To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

April 1st, 2010
Renesas Electronics Corporation

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

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RENESAS

DATA SHEET

RENESAS

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC8172TB

SILICON MMIC 2.5 GHz FREQUENCY UP-CONVERTER FOR WIRELESS TRANSCEIVER

DESCRIPTION

The μPC8172TB is a silicon monolithic integrated circuit designed as frequency up-converter for wireless transceiver transmitter stage. This IC is manufactured using NEC's 30 GHz $f_{max.}$ UHS0 (Ultra High Speed Process) silicon bipolar process.

This IC is as same circuit current as conventional μPC8106TB, but operates at higher frequency, higher gain and lower distortion. Consequently this IC is suitable for mobile communications.

FEATURES

- Recommended operating frequency : f_{RFout} = 0.8 to 2.5 GHz
- Higher IP_3 : CG = 9.5 dB TYP., OIP_3 = +7.5 dBm TYP. @ f_{RFout} = 0.9 GHz
- High-density surface mounting : 6-pin super minimold package
- Supply voltage : V_{CC} = 2.7 to 3.3 V

APPLICATIONS

- PCS1900M
- 2.4 GHz band transmitter/receiver system (wireless LAN etc.)

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μPC8172TB-E3	6-pin super minimold	C3A	• Embossed tape 8 mm wide. • Pin 1, 2, 3 face the tape perforation side. • Qty 3 kpcs/reel.

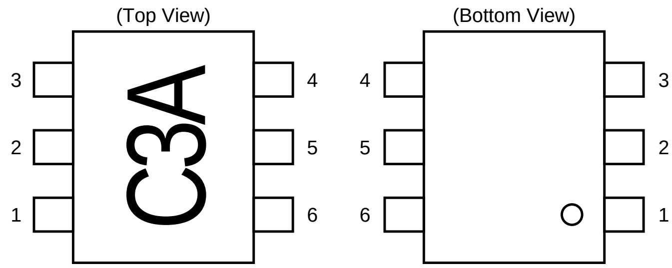
Remark To order evaluation samples, please contact your local NEC sales office.
(Part number for sample order: μPC8172TB)

Caution Electro-static sensitive devices

Document No. P14729EJ2V0DS00 (2nd edition)
Date Published September 2000 N CP(K)
Printed in Japan

The mark ★ shows major revised points.

PIN CONNECTIONS



Pin No.	Pin Name
1	IFinput
2	GND
3	LOinput
4	PS
5	V_{CC}
6	RFoutput

SERIES PRODUCTS (T_A = +25°C, V_{CC} = V_{RFout} = 3.0 V, Z_S = Z_L = 50 Ω)

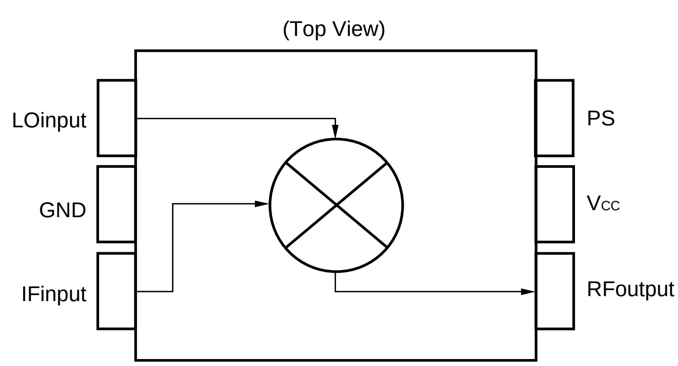
Part Number	I_{CC} (mA)	f_{RFout} (GHz)	CG (dB)		
			@RF 0.9 GHz[Note]	@RF 1.9 GHz	@RF 2.4 GHz
μPC8172TB	9	0.8 to 2.5	9.5	8.5	8.0
μPC8106TB	9	0.4 to 2.0	9	7	–
μPC8109TB	5	0.4 to.2.0	6	4	–
μPC8163TB	16.5	0.8 to 2.0	9	5.5	–

Part Number	$P_{O(sat)}$ (dBm)			OIP_3 (dBm)		
	@RF 0.9 GHz[Note]	@RF 1.9 GHz	@RF 2.4 GHz	@RF 0.9 GHz[Note]	@RF 1.9 GHz	@RF 2.4 GHz
μPC8172TB	+0.5	0	–0.5	+7.5	+6.0	+4.0
μPC8106TB	–2	–4	–	+5.5	+2.0	–
μPC8109TB	–5.5	–7.5	–	+1.5	–1.0	–
μPC8163TB	+0.5	–2	–	+9.5	+6.0	–

Note f_{RFout} = 0.83 GHz @ μPC8163TB

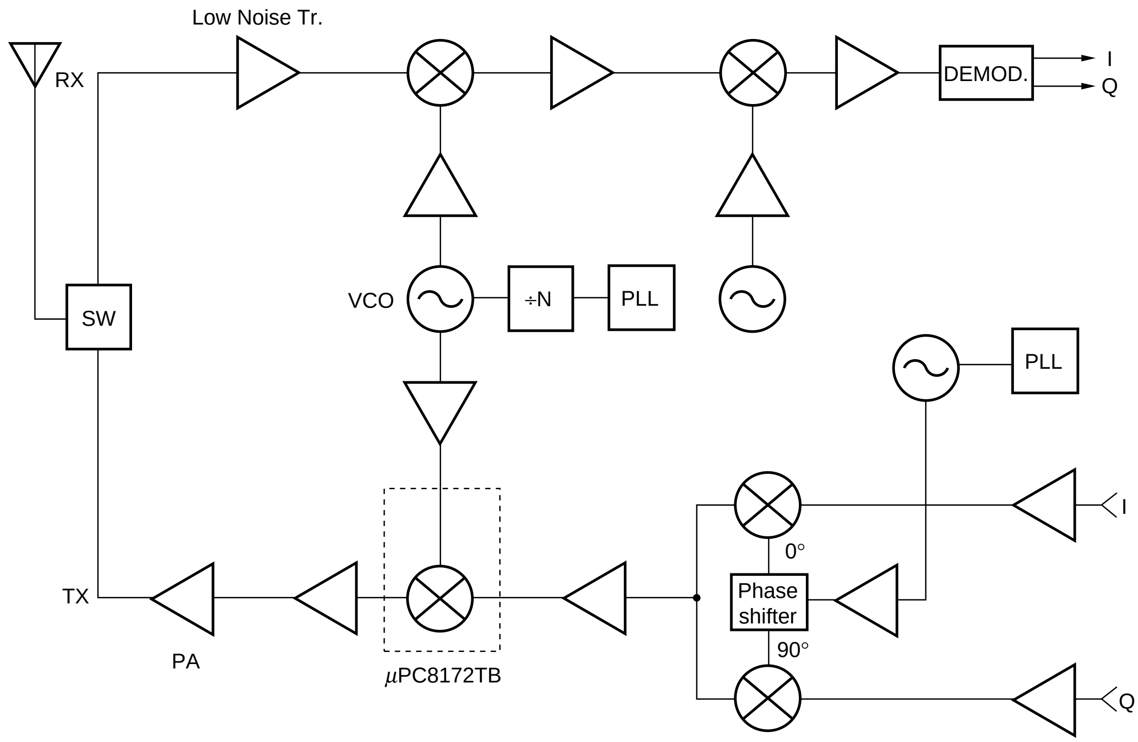
Remark Typical performance. Please refer to **ELECTRICAL CHARACTERISTICS** in detail.
To know the associated product, please refer to each latest data sheet.

BLOCK DIAGRAM (FOR THE μPC8172TB)



SYSTEM APPLICATION EXAMPLES (SCHEMATICS OF IC LOCATION IN THE SYSTEM)

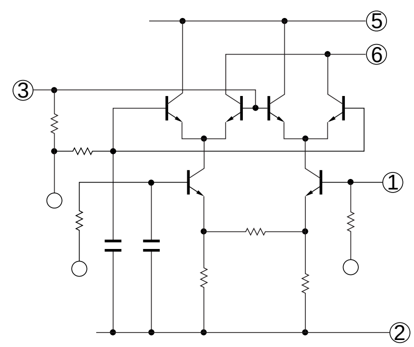
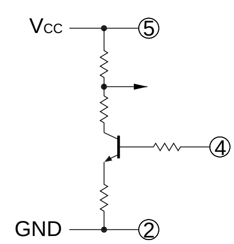
Wireless Transceiver



To know the associated products, please refer to each latest data sheet.

CONTENTS

1. PIN EXPLANATION

<table>
<tr><th>Pin No.</th><th>Pin Name</th><th>Applied Voltage (V)</th><th>Pin Voltage (V)[Note]</th><th>Function and Explanation</th><th>Equivalent Circuit</th></tr>
<tr><td>1</td><td>IFinput</td><td>–</td><td>1.4</td><td>This pin is IF input to double balanced mixer (DBM). The input is designed as high impedance.
The circuit contributes to suppress spurious signal. Also this symmetrical circuit can keep specified performance insensitive to process-condition distribution.
For above reason, double balanced mixer is adopted.</td><td rowspan="5">
</td></tr>
<tr><td>2</td><td>GND</td><td>GND</td><td>–</td><td>GND pin. Ground pattern on the board should be formed as wide as possible. Track Length should be kept as short as possible to minimize ground impedance.</td></tr>
<tr><td>3</td><td>LOinput</td><td>–</td><td>2.3</td><td>Local input pin. Recommendable input level is –10 to 0 dBm.</td></tr>
<tr><td>5</td><td>V_{CC}</td><td>2.7 to 3.3</td><td>–</td><td>Supply voltage pin.</td></tr>
<tr><td>6</td><td>RFoutput</td><td>Same bias as V_{CC} through external inductor</td><td>–</td><td>This pin is RF output from DBM. This pin is designed as open collector. Due to the high impedance output, this pin should be externally equipped with LC matching circuit to next stage.</td></tr>
<tr><td>4</td><td>PS</td><td>V_{CC}/GND</td><td>–</td><td>Power save control pin. Bias controls operation as follows.
<table><tr><th>Pin bias</th><th>Control</th></tr><tr><td>V_{CC}</td><td>Operation</td></tr><tr><td>GND</td><td>Power Save</td></tr></table></td><td>
</td></tr>
</table>

Note Each pin voltage is measured with $V_{CC} = V_{PS} = V_{RFout} = 3.0$ V.

