Power distribution network (PDN) noise is one of the most common issues in low power applications, including ADCs and LNAs, as well as in data channels. Troubleshooting these issues can be time consuming. The jitter must be measured in-circuit, where physical access is often limited and these sensitive circuits can be disrupted by 1mV of power supply noise or even less. Even a circuit that appears to be fully functional can have hidden sensitivities that go undiscovered until a particular operating condition is set.

A Picotest J2150A Harmonic Comb paired with the P2100A or P2101A 50Ω transmission line ‘PDN’ probes and a Keysight spectrum analyzer, signal analyzer or oscilloscope provide an ultra-portable and simple method of locating PDN sensitivities.

The J2150A harmonic comb provides a wideband noise source with a 50Ω output impedance. The harmonic comb covers an ultra-wide range of 1kHz to more than 1GHz in a highly portable USB stick. The P2100A and P2101A probes provide unity gain, 50Ω connections to the PDN in a comfortable browser style probe. The probe is used in conjunction with a Keysight Spectrum Analyzer, such as the N9020A (MXA), a Signal Source Analyzer, such as the E5052B (SSA) or an Infiniium S oscilloscope using the FFT or VSA features.

The P2100A 1-port probe can inject noise into each decoupling capacitor while monitoring the system performance, such as clock jitter. The P2101A 2-port probe can inject the harmonic comb noise through one port while the other port displays the injected noise.

The harmonic comb fits in your pocket while the probes will easily fit in a backpack, briefcase or laptop bag. The harmonic comb only requires the USB connection for 5V power. While there is generally an unused USB slot available in most instruments, the comb can also be powered from cell phone backup batteries.

Quickly identify PDN sensitivities, in-circuit, using a simple probe-based solution

- Fast, in-circuit identification of PDN sensitivities
- Multi-mode harmonic comb spans 1kHz-1GHz
- Frequency & impulse width dithering minimize dead-zones due to sampling effects
- Once a sensitivity frequency is identified, the comb can be locked for single frequency operation
- Convenient, ultra-portable USB stick with single button operation
- The J2150A harmonic comb pairs with Picotest P2100A and P2101A 50Ω transmission line probes
Troubleshooting Clock Jitter

The PDN interrogation using the comb’s search mode signal reveals a resonance at approximately 7.5MHz as seen in the spectrum sidebands around the clock fundamental frequency. Note the peaks are approximately -30dBc.

System Components

**Keysight Technologies**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5052B</td>
<td>SSA Signal Source Analyzer</td>
</tr>
<tr>
<td>N9020A</td>
<td>MXA Signal Analyzer</td>
</tr>
<tr>
<td>E5061B</td>
<td>ENA Network Analyzer</td>
</tr>
</tbody>
</table>

**Picotest**

Power Integrity Station Bundle for Keysight ENA, SSA or Oscilloscopes:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J2150A</td>
<td>USB Harmonic Comb Generator</td>
</tr>
</tbody>
</table>
| P2100A | 1-Port 50 ohm Transmission Line PDN Probe  
-13dBm typical 1kHz and 100kHz  
-17dBm typical 8MHz  
10kHz square wave 13dBm, typical Duty cycle 50% typical  
DC coupled 0 to +2.5V pulse into 50Ohms  
Typical rise/fall time 470ps/270ps  
Absolute Maximum Voltage < 50VAC and 75VDC |
| P2101A | 2-Port 50 ohm Transmission Line PDN Probe  
Impedance: 50 ohms, works with all 50 ohm instruments  
Tip Capacitance, <1pF, 420fF Typical  
Bandwidth DC – 1.3GHz  
Variable pitch swivel tip fits multiple caps (0603-1206)  
Small form factor |

To learn how this solution can address your specific needs please contact Keysight’s solutions partner, Picotest  
www.keysight.com/find/picotest

Keysight and its Solutions Partners work together to help customers meet their unique challenges, in design, manufacturing, installation or support. To learn more about the program, our partners and solutions go to  
www.keysight.com/find/solutionspartner

Picotest provides products that are designed to simplify measurements while providing the ultimate resolution when using test instruments.  
www.picotest.com

For information on Keysight Technologies’ products, applications and services, go to  
www.keysight.com

This information is subject to change without notice.

© Keysight Technologies, 2016  
Published in USA, June 27, 2016  
5992-1645EN  
www.keysight.com