Fiber Optic SFF 1300 nm LED 2x5 with Collar 155 Mbps Lightwave Transceiver with VF-45™

Data Sheet

OVF2121

Features

- Single +3.3V power supply
- 1310 nm LED
- Metal collar, for better EMI resistance
- Extremely low power consumption < 0.7 W
- PECL differential inputs and outputs
- RJ-45 style VF-45™ connector system
- 2km link distance on multimode fiber
- System optimized for 62.5/50 µm graded index fiber
- Multi-source footprint
- Small footprint for high channel density
- UL-94 V-0 certified
- ESD Class 2 per MIL-STD 883 Method 3015
- Voted as SG-connector by FC-Standard
- Compliant with FCC (Class B) and EN 55022

Applications

- Telecommunications and Data Communications system networks
- Fiber-to-the-desktop
- Ethernet, Fast Ethernet, FDDI, ATM, SONET
- Switches/bridges/routers/server
- Local Area Networks
- High speed computer links
- Switching system
- 10 Base Fx 1300 nm with DC-free balanced coding

Description

The Optocom Small Form Factor (SFF) 2x5 OVF2121 transceiver with collar provides signal conversion and processing for high performance integrated duplex data links. It operates over multimode fiber by converting lightwave information into an electrical signal and vice versa at a data rate of 155 Mb/s for distances of up to 2 km. The SFF transceiver module is a single unit comprised of a high speed LED light source and a photodiode detector.

This transceiver module is fully compliant with the Asynchronous Transfer Mode (ATM) OC-3 standard, the Fiber Distributed Data Interface (FDDI) Low Cost Fiber Physical Layer Medium Dependent (LCF_PMD) draft standard, the FDDI PMD Standard, and SFF MSA.

*VF-45™ is a trademark of 3M.
*Volition™ is a trademark of 3M.

Description - continued

The OVF2120 supports Volition connectorization, which competes with UTP/CAT 5 solutions. It is compatible with RJ-45 style backpanels for fiber-to-the-desktop technology. The receptacle accepts the SG connector.

The inputs/outputs are PECL compatible and the unit operates from a +3.3V power supply. As an option, the data output stages can be switched to static levels during absence of light, as indicated by the Signal Detect function. It can be directly interfaces with available chipsets.

Safety

Laser Compliance Statement

The OVF2121 is classified as a Class I LED Product. It complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated under recommended operating conditions. Because the transceiver is designed to be inherently eye safe, it does not require open fiber control thus eliminating complex electronics or mechanics.

Caution – use of device other than those specified herein may result in hazardous LED radiation exposure or other damage. Please embrace all customary precautions and discretion while handling this device.

Performance Specifications

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause damage to the optical device. Operations of the optical device are suggested to remain within the recommended operating conditions. Exposure to the absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Minimum	Maximum	Unit
Supply Voltage	V_{CC}-V_{EE}	-0.5	4.5	V
Data Input Levels (PECL)	V_{IN}		V_{EE} -V_{CC}	V
Differential Data Input Voltage			3	V
Operating Ambient Temperature	T_{AMB}	0	70	°C
Storage Ambient Temperature	T_{STG}	-40	+85	°C
Humidity/ Temperature Test Condition	RH		85/85	%/°C
Soldering Conditions, Temp/Time MIL_STD 883C, Method 2003	T_{SOLD}/ t_{SOLD}		270/10	°C/sec
ESD Resistance (all pins to V_{EE}, human body)			1.5	kV
Output Current	Io		50	mA

Recommended Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Ambient Temperature[1]	T_{AMB}	0		70	°C
Power Supply Voltage[1]	V_{CC}-V_{EE}	3	3.3	3.6	V
Supply Current[2]	I_{CC}			230	mA
Transmitter					
Data Input High Voltage	V_{IH}-V_{CC}	-1165		-880	mV
Data Input Low Voltage	V_{IL}-V_{CC}	-1810		-1475	mW
Threshold Voltage	V_{BB}-V_{CC}	-1380		-1260	
Input Data Rise/Fall, 20%-80%	t_R, t_F	0.4		1.3	ns

