

Receive Dual Low Noise Amplifier/Mixer

Description

The CXG1109EN is a receive dual low noise amplifier/mixer MMIC. This IC is designed using the Sony's GaAs J-FET process.

Features

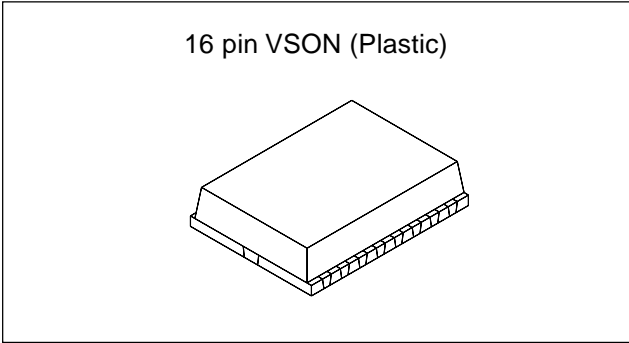
- High conversion gain: $G_p = 16.5$ to 17 dB (LNA Typ.)
 $G_c = 9.5$ to 10 dB (MIX Typ.)
- Low noise figure: $NF = 1.5$ dB (LNA Typ.)
 $NF = 4$ to 5 dB (MIX Typ.)
- Single 3V power supply operation
- Low LO input power operation $P_{LO} = -12.5$ dBm
- Single CTL pin achieved by the built-in inverter circuit
- 16-pin VSON package

Applications

800MHz Japan digital cellular telephones (PDC)

Structure

GaAs J-FET MMIC



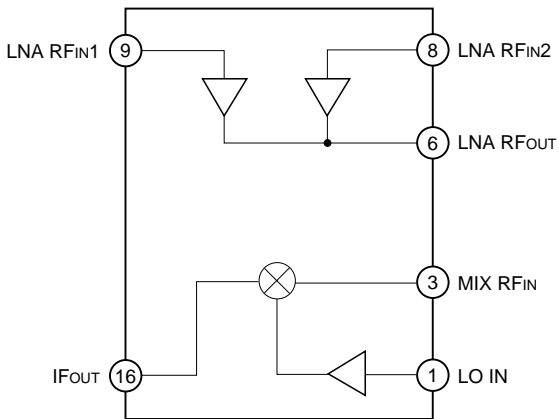
Absolute Maximum Ratings (Ta = 25°C)

• Supply voltage	V _{DD}	4.5	V
• Input power	P _{IN}	+13	dBm
• Current consumption	I _{DD}	15	mA
• Operating temperature	T _{opr}	-35 to +85	°C
• Storage temperature	T _{stg}	-65 to +150	°C

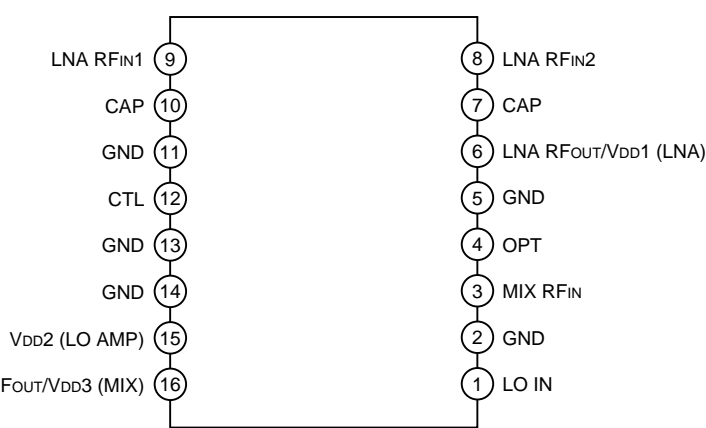
Recommended Operating Voltages

• Supply voltage	V _{DD}	2.7 to 3.3	V
• Control voltage	V _{CTL} (H)	2.4 to 3.3	V
	V _{CTL} (L)	0 to 0.3	V

Block Diagram



Pin Configuration



GaAs MMICs are ESD sensitive devices. Special handling precautions are required.

