Chipsmall

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BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC8179TK

3 V SILICON MMIC LOW CURRENT AMPLIFIER
FOR MOBILE COMMUNICATIONS

DESCRIPTION

The μPC8179TK is a silicon monolithic integrated circuit designed as amplifier for mobile communications. This IC can realize low current consumption with external chip inductor which can not be realized on internal 50 Ω wide band matched IC. μPC8179TK adopts 6-pin lead-less minimold package using same chip as the conventional μPC8179TB in 6-pin super minimold.

TK suffix IC which is smaller package than TB suffix IC contributes to reduce mounting space by 50%.

This IC is manufactured using our 30 GHz f_{max} UHS0 (Ultra High Speed Process) silicon bipolar process.

FEATURES

- Low current consumption   : I_{CC} = 4.0 mA TYP. @ V_{CC} = 3.0 V
- Supply voltage   : V_{CC} = 2.4 to 3.3 V
- Excellent isolation   : ISL = 43.0 dB TYP. @ f = 1.0 GHz
                                                 ISL = 42.0 dB TYP. @ f = 1.9 GHz
                                                 ISL = 42.0 dB TYP. @ f = 2.4 GHz
- Power gain   : G_P = 13.5 dB TYP. @ f = 1.0 GHz
                                                 G_P = 15.5 dB TYP. @ f = 1.9 GHz
                                                 G_P = 16.0 dB TYP. @ f = 2.4 GHz
- Gain 1 dB compression output power : $P_{O\,(1\,dB)}$ = +2.0 dBm TYP. @ f = 1.0 GHz
                                                 $P_{O\,(1\,dB)}$ = +0.5 dBm TYP. @ f = 1.9 GHz
                                                 $P_{O\,(1\,dB)}$ = +0.5 dBm TYP. @ f = 2.4 GHz
- Operating frequency   : 0.1 to 2.4 GHz (Output port LC matching)
- High-density surface mounting   : 6-pin lead-less minimold package (1.5 $\times$ 1.3 $\times$ 0.55 mm)
- Light weight   : 3 mg (Standard value)

APPLICATION

- Buffer amplifiers on 0.1 to 2.4 GHz mobile communications system

Caution: Observe precautions when handling because these devices are sensitive to electrostatic discharge

The mark ★ shows major revised points.

♣ ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPC8179TK-E2	μPC8179TK-E2-A	6-pin lead-less minimold (1511) (Pb-Free) **Note**	6C	• Embossed tape 8 mm wide • Pin 1, 6 face the perforation side of the tape • Qty 5 kpcs/reel

Note With regards to terminal solder (the solder contains lead) plated products (conventionally plated), contact your nearby sales office.

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPC8179TK-A

PRODUCT LINE-UP (T_A = +25°C, V_{CC} = V_{out} = 3.0 V, Z_S = Z_L = 50 Ω)

Parameter Part No.	I_{CC} (mA)	1.0 GHz output port matching frequency			1.66 GHz output port matching frequency			1.9 GHz output port matching frequency			2.4 GHz output port matching frequency			Marking
		G_P (dB)	ISL (dB)	$P_{O\,(1dB)}$ (dBm)	G_P (dB)	ISL (dB)	$P_{O\,(1dB)}$ (dBm)	G_P (dB)	ISL (dB)	$P_{O\,(1dB)}$ (dBm)	G_P (dB)	ISL (dB)	$P_{O\,(1dB)}$ (dBm)	
μPC8178TB	1.9	11.0	39.0	−4.0	–	–	–	11.5	40.0	−7.0	11.5	38.0	−7.5	C3B
μPC8178TK	1.9	11.0	40.0	−5.5	–	–	–	11.0	41.0	−8.0	11.0	42.0	−8.0	6B
μPC8179TB	4.0	13.5	44.0	+3.0	–	–	–	15.5	42.0	+1.5	15.5	41.0	+1.0	C3C
μPC8179TK	4.0	13.5	43.0	+2.0	–	–	–	15.5	42.0	+0.5	16.0	42.0	+0.5	6C
μPC8128TB	2.8	12.5	39.0	−4.0	13.0	39.0	−4.0	13.0	37.0	−4.0	–	–	–	C2P
μPC8151TB	4.2	12.5	38.0	+2.5	15.0	36.0	+1.5	15.0	34.0	+0.5	–	–	–	C2U
μPC8152TB	5.6	23.0	40.0	−4.5	19.5	38.0	−8.5	17.5	35.0	−8.5	–	–	–	C2V

Remarks 1. Typical performance. Please refer to **ELECTRICAL CHARACTERISTICS** in detail.
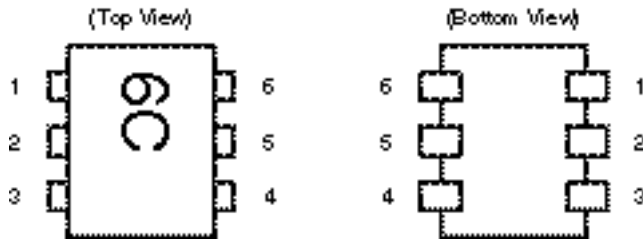   **2.** To know the associated product, please refer to each latest data sheet.

SYSTEM APPLICATION EXAMPLE

Location examples in digital cellular
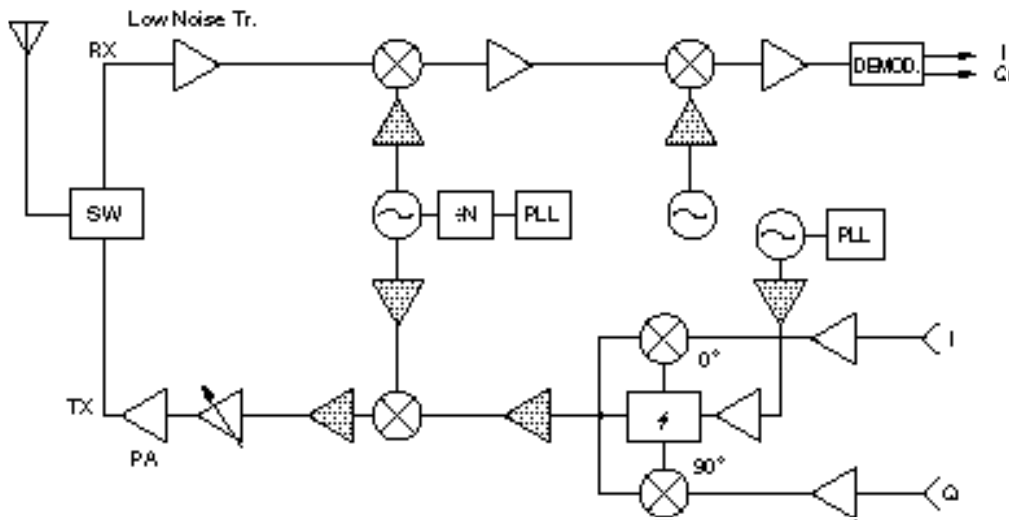
These ICs can be added to your system around ⚎ parts, when you need more isolation or gain. The application herein, however, shows only examples, therefore the application can depend on your kit evaluation.