Data High Time[3]	t_{on}			1000	ns
Receiver					
Output Current	I_o			25	mA
Input Duty Cycle Distortion	t_{DCD}			1.0	ns
Input Data Dependent Jitter	t_{DDJ}				ns
Input Random Jitter	t_{RJ}			0.76	ns
Input Center Wavelength	I_C	1260		1380	nm
Electrical Output Load[4]	RL		50		Ω

Notes:
1. **Maximum power supply voltage cannot be used at maximum temperature range.**
2. **For V_{CC}-V_{EE} (min, max). 50% duty cycle. The supply current (I_{CC2}+I_{CC3}) does not include the load drive current (I_{CC1}). Add maximum 45 mA for the three outputs. Load is 50 Ω into V_{CC}-2V.**
3. **To maintain good LED reliability, the device should not be held in the ON state for more than the specified time. Normal operation should be done with 50% duty cycle.**
4. **To achieve proper PECL output levels the 50 Ω termination should be done to V_{CC}-2V. For correct terminations, see the application notes.**

Transmitter Electro-Optical Interface

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Data Rate	DR			160	Mbps
Launched Power (Average) into 62.5 µm Fiber[1,3]	Po	-20	-16	-14	dBm
Center Wavelength[2,3]	λc	1270		1360	nm
Spectral Width (FW HM) [2,4]	Δλ			170	nm
Output Rise/Fall Time, 10%-90%[2,5]	t_R, t_F	0.6		2.5	ns
Temperature Coefficient of Optical Output Power	TC_P			0.03	dB/°C
Extinction Ratio (Dynamic)[2,6]	Er			10	%
Optical Power Low[7]	P_{TD}			-45	dBm
Overshoot	OS			10	%
Duty Cycle Distortion[8,9]	t_{DCD}			0.6	ns
Data Dependent Jitter[8,10]	T_{DDJ}			0.3	ns
Random Jitter[8,11]	T_{RJ}			0.6	ns

Notes:
1. **Measured at the end of 5 meters of 62.5/125 graded index fiber using calibrated power meter and a precision test ferrule. Cladding modes are removed. Values valid for EOL and worst-case temperature.**
2. **The input data pattern is a 12.5 MHz square wave pattern.**
3. **Center wavelength is defined as the midpoint between the two 50% levels of the optical spectrum of the LED.**
4. **Spectral width (full width, half max) is defined as the difference between 50% levels of the optical spectrum of the LED.**
5. **10% to 90% levels. Measured using the 12.5 MHZ square wave pattern with an optoelectronic measurement system (detector and oscilloscope) having 3 dB bandwidth ranging from less than 0.1 MHz to more than 750 MHz.**
6. **Extinction Ratio is defined as PL/PH x 100%. Measurement system is defined as in Note 5.**
7. **Optical Power Low is the output power level when a steady state low data pattern (FDDI Quiet Line state) is used to drive the transmitter. Value valid <1 ms after input low.**
8. **Test method is defined as for FDDI-PMD. Jitter values are peak-to-peak.**
9. **Duty Cycle Distortion is defined as 0.5 [(width of wider state) minus (width of narrower state)]. It is measured with stream of idle symbols (62.5 MHz square wave).**
10. **Measured with the same pattern as for FDDI-PMD.**
11. **Measured with the Halt Line state (12.5 MHz square wave).**

Receiver Electro-Optical Specifications

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Data Rate[1]	D_R	10		160	Mbps
Sensitivity (Average Power)[1]	P_{IN}		-33	-31	dBm
Sensitivity (Average Power) Center[2]	P_{IN}		-35.5		dBm
Saturation (Average Power)[1]	P_{SAT}	-14	-11		dBm
Duty Cycle Distortion[3,4]	t_{DCD}			1	ns

