Fiber Optic LAN Modules

VF-45™ 1x5 Transceiver for 850nm Multimode 100 Mb/s Ethernet

VFE-2141-G

FEATURES

- 850 nm multimode VCSEL on 100Mb/s
- Compatible with Fast Ethernet and Token Ring protocols
- Innovative, new style interconnect is cost competitive with copper solutions, enabling fiber-to-the-desktop
- Small footprint allows high density port spacing
- RoHS compliance

Radiantech's VFE-2141-G VF-45™ fiber optic transceiver provides a RoHS compliant low cost solution to the requirements of 100 Mbit Fast Ethernet and 4/16 Mbit Token Ring LAN (Local Area Network) applications. The VFE-2141-G combines a fiber optic transmitter and receiver with the VF-45™ connector, an innovative new connection scheme that lends itself to high density applications by significantly reducing the board space required for a fiber optic transceiver. The inexpensive VF-45™ connector enables cost effective fiber-to-the-desktop in the horizontal LAN cabling environment, while maintaining high standards of performance. The VFE-2141-G is interoperable with existing short wavelength fiber optic solutions for Fast Ethernet and Token Ring.

The VFE-2141-G utilizes existing optoelectronic components and ICs (Integrated Circuits) with proven capabilities in the Fast Ethernet and Token Ring LAN environment. The VF-45™ connector allows the VFE-2141-G to look and feel similar to existing UTP (Unshielded Twisted Pair) copper interconnects with the added benefits of fiber optic performance.

The transmitter consists of a high reliability GaAlAs 850 nm VCSEL (Vertical Cavity Surface Emitting Laser) coupled to a multimode fiber through the VF-45™ connector. The VCSEL uses a plastic microlens to collimate the light and increase the intensity, providing consistent power launch into fiber optic cables.

The hybrid bipolar fiber optic receiver consists of a silicon PIN (P-type / Intrinsic / N-type detector) photodiode for high-speed operation and a transimpedance preamplifier IC for excellent noise immunity. The device is designed to operate on the ECL (Emitter Coupled Logic) standard of 3.3 V and has very good PSRR (Power Supply Rejection Ratio).

These transceivers are compatible with industry standard hand and wave soldering processes.

⚠ WARNING

EYE DAMAGE

- The VCSEL used in this device is a class I laser and should be treated as a potential eye Hazard.
- Do not use magnification (such as a microscope or other focusing equipment) when viewing the device's output.

Failure to comply with these instructions could result in death or serious injury.

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ABSOLUTE MAXIMUM TRANSMITTER RATINGS

Parameter	Rating
Storage Temperature	-40 °C to +85 °C
Operating Temperature	0 to °C +70 °C
Lead Solder Temperature	260 °C for 10 sec.
Reverse Input Voltage	1.8 V
Continuous Forward Current (Heat Sinked)	15 mA

CAUTION

STRESS DAMAGE

Functional operation of the device at or above "Absolute Maximum Ratings" may affect reliability.

Failure to comply with these instructions may result in product damage.

CAUTION

ELECTROSTATIC DISCHARGE (ESD) DAMAGE

Follow normal ESD precautions when handling this product.

Failure to comply with these instructions may result in product damage.

TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS (T_A=25 °C unless otherwise specified)

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit	Note
Fiber Coupled Optical Power: 50 µm fiber	I_f = 7 mA peak; 50% duty cycle. NA=0.20	P_{OC} (Avg.)	-19.0	-13.3	-9.0	dBm	1, 2
	(over temp.)	P_{OC} (Avg.)	-20.0		-8.5	dBm	
Fiber Coupled Optical Power: 62.5 µm Fiber	I_f = 7 mA peak; 50% duty cycle. NA=0.275	P_{OC} (Avg.)	-17.0	-9.5	-4.5	dBm	1, 2, 3
	(over temp.)	P_{OC} (Avg.)	-18.0		-4.0	dBm	
Forward Voltage	I_f = 7 mA DC	V_F		1.8	2.2	V	
Forward Voltage Temperature Coefficient	I_f = 7 mA DC	$\Delta V_F/\Delta T$		-1.5		mV/°C	
Peak Wavelength	I_F = 7 mA DC	λp	830	850	860	nm	
Response Time	I_F = 7 mA Peak, no prebias	t_R /t_F		1.0	2.5	ns	
P_O Temp Coefficient	I_F = 7 mA	ΔP_O / ΔT		-0.019		dB/°C	
Series Resistance	DC	R_S	30	45	60	Ω	

Notes:

1. Maximum degradation at end of life = 2 dB.
2. P_{OC} is measured using a 2.5 meter 50/125 µm GGP patch cord which is intended to accurately represent a working system.
3. P_{OC} of 62.5/125 µm fiber is estimated from that of 50/125 µm.

