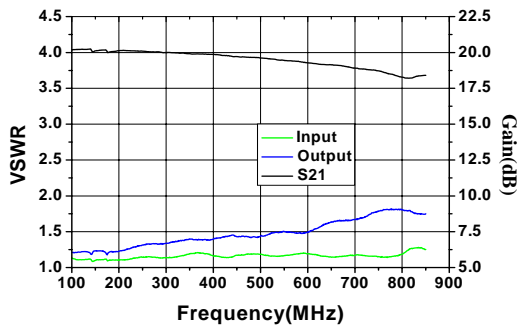


### Product Description

F215 is a high performance InGaP/GaAs Heterojunction Bipolar Transistor MMIC Amplifier. A Darlington configuration provides DC-0.5GHz performance with excellent thermal performance. The heterojunction increases breakdown voltage and minimizes leakage current between junctions. Only a single positive supply voltage, DC-blocking capacitors, a bias resistor, and an optional RF choke are required for operation.

F215 is RoHS compliant and manufactured with green molding compounds that contain no antimony trioxide nor halogenated fire retardants.



**F215** RoHS Compliant & Green Package

**DC—500MHz, Cascadable InGaP/GaAs HBT MMIC Amplifier**



### Product Features

- Lead Free, RoHS Compliant
- IP3=38dBm @ 500MHz
- High Gain:19.6dB@500MHz
- Stable Gain Over Temperature
- 1000V ESD, Class 1C
- Operation from Single Supply
- Low Thermal Resistance

### Applications

- Driver Amplifier
- Cellular, PCS, GSM, UMTS
- IF Amplifier

Symbol	Parameter	Units	Freq	Min.	Typ.	Max.
G	Small Signal Gain	dB	100MHz		20.3	
			240MHz	18.5	20.1	21.5
			500MHz	18.0	19.6	21.0
P <sub>1dB</sub>	Output Power at 1dB Compression	dBm	100MHz		20.6	
			240MHz		20.6	
			400MHz	19	20.6	
OIP <sub>3</sub>	Output Third Order Intercept Point	dBm	100MHz		38	
			240MHz		38	
			400MHz		38	
Input VSWR	Input VSWR	Ratio	500MHz		1.2	2.0
Output VSWR	Output VSWR	Ratio	500MHz		1.5	2.0
NF	Noise Figure	dB	500MHz		3.0	3.8
V <sub>D</sub>	Device Operating Voltage	V		4.5	4.9	5.3
I <sub>D</sub>	Device Operating Current	mA		85	93	101
R <sub>TH</sub> , j-1	Thermal Resistance	°C/W			43	

Test condition: V<sub>s</sub>=8V I<sub>D</sub>=93mA Typ OIP<sub>3</sub> Tone Spacing=1MHz, Pout per ton=0 dBm  
 R<sub>BIAS</sub>=33 Ohms T<sub>L</sub>=25°C Z<sub>S</sub>=Z<sub>L</sub>=50 Ohms App circuit page 4

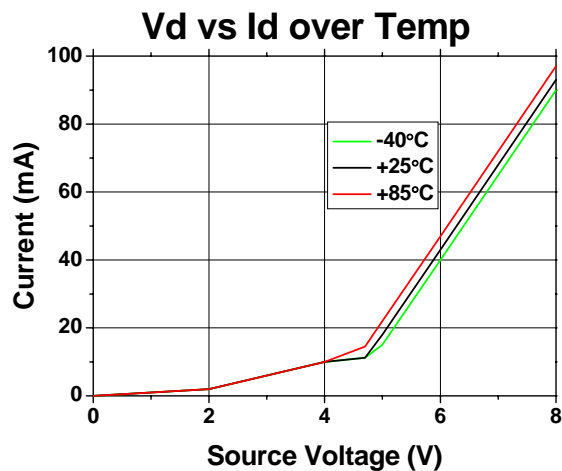
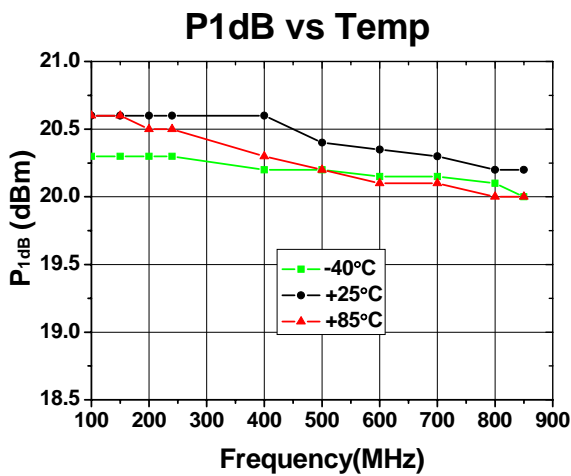
### Typical RF Performance at Key Operating Frequencies

