

# RQL1001JLAQH

SiGe MMIC

High Frequency Low Noise Amplifier

REJ03G1539-0100

Rev.1.00

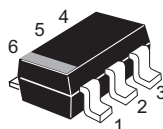
May 16, 2007

## Features

- Small SMD package CMPAK-6.
- Ideal for wireless LAN(2.4 GHz / 5 GHz band), Cordless Phone, GPS antenna, IMS band applications
- Low noise, High gain,  
 $NF = 1.2 \text{ dB}$ ,  $PG = 19.5 \text{ dB}$ ,  $f = 2.45 \text{ GHz}$   
 $NF = 2.1 \text{ dB}$ ,  $PG = 16.5 \text{ dB}$ ,  $f = 5.85 \text{ GHz}$
- Having of power control terminal (Vctrl)

## Outline

RENESAS Package code: PTSP0006JA-A  
(Package name: CMPAK-6)



1. RFout
2. GND
3. Vctrl
4. GND
5. RFin
6. GND

Note: Marking is "JL".

## Absolute Maximum Ratings

( $T_a = 25^\circ\text{C}$ )

Item	Symbol	Ratings	Unit
Supply Voltage	$V_{CC}$	4	V
Maximum Current	$I_{CC}$	20	mA
Maximum Input Power	$P_{in \text{ max}}$	+5	dBm
Total Power Dissipation	$P_t$	80 <sup>Note</sup>	mW
Operating Case Temperature	$T_{c(op)}$	-10 to +85	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

Note: Value on PCB ( FR-4 : 40 x 40 x 1.6 mm double side )

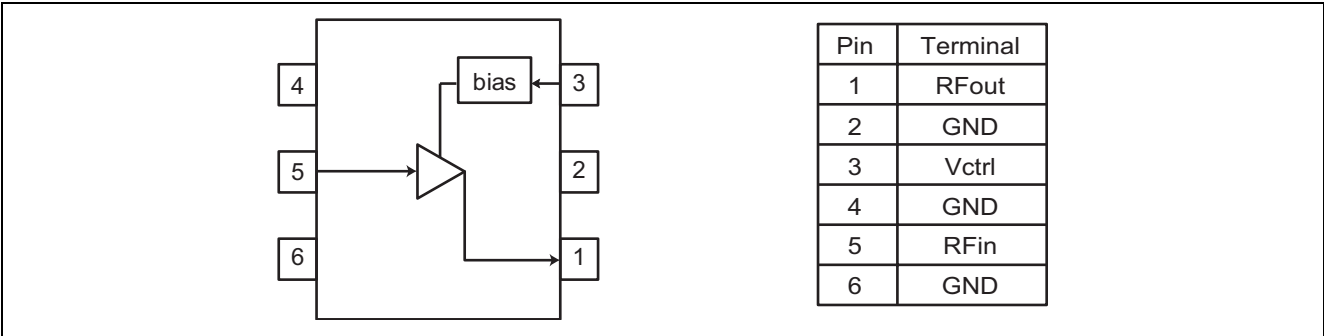
Electrical Characteristics

(Ta = 25°C)

