

5.125 GHz to 5.875 GHz, SMA, GaN Bi-Directional Amplifier, C-Band, 10W Psat, 43dB Tx Gain, 20% Efficiency, 2 microsec speed, Autosensing

The FM15B5006 is a Class AB high power Bi-Directional Amplifier that operates in C-Band from 5125 MHz to 5875 MHz and features autosensing transmit/receive (T/R) control. This amplifier generates 10 Watts typical Psat RF output power to boost performance of datalinks and transmitters. The module utilizes the latest Gallium Nitride (GaN) semiconductor technology with 20% power efficiency. The package design features a small form factor that's ideal for size, weight, and power (SWaP) constrained applications used in broadband RF telemetry, tactical communication, electronic warfare, and unmanned aircraft and ground systems, as well as software defined radios. Impressive typical performance includes 10 dB of transmit gain, 10 dB of receive gain, 2 μ sec switching speed, and low harmonic suppression of -20 dBc. Additionally, with a nominal +30 dBm (1 Watt) RF input power, the amplifier can provide 10 dB of gain from 5125 MHz to 5875 MHz for continuous wave (CW) and near-constant envelope waveforms. Operating voltage is +28 Vdc with 2.5A of DC current. Additional features include a single power supply and overvoltage protection. For TTL logic on/off autosensing control, +3.3V logic is used for monitoring Tx and Rx status, 0V for transmit mode and +3.3V for receive mode. The amplifier automatically switches between transmit and receive through RF detection at the XCVR (Transceiver) SMA port. The rugged Mil-Grade assembly supports female SMA RF input/output connectors and a micro-D 9 pin socket command control connector with an accessory cable assembly included. The operating baseplate temperature range is -40°C to +85°C and the unit is guaranteed to withstand up to 95% relative humidity, altitude levels up to 30,000 ft, and random vibration and shock profiles (see chart below). Pasternak also offers an accessory Harmonic filter option, model FMHFL0001 that can be used at the output of the FM15B5006 bidirectional power amplifier. This lowpass RF filter covers 2.5 to 6 GHz and has low insertion loss with power handling up to 50W and specifically designed to reduce harmonics at the output of transmitters operating at up through C-Band and offers rejection levels of greater than 20 dB from 8 GHz to 10 GHz. The filter is offered in a miniature SMA connectorized package.

Electrical Specifications (TA = +25°C, DC Voltage = 28Volts DC Current = 2.5A)

Transmit

Description	Min	Typ	Max	Unit
Frequency Range	5.125		5.875	GHz
Psat Output Power*		10	17	Watts
RF Input Power	+30	+33		dBm
Gain		43		dB
2nd Harmonics			-20	dBc
3rd Harmonics			-20	dBc
Operating DC Voltage	27	28	32	Volts
Current Draw		2.5	3	A
Quiescent Current (biased)		330		mA
Switching Time		2		uSec
Efficiency		20		%
Output Mismatch VSWR			10:1	
Input VSWR		2:1		

*+30 dBm Input Power



Features:

- Bi-Directional GaN High Power Amplifier
- 10W Psat Output Power
- C Band Class AB Design
- Frequency Range: 5125 MHz to 5875 MHz
- Autosensing T/R Control
- 10 dB Transmit Gain
- 10 dB Receive Gain
- Switching Speed 2 μ sec
- PAE: 20%
- +3.3V TTL Logic Control
- Small Form Factor Rugged Mil-Grade Package
- 50 Ohm Design
- Female SMA RF Connectors
- +28Vdc @ 2.5A DC Current
- -40°C to +85°C Operating Baseplate Temperature
- Output Harmonic Filter Accessory Option

Applications:

- Unmanned Aircraft (UAS) Group 2 & 3
- Unmanned Ground Vehicles (UGV)
- RF Telemetry
- RF Communications Systems
- Software Defined Radios
- Data Links
- Transmitters
- Test & Measurement
- Telecom Infrastructure

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Receive

Description	Min	Typ	Max	Unit
1 dB Compression Point		+18		dBm
3rd Order Intercept Point		+27		dBm
Gain		10		dB
Gain Flatness		±1.25		dB
Noise Figure		3		dB
Current Draw		50		mA

Protections

Parameter	Rating	Unit
Max Device Voltage	32	V
Max Device Current	3.5	A
Max RF Input Power @ ANT Port, $Z_L = 50 \Omega$	+30	dBm
Max RF Input Power @ XCVR Port, $Z_L = 50 \Omega$	+33	dBm
Max Operating Temperature (ambient)	60	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	100	°C



ESD Sensitive Material,
 Transport material in Approved
 ESD bags. Handle only in
 approved
 ESD Workstation.

