

# MMIC Mixer

IIP3 = 15 dBm, Gc = -0.5 dB @ 450 MHz,  
MCPH6

## SMA5101

### Features

- Wide Band: Up to Ku Band
- Low Distortion: IIP3 = 20 dBm (@ ICC > 11 mA)
- SMT, Ultra Small Package : 2.0x2.1x0.85 mm
- High Conversion Gain: -0.5 dB (@ 450 MHz)
- Low Voltage Available: 1.2 V and Above
- Pb-Free, Halogen Free And ROHS Compliant

### Specifications

#### ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

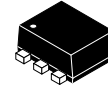
Symbol	Parameter	Ratings	Unit
V <sub>CBO</sub>	Collector-to-Base Voltage	8	V
V <sub>CEO</sub>	Collector-to-Emitter Voltage	6	V
V <sub>EBO</sub>	Emitter-to-Base Voltage	2	V
I <sub>CC</sub>	Collector Current	50	mA
P <sub>C</sub>	Max Power Dissipation	280	mW
Topr	Operating Temperature	-40 to +85	°C
Tstg	Storage Temperature	-55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### RECOMMENDED OPERATING CONDITIONS (Ta = 25°C)

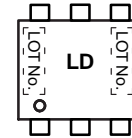
Symbol	Parameter	Ratings			Unit
		Min	Typ	Max	
V <sub>C1E1</sub>	Supply Voltage	1.2	3	6	V
V <sub>C2E1</sub>		1.2	3	6	V
V <sub>C1E2</sub>		1.2	3	6	V
V <sub>C2E2</sub>		1.2	3	6	V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

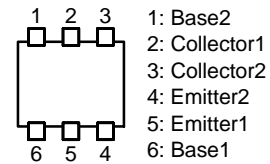


SC-88FL / MCPH6  
CASE 419AS

### MARKING DIAGRAM



### PIN DESCRIPTION



### ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

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## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Symbol	Parameter	Conditions	Ratings			Unit
			Min	Typ	Max	
$I_{C1B1O}$	Collector Cutoff Current	$V_{C1B1} = 5\text{ V}$	–	–	1	$\mu\text{A}$
$I_{C2B1O}$		$V_{C2B1} = 5\text{ V}$	–	–	1	$\mu\text{A}$
$I_{C1B2O}$		$V_{C1B2} = 5\text{ V}$	–	–	1	$\mu\text{A}$
$I_{C2B2O}$		$V_{C2B2} = 5\text{ V}$	–	–	1	$\mu\text{A}$
$I_{E1B1O}$	Emitter Cutoff Current	$V_{E1B1} = 1\text{ V}$	–	–	1	$\mu\text{A}$
$I_{E2B1O}$		$V_{E2B1} = 1\text{ V}$	–	–	1	$\mu\text{A}$
$I_{E1B2O}$		$V_{E1B2} = 1\text{ V}$	–	–	1	$\mu\text{A}$
$I_{E2B2O}$		$V_{E2B2} = 1\text{ V}$	–	–	1	$\mu\text{A}$
$h_{FE1}$	DC Current Gain	$V_{C1E1} = 1\text{ V}, I_{C1E1} = 3\text{ mA}$	20	–	120	
$h_{FE2}$		$V_{C2E1} = 1\text{ V}, I_{C2E1} = 3\text{ mA}$	20	–	120	
$h_{FE3}$		$V_{C1E2} = 1\text{ V}, I_{C1E2} = 3\text{ mA}$	20	–	120	
$h_{FE4}$		$V_{C2E2} = 1\text{ V}, I_{C2E2} = 3\text{ mA}$	20	–	120	
GC	Conversion Gain (Note 1)	$V_{CC} = 5\text{ V}, I_{CC} = 6\text{ mA},$ $f(\text{RF}) = 450\text{ MHz}, f(\text{LO}) = 500\text{ MHz},$ $P(\text{RF}) = -15\text{ dBm}, P(\text{LO}) = -6\text{ dBm}$	–	-0.5	–	dB
IIP3	Input Intercept Point (Note 1)	$V_{CC} = 5\text{ V}, I_{CC} = 6\text{ mA},$ $f(\text{RF1}) = 450\text{ MHz}, f(\text{RF2}) = 451\text{ MHz}, f(\text{LO}) = 500\text{ MHz},$ $P(\text{RF1}) = P(\text{RF2}) = -15\text{ dBm}, P(\text{LO}) = -6\text{ dBm}$	–	15	–	dBm

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. On evaluation board.

