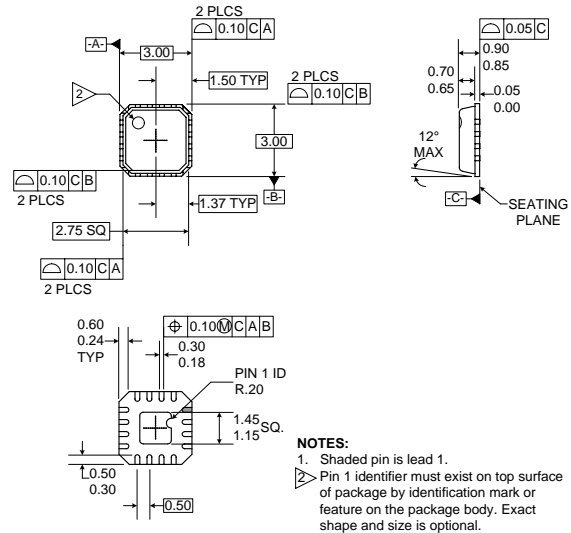


Typical Applications

- Tri-Band EGSM/DCS/PCS Handsets
- Dual-Band EGSM/DCS Handsets

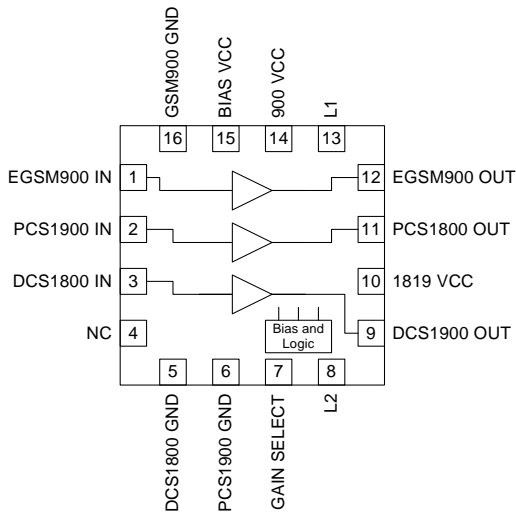
Product Description

The RF2417 is a highly-integrated, low-power and low-cost tri-band LNA for EGSM-based multi-band handset applications. All input and output ports include on-chip matching, thus minimizing external components. The device supports the worldwide EGSM and DCS bands and the North American PCS band. A 20dB gain reduction mode is provided. Three mode-control pins control gain and band selection. Unused functions are powered down for the lowest power consumption. The RF2417 is packaged in a 3mmx3mm, 16-pin leadless chip carrier, and is manufactured in the Silicon Germanium (SiGe HBT) process technology.



Optimum Technology Matching® Applied

- | | | |
|-------------------------------------|-----------------------------------|--|
| <input type="checkbox"/> Si BJT | <input type="checkbox"/> GaAs HBT | <input type="checkbox"/> GaAs MESFET |
| <input type="checkbox"/> Si Bi-CMOS | <input type="checkbox"/> SiGe HBT | <input type="checkbox"/> Si CMOS |
| <input type="checkbox"/> InGaP/HBT | <input type="checkbox"/> GaN HEMT | <input checked="" type="checkbox"/> SiGe Bi-CMOS |



Functional Block Diagram

Package Style: QFN, 16-Pin, 3x3

Features

- On-Chip Matching
- Gain Reduction Mode
- 2.7V Supply Voltage
- Low Noise Figure
- Supports Tri-Band Applications

Ordering Information

- | | |
|-------------|----------------------------------|
| RF2417 | Tri-Band Low Noise Amplifier |
| RF2417 PCBA | Fully Assembled Evaluation Board |

RF Micro Devices, Inc.
 7628 Thorndike Road
 Greensboro, NC 27409, USA

Tel (336) 664 1233
 Fax (336) 664 0454
<http://www.rfmd.com>

Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	-0.5 to +5.0	V _{DC}
Input RF Power	+6	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C



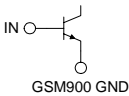

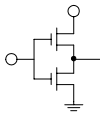
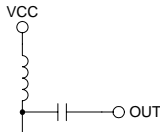
Caution! ESD sensitive device.

