AND9535/D

434 MHz LNA for RKE using the NSVF3007SG3

ON Semiconductor®

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APPLICATION NOTE

Overview

This application note explains about ON Semiconductor's NSVF3007SG3 which is used as a Low Noise Amplifier (LNA) for RKE (Remote Keyless Entry).

The NSVF3007SG3 is a silicon bipolar transistor best suited for high-frequency applications which is assembled in the 3-pin surface mount package.
For information about the performance, please refer to the datasheet of this product.

Since the evaluation board is adjusted to achieve optimal performance in RKE (434 MHz), the product can provide 14 dB gain and 1.45 dB noise figure.

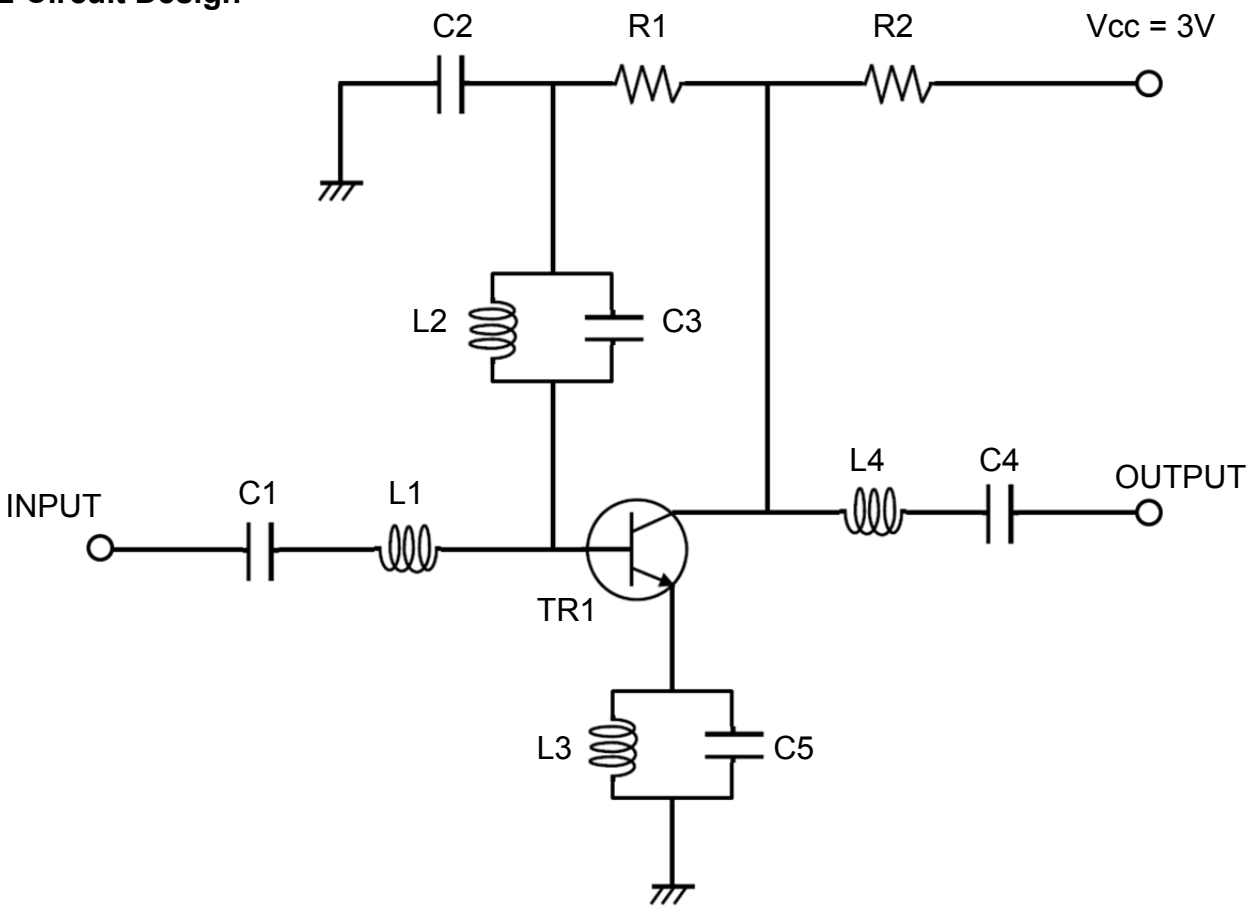
A standard material FR4 is used for the printed circuit board (PCB).
Please note that the losses of the PCB and the SMA connector are not excluded from the noise figure.