symbol	parameter	units	Frequency (MHz)				
			100	240	400	500	850
G	Small Signal Gain	dB	20.2	20.1	19.8	19.6	18.4
OIP <sub>3</sub>		dBm	38	38	38	38	36
P <sub>1dB</sub>		dBm	20.6	20.6	20.6	20.4	20.2
Input VSWR			1.14	1.13	1.16	1.18	1.25
Output VSWR			1.21	1.29	1.39	1.44	1.75
S <sub>12</sub>	Reverse Isolation	dB	23.0	23.0	22.7	22.6	22.3
NF	Noise Figure	dB	3.0	3.0	3.1	3.0	3.1

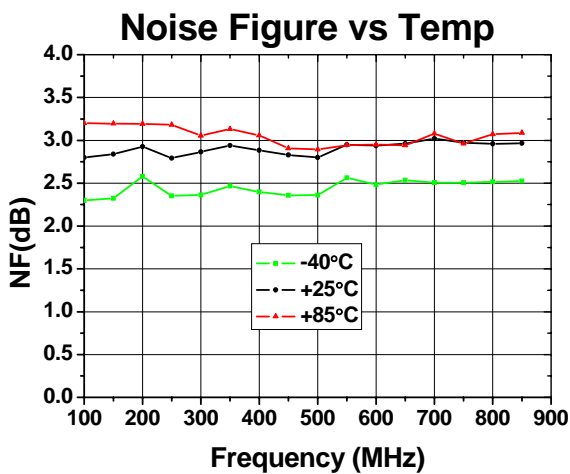
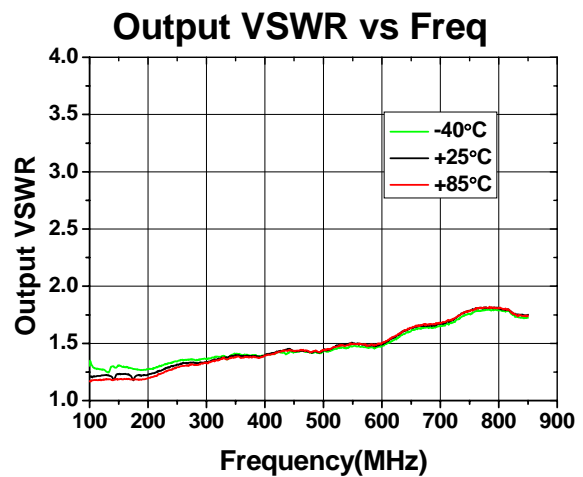
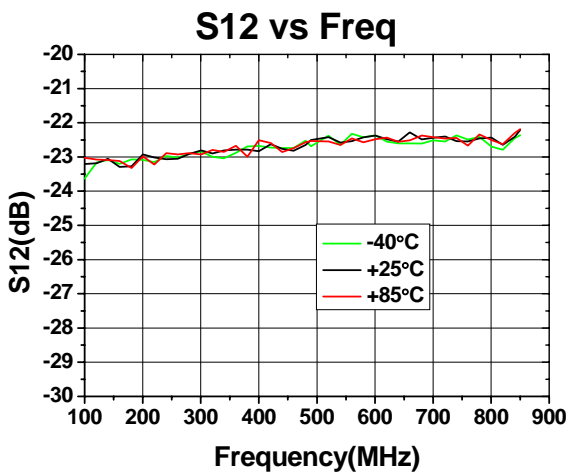
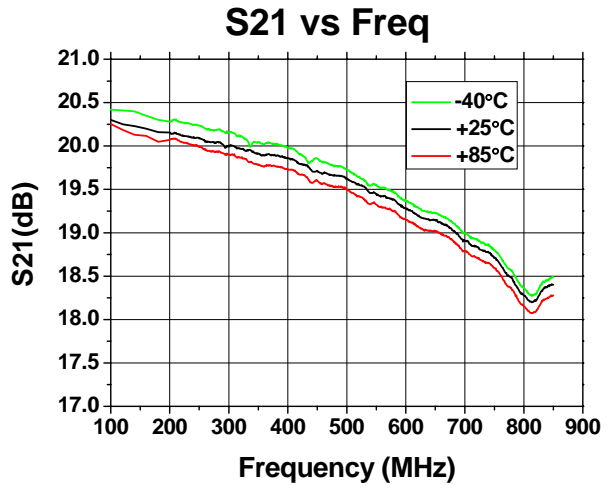
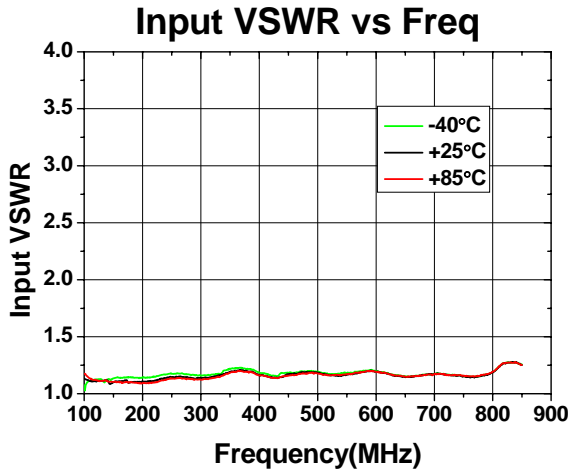
Test condition: V<sub>S</sub>=8V I<sub>D</sub>=93mA Typ R<sub>BIAS</sub>=33 Ohms T<sub>L</sub>=25°C Z<sub>S</sub>=Z<sub>L</sub>=75 Ohms,  
 (1) OIP<sub>3</sub> Tone Spacing=1MHz, Pout per ton=0 dBm App circuit page 4

