

MeLT Test Head Solution

- Cost-effective, highly-integrated G.Fast and xDSL line test solution for worldwide applications
- Complete Reference Design Available including Power Supply including Schematic, BOM and Layout
- Extremely small PCB area required
 - Reference Design uses 57cm² for 32 MeLT channels including feed and sense resistors

MeLT792 Hardware

- ZL792588 NGCC SLAC Processor
 - A single Device supports up to 128 Test Channels
 - Voltage Sense
 - Control Functions
 - A/D and D/A Conversion
- ZL75816 Driver Test Access Switch (DTAS)
 - High Voltage Driver
 - Integrated Protection consistent with ITU-T K.20 and K.45
 - Switching Regulator Control
- Inverting Boost Power Supply Reference Design supports up to 128 channels and is highly cost effective
- Optional Calibration Circuitry for Improved Accuracy

MeLT792 Software

- Le71SK7920THM Software Package
 - Comprehensive test diagnostics that are consistent with ITU-T G.996.2, BBF and Deutsche Telecom 183TR20 requirements
 - Two Lines of simultaneous Test allowed
 - Wetting or Sealing Current

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Ordering Information

Device	Package Type (Green) ¹	Packing
ZL75816GDG2	161 ball 12x12mm BGA	Tray
ZL792588GDG2	196 ball 15x15mm BGA	Tray

Software Package	Description
Le71SK7920THM	TestHead MeLT

1 - The green package meets RoHS 2 Directive 2011/65/EU of the European Council to minimize the environmental impact of electrical equipment.

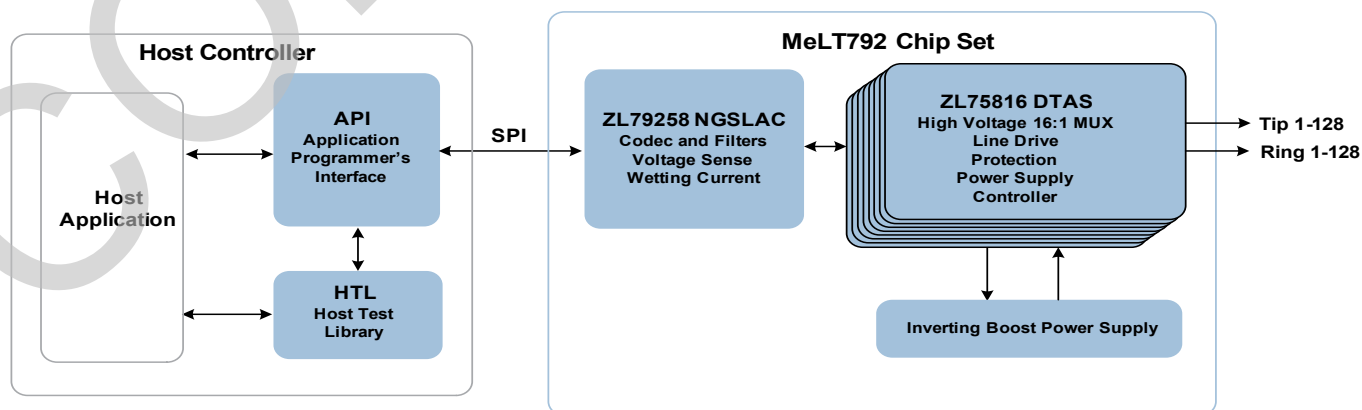
Applications

- Metallic Line Test Capability (MeLT) for G.Fast FTTdp
 - Supports Standard or Reverse Power Feed Systems
- Metallic Line Test Capability (MeLT) for xDSL DSLAM

Related Literature

- 154034 DTAS - Driver Test Access Switch Data Sheet
- 136868 Le79258 NGSLAC Processor Data Sheet
- 154383 MeLT Hardware Design Guide
- 156891 32 Channel Reference Design User's Guide
- 145981 TestHead MeLT Software Data Sheet
- 135491 Voice Path™ API-II Test Library User's Guide
- 155370 Voice Path™ API-II MeLT Reference Guide

