



050-411

PRODUCT BRIEF
50 MHz TO 6 GHz
PRINTED CIRCUIT BOARD (PCB) MOUNTED
RF-OVER-FIBER CWDM TRANSMITTER
LOW-NOISE CONFIGURATION
SMALL & COMPACT WITH RUGGED CONSTRUCTION FOR HARSH ENVIRONMENTS

20U2-xxxx

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050-411 Product Brief
PCB Mount RF-over-Fiber Transmitter
50 MHz – 6 GHz



For reference only

Glenair 050-411 is a compact low noise PCB Mount “RF-over-Fiber” Transmitter that has useful RF bandwidth from 50 MHz to 6 GHz with excellent Spurious Free Dynamic Range (SFDR) performance when used in conjunction with 050-412 RF-over-Fiber Receiver.

The 050-411 mechanical design is suited to the harsh temperature and vibration environments found in Military, Aerospace, Railway, Oil and Gas, and Industrial applications. The device is comprised of a transmitter section that resides in an enclosed, EMI shielded package which interfaces with a host board through a high speed electrical PCB Mount connector.

The RF to Optical transmitter includes Low Noise RF amplifiers driving an uncooled distributed-feedback (DFB) laser module, laser bias control. Compensation circuits are also included. The DFB lasers are available in CWDM wavelengths.

APC fiber optic contact is standard. Other connector options are also available.

KEY FEATURES/BENEFITS:

- Rugged PCB Mount design
- 50 MHz to 6 GHz Bandwidth
- Low Noise
- High Spurious Free Dynamic Range (SFDR) link in conjunction with 050-412
- PCB mount module is securely mounted with screws to ensure excellent shock and vibration performance
- Captive screws to simplify manufacturing logistics and assembly
- High-Speed electrical plug-in connector eliminates the need for soldering or coax cable interfaces, and enables ease of servicing
- -40°C to +85°C Operating Case Temperature
- Evaluation fixture available

APPLICATIONS:

- Harsh Environments such as: Airborne, Tactical, Railway, Industrial, Oil and Gas, and Shipboard applications

050-411 Product Brief
PCB Mount RF-over-Fiber Transmitter
50 MHz – 6 GHz



HOW TO ORDER:

TABLE 1

Part Number		Fiber Pigtail Modifier	Fiber Length
050-411 50 MHz - 6 GHz, Transmitter	Blank = No CWDM specified, Any CWDM wavelength allowed, typical 1310nm -27 = 1270nm Central Wavelength -29 = 1290 nm Central Wavelength -31 = 1310 nm Central Wavelength -33 = 1330nm Central Wavelength *Contact Glenair, other wavelengths may be supported	Blank = SMF Fiber pigtail (0.5m-2m), SC/APC -GHD = Glenair High Density, APC Contact (181-047-1255C), SMF pigtail	Blank (0.5m-2m) -xxxx Order in increments of 0.5" Example: 0185 = 18.5" See tolerances Maximum Length 35"

Example PNs:

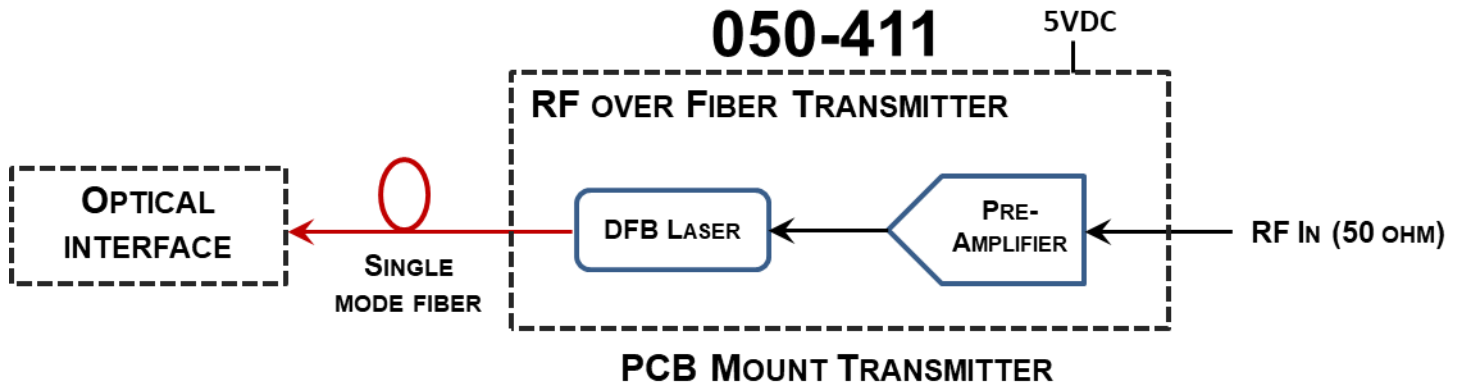
- 050-411** = Transmitter Any CWDM wavelength supported, SC/APC, 0.5m to 2m SMF pigtail length
- 050-411-31** = Transmitter 1310nm CWDM, SC/APC, 0.5m to 2m SMF pigtail length
- 050-411-GHD-0185** = Transmitter, GHD APC Contacts, 18.5" SMF pigtail length
- 050-411-33-GHD-0185** = Transmitter 1330nm, GHD APC Contacts, 18.5" SMF pigtail length

