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RF6514

3.3V TO 4.0V, 470MHz to 510MHz TRANSMIT/RECEIVE MODULE

Package: LGA, 28-Pin, 5.5mm x 5.0mm

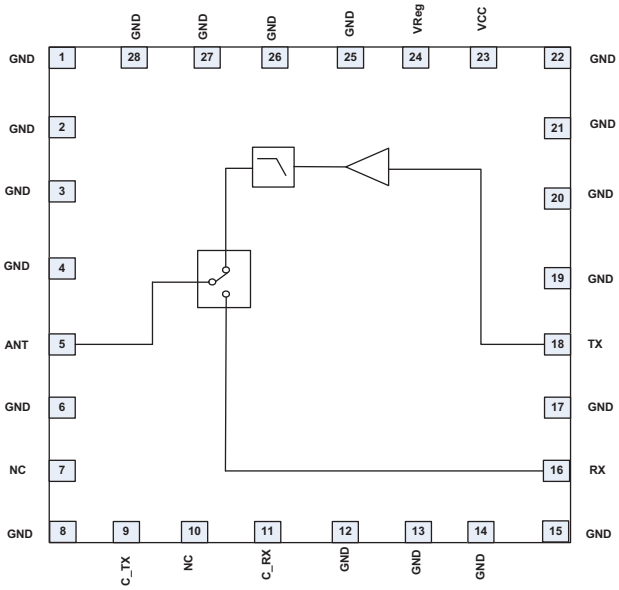


Features

- Tx Output Power: 30dBm
- Separate 50Ω Tx/Rx Transceiver Interface
- Rx Insertion Loss: 1dB

Applications

- Wireless Automated Metering
- Wireless Alarm Systems
- Portable Battery Powered Equipment
- Smart Energy
- 490MHz ISM Band Application
- Single Chip RF Front End Module



Functional Block Diagram

Product Description

This module is intended for 470MHz to 510MHz AMR solutions. It provides separate ports for Rx and Tx paths. The PA section provides a nominal output power of 30dBm. The device is provided in a 5.5mm x 5.0mm, 28-pin package.

Ordering Information

RF6514	ISM Band Transmit/Receive Module
RF6514PCK-410	Fully Assembled Evaluation Board and 5 loose sample pieces
RF6514SR	Standard 100 piece reel
RF6514TR7	Standard 2500 piece reel

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	☑ GaAs pHEMT	☐ GaN HEMT
☐ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	☐ BiFET HBT
☑ InGaP HBT	☐ SiGe HBT	☐ Si BJT	

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Absolute Maximum Ratings

Parameter	Rating	Unit
Battery Voltage	5	V
RF Port Impedance	50	Ω
Operating Temperature	-30 to 70	°C
Storage Temperature	-40 to 85	°C
ESD, HBM (RF pins)	500	V
ESD, HBM (All pins)	500	V
ESD, CDN (RF pins)	500	V
ESD, CDM (all pins)	500	V
MSL	MSL 3	
Maximum Input Power to PA	+20	dBm

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

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RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Frequency	470		510	MHz	
RF Port Impedance		50		Ω	
Total Leakage Current		4	5	µA	V_{CC} = 3.6V, V_{REG} = 0V
ESD, HBM	500			V	RF pins
	500			V	All other pins
ESD, CDM	500			V	RF pins
	500			V	All other pins
PA Section					V_{CC} = 3.6V, V_{REG} = 3.4V, C_TX = 3.4V, C_RX = 0V; Temperature = 25°C; Unless otherwise specified.
CW P_{OUT} Saturation	30	31	32	dBm	
Large Signal Gain	14	15.5	17	dB	
Thermal Resistance	28.57			°C/W	V_{CC} = 4.0V, V_{REG} = 3.8V, 30dBm P_{OUT}, T_{REF} = 126°C
2Fo to 10Fo	-55	-60		dBc	
Input Return Loss	10			dB	
Battery Voltage	3.3	3.6	4.0	V	V_{CC}
Battery Current	700	800	850	mA	
Power Down Current		0.3	2	µA	V_{CC} = 3.6V, V_{REG} = 0V
V_{REG}	3.1	3.4	V_{CC} - 0.2V	V	
V_{REG} Current		3	4	mA	
Rx Section					V_{CC} = 3.6V, V_{REG} = 0V, C_TX = 0V, C_RX = 3.4V; Temperature = 25°C; Unless otherwise specified.
Noise Figure		0.7	1	dB	
Input IP3	18	12		dBm	
Input Return Loss	10			dB	
Output Return Loss	10			dB	