Microsemi's MeLT792 Solution



Product Description

The MeLT792 chip set consists of the ZL792588 NGSLAC Processor and the ZL75816 Driver Test Access Switch (DTAS). The DTAS multiplexes 16 G.Fast or DSL lines to a single MeLT test channel. The DTAS provides the required Driver, while the NGSLAC provides the Sense functionality. The DTAS device has integrated secondary protection, consistent with ITU-T K.20 and K.45 requirements, so no per channel secondary protection device is required.

The DTAS is stackable to support up to 128 channel systems. Used with a single Le79258 SLAC Processor the two devices forms a complete MeLT Test Head for up to 128 channels.

Microsemi provides a low cost Inverting Boost reference design. The DTAS integrates the required control circuitry, which combined with the Inverting Boost circuitry implements a dual-output switching power supply which generates the required -48V and +24V batteries from a 12V input. For Reverse Power Feed applications, batteries are adjusted to -60V and +30V. A single supply generates the necessary battery voltages to support 128 channels of MeLT measurements.

When the MeLT792 Chipset is used in dry xDSL or G.Fast application and when reverse power feed is not used, wetting or sealing current is provided to prevent corrosion of the copper transmission wires.

The MeLT792 chip set utilizes one of three calibration schemes, the first utilizing a resistor calibration network, the second and third the resistor calibration network plus an calibration circuit for greater precision. The optional calibration circuit can be connected only during manufacturing test for Factory Calibration. Alternatively the calibration circuit can be permanently populated on the MeLT TestHead and In-Service Calibration can be performed.

The Le71SK7920THM Software Package is a comprehensive test package whose diagnostics are consistent with ITU-T G.996.2, BBF and Deutsche Telecom 183TR20 requirements and allows for two lines of simultaneous test for applications up to 96 lines.

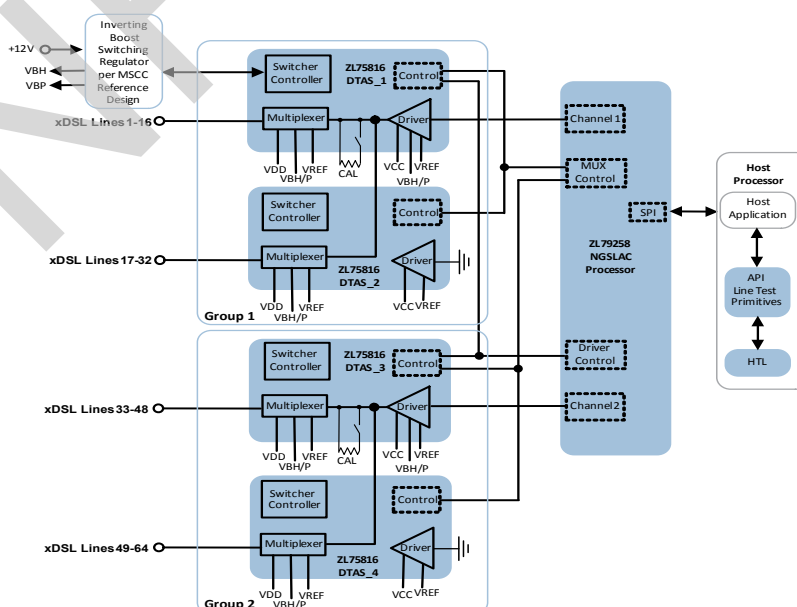
The MeLT792 Le71SK7920THM Software Package consists of the Microsemi VoicePath™ Application Program Interface, otherwise known as VP-API-II and the VoicePath™ Host Test Library (HTL)

The VP-API-II is a C source code module that provides a standard software interface for controlling the Microsemi MeLT devices. The VP-API-II hides the details of controlling Microsemi devices and allows software developers to focus on the application instead of the hardware. There is no need for the user to consider the details of device state list in the truth tables.