PIN CONNECTIONS

Pin No.	Pin Name
1	INPUT
2	GND
3	GND
4	OUTPUT
5	GND
6	V_{CC}

PIN EXPLANATION

Pin No.	Pin Name	Applied Voltage (V)	Pin Voltage (V)[Note]	Function and Applications	Internal Equivalent Circuit
1	INPUT	–	0.90	Signal input pin. A internal matching circuit, configured with resisters, enables 50 Ω connection over a wide band. This pin must be coupled to signal source with capacitor for DC cut.	
2 3 5	GND	0	–	Ground pin. This pin should be connected to system ground with minimum inductance. Ground pattern on the board should be formed as wide as possible. All the ground pins must be connected together with wide ground pattern to decrease impedance defference.	
4	OUTPUT	Voltage as same as V_{CC} through external inductor	–	Signal output pin. This pin is designed as collector output. Due to the high impedance output, this pin should be externally equipped with LC matching circuit to next stage. For L, a size 1 005 chip inductor can be chosen.	
6	V_{CC}	2.4 to 3.3	–	Power supply pin. This pin should be externally equipped with bypass capacitor to minimize its impedance.	

Note Pin voltage is measured at V_{CC} = 3.0 V.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Test Conditions	Ratings	Unit
Supply Voltage	V$_{CC}$	T$_A$ = +25°C, Pin 4, Pin 6	3.6	V
Circuit Current	I$_{CC}$	T$_A$ = +25°C	15	mA
Power Dissipation	P$_D$	T$_A$ = +85°C **Note**	232	mW
Operating Ambient Temperature	T$_A$		−40 to +85	°C
Storage Temperature	T$_{stg}$		−55 to +150	°C
Input Power	P$_{in}$	T$_A$ = +25°C	+5	dBm

Note Mounted on double-sided copper-clad 50 × 50 × 1.6 mm epoxy glass PWB

RECOMMENDED OPERATING RANGE

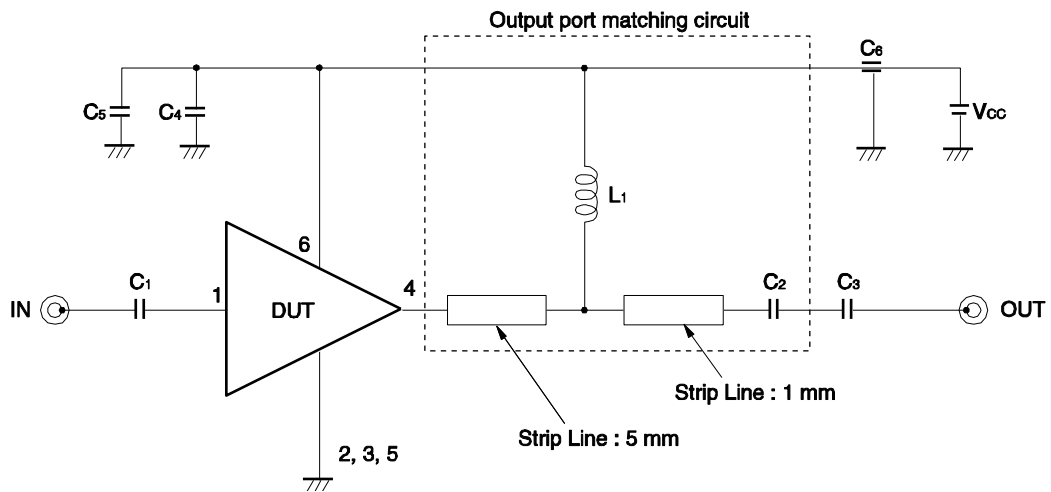| Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Supply Voltage	V$_{CC}$	2.4	3.0	3.3	V	The same voltage should be applied to pin 4 and pin 6.
Operating Ambient Temperature	T$_A$	−40	+25	+85	°C	

ELECTRICAL CHARACTERISTICS
(Unless otherwise specified, T$_A$ = +25°C, V$_{CC}$ = V$_{out}$ = 3.0 V, Z$_S$ = Z$_L$ = 50 Ω, at LC matched frequency)
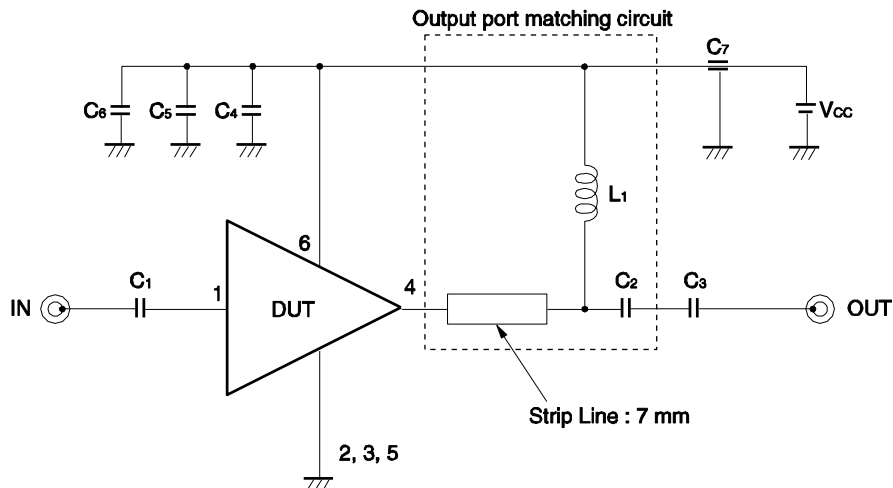
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	I$_{CC}$	No signal	2.9	4.0	5.4	mA
Power Gain	G$_P$	f = 1.0 GHz, P$_{in}$ = −30 dBm	11.0	13.5	15.5	dB
		f = 1.9 GHz, P$_{in}$ = −30 dBm	13.0	15.5	17.5	
		f = 2.4 GHz, P$_{in}$ = −30 dBm	14.0	16.0	18.5	
Isolation	ISL	f = 1.0 GHz, Pin = −30 dBm	39.0	43.0	−	dB
		f = 1.9 GHz, Pin = −30 dBm	37.0	42.0	−	
		f = 2.4 GHz, Pin = −30 dBm	37.0	42.0	−	
Gain 1 dB Compression Output Power	P$_{O (1 dB)}$	f = 1.0 GHz	−0.5	+2.0	−	dBm
		f = 1.9 GHz	−2.0	+0.5	−	
		f = 2.4 GHz	−3.0	+0.5	−	
Noise Figure	NF	f = 1.0 GHz	−	5.0	6.5	dB
		f = 1.9 GHz	−	5.0	6.5	
		f = 2.4 GHz	−	5.0	6.5	
Input Return Loss	RL$_{in}$	f = 1.0 GHz, Pin = −30 dBm	4.0	7.0	−	dB
		f = 1.9 GHz, Pin = −30 dBm	4.0	7.0	−	
		f = 2.4 GHz, Pin = −30 dBm	6.0	9.0	−	

