SONY

SP4T Antenna Switch

CXG1234XR

Description

The CXG1234XR is an SP4T antenna switch.
On chip logic reduces component count and simplifies PCB layout by allowing direct connection of the switch to digital baseband control lines with the CMOS logic levels. It requires 2 CMOS control lines.
The Sony GaAs JPHEMT MMIC Process is used for low insertion loss.

Features

- Insertion loss: 0.40dB (Typ.) @960MHz
  0.50dB (Typ.) @2170MHz
- Lead-Free and RoHS compliant

Package

Small package size: 16-pin XQFN (2.3mm × 2.3mm × 0.35mm) (Typ.)

Structure

GaAs JPHEMT MMIC

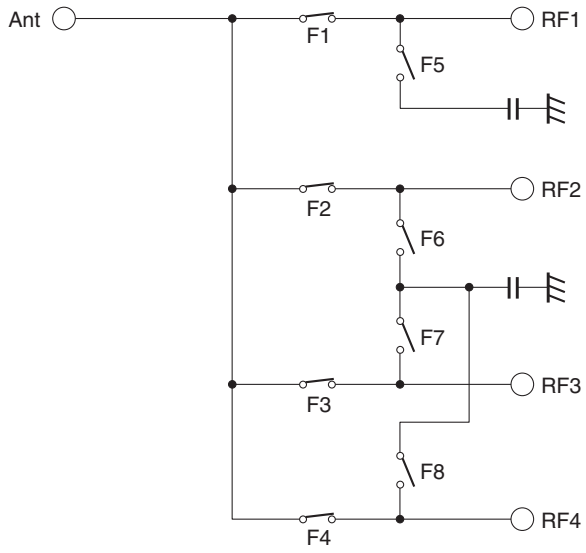
Absolute Maximum Ratings

◆ Bias voltage	V_{DD}	7	V	(Ta = 25℃)
◆ Control voltage	Vctl	5	V	(Ta = 25℃)
◆ Input power max.		27	dBm	(824 to 915MHz, Ta = 25℃)
◆ Input power max.		24	dBm	(1710 to 1980MHz, Ta = 25℃)
◆ Operating temperature		–35 to +85	℃	
◆ Storage temperature		–65 to +150	℃	
◆ Allowable power dissipation	P_D	100	mW	*1

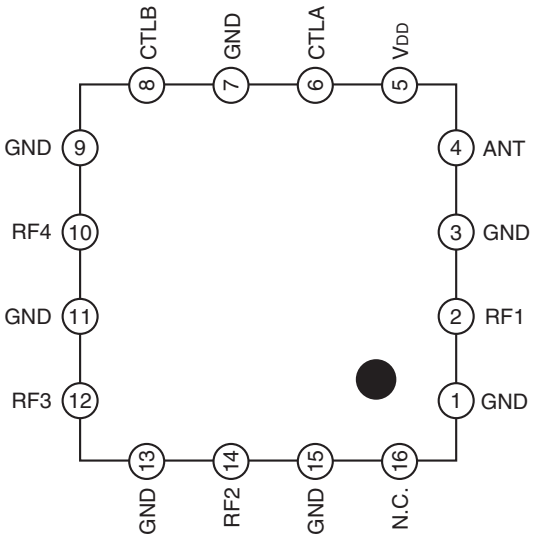
*1 25mm × 25mm × t: 0.8mm, Mounted on standard board (FR-4)

This IC is ESD sensitive device. Special handling precautions are required.

Block Diagram



Pin Configuration



16-pin XQFN
2.3mm × 2.3mm × 0.35mm (Typ.)