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Electrical Characteristics

Conditions: $V_{DD} = 3.0V$, $V_{CTL} (H) = 3.0V$, $V_{CTL} (L) = 0V$, $f_{RF1} = 885MHz$, $f_{RF2} = 810MHz$, $f_{LO} = f_{RF} - 130MHz$, $P_{LO} = -12.5dBm$, $T_a = 25^{\circ}C$, unless otherwise specified

Low Noise Amplifier Block

Item	Symbol	Path	RF frequency	V_{CTL}	Min.	Typ.	Max.	Unit	Measurement condition
Current consumption	I_{DD}	—	—	H	—	1.9	2.5	mA	When no signal
			—	L	—	1.9	2.5		
Control current	I_{CTL}	—	—	H	—	55	80	μA	
			—	L	-1	0	—		
Power gain	G_p	$RF_{IN1} \rightarrow RF_{OUT}$	f_{RF1}	H	15	16.5	19	dB	When a small signal
				L	—	-20	-15		
		$RF_{IN2} \rightarrow RF_{OUT}$	f_{RF2}	H	—	-26	-21		
				L	15	17	19		
Noise figure	NF	$RF_{IN1} \rightarrow RF_{OUT}$	f_{RF1}	H	—	1.5	2	dB	
		$RF_{IN2} \rightarrow RF_{OUT}$	f_{RF2}	L	—	1.5	2		
Input IP3	IIP3	$RF_{IN1} \rightarrow RF_{OUT}$	f_{RF1}	H	-11	-7.5	—	dBm	*1
		$RF_{IN2} \rightarrow RF_{OUT}$	f_{RF2}	L	-12.5	-9	—		
Isolation	ISO	$RF_{OUT} \rightarrow RF_{IN1}$	f_{RF1}	H	17	22	—	dB	When a small signal
		$RF_{OUT} \rightarrow RF_{IN2}$	f_{RF2}	L	18	23	—		