The VoicePath Test Library or Host Test Library, (HTL) is an additional layer of software that further abstracts the line testing capabilities of the VP-API-II. The software is responsible for running the high level test sequence, utilizing the low level basic test routines, called Test Primitives, by running several VP-API-II test primitives in sequence.

[Figure 1](#) shows a block diagram for a 64 channel MeLT solution that allows two lines of simultaneous test

Figure 1 - MeLT792 Block Diagram.



Supported Tests

The MeLT test algorithms are robust and field proven. Test suites with accuracies are published by Microsemi. Access switch application is gentle and will not cause a CRC error or affect data rate of the G.Fast of xDSL signal.

Microsemi's MeLT solution is supported by the LE79128THM firmware. [Table 1](#) provides a list of the MeLT792 supported line tests and a brief description

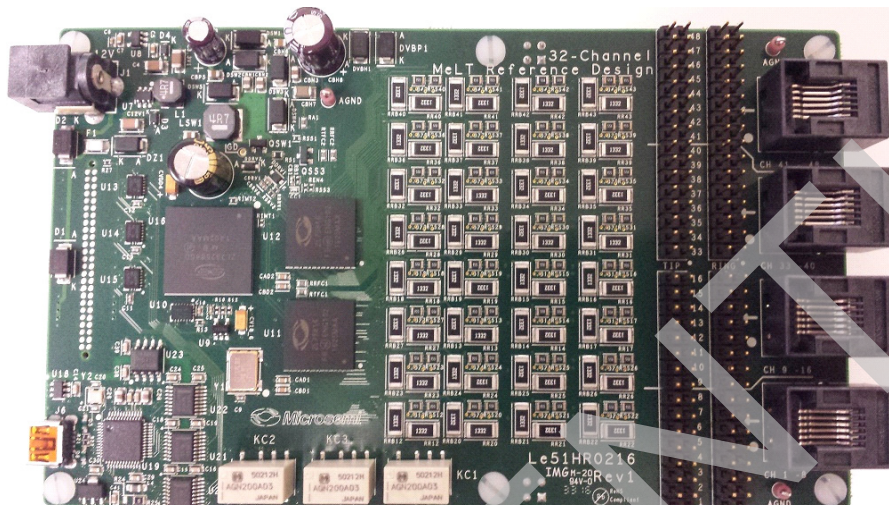
Table 1 - MeLT792 - Supported Tests

Algorithm Names	Description
Four-Element Insulation Resistance Test with Controlled Metallic Voltage	To measure the resistances connected between Tip and ground, Ring and ground, Tip to Ring, and Ring to Tip. The test can also measure the foreign DC current.
Three-Element Capacitance Test with Frequency Control	To measure the capacitances connected between Tip and Ground, Ring and Ground, and Tip to Ring.
Foreign DC Voltage Test	To measure the DC foreign voltage present in the loop. A low-pass filter is used to filter out any AC voltage present on the line.
Foreign AC Voltage and Frequency Measurement	To measure the AC foreign voltage and frequency present in the loop.
Foreign AC Currents Test	To measure the AC current flowing in each lead when the line is set to a specific common mode voltage.
Loop Capacitance with High Metallic Voltage Test	To measure the capacitance connected between Tip and Ring with control over the test stimulus voltages.
Extended Master Socket Test	To detect the presence of a passive test termination (PPA - Passiver Prüfabschluss) used in the German telephony network, a Hong Kong Master Socket or a UK Master Socket.
CPE Splitter and IAD Signature Detection	To measure the CPE splitter and IAD signature types.
CO Splitter Signature Detection	To detect the CO splitter signature types.
Loop Resistance with High Metallic Voltage Test	To detect the ETSI CPE signature type.
Susceptance Test	Measures the complex admittance of the Tip to ground, Ring to ground, and Tip to Ring branches using a sinewave with phase control and reports the conductance and admittance of each branch.
Tracing Tone Generation	To generate specific tones to a specific line.
Extended Group Test	To execute a series of voltage, resistance, capacitance and signature tests in a minimum amount of time.
