

L-BAND UP/DOWN CONVERTER

DESCRIPTION

The μ PG2121TB is L-band up-converter or down-converter IC (LO Buff. Amp. + Passive Mixer). The device can convert the RF frequency to IF frequency and operate low current. It housed in an original 6-pin super minimold package that is smaller than usual 6-pin minimold easy to install and contributes to miniaturizing the system.

FEATURES

- +2.8 V single voltage
- Low distortion (IIP₃ = +23 dBm TYP.)
- Low current operation (I_{DD} = 3.5 mA TYP.)
- LO buffer amplifier and passive mixer on a single chip
- 6-pin super minimold package (Size: 2.0 × 1.25 × 0.9 mm)

APPLICATION

- L-band digital cellular etc.

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μ PG2121TB-E3	6-pin super minimold	G2E	Embossed tape 8 mm wide. Pin 1 face the tape perforation side. Qty 3kpcs / reel.

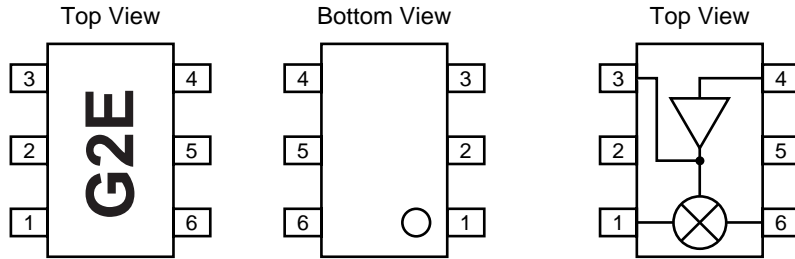
Remark To order evaluation samples, please contact your local NEC sales office.
(Part number for sample order: μ PG2121TB)

Caution The IC must be handled with care to prevent static discharge because its circuit composed of GaAs HJ-FET.

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

PIN CONNECTIONS

Pin No.	Connection	Pin No.	Connection
1	RF or IF	4	LO IN
2	GND	5	GND
3	V _{DD}	6	IF or RF



ABSOLUTE MAXIMUM RATINGS (T_A = +25 °C)

Parameter	Symbol	Ratings	Unit
Supply Voltage	V _{DD}	6.0	V
LO Input Power	P _{LO}	+10	dBm
RF Input Power	P _{RF}	+10	dBm
Total Power Dissipation	P _{tot}	140 ^{Note}	mW
Operating Ambient Temperature	T _A	-30 to +90	°C
Storage Temperature	T _{stg}	-35 to +150	°C

Note Mounted on a 50 × 50 × 1.6 mm double copper clad epoxy glass PWB, T_A = +85 °C

ELECTRICAL CHARACTERISTICS (T_A = +25 °C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V _{DD}	+2.7	+2.8	+3.0	V
RF Frequency	f _{RF}	810	–	960	MHz
IF Frequency	f _{IF}	50	–	400	MHz
LO Input Power	P _{LO}	–10	–5	0	dBm

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, T_A = +25 °C, V_{DD} = 2.8 V, f_{RF1} = 850 MHz, f_{RF2} = 850.1 MHz, P_{RF1} = P_{RF2} = –3 dBm, f_{LO} = 940 MHz, P_{LO} = –5 dBm, f_{IF} = 90 MHz, f_{IM3} = 90.1 MHz)

Parameter	Symbol	Test Condition	MIN.	TYP.	MAX.	Unit
Total Current	I _{DD}		–	3.5	4.5	mA
Conversion Loss	L _C		–	–6.0	–7.5	dB
3rd Order Distortion Input Intercept Point ^{Note}	IIP ₃		+18	+23	–	dBm
3rd Order Intermodulation Distortion	IM ₃		–	–52	–42	dBc
Local Leakage	L _{LO}		–	–13	–11	dBm

