

Low Noise Amplifier with Bypass Switch/Mixer

Description

The CXG1097EN is a dual mode low noise amplifier with a bypass switch/ mixer MMIC for Japan CDMA cellular. This IC is designed using the Sony's GaAs J-FET process.

Features

- Dual mode low noise amplifier with a bypass switch
- High gain

Low noise amplifier high current mode:

$$G_p = 14.5\text{dB (Typ.)}$$

Mixer:

$$G_c = 12.0\text{dB (Typ.)}$$

- Low noise

Low noise amplifier high current mode:

$$NF = 1.6\text{dB (Typ.)}$$

Mixer:

$$NF = 4.5\text{dB (Typ.)}$$

- Low distortion

Low noise amplifier high current mode:

$$IIP3 = +4.5\text{dBm (Typ.)}$$

Mixer:

$$IIP3 = +3\text{dBm (Typ.)}$$

- Small package 16-pin VSON

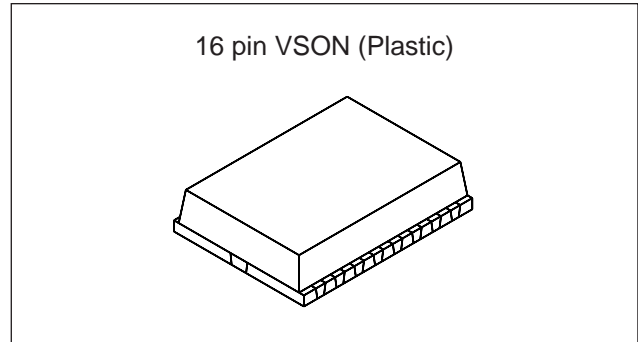
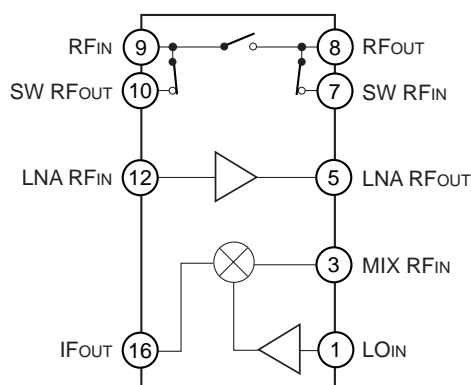
Applications

Japan CDMA cellular (J-CDMA)

Element Structure

GaAs J-FET MMIC

Block Diagram



Absolute Maximum Ratings (Ta = 25°C)

| | | | |
|-------------------------|------------------|-------------|-----|
| • Supply voltage | V _{DD} | 4.5 | V |
| • Input power | P _{IN} | +5 | dBm |
| • Operating temperature | T _{opr} | -35 to +85 | °C |
| • Storage temperature | T _{stg} | -65 to +150 | °C |

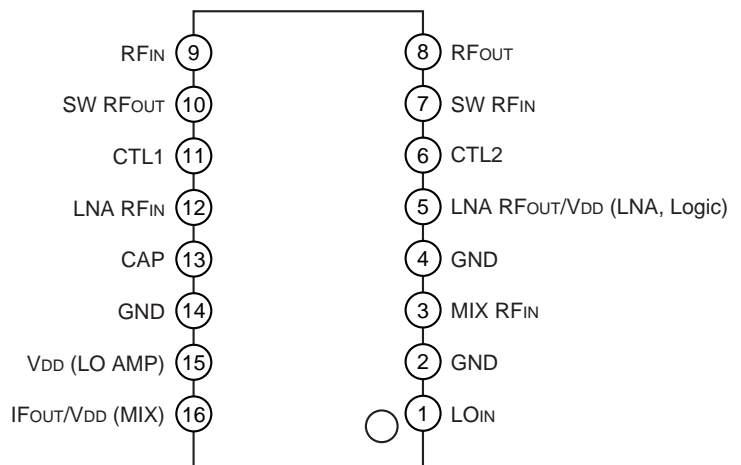
Recommended Operating Conditions

| | | | |
|-------------------|----------------------|------------|---|
| • 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 |