RF Micro Devices believes the furnished information is correct and accurate at the time of this printing. However, RF Micro Devices reserves the right to make changes to its products without notice. RF Micro Devices does not assume responsibility for the use of the described product(s).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
EGSM900MHz Mode					
LNA Parameters					
Frequency Range (f _{IN})	925		960	MHz	T _{AMBIENT} =25°C, V _{CC} =2.7V to 2.86V L1=0; L2=1
Input Impedance (Z _I)		50		Ω	High Gain; GS=1
		50		Ω	Low Gain; GS=0
Output Impedance (Z _O)		50		Ω	High Gain; GS=1
		50		Ω	Low Gain; GS=0
Noise Figure (NF)		1.6	1.7	dB	High Gain; GS=1
			6	dB	Low Gain; GS=0
Gain (G _{Typ})	17	18	19	dB	High Gain; GS=1
Gain Variation Over Temperature Range (G _{TEMP})			0.5	dB	-40°C to +85°C
Gain Variation Over Frequency Band (G _{FREQ})			±0.75	dB	
Low Gain (G _{LOW})	-6	-3		dB	Low Gain; GS=0
Input IP3	-5			dBm	High Gain; GS=1
	15			dBm	Low Gain; GS=0
Input 1 dB Compression Point (ICP _{1dB})	-22	-20		dBm	High Gain; GS=1
	-15			dBm	Low Gain; GS=0
Isolation		22		dB	RF _{OUT} to RF _{IN}
Turn-On Settling Time			10	uS	
Rise and Fall Time (t _r , t _f)			10	uS	
Power Supply Parameters					
Supply Voltage (V _{CC})	2.7		3.3	V	
Current Consumption (I _{CC})		5.0	6.0	mA	High Gain @ 25°C; GS=1
			0.5	mA	Low Gain @ 25°C; GS=0
Standby Current (I _{CC})			10	uA	L1=0; L2=0

Parameter	Specification			Unit	Condition	
	Min.	Typ.	Max.			
DCS1800MHz Mode						
LNA Parameters						
Frequency Range (f_{IN})	1805		1880	MHz	$T_{AMBIENT}=25^{\circ}C$, $V_{CC}=2.7V$ to $2.86V$ L1=1; L2=0	
Input Impedance (Z_I)		50		Ω	High Gain; GS=1	
Output Impedance (Z_O)		50		Ω	Low Gain; GS=0	
		50		Ω	High Gain; GS=1	
Noise Figure (NF)		50		Ω	Low Gain; GS=0	
			1.9	dB	High Gain; GS=1	
Gain (G_{TYP})	17	19	20	6	dB	Low Gain; GS=0
				± 1.0	dB	High Gain; GS=1
Gain Variation Over Temperature Range (G_{TEMP})					-40°C to +85°C	
Gain Variation Over Frequency Band (G_{FREQ})			0.5	dB		
Low Gain (G_{LOW})	-7	-5	-3	dB	Low Gain; GS=0	
Input IP3	-5			dBm	High Gain; GS=1	
Input 1 dB Compression Point (ICP_{1dB})	15			dBm	Low Gain; GS=0	
	-20	-18		dBm	High Gain; GS=1	
Isolation	-15			dBm	Low Gain; GS=0	
		33		dB	RF_{OUT} to RF_{IN}	
Turn-On Settling Time			10	μS		
Rise and Fall Time (t_r, t_f)			10	μS		
Power Supply Parameters						
Supply Voltage (V_{CC})	2.7		3.3	V		
Current Consumption (I_{CC})		5.5	7.0	mA	High Gain @ 25°C; GS=1	
			0.5	mA	Low Gain @ 25°C; GS=0	
Standby Current (I_{CC})			10	μA	L1=0; L2=0	