### Measurement Circuit

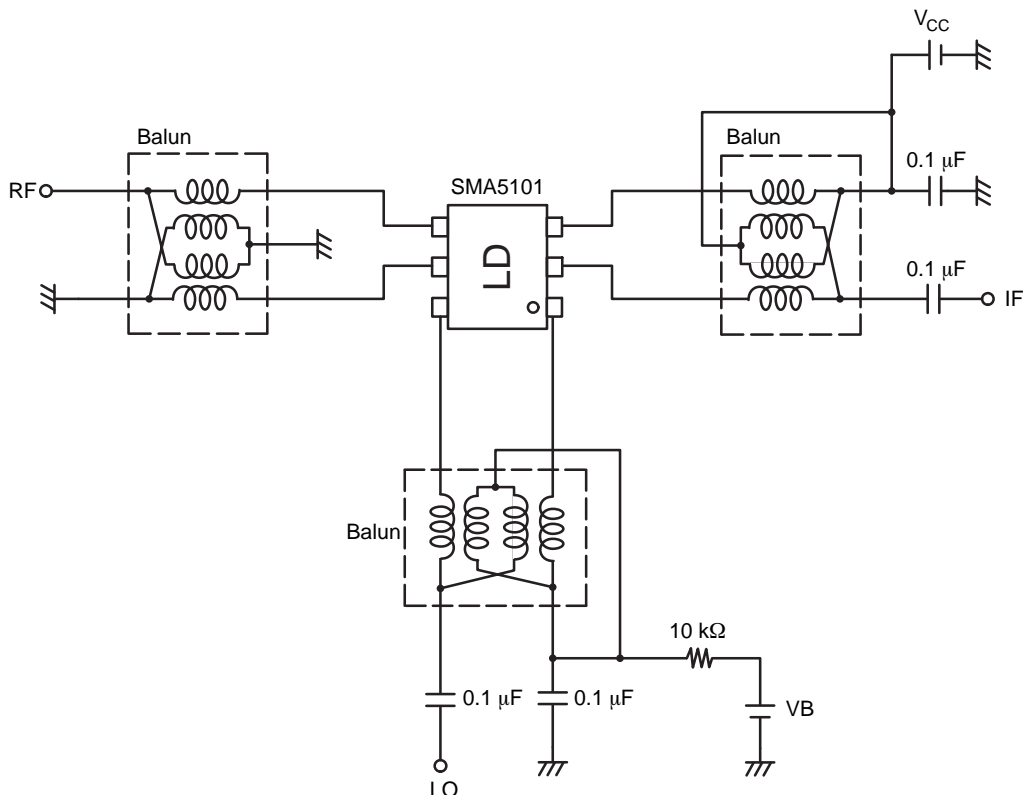


Figure 1. Measurement Circuit

# SMA5101

## Evaluation Board

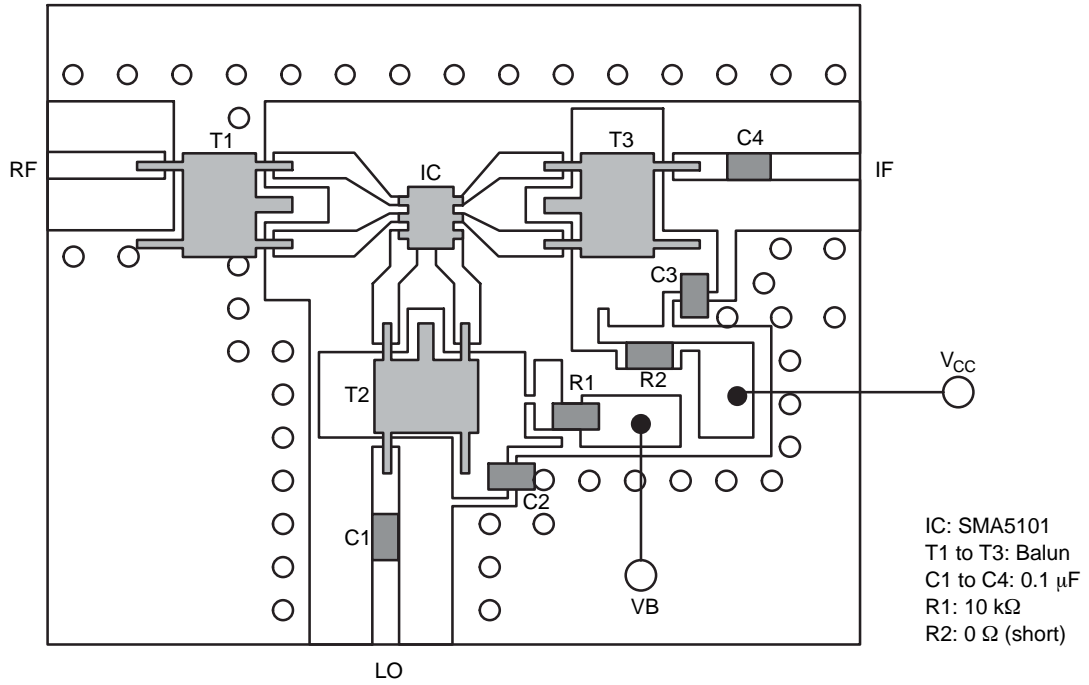


