Errata

Title & Document Type:  3588A Performance Test Guide

Manual Part Number:  03588-90018

Revision Date:  March 1996

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HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. We have made no changes to this manual copy. The HP XXXX referred to in this document is now the Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A.

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About this Manual

We’ve added this manual to the Agilent website in an effort to help you support your product. This manual provides the best information we could find. It may be incomplete or contain dated information, and the scan quality may not be ideal. If we find a better copy in the future, we will add it to the Agilent website.

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Support for Your Product

Agilent no longer sells or supports this product. You will find any other available product information on the Agilent Test & Measurement website:

   www.tm.agilent.com

Search for the model number of this product, and the resulting product page will guide you to any available information. Our service centers may be able to perform calibration if no repair parts are needed, but no other support from Agilent is available.
SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements. This is a Safety Class I instrument.

GROUND THE INSTRUMENT

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument is equipped with a three-conductor ac power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure the safety features are maintained.

DANGEROUS PROCEDURE WARNINGS

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

| Warning | Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting. |
SAFETY SYMBOLS

General Definitions of Safety Symbols Used On Equipment or In Manuals.

Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.

Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked).

Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.

Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. A terminal marked with this symbol must be connected to ground in the manner described in the installation (operating) manual, and before operating the equipment.

Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.

Alternating current (power line).

Direct current (power line).

Alternating or direct current (power line).

| Warning | The WARNING sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which if not correctly performed or adhered to, could result in injury or death to personnel. |
| Caution | The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. |
| Note | The NOTE sign denotes important information. It calls attention to procedure, practice, condition or the like, which is essential to highlight. |
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Chapter 1

General Information
General Information

Introduction

This guide contains the operation verification and performance tests, along with general information, specifications, and installation information. It is, therefore, part of the documentation supplied with every HP 3588A Spectrum Analyzer with an additional copy supplied with the Service Package, option 915.

Safety Considerations

The HP 3588A Spectrum Analyzer is a Safety Class I instrument (provided with a protective earth terminal). Although this instrument has been designed in accordance with international safety standards, this manual contains information, cautions and warnings that must be followed to ensure safe operation and retain the HP 3588A Spectrum Analyzer in safe operating condition. Service must be performed by trained service personnel who are aware of the hazards involved (such as fire and electrical shock).

Instrument Description

The HP 3588A Spectrum Analyzer is a high performance, 10 Hz to 150 MHz, synthesized spectrum analyzer offering swept spectrum and narrow band zoom measurements. Swept spectrum mode uses digital IF filters that allow increased measurement speed (up to four times faster than conventional swept-tuned analyzers for comparable measurements) with no additional amplitude error or resolution loss. Narrow band zoom uses an implementation of the Fast Fourier Transform to provide even faster measurements (up to 350 times faster than conventional swept-tuned analyzers for comparable measurements) with even greater resolving power. Narrow band zoom mode can be used for spans of 40 kHz and less. The HP 3588A Spectrum Analyzer has a built-in source with programmable amplitude that allows scalar network measurements. Measurements can be saved using the internal non-volatile memory or the optional internal 3.5-inch flexible disk drive. Plots and prints of the measurements can be made directly to HP-IB printers and plotters. The HP 3588A Spectrum Analyzer also supports the HP Instrument BASIC programming language (IBASIC).
Serial Numbers

Hewlett-Packard makes frequent improvements to its products to enhance their performance, usability, or reliability, and to control costs. HP service personnel have access to complete records for each instrument model, based on the equipment's serial number. Whenever you contact HP about our analyzer, have the complete serial number available to ensure obtaining the most complete and accurate information possible.

A serial number label is attached to the rear of the analyzer. The serial number has two parts - the prefix (the first four numbers and a letter) and the suffix (the last five numbers).

Options

The following options are available for the HP 3588A Spectrum Analyzer:

- 001 Precision Frequency Reference
- 003 Additional 2 Mbyte RAM
- 004 Delete Disk Drive
- 006 Semiautomated Performance Test Kit
- 1C2 HP Instrument BASIC
- 908 Rack Mount Kit
- 915 Service Package
- 916 Extra Operation Manual
- 920 Extra HP-IB Manual
- W30 Adds an additional 2 years to standard warranty
  (for a total of 3-years warranty)
Accessories

The following accessories are available for the HP 3588A Spectrum Analyzer.

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active probe</td>
<td>HP 41800A</td>
</tr>
<tr>
<td>Rack Mount kit</td>
<td>HP 35660-88010</td>
</tr>
<tr>
<td>Box of ten 3 5-inch double-sided, double-density disks</td>
<td>HP 92192A</td>
</tr>
<tr>
<td>Coax BNC inline-coax BNC inline connector for option 001</td>
<td>HP 1250-1499</td>
</tr>
<tr>
<td>25Ω BNC feedthrough series resistor</td>
<td>HP 1250-2275</td>
</tr>
<tr>
<td>Nylon mounting clip for BNC feedthrough series resistor</td>
<td>HP 1400-1356</td>
</tr>
<tr>
<td>Operating Manual</td>
<td>HP 03588-90000</td>
</tr>
<tr>
<td>Includes Getting Started Guide</td>
<td>HP 03588-90005</td>
</tr>
<tr>
<td>HP-IB Programming Reference</td>
<td>HP 03588-90025</td>
</tr>
<tr>
<td>Using HP Instrument BASIC with the HP 3588A</td>
<td>HP 03588-90040</td>
</tr>
<tr>
<td>Service Package</td>
<td></td>
</tr>
<tr>
<td>Includes Service kit</td>
<td>HP 03588-84401</td>
</tr>
<tr>
<td>Service Manual</td>
<td>HP 03588-90017</td>
</tr>
<tr>
<td>Performance Test Guide</td>
<td>HP 03588-90051</td>
</tr>
<tr>
<td>Semi-automated Performance Test Kit †</td>
<td>HP 03588-84402</td>
</tr>
<tr>
<td>Includes Semi-automated Performance Test Guide</td>
<td>HP 03588-90006</td>
</tr>
<tr>
<td>Semi-automated Performance Test Disk</td>
<td>HP 03588-19405</td>
</tr>
</tbody>
</table>

† HP 3588A Spectrum Analyzer: without disk drive (option 004), require HP BASIC or a series 200 or 300 computer.

Recommended Test Equipment

Table 1-2 lists the recommended equipment needed to test the performance of the HP 3588A Spectrum Analyzer. Table 1-3 lists additional equipment needed to adjust and troubleshoot the analyzer. Other equipment may be substituted for the recommended model if it meets or exceeds the listed critical specifications. When substitutions are made, you may have to modify the procedures to accommodate the different operating characteristics.
<table>
<thead>
<tr>
<th>Instrument</th>
<th>Critical Specifications</th>
<th>Recommended Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Multimeter</td>
<td>Frequency Range: 10 Hz to 300 kHz&lt;br&gt;AC Range: 2 mV to 20V&lt;br&gt;Amplitude Accuracy ± 0.1%&lt;br&gt;dBm Math Mode</td>
<td>HP 3456A</td>
</tr>
<tr>
<td>Frequency Standard</td>
<td>Frequency Accuracy ± 0.0025 ppm</td>
<td>HP 5061B</td>
</tr>
<tr>
<td>Milliwatt Power Meter</td>
<td>Power Range: ± 0.2 dBm&lt;br&gt;10 Hz to 100 Hz: ± 0.4 dB&lt;br&gt;100 Hz to 300 Hz: ± 0.27 dB&lt;br&gt;300 kHz: ± 0.035 dB&lt;br&gt;30 kHz to 150 MHz: ± 0.13 dB&lt;br&gt;Input Impedance: 50Ω&lt;br&gt;0 dBm Control Voltage Output</td>
<td>W &amp; G EPM-1 †&lt;br&gt;Wandel &amp; Galertman, Inc&lt;br&gt;1800 Wyatt Drive, Suite 2&lt;br&gt;Santa Clara, CA 95054&lt;br&gt;(408) 969-7622</td>
</tr>
<tr>
<td>Power Meter</td>
<td>Frequency Range: 100 kHz to 150 MHz&lt;br&gt;Input Range: 100 kHz to 150 MHz&lt;br&gt;Amplitude Accuracy (with power sensor) ± 0.27 dB</td>
<td>HP 438A&lt;br&gt;Alternate: HP 436A</td>
</tr>
<tr>
<td>Power Sensor</td>
<td>SWR ≤ 1.30&lt;br&gt;Impedance: 50W</td>
<td>HP 8482A</td>
</tr>
<tr>
<td>Power Splitter</td>
<td>SWR ≤ 1.10&lt;br&gt;Input Impedance: 50Ω&lt;br&gt;Two Outputs</td>
<td>HP 11667A</td>
</tr>
<tr>
<td>Spectrum Analyzer</td>
<td>Frequency Range: 100 Hz to 150 MHz&lt;br&gt;Amplitude Range: 100 to 20 dBm&lt;br&gt;Dynamic Range: ≤ -52 dBc&lt;br&gt;Phase Noise: ≤ -66 dBm at 500 Hz offset&lt;br&gt;Marker Noise Function</td>
<td>HP 8566B-10</td>
</tr>
<tr>
<td>Synthesized Signal Generator</td>
<td>Dynamic Range: ≤ -92 dBc&lt;br&gt;Frequency Range: 1 MHz to 150 MHz&lt;br&gt;Impedance: 50Ω&lt;br&gt;Resolution: 0.1 Hz&lt;br&gt;External Reference Input</td>
<td>HP 8663A&lt;br&gt;Alternate: HP 8662A</td>
</tr>
<tr>
<td>Step Attenuator</td>
<td>0 to 20 dB: ±0.02 dB&lt;br&gt;with calibration data at 100 kHz and 300 kHz</td>
<td>HP 3550</td>
</tr>
<tr>
<td>Synthesizer/Level Generator</td>
<td>Frequency Range: 10 MHz to 25 MHz&lt;br&gt;Harmonic Distortion: ≤ -32 dBc</td>
<td>HP 3335A</td>
</tr>
<tr>
<td>Synthesizer</td>
<td>Frequency Range: 10 Hz to 10 MHz&lt;br&gt;Impedance: 50Ω</td>
<td>HP 3326A&lt;br&gt;Alternate: HP 3325A&lt;br&gt;HP 3325B</td>
</tr>
<tr>
<td>21 MHz Low Pass Filter</td>
<td>Filter Rejection: ≤ -80 dB&lt;br&gt;Impedance: 50Ω</td>
<td>TTE # JH7-21M-50-6138&lt;br&gt;TTE, Inc&lt;br&gt;2214 S. Benny Avenue&lt;br&gt;Los Angeles, CA 90064</td>
</tr>
<tr>
<td>50 MHz Low Pass Filter</td>
<td>Filter Rejection: ≤ -80 dB&lt;br&gt;Impedance: 50Ω</td>
<td>TTE # JH7-50M-50-6138</td>
</tr>
</tbody>
</table>

† This equipment is only used in test 11a. An alternate test is included in this manual, which does not require this equipment.
<table>
<thead>
<tr>
<th>Instrument</th>
<th>Critical Specifications</th>
<th>Recommended Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 dB Amplifier</td>
<td>Frequency Range: 10 Hz to 150 MHz</td>
<td>Q-B-210</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q-Bert Corp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P.O. Box 2208</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Melbourne, Florida 32901</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(407) 727-1890</td>
</tr>
<tr>
<td>50Ω Directional Bridge</td>
<td>Directivity &gt; 40 dB</td>
<td>HP 35677-83902</td>
</tr>
<tr>
<td></td>
<td>Impedance 50Ω</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequency Range: 50 to 150 MHz</td>
<td></td>
</tr>
<tr>
<td>Power Supply</td>
<td>Volts +20 Vdc</td>
<td>HP 6236B</td>
</tr>
<tr>
<td></td>
<td>Amps 0.5</td>
<td></td>
</tr>
<tr>
<td>Attenuator</td>
<td>(1) 10 dB 30 to 30 MHz</td>
<td>HP 8491A opt 010</td>
</tr>
<tr>
<td>50Ω Feedthrough Termination</td>
<td>±0.2%</td>
<td>HP 11048C</td>
</tr>
<tr>
<td>100 kΩ Feedthrough Termination</td>
<td>±0.2%</td>
<td>see figure 1-1</td>
</tr>
<tr>
<td>Adapters</td>
<td>141 Nml-to-BNC(t)</td>
<td>HP 1250-0780</td>
</tr>
<tr>
<td></td>
<td>141 CMa(t)-to-BNC(h)</td>
<td>HP 1250-1200</td>
</tr>
<tr>
<td></td>
<td>BNC(t)-to-Dual Banana Plug</td>
<td>HP 1251-2277</td>
</tr>
<tr>
<td></td>
<td>121 NID-to-BNC(h)</td>
<td>HP 1250-0077</td>
</tr>
<tr>
<td></td>
<td>Nml-to-BNC(h)</td>
<td>HP 1250-1536 t</td>
</tr>
<tr>
<td></td>
<td>Nml-to-BNC(h)</td>
<td>HP 1250-0082</td>
</tr>
<tr>
<td></td>
<td>121 SMA(m) to BNC (m)</td>
<td>HP 1250-1787</td>
</tr>
<tr>
<td></td>
<td>BNC Tee</td>
<td>HP 1250-0781</td>
</tr>
<tr>
<td></td>
<td>BNC(h) to dual banana plug (m)</td>
<td>HP 1251-2277</td>
</tr>
<tr>
<td></td>
<td>(2) BNC(h) to alligator clip</td>
<td>Pomona model 2630</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ITT Pomona Electronics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1500 East Ninth street</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pomona, CA 91769</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(714) 623-3463</td>
</tr>
<tr>
<td>Cables</td>
<td>7 BNC-to-BNC 122 cm</td>
<td>HP 8120-1840</td>
</tr>
<tr>
<td></td>
<td>Error Correction Cable</td>
<td>HP 03588-61630 t</td>
</tr>
</tbody>
</table>

1 This equipment is only used in test 11a. An alternate test is included in this manual, which does not require this equipment.

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**Figure 1-1. 100 kΩ Feedthrough Termination**
<table>
<thead>
<tr>
<th>Instrument</th>
<th>Critical Specifications</th>
<th>Recommended Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Counter</td>
<td>Frequency Range: 10 to 500 MHz</td>
<td>HP 5334B Opt 030</td>
</tr>
<tr>
<td></td>
<td>Resolution: &lt; 1 Hz at 10 MHz</td>
<td>Alternate</td>
</tr>
<tr>
<td></td>
<td>Frequency Accuracy: ±25 x 10⁻¹⁴ Hz</td>
<td>HP 5343A</td>
</tr>
<tr>
<td></td>
<td>Sensitivity: -20 dBm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Impedance: 1 MΩ</td>
<td></td>
</tr>
<tr>
<td>Logic Probe</td>
<td>TTL/CMOS</td>
<td>HP 545A</td>
</tr>
<tr>
<td></td>
<td>Maximum Clock: &gt; 25 MHz</td>
<td>Alternate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HP 5006A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HP 5006A/B</td>
</tr>
<tr>
<td>Oscilloscope</td>
<td>Bandwidth: ≥150 MHz</td>
<td>HP 541110</td>
</tr>
<tr>
<td></td>
<td>Vertical Sensitivity: 10 mV/Div</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input Coupling: AC, DC, 500V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waveform Math: A-B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trigger Ext, Int, Chop</td>
<td></td>
</tr>
<tr>
<td>Oscilloscope Probe</td>
<td>Impedance: ≥1 MΩ</td>
<td>HP 10431A</td>
</tr>
<tr>
<td></td>
<td>Division Ratio: 10:1</td>
<td></td>
</tr>
<tr>
<td>Resistive Divider Probe Kit</td>
<td>Impedance: 500Ω</td>
<td>HP 10029A</td>
</tr>
<tr>
<td></td>
<td>Division Accuracy: ±3%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input Capacitance: &lt; 0.7 pF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Division Ratio: 1:1, 5:1, 10:1, 20:1, 50:1, 100:1</td>
<td></td>
</tr>
<tr>
<td>Ball Driver Hex Tool</td>
<td>Size: 3/32</td>
<td>Bondhus</td>
</tr>
<tr>
<td>Spectrum Analyzer</td>
<td>Impedance: 1 MΩ</td>
<td>HP 35658</td>
</tr>
<tr>
<td></td>
<td>Frequency Range: 20 Hz to 200 kHz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amplitude Accuracy: ±1 dB</td>
<td></td>
</tr>
<tr>
<td>HP 3508A Service Kit</td>
<td>Includes:</td>
<td>HP 03586-84401</td>
</tr>
<tr>
<td></td>
<td>Power Supply Test Board</td>
<td>HP 35672-65590</td>
</tr>
<tr>
<td></td>
<td>SMB Extender Cable (7)</td>
<td>HP 03585-61810</td>
</tr>
<tr>
<td></td>
<td>Extender Board, 12 pin</td>
<td>HP 03588-66505</td>
</tr>
<tr>
<td></td>
<td>Extender Board, 48 pin</td>
<td>HP 03589-65566</td>
</tr>
<tr>
<td></td>
<td>Fast Bus Extender Cable</td>
<td>HP 35660-61821</td>
</tr>
<tr>
<td></td>
<td>BNC-to-SMB Cable (2)</td>
<td>HP 03595-61816</td>
</tr>
<tr>
<td></td>
<td>Capacitive Load</td>
<td>HP 35660-84401</td>
</tr>
<tr>
<td></td>
<td>SMB-to-SMB Adapter (2)</td>
<td>HP 1259-8669</td>
</tr>
<tr>
<td></td>
<td>Flat Edge Adjustmen Tool</td>
<td>HP 0710-1923</td>
</tr>
<tr>
<td></td>
<td>Small Adjustment Tool</td>
<td>HP 0710-1514</td>
</tr>
</tbody>
</table>

† Not required for performance tests—only required for adjustment and troubleshooting procedures.
Specifications

Note: All receiver specifications are with the source turned off and low-distortion mode off, unless otherwise noted. Specifications apply from 10 Hz to 150 MHz unless otherwise noted.

Amplitude Measurement Range

Maximum Safe Input Power

\[
\begin{align*}
50\Omega & \quad 75\Omega & \quad 1\ \Omega \\
\text{Average Continuous Power} & \quad +26\ dBm & \quad +28\ dBm & \quad - \\
(10\ Hz\ to\ 150\ MHz) \quad & \quad & \quad & \\
\text{DC Voltage} & \quad \pm4\ \text{volts} & \quad \pm4\ \text{volts} & \quad - \\
\text{Combined AC/DC} & \quad \pm4\ \text{Vpk} & \quad \pm4\ \text{Vpk} & \quad \pm25\ \text{Vpk}
\end{align*}
\]

Input Range Settings

(characteristic only)

\[
\begin{align*}
50\Omega & \quad +20\ \text{dBm} \ to\ -20\ \text{dBm} \\
& \quad \text{(on 10 dB steps)} \\
75\Omega & \quad +22\ \text{dBm} \ to\ -18\ \text{dBm} \ \text{with included adapter} \\
& \quad \text{and automatic corrections} \\
1\ \Omega & \quad 0\ \text{dBm} \ (\text{for reference impedance} = 50\Omega)
\end{align*}
\]

Amplitude Display Range

Reference Level Range (characteristic only)

\[
\begin{align*}
-600 \ to\ +600\ \text{dBm} \\
-600 \ to\ +600\ \text{dB}
\end{align*}
\]

Dynamic Range

A/D Overload Level

A/D overload occurs for signals > 2 dB relative to the selected range.

Noise Level

Noise is specified in dBm/Hz using the marker noise key. Specification for swept spectrum mode with low-distortion mode off and 50Ω input impedance. Add 10 dB to specification if low-distortion mode is on. For 75Ω input, add 2 dB to the specification.

Harmonic Distortion?

Low-distortion mode, 50 and 75Ω inputs; harmonic distortion products are < -80 dBc I < -90 dBc typical for spectrally pure input signals with total input power level = range. Degradation specification by 10 dB when low-distortion mode is off.

\[
\begin{align*}
1\ \Omega & \quad < -65\ \text{dBc} \ I < -75\ \text{dBc} \text{ typical}
\end{align*}
\]

Intermodulation Distortion?

Low-distortion mode, 50 and 75Ω inputs; intermodulation distortion products are < -80 dBc I < -90 dBc typical with respect to 2 tones 6 dB below range. Degradation specification by 10 dB when low-distortion mode is off.

\[
\begin{align*}
1\ \Omega & \quad < -65\ \text{dBc} I < -75\ \text{dBc} \text{ typical}
\end{align*}
\]

Residual Responses

Residual responses are ≤ -110 dBm on the -20 dBm range. Degradation specification by 10 dB when low-distortion mode is on. Degradation 10 dB for 40 kHz spans in narrowband zoom mode.

Image, Multiple and Out of Band Responses

< -70 dBc I < -80 dBc typical where applied carrier level = range.
Local Oscillator Feedthrough
Local oscillator feedthrough (apparent signal at dc) is > 20 dB below range. Degradation specification by 10 dB when lower-distortion mode is on.

