

Telecom Mask Testers

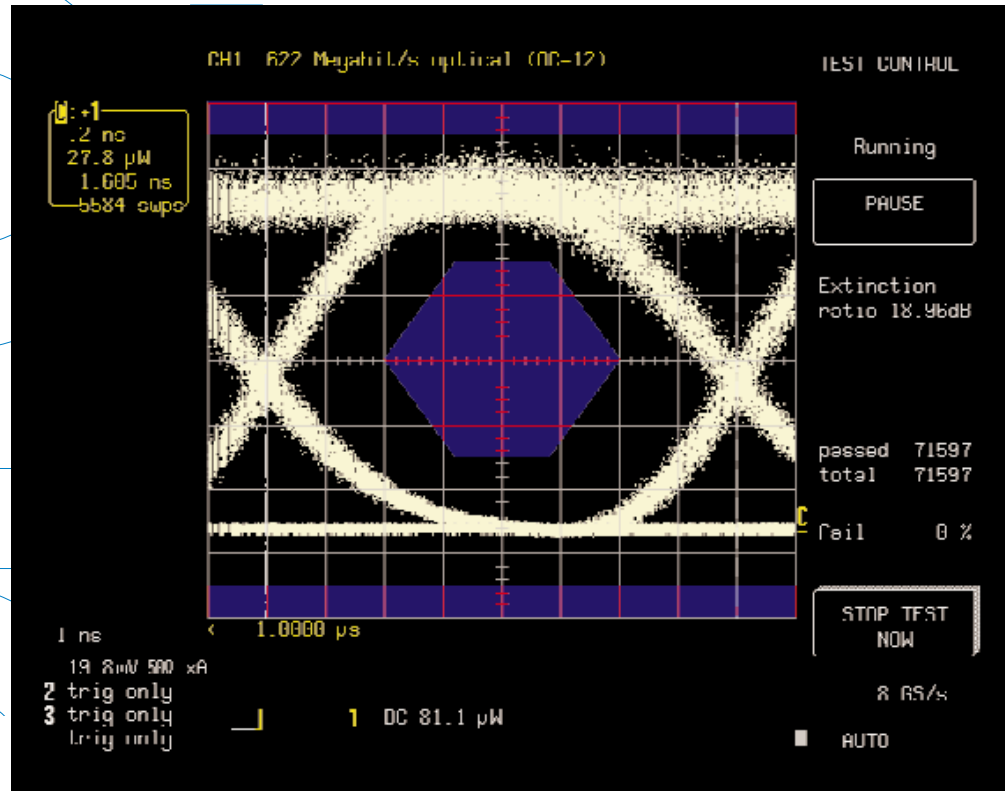
MT01
ITU Masks

MT02
ANSI Masks

MT03
Optical Masks

LEADING FEATURES

- Easy to use
- Works on random bit streams
- Self-aligning
- Self-scaling
- Includes optical-to-electrical converter for optical testing
- Includes all necessary balanced and coax adapters for electrical testing
- Dedicated menus
- Full remote control support for production test



OC12 fiber optic signal testing with MT03 option.

LeCroy's powerful and innovative Mask Testers instantly transform your digital oscilloscope into a dedicated mask testing tool, specifically designed for manufacturing, type approval, and field testing of telecommunications, electrical and optical signals.

• **Powerful:** The tester's finder function allows pulses or patterns to be easily isolated — even from random bit streams. Mask alignment is totally automatic, saving valuable testing time.

• **Easy to use:** The Mask Tester takes over control of the oscilloscope. The scope displays only the tester's dedicated menus, blocking unneeded controls and reducing the risk of incorrect test results.

• **Convenient:** The Mask Tester provides all the twisted-pair and 75 Ω interfaces you'll need for quality cable termination and exact amplitude scaling of electrical signals, plus a highly accurate optical-to-electrical (O/E) converter and optical cable for optical test.

LeCroy

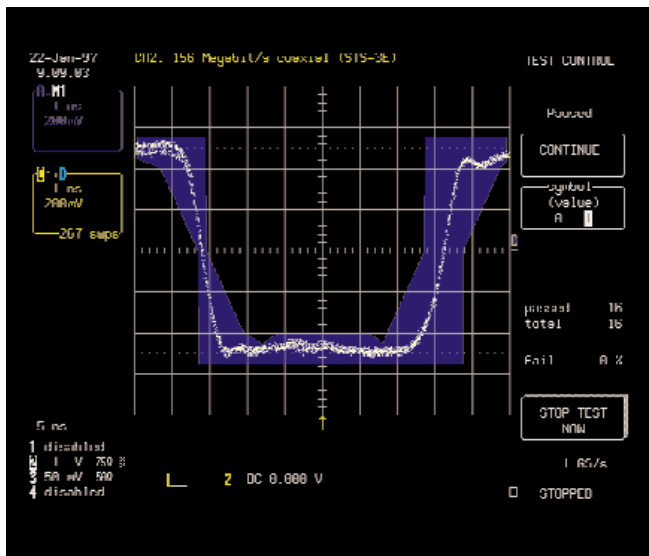
Dedicated Mask Tester

With the MT01, MT02, and MT03 Mask Test (MT) Kit solutions, your LeCroy digital oscilloscope becomes a powerful, dedicated mask testing instrument. Electrical signal mask testing is supported by the MT01 and MT02 Test Kits, and optical signal mask testing is supported by the MT03 Test Kit.

