

# Z1888 Manufacturing Process Test System

*For manufacturers who need the best manufacturing process test system, Teradyne has designed the perfect solution: The Z1888 delivers the proven technology, architecture, and low operating cost of the Z1800-Series enhanced with the state-of-the-art PRISM-Z™ analog test sub-system and the MultiScan™ vectorless test toolset. Its small-footprint console makes the Z1888 especially suited to fast-paced, volume SMT production where high fault coverage of dense and complex VLSI boards is essential. The Z1888 offers all the Z1800-Series' hallmarks: short turn-on-time, quick ECO implementation, and unparalleled reliability plus an open architecture which makes on-site upgrading practical and affordable.*

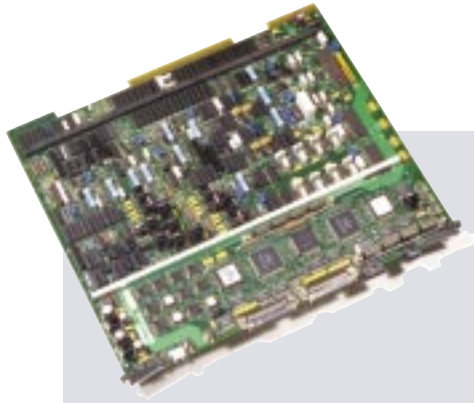


The Z1888 sets the standard for low cost, short cycle time, reliability, and ease of use.

**M**anufacturing process test (MPT) using in-circuit test techniques is now the standard test strategy for high throughput inspection and control of modern SMT production processes. Teradyne's MPT systems inspect boards for assembly and component defects, providing detailed information to be fed back to correct and improve the assembly process. Our Z1800-Series testers set the standard for fast program turn-on, high throughput, and comprehensive fault coverage. Beyond this is the minimum infrastructure, superb reliability, and low cost that makes Z1800-Series testers easy to deploy

anywhere in the world. More than 2,200 Z1800-Series testers have been sold worldwide.

The Z1888 builds on the proven acceptance of the Z1800-Series as the industry MPT standard. It delivers the high fault coverage, short programming time for complex devices, and great adaptability required to meet the rigors of modern SMT production environments. And the Z1888's built-in upgrade path gives you the flexibility you need to upgrade the system in the field.



The PRISM-Z™ is a single-board analog measurement processor featuring a new, DSP-based design. A next-generation analog measurement system, PRISM-Z leads the industry in accuracy, stability, repeatability, and throughput.

## Industry-Leading Analog Performance

The PRISM-Z™ (PRecision Integrated Signal Measurement) module is a next-generation analog measurement system for the Z1800-Series family of test systems. The PRISM-Z is a single-board analog measurement processor featuring a new, DSP-based (Digital Signal Processor) design. The PRISM-Z analog instrument features industry-leading precision for analog in-circuit and functional test. It offers improved accuracy, stability, repeatability, and throughput.

This new analog instrument extends the high and low ranges of component values that can be tested on Z1800-Series manufacturing process test systems. The PRISM-Z provides greater range and accuracy, especially for testing small capacitors, small and large inductors, and RC combinations. The PRISM-Z offers better stability across a wider range of operating temperatures and improved transportability of programs between systems. This results in enhanced throughput and repeatability in production.

## Comprehensive Vectorless Test

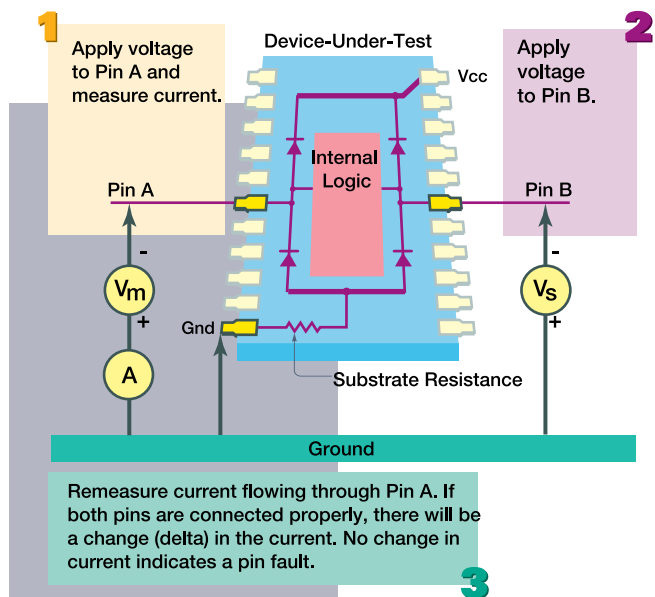
Power off device test—called vectorless test—is the preferred method to find trace opens and other faults around large SMT silicon-based packages. It eliminates having to develop the lengthy test patterns required to inspect complex VLSI and ASIC parts on traditional “backdrive” in-circuit and combinational testers. The MultiScan™ vectorless test system—standard in the Z1888—is Teradyne’s comprehensive toolset for power-off vectorless board test.

