

Description

The CXG1224XR is a high power SP4T+SP4T antenna switch for GSM/UMTS applications. The low insertion loss on transmit means increased talk time as the Tx power amplifier can be operated at a lower output level. On chip logic reduces component count and simplifies PCB layout by allowing direct connection of the switch to digital baseband control lines with CMOS logic levels. It requires 3 CMOS control lines. The Sony GaAs JPHEMT MMIC process is used for low insertion loss.

(Applications: GSM/UMTS dual-mode handsets)

Features

- ◆ Insertion loss (Tx1) 0.35dB (Typ.) @34dBm (GSM900)

Package

Small and low height package size: 24-pin XQFN (2.7mm × 3.5mm × 0.4mm (Max.))

Structure

GaAs JPHEMT MMIC

Absolute Maximum Ratings

(Ta = 25°C)

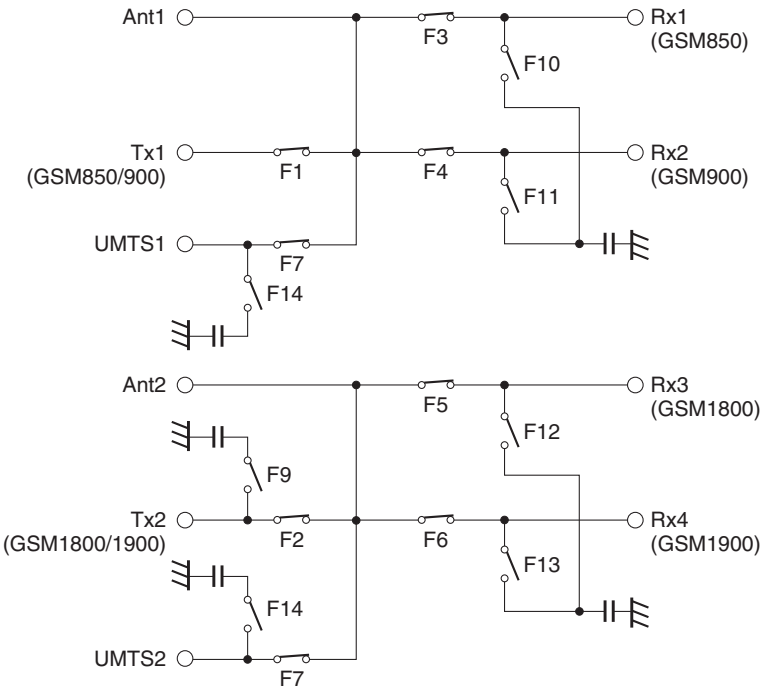
◆ Bias voltage	V _{DD}	7	V
◆ Control voltage	V _{ctl}	5	V
◆ Input power max. (Tx1)		36	dBm (Duty cycle = 12.5 to 50%)
◆ Input power max. (Tx2)		34	dBm (Duty cycle = 12.5 to 50%)
◆ Input power max. (UMTS1, 2)		32	dBm
◆ Input power max. (all_Rx)		13	dBm
◆ Operating temperature		-35 to +85	°C
◆ Storage temperature		-65 to +150	°C

This IC is ESD sensitive device. Special handling precautions are required.
The actual ESD test data will be available later.

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Block Diagram



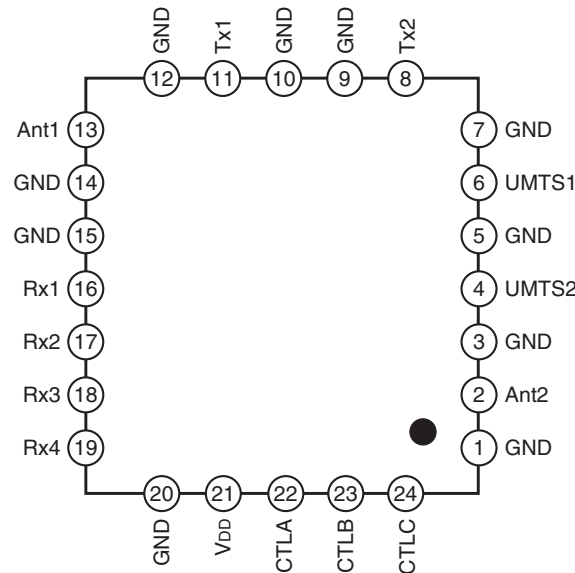
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Pin Configuration