★ 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Test Conditions	Rating	Unit
Supply Voltage	V_{CC}	T_A = +25°C	3.6	V
PS pin Input Voltage	V_{PS}	T_A = +25°C	3.6	V
Power Dissipation of Package	P_D	Mounted on double-side copperclad 50 × 50 × 1.6 mm epoxy glass PWB (T_A = +85°C)	270	mW
Operating Ambient Temperature	T_A		–40 to +85	°C
Storage Temperature	T_{stg}		–55 to +150	°C
Input Power	P_{in}		+10	dBm

3. RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Supply Voltage	V_{CC}	The same voltage should be applied to pin 5 and 6	2.7	3.0	3.3	V
Operating Ambient Temperature	T_A		–40	+25	+85	°C
Local Input Level	P_{LOin}	Z_S = 50 Ω (without matching)	–10	–5	0	dBm
RF Output Frequency	f_{RFout}	With external matching circuit	0.8	–	2.5	GHz
IF Input Frequency	f_{IFin}		50	–	400	MHz

4. ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{CC} = V_{RFout} = 3.0 V, f_{IFin} = 240 MHz, P_{LOin} = –5 dBm, and V_{PS} ≥ 2.7 V unless otherwise specified)

Parameter	Symbol	Test Conditions Note	MIN.	TYP.	MAX.	Unit
Circuit Current	I_{CC}	No Signal	5.5	9.0	13	mA
Circuit Current In Power Save Mode	$I_{CC(PS)}$	V_{PS} = 0 V	–	–	2	μA
Conversion Gain	CG1	f_{RFout} = 0.9 GHz, P_{IFin} = –30 dBm	6.5	9.5	12.5	dB
	CG2	f_{RFout} = 1.9 GHz, P_{IFin} = –30 dBm	5.5	8.5	11.5	dB
	CG3	f_{RFout} = 2.4 GHz, P_{IFin} = –30 dBm	5	8.0	11.0	dB
Saturated RF Output Power	$P_{O(sat)}1$	f_{RFout} = 0.9 GHz, P_{IFin} = 0 dBm	–2.5	+0.5	–	dBm
	$P_{O(sat)}2$	f_{RFout} = 1.9 GHz, P_{IFin} = 0 dBm	–3.5	0	–	dBm
	$P_{O(sat)}3$	f_{RFout} = 2.4 GHz, P_{IFin} = 0 dBm	–4	–0.5	–	dBm

Note $f_{RFout} < f_{LOin}$ @ f_{RFout} = 0.9 GHz
$f_{LOin} < f_{RFout}$ @ f_{RFout} = 1.9 GHz/2.4 GHz

5. OTHER CHARACTERISTICS, FOR REFERENCE PURPOSES ONLY

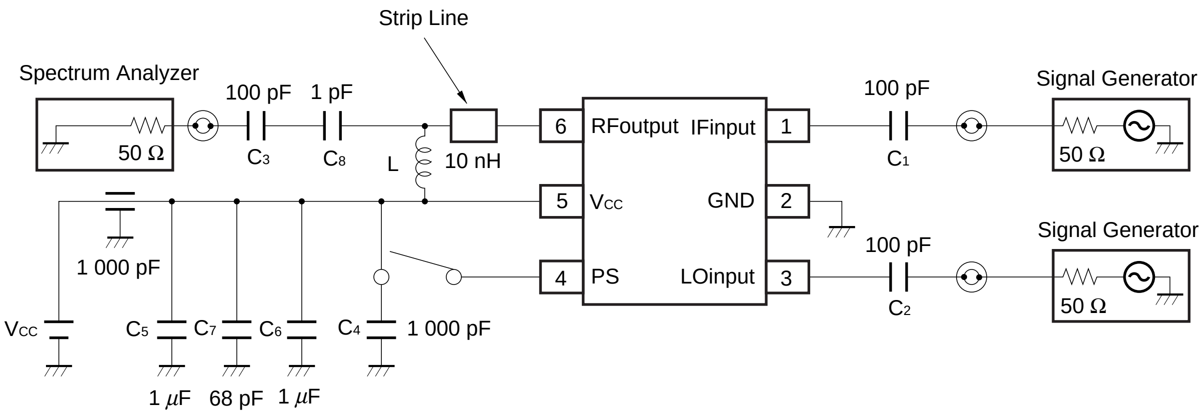
(T_A = +25°C, V_{CC} = V_{RFout} = 3.0 V, P_{LOin} = –5 dBm, and V_{PS} ≥ 2.7 V unless otherwise specified)

Parameter		Symbol	Test Conditions[Note]		Data	Unit
Output Third-Order Distortion Intercept Point		$OIP_3$1	f_{RFout} = 0.9 GHz	$f_{IFin}1$ = 240 MHz, $f_{IFin}2$ = 241 MHz	+7.5	dBm
		$OIP_3$2	f_{RFout} = 1.9 GHz		+6.0	dBm
		$OIP_3$3	f_{RFout} = 2.4 GHz		+4.0	dBm
Input Third-Order Distortion Intercept Point		$IIP_3$1	f_{RFout} = 0.9 GHz	$f_{IFin}1$ = 240 MHz, $f_{IFin}2$ = 241 MHz	–2.0	dBm
		$IIP_3$2	f_{RFout} = 1.9 GHz		–2.5	dBm
		$IIP_3$3	f_{RFout} = 2.4 GHz		–4.0	dBm
SSB Noise Figure		SSB•NF1	f_{RFout} = 0.9 GHz, f_{IFin} = 240 MHz		9.5	dB
		SSB•NF2	f_{RFout} = 1.9 GHz, f_{IFin} = 240 MHz		10.4	dB
		SSB•NF3	f_{RFout} = 2.4 GHz, f_{IFin} = 240 MHz		10.6	dB
Power Save Response Time	Rise time	$T_{PS(rise)}$	V_{PS}: GND → V_{CC}		1	μs
	Fall time	$T_{PS(fall)}$	V_{PS}: V_{CC} → GND		1.5	μs

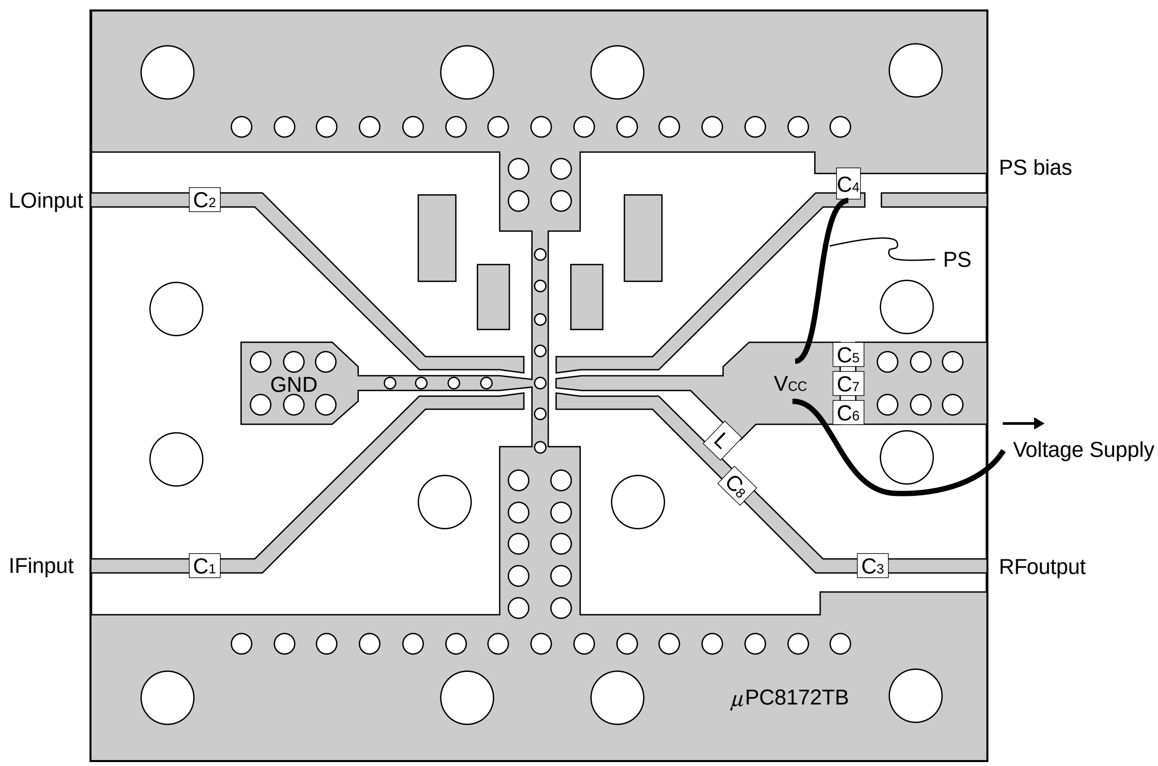
Note f_{RFout} < f_{LOin} @ f_{RFout} = 0.9 GHz
f_{LOin} < f_{RFout} @ f_{RFout} = 1.9 GHz/2.4 GHz

6. TEST CIRCUIT

★ 6.1 TEST CIRCUIT 1 (f_{RFout} = 900 MHz)



EXAMPLE OF TEST CIRCUIT 1 ASSEMBLED ON EVALUATION BOARD



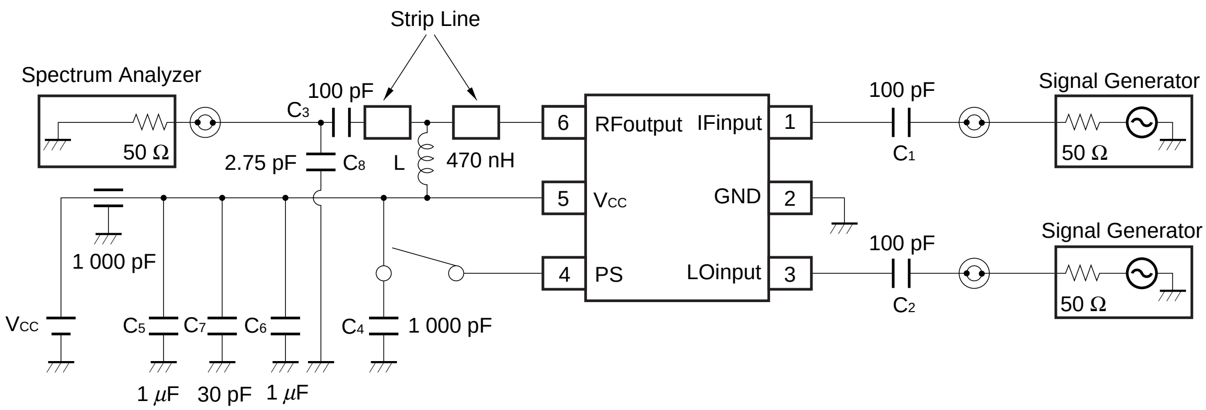
COMPONENT LIST

Form	Symbol	Value
Chip capacitor	C1, C2, C3	100 pF
	C4	1 000 pF
	C5, C6	1 μF
	C7	68 pF
	C8	1 pF
Chip inductor	L	10 nH Note

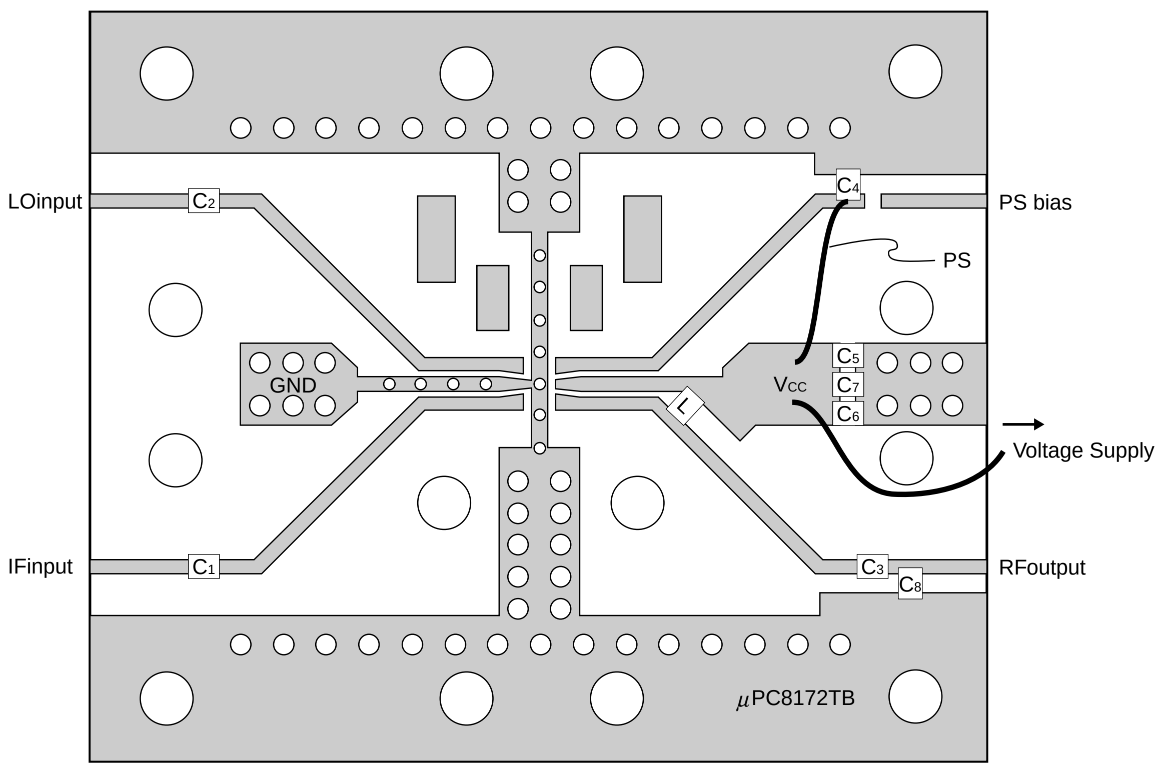
(∗1) 35 × 42 × 0.4 mm polyimide board, double-sided copper clad
(∗2) Ground pattern on rear of the board
(∗3) Solder plated patterns
(∗4) ○○◯: Through holes

Note 10 nH: LL1608-FH10N (TOKO Co., Ltd.)