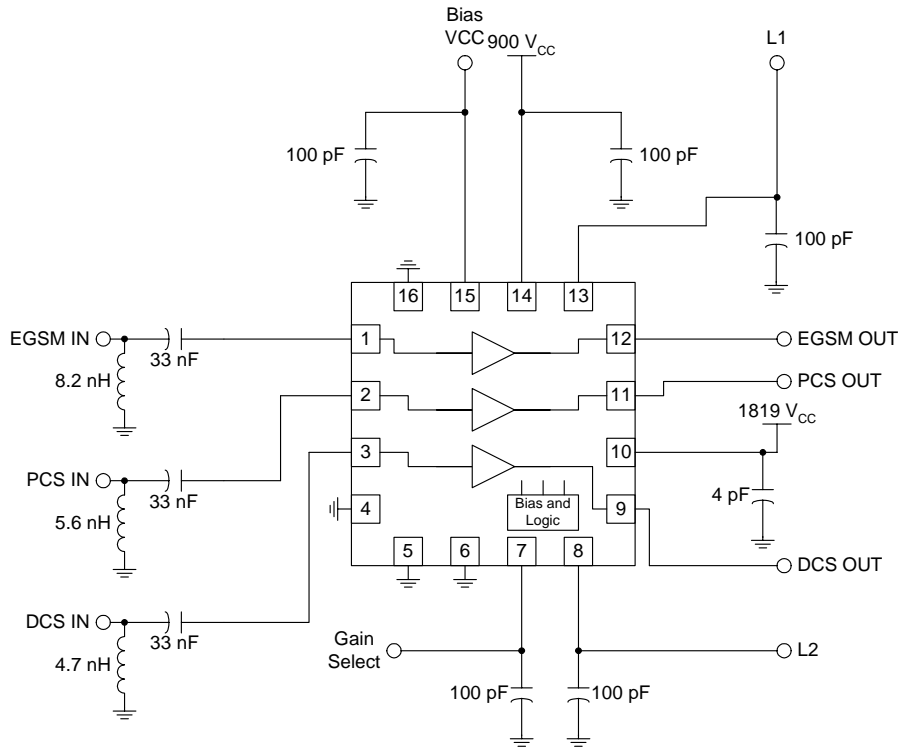
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
PCS1900MHz Mode					
LNA Parameters					
Frequency Range (f_{IN})	1930		1990	MHz	$T_{AMBIENT}=25^{\circ}C$, $V_{CC}=2.7V$ to $2.86V$ L1=1; L2=1
Input Impedance (Z_I)		50		Ω	High Gain; GS=1
		50		Ω	Low Gain; GS=0
Output Impedance (Z_O)		50		Ω	High Gain; GS=1
		50		Ω	Low Gain; GS=0
Noise Figure (NF)		1.9	2.0	dB	High Gain; GS=1
			6	dB	Low Gain; GS=0
Gain (G_{TYP})	16	17	19	dB	High Gain; GS=1
Gain Variation Over Temperature Range (G_{TEMP})			± 1.25	dB	-40°C to +85°C
Gain Variation Over Frequency Band (G_{FREQ})			1.0	dB	
Low Gain (G_{LOW})	-7	-5	-3	dB	Low Gain; GS=0
Input IP3	-3			dBm	High Gain; GS=1
	15			dBm	Low Gain; GS=0
Input 1 dB Compression Point (ICP_{1dB})	-20	-18		dBm	High Gain; GS=1
	-15			dBm	Low Gain; GS=0
Isolation		35		dB	RF_{OUT} to RF_{IN}
Turn-On Settling Time Rise and Fall Time (t_r, t_f)			10	μS	
			10	μS	
Logic Levels					
Input Low			0.5	V	
Input High	2			V	
Input Current		10	100	μA	
Input Impedance		40		$k\Omega$	
Power Supply Parameters					
Supply Voltage (V_{CC})	2.7		3.3	V	
Current Consumption (I_{CC})		5.5	7.0	mA	High Gain @ 25°C; GS=1
			0.5	mA	Low Gain @ 25°C; GS=0
Standby Current (I_{CC})			10	μA	L1=0; L2=0

Pin	Function	Description	Interface Schematic
1	EGSM900 IN	EGSM 900MHz LNA input. Requires DC blocking cap.	
2	PCS1900 IN	PCS 1900MHz LNA input. Requires DC blocking cap.	
3	DCS1800 IN	DCS 1800MHz LNA input. Requires DC blocking cap.	See pin 2.
4	NC	Connect to die flag.	
5	DCS1800 GND	DCS 1800MHz LNA ground connect to die flag.	
6	PCS1900 GND	PCS 1900MHz LNA ground connect to die flag.	
7	Gain Select	Gain select pin. Requires AC-coupling capacitor to ground (Logic 1: High Gain; Logic 0: Low Gain)	
8	L2	Logic pin 2. Requires AC-coupling capacitor to ground.	See pin 7.
9	DCS1800 OUT	DCS 1800MHz output. Internally matched to 50Ω.	
10	1819 VCC	DCS 1800MHz/PCS 1900MHz supply pin. This requires immediate AC-coupling to ground.	
11	PCS1900 OUT	PCS 1900MHz output. Internally matched to 50Ω.	See pin 9.
12	EGSM900 OUT	EGSM 900MHz output. Internally matched to 50Ω.	See pin 9.
13	L1	Logic pin 1. Requires AC-coupling capacitor to ground.	See pin 7.
14	900 VCC	EGSM 900MHz supply pin. This requires immediate AC-coupling to ground.	
15	Bias VCC	Bias supply. Requires AC-coupling capacitor to ground.	
16	EGSM900 GND	EGSM 900MHz ground.	

