

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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## Evaluation Board Information

# **EC-NE3508M04**

## **2.4 GHz LNA Evaluation Board**

### **for Satellite Radio Application (OIP<sub>3</sub> optimized)**

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- **Evaluation Board Pattern Layout**
- **Circuit Description**
- **Evaluation Board Test Results**
- **Gain and Isolation**
- **Input and Output Return Loss**
- **P<sub>in</sub>-P<sub>out</sub> & IM<sub>3</sub> Performance**
- **1 dB Gain Compression Output Power**

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**This document outlines general applications for this product. The application circuits and circuit constants provided in this document are simply examples and should not be used for mass production design. Be aware also that there is no intention to standardize the restrictions and characteristics of these application circuits.**

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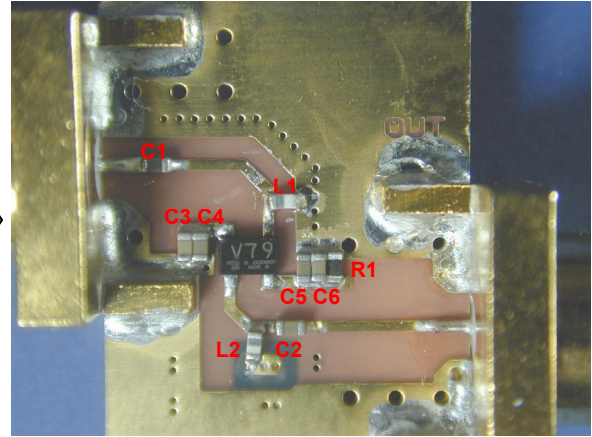
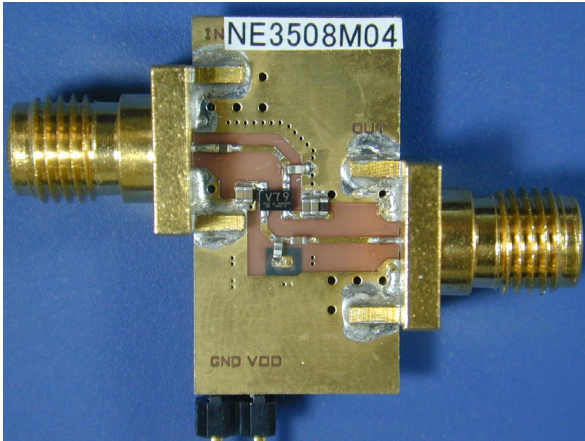
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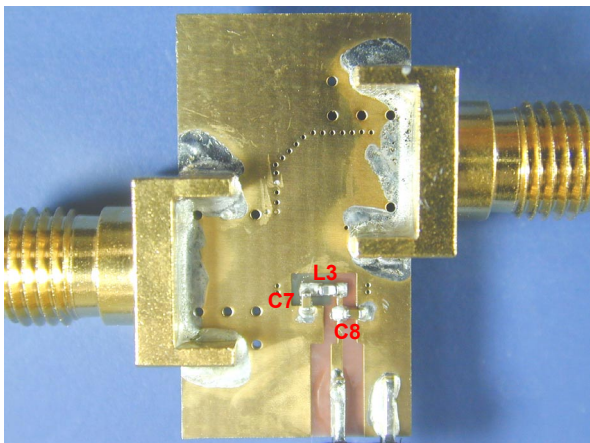
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# Evaluation Board Pattern Layout

