Technical Data Sheet

June 2002

SAMSUNG ELECTRONICS

FIBEROPTICS DIVISION

TR133LA
622Mbps 1310nm LC Duplex Single Mode Transceiver

Features

- 1.3µm InGaAsP MQW Fabry-Perot laser
- Highly sensitive InGaAs PIN photodiode
- Operating temperature range
  - Extended Temperature : -45~85 °C.
  - Standard Temperature : 0~70 °C.
- Single +3.3V power supply
- Multisourced 2X5 package style with LC receptacle
- LVPECL level data and LVTTL signal detect outputs
- Wave solder process compatible

Applications

ATM systems, LAN and WAN equipment, Adapters, Routers and Switches, Backbone equipment, SONET OC-12 / SDH STM-4 and Inter/intra-office.

Product Code

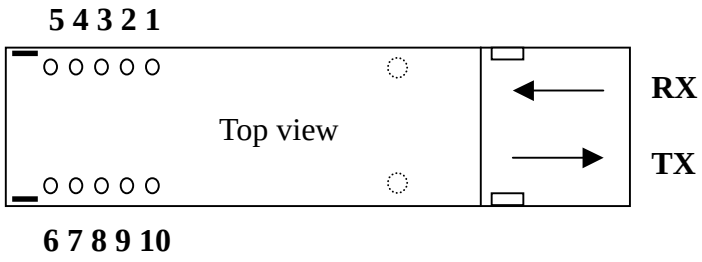
Product Code	Extinction Ratio	Output Power	Distance	Temperature
TR133LA-0D30S	≥8.2dB	-15~-8dBm	15Km	-45 °C.~85 °C.
TR133LB-0D30S				0 °C.~70 °C.

Description

The TR133LA/TR133LB is Samsung's 622Mbps uncooled transceiver module utilizing an optical subassembly (OSA) and a low cost plastic package. A reliable 1.3µm InGaAsP MQW Fabry-Perot laser diode and a highly sensitive InGaAs PIN photodiode constitute the major part of this module, which also boasts uncooled operation over the temperature range of -40°C to 85°C (0°C to 70°C)

This module will meet the growing demand on the optical network unit (ONU) for access network and local area network (LAN) for SONET OC-12 and SDH STM-4.