Truth Table

Port	A	B	F1	F2	F3	F4	F5	F6	F7	F8
ANT – RF1	H	H	ON	OFF	OFF	OFF	OFF	ON	ON	ON
ANT – RF2	H	L	OFF	ON	OFF	OFF	ON	OFF	ON	ON
ANT – RF3	L	L	OFF	OFF	ON	OFF	ON	ON	OFF	ON
ANT – RF4	L	H	OFF	OFF	OFF	ON	ON	ON	ON	OFF

DC Bias Condition

(Ta = 25°C)

Item	Min.	Typ.	Max.	Unit
Vctl (H)	1.5	1.8	3.6	V
Vctl (L)	0	—	0.3	
V_{DD}	2.6	2.8	3.6	

Electrical Characteristics

(Ta = 25℃, V_{DD} = 2.8V, Vctl = 0V/1.8V)

Item	Symbol	Port	Condition	Min.	Typ.	Max.	Unit
Insertion loss	IL	Ant – RF1, 2, 3, 4	*1	—	0.40	0.55	dB
			*2	—	0.50	0.65	
VSWR	VSWR		869 to 2170MHz	—	1.2	1.5	—
Harmonics	2fo	Ant – RF1, 2, 3, 4	*3	—	–50	–35	dBm
	3fo			—	–45	–35	
	2fo		*4	—	–50	–35	
	3fo			—	–50	–35	
IMD2	IMD2	Ant – RF1, 2, 3, 4	*5	—	–94	–84	dBm
Input IP2	IIP2			89	99	—	dBm
IMD3	IMD3	Ant – RF1, 2, 3, 4	*6	—	–91	–81	dBm
Input IP3	IIP3			53	58	—	dBm
Control current	Ictl		Vctl = 1.8V	—	10	25	μA
Supply current	Idd		V_{DD} = 2.8V (state: HH)	—	160	260	μA
Switching speed	Swt		50% Ctl to 90% RF	—	3	6	μs

Electrical characteristics are measured with all RF ports terminated in 50Ω.

*1 Power incident on Ant, Pin = 0dBm, 869 to 960MHz.

*2 Power incident on Ant, Pin = 0dBm, 1805 to 2170MHz.

*3 Power incident on RFx, Pin = 24dBm, 824 to 915MHz.

*4 Power incident on RFx, Pin = 21dBm, 1710 to 1980MHz.

*5 Pin = 20dBm, Ftx = 1950MHz, $P_{Blocker}$ = –15dBm, $F_{Blocker}$ = 190MHz, Fim = 2140MHz,
IIP2 = Pin + ($P_{Blocker}$ – IMD2)

*6 Pin = 20dBm, Ftx = 1950MHz, $P_{Blocker}$ = –15dBm, $F_{Blocker}$ = 1760MHz, Fim = 2140MHz,
IIP3 = Pin + ($P_{Blocker}$ – IMD3)/2

(Ta = 25℃, V_{DD} = 2.8V, Vctl = 0V/1.8V)

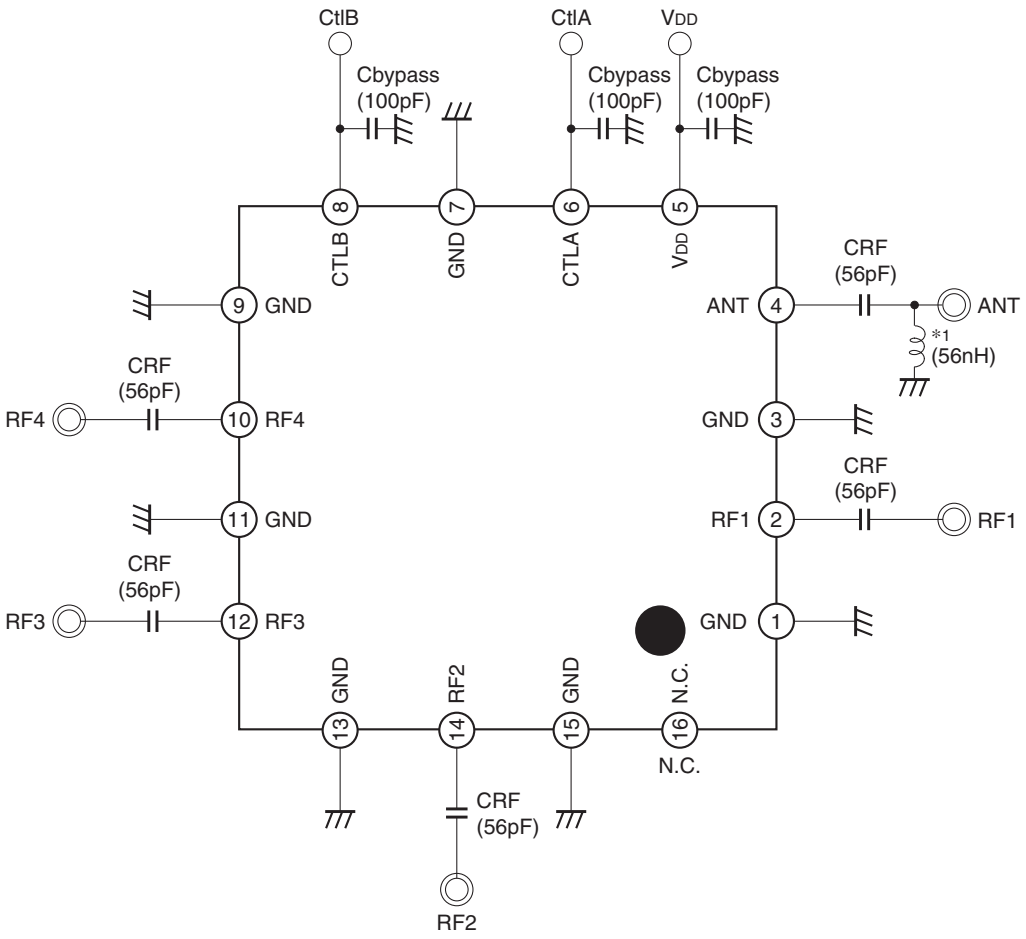
Item	Symbol	Port		Condition	Min.	Typ.	Max.	Unit
		Active	Port					
Isolation	ISO.	RF1	Ant – RF2	*1	20	33	—	dB
			Ant – RF3		20	32	—	
			Ant – RF4		20	32	—	
			Ant – RF2	*2	20	38	—	
			Ant – RF3		20	35	—	
			Ant – RF4		20	31	—	
		RF2	Ant – RF1	*1	20	31	—	
			Ant – RF3		20	33	—	
			Ant – RF4		20	30	—	
			Ant – RF1	*2	20	26	—	
			Ant – RF3		20	28	—	
			Ant – RF4		20	24	—	
		RF3	Ant – RF1	*1	20	31	—	
			Ant – RF2		20	30	—	
			Ant – RF4		20	32	—	
			Ant – RF1	*2	20	27	—	
			Ant – RF2		20	26	—	
			Ant – RF4		20	28	—	
		RF4	Ant – RF1	*1	20	32	—	
			Ant – RF2		20	31	—	
			Ant – RF3		20	34	—	
			Ant – RF1	*2	20	27	—	
			Ant – RF2		20	31	—	
			Ant – RF3		20	37	—	

Electrical characteristics are measured with all RF ports terminated in 50Ω.

*1 Power incident on Ant, Pin = 0dBm, 869 to 960MHz.

*2 Power incident on Ant, Pin = 0dBm, 1805 to 2170MHz.

Recommended Circuit



When using this IC, the following external components should be used:

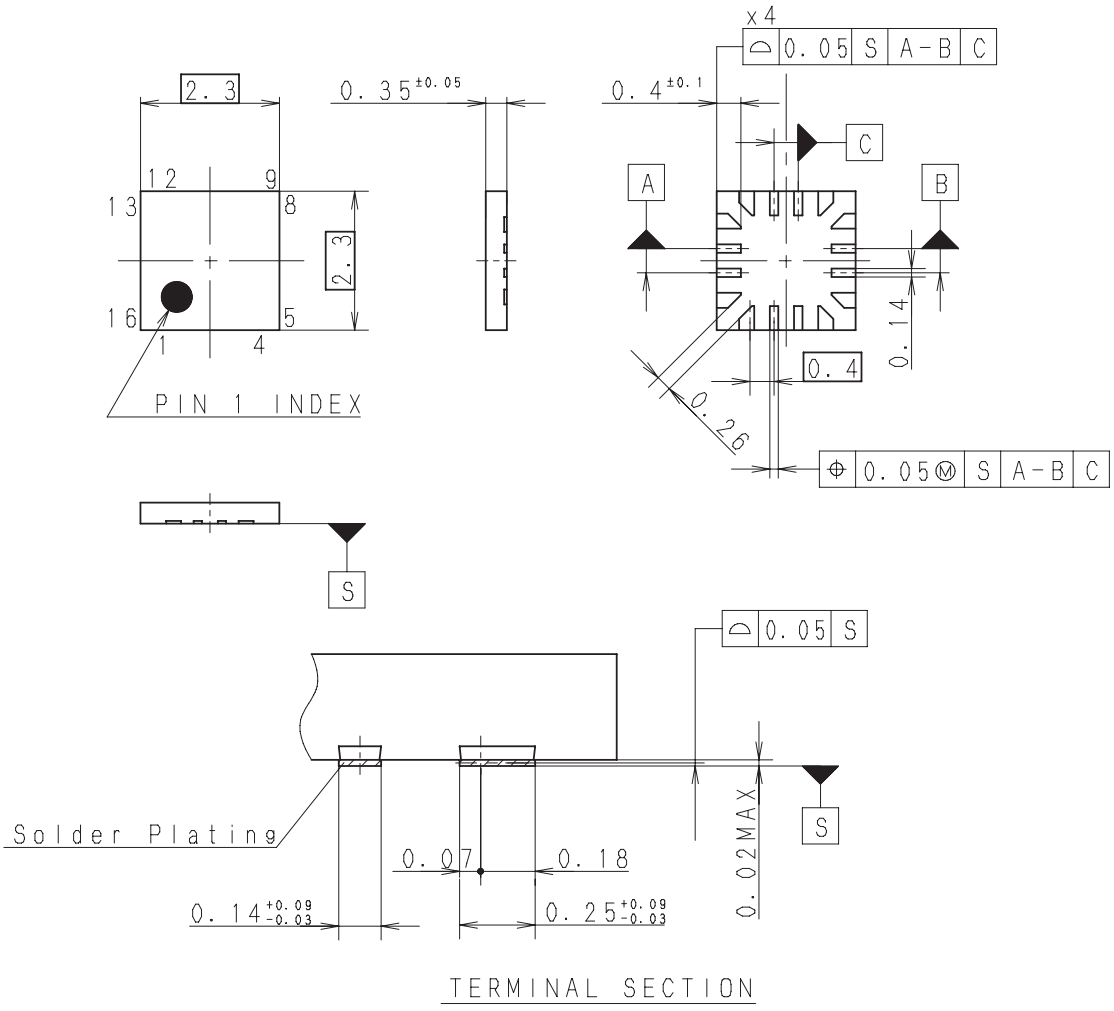
CRF: This capacitor is used for RF decoupling and must be used for all applications.
Cbypass: This capacitor is used for DC line filtering. 100pF is recommended.

*1 Inductor (56nH) is recommended on Ant port for ESD protection.
Capacitors are required on all RF ports for DC blocking.

Package Outline

(Unit: mm)

16PIN XQFN (PLASTIC)



TERMINAL SECTION

Note:Cutting burr of lead are 0.05mm MAX.

SONY CODE	XQFN-16P-01
JEITA CODE	————
JEDEC CODE	————

AP-4000-16033BS Rev. 0

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
TERMINAL TREATMENT	SOLDER PLATING
TERMINAL MATERIAL	COPPER ALLOY
PACKAGE MASS	0.01g

LEAD PLATING SPECIFICATIONS

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