Standard Tolerances for Fiber Pigtail	
Length	Tolerance
4" to 12"	+0.5 inches to -0 inches
12" to 24"	+1 inches to -0 inches
24' to 35"	+3 inches to -0 inches

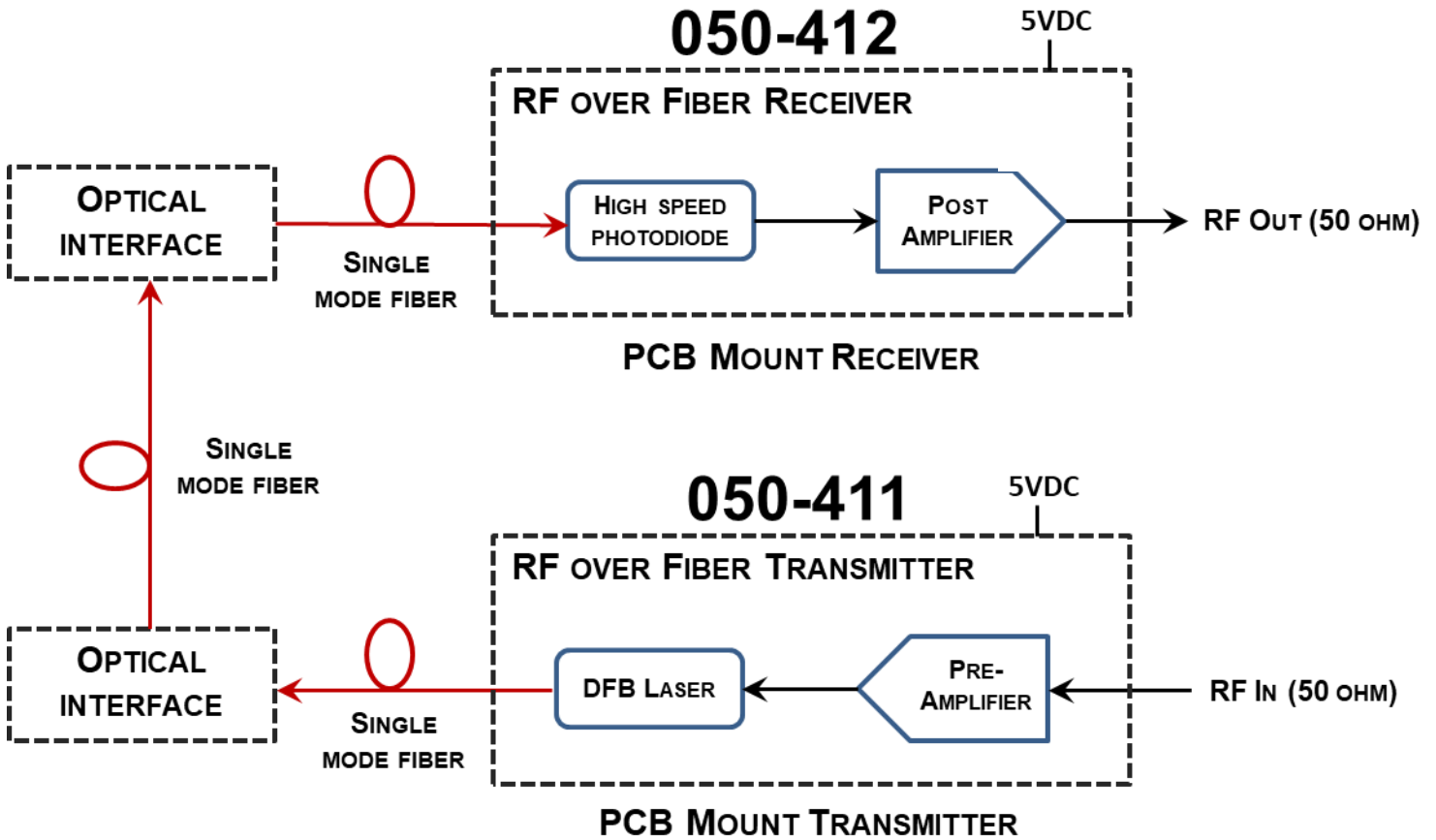
050-411 Product Brief
 PCB Mount RF-over-Fiber Transmitter
 50 MHz – 6 GHz



