
Description

The CXM3535XR is a high power SP6T antenna switch for 6TRx applications.
The CXM3535XR has a +1.8V CMOS compatible decoder.
The Sony GaAs Junction gate pHEMT (JPHEMT) MMIC process is used for low insertion loss and high linearity.
(Applications: CDMA/GSM/UMTS/LTE handsets)

Features

- ◆ Low insertion loss : 0.33dB (Typ.) TRx (Cellular band)
 0.40dB (Typ.) TRx (IMT Tx band)
- ◆ High linearity: IIP3 = 68dBm
- ◆ Low voltage operation: $V_{DD} = 2.5V$
- ◆ No DC blocking capacitors
- ◆ Small package Size: XQFN-22P (2.4mm × 3.3mm × 0.4mm Max.)
- ◆ Lead-free and RoHS compliant

Structure

GaAs Junction Gate pHEMT (JPHEMT) MMIC Switch, CMOS Decoder

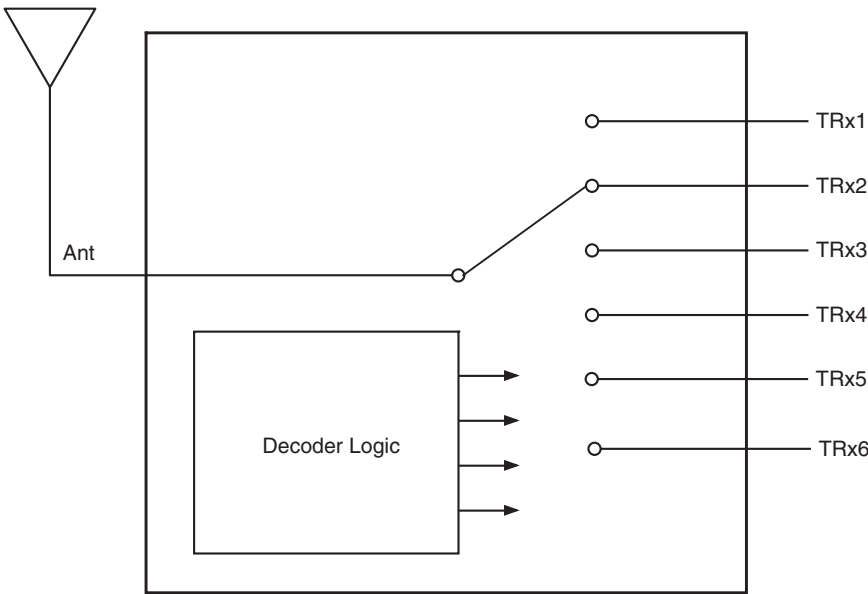
This IC is ESD sensitive device. Special handling precautions are required.

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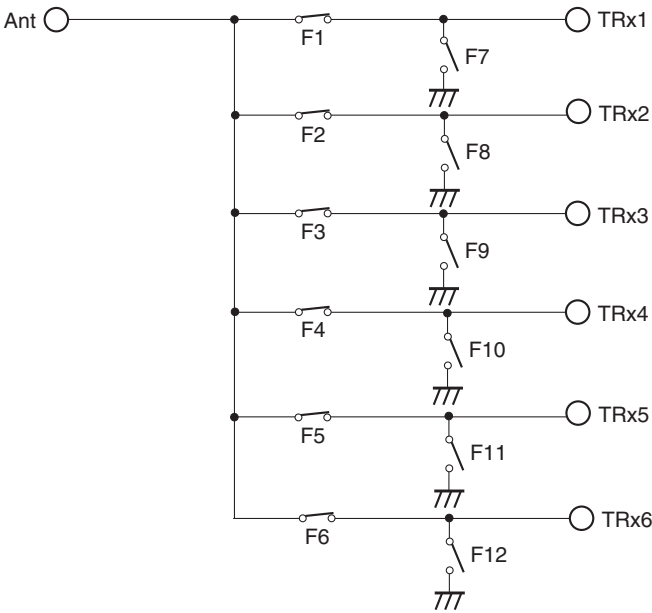