Figure 2. Evaluation Board

## Circuit Example (Self Bias)

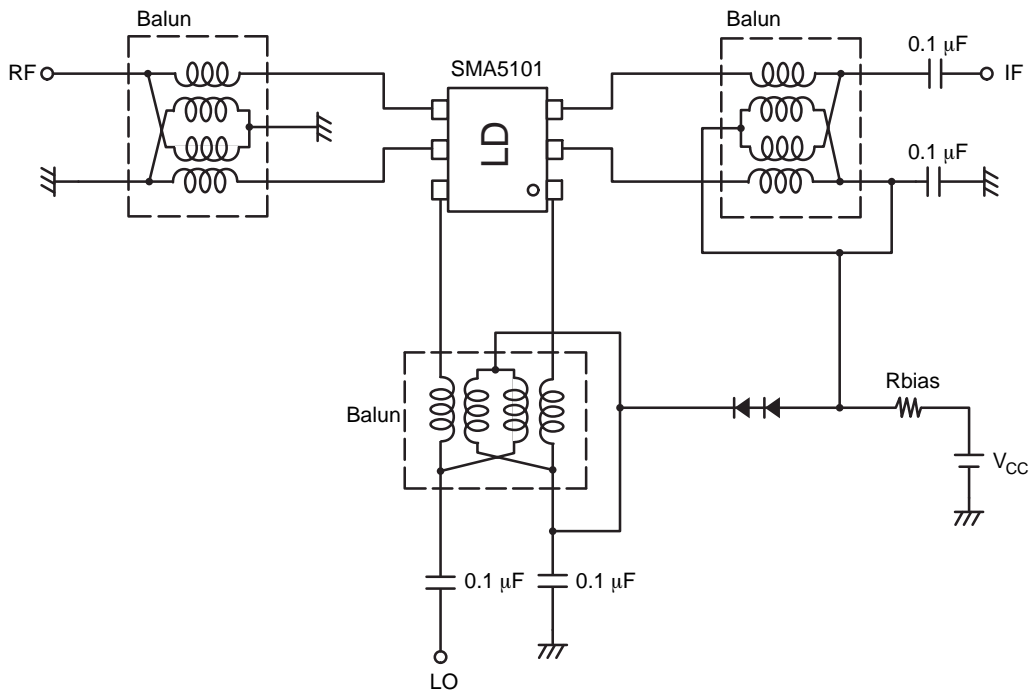
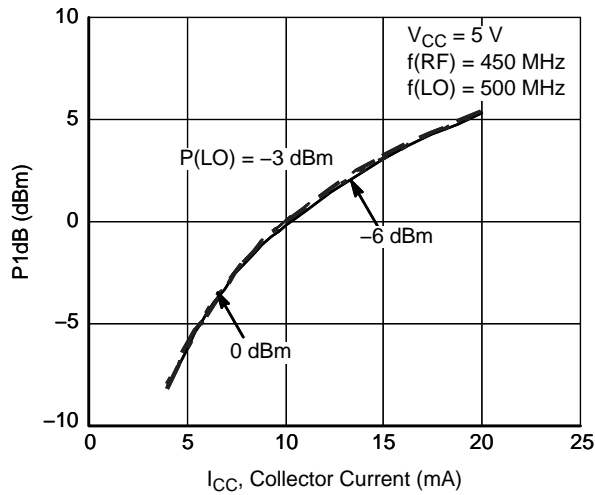
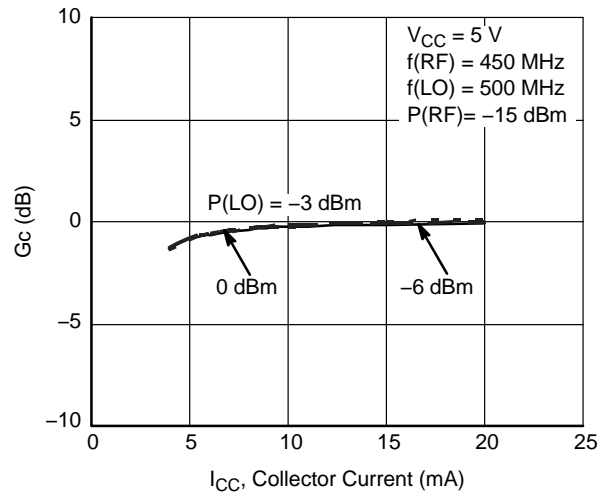