■ **TEST CIRCUITS**

<1> f = 1.0 GHz

Output port matching circuit

C5 C4 C6 Vcc

L1

6

IN C1 1 DUT 4 C2 C3 OUT

Strip Line : 1 mm

Strip Line : 5 mm

2, 3, 5

<2> f = 1.9 GHz

Output port matching circuit

C6 C5 C4 C7 Vcc

L1

6

IN C1 1 DUT 4 C2 C3 OUT

Strip Line : 7 mm

2, 3, 5

<3> f = 2.4 GHz

Output port matching circuit

C5 C4 C3 C6 Vcc

L2

6

IN C1 1 DUT 4 L1 C2 OUT

Strip Line : 4 mm

Strip Line : 3 mm

2, 3, 5
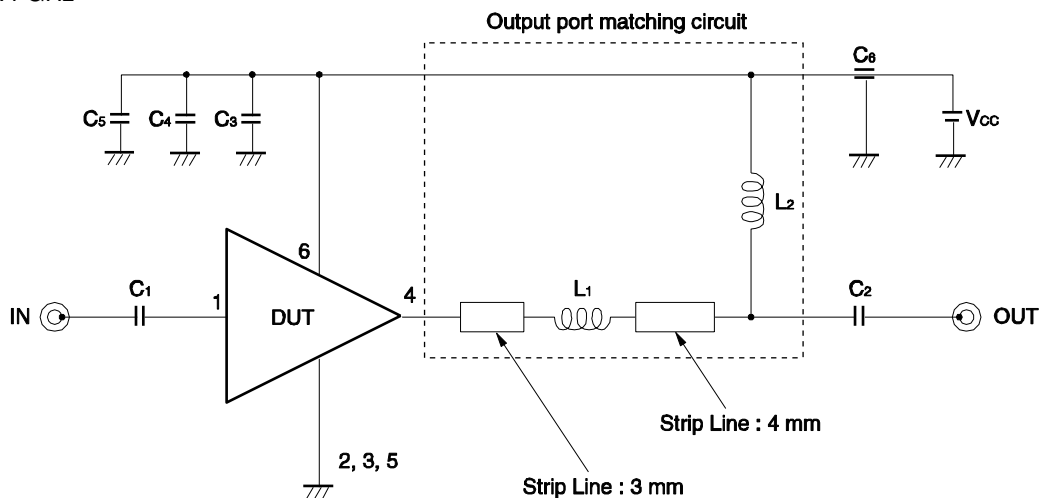
● **ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD**
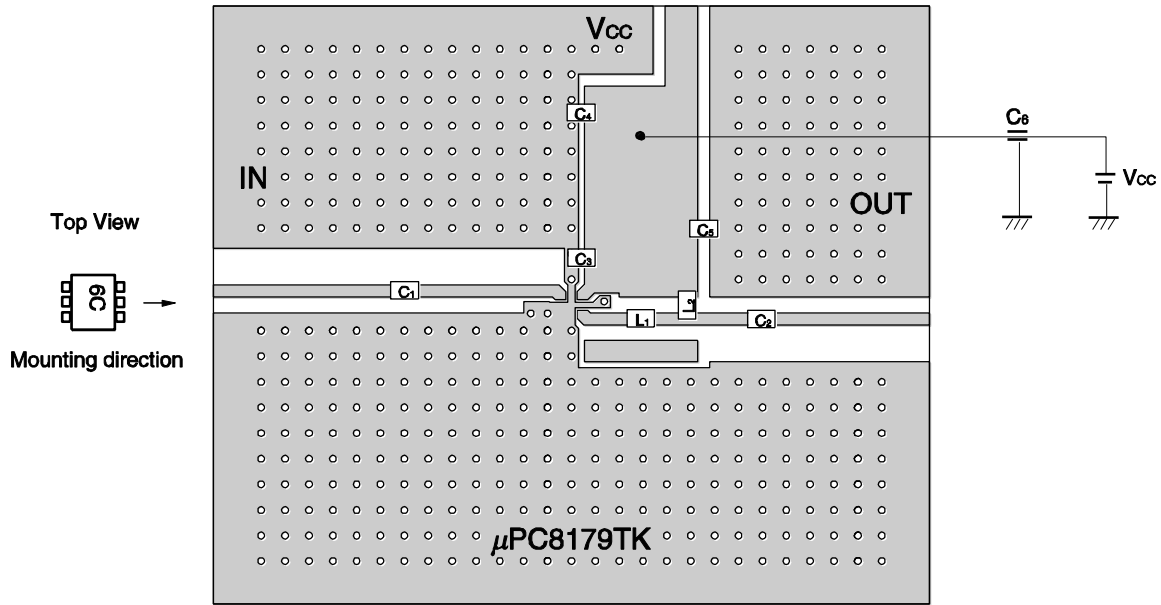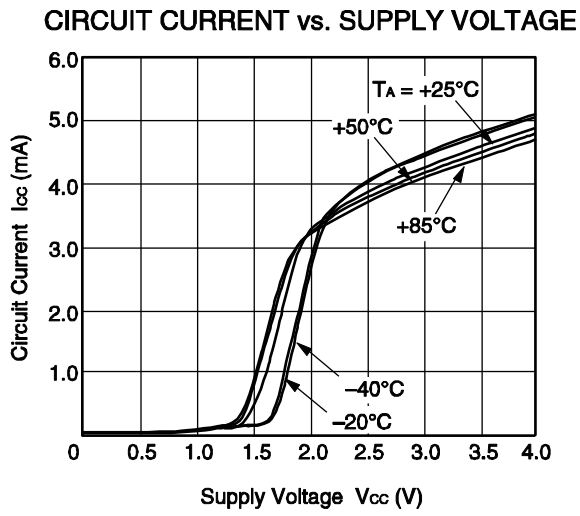
<1> f = 1.0 GHz
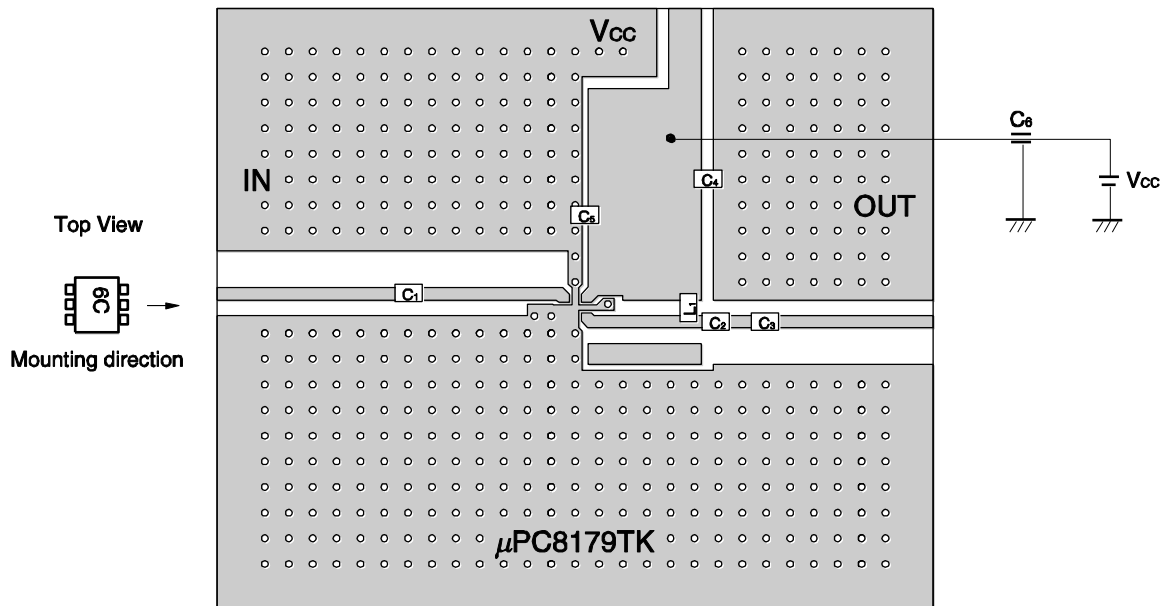
Remarks 1. 42 × 35 × 0.4 mm double-sided copper-clad polyimide board
2. Back side: GND pattern
3. Gold plated on pattern
4. o :Through holes

