

High Power DPDT Switch with Logic Control

CXG1213XR

Description

This CXG1213XR can be used in wireless communication systems, for example, W-CDMA handsets. The IC has on-chip logic for operation with 2 CMOS control inputs. The Sony JPHEMT process is used for low insertion loss and on-chip logic circuit. (Applications: Antenna switch for cellular handsets, dual-band W-CDMA)

Features

- ◆ Low insertion loss
- ◆ 2 CMOS compatible control

Package

Small package size: 12-pin XQFN

Structure

GaAs JPHEMT MMIC

Absolute Maximum Ratings

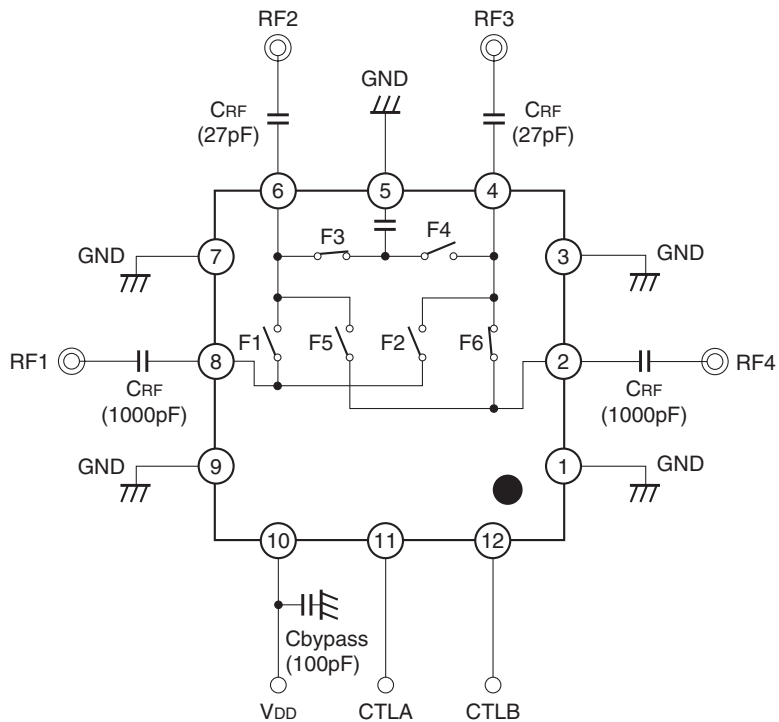
(Ta = 25°C)

◆ Bias voltage	V _{DD}	7	V
◆ Control voltage	V _{ctl}	5	V
◆ Operating temperature	T _{opr}	-35 to +85	°C
◆ Storage temperature	T _{stg}	-65 to +150	°C

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

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Block Diagram and 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.

Truth Table

State	CTLA	CTLB	ON Path	F1	F2	F3	F4	F5	F6
1	L	L	RF4 – RF3	OFF	OFF	ON	OFF	OFF	ON
2	L	H	RF4 – RF2	OFF	OFF	OFF	ON	ON	OFF
3	H	L	RF1 – RF3	OFF	ON	ON	OFF	OFF	OFF
4	H	H	RF1 – RF2	ON	OFF	OFF	ON	OFF	OFF

Electrical Characteristics (1)

(Ta = 25°C)

Item	Symbol	State	Condition	Min.	Typ.	Max.	Unit
Insertion loss	IL	1	RF4 – RF3, 830 to 885MHz		0.25	0.45	dB
			1920 to 1980MHz		0.40	0.65	dB
			2110 to 2170MHz		0.45	0.70	dB
		2	RF4 – RF2, 830 to 885MHz		0.25	0.45	dB
			1920 to 1980MHz		0.40	0.65	dB
			2110 to 2170MHz		0.45	0.70	dB
		3	RF1 – RF3, 830 to 885MHz		0.25	0.45	dB
			1920 to 1980MHz		0.40	0.65	dB
			2110 to 2170MHz		0.45	0.70	dB
		4	RF1 – RF2, 830 to 885MHz		0.25	0.45	dB
			1920 to 1980MHz		0.40	0.65	dB
			2110 to 2170MHz		0.45	0.70	dB
Isolation	ISO.	2	RF4 – RF3, 830 to 885MHz	20	25		dB
			1920 to 2170MHz	15	20		dB
		1	RF4 – RF2, 830 to 885MHz	25	30		dB
			1920 to 2170MHz	20	25		dB
		4	RF1 – RF3, 830 to 885MHz	25	30		dB
			1920 to 2170MHz	18	23		dB
		3	RF1 – RF2, 830 to 885MHz	20	25		dB
			1920 to 2170MHz	15	20		dB
VSWR	VSWR		50Ω		1.2		—
Switching speed	TSW				5	10	μs
1dB compression input power	P1dB		V _{DD} = 2.85V		32		dBm
ACLR	ACLR1		±5MHz, 3.84MHz BW*1		–60	–50	dBc
	ACLR2		±10MHz, 3.84MHz BW*1		–65	–55	dBc
Harmonics	2fo		*2		–95	–80	dBc
	3fo		*2		–90	–75	dBc
Bias current	I _{DD}		V _{DD} = 2.85V		80	150	μA
Control current	I _{ctl}		V _{ctl} (H) = 1.85V		10	20	μA

*1 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 830 to 840MHz, 1920 to 1980MHz, ROHDE & SCHWARZ SMIQ06B is used as a signal source, and the modulation and filter settings conform to WCDMA.

