

Verify the next generation of high-speed Internet connection devices on interoperability and use case software incl. PoE (IEEE) & RPF (ETSI)



Test any Broadband product that is equipped with G.fast (106/212 MHz), GHNA, SPE Single Pair Ethernet according line test reference (TR-285i2/TP100) from DC up to 250 MHz at an unrivalled accuracy of <math><1\text{dB}</math> on all 16 line length settings.

The DLA 351 Gft is a length programmable device that simulates the link between the Central Office equipment of the Telecom Operator and the high-speed modem in the Home or Office for access to the Net. The DLA 351 Gft attenuates the modem signal as per selected test case that will affect the transmission signal and thus the maximum Upstream and Downstream speed. It is used for checking bandwidth profiles & PSD masks as defined in each ITU-T standard as well as for testing other functions like recovery time after loss of synchronization, stability of the link, application specific software functions and other gateway features. The DLA 351 Gft permits to select 16 line lengths. Short interrupts of the connection, so-called micro-interrupts, are programmable at both sides of the transmission link in terms of duration and number of interruptions over time creating impulses that test the robustness of the device under test. The DLA 351 Gft is compatible with the ICL software interface for automation of testing through Ethernet CLI telnet session with Pre-defined Test Scenario's of the standard and technology under test, or controllable with Representational State Transfer REST API.

The DLA is equipped with fixed signal filters per each length. The signal attenuation follows the insertion loss characteristic of the TP100 line type as defined in BBF/TR-285 and in ITU-T, ATIS/ETSI recommendations with impedance of 100 Ohm and step size of 50 meter. Each step size is accurately tuned within the tolerance of 1dB over the entire spectrum resulting in repeatable testing of broadband modems from 144 kbps up to 2 Gbps.

- ✔ **Chip independent Physical Layer Link**
- ✔ **Line type attenuation curve TP100 (0.5 mm/24 AWG)**
- ✔ **Programmable length of 750 meter (2460 feet)**
- ✔ **Selectable use case per 50 m stepsize (16 use cases)**
- ✔ **By-pass crosstalk -110dB/1MHz (20 dB < A-max)**
- ✔ **Noise floor better than -155 dBm/Hz**
- ✔ **CLI interface for automation purpose**
- ✔ **Selection buttons with display showing activated test**

Technologies

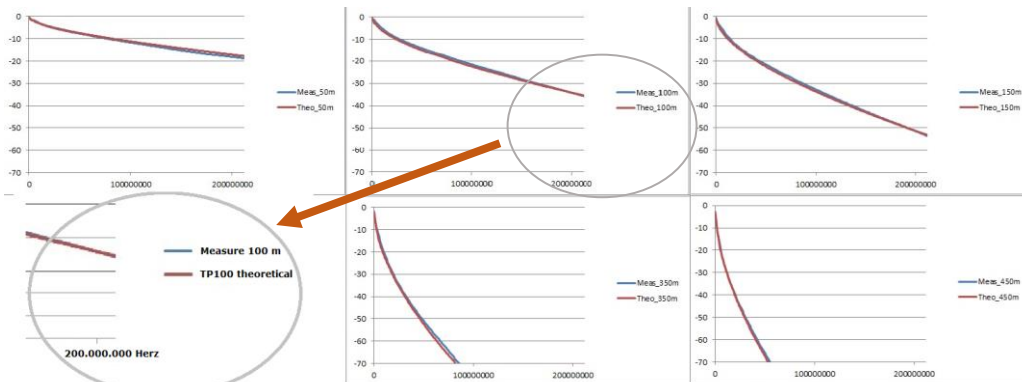
G.fast 106 MHz
G.fast 212 MHz
GHNA
Single Pair Ethernet
VDSL2 (35b)
VDSL/G.fast Bond

Applications

- test interoperability
- test functions
- software tests
- regression tests
- production tests
- rate-reach test
- PoE/RPF test

Features

- complex impedance
- set/change length
- set micro-interrupt
- configuration check
- remote control
- controller display
- symmetric



Blue line shows attenuation curve of DLA 351 Gft
Purple line shows TP-100 TR-285i2 reference

DLA 351 Gft

Repeatable test results thanks to high accuracy and outstanding Return Loss characteristics



Qualifying test results with Sparnex Instruments' unique repeatability warranty: testing under equal circumstances in different labs must generate equal results. SI guaranteed.