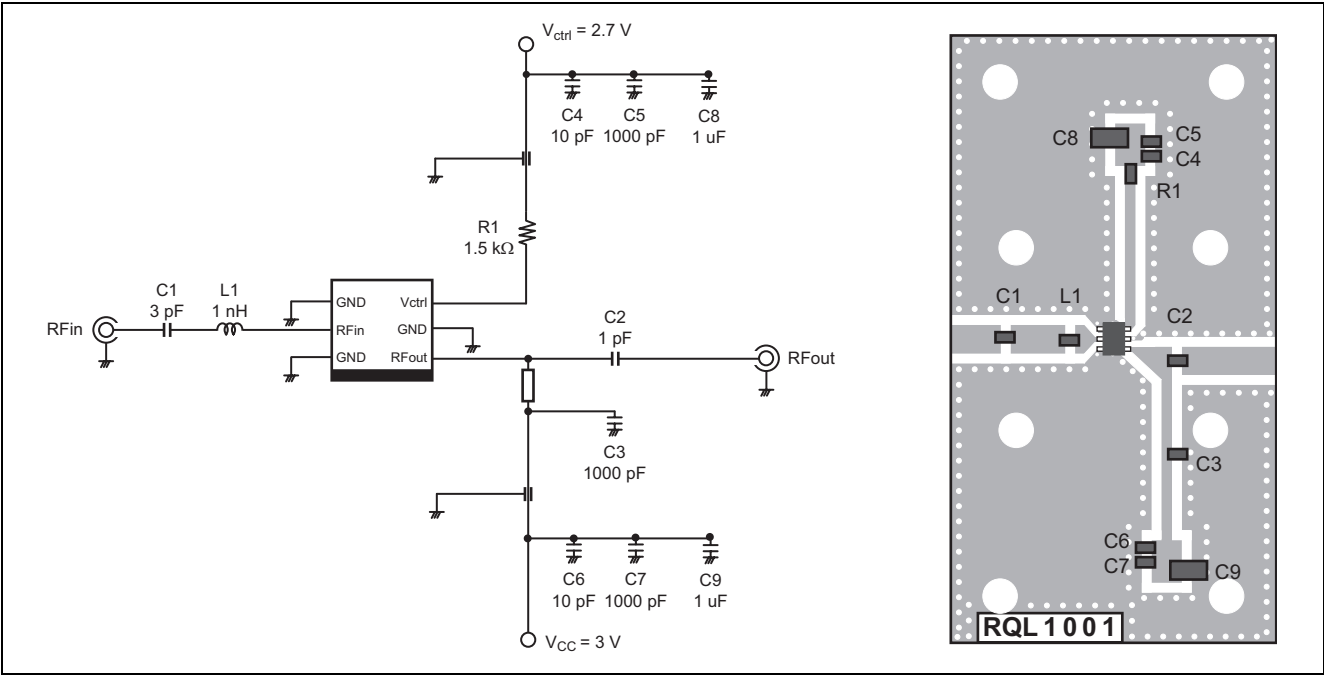
Item	Symbol	Min.	Typ	Max.	Unit	Test Conditions
Noise Figure	NF	—	1.2	—	dB	f = 2.45 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 2.7 V
		—	2.1	—		f = 5.85 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 3.0 V
Power Gain	PG	—	19.5	—	dB	f = 2.45 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 2.7 V
		—	16.5	—		f = 5.85 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 3.0 V
Input Return Loss <sup>note1</sup>	S11	—	12	—	dB	f = 2.45 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 2.7 V
		—	10	—		f = 5.85 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 3.0 V
Output Return Loss <sup>note2</sup>	S22	—	20	—	dB	f = 2.45 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 2.7 V
		—	25	—		f = 5.85 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 3.0 V
1 dB Compression Point at output	P1dB	—	+3.5	—	dBm	f = 2.45 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 2.7 V
		—	+2	—		f = 5.85 GHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 3.0 V
Third Order Intercept Point at output	OIP3	—	+13.5	—	dBm	f = 2.45 GHz, Δf = 1 MHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 2.7 V
		—	+11	—		f = 5.85 GHz, Δf = 1 MHz, V <sub>CC</sub> = 3 V, V <sub>ctrl</sub> = 3.0 V

Notes: 1, 2. Value on our specification circuit. (Refer to P.3, P.5)

Circuit Block Diagram



2.45 GHz Characteristics

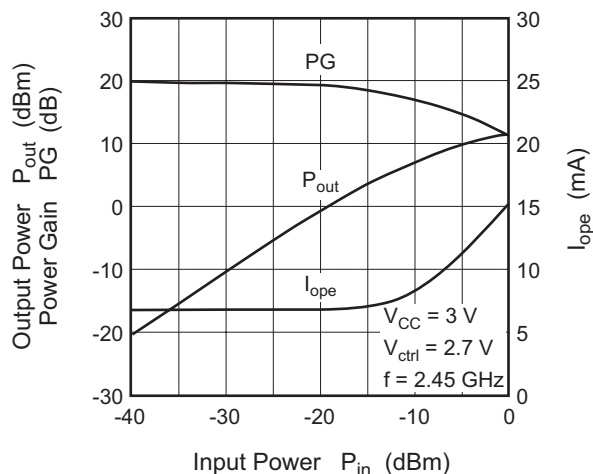


Component ID	Value	Part Code	Tolerance	Rated Voltage	Manufacture
C1	3 pF	CM05CH3R0C50AH	-0.25 to +0.25 pF	50 V	KYOCERA
C2	1 pF	CM05CH1R0C50AH	-0.25 to +0.25 pF		
C3, C5, C7	1000 pF	CM05B102K50AH	-10 to +10%		
C4, C6	10 pF	CM05CH100J50AH	-5 to 5%		
C8, C9	1 μF	F921A105MPA	-10 to +10%	10 V	NICHICON

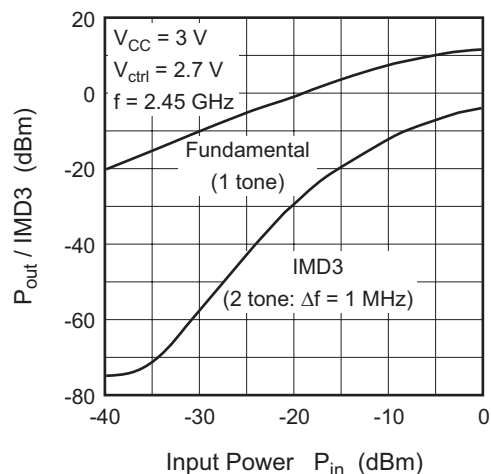
Component ID	Value	Part Code	Tolerance	I <sub>max</sub>	Manufacture
L1	1 nH	LL1005-FHL1N0S	-0.3 to 0.3 nH	500 mA	TOKO

Component ID	Value	Part Code	Tolerance	Power Rating	Manufacture
R1	1.5 kΩ	RK73B1ETTD152J	-5 to +5%	0.063 W	KOA

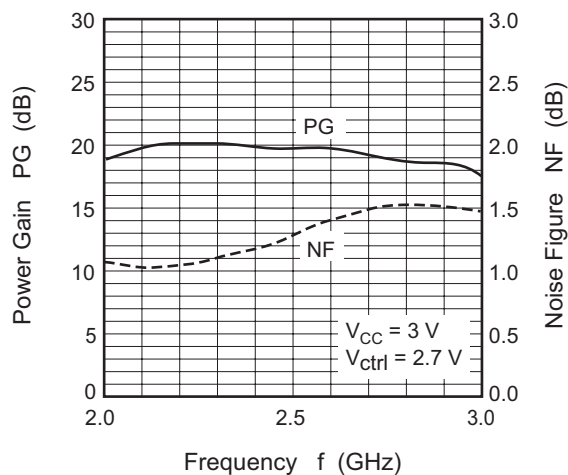
Pin - Pout Characteristics



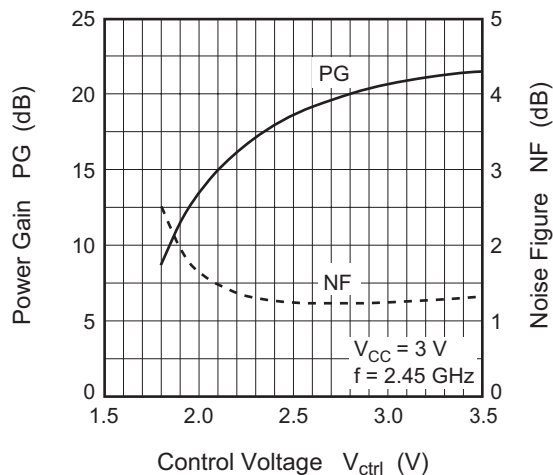
3rd. Order Intermodulation Distortion



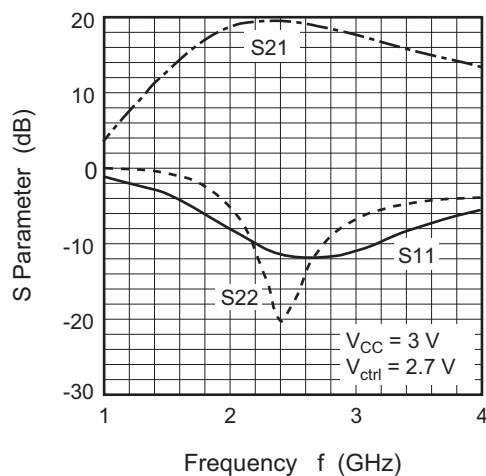
Power Gain, Noise Figure vs. Frequency



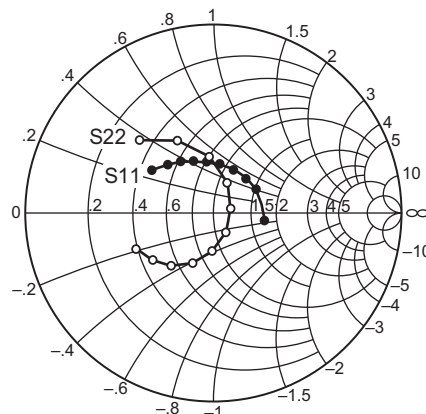
Power Gain, Noise Figure vs. Control Voltage



S Parameter vs. Frequency

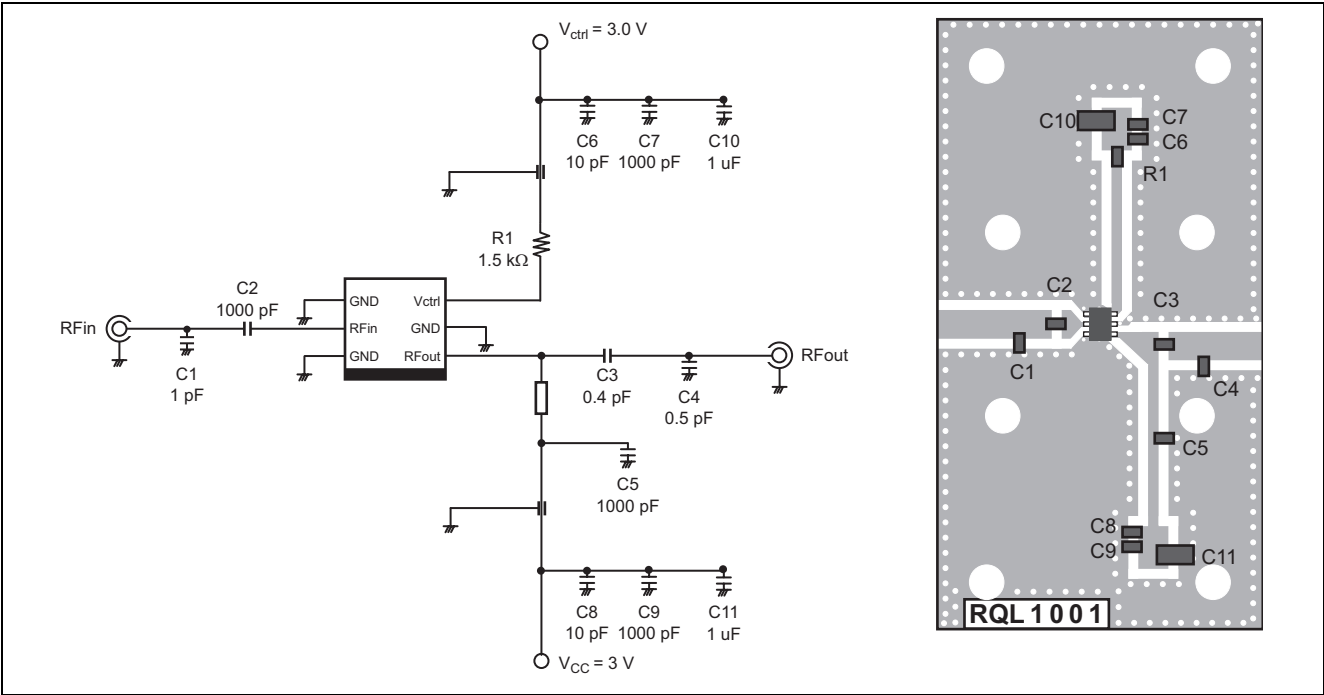


S Parameter vs. Frequency



Test condition :  $V_{CC} = 3\text{ V}$ ,  $V_{ctrl} = 2.7\text{ V}$   
2.0 to 3.0 GHz (0.1 GHz step)

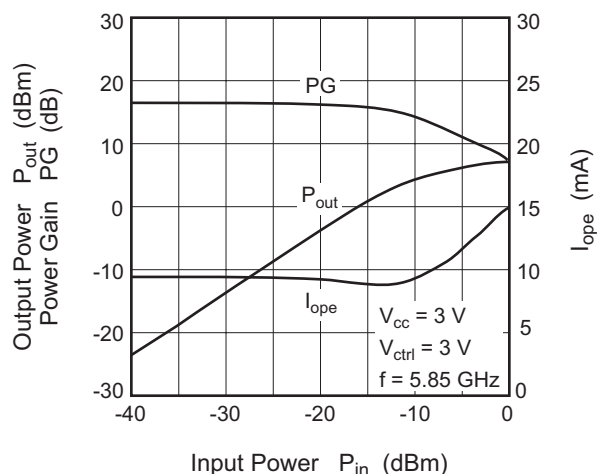
5.85 GHz Characteristics



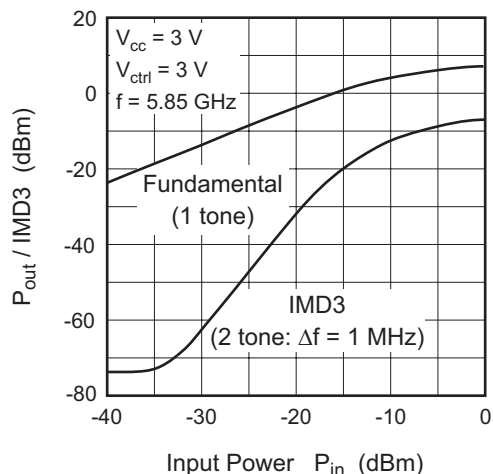
Component ID	Value	Part Code	Tolerance	Rated Voltage	Manufacture
C1	1 pF	CM05CH1R0C50AH	-0.25 to +0.25 pF	50 V	KYOCERA
C2, C5, C7, C9	1000 pF	CM05B102K50AH	-10 to +10%		
C3	0.4 pF	CM05CH0R4C50AH	-0.25 to +0.25 pF		
C4	0.5 pF	CM05CH0R5C50AH	-0.25 to +0.25 pF		
C6, C8	10 pF	CM05CH100J50AH	-5 to 5%	10 V	NICHICON
C10, C11	1 μF	F921A105MPA	-10 to +10%		

Component ID	Value	Part Code	Tolerance	Power Rating	Manufacture
R1	1.5 kΩ	RK73B1ETTD152J	-5 to +5%	0.063 W	KOA

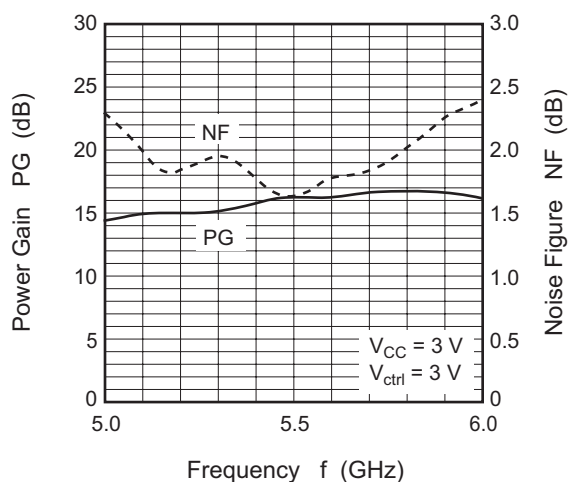
Pin - Pout Characteristics



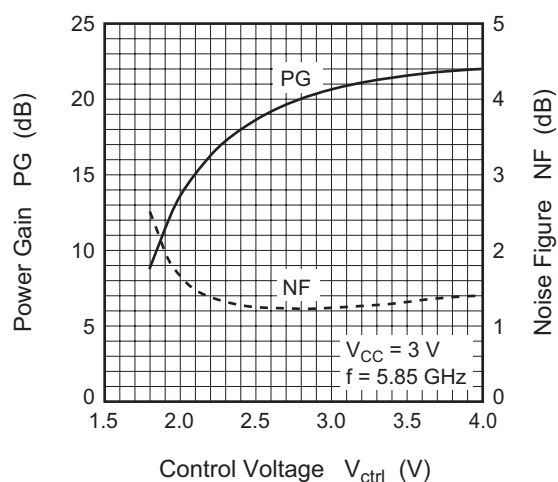
3rd. Order Intermodulation Distortion



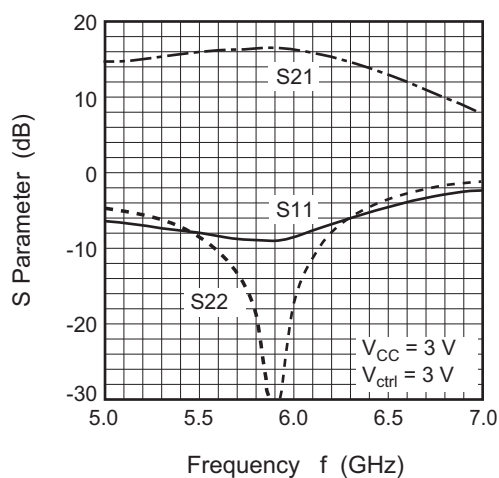
Power Gain, Noise Figure vs. Frequency



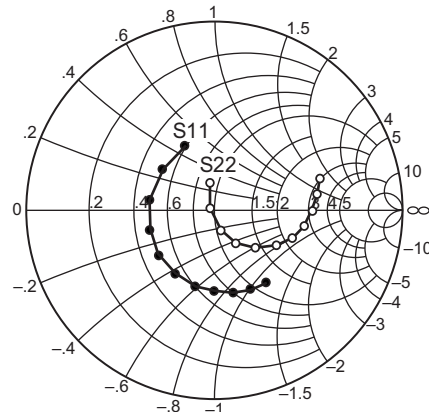
Power Gain, Noise Figure vs. Control Voltage



S Parameter vs. Frequency



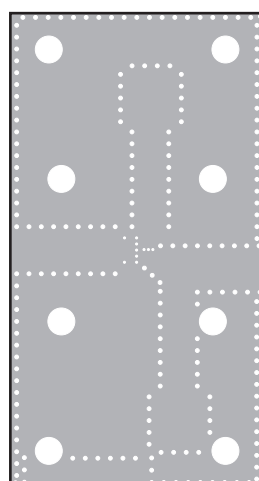
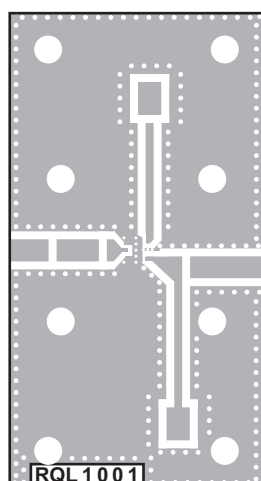
S Parameter vs. Frequency



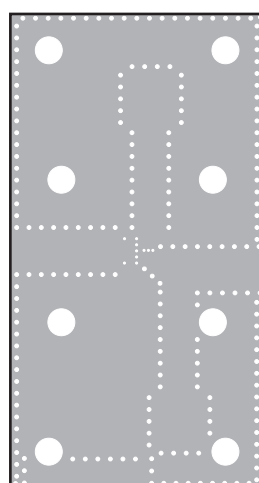
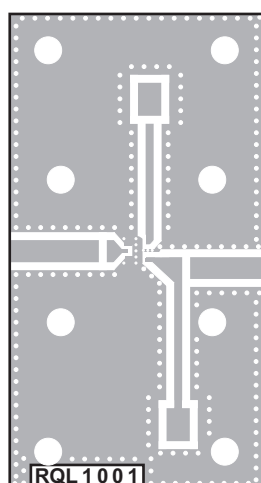
Test condition :  $V_{CC} = 3\text{ V}$ ,  $V_{ctrl} = 3\text{ V}$   
5.0 to 6.0 GHz (0.1 GHz step)

