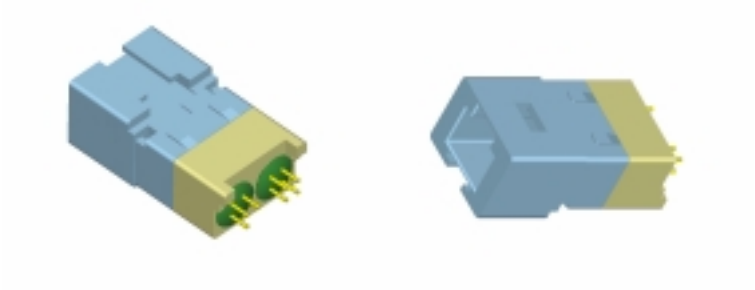
Fiber Optic LAN Components
MTRJ SFF 2.5 Gbps OFE

Preliminary
HFT259x-521

FEATURES

- Prealigned Pluggable MTRJ connector in compliance with the SFF (Small Form Factor) MultiSource Agreement.
- VCSEL packaged with a back monitor photodiode
- Common anode and common cathode polarities available
- TO-46 hermetic package for VCSEL and Pin + Preamp
- 3.3 V operation
- GaAs PIN detector and BiCMOS preamplifier
- Differential output for low noise
- Data rates > 1GHz
- Laser is attenuated. Unattenuated versions available (HFT2593-522 and HFT2594-522)



The HFT259x-521 is a single package transmitter and receiver designed to interface with the MT-RJ style optical connectors.

The transmitter is a high performance 850nm VCSEL (Vertical Cavity Surface Emitting Laser) packaged for high speed data communications. This product combines all the performance advantages of VCSEL with a custom designed power monitor diode. The power monitor diode can be used with an appropriate feedback control circuitry to set a maximum power level for each VCSEL. Attenuating coatings are available on the Laser transmitter to simplify design and assist in meeting eye safety requirements.

The PIN + preamp converts optical power into a differential output electrical signal. As the light increases, the differential output voltage increases, limiting at input powers above –10dBm. The differential output is designed to be AC coupled into a data amplifier.

The Honeywell HFT259x-521 is designed to interface with 50/125 and 62.5/125µm multimode fiber within an MT-RJ style interface.

ELECTRO-OPTICAL CHARACTERISTICS (T_A=25 °C unless otherwise stated, 50/125 µm fiber)

VCSEL Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Peak Fiber Coupled Optical Power (See Threshold current and slope efficiency which control power output)	I_F=9mA Peak 50/125 μm fiber NA = 0.20	P_{oc}		0.500		mW	1
Threshold Current		I_{TH}	1	3	5	mA	
Threshold Current Temperature Variation	T_A = 0°C to 70°C	ΔI_{TH}	-1.5		1.5	mA	2
Slope Efficiency	Poc =0.5mW	η	0.04		0.20	mW/mA	3
Slope Efficiency Temperature variation	T_A = 0°C to 70°C	$\Delta\eta/\Delta T$		-6000		PPM/°C	
Peak Wavelength	I_F=9mA	λ_P	830	850	860	nm	
λ_P Temperature Variation	I_F=9mA	$\Delta\lambda_P/\Delta T$		0.06		nm/°C	
Spectral Bandwidth, RMS	I_F=9mA	$\Delta\lambda$			0.85	nm	
Laser Forward Voltage	I_F=9 mA	V_F		1.8	2.2	V	
Laser Reverse Voltage	I_R=10 μA	BVR_{LD}		-10		V	
Rise and Fall Times	Prebias Above Threshold, 20%-80%	t_r			100	ps	4
		t_f			150		
Relative Intensity Noise	1 GHz BW, I_F=9mA	RIN		-130	-122	dB/Hz	
Series Resistance	I_F=9 mA	R_S	18	25	40	Ohms	
Series Resistance Temperature Coefficient	I_F=9 mA, T_A = 0°C to 70°C	dRs/dT		-3000		PPM/°C	
Back Monitor Photodiode Parameters	**Test Conditions**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**	**Notes**
Monitor Current	Poc =.5mW	I_{PD}		0.2		mA	
Monitor current Temperature Variation	Poc =.5mW	$\Delta I_{PD}/\Delta T$		0.2		%/°C	
Dark Current	Po =0mW, V_R=3V	I_D			20	nA	
PD Reverse Voltage	Po =0mW, I_R=10 μA	BVR_{PD}	30	115		V	5
PD Capacitance	V_R=0V, Freq=1MHz	C		75	100	pF	
	V_R=3V, Freq=1MHz			40	55		
PIN + Preamp Parameters	**Test Condition**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**	**Notes**
Supply Voltage	P_{in} = 0μW, Rload=50Ω	V_{cc}	3.0	3.3	3.8	Volts	6
Supply Current	P_{in} = 0μW, Rload=50Ω	I_{cc}		26	50	mA	6
Output Voltage	P_{in} = 100μW, Rload=50Ω	V_{out}		200	500	mV	6
Responsivity		R		1600		μV/μW	7,8
Overload (Surge Power)			0	3		dB	
Upper 3dB Bandwidth		BW_{upper}	2000	2400	2800	MHz	9
RMS Input Referred Noise	P_{in}=0μW, R_{load}=50Ω 937.5MHz (1.875 GHz) BT Filter			500		nW	10
Sensitivity	BER=10^{-12}, SNR=7	S	-20	-24		dBm	
Power Supply Rejection Ratio	P_{in}=0μW, R_{load}=50Ω	PSRR	10	30		dB	11
Pulse Width Distortion	P_{in}=20μW peak, R_{load}=50Ω	PWD			40	ps	12
Rise/Fall Time	P_{in}=20μW peak, R_{load}=50Ω	T_R/T_F			250	ps	13
Wavelength Responsivity	P_{in}=20μW peak, R_{load}=50Ω	λ	760	850	860	nm	