Mixer Block

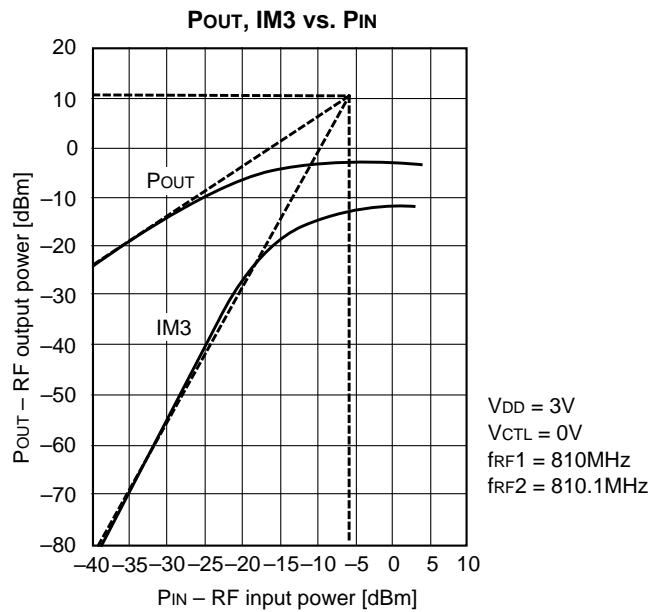
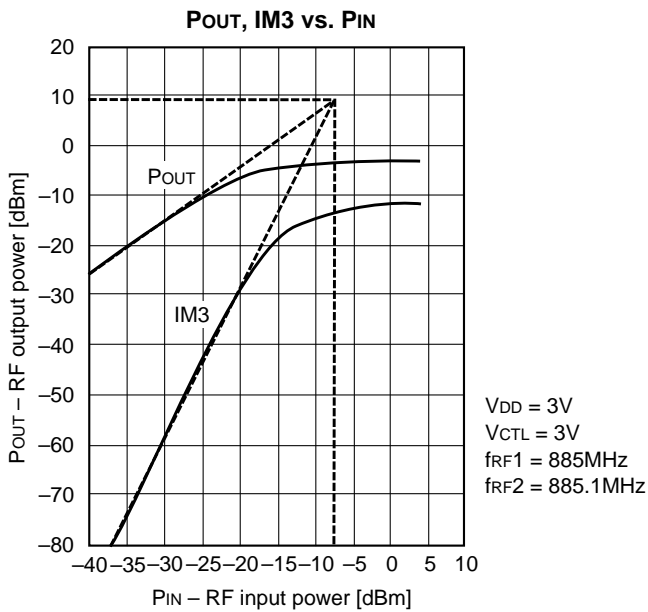
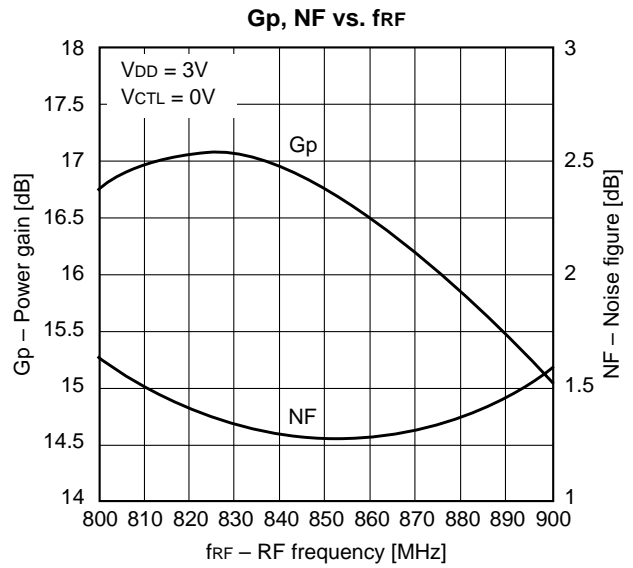
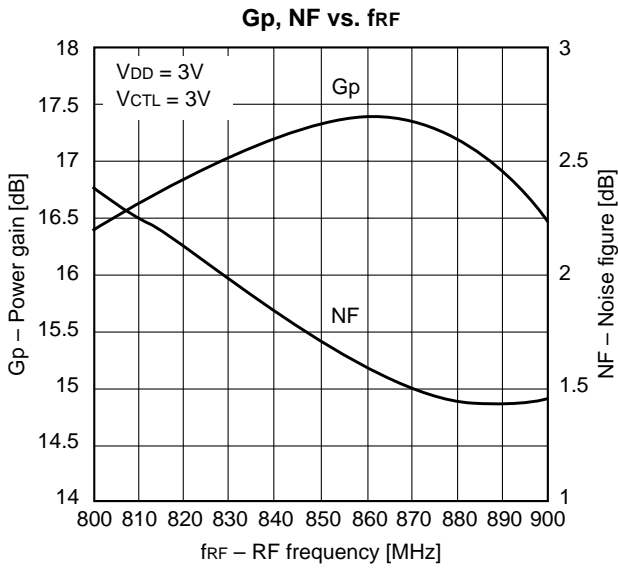
Item	Symbol	RF frequency	Min.	Typ.	Max.	Unit	Measurement condition
Current consumption	I_{DD}	—	—	4.5	6.2	mA	When no signal
Power gain	G_c	f_{RF1}	9	10	11.5	dB	When a small signal
		f_{RF2}	8.5	9.5	11		
Noise figure	NF	f_{RF1}	—	5	6.5	dB	
		f_{RF2}	—	4	5.5		
Input IP3	IIP3	f_{RF1}	-1	1.5	—	dBm	*1
		f_{RF2}	-1.5	1.5	—		
LO to RF leak level	PIk	f_{RF1}	—	-22	-17	dBm	$f_{LO} = 755MHz$
		f_{RF2}	—	-24	-19		$f_{LO} = 680MHz$

The values shown above are the specified values on the Sony's recommended evaluation board.