MultiScan provides fast programming and complete manufacturing process fault coverage—without in-circuit backdrive and test vectors. MultiScan consists of three complementary tools for the Z1800-Series testers: DeltaScan™ analog junction test, FrameScan™ capacitive coupling test, and CapScan™ capacitive coupling test.

Together, they deliver the most comprehensive vectorless fault coverage available. By dramatically reducing the time and costs needed to generate test programs, MultiScan lets you cut cycle time while boosting fault coverage on complex VLSI boards.

## Production Environment Flexibility

MPT systems are meant to be used “in-line”—immediately following the SMT assembly and soldering equipment itself. The Z1888 features a compact footprint of only 11.1 square feet (1.03 square meters) and a tiltable work surface and recessed front panel for more comfortable seated operation. A variety of available board handlers, mechanical fixture actuators and other accessories such as monitor arms can be attached easily to the Bosch frame of the Z1888 console, offering unparalleled flexibility in almost any production environment. Together with the Z1800-Series’ proven reliability of 4000 hours MTBF, there is no other system better qualified for the rigors of today’s high-volume, short-cycle-time board manufacturing processes.

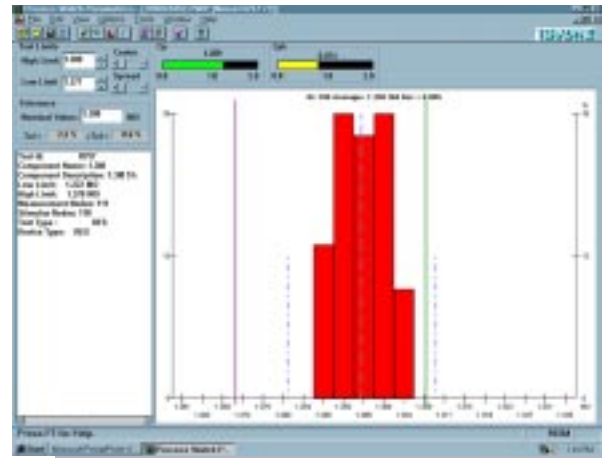


DeltaScan™ analog junction test performs simple DC current measurements on unique pin pairs of the device-under-test, using the ESD protection (or parasitic) diodes present on virtually every digital device pin and most mixed-signal device pins. DeltaScan provides high fault coverage on virtually any package style, including through-hole, SMT, ball grid arrays (BGAs), and components with heat sinks or fans mounted on them.

## Complete Manufacturing Process Testing

The Z1888 ships standard with the features you need to achieve high fault coverage on the most complex boards at the lowest overall cost.

- Comprehensive analog, digital and mixed-signal test capability.
- Standard MultiScan vectorless test system with higher fault coverage than competing solutions.
- PRISM-Z DSP-based analog sub-system for industry-leading accuracy, reliability, and throughput.
- Minimum footprint, ergonomic console, including tilt, designed for straightforward integration into automated SMT lines.
- The industry's fastest, easiest-to-use program generation and test validation tools.
- ProcessWatch™ Monitor real-time process monitoring with alarms.
- ProcessWatch™ Parametrics for ensuring stable, reliable test programs.



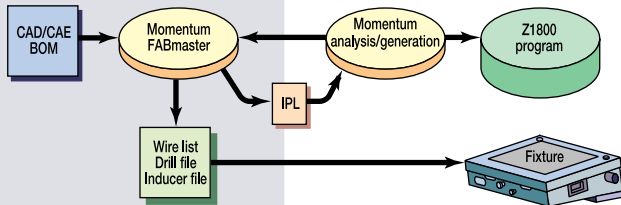
ProcessWatch™ Parametrics software ensures transportable, repeatable Z1888 test programs.