Block Diagram

SP6T Antenna Switch



RF Switch

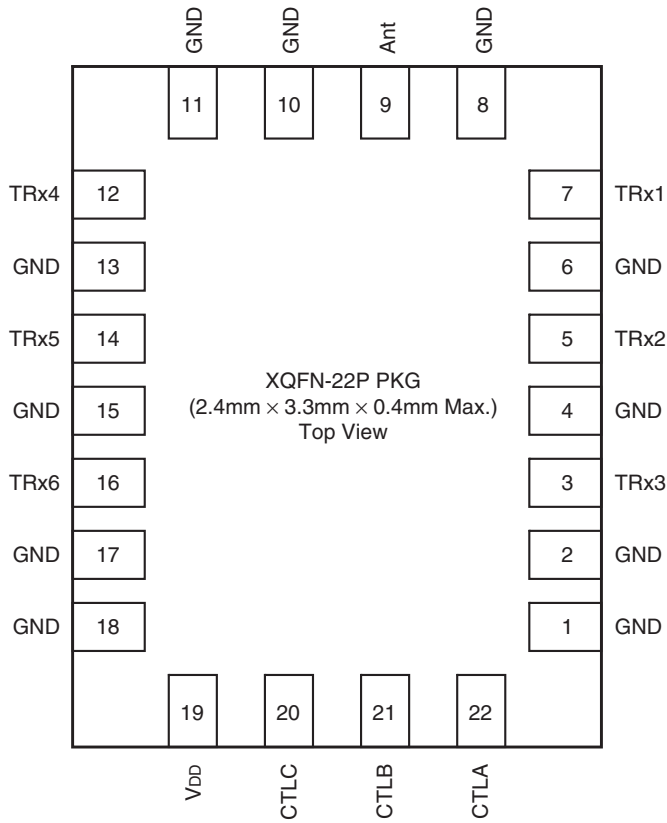




Truth Table

State	A	B	C	Active path	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
1	L	L	L	TRx1	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON
2	L	L	H	TRx2	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	ON	ON	ON	ON
3	L	H	L	TRx3	OFF	OFF	ON	OFF	OFF	OFF	ON	ON	OFF	ON	ON	ON
4	L	H	H	TRx4	OFF	OFF	OFF	ON	OFF	OFF	ON	ON	ON	OFF	ON	ON
5	H	L	—	TRx5	OFF	OFF	OFF	OFF	ON	OFF	ON	ON	ON	ON	OFF	ON
6	H	H	—	TRx6	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	OFF

Pin Configuration



DC Bias Conditions

(Ta = 25°C)

Item	Min.	Typ.	Max.	Unit
V _{DD}	2.5	2.6	3.3	V
V _{ctl} (H)	1.35	1.8	3.3	V
V _{ctl} (L)	0	—	0.45	V

Absolute Maximum Ratings

♦ Supply voltage	V _{DD}	4	V	(Ta = 25°C)
♦ Control voltage	V _{ctl}	4	V	(Ta = 25°C)
♦ Maximum input	[TRx]	36	dBm	(Duty cycle = 12.5% to 50%) (Ta = 25°C)
♦ Operating temperature	Topr	−35 to +90	°C	
♦ Storage temperature	Tstg	−65 to +150	°C	

Electrical Characteristics
(V_{DD} = 2.5V, T_a = 25°C)