Mechanical Specifications
Size

Length	3.57 in [90.68 mm]
Width	2.57 in [65.28 mm]
Height	0.5 in [12.7 mm]
Weight	0.35 lbs [158.76 g]
RF Connector (Input)	SMA Female
RF Connector (Output)	SMA Female
DC Connector	Micro-D, 9-Pin Socket

Environmental Specifications

Vibration Amplitude	4 Hz - 15 Hz	A	0.024	0.030	0.036	in
	16 Hz - 25 Hz	A	0.016	0.020	0.024	in
	26 Hz - 33 Hz	A	0.008	0.010	0.012	in
Shock Peak Acceleration (Functional Shock)				30 g for 15 ms		
				20 g for 20 ms		

Temperature

Operating Range	-40 to +85 deg C
Storage Range	-60 to +100 deg C

Humidity
Altitude

95%
MIL-STD-810F Method 5004



Compliance Certifications (see [product page](#) for current document)

Plotted and Other Data

Notes:

- Values at +25 °C, sea level

Amplifier Power-up Precautions

- 1.) Confirm that proper ESD precautions and controls are always in place before handling any Amplifier module.
- 2.) Confirm adequate thermal management is in place to effectively dissipate heat away from the Amplifier package. The Amplifier operational baseplate temperature must be within the operational temperature range stated in the Amplifier datasheet. Depending on the design and thermal requirements, using a heatsink with cooling fan is always recommended for safe reliable operation. A heat sink without a cooling fan may also be used. Damage caused from overheating will void the warranty.
- 3.) Confirm adequate system grounding is established. The DC power supply and Amplifier must have a common ground in order to operate properly.
- 4.) Power Amplifiers may require additional DC Current when initially powered-up. Depending on the design, the input current draw could range from an additional 10% to 100% above the maximum rated DC current of the Amplifier. This varies based on product part number.
- 5.) Confirm the DC power supply, if limited, is set to allow for additional start-up current that's rated for the Power Amplifier.
- 6.) Confirm the system is designed and calibrated for 50 ohms. Any impedance mismatch may cause performance issues.
- 7.) Perform a CALIBRATION (if required) with the loads before connecting the Amplifier to the Network Analyzer to ensure proper performance.
- 8.) Use a fixed attenuator between the signal source and input port of the Amplifier to optimize the input VSWR match.
- 9.) Confirm the input power level at the input port of the amplifier does not exceed the maximum rated limit for input power (as stated in the Amplifier datasheet).
 P_{in} for Small Signal Gain = P1dB-SSG-10 dB
 P_{in} for P1dB = P1dB-SSG+1 dB
- 10.) Confirm the Network Analyzer is always connected to the Amplifier first before DC power is applied to the Amplifier.
- 11.) As long as the input and output ports of the amplifier are connected to a 50Ohm load and RF signal power is applied, the Amplifier can be powered up with DC voltage.
- 12.) Confirm the Amplifier output load is matched for a 50 Ohm impedance and will not exceed the maximum rated VSWR or Return Loss limit for the Amplifier. Exceeding the maximum rated VSWR or Return Loss limit will result in reflected signal power that could damage the Amplifier and void the warranty.
- 13.) **Power Amplifier connected to an Antenna for signal transmission** - It's strongly recommended to use a high power fixed attenuator pad or an Isolator between the output port of the Amplifier and input port to the antenna. Any reflected signal power due to impedance mismatch will likely damage the Amplifier and void the warranty.
- 14.) The attenuator or isolator used at the output port of the Amplifier must be rated to handle the output power level and operational frequency band of the amplifier.