Logic Control

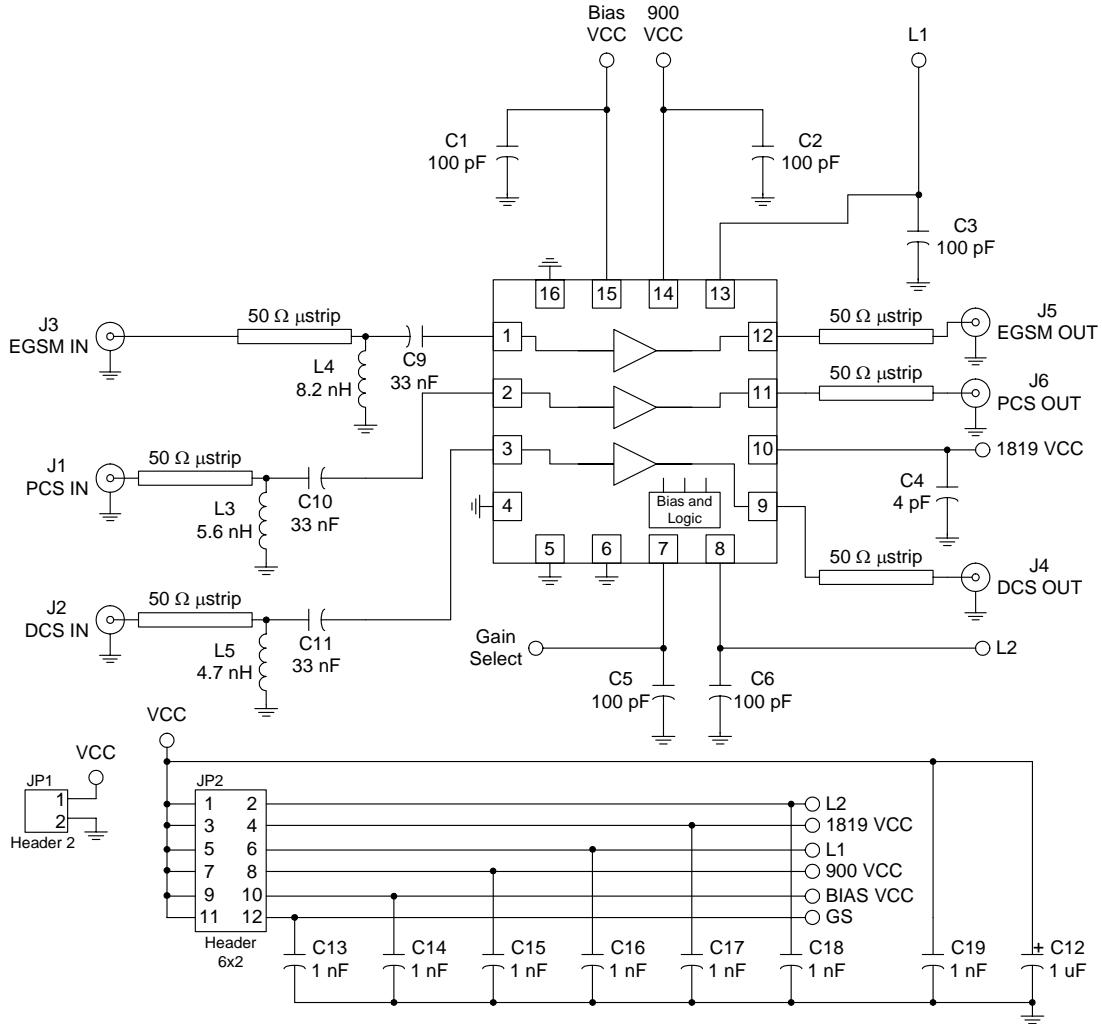
Mode		L1	L2	GS
Standby		0	0	X
EGSM900	High Gain	0	1	1
	Low Gain	0	1	0
DCS1800	High Gain	1	0	1
	Low Gain	1	0	0
PCS1900	High Gain	1	1	1
	Low Gain	1	1	0

