32 IXIA OC48c Load Modules

This chapter provides details about OC48c family of load modules—
specifications and features.

The OC48c family of load modules implements Optical Carrier interfaces that
runs at OC48 speeds. The interface operates in concatenated mode, as opposed to
channelized mode. Cards are available that perform Packet Over SONET testing,
Bit Error Rate Testing or both. The features available for these load modules are
included in the *Port Features by Port Type* matrix, which is located on the
ixiacom.com website under Support/User Guides/Spreadsheets.

One of the modules in this family, the LMOC48c, is shown in the following
figure.
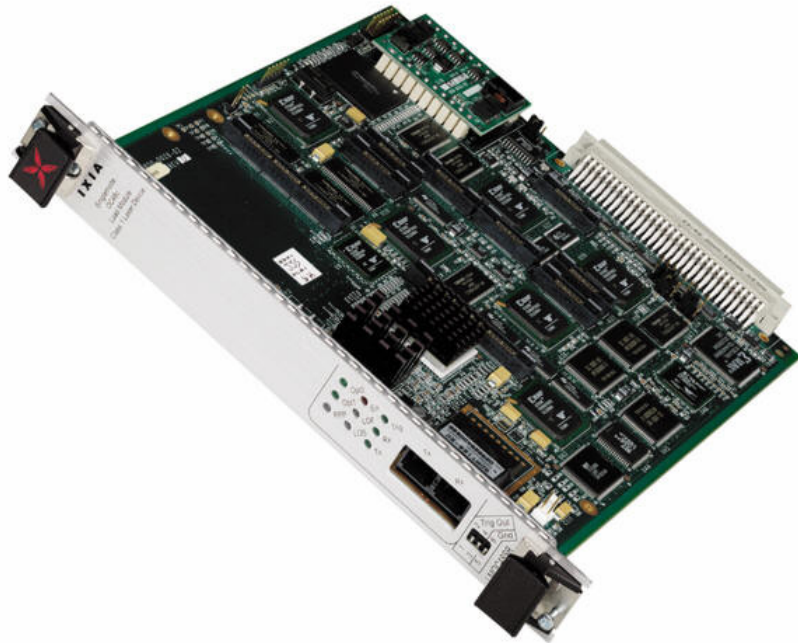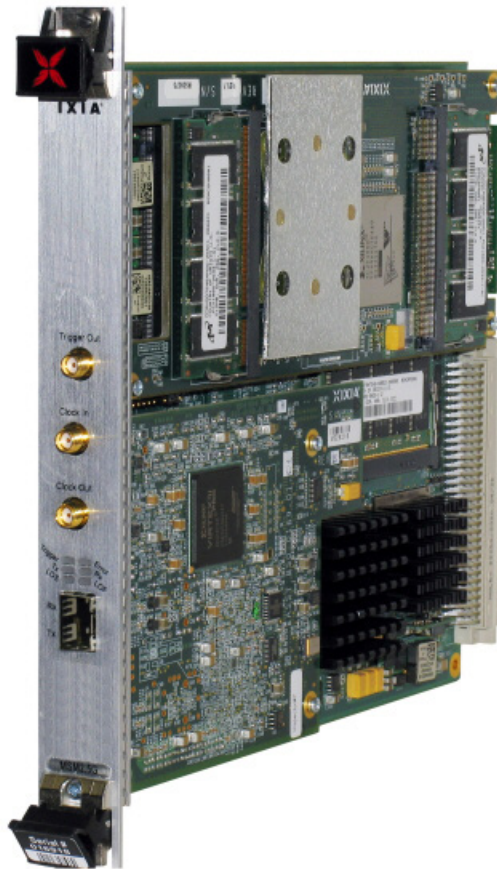
Figure 32-1. LMOC48c Load Module

Figure 32-2. MSM2.5G1-01 Load Module

Part Numbers

The part numbers are shown in the following figure. Items without a *Price List Names* entry are no longer available.