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Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Antenna Switch Section					
Isolation	20			dB	Any used port to any unused port
Logic Voltage, High	3.1	3.4	Vcc-0.2	V	
Logic Voltage, Low	0.0	0.2	0.4	V	All Logic I/O's
Logic Current, High		5	10	μA	All Logic I/O's
Logic Current, Low		0.4		μA	All Logic I/O's

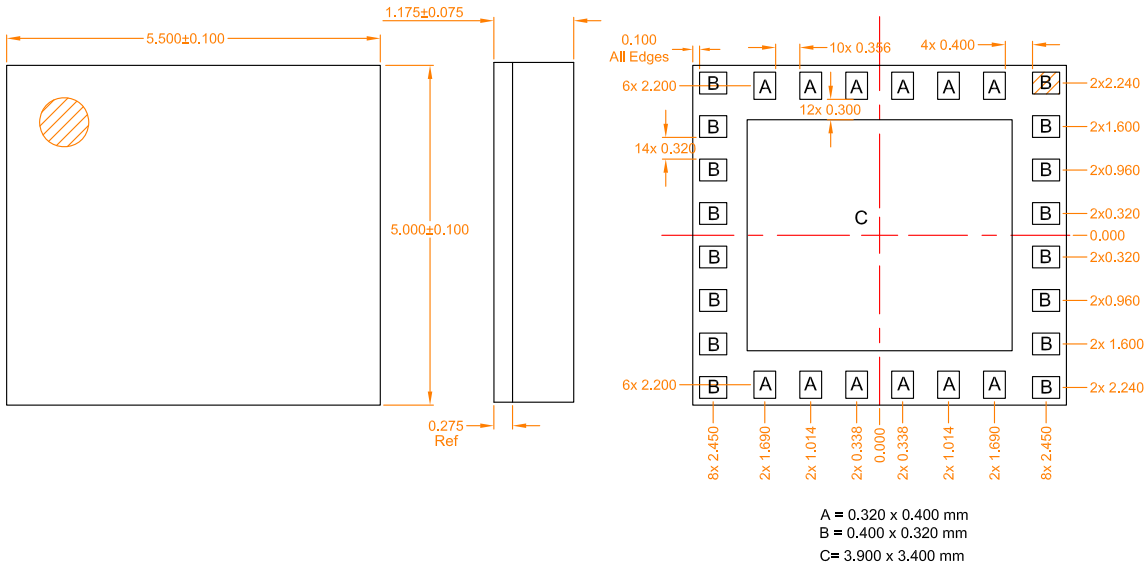
Operating Mode	Module Logic Truth Table		Typ. Battery Current at P_{OUT} = 30dBm
	C_TX	C_RX	
TX-ANT	1	0	850mA
RX-ANT	0	1	0.3μA

Pin Names and Descriptions

Pin	Name	Description
5	ANT	Antenna Connect Port.
9	C_TX	Transmit Selection Control Line.
11	C_RX	Receive Selection Control Line.
16	RX	Receive Port.
18	TX	Transmit Port.
23	VCC	Power Amplifier Supply Voltage.
24	VREG	Power Amplifier Bias Control. V_{CC}= 0.2V = ON, 0V = OFF.
7, 10	NC	
1, 2, 3, 4, 6, 8, 12, 13, 14, 15, 17, 19, 20, 21, 22, 25, 26, 27, 28	GND	Ground.

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Package Drawing

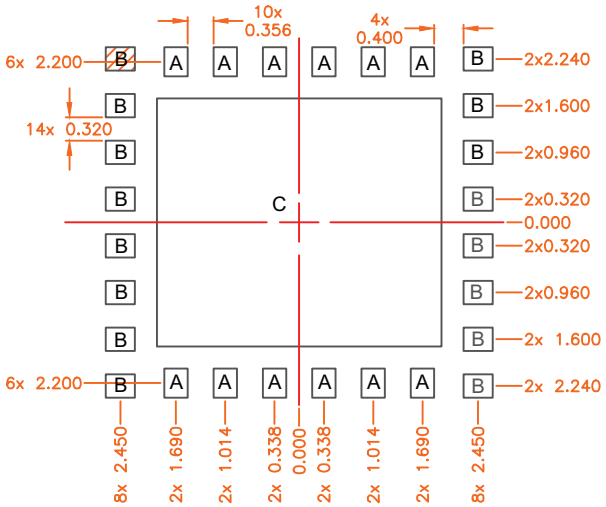


All units in µm.

