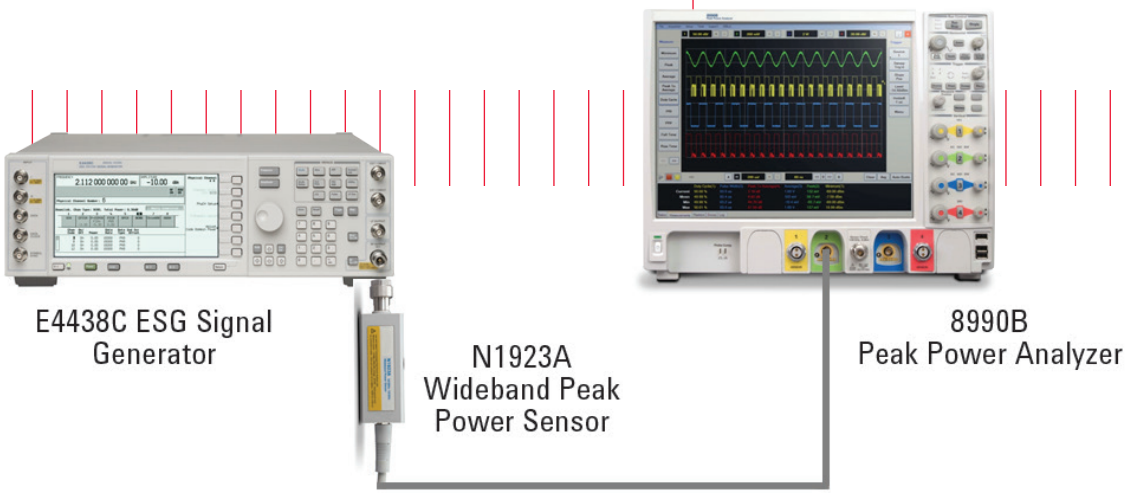
Keysight Technologies

Making Droop Measurements Using the Keysight 8990B Peak Power Analyzer

Application Brief



KEYSIGHT TECHNOLOGIES

Introduction

Pulse droop measurement is important for testing the stability of a power amplifier's or transmitter's output power. For example, the output power of a radar transmitter has to be stable in order to meet the radar detection and performance specifications. Droop measurement allows operators to monitor the stability of the transmitter power.

The conventional solution for measuring the droop signal requires a peak power meter that supports four markers and a delta marker. While the active marker and the delta marker can be used to measure the droop on the radar pulse, users have to manually allocate the marker at the rising and falling edges of the radar pulse signal prior measuring the droop measurement.

An alternative to this measurement process is through the use of the Keysight Technologies, Inc. 8990B peak power analyzer (PPA) with built-in Windows software. This application note demonstrates the ability of the 8990B PPA to automatically perform droop measurement using its trace graph.

This application note applies to the following products from Keysight:

- 8990B peak power analyzer (PPA)
- N1923/24A wideband power sensor

Droop Measurement

The droop measurement view on the 8990B PPA is used to measure the amount of droop, AD, of the input signal, as shown in Figure 1. This function is only applicable for RF input channels.

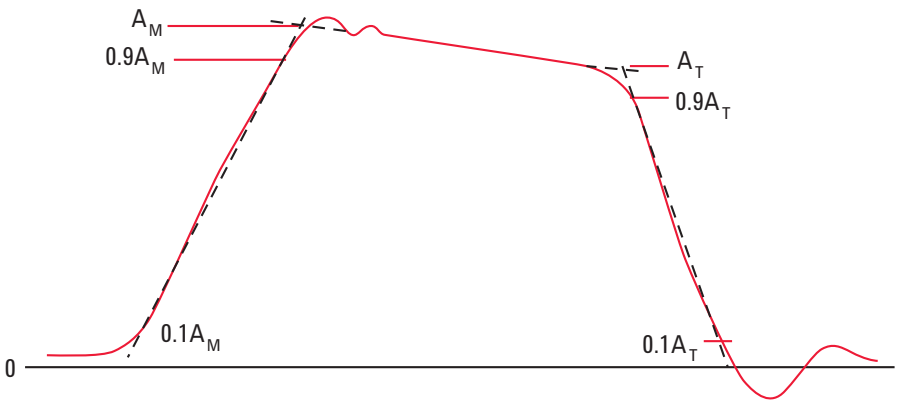


Figure 1. Example of the droop measurement view on the 8990B

Pulse amplitude, A_M

The pulse amplitude quantity is determined by the intersection of a line passing through the points on the leading edge—where the instantaneous value reaches 10% and 90% of A_M—with a straight line that is the best least-squares fit to the pulse in the pulse-top region (usually this fits visually rather than numerically). For pulses deviating greatly from the ideal trapezoidal pulse shape, a number of successive approximations may be necessary to determine A_M.

Trailing edge (last transition) amplitude, A_T

The trailing edge amplitude quantity is determined by the intersection of a line passing through the points on the trailing edge—where the instantaneous value reaches 90% and 10% of A_T—with the straight-line segment fitted to the top of the pulse in determining A_M.

