

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

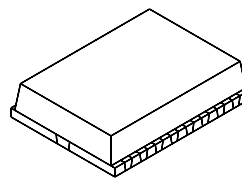
Description

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: PI 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 @ $T_a = 25^\circ C$
• Control voltage	V_{CTL}	5	V @ $T_a = 25^\circ C$
• Operating temperature	T_{opr}	-35 to +85	$^\circ C$
• Storage temperature	T_{stg}	-65 to +150	$^\circ C$

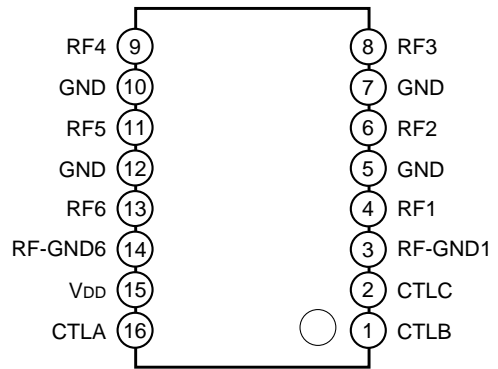
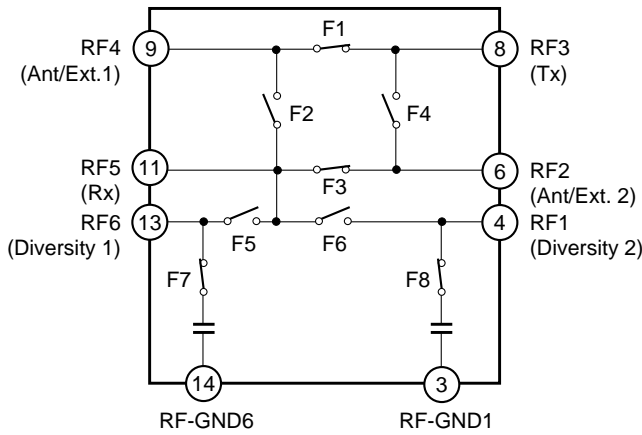
Note on Handling

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

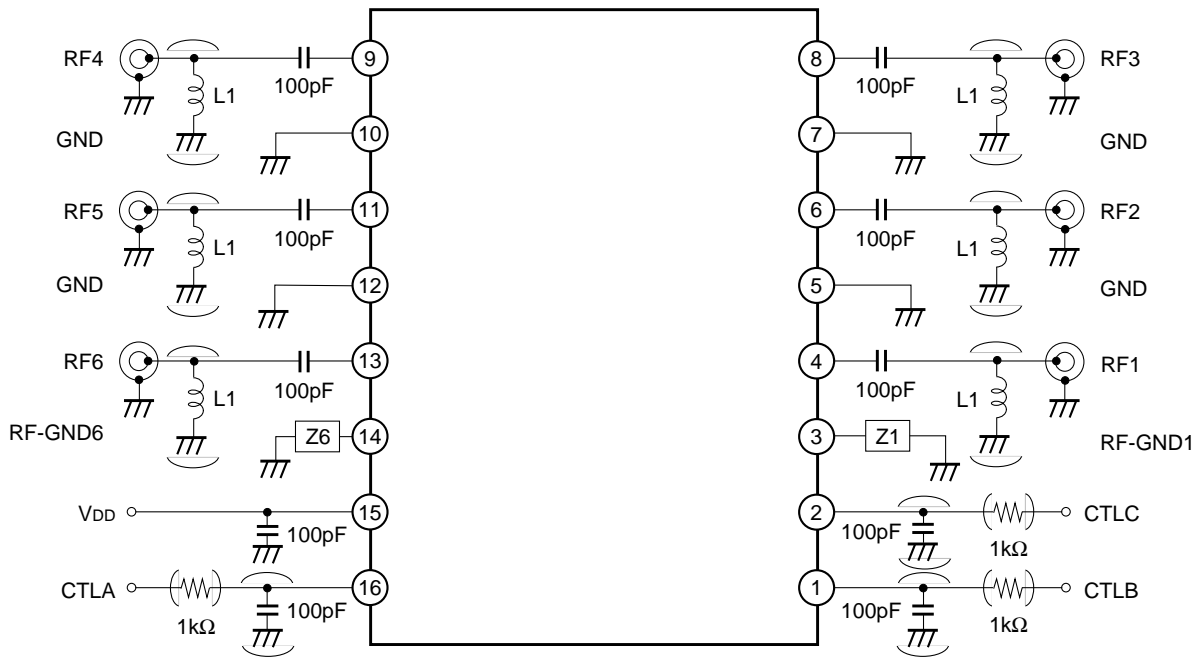
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Block Diagram

Pin Configuration



Recommended Circuit



- * DC blocking capacitors (CRF) are needed.
- * Recommended to use bypass capacitors (C_{bypass}).
- * Recommended to use control resistors (R_{CTL}), 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, T_a = 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
3rd 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, ACP (±100kHz) < -75dBc,
2nd harmonics < -65dBc, 3rd harmonics < -65dBc

Electrical Characteristics 2

(V_{CTL} (L) = 0V, V_{CTL} (H) = 3V, Ta = 25°C)

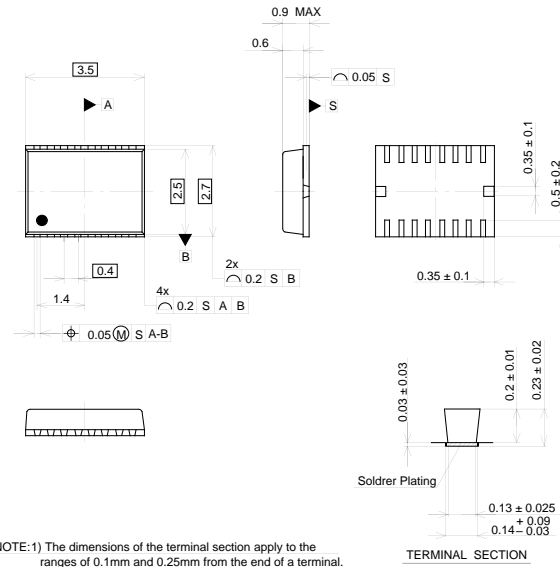
Item		Frequency	Condition	Min.	Typ.	Max.	Unit
Insertion loss	RF3-RF2	1429 to 1453MHz	Pin = 29.5dBm, V _{DD} = 2.8 to 3.0V		0.40	0.70	dB
	RF3-RF4	1429 to 1453MHz	Pin = 29.5dBm, V _{DD} = 2.8 to 3.0V		0.40	0.70	dB
	RF5-RF2	1477 to 1501MHz	Pin = 7dBm, V _{DD} = 2.8 to 3.0V		0.65	0.95	dB
	RF5-RF4	1477 to 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
3rd 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, ACP (±100kHz) < -75dBc,
2nd harmonics < -65dBc, 3rd harmonics < -65dBc

Package Outline

Unit: mm

16PIN VSON(PLASTIC)



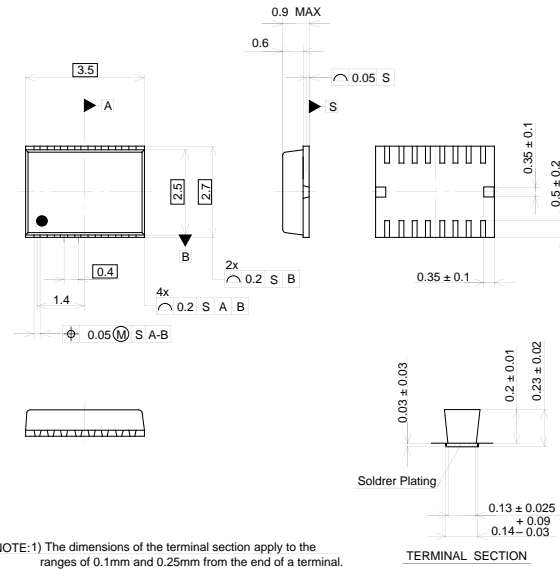
PACKAGE STRUCTURE

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

Kokubu Ass'y

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

LEAD PLATING SPECIFICATIONS

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