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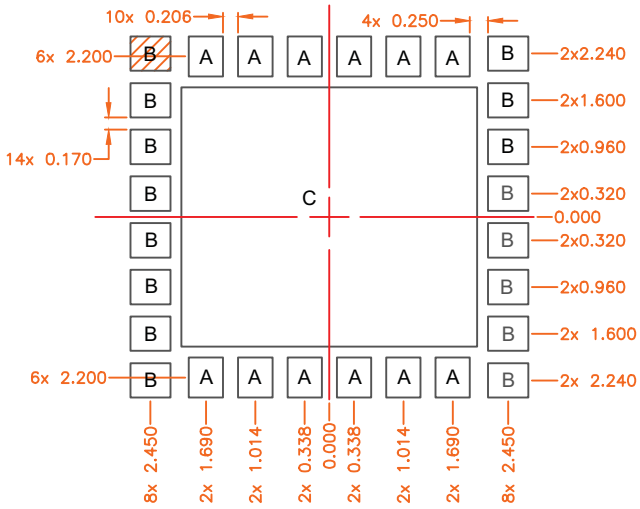
PCB Patterns

A = 0.320 x 0.400 mm
B = 0.400 x 0.320 mm
C= 3.900 x 3.400 mm



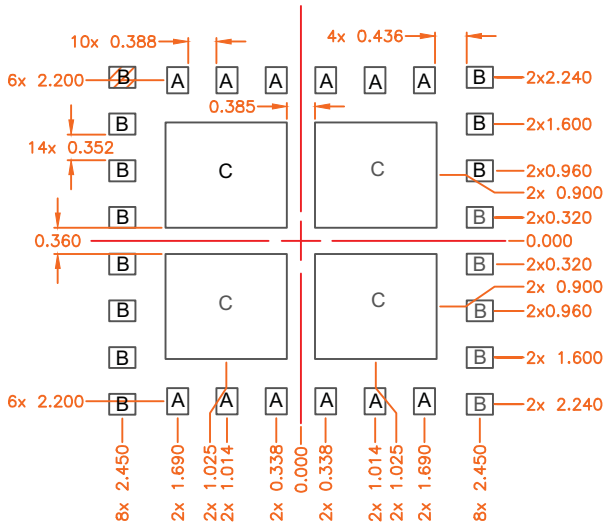
PCB Metal Land Pattern

A = 0.470 x 0.550 mm
B = 0.550 x 0.470 mm