■ Summary of Data

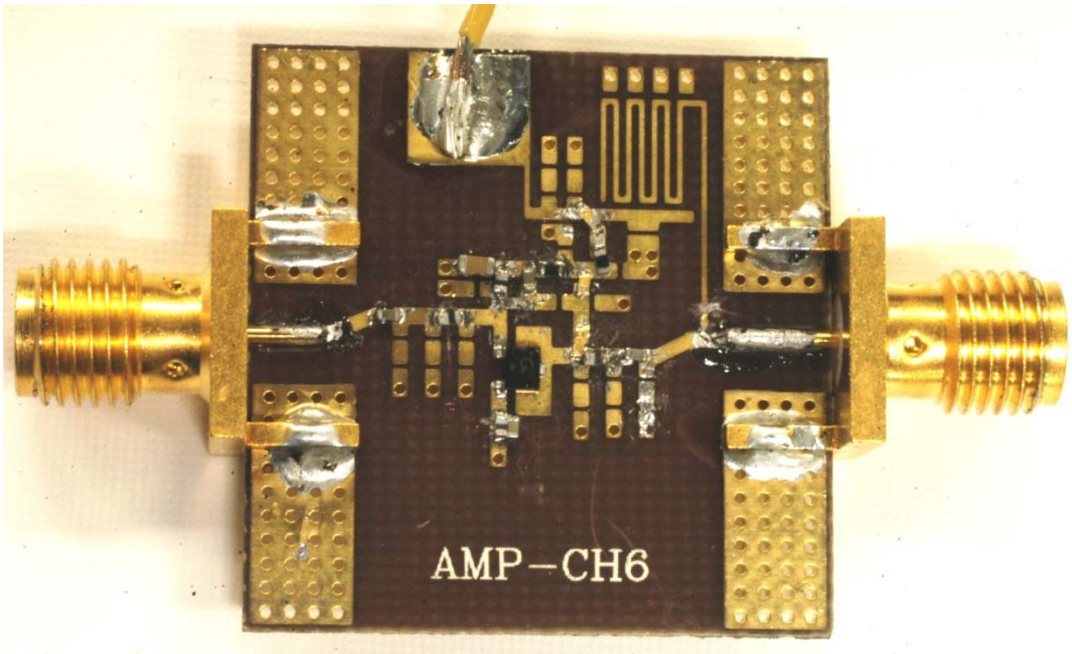
Ta = 25°C, Input Power = −30 dBm

Parameter	Symbol	Condition	Result	Unit
DC Voltage	Vcc		3.0	V
DC Current	Icc		2.14	mA
Power Gain	Gp	f = 434 MHz	15.4	dB
Noise Figure	NF	f = 434 MHz	1.65	dB
Input Return Loss	RLin	f = 434 MHz	3.8	dB
Output Return Loss	RLout	f = 434 MHz	8.0	dB
Isolation	ISL	f = 434 MHz	21.1	dB
Gain 1 dB Compression Input Power	Pin1dB	f = 434 MHz	–22	dBm
Input 3rd Order Intercept Point	IIP3	f1 = 433 MHz f2 = 434 MHz Pin = −35 dBm	–7.1	dBm