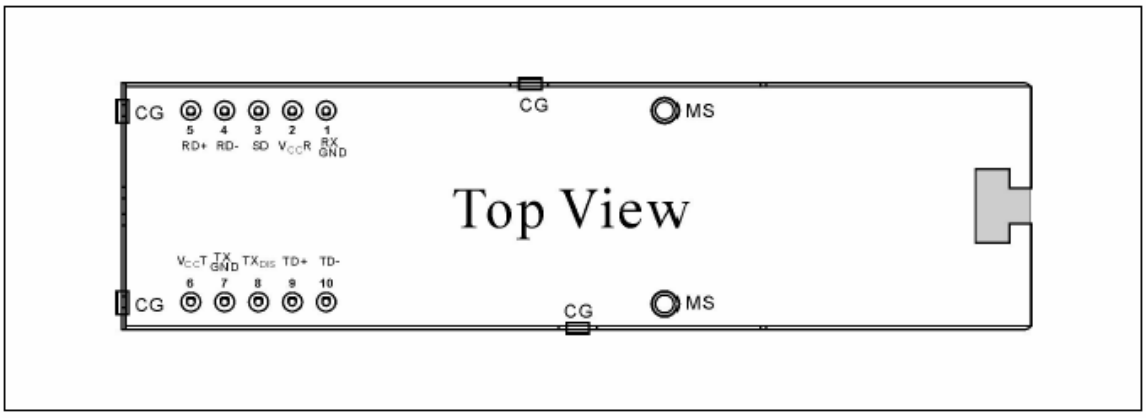
Deterministic Jitter[4,5]	t_{DJ}		1	ns
Random Jitter[4,6]	t_{RJ}		1	ns
Signal Detect Assert Level[7]	P_{SDA}	-42.5	-30	dBm
Signal Detect Deassert Level[8]	P_{SDO}	-45	-31.5	dBm
Signal Detect Hysteresis	P_{SDA}-P_{SDO}	1.5		dB
Output Low Voltage[9]	V_{OL}-V_{CC}	-1810	-1620	mV
Output High Voltage[9]	V_{OH}-V_{CC}	-1025	-880	mV
Output Data Rise/Fall Time, 20%-80%	t_R, t_F		1.3	ns
Output SD Rise/Fall Time, 20%-80%	t_R, t_F		40	ns

Notes:
1. **For a bit error rate (BER) of less than $1x10^{-12}$ over a receiver eye opening of at least 1.5 ns. Measured with a 2^{23}-1 PRBS at 155 Mbps.**
2. **For a BER of less than $1x10^{-12}$. Measured in the center of the eye opening with a 2^{23}-1 PRBS at 155 Mbps.**
3. **Measured at an average optical power level of -20 dBm with a 62.5 MHz square wave.**
4. **All jitter values are peak-to-peak. RX output jitter requirements are not considered in the ATM standard draft. In general the same requirements as for FDDI are met.**
5. **Measured at an average optical power level of -20 dBm.**
6. **Measured at -29 dBm average power.**
7. **An increase in optical power through the specified level will cause the SIGNAL detect output to switch from a Low state to a High state.**
8. **A decrease in optical power through the specified level will cause the SIGNAL detect output to switch from a High state to a Low state.**
9. **PECL compatible. Load is 50 Ω into V_{CC}-2V. Measured under DC conditions. For dynamic measurements, a tolerance of 50 mV should be added.**

Regulatory Compliance

Feature	Standard	Comments
Electromagnetic Interference (EMI)	FCC Class B EN 55022 Class B CISPR 22	Noise frequency range: 30 MHz to 1 GHz
Immunity: Electrostatic Discharge	EN 61000-4-2 IEC 1000-4-2	Discharges of ±1.5kV with an air discharge probe on the receptacle cause no damage.
Immunity: Radio Frequency Electromagnetic Field	EN 61000-4-3 IEC 1000-4-3	With a field strength of 10 V/m rms, noise frequency ranges from 10 MHz to 1 GHz.
Eye Safety	IEC 825-1	Class 1 LED Product (KLASSE 1 LED Product)

