Keysight E1420B
High-Performance VXI Universal Counter

- 1-Slot, C-size, message based
- 200 MHz frequency range, optional 2.5 GHz channel
- 9-digit resolution in 1 second gate time
- 2 ns time interval resolution (200 ps with averaging)
- Shared memory option configuration
- Phase measurement and measurement timeout
Single Measurement Auto-Trigger Speeds Measurements

Repetitive auto-trigger measurements are faster than ever with the E1420B's single measurement auto-trigger. This feature analyzes the input signal only once, setting the trigger levels, and speeding through the rest of the measurements.

Adjustable Sensitivity

Measuring low-level signals isn't a problem: the Keysight E1420B features 35 mV rms sensitivity to 200 MHz. When noise is a problem, this sensitivity can be decreased to 100 mV rms by using hysteresis control.

Optional 2.5 GHz Channel (Input 3)

Increase your frequency range to 2.5 GHz for communications and navigation applications.

Save on Software Costs with SCPI

The E1420B features the industry standard SCPI interface language. SCPI will let you develop code that can easily be leveraged, increase the life of test software, and decrease the time spent learning new instrument languages. SCPI also simplifies the use of the counter; for example, you can set a trigger level using a percentage of signal amplitude.
# Product Specifications

## Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period:</td>
<td>Yes</td>
</tr>
<tr>
<td>Time interval:</td>
<td>Yes</td>
</tr>
<tr>
<td>Totalize:</td>
<td>Yes</td>
</tr>
<tr>
<td>Gated totalize:</td>
<td>Yes</td>
</tr>
<tr>
<td>Ratio:</td>
<td>Yes</td>
</tr>
<tr>
<td>Pulse width:</td>
<td>Yes</td>
</tr>
<tr>
<td>Rise/fall time:</td>
<td>Yes</td>
</tr>
<tr>
<td>Phase:</td>
<td>Yes</td>
</tr>
<tr>
<td>VDC:</td>
<td>Yes</td>
</tr>
<tr>
<td>VAC:</td>
<td>Yes</td>
</tr>
<tr>
<td>Up/down counter:</td>
<td>No</td>
</tr>
</tbody>
</table>

## Measurements

### Frequency

<table>
<thead>
<tr>
<th>Frequency</th>
<th>200 MHz (standard) 2.5 GHz (with option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency 1, 2, 3:</td>
<td>0.001 Hz to 200 MHz: input 1;</td>
</tr>
<tr>
<td></td>
<td>0.001 Hz to 100 MHz: input 2;</td>
</tr>
<tr>
<td></td>
<td>90 MHz to 2.5 GHz: input 3 (Optional)</td>
</tr>
<tr>
<td>Resolution:</td>
<td>9 digits/s of measurement time + trigger error + system jitter (Frequency resolution is directly proportional to gate time. For example, resolution is 9 digits for a 1-second gate time and 8 digits for a 0.1-second gate time.)</td>
</tr>
</tbody>
</table>

### Period 1, 2, 3:

| Range               | 5 ns to 1,000 s: input 1;             |
|                     | 10 ns to 1000 s: input 2;             |
|                     | 400 ps to 10 ns: input 3 (Optional)   |
| Resolution:         | Same as Frequency                     |

### Time interval (TI) 1 to 2:

| Range               | 1 ns to 1,000 s (single-shot);        |
|                     | 1 ns to 10 s (averaging) (100-gate average) |
| Resolution:         | 2 ns +trigger error, single-shot:     |
|                     | 200 ps +trigger error averaging       |

### Rise/fall time 1:* 

| Range               | 15 ns to 400 µsec (automatic); to 800 sec (manual) |
| Resolution:         | Same as TI                                      |

### Pulse width 1, 2:* 

| Range               | 5 ns to 1 ms                                      |
| Resolution:         | Same as TI                                      |

### Phase 1 relative 2:* 

| Range               | 0.1° to 360°                                    |
| Resolution:         | TI resolution x frequency x 360°                |

### Ratio 1/2, 2/1, 3/1:

| Range (1/2, 2/1):   | 0.001 Hz to 100 MHz                             |
| Range (3/ 1):       | 90 MHz to 2.5 GHz (Optional)                    |

## Measurements (continued)

### Totalize 1, 1 by 2, 2 by 1:

| Range               | 0 to (1 x 1.0E12 •1) events                   |

### Min / max. AC voltage 1, 2:*

| Range               | 200 mVp-p to 5 Vp-p (x Atten.)                |
| Resolution:         | 30 mV (x Atten.)                              |

### Min / max. DC voltage 1:

| Range               | 30 mV to ±10 V (x Atten.)                     |
| Resolution:         | 30 mV (x Atten.)                              |

*Frequency range 1 kHz to 20 MHz.