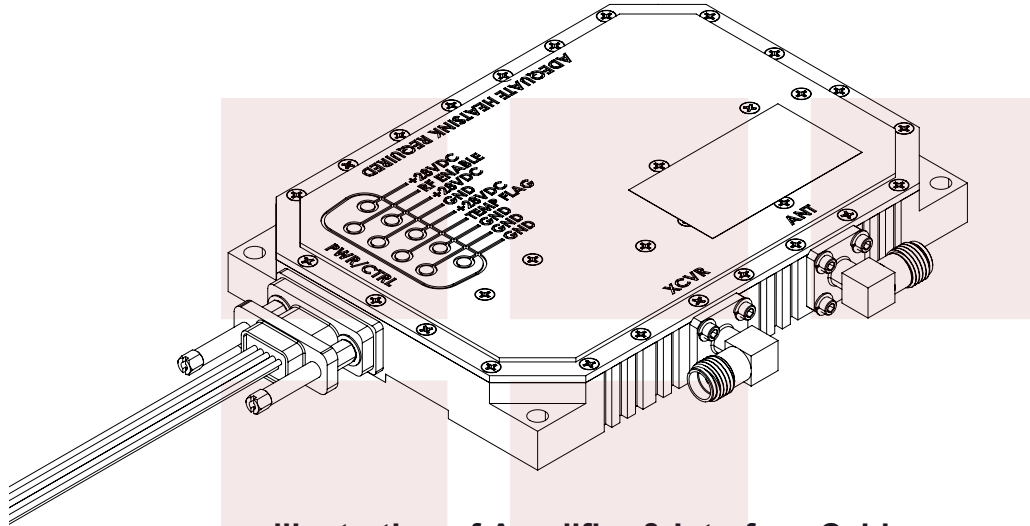
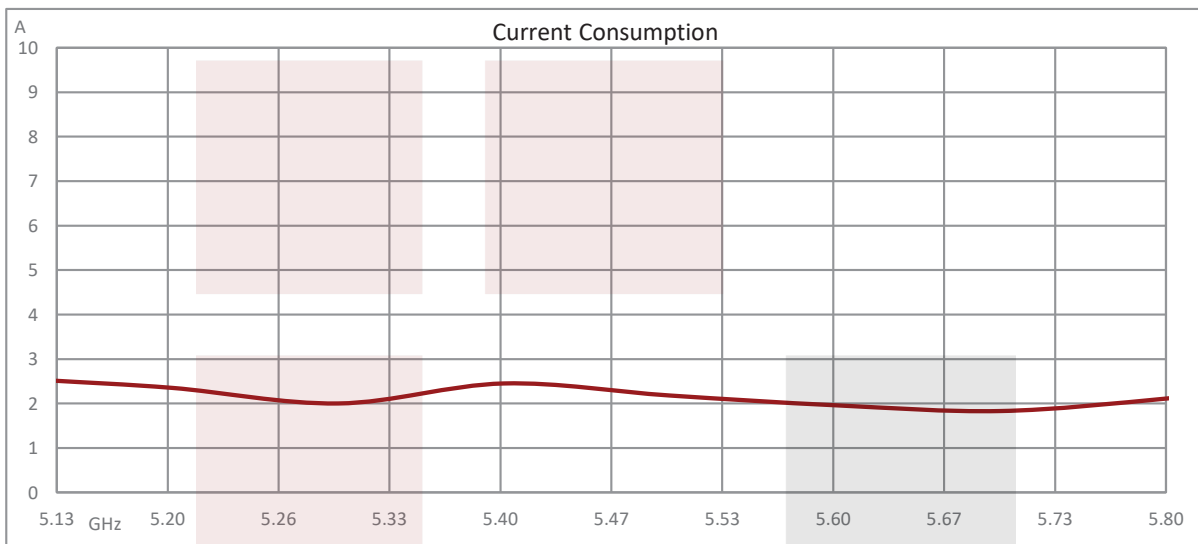
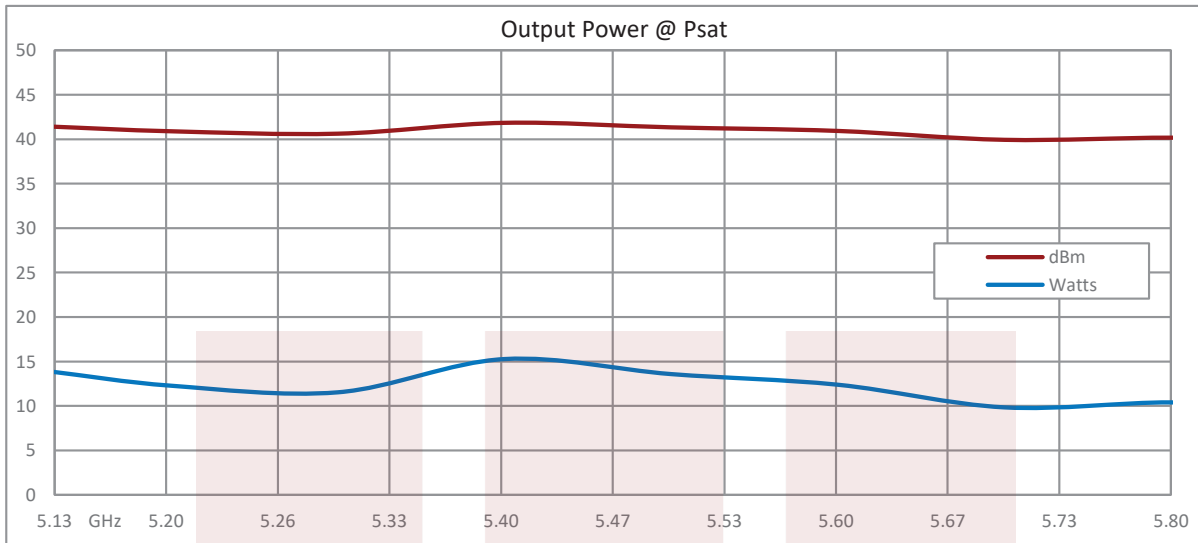