Connection Diagram

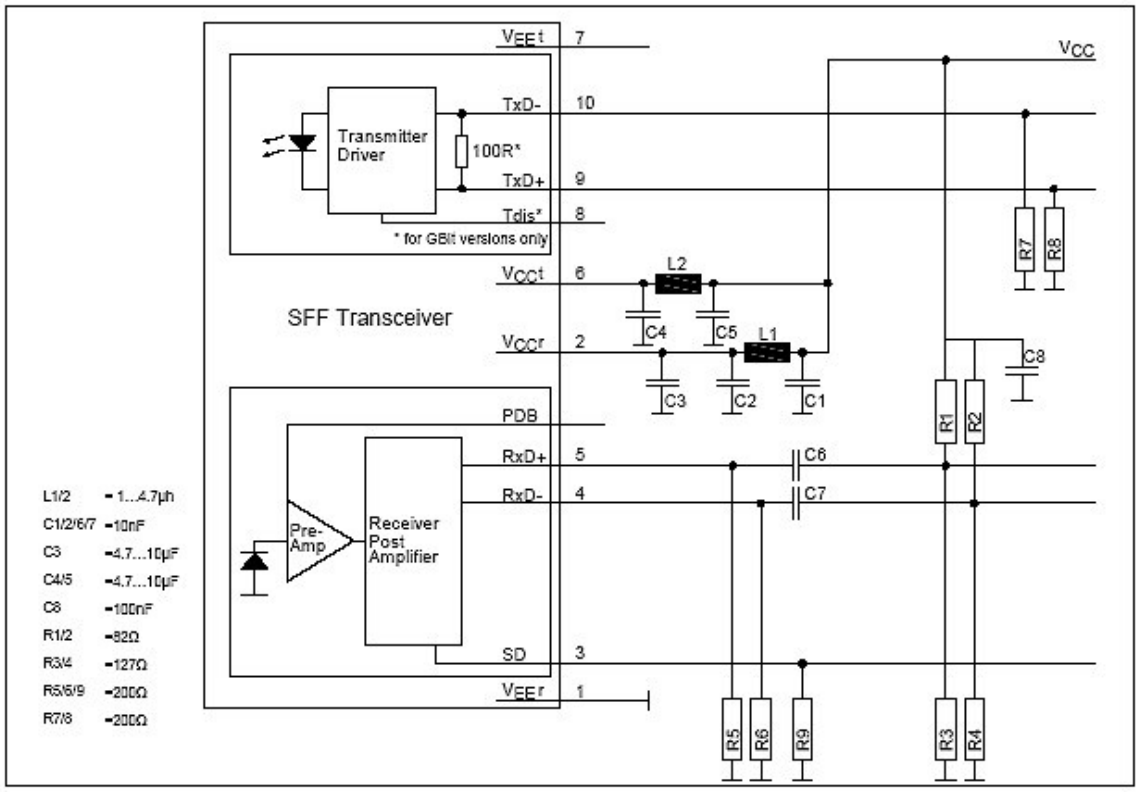


Pin Description

Pin Name		Level/Logic	Pin	Description
RX GND	Receiver Signal Ground	N/A	1	
VccR	Receiver Power Supply	N/A	2	
SD	Signal Detect	PECL Compatible	3	Normal Operation: Logic "1" Output, represents that light is present at receiver input. Fault Condition: Logic "0" Output.
RD-	Received Data Out Not	PECL, DC Coupled	4	Receiver Data Out Not
RD+	Received Data Out	PECL, DC Coupled	5	Receiver Data Out
VccT	Transmitter Power Supply	N/A	6	
TX GND	Transmitter Signal Ground	N/A	7	
TX_{DIS}	Transmitter Disable	NC	8	NC
TD+	Transmit Data	PECL, DC Coupled	9	Transmitter Data In
TD-	Transmit Data Not	PECL, DC Coupled	10	Transmitter Data Not In
CG	Case Ground	N/A		An optional connection of the transceiver to the equipment
MS	Mounting Stud	N/A		The mounting studs are provided for transceiver mechanical attachment to the circuit board.