Short Group Test	To execute a series of voltage, resistance and capacitance tests in a minimum amount of time.
Calibration	To measure correction factors that can be used to improve measurement accuracy.
Apply Calibration	To transfer the calibration factors into the SLAC in order to improve the testing accuracy.
Distance to Open Test	To diagnose a line to locate a cable cut. Returns the distance in meters between the central office and the cable cut.
Read Loop and Battery Conditions	Read the loop conditions and battery voltages.
Extended Read Loop and Battery Conditions	This procedure measures the instantaneous loop resistance, loop currents, and loop and battery voltages. No filtering is done during the measurement.
Generic Insulation Resistance	Similar to Three-Element Insulation Resistance Test except user can control voltage and measurement times.
Line Circuit Currents and Voltages	Measure AC or DC current or voltage while providing service
Repetitive Generic Test	This function can be used to set up some DC conditions on the line under test and to repetitively measure a voltage or current at a high sampling rate while the line is settling.
Generic Three Element Capacitance Test	Similar to Three-Element Capacitance Test except user can control voltage, frequency and measurement times.
Get Line Voltages	To measure voltages generated by the line circuit.
MELT-PMD Test Control Function	This function performs a test sequence consisting of multiple VP-TL tests within a single test call. This function can be used to perform the ITU-T G.996.2 MELT testing

Collateral

Microsemi offers a complete 32 channel reference design and evaluation board. The Le51HR0216 Reference Design Board is available from Microsemi for testing and prototyping purposes. This board is shown in [Figure 2](#)

Figure 2 - Le51HR0216 32 channel Evaluation Board



A complete 32 channel reference design package is available. The Reference Design Package includes schematic, BOM and layout files for a 32 channel MeLT solution. It is meant to be a cut and paste example of a 32 channel building block implementation of Microsemi's MeLT792 solution. The basic 32 channel building block can be used as a basis for an 8, 16 or 24 channel solution and extended for a MeLT solution up to 128 channels.

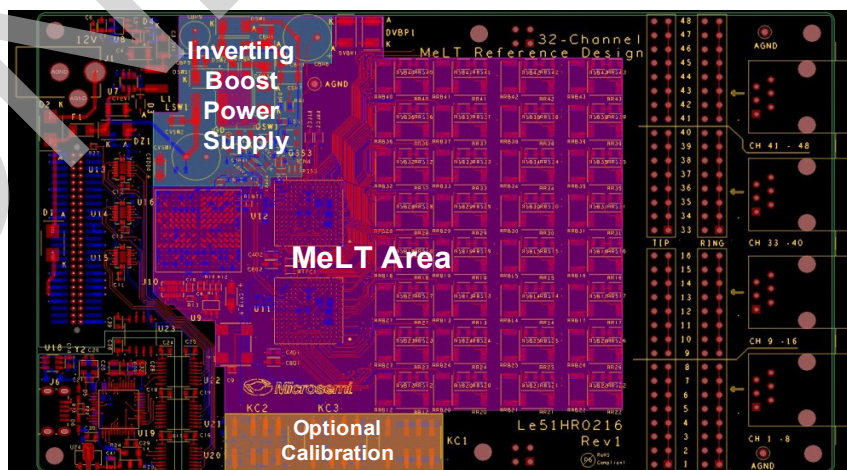
PCB Area

[Figure 3](#) shows the 32-Channel demo board PCB area consumption. The board is a 10 layer PCB with the following areas:

- Total Area for MeLT: 57.1cm²
- Power Supply Area: 7.6cm²
- Optional Calibration Area: 4.0cm²

PSU and Cal areas common to higher line counts

Figure 3 - PCB Area



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