Fiber Optic
VF45 Quad Transceiver for 10Mb/s Ethernet and 16Mb/s Token Ring

HFM2604-001

FEATURES

- Compatible with Ethernet and Token Ring protocols
- Innovative *NEW* style interconnect is competitive with UTP solutions for **Fiber-To-The-Desktop**
- Small footprint allows high density port spacing

The VF45 Fiber Optic transceiver is intended to provide a low cost solution to the requirements of 10 Mbit Ethernet and 4/16 Mbit Token Ring LAN applications. The HFM2604 combines a fiber optic transmitter and receiver with an innovative new connection scheme. The HFM2600 lends itself to high density applications by significantly reducing the board space required for a fiber optic transceiver. The inexpensive VF45 connection scheme enables cost effective *fiber-to-the-desktop* in the horizontal LAN cabling environment, while maintaining high standards of performance. The HFM2604 is completely interoperable with existing short wavelength fiber optic solutions for Ethernet and Token Ring.

The HFM2604 utilizes existing Honeywell optoelectronic components and IC's with proven capabilities in the Ethernet and Token Ring LAN environment. The new style interconnect allows the HFM2604 to look and feel similar to existing UTP copper interconnects with the added benefits of fiber optic performance.

The transmitter consists of a high reliability GaAlAs 850nm LED coupled to a multimode fiber through a VF45 style connector. The LED uses a glass microlens over the Caprock junction to collimate the light, increasing the intensity, which provides for consistent power launch into fiber optic cables.

The hybrid bipolar fiber optic receiver consists of a silicon PIN photodiode for high speed operation and a transimpedance preamplifier IC for excellent noise immunity. The device is designed to operate on the ECL standard of -5.2 volts and has very good Power Supply Rejection Ratio (20 db @ 10 MHz typical). It can also be operated with a +5 volts supply although some PSRR performance will be sacrificed at data rates below 1 MHz.

PRELIMINARY 4/29/98

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ABSOLUTE MAXIMUM RATINGS - TRANSMITTER

PARAMETER	RATING
Storage Temperature	-40 to +85ºC
Operating Temperature	0 to +70ºC
Lead Solder Temperature	260ºC for 10 sec.
Reverse Input Voltage	1.8 Volts
Continuous Forward Current (Heat Sinked)	100mA

NOTICE

Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operations section for extended periods of time may affect reliability.

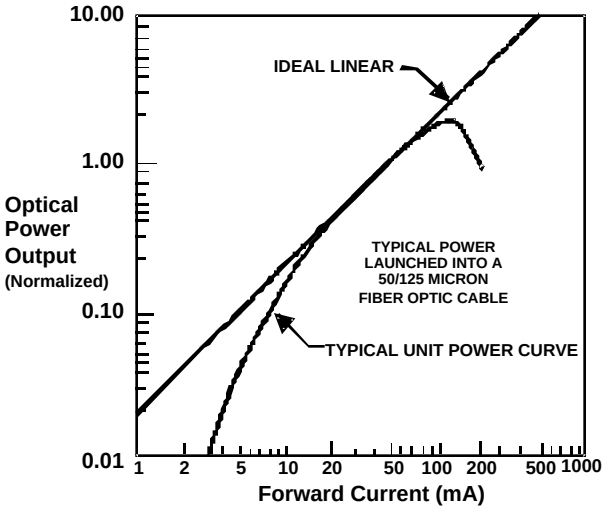
TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS(T_A=25 °C unless otherwise stated)