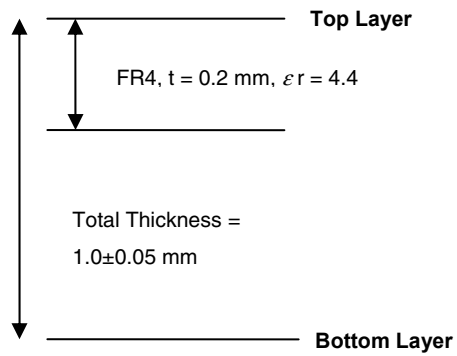
<Top View>



<Bottom View>



<PCB Cross Section>

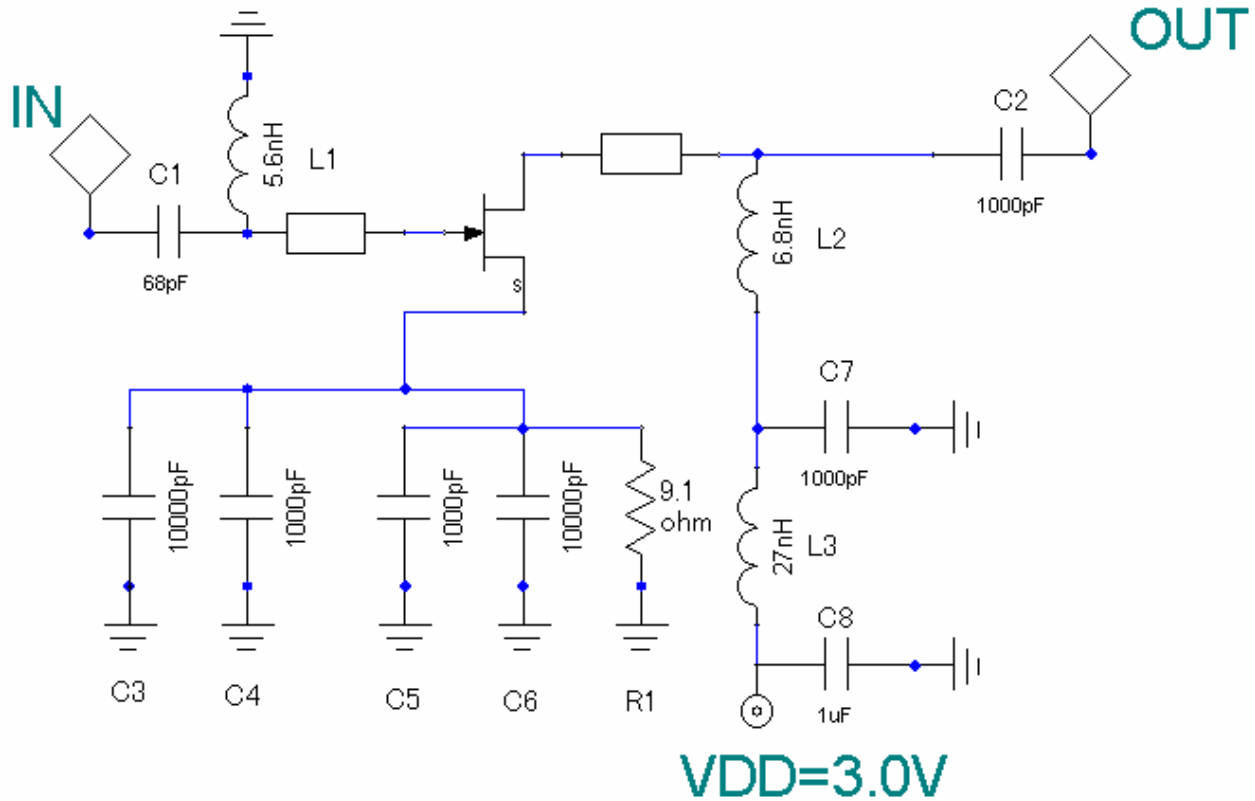


size 11.0 mm × 24.0 mm

material FR4 (ELC4756/Sumitomo)  
 $t = 0.2 \text{ mm}$ ,  $\epsilon_r = 4.4$

## Circuit Description

( $V_{DD} = 3.0\text{ V}$ ,  $I_D = 29.1\text{ mA}$ ,  $f = 2.4\text{ GHz}$  (OIP3 optimized))



### COMPONENTS OF TEST CIRCUIT

Parts	Part Number	Maker	Symbol	Value	Unit
Chip Capacitor	GRM1552C1H680JD01	Murata	C1	68	pF
Chip Capacitor	GRM155B11H102KA01	Murata	C2, C4, C5, C7	1 000	pF
Chip Capacitor	GRM155B11E103KA01	Murata	C3, C6	10 000	pF
Chip Capacitor	GRM155F10J105ZE01	Murata	C8	1	$\mu\text{F}$
Chip Inductor	AML1005H5N6ST	FDK	L1	5.6	nH
Chip Inductor	AML1005H6N8JT	FDK	L2	6.8	nH
Chip Inductor	AML1005H27NJT	FDK	L3	27	nH
Transistor	NE3508M04	NEC	TR		
Chip Resistor	MCR01MZPJ9R1	ROHM	R1	9.1	$\Omega$
DC Connentor	A2-2PA-2.45DSA (71)	Hirose			
RF Connector	01K2266-00	WAKA			
Substrate	FR4 (t = 0.2 mm)	Sumitomo			