★ 6.2 TEST CIRCUIT 2 (f_{RFout} = 1.9 GHz)



EXAMPLE OF TEST CIRCUIT 2 ASSEMBLED ON EVALUATION BOARD



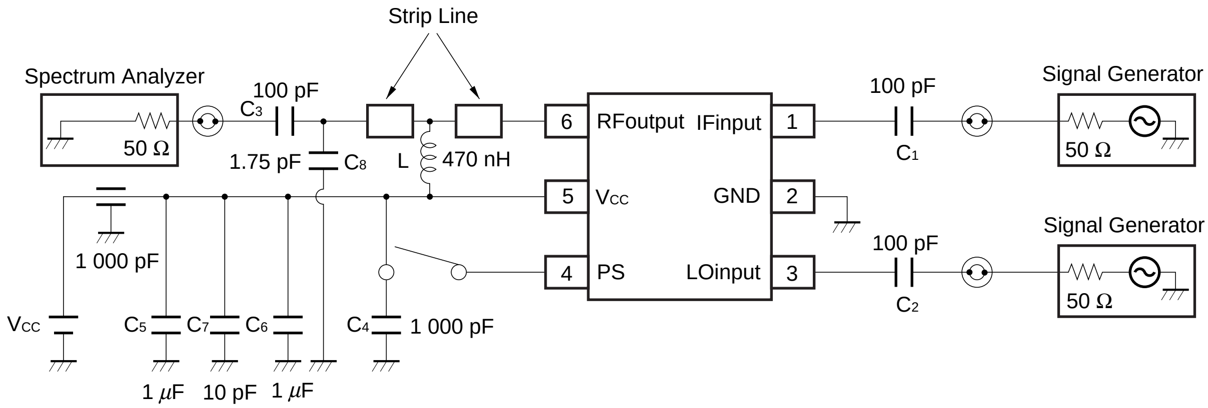
COMPONENT LIST

Form	Symbol	Value
Chip capacitor	C_1, C_2, C_3	100 pF
	C_4	1 000 pF
	C_5, C_6	1 μF
	C_7	30 pF
	C_8	2.75 pF
Chip inductor	L	470 nH[Note]

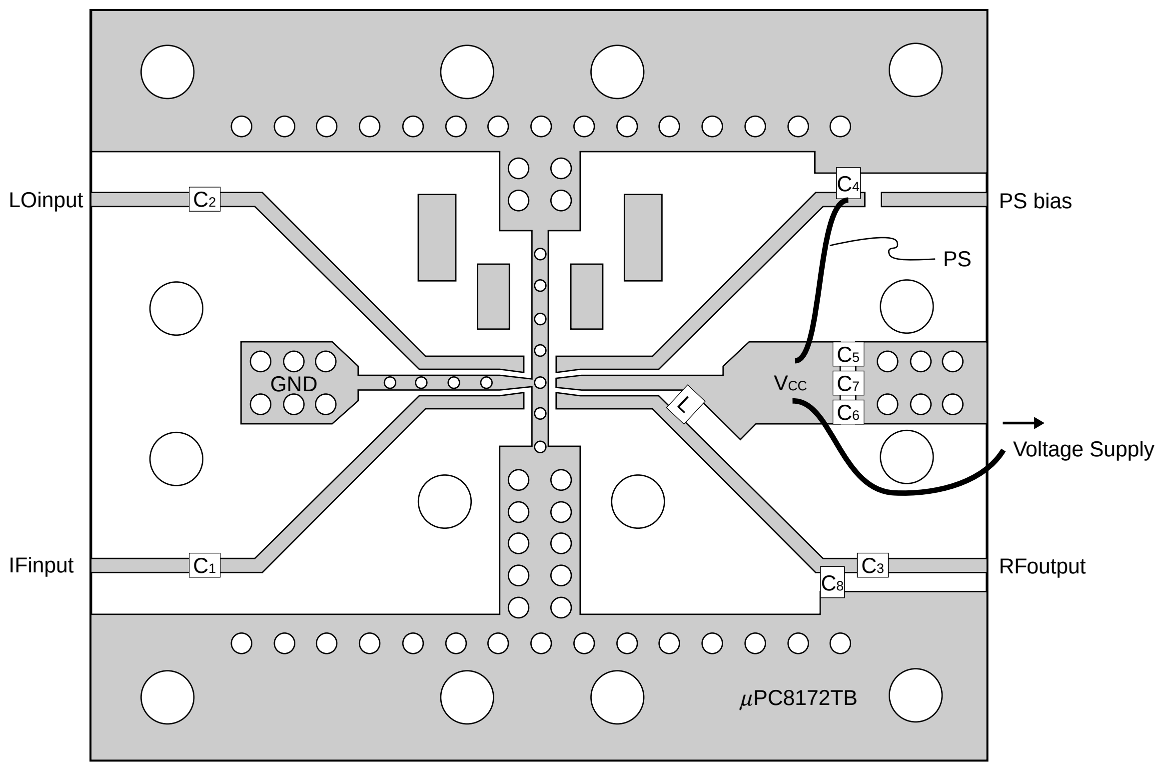
(∗1) 35 × 42 × 0.4 mm polyimide board, double-sided copper clad
(∗2) Ground pattern on rear of the board
(∗3) Solder plated patterns
(∗4) ∘ ○ ◯: Through holes

Note 470 nH: LL2012-FR47 (TOKO Co., Ltd.)

★ 6.3 TEST CIRCUIT 3 (f_{RFout} = 2.4 GHz)



EXAMPLE OF TEST CIRCUIT 3 ASSEMBLED ON EVALUATION BOARD



COMPONENT LIST

Form	Symbol	Value
Chip capacitor	C_1, C_2, C_3	100 pF
	C_4	1 000 pF
	C_5, C_6	1 μF
	C_7	10 pF
	C_8	1.75 pF
Chip inductor	L	470 nH[Note]

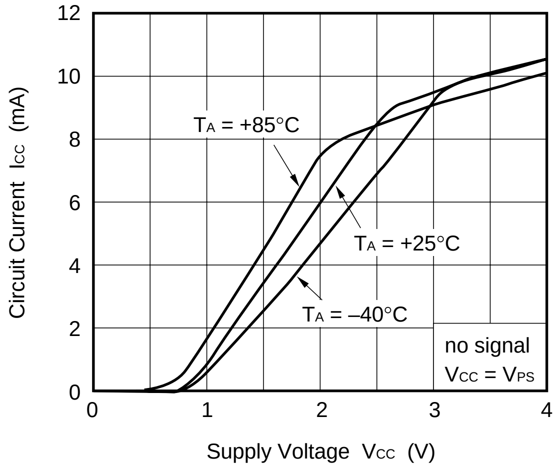
(∗1) 35 × 42 × 0.4 mm polyimide board, double-sided copper clad
(∗2) Ground pattern on rear of the board
(∗3) Solder plated patterns
(∗4) ○○◯: Through holes

Note 470 nH: LL2012-FR47 (TOKO Co., Ltd.)

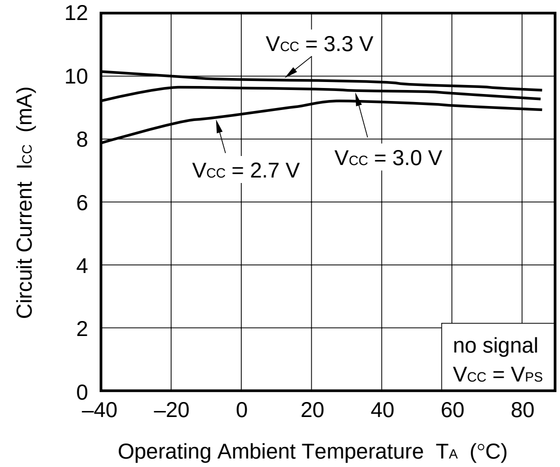
Caution The test circuits and board pattern on data sheet are for performance evaluation use only (They are not recommended circuits). In the case of actual design-in, matching circuit should be determined using S-parameter of desired frequency in accordance to actual mounting pattern.

★ 7. TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C, V_{CC} = V_{RFout})

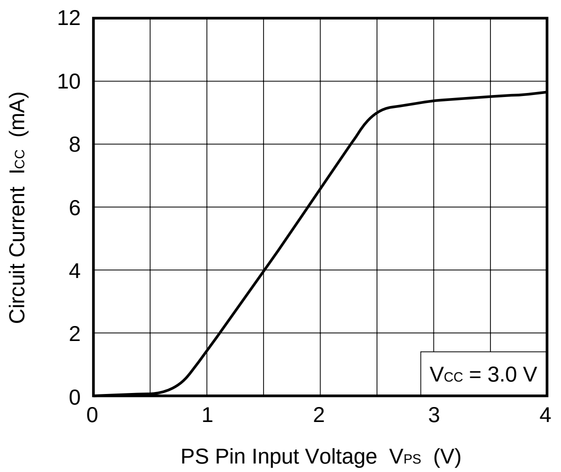
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



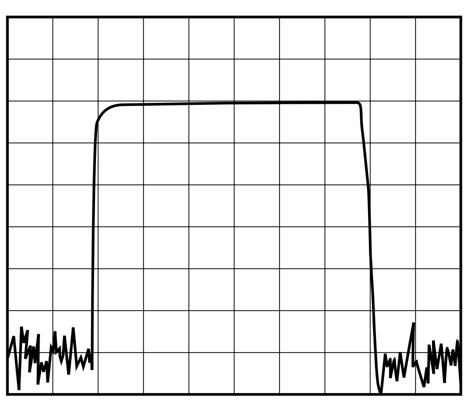
CIRCUIT CURRENT vs. OPERATING AMBIENT TEMPERATURE