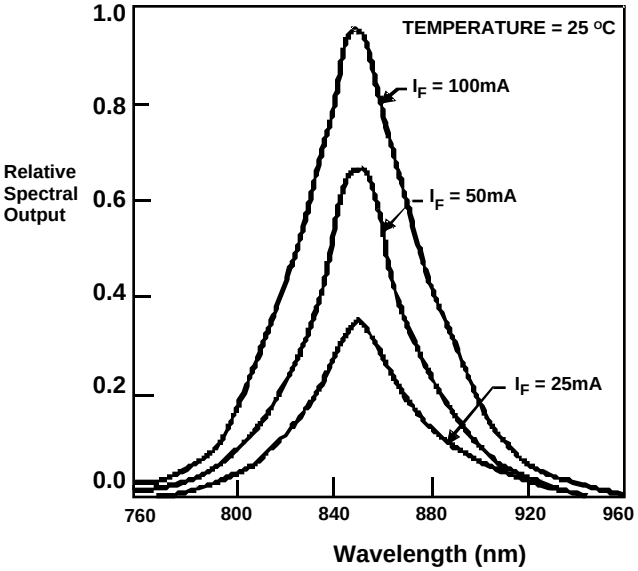
Transmitter Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Fiber Coupled Optical Power	I_f =32mA Peak; 50% duty cycle; 50µm fiber NA=0.20 (Over Temp)	P_{OC} Avg.	-21.8	-17.8	-15.8	dBm	1,2
		P_{OC} Avg.	-22.3		-15.3	dBm	
Fiber Coupled Optical Power	I_f =32mA Peak; 50% duty cycle; 62.5µm fiber NA=0.275 (Over Temp)	P_{OC} Avg.	-18.0	-14.0	-12.0	dBm	1,2
		P_{OC} Avg.	-18.5		-11.5	dBm	
Forward Voltage	I_f =32mA	V_F		1.60		Volts	
	I_f =60mA	V_F	1.48	1.70	2.09	Volts	
Forward Voltage Temp. Coefficient	I_f =32mA	$\Delta V_F / \Delta T$		-.25		mV/ºC	
	I_f = 60mA	$\Delta V_F / \Delta T$		-.22		mV/ºC	
Reverse Voltage	I_R=10µA	B_{VR}	1.8	3.8		Volts	
Peak Wavelength	I_F=32mA dc	λp				nm	
	I_F= 60mA dc	λp	810	850	885	nm	
Response Time	I_F=32mA Peak, No Prebias	t_R/t_F		4.0	6.0	ns	
P_O Temp Coefficient	I_F=100mA	$\Delta P_O / \Delta T$		-0.019		dB/°C	
	I_F= 60mA	$\Delta P_O / \Delta T$		-0.024		dB/°C	
Series Resistance	DC	r_s		4.0		ohms	
Device Capacitance	V_R=0V f=1MHz	C		55		pF	
Thermal Resistance	Heat Sinked			260		°C/W	

Notes

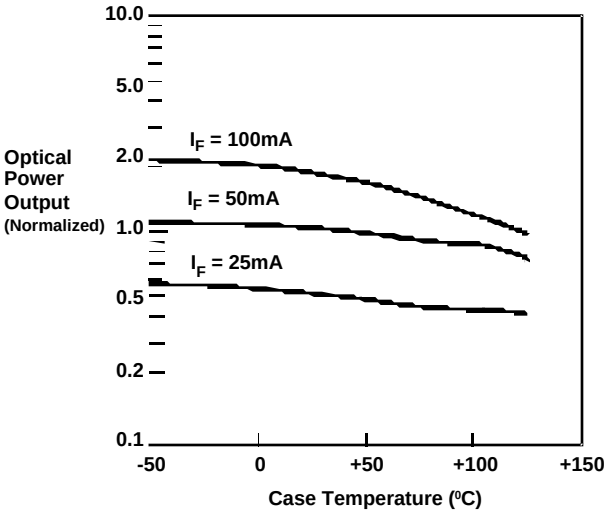
1. Maximum degradation at end of life = 2dB.
2. POC is measured using an 8 to 10 meter mode stripped cable which is intended to accurately represent a working system.

Typical Optical Power Output vs Forward Current **Typical Spectral Output vs Wavelength**





Typical Optical Power Output vs Case Temperature



NOTICE

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation to equipment, take normal ESD precautions when handling this product.

CAUTION

Under certain application conditions, the infrared optical output of this device may exceed Class 1 eye safety limits, as defined by IEC 825-1 (1993-11). Do not use magnification (such as a microscope or other focusing equipment) when viewing the device's output.

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ABSOLUTE MAXIMUM RATINGS - RECEIVER

PARAMETER	RATING
Storage Temperature	-40 to +85°C
Operating Temperature	0 to +70°C
Lead Solder Temperature	260°C for 10 sec.
Supply Voltage (V_{CC} - V_{EE})	-0.5 to -6.0 Volts

RECOMMENDED OPERATING CONDITIONS

Supply Voltage (V_{CC} - V_{EE})	5.0 to 5.5 Volts
Optical Signal Input	1.0 to 100µW

NOTICE

Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operations section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