## Built-in Upgrade Path

The Z1888's open architecture lets you expand beyond the system's standard analog and digital in-circuit capabilities to add features such as IEEE functional test instrumentation and non-volatile memory (NVM) programming.

You can upgrade the Z1888 right at your site with the following options:

- Analog and mixed-signal functional test using VXI/IEEE instruments.
- Integrated LabWindows software, "virtual instrument" software from National Instruments.
- Teradyne's Functional Interface Board™ for complete signal routing flexibility and a built-in "breadboard area" for your own custom circuitry.
- The Digital Function Processor™ to handle large data streams for memory testing, serial port testing, as well as dynamic programming of Flash and EEPROM.



Momentum™ software lets test engineers perform complete test-set generation—from CAD/CAE input to test program generation and fixture design—in one integrated, easy-to-use environment. Momentum guides the test engineer through the optimum program and fixture-generation process, ensuring programs that have high turn-on rates and require minimum debug time on the tester.

## Integrated CAD-Tester Programming Environment

Momentum™ is a comprehensive, easy-to-use toolset that accepts data from a variety of sources—be it CAD data, a Bill of Materials, or a netlist—then uses the information in these sources to create a high turn-on rate program and generate the complete fixture design. Users can now move quickly through the complete program and fixture development process—from CAD data to testability analysis to Z1800-Series program generation and fixture design—in a single, integrated environment.

Running on Windows 95 or Windows NT, Momentum software includes input translation of multiple CAD formats; testability analysis; test program generation; and fixture generation. By providing one easy-to-use, comprehensive environment to manage the entire test job development process from CAD data to final program and fixture design, Momentum cuts data collection time, minimizes fixture build time and ensures fast debug of stable, reliable test programs—getting in-circuit test development off the critical path for production ramp.



ProcessWatch™ Monitor software is the Z1800-Series' proven tool for real-time process feedback, monitoring, and alarms.

## General System Features

- Up to 2048 analog/digital, non-multiplexed driver channels with high performance signal interface using impedance-controlled wireless connection to Driver/Receiver cards.
- DUT power supplies:  
5V @ 45A
- Dual programmable power supply (optional):  
0 to 55V, 2A.  
(0 to 30V, 2A for systems with GS mark)
- Antistatic work surface and ESD Kit.
- Integrated power line conditioning and monitoring.
- System self-test and diagnostic fixture software (MTTR 10 min. typical.)
- 100 to 250V, 50/60Hz, single phase line voltage transformer.
- PC I/O card and cable.
- Supports optional board handling systems and mechanical fixturing press-down units.

## Digital Test Specifications

- Non-multiplexed driver architecture— driver behind every pin at all times.
- Comprehensive truth table testing using Gray code coherent stimuli (Up to 32K patterns per burst), static logic levels and synchronous preset pulses.
- Up to 2 million data patterns per second.
- Measurement modes: signature analysis, transition counting, period measurement.
- Fully automatic, unlimited digital parallel sensing per-test-step.
- Programmable dual threshold sensing checks IC output high and low level; input voltage range of -2V to 10V.
- Vector Performance™ Option: Vector test patterns available simultaneously on every pin. Up to 250,000 vector patterns per burst.
- Optional programmable drive levels are available: 2.7 to 5.5 V.
- 400mA Source/Sink capability at every node. Supports all logic families. (TTL, MOS, CMOS, NMOS, AS, & FAST)
- Programmable backdrive timeout and duty cycle control protects DUT ICs.
- Controlled slew rate of 120V per  $\mu$ sec prevents overshoots.
- Hicheck™ produces a “HIGH” signature for all “stuck high” measurements.
- Selectable pull up, pull down and mid-terminators.
- Tracer™ interactive open pin verification routine eliminates false device rejects.
- Fault Inject grades fault coverage of digital tests.