## Evaluation Board Test Results

(V<sub>DD</sub> = 3.0 V, I<sub>D</sub> = 29.1 mA, f = 2.4 GHz)

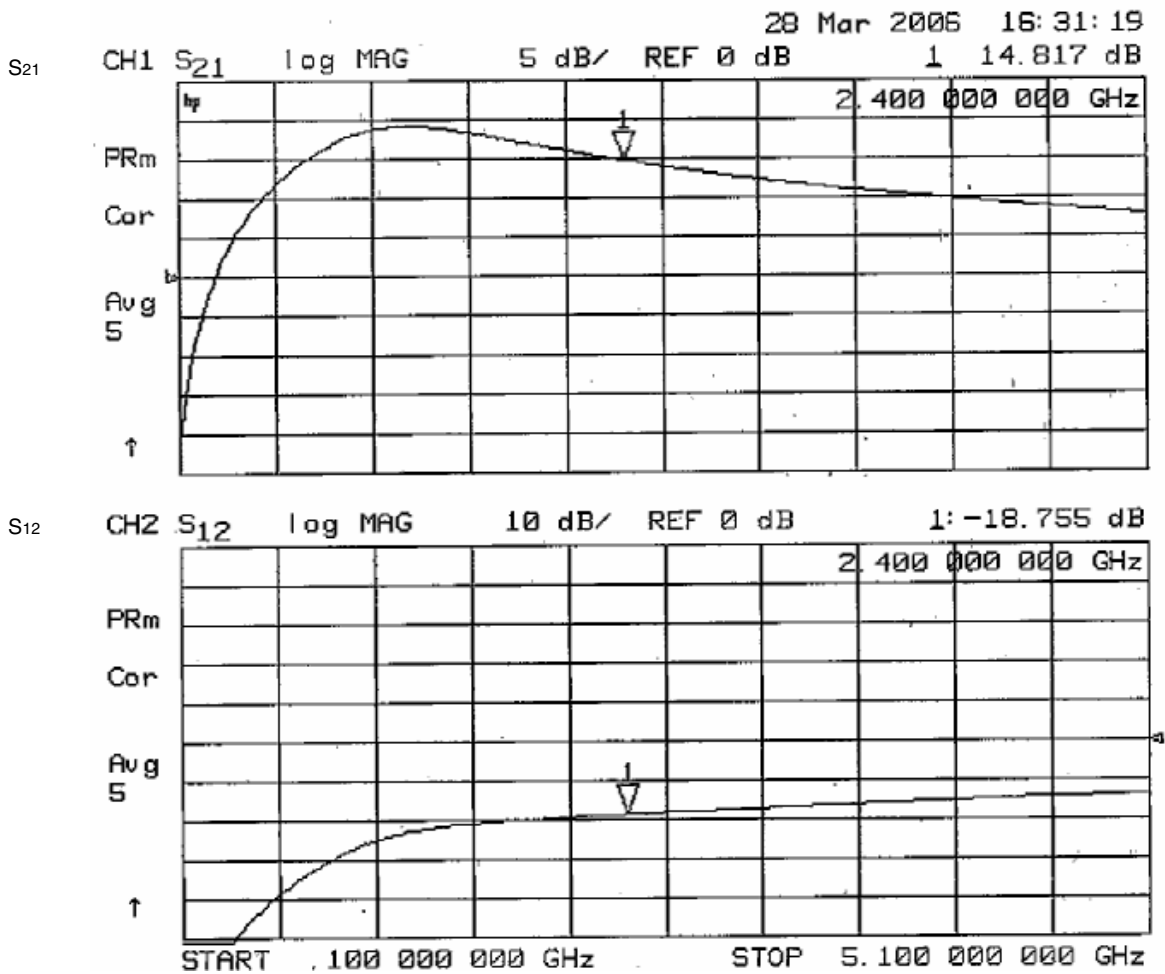
Item	Symbol	Data	Unit
Noise Figure	NF <sup>Note 1</sup>	0.74	dB
Associated Gain	G <sub>a</sub>	14.8	dB
Return Loss (in)	RL <sub>in</sub>	11.5	dB
Return Loss (out)	RL <sub>out</sub>	18.8	dB
Output Power at 1 dB Compression Point	P <sub>out (1 dB)</sub>	15.9	dB
Output 3rd Order Distortion Intercept Point	OIP <sub>3</sub> <sup>Note 2</sup>	33.0	dBm