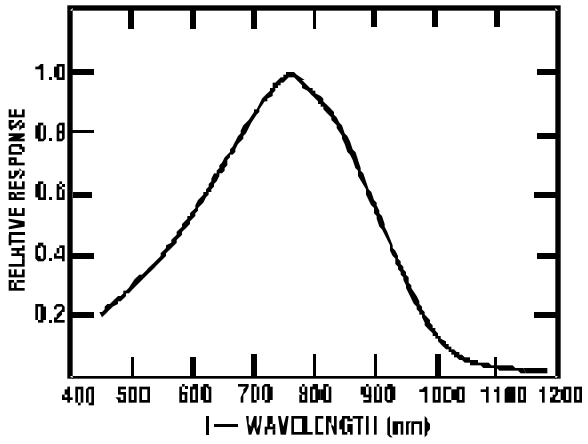
RECEIVER ELECTRO-OPTICAL CHARACTERISTICS (T_A = 0°C<T<70°C, V_{EE} = -5.2V, unless otherwise specified)

Parameters	Test Condition	Symbol	Min.	Typ. (6)	Max.	Units
Responsivity @ 25°C	f = 10 MHz; 50% duty cycle P_{IN} = 100µW peak	R	5.3	7.0	9.6	mV/µW
Over temperature 0 to +70°C	λ = 850 nm 62.5µm core fiber	R	4.5		11.5	mV/µW
Input Power @ 25°C	f = 10 MHz; 50% duty cycle λ = 850nm	P_{IN} (avg.)	-34 0.4		-10.6 87.5	dBm µW
Over temperature 0 to +70°C	PWD = 2.5 nS	P_{IN} (avg)			-11.2 75	dBm µW
DC Output Voltage	$P_{IN} \leq 0.1\mu W$	V_{ODC}	-4.0	-3.65	-3.3	V
Power Supply Current @ 25°C	R_{LOAD} =0	I_{CC}		9	15	mA
Rise/Fall Time @ 25°C	f = 10 MHz; 50% duty cycle P_{IN} = 50µW avg.	t_R / t_F		3.6	4.5	nS
Overtemperature 0 to +70°C	λ = 850 nm	t_R / t_F	.	3.6	6.3	nS
Pulse Width Distortion (Note 5)	f = 10MHz; 50% duty cycle P_{IN} = 75µW avg. λ = 850 nm	PWD		0.2	2.5	nS
Bandwidth	λ = 850nm R = .707R Max.	BW		125		MHz
RMS Noise Output Voltage @ 25°C	P_{IN} = 0µW 75 MHz, 3 pole Bessel filter on output	V_{NO}		0.52	0.58	mV
	No filter on output	V_{NO}			0.70	mV
Output PSRR (Note 4)	f = 10 MHz			20		db
Output Overshoot @ 25°C	P_{IN} = 10µW			10	13	%
Output Resistance	f = 50 Mhz			20		ohms
RMS Input Noise Power (Note3) @ 25°C	P_{IN} = 0 µW 75 Mhz, 3 pole Bessel filter on output	P_{NI}		-41.3 0.074	-41.0 0.079	dBm µW

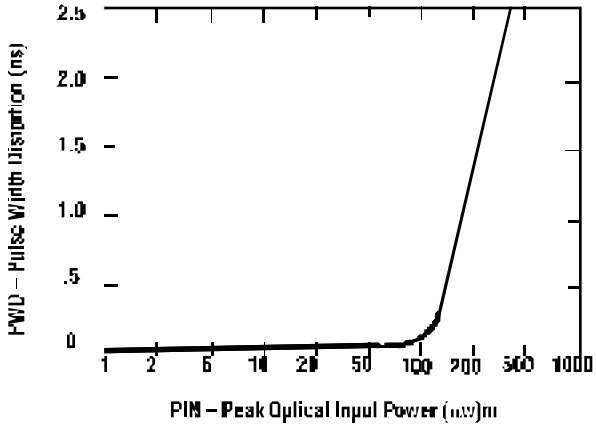
1. Quiescent output voltage(V_{ODC}) = V_{cc} -3.65 Volts typical. Dynamic output voltage swing is above the quiescent output voltage. ($V_O = V_{ODC} + R \times P_{IN}$)
2. Photodiode has 600mm (.024 in.) diameter microlens for optical coupling.
3. Input referred noise is calculated as $P_{HI} = V_{NO} / R$.
4. Output PSRR is defined as 20 log (V supply ripple / V_{OUT} ripple).
5. Measured at the 50% amplitude point on the output waveform.
6. Typical specifications are for operation at T_A 25°C.
7. Output pinh should be AC coupled to a 511 ohm load. Load capactitance <50pf (see circuit diagram).