Power and Innovation

Do you ever wish your oscilloscope could isolate a pulse in that scrambled STS-1 signal? Your wish is granted using the Mask Tester's finder search engine.

Capturing and aligning certain telecom signals can be tricky. But the MT Kit's finder feature uses pattern recognition. Pulse isolation can be performed on any random bit stream, eliminating the need for sophisticated pattern generators.



Testing the 155 Mb/s SONET/SDH electrical signal. Notice how the "1" pattern is cleanly isolated in the PRBS stream.

Some CMI-encoded signals (STS-3E, STM-1E, 140 Mb/s) allow a limited amount of offset (± 0.05 V) when the signal is adjusted to the mask. The Mask Tester does this automatically, prompting the user if the offset goes beyond limits defined by the related telecom standard. And, as required by the standard, the resulting offset adjustment is propagated to both masks ("1" and "0").

Ease of Use

The Mask Tester's powerful features are even easier to use, thanks to another innovation: the tester takes over complete control of the scope. It shows only those on-screen menus dedicated to the application, blocking unnecessary front panel controls. This simplifies operation and reduces the risk of incorrect test results. The general purpose DSO is made to "think and act" just like a dedicated mask tester.

Maximum Convenience

The MT Kits provide complete solutions. For optical signal testing, a high-accuracy optical-to-electrical converter, optical cable adapters, and fiber are included. For electrical tests, twisted-pair and 75 Ω lines can easily be interfaced to the oscilloscope via the intelligent ProBus[®] adapters that are supplied. These adapters provide the scope with both correct line termination and accurate amplitude scaling. The balanced adapters are Op-Amp based, providing ultra-wide bandwidth, flat frequency response, and overall low distortion. Signal fidelity is assured.

Full Remote-Control Support

All Mask Tester functions are available using high-level remote control commands. And because the functions are especially designed and tailored to the tester, it takes fewer than 10 commands to control all of them. This makes ATE integration fast and painless.

Optical Signal Mask Test Kit

LeCroy's MT03 Mask Test Kit provides the ability to perform STM-1/OC3 and STM-4/OC12 optical signal mask testing to ensure compliance with the ITU G.957 test requirements.

Optical-to-Electrical Converter

The OE325 — a high-quality optical-to-electrical converter — converts the optical signal to an oscilloscope-compatible electrical signal. It is fully integrated into the LeCroy scope and receives its power and control from the scope. In addition, OE325 provides the flexibility of connecting directly to the OE325 FC connector or, optionally, using the fiber cable that is included with MT03.



ITU G.957 Compliance Testing

The OE325, combined with the MT03 software, provides a very easy-to-use system for testing STM-1/OC3 and STM-4/OC12 compliance. The MT03 Kit's capabilities include special digital processing of the OE325 signal that ensures reference receiver testing requirements are met, as specified in ITU G.957.

Reference Receiver

The MT03 reference receiver is a 4-pole Bessel-Thomson filter. The filter parameters are tuned to the O/E converter and the scope channel to achieve exactly the right filter characteristics for the optical reference receiver.

Automatic Optical Signal Measurements

The MT03 Kit automatically provides measurement of Extinction Ratio (dB) Mean Power (dBm), Eye Crossing Level (%), Signal Top (dBm), and Signal Base (dBm).

Automatic and Custom Testing

In the MT operation test mode, oscilloscope controls are limited to automatically displayed menus. This ensures proper test control. Front panel oscilloscope controls are disabled, and the test signal gain and offset are automatically adjusted and aligned to the test masks to allow easy determination of signal compliance.

For custom testing, the OE325 can be used outside the MT operation mode. In this operation mode, additional tests can be performed, such as jitter analysis, parametric testing, etc., with or without application of reference receiver filtering.