Item	Symbol	Path	Conditions	Min.	Typ.	Max.	Unit
Insertion loss	I.L	Ant-TRx1, 2, 3, 4, 5, 6	*1, *2, *6, *8	—	0.33	0.48	dB
			*3, *4, *7, *9	—	0.40	0.55	
			*5	—	0.45	0.60	
Isolation	ISO	TRx1-TRx2 (TRx1 or TRx2 Active)	*1, *2, *6, *8	29	31.5		dB
		TRx2-TRx3 (TRx2 or TRx3 Active)	*3, *7, *9	22	24		
		TRx4-TRx5 (TRx4 or TRx5 Active)					
		TRx5-TRx6 (TRx5 or TRx6 Active)	*4, *5	19	21		
		TRx1-TRx3, 4, 5, 6 (TRx1 Active)	*1, *2, *6, *8	35	40		
		TRx2-TRx4, 5, 6 (TRx2 Active)					
		TRx3-TRx1, 4, 5, 6 (TRx3 Active)	*3, *7, *9	25	29		
		TRx4-TRx1, 2, 3, 6 (TRx4 Active)					
		TRx5-TRx1, 2, 3 (TRx5 Active)	*4, *5	23	25		
VSWR	VSWR	All ports active paths	600 to 2700MHz	—	—	1.50	—
Harmonics1	2fo	Ant-TRx1, 2, 3, 4, 5, 6	*6	—	−52	−36	dBm
	3fo			—	−42	−36	
Harmonics2	2fo	Ant-TRx1, 2, 3, 4, 5, 6	*7	—	−54	−36	
	3fo			—	−52	−36	
Harmonics3	2fo	Ant-TRx1, 2, 3, 4, 5, 6	*2, *3, *5	—	−65	−40	
	3fo			—	−61	−40	
Intermodulation distortion level in Rx band	IMD2	Ant-TRx1, 2, 3, 4, 5, 6	*10, *11, *12, *15, *16, *19, *20	—	—	−105	dBm
	IMD3		*10, *13, *14, *17, *18, *21, *22	—	—	−105	
Input IP3	IIP3	Ant-TRx1, 2, 3, 4, 5, 6	*10, *23	65	68	—	dBm
			*10, *24	65	68	—	
Switching time	T _s		50% ctl to 90% RF	—	3	5	μs
Control current	I _{ctl}		V _{ctl} = 1.8V	—	1	5	μA
Supply current	I _{DD}		V _{DD} = 2.6V	—	0.17	0.40	mA

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

*1 Pin = 26dBm, 704 to 787MHz (Band 13, Band 17)

*2 Pin = 26dBm, 824 to 960MHz (Band 5, Band 8)

*3 Pin = 26dBm, 1710 to 1990MHz (Band 1 Tx, Band 2 Tx, Band 3 Tx, Band 4 Tx)

*4 Pin = 10dBm, 2110 to 2170MHz (Band 1 Rx, Band 4 Rx)

*5 Pin = 26dBm, 2500 to 2690MHz (Band 7)

*6 Pin = 34dBm, 824 to 915MHz (GSM 850/900 Tx)

*7 Pin = 32dBm, 1710 to 1910MHz (GSM 1800/1900 Tx)

*8 Pin = 10dBm, 869 to 960MHz (GSM 850/900 Rx)

*9 Pin = 10dBm, 1805 to 1990MHz (GSM 1800/1900 Rx)

*10 Measured with the recommended circuit

IMD Condition

Band	fRx on TRx	fRx +20dBm on TRx	fBlocker −15dBm on Ant		IMD Condition
Band 1	2140MHz	1950MHz	IMD2 (fRx-fTx)	190MHz	*11
			IMD2 (fRx+fTx)	4090MHz	*12
			IMD3 (2fTx-fRx)	1760MHz	*13
			IMD3 (2fTx+fRx)	6040MHz	*14
Band 2	1960MHz	1880MHz	IMD2 (fRx-fTx)	80MHz	*15
			IMD2 (fRx+fTx)	3840MHz	*16
			IMD3 (2fTx-fRx)	1800MHz	*17
			IMD3 (2fTx+fRx)	5720MHz	*18
Band 5	880MHz	835MHz	IMD2 (fRx-fTx)	45MHz	*19
			IMD2 (fRx+fTx)	1715MHz	*20
			IMD3 (2fTx-fRx)	790MHz	*21
			IMD3 (2fTx+fRx)	2550MHz	*22