CIRCUIT CURRENT vs. PS PIN INPUT VOLTAGE



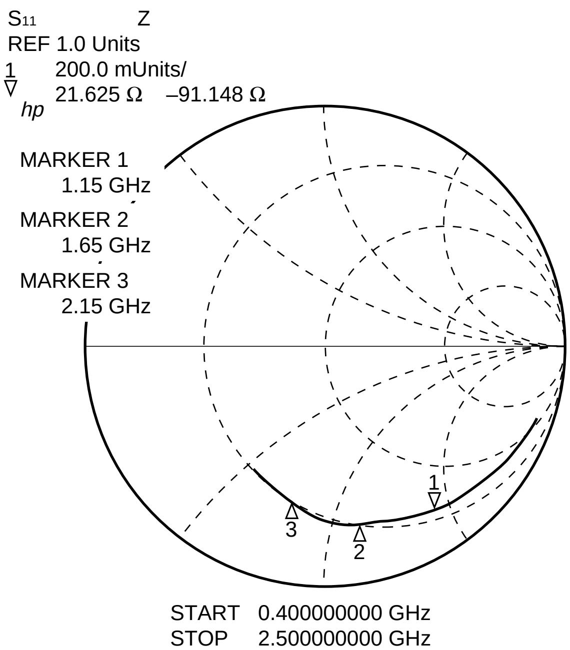
PS PIN CONTROL RESPONSE TIME



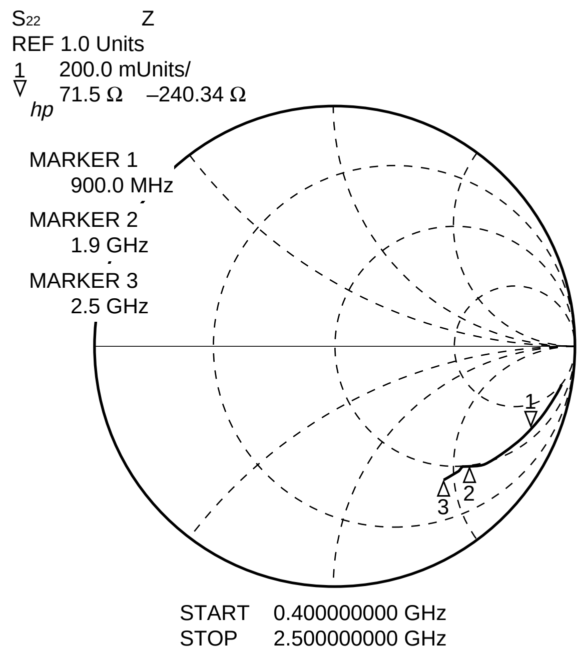
REF LVL = 0 dBm
ATT = 10 dB
10 dB/DIV (Vertical axis)
CENTER = 0.9 GHz
SPAN = 0 Hz
RBW = 3 MHz
VBW = 3 MHz
SWP = 50 μsec
5 μsec/DIV (Horizontal axis)

★ S-PARAMETERS FOR EACH PORT ($V_{CC} = V_{PS} = V_{RFout} = 3.0$ V)
(The parameters are monitored at DUT pins)

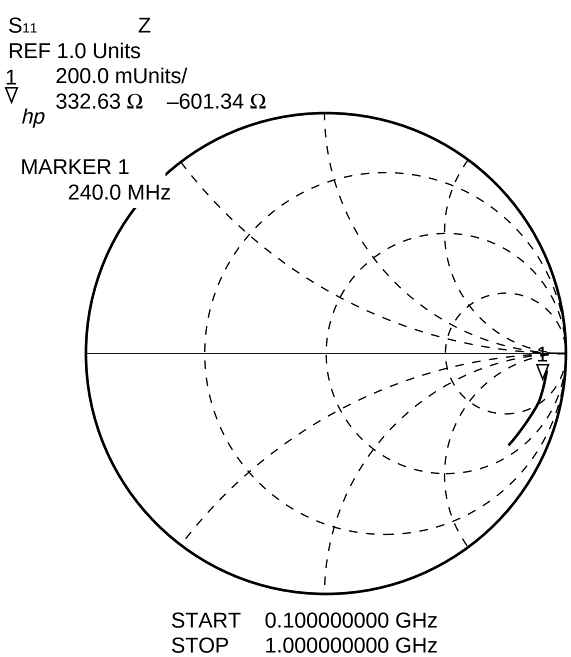
LO port



RF port (without matching)

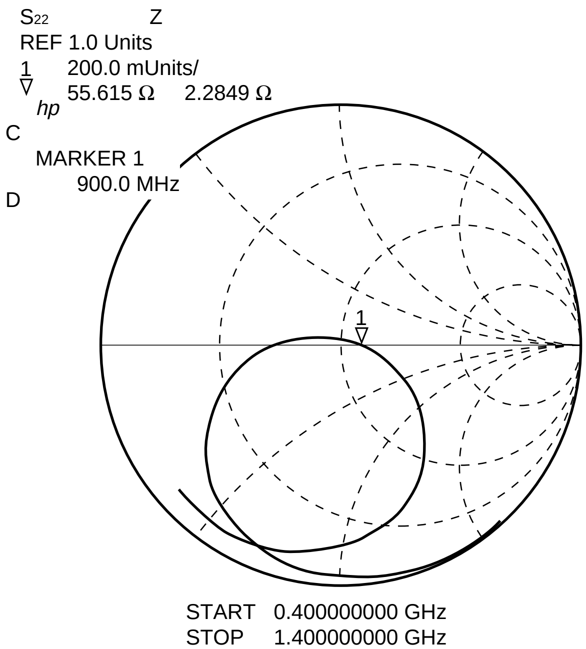


IF port

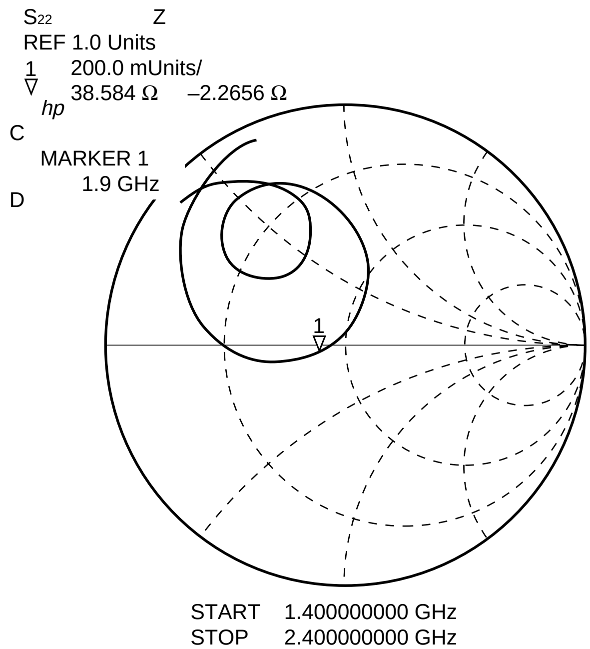


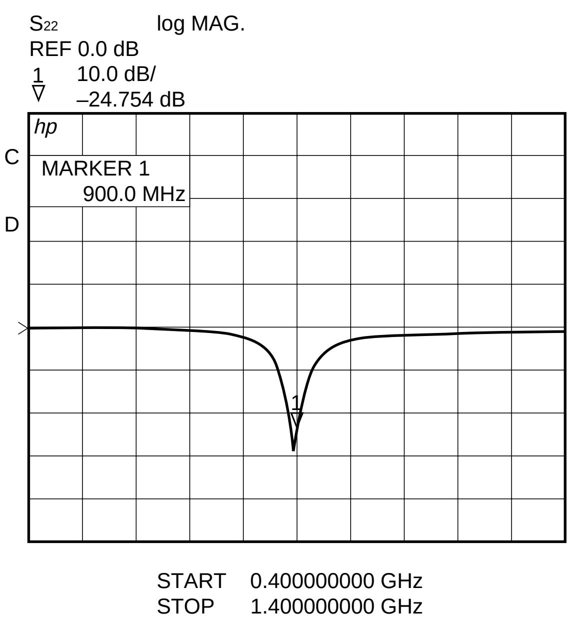
★ **S-PARAMETERS FOR MATCHED RF OUTPUT** ($V_{CC} = V_{PS} = V_{RFout} = 3.0$ V) –**ON EVALUATION BOARD**–
(S_{22} data are monitored at RF connector on board)

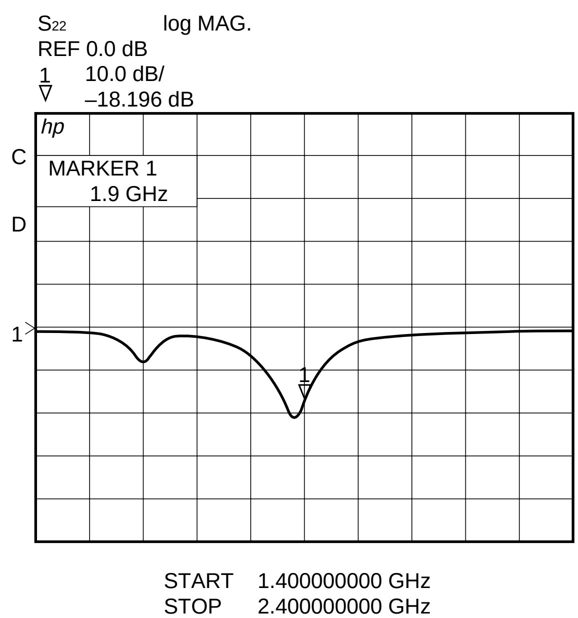
900 MHz (matched in test circuit 1)