C= 4.050 x 3.550 mm



PCB Solder Mask Pattern

A = 0.288 x 0.360 mm
B = 0.360 x 0.288 mm
C = 1.665 x 1.440 mm

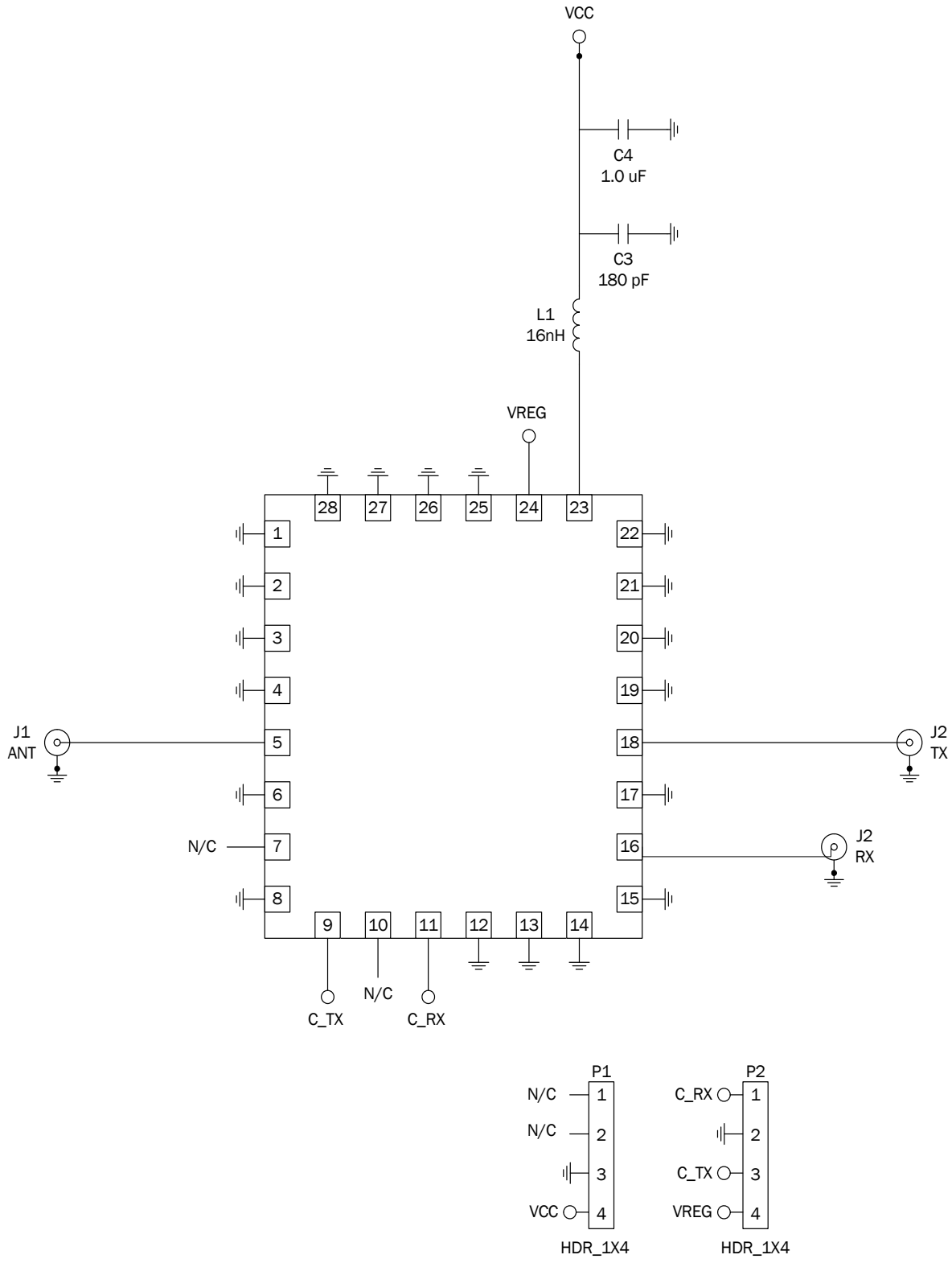


PCB Stencil Pattern

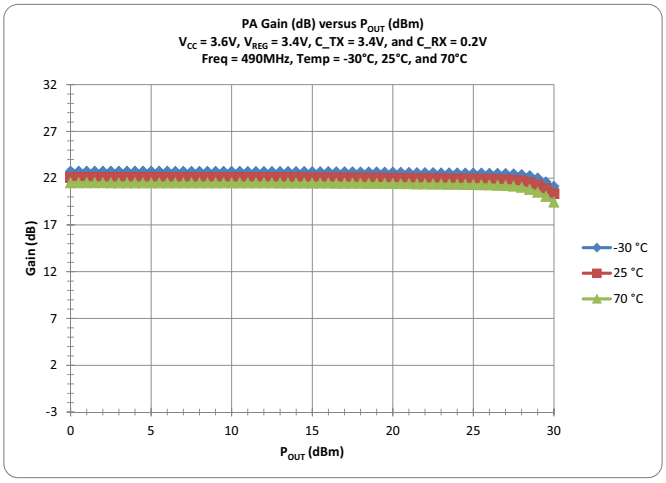
Notes:
1. Shaded area represents Pin 1 location.