## Evaluation Board

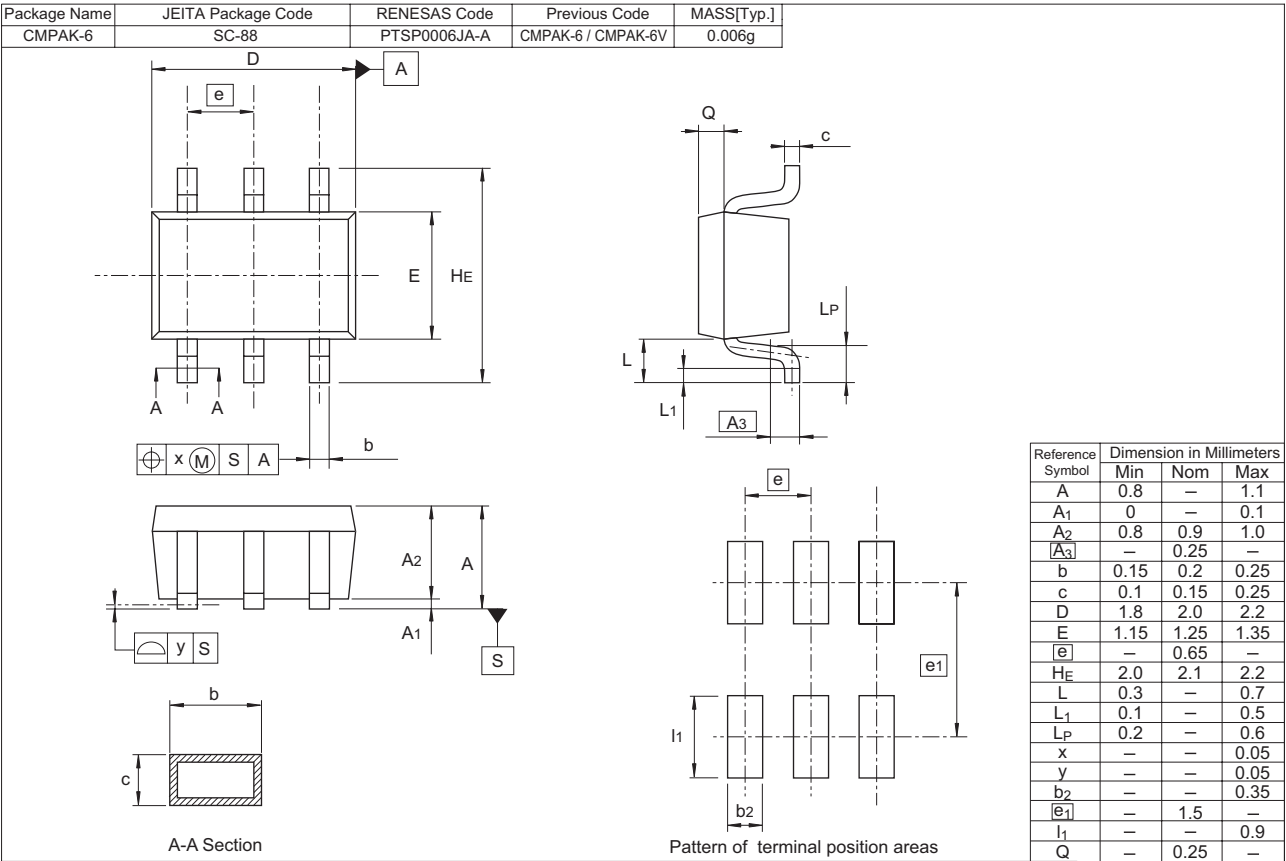
$f = 2.45 \text{ GHz}$



$f = 5.85 \text{ GHz}$



Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
RQL1001JLTL-E	3000 pcs	φ178 mm reel, 8 mm emboss taping

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.



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