1.9 GHz (matched in test circuit 2)

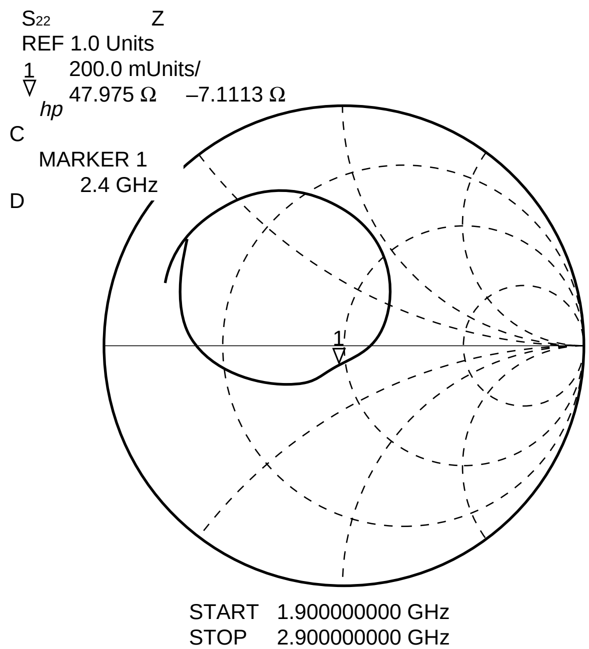


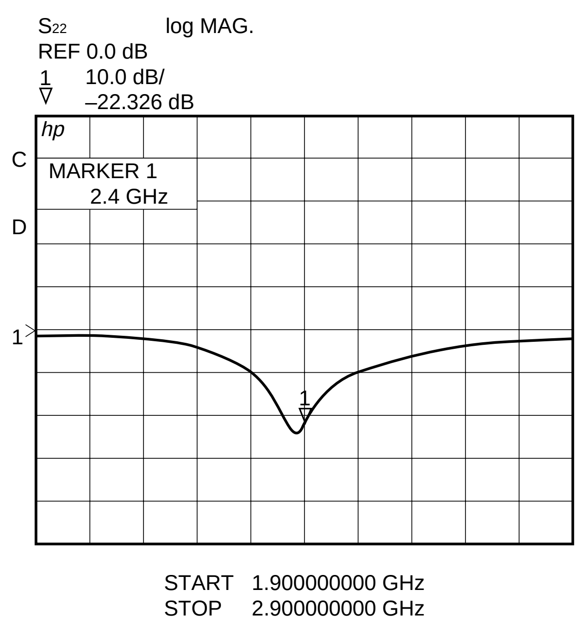


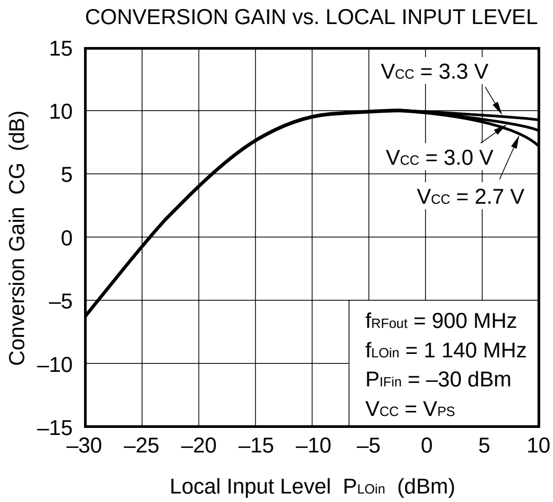


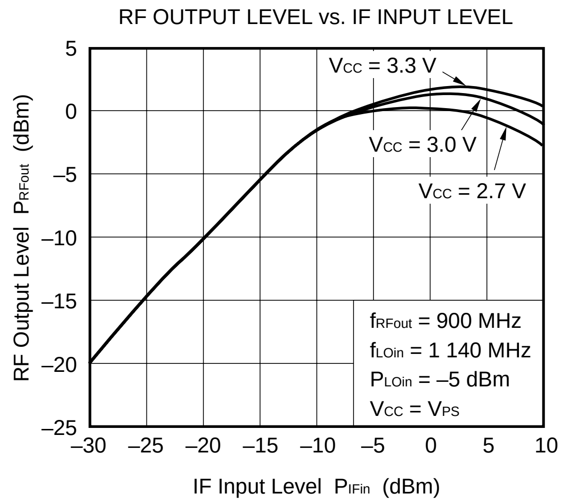
★ **S-PARAMETERS FOR MATCHED RF OUTPUT** ($V_{CC} = V_{PS} = V_{RFout} = 3.0$ V) **–ON EVALUATION BOARD–**
(S_{22} data are monitored at RF connector on board)

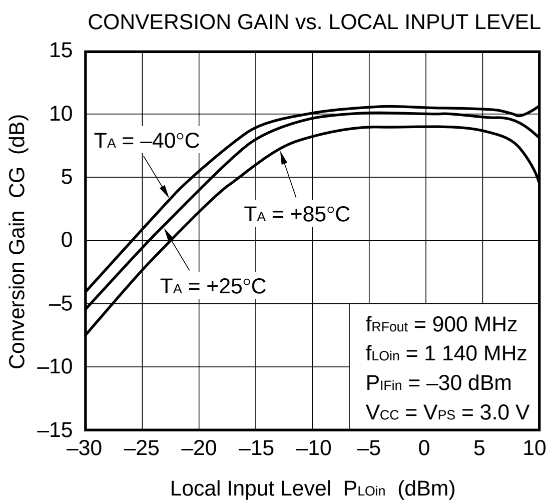
2.4 GHz (matched in test circuit 3)

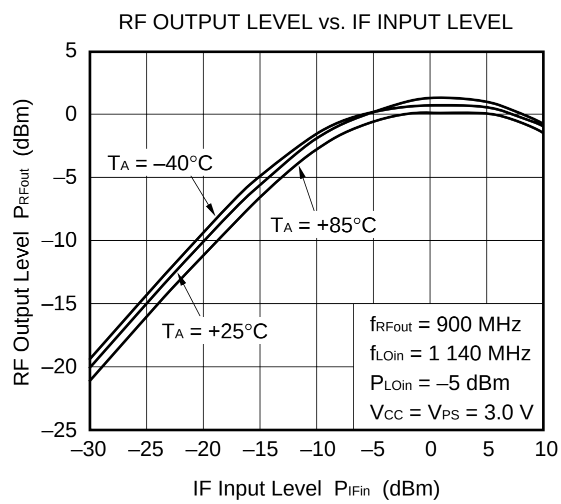




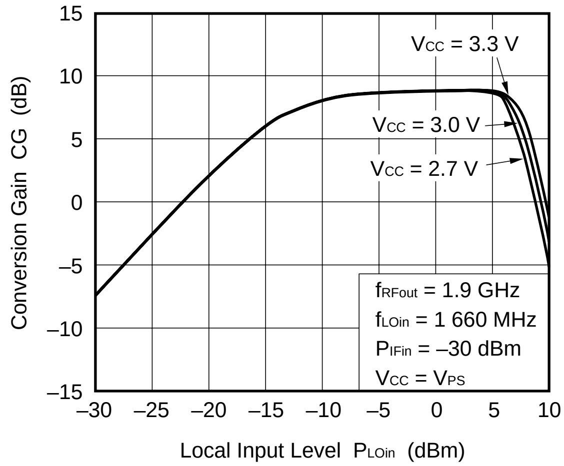

CONVERSION GAIN vs. LOCAL INPUT LEVEL
Conversion Gain CG (dB)
Local Input Level PLOin (dBm)
VCC = 3.3 V
VCC = 3.0 V
VCC = 2.7 V
fRFout = 900 MHz
fLOin = 1 140 MHz
PIFin = –30 dBm
VCC = VPS
15
10
5
0
–5
–10
–15
–30
–25
–20
–15
–10
–5
0
5
10


RF OUTPUT LEVEL vs. IF INPUT LEVEL
RF Output Level PRFout (dBm)
IF Input Level PIFin (dBm)
VCC = 3.3 V
VCC = 3.0 V
VCC = 2.7 V
fRFout = 900 MHz
fLOin = 1 140 MHz
PLOin = –5 dBm
VCC = VPS
5
0
–5
–10
–15
–20
–25
–30
–25
–20
–15
–10
–5
0
5
10

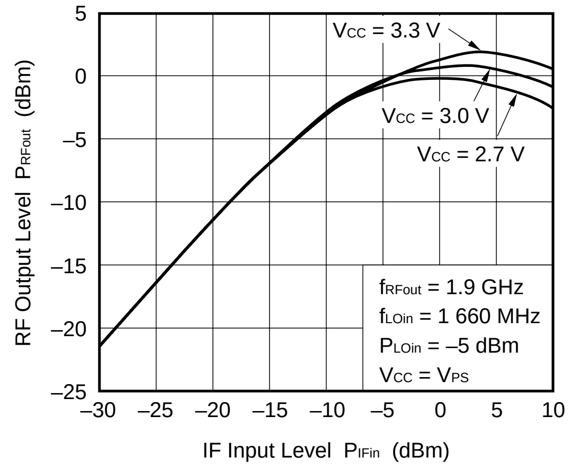

CONVERSION GAIN vs. LOCAL INPUT LEVEL
Conversion Gain CG (dB)
Local Input Level PLOin (dBm)
TA = –40°C
TA = +85°C
TA = +25°C
fRFout = 900 MHz
fLOin = 1 140 MHz
PIFin = –30 dBm
VCC = VPS = 3.0 V
15
10
5
0
–5
–10
–15
–30
–25
–20
–15
–10
–5
0
5
10


RF OUTPUT LEVEL vs. IF INPUT LEVEL
RF Output Level PRFout (dBm)
IF Input Level PIFin (dBm)
TA = –40°C
TA = +85°C
TA = +25°C
fRFout = 900 MHz
fLOin = 1 140 MHz
PLOin = –5 dBm
VCC = VPS = 3.0 V
5
0
–5
–10
–15
–20
–25
–30
–25
–20
–15
–10
–5
0
5
10