Table 32-1.   Part Numbers for OC48 Modules

Load Module	Part Numbers	Description
LMOC48cPOS	LMOC48C	1-port multilayer OC48cSR-1 POS/SDH, 1310nm, singlemode
LMOC48cPOS-M	LMOC48C3	1-port multilayer OC48cSR-1 POS/SDH, 1310nm, singlemode, manufacturing version
LMOC48cBERT	LMOC48311	1-port multilayer OC48cSR-1 SONET/ BERT, 1310nm, singlemode
	LMOC48312	1-port multilayer OC48clR-2 SONET/ BERT, 1550nm, singlemode

Table 32-1.　Part Numbers for OC48 Modules

Load Module	Part Numbers	Description
LMOC48cPOS/ BERT	LMOC48411	1-port multilayer OC48cSR-1 POS/BERT, 1310nm, singlemode
	LMOC48412	1-port multilayer OC48cIR-2 POS/BERT, 1550nm, singlemode
2.5G MSM POS	MSM2.5G1-01	1-port multilayer OC48cSR-1 POS/SDH, 1310nm, singlemode
SW-DCCSONET		DCC SONET support for all modules.
		SRP SONET support for all modules.
SW-SRPSONET SW-RPRSONET	945-0002	SRP SONET and RPR SONET support for all modules
SW-VCAT-SONET	945-0005	SONET Virtual Concatenation (VCAT) option

Specifications

The load module specifications are contained in the following table. The limitations of -3, Layer 2/3, and Layer 7 cards are discussed in *Ixia Load Modules* on page 1-5.

Table 32-2.　OC48 Load Module Specifications

	LMOC48c	LMOC48cBERT LMOC48cBERTRx	LMOC48c POS+ BERT[1]	2.5G MSM POS[2]
# ports	1	1	1	1
-3/-M Card Available	Y	N	N	N
Layer2/Layer3 Card Available?	N	N/A	N	Y
Layer 7 Card Available	N	N/A	N	N
Data Rate	1-100% of OC48 speeds	2.488 Gbps		1-100% of OC48 speeds
Connector/ Wavelength-Mode	SC/1310nm or 1550nm Singlemode	SC/1310nm Singlemode		SFP/1310nm or 1550nm Singlemode
Capture buffer size	32MB	N/A		Up to 384 MB
Captured packet size	26-65,535 bytes	N/A		17-65,535 bytes

Table 32-2. OC48 Load Module Specifications

	LMOC48c	LMOC48cBERT LMOC48cBERTRx	LMOC48c POS+ BERT[1]	2.5G MSM POS[2]
Streams per port	255	N/A		256
Flows per port	N/A	N/A		N/A
Advanced Streams	160			256
Preamble size: min-max	N/A	N/A		N/A
Frame size: min-max	26-65,535	N/A		25-65,535
Inter-frame gap: min-max	N/A	N/A		4.0ns - 42sec in 3.2ns steps
Inter-burst gap: min-max	1μs - 42secs	N/A		4.0ns - 42sec in 10.0ns steps
Inter-stream gap: min-max	1μs - 42secs	N/A		4.0ns - 42sec in 10.0ns steps
Normal stream frame rate	0.023fps - full line rate			0.023fps - full line rate
Advanced streams frame rate[3]	Slow: 0.023 - 2083333 fps Med: 95fps - full line rate Fast: 1525fps - full line rate			Slow: 0.023fps Fast: 1525fps
Latency	20ns resolution	N/A		20ns resolution

1. Refer to the LMOC48cPOS and LMOC48cBERT columns for the characteristics of this card when its port is in POS or BERT mode, respectively.

2. Due to power requirements, only one 2.5G MSM POS module can be used in a 250 or 400T chassis. Other modules can be used with the 2.5G MSM POS in the same chassis, but only one 2.5G MSM POS at a time (excepting MSM family of modules and the CPM1000T8, which have the same limitation).

3. Streams are divided up into three categories: 144 slow speed streams, 8 medium streams, and 8 fast streams (excluding the 2.5G MSM POS load module).

OC48c VAR Calibration

This procedure allows the OC48 VAR module's transmission frequency to be varied to test compliance of devices to the limits of the specification.

Frequency Adjustment

The OC48 VAR allows a variation of +/- 100 parts per million (ppm) from the clock source's nominal frequency, through a DC voltage input into the BNC jack marked 'DC IN' on the front panel. The variation is from the lowest frequency when DC IN is 0 V, to highest frequency when DC IN is 3.3 V. The input voltage should be used only within this range, although the DC IN circuitry is designed to withstand +/- 30 V in the case of accidental overdrive from a function generator. The input has a single-pole low pass at 16 Hz to keep injected noise from causing a violation of OC48 jitter specifications. As a result, the system should be given 50 to 100 milliseconds to settle after a voltage step at DC IN.

Frequency Monitoring

The frequency may be monitored through the BNC marked 'Freq Monitor.' This output provides the OC48 line clock divided by 16. The center frequency is 155.52 MHz. The voltage is 70 mV peak-to-peak into 50 ohms, suitable for direct connection into a frequency counter (such as an HP53181A) through 50 ohm coaxial cable. The frequency counter should be set for 50 ohm termination in a suitably sensitive mode.

Port LEDs

There are two sets of LEDs, one for LMOC-48c load modules and one for MSM OC-48c load modules.

Each OC48c port incorporates a set of LEDs, as described in the following figure.

Table 32-3.   LMOC48c Port LEDs

LED Label	Usage
PPP	Green if a PPP link has been established. Red otherwise.
Option 1	Reserved for future use.
Option 2	Reserved for future use.
LOS	Red during Loss of Signal, Green otherwise.
LOF	Red during Loss of Frame, Green otherwise.
Error	Red on any POS error.
Tx	Green while data is transmitted.
Rx	Green while data is received.
Trig	Follows the state of the *Trigger Out* pin, which is programmed through User Defined Statistic 1.

Each 2.5G MSM POS port incorporates a set of LEDs, as described in the following table.

Table 32-4.   MSM2.5G1-01 Port LEDs

LED Label	Usage
Trigger	Green if a Trigger A condition occurred, Red if a temperature condition occurred.
Tx	Green if transmit is active and frames are being sent, blank otherwise.
LOS	Green if signal level is good, Red if loss of signal condition is detected, blank if no transceiver is detected.
Error	Red if module is in an error state, blank otherwise.
Rx	Green if valid frames being received, Red if errored frames being received, blank otherwise.
LOF	Green if valid framing exists, Red if loss of frame condition exists.

Trigger Out Values

The signals available on the trigger out pins for legacy OC-48c load modules in this category are described in the following table.

Table 32-5.   LMOC48c Trigger Out Signals

Pin	Signal
1	Always high (no trigger available)
2	Always high (no trigger available)
3	Always high (no trigger available)
4	Always high (no trigger available)

The signals available on the trigger out pins for MSM load modules in this category are described in the following table.

Table 32-6.   2.5G MSM POS Trigger Out Signals

Pin/LED	Value
Trigger Out	10nS active high pulse on trigger.
Trigger LED	Indicates Trigger. This triggers on User Defined Statistic 1.

Optical Specifications

The optical characteristics for the OC48c cards are described in the following table.

Table 32-7.   LMOC48c Optical Specifications

Specification	OC48c Singlemode
Average Output Power–Minimum/ Maximum	-10 dBM/-3 dBM
Transmit Center Wavelength– Minimum/Maximum	1266 nm/1360 nm
Receive Center Wavelength–Minimum/ Maximum	1260 nm/1580 nm
Receive Sensitive–Minimum/Maximum	-18 dBM/-3 dBM
Safety	Class 1 Laser

Statistics

Statistics for OC48 cards, under various modes of operation may be found in *Table B-14* on page B-57.