Application Schematic



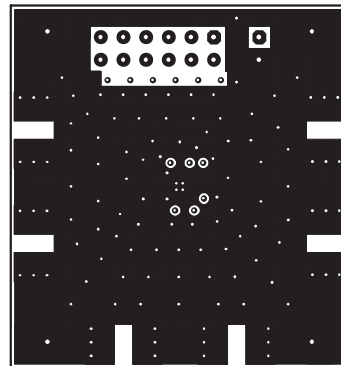
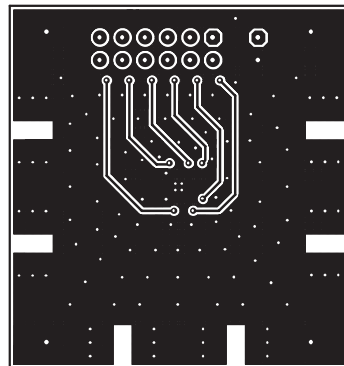
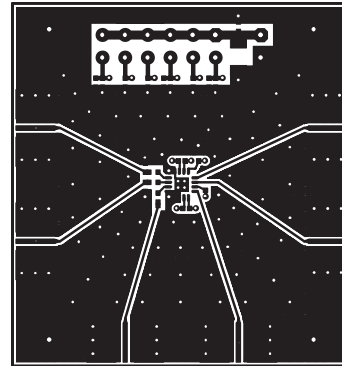
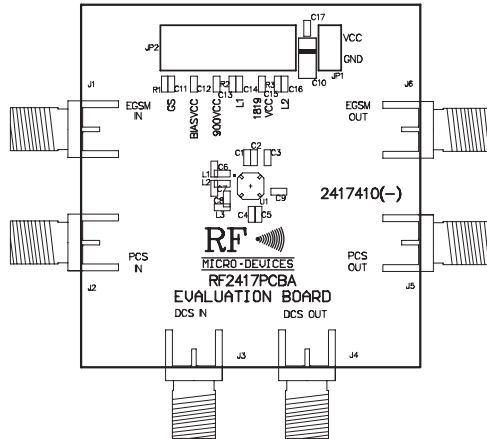
Evaluation Board Schematic

(Download [Bill of Materials](http://www.rfmd.com) from www.rfmd.com.)

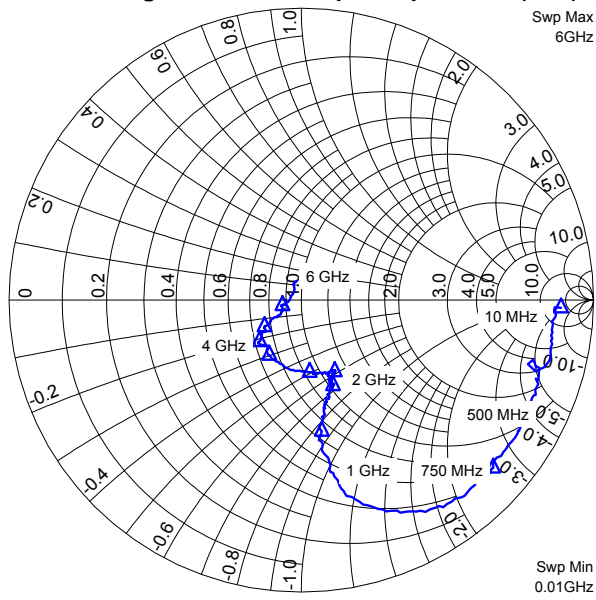


Evaluation Board Layout Board Size 1.5" x 1.6"

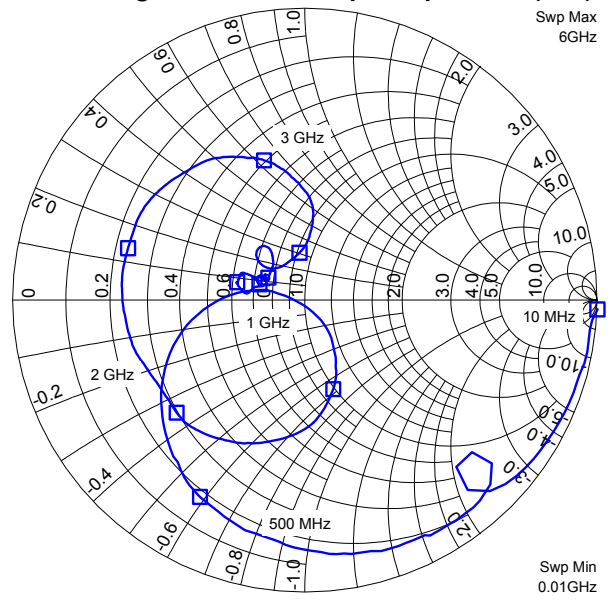
Board Thickness 0.58", Board Material FR-4, Multi-Layer