Spectral Purity
Phase noise is \(-105 \text{ dBc} \) when measured at a 1 kHz offset and normalized to a 1 Hz noise power bandwidth.

Scale Fidelity (Linearity)

<table>
<thead>
<tr>
<th>Level ( f )</th>
<th>Incremental ( f )</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to -30 dB</td>
<td>(&lt; 0.05 \text{ dB} )</td>
<td>0.02 dB</td>
</tr>
<tr>
<td>-30 to -40 dB</td>
<td>(&lt; 0.1 \text{ dB} )</td>
<td>0.03 dB</td>
</tr>
<tr>
<td>-40 to -50 dB</td>
<td>(&lt; 0.3 \text{ dB} )</td>
<td>0.05 dB</td>
</tr>
<tr>
<td>-50 to -60 dB</td>
<td>(&lt; 0.5 \text{ dB} )</td>
<td>0.10 dB</td>
</tr>
<tr>
<td>-60 to -70 dB</td>
<td>(&lt; 0.7 \text{ dB} )</td>
<td>0.10 dB</td>
</tr>
<tr>
<td>-70 to -80 dB</td>
<td>(- )</td>
<td>0.25 dB</td>
</tr>
<tr>
<td>-80 to -90 dB</td>
<td>(- )</td>
<td>0.25 dB</td>
</tr>
<tr>
<td>-90 to -100 dB</td>
<td>(- )</td>
<td>0.40 dB</td>
</tr>
<tr>
<td>-100 to -110 dB</td>
<td>(- )</td>
<td>0.70 dB</td>
</tr>
<tr>
<td>-110 to -120 dB</td>
<td>(- )</td>
<td>4.0 dB</td>
</tr>
</tbody>
</table>

Specified for frequencies \( \geq 100 \text{ kHz} \)

Note: The HP 3588A noise bandwidth is < 1 Hz for narrowband zoom mode spans < 150 Hz, causing measurement phase noise in dBc to be REDUCED by \( 10 \times \log \{1 \text{ noise bandwidth}\} \) relative to the above graph. Thus, good dynamic range is maintained even for extremely small offset frequencies in very narrow spans.

Amplitude Accuracy
Amplitude accuracy is the sum of full scale absolute accuracy and scale fidelity linearity. Recalibration due to change in instrument state is not required for the accuracy shown.

Full Scale Absolute Accuracy (applies over the entire 0 to 55°C temperature range) (true table below)

For swept mode, these accuracies apply for sweep times \( \geq 4 \) times the default auto-coupled sweep time. Add \( \pm 0.1 \text{ dB} \) for default auto-coupled sweep times.

Add the following frequency response errors for narrowband zoom mode:

| High-accuracy zoom ( Bartlett window) | \( \pm 0.005 \text{ dB} \) |
| High-resolution zoom (Hanning window) | \( +0, -1.5 \text{ dB} \) |

Initial Accuracy

<table>
<thead>
<tr>
<th>Without Opt. 001</th>
<th>With Opt. 001</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 30 Hz</td>
<td>( \pm 0.5 \text{ ppm} )</td>
</tr>
<tr>
<td>10 to 55 Hz</td>
<td>( \pm 1.0 \text{ ppm} )</td>
</tr>
<tr>
<td>( \pm 1 \text{ dB typ} )</td>
<td>( \pm 0.2 \text{ dB typ} )</td>
</tr>
<tr>
<td>( \pm 0.1 \text{ ppm} )</td>
<td>( \pm 0.07 \text{ ppm} )</td>
</tr>
</tbody>
</table>

Aging

| \( \pm 0.25 \text{ ppm/month} \) | \( \pm 0.125 \text{ ppm/month} \) |

Frequency Counter Resolution

| 0.1 Hz |

Full Scale Absolute Accuracy

<table>
<thead>
<tr>
<th>10 Hz</th>
<th>100 Hz</th>
<th>300 kHz</th>
<th>300 kHz</th>
<th>40 MHz</th>
<th>150 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>50( \Omega ) Input</td>
<td>( \pm 0.5 \text{ dB} )</td>
<td>( \pm 1.0 \text{ dB} )</td>
<td>( \pm 0.5 \text{ dB} )</td>
<td>( \pm 0.4 \text{ dB} )</td>
<td>( \pm 0.5 \text{ dB} )</td>
</tr>
<tr>
<td>(( \pm 1 \text{ dB typ} )</td>
<td>(( \pm 0.5 \text{ dB typ} )</td>
<td>(( \pm 0.2 \text{ dB typ} )</td>
<td>(( \pm 0.2 \text{ dB typ} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75( \Omega ) Input</td>
<td>( \pm 2.5 \text{ dB} )</td>
<td>( \pm 1.0 \text{ dB} )</td>
<td>( \pm 0.8 \text{ dB} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 ( M\Omega ) Input</td>
<td>( \pm 2.5 \text{ dB} )</td>
<td>( \pm 1.0 \text{ dB} )</td>
<td>( \pm 0.8 \text{ dB} )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The calibrated reference level accuracy at 100 kHz where reference level = range \( \pm 0.3 \text{ dB} \) (0.1 dB typical)

Input Port Return Loss

> 20 dB for 50 and 75\( \Omega \) input and all operating ranges.

Frequency

Range
Specifications apply over the range of 10 Hz to 150 MHz (10 Hz to 40 MHz for 1 \( M\Omega \) input).

Frequency Accuracy
Frequency accuracy is measured using the frequency counter marker function, and is the sum of initial accuracy + aging + frequency counter resolution. Aging is referenced to the most recent reference calibration at 23°C.

<table>
<thead>
<tr>
<th>Without Opt. 001</th>
<th>With Opt. 001</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 30 Hz</td>
<td>( \pm 0.5 \text{ ppm} )</td>
</tr>
<tr>
<td>10 to 55 Hz</td>
<td>( \pm 1.0 \text{ ppm} )</td>
</tr>
<tr>
<td>( \pm 1 \text{ dB typ} )</td>
<td>( \pm 0.2 \text{ dB typ} )</td>
</tr>
<tr>
<td>( \pm 0.1 \text{ ppm} )</td>
<td>( \pm 0.07 \text{ ppm} )</td>
</tr>
</tbody>
</table>

Aging

| \( \pm 0.25 \text{ ppm/month} \) | \( \pm 0.125 \text{ ppm/month} \) |

Frequency Counter Resolution

| 0.1 Hz |

1-8
Frequency Span Range
(characteristic only)
Sweep span:
Range: 10 Hz to 150 MHz, and zero span
Resolution: 0.1 Hz
Accuracy: Greater of 0.1 Hz or 1.25% of span
Start/stop frequency: 0 Hz to 150 MHz
Narrowband zoom mode span:
Range: 12.3 Hz to 40 kHz in 2 steps
Accuracy: ±0.001% of span

Resolution Bandwidth
Resolution Bandwidth Sizes
Sweep spectrum mode filter bandwidth: 1.1 Hz to 17 kHz ±10%
Narrowband zoom mode filter bandwidth:
High-accuracy zoom: 0.90% of span (11 MHz to 360 Hz)
High-resolution zoom: 0.37% of span (4.5 MHz to 148 Hz)
Bandwidth Selectivity (shape factor)
Ratio of -60 dB to -3 dB bandwidth:
Sweep spectrum mode (see figure below):
Manual sweep: < 4.0:1
Auto-coupled sweep: 4.3:1 (typical)
Auto-coupled oversweep: 5.1:1 (typical)
Narrowband zoom mode:
High-accuracy zoom: 2.6:1
High-resolution zoom: 9.1:1

Sweep Rate
(characteristic only, with coupling on)
Over sweep mode on: 2 x RBW Hz/second (max)
Over sweep mode off: RBW Hz/second (max)

Narrowband Zoom Mode Measurement Speed
(characteristic only)
> 7 measurements per second for span ≥ 10 kHz

Narrowband Zoom Mode Time Record Length
(characteristic only)
400:span seconds

HP 1B Binary Trace Transfer Rate
(characteristic only) < 120 ms/trace

Trigger
(characteristic only)

Trigger Input
Triggers on negative TTL transition or contact closure to ground

Trigger Output
Trigger is a negative TTL transition. Fanout is 3 TTL LS loads

Source
Amplitude Range: -59.9 dBm to +10 dBm, and OFF
Amplitude Resolution: 0.1 dB
Absolute Amplitude Accuracy: ±1 dB
(at 300 kHz and +10 dBm output level)
Dynamic Accuracy
Add 0.02 dB/dB below 10 dBm output level to the absolute accuracy specification
Frequency Response
Output level variation: < ±1 dB over the specified frequency range relative to the level at 300 kHz
Frequency Range: 10 Hz to 150 MHz

Spurious Products
Harmonic Products: < -30 dBc
Non-Harmonic Products: < -40 dBc
General Information
Specifications

Noise

<= -90 dB relative to the carrier in a 1 Hz bandwidth for offsets > 500 Hz from the carrier.

Output Port Return Loss

> 20 dB

General

Environmental

Temperature

Standard instrument

Operating 5°C to 50°C
Storage (no disk in drive) -20°C to 60°C

Delete disk option

Operating 0°C to 55°C
Storage -40°C to 70°C

Humidity (non-condensing)

Standard instrument

Operating 8% to 80% at 30°C
Storage (no disk in drive) 5% to 95%

Delete disk option

Operating 5% to 95% at 40°C
Storage 5% to 95% at 40°C

Altitude

Standard instrument

Operating 2,150 m (7,000 ft)
Storage (no disk in drive) 4,570 m (15,000 ft)

Delete disk option

Operating 4,570 m (15,000 ft)
Storage 4,570 m (15,000 ft)

1.5m above 2,150 meters (7,000 feet), derate operating temperature by
-3.6°C/1,000 m (-1°F/1,000 ft)

Calibration Interval

1 year

Warmup Time

30 minutes

Power Requirements

115 VAC operation

90 - 132 Vrms, 47 - 440 Hz

230 VAC operation

198 - 264 Vrms, 47 - 66 Hz

Maximum Power Dissipation

450 VA

Weight

Net 28 kg (61 lbs)
Shipping 38 kg (81 lbs)

Dimensions

Height 222 mm (8.75 in)
Width 425.5 mm (16.75 in)
Depth 630 mm (24.8 in)

HP-IB

Implementation of IEEE Std 488.1 & 488.2
SH1, SH2, T6, TEO, L4, LED, SR1, RLI, PPD, DC1, DT1, C1, C2, C3, C12, E2

Peripherals Supported

HP-IB graphics printers (tractor dumps only)
HP IB plotters using HP GL

Standard Internal Memory

1 Mbyte RAM (fully partitionable)

Memory Option 003

Additional available 2 Mbyte RAM
Chapter 2

Installation
Installation

Introduction

This chapter contains power requirements and operating environment information needed to install the HP 3588A Spectrum Analyzer. Also included in this chapter are instructions for cleaning the screen and information on storage and shipment.

Incoming Inspection

The HP 3588A Spectrum Analyzer was carefully inspected both mechanically and electrically before shipment. It should be free of marks or scratches and, it should meet its published specifications upon receipt. Shipped with the analyzer is the power cord and the plastic transportation disk, part number HP 5061-2819 (unless disk drive is deleted, option 004).

Inspect the analyzer for physical damage incurred in transit. If the analyzer was damaged in transit, save all packing materials, file a claim with the carrier, and call your Hewlett-Packard sales and service office.

Warning

If the analyzer is mechanically damaged, the integrity of the protective earth ground may be interrupted. Do not connect the analyzer to power if it is damaged.

Incoming Tests

Finish incoming inspection by testing the electrical performance of the analyzer using the operation verification or performance tests in chapter 3, or using the semiautomated operation verification or performance tests in the Semiautomated Performance Test Kit, option 006. The operation verification tests verify the basic operating integrity of the analyzer; the tests in this guide take about 2 hours to complete and the semiautomated tests take about 1 hour to complete. The performance tests verify that the analyzer meets all the performance specifications; the tests in this guide take about 7 hours to complete and the semiautomated tests take about 3 hours to complete.
Power Requirements

The analyzer can operate from a single-phase ac power source supplying voltages as shown in table 2-1. With all options installed, power consumption is less than 450 VA.

The line-voltage selector switch is set at the factory to match the most commonly used line voltage of the country of destination; the appropriate fuse is also installed. To check or change either the line-voltage selector switch or the fuse, see figure 2-1, table 2-1, and the following procedures.

Warning

Only a qualified service person, aware of the hazards involved, should measure the line voltage.

Caution

Before applying ac line power to the analyzer, ensure the line-voltage selector switch (on the rear panel) is set for the proper line voltage and the correct line fuse is installed in the fuse holder.

Figure 2-1. Voltage Selection and Fuse Replacement
Caution Refer to product's rear panel for fuse rating and type.

Table 2-1. Line Voltage and Fuse Selection

<table>
<thead>
<tr>
<th>AC Line Voltage</th>
<th>Frequency</th>
<th>Selector Switch</th>
<th>HP Part Number</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-132 Vrms</td>
<td>47.440</td>
<td>120</td>
<td>2110-0342</td>
<td>8A 250V Normal Blo</td>
</tr>
<tr>
<td>198-264 Vrms</td>
<td>47.66</td>
<td>240</td>
<td>2110-0055</td>
<td>4A 250V Fast Acting</td>
</tr>
<tr>
<td>90-132 Vrms</td>
<td>47.440</td>
<td>115</td>
<td>2110-0056</td>
<td>6A 250V Fast Acting</td>
</tr>
<tr>
<td>198-264 Vrms</td>
<td>47.66</td>
<td>230</td>
<td>2110-0003</td>
<td>3A 250V Fast Acting</td>
</tr>
</tbody>
</table>

To change the line voltage selector switch:

1. Unplug the power cord from the analyzer.
2. Slide the line voltage selector switch (see figure 2-1) to the proper voltage (see table 2-1).

To change the fuse:

1. Unplug the power cord from the analyzer.
2. Using a small screw driver, turn the fuse holder cap counter-clockwise and remove when the fuse cap is free from the housing (see figure 2-1).
3. Pull the fuse from the fuse holder cap.
4. To reinstall, select the proper fuse (see table 2-1) and place in the fuse holder cap. Place the fuse holder cap in the housing and turn clockwise while pressing in.

Power Cable and Grounding Requirements

On the HP-IB connector, pin 12 and pins 18 through 24 are tied to protective earth ground and the HP-IB cable shield. The instrument frame, chassis, covers, all exposed metal surfaces including the BNC connectors' outer shell are connected to protective earth ground.

Warning DO NOT interrupt the protective earth ground or "float" the HP 3588A Spectrum Analyzer. This action could expose the operator to potentially hazardous voltages.

The analyzer is equipped with a three-conductor power cord that grounds the analyzer when plugged into an appropriate receptacle. The type of power cable plug shipped with each analyzer depends on the country of destination. See figure 2-2 for the available power cables and plug configurations.
**Installation**

**Power Requirements**

<table>
<thead>
<tr>
<th>Country</th>
<th>Plug Type</th>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>B5 1363A</td>
<td>230V</td>
<td>6A</td>
</tr>
<tr>
<td></td>
<td>CABLE* HP 5041-5807</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia/New Zealand</td>
<td>NZC5 1880AC C112</td>
<td>230V</td>
<td>6A</td>
</tr>
<tr>
<td></td>
<td>CABLE* HP 5041-5808</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continental Europe</td>
<td>CEE7-11</td>
<td>230V</td>
<td>6A</td>
</tr>
<tr>
<td></td>
<td>CABLE* HP 5041-5809</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td>NEMA 6-15P</td>
<td>250V</td>
<td>6A**</td>
</tr>
<tr>
<td></td>
<td>CABLE* HP 5041-5816</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>MITI 41-6692</td>
<td>125V</td>
<td>12A</td>
</tr>
<tr>
<td></td>
<td>CABLE* HP 5041-5840</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>SEV 1011 1959-24507</td>
<td>230V</td>
<td>6A</td>
</tr>
<tr>
<td></td>
<td>TYPE 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CABLE* HP 5041-5812</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>DHCR 107</td>
<td>230V</td>
<td>6A</td>
</tr>
<tr>
<td></td>
<td>CABLE* HP 5041-5814</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The number shown for the plug is the industry identifier for the plug only, the number shown for the cable is an HP part number for a complete cable including the plug.

**Warning**

The power cable plug must be inserted into an outlet provided with a protective earth terminal. Defeating the protection of the grounded analyzer cabinet can subject the operator to lethal voltages.
Operating Environment

The operating and storage environment specifications for the analyzer, with and without the disk drive, are listed in chapter 1, "General Information."

---

**Warning**

To prevent potential fire or shock hazard, do not expose the analyzer to rain or other excessive moisture.

---

Protect the analyzer from moisture and temperatures or temperature changes that cause condensation within the analyzer.

---

**Caution**

The disk drive is designed for operation in a typical office environment. Use of the equipment in an environment containing dirt, dust, or corrosive substances will drastically reduce the life of the disk drive and the flexible disks. The disks should be stored in a dry, static-free environment.

---

**Analyzer Cooling**

Cooling air enters the analyzer through both sides and exhausts through the rear panel. Install the analyzer to allow free circulation of cooling air.
HP-IB System Interface Connections

The analyzer is compatible with the Hewlett-Packard Interface Bus (HP-IB). The HP-IB is Hewlett-Packard’s implementation of IEEE Standard 488.2. The analyzer is connected to the HP-IB by connecting an HP-IB interface cable to the connector located on the rear panel. Total allowable transmission path length is 2 meters times the number of devices or 20 meters, whichever is less. Operating distances can be extended using an HP-IB Extender.

For additional HP-IB programming information see the HP 3588A HP-IB Programming Reference.

Caution

The analyzer contains metric threaded HP-IB cable mounting studs as opposed to English threads. Use only metric threaded HP-IB cable lockscrews to secure the cable to the analyzer. Metric threaded fasteners are black, while English threaded fasteners are silver.

Screen (CRT) Cleaning

The analyzer screen is covered with a plastic diffuser screen (this is not removable by the operator). Under normal operating conditions, the only cleaning required will be an occasional dusting. However, if a foreign material adheres itself to the screen, set the power switch to STANDBY (0), remove the power cord, dampen a soft, lint-free cloth, with a mild detergent mixed in water, and carefully wipe the screen.

Warning

Do not apply any water mixture directly to the screen or allow moisture to go behind the front panel. Moisture behind the front panel will severely damage the instrument. To prevent damage to the screen, do not use cleaning solutions other than the above.
Installation

The analyzer is shipped with plastic feet in place, ready for use as a portable bench analyzer. The plastic feet are shaped to make full-width modular instruments self-align when they are stacked.

To install the analyzer in an equipment cabinet, follow the instructions shipped with the Rack Mount Kit, option 908.

Turning on the HP 3588A

First, apply proper line power to the analyzer, then press the rocker-switch in the lower left-hand corner of the analyzer to ON (I). The analyzer requires about 35 seconds to test memory and self-calibrate.

For measurement specific information or other operating information, see the HP 3588A Getting Started Guide or other appropriate manual.

Storage and Shipment

Storage

Store the analyzer in a clean, dry, and static free environment. For other requirements, see environmental specifications in chapter 1.

Shipment

Caution

When transporting the analyzer (with disk drive), insert the plastic disk protector, part number HP 5061-2819, into the disk drive to prevent damage.
Containers and materials identical to those used in factory packaging are available through Hewlett-Packard offices, see figure 2-3. If the analyzer is being returned to Hewlett-Packard for service, attach a tag describing the type of service required, the return address, model number, and full serial number. Also, mark the container FRAGILE to ensure careful handling. In any correspondence, refer to the analyzer by model number and full serial number.

If it is necessary to package the analyzer in a container other than original packaging, observe the following (use of other packaging is not recommended):

- Protect the front panel with cardboard and wrap the analyzer in heavy paper or anti-static plastic.

- Use a double-wall carton made of at least 350-pound test material and cushion the analyzer to prevent damage.

- Identify the shipment as above and mark FRAGILE.

---

**Caution**

Do not use styrene pellets in any shape as packing material for the analyzer. The pellets do not adequately cushion the analyzer and do not prevent the analyzer from shifting in the carton. In addition, the pellets create static electricity that can damage electronic components.
Chapter 3

Operation Verification and Performance Tests
Operation Verification and Performance Tests

Introduction

This section contains the operation verification tests and the performance tests. The operation verification tests give a high confidence level (>90%) that the HP 3588A Spectrum Analyzer is operating properly and within specifications. The operation verification tests are a subset of the performance tests. Operation verification should be used for incoming and after-repair inspections.

The performance tests provide the highest level of confidence (>98%) and are used to verify that the HP 3588A Spectrum Analyzer conforms to its published specifications. Some repairs require a performance test to be done after the repair (see the HP 3588A Service Manual for this information).

Safety Considerations

Although the HP 3588A Spectrum Analyzer is designed in accordance with international safety standards, this manual contains information, cautions, and warnings that must be followed to ensure safe operation and to keep the unit in safe condition. The operation verification and performance test procedures must be performed by trained service personnel who are aware of the hazards involved (such as fire and electrical shock).

Warning

Any interruption of the protective (grounding) conductor inside or outside the unit, or disconnection of the protective earth terminal can expose operators to potentially dangerous voltages.