COMPONENT LIST

Form	Symbol	Value	Type code	Maker
Chip capacitor	C_1, C_3	1 000 pF	GRM40CH102J50PT	murata
	C_2	0.75 pF	GRM39CKR75C50PT	murata
	C_4	5 pF	GRM39CH050C50PT	murata
	C_5	8 pF	GRM39CH080D50PT	murata
Feed-though Capacitor	C_6	1 000 pF	DFT301-801 × 7R102S50	murata
Chip inductor	L_1	12 nH	LL1608-FH12N	TOKO

<2> f = 1.9 GHz
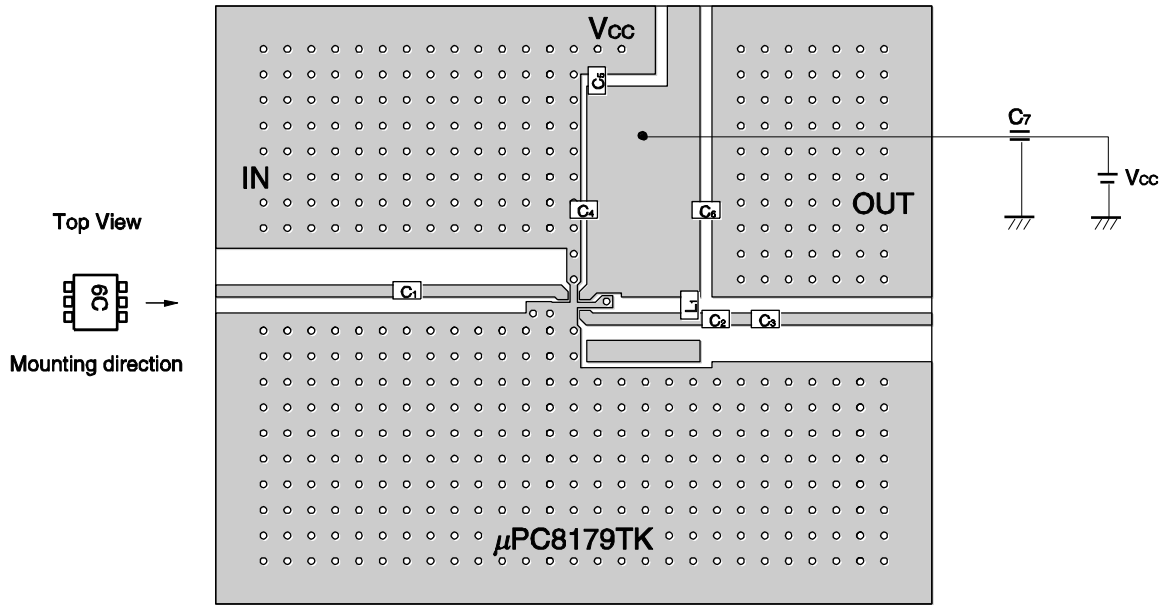
Remarks 1. 42 $\times$ 35 $\times$ 0.4 mm double-sided copper-clad polyimide board
   2. Back side: GND pattern
   3. Gold plated on pattern
   4. ○ :Through holes

COMPONENT LIST

Form	Symbol	Value	Type code	Maker
Chip capacitor	C_1, C_3, C_5, C_6	1 000 pF	GRM40CH102J50PT	murata
	C_2	0.5 pF	GRM39CKR5C50PT	murata
	C_4	8 pF	GRM39CH080D50PT	murata
Feed-though Capacitor	C_7	1 000 pF	DFT301-801 $\times$ 7R102S50	murata
Chip inductor	L_1	2.7 nH	LL1608-FH2N7S	TOKO

<3> f = 2.4 GHz

Remarks 1. 42 × 35 × 0.4 mm double-sided copper-clad polyimide board
2. Back side: GND pattern
3. Gold plated on pattern
4. ○ :Through holes