Figure 3. Circuit Example (Self Bias)

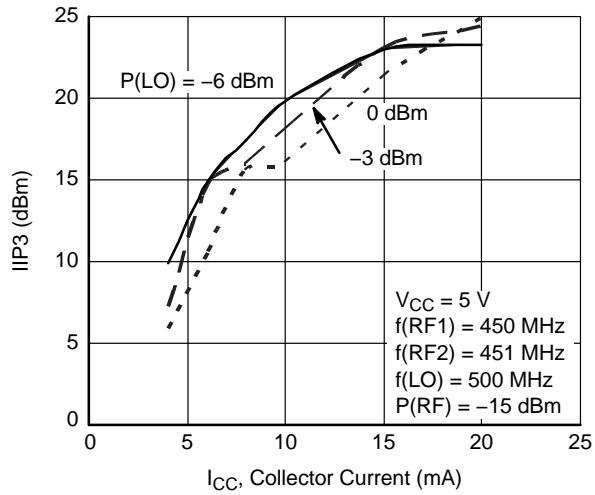
# SMA5101



**Figure 4. P1dB –  $I_{CC}$**



**Figure 5.  $G_C$  –  $I_{CC}$**



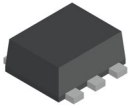
**Figure 6. IIP3 –  $I_{CC}$**

## ORDERING INFORMATION

Device Order Number	Specific Device Marking	Package Type (JEITA, JEDEC)	Package Type	Shipping <sup>†</sup>
SMA5101-TL-H	LD	SC-88FL (Pb-Free/Halogen Free)	MCPH6 (Pb-Free/Halogen Free)	3000 / Tape & Reel

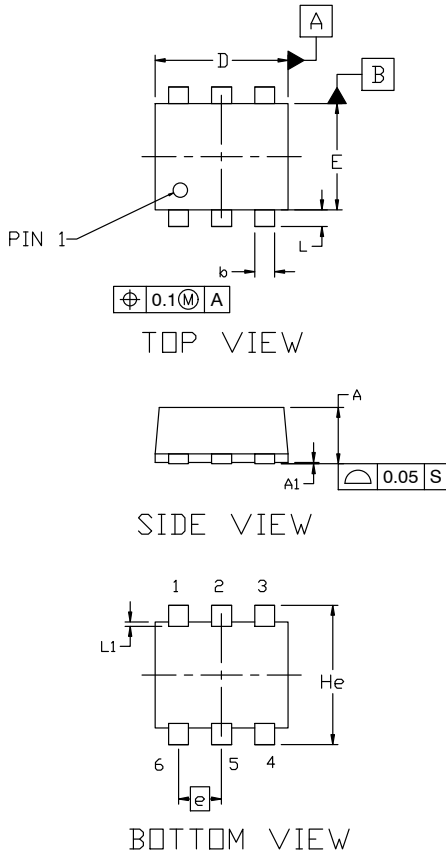
<sup>†</sup>For Information On Tape And Reel Specifications, Including Part Orientation And Tape Sizes, Please Refer To Our Tape And Reel Packaging Specifications Brochure, Brd8011/D.

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SC-88FL / MCPH6  
CASE 419AS  
ISSUE A

DATE 28 SEP 2022

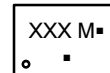


NOTES:

1. NO INDUSTRY STANDARD APPLIES TO THIS PACKAGE.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND THE BAR PROTRUSIONS.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.80	0.85	0.90
A1	0.00	---	0.02
b	0.25	0.30	0.40
c	0.12	0.15	0.25
D	1.94	2.00	2.06
E	1.54	1.60	1.66
He	2.05	2.10	2.15
L	0.19	0.25	0.31
L1	0.00	0.07	0.12
e	0.65 BSC		

**GENERIC MARKING DIAGRAM\***



- XXX = Specific Device Code
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

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