Element Structure

GaAs J-FET MMIC

Pin Configuration



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Electrical Characteristics

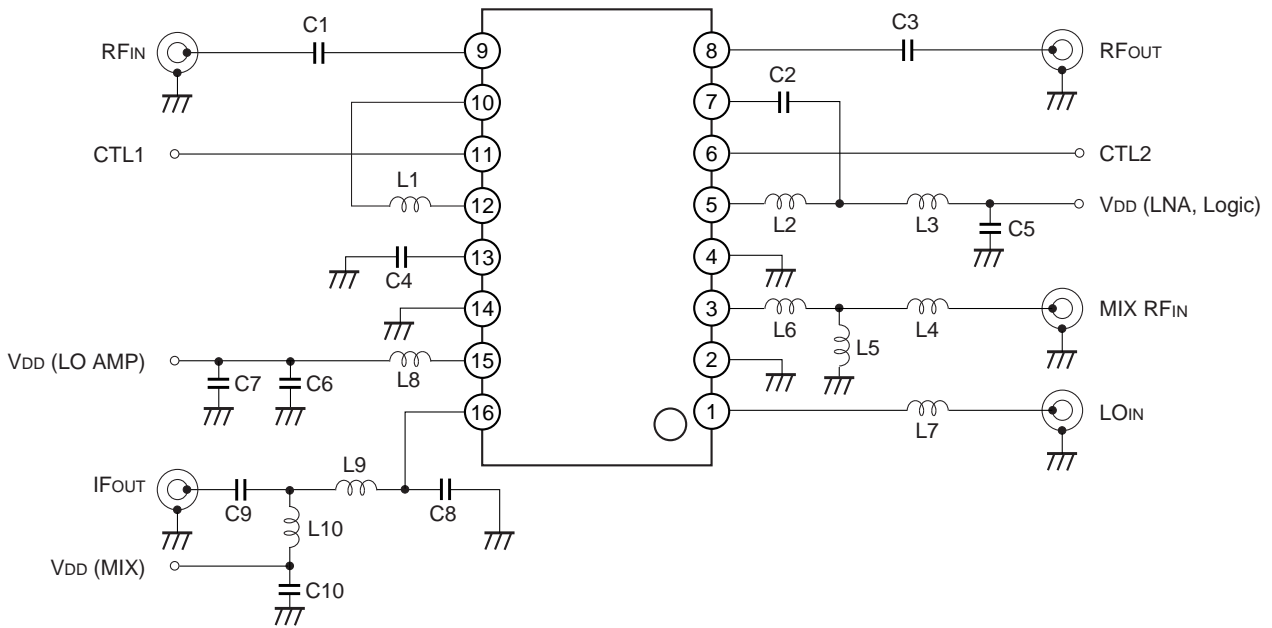
Conditions: $V_{DD} = 2.7V$, $V_{CTL} (H) = 2.7V$, $V_{CTL} (L) = 0V$, $f_{RF} = 850MHz$, $f_{LO} = 740MHz$, $P_{LO} = -10dBm$,
 unless otherwise specified ($T_a = 25^{\circ}C$)