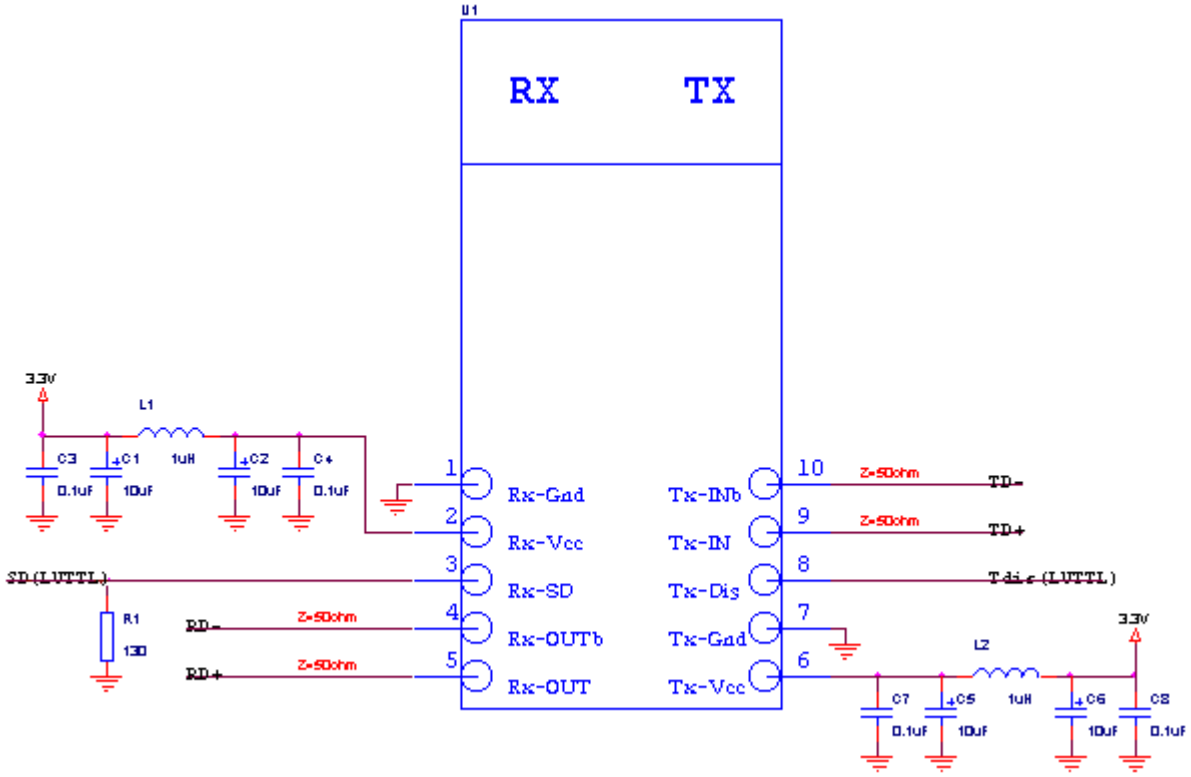
Pin Information



TR133LA/TR133LB Transceiver, 2X5 pin Configuration, Top View

TR133LA/TR133LB	
Pin	Descriptions
1 : VeeR	Receiver Signal Ground. Directly connect this pin to the receiver ground plane.
2 : VccR	Receiver Power Supply. Provide +3.3V DC via the recommended receiver power supply filter circuit. Locate the power supply filter circuit as close as possible to the Rx V_{CC} pin.
3 : SD	Signal Detect. Normal optical input levels to the receiver result in a logic "1" output. Low optical input levels to the receiver result in a fault condition indicated by a logic "0" output. This signal detect output can be used to drive a TTL input on an upstream circuit, such as signal detect input or loss of signal-bar.
4 : RD -	Receiver Data Out Bar. RD– is an open-emitter output circuit. Terminate this high-speed differential PECL output with standard PECL techniques at the follow-on device input pin.
5 : RD +	Receiver Data Out. RD+ is an open-emitter output circuit. Terminate this high-speed differential PECL output with standard PECL techniques at the follow-on device input pin.
6 : VccT	Transmitter Power Supply. Provide +3.3V DC via the recommended transmitter power supply filter circuit. Locate the power supply filter circuit as close as possible to the Tx V_{CC} pin.
7 : VeeT	Transmitter Signal Ground. Directly connect this pin to the transmitter signal ground plane

8 : TDIS	Transmitter Disable. Optional feature, connect this pin to logic high “1” to disable module. To enable module connect to logic low “0”.
9 : TD +	Transmitter Data In. Terminate this high-speed differential PECL input with standard PECL techniques at the transmitter input pin.
10 : TD -	Transmitter Data In Bar. Terminate this high-speed differential PECL input with standard PECL techniques at the transmitter input pin.



Application Circuit

Module Performance Characteristics

Electrical Characteristics					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Transmitter Section (Ambient operating temperature V_{CC}=3.14V to 3.47V)					
Power supply current(1)	I_{CC}	-	-	140	mA
Differential input voltage(2)	$V_{IH} – V_{IL}$	300	-	1860	mV
Common mode input voltage	V_{CM}	Vcc-1.38	-	Vcc-0.47	V
Transmit disable input voltage high	V_{DH}	2.0	-	-	V
Transmit disable input voltage low	V_{DL}	-	-	0.8	V
(1) Specified at V_{CC} max. and max. temp. (2) No external interface PECL load is required					
Receiver Section (Ambient operating temperature V_{CC}=3.14V to 3.47V)					
Power supply current(1)	I_{CC}	-	-	100	mA
Data output voltage-low	V_{OL}	$V_{CC} – 1.9$	-	$V_{CC} – 1.4$	V
Data output voltage-high	V_{OH}	$V_{CC} – 1.05$	-	$V_{CC} – 0.85$	V
Signal detect output voltage-low	V_{OL}	-	-	0.8	V
Signal detect output voltage-high	V_{OH}	2.0	-	-	V
(1) Excludes output load current					