FIGURE 1: TYPICAL OPTICAL POWER OUTPUT VS. FORWARD CURRENT (DC)

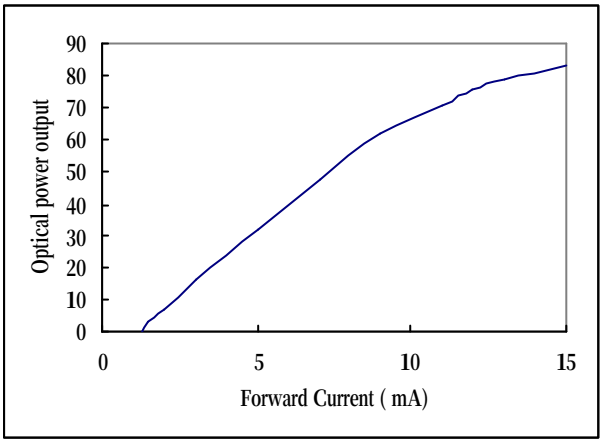


FIGURE 2: TYPICAL SPECTRAL OUTPUT

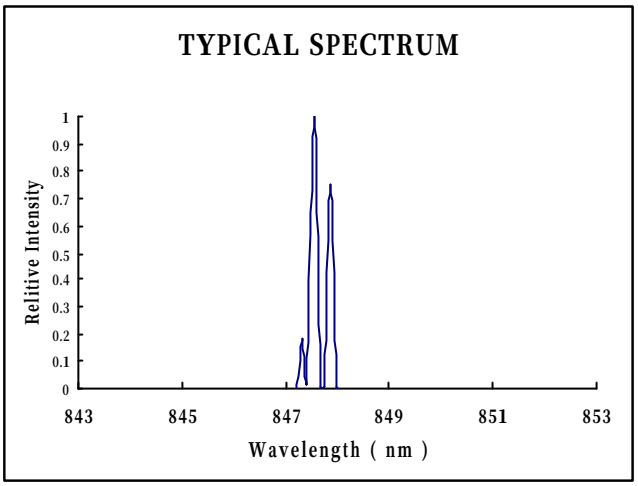
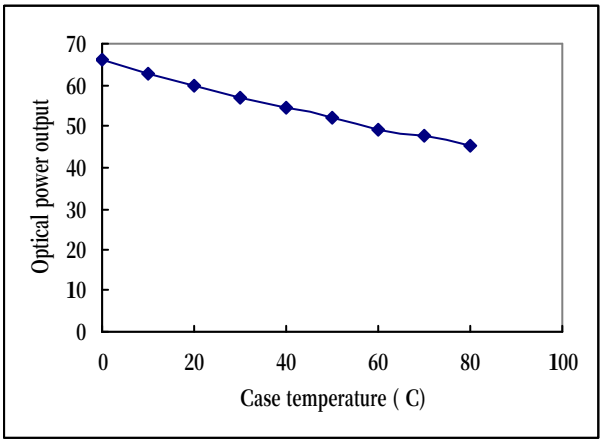


FIGURE 3: TYPICAL OPTICAL POWER OUTPUT VS. CASE TEMPERATURE



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ABSOLUTE MAXIMUM RECEIVER RATINGS

Parameter	Rating
Storage Temperature	-40 °C to +85 °C
Operating Temperature	0 °C to +70 °C
Lead Solder Temperature	260 °C for 10 sec.
Supply Voltage (V_{CC} -V_{EE})	4.5 V

RECOMMENDED OPERATING CONDITIONS

Parameter	Condition
Supply Voltage (V_{CC} -V_{EE})	3.3 V
Optical Signal Input	1.0 µW to 150 µW

CAUTION

PRODUCT DAMAGE

Do not conduct aqueous clean following wave soldering as this product contains optical elements which are not sealed against water ingress.