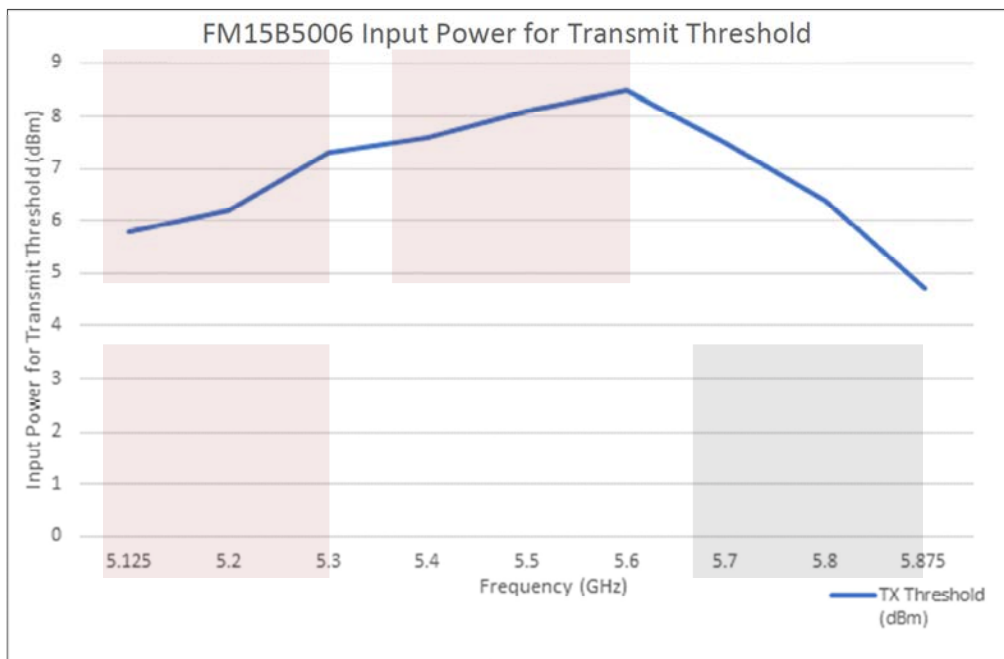
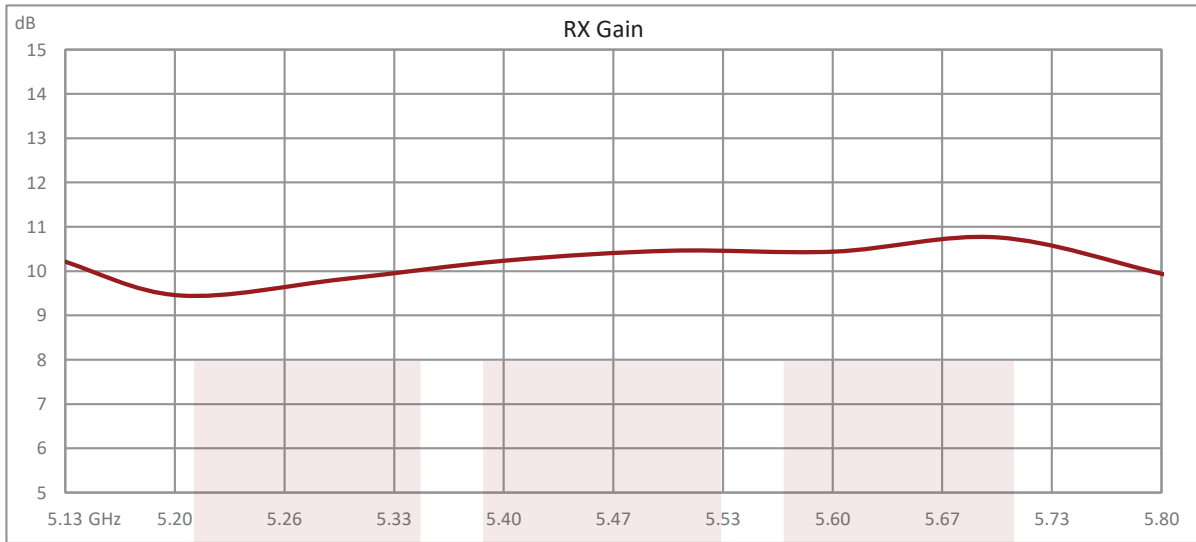