TYPICAL PERFORMANCE CURVES

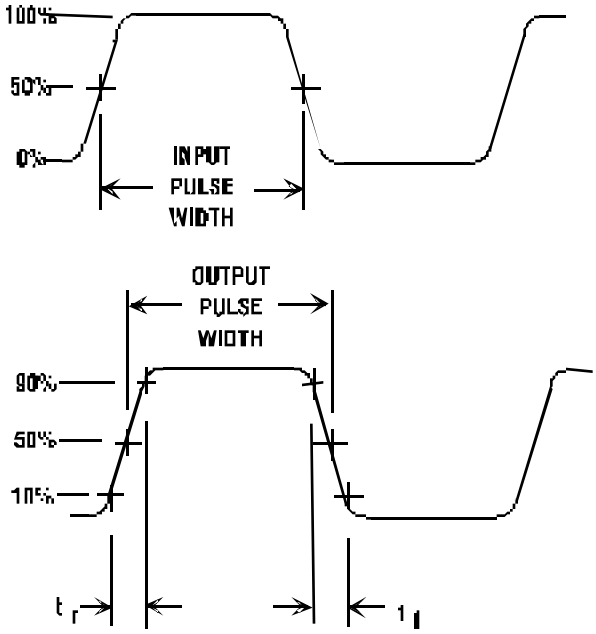
Spectral Response

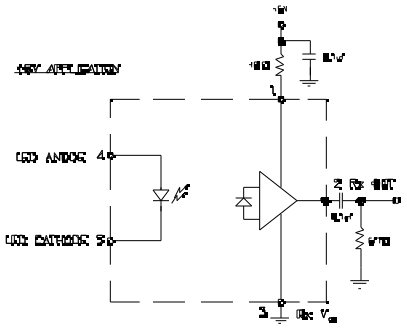


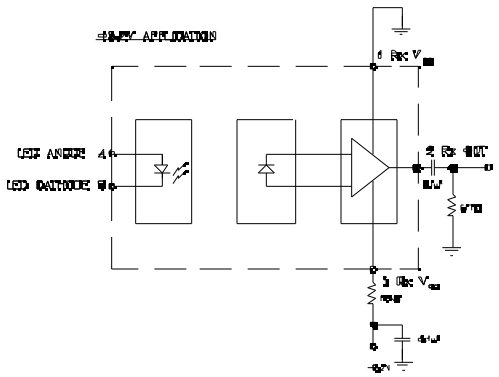
Pulse Width Distortion vs Optical Input Power



Switching Waveform







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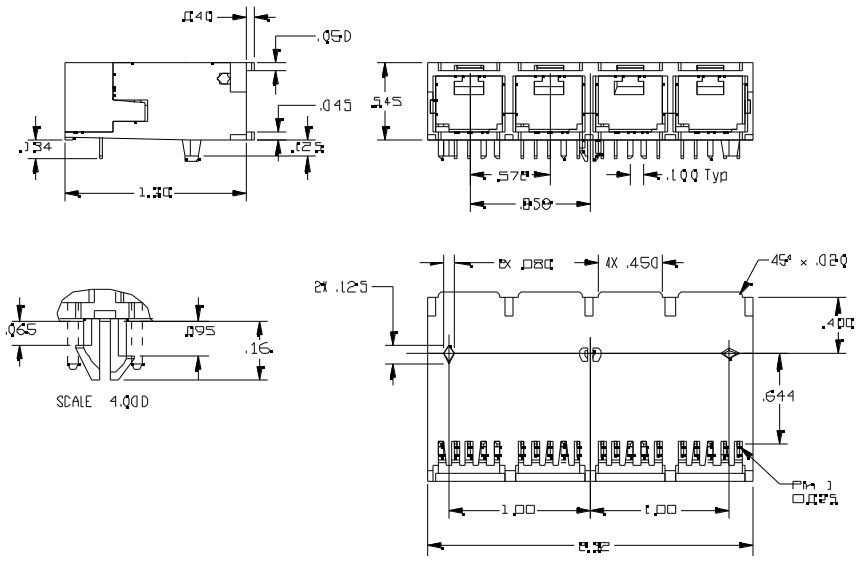
ORDER GUIDE

Catalog Listing	Description
HFM2604-001	Fiber Optic VF45 QuadTransceiver

To order the Patch Cords please call 3M at 1-800-426-8688
Patch Cord Part number
VOL-V6R3 (62.5um, VF45-to-VF45 , 3m long)
VOL-T6R3 (62.5um, VF45-to-ST, 3m long)
VOL-C6R3 (62.5um, VF45-to-SC, 3m long)



Pinout	Function
1.	Rx Vcc
2.	Rx Output
3.	Rx V_{EE}
4.	LED Anode
5.	LED Cathode

SALES AND SERVICE
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