■ Circuit Design



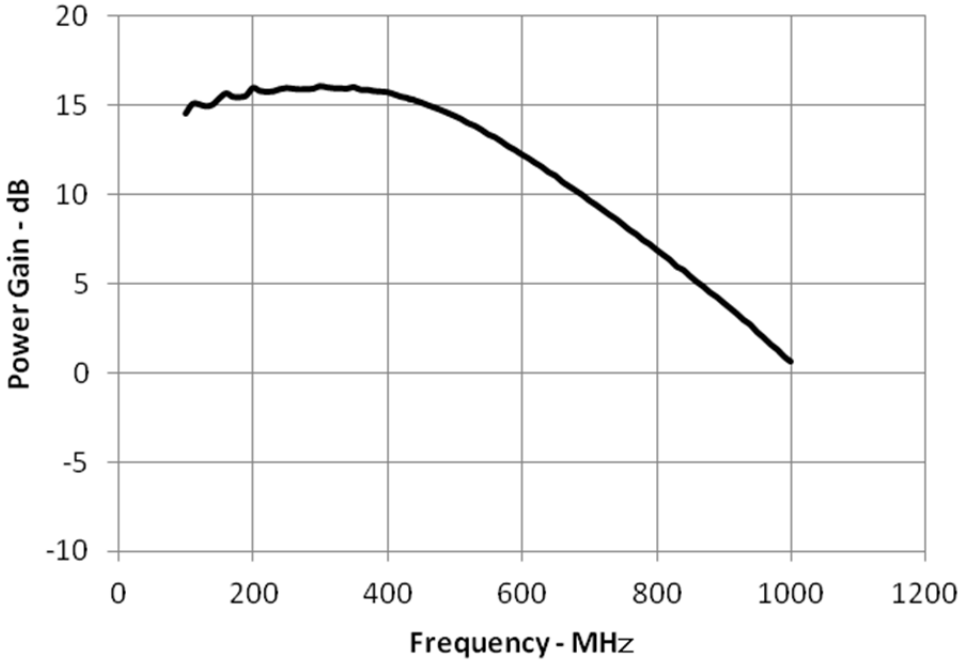
■ Evaluation Board



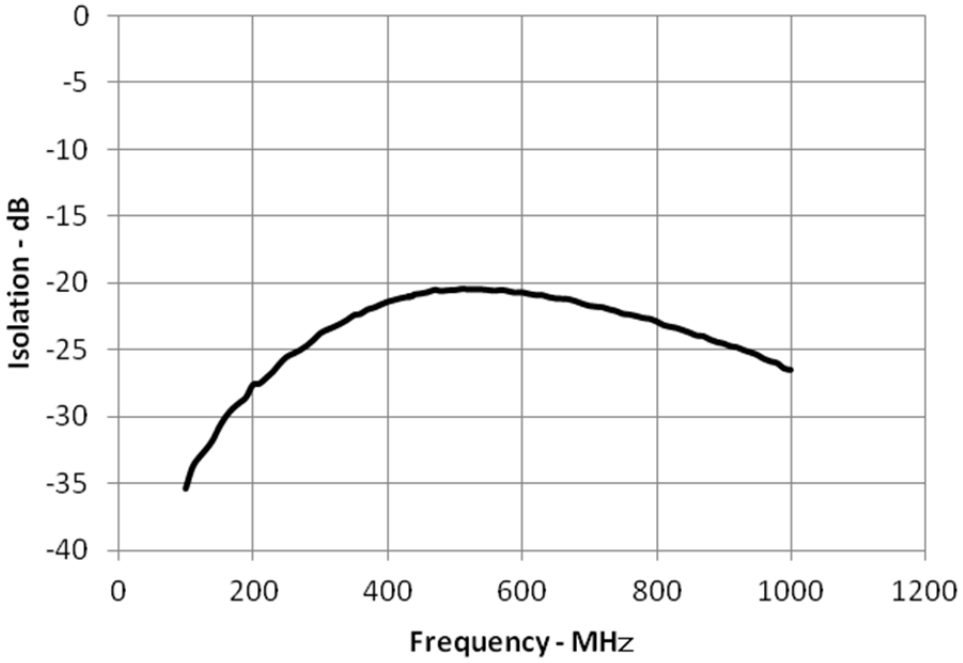
■ Bill of Materials

Item	Symbol	Value	Manufacturer	Size
Bip-Tr	TR1	NSVF3007SG3	ON Semiconductor	SC70
Capacitor	C1	100 pF	Murata GRM155	1005
	C2	47 nF	Various	1608
	C3	3 pF	Murata GRM155	1005
	C4	680 pF	Murata GRM155	1005
	C5	10 nF	Murata GRM155	1005
Resistor	R1	47 kΩ	Various	1005
	R2	470 Ω	Various	1005
Inductor	L1	12 nH	TDK MLG1005S	1005
	L2	100 nH	TDK MLG1005S	1005
	L3	3.8 nH	TDK MLG1005S	1005
	L4	18 nH	TDK MLG1005S	1005
Material	–	FR4	–	25 x 25 mm