illustration of Amplifier & Interface Cable

Typical Performance Data





5.125 GHz to 5.875 GHz, SMA, GaN Bi-Directional Amplifier, C-Band, 10W Psat, 43dB Tx Gain, 20% Efficiency, 2 microsec speed, Autosensing from Fairview Microwave is in-stock and available to ship same-day. All of our RF/microwave products are available off-the-shelf from our ISO 9001:2008 certified facilities in Lewisville, Texas. Fairview Microwave is RF on-demand.

For additional information on this product, please click the following link: [5.125 GHz to 5.875 GHz, SMA, GaN Bi-Directional Amplifier, C-Band, 10W Psat, 43dB Tx Gain, 20% Efficiency, 2 microsec speed, Autosensing FM15B5006](#)

URL: <https://www.fairviewmicrowave.com/high-power-bi-directional-amplifier-10-watts-5.875-ghz-sma-fm15b5006-p.aspx>

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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	6/15/2020	T.GALLA

Dimensions:
 Top view: 3.57 [90.7] (width), 3.35 [85.1] (width), .110 [2.79] (offset), 2.35 [59.7] (width), 2.57 [65.3] (width), 3.00 [76.2] REF (width).
 Side view: .51 [13.0] (height), .24 [6.0] (height), .87 [22.2] (height).
 Detail A: PIN9, PIN5, PIN6, PIN1.

Labels on PCB: MICRO-D 9-PIN SOCKET (SEE PINOUT TABLE), PWR/CTRL, +28VDC, RF ENABLE, +28VDC, GND, +28VDC, TEMP FLAG, GND, GND, GND, GND, XCVR, ANT, 2X SMA FEMALE RIGHT ANGLE.