**Notes 1.** A substrate loss 0.11 dB is including in value of NF.

**2.** f = 2.4 GHz, 1 MHz offset

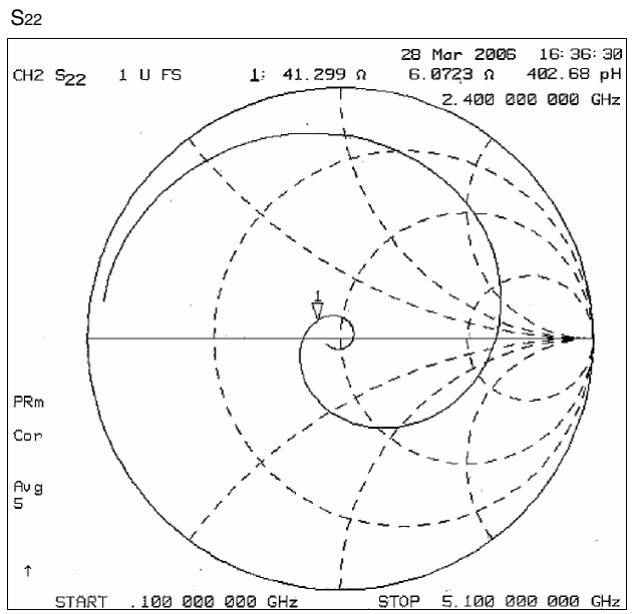
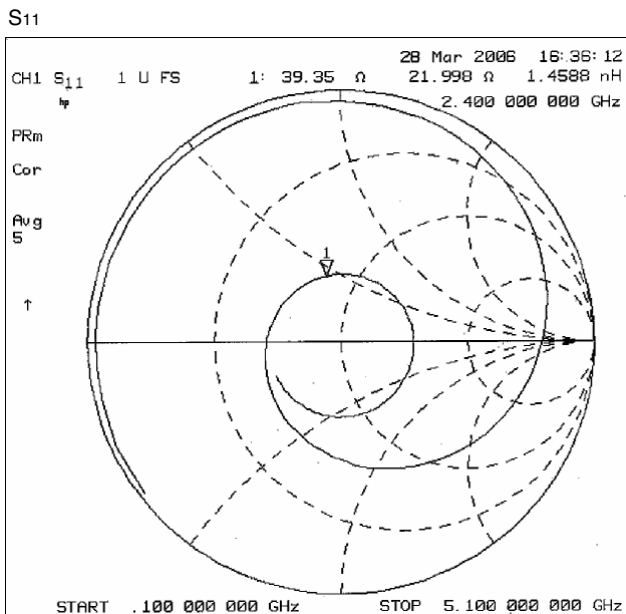
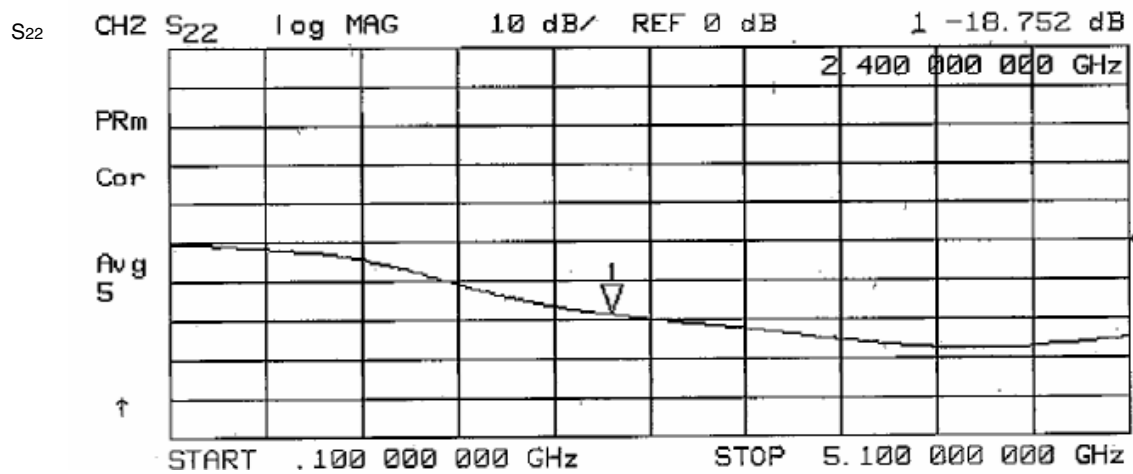
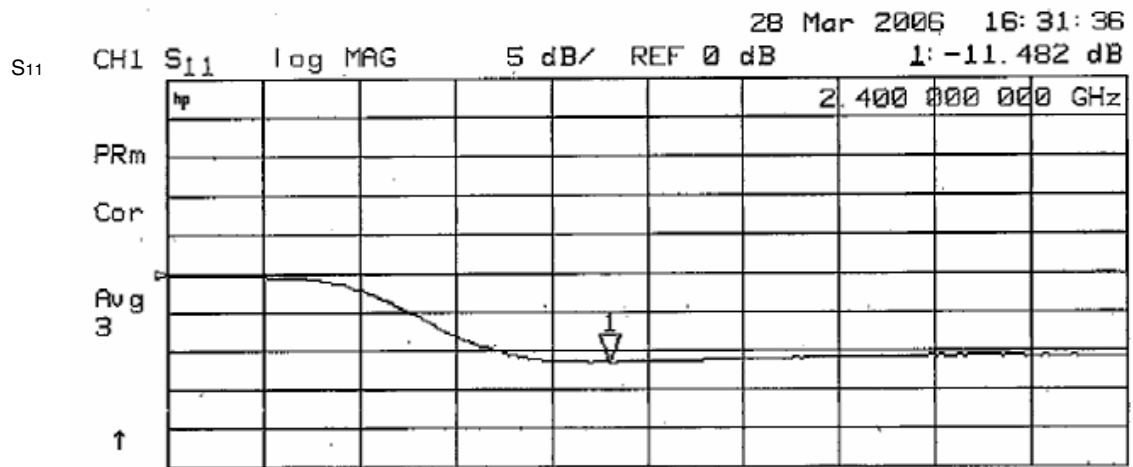
### Gain and Isolation