IIP3 Condition

Band	f1 +27dBm on TRx	f2 +27dBm on TRx	IIP3 Condition $IIP3 = (3 \times P_{out} - IM3)/2$
Band 1	1950MHz	1951MHz	*23
Band 5	835MHz	836MHz	*24

Triple Beat Ratio(V_{DD} = 2.5V, Ta = 25°C)

Item	Symbol	Path	Condition					Min.	Typ.	Max.	Unit
Triple Beat Ratio	TBR		Input power at TRx [dBm]	Tx1 at TRx* ¹ [MHz]	Tx2 at TRx* ¹ [MHz]	Jammer at Ant -30dBm [MHz]	Triple Beat Product at TRx* ¹ [MHz]				dBc
		Ant-TRx1, TRx2, TRx3, TRx4, TRx5, TRx6	21.5	835.5	836.5	881.5	881.5±1	81	—	—	
			21.5	1880	1881	1960	1960±1	81	—	—	
			13.5	1732	1733	2132	2132±1	81	—	—	

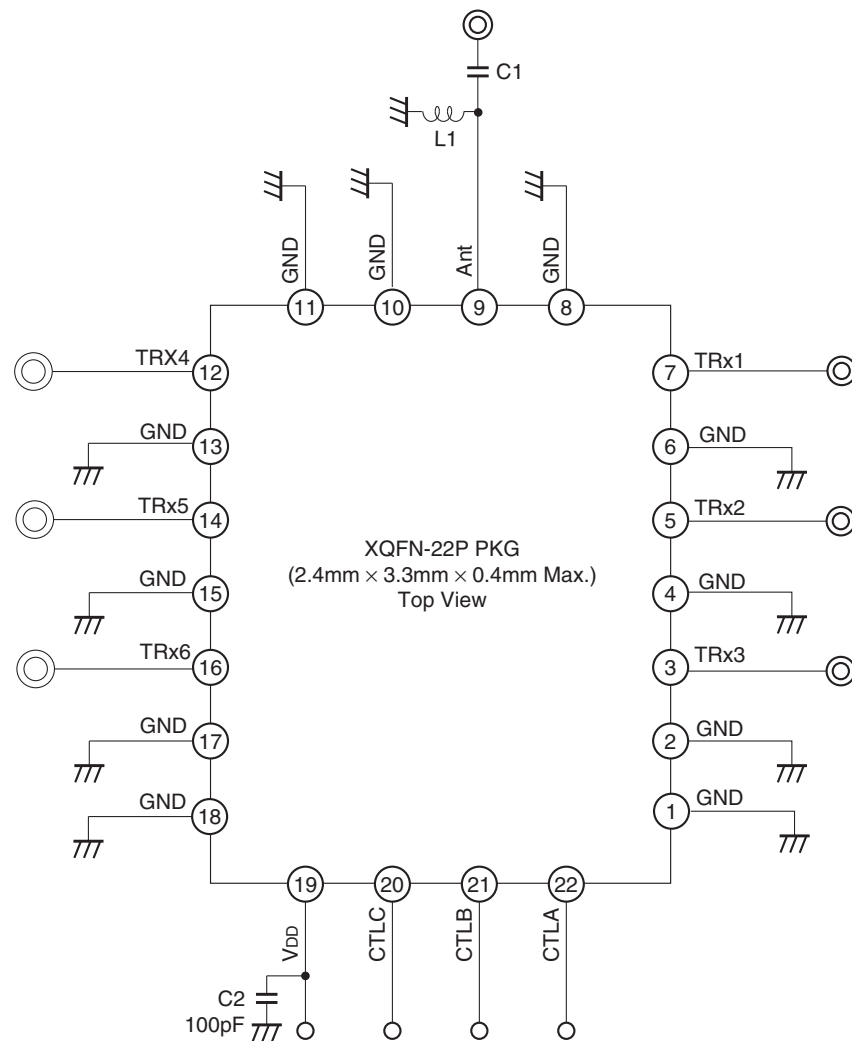
*1 Electrical characteristics are measured with all RF ports terminated in 50Ω.
Measured with the recommended circuit

IIP2(V_{DD} = 2.5V, Ta = 25°C)

Item	Symbol	Path	Condition			Min.	Typ.	Max.	Unit
Input IP2	IIP2		Tx at TRx* ¹ 24dBm [MHz]	Jammer at Ant -20dBm [MHz]	IM2 Product at TRx* ¹ [MHz]				dBm
		Ant-TRx1, TRx2, TRx3, TRx4, TRx5, TRx6	836.61	1718.61	881.61	113.5	—	—	
			836.61	45	881.61	95.5	—	—	
			1885	3850	1965	95.5	—	—	
			1885	80	1965	95.5	—	—	
			1732.5	3865	2132.5	95.5	—	—	
			1732.5	400	2132.5	95.5	—	—	

*1 Electrical characteristics are measured with all RF ports terminated in 50Ω.
Measured with the recommended circuit

Recommended Circuit



*1 No DC blocking capacitors are required on all RF ports.

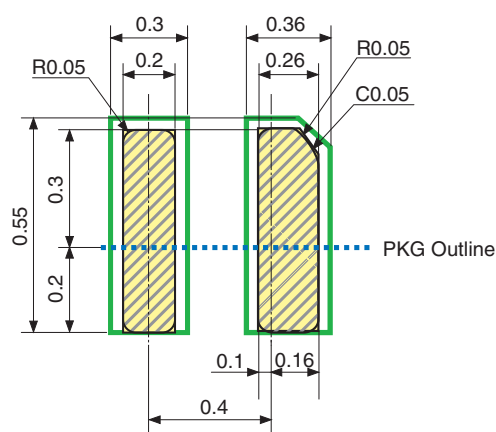
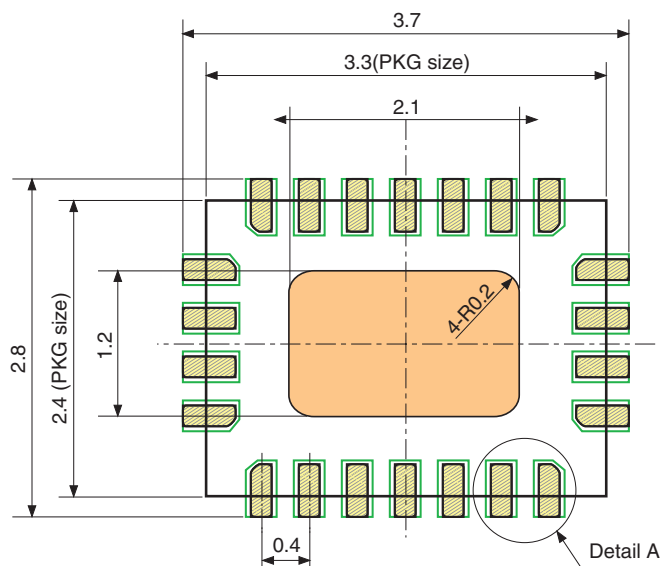
*2 The DC levels of all RF ports are GND.

*3 L1 (22nH) and C1 (12pF) are recommended on Ant port for ESD protection.

XQFN-22P-01 Macro for MMIC (Reference)

Specification

- PKG size: 3.3mm × 2.4mm t0.35mm
- Terminal pitch: 0.4mm
- Terminal length: 0.3mm
- Mask thickness: 0.11mm