Droop, A_D

Droop is the difference between A_M and A_T. It is expressed in percentage of A_M.

Typical Test Configuration and SCPI Commands

Figure 2 illustrates the equipment configuration for droop measurement.

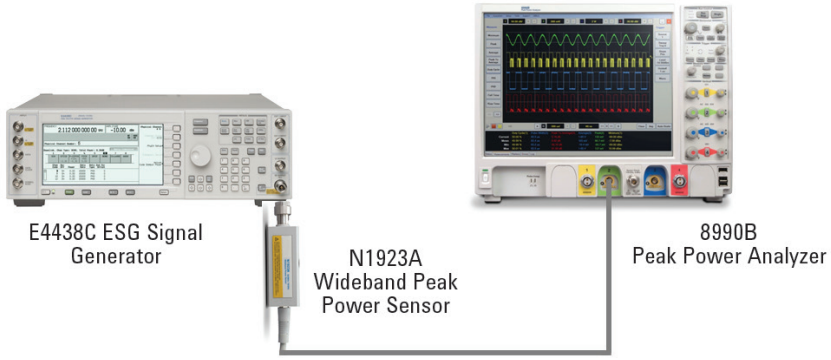


Figure 2. Typical setup diagram of droop measurement

Measurement data is obtained using the follow SCPI commands.

SCPI	Description
Keysight ESG/MXG/EXG/PSG signal generator	
SYST:PRES	Preset the instrument to its default settings
FREQ 1GHz	Set frequency to 1 GHz (example)
POW:LEVEL 0DBM	Set output power to 0 dBm (example)
SOUR:PULM:INIT1:PERIOD 10uS	Set pulse period 10 µs (example)
SOUR:PULM:INIT1:PWIDTH 4uS	Set pulse width to 4 µs (example)
SOUR:PULM:STAT ON	Turn on pulse signal
OUTP:MOD:STAT ON	Turn on modulation signal
OUTP:STAT ON	Turn on RF output

8990B PPA – initialization	
SYST:PRES	
*OPC?	Wait for operation to complete. Return 1 means operation completed
CHAN1:FREQ 1G	Set Channel 1 frequency to 1 GHz (example)
AUT	Autoscale the waveform display
*OPC?	
TIME:SCALE 1u	Set timebase to 1 µs/div
CHAN1:SCALE 20	Set Channel 1 scale to 20 dB/div
ACQUIRE:DROOP:STATE 1	Turn on droop measurement mode
ACQUIRE:DROOP:SOURCE CHAN1	Set droop measurement source to Channel 1
*OPC?	
Querying droop measurement	
MEAS:DRO?	Query droop measurement

Conclusion

The 8990B peak power analyzer provides an automatic droop function via built-in Windows software to perform the droop measurement. Without the need for marker allocation, the ease-of-use software automatically calculates the droop measurement and shows the result on the front panel of the instrument. This saves time and effort, so focus can remain on important details.

References

Keysight 8990B Peak Power Analyzer (PPA) Pulse Radar Power Measurement, Demonstration Guide, literature number 5990-8708EN

Keysight 8990B Peak Power Analyzer (PPA) product website
www.keysight.com/find/peakpoweranalyzer

myKeysight

www.keysight.com/find/mykeysight
A personalized view into the information most relevant to you.

www.axiestandard.org
AdvancedTCA® Extensions for Instrumentation and Test (AXIe) is an open standard that extends the AdvancedTCA for general purpose and semiconductor test. Keysight is a founding member of the AXIe consortium. ATCA®, AdvancedTCA®, and the ATCA logo are registered US trademarks of the PCI Industrial Computer Manufacturers Group.

www.lxistandard.org
LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Keysight is a founding member of the LXI consortium.

www.pxisa.org
PCI eXtensions for Instrumentation (PXI) modular instrumentation delivers a rugged, PC-based high-performance measurement and automation system.

Three-Year Warranty
www.keysight.com/find/ThreeYearWarranty
Keysight's commitment to superior product quality and lower total cost of ownership. The only test and measurement company with three-year warranty standard on all instruments, worldwide.

Keysight Assurance Plans
www.keysight.com/find/AssurancePlans
Up to five years of protection and no budgetary surprises to ensure your instruments are operating to specification so you can rely on accurate measurements.

www.keysight.com/quality
Keysight Technologies, Inc.
DEKRA Certified ISO 9001:2008
Quality Management System

Keysight Channel Partners
www.keysight.com/find/channelpartners
Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at:
www.keysight.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

Europe & Middle East

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	0800 000154
Sweden	0200 882255
Switzerland	0800 805353 Opt. 1 (DE) Opt. 2 (FR) Opt. 3 (IT)
United Kingdom	0800 0260637

For other unlisted countries:
www.keysight.com/find/contactus
(BP-07-10-14)

KEYSIGHT TECHNOLOGIES

Published in USA, August 3, 2014
5991-2648EN
www.keysight.com