Optical Characteristics					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Transmitter Section (Ambient operating temperature V_{CC}=3.14V to 3.47V)					
Average output power(1) TR133LA(B)-0D30S	P_O	-15		-8	dBm
Center wavelength TR133LA(B)-0D30S	λ_C	1274		1356	nm
Output spectral width (RMS) TR133LA(B)-0D30S	$\Delta\lambda_{RMS}$			2.5	nm
Dynamic extinction ratio TR133LA(B)-0D30S	E_R	8.2			dB
Output eye	Comply with Bellcore TR-NWT-000253 and ITU G.957				
Optical rise time (10% to 90%)	t_R			1	ns
Optical fall time (90% to 10%)	t_F			1	ns
(1) SMF coupled					
Receiver Section (Ambient operating temperature V_{CC}=3.14V to 3.47V)					
Average receiver sensitivity(1)				-28	dBm
Maximum input power	P_{MAX}	-8			dBm
Link status switching threshold Decreasing light Increasing light	 LST_D LST_I	 -40		 -29	 dBm dBm
Link status hysteresis			3.0		dB
(1) Measured at $1x10^{-10}$ BER with 2^{23}-1 PRBS, according to ITU-T G.958 spec.					

Notes: TR133LA is designed for Extended Temperature and TR133LB is designed for Standard Temperature.

Absolute Maximum Ratings

These are absolute maximum ratings only. Higher stress than these ratings may adversely affect device reliability or cause permanent damage to the device.

Parameter	Symbol	Min	Max	Unit
Power supply voltage	V_{CC}	0	3.6	V
Lead soldering temperature/time			250/10	^{o}C /sec
Operating case temperature range(1)	T_{OPC}	-40	+85	^{o}C
Storage case temperature range	T_{STC}	-40	+85	^{o}C

(1) In case of Standard Temperature : 0 ^{o}C to 70 ^{o}C

Operating Environment

Parameter	Symbol	Min	Max	Unit
Power supply voltage	V_{CC}	3.14	3.47	V
Ambient operating temperature(2)	T_{OP}	-40	+85	^{o}C

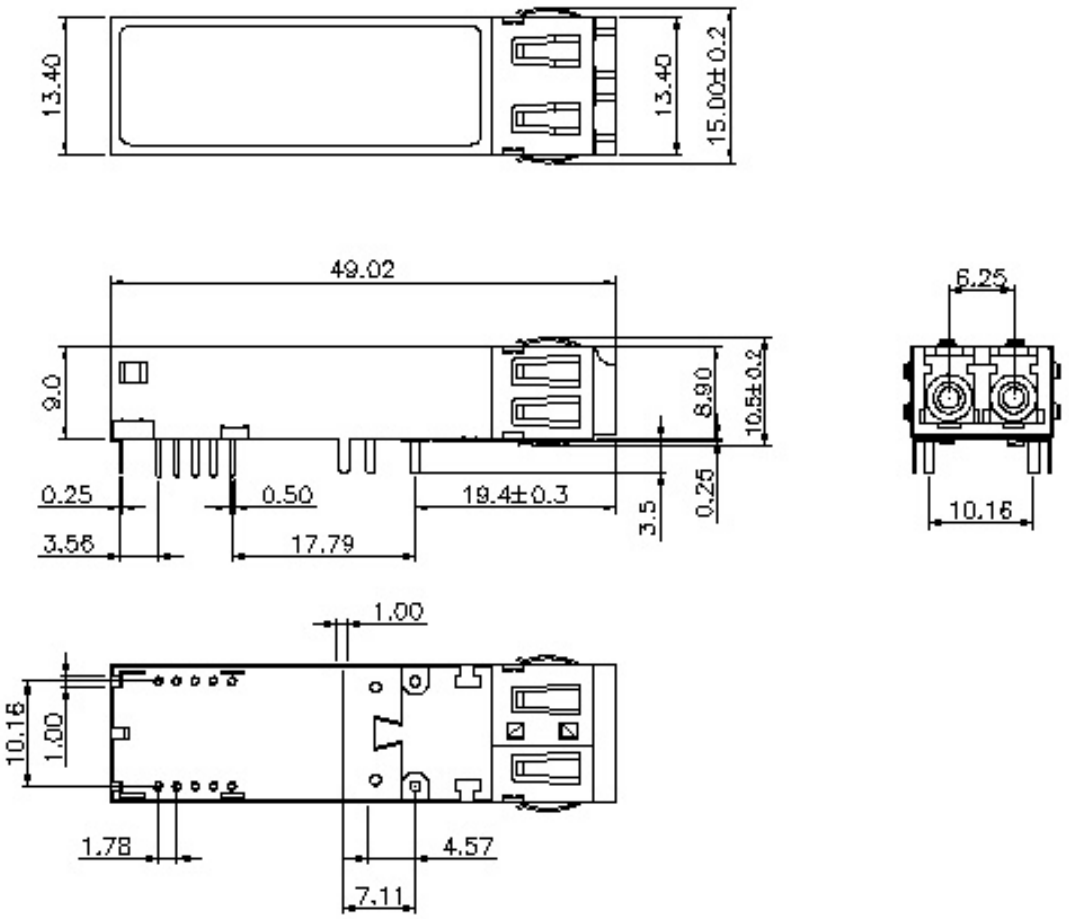
(2) In case of Standard Temperature : 0 ^{o}C to 70 ^{o}C