4X Ø.129 [3.28] THRU HOLES

Pin #	I/O	Function
1,2,6,8	I	GND
3,4,5	I	DC Power (+28VDC)
7	0	Over Temperature Flag 0V = Temperature Fault +3.3V = No Fault
9	I	T/R Control (+3.3V Logic) Autosense Mode 0V = TX +3.3V = RX

DETAIL A

LABEL

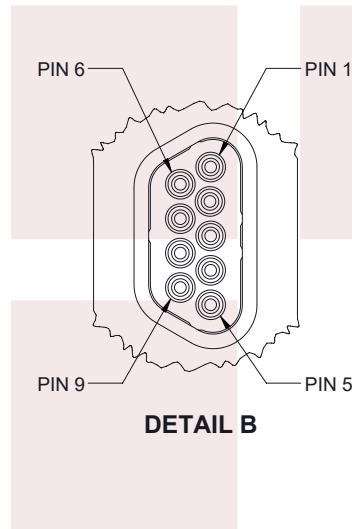
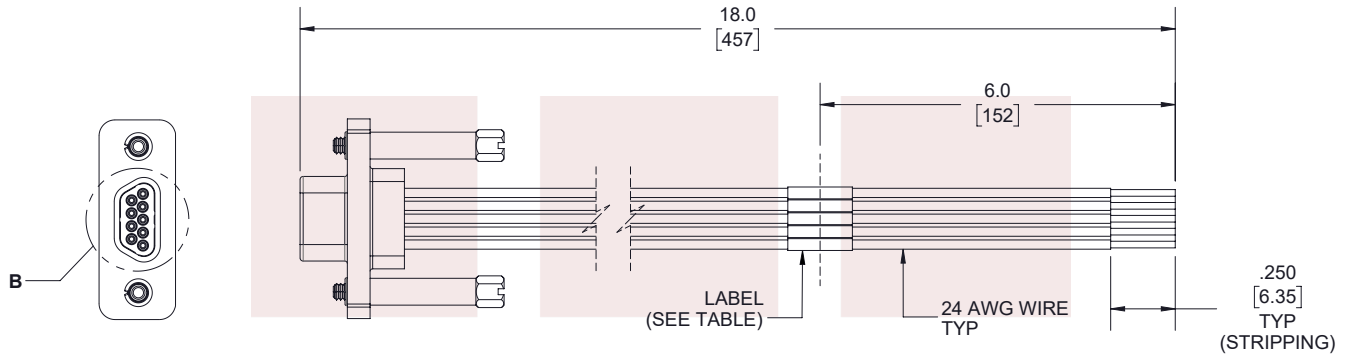
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ALL DIMENSIONS SHOWN ARE FOR REFERENCE ONLY.		SCALE		N/A	
SIZE A	CAGE CODE 3FKR5	DRAWN BY K.DANG	ITEM NO. FM15B5006	REV A	

T-Rev.D

INTERFACE CABLE



Pinout		
Pin #	Wire Color	Label
1	Black	GND
2	Brown	GND
3	Red	+ 28V
4	Orange	+ 28V
5	Yellow	+ 28V
6	Green	GND
7	Blue	Temp Flag
8	Purple	GND
9	Gray	T/R Enable

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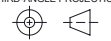
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DIMENSIONS IN [] ARE MILLIMETERS

TOLERANCES: CABLE LENGTH (L) TOLERANCES:

.X = ±.2 [.508]	FRACTIONS ± 1/32	L ≤ 12 [305] = +1 [25] / -0
.XX = ±.02 [.51]	ANGLES ± 1°	12 [305] < L ≤ 60 [1524] = +2 [51] / -0
.XXX = ±.005 [.13]		60 [1524] < L ≤ 120 [3048] = +4 [102] / -0
		120 [3048] < L ≤ 300 [7620] = +6 [152] / -0
		300 [7620] < L = +5%L / -0

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SHEET 2 OF 3

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SCALE N/A

SIZE A	CAGE CODE 3FKR5	DRAWN BY K.DANG	ITEM NO. FM15B5006	REV A
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T-Rev.D