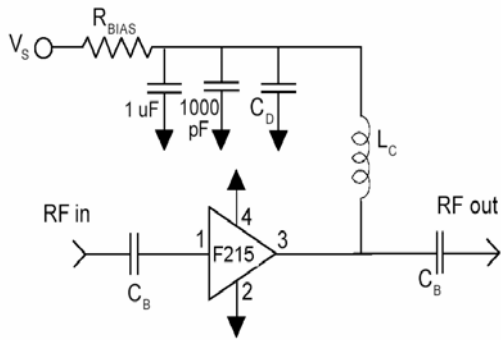
### Absolute Maximum Ratings

Parameters	Absolute Limit	Operation beyond any one of these limits may cause permanent damage. Bias Conditions should satisfy the following expression: $I_D V_D < (T_J - T_L) / R_{THj-l}$ $T_L = T_{LEAD}$
Max. Device Current (I <sub>D</sub> )	150 mA	
Max. Device Voltage(V <sub>D</sub> )	6V	
Max. RF Input Power	+19 dBm	
Max. Operating Dissipating Power	0.8 W	
Max. Junction Temp. (T <sub>J</sub> )	+150°C	
Operating Temp. range (T <sub>L</sub> )	-40°C ~ +85°C	
Max. Storage Temp.	+150°C	



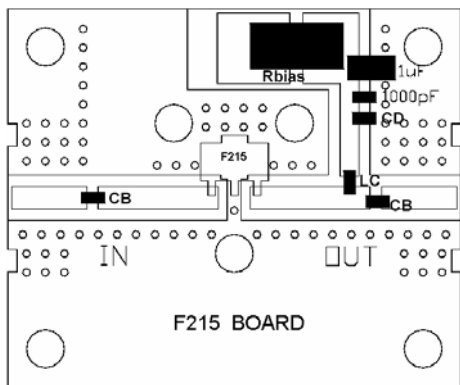
Test Condition:  $V_s=8V$ ,  $R_{\text{-bias}}=33\Omega$ ,  $I_d=93mA$ ,  $Temp=+25^\circ C$





**Application Circuit Element Values**

Reference Designator	Frequencies (MHz)				
	70	100	240	500	850
C <sub>B</sub>	1 uF	1000pF	1000pF	220pF	100pF
C <sub>D</sub>	1 uF	100 pF	100 pF	100pF	68 PF
L <sub>C</sub>	6.8 uH	1.2 uH	1.2 uH	68 nH	33 nH