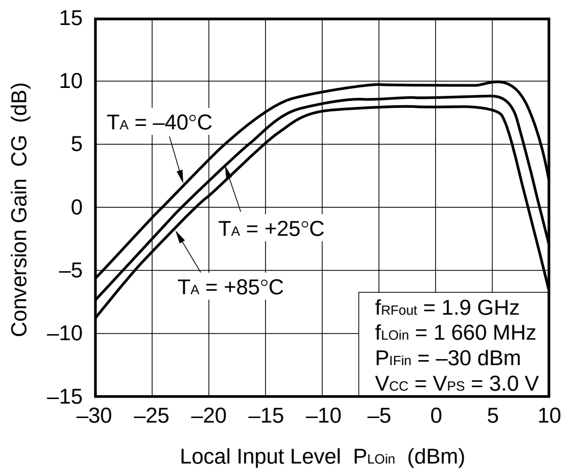
CONVERSION GAIN vs. LOCAL INPUT LEVEL



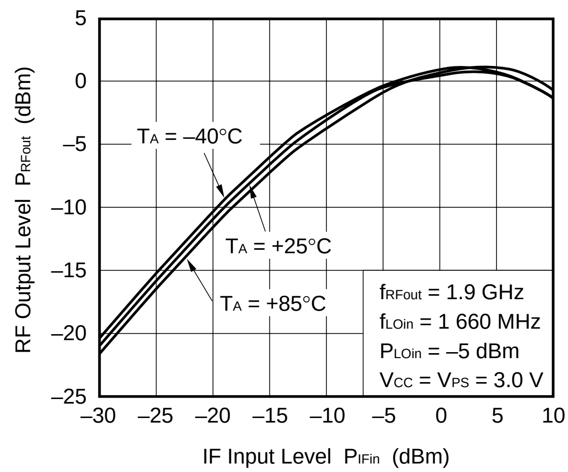
RF OUTPUT LEVEL vs. IF INPUT LEVEL

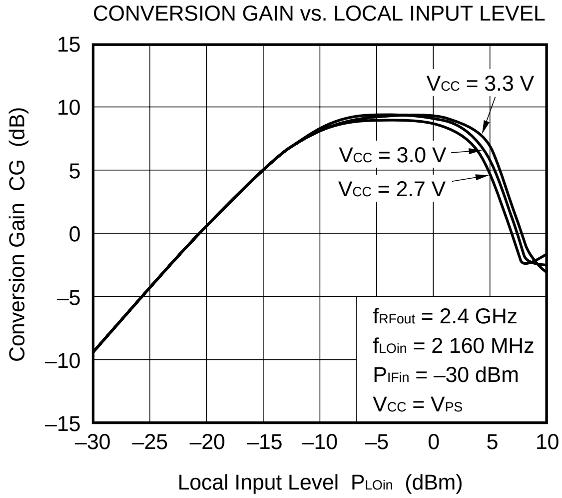


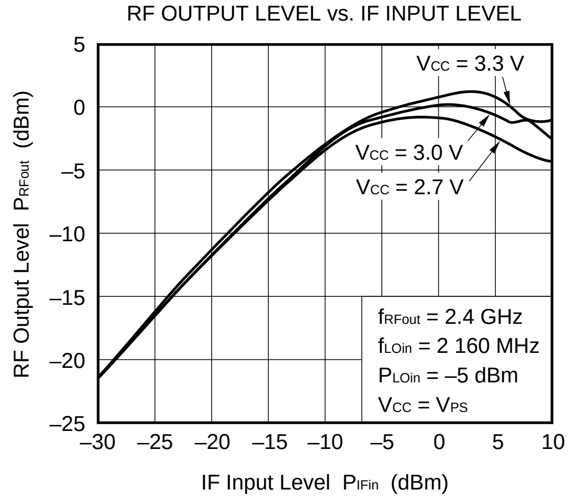
CONVERSION GAIN vs. LOCAL INPUT LEVEL

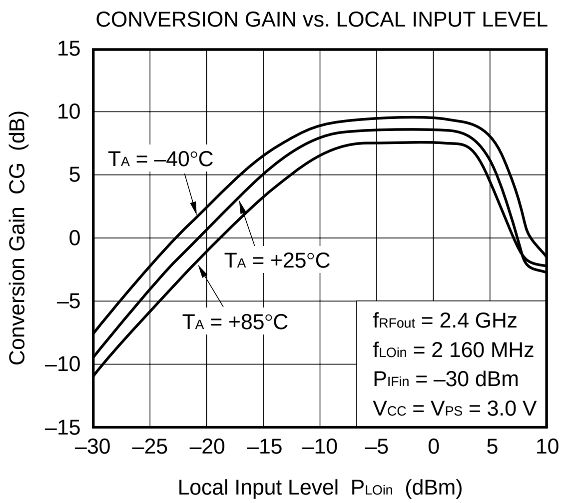


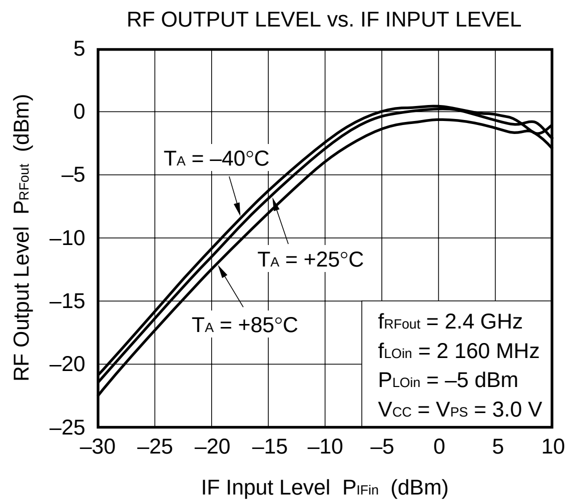
RF OUTPUT LEVEL vs. IF INPUT LEVEL



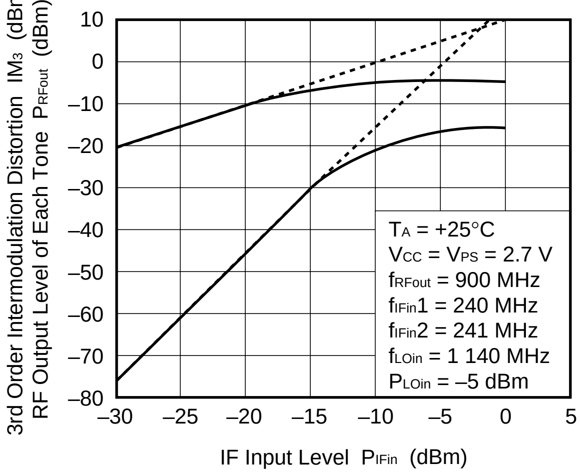

CONVERSION GAIN vs. LOCAL INPUT LEVEL
15
10
5
0
–5
–10
–15
–30 –25 –20 –15 –10 –5 0 5 10
Conversion Gain CG (dB)
Local Input Level PLOin (dBm)
VCC = 3.3 V
VCC = 3.0 V
VCC = 2.7 V
fRFout = 2.4 GHz
fLOin = 2 160 MHz
PIFin = –30 dBm
VCC = VPS


RF OUTPUT LEVEL vs. IF INPUT LEVEL
5
0
–5
–10
–15
–20
–25
–30 –25 –20 –15 –10 –5 0 5 10
RF Output Level PRFout (dBm)
IF Input Level PIFin (dBm)
VCC = 3.3 V
VCC = 3.0 V
VCC = 2.7 V
fRFout = 2.4 GHz
fLOin = 2 160 MHz
PLOin = –5 dBm
VCC = VPS

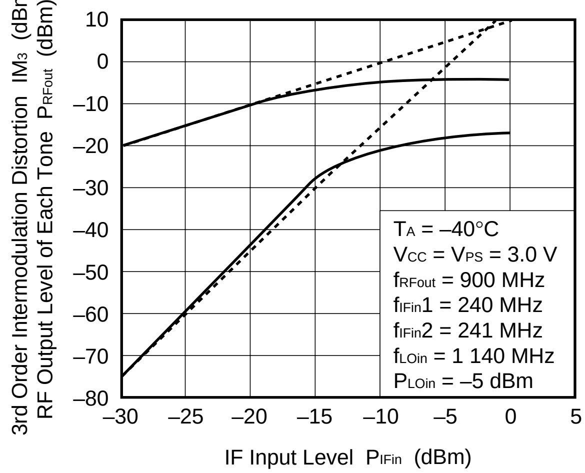

CONVERSION GAIN vs. LOCAL INPUT LEVEL
15
10
5
0
–5
–10
–15
–30 –25 –20 –15 –10 –5 0 5 10
Conversion Gain CG (dB)
Local Input Level PLOin (dBm)
TA = –40°C
TA = +25°C
TA = +85°C
fRFout = 2.4 GHz
fLOin = 2 160 MHz
PIFin = –30 dBm
VCC = VPS = 3.0 V


RF OUTPUT LEVEL vs. IF INPUT LEVEL
5
0
–5
–10
–15
–20
–25
–30 –25 –20 –15 –10 –5 0 5 10
RF Output Level PRFout (dBm)
IF Input Level PIFin (dBm)
TA = –40°C
TA = +25°C
TA = +85°C
fRFout = 2.4 GHz
fLOin = 2 160 MHz
PLOin = –5 dBm
VCC = VPS = 3.0 V

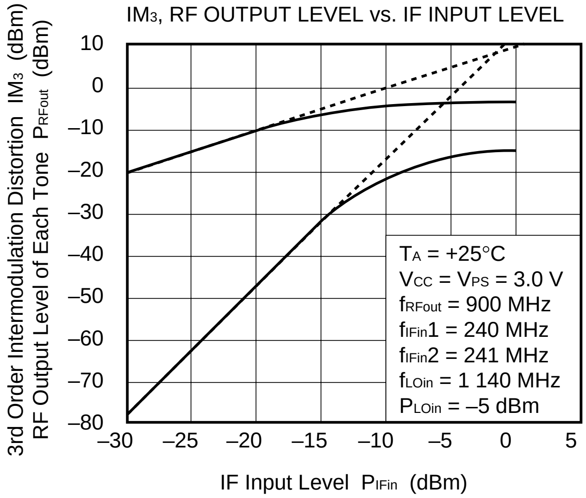
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



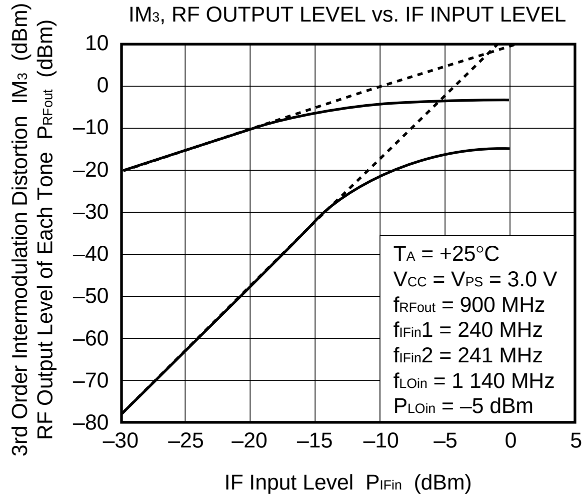
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



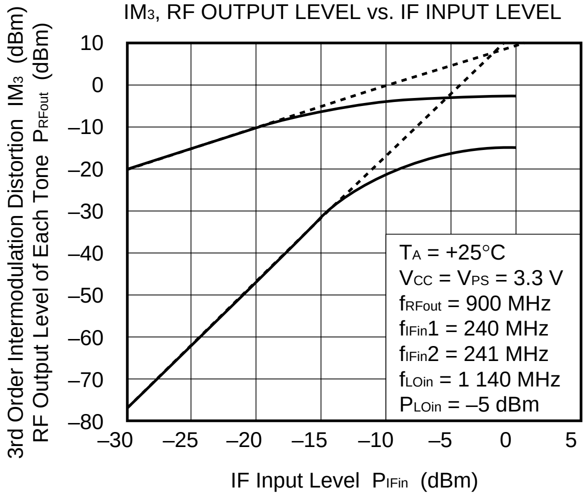
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



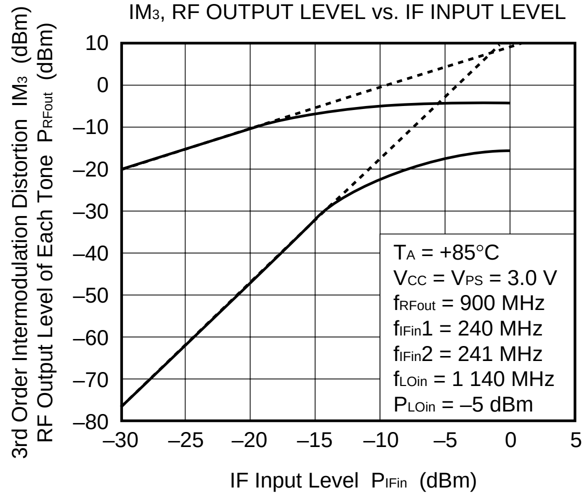
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



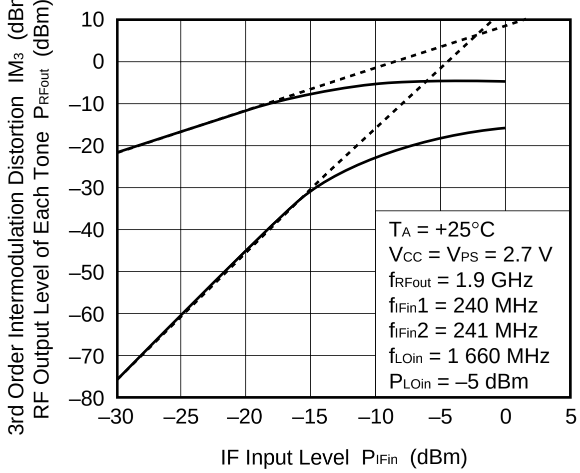
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



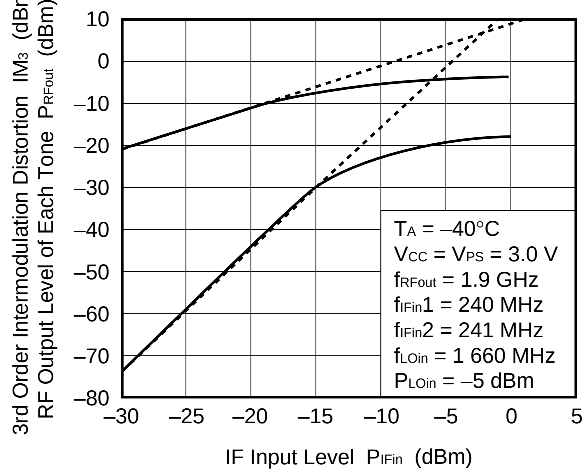
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