(Preliminary)

(Top View)





Truth Table

Mode	CTL			Switch													
	A	B	C	F1	F2	F3	F4	F5	F6	F7	F9	F10	F11	F12	F13	F14	
Tx1 GSM850/900	H	H	L	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	
Tx2 GSM1800/1900	H	L	L	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	
Rx1 GSM850	L	L	L	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	ON	ON	ON	ON	
Rx2 GSM900	L	L	H	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	ON	OFF	ON	ON	ON	
Rx3 GSM1800	L	H	H	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON	ON	ON	OFF	ON	ON	
Rx4 GSM1900	L	H	L	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	ON	ON	ON	OFF	ON	
UMTS1	H	L	H	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	OFF	
UMTS2	H	L	H	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	OFF	



DC Bias Condition

(Ta = 25°C)

Item	Min.	Typ.	Max.	Unit
Vctl (H)	2.0	2.8	3.6	V
Vctl (L)	0	—	0.4	
VDD	2.6	2.8	3.6	



Electrical Characteristics

(Ta = 25°C)

Item	Symbol	Port	Condition	Min.	Typ.	Max.	Unit
Insertion loss	IL	Ant1 – Tx1	*2		0.35	0.50	dB
		Ant1 – Rx1	*4, *5		0.50	0.65	
		Ant1 – Rx2	*4, *5		0.50	0.65	
		Ant1 – UMTS1	*8		0.38	0.53	
			*9		0.38	0.53	
		Ant2 – Tx2	*3		0.47	0.62	
		Ant2 – Rx3	*6, *7		0.70	0.85	
		Ant2 – Rx4	*6, *7		0.65	0.80	
		Ant2 – UMTS2	*10		0.43	0.58	
			*11		0.52	0.67	
Isolation	ISO.	Ant1 – Rx1		27	32		dB
		Ant1 – Rx2		30	35		
		Ant1 – UMTS1		29	34		
		Ant1 – Tx1	*8, *9	18	21		
		Ant1 – Rx1		26	31		
		Ant1 – Rx2		30	35		
		Tx1 – Rx1	*2	32	37		
		Tx1 – Rx2		31	36		
		UMTS1 – Rx1	*8, *9	31	36		
		UMTS1 – Rx2		31	36		
		Ant2 – Rx3	*3	28	33		
		Ant2 – Rx4		25	30		
		Ant2 – UMTS2		20	24		
		Ant2 – Tx2	*10, *11	23	28		
		Ant2 – Rx3		26	31		
		Ant2 – Rx4		23	28		
		Tx2 – Rx3	*3	32	36		
		Tx2 – Rx4		29	34		
		UMTS2 – Rx3	*10, *11	27	32		
		UMTS2 – Rx4		25	30		
VSWR	VSWR	All ports in active paths	824 to 2170MHz		1.2		—

Item	Symbol	Port	Condition	Min.	Typ.	Max.	Unit
Harmonics *1	2fo	Tx1 – Ant1	*2		–33	–30	dBm
	3fo				–30	–27	
	2fo	UMTS1 – Ant1	*8		–47	–44	
	3fo				–49	–46	
	2fo	Tx2 – Ant2	*3		–34	–31	
	3fo				–32	–28	
	2fo	UMTS2 – Ant2	*10		–43	–40	
	3fo				–42	–39	
Control Current	I _{ctl}		V _{ctl} = 2.8V		25	45	μA
Supply Current	I _{DD}		V _{DD} = 2.8V		0.30	0.45	mA
Switching Speed	Swt1	Tx1, Tx2, Rx1, Rx2, Rx3, Rx4	V _{DD} = 2.8V, V _{ctl} = 2.8V		5	10	μs
	Swt2	UMTS1, UMTS2			10	15	

Note) Electrical Characteristics are measured with all RF ports terminated in 50Ω.

*1 Harmonics measured with Tx inputs harmonically matched. It is recommend that the harmonic matching is used to ensure optimum performance.

*2 Power incident on Tx1, Pin = 34dBm, 824 to 915MHz, V_{DD} = 2.8V, Tx1 enabled

*3 Power incident on Tx2, Pin = 32dBm, 1710 to 1910MHz, V_{DD} = 2.8V, Tx2 enabled

*4 Power incident on Ant1, Pin = 10dBm, 869 to 894MHz, V_{DD} = 2.8V, Rx1 or Rx2 enabled

*5 Power incident on Ant1, Pin = 10dBm, 925 to 960MHz, V_{DD} = 2.8V, Rx1 or Rx2 enabled

*6 Power incident on Ant2, Pin = 10dBm, 1805 to 1880MHz, V_{DD} = 2.8V, Rx3 or Rx4 enabled

*7 Power incident on Ant2, Pin = 10dBm, 1930 to 1990MHz, V_{DD} = 2.8V, Rx3 or Rx4 enabled

*8 Power incident on UMTS1, Pin = 26dBm, 824 to 849MHz, V_{DD} = 2.8V, UMTS1 enabled

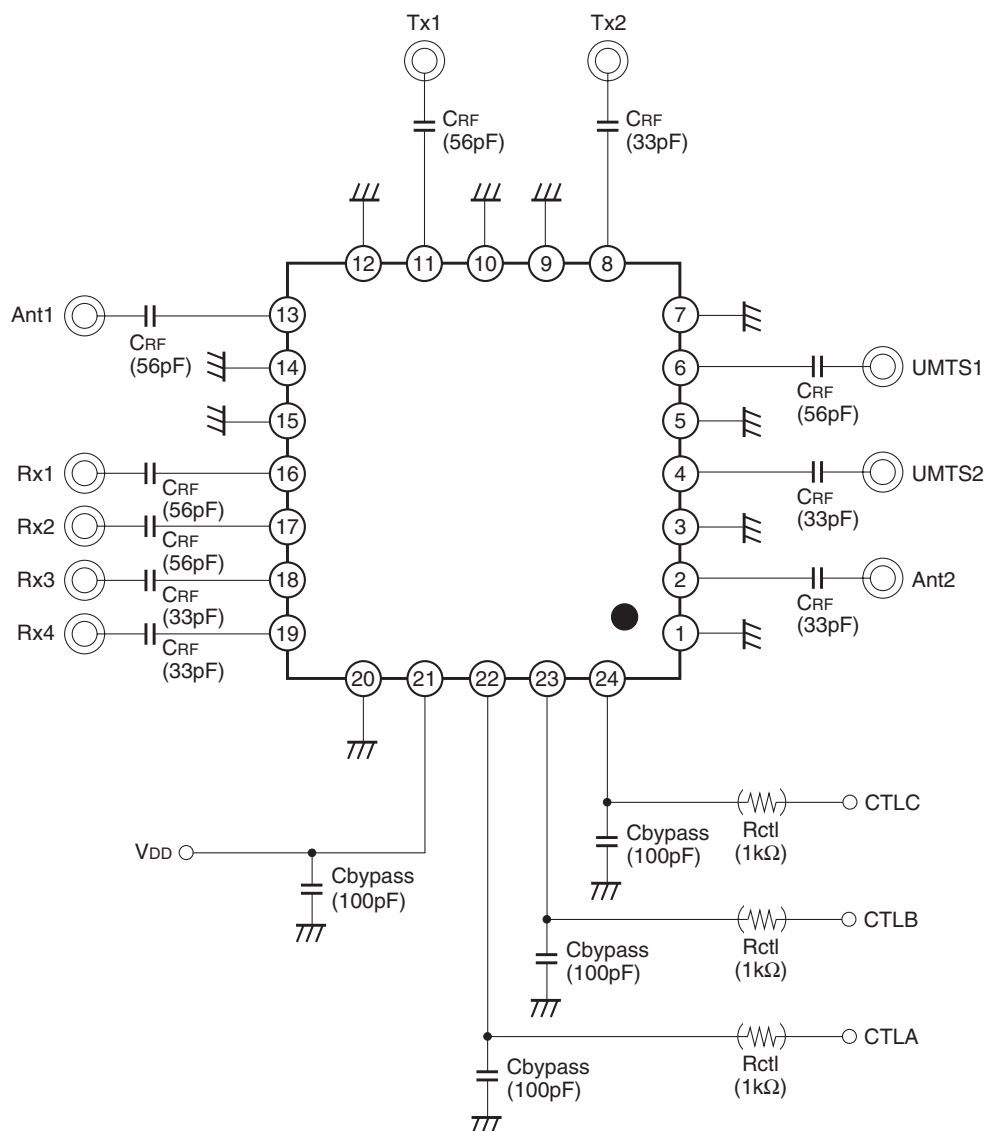
*9 Power incident on Ant1, Pin = 10dBm, 869 to 894MHz, V_{DD} = 2.8V, UMTS1 enabled