Application Notes

Multimode 1300 nm LED Ethernet/ Fast Ethernet/ FDDI/ ATM 2x5 Transceiver



Application Notes - continued

Solutions for connecting a 3.3V Fiber Optic Transceiver to a 5.0V Framer-/Phy-Device.

Figure 1. Common GND

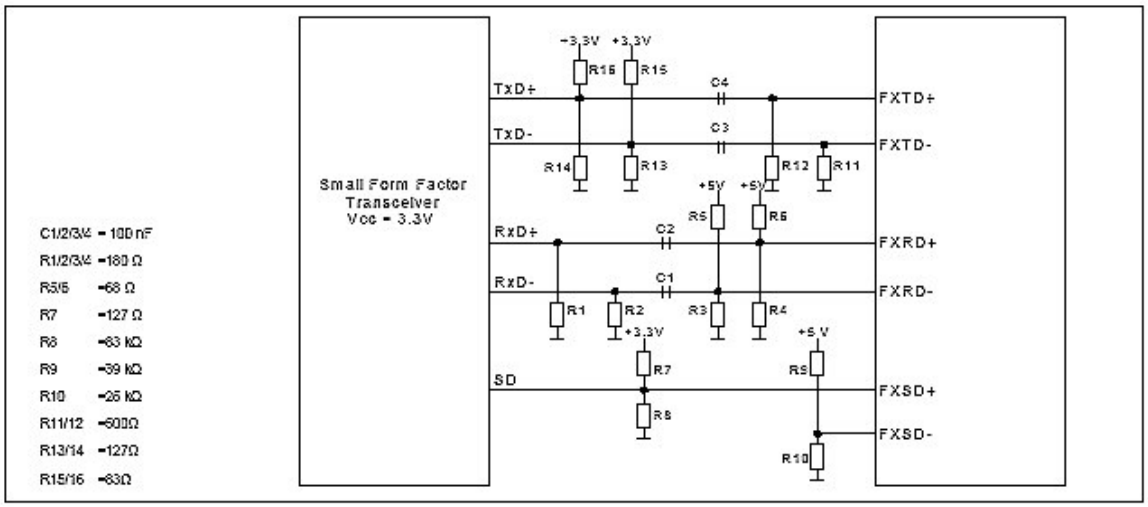
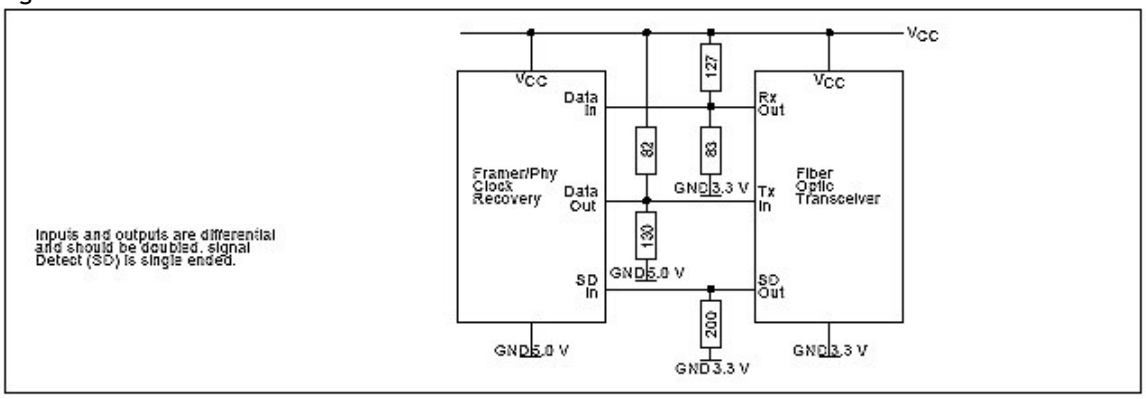