COMPONENT LIST

Form	Symbol	Value	Type code	Maker
Chip capacitor	C_1, C_2, C_4, C_5	1 000 pF	GRM40CH102J50PT	murata
	C_3	10 pF	GRM39CH100D50PT	murata
Feed-though Capacitor	C_6	1 000 pF	DFT301-801 × 7R102S50	murata
Chip inductor	L_1	2.7 nH	LL1608-FH2N7S	TOKO
	L_2	1.8 nH	LL1608-FH1N8S	TOKO

● **TYPICAL CHARACTERISTICS (T$_A$ = +25°C, unless otherwise specified)**

CIRCUIT CURRENT vs. SUPPLY VOLTAGE

Remark The graph indicates nominal characteristics.

f = 1.0 GHz MATCHING

S₁₁-FREQUENCY

MARKER 1
1.0 GHz

1: 76.586 Ω
−65.898 Ω
2.4152 pF

Vcc = 3.0 V
Icc = 4.23 mA
Pin = −30 dBm

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S₂₂-FREQUENCY

MARKER 1
1.0 GHz

1: 64.07 Ω
2.8164 Ω
448.24 pH

Vcc = 3.0 V
Icc = 4.23 mA
Pin = −30 dBm

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S₁₁-FREQUENCY

S₁₁ log   MAG   2 dB/   REF 0 dB   1: −7.7054 dB

Pin = −30 dBm,
MARKER 1 f = 1.0 GHz

Vcc = 2.7 V   2.4 V

3.0 V   3.3 V

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S₁₂-FREQUENCY

S₁₂ log   MAG   5 dB/   REF −20 dB   1: −43.627 dB

Pin = −30 dBm,
MARKER 1 f = 1.0 GHz

——— Vcc = 2.4 V
—·—·—   2.7 V
·········   3.0 V
- - - - -   3.3 V

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S₂₁-FREQUENCY

S₂₁ log   MAG   2 dB/   REF 0 dB   1: 13.368 dB

Pin = −30 dBm,
MARKER 1 f = 1.0 GHz

Vcc = 3.3 V   3.0 V

2.7 V   2.4 V

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S₂₂-FREQUENCY

S₂₂ log   MAG   2 dB/   REF 0 dB   1: −15.922 dB

Vcc = 2.4 V
2.7 V
3.0 V
3.3 V

Pin = −30 dBm,
MARKER 1 f = 1.0 GHz

START 100.000 000 MHz   STOP 3 100.000 000 MHz

Remark The graphs indicate nominal characteristics.

S11-FREQUENCY

S11 log   MAG   2 dB/   REF 0 dB   1: −7.4331 dB

Pin = −30 dBm, Vcc = 3.0 V
MARKER 1 f = 1.0 GHz

TA = −40°C

+25°C   +85°C

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S12-FREQUENCY

S12 log   MAG   5 dB/   REF −20 dB   1: −40.365 dB

Pin = −30 dBm, Vcc = 3.0 V
MARKER 1 f = 1.0 GHz

TA = −40°C   +25°C

+85°C

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S21-FREQUENCY

S21 log   MAG   2 dB/   REF 0 dB   1: 13.617 dB

Pin = −30 dBm, Vcc = 3.0 V
MARKER 1 f = 1.0 GHz

TA = −40°C

+25°C

+85°C

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S22-FREQUENCY

S22 log   MAG   2 dB/   REF 0 dB   1: −9.8258 dB

TA = −40°C
+25°C
+85°C

Pin = −30 dBm, Vcc = 3.0 V
MARKER 1 f = 1.0 GHz

START 100.000 000 MHz   STOP 3 100.000 000 MHz

Remark The graphs indicate nominal characteristics.

OUTPUT POWER vs. INPUT POWER

OUTPUT POWER vs. INPUT POWER

OUTPUT POWER, IM3 vs. INPUT POWER

OUTPUT POWER, IM3 vs. INPUT POWER

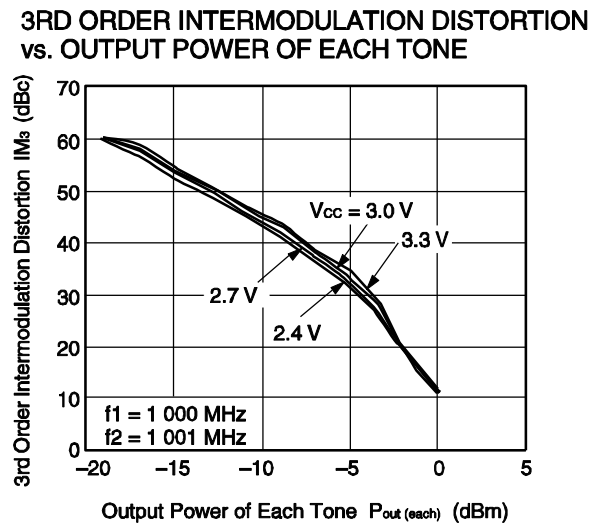## OUTPUT POWER, IM3 vs. INPUT POWER

OUTPUT POWER, IM3 vs. INPUT POWER

Remark The graphs indicate nominal characteristics.

OUTPUT POWER, IM3 vs. INPUT POWER

OIP3 = 12.4 dBm

Pout (undes)

Pout (des)

IM3 (des)

IM3 (undes)

VCC = 3.0 V
TA = −40°C
f1 = 1 000 MHz
f2 = 1 001 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

OIP3 = 12.0 dBm

Pout (undes)

Pout (des)

IM3 (des)

IM3 (undes)

VCC = 3.0 V
f1 = 1 000 MHz
f2 = 1 001 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

OIP3 = 10.4 dBm

Pout (undes)

Pout (des)

IM3 (des)

IM3 (undes)

VCC = 3.0 V
TA = +85°C
f1 = 1 000 MHz
f2 = 1 001 MHz

3RD ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE

VCC = 3.0 V
3.3 V
2.7 V
2.4 V

f1 = 1 000 MHz
f2 = 1 001 MHz

NOISE FIGURE vs. SUPPLY VOLTAGE

f = 1.0 GHz

TA = +85°C

+25°C

−40°C

Remark The graphs indicate nominal characteristics.