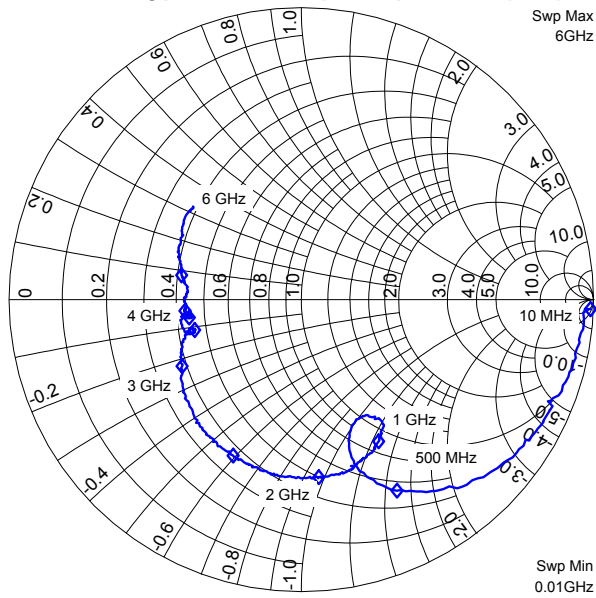
EGSM High Gain Mode Input Impedance (S11)



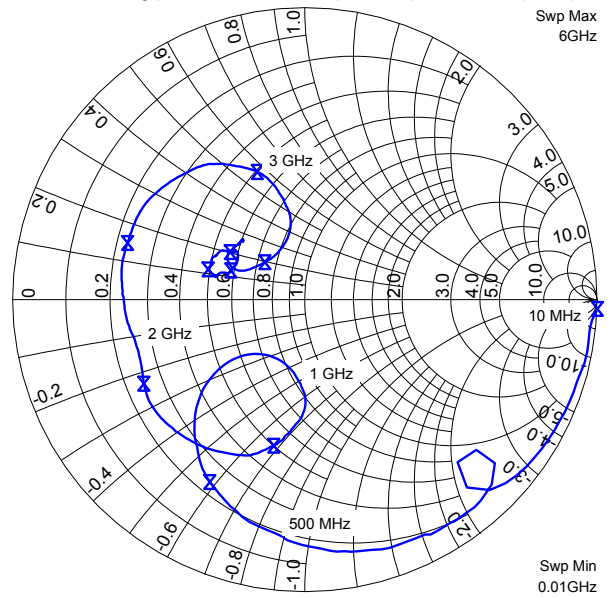
EGSM High Gain Mode Output Impedance (S22)



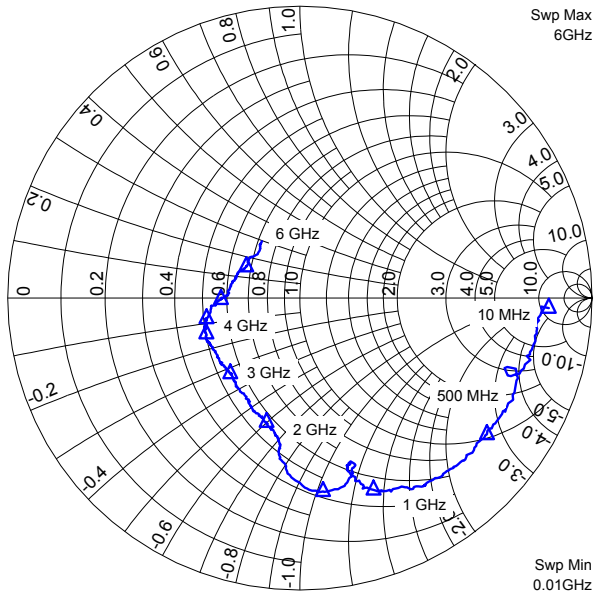
EGSM Bypass Mode Input Impedance (S11)



