



LXI-based Test System Improves Throughput in Semiconductor Manufacturing by 233 Percent



Description

Every millisecond in the manufacturing process is critical when testing semiconductor devices for cellular phones. One IC manufacturer successfully reduced the time required to test W-CDMA power amplifier ICs by 2800 ms by deploying an LXI-based test system. This new test system increased throughput by 233.3 percent over the prior GPIB-based systems.



The Challenge

The manufacturer was looking for improvements in three areas, test time, cost-of-test, and the speed and ease of test setup. Reducing test time ensured that testing would not be a limiting factor as demand for W-CDMA power amp ICs increased with the production demand for cellular handsets.

Lowering the cost-of-test ensured that as the maturing cell phone market drives handset prices down and the pressure to cut costs is passed through to component providers, this manufacturer was well positioned to manage costs effectively. Speeding up the set-up of the

test system allowed the manufacturer to manage the ever-shorter lifespan of handsets, which results in frequent changes in the manufacturing process.

The technical requirements for testing the W-CDMA power amplifier were to perform the following tests at two different frequencies, 1.8 and 1.9 GHz:

- Search for input power at +0, +10 and +20 dBm output power, results to be within ± 0.1 dB tolerance
- Supply reference and control currents at both frequencies and all three power levels
- Measure the ± 5 MHz and ± 10 MHz adjacent and alternate channel power ratios (ACPR) at both frequencies and all three power levels
- All ACPR results to be within ± 0.6 dB tolerance
- Perform leakage-current tests before and after all of the above measurements (RF off; only supply voltage on)



The LXI Solution

LXI Class C-compliant instruments used to build this solution consisted of a standalone PC running Windows XP coupled with:

- An Agilent signal analyzer
- An Agilent Vector signal generator
- An Agilent 6½-digit DMM
- An Agilent modular power system mainframe configured with three precision DC power modules

The Results

The LXI-based system was significantly faster than the existing GPIB-based system, achieving a performance increase of 70 percent over the existing system and 36.8 percent over several alternatives that were also considered.

The two primary contributors to the improved speed and throughput were:

- The communication speed of LAN, which is the backbone of LXI-based test systems.
- The measurement speed of the instruments. All of the instruments were manufactured by Agilent and are certified LXI Class C compliant.

Assuming around-the-clock production, the LAN/LXI-based approach enabled throughput of 72,000 devices per day, contrasting vividly with the GPIB-based system that produced 21,600 devices per day. That's a 233.3 percent improvement over the existing GPIB system.

Ease-of-use

Typically LXI instruments feature built-in web servers so that users can monitor and control the system using Ethernet and any standard web browser. All major instrument functionalities are accessible through the web server, greatly simplifying software development, system commissioning, troubleshooting, and maintenance.

Commercial, low-cost Ethernet services can be used to gain access and immediate control over the installation. LXI-compliant instruments are self-contained, dependable units that demonstrate predictable operation are easy to set up, configure, and debug.

About LXI and the LXI Consortium

LXI is the LAN-based successor to GPIB. The LXI standard goes beyond GPIB to provide additional capabilities that reduce the time it takes to set up, configure and debug test systems by connecting directly to the standard ports on a PC. It also removes the inherent cable length limitations of GPIB. Also, LXI software and drivers simplify test system set-up. LXI also helps integrators leverage the time and effort already invested in system software and architecture.

The standard is managed by the LXI Consortium, a not-for-profit corporation comprised of leading test and measurement companies. The group's goals are to develop, support and promote the LXI standard. LXI's flexible packaging, high-speed I/O, and prolific use of LAN address a broad range of commercial, industrial, aerospace and military applications. Additional information about LXI-compliant products as well as licensing, specifications and consortium membership is available at www.lxistandard.org.

POWER OUT	0 dBm	0 dBm	10 dBm	10 dBm	20 dBm	20 dBm
FREQUENCY	1.8 GHz	1.9 GHz	1.8 GHz	1.9 GHz	1.8 GHz	1.9 GHz
Pin	-6.06	-5.479	-1.14	-0.3664	0.714	0.1364
GAIN	13.06	12.40	17.14	16.37	27.29	27.06
ACPR-L5M	-47.45	-43	-50.24	-47.46	-38.59	-38.38
ACPR-L5M	-41.63	-43.21	-50.71	-45.58	-39.44	-39.22
ACPR-L10M	-51.45	-50.89	-57.81	-57.63	-61.39	-61.29
ACPR-U10M	-51.16	-50.74	-57.6	-58.41	-59.35	-57.96
Icc	20.68m	23.23m	46.67m	53.43m	0.4561	0.4331
Irif	4.942m	4.947m	4.966m	4.962m	3.839m	3.962m
Iconf	0.1801m	0.1822m	0.1805m	0.1817m	-0.3560u	-1.451u
Ipd	1.309u	0	0	0	0	0.6060u



LAN extensions for Instrumentation

The Successor to GPIB.

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