## Analog Test Specifications

Resistor	
Value Meas	Type Accuracy
0.1 $\Omega$ to 0.1 $\Omega$	4-wire $\pm 1.0\%$ +/- 3m $\Omega$
1 $\Omega$ to 10M $\Omega$	2-wire $\pm 0.2\%$ to 2%
10M $\Omega$ to 100M $\Omega$	2-wire 10%

Capacitor	
Value	Accuracy
1pF to 42pF	2 wire $\pm 1.0\%$ $\pm 1$ pF
42uF to 100,000uF	4 wire $\pm 2.0\%$

RC parallel combinations	
Value	Accuracy
10pF / 950k	25% $\pm 11\%$
100pF / 300k	7% $\pm 2\%$
100pf / 7.6k	12% $\pm 5.5\%$
1nF / 39k	5.2% $\pm 1.1\%$
1nF / 97k	5.2% $\pm 1.1\%$
1nF / 9.7k	6.3% $\pm 3.2\%$
1nF / 970 $\Omega$	7.5% $\pm 3.7\%$
10nf / 4k	5% $\pm 0.5\%$
10nF / 100 $\Omega$	7% $\pm 3.5\%$
100nF / 1k	5% $\pm 0.5\%$
1uF / 100k	5% $\pm 0.5\%$
1uF / 100 $\Omega$	10% $\pm 0.5\%$
10pF / 1K	25% $\pm 12\%$

Inductor	
Value	Accuracy
1 mH to 50 mH	4 wire $\pm 2.0\%$
50 mH to 500 mH	4 wire $\pm 1.0\%$
50 mH to 500 mH	2 wire $\pm 2.0\%$
500 mH to 5 H	2 wire $\pm 1.0\%$
5 H to 50 H	2 wire $\pm 1.0\%$

- Low-voltage stimulus for resistor, capacitor and inductor measurements, nominal stimulus 100mV across component-under-test.
- Transistor gain testing.
- Analog Switching Relay-on resistance < 200 milliohm.
- Relay-off resistance 1E13 ohm min.
- Relay stand-off voltage > 120V.
- Relay carrying current 1A.
- User serviceable relays socketed for quick service; self-tests identify failing relays
- Programmable signal averaging for noise immunity, 1 to 255 measurements.
- HiGuard™ nulls thermal EMF for improved guarded measurement accuracy.
- 60V/20mA (required for GS Certification) or 100V/20mA, ac/dc stimulus for high voltage device testing (optional).
- Active Squelch discharges components quickly, prior to test to ensure accuracy, high throughput and repeatability.
- Automatic learning of shorts and continuities tests.
- Separately programmable shorts and continuities thresholds; default 5 ohm.
- Dual, independently programmable stimulus sources.
- 16-bit programmable stimulus source.
- Validate/AutoAccept automatically debugs analog tests.
- Relay Array Board provides 32 programmable user relays.

## Software

- Language-free, menu-driven programming system with context-sensitive help.
- Momentum™ Automatic Fixture and Program Generation (AFPG) software (optional).
- Gray code and vector template library for automatic test generation (VLSI, LSI, SSI, MSI, microprocessor, memory).
- Automatic digital and analog guard analysis with automatic board disable generation.
- Interactive debugging of test programs using “Stop-on-Fail” editing.
- AutoProbeCheck™ verifies fixture-to-board contact to eliminate false rejects.
- Nodefinder™ probe utility detects/displays test system channel numbers, speeding debug operations.
- Reverse Nodefinder physically locates specific test system nodes at the board-under-test using a hand-held probe.
- Program branching and chaining commands control test program flow for testing of multiple boards.
- Test Toolbox™ programmable C-language system utilities.
- ProcessWatch™ online data collection of test results for real-time yield monitoring, alarms, and defect analysis (optional).
- Automatic multipanel test generation and testing.
- Built-in JEDEC translator provides models for programmable PAL/GAL devices.

## Physical Specifications

- Dimensions:  
32” (82 cm)H x 34.5” (88 cm)D x 48” (122 cm)L.
- Weight: (approximate):  
600 lb (273 kg).
- Power Requirements:  
100-250V, 1.8KVA, 3-wire, 50 or 60 Hz single phase.
- Environmental Requirements:  
Ambient Temperature: 64-89°F (18-32°C).  
Relative Humidity: 20-70% non-condensing.  
Vacuum Pump Temperature: 32-122°F (0-50°C).  
Required Vacuum Pump Capacity: 41 CFM.
- Power Connectors: NEMA L5-30P.
- Certified for safety by  
TUV Rheinland N.A. to a CE Mark.

## TERADYNE

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