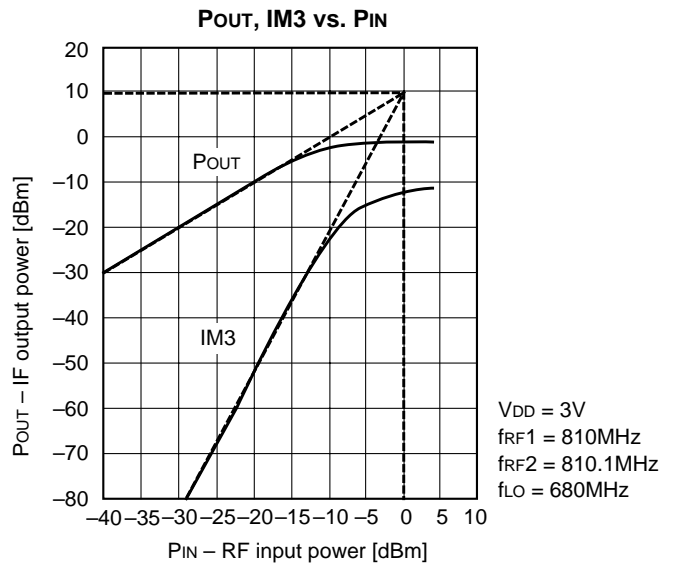
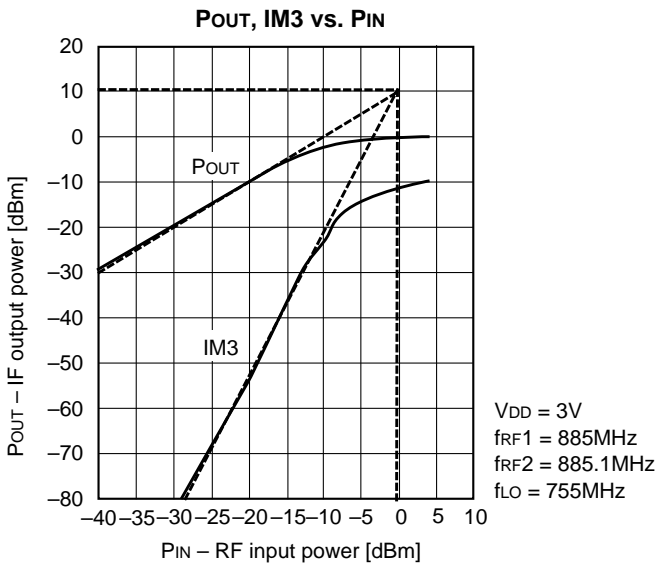
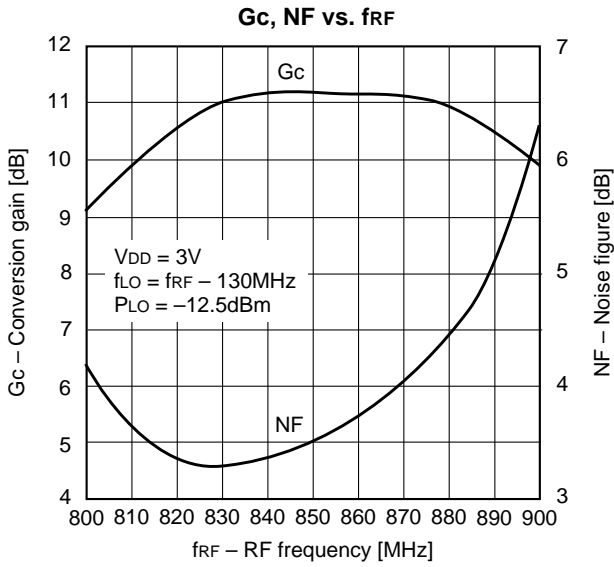
*1 Conversion from the IM3 suppression ratio for two-wave input: PRF = -30dBm (low noise amplifier block)/ -22.5dBm (mixer block) at $f_{RFOffset} = 100kHz$.