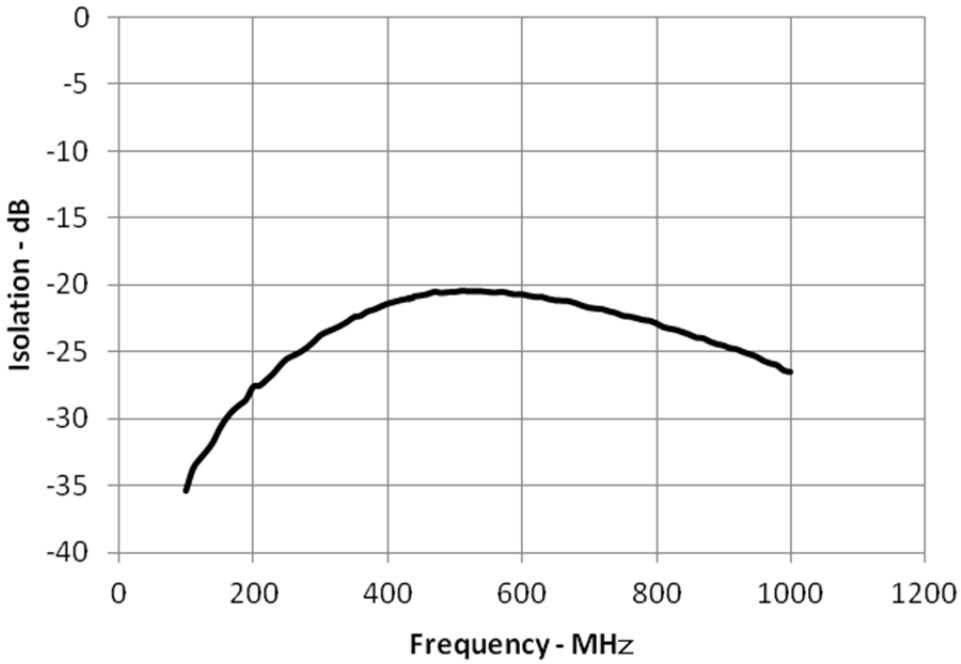
■ Power Gain



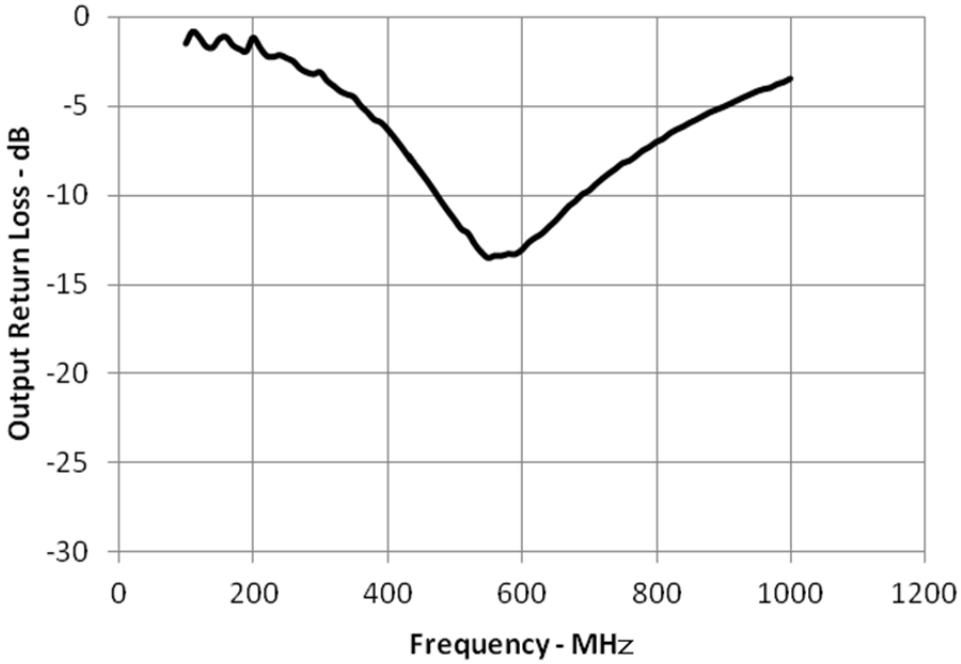
■ Isolation



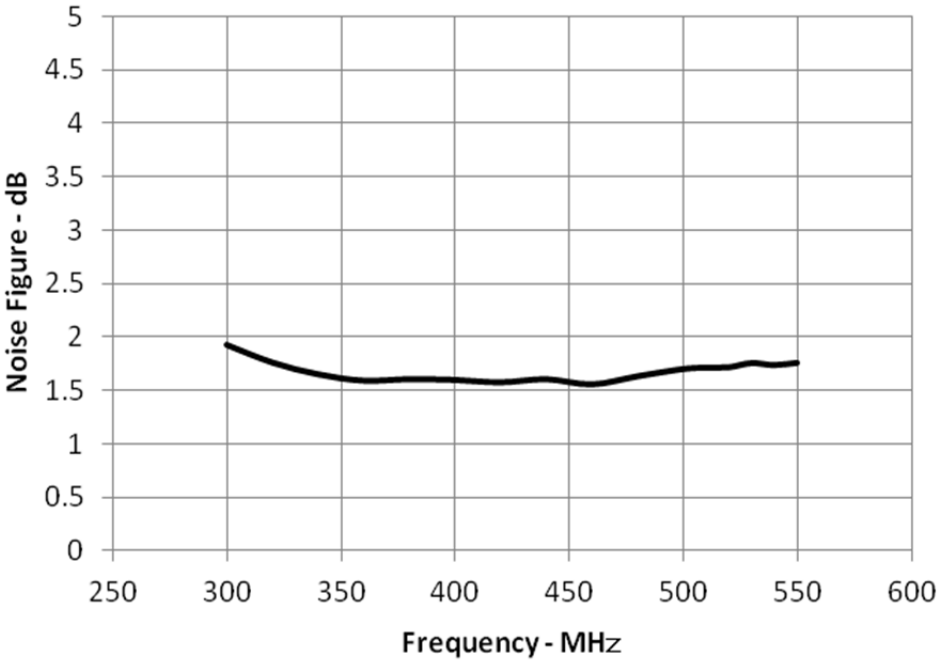