Notes:

1. Operating power is set by the peak operating current $I_{PEAK}=I_{BIAS}+I_{MODULATION}$.
2. Operation at temperatures outside the specified range may result in the threshold current exceeding the maximums defined in the electro-optical characteristics table.
3. Slope efficiency is defined as ΔPo/ΔIF at a total power output of 0.5 mW.
4. Rise and fall times are sensitive to drive electronics, 100ps rise and fall times are achievable with Honeywell VCSELs.
5. To safeguard the VCSEL from current spike damage, short the VCSEL anode and cathode to each other during photodiode BVR verification testing. Additionally to safeguard the backmonitor PIN photodiode, limit the photodiode reverse voltage in accordance with the absolute maximum rating.
6. Pin refers to the total optical power at the face of the fiber optic cable input to the PIN + Preamp Detector.
7. Responsivity measured with source wavelength of 850nm, 125MHz square wave, P_{in}=20µW peak, R_{load}=50Ω.
8. The output voltage increases as received light power increases, up to approximately –15dBm. The preamplifier is designed to limit the electrical output signal above this optical input level, and does not introduce signal distortion until the average input power exceeds 0dBm.
   Bandwidth is measured with a small signal sinusoidal light source with 50 µW average power, R_{load}=50Ω.
10. RMS input referred optical noise is obtained by measuring the RMS output referred noise, then dividing by the responsivity.
11. PSRR is measured from 300KHz to 1GHz by injecting a –20dB electrical signal on the V_{cc} pin. The nominal value at 100MHz is recorded. No external bypass components are assumed. An external V_{cc} filter network will greatly increase the PSRR.
12. Measured at the 50% level of output pulses using 0.5 GHz square wave with <200 ps rise time.
13. Rise and fall times are measured with source wavelength of 850nm, 125MHz square wave, with optical rise and fall times < 200ps, P_{in}=20µW peak, R_{load}=50Ω.

ABSOLUTE MAXIMUM RATINGS

Parameter	Rating
Storage Temperature	-40 to +85°C
Case Operating Temperature	0 to +70°C
Lead Solder Temperature	260°C, 10 sec.
Laser Continuous Forward current, Heat Sinked	15 mA
Laser Reverse Breakdown Voltage (I_R = 10µA)	5V @ 10 µA
Back Monitor Reverse Voltage	30 V
Incident Optical Power on the Detector	0 dBm average, +4 dBm peak
Power Supply Voltage (PIN + Preamp)	3.8V

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.

