



PRODUCT TESTING GUIDE

DESIGN QUALIFICATION TESTING

All Samtec series undergo Design Qualification Testing (DQT). This includes Gas Tight, Normal Force, Thermal Aging, Mating/Unmating/Durability, IR/DWV, Current Carrying Capacity (CCC), and Mechanical Shock/Random Vibration/LLCR and Event Detection.



EXTENDED LIFE PRODUCT™

E.L.P.™ certified products are tested to additional, rigorous standards which evaluate contact resistance in simulated storage and field conditions.

Products are exposed to 10-year Mixed Flowing Gas, where sulfur dioxide, chlorine, hydrogen sulfide and nitrogen dioxide flow around parts for 14 days, and achieve high mating cycles (250 to 2,500). Certain plating and/or contact options apply.

For additional details, including a list of qualifying products and test results, visit samtec.com/ELP or contact the Customer Engineering Support Group at ASG@samtec.com.



SEVERE ENVIRONMENT TESTING

Severe Environment Testing (SET) is a Samtec initiative to test products beyond typical industry standards and specifications to ensure they are more than suitable for rugged/harsh environment industries, including military, space, automotive, industrial and other extreme applications. Visit samtec.com/SET or contact set@samtec.com for more information and current available test results.



Additional Testing Includes:

- VITA 47.1 Module Insertions
- VITA 47.3 Humidity
- VITA 47.1 Operating Shock Class OS2
- VITA 47.1 Vibration Class VS3
- Exceeds VITA 47.1 Temperature Cycling Class C4
- Exceeds VITA 47.1 Non-Operating Temperature Class C4
- VITA 47.1 Electrostatic Discharge Resistance
- Exceeds VITA 47.1 Altitude for DWV

NASA:

SET products are approved for Class D missions that require high-reliability, quick-turn and cost-effective solutions for LEO satellites, SmallSats, CubeSats and other space exploration applications.

Samtec also utilizes NASA outgassing data to determine if certain products meet NASA's ASTM E595-77/84/90 test requirements. Visit outgassing.nasa.gov for data.

PRODUCT TESTING QUICK REFERENCE GUIDE



| TEST | DESIGN QUALIFICATION TESTING (DQT) | EXTENDED LIFE PRODUCT™ (E.L.P.™) | SEVERE ENVIRONMENT TESTING (SET) |
|--|--|---|--|
| Gas Tight | N/A | ✓* | ✓* |
| Normal Force | ✓ | ✓* | ✓* |
| Thermal Aging | ✓ | ✓* | ✓* |
| Mating / Unmating / Durability (240 Hrs) | ✓ (90-98% Relative Humidity, 100 Cycles) | ✓* (90-98% Relative Humidity, 100 Cycles) | ✓ (100% Relative Humidity, 250 Cycles) |
| IR / DWV | ✓ | ✓* | ✓ (At Altitude of 70,000 Feet) |
| CCC | ✓ | ✓* | ✓* |
| Mechanical Shock / Random Vibration / LLCR | ✓ (100 G Peak, 6 ms, Half Sine & 7.56gRMS Avg, 2 Hr / Axis) | ✓* (100 G Peak, 6 ms, Half Sine & 7.56gRMS Avg, 2 Hr / Axis) | ✓ (40 G Peak, 11 ms, Half Sine & 12gRMS, 5 - 2,000 Hz, 1 Hr / Axis) |
| Mechanical Shock / Random Vibration / Nanosecond Event Detection | ✓ (100 G Peak, 6 ms, Half Sine & 7.56gRMS Avg, 2 Hr / Axis) | ✓* (100 G Peak, 6 ms, Half Sine & 7.56gRMS Avg, 2 Hr / Axis) | ✓ (40 G Peak, 11 ms, Half Sine & 12gRMS, 5 - 2,000 Hz, 1 Hr / Axis) |
| Temperature Cycling (500 Cycles) | N/A | N/A | ✓ |
| Non-Operating Class Temperature | N/A | N/A | ✓ |
| Electrostatic Discharge (ESD) | N/A | N/A | ✓ |
| 10 Year MFG (Mixed Flowing Gas) | N/A | ✓ | N/A |
| Mating Cycles (250 to 2,500) | N/A | ✓ | N/A |

Gas Tight*

Measures LLCR change after mated product is exposed in nitric acid for 1 hour. This test verifies there is enough normal force between contacts that a gas tight seal is created at the interface.

Normal Force*

Measures the contact gap compared to the print before taking normal force measurements; contact gaps are measured after thermal aging.

Thermal Aging*

Measures the change in LLCR and mating/unmating force after products have been thermally exposed.

Mating / Unmating / Durability*

Measures the change in LLCR and mating / unmating after products have been cycled and exposed to various environmental conditions.

Insulation Resistance / Dielectric Withstanding Voltage (IR/DWV)*

Determines the testing voltage and then ensures environmental exposure will not cause the product to fail at the test voltage.

Current Carrying Capacity (CCC)*

Establishes the maximum CCC versus ambient temperature.

Mechanical Shock / Random Vibration / LLCR*

Measures the product's ability to withstand a series of mechanical shocks and random vibration. LLCR is a before and after check for damage.

Mechanical Shock / Random Vibration / Nanosecond Event Detection*

Measures the product's ability to withstand a series of mechanical shocks and vibrations. Event detection monitors continuity during testing.

Temperature Cycling

Evaluates the product's reliability through thermal fatigue by cycling through two temperature extremes (-65 °C to 125 °C, 30 minute dwell time at each extreme).

Non-Operating Class Temperature

Determines the temperature range at which the product operates at peak level (-55 °C to 125 °C at 100 cycles, and -65 °C to 125 °C at 100 cycles; 200 total cycles).

Electrostatic Discharge (ESD)

Measures the level of electrostatic voltage the product can withstand (exposure to 5k, 10k and 15k Volts, repeated 10 times).

10-Year Mixed Flowing Gas (MFG)

Measures the change in LLCR after the product has been cycled and exposed to various environmental conditions.

Mating Cycles

Measures the maximum number of mating/unmating cycles the product can withstand while maintaining the maximum resistance & pull force.

DWV at Altitude

Measures the peak voltage that a product can withstand before dielectric breakdown at high altitudes (70,000 feet).

* Completed as part of initial Design Qualification Testing (DQT). All series undergo DQT. Extended Life Product™ testing and Severe Environment Testing are performed in addition to DQT. Please visit [samtec.com](https://www.samtec.com) for details.