■ Input Return Loss



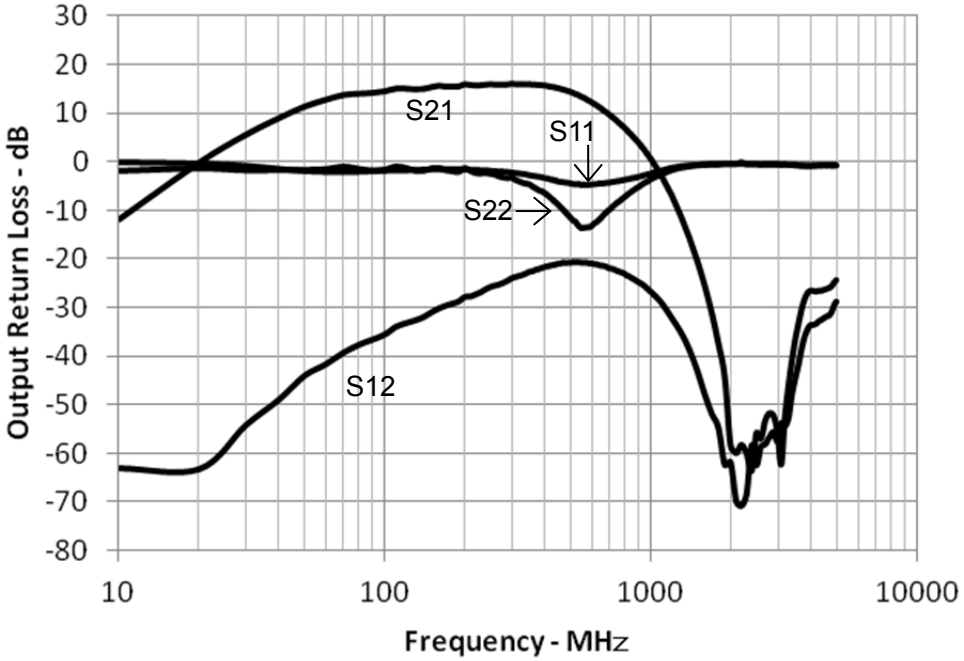
■ Output Return Loss



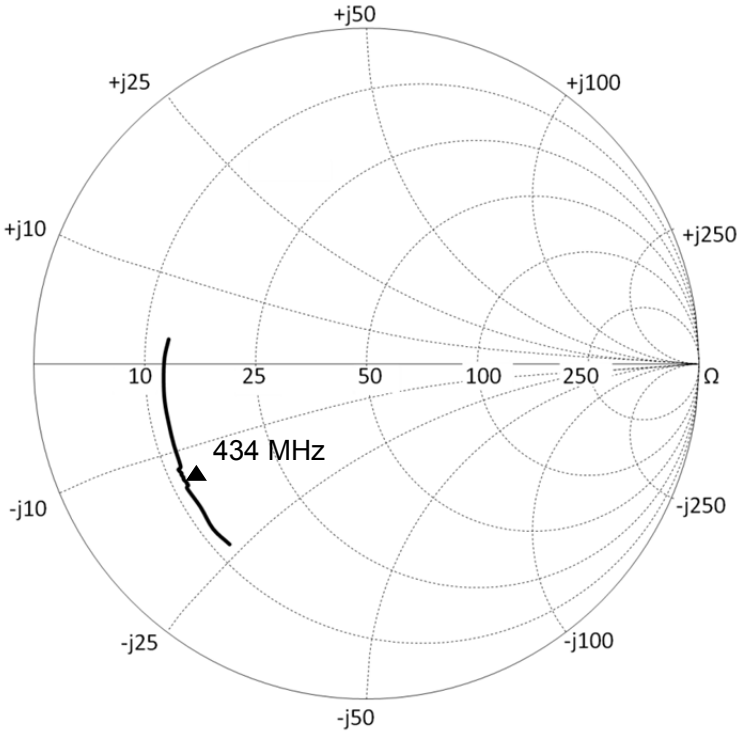
■ Noise Figure



■ S11, S21, S12, S22 Wide Span

