

# OC-48/STM-16 RECEIVER WITH CLOCK RECOVERY

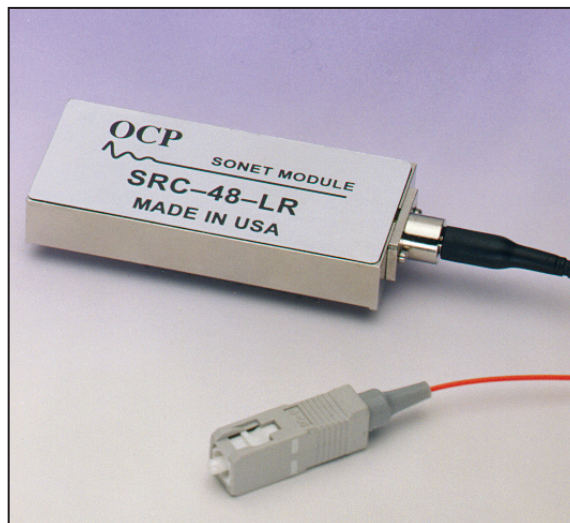
## SRC48

### Product Description

The SRC48 modules are receivers with internal clock recovery designed to meet or exceed the SONET/SDH optical interface requirements at OC-48/STM-16 (2.488 Gb/s) data rate. Three performance versions are available which are fully compliant with Short Reach, Intermediate Reach and Long Reach specifications at 1300 nm and 1550 nm wavelength.

The receiver for the Short Reach and Intermediate Reach version uses PIN photodiodes. For the Long Reach version, InGaAs avalanche photodiodes (APDs) are used to achieve high sensitivity. The Long Reach receiver features a low noise GaAs transimpedance IC with AGC capability to provide an extremely wide dynamic range. A Phase Lock Loop (PLL) circuit is included to perform the clock recovery function and resampling of the data. Both DATA and CLOCK outputs are differential signals designed to be AC-coupled into 50 ohm load. A TTL Signal Detect function which indicates loss of optical input and an analog Received Optical Power Monitor output are also provided.

All receiver modules can be operated with a single +5V supply. The operating temperature range is -40°C to +85°C for the Short Reach and Intermediate Reach version and 0°C to +70°C for the Long Reach version. All receivers are housed in a 24-pin dual-in-line metal package with fiber pigtail (single mode fiber for Long Reach version and 50/125 µm multimode fiber for Short Reach and Intermediate Reach versions). The fiber pigtail is terminated with ST, FC or SC connector.



### Features

- Fully compliant with SONET/SDH OC-48/STM-16 (2.5 Gb/s) specifications
- Long Reach 1310 nm & 1550 nm as well as Intermediate Reach and Short Reach
- Internal temperature-compensated High Voltage APD Supply (Long Reach version)
- 40°C to +85°C Operating Temperature (Intermediate Reach and Short Reach)
- 24-pin DIP metal package
- FC, ST, SC-connectorized fiber pigtails
- Differential DATA & CLOCK interface
- TTL SIGNAL DETECT output
- Received Optical Power Monitor function
- Single +5 V supply

### Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	$T_{ST}$	- 40	+ 85	°C
Operating Case Temperature	"I" option ("SR" & "IR" only)	- 40	+ 85	°C
	"H" option	0	+ 70	
Maximum Optical Input Power ("LR" only)	$P_{in,max}$	-	- 5.0	dBm
Supply Voltage	$V_{CC}$	0	+ 6.0	V
Input Voltage	$V_{IN}$	0	$V_{CC}$	V
Lead Soldering Temperature & Time	-	-	260°C, 10 sec	