*10 Power incident on UMTS2, Pin = 26dBm, 1920 to 1980MHz, V_{DD} = 2.8V, UMTS2 enabled

*11 Power incident on Ant2, Pin = 10dBm, 2110 to 2170MHz, V_{DD} = 2.8V, UMTS2 enabled



Recommended Circuit



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

Rctl: This resistor is used to improve ESD performance. 1kΩ is recommended.

CRF: This capacitor is used for RF decoupling and must be used for all applications.

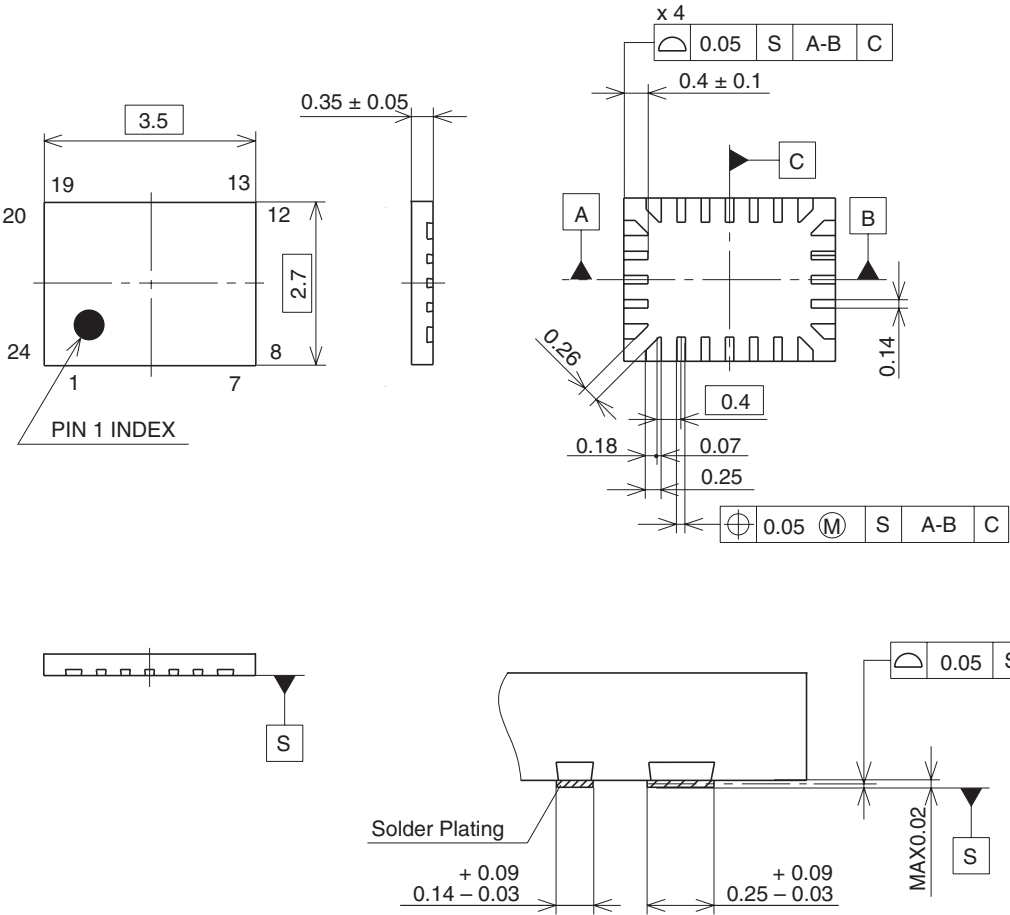
Cbypass: This capacitor is used for DC line filtering. 100pF is recommended.

Package Outline

(Unit: mm)

24PIN XQFN (PLASTIC)

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TERMINAL SECTION

Note:Cutting burr of lead are 0.05mm MAX.

SONY CODE	XQFN-24P-01
EIAJ CODE	_____
JEDEC CODE	_____

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD 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