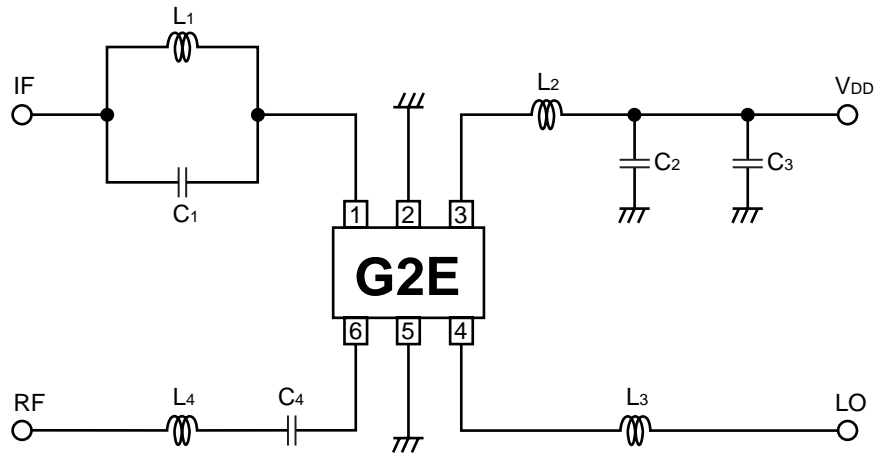
Note IIP₃ is determined by comparing two method; theoretical calculation and cross point of IM₃ curve.

$$IIP_3 = \frac{\Delta IM_3 \times P_{RF} + CG - P_{IM3}}{\Delta IM_3 - 1} \text{ [dBm]} \quad \Delta IM_3: P_{IM3} \text{ gradient}$$