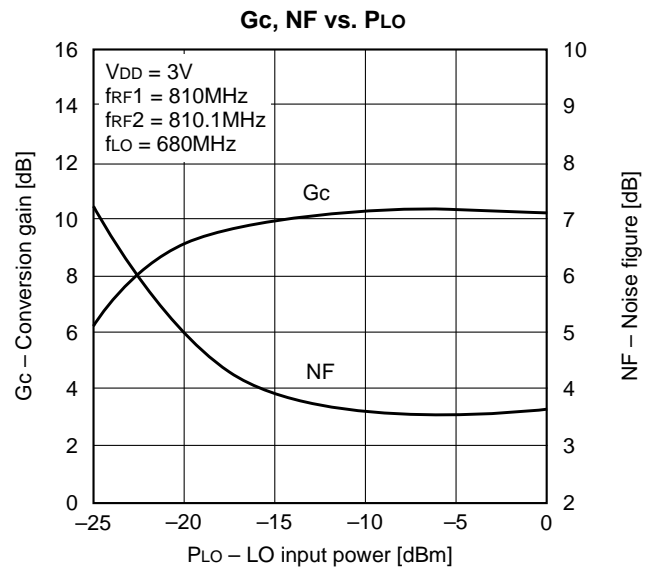
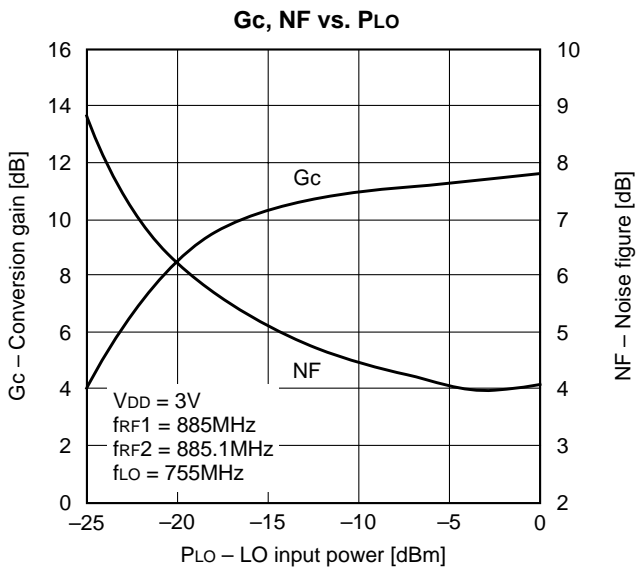
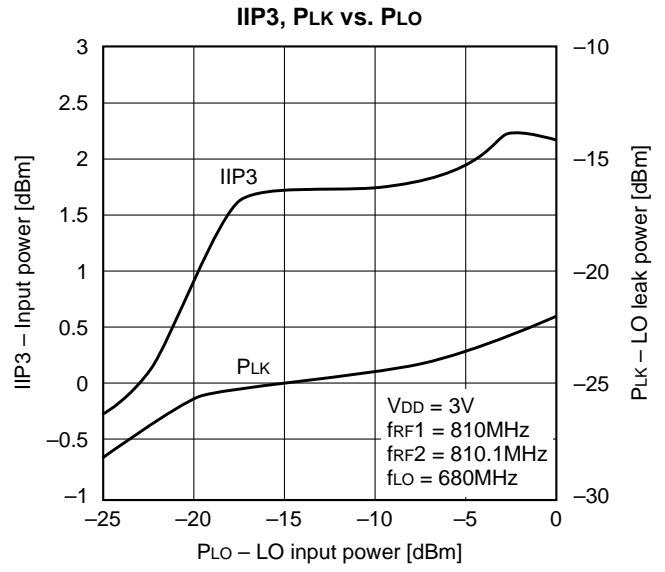
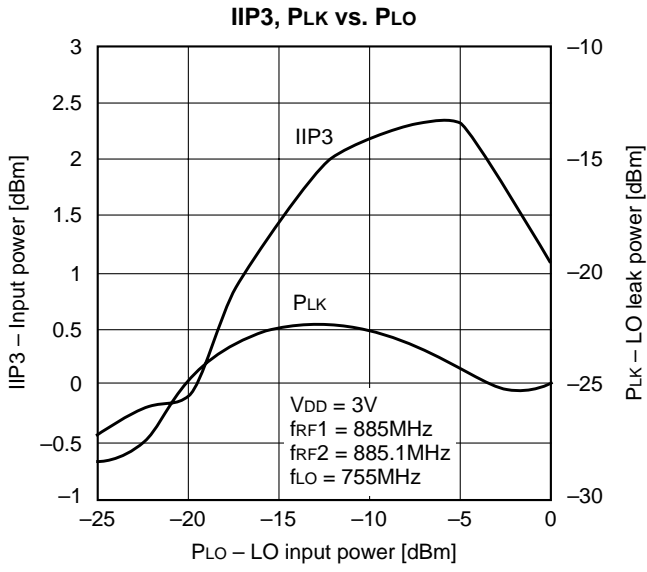
Example of Representative Characteristics (Ta = 25°C)