| Block | Item | V _{CTL1} | V _{CTL2} | Symbol | Min. | Typ. | Max. | Unit | Measurement condition | | |
|---------------------------|--------------------------------|-------------------|-------------------|--------------------|------|------|------|---------------------|-----------------------|---------------------|---------------------|
| Low noise amplifier block | Control current for High state | H | L | I _{CTLH} | — | 50 | 70 | μA | When no signal | | |
| | | L | H | | | | | | | | |
| | Current consumption | L | L or H | I _{DDSW} | — | 0.3 | 0.6 | mA | | | |
| | | H | L | I _{DDL} | — | 3.8 | 5 | | | | |
| | | H | H | I _{DDH} | — | 10.5 | 17 | | | | |
| | Power gain | L | L or H | G _{PSW} | -3.7 | -3.2 | -2.7 | dB | | When a small signal | |
| | | H | L | G _{PL} | 11 | 12.5 | 14 | | | | |
| | | H | H | G _{PH} | 13 | 14.5 | 16 | | | | |
| | Noise figure | H | L | N _{FL} | — | 1.8 | 2.3 | dB | | | |
| | | H | H | N _{FH} | — | 1.6 | 2.1 | | | | |
| | Input IP3 | L | L or H | IIP3 _{sw} | 25 | 35 | — | dBm | | | *1 |