Under no circumstances should an operator remove any covers, screws, shields or in any other way access the interior of the HP 3588A Spectrum Analyzer. There are no operator controls inside the analyzer.
Test Duration

Operation verification require approximately 2 hours to complete. The performance tests require approximately 7 hours to complete.

Caution

Before applying line power to the analyzer or testing its electrical performance, see chapter 2, "Installation."

Calibration Cycle

To verify the HP 3588A Spectrum Analyzer is meeting its published specifications, do the performance tests every 12 months.

Equipment Required

The equipment needed for operation verification and performance tests is listed in table 1-2. Other equipment may be substituted for the recommended model if it meets or exceeds the listed critical specifications.

Measurement Uncertainty

The Performance Test Record contains a table listing the measurement uncertainty and ratio for each performance test using the recommended test equipment. The table also provides a place to record the measurement uncertainty and ratio for each performance test using equipment other than the recommended test equipment.
### Operation Verification and Performance Test List

The following table lists the operation verification and performance tests.

<table>
<thead>
<tr>
<th>Operation Verification Tests</th>
<th>Performance Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Local Oscillator Feedthrough</td>
<td>1. Local Oscillator Feedthrough</td>
</tr>
<tr>
<td>2. Phase Noise</td>
<td>2. Phase Noise</td>
</tr>
<tr>
<td>3. Residual Responses</td>
<td>3. Residual Responses</td>
</tr>
<tr>
<td>5. Frequency Accuracy</td>
<td>5. Frequency Accuracy</td>
</tr>
<tr>
<td>7. Image Responses</td>
<td>7. Image Responses</td>
</tr>
<tr>
<td>8. Input Harmonic Distortion</td>
<td>8. Input Harmonic Distortion</td>
</tr>
<tr>
<td>10. Source Amplitude Accuracy and Frequency Response</td>
<td>10. Source Amplitude Accuracy and Frequency Response</td>
</tr>
<tr>
<td>11a. Input Amplitude Accuracy and Flatness</td>
<td>11a. Input Amplitude Accuracy and Flatness</td>
</tr>
<tr>
<td>12. Reference Level Accuracy</td>
<td>12. Reference Level Accuracy</td>
</tr>
<tr>
<td>17. Source Harmonic Distortion</td>
<td>17. Source Harmonic Distortion</td>
</tr>
</tbody>
</table>
## Specifications and Performance Tests

The following table lists specifications and the performance test or tests that verify each specification.

**Table 3.2. Specification and Performance Tests**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Performance Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Range</td>
<td></td>
</tr>
<tr>
<td>Noise Level</td>
<td>1. Local Oscillator Feedthrough</td>
</tr>
<tr>
<td>Spurious Responses</td>
<td>2. Phase Noise</td>
</tr>
<tr>
<td>Spectral Purity</td>
<td></td>
</tr>
<tr>
<td>Amplitude Accuracy</td>
<td></td>
</tr>
<tr>
<td>Full Scale Absolute Accuracy</td>
<td>11a or 11b. Input Amplitude Accuracy and Flatness</td>
</tr>
<tr>
<td>Scale Fidelity</td>
<td>12. Reference Level Accuracy</td>
</tr>
<tr>
<td>Input Port Return Loss</td>
<td>13. Log Scale Accuracy</td>
</tr>
<tr>
<td>Frequency Accuracy</td>
<td>14. Source Dynamic Accuracy</td>
</tr>
<tr>
<td>Source</td>
<td></td>
</tr>
<tr>
<td>Absolute Amplitude Accuracy</td>
<td>15. Input Return Loss</td>
</tr>
<tr>
<td>Dynamic Accuracy</td>
<td>16. Source Return Loss</td>
</tr>
<tr>
<td>Frequency Response</td>
<td></td>
</tr>
<tr>
<td>Spurious Products</td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td></td>
</tr>
<tr>
<td>Output Port Return Loss</td>
<td></td>
</tr>
</tbody>
</table>
How to Do an Operation Verification or Performance Test

The operation verification tests are a subset of the performance tests. A shaded box at the beginning of each test tells if the test is an operation verification test in addition to a performance test. The shaded box also specifies if the entire test or only part of the test should be performed for operation verification.

There are two types of keys on the HP 3588A Spectrum Analyzer — hardkeys and softkeys.

- Hardkeys are front-panel buttons whose functions are always the same. Hardkeys have a label printed directly on the key itself. Throughout this guide, they are printed like this: [Hardkey]

- Softkeys are keys whose functions change with the analyzer’s current menu selection. A softkey’s function is indicated by a video label to the left of the key (on the edge of the analyzer’s screen). Throughout this guide, softkeys are printed like this: [SOFTKEY]

- Some softkeys toggle through different settings. Toggle softkeys have a highlighted word in their label that changes with each press of the softkey. Throughout this guide, toggle softkeys are depicted as they appear after you press the softkey. For example, [FREQ CNTL ON OFF] means to press [FREQ CNTL ON OFF] until the word ON is highlighted.

Record the results of each test in the “Operation Verification Test Record” or the “Performance Test Record.” These test records may be reproduced without written permission of Hewlett-Packard.

If a test fails, contact your local Hewlett-Packard sales and service office or have a qualified service technician see the “Service” section of the HP 3588A Service Manual.

---

Note

To minimize the time required to change instrument configurations between tests, do the tests in the order given.
1. **Local Oscillator Feedthrough**

**Operation Verification — Yes**

For Operation Verification, the procedure is the same as the Performance Test procedure.

This test verifies that the HP 3588A Spectrum Analyzer meets its dynamic range specification for local oscillator (LO) feedthrough. In this test, the analyzer measures the LO feedthrough, which appears as a signal at 0 Hz.

**Equipment Required**

None

1. Press the following keys:
   - [Preset]
   - [Spcl Fctn]
     - [SINGLE CAL]
     - [AUTO CAL ON OFF]
   - [Range/Input]
     - [RANGE]
     - -20
     - [dBm]
   - [Freq]
     - [CENTER]
     - 0
     - [Hz]
     - [SPAN]
     - 1
     - [kHz]
   - [Sweep]
     - [SWEEP AUTO MAN]
   - [Res BW]
     - [RES BW]
     - 4.5
     - [Hz]
   - [Avg/Pk Hld]
     - [VIDEO AVERAGE]

2. Enter the **Man** readout in the test record.
2. Phase Noise

Operation Verification — Yes

For Operation Verification, the procedure is the same as the Performance Test procedure.

This test verifies that the HP 3588A Spectrum Analyzer meets its dynamic range specification for spectral purity. In this test, the analyzer uses its internal 10 MHz calibration signal as a clean signal source for measuring phase noise.

Equipment Required

None

1. Press the following keys.

   [ Preset ]
   [ Spec Fctn ]
   [ SINGLE CAL ]
   [ AUTO CAL ON OFF ]
   [ PFM TESTS ] ( NOTE: Ignore source uncalibrated message )
   [ CALIBRAT TO INPUT ]
   [ Sweep ]
   [ OVERSWEEP ON OFF ]
   [ Freq ]
   [ CENTER ]
   10
   [ MHz ]
   [ SPAN ]
   5
   [ kHz ]
   [ Marker ]
   [ ZERO OFFSET ]
   [ MARKER X ENTRY ]
   10.001
   [ MHz ]
   [ Marker Fctn ]
   [ NOISE LEVEL ON OFF ]

2. Enter the Δ Mkr readout in the test record.
3. Residual Responses

Operation Verification — Yes

For Operation Verification, the procedure is the same as the Performance Test procedure.

This test verifies that the HP 3588A Spectrum Analyzer meets its dynamic range specification for residual responses. In this test, the analyzer measures the residual responses of the power line frequency and its harmonics, the power supply switching frequency, the reference frequencies, and the oscillator harmonics.

Equipment Required: 50Ω Feedthrough Termination

1. Connect the 50Ω feedthrough termination to the INPUT connector.

2. Press the following keys:

   - [ Preset ]
   - [ Spcl Fctn ]
     - [ SINGLE CAL ]
     - [ AUTO CAL ON OFF ]
   - [ Ranglnput ]
     - [ RANGE ]
     - [-20]
     - [ dBM ]
   - [ Meas Type ]
     - [ NARROW BAND ZOOM ]
   - [ AvglPk Hld ]
     - [ VIDEO AVERAGE ]
   - [ Freq ]
     - [ SPAN ]
     - [ 36.0625 ]
     - [ Hz ]
3. For each of the following frequencies, perform steps a and b:

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Hz or 60 Hz†</td>
</tr>
<tr>
<td>100 Hz or 120 Hz‡</td>
</tr>
<tr>
<td>150 Hz or 180 Hz †</td>
</tr>
<tr>
<td>125 kHz</td>
</tr>
<tr>
<td>24.7623 kHz</td>
</tr>
<tr>
<td>35.7134 kHz</td>
</tr>
<tr>
<td>100 kHz</td>
</tr>
<tr>
<td>187.5 kHz</td>
</tr>
<tr>
<td>250 kHz</td>
</tr>
<tr>
<td>10 MHz</td>
</tr>
</tbody>
</table>

† If local line frequency is 50 Hz, check this frequency
‡ If local line frequency is 60 Hz, check this frequency

a. Press the following keys:
   [CENTER] (to frequency in table)

b. After the averaging is complete (10 averages) enter the Mkr readout in the test record.
4. Noise Level

**Operation Verification — Yes**

For Operation Verification, check only the frequencies listed in the shaded boxes.

This test verifies that the HP 3588A Spectrum Analyzer meets its dynamic range specification for noise level. In this test, the analyzer's noise level marker function measures the noise level. The noise level is measured using the receiver's 50Ω input path, with low distortion mode on and off, and using the 1 MΩ input path.

**Equipment Required:**

- 50Ω Feedthrough Termination
- 100 kΩ Feedthrough Termination

1. Connect the 50Ω feedthrough termination to the INPUT connector.

2. Press the following keys:

   - [Preset ]
   - [Spec Fctn ]
     - [SINGLE CAL ]
     - [AUTO CAL ON OFF ]
   - [Range/Input ]
     - [RANGE ]
     - [ -20 ]
     - [dBm ]
   - [Freq ]
     - [ZERO SPAN ]
   - [Marker Fctn ]
     - [NOISE LVL ON OFF ]
   - [Meas Type ]
     - [LOW DICT ON OFF ]
3. For each of the following frequencies, perform steps a and b

<table>
<thead>
<tr>
<th>Resolution Bandwidth</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 ± Hz</td>
<td>150 MHz</td>
</tr>
<tr>
<td>140 MHz</td>
<td></td>
</tr>
<tr>
<td>120 MHz</td>
<td></td>
</tr>
<tr>
<td>71 MHz</td>
<td></td>
</tr>
<tr>
<td>19 MHz</td>
<td></td>
</tr>
<tr>
<td>5.3 MHz</td>
<td></td>
</tr>
<tr>
<td>5 ± kHz</td>
<td></td>
</tr>
<tr>
<td>290 Hz</td>
<td>5 ± kHz</td>
</tr>
<tr>
<td>73 Hz</td>
<td>530 Hz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution Bandwidth</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 ± Hz</td>
<td>150 MHz</td>
</tr>
<tr>
<td>120 MHz</td>
<td></td>
</tr>
<tr>
<td>19 MHz</td>
<td></td>
</tr>
<tr>
<td>73 Hz</td>
<td>530 Hz</td>
</tr>
</tbody>
</table>

- For Performance Tests
- For Operation Verification

a. Press the following keys:
   - `[ Res BW ]`
   - `[ RES BW ]` (to resolution bandwidth in table)
   - `[ Freq ]`
   - `[ CENTER ]` (to frequency in table)

b. Enter the Mkr readout in the test record.

4. Press the following keys:
   - `[ Meas Type ]`
   - `[ LOW DIST ON OFF ]`

5. Repeat step 3

6. Disconnect the 50Ω feedthrough termination, and connect the 100 kΩ feedthrough termination to the INPUT connector.

7. Press the following keys:
   - `[ Range/Input ]`
   - `[ MEGOHM ]`
8. For each of the following frequencies, perform steps a and b

<table>
<thead>
<tr>
<th>Resolution Bandwidth</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>171 Hz</td>
<td>40 MHz</td>
</tr>
<tr>
<td></td>
<td>101 MHz</td>
</tr>
<tr>
<td></td>
<td>10.1 kHz</td>
</tr>
<tr>
<td>290 Hz</td>
<td>10.1 kHz</td>
</tr>
<tr>
<td>73 Hz</td>
<td>110 Hz</td>
</tr>
<tr>
<td>9.1 Hz</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution Bandwidth</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>171 Hz</td>
<td>40 MHz</td>
</tr>
<tr>
<td>290 Hz</td>
<td>10.1 kHz</td>
</tr>
<tr>
<td>9.1 Hz</td>
<td>110 Hz</td>
</tr>
</tbody>
</table>

a. Press the following keys.
   [ Res BW ]
   [ RES BW ] (to resolution bandwidth in table)
   [ Freq ]
   [ CENTER ] (to frequency in table)

b. Enter the Mkr readout in the test record.
5. Frequency Accuracy

Operation Verification — Yes

For Operation Verification, the procedure is the same as the Performance Test procedure.

This test verifies that the HP 3588A Spectrum Analyzer meets its frequency accuracy specification. In this test, the analyzer's counter function measures an accurate 100 MHz signal. The frequency limits are then calculated using the number of days since the last frequency reference adjustment.

---

**Note**
The HP 3588A Spectrum Analyzer must be on for 48 hours before performing this test.

---

**Equipment Required**
- Synthesized Signal Generator
- Frequency Standard
- N(m)-to-BNC(f) Adapter
- BNC Cables (2)

1. Connect the test equipment as shown in figure 3-1.

![Figure 3-1. Frequency Accuracy Setup](image-url)
2. Set the signal generator as follows:
   Frequency 100 MHz
   Amplitude 0 dBm

3. Press the following keys:
   [ Preset ]
   [ Spcl Ftn ]
   [ SINGLE CAL ]
   [ AUTO CAL ON OFF ]

4. Wait for a complete sweep, then press the following keys:
   [ Marker ]
   [ MARK -> PEAK ]
   [ Marker Ftn ]
   [ FREQ CNTR ON OFF ]

5. Enter the CTR readout in the test record.

6. Calculate the lower frequency limit specification using one of the following formulas, and enter the result in the test record's Calculated Lower Limit column.

   Without option 001 = 100 × 1E6 - (25 × N) - 50 - 0.1
   (N = number of months since the 80 MHz reference VCXO was adjusted)

   With option 001 = 100 × 1E6 - (12.5 × N) - 1 - 0.1
   (N = number of months since the oven frequency was adjusted)

7. Calculate the upper frequency limit specification using one of the following formulas, and enter the result in the test record's Calculated Upper Limit column.

   Without option 001 = 100 × 1E6 + (25 × N) + 50 + 0.1
   (N = number of months since the 80 MHz reference VCXO was adjusted)

   With option 001 = 100 × 1E6 + (12.5 × N) + 1 + 0.1
   (N = number of months since the oven frequency was adjusted.)
6. Spurious Responses

**Operation Verification — Yes**

For Operation Verification, the procedure is the same as the Performance Test procedure.

This test verifies that the HP 3588A Spectrum Analyzer meets its dynamic range specification for spurious responses. In this test, the analyzer measures spurious responses such as API spurs, step loop spurs, sum loop spurs, and LO sideband spurs. The analyzer first measures a signal from the signal generator, establishing a reference level. Then, using its offset marker, the analyzer measures the spur.

**Equipment Required:**
- Synthesized Signal Generator
- N(m)-to-BNC(f) Adapter
- BNC Cables (2)

1. Connect the test equipment as shown in figure 3-2.

![Figure 3-2. Spurious Responses Setup](image)

2. Set the signal generator's amplitude to -21 dBm.
3 Press the following keys:

- [Preset]
- [Spcf Fctn]
  - [SINGLE CAL]
  - [AUTO CAL ON OFF]
- [Range/Input]
  - [RANGE]
  - [-20]
  - [dBi]
- [Res BW]
  - [RES BW]
  - [4.5]
  - [Hz]
- [Avg/Pk Hld]
  - [VIDEO AVERAGE]
- [Sweep]
  - [SWEEP AUTO MAN]

4. For each of the following source frequencies, perform steps a through c:

<table>
<thead>
<tr>
<th>Source Frequency (MHz)</th>
<th>Spur Frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.8125</td>
<td>10.8428</td>
</tr>
<tr>
<td>9.8125</td>
<td>9.8248</td>
</tr>
<tr>
<td>148.8125</td>
<td>149.8248</td>
</tr>
<tr>
<td>95.81274</td>
<td>95.81254</td>
</tr>
<tr>
<td>95.8149</td>
<td>95.8129</td>
</tr>
<tr>
<td>100.79274</td>
<td>100.79254</td>
</tr>
<tr>
<td>100.7949</td>
<td>100.7929</td>
</tr>
<tr>
<td>100.79454</td>
<td>100.79254</td>
</tr>
<tr>
<td>100.794504</td>
<td>100.792504</td>
</tr>
<tr>
<td>1 8125</td>
<td>4.81373</td>
</tr>
<tr>
<td>7 81496</td>
<td>4.81373</td>
</tr>
<tr>
<td>144.8125</td>
<td>144.822623</td>
</tr>
<tr>
<td>144.832746</td>
<td>144.822623</td>
</tr>
<tr>
<td>89.9125</td>
<td>89.8125</td>
</tr>
</tbody>
</table>

a. Set the signal generator’s frequency to the source frequency in the table.

b. Press the following keys:

- [MANUAL FREQ] (to source frequency in table)
- [Marker]
  - [ZERO OFFSET]
- [Sweep]
  - [MANUAL FREQ] (to spur frequency in table)

c. Enter the D Man readout in test record.
7. Image Responses

**Operation Verification – Yes**

For Operation Verification, the procedure is the same as the Performance Test procedure.

This test verifies that the HP 3588A Spectrum Analyzer meets its dynamic range specification for image responses. In this test, the analyzer measures the IF image spurs. The analyzer first measures a signal from the signal generator, establishing a reference level. Then, using its offset marker, the analyzer measures the image spurs.

**Equipment Required:**
- Synthesized Signal Generator
- N-imp-to-BNC (1) Adapter
- BNC Cables (2)

1. Connect the test equipment as shown in figure 3-3.

![Image Responses Setup](image)

**Figure 3-3. Image Responses Setup**

2. Set the signal generator as follows:
   - Amplitude: +10 dBm
   - Frequency: 61.23456 MHz
3. Press the following keys:
   [ Preset ]
   [ Spcl Fctn ]
     [ SINGLE CAL ]
     [ AUTO CAL ON OFF ]
   [ Range/Input ]
     [ RANGE ]
     10
     [ dBM ]
   [ Res BW ]
     [ RES BW ]
     4.5
     [ Hz ]
   [ Sweep ]
     [ SWEEP AUTO MAN ]
     [ MANUAL FREQ ]
     61 23456
     [ MHz ]
   [ Marker ]
     [ ZERO OFFSET ]
   [ Avg/Pk Hld ]
     [ VIDEO AVERAGE ]

4. For each of the following frequencies, perform steps a and b:

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 05956</td>
</tr>
<tr>
<td>60 05956</td>
</tr>
<tr>
<td>61 35956</td>
</tr>
</tbody>
</table>

a. Press the following keys:
   [ Sweep ]
   [ MANUAL FREQ ] (to frequency in table)

b. Enter the Δ Man readout in the test record.
8. Input Harmonic Distortion

Operation Verification — Yes

For Operation Verification, only perform steps 1 through 4.

This test verifies that the HP 3588A Spectrum Analyzer meets its dynamic range specification for input harmonic distortion. In this test, a low pass filter attenuates the harmonics of a signal from the synthesizer/level generator. The analyzer then measures the signal, establishing a reference level. Then, using its offset marker, the analyzer measures the second and third harmonics. Harmonic distortion is measured using the receiver's 50Ω input path, with low distortion mode on and off, and using the 1 MΩ input path.

Equipment Required:
- Synthesizer/Level Generator
- 21 MHz Low Pass Filter
- 50Ω Feedthrough Termination
- BNC Cables (3)

1. Connect the test equipment as shown in figure 3-4.

![Figure 3-4. Input Harmonic Distortion Setup](image)

2. Set the synthesizer/level generator's amplitude to −2 dBm.
3. Press the following keys:
   (Preset)
   (Spcl Fcns)
     (SINGLE CAL)
     (AUTO CAL ON OFF)
   (Range/Input)
     (RANGE)
     0
     (dBm)
   (Res BW)
     (RES BW)
     4.5
     (Hz)
   (Sweep)
     (SWEEP AUTO MAN)
   (Avg/Pk Hld)
     (VIDEO AVERAGE)
   (Meas Type)
     (LOW DIST ON OFF)

4. For each of the following fundamental frequencies, using the filter listed perform steps a through e:

<table>
<thead>
<tr>
<th>Low Pass Filter</th>
<th>Fundamental Frequency (MHz)</th>
<th>Second Harmonic (MHz)</th>
<th>Third Harmonic (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MHz</td>
<td>47.265018</td>
<td>94.530036</td>
<td>141.795054</td>
</tr>
<tr>
<td>21 MHz</td>
<td>18.816541</td>
<td>37.633082</td>
<td>56.449623</td>
</tr>
</tbody>
</table>

a. Set the synthesizer/level generator's frequency to the fundamental frequency in the table.

b. Press the following keys:
   (Sweep)
   (MANUAL FREQ) (to fundamental frequency in table)
   (Marker)
   (ZERO OFFSET)
   (Sweep)
   (MANUAL FREQ) (to second harmonic in table)

c. Enter the Δ Man readout in the test record.

d. Press the following keys:
   (MANUAL FREQ) (to third harmonic in table)

e. Enter the Δ Man readout in the test record.
5. Press the following keys:
   [Meas Type]
   [Low Dist on OFF]


7. Disconnect the cable connected to the INPUT connector. Connect the 50Ω feedthrough termination to the INPUT connector, and connect the cable to the 50Ω feedthrough termination.