NOTICE

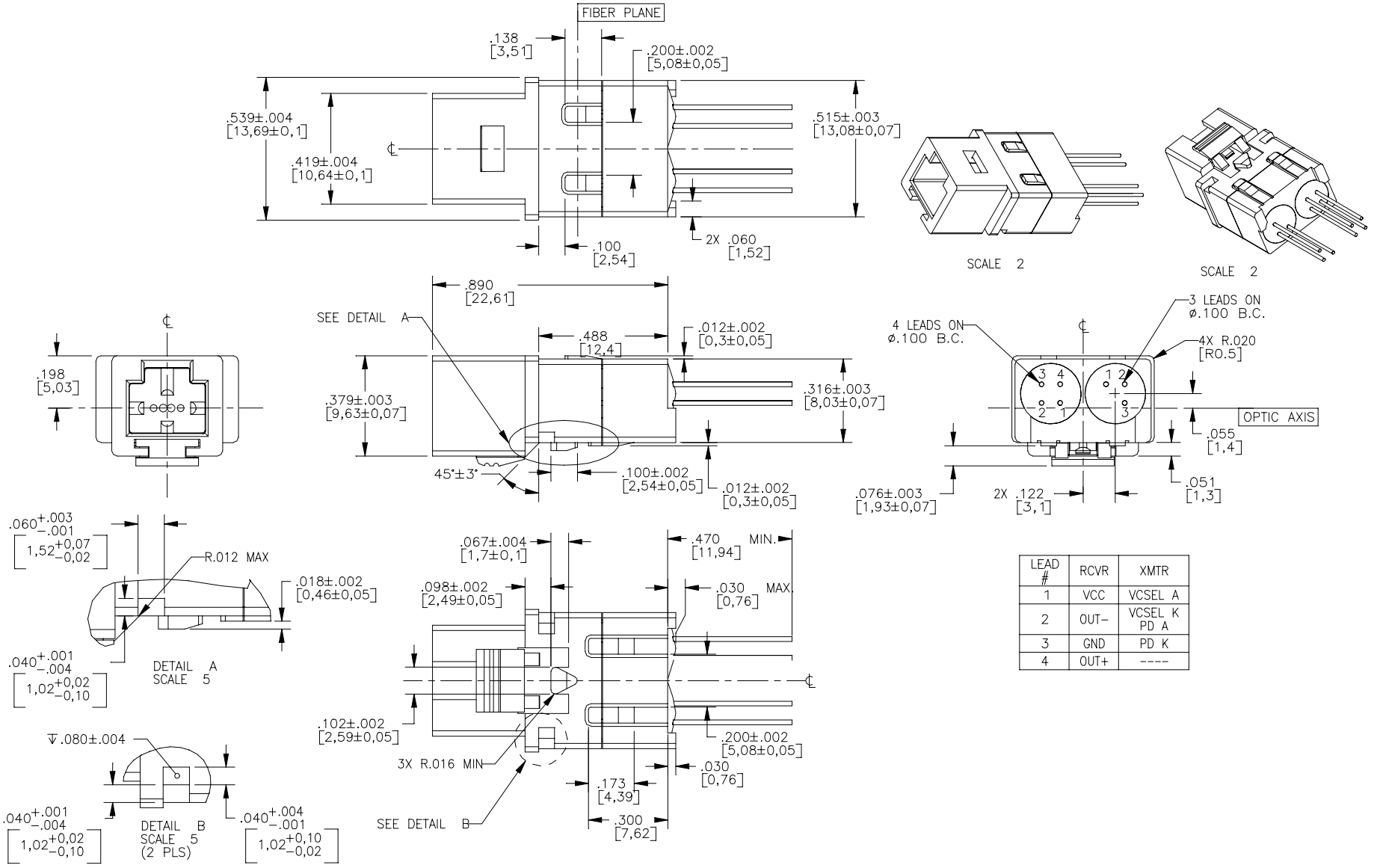
The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation to equipment, take normal ESD precautions when handling this product

ORDER GUIDE

Catalog Listing	Description
HFT2590-521	Attenuated, Common Anode
HFT2591-521	Attenuated, Common Cathode

Preliminary

HFT259x-521



LEAD #	RCVR	XMTR
1	VCC	VCSEL A
2	OUT−	VCSEL K PD A
3	GND	PD K
4	OUT+	----

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TELEPHONE
1-800-367-6786 (USA)
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1-972-470-4326 (Customer Response Center)
1-972-470-4549 (Fax on demand)
+49 (0) 89 3599971 (Germany)
+65 35436775 (Singapore)
+44 (0) 118 981 7513 (UK)

INTERNET
http://www.Honeywell.com/sensing
opto@micro.honeywell.com

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Honeywell

Honeywell Inc.
11 West Spring Street
Freeport, Illinois 61032

Printed with Soy Ink
on 50% Recycled Paper

Honeywell Inc.
Optoelectronics Facility
830 East Arapaho Road
Richardson, Texas 75081

Honeywell Control Systems Ltd.
Zodiac House
Calleva Park
Aldermaston, Berkshire
RG7 8HW England

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