Low Noise Amplifier Block

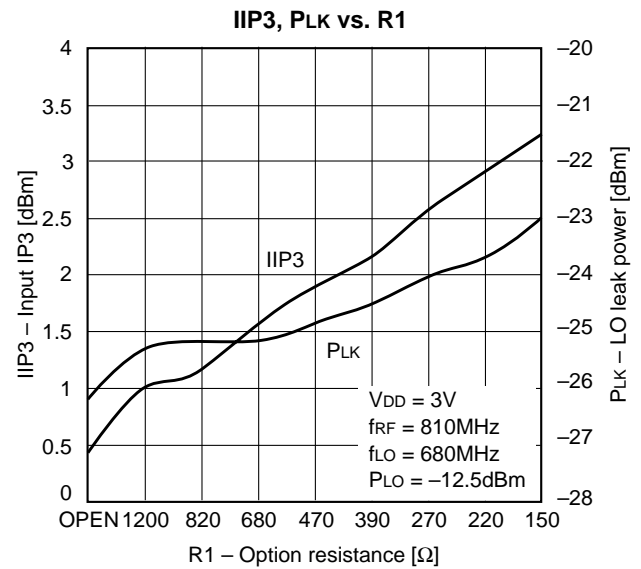
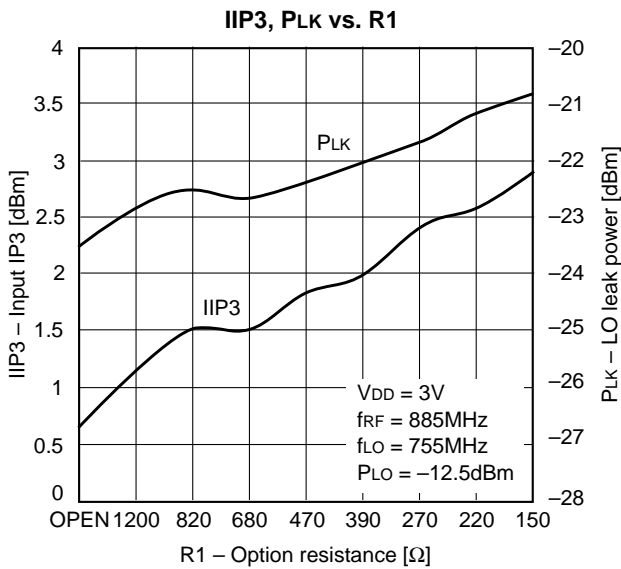
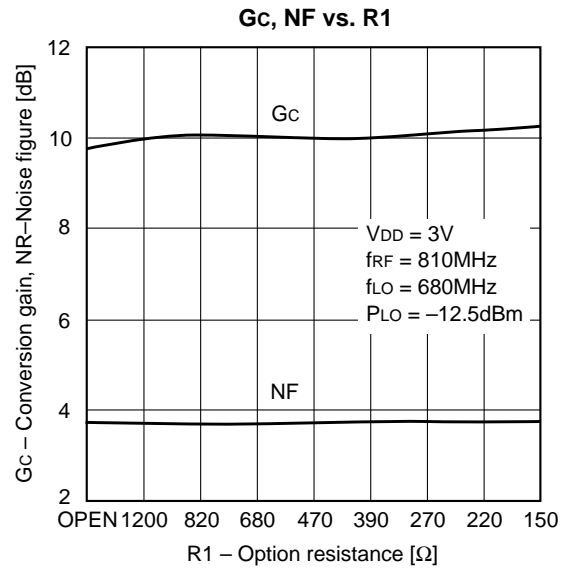
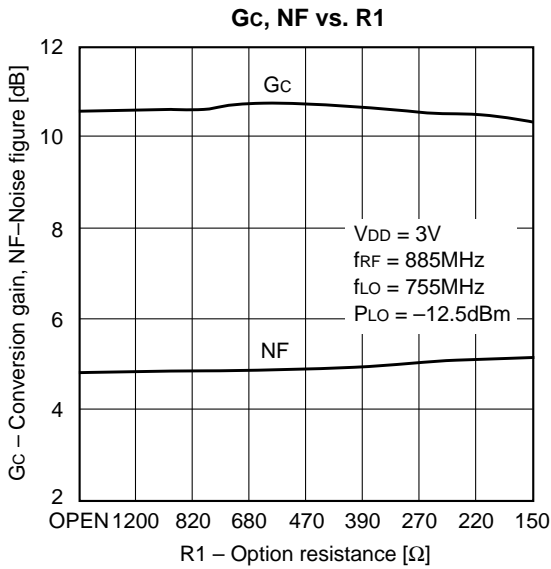
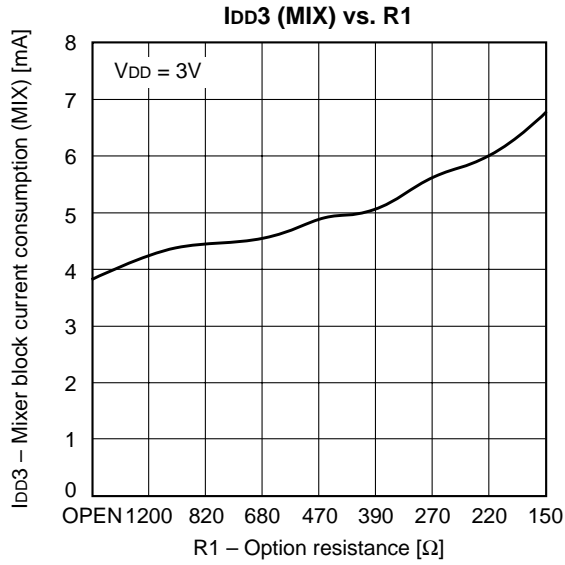