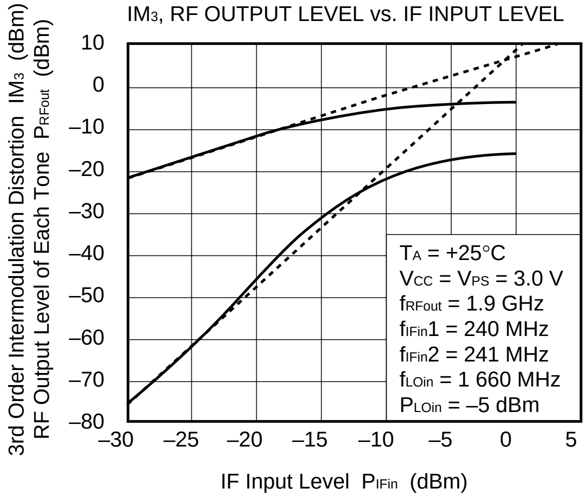
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



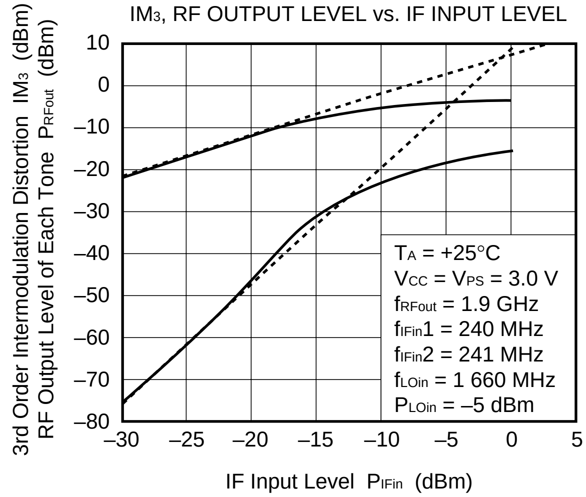
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



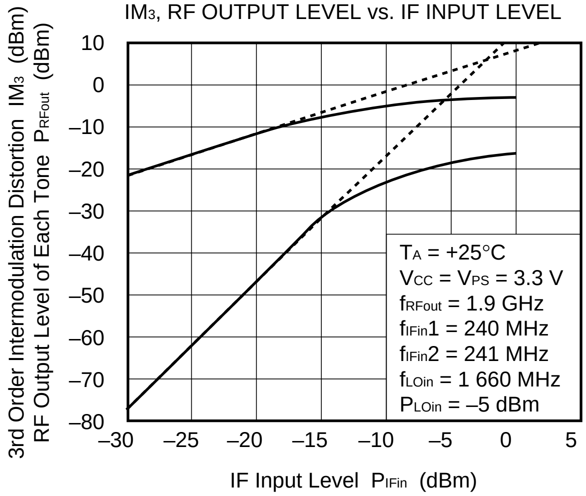
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



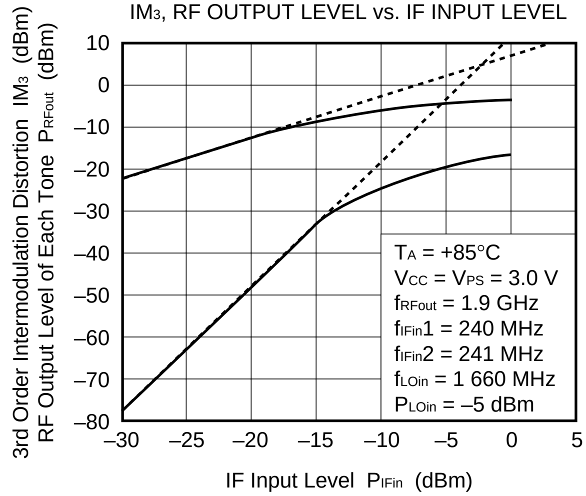
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



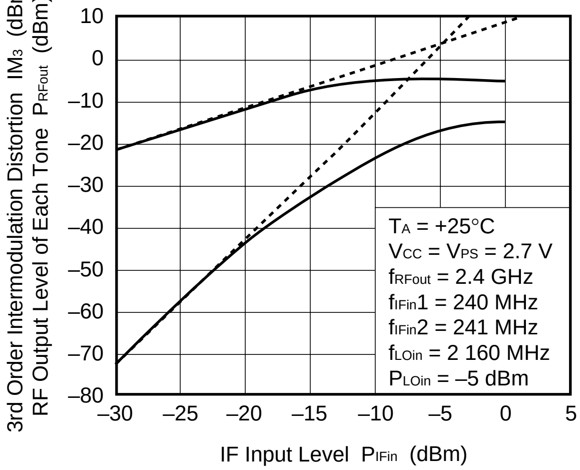
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



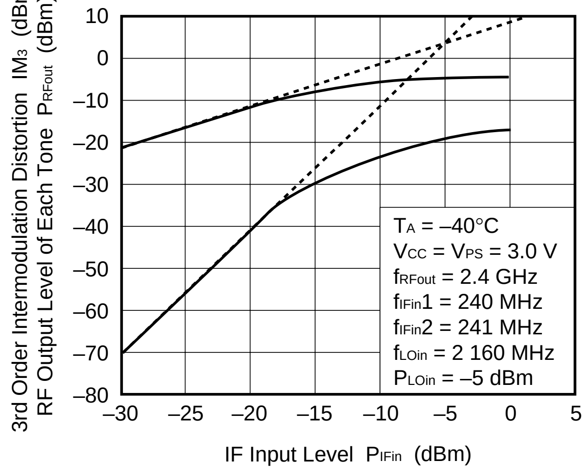
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



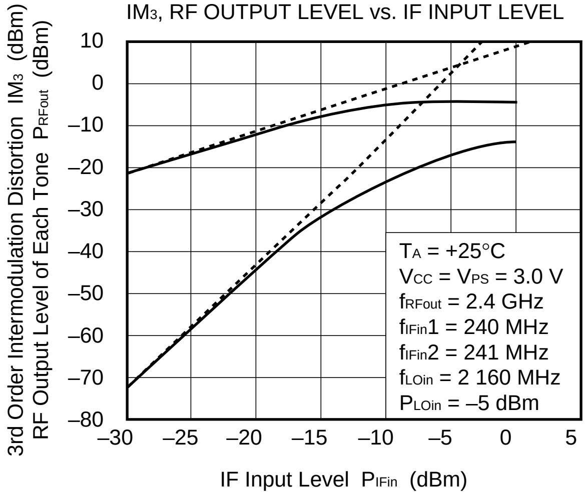
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



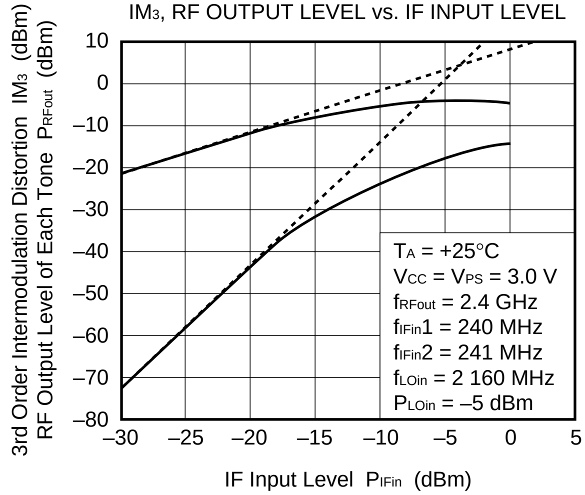
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



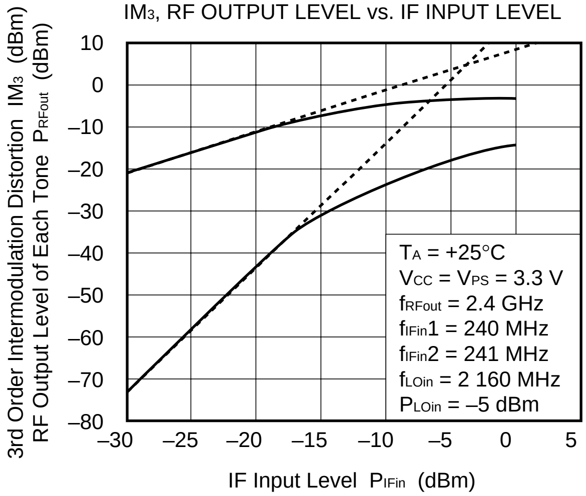
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL



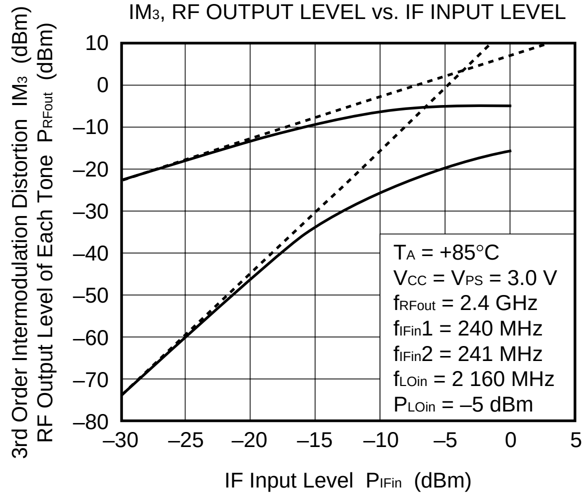
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL

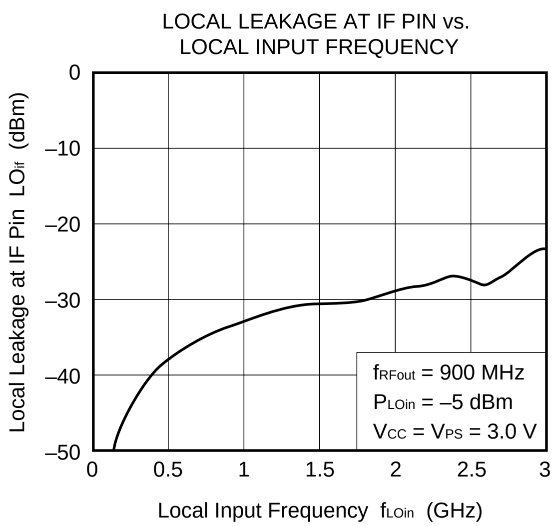


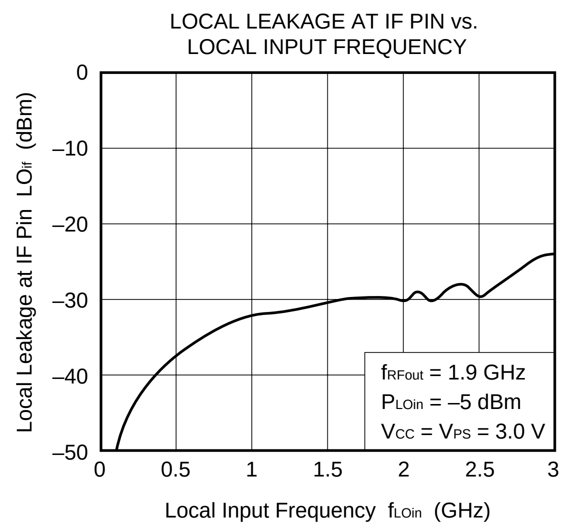
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL

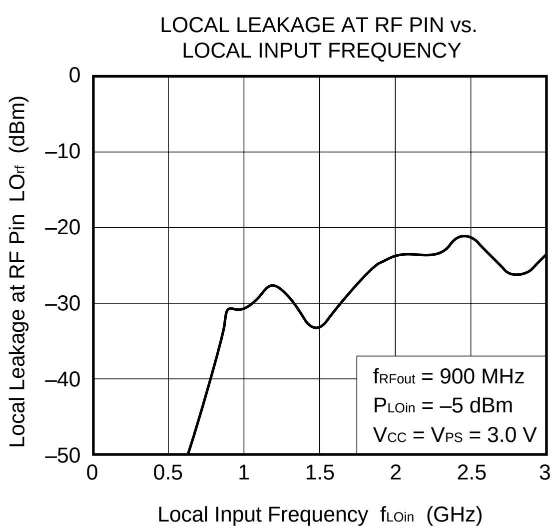


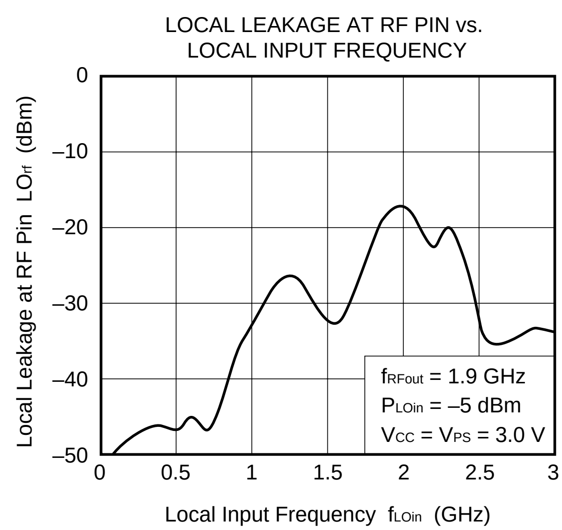
IM3, RF OUTPUT LEVEL vs. IF INPUT LEVEL

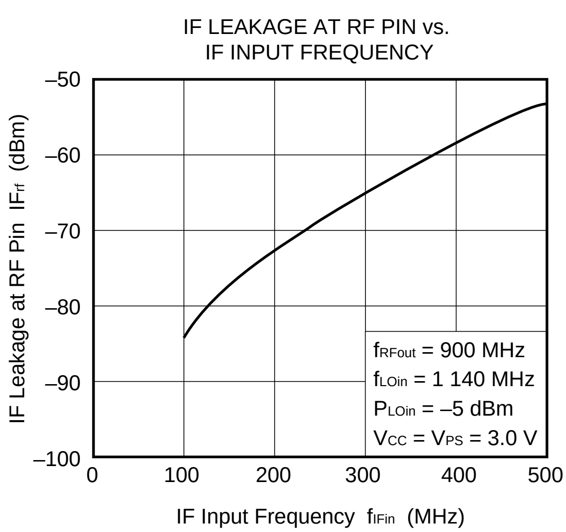


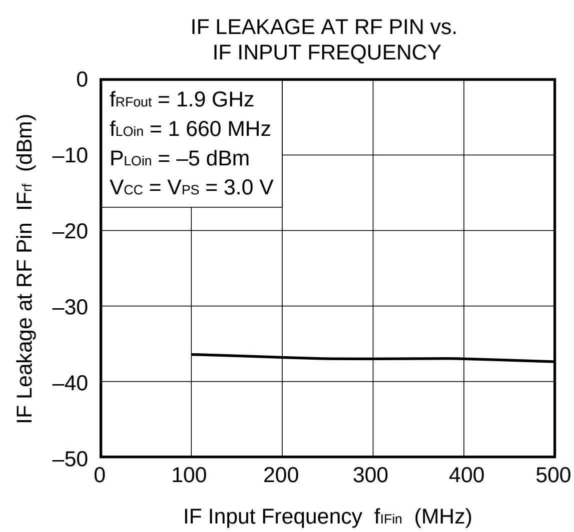

LOCAL LEAKAGE AT IF PIN vs.
LOCAL INPUT FREQUENCY
Local Leakage at IF Pin LOif (dBm)
Local Input Frequency fLOin (GHz)
fRFout = 900 MHz
PLOin = –5 dBm
VCC = VPS = 3.0 V
0
–10
–20
–30
–40
–50
0
0.5
1
1.5
2
2.5
3


LOCAL LEAKAGE AT IF PIN vs.
LOCAL INPUT FREQUENCY
Local Leakage at IF Pin LOif (dBm)
Local Input Frequency fLOin (GHz)
fRFout = 1.9 GHz
PLOin = –5 dBm
VCC = VPS = 3.0 V
0
–10
–20
–30
–40
–50
0
0.5
1
1.5
2
2.5
3

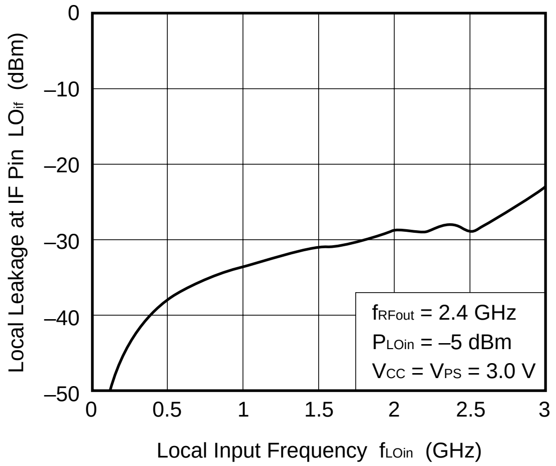

LOCAL LEAKAGE AT RF PIN vs.
LOCAL INPUT FREQUENCY
Local Leakage at RF Pin LOrf (dBm)
Local Input Frequency fLOin (GHz)
fRFout = 900 MHz
PLOin = –5 dBm
VCC = VPS = 3.0 V
0
–10
–20
–30
–40
–50
0
0.5
1
1.5
2
2.5
3


LOCAL LEAKAGE AT RF PIN vs.
LOCAL INPUT FREQUENCY
Local Leakage at RF Pin LOrf (dBm)
Local Input Frequency fLOin (GHz)
fRFout = 1.9 GHz
PLOin = –5 dBm
VCC = VPS = 3.0 V
0
–10
–20
–30
–40
–50
0
0.5
1
1.5
2
2.5
3

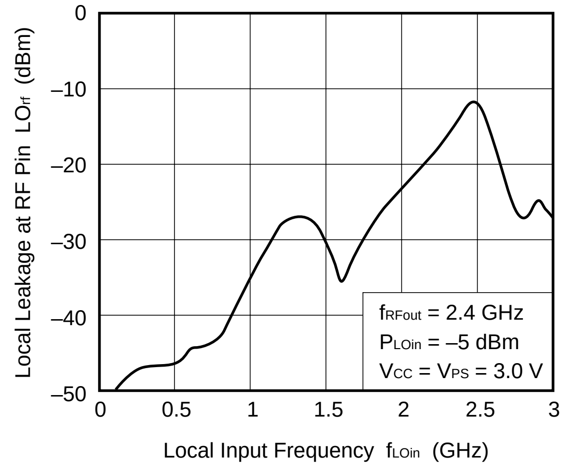

IF LEAKAGE AT RF PIN vs.
IF INPUT FREQUENCY
IF Leakage at RF Pin IFrf (dBm)
IF Input Frequency fIFin (MHz)
fRFout = 900 MHz
fLOin = 1 140 MHz
PLOin = –5 dBm
VCC = VPS = 3.0 V
–50
–60
–70
–80
–90
–100
0
100
200
300
400
500


IF LEAKAGE AT RF PIN vs.
IF INPUT FREQUENCY
IF Leakage at RF Pin IFrf (dBm)
IF Input Frequency fIFin (MHz)
fRFout = 1.9 GHz
fLOin = 1 660 MHz
PLOin = –5 dBm
VCC = VPS = 3.0 V
0
–10
–20
–30
–40
–50
0
100
200
300
400
500

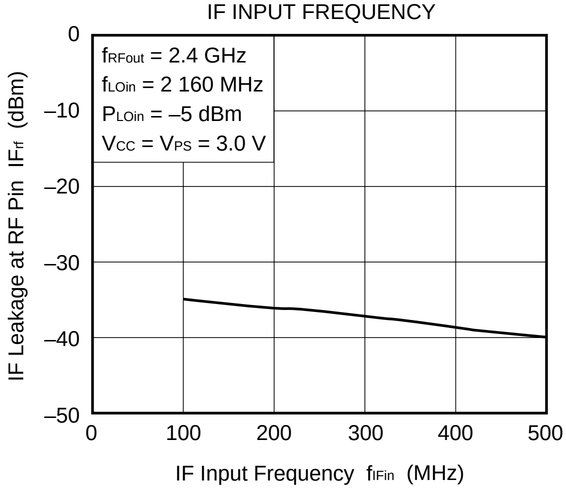
LOCAL LEAKAGE AT IF PIN vs.
LOCAL INPUT FREQUENCY



LOCAL LEAKAGE AT RF PIN vs.
LOCAL INPUT FREQUENCY



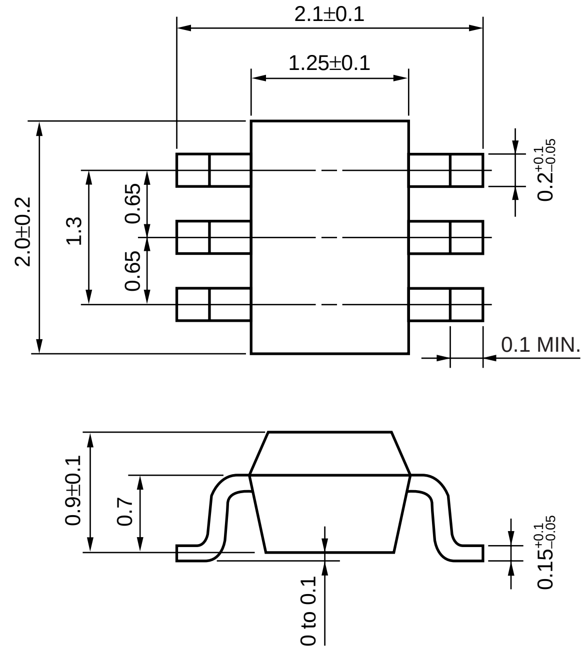
IF LEAKAGE AT RF PIN vs.
IF INPUT FREQUENCY



Remark The graphs indicate nominal characteristics.

★ 8. PACKAGE DIMENSIONS

6-PIN SUPER MINIMOLD (UNIT: mm)



9. NOTE ON CORRECT USE

(1) Observe precautions for handling because of electrostatic sensitive devices.
(2) Form a ground pattern as wide as possible to minimize ground impedance (to prevent undesired oscillation).
(3) Connect a bypass capacitor (example: 1 000 pF) to the V_{CC} pin.
(4) Connect a matching circuit to the RF output pin.
(5) The DC cut capacitor must be each attached to the input and output pins.

10. RECOMMENDED SOLDERING CONDITIONS

This product should be soldered under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your NEC sales representative.

Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared Reflow	Package peak temperature: 235°C or below Time: 30 seconds or less (at 210°C) Count: 3, Exposure limit: None[Note]	IR35-00-3
VPS	Package peak temperature: 215°C or below Time: 40 seconds or less (at 200°C) Count: 3, Exposure limit: None[Note]	VP15-00-3
Wave Soldering	Soldering bath temperature: 260°C or below Time: 10 seconds or less Count: 1, Exposure limit: None[Note]	WS60-00-1
Partial Heating	Pin temperature: 300°C Time: 3 seconds or less (per side of device) Exposure limit: None[Note]	–

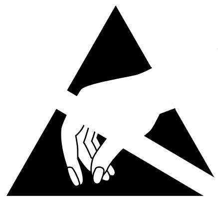
Note After opening the dry pack, keep it in a place below 25°C and 65% RH for the allowable storage period.

Caution Do not use different soldering methods together (except for partial heating).

For details of recommended soldering conditions for surface mounting, refer to information document SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL (C10535E).

[MEMO]

[MEMO]



ATTENTION

OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES