SONY

# CXG1090EN

## High Power 2 × 4 Antenna Switch MMIC with Integrated Control Logic

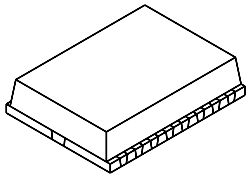
### Description

The CXG1090EN is a high power antenna switch MMIC. This IC is suited to connect Tx/Rx to one of 4 antennas in cellular handset such as PDC.

The CXG1090EN has the integrated control logic and can be operated with CMOS input.

This IC is designed using the Sony's GaAs J-FET process which enable the CXG1090EN to be operated with low voltage.

16 pin VSON (Plastic)



### Features

- Low insertion loss: 0.30dB (Typ.)@900MHz, 0.40dB (Typ.)@1.5GHz
- Small package: 16-pin VSON
- High power handling: Pl dB: 37dBm
- CMOS compatible input control
- Low bias voltage: $V_{DD}$ = 3.0V

### Applications

2 × 4 antenna switch for digital cellular telephones such as PDC handsets

### Structure

GaAs J-FET MMIC

### Absolute Maximum Ratings

| | | | | |
|---|---|---|---|---|
| • Bias voltage | $V_{DD}$ | 7 | V | @Ta = 25°C |
| • Control voltage | $V_{CTL}$ | 5 | V | @Ta = 25°C |
| • Operating temperature | Topr | –35 to +85 | °C | |
| • Storage temperature | Tstg | –65 to +150 | °C | |

### Note on Handling

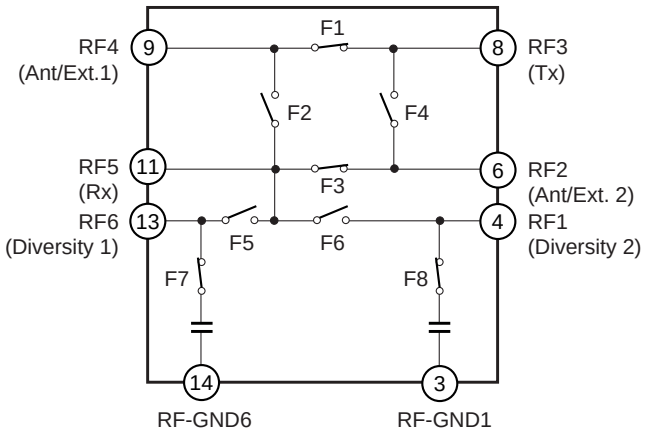
GaAs MMICs are ESD sensitive devices. Special handling precautions are required.



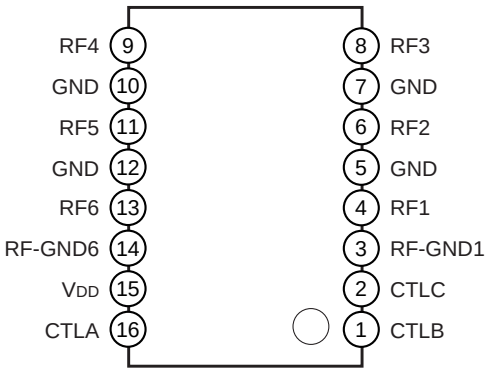


E00222-PS

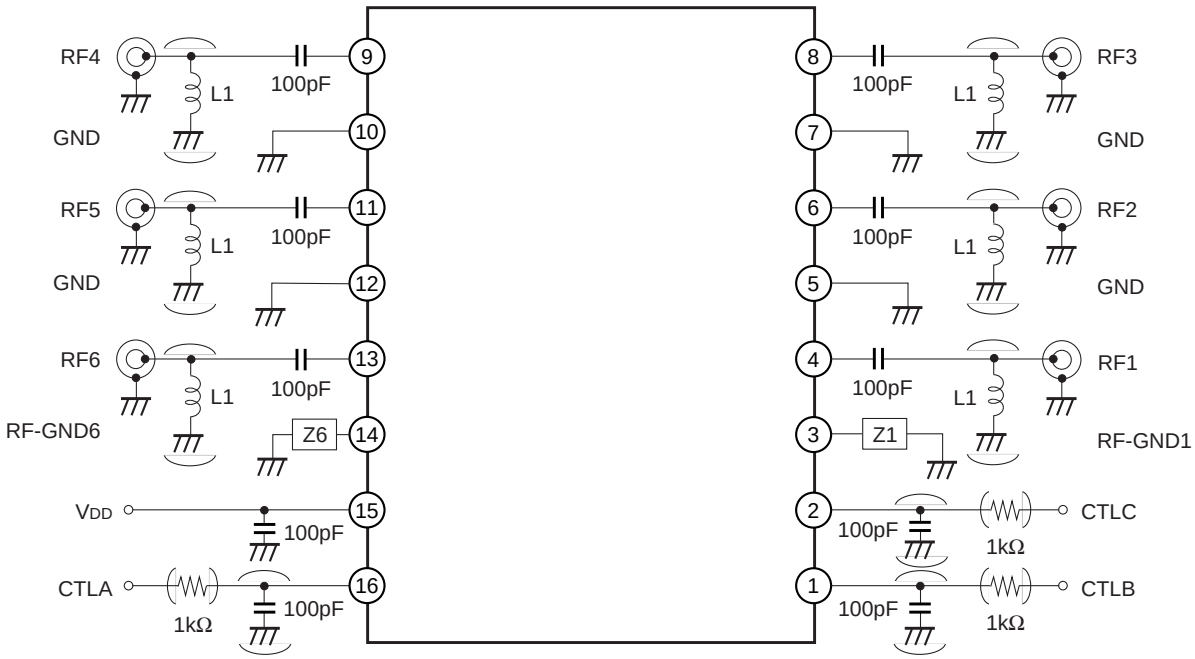
## Block Diagram




## Pin Configuration




## Recommended Circuit




* DC blocking capacitors (CRF) are needed.
* Recommended to use bypass capacitors (Cbypass).
* Recommended to use control resistors (RCTL), when it is necessary to improve the electrostatic discharge strength (ESD).

**Truth Table**

| Control | | | ON | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CTLA | CTLB | CTLC | | | | | | | | | |
| H | L | L | RF3 → RF2 | OFF | ON | OFF | ON | OFF | OFF | ON | ON |
| H | L | H | RF3 → RF4 | ON | OFF | ON | OFF | OFF | OFF | ON | ON |
| L | L | L | RF5 → RF2 | ON | OFF | ON | OFF | OFF | OFF | ON | ON |
| L | L | H | RF5 → RF4 | OFF | ON | OFF | ON | OFF | OFF | ON | ON |
| L | H | L | RF5 → RF6 | OFF | OFF | OFF | OFF | ON | OFF | OFF | ON |
| L | H | H | RF5 → RF1 | OFF | OFF | OFF | OFF | OFF | ON | ON | OFF |

**DC Bias Condition** (Ta = 25°C)

| Item | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| $V_{CTL}$ (H) A to C | 2.4 | | 3.6 | V |
| $V_{CTL}$ (L) A to C | 0 | | 0.8 | V |
| $V_{DD}$ | 2.8 | | 3.2 | V |

**Electrical Characteristics 1** ($V_{CTL}$ (L) = 0V, $V_{CTL}$ (H) = 3V, Ta = 25°C)

| Item | | Frequency | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Insertion loss | RF3-RF2 | 889 to 960MHz | Pin = 29.5dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.32 | 0.55 | dB |
| | RF3-RF4 | 889 to 960MHz | Pin = 29.5dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.30 | 0.55 | dB |
| | RF5-RF2 | 810 to 885MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.55 | 0.85 | dB |
| | RF5-RF4 | 810 to 885MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.55 | 0.85 | dB |
| | RF5-RF1 | 810 to 885MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.5 | 0.8 | dB |
| | RF5-RF6 | 810 to 885MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.5 | 0.8 | dB |
| Isolation | RF3-RF2 | 889 to 960MHz | Pin = 29.5dBm, $V_{DD}$ = 2.8 to 3.0V | 17 | 19 | | dB |
| | RF3-RF4 | 889 to 960MHz | Pin = 29.5dBm, $V_{DD}$ = 2.8 to 3.0V | 17 | 21 | | dB |
| | RF5-RF2 | 810 to 885MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | 17 | 21 | | dB |
| | RF5-RF4 | 810 to 885MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | 17 | 19 | | dB |
| | RF5-RF1 | 810 to 885MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | 31 | 38 | | dB |
| | RF5-RF6 | 810 to 885MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | 24 | 29 | | dB |
| VSWR | Each ON Port | 810 to 960MHz | | | | 1.4 | |
| ACP (±50kHz) | RF3-RF2 | 889 to 960MHz | Pin = 29.5dBm, $V_{DD}$ = 3.0V*1 | | –67 | –57 | dBc |
| | RF3-RF4 | | Pin = 29.5dBm, $V_{DD}$ = 2.8V*1 | | –67 | –55 | dBc |
| ACP (±100kHz) | RF3-RF2 | 889 to 960MHz | Pin = 29.5dBm, $V_{DD}$ = 3.0V*1 | | –75 | –65 | dBc |
| | RF3-RF4 | | Pin = 29.5dBm, $V_{DD}$ = 2.8V*1 | | –75 | –62 | dBc |
| 2nd harmonics | RF3-RF2 | 889 to 960MHz | Pin = 29.5dBm, $V_{DD}$ = 3.0V*1 | | –67 | –60 | dBc |
| | RF3-RF4 | | Pin = 29.5dBm, $V_{DD}$ = 2.8V*1 | | –67 | –57 | dBc |
| 3nd harmonics | RF3-RF2 | 889 to 960MHz | Pin = 29.5dBm, $V_{DD}$ = 3.0V*1 | | –67 | –60 | dBc |
| | RF3-RF4 | | Pin = 29.5dBm, $V_{DD}$ = 2.8V*1 | | –67 | –57 | dBc |
| Control current | | | | | 85 | 150 | µA |
| Bias current | | | $V_{DD}$ = 3.0V | | 0.45 | 1 | mA |
| | | | $V_{DD}$ = 2.8V | | 0.4 | 0.9 | mA |
| Switching speed | | | | | 1.0 | 5.0 | µs |

*1 Input signal: ACP (±50kHz) < –65dBc, APC (±100kHz) < –75dBc,
2nd harmonics < –65dBc, 3rd harmonics < –65dBc

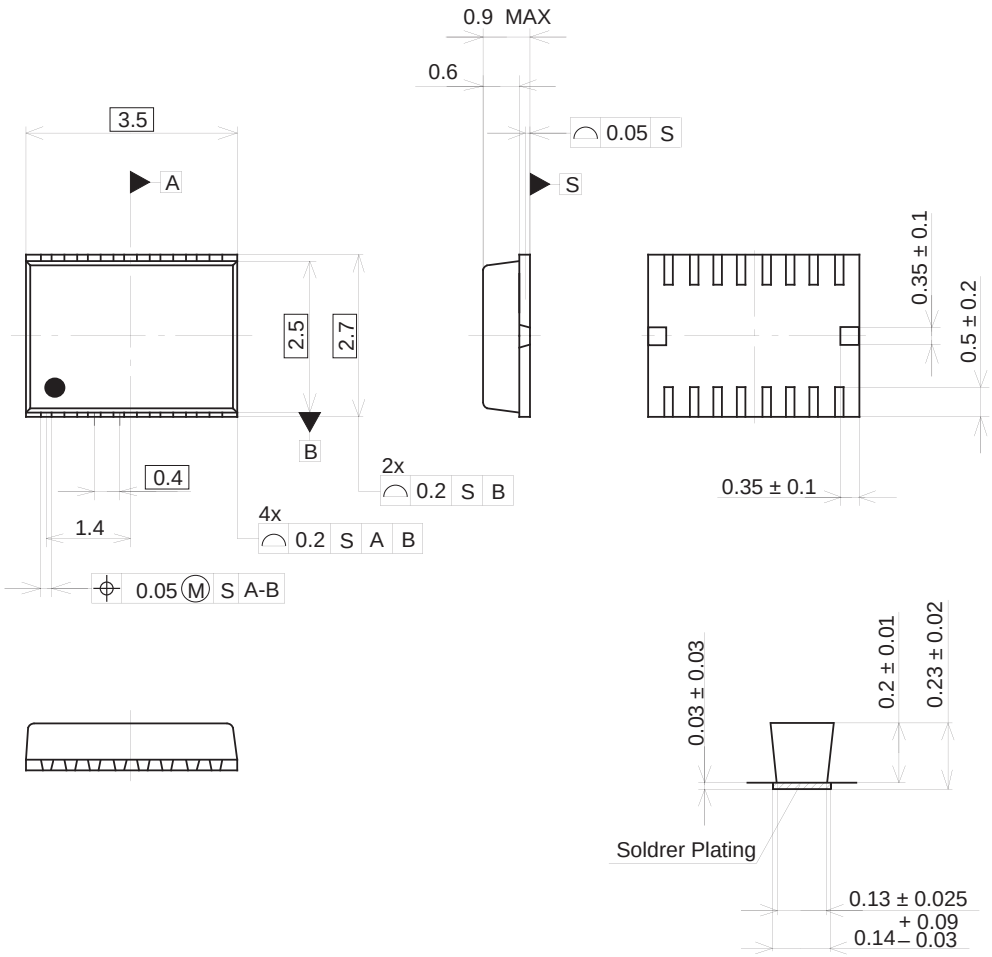
**Electrical Characteristics 2** ($V_{CTL}$ (L) = 0V, $V_{CTL}$ (H) = 3V, Ta = 25°C)

| Item | | Frequency | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Insertion loss | RF3-RF2 | 1429 to 1453MHz | Pin = 29.5dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.40 | 0.70 | dB |
| | RF3-RF4 | 1429 to 1453MHz | Pin = 29.5dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.40 | 0.70 | dB |
| | RF5-RF2 | 1477 to 1501MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.65 | 0.95 | dB |
| | RF5-RF4 | 1477 to 1501MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.65 | 0.95 | dB |
| | RF5-RF1 | 1477 to 1501MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.60 | 0.90 | dB |
| | RF5-RF6 | 1477 to 1501MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | | 0.60 | 0.90 | dB |
| Isolation | RF3-RF2 | 1429 to 1453MHz | Pin = 29.5dBm, $V_{DD}$ = 2.8 to 3.0V | 12 | 15 | | dB |
| | RF3-RF4 | 1429 to 1453MHz | Pin = 29.5dBm, $V_{DD}$ = 2.8 to 3.0V | 15 | 18 | | dB |
| | RF5-RF2 | 1477 to 1501MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | 15 | 18 | | dB |
| | RF5-RF4 | 1477 to 1501MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | 13 | 16 | | dB |
| | RF5-RF1 | 1477 to 1501MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | 35 | 40 | | dB |
| | RF5-RF6 | 1477 to 1501MHz | Pin = 7dBm, $V_{DD}$ = 2.8 to 3.0V | 20 | 25 | | dB |
| VSWR | Each ON Port | 1429 to 1501MHz | | | | 1.4 | |
| ACP (±50kHz) | RF3-RF2 | 1429 to 1453MHz | Pin = 29.5dBm, $V_{DD}$ = 3.0V*1 | | –67 | –55 | dBc |
| | RF3-RF4 | | Pin = 29.5dBm, $V_{DD}$ = 2.8V*1 | | –67 | –53 | dBc |
| ACP (±100kHz) | RF3-RF2 | 1429 to 1453MHz | Pin = 29.5dBm, $V_{DD}$ = 3.0V*1 | | –75 | –65 | dBc |
| | RF3-RF4 | | Pin = 29.5dBm, $V_{DD}$ = 2.8V*1 | | –75 | –62 | dBc |
| 2nd harmonics | RF3-RF2 | 1429 to 1453MHz | Pin = 29.5dBm, $V_{DD}$ = 3.0V*1 | | –67 | –60 | dBc |
| | RF3-RF4 | | Pin = 29.5dBm, $V_{DD}$ = 2.8V*1 | | –67 | –57 | dBc |
| 3nd harmonics | RF3-RF2 | 1429 to 1453MHz | Pin = 29.5dBm, $V_{DD}$ = 3.0V*1 | | –67 | –57 | dBc |
| | RF3-RF4 | | Pin = 29.5dBm, $V_{DD}$ = 2.8V*1 | | –67 | –55 | dBc |
| Control current | | | | | 85 | 150 | µA |
| Bias current | | | $V_{DD}$ = 3.0V | | 0.45 | 1 | mA |
| | | | $V_{DD}$ = 2.8V | | 0.4 | 0.9 | mA |
| Switching speed | | | | | 1.0 | 5.0 | µs |

*1 Input signal: ACP (±50kHz) < –65dBc, APC (±100kHz) < –75dBc,
2nd harmonics < –65dBc, 3rd harmonics < –65dBc

**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.

TERMINAL SECTION

| | |
|---|---|
| SONY CODE | VSON-16P-01 |
| EIAJ CODE | ———— |
| JEDEC CODE | ———— |

PACKAGE STRUCTURE

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