## Input Characteristics for Channels 1.2

### Sinewave sensitivity: 

35 mV rms

### Pulse sensitivity: 

100 mVp-p (with minimum pulse width of 5 ns)

### Dynamic range:

200 mVp-p to 5 Vp-p (x Atten.)

### Attenuator:

x1 (default) or x10

### Signal operating range:

± 10 V (x Atten.); (1 MQ); ± 5 V (50 Ohm)

### Trigger level range:

± 10.2 V with step size of 2.5 mV (Specified by V or % of signal)

### Trigger level accuracy:

± 30 mV (x Atten.) ± 1% of trigger level

### Coupling:

AC/DC

### Impedance:

50 Ω/1 MQ (default programmable)

### Slopes:

Positive or Negative

### Input:

Separate or Common (1 routed to 2)

## General Characteristics

### Gate time:

1 ms to 99.99s in 1 ms steps

### External arm:

via front-panel BNC or VXI TIL TRIG lines

### Auto trigger:

Range: 1 kHz to 20 MHz (Single or Repetitive Range)

Minimum amplitude: 200 mVp-p (x Attn.)

### TI delay (inserts delay after start event before allowing stop event to occur):

Range: 1 ms to 99 s in 1 ms step

Measurement timeout: 0.1 s to 1,500 s

### Gate output:

VXI TTLTRIP Lines

### Measurement throughput rate (measured using Radi-sys EPC-2):

Free-run: Up to 60 Measurements /s

Switching: Up to 40 Measurements /s

Shared memory (option 040): Up to 160 Measurements/s

Memory states: 10 setups can be stored and recalled (Volatile)
**Time Base**

- **Standard:** VX I CLK10
- **Option 010 TCXO time base:**
  - **Frequency:** 10 MHz
  - **Aging:** <0.1 ppm/month
  - **Temperature:** ±1 ppm/0 to 40°C

**UHF Channel (Input 3)**

- **Frequency range:** 90 MHz to 2.5 GHz
- **Sensitivity (sinewave):**
  - 90 MHz - 1 GHz: -25 dBm
  - 1 GHz - 1.8 GHz: -20 dBm
  - 1.8 GHz - 2.5 GHz: -12 dBm

**Shared Memory (Option 040)**

- Shared memory throughput rate: Up to 160 Measurements/s

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**General Specifications**

**VXI Characteristics**

- **VXI device type:** Message based
- **Size:** C
- **Slots:** 1
- **Connectors:** P1/2
- **Shared memory:** Yes
- **VXI buses:** TTL Trigger Bus

**Instrument Drivers - See the Keysight Technologies Website**

- **1-SCPI Win 3.1:** n/a
- **1-SCPI Series 700:** n/a
- **C-SCPI LynxOS:** n/a
- **C-SCPI Series 700** n/a
- **Panel Drivers:** Yes
- **VXI plug&play Win Framework:** Yes
- **VXI plug&play Win 95/ NT Framework:** Yes
- **VXI plug&play HP-UX Framework:** No

**Module Current**

<table>
<thead>
<tr>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPM</td>
</tr>
<tr>
<td>IDM</td>
</tr>
<tr>
<td>5 V</td>
</tr>
<tr>
<td>12 V</td>
</tr>
<tr>
<td>24 V</td>
</tr>
<tr>
<td>5.2 V</td>
</tr>
<tr>
<td>2 V</td>
</tr>
</tbody>
</table>

**Cooling/Slot**

<table>
<thead>
<tr>
<th>Watts/Slot</th>
<th>Air Flow liter/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.50</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Ordering Information**

<table>
<thead>
<tr>
<th>Description</th>
<th>Product No.</th>
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<td>High-Performance VXI Universal Counter</td>
<td>E1420B</td>
</tr>
<tr>
<td>TCXO Time Base</td>
<td>E1420B 010</td>
</tr>
<tr>
<td>UHF Input Channel</td>
<td>E1420B 030</td>
</tr>
<tr>
<td>High Throughput/Shared RAM</td>
<td>E1420B 040</td>
</tr>
<tr>
<td>Reduced TI Delay Spec</td>
<td>E1420B 100</td>
</tr>
<tr>
<td>Service Manual</td>
<td>E1420B OB3</td>
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