Failure to comply with these instructions may result in product damage.

RECEIVER ELECTRO-OPTICAL CHARACTERISTICS (T_A=0°<T<70°C, V_{EE}=3.3V unless otherwise specified)

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit	Note
Responsivity @ 25 °C	F = 10 / 62.5 MHz; 50% duty cycle	R	10	15	30	mV/µW	
Over Temperature 0 °C to +70 °C	P_{IN} = 2 µW avg. λ = 850 nm 62.5 mm core fiber	R	9.0		30	mV/µW	
Input Power @ 25 °C	F = 62.5 MHz; 50% duty cycle λ= 850 nm	P_{IN} (avg.)	-30			dBm	1
Power Supply Current	R_{LOAD} = 0	I_{CC}	12	22	32	mA	
Rise/Fall Time @ 25 °C	F = 62.5MHz; 50% duty cycle	t_R / t_F		3.0	4.5	nS	
Over Temperature 0 °C to +70 °C	P_{IN} = 2 µW avg. λ = 850 nm	t_R / t_F		3.0	4.5	nS	
Pulse Width Distortion	F = 62.5MHz; 50% duty cycle P_{IN} = 2 µW avg. λ = 850 nm	PWD		0.2	1.0	nS	1
Bandwidth	λ = 850 nm R = .707R Max.	BW		125		MHz	
Peak to Peak Noise Output Voltage	P_{IN} = 0 µW 100 MHz, 3 pole Bessel filter on output	V_{NO}		1	1.2	mV	
Output Overshoot	P_{IN} = 2 µW			10	15	%	
Output Resistance	F = 50 MHz		25	40	100	Ω	

Notes:

*Typical specifications are for operation at T A =25 °C.