| | | H | L | IIP3 _L | -3 | 0 | — | | | | |
| H | | H | IIP3 _H | 2 | 4.5 | — | | | | | |
| Isolation | H | L | Iso | 20 | 24 | — | dB | When a small signal | | | |
| | H | H | | | | | | | | | |
| Mixer block | Current consumption | | | I _{DD} | — | 7.5 | 10 | | mA | | When no signal |
| | Conversion gain | | | G _c | 10.5 | 12 | 13.5 | | dB | | When a small signal |
| | Noise figure | | | N _F | — | 4.5 | 6 | | dB | | |
| | Input IP3 | | | IIP3 | 0.5 | 3 | — | | dBm | *1 | |
| | LO to RF leak level | | | P _{LK} | — | -30 | -25 | | dBm | — | |

*1 $f_{RF}=850MHz/850.9MHz$, $P_{RF} = -25dBm$ (low noise amplifier mode, mixer)/0dBm (bypass switch mode)
 Conversion by the IM3 suppression ratio for two-wave input.

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

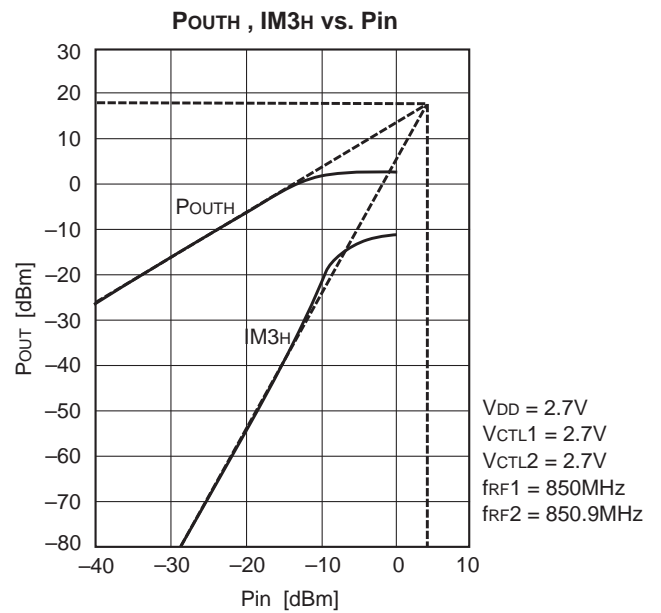
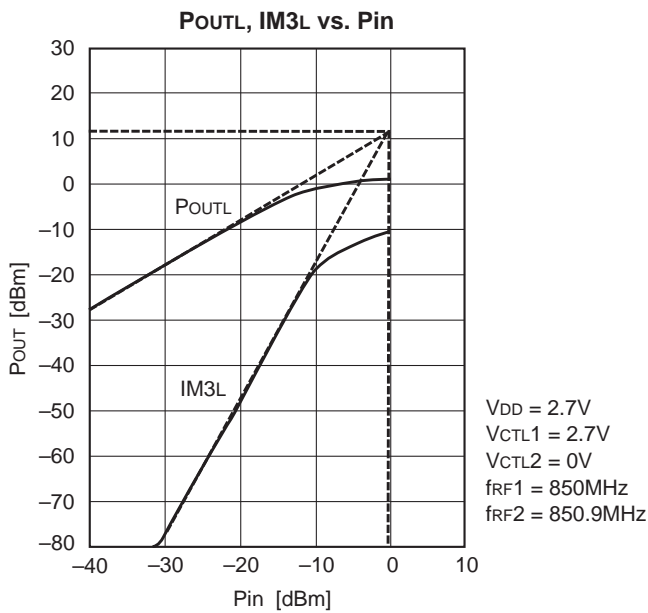
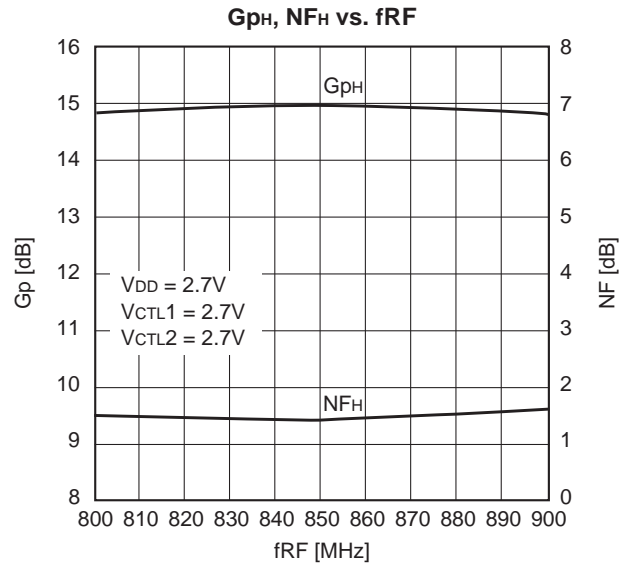
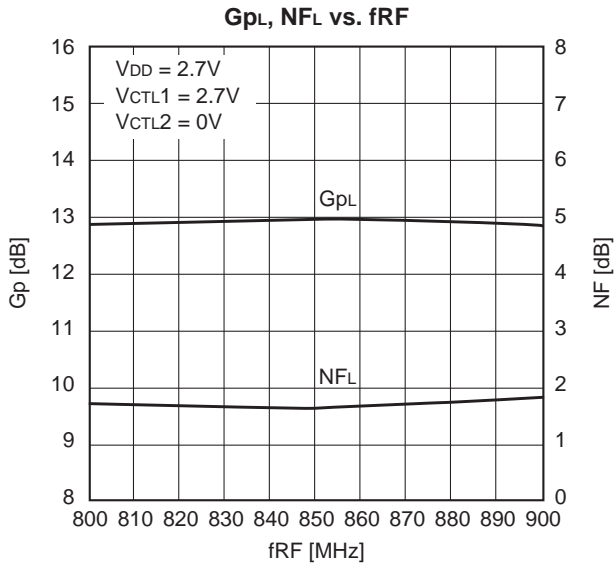
Recommended Evaluation Circuit