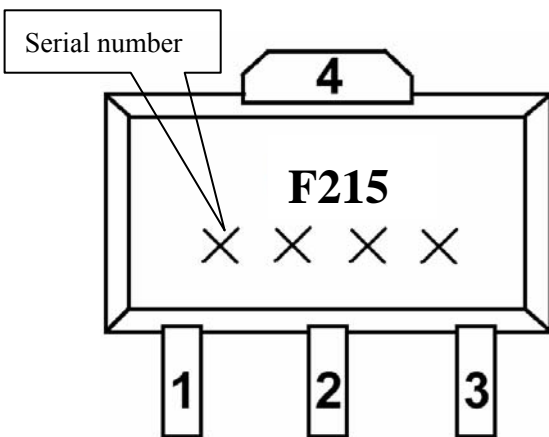
**Recommended Bias Resistor Value for I<sub>D</sub>=93mA**  
 $R_{BIAS} = (V_S - V_D) / I_D$

Supply voltage(V <sub>S</sub> )	7.5V	8V	10V	12V
R <sub>BIAS</sub>	27Ω	33Ω	55Ω	77Ω

Note: R<sub>BIAS</sub> provides DC bias stability over Temp.

**Mounting Instructions**

- NOTE: For broadband RF unconditional stability do not put GND vias under the exposed backside GND paddle.
- Solder the copper pad on the backside of the device package to the ground plane.
- Use a large ground pad area with many plated through-holes as shown.
- Measurement for this data sheet is made on 0.5 mm thick FR-4 board with 3.38 dielectric constant.



**Marking and Pin definition**

**ESD sensitive**

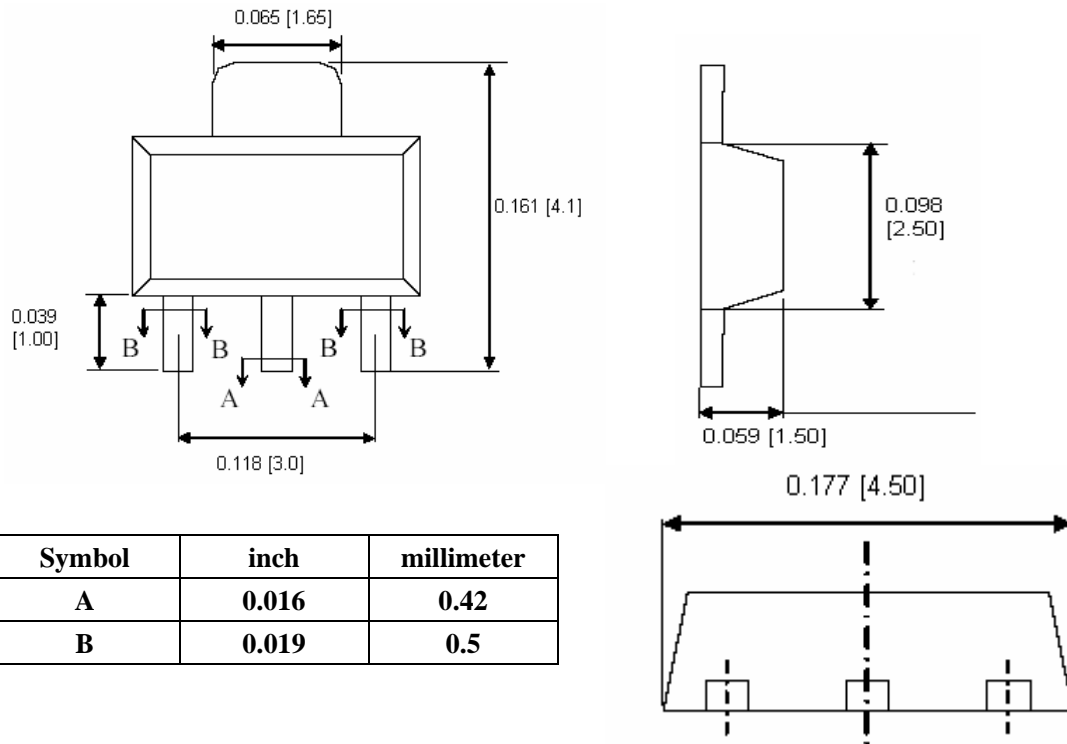


**Note: F215 must precaution in handing, testing and packaging !**

Pin	Function	Description
1	<b>RF IN</b>	RF input pin. This pin requires an external DC blocking capacitor.
2, 4	<b>GND</b>	Connecting to ground. Use via holes for best performance to reduce lead inductance.
3	<b>RF OUT / BIAS</b>	RF output and bias pin. DC blocking capacitor is necessary for proper operating.

### SOT89 Packaging and PCB Pad Layout

Units: inch [millimeter]



Symbol	inch	millimeter
A	0.016	0.42
B	0.019	0.5

