



Verizon NEBS™ Compliance: JI-ONT
NEBS Testing Requirements
Verizon Technical Purchasing Requirements
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1.0 PURPOSE

The purpose of this Verizon Technical Purchasing Requirement document is to provide basic design guidelines and define the minimum required NEBS testing for JI-ONTs.

As with other products that serve the network, JI-ONTs shall be tested to determine their safety, performance, and reliability characteristics. The supplier shall provide a production sample to a Verizon-approved Independent Testing Laboratory (ITL) for testing and shall furnish the test results to Verizon's NEBS Compliance and Quality Assurance team for review. In addition to NEBS testing, JI-ONTs shall comply with all applicable local, state and federal statutes and regulatory requirements prior to general deployment.

2.0 SCOPE

This Technical Purchasing Requirement document is intended to summarize Verizon's Environmental, Electromagnetic Compliance, and Electrical Safety requirements, as well as additional performance requirements for all of its JI-ONT products.

The "punchlist" of tests contained herein shall be used by equipment suppliers and the Verizon approved Independent Test Laboratories as the baseline of tests to create the NEBS Test Plan. In all instances of test planning and test execution, the most recent and accepted versions of the GR standards shall be used.



3.0 REFERENCES

GR-63-CORE	NEBS™ Requirements: Physical Protection
GR-78-CORE	Generic Physical Design Requirements for Telecommunications Products and Equipment
GR-418-CORE	Generic Reliability Assurance Requirements for Fiber Optic Transport Systems
GR-950-CORE	Generic Requirements for Optical Network Unit (ONU) Closures
GR-1089-CORE	Electromagnetic Compatibility and Electrical Safety – Generic Criteria for Network Telecommunications Equipment
SIT.NEBS.RQS.NPI.2006.040	Verizon NEBS Compliance Clarification Document
SIT.NEBS.TE.NPI.2004.015	Telecommunications Carrier Group NEBS Compliance Checklist
UL-1449 2nd Edition	Transient Voltage Surge Suppressors

4.0 ACRONYMS

BBU	Battery Back-up Unit
EFT	Electrical Fast Transient
EMI	Electromagnetic Interference
ESD	Electro Static Discharge
EUT	Equipment Under Test
FTTP	Fiber To The Premise
ITL	Independent Testing Laboratory
JI-ONT	Just Inside - Optical Network Terminal
NEMA	National Electrical Manufacturers Association
ONT	Optical Network Terminal
OPSU	ONT Power Supply Unit

5.0 DEFINITIONS

A JI-ONT is an ONT capable of delivering voice, data and video services to a single residential customer, which is located inside the customer's dwelling. The JI-ONT is different from an Indoor SFU-ONT as it integrates the battery back-up unit (BBU) and ONT power supply unit (OPSU) into a single housing that provides power to the ONT.



6.0 GENERAL REQUIREMENTS

ONTs must be designed and tested to a qualification test plan that includes all of the applicable criteria. The JI-ONT must meet the applicable criteria contained in the Section 8. In addition to these NEBS requirements, the ONT physical design must meet the requirements set forth in GR-78-CORE (*Generic Physical Design Requirements for Telecommunications Products and Equipment*). Vendors may self-declare their product's compliance to GR-78-CORE by submitting a completed copy of the Telecommunication Carrier Group Checklist, specifically Appendix B. Current versions of the TCG Compliance Checklist and the Verizon NEBS Clarification document can be found on the Verizon web page (<http://www.verizonnebs.com/index.html#chklist>).

Verizon requires that manufacturers submit their EUT and associated documentation to a Verizon approved ITL for testing and verification of conformance to the qualification test requirements in this document. For a list of Verizon approved laboratories and locations, consult the Verizon web page at <http://www.verizonnebs.com/tcppage.html>.



7.0 TEST REQUIREMENTS – JI-ONT

The JI-ONT NEBS requirements need to account for the indoor environment in which they will be located. JI-ONTs will be installed just inside the house, either in a basement, garage or in a living area, where the environmental conditions are less severe than for ONTs that are mounted outdoors. The table below describes the testing required for JI-ONTs.