f = 1.9 GHz MATCHING

S11-FREQUENCY

MARKER 1
1.9 GHz

1: 36.523 Ω
–50.693 Ω
1.6524 pF

Vcc = 3.0 V
Icc = 4.23 mA
Pin = –30 dBm

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S22-FREQUENCY

MARKER 1
1.9 GHz

1: 47.293 Ω
–18.213 Ω
4.5993 pF

Vcc = 3.0 V
Icc = 4.23 mA
Pin = –30 dBm

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S11-FREQUENCY

S11 log   MAG   2 dB/   REF 0 dB   1: –7.7246 dB

Vcc = 2.7 V
2.4 V
3.0 V
3.3 V

Pin = –30 dBm,
MARKER 1 f = 1.9 GHz

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S12-FREQUENCY

S12 log   MAG   5 dB/   REF –20 dB   1: –41.3 dB

Pin = –30 dBm,
MARKER 1 f = 1.9 GHz

Vcc = 2.4 V
2.7 V
3.0 V
3.3 V

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S21-FREQUENCY

S21 log   MAG   2 dB/   REF 0 dB   1: 16.03 dB

Pin = –30 dBm,
MARKER 1 f = 1.9 GHz

Vcc = 3.3 V
3.0 V
2.4 V
2.7 V

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S22-FREQUENCY

S22 log   MAG   2 dB/   REF 0 dB   1: –15.331 dB

Vcc = 2.4 V
2.7 V
3.0 V
3.3 V

Pin = –30 dBm,
MARKER 1 f = 1.9 GHz

START 100.000 000 MHz   STOP 3 100.000 000 MHz

Remark The graphs indicate nominal characteristics.

S11-FREQUENCY

S11 log MAG 2 dB/ REF 0 dB 1: −8.2556 dB

Pin = −30 dBm, Vcc = 3.0 V,
MARKER 1 f = 1.9 GHz

TA = −40°C
+25°C
+85°C

START 100.000 000 MHz STOP 3 100.000 000 MHz

S12-FREQUENCY

S12 log MAG 5 dB/ REF −20 dB 1: −41.365 dB

Pin = −30 dBm, Vcc = 3.0 V,
MARKER 1 f = 1.9 GHz

TA = −40°C 1
+25°C
+85°C

START 100.000 000 MHz STOP 3 100.000 000 MHz

S21-FREQUENCY

S21 log MAG 2 dB/ REF 0 dB 1: 15.717 dB

Pin = −30 dBm,
Vcc = 3.0 V,
MARKER 1 f = 1.9 GHz

TA = −40°C
1
+25°C
+85°C

START 100.000 000 MHz STOP 3 100.000 000 MHz

S22-FREQUENCY

S22 log MAG 2 dB/ REF 0 dB 1: −16.419 dB

TA = −40°C
+25°C
+85°C

Pin = −30 dBm,
Vcc = 3.0 V,
MARKER 1 f = 1.9 GHz

START 100.000 000 MHz STOP 3 100.000 000 MHz

Remark The graphs indicate nominal characteristics.

OUTPUT POWER vs. INPUT POWER

Vcc = 3.0 V
3.3 V
2.7 V
2.4 V
f = 1.9 GHz

OUTPUT POWER vs. INPUT POWER

$T_A = -40°C$
+25°C
+85°C
f = 1.9 GHz
Vcc = 3.0 V

OUTPUT POWER, IM3 vs. INPUT POWER

$OIP_3 = 9.0$ dBm
$P_{out (des)}$
$IM_3 (undes)$
$P_{out (undes)}$
$IM_3 (des)$
Vcc = 2.4 V
f1 = 1 900 MHz
f2 = 1 901 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

$OIP_3 = 9.7$ dBm
$P_{out (des)}$
$IM_3 (des)$
$P_{out (undes)}$
$IM_3 (undes)$
Vcc = 2.7 V
f1 = 1 900 MHz
f2 = 1 901 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

$OIP_3 = 10.4$ dBm
$P_{out (des)}$
$IM_3 (des)$
$P_{out (undes)}$
$IM_3 (undes)$
Vcc = 3.0 V
f1 = 1 900 MHz
f2 = 1 901 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

$OIP_3 = 10.5$ dBm
$P_{out (des)}$
$IM_3 (des)$
$P_{out (undes)}$
$IM_3 (undes)$
Vcc = 3.3 V
f1 = 1 900 MHz
f2 = 1 901 MHz

Remark The graphs indicate nominal characteristics.

OUTPUT POWER, IM₃ vs. INPUT POWER

OIP₃ = 10.8 dBm

Pout (undes)

Pout (des)

IM₃ (undes)

IM₃ (des)

Vcc = 3.0 V
TA = −40°C
f1 = 1 900 MHz
f2 = 1 901 MHz

Output power Pout (dBm) / 3rd Order Intermodulation Distortion IM₃ (dBm)

Input Power Pin (dBm)

OUTPUT POWER, IM₃ vs. INPUT POWER

OIP₃ = 10.4 dBm

Pout (undes)

Pout (des)

IM₃ (undes)

IM₃ (des)

Vcc = 3.0 V
f1 = 1 900 MHz
f2 = 1 901 MHz

Output power Pout (dBm) / 3rd Order Intermodulation Distortion IM₃ (dBm)

Input Power Pin (dBm)

OUTPUT POWER, IM₃ vs. INPUT POWER

OIP₃ = 10.1 dBm

Pout (undes)

Pout (des)

IM₃ (undes)

IM₃ (des)

Vcc = 3.0 V
TA = +85°C
f1 = 1 900 MHz
f2 = 1 901 MHz

Output power Pout (dBm) / 3rd Order Intermodulation Distortion IM₃ (dBm)

Input Power Pin (dBm)

3RD ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE

Vcc = 3.0 V

3.3 V

2.4 V

2.7 V

f1 = 1 900 MHz
f2 = 1 901 MHz

3rd Order Intermodulation Distortion IM₃ (dBc)

Output Power of Each Tone Pout (each) (dBm)

NOISE FIGURE vs. SUPPLY VOLTAGE

f = 1.9 GHz

TA = +85°C

+25°C

−40°C

Noise Figure NF (dB)

Supply Voltage Vcc (V)

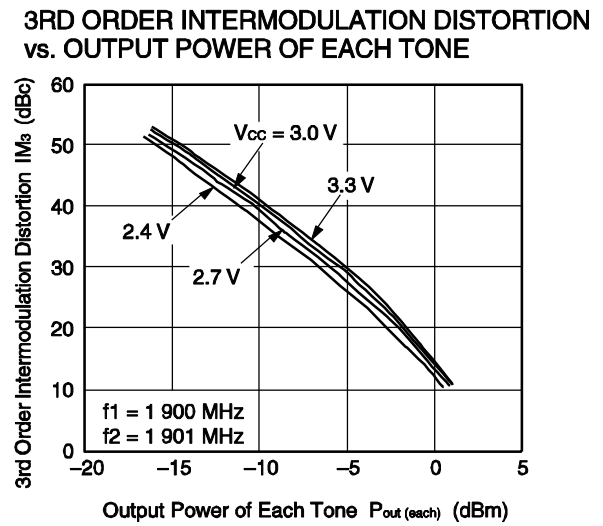**Remark** The graphs indicate nominal characteristics.