**Receiver Performance Characteristics** (Over Operating Case Temperature.)

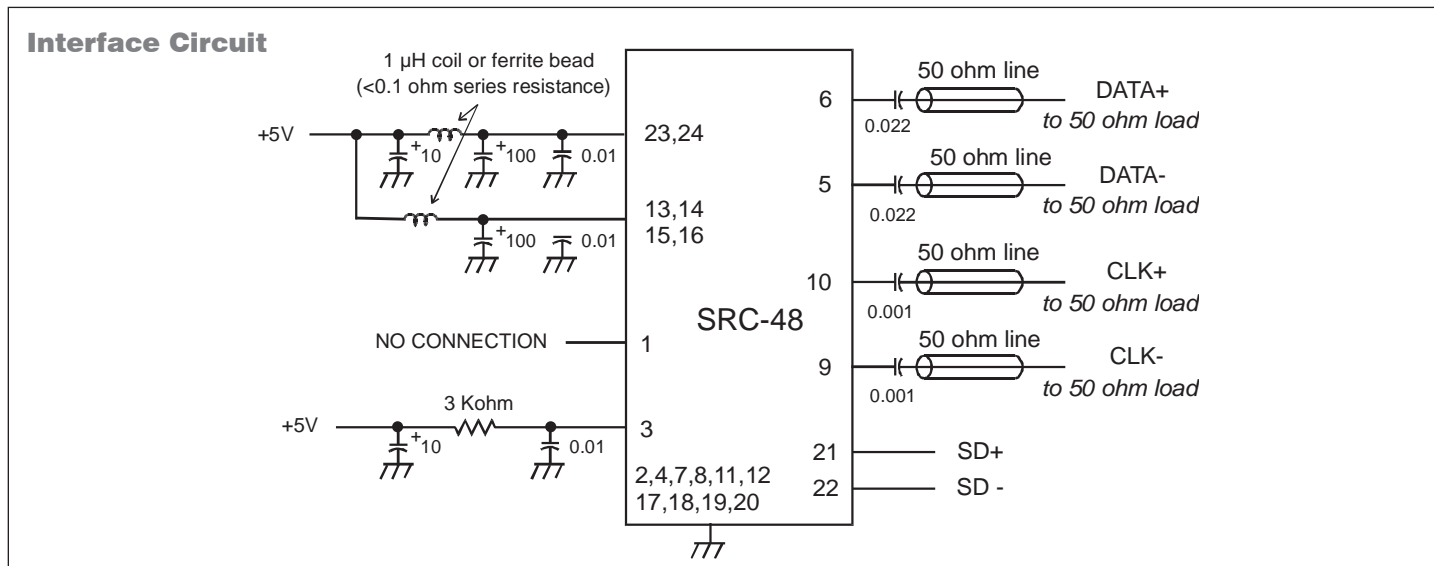
Parameter		Symbol	Minimum	Typical	Maximum	Units	
Data Rate		$B$	2.48832 - 500 ppm	2.48832	2.48832 + 500 ppm	Gb/s	
Receiver Sensitivity ( $10^{-10}$ BER) <sup>1</sup>	Short & Intermediate Reach	$P_{min}$	- 20.0	- 24.0	-	dBm	
	Long Reach		- 28.0	- 31.0	-		
Maximum Input Optical Power ( $10^{-10}$ BER) <sup>1</sup>	Short Reach (SR)	$P_{max}$	- 3.0	- 1.0	-	dBm	
	Intermediate Reach (IR)		0	2.0	-		
	Long Reach (LR)		- 8.0	-	- 6.0		
Signal Detect Thresholds	SR & IR	Increasing Light Input	$P_{sd+}$	-	-	- 20.0	dBm
		Decreasing Light Input	$P_{sd-}$	- 35.0	-	-	
	LR	Increasing Light Input	$P_{sd+}$	-	-	- 28.0	dBm
		Decreasing Light Input	$P_{sd-}$	- 42.0	-	-	
Signal Detect Hysteresis		-	0.5	1.0	-	dB	
Optical Power Monitor Current	LR ( $P_{in}$ from -28 dBm to -17 dBm)	$I_{PM}$	-	6	-	$\mu A/\mu W$	
	IR & SR ( $P_{in}$ from -20 dBm to 0 dBm)		-	0.8	-		
Wavelength of Operation		$\lambda$	1100	-	1600	nm	
Clock Sampling Point		$T_{CSP}$	150	200	250	ps	
Output Clock Jitter		$CLK_j$	-	-	0.01	UIrms	
Jitter Tolerance & Transfer Function		compliant with ITU Recommendation G.958					

<sup>1</sup> Specified in Average Optical Input Power and measured at 2.48832 Gb/s and 1300 nm or 1550 nm wavelength with 2<sup>23</sup>-1 PRBS.

**Receiver Electrical Interface**

Parameter		Symbol	Minimum	Typical	Maximum	Units
Supply Voltage		$V_{CCA}, V_{CCD}$	4.75	5.0	5.25	V
Supply Current	SR & IR	$I$	-	425	525	mA
	LR		-	465	565	
Output Voltage Swing <sup>1</sup>	DATA	$V_{PP}$	0.4	0.75	0.95	V
	CLOCK		0.35	0.45	0.95	
Output HIGH Voltage (SIGNAL DETECT)		$V_{OH}$	2.7	-	$V_{CCD}$	V
Output LOW Voltage (SIGNAL DETECT)		$V_{OL}$	0	-	0.50	V

<sup>1</sup> AC-coupled into 50 ohm load

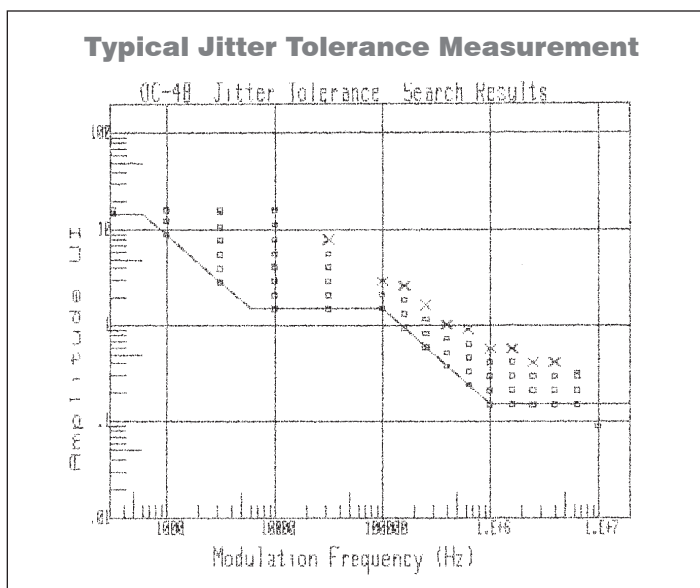
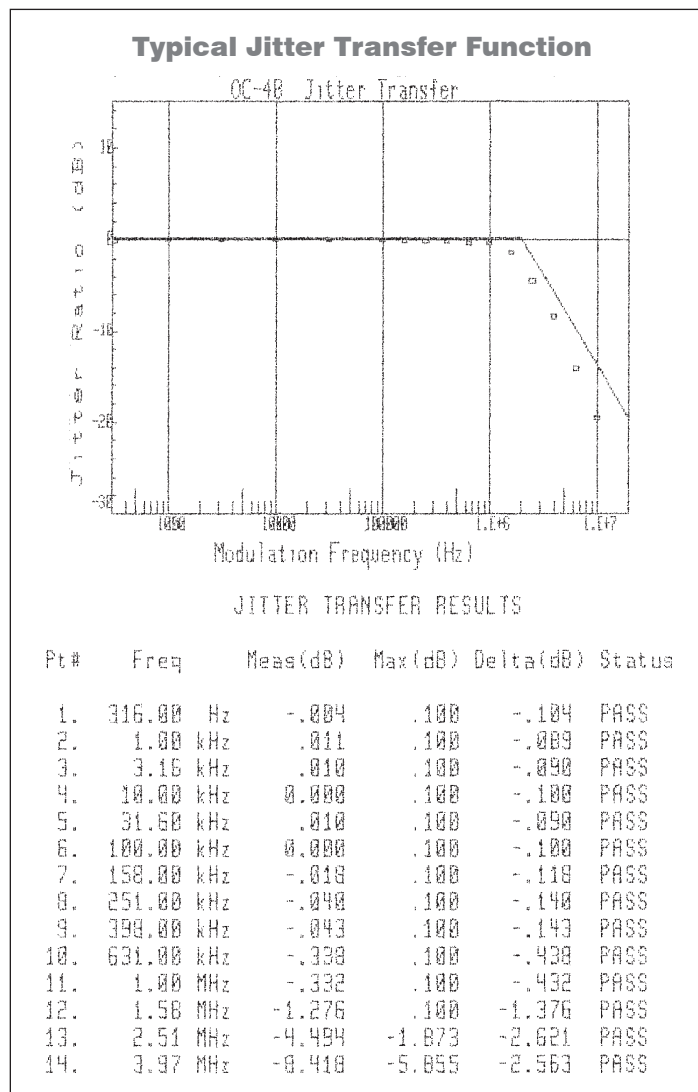
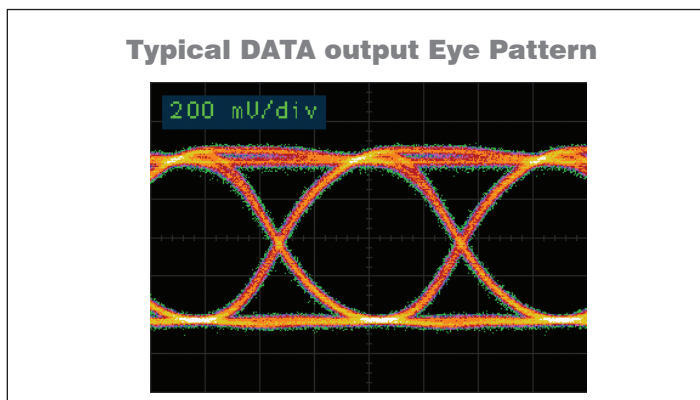
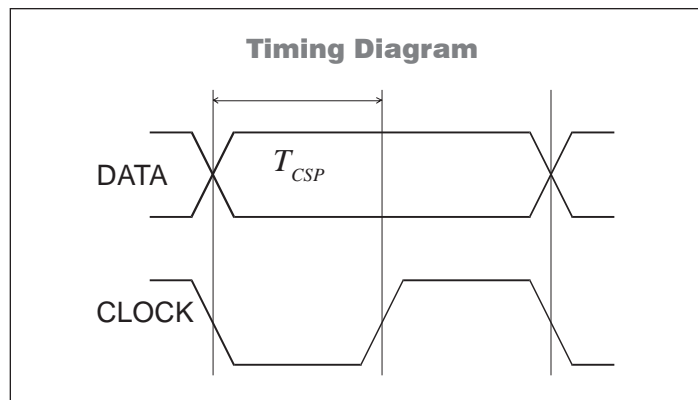
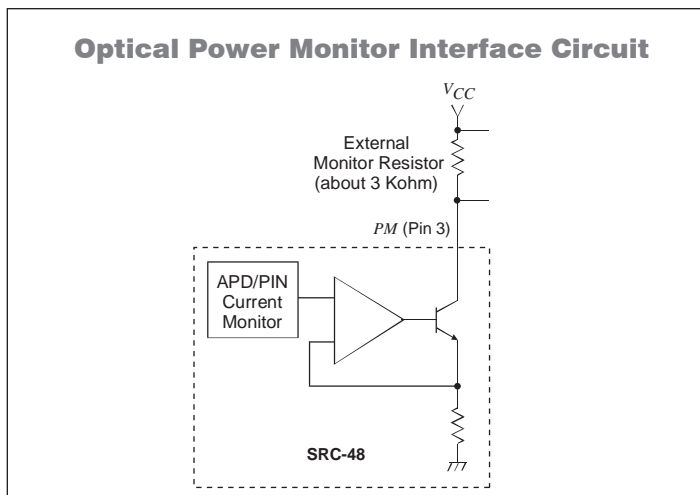


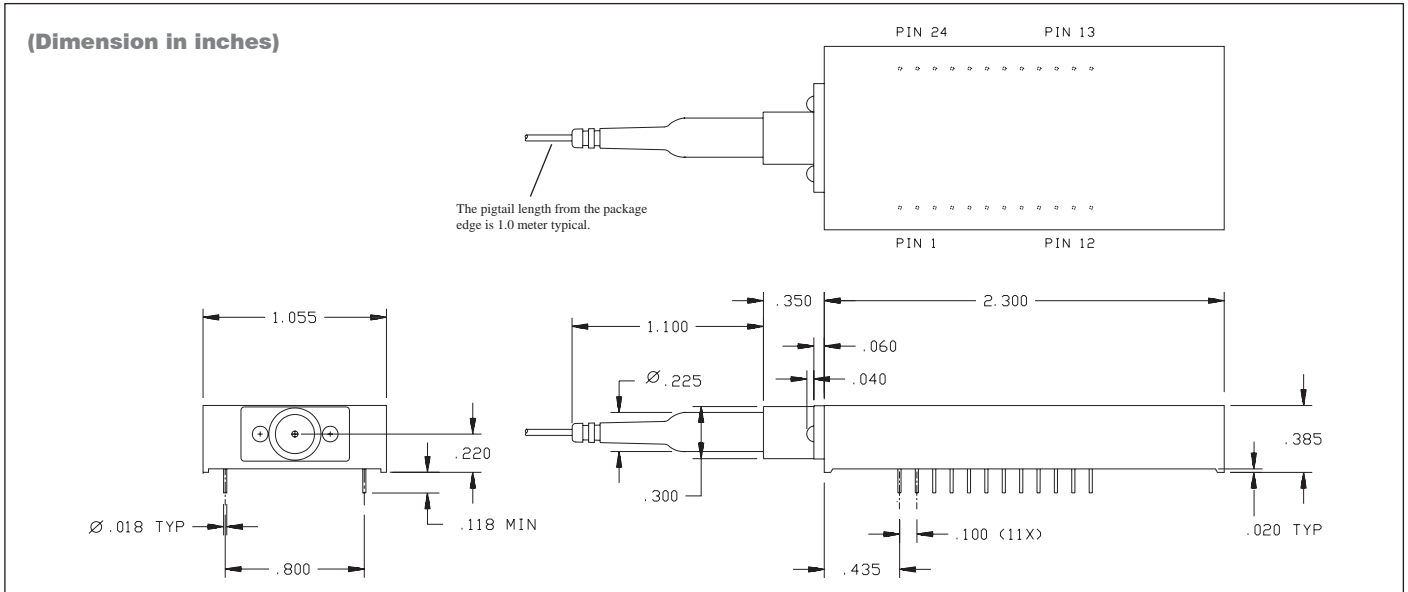
**Application Notes**

The receiver converts the incident optical power to a photocurrent via a high performance P-I-N photodiode (Short and Intermediate Reach version) or an avalanche photodiode (Long Reach version). The photocurrent can be monitored via the voltage drop across an external resistor connected between *PM* and  $V_{CC}$ . The APD Bias Voltage is internally generated from the +5 V supply by a low noise DC-DC converter. The APD Bias Voltage is temperature compensated to ensure stable operation over the entire operating temperature range.

entire operating temperature range.

Both DATA and CLOCK outputs are differential signals designed to be AC-coupled into 50 ohm load. Transmission lines are recommended for best performance. The Signal Detect circuit monitors the level of the incoming optical signal and generates a logic LOW signal at the SIGNAL DETECT+ output when insufficient photocurrent is produced. No termination resistor is required for the SIGNAL DETECT outputs.



**Package Outline**

**Pinout Assignments**

PIN	FUNCTION	PIN	FUNCTION
1	N/C (NO CONNECTION)	24	V <sub>CCA</sub> (V <sub>CC</sub> ANALOG)
2	GND	23	V <sub>CCA</sub> (V <sub>CC</sub> ANALOG)
3	PM (optical Power Monitor)	22	SD - (SIGNAL DETECT -)
4	GND	21	SD + (SIGNAL DETECT +)
5	DATA OUTPUT -	20	GND
6	DATA OUTPUT +	19	GND
7	GND	18	GND
8	GND	17	GND
9	CLK - (CLOCK OUTPUT -)	16	V <sub>CCD</sub> (V <sub>CC</sub> DIGITAL)
10	CLK + (CLOCK OUTPUT +)	15	V <sub>CCD</sub> (V <sub>CC</sub> DIGITAL)
11	GND	14	V <sub>CCD</sub> (V <sub>CC</sub> DIGITAL)
12	GND	13	V <sub>CCD</sub> (V <sub>CC</sub> DIGITAL)

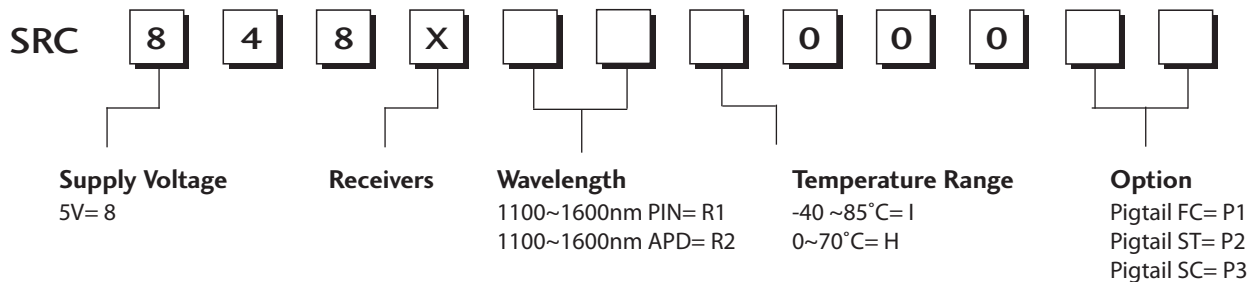
**Related TX, RX & Transceiver Modules**
**STX-48:** OC-48/STM-16 Transmitter (24-pin DIP)

**SRX-48:** OC-48/STM-16 Receiver without Clock Recovery (24-pin DIP)

**DTR-2488-SM:** OC-48/STM-16 Transceiver without Clock Recovery (industry standard 1x9 package)

**DTR-2488-SM2:** OC-48/STM-16 Transceiver without Clock Recovery (industry standard 2x9 package)

**DTC-48:** OC-48/STM-16 Transceiver with Clock Recovery (industry standard 2x9 package)

**Ordering Information**


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