Electrical Mask Test Specifications

Supported Mask Tests

MT01: E1(2 Mb/s), E2 (8 Mb/s), E3 (34 Mb/s), E4 (140 Mb/s "0" and "1"), and STM-1e (156 Mb/s "0" and "1")

MT02: DS-1, DS-3, STS-1, STS-3 ("0" and "1")

Signal Adapters

MT01: 120 Ω balanced adapter with Siemens-type banana connector, 75 Ω coax adapter

MT02: 100 Ω balanced adapter with Banyam-type connector, 75 Ω coax adapter

Features

MT01:

- Automatic signal-to-mask alignment
- Cable attenuation compensation
- Four selectable Pass/Fail actions: "Stop," "Hardcopy," "Store," "Beep"

- "1" and "0" CMI pulse extraction for 140 and 156 Mb/s
- Convenient offset management for 140 and 156 Mb/s
- 120 Ω balanced and 75 Ω coax ProBus adapters: automatic scale compensation for accurate amplitude readout

MT02:

- Exclusive, "isolated pulse" extraction on random bit stream, following ANSI T1.102 requirements
- Four selectable Pass/Fail actions: "Stop," "Hardcopy," "Store," "Beep"
- "1" and "0" CMI pulse extraction for 140 and 156 Mb/s
- 100 Ω balanced, and 75 Ω coax ProBus adapters: automatic scale compensation for accurate amplitude readout

Warranty: Three years

Name	Bit Rate (Mb/s)	Tested Pulses	Impedance	Coding	Isolation Required	Isolation Pattern*
MT01 - ITU G.703						
2 MTP	2.048	pos neg	120 Ω	HDB3	NO	
2 M Coax	2.048	pos neg	75 Ω	HDB3	NO	
8 M Coax	8.448	pos neg	75 Ω	HDB3	NO	
34 M	34.368	pos neg	75 Ω	HDB3	NO	
139 M	139.264	pos neg	75 Ω	CMI	YES	1010 1001
STM-1E	155.520	pos neg	75 Ω	CMI	YES	1010 1001
MT02 - ANSI T1.102						
DS-1	1.544	pos neg	100 Ω	AMI or B8ZS	YES	-1000010 10000-10
DS-3	44.736	pos neg	75 Ω	B3ZS	YES	-1000010 10000-10
STS-1	51.840	pos neg	75 Ω	B3ZS	YES	1010 0010
STS-3	155.520	pos neg	75 Ω	CMI	YES	1010 1001

* "1" corresponds to "high" state and "0" corresponds to a "low" state for bipolar signal (like CMI)

"1" corresponds to a "high" state and "0" to a "mid" state around 0 V and "-1" to a "low" state for tri-state signals

Optical Mask Test Kit Specifications

Supported Mask Tests

- STM-1/OC3 (155.52 Mbytes/s) "0" and "1"
- STM-4/OC12 (622.08 Mbytes/s) "0" and "1"

Hardware Components

- High-accuracy optical-to-electrical converter
- FC female-to-SC female adapter
- FC female-to-ST female adapter
- FC male-to-FC male one-meter fiber cable

Features

MT03:

- ITU G.957 compliant test system
- Automatic signal-to-mask alignment
- Automatic signal power compensation
- Reference receiver
- Four selectable Pass/Fail actions: "Stop," "Hardcopy," "Store," "Beep"
- Automatic test and manual test operation modes
- Automatic measurements

Automatic Measurements

- Extinction Ratio: $10\log_{10}$ (Top/Base)
- Mean Power: (Top + Base)/2
- Eye Crossing Level
- Signal Top Power
- Signal Base Power

OE325 Specifications

Wavelength Coverage: 950 – 1600 nm

Bandwidth: 1.5 GHz

Conversion Gain: > 500 mV/mW

Max.Average Input Optical Power (non-destruct): 4 dBm (2.5 mW)

Max.Peak Input Optical Power (non-destruct): 7 dBm

Sensitivity: -23 dBm min

Typical Probe Sensitivity: -26 dBm typ

Dynamic Range: -35dBm – 0 dBm

Type: Single mode

Name	Mb/s	Tested Pulses	Impedance	Coding	Isolation Required
MT03 - ITU G.957					
STM-1/OC3	155.52	pos neg	N/A	NRZ	NO
STM-4/OC12	622.08	pos neg	N/A	NRZ	NO

Ordering Information

	Product Code
ITU G.703 electrical pulse masks, includes 120 Ω balanced and 75 Ω coax adapters	MT01
ANSI T1.102 electrical pulse mask includes 100 Ω balanced and 75 Ω coax adapters	MT02
ITU G.957 optical pulse masks and optical-to-electrical converter, fiber and fiber adapters	MT03
Bundled MT01 + MT02 package	MT01/02
Bundled MT01 + MT02 + MT03 package	MT01/02/03
Field upgrade for MT01	RK-MT01
Field upgrade for MT02	RK-MT02
Field upgrade for MT03	RK-MT03
Field upgrade for MT01 + MT02	RK-MT01 + MT02
Field upgrade for MT01 + MT02 + MT03	RK-MT01 + MT02 + MT03

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