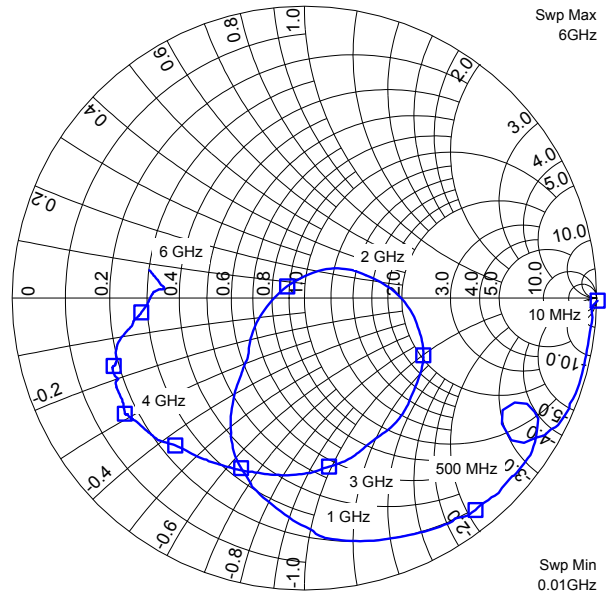
EGSM Bypass Mode Output Impedance (S22)



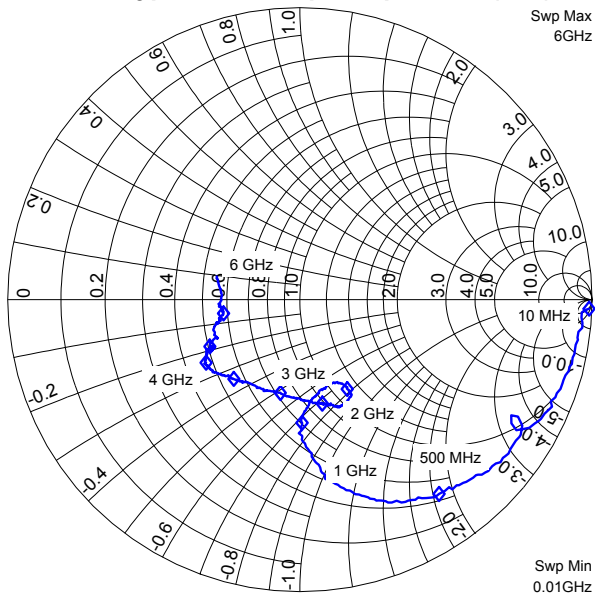
DCS High Gain Mode Input Impedance (S11)



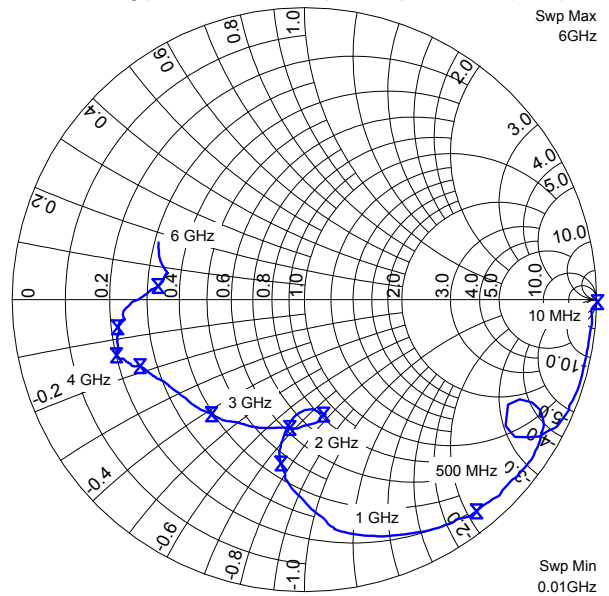
DCS High Gain Mode Output Impedance (S22)



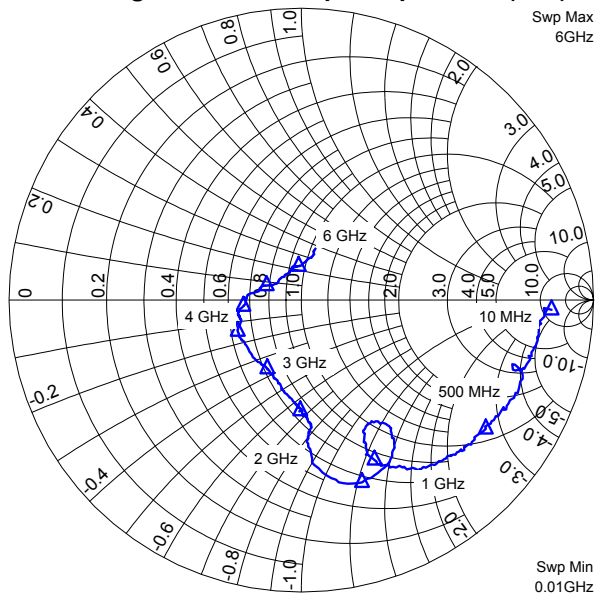
DCS Bypass Mode Input Impedance (S11)