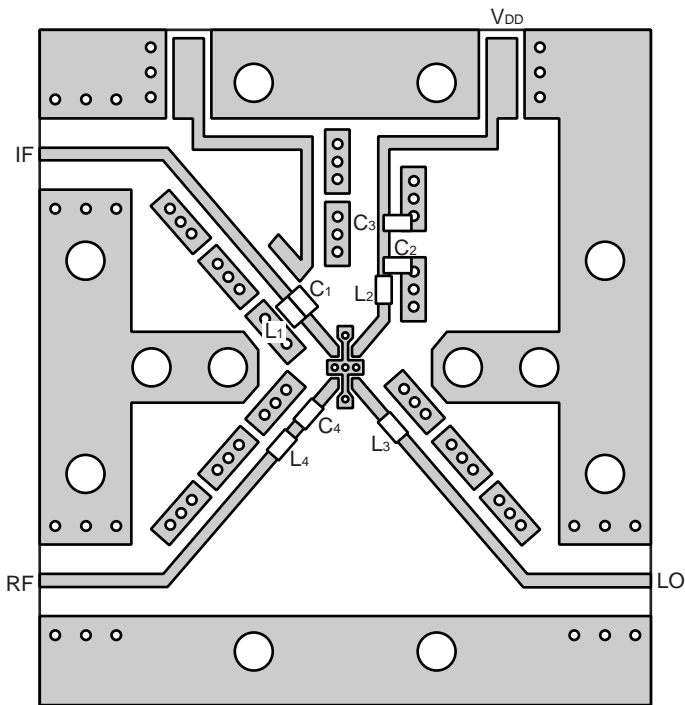
Calculated as ΔIM₃ = 3

EVALUATION CIRCUIT

T_A = +25 °C, V_{DD} = +2.8 V, f = 850 MHz



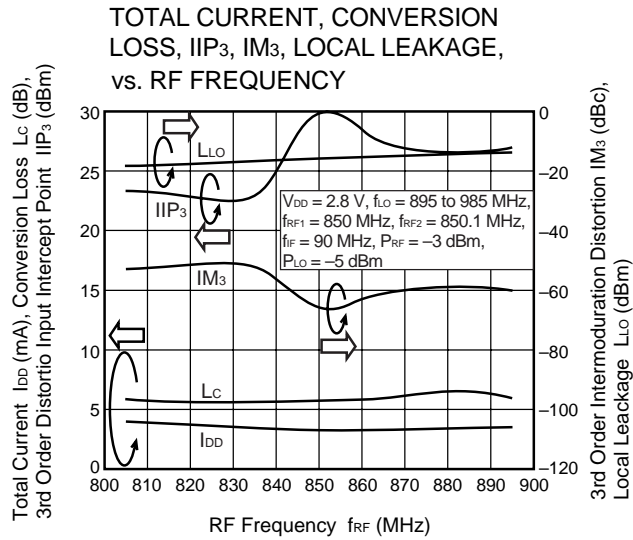
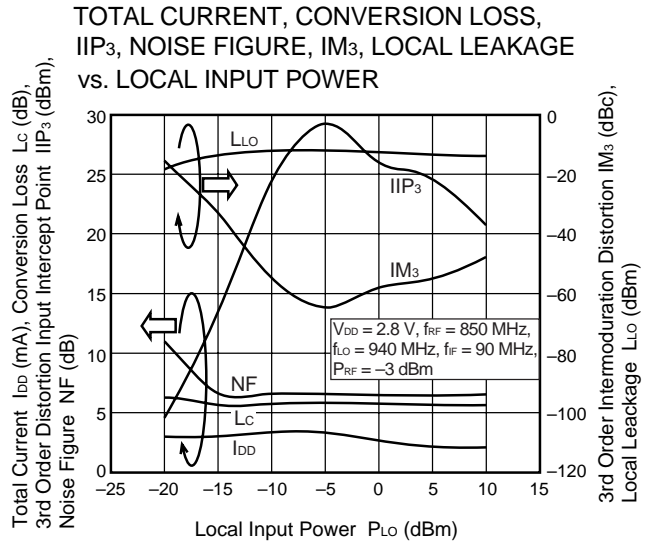
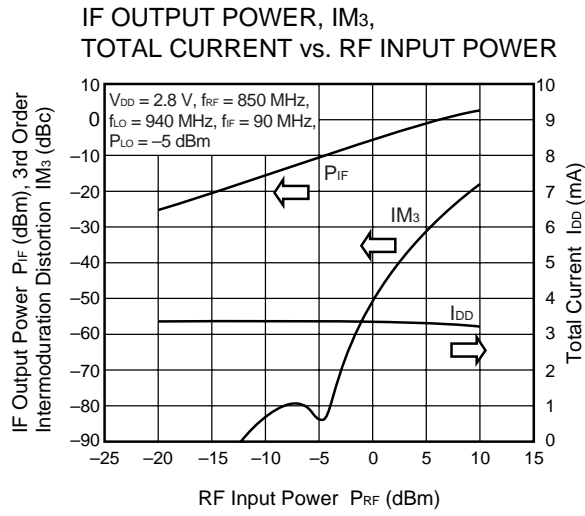
EVALUATION BOARD



USING THE NEC EVALUATION BOARD

	Values	Part Number	Maker
C1	5 pF	GRM39CH 050 C50	muRata
C2	33 pF	GRM36CH 330 J50	muRata
C3	1 000 pF	GRM39B 102 K50	muRata
C4	5 pF	GRM39CH 050 C50	muRata
L1	6.8 nH	TFL0510 6N8	susumu
L2	15 nH	TFL0816 15N	susumu
L3	27 nH	TFL0816 27N	susumu
L4	6.8 nH	TFL0816 6N8	susumu

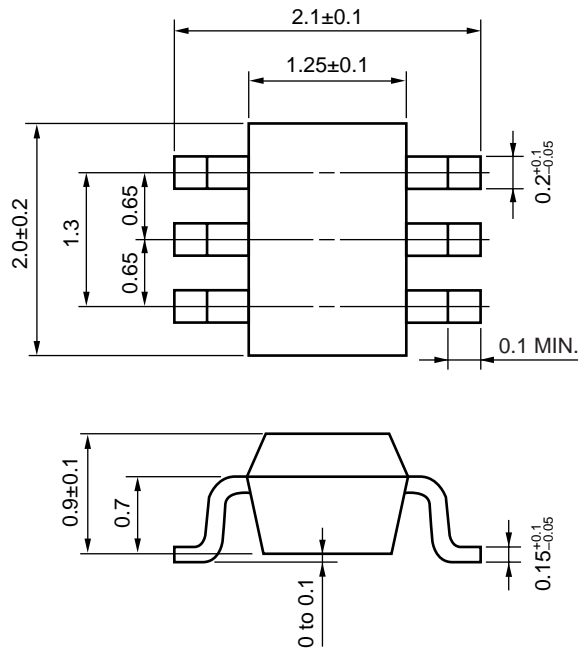
TYPICAL CHARACTERISTICS (Unless otherwise specified, $T_A = +25\text{ }^\circ\text{C}$)



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN SUPER MINIMOLD (UNIT: mm)



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).

CAUTION

**The great care must be taken in dealing with the devices in this guide.
 The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.
 Keep the law concerned and so on, especially in case of removal.**

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