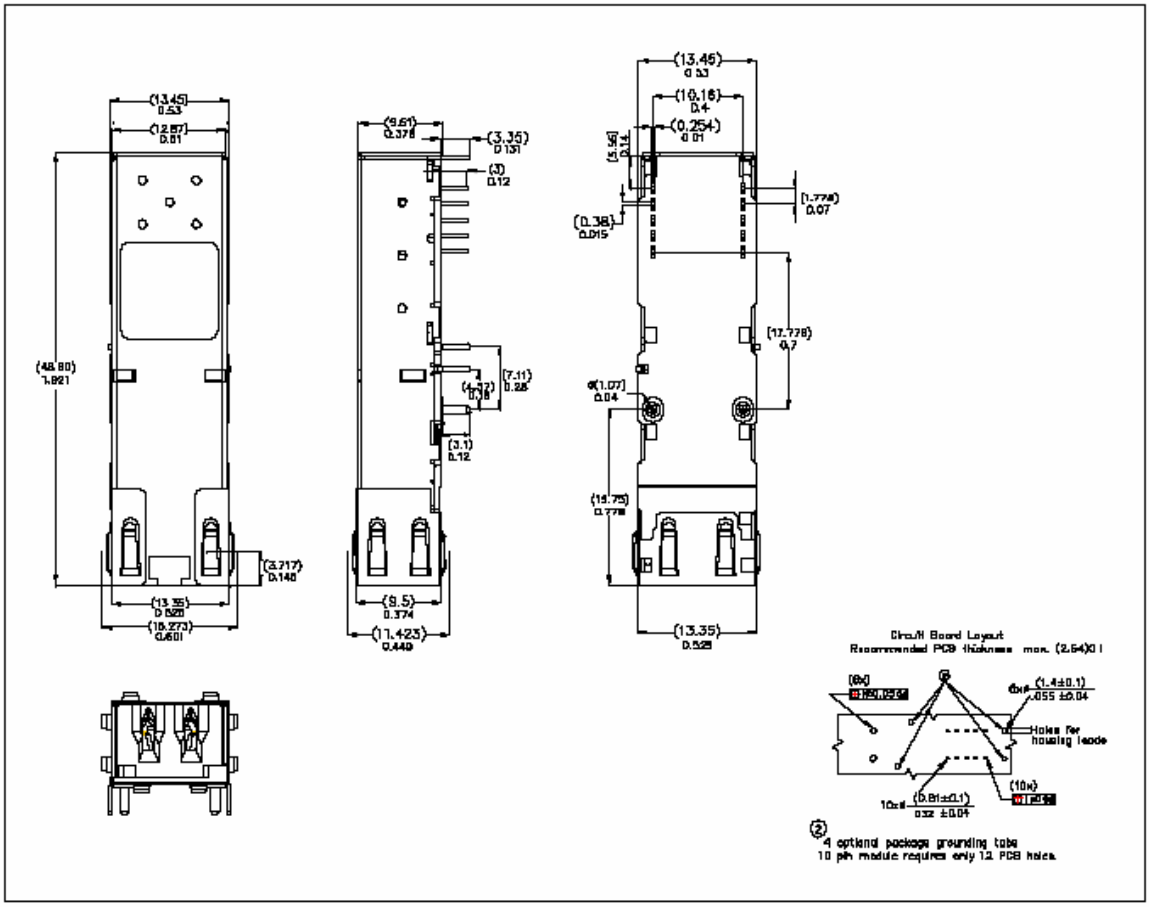
Figure 2. Common Vcc



Physical Characteristics

Outline Diagram

Dimensions for the device package are given in millimeters.



Additional Information

Contact

For additional information, product specifications, or information about Optocom:

Internet: http://www.optocom.com
Email: sales@optocom.com
Tel: +1 978 988 8711
Fax: +1 978 988 8722