FIGURE 4: SPECTRAL RESPONSE

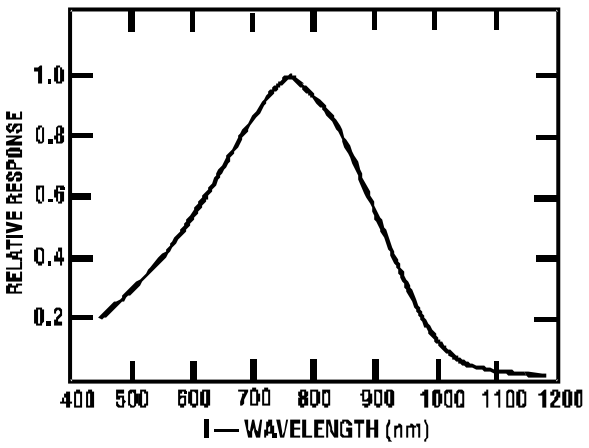


FIGURE 5: SWITCHING WAVEFORM

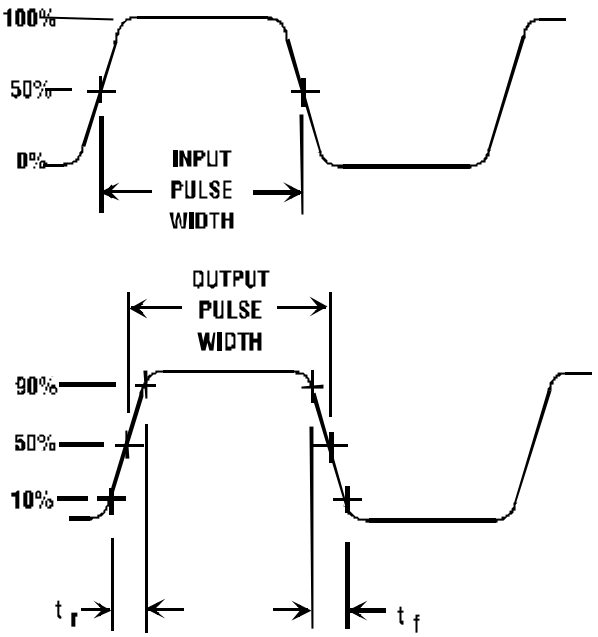


FIGURE 6: CIRCUIT DIAGRAM
VFE-2141-G 3.3 V

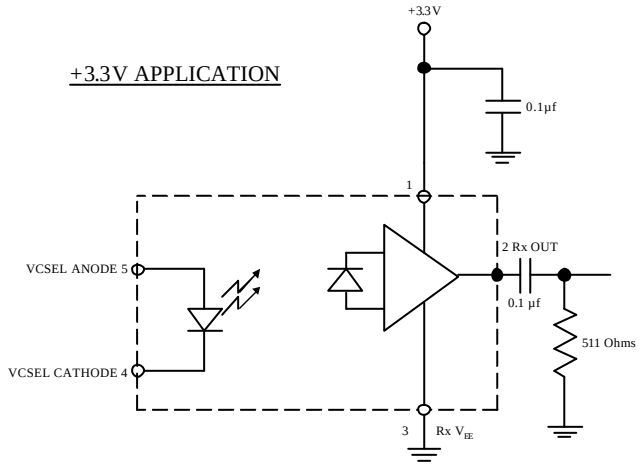
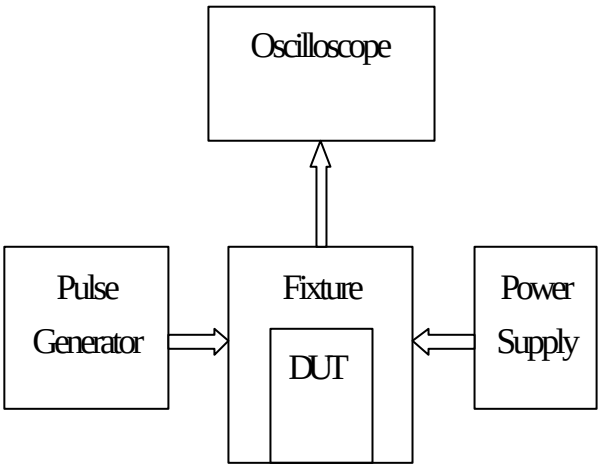


FIGURE 7: TYPICAL TESTING DIAGRAM



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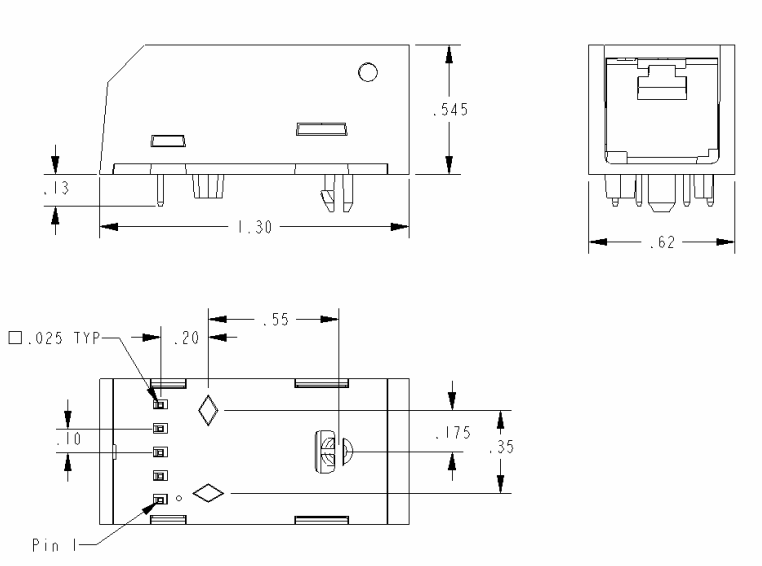
ORDER GUIDE

Catalog Listing	Description
VFE-2141-G-P	Fiber Optic VF-45™ Transceiver 850nm 100Mbps (for P Company only)

MOUNTIND DIMENSIONS (FOR REFERNECE ONLY: inch)



PINOUT

Number	Function
1	RX V_{CC}
2	RX Output
3	RX V_{EE} GND
4	VCSEL Anode
5	VCSEL Cathode

WARRANTY/REMEDY

Radiantech Inc. warrants goods of its manufacture as being free of defective material and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Radiantech during that period of coverage, Radiantech will repair or replace without charge those items it finds defective. The foregoing is Buyer' s sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

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