| | | | |
|-----|-------|-----|--------|
| L1 | 18nH | C1 | 100pF |
| L2 | 18nH | C2 | 100pF |
| L3 | 33nH | C3 | 100pF |
| L4 | 10nH | C4 | 1000pF |
| L5 | 15nH | C5 | 1000pF |
| L6 | 27nH | C6 | 100pF |
| L7 | 33nH | C7 | 1000pF |
| L8 | 33nH | C8 | 6pF |
| L9 | 220nH | C9 | 1000pF |
| L10 | 180nH | C10 | 1000pF |

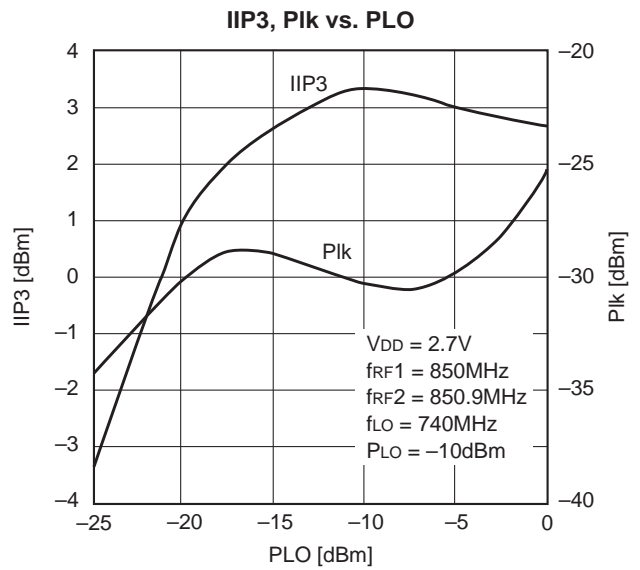
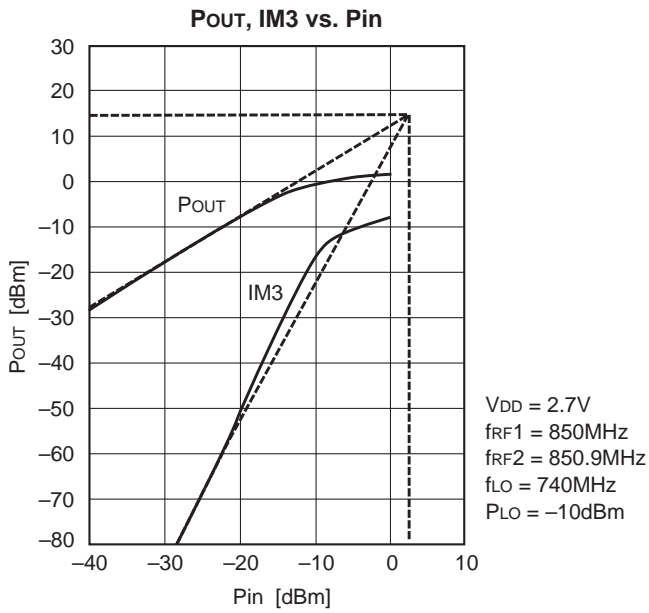
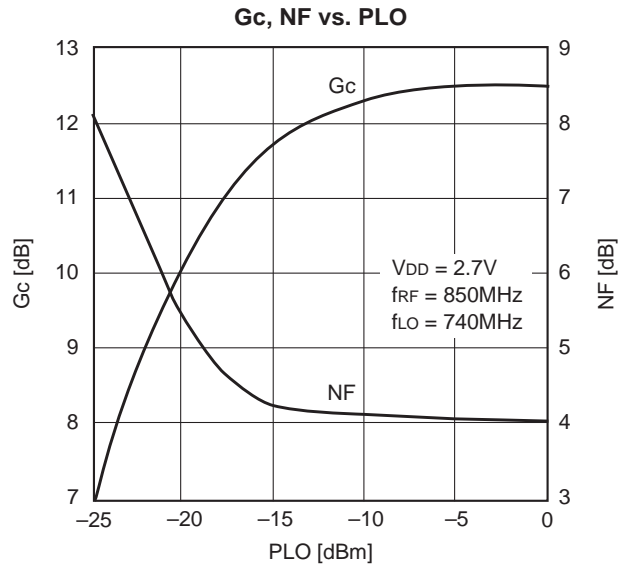
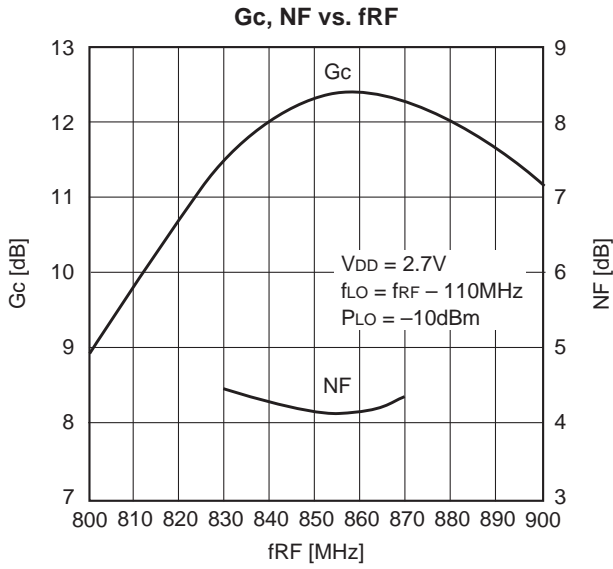
Example of Representative Characteristics (Ta = 25°C)

Low Noise Amplifier Block

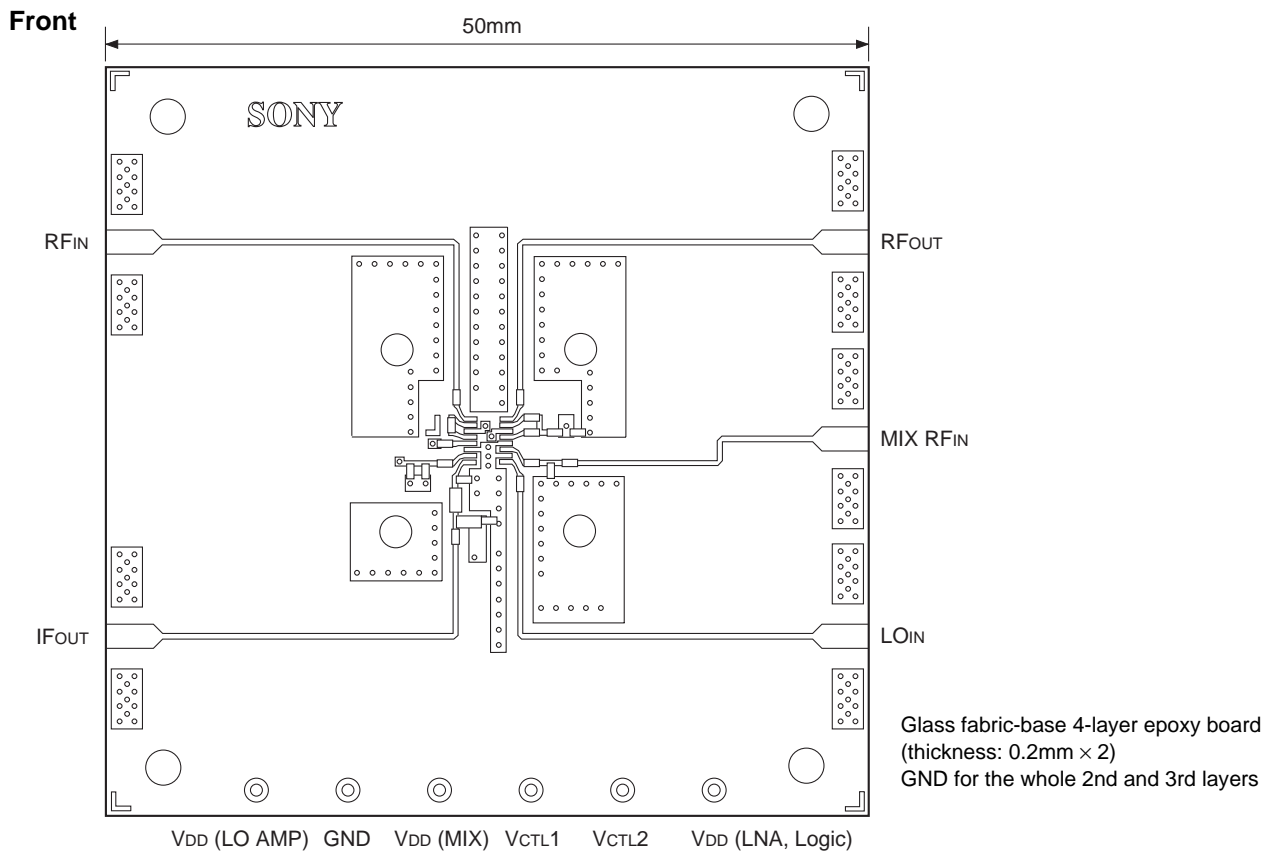


Example of Representative Characteristics (Ta = 25°C)