Functional Block Diagram:



RF Over Fiber Link:



050-411 Product Brief
PCB Mount RF-over-Fiber Transmitter
50 MHz – 6 GHz



Ratings and Specifications:

TABLE 2 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ.	Max	Units	Notes
Storage Temperature	T _s	-55	--	+85	°C	
Supply Voltage (5V)	V _{CC}	4.5	--	5.5	V	
Maximum RF Input Power	P _{IN_Max}	--	--	0	dBm	Composite power for multichannel

TABLE 3 OPERATING CONDITIONS

Parameter	Symbol	Min	Typ.	Max	Units	Notes
Operating Temperature, Case	T _{OP}	-40	--	+85	°C	
Operating Temperature, Case (CWDM)	T _{OP CWDM}	-40	--	+85	°C	TBC
Supply Voltage (5V)	V _{CC}	4.95	5.0	5.05	V	
Supply Current (5V)	I _{CC}	--	85	120	mA	

TABLE 4 RF LINK CHARACTERISTICS - 050-411 Transmitter and 050-412 Receiver with Optical Power = 5.5 dBm at 25°C

Parameter	Symbol	Min	Typ.	Max	Units	Notes
RF Link Gain	G	-2	0	2	dB	At 25°C measured with 050-412 (Receiver)
Frequency Response	FR	--	±2.5	--	dB	At 25°C measured with 050-412 (Receiver)
High Frequency Cutoff	HFC	--	6000	--	MHz	At 25°C measured with 050-412 (Receiver)
Low Frequency Cutoff	LFC	30	50	--	MHz	At 25°C measured with 050-412 (Receiver)
Input Third-Order Intercept @ 1 GHz	IIP3	--	20	--	dBm	-10 dBm/tone, at 25°C measured with 050-412 (Receiver)
Input Third-Order Intercept @ 6 GHz	IIP3	--	10	--	dBm	-10 dBm/tone, at 25°C measured with 050-412 (Receiver)
Noise Figure @ 1 GHz	NF	--	20	--	dB	At 25°C measured with 050-412 (Receiver)
Noise Figure @ 6 GHz	NF	--	28	--	dB	At 25°C measured with 050-412 (Receiver)
3 rd Order Spurious-Free Dynamic Range @ 1 GHz	SFDR	--	115	--	dB/Hz ^{2/3}	-10 dBm/tone, at 25°C measured with 050-412 (Receiver)
3 rd Order Spurious-Free Dynamic Range @ 6 GHz	SFDR	--	104	--	dB/Hz ^{2/3}	-10 dBm/tone, at 25°C measured with 050-412 (Receiver)

TABLE 5 ELECTRO-OPTICAL CHARACTERISTICS – TRANSMITTER (T_{OP} UNLESS NOTED OTHERWISE)

Parameter	Symbol	Min	Typ.	Max	Units	Notes
Optical Output Power	P _{OUT}	3		8	dBm	
Optical Wavelength	λ	1250		1490	nm	
-27	λ	1261	1271	1279	nm	
-29	λ	1281	1291	1309	nm	
-31	λ	1301	1311	1319	nm	
-33	λ	1321	1331	1339	nm	
Relative Intensity Noise	RIN	--	--	-145	dB/Hz	
Transmitter Input Impedance	Z _{IN}	--	50	--	Ohms	AC coupled Internally
Input Return Loss	RL	--	10	--	dB	

050-411 Product Brief
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50 MHz – 6 GHz



Ratings and Specifications: (Continued)

TABLE 6 COMPLIANCE SPECIFICATIONS (TO BE CONFIRMED)

CHARACTERISTIC	Standard	Condition	Notes
Mechanical Shock	MIL-STD-810	Para. 516.6, proc. I, 650g	0.9 ms Operating
Mechanical Vibration	MIL-STD-810	Para. 514.6, 40g rms	Random, Operating
ESD	MIL-STD-883		1000V HBM
Flame Resistance	MIL-STD-1344	Method 1012, Cond. B	30 Seconds
Altitude Altitude, 25Kft Altitude, 70Kft Decompression Overpressure	RTCA DO160G	Section 4.6.1 Category B1 Section 4.6.1 Category E1 Section 4.6.2 Category A2 Section 4.6.3 Category A1	Operating Altitude, 25,000 ft Operating Altitude, 70,000 ft Operating Altitude, 45,000 ft 28 Psi
Damp Heat	RTCA DO160G MIL-STD-1344	Section 6 Category A Method 1002.2, Cond. B	48 Hours, Non-Operational 10 Cycles, 24 Hours, Operational
Eye Safety	IEC 60825-1:2007/ EN 60825-1:2007	Class 1M Laser Product	

050-411 Product Brief
PCB Mount RF-over-Fiber Transmitter
50 MHz – 6 GHz



TABLE 7 J1: PIN ASSIGNMENTS
CONNECTOR: SAMTEC LSS-110-01-L-DV-A

See datasheet for details

050-411 Product Brief
PCB Mount RF-over-Fiber Transmitter
50 MHz – 6 GHz



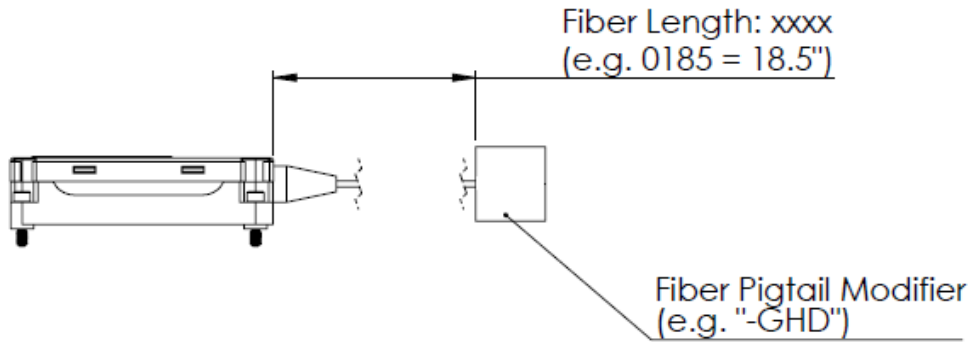
FIGURE 1 - OUTLINE DRAWING

See datasheet for details

050-411 Product Brief
PCB Mount RF-over-Fiber Transmitter
50 MHz – 6 GHz



FIGURE 1.1 – PART NUMBER CONFIGURATION DRAWING



050-411 Product Brief
PCB Mount RF-over-Fiber Transmitter
50 MHz – 6 GHz



FIGURE 2 - OUTLINE DRAWING CONTINUED (MARKING)

LABELING:

Each unit will be shipped in an antistatic bag. The label on the antistatic bag shall be at a minimum Arial size 10 black font and contain at a minimum the following information:

ANTISTATIC BAG LABEL:

Glenair
Cage Code (06324)
Part Number (PN 050-411 as required)
Date Code (DC xxxx)
Serial Number (SN 123456)

Each unit will be marked, either with a label or laser engraving, as follows:

- Marking font to be Arial, greater than .08 inches in height.
- Marking:
 - FIRST LINE OF TEXT
 - Glenair
 - Serial Number (6 digits)
 - SECOND LINE OF TEXT:
 - Part number

Example:

**GLENAIR SN123456
050-411**

050-411 Product Brief
PCB Mount RF-over-Fiber Transmitter
50 MHz – 6 GHz



Table 8 Two-Wire interface ID: Data Fields – Address A2h

Byte # Decimal	Data Notes
0-95	Reserved
96	Temperature MSB (Note 1)
97	Temperature LSB (Note 1)
98	Vcc MSB (Note 2)
99	Vcc LSB (Note 2)
100	TX Bias MSB (Note 3)
101	TX Bias LSB (Note 3)
105-255	Reserved

Notes:

1. Temperature (Temp) is decoded as a 16 bit signed twos compliment integer in increments of 1/256 °C.
2. Supply voltage (Vcc) is decoded as a 16 bit unsigned integer in increments of 100 μ V.
3. Laser bias current (Tx Bias) is decoded as a 16 bit unsigned integer in increments of 2 μ A.

TABLE 9 DIGITAL DIAGNOSTIC MONITOR CHARACTERISTICS (WHEN APPLICABLE)

PARAMETER	SYMBOL	MIN.	UNITS	NOTES
Module Internal Temperature Accuracy	TINT	± 3.0	°C	Temperature is measured internal to the module and is valid from -40°C to +85 °C case temperature
Module Internal Supply Voltage accuracy	VINT	± 0.1	V	Supply voltage is measured internal to the module and can, with less accuracy, be correlated to the voltage at the Vcc pin. Valid over 5V $\pm 5\%$
Laser DC Bias Current Accuracy	IINT	± 10	%	

050-411 Product Brief
PCB Mount RF-over-Fiber Transmitter
50 MHz – 6 GHz



ACCESSORIES

PCB Threaded Inserts, (PN 990-05017-1) sold as a kit of 100 pcs under kit part number 059-0007-1

KEY FEATURES:

- Simplifies installation of PCB Mount transceivers eliminating the need for washers and nuts. Soldered to PCB to eliminate need for handling nuts during assembly.

EVALUATION Board, PN 050-404-EVALBOARD - Includes

- Assembled circuit board with mating connector to mount module
 - SMA connector for RF port access
 - DC Power & I2C connection test points
 - Status LED's
- SC/APC to SC/APC Adapter to connect to Receiver