Data Sheet PU10059EJ02V0DS

f = 2.4 GHz MATCHING

S11-FREQUENCY

MARKER 1
2.4 GHz

1: 26.719 Ω
−37.301 Ω
1.7778 pF

1

Vcc = 3.0 V
Icc = 4.23 mA
Pin = −30 dBm

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S22-FREQUENCY

1: 44.846 Ω
11.99 Ω
795.13 pH

1

MARKER 1
2.4 GHz

Vcc = 3.0 V
Icc = 4.23 mA
Pin = −30 dBm

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S11-FREQUENCY

S11 log   MAG   2 dB/   REF 0 dB   1: −9.4265 dB

Vcc = 2.4 V
2.7 V
1
3.0 V
3.3 V

Pin = −30 dBm,
MARKER 1 f = 2.4 GHz

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S12-FREQUENCY

S12 log   MAG   5 dB/   REF −20 dB   1: −42.425 dB

Pin = −30 dBm,
MARKER 1 f = 2.4 GHz

	Vcc = 2.4 V
	2.7 V
	3.0 V
	3.3 V

1

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S21-FREQUENCY

S21 log   MAG   2 dB/   REF 0 dB   1: 16.497 dB

Pin = −30 dBm,
MARKER 1 f = 2.4 GHz

1
3.0 V
2.7 V
Vcc = 3.3 V
2.4 V

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S22-FREQUENCY

S22 log   MAG   2 dB/   REF 0 dB   1: −16.926 dB

Vcc = 2.4 V
2.7 V
3.0 V
3.3 V

Pin = −30 dBm,
MARKER 1 f = 2.4 GHz

1

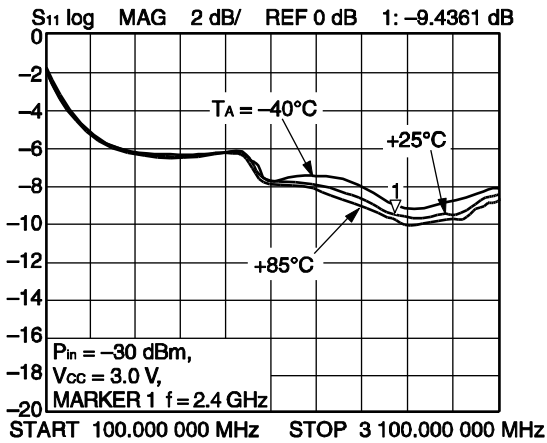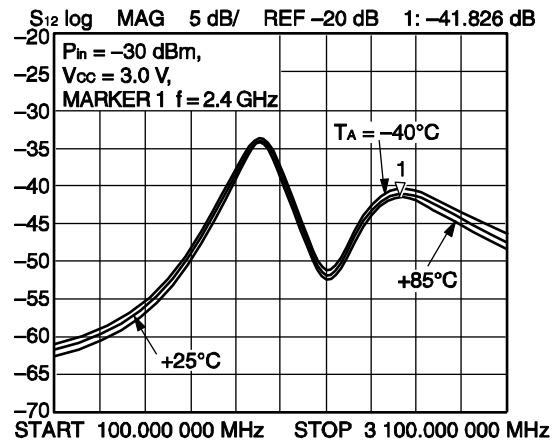START 100.000 000 MHz   STOP 3 100.000 000 MHz

Remark The graphs indicate nominal characteristics.

S11-FREQUENCY

S11 log   MAG   2 dB/   REF 0 dB   1: −9.4361 dB

TA = −40°C
+25°C
1
+85°C

Pin = −30 dBm,
Vcc = 3.0 V,
MARKER 1 f = 2.4 GHz

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S12-FREQUENCY

S12 log   MAG   5 dB/   REF −20 dB   1: −41.826 dB

Pin = −30 dBm,
Vcc = 3.0 V,
MARKER 1 f = 2.4 GHz

TA = −40°C
1
+85°C
+25°C

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S21-FREQUENCY

S21 log   MAG   2 dB/   REF 0 dB   1: 16.148 dB

Pin = −30 dBm,
Vcc = 3.0 V,
MARKER 1 f = 2.4 GHz

1
TA = −40°C
+25°C   +85°C

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S22-FREQUENCY

S22 log   MAG   2 dB/   REF 0 dB   1: −15.993 dB

TA = +85°C
+25°C
1
−40°C

Pin = −30 dBm,
Vcc = 3.0 V,
MARKER 1 f = 2.4 GHz

START 100.000 000 MHz   STOP 3 100.000 000 MHz

Remark The graphs indicate nominal characteristics.

OUTPUT POWER vs. INPUT POWER

$V_{CC} = 3.0$ V
3.3 V
2.7 V
2.4 V
f = 2.4 GHz

OUTPUT POWER vs. INPUT POWER

$T_A = -40°C$
$+25°C$ $+85°C$
f = 2.4 GHz
$V_{CC} = 3.0$ V

OUTPUT POWER, IM3 vs. INPUT POWER

$OIP_3 = 9.1$ dBm
$P_{out (undes)}$
$P_{out (des)}$
$IM_3 (undes)$
$IM_3 (des)$
$V_{CC} = 2.4$ V
f1 = 2 400 MHz
f2 = 2 401 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

$OIP_3 = 9.6$ dBm
$P_{out (undes)}$
$P_{out (des)}$
$IM_3 (undes)$
$IM_3 (des)$
$V_{CC} = 2.7$ V
f1 = 2 400 MHz
f2 = 2 401 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

$OIP_3 = 10.1$ dBm
$P_{out (undes)}$
$P_{out (des)}$
$IM_3 (undes)$
$IM_3 (des)$
$V_{CC} = 3.0$ V
f1 = 2 400 MHz
f2 = 2 401 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

$OIP_3 = 10.3$ dBm
$P_{out (undes)}$
$P_{out (des)}$
$IM_3 (undes)$
$IM_3 (des)$
$V_{CC} = 3.3$ V
f1 = 2 400 MHz
f2 = 2 401 MHz

Remark The graphs indicate nominal characteristics.