Outline Diagram

Dimensions are in millimeters (inches).

Tolerances : x.xx ± 0.025mm

x.x ± 0.05mm, unless otherwise specified



Functional Description Receiver Section

Design

The receiver section contains an InGaAs PIN photodiode mounted together with a transimpedance preamplifier IC in the OSA, coupled to a postamp/decision circuit on a separate circuit board. The postamplifier is AC coupled to the preamplifier as illustrated in Figure 1. The coupling capacitor is large enough to pass the SONET/SDH test pattern at 622MBd without significant distortion or performance penalty. If a lower signal rate is used, sensitivity, jitter and pulse distortion could be degraded.

Noise Immunity

The receiver includes internal circuit components to filter power supply noise. Under some conditions of EMI and power supply noise, external power supply filtering may be necessary. If receiver sensitivity is degraded by power supply noise, the filter network illustrated in Figure 2 may be used to improve performance. The values of the filter components are general recommendations and may be changed to suit a particular system environment. Shielded inductors are recommended.

The Signal Detect Circuit

The signal detect circuit works by sensing the peak level of the received signal and comparing this level to a reference.

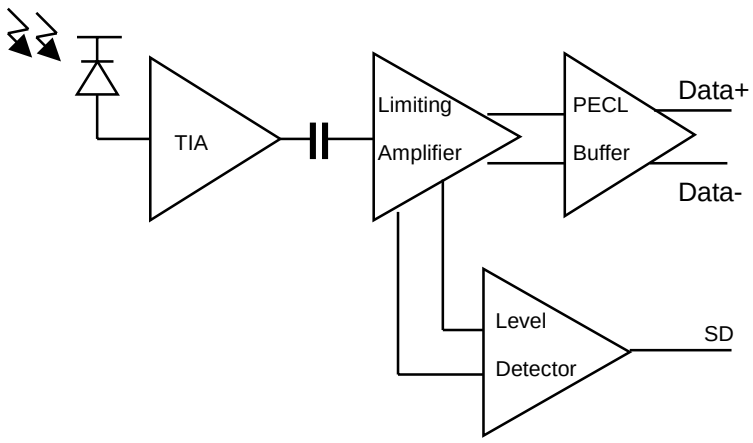


Figure 1 Receiver Block Diagram

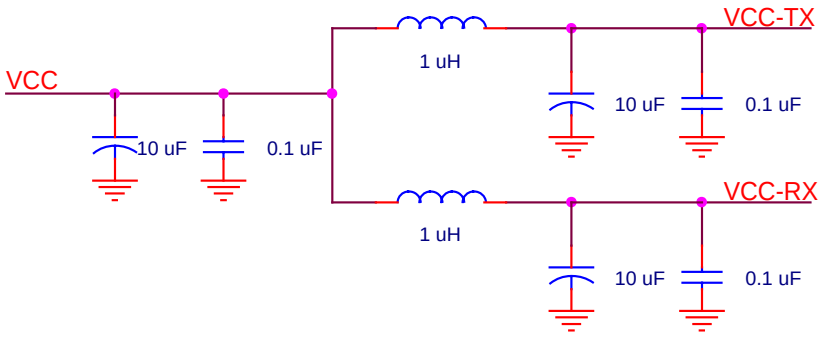


Figure 2 Power Supply Filtering Circuit

Functional Description-Transmitter Section

Design