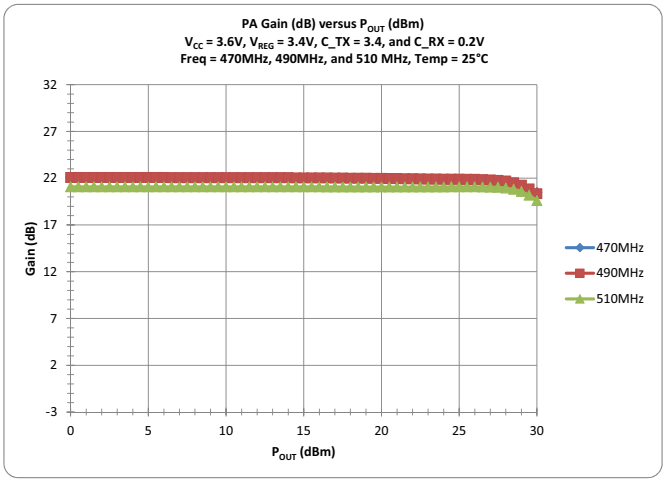
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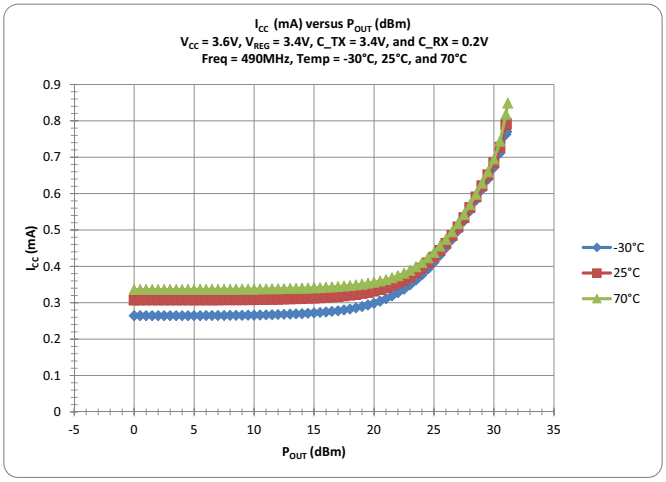
Application Schematic

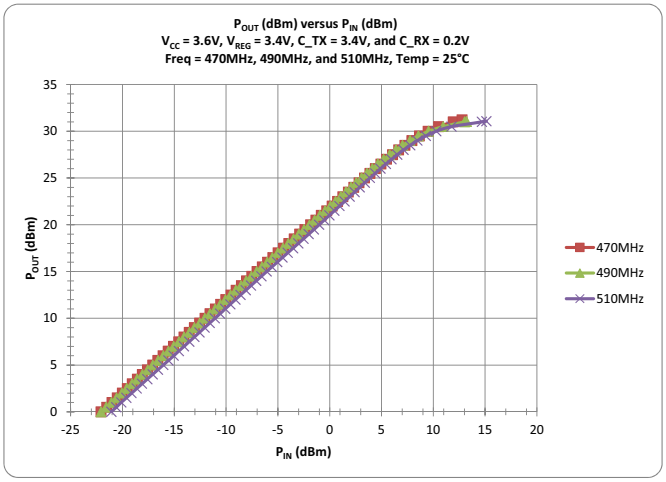


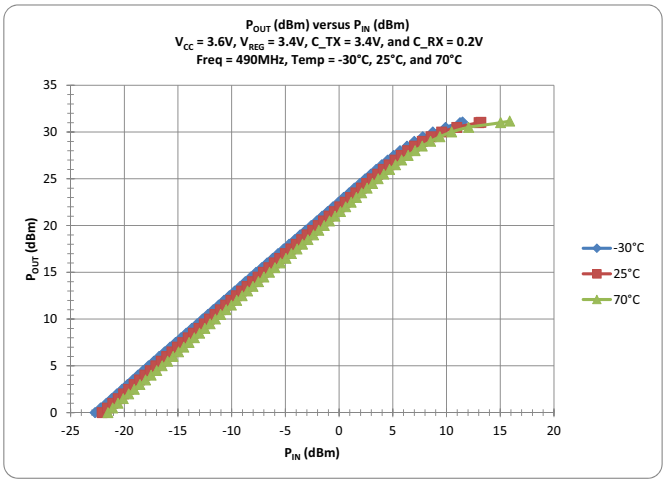
Typical Performance

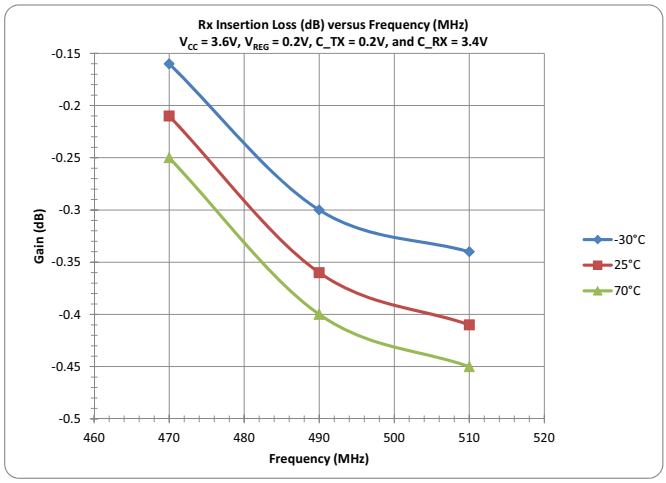












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Typical Performance