Detail A

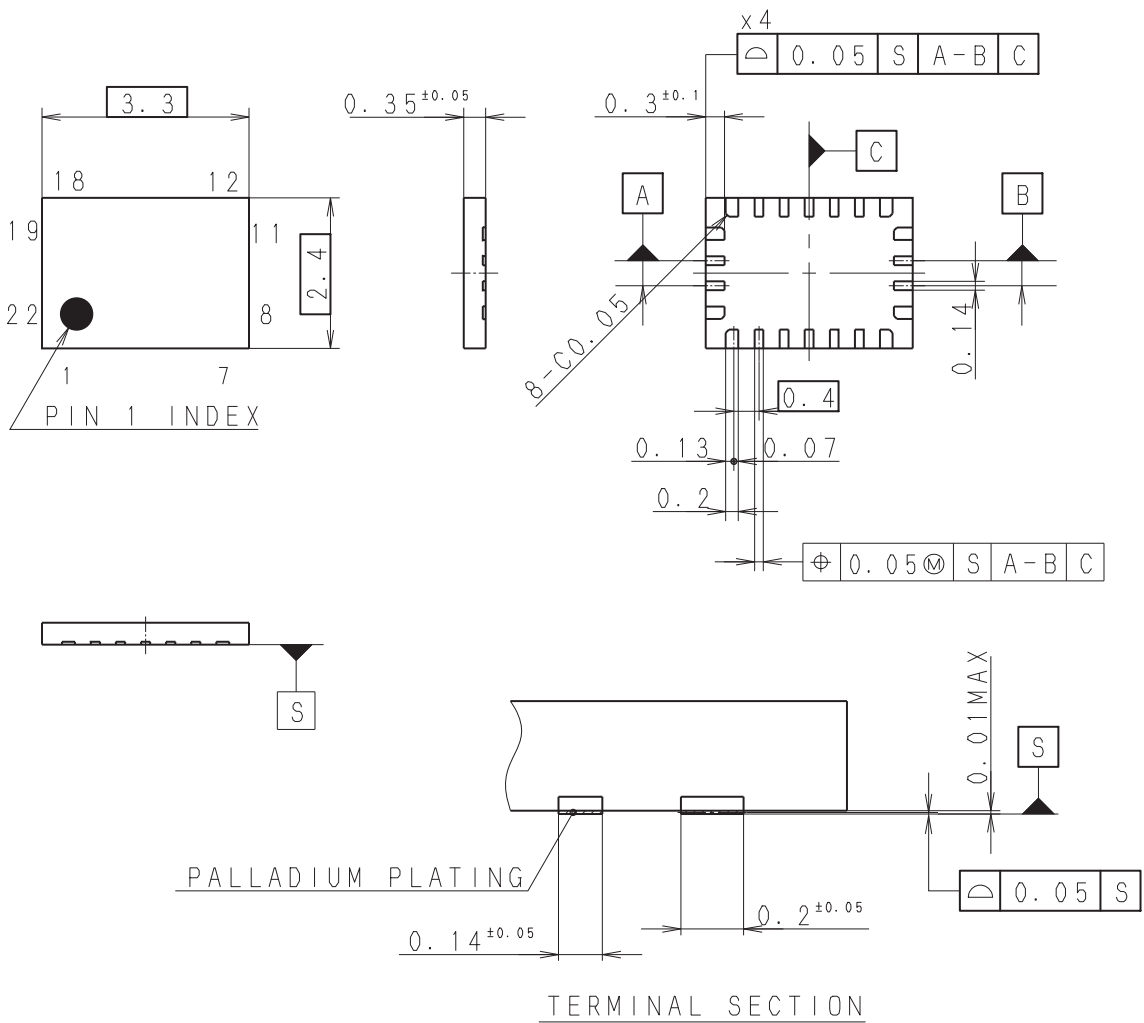
-  : Land area
  : Mask open area (Solder printing area)
-  : Board resist open area
  : Metal area in board (GND plane is recommended.)
-  : PKG outline



Package Outline

(Unit: mm)

22PIN XQFN (PLASTIC)



Note:Cutting burr of lead are 0.05mm MAX.

PACKAGE STRUCTURE

SONY CODE	XQFN-22P-01
JEITA CODE	_____
JEDEC CODE	_____

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	PALLADIUM PLATING
LEAD MATERIAL	COPPER ALLOY
PACKAGE MASS	0.01g

AP-4000-22009S Rev. 0