The transmitter section uses a Fabry-Perot laser as its optical source. This laser source is mounted in an OSA separated from the printed circuit board. The OSA has been designed to be compliant with IEC 825 Class 1 and CDRH Class 1 eye safety requirements. The optical output is controlled by a custom IC that detects the laser output via the monitor photodiode as shown in Figure 3. This IC provides both DC and AC current drivers to the laser to ensure correct modulation, eye diagram and extinction ratio over temperature, supply voltage and life.

PCB Mounting

The model has two solderable mounting studs. These studs are not electrically connected. The transceiver is designed for common production processes. It may be wave soldered and aqueous washed provided that the process plug is in place. Each process plug can only be used once during processing, although with subsequent use, it can be used as a dust cover.

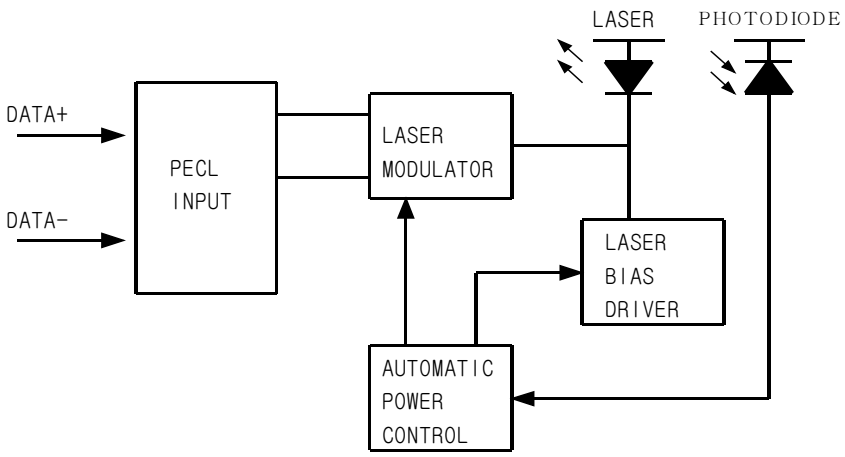


Figure 3 Transmitter Block Diagram

Laser Safety Information

Class I Laser Product

This product complies with IEC825-1, IEC825-2 laser safety requirements
Single-mode connector
Wavelength=1.3µm
Maximum power = 0.2mW (TR133LA-0D30S/TR133LB-0D30S)
Label is not affixed to the module because of size constraints but is contained in the shipping carton.
Product is not shipped with power supply

Caution: Use of controls, adjustments, and procedures other than those specified herein may result in hazardous laser radiation exposure

NOTICE

Unterminated optical connectors may emit laser radiation.

Do not view with optical instruments

Contact us

Fiberoptics Division
Telecommunication Network Business
Samsung Electronics Co.,Ltd.
7 th Fl., Samsung Main Bldg. 250, 2-Ka,
Taepyung-Ro, Chung-Ku, Seoul,
Korea 100-742

Phone: (82) 2-751-3278
Fax: (82) 2-751-2687
E-mail: opto@samsung.com
URL: www.samsungfiberoptics.com