Mixer Block

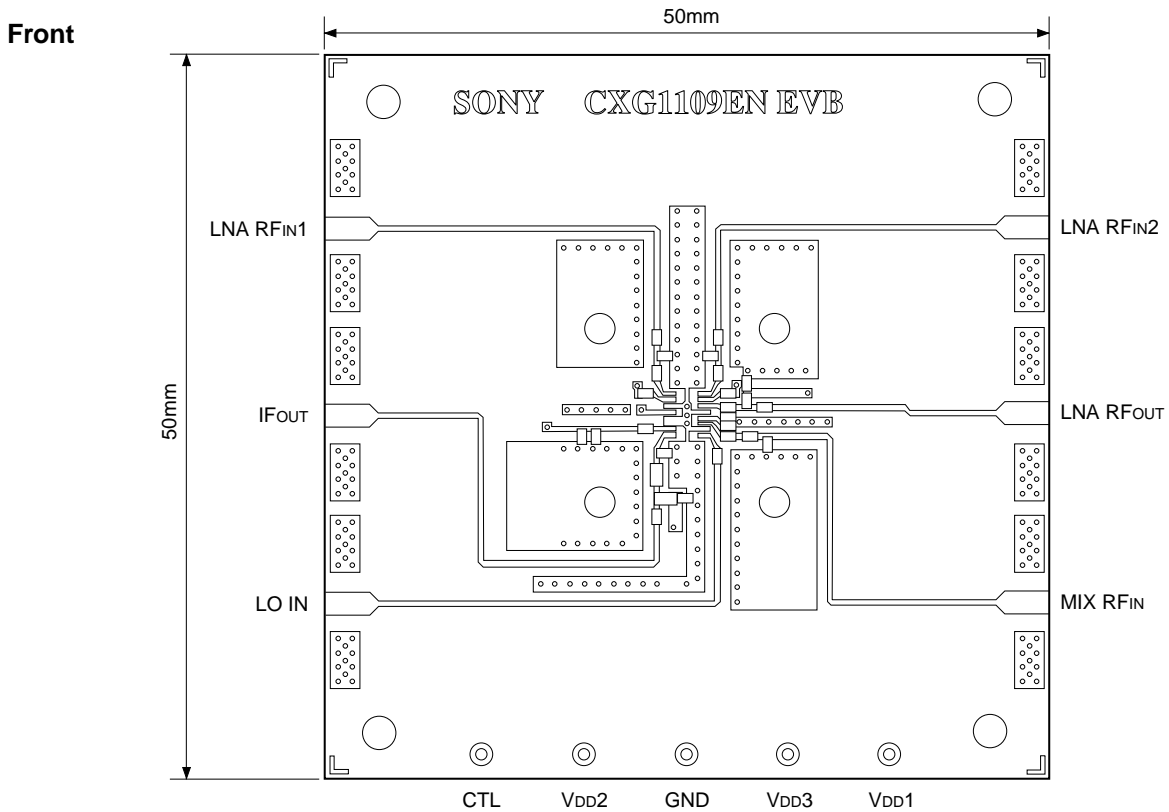




Example of Characteristics for Option Resistance R1 Changed (Ta = 25°C)