(V<sub>DD</sub> = 3.0 V, I<sub>D</sub> = 29.1 mA, f = 2.4 GHz)



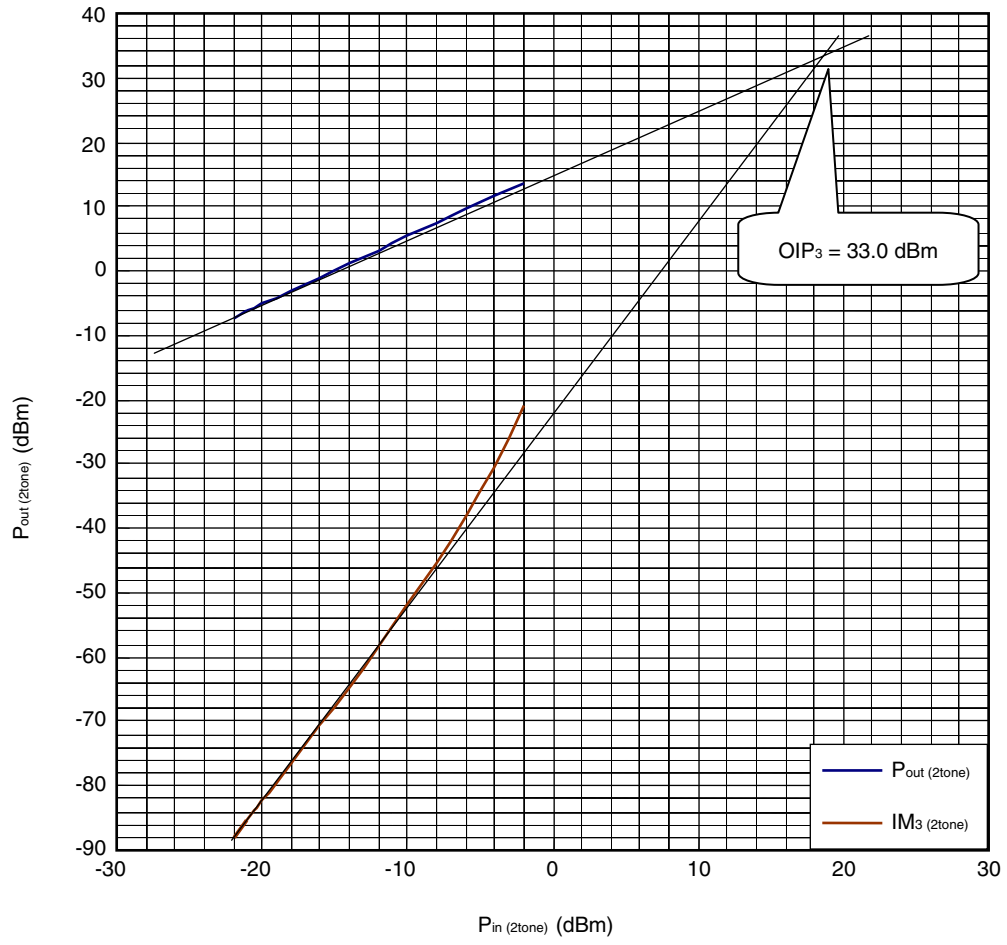
# Input and Output Return Loss

(V<sub>DD</sub> = 3.0 V, I<sub>D</sub> = 29.1 mA, f = 2.4 GHz)



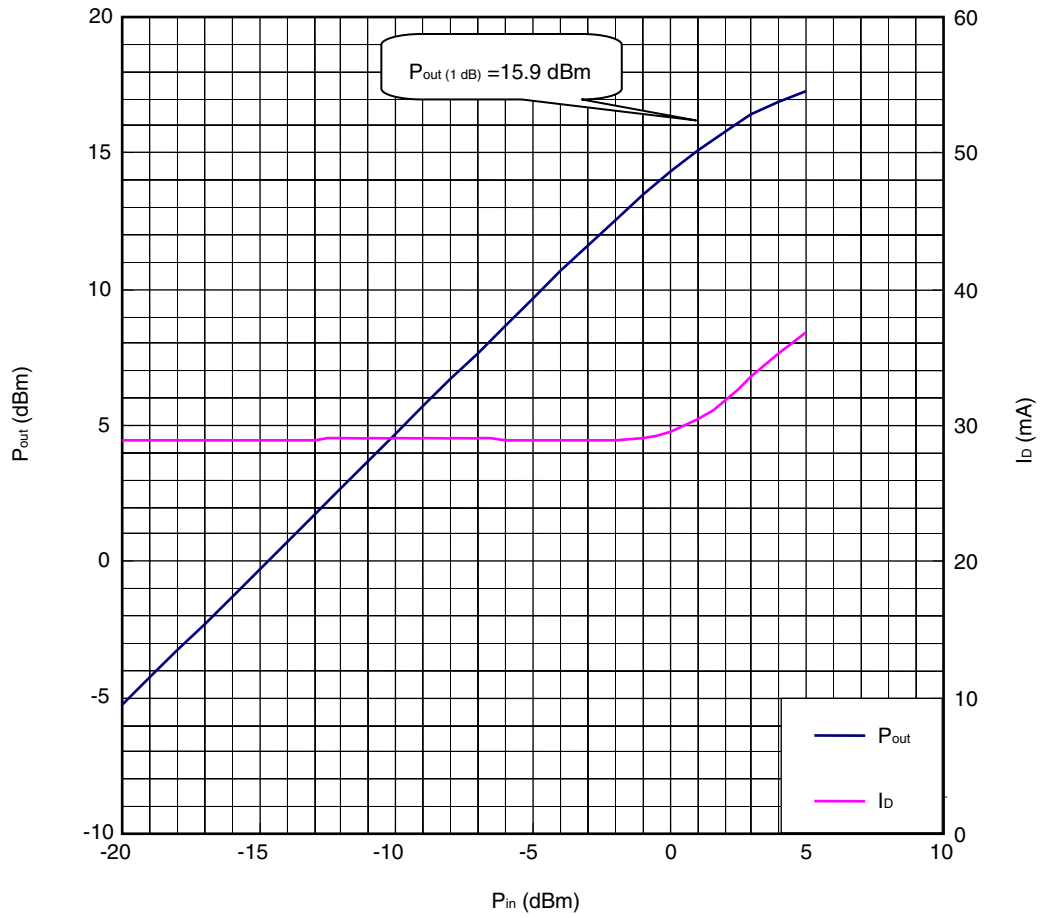
# P<sub>in</sub>-P<sub>out</sub> & IM<sub>3</sub> Performance

(V<sub>DD</sub> = 3.0 V, I<sub>D</sub> = 29.1 mA, f = 2.4 GHz, 1 MHz offset)



# 1 dB Gain Compression Output Power

( $V_{DD} = 3.0\text{ V}$ ,  $I_D = 29.1\text{ mA}$ ,  $f = 2.4\text{ GHz}$ )



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