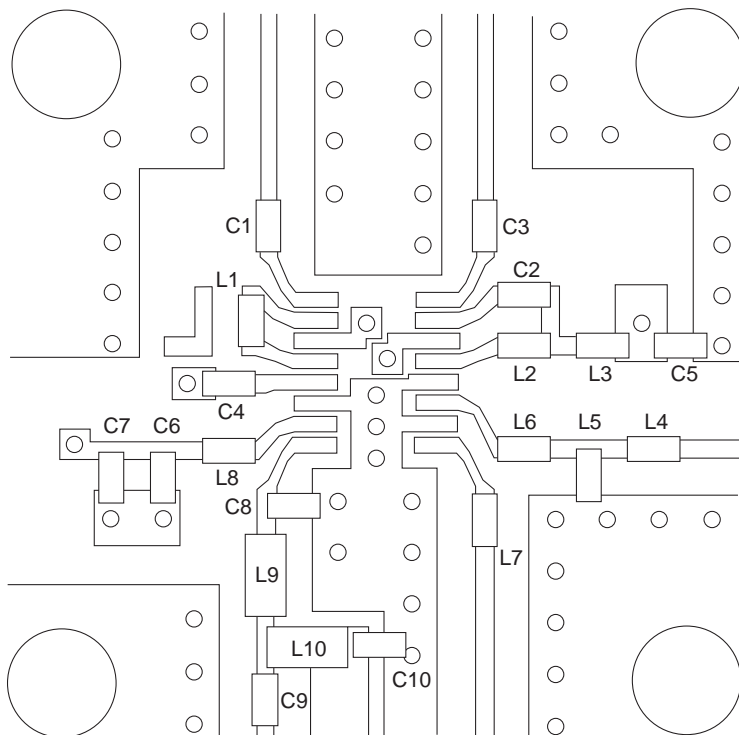
Mixer Block



Recommended Evaluation Board

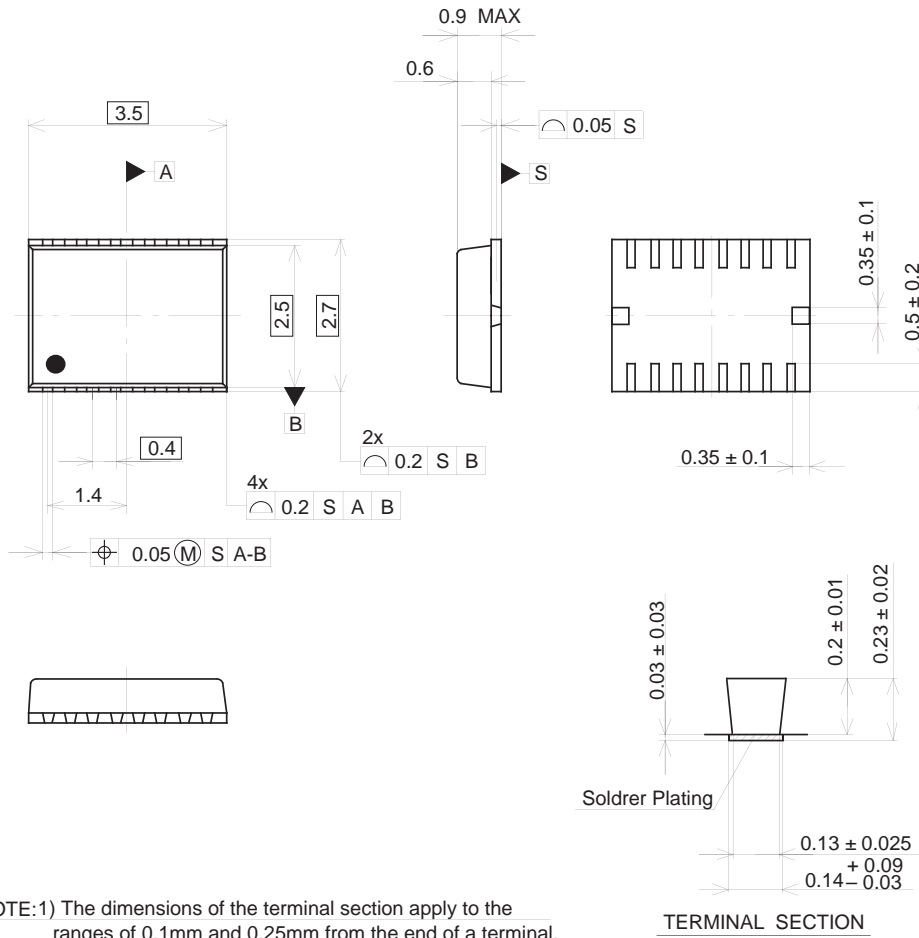


Enlarged Diagram of Center Part



Package Outline Unit: mm

16PIN VSON(PLASTIC)



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 |