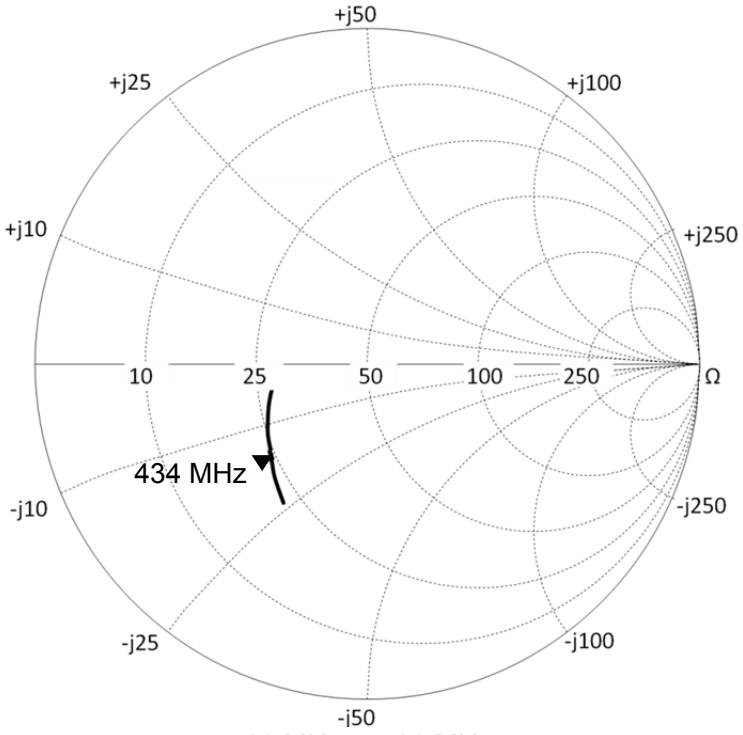


■ Smith Chart
Input Return Loss



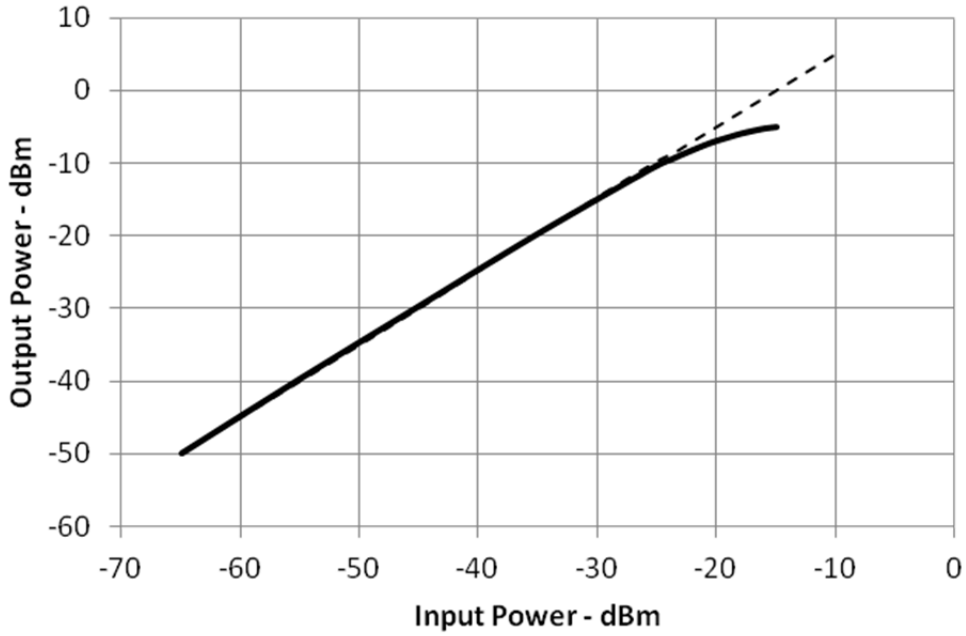
400 MHz to 500 MHz

■ Smith Chart
Output Return Loss



400 MHz to 500 MHz

■ Gain 1 dB Compression Point



■ Input 3rd Order Intercept Point

f1 = 433 MHz, f2 = 434 MHz, Pin = −35 dBm