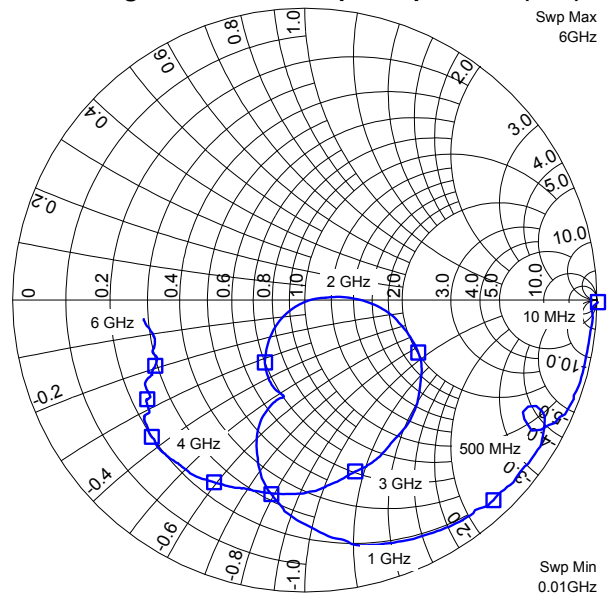
DCS Bypass Mode Output Impedance (S22)



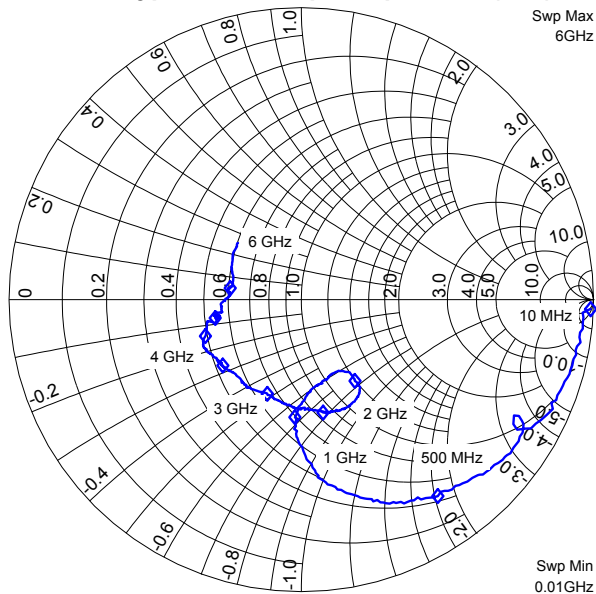
PCS High Gain Mode Input Impedance (S11)



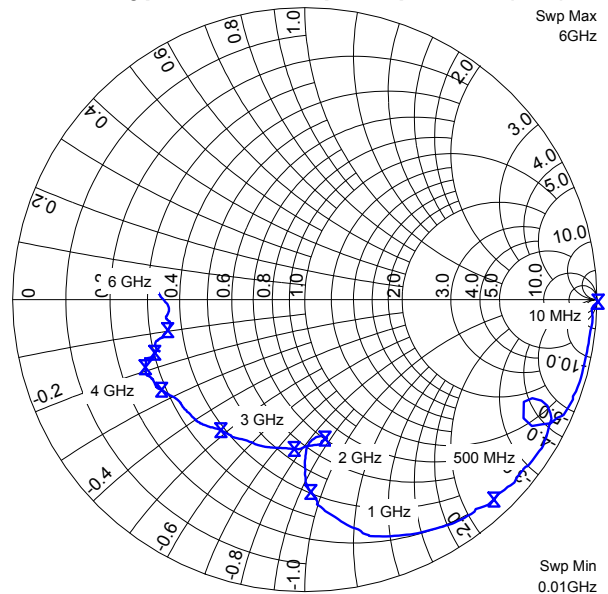
PCS High Gain Mode Output Impedance (S22)



PCS Bypass Mode Input Impedance (S11)



PCS Bypass Mode Output Impedance (S22)



NOTES:

1. All plots shown were taken at $V_{CC}=2.8V$ and room ambient temperature.
2. All S11 and S22 plots shown were taken from an RF2417 assembled on a 2417310 evaluation board. The data was extracted without the external input or output tuning components in place and the reference points at the RF IN and RFOUT pins of the device.