OUTPUT POWER, IM3 vs. INPUT POWER

OIP3 = 10.2 dBm

Pout (undes)

IM3 (undes)

Pout (des)

IM3 (des)

Vcc = 3.0 V
TA = −40°C
f1 = 2 400 MHz
f2 = 2 401 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

OIP3 = 10.1 dBm

Pout (undes)

Pout (des)

IM3 (undes)

IM3 (des)

Vcc = 3.0 V
f1 = 2 400 MHz
f2 = 2 401 MHz

OUTPUT POWER, IM3 vs. INPUT POWER

OIP3 = 9.3 dBm

Pout (undes)

Pout (des)

IM3 (undes)

IM3 (des)

Vcc = 3.0 V
TA = +85°C
f1 = 2 400 MHz
f2 = 2 401 MHz

3RD ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE

Vcc = 3.0 V

2.4 V

2.7 V

3.3 V

f1 = 2 400 MHz
f2 = 2 401 MHz

NOISE FIGURE vs. SUPPLY VOLTAGE

f = 2.4 GHz

TA = +85°C

+25°C

−40°C
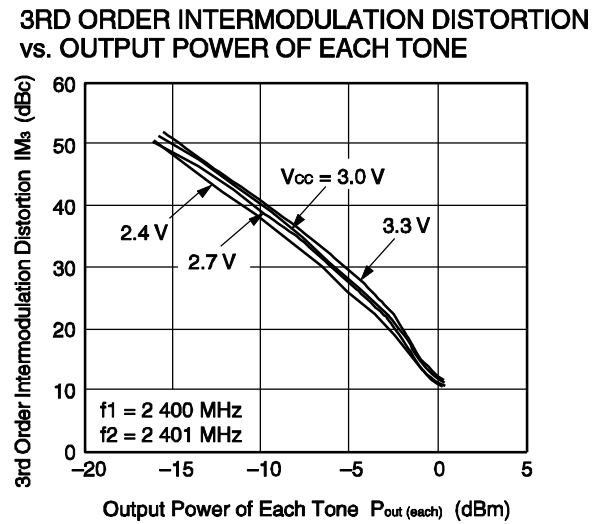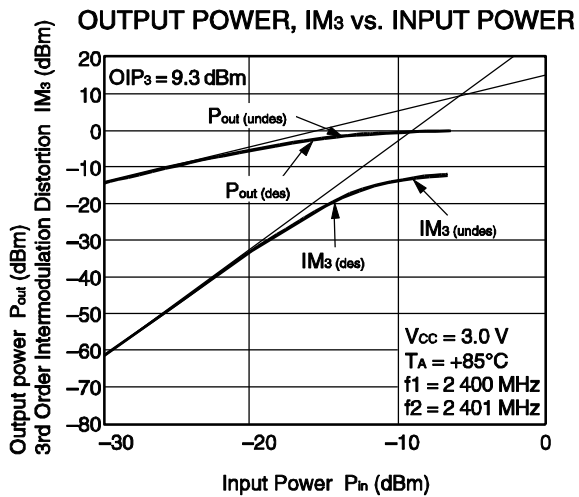
Remark The graphs indicate nominal characteristics.

f = 3.0 GHz MATCHING

S11-FREQUENCY

1:•77.02 Ω −65.883 Ω
• 1 GHz
2:•37.43 Ω −53.027 Ω
• 1.9 GHz
3:•28.781 Ω −39.209 Ω
• 2.4 GHz
4:•25.676 Ω −27.78 Ω
• 1.9097 pF

MARKER 4
3 GHz

Vcc = 3.0 V
Icc = 4.23 mA
Pin = −30 dBm
TA = +25°C
(at L loaded)

START 100.000 000 MHz   STOP 3 100.000 000 MHz

S22-FREQUENCY

1:•96.859 Ω −359.69 Ω
• 1 GHz
2:•54.43 Ω −218.02 Ω
• 1.9 GHz
3:•41.422 Ω −181.84 Ω
• 2.4 GHz
4:•27.039 Ω −151.69 Ω
• 349.74 fF

MARKER 4
3 GHz

Vcc = 3.0 V
Icc = 4.23 mA
Pin = −30 dBm
TA = +25°C
(at L loaded)

START 100.000 000 MHz   STOP 3 100.000 000 MHz

Remark The graphs indicate nominal characteristics.

CEL California Eastern Laboratories   *μ*PC8179TK

■ **PACKAGE DIMENSIONS**

6-PIN LEAD-LESS MINIMOLD (1511) (UNIT: mm)

24   Data Sheet PU10059EJ02V0DS
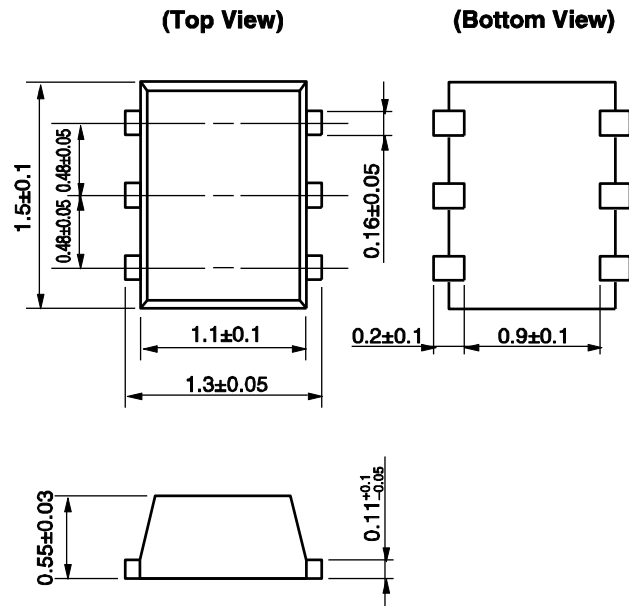
NOTE ON CORRECT USE

(1) Observe precautions for handling because of electro-static sensitive devices.

(2) Form a ground pattern as widely as possible to minimize ground impedance (to prevent undesired oscillation). All the ground pins must be connected together with wide ground pattern to decrease impedance difference.

(3) The bypass capacitor should be attached to Vcc line.

(4) The inductor (L) should be attached between output and Vcc pins. The L and series capacitor (C) values should be adjusted for applied frequency to match impedance to next stage.

(5) The DC capacitor must be attached to input pin.

RECOMMENDED SOLDERING CONDITIONS

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

Soldering Method	Soldering Conditions		Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature)	: 260°C or below	IR260
	Time at peak temperature	: 10 seconds or less	
	Time at temperature of 220°C or higher	: 60 seconds or less	
	Preheating time at 120 to 180°C	: 120±30 seconds	
	Maximum number of reflow processes	: 3 times	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	
Wave Soldering	Peak temperature (molten solder temperature)	: 260°C or below	WS260
	Time at peak temperature	: 10 seconds or less	
	Preheating temperature (package surface temperature)	: 120°C or below	
	Maximum number of flow processes	: 1 time	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	
Partial Heating	Peak temperature (terminal temperature)	: 350°C or below	HS350
	Soldering time (per side of device)	: 3 seconds or less	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	

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