8. Press the following keys.
   [Range/Input]
   [1 MEGOHM]

9. For each of the following fundamental frequencies, using the filter listed perform steps a through e

<table>
<thead>
<tr>
<th>Low Pass Filter</th>
<th>Fundamental Frequency (MHz)</th>
<th>Second Harmonic (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 MHz</td>
<td>18.816621</td>
<td>37.633082</td>
</tr>
</tbody>
</table>

a. Set the synthesizer/level generator's frequency to the fundamental frequency in the table.

b. Press the following keys:
   [Sweep]
   [Manual Freq] (to fundamental frequency in table)
   [Marker]
   [Zero Offset]
   [Sweep]
   [Manual Freq] (to second harmonic in table)

c. Enter the Δ Man readout in the test record.

d. Press the following keys:
   [Manual Freq] (to third harmonic in table)

e. Enter the Δ Man readout in the test record.
9. Intermodulation Distortion

Operation Verification — No

Do not perform this test for Operation Verification.

This test verifies that the HP 3588A Spectrum Analyzer meets its dynamic range specification for intermodulation distortion. In this test, a $50\Omega$ directional bridge mixes two signals. The resulting modulated signal is measured by the analyzer, establishing a reference level. Then, using its offset marker, the analyzer measures the second and third order intermodulation products (the sum and difference frequencies). Intermodulation distortion is measured using the receiver's $50\Omega$ input path, with low distortion mode on and off, and using the 1 M$\Omega$ input path.

Equipment Required:

- Synthesized Signal Generator
- Synthesizer/Level Generator
- $50\Omega$ Directional Bridge
- $50\Omega$ Feedthrough Termination
- N(m)-to-BNC(f) Adapters (4)
- SMA(m)-to-BNC(f) Adapters (4)
- BNC Cables (7)
- BNC to Alligator Clip (2)
- Dual Banana to BNC(f) Adapter
- BNC Tee
- SMA(m)-to-BNC(m) Adapters(2)
- N(1)-to-BNC(m) Adapters (2)
- 10 dB Amplifiers (2)
- 10 dB Attenuators (2)
- Power Supply
1. Connect the test equipment as shown in figure 3-5.

![Diagram](image_url)

Figure 3-5. Intermodulation Distortion Setup

2. Press the following keys:

- **Preset**
- **Spcl Fctn**
  - **SINGLE CAL**
  - **AUTO CAL ON OFF**
- **Range/Input**
  - **RANGE**
  - -20
  - **dBm**
- **Freq**
  - **FULL SPAN**
- **Res BW**
  - **RES BW**
  - 1.1
  - **Hz**
- **Meas Type**
  - **LOW DIST ON OFF**
3. Set the signal generator's frequency to 23.634466 MHz, and adjust its amplitude for a readout of -26.0 dBm ± 0.1 dB (approximately -19 dBm).

4. For each of the following source frequencies, perform steps a through h:

<table>
<thead>
<tr>
<th>Source Frequency</th>
<th>2nd Order Difference</th>
<th>2nd Order Sum</th>
<th>3rd Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.634466 MHz</td>
<td>134 Hz</td>
<td>47.269066 MHz</td>
<td>23.684734 MHz</td>
</tr>
<tr>
<td>23.634466 MHz</td>
<td>2.641 Hz</td>
<td>47.271713 MHz</td>
<td>23.640148 MHz</td>
</tr>
<tr>
<td>23.634466 MHz</td>
<td>601 Hz</td>
<td>47.338923 MHz</td>
<td>23.754466 MHz</td>
</tr>
</tbody>
</table>

a. Press the following keys:

   ([ Sweep ]
   { [ SWEEP AUTO MAN ]
   { [ MANUAL FREQ ]}
   23.634466
   { [ MHz ]}

b. Set the synthesizer/level generator's frequency to the source frequency in the table, and adjust its amplitude for a readout of -26.0 dBm ± 0.1 dB (approximately -19 dBm).

c. Press the following keys:

   ([ Marker ]
   { [ ZERO OFFSET ]
   [{ [ AvgI/Pk Hld ]}
   { [ VIDEO AVERAGE ]}
   ([ Sweep ]
   { [ MANUAL FREQ ]}(to 2nd order difference frequency in table)

d. Enter the Δ Man readout in the test record.

e. Press the following keys:

   ([ MANUAL FREQ ])(to 2nd order sum frequency in table)

e. Enter the Δ Man readout in the test record.

f. Press the following keys:

   ([ MANUAL FREQ ])(to 3rd order frequency in table)

h. Enter the Δ Man readout in the test record.

i. Press the following keys:

   ([ Marker ]
   { [ OFFSET ON OFF ]
   [{ [ AvgI/Pk Hld ]}
   { [ OFF ]}

5. Press the following keys:

   ([ Meas Type ]
   { [ LOW DIST ON OFF ]

3-24
6. Adjust the signal generator's amplitude for a **Man** readout of −26.0 dBm ±0.1 dB (approximately −19 dBm).

7. Repeat step 4.

8. Disconnect the cable connected to the INPUT connector. Connect the 50Ω feedthrough termination to the INPUT connector, and connect the cable to the 50Ω feedthrough termination.

9. Press the following keys:
   - **Sweep**
   - **MANUAL FREQ**
   - 23.63446 MHz
   - **Range/Input**
   - **1 MEGOHM**

10. Adjust the signal generator's amplitude for a **Man** readout of −6.0 dBm ±0.1 dB (approximately +1 dBm).

11. For each of the following source frequencies, perform steps a through g.

<table>
<thead>
<tr>
<th>Source Frequency</th>
<th>2nd Order</th>
<th>3rd Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.6346 MHz</td>
<td>134 Hz</td>
<td>23.634734 MHz</td>
</tr>
<tr>
<td>23.637907 MHz</td>
<td>2.841 kHz</td>
<td>23.640148 MHz</td>
</tr>
<tr>
<td>23.634466 MHz</td>
<td>60 kHz</td>
<td>23.754466 MHz</td>
</tr>
</tbody>
</table>

a. Press the following keys:
   - **Sweep**
   - **MANUAL FREQ** (to source frequency in table)

b. Set the synthesizer/level generator's frequency to the source frequency in the table, and adjust its amplitude for a **Man** readout of −6.0 dBm ±0.1 dB (approximately +1 dBm).
c. Press the following keys:
   [ Marker ]
   [ ZERO OFFSET ]
   [ Ave|Pk HD ]
   [ VIDEO AVERAGE ]
   [ Sweep ]
   [ MANUAL FREQ ] (to second order frequency in table)

d. Enter the Δ Man readout in the test record.

e. Press the following keys:
   [ MANUAL FREQ ] (to third order frequency in table)

f. Enter the Δ Man readout in the test record

g. Press the following keys:
   [ Marker ]
   [ OFFSET ON OFF ]
   [ Ave|Pk HD ]
   [ OFF ]
10. Source Amplitude Accuracy and Frequency Response

Operation Verification — Yes

For Operation Verification, check only the frequencies listed in the shaded boxes.

This test verifies that the HP 3588A Spectrum Analyzer meets its source specification for absolute amplitude accuracy and frequency response. In this test, a multimeter measures the analyzer’s source from 10 Hz to 100 kHz and a power meter measures the analyzer’s source from 300 kHz to 150 MHz. The value measured at 300 kHz is used to calculate the lower and upper limit specifications for all frequencies except 300 kHz.

Equipment Required: Digital Multimeter
                      Power Meter
                      Power Sensor
                      50Ω Feedthrough Termination
                      BNC(f)-to-Dual Banana Plug Adapter
                      N(f)-to-BNC(m) Adapter
                      BNC Cable

1. Connect the 50Ω feedthrough termination to the multimeter using the adapter.

2. Measure the resistance of the feedthrough termination and enter as the reference impedance for dBm operation (RES). Then set the multimeter’s function to ac volts (most accurate mode), ac bandwidth to 10 Hz - 1 MHz, and math mode to dBm. For an HP 3458A Digital Multimeter, press the following keys:

   blue shift key
   OHM
   blue shift key
   Menu Scroll ↓
   10 (RES)
   ACV
   blue shift key
   Menu Scroll ↑
   10, 1000000
   blue shift key
   Menu Scroll ↓
   3 (SYNC)
   blue shift key
   Menu Scroll ↓
   5 (dBm)
   Reset
   S
   (until SMATH is shown)
   ENTER
   C
   (until ACBAND is shown)
   ENTER
   S
   (until SETACV is shown)
   ENTER
   L
   (until MATH is shown)
   ENTER
Note

If your digital multimeter does not have dBm math capability, record the resistance of the feedthrough termination (RES) for later calculations.

1. Connect the test equipment as shown in figure 3-6.

![Diagram of test equipment setup](image)

**Figure 3-6. Source Responses Setup for Low Frequencies**

2. Press the following keys:
   - [Preset ]
   - [Spcl Fctn ]
     - [SINGLE CAL]
     - [AUTO CAL ON OFF]
   - [Freq ]
     - [FULL SPAN]
   - [Source ]
     - [SOURCE ON OFF]
     - [SOURCE AMPLITUDE ]
     - [10]
     - [dBm]
   - [Sweep ]
     - [SWEEP AUTO MAN]
3. For each of the following frequencies, perform steps a and b:

<table>
<thead>
<tr>
<th>For Performance Tests</th>
<th>For Operation Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency</strong></td>
<td><strong>Frequency</strong></td>
</tr>
<tr>
<td>10 Hz</td>
<td>10 Hz</td>
</tr>
<tr>
<td>100 Hz</td>
<td>100 Hz</td>
</tr>
<tr>
<td>1 kHz</td>
<td>10 kHz</td>
</tr>
<tr>
<td>10 kHz</td>
<td>30 kHz</td>
</tr>
<tr>
<td>30 kHz</td>
<td></td>
</tr>
<tr>
<td>100 kHz</td>
<td></td>
</tr>
</tbody>
</table>

a. Press the following keys:
   [MANUAL FREQ] (to frequency in table)

b. Enter the multimeter’s readout in the test record.

---

**Note**

If your digital multimeter does not have dBm math capability, use the following formula to convert your measurement results to dBm.

$$10 \times \log_{10} \left( \frac{\text{readout}^2 / \text{RES}}{1 \text{ mW}} \right) = \text{dBm}$$

readout = multimeter’s readout in volts

RES = measured resistance of the feedthrough termination

---

4. Connect the test equipment as shown in figure 3-7.

![Figure 3-7. Source Response Setup for High Frequencies](image)

5. Set the power meter’s function to dBm
6. For each of the following frequencies, perform steps a through c:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>For Performance Tests</th>
<th>For Operation Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 kHz</td>
<td></td>
<td>300 kHz</td>
</tr>
<tr>
<td>500 kHz</td>
<td></td>
<td>10 MHz</td>
</tr>
<tr>
<td>1 MHz</td>
<td></td>
<td>40 MHz</td>
</tr>
<tr>
<td>2 MHz</td>
<td></td>
<td>100 MHz</td>
</tr>
<tr>
<td>5 MHz</td>
<td></td>
<td>150 MHz</td>
</tr>
<tr>
<td>10 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>135 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 MHz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Press the following keys:
   | I MANUAL FREQ I (to frequency in table)

b. Set the power meter's calibration factor for the frequency in the table.

c. Enter the power meter's readout in the test record.

7. Subtract 1 dB from the measured value at 300 kHz. Enter the result in the test record as the lower limit specification for all frequencies, except 300 kHz.

8. Add 1 dB to the measured value at 300 kHz. Enter the result in the test record as the upper limit specification for all frequencies, except 300 kHz.
11a. Input Amplitude Accuracy and Flatness

Operation Verification — Yes

For Operation Verification, only perform steps 1 through 34

This test verifies that the HP 3588A Spectrum Analyzer meets its amplitude accuracy specification. In this test, the analyzer measures the power splitter and cable errors at four spans and stores the results in its internal data registers. A milliwatt power meter provides correction to the source, maintaining 0 dBm at the power sensor input. Then the analyzer measures the flatness of each frequency span. Using its internal math functions, the analyzer corrects for any errors caused by the power splitter and cables. This test checks the input flatness from 10 Hz to 150 MHz in the 50Ω input path and from 10 Hz to 40 MHz in the 1 MΩ input path.

---

Note

Test 11b, "Alternate Input Amplitude Accuracy and Flatness" does not require a milliwatt power meter. Perform either this test or test 11b, "Alternate Input Amplitude Accuracy and Flatness."

---

Equipment Required

- Milliwatt Power Meter
- Power Splitter
- Error Correction Cable
- 50Ω Feedthrough Termination
- BNC Cables (3)
- N(f)-to-BNC(f) Adapter
- N(m)-to-BNC(f) Adapters (3)
1. Set the power switch to STANDBY (0) and remove the power cord. Remove the top cover (see figure 3-8).

![Figure 3-8. Removing Top Cover]

**Warning**

When replacing the handle assemblies, be careful to position properly and attach firmly. If improperly attached, the handles could come off when lifting the analyzer, causing personal injury.
2. Reconnect the power cord and set the power switch to ON (1).

3. Set the milliwatt power meter as follows:
   - **Range**: 0 dBm, ± 0.2 dBm (red)
   - **Ri**: 50Ω, 0 dBm
   - **Control Voltage Gain**: maximum (clockwise)
   - **Control Voltage Polarity**: + (positive)

4. Connect the milliwatt power sensor to its calibration output and adjust CAL for a 0 dBm reading.

5. Connect the test equipment as shown in figure 3-9.

---

**Figure 3-9. Frequency Response Setup**
6. Press the following keys:

- [Preset]
- [Spcl Fctn]
  - [SINGLE CAL]
  - [AUTO CAL ON/OFF]
- [Trigger]
  - [ARM AUTO MAN]
- [Source]
  - [SOURCE ON/OFF]
  - [SOURCE AMPLITUDE]
  - 6 (nominal loss of power splitter)
  - [dBm]
- [Freq]
  - [START]
  - 10
  - [Hz]
  - [STOP]
  - 100
  - [Hz]
- [Res BW]
  - [RES BW]
  - 4.5
  - [Hz]
- [Range/Input]
  - [RANGE]
  - 10
  - [dBm]
- [Sweep]
  - [Sweep Time]
  - 13
  - [SEC]
- [Trigger]
  - [ARM]
7. Wait for a complete sweep, then press the following keys.

[ Save/Recall ]
[ DEFAULT DISK ]
[ VOLATILE RAM DISK ]
[ CANCEL/RETURN ]
[ SAVE TRACE ]
[ INTO D1 ]
[ SAVE STATE ]
STATE1

Note
To type in STATE1, use the marker knob to highlight the space after STATE, then press [ 1 ]. If a character needs to be deleted, use the marker knob to highlight the character, then press [ DELETE CHARACTER ].

[ ENTER ]
[ Freq ]
[ START ]
100
[ Hz ]
[ STOP ]
30
[ kHz ]
[ Res BW ]
[ RES BW ]
73
[ Hz ]
[ Sweep ]
[ SWEEP TIME ]
12
[ SEC ]
[ Trigger ]
[ ARM ]
8. Wait for a complete sweep, then press the following keys:

- Save/Recall
- Save Trace
- Into D3
- Save State
- State2
- Enter

- Freq
  - Start
  - 30 kHz
  - Stop
  - 40 MHz

- Res BW
  - Res BW
  - 4.6 kHz

- Sweep
  - Sweep Time
  - 10 sec

- Trigger
  - Arm

9. Wait for a complete sweep, then press the following keys:

- Save/Recall
- Save Trace
- Into D5
- Save State
- State3
- Enter

- Freq
  - Stop
  - 150 MHz

- Res BW
  - Res BW
  - 4.6 kHz

- Sweep
  - Sweep Time
  - 15 sec

- Trigger
  - Arm
10. Wait for a complete sweep, then press the following keys:

[ Save/Recall ]
[ SAVE TRACE ]
[ INTO D7 ]
[ SAVE STATE ]
STATE4
[ ENTER ]

11. Referring to figure 3-9, disconnect the cable connected to the INPUT connector (cable 1) and connect to the power sensor. Connect the cable that was connected to the power sensor (cable 2) to the INPUT connector. Do NOT disconnect the cables from the power splitter.

12. Press the following keys:

[ Trigger ]
[ ARM ]

13. Wait for a complete sweep, then press the following keys:

[ Save/Recall ]
[ SAVE TRACE ]
[ INTO D8 ]
[ RECALL STATE ]
STATE3
[ ENTER ]
[ Trigger ]
[ ARM ]

14. Wait for a complete sweep, then press the following keys:

[ Save/Recall ]
[ SAVE TRACE ]
[ INTO D6 ]
[ RECALL STATE ]
STATE2
[ ENTER ]
[ Trigger ]
[ ARM ]

15. Wait for a complete sweep, then press the following keys:

[ Save/Recall ]
[ SAVE TRACE ]
[ INTO D4 ]
[ RECALL STATE ]
STATE1
[ ENTER ]
[ Trigger ]
[ ARM ]
16. Wait for a complete sweep, then press the following keys:

```
[Save/Recall]
[SAVE TRACE]
[INTO D2]
[Math]
[DEFINE F1] (F1 = SPEC(D2/D1))
[SPECTRUM]
[/]
[
[
[DATA REG (D1-D8)]
[DATA REG D2]
[/]
[DATA REG (D1-D8)]
[DATA REG D1]
[
]
[ENTER]
[DEFINE F2] (F2 = SPEC(D4/D3))
[SPECTRUM]
[/]
[
[
[DATA REG (D1-D8)]
[DATA REG D4]
[/]
[DATA REG (D1-D8)]
[DATA REG D3]
[
]
[ENTER]
[DEFINE F3] (F3 = SPEC(D6/D5))
[SPECTRUM]
[/]
[
[
[DATA REG (D1-D8)]
[DATA REG D6]
[/]
[DATA REG (D1-D8)]
[DATA REG D5]
[
]
[ENTER]
[DEFINE F4] (F4 = SPEC(D8/D7))
[SPECTRUM]
[/]
[
[
[DATA REG (D1-D8)]
[DATA REG D8]
[/]
[DATA REG (D1-D8)]
[DATA REG D7]
[
]
[ENTER]
```
17. Connect the error correction cable from the milliwatt power meter (red to A and black to B) to A42 J5 (EXT LVL). See Figure 3-10.

Figure 3-10. Connecting Error Correction Cable

Note

A calibration failure will occur if the HP 3588A Spectrum Analyzer does an internal calibration while the error correction cable is connected to A42 J5. Make sure to disconnect the error correction cable before pressing [ Preset ], [ SINGLE CAL ], [ AUTO CAL ON OFF ], or before cycling power.

18. Adjust the milliwatt power meter's control voltage reference to 0 dBm. If unable to adjust to 0 dBm, set the control voltage polarity to − (negative) and adjust the control voltage reference again.
19. Press the following keys:
   [Save/Recall]
   [RECALL STATE]
   [STATE4]
   [ENTER]
   [Trace Data]
   [FUNCTION (F1-F5)]
   [F4]
   [Res BW]
   [RES BW]
   9.1
   [kHz]
   [Sweep]
   [SWEEP TIME]
   200
   [SEC]
   [Trigger]
   [ARM]

20. Wait for the sweep to reach the first graticule, then press the following keys:
   [Sweep]
   [SWEEP TIME]
   60
   [SEC]
21. After a complete sweep, press the following keys:
   
   [ Scale ]
   [ AUTOSCALe ]
   [ Marker ]
   [ MAR —> PEAK ]

22. Enter the Mkr readout in the test record as the maximum measured value for 30 kHz to 150 MHz.

23. Position the marker at the minimum point on the trace, and enter the Mkr readout in the test record as the minimum measured value for 30 kHz to 150 MHz.

24. Position the marker at the maximum point above 300 kHz and below 40 MHz, and enter the Mkr readout in the test record as the maximum measured value for 300 kHz to 40 MHz.

25. Position the marker at the minimum point above 300 kHz and below 40 MHz, and enter the Mkr readout in the test record as the minimum measured value for 300 kHz to 40 MHz.

26. Press the following keys:
   
   [ Save/Recall ]
   [ RECALL STATE ]
   STATE2
   [ ENTER ]
   [ Trace Data ]
   [ FUNCTION (F1-F5) ]
   [ F2 ]
   [ Res BW ]
   [ RES BW ]
   73
   [ Hz ]
   [ Sweep ]
   [ SWEEP TIME ]
   50
   [ Sec ]
   [ Trigger ]
   [ ARM ]

27. Wait for the next complete sweep, then press the following keys:
   
   [ Scale ]
   [ AUTOSCALe ]
   [ Marker ]
   [ Mkr —> PEAK ]

28. Enter the Mkr readout in the test record as the maximum measured value for 100 Hz to 30 kHz.

29. Position the marker at the minimum point on the trace, and enter the Mkr readout in the test record as the minimum measured value for 100 Hz to 30 kHz.
30. Press the following keys:
   - [Save/Recall]
   - [SAVE STATE]
   - STATE2
   - [ENTER]
   - [RECALL STATE]
   - STATE1
   - [ENTER]
   - [Trace Data]
   - [FUNCTION [F1-F5]]
   - [F1]
   - [Res BW]
   - [RES BW]
   - 4.5
   - [Hz]
   - [Sweep]
   - [Sweep Time]
   - 50
   - [Sec]
   - [Trigger]
   - [ARM]

31. Wait for a sweep, then press the following keys.
   - [Scale]
   - [AUTOSCALE]
   - [Save/Recall]
   - [SAVE STATE]
   - STATE1
   - [ENTER]
   - [Marker]
   - [MARK -> PEAK]

32. Enter the Mkr readout in the test record as the maximum measured value for 10 Hz to 100 Hz.

33. Position the marker at the minimum point on the trace, and enter the Mkr readout in the test record as the minimum measured value for 10 Hz to 100 Hz.

---

**Note**

This completes the Operation Verification procedure for Input Amplitude Accuracy and Flatness. Set the power switch to STANDBY (0) and remove the power cord. Disconnect the error correction cable from A42 J5, and replace the top cover and handle assembly (see figure 3-8).

To complete the Performance Test procedure, continue following this procedure (do not disconnect the error correction cable or replace the top cover).
34. Disconnect cable 2 from the INPUT connector. Connect a 50Ω feedthrough termination to the INPUT connector and connect cable 2 to the feedthrough termination.

35. Press the following keys:

   [Save/Recall]
   [RECALL STATE]
   STATE3
   [ENTER]

   [Input/Range]
   [1 MEGOHM]

   [Trace Data]
   [FUNCTION [F1 F5]]
   [F3]

   [Sweep]
   [SWEEP TIME]
   120
   [SEC]

   [Trigger]
   [ARM]
36. Wait for the sweep to reach the first graticule, then press the following keys:
   [Sweep]
   [SWEEP TIME]
   30
   [SEC]

37. After a complete sweep, press the following keys
   [Scale]
   [AUTOSCALE]
   [Marker]
   [MKR -> PEAK]

38. Enter the **Mkr** readout in the test record as the maximum measured value for 30 kHz to 40 MHz.

39. Position the marker at the minimum point on the trace, and enter the **Mkr** readout in the test record as the minimum measured value for 30 kHz to 40 MHz.

40. Press the following keys:
    [Save/Recall]
    [RECALL STATE]
    **STATE2**
    [ENTER]
    [Input/Range]
    [1 MEGOHM]
    [Trigger]
    [ARM]

41. Wait for a complete sweep, then press the following keys:
    [Scale]
    [AUTO SCALE]
    [Marker]
    [MKR -> PEAK]

42. Enter the **Mkr** readout in the test record as the maximum measured value for 100 Hz to 30 kHz.

43. Position the marker at the minimum point on the trace, and enter the **Mkr** readout in the test record as the minimum measured value for 100 Hz to 30 kHz.
44. Press the following keys:
   - [Save|Recall]
   - [RECALL STATE]
   - STATE1
   - [ENTER]
   - [Input|Range]
   - [1 MEGOHM]
   - [Trigger]
   - [ARM]

45. Wait for a complete sweep, then press the following keys:
   - [Scale]
   - [AUTO SCALE]
   - [Marker]
   - [Mkr -> PEAK]

46. Enter the Mkr readout in the test record as the maximum measured value for 10 Hz to 100 Hz.

47. Position the marker at the minimum point on the trace, and enter the Mkr readout in the test record as the minimum measured value for 10 Hz to 100 Hz.

48. Set the power switch to STANDBY (0) and remove the power cord. Disconnect the error correction cable from A42 J5, and replace the top cover and handle assembly (see figure 3-8).
11b. Alternate Frequency Response (Amplitude Flatness)

**Operation Verification — Yes**

For Operation Verification, only perform steps 1 through 6. Also, check only the frequencies listed in the shaded box.

This test verifies that the HP 3588A Spectrum Analyzer meets its amplitude accuracy specification for frequency response. In this test, the analyzer generates and measures a signal from 10 Hz to 150 MHz using the receiver's 50Ω input path and from 10 Hz to 40 MHz using the 1 MΩ input path. The source amplitude levels measured in test 10, Source Amplitude Accuracy and Frequency Response, are subtracted from the levels measured in this test for the 50Ω input path. Since the receiver's 1 MΩ input path requires a lower source level, this test measures the source's output (with a multimeter from 10 Hz to 100 kHz and with a power meter from 300 kHz to 40 MHz). These levels are subtracted from the levels measured for the 1 MΩ input path. Then for specified frequency ranges in both the 50Ω and 1 MΩ input paths, the largest negative error is subtracted from the largest positive error, resulting in the frequency response error.

**Equipment Required:**
- Power Meter
- Power Sensor
- Digital Multimeter
- 50Ω Feedthrough Termination
- N(f)-to-BNC(m) Adapter
- BNC Cable
- BNC(f)-to-Dual Banana Plug Adapter

**Note**

This test is an alternate for test 11a, "Frequency Response." Perform either this test or test 11a, "Frequency Response."

1. Connect the SOURCE connector to the INPUT connector using a BNC cable
2 Press the following keys:

- [Preset]
- [Spcl Fctn]
  - [SINGLE CAL]
  - [AUTO CAL ON OFF]
- [Freq]
  - [FULL SPAN]
- [Source]
  - [SOURCE ON OFF]
  - [SOURCE AMPLITUDE]
    - 10 [dBm]
- [Range/Input]
  - [RANGE]
    - 20 [dBm]
- [Res BW]
  - [RES BW]
    - 4.5 [Hz]
- [Sweep]
  - [Sweep AUTO MAN]
3. For each of the following frequencies, perform steps a and b.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td>10 Hz</td>
</tr>
<tr>
<td>100 Hz</td>
<td>100 Hz</td>
</tr>
<tr>
<td>1 kHz</td>
<td>30 kHz</td>
</tr>
<tr>
<td>30 kHz</td>
<td>300 kHz</td>
</tr>
<tr>
<td>100 kHz</td>
<td>10 MHz</td>
</tr>
<tr>
<td>300 kHz</td>
<td>40 MHz</td>
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<tr>
<td>500 kHz</td>
<td>100 MHz</td>
</tr>
<tr>
<td>1 MHz</td>
<td>150 MHz</td>
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<tr>
<td>2 MHz</td>
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<tr>
<td>5 MHz</td>
<td></td>
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<td>10 MHz</td>
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<td>25 MHz</td>
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<td>40 MHz</td>
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<tr>
<td>70 MHz</td>
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<td>85 MHz</td>
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</tr>
<tr>
<td>100 MHz</td>
<td></td>
</tr>
<tr>
<td>120 MHz</td>
<td></td>
</tr>
<tr>
<td>135 MHz</td>
<td></td>
</tr>
<tr>
<td>150 MHz</td>
<td></td>
</tr>
</tbody>
</table>

a. Press the following keys:
   (MANUAL FREQ) (to frequency in table)

b. Enter the Man readout in the test record's Measured Value column.

4. Enter the measured values recorded for test 10, Source Amplitude Accuracy and Frequency Response, in the test record's Reference Value column (50\(\Omega\) input impedance).

5. Subtract the reference value from the measured value for each frequency, and enter the result in the test record's Input Error column.

6. Disconnect the cable connected to the INPUT connector. Connect the 50\(\Omega\) feedthrough termination to the INPUT connector, and connect the cable to the 50\(\Omega\) feedthrough termination.
7 Press the following keys:

- [Range/Input]
  - [1 MEGOHM]
- [Source]
  - [SOURCE AMPLITUDE]
  - -5
  - [dBm]
- [Sweep]

8. For each of the following frequencies, perform steps a and b:

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
</tr>
<tr>
<td>100 Hz</td>
</tr>
<tr>
<td>1 kHz</td>
</tr>
<tr>
<td>10 kHz</td>
</tr>
<tr>
<td>30 kHz</td>
</tr>
<tr>
<td>100 kHz</td>
</tr>
<tr>
<td>300 kHz</td>
</tr>
<tr>
<td>500 kHz</td>
</tr>
<tr>
<td>1 MHz</td>
</tr>
<tr>
<td>2 MHz</td>
</tr>
<tr>
<td>5 MHz</td>
</tr>
<tr>
<td>10 MHz</td>
</tr>
<tr>
<td>25 MHz</td>
</tr>
<tr>
<td>40 MHz</td>
</tr>
</tbody>
</table>

a. Press the following keys:

- [MANUAL FREQ] (to frequency in table)

b. Enter the Man readout in the test record’s Measured Value column.

9. Connect the 50Ω feedthrough termination to the multimeter using the adapter.
10 Measure the resistance of the feedthrough termination and enter as the reference impedance for dBm operation (RES). Then set the multimeter’s function to volts (most accurate mode), ac bandwidth to 10 Hz - 1 MHz, and math mode to dBm. For an HP 3458A Digital Multimeter, press the following keys:

- blue shift key
- OHM
- blue shift key
- Menu Scroll ↓
- 10 (RES)
- ENTER
- ACV
- blue shift key
- Menu Scroll ↑
- 10, 100000
- ENTER
- blue shift key
- Menu Scroll ↓
- 3 (SYNC)
- ENTER
- blue shift key
- Menu Scroll ↓
- 5 (dBm)
- ENTER

**Note**

If your digital multimeter does not have dBm math capability, record the resistance of the feedthrough termination (RES) for later calculations.

1. Connect the test equipment as shown in figure 3-11.
2. For each of the following frequencies, perform steps a and b.

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
</tr>
<tr>
<td>100 Hz</td>
</tr>
<tr>
<td>1 kHz</td>
</tr>
<tr>
<td>10 kHz</td>
</tr>
<tr>
<td>30 kHz</td>
</tr>
<tr>
<td>100 kHz</td>
</tr>
</tbody>
</table>

a. Press the following keys:
   [MANUAL FREQ] [(to frequency in table)]

b. Enter the multimeter's readout in the test record's Reference Value column.

---

**Note**

If your digital multimeter does not have dBm math capability, use the following formula to convert your measurement results to dBm:

\[
10 \times \log_{10} \left( \frac{\text{readout}^2}{\text{RES}} \right) \text{ dBm}
\]

readout = multimeter's readout in volts

RES = measured resistance of the feedthrough termination

---

3. Connect the test equipment as shown in figure 3-12

![Figure 3-12. High Frequency Response Setup](image)
4. Set the power meter's function to dBm.
5. For each of the following frequencies, perform steps a through c:

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 kHz</td>
</tr>
<tr>
<td>500 kHz</td>
</tr>
<tr>
<td>1 MHz</td>
</tr>
<tr>
<td>2 MHz</td>
</tr>
<tr>
<td>5 MHz</td>
</tr>
<tr>
<td>10 MHz</td>
</tr>
<tr>
<td>25 MHz</td>
</tr>
<tr>
<td>40 MHz</td>
</tr>
</tbody>
</table>

a. Press the following keys:
[MANUAL FREQ] (to frequency in table)
b. Set the power meter's calibration factor for the frequency in the table.
c. Enter the power meter's readout in the test record's Reference Value column.
6. Referring to the test record, subtract the reference value from the measured value (for each frequency) and enter the result in the test record's Input Error column.
12. Reference Level Accuracy

Operation Verification – Yes

For Operation Verification, the procedure is the same as the Performance Test procedure.

This test verifies that the HP 3588A Spectrum Analyzer meets its amplitude accuracy specification for calibrated level accuracy. In this test, the synthesizer is adjusted to an exact amplitude level at 300 kHz. The analyzer’s range is set to the amplitude level and the signal is measured. Then the receiver’s input range is subtracted from the measured value. This test checks the calibrated level accuracy at five levels from -20 to +20 dBm.

Equipment Required
- Synthesizer
- Digital Multimeter
- 50Ω Feedthrough Termination
- BNC(0)-to-Dual Banana Plug Adapter
- BNC Cables (2)

1. Connect the 50Ω feedthrough termination to the multimeter using the adapter.

2. Measure the resistance of the feedthrough termination and enter as the reference impedance for dBm operation (RES). Then set the multimeter’s function to ac volts (most accurate mode) and math mode to dBm. For an HP 3458A Digital Multimeter, press the following keys:

   blue shift key  blue shift key  Reset
   OHM            S
   Menu Scroll U  (until SMATH is shown)  ENTER
   10 (RES)       ACV
   Menu Scroll U  S
   3 (SYNC)       (until SETACV is shown)  ENTER
   blue shift key  blue shift key
   Menu Scroll U  L
   5 (dBm)        (until MATH is shown)  ENTER

Note
If your digital multimeter does not have dBm math capability, record the resistance of the feedthrough termination (RES) for later calculations.
1. Connect the test equipment as shown in figure 3-13.

![Figure 3-13. Reference Level Accuracy Setup](image)

2. Set the synthesizer's frequency to 300 kHz.

3. Press the following keys:
   - [Preset]
   - [Spcl Fctn]
     - [SINGLE CAL]
     - [AUTO CAL ON OFF]
   - [Freq]
     - [CENTER]
     - 300 [Hz]
     - [SPAN]
     - 1 [Hz]
   - [Sweep]
     - [Sweep Auto] [MAN]
4. For each of the following amplitudes, perform steps a through f.

<table>
<thead>
<tr>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20 dBm ±0.01 dB</td>
</tr>
<tr>
<td>-10 dBm ±0.01 dB</td>
</tr>
<tr>
<td>0 dBm ±0.01 dB</td>
</tr>
<tr>
<td>+10 dBm ±0.01 dB</td>
</tr>
<tr>
<td>+20 dBm ±0.01 dB</td>
</tr>
</tbody>
</table>

a. Connect the synthesizer’s output to the multimeter through the 50Ω feedthrough termination and adapter.

b. Adjust the synthesizer’s amplitude to the range in the table as read by the multimeter.

Note

If your digital multimeter does not have dBm math capability, use the following formula to convert your measurement results to dBm

\[
10 \times \log_{10} \left( \frac{\text{readout}^2}{\text{RES} \times 1 \text{ mW}} \right) = \text{dBm}
\]

readout = multimeter’s readout in volts
RES = measured resistance of the feedthrough termination

c. Disconnect the cable connected to the multimeter. Using the same cable (without the 50Ω feedthrough termination), connect the synthesizer to the INPUT connector.

d. Press the following keys:

[ Range/Input ]
[ RANGE ] (to range in table)

e. Enter the Man readout in the test record

f. Subtract the range from the Man readout, and enter the result in the test record.
13. Log Scale Accuracy

Operation Verification — No

Do not perform this test for Operation Verification.

This test verifies that the HP 3588A Spectrum Analyzer meets its amplitude accuracy specification for log scale accuracy. In this test, a power splitter connects the synthesizer's output to the analyzer and to the multimeter. The synthesizer is adjusted to a reference level using the analyzer. From this reference level, the synthesizer's amplitude is reduced in 10 dB steps. Both the multimeter and the receiver measure the synthesizer's output. The value the analyzer measures is subtracted from the value the multimeter measures, resulting in the log scale accuracy for that amplitude. This test checks log scale accuracy at 7 amplitude levels at 100 kHz.

Equipment Required:
- Digital Multimeter
- Synthesizer
- Step Attenuator (with calibration data at 100 kHz)
- Power Splitter
- 50Ω Feedthrough Termination
- N(m)-to-BNC(f) Adapters (3)
- BNC(f)-to-Dual Banana Plug Adapter
- BNC Cables (5)

1. Connect the 50Ω feedthrough termination to the multimeter using the adapter.

2. Measure the resistance of the feedthrough termination and enter as the reference impedance for dBm operation (RES). Then set the multimeter's function to ac volts (most accurate mode). For an HP 3458A Digital Multimeter, press the following keys:

- blue shift key
- OHM
- blue shift key
- Menu Scroll ▼
- 10 (RES)
- ACV
- blue shift key
- Menu Scroll ▼
- 3 (SYNC)

- Reset
- S
- (until SMATH is shown)
- ENTER

- S
- (until SETACV is shown)
- ENTER
If your digital multimeter does not have dBm math capability, record the resistance of the feedthrough termination (RES) for later calculations.

1. Connect the test equipment as shown in figure 3-14.

![Figure 3-14. Log Scale Accuracy Setup](image)

2. Press the following keys:

   [Preset]
   [Spd Fctn]
   [SINGLE CAL]
   [AUTO CAL ON OFF]

   [Freq]
   [CENTER]
   100
   [Hz]
   [SPAN]
   1
   [Hz]

   [Sweep]
   [SWEEP AUTO MAN]

   [Range/Input]
   [RANGE]
   10
   [dBm]
3. Set the step attenuator to 0 dB.
4. Set the synthesizer as follows:

| Frequency | 100 kHz |
| Amplitude | (adjust for \text{MAN} \text{readout of 10 dBm} \pm 0.01 \text{ dB}) |

5. Press the following keys:
   - [Marker ]
   - [ ZERO OFFSET ]
   - [ Avg/Pk Hold ]
   - [ VIDEO AVERAGE ]

6. Set the multimeter's math mode to \text{dBm} and null. For an HP 3458A Digital Multimeter, press the following keys:

   blue shift key   L
   Menu Scroll \downarrow (until MATH is shown)
   5, 9 (dBm, NULL) ENTER

\underline{Note}

If your digital multimeter does not have math null capability, record the multimeter readout in \text{dBm} for later calculations.

If your digital multimeter does not have \text{dBm} math capability, use the following formula to convert your measurement result to \text{dBm}:

\[10 \times \log_{10} \left( \frac{\text{readout}}{\text{RES} / 1 \text{ mW}} \right) = \text{dBm}\]

\text{readout} = \text{multimeter's readout in volts}  
\text{RES} = \text{measured resistance of the feedthrough termination}
1. For each of the following levels, perform steps a through c.

<table>
<thead>
<tr>
<th>Level (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
</tr>
<tr>
<td>-20</td>
</tr>
<tr>
<td>-30</td>
</tr>
<tr>
<td>-40</td>
</tr>
<tr>
<td>-50</td>
</tr>
</tbody>
</table>

a. Adjust the synthesizer's amplitude down from the reference amplitude set in step 6 by the amount in the table.
b. Enter the multimeter readout in the test record's Reference Value column.

c. Press [Meas Restart], then enter the Δ Man readout in the test record's Measured Value column.

Note
If your digital multimeter does not have math null capability, subtract the multimeter readout in step 8 from the current multimeter readout before entering in the test record's Reference Value column.

2. Set the step attenuator to 10 dB.

3. Enter the multimeter readout in the test record's Reference Value column.

4. Enter the step attenuator's 10 dB insertion loss error at 100 kHz (from step attenuator's calibration data sheet) in the test record's Insertion Loss Error column.

5. Press [Meas Restart], then enter the Δ Man readout in the test record's Measured Value column.

6. Set step attenuator to 20 dB.

7. Enter the multimeter readout in the test record's Reference Value column.

8. Enter the step attenuator's 20 dB insertion loss error at 100 kHz (from step attenuator's calibration data sheet) in the test record's Insertion Loss Error column.

9. Press [Meas Restart], then enter the Δ Man readout in the test record's Measured Value column.

10. For input levels of -10 through -50, subtract the measured value from the reference value and enter the result in the test record.

11. For input levels of -60 and -70, subtract the attenuator setting, the insertion loss error, and the measured value from the reference value. Enter the result in the test record.
14. Source Dynamic Accuracy

Operation Verification — Yes

For Operation Verification, the procedure is the same as the Performance Test procedure.

This test verifies that the HP 3588A Spectrum Analyzer meets its source specification for dynamic accuracy. In this test, a step attenuator attenuates the source output by 20 dB, establishing a reference level. Then, the source internally attenuates the output, and the step attenuator's attenuation is decreased by the same amount. Using the offset marker, the analyzer measures the source output again. This value minus the correction for the step attenuator error is the source dynamic accuracy. This test checks dynamic accuracy at 300 kHz for all of the fixed attenuation pads and two attenuation levels in the variable attenuation circuit.

Equipment Required:  
Step Attenuator (with calibration data at 300 kHz)  
BNC Cables (2)

1. Connect the test equipment as shown in figure 3-15.

![Source Dynamic Accuracy Setup](image)

**Figure 3 15  Source Dynamic Accuracy Setup**

2. Set the step attenuator to 20 dB
3. Press the following keys.

- [Preset]
- [Spcl Fctn]
  - [SINGLE CAL]
  - [AUTO CAL ON OFF]
- [Sweep]
  - [SWEEP AUTO MAN]
  - [MANUAL FREQ]
  - 300
  - [Hz]
- [Res BW]
  - [RES BW]
  - 290
  - [Hz]
- [Range/Input]
  - [RANGE]
  - 10
  - [dBm]
- [Source]
  - [SOURCE ON OFF]
  - [SOURCE AMPLITUDE]
  - 10
  - [dBm]
- [Marker]
  - [ZERO OFFSET]
- [Spcl Fctn]
  - [PRFM TESTS] (NOTE: ignore source uncalibrated message)
  - [SRCE 10 dB IN OUT]

4. Set the step attenuator to 10 dB.

5. Enter the Δ Man readout in the test record for the measured value of the 10 dB PAD.

6. Press the following keys.

- [SRCE 10 dB IN OUT]
- [SRCE DAC ATTEN]
  - 10
  - [dB]

7. Enter the Δ Man readout in the test record for the measured value of the 10 dB DAC.

8. Press the following keys

- [SRCE DAC ATTEN]
  - 0
  - [dB]
- [SRCE 20 dB A IN OUT]

9. Set the step attenuator to 0 dB.

10. Enter the Δ Man readout in the test record for the measured value of the 20 dB PAD A.
11. Press the following keys:
   [ SRC E 20 dB A IN OUT ]
   [ SRC E 20 dB B IN OUT ]

12. Enter the Δ Man readout in the test record for the measured value of the 20 dB PAD B.

13. Press the following keys:
   [ SRC E 20 dB B IN OUT ]
   [ SRC E DAC ATTEN ]
   [ 20 dB ]

14. Enter the Δ Man readout in the test record for the measured value of the 20 dB DAC.

15. Using the step attenuator's calibration data sheets, calculate and enter the correction for the step attenuator's error.
   — The correction for the source's 10 dB attenuation is the step attenuator's 20 dB insertion loss error, minus its 10 dB insertion loss error
   — The correction for the source's 20 dB attenuation is the step attenuator's 20 dB insertion loss error.

16. For each attenuation, subtract the correction from the measured value, and enter the result in the test record.
15. Input Return Loss

Operation Verification – No
Do not perform this test for Operation Verification.

This test verifies that the HP 3588A Spectrum Analyzer meets its amplitude accuracy specification for input return loss. In this test, a signal generator provides a signal to the source port of the 50Ω directional bridge. A spectrum analyzer measures the change that occurs to the directional bridge's reflected port when the HP 3588A analyzer's input is connected to the directional bridge's load port. This test checks the input return loss at all attenuator settings at 100 MHz and 150 MHz.

Equipment Required

- Synthesized Signal Generator
- Spectrum Analyzer
- 50Ω Directional Bridge
- SMA(m)-to-BNC(f) Adapters (2)
- N(m)-to-BNC(t) Adapter
- N(m)-to-BNC(m) Adapter
- BNC Cables (3)

1. Connect the test equipment as shown in figure 3-16.

![Diagram](image.png)

Figure 3-16. Input Return Loss Setup
1. Press the following keys:
   - [Preset]
   - [Spct Fctn]
     - [SINGLE CAL]
     - [AUTO CAL ON OFF]

2. Set the signal generator as follows:
   - Amplitude: -15 dBm
   - Frequency: 100 MHz

3. Set the spectrum analyzer as follows:
   - Input: 1
   - Frequency Span: 0 Hz
   - Resolution BW: 10 kHz
   - Center Frequency: 100 MHz
   - Sweep: Single

4. After the spectrum analyzer completes a sweep, measure and record the peak amplitude or set the relative marker value using marker functions.

5. Connect the load port of the bridge directly to the INPUT connector using adapter (do NOT use a BNC cable).

6. For each of the following ranges, perform steps a through c:

<table>
<thead>
<tr>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>+20</td>
</tr>
<tr>
<td>+10</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>-10</td>
</tr>
<tr>
<td>-20</td>
</tr>
</tbody>
</table>

   a. Press the following keys:
      - [Range/Input]
      - [Range] (to range in table)

   b. Set the spectrum analyzer to sweep again.

   c. After the spectrum analyzer completes the sweep, measure the peak amplitude relative to the peak amplitude when the load port was not connected (use marker functions, or subtract the peak amplitude when the load port was not connected from the peak amplitude when the load port was connected). Enter the result in the test record.

7. Disconnect the load port of the bridge from the INPUT connector.

8. Repeat steps 3 through 7, setting the frequency in steps 3 and 4 to 150 MHz.
16. Source Return Loss

Operation Verification – No

Do not perform this test for Operation Verification.

This test verifies that the HP 3588A Spectrum Analyzer meets its source specification for return loss. In this test, a signal generator provides a signal to the source port of a 50Ω directional bridge. A spectrum analyzer measures the change that occurs to the directional bridge’s reflected port when the HP 3588A analyzer’s source is connected to the directional bridge’s load port. This test checks the source return loss for 6 source amplitudes at 60 MHz, 120 MHz, and 150 MHz.

Equipment Required

- Spectrum Analyzer
- Synthesized Signal Generator
- 50Ω Directional Bridge
- SMA(m)-to-BNC(f) Adapters (2)
- N(m)-to-BNC(f) Adapter
- N(m)-to-BNC(m) Adapter
- BNC Cables (3)

1. Connect the test equipment as shown in figure 3-16.

Figure 3.16 Source Return Loss Setup
2. Set the signal generator as follows:
   Amplitude \(-15\) dBm

3. Set the spectrum analyzer as follows:
   Input 1
   Frequency Span 0 Hz
   Resolution BW 10 kHz

4. Press the following keys:
   [Preset]
   [Spcl Fcts]
     [SINGLE CAL]
     [AUTO CAL ON OFF]
   [Freq]
     [FULL SPAN]
   [Sweep]
     [SWEEP AUTO MAN]
     [MANUAL FREQ]
     0 Hz
   [Source]
     [SOURCE ON OFF]

5. Set the signal generator's frequency to 60 MHz

6. Set the spectrum analyzer as follows:
   Center Frequency 60 MHz
   Sweep Single

7. After the spectrum analyzer completes the sweep, measure and record the peak amplitude or set a relative marker using marker functions.

8. Connect the load port of the directional bridge directly to the SOURCE connector using adapter (do NOT use a BNC cable).
9. For each of the following source amplitudes, perform steps a through c:

<table>
<thead>
<tr>
<th>Source Amplitude (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+10</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>-10</td>
</tr>
<tr>
<td>-20</td>
</tr>
<tr>
<td>-30</td>
</tr>
<tr>
<td>-40</td>
</tr>
</tbody>
</table>

a. Press the following keys:
1 SOURCE AMPLITUDE 1 to source amplitude in table

b. Set the spectrum analyzer to sweep again.

c. After the spectrum analyzer completes the sweep, measure the peak amplitude relative to the peak amplitude when the directional bridge was not connected to the SOURCE connector (use marker functions, or subtract the peak amplitude before the directional bridge was connected from the peak amplitude after the directional bridge was connected). Enter the result in the test record.

10. Disconnect the directional bridge's load port from the SOURCE connector.

11. Repeat steps 5 through 10, setting the frequency in steps 5 and 6 to 120 MHz.

12. Repeat steps 5 through 9, setting the frequency in steps 5 and 6 to 150 MHz.
17. Source Harmonic Distortion

Operation Verification — Yes

For Operation Verification, check only the frequencies listed in the shaded box.

This test verifies that the HP 3588A Spectrum Analyzer meets its source specification for harmonic distortion. In this test, a spectrum analyzer measures the source output, establishing a reference level. The spectrum analyzer then measures the second and third harmonic relative to the reference level.

Equipment Required:  
- Spectrum Analyzer
- BNC Cables (2)

1. Connect the test equipment as shown in figure 3-17

![Figure 3-17. Source Harmonic Distortion Setup](image)
2. Press the following keys:
   [ Preset ]
   [ Spec Fctn ]
   [ SINGLE CAL ]
   [ AUTO CAL ON OFF ]
   [ Source ]
   [ SOURCE ON OFF ]
   [ SOURCE AMPLITUDE ]
   10
   [ dBm ]
   [ Sweep ]
   [ SWEEP AUTO MAN ]

3. Set the spectrum analyzer as follows:
   - Reference Level: +10 dBm
   - Frequency Span: 5 kHz
   - Sweep Mode: Single

4. For each of the following fundamental frequencies, perform steps a through g:

<table>
<thead>
<tr>
<th>For Performance Tests</th>
<th>For Operation Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fundamental Frequency</strong></td>
<td><strong>Second Harmonic</strong></td>
</tr>
<tr>
<td>100 kHz</td>
<td>200 kHz</td>
</tr>
<tr>
<td>1 MHz</td>
<td>2 MHz</td>
</tr>
<tr>
<td>10 MHz</td>
<td>20 MHz</td>
</tr>
</tbody>
</table>

a. Press the following keys:
   [ MANUAL FREQ ] (to fundamental frequency in table)

b. Set the spectrum analyzer’s center frequency to the fundamental frequency in the table and start a sweep.

c. After the spectrum analyzer completes the sweep, measure and record the peak amplitude of the fundamental frequency or set a relative marker using marker functions.
d. Change the spectrum analyzer's center frequency to the second harmonic and start a sweep.

e. After the spectrum analyzer completes the sweep, measure the peak amplitude of the second harmonic relative to the peak amplitude of the fundamental frequency (use marker functions, or subtract the peak amplitude of the fundamental frequency from the peak amplitude of the second harmonic). Enter the result in the test record.

f. Change the spectrum analyzer's center frequency to the third harmonic and start a sweep.

g. After the spectrum analyzer completes the sweep, measure the peak amplitude of the third harmonic relative to the peak amplitude of the fundamental frequency (use marker functions, or subtract the peak amplitude of the fundamental frequency from the peak amplitude of the third harmonic). Enter the result in the test record.
18. Source Spurious Responses

Operation Verification – Yes

For Operation Verification, the procedure is the same as the Performance Test procedure.

This test verifies that the HP 3588A Spectrum Analyzer meets its source specification for spurious responses. In this test, a spectrum analyzer measures the source's output, establishing a reference level. The spectrum analyzer then measures a spur relative to the reference level.

Equipment Required:
- Spectrum Analyzer
- BNC Cables (2)

1. Connect the test equipment as shown in figure 3-18.

![Figure 3-18. Source Spurious Responses Setup](image-url)
2. Press the following keys:
   - [ Preset ]
   - [ Spcl Ftn ]
     - [ SINGLE CAL ]
     - [ AUTO CAL ON OFF ]
   - [ Source ]
     - [ SOURCE ON OFF ]
     - [ SOURCE AMPLITUDE ]
     - 10 dBm
   - [ Sweep ]
     - [ SWEEP AUTO MAN ]

3. For each of the following spur frequencies, perform steps a through c:

<table>
<thead>
<tr>
<th>Reference Frequency</th>
<th>Spur Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 kHz</td>
<td>10.1875 MHz</td>
</tr>
<tr>
<td>101 MHz</td>
<td>101.1875 MHz</td>
</tr>
<tr>
<td>149.9 MHz</td>
<td>10.3875 MHz</td>
</tr>
</tbody>
</table>

a. Press the following keys:
   - [ MANUAL FREQ ] (to reference frequency in table)

b. Set the spectrum analyzer as follows:
   - Center Frequency: (to reference frequency in table)
   - Frequency Span: 20 kHz
   - Reference Level: +10 dBm

c. After the spectrum analyzer completes a sweep, measure and record the peak amplitude or set a relative marker using marker functions.

d. Set the spectrum analyzer as follows:
   - Center Frequency: (to spur frequency in table)
   - Frequency Span: 100 Hz

e. After the spectrum analyzer completes a sweep, measure the peak amplitude relative to the reference frequency's peak amplitude (use marker functions, or subtract the peak amplitude of the reference frequency from the peak amplitude of the spur frequency). Enter the result in the test record.
19. Source Noise

Operation Verification — Yes

For Operation Verification, check only the frequencies listed in the shaded box.

This test verifies that the HP 3588A Spectrum Analyzer meets its source specification for noise. In this test, a spectrum analyzer measures the HP 3588A analyzer's source, establishing a reference level. Then, using its noise marker function, the spectrum analyzer measures the source at six offset frequencies. The spectrum analyzer's noise marker function normalizes the marker value to a 1 Hz bandwidth.

Equipment Required:
- Spectrum Analyzer
- BNC Cables (2)

1. Connect the test equipment as shown in figure 3-19.
2. Press the following keys:
   - [Preset]
   - [Spcl Fctn]
     - [SINGLE CAL]
     - [AUTO CAL ON OFF]
   - [Source]
     - [SOURCE ON OFF]
     - [SOURCE AMPLITUDE]
     - 10
     - [dBm]
   - [Sweep]
     - [SWEEP AUTO MAN]

3. For each of the following reference frequencies, perform steps a through c:

   **For Performance Tests**

<table>
<thead>
<tr>
<th>Reference Frequency (MHz)</th>
<th>Offset Frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0125</td>
<td>8.013012</td>
</tr>
<tr>
<td></td>
<td>8.015060</td>
</tr>
<tr>
<td></td>
<td>8.025301</td>
</tr>
<tr>
<td></td>
<td>8.076506</td>
</tr>
<tr>
<td></td>
<td>8.332531</td>
</tr>
<tr>
<td></td>
<td>9.612656</td>
</tr>
<tr>
<td>140.0125</td>
<td>140.013012</td>
</tr>
<tr>
<td></td>
<td>140.015060</td>
</tr>
<tr>
<td></td>
<td>140.025301</td>
</tr>
<tr>
<td></td>
<td>140.076506</td>
</tr>
<tr>
<td></td>
<td>140.332531</td>
</tr>
<tr>
<td></td>
<td>141.612656</td>
</tr>
</tbody>
</table>

   **For Operation Verification**

<table>
<thead>
<tr>
<th>Reference Frequency (MHz)</th>
<th>Offset Frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0125</td>
<td>8.013012</td>
</tr>
<tr>
<td></td>
<td>8.076506</td>
</tr>
</tbody>
</table>

   a. Press the following keys:
      - [Sweep]
      - [MANUAL FREQ] (to reference frequency in table)

   b. Set the spectrum analyzer as follows:
      - **Noise Marker Function**: Off
      - **Frequency Span**: 20 kHz
      - **Reference Level**: +10 dBm
      - **Center Frequency**: (to reference frequency in table)
      - **Sweep Mode**: Single
c. After the spectrum analyzer completes the sweep, measure the peak amplitude and enter in the test record as the reference value for each offset frequency.

d. Set the spectrum analyzer as follows:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Span</td>
<td>100 Hz</td>
</tr>
<tr>
<td>Reference Level</td>
<td>-50 dBm</td>
</tr>
<tr>
<td>Noise Marker Function</td>
<td>On</td>
</tr>
</tbody>
</table>

e. For each offset frequency, perform steps i through iii.

i. Change the spectrum analyzer's center frequency to the offset frequency in the table and start a sweep.

ii. After the spectrum analyzer completes the sweep, measure the peak amplitude and enter the noise marker value in the test record.

iii. Referring to the test record, subtract the reference value from the measured value and enter in the test record.
Performance Test Record

Calibration Entity and Address

Test Performed By

Report Number

Customer

Trace Number

Installed Options

Test Date

Temperature

Humidity

Power Line Frequency
Trace Number ______________ Report Number ____________ Test Date __/__/__

Test Equipment:

Digital Multimeter

Model __________________________________________

Trace Number __________________________________

Calibration Due Date ____________________________

Frequency Standard

Model __________________________________________

Trace Number __________________________________

Calibration Due Date ____________________________

Milliwatt Power Meter

Model __________________________________________

Trace Number __________________________________

Calibration Due Date ____________________________

Power Meter

Model __________________________________________

Trace Number __________________________________

Calibration Due Date ____________________________

Power Sensor

Model __________________________________________

Trace Number __________________________________

Calibration Due Date ____________________________
Trace Number________________________Report Number____________________Test Date __/__/____

**Power Splitter**

Model____________________________________

Trace Number___________________________

Calibration Due Date_____________________

**Spectrum Analyzer**

Model____________________________________

Trace Number___________________________

Calibration Due Date_____________________

**Step Attenuator**

Model____________________________________

Trace Number___________________________

Calibration Due Date_____________________

**Synthesized Signal Generator**

Model____________________________________

Trace Number___________________________

Calibration Due Date_____________________

**Synthesizer/Level Generator**

Model____________________________________

Trace Number___________________________

Calibration Due Date_____________________
Operation Verification and Performance Tests
Performance Test Record

Trace Number: __________________ Report Number: _______________ Test Date: ___/___/

Two-Channel Synthesizer

Model: ____________________________

Trace Number: _______________________

Calibration Due Date: ________________

50Ω Directional Bridge

Model: ____________________________

Trace Number: _______________________

Calibration Due Date: ________________
### Measurement Uncertainty

<table>
<thead>
<tr>
<th>Performance Test</th>
<th>Using Recommended Test Equipment</th>
<th>Using Other Test Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measurement Uncertainty</td>
<td>Ratio</td>
</tr>
<tr>
<td>1 Local Oscillator Feedthrough</td>
<td>NA$^1$</td>
<td>NA$^1$</td>
</tr>
<tr>
<td>2 Phase Noise</td>
<td>NA$^1$</td>
<td>NA$^1$</td>
</tr>
<tr>
<td>3 Residual Responses</td>
<td>NA$^1$</td>
<td>NA$^1$</td>
</tr>
<tr>
<td>4 Noise Level</td>
<td>NA$^1$</td>
<td>NA$^1$</td>
</tr>
<tr>
<td>5 Frequency Accuracy</td>
<td>±0.00003 ppm</td>
<td>&gt; 10 :1</td>
</tr>
<tr>
<td>(Allowing adjustment)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Spurious Responses</td>
<td>±0.25 dB</td>
<td>NA$^2$</td>
</tr>
<tr>
<td>Typical scale fidelity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test signal spurious responses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 120 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120 to 150 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Image Responses</td>
<td>±0.25 dB</td>
<td>NA$^2$</td>
</tr>
<tr>
<td>Typical scale fidelity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test signal spurious responses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 120 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120 to 150 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Input Harmonic Distortion</td>
<td>±0.25 dB</td>
<td>NA$^2$</td>
</tr>
<tr>
<td>Typical scale fidelity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test signal harmonics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; -100 dBc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Intermodulation Distortion</td>
<td>±0.25 dB</td>
<td>NA$^2$</td>
</tr>
<tr>
<td>Typical scale fidelity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical test signals distortion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; -86 dBc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Source Amplitude Accuracy and Frequency Response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Hz</td>
<td>±0.011 dB</td>
<td>&gt; 10 :1</td>
</tr>
<tr>
<td>100 Hz</td>
<td>±0.010 dB</td>
<td>&gt; 10 :1</td>
</tr>
<tr>
<td>1 kHz</td>
<td>±0.010 dB</td>
<td>&gt; 10 :1</td>
</tr>
<tr>
<td>10 kHz</td>
<td>±0.011 dB</td>
<td>&gt; 10 :1</td>
</tr>
<tr>
<td>30 kHz</td>
<td>±0.012 dB</td>
<td>&gt; 10 :1</td>
</tr>
<tr>
<td>100 kHz</td>
<td>±0.017 dB</td>
<td>&gt; 10 :1</td>
</tr>
<tr>
<td>300 kHz</td>
<td>±0.109 dB$^2$</td>
<td>8.1 :1</td>
</tr>
<tr>
<td>500 kHz</td>
<td>±0.109 dB$^2$</td>
<td>8.1 :1</td>
</tr>
<tr>
<td>1 kHz</td>
<td>±0.109 dB$^2$</td>
<td>8.1 :1</td>
</tr>
<tr>
<td>2 MHz</td>
<td>±0.109 dB$^2$</td>
<td>8.1 :1</td>
</tr>
<tr>
<td>5 MHz</td>
<td>±0.109 dB$^2$</td>
<td>8.1 :1</td>
</tr>
<tr>
<td>10 MHz</td>
<td>±0.097 dB$^2$</td>
<td>9.9 :1</td>
</tr>
<tr>
<td>25 MHz</td>
<td>±0.099 dB$^2$</td>
<td>9.9 :1</td>
</tr>
<tr>
<td>40 MHz</td>
<td>±0.099 dB$^2$</td>
<td>9.9 :1</td>
</tr>
<tr>
<td>55 MHz</td>
<td>±0.099 dB$^2$</td>
<td>9.9 :1</td>
</tr>
<tr>
<td>70 MHz</td>
<td>±0.099 dB$^2$</td>
<td>9.9 :1</td>
</tr>
<tr>
<td>85 MHz</td>
<td>±0.099 dB$^2$</td>
<td>9.9 :1</td>
</tr>
<tr>
<td>100 MHz</td>
<td>±0.099 dB$^2$</td>
<td>9.9 :1</td>
</tr>
<tr>
<td>120 MHz</td>
<td>±0.099 dB$^2$</td>
<td>9.9 :1</td>
</tr>
<tr>
<td>135 MHz</td>
<td>±0.099 dB$^2$</td>
<td>9.9 :1</td>
</tr>
<tr>
<td>150 MHz</td>
<td>±0.099 dB$^2$</td>
<td>9.9 :1</td>
</tr>
</tbody>
</table>

1 internal test  
2 single sided specification  
3 root sum squares calculation method
<table>
<thead>
<tr>
<th>Trace Number</th>
<th>Report Number</th>
<th>Test Date</th>
<th>Performance Test</th>
<th>Using Recommended Test Equipment</th>
<th>Measurement Uncertainty</th>
<th>Ratio</th>
<th>Using Other Test Equipment</th>
<th>Measurement Uncertainty</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>11a</td>
<td></td>
<td></td>
<td>Input Amplitude Accuracy and Flatness</td>
<td>50Ω</td>
<td>10 Hz to 100 Hz: ±0.035 dB, 100 Hz to 30 kHz: ±0.035 dB, 30 kHz to 40 MHz: ±0.035 dB, 40 kHz to 50 MHz: ±0.035 dB, 50 MHz to 100 MHz: ±0.045 dB, 100 MHz to 150 MHz: ±0.060 dB</td>
<td>&gt; 10.1</td>
<td></td>
<td>1 MΩ</td>
<td>10 to 100 Hz: ±0.035 dB, 100 Hz to 30 kHz: ±0.035 dB, 30 kHz to 40 MHz: ±0.035 dB</td>
</tr>
<tr>
<td>11b</td>
<td></td>
<td></td>
<td>Alternate Input Amplitude Accuracy and Flatness</td>
<td>50Ω</td>
<td>10 Hz: ±0.011 dB, 100 Hz: ±0.010 dB, 1 kHz: ±0.010 dB, 10 kHz: ±0.011 dB, 30 kHz: ±0.012 dB, 100 kHz: ±0.017 dB, 300 kHz: ±0.109 dB, 500 kHz: ±0.109 dB, 1 MHz: ±0.109 dB, 2 MHz: ±0.109 dB, 5 MHz: ±0.097 dB, 10 MHz: ±0.089 dB, 25 MHz: ±0.089 dB, 40 MHz: ±0.092 dB, 55 MHz: ±0.092 dB, 70 MHz: ±0.092 dB, 85 MHz: ±0.098 dB, 100 MHz: ±0.098 dB, 120 MHz: ±0.098 dB, 135 MHz: ±0.098 dB, 150 MHz: ±0.098 dB, 1 MΩ</td>
<td>±0.011 dB</td>
<td>&gt; 10.1</td>
<td></td>
<td>10 Hz</td>
</tr>
</tbody>
</table>

1 internal test
2 single sided specification
3 root-sum-square calculation method

6 of 20
<table>
<thead>
<tr>
<th>Trace Number</th>
<th>Report Number</th>
<th>Test Date: <strong>/</strong>/__</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Performance Test</th>
<th>Using Recommended Test Equipment</th>
<th></th>
<th>Using Other Test Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measurement Uncertainty</td>
<td>Ratio</td>
<td>Measurement Uncertainty</td>
</tr>
<tr>
<td>11b</td>
<td>Alternate Input Amplitude Accuracy and Flatness (cont)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 MHz</td>
<td>$\pm 0.109$ dB$^2$</td>
<td>5.11</td>
<td></td>
</tr>
<tr>
<td>2 MHz</td>
<td>$\pm 0.109$ dB$^2$</td>
<td>5.11</td>
<td></td>
</tr>
<tr>
<td>5 MHz</td>
<td>$\pm 0.097$ dB$^2$</td>
<td>6.41</td>
<td></td>
</tr>
<tr>
<td>10 MHz</td>
<td>$\pm 0.089$ dB$^2$</td>
<td>6.21</td>
<td></td>
</tr>
<tr>
<td>25 MHz</td>
<td>$\pm 0.089$ dB$^2$</td>
<td>6.21</td>
<td></td>
</tr>
<tr>
<td>40 MHz</td>
<td>$\pm 0.092$ dB$^2$</td>
<td>6.01</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Reference Level Accuracy</td>
<td>$\pm 0.036$ dB</td>
<td>8.1</td>
</tr>
<tr>
<td>13</td>
<td>Log Scale Accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 30 dB</td>
<td>$\pm 0.007$ dB</td>
<td>7.1</td>
<td></td>
</tr>
<tr>
<td>-40 dB</td>
<td>$\pm 0.044$ dB</td>
<td>22.1$^4$</td>
<td></td>
</tr>
<tr>
<td>-50 dB</td>
<td>$\pm 0.044$ dB</td>
<td>6.61</td>
<td></td>
</tr>
<tr>
<td>-60 dB</td>
<td>$\pm 0.064$ dB</td>
<td>7.31</td>
<td></td>
</tr>
<tr>
<td>-70 dB</td>
<td>$\pm 0.064$ dB</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Source Dynamic Accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 dB pad</td>
<td>$\pm 0.02$ dB</td>
<td>98.1</td>
<td></td>
</tr>
<tr>
<td>20 dB pad</td>
<td>$\pm 0.02$ dB</td>
<td>$&gt;10.1$</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Input Return Loss</td>
<td>$\pm 0.9$ dB</td>
<td>NA$^2$</td>
</tr>
<tr>
<td>16</td>
<td>Source Return Loss</td>
<td>$\pm 0.9$ dB</td>
<td>NA$^2$</td>
</tr>
<tr>
<td>17</td>
<td>Source Harmonic Distortion</td>
<td>$\pm 3.5$ dB</td>
<td>NA$^2$</td>
</tr>
<tr>
<td>18</td>
<td>Source Spurious Responses</td>
<td>$\pm 1.5$ dB$^3$</td>
<td>NA$^2$</td>
</tr>
<tr>
<td>19</td>
<td>Source Noise</td>
<td>$\pm 1.65$ dB$^2$</td>
<td>NA$^2$</td>
</tr>
</tbody>
</table>

1 Internal test  
2 Single sided specification  
3 Root sum squares calculation method  
4 Unable to meet the 4:1 ratio with current test equipment  
Vernier accuracy of multimeter if calculated value is within 0.05 dB of specification
Trace Number: ______________ Report Number: ______________ Test Date: __/__/____

1. **Local Oscillator Feedthrough** PASS______ FAIL______

   Specification: >20 dB below range

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Measured Value (dBm)</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Hz</td>
<td></td>
<td>&lt; -40 dBm</td>
</tr>
</tbody>
</table>

2. **Phase Noise** PASS______ FAIL______

   Specification
   1 kHz offset normalized to 1 Hz noise power bandwidth < -105 dBC

<table>
<thead>
<tr>
<th>Measured Value (dB/Hz)</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; -105 dB/Hz</td>
</tr>
</tbody>
</table>

3. **Residual Responses** PASS______ FAIL______

   Specification: -20 dBm range < -110 dBm

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Measured Value (dBm)</th>
<th>Specification (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Hz or 60 Hz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>100 Hz or 120 Hz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>150 Hz or 180 Hz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>1.25 kHz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>24.7623 kHz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>35.7134 kHz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>100 kHz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>187.5 kHz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>250 kHz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>10 MHz</td>
<td></td>
<td>&lt; -110</td>
</tr>
</tbody>
</table>
4. **Noise Level**  

**PASS**  **FAIL**

**Specification:**
- 50Ω input impedance $\leq -132$ dBm/Hz above 30 kHz (degrade by 3 dB for start frequency ≤30 kHz in auto-sweep mode)
- $\leq -129$ dBm/Hz between 2 kHz and 30 kHz inclusive
- 100 Hz to 2 kHz is l/f noise and is $\leq -129$ dBm/Hz at 2 kHz
- and $\leq -116$ dBm/Hz at 100 Hz
- add 10 dB to specification if low-distortion mode is ON

75Ω input impedance add 2 dB to 50Ω specification

1 MΩ input impedance $\leq -110$ dBm/Hz below 40 MHz with l/f corner at 100 kHz (terminated in 100 kΩ)

<table>
<thead>
<tr>
<th>Step</th>
<th>Low Distortion</th>
<th>Input Impedance</th>
<th>Resolution Bandwidth</th>
<th>Frequency</th>
<th>Measured Value (dBm/Hz)</th>
<th>Specification (dBm/Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>ON</td>
<td>50Ω</td>
<td>17 kHz</td>
<td>150 MHz</td>
<td></td>
<td>$\leq -122$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>140 MHz</td>
<td></td>
<td>$\leq -122$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>120 MHz</td>
<td></td>
<td>$\leq -122$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>71 MHz</td>
<td></td>
<td>$\leq -122$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19 MHz</td>
<td></td>
<td>$\leq -122$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.3 MHz</td>
<td></td>
<td>$\leq -122$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>53 kHz</td>
<td></td>
<td>$\leq -122$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>290 Hz</td>
<td></td>
<td>$\leq -119$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>73 Hz</td>
<td></td>
<td>$\leq -114$</td>
</tr>
<tr>
<td>5</td>
<td>OFF</td>
<td>50Ω</td>
<td>17 kHz</td>
<td>150 MHz</td>
<td></td>
<td>$\leq -132$</td>
</tr>
<tr>
<td></td>
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<td>140 MHz</td>
<td></td>
<td>$\leq -132$</td>
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<td></td>
<td>120 MHz</td>
<td></td>
<td>$\leq -132$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>71 MHz</td>
<td></td>
<td>$\leq -132$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19 MHz</td>
<td></td>
<td>$\leq -132$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.3 MHz</td>
<td></td>
<td>$\leq -132$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>53 kHz</td>
<td></td>
<td>$\leq -132$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>290 Hz</td>
<td></td>
<td>$\leq -129$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>73 Hz</td>
<td></td>
<td>$\leq -124$</td>
</tr>
<tr>
<td>8</td>
<td>OFF</td>
<td>1 MΩ</td>
<td>17 kHz</td>
<td>40 MHz</td>
<td></td>
<td>$\leq -110$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10.1 MHz</td>
<td></td>
<td>$\leq -110$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10.1 kHz</td>
<td></td>
<td>$\leq -110$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>290 Hz</td>
<td></td>
<td>$\leq -100$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>73 Hz</td>
<td></td>
<td>$\leq -90$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.1 Hz</td>
<td></td>
<td>$\leq -80$</td>
</tr>
</tbody>
</table>
5. Frequency Accuracy  PASS     FAIL

Specification: initial accuracy without option 001 = ±0.5 ppm
with option 001 = ±0.01 ppm
add ±0.1 ppm if instrument on < 48 hours

aging without option 001 = ±0.25 ppm/month
with option 001 = ±0.125 ppm/month
frequency counter resolution = ±0.1 Hz

<table>
<thead>
<tr>
<th>Calculated Lower Limit (Hz) †</th>
<th>Measured Value (Hz)</th>
<th>Calculated Upper Limit (Hz) ‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;</td>
<td>&lt;</td>
<td></td>
</tr>
</tbody>
</table>

† Without Option 001 = 100 x 10⁶ x (1.25 x ____ months) - 50 x 0.1 = ______
‡ With Option 001 = 100 x 10⁶ x (12.5 x ____ months) - 1 x 0.1 = ______

Months = number since last frequency adjustment

6. Spurious Responses  PASS     FAIL

Specification: spurious sidebands <-70 dBC

<table>
<thead>
<tr>
<th>Source Frequency (MHz)</th>
<th>Spur Frequency (MHz)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 8125</td>
<td>10 8428</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>9 8125</td>
<td>9 8248</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>149 8125</td>
<td>149 8248</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>95 81274</td>
<td>95 81254</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>95 8149</td>
<td>95 8129</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>100 79274</td>
<td>100 79254</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>100 7949</td>
<td>100 7929</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>100 79454</td>
<td>100 79254</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>100 794504</td>
<td>100 792504</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>100 7945004</td>
<td>100 7925004</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>1.8125</td>
<td>4 81373</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>7 81496</td>
<td>4 81373</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>144 8125</td>
<td>144 822623</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>144 832746</td>
<td>144 822623</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>89 9125</td>
<td>89 8125</td>
<td></td>
<td>&lt;-70</td>
</tr>
</tbody>
</table>
7. **Image Responses**  PASS  FAIL

Specification: carrier level < range <= -70 dBC

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.85956</td>
<td></td>
<td>&lt;= -70</td>
</tr>
<tr>
<td>60.85956</td>
<td></td>
<td>&lt;= -70</td>
</tr>
<tr>
<td>81.36956</td>
<td></td>
<td>&lt;= -70</td>
</tr>
</tbody>
</table>

8. **Input Harmonic Distortion**  PASS  FAIL

Specification:
- low distortion mode ON
  - 50Ω and 75Ω input <= -80 dBC

- low distortion mode OFF
  - 50Ω and 75Ω input <= -70 dBC
  - 1 MΩ input  <= -65 dBC

<table>
<thead>
<tr>
<th>Step</th>
<th>Low Distortion</th>
<th>Input Imp.</th>
<th>Low Pass Filter</th>
<th>Fundamental (MHz)</th>
<th>Harmonic (MHz)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>ON</td>
<td>50Ω</td>
<td>50 MHz</td>
<td>47.265018</td>
<td>94.530036</td>
<td>141.795054</td>
<td>&lt;= -80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21 MHz</td>
<td>18.818541</td>
<td>37.633082</td>
<td>56.449623</td>
<td>&lt;= -80</td>
</tr>
<tr>
<td>6</td>
<td>OFF</td>
<td>50Ω</td>
<td>50 MHz</td>
<td>47.265018</td>
<td>94.530036</td>
<td>141.795054</td>
<td>&lt;= -70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21 MHz</td>
<td>18.818541</td>
<td>37.633082</td>
<td>56.449623</td>
<td>&lt;= -70</td>
</tr>
<tr>
<td>9</td>
<td>OFF</td>
<td>1 MΩ</td>
<td>21 MHz</td>
<td>18.818541</td>
<td>37.633082</td>
<td></td>
<td>&lt;= -65</td>
</tr>
</tbody>
</table>
9. Intermodulation Distortion  PASS  FAIL

Specification: low distortion mode ON
50Ω and 75Ω input <-80 dBC

low distortion mode OFF
50Ω and 75Ω input <-70 dBC
1 MΩ input  <-65 dBC

<table>
<thead>
<tr>
<th>Step</th>
<th>Low Distortion</th>
<th>Input Impedance</th>
<th>Source Frequency</th>
<th>Frequency</th>
<th>Measured Value (dB)†</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>ON</td>
<td>50Ω</td>
<td>23.6346 MHz</td>
<td>134 Hz</td>
<td></td>
<td>&lt;-80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47.269065 MHz</td>
<td></td>
<td>&lt;-80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23.634734 MHz</td>
<td></td>
<td>&lt;-80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23.637307</td>
<td>2.841 kHz</td>
<td></td>
<td>&lt;-80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47.271773 MHz</td>
<td></td>
<td>&lt;-80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23.604148 MHz</td>
<td></td>
<td>&lt;-80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23.694466</td>
<td>60 kHz</td>
<td></td>
<td>&lt;-80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47.328923 MHz</td>
<td></td>
<td>&lt;-80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23.754466 MHz</td>
<td></td>
<td>&lt;-80</td>
</tr>
<tr>
<td>7</td>
<td>OFF</td>
<td>50Ω</td>
<td>23.6346 MHz</td>
<td>134 Hz</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47.269066 MHz</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>23.634734 MHz</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23.637307</td>
<td>2.841 kHz</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>47.271773 MHz</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>23.604148 MHz</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23.694466</td>
<td>60 kHz</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47.328923 MHz</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23.754466 MHz</td>
<td></td>
<td>&lt;-70</td>
</tr>
<tr>
<td>11</td>
<td>OFF</td>
<td>1 MΩ</td>
<td>23.6346 MHz</td>
<td>134 Hz</td>
<td></td>
<td>&lt;-65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23.634734 MHz</td>
<td></td>
<td>&lt;-65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23.637307</td>
<td>2.841 kHz</td>
<td></td>
<td>&lt;-65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23.604148 MHz</td>
<td></td>
<td>&lt;-65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23.694466</td>
<td>60 kHz</td>
<td></td>
<td>&lt;-65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23.754466 MHz</td>
<td></td>
<td>&lt;-65</td>
</tr>
</tbody>
</table>
10. Source Amplitude Accuracy and Frequency Response  PASS  FAIL

Specification: at 300 kHz  10 dBm ±1 dB

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Lower Limit (dBm)</th>
<th>Measured Value (dBm)</th>
<th>Upper Limit (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 Hz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300 kHz</td>
<td>+9.0</td>
<td></td>
<td>+11.0</td>
</tr>
<tr>
<td>500 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70 MHz</td>
<td></td>
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<tr>
<td>85 MHz</td>
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<tr>
<td>100 MHz</td>
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<tr>
<td>120 MHz</td>
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<td></td>
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<tr>
<td>135 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† Measured Value at 300 kHz ± 1 dB
‡ Measured Value at 300 kHz ± 1 dB
11a. Input Amplitude Accuracy and Flatness  PASS  FAIL

Specification:

50Ω input 10 Hz - 100 Hz  ±2.5 dB
100 Hz - 30 kHz  ±1.0 dB
30 kHz - 150 MHz  ±0.5 dB
300 kHz - 40 MHz  ±0.4 dB

75Ω input 10 Hz - 100 Hz  ±2.5 dB
100 Hz - 30 kHz  ±1.0 dB
30 kHz - 150 MHz  ±0.8 dB

1 MΩ input 10 Hz - 100 Hz  ±2.5 dB
100 Hz - 30 kHz  ±1.0 dB
30 kHz - 40 MHz  ±0.6 dB

Add the following frequency response errors for windows used in narrow band zoom mode operation:

- high accuracy zoom  ±0.005 dB
- high resolution zoom  +0, -1.5 dB

<table>
<thead>
<tr>
<th>Impedance</th>
<th>Range</th>
<th>Upper Limit (dBm)</th>
<th>Measured Value (dBm)</th>
<th>Lower Limit (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50Ω</td>
<td>30 kHz - 150 MHz</td>
<td>+0.5</td>
<td>Maximum</td>
<td>-0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+0.5</td>
<td>Minimum</td>
<td>-0.5</td>
</tr>
<tr>
<td></td>
<td>300 kHz - 40 MHz</td>
<td>+0.4</td>
<td>Maximum</td>
<td>-0.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+0.4</td>
<td>Minimum</td>
<td>-0.4</td>
</tr>
<tr>
<td></td>
<td>100 Hz - 30 kHz</td>
<td>+1.0</td>
<td>Maximum</td>
<td>-1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+1.0</td>
<td>Minimum</td>
<td>-1.0</td>
</tr>
<tr>
<td></td>
<td>10 Hz - 100 Hz</td>
<td>+2.5</td>
<td>Maximum</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+2.5</td>
<td>Minimum</td>
<td>-2.5</td>
</tr>
<tr>
<td>1 MΩ</td>
<td>30 kHz - 40 MHz</td>
<td>+0.6</td>
<td>Maximum</td>
<td>-0.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+0.6</td>
<td>Minimum</td>
<td>-0.6</td>
</tr>
<tr>
<td></td>
<td>100 Hz - 30 kHz</td>
<td>+1.0</td>
<td>Maximum</td>
<td>-1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+1.0</td>
<td>Minimum</td>
<td>-1.0</td>
</tr>
<tr>
<td></td>
<td>10 Hz - 100 Hz</td>
<td>+2.5</td>
<td>Maximum</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+2.5</td>
<td>Minimum</td>
<td>-2.5</td>
</tr>
</tbody>
</table>
### 11b. Alternate Input Amplitude Accuracy and Flatness

**Specification:** same as 11a

<table>
<thead>
<tr>
<th>Input Impedance</th>
<th>Frequency</th>
<th>Measured Value (dBm)</th>
<th>Reference Value (dBm)</th>
<th>Calculated Value (dBm)</th>
<th>Specifications (0 dBm)</th>
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<tbody>
<tr>
<td>50Ω</td>
<td>10 Hz</td>
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<td></td>
<td></td>
<td>±2.5 dB</td>
</tr>
<tr>
<td></td>
<td>100 Hz</td>
<td></td>
<td></td>
<td></td>
<td>±1.0 dB</td>
</tr>
<tr>
<td></td>
<td>1 kHz</td>
<td></td>
<td></td>
<td></td>
<td>±1.0 dB</td>
</tr>
<tr>
<td></td>
<td>10 kHz</td>
<td></td>
<td></td>
<td></td>
<td>±1.0 dB</td>
</tr>
<tr>
<td></td>
<td>30 kHz</td>
<td></td>
<td></td>
<td></td>
<td>±0.5 dB</td>
</tr>
<tr>
<td></td>
<td>100 kHz</td>
<td></td>
<td></td>
<td></td>
<td>±0.5 dB</td>
</tr>
<tr>
<td></td>
<td>500 kHz</td>
<td></td>
<td></td>
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<td>±0.4 dB</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>±0.4 dB</td>
</tr>
<tr>
<td></td>
<td>2 MHz</td>
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<td>±0.4 dB</td>
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<td>5 MHz</td>
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<tr>
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<td>±0.4 dB</td>
</tr>
<tr>
<td></td>
<td>40 MHz</td>
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<td></td>
<td></td>
<td>±0.4 dB</td>
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<tr>
<td></td>
<td>55 MHz</td>
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</tr>
<tr>
<td></td>
<td>70 MHz</td>
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<td></td>
<td></td>
<td>±0.5 dB</td>
</tr>
<tr>
<td></td>
<td>85 MHz</td>
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<td>±0.5 dB</td>
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<td>±0.5 dB</td>
</tr>
<tr>
<td></td>
<td>120 MHz</td>
<td></td>
<td></td>
<td></td>
<td>±0.5 dB</td>
</tr>
<tr>
<td></td>
<td>135 MHz</td>
<td></td>
<td></td>
<td></td>
<td>±0.5 dB</td>
</tr>
<tr>
<td></td>
<td>150 MHz</td>
<td></td>
<td></td>
<td></td>
<td>±0.5 dB</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>Frequency</td>
<td>Measured Value (dBm)</td>
<td>Reference Value (dBm)</td>
<td>Calculated Value (dBm)</td>
<td>Specifications (0 dBm)</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------</td>
<td>----------------------</td>
<td>-----------------------</td>
<td>------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>1 MΩ</td>
<td>10 Hz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±2.5 dB</td>
</tr>
<tr>
<td></td>
<td>100 Hz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±1.0 dB</td>
</tr>
<tr>
<td></td>
<td>1 kHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±1.0 dB</td>
</tr>
<tr>
<td></td>
<td>10 kHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±1.0 dB</td>
</tr>
<tr>
<td></td>
<td>30 kHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td></td>
<td>100 kHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td></td>
<td>300 kHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td></td>
<td>500 kHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td></td>
<td>1 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td></td>
<td>2 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td></td>
<td>5 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td></td>
<td>10 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td></td>
<td>25 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
<tr>
<td></td>
<td>40 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.6 dB</td>
</tr>
</tbody>
</table>

12. Reference Level Accuracy PASSFAIL

Specification:
at 300 kHz reference level = range $\leq\pm0.3$ dB

<table>
<thead>
<tr>
<th>Measured Value (dBm)</th>
<th>Range (dBm)</th>
<th>Calculated Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-20 -</td>
<td>-</td>
<td>$&lt;\pm0.3$</td>
</tr>
<tr>
<td>-</td>
<td>-10 -</td>
<td>-</td>
<td>$&lt;\pm0.3$</td>
</tr>
<tr>
<td>-</td>
<td>0 -</td>
<td>-</td>
<td>$&lt;\pm0.3$</td>
</tr>
<tr>
<td>-</td>
<td>10 -</td>
<td>-</td>
<td>$&lt;\pm0.3$</td>
</tr>
<tr>
<td>-</td>
<td>20 -</td>
<td>-</td>
<td>$&lt;\pm0.3$</td>
</tr>
</tbody>
</table>
13. Log Scale Accuracy  PASS      FAIL

Specification:
- 0 to -30 dB  < 0.05 dB
- -30 to -40 dB  < 0.1 dB
- -40 to -50 dB  < 0.3 dB
- -50 to -60 dB  < 0.5 dB
- -60 to -70 dB  < 0.7 dB

<table>
<thead>
<tr>
<th>Level (dB)</th>
<th>Reference Value (dB)</th>
<th>Measured Value (dB)</th>
<th>Calculated Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10</td>
<td></td>
<td></td>
<td></td>
<td>&lt; ±0.05</td>
</tr>
<tr>
<td>-20</td>
<td></td>
<td></td>
<td></td>
<td>&lt; ±0.05</td>
</tr>
<tr>
<td>-30</td>
<td></td>
<td></td>
<td></td>
<td>&lt; ±0.05</td>
</tr>
<tr>
<td>-40</td>
<td></td>
<td></td>
<td></td>
<td>&lt; ±0.10</td>
</tr>
<tr>
<td>-50</td>
<td></td>
<td></td>
<td></td>
<td>&lt; ±0.30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level (dB)</th>
<th>Reference Value (dB)</th>
<th>Attenuator Setting (dB)</th>
<th>Insertion Loss Error</th>
<th>Measured Value (dB)</th>
<th>Calculated Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-60</td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td>&lt; ±0.50</td>
</tr>
<tr>
<td>-70</td>
<td></td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td>&lt; ±0.70</td>
</tr>
</tbody>
</table>

*The digital multimeter needs to be verified if the Calculated Value is within 0.05 dB of specification.

14. Source Dynamic Accuracy  PASS      FAIL

Specification: at 300 kHz ±0.02 dB/dB below 10 dBm

<table>
<thead>
<tr>
<th>Attenuation</th>
<th>Measured Value (dB)</th>
<th>Correction (dB)</th>
<th>Dynamic Accuracy (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 dB PAD</td>
<td></td>
<td></td>
<td></td>
<td>±0.2</td>
</tr>
<tr>
<td>10 dB DAC</td>
<td></td>
<td></td>
<td></td>
<td>±0.2</td>
</tr>
<tr>
<td>20 dB PAD A</td>
<td></td>
<td></td>
<td></td>
<td>±0.4</td>
</tr>
<tr>
<td>20 dB PAD B</td>
<td></td>
<td></td>
<td></td>
<td>±0.4</td>
</tr>
<tr>
<td>20 dB DAC</td>
<td></td>
<td></td>
<td></td>
<td>±0.4</td>
</tr>
</tbody>
</table>

*20 dB insertion loss error at 300 kHz minus 10 dB insertion loss error at 300 kHz
*+20 dB insertion loss error at 300 kHz
15. **Input Return Loss**  
PASS  FAIL

**Specification: >20 dB**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Range (dBm)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>20</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-20</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td>150</td>
<td>20</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-20</td>
<td></td>
<td>&lt; -20</td>
</tr>
</tbody>
</table>

16. **Source Return Loss**  
PASS  FAIL

**Specification: >20 dB**

<table>
<thead>
<tr>
<th>Reference Frequency (MHz)</th>
<th>Source Amplitude (dBm)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>+10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-20</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-30</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-40</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td>120</td>
<td>+10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-20</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-30</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-40</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td>150</td>
<td>+10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-10</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-20</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-30</td>
<td></td>
<td>&lt; -20</td>
</tr>
<tr>
<td></td>
<td>-40</td>
<td></td>
<td>&lt; -20</td>
</tr>
</tbody>
</table>
### 17. Source Harmonic Distortion

**Specification:** $\leq -30 \text{ dBC}$

<table>
<thead>
<tr>
<th>Fundamental Frequency</th>
<th>Harmonic</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 kHz</td>
<td>200 kHz</td>
<td></td>
<td>$\leq -30$</td>
</tr>
<tr>
<td></td>
<td>300 kHz</td>
<td></td>
<td>$\leq -30$</td>
</tr>
<tr>
<td>1 MHz</td>
<td>2 MHz</td>
<td></td>
<td>$\leq -30$</td>
</tr>
<tr>
<td></td>
<td>3 MHz</td>
<td></td>
<td>$\leq -30$</td>
</tr>
<tr>
<td>10 MHz</td>
<td>20 MHz</td>
<td></td>
<td>$\leq -30$</td>
</tr>
<tr>
<td></td>
<td>30 MHz</td>
<td></td>
<td>$\leq -30$</td>
</tr>
<tr>
<td>50 MHz</td>
<td>100 MHz</td>
<td></td>
<td>$\leq -30$</td>
</tr>
<tr>
<td></td>
<td>150 MHz</td>
<td></td>
<td>$\leq -30$</td>
</tr>
<tr>
<td>75 MHz</td>
<td>150 MHz</td>
<td></td>
<td>$\leq -30$</td>
</tr>
</tbody>
</table>

### 18. Source Spurious Responses

**Specification:** $\leq -40 \text{ dBC}$

<table>
<thead>
<tr>
<th>Reference Frequency</th>
<th>Spur Frequency (MHz)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 kHz</td>
<td>101.1975 MHz</td>
<td></td>
<td>$\leq -40$</td>
</tr>
<tr>
<td>101 MHz</td>
<td>101.1975 MHz</td>
<td></td>
<td>$\leq -40$</td>
</tr>
<tr>
<td></td>
<td>101.375 MHz</td>
<td></td>
<td>$\leq -40$</td>
</tr>
<tr>
<td>149.9 MHz</td>
<td>103.875 MHz</td>
<td></td>
<td>$\leq -40$</td>
</tr>
</tbody>
</table>
19. **Source Noise**  

PASS  
FAIL  

Specification 1 Hz bandwidth, offsets > 500 Hz from carrier  
< -80 dB relative to the carrier  

<table>
<thead>
<tr>
<th>Reference Frequency (MHz)</th>
<th>Offset Frequency (MHz)</th>
<th>Measured Value (dBm)</th>
<th>Reference Value (dBm)</th>
<th>Calculated Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 0125</td>
<td>8 013012</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>8 015060</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>8 025590</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>8 076505</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>8 33253</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>9 612655</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td>140 0125</td>
<td>140 013012</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>140 015060</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>140 025590</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>140 076505</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>140 33253</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
<tr>
<td></td>
<td>140 612655</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -80</td>
</tr>
</tbody>
</table>
Operation Verification Test Record

Calibration Entity and Address

Test Performed By

Report Number

Customer

Trace Number

Installed Options

Test Date

Temperature

Humidity

Power Line Frequency
1. Local Oscillator Feedthrough

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Measured Value</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Hz</td>
<td>dBm</td>
<td>&lt; -40 dBm</td>
</tr>
</tbody>
</table>

2. Phase Noise

<table>
<thead>
<tr>
<th>Measured Value</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>dB/Hz</td>
<td>&lt; -105 dB/Hz</td>
</tr>
</tbody>
</table>

3. Residual Responses

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Measured Value (dBm)</th>
<th>Specification (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Hz or 60 Hz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>100 Hz or 120 Hz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>250 kHz</td>
<td></td>
<td>&lt; -110</td>
</tr>
<tr>
<td>10 MHz</td>
<td></td>
<td>&lt; -110</td>
</tr>
</tbody>
</table>
4. Noise Level

Specification:

50Ω input impedance
- ≤-132 dBm/Hz above 30 kHz (degrade by 3 dB for start frequency ≤30 kHz in auto-sweep mode)
- ≤-129 dBm/Hz between 2 kHz and 30 kHz inclusive
- 100 Hz to 2 kHz is 1/f noise and is ≤-129 dBm/Hz at 2 kHz
- and ≤-116 dBm/Hz at 100 Hz
- add 10 dB to specification if low-distortion mode is ON

75Ω input impedance
- add 2 dB to 50Ω specification

1 MΩ input impedance (terminated in 100 kΩ)
- ≤-110 dBm/Hz below 40 MHz with 1/f corner at 100 kHz

<table>
<thead>
<tr>
<th>Step</th>
<th>Low Distortion</th>
<th>Input Impedance</th>
<th>Resolution Bandwidth</th>
<th>Frequency</th>
<th>Measured Value (dBm/Hz)</th>
<th>Specification (dBm/Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>ON</td>
<td>50Ω</td>
<td>17 kHz</td>
<td>150 MHz</td>
<td>__________</td>
<td>≤-122</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>120 MHz</td>
<td>__________</td>
<td>≤-122</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19 MHz</td>
<td>__________</td>
<td>≤-122</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>73 Hz</td>
<td>__________</td>
<td>≤-114</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>530 Hz</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OFF</td>
<td>50Ω</td>
<td>17 kHz</td>
<td>150 MHz</td>
<td>__________</td>
<td>≤-132</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>120 MHz</td>
<td>__________</td>
<td>≤-132</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19 MHz</td>
<td>__________</td>
<td>≤-132</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>73 Hz</td>
<td>__________</td>
<td>≤-124</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>530 Hz</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>OFF</td>
<td>1 MΩ</td>
<td>17 kHz</td>
<td>40 MHz</td>
<td>__________</td>
<td>≤-110</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>290 Hz</td>
<td>__________</td>
<td>≤-100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.1 Hz</td>
<td>__________</td>
<td>≤-80</td>
</tr>
</tbody>
</table>
5. Frequency Accuracy

**Specification**

- **Initial Accuracy**
  - Without option 001 = ±0.5 ppm
  - With option 001 = ±0.01 ppm
  - Add ±0.1 ppm if instrument on < 48 hours

- **Aging**
  - Without option 001 = ±0.25 ppm/month
  - With option 001 = ±0.125 ppm/month

**Frequency Counter Resolution** = ±0.1 Hz

<table>
<thead>
<tr>
<th>Calculated Lower Limit (Hz)</th>
<th>Measured Value (Hz)</th>
<th>Calculated Upper Limit (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤</td>
<td>≤</td>
<td>≤</td>
</tr>
</tbody>
</table>

- Without Option 001 = \(100 \times 10^5 \times \frac{1}{25 \times \text{month}}\) - 50 + 0.1
- With Option 001 = \(100 \times 10^5 \times \frac{125 \times \text{month}}{1} - 0.1\)
- Without Option 001 = \(100 \times 10^5 \times \frac{125 \times \text{month}}{1} + 0.1\)
- With Option 001 = \(100 \times 10^5 \times \frac{125 \times \text{month}}{1} - 0.1\)

*Month* = number since last frequency adjustment

6. Spurious Responses

**Specification:**  

**Spurious Sidebands**  

\(-70 \text{ dBC}\)

<table>
<thead>
<tr>
<th>Source Frequency (MHz)</th>
<th>Spur Frequency (MHz)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 8125</td>
<td>10 8438</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>9 8125</td>
<td>9 8248</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>149 8125</td>
<td>149 8248</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>95 81274</td>
<td>95 81254</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>95 8149</td>
<td>95 8129</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>100 79274</td>
<td>100 79254</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>100 7949</td>
<td>100 7929</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>100 79454</td>
<td>100 79254</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>100 794504</td>
<td>100 792504</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>100 7945004</td>
<td>100 7925004</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>1 8125</td>
<td>4 81373</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>7 81498</td>
<td>4 81373</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>144 8125</td>
<td>144 822623</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>144 832126</td>
<td>144 822623</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>89 9125</td>
<td>89 9125</td>
<td></td>
<td>≤ -70</td>
</tr>
</tbody>
</table>
7. Image Responses

Specification: carrier level < range ≤ -70 dBC

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.85955</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>60.85956</td>
<td></td>
<td>≤ -70</td>
</tr>
<tr>
<td>61.35955</td>
<td></td>
<td>≤ -70</td>
</tr>
</tbody>
</table>

8. Input Harmonic Distortion

Specification: low distortion mode ON, 50Ω and 75Ω input ≤ -80 dBC

<table>
<thead>
<tr>
<th>Step</th>
<th>Low Dist.</th>
<th>Input Imp.</th>
<th>Low Pass Filter</th>
<th>Fundamental (MHz)</th>
<th>Harmonic (MHz)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>ON</td>
<td>50Ω</td>
<td>50 MHz</td>
<td>47.265018</td>
<td>94.530036</td>
<td>141.795064</td>
<td>≤ -80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21 MHz</td>
<td>18.816541</td>
<td>37.633082</td>
<td>56.449623</td>
<td>≤ -80</td>
</tr>
</tbody>
</table>

10. Source Amplitude Accuracy and Frequency Response

Specification: at 300 kHz 10 dBm ± 1 dB

Frequency response relative to 300 kHz 300 kHz output level ± 1 dB

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Lower Limit (dBm)</th>
<th>Measured Value (dBm)</th>
<th>Upper Limit (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td>t</td>
<td></td>
<td>t</td>
</tr>
<tr>
<td>100 Hz</td>
<td>t</td>
<td></td>
<td>t</td>
</tr>
<tr>
<td>10 kHz</td>
<td>t</td>
<td></td>
<td>t</td>
</tr>
<tr>
<td>30 kHz</td>
<td>t</td>
<td></td>
<td>t</td>
</tr>
<tr>
<td>300 kHz</td>
<td>t</td>
<td>+9.0</td>
<td>+11.0</td>
</tr>
<tr>
<td>10 MHz</td>
<td>t</td>
<td></td>
<td>t</td>
</tr>
<tr>
<td>100 MHz</td>
<td>t</td>
<td></td>
<td>t</td>
</tr>
<tr>
<td>150 MHz</td>
<td>t</td>
<td></td>
<td>t</td>
</tr>
</tbody>
</table>

11a. Input Amplitude Accuracy and Flatness

PASS_____FAIL_____
### Specification

50Ω input

<table>
<thead>
<tr>
<th>Range</th>
<th>Upper Limit (dBm)</th>
<th>Measured Value (dBm)</th>
<th>Lower Limit (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz - 100 Hz</td>
<td>±2.5 dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 Hz - 30 kHz</td>
<td>±1.0 dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 kHz - 150 MHz</td>
<td>±0.5 dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300 kHz - 10MHz</td>
<td>±0.4 dB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**11b. Alternate Input Amplitude Accuracy and Flatness**

PASS     FAIL

**Specification:** same as 11a

<table>
<thead>
<tr>
<th>Input Impedance</th>
<th>Frequency</th>
<th>Measured Value (dBm)</th>
<th>Reference Value (dBm)</th>
<th>Input Error (dBm)</th>
<th>Specification (0 dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50Ω</td>
<td>10 Hz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±2.5 dB</td>
</tr>
<tr>
<td></td>
<td>100 Hz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±1.0 dB</td>
</tr>
<tr>
<td></td>
<td>10 kHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±1.0 dB</td>
</tr>
<tr>
<td></td>
<td>30 kHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.5 dB</td>
</tr>
<tr>
<td></td>
<td>300 kHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.4 dB</td>
</tr>
<tr>
<td></td>
<td>1 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.4 dB</td>
</tr>
<tr>
<td></td>
<td>40 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.5 dB</td>
</tr>
<tr>
<td></td>
<td>100 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.5 dB</td>
</tr>
<tr>
<td></td>
<td>150 MHz</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>±0.5 dB</td>
</tr>
</tbody>
</table>
12. Reference Level Accuracy  

<table>
<thead>
<tr>
<th>Measured Value (dBm)</th>
<th>Range (dBm)</th>
<th>Calculated Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20</td>
<td>-20</td>
<td>-20</td>
<td>&lt;±0.3 dB</td>
</tr>
<tr>
<td>-10</td>
<td>-10</td>
<td>-10</td>
<td>&lt;±0.3 dB</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>&lt;±0.3 dB</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>10</td>
<td>&lt;±0.3 dB</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td>20</td>
<td>&lt;±0.3 dB</td>
</tr>
</tbody>
</table>

14. Source Dynamic Accuracy  

<table>
<thead>
<tr>
<th>Attenuation</th>
<th>Measured Value (dB)</th>
<th>Correction (dB)</th>
<th>Dynamic Accuracy (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 dB PAD</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>±0.2 dB</td>
</tr>
<tr>
<td>10 dB DAC</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>±0.2 dB</td>
</tr>
<tr>
<td>20 dB PAD A</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>±0.4 dB</td>
</tr>
<tr>
<td>20 dB PAD B</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>±0.4 dB</td>
</tr>
<tr>
<td>20 dB DAC</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>±0.4 dB</td>
</tr>
</tbody>
</table>

17. Source Harmonic Distortion  

<table>
<thead>
<tr>
<th>Fundamental Frequency</th>
<th>Harmonic</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 kHz</td>
<td>200 kHz</td>
<td>-</td>
<td>&lt; -30</td>
</tr>
<tr>
<td></td>
<td>300 kHz</td>
<td>-</td>
<td>&lt; -30</td>
</tr>
<tr>
<td>50 MHz</td>
<td>100 MHz</td>
<td>-</td>
<td>&lt; -30</td>
</tr>
<tr>
<td></td>
<td>150 MHz</td>
<td>-</td>
<td>&lt; -30</td>
</tr>
</tbody>
</table>
## 18. Source Spurious Responses

**Specification:** \(-40\) dBc

<table>
<thead>
<tr>
<th>Reference Frequency</th>
<th>Spur Frequency (MHz)</th>
<th>Measured Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1011 Hz</td>
<td>10 1875</td>
<td></td>
<td>(&lt; -40)</td>
</tr>
<tr>
<td>101 MHz</td>
<td>101 1875</td>
<td></td>
<td>(&lt; -40)</td>
</tr>
<tr>
<td></td>
<td>101 375</td>
<td></td>
<td>(&lt; -40)</td>
</tr>
<tr>
<td>149 9 MHz</td>
<td>10 3875</td>
<td></td>
<td>(&lt; -40)</td>
</tr>
</tbody>
</table>

## 19. Source Noise

**Specification:**
- 1 Hz bandwidth offsets > 500 Hz from carrier
- \(-80\) dB relative to the carrier

<table>
<thead>
<tr>
<th>Reference Frequency (MHz)</th>
<th>Offset Frequency (MHz)</th>
<th>Measured Value (dBm)</th>
<th>Reference Value (dBm)</th>
<th>Calculated Value (dB)</th>
<th>Specification (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0125</td>
<td>8.013012</td>
<td></td>
<td></td>
<td></td>
<td>(&lt; -80)</td>
</tr>
<tr>
<td>8.076506</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(&lt; -80)</td>
</tr>
</tbody>
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