Use of DLA 351 Gft

The DLA 351 Gft is used for testing the modem on interoperability and for qualifying software updates and upgrades. The high repeatability of test results makes the DLA the ideal reference in the lab for running regression tests as well as for reproducing the behavior and performance of the modem-under-test in each use case. It is the preferred choice of broadband experts in the lab for qualifying modems and for comparing test results.

DLA 351 Gft APPLICATIONS

- **Interoperability testing for Certification**
- **Software Upgrade / regression testing**
- **Product design & general functions testing**
- **Production/Manufacturing quality testing**
- **Universal test reference for all broadband technologies**
- **Benchmark rate-reach testing without bt & stress tests**
- **Programmable -new- use cases with 16 line length settings**



DLA line attenuators compared to LSX true line simulators: its about simulation of delay

The effect of a cable on an electrical transmission signal is defined with the so-called secondary parameters, to know the insertion loss/attenuation in dB/Hz, the complex impedance of lines, and the delay caused by the copper lines. These parameters are derived from the primary R-L-C-G values which are unique per line type and distance, and defined in the Standards as mandatory for simulating the line reference for testing. Artificial line filter attenuators like DLA match the attenuation curve of a wireline. The impedance though of most attenuators in the market is fixed and real. The DLA is a better solution since the impedance from DC is complex like it is the case with real lines. The delay caused by twisted pair is neglected with artificial signal attenuators since the parameter 'G' of the R-L-C-G parameters is not taken into account in a signal filter where 'G' = 0. When no delay is simulated than it is assumed that the transmission signals (Tx/Rx) appear instantly in '0' time along the cable at a speed faster than light which is obviously not the case in reality on real cable. 'G' is part of the twisted pair reference definition in the Standard for the purpose of correct and unequivocal certification. This delay is not simulated by the DLA 351 Gft. The LSX 2200 that complements the DLA 351 product range simulates delay as well as it is a true and even much more accurate line simulator system used by the broadband experts from chip vendors, major equipment vendors and large telecom operators.



DLA 351 Gft

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SPECIFICATIONS

Datasheet

Line Attenuation ~ Artificial line filter characteristics

- Line type attenuation curve: TP 100 (0.5 mm / 24 AWG)
- Line length range: 750 m
- Step size : 50 m
- Range of attenuation: from 0 m ~ 1500 m cascaded
- # Line step sizes : 16 lengths (50 m granularity up to 750 m)
- Line type convertor : CAD 55 real cable type attenuation for TR-337 tests
- Compatible : DLA 352 xDSL
- Frequency bandwidth : 15 kHz to 250 MHz
- Nominal impedance : 100 Ohm
- Impedance from DC to 1,2 MHz: complex towards 100 Ohm
- Attenuation MAE (Mean Averaged Error): acc. calibration Bima A300W <math>< \pm 1\text{ dB}</math>
- Impedance accuracy 0,5 mm TP100: $\pm 10\%$ max from 100 kHz ~ 250 MHz
- Noise floor: <math>< -155\text{ dBm/Hz}</math>
- Group delay: R-L-C ('G'=0)
- Return loss: <math>< 21\text{ dB}</math>

Noise Injector (Optional in 19" version)

- Insertion loss effect: 0 dB
- Technology: noise coupler Unbalanced 50 Ohm – balanced 100 Ohm
- Frequency bandwidth: 250 MHz
- Return loss: <math>< 20\text{ dB}</math>

Noise Generator (Optional in 19" version)

- Type: ARB 576 ~ designed for certification testing
- Bandwidth: 240 MHz (expandable)
- Ports: 2 ports individually programmable
- Frequency span width: 625 MHz & 1,25 GSPS
- DAC: 16 bits
- CREST: configurable from 2 to 8 with CDF correction
- Impedance: unbalanced 50 Ohm to noise injector balanced 100 Ohm
- White Guassian noise WGN: -85 dBm/Hz to -145 dBm/Hz in 0.1 db step size
- Programmable noise: NEXT, FEXT, User specific, line loop filters, micro-interrupts, impulse noise, REIN, SHINE, PEIN, RFI-noise, notches, clocked dynamic & static noise, symmetric and a-symmetric impedance effects
- Database: Pre-defined noises and standardized field noises
- Libraries: TR-60/TR-100 i1-2-3/TR-105/TR-114/TR-115 i1-2-3, TR-337i1-2-3-4/TR-380i1-2, WT-476, Country and Operator specific test plans, Mix and gain up to 7 sources with NCS software
- Combined noise / mixing /adding: noise scenario events libraries or programmable
- Consecutive noise: with NCS, NIS, NBS noise software tools
- Compatible:

DLA 351 Gft

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CONNECTORS

- Node/device-under-test connection: shielded cable RJ-45
- CLI: RJ-45 Ethernet 10/100 base-T

POWER

- 100 – 240 VAC/50-60 Hz 2 A adapter

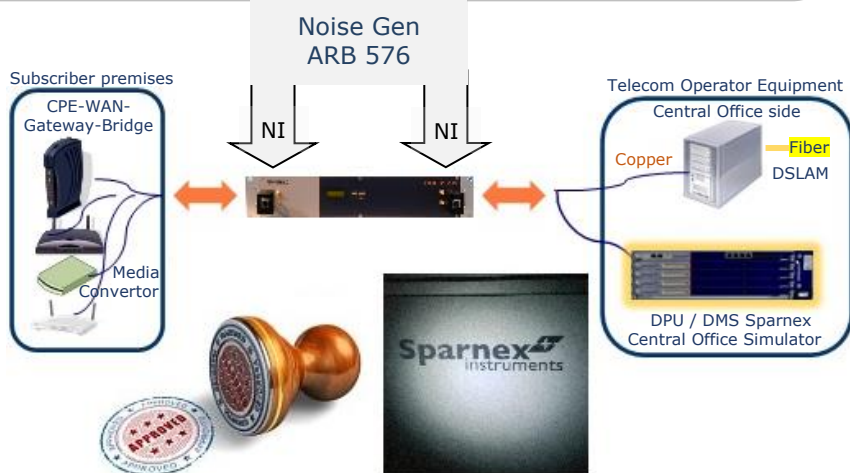
MECHANICAL

- 50 mm x 240 mm x 150 mm (H x W x D) top table version
- DLA 352 Gft = DLA 351 Gft in 19" format 2 U (HE)
- weight: 1,489 gram

ORDERING INFORMATION

DLA 351 Gft 91.57.3100

DLA Noise Injector for DLA 352 Gft	91.57.3115
DLA Noise Generator ARB 576 for DLA 352 Gft	91.57.3120
NCS 3.1 Noise Creation Software	91.57.3130
NIS 1.2 Noise Import Software	91.57.3132
NBS ATP-337i3 / TR-380i2 / WT-476	on demand
PSD Verification ITU-T G.9701 C1/2 Am 1/2/3/4	on demand
NBS Telecom Operator Specific CSP SX-xxx	on demand
Noise libraries ARB 576 (different types)	on demand
Automation Scripts per each TR-x, Am-x, i-x	on demand



The NextGen of wireline transmission technology is reaching an astonishing 1,5 Gbps over 100 m twisted pair. That is 50% faster than what is outlined by Operators with fiber to the subscriber, and 5~6 times faster than VDSL2. It is the ideal complementary solution for realizing the fiber promise of high-speed broadband by using existing wirelines in homes, apartments and buildings, as well as wirelines from existing street cabinets where fiber broadband has landed and might be available but can not reach the user gates where everyone is waiting for faster broadband connection. Carrying fiber speed broadband data over wire lines is using a transmission technology that needs adequate and accurate test equipment other than classic xDSL test and simulation tools.

Using real cable is one possible way of testing, but that is a questionable approach in terms of required accuracy for repeatable and lab independent comparable test results since it is practically impossible to reproduce accurately a controlled test environment based on switches and cables. The wavelength of this technology is 5ft or 1,5m: one unknown bad connection might cause test results that raise unjustified concerns about the quality of the product/DUT that are due to and caused by the test setup and not by the equipment under test.

The LSX 2200, LSX 2208 and the DLA 351 Gft are built by transmission experts for testing the products that use this exciting new technology. 2 Gbps over wirelines is a true milestone that needs a true accurate line simulator and a truly reliable test reference like DLA 351 Gft as part of a test platform that can test any use case up to the limit of the technology - for certification and benchmarking with the purpose of agreeing on technology, products, applications, roll-out and service.

Sparnex Instruments has a range of high-end line attenuators and simulators known under the product-group names 'DLA', 'LSX', 'MLT', 'Coax DLS' and 'PLS' for wireline transmission devices, coaxial transmission devices, and AC power line devices that allow for accurate and repeatable product performance testing according Standards of different Standardization bodies like ITU-T, IEEE and technology industry forums.