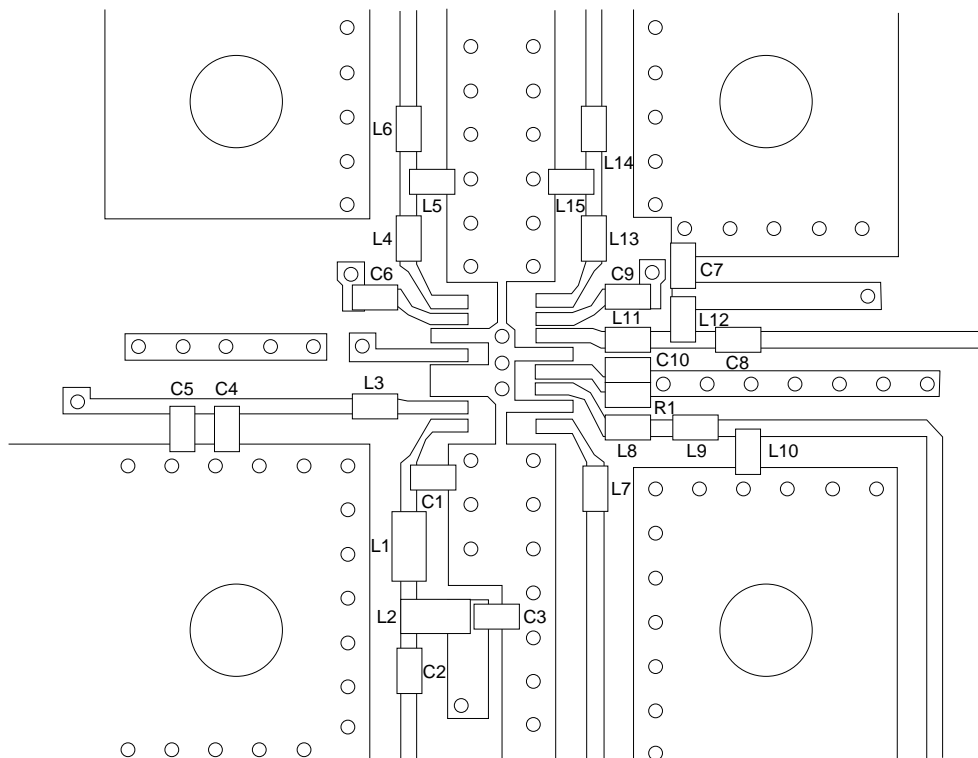


Recommended Evaluation Board



Glass fabric-base 4-layer epoxy board (thickness: 0.2mm × 2)
GND for the whole 2nd and 3rd layers

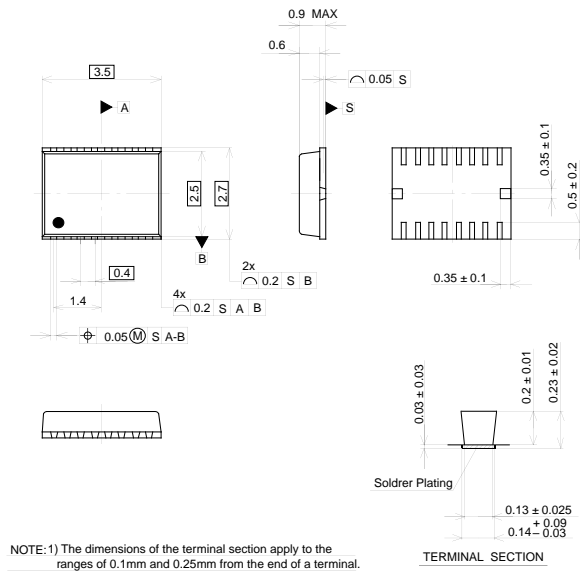
Enlarged Diagram of Center Part



Package Outline

Unit: mm

16PIN VSON (PLASTIC)



NOTE: 1) The dimensions of the terminal section apply to the ranges of 0.1mm and 0.25mm from the end of a terminal.

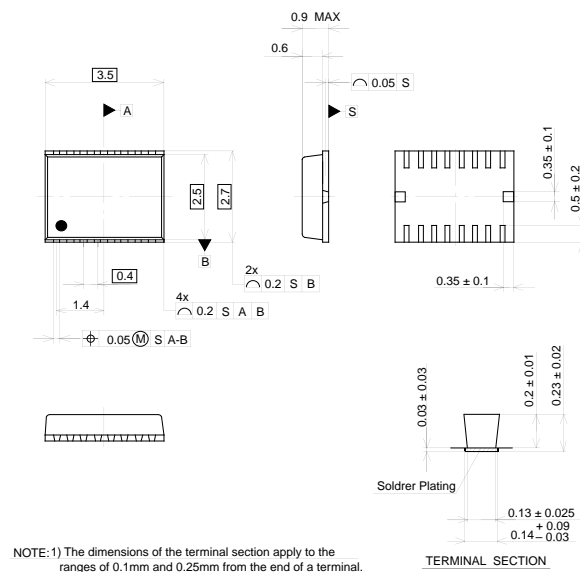
PACKAGE STRUCTURE

SONY CODE	VSON-16P-01
EIAJ CODE	_____
JEDEC CODE	_____

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	COPPER ALLOY
PACKAGE MASS	0.02 g

Kokubu Ass'y

16PIN VSON (PLASTIC)



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LEAD PLATING SPECIFICATIONS

ITEM	SPEC.
LEAD MATERIAL	COPPER ALLOY
SOLDER COMPOSITION	Sn-Bi Bi:1-4wt%
PLATING THICKNESS	5-18µm