Standard	Section	Notes
GR-1089-CORE	Section 2 – System Level ESD and EFT	
	Section 3 – Electromagnetic Interference	
	Section 4 – Lightning and AC Power Fault	First level intra-building lightning surge tests on telecommunications ports performed at 5KV level
	Section 7 – Electrical Safety Criteria	
	Section 9 – Bonding and Grounding	
GR-63-CORE	Section 4.1.1 – Transportation and Storage Environment Criteria	
	Section 4.1.2 – Operating Temperature and Humidity Criteria	Modified operating temperature range of -20°C to +50°C
	Section 4.1.3 – Altitude	
	Section 4.1.4 – Temperature Margin Evaluation	
	Section 4.1.6 - Heat Dissipation	
	Section 4.1.7 – Surface Temperature Measurements	
	Section 4.2 – Fire Resistance	
	Section 4.3.1 – Packaged Equipment Shock Criteria	
	Section 4.3.2 – Unpackaged Equipment Shock Criteria	
	Section 4.4.1 Earthquake Environment and Criteria	
	Section 4.4.3 – Wall Mounted Equipment Anchor Criteria	



GR-63-CORE	Section 4.4.4 – Office Vibration Environment and Criteria	
	Section 4.4.5 – Transportation Vibration Criteria	
	Section 4.5 – Airborne Contaminants	Outdoor Levels
	Section 4.7 - Illumination	
GR-418-CORE	Section 4.8 – Thermal Cycling	Modified temperature range of -20°C to +50°C
UL-1449	Section 31 – Leakage Current Test Section 32 – Dielectric Voltage-Withstand Test Section 34 – Measured Limiting Voltage Test Section 35 – Surge Current Test Section 36 – Overvoltage Test Section 37 – Abnormal Overvoltage Test	Testing to be performed on a system level basis.
Verizon Requirement	Cold Temperature Charge	Discharge battery to 20% residual charge; attempt to charge battery while ambient temperature remains at -20°C.
Verizon Requirement	Cold Temperature Start	Disconnect the AC power to the OPSU forcing the BBU unit to power ONT while ambient temperature is at -20°C.



8.0 NEBS QUALIFICATION PLAN GUIDELINES

8.1 Equipment Test Setup Guidelines

Test configuration: The Equipment Under Test (EUT) shall be fully configured and performing its designated functions during the application of NEBS testing. The EUT and all associated documentation (installation and operating manuals), mounting and grounding schemes shall be provided to the test laboratory by the vendor prior to test commencement. All equipment interfaces (voice, video and data) shall be monitored for functionality and the test plan shall include the pass/fail criteria for each interface or service type.

8.1.1 ESD

Apply “normal operation” test criteria for ESD on customer-accessed surfaces behind the customer access door.

8.1.2 EMI

The Equipment Under Test shall demonstrate safe and reliable operation with both the network elements intended for use at a customer’s premises as well as standard consumer electronic products when operated together within close proximity. The EUT shall not cause unwanted interference to adjacent consumer electronics.

- The vendor is required to generate a test plan to demonstrate safe and reliable operation of both the network elements intended for use at customer’s premises as well as standard consumer electronic products when operated within close proximity.
- Wall mountable ONT types shall be installed on a flat, non-metallic surface such as wood or PVC at a 5’ height.
- Cables should be run vertically down and out through the turntable floor openings.
- Power is not to be split out if the equipment is powered via telecommunications cable. Conducted emissions are to be performed on a single lead for both power and signal.

8.1.3 Lightning Surge and AC Power Fault

First-Level lightning surge requirements shall apply to demonstrate performance and lightning protection. The ONT shall be designed to withstand lightning surges on the Telecommunications and AC Power ports. To demonstrate compliance, the vendor’s equipment shall be able to withstand First-Level lightning surge levels up to $\pm 5000V$ on the Telecommunications Ports. The acceptance criteria is that the equipment be capable of resuming operation after a $\pm 5000V$ lightning strike without replacement of components, manual rebooting, or human intervention.



8.1.4 Vibration

Wall mountable ONT types shall be installed and tested on a stiff vertical surface having a natural frequency greater than 35 Hz as specified in Section 5.1.4.3 of GR-63-CORE.

8.1.5 Use of Fire Resistant Materials and Fire Resistance Testing

The ONT shall utilize fire resistant materials and components as described in GR-63-CORE Section 4.2.3 and GR-78-CORE. Fire resistance testing will be performed in the electronics compartment to demonstrate the ONT Fire Resistance and Self-Extinguishing characteristics. Fire resistance testing shall be performed per GR-63-CORE and the Verizon NEBS Clarification document.

Design Requirement:

- Flames shall not exit the ONT at any time during the test, since any amount of flames exiting the equipment poses a significant safety hazard.