*2 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 830 to 840MHz, 1920 to 1980MHz

(Ta = -35 to +85°C, The temperature characteristics are design guaranteed.)

Item	Symbol	State	Condition	Min.	Typ.	Max.	Unit
Insertion loss	IL	1	RF4 – RF3, 830 to 885MHz			0.60	dB
			1920 to 1980MHz			0.80	dB
			2110 to 2170MHz			0.85	dB
		2	RF4 – RF2, 830 to 885MHz			0.60	dB
			1920 to 1980MHz			0.80	dB
			2110 to 2170MHz			0.85	dB
		3	RF1– RF3, 830 to 885MHz			0.60	dB
			1920 to 1980MHz			0.80	dB
			2110 to 2170MHz			0.85	dB
		4	RF1 – RF2, 830 to 885MHz			0.60	dB
			1920 to 1980MHz			0.80	dB
			2110 to 2170MHz			0.85	dB
Isolation	ISO.	2	RF4 – RF3, 830 to 885MHz	18			dB
			1920 to 2170MHz	13			dB
		1	RF4 – RF2, 830 to 885MHz	23			dB
			1920 to 2170MHz	18			dB
		4	RF1 – RF3, 830 to 885MHz	23			dB
			1920 to 2170MHz	16			dB
		3	RF1 – RF2, 830 to 885MHz	18			dB
			1920 to 2170MHz	13			dB
VSWR	VSWR		50Ω		1.2	—	
Switching speed	TSW					15	μs
1dB compression input power	P1dB		V _{DD} = 2.85V		32		dBm
ACLR	ACLR1		±5MHz, 3.84MHz BW*1			-45	dBc
	ACLR2		±10MHz, 3.84MHz BW*1			-50	dBc
Harmonics	2fo		*2			-75	dBc
	3fo		*2			-70	dBc
Bias current	I _{DD}		V _{DD} = 2.85V			180	μA
Control current	I _{ctl}		V _{ctl} (H) = 1.85V			40	μA

*1 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 830 to 840MHz, 1920 to 1980MHz, ROHDE & SCHWARZ SMIQ06B is used as a signal source, and the modulation and filter settings conform to WCDMA.

*2 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 830 to 840MHz, 1920 to 1980MHz

(Ta = 25°C, The IMD characteristics are design guaranteed.(with recommended circuit))

Item	Symbol	State	Condition	Min.	Typ.	Max.	Unit
IMD	IMD2	1	*1, Blocking f= 45MHz		-105	-95	dBm
			*1, Blocking f= 1715MHz		-108	-98	dBm
	IMD3		*1, Blocking f= 790MHz		-108	-98	dBm
			*1, Blocking f= 2550MHz		-107	-97	dBm
	IMD2		*2, Blocking f= 190MHz		-107	-97	dBm
			*2, Blocking f= 4090MHz		-117	-107	dBm
	IMD3	*2, Blocking f= 1760MHz		-106	-96	dBm	
		*2, Blocking f= 6040MHz		-106	-96	dBm	
	IMD2	3	*1, Blocking f= 45MHz		-105	-95	dBm
			*1, Blocking f= 1715MHz		-110	-100	dBm
	IMD3		*1, Blocking f= 790MHz		-107	-97	dBm
			*1, Blocking f= 2550MHz		-115	-105	dBm
	IMD2		*2, Blocking f= 190MHz		-107	-97	dBm
			*2, Blocking f= 4090MHz		-110	-100	dBm
IMD3	*2, Blocking f= 1760MHz		-106	-96	dBm		
	*2, Blocking f= 6040MHz		-107	-97	dBm		

*1 Rxf = 880MHz, Txf= 835MHz(Pin1= 20dBm), Pin2= -15dBm, 0/1.85V control, VDD = 2.85V

*2 Rxf = 2.14GHz, Txf= 1.95GHz(Pin1= 20dBm), Pin2= -15dBm, 0/1.85V control, VDD = 2.85V

Electrical Characteristics (2)

(Ta = 25°C)

Item	Symbol	State	Condition	Min.	Typ.	Max.	Unit
Insertion loss	IL	1	RF4 – RF3, 843 to 925MHz		0.25	0.45	dB
			1920 to 1980MHz		0.40	0.65	dB
			2110 to 2170MHz		0.45	0.70	dB
		2	RF4 – RF2, 843 to 925MHz		0.25	0.45	dB
			1920 to 1980MHz		0.40	0.65	dB
			2110 to 2170MHz		0.45	0.70	dB
		3	RF1 – RF3, 843 to 925MHz		0.25	0.45	dB
			1920 to 1980MHz		0.40	0.65	dB
			2110 to 2170MHz		0.45	0.70	dB
		4	RF1 – RF2, 843 to 925MHz		0.25	0.45	dB
			1920 to 1980MHz		0.40	0.65	dB
			2110 to 2170MHz		0.45	0.70	dB
Isolation	ISO.	2	RF4 – RF3, 843 to 925MHz	20	25		dB
			1920 to 2170MHz	15	20		dB
		1	RF4 – RF2, 843 to 925MHz	25	30		dB
			1920 to 2170MHz	20	25		dB
		4	RF1 – RF3, 843 to 925MHz	25	30		dB
			1920 to 2170MHz	18	23		dB
3	RF1 – RF2, 843 to 925MHz	20	25		dB		
	1920 to 2170MHz	15	20		dB		
VSWR	VSWR		50Ω		1.2		—
Switching speed	TSW				5	10	μs
1dB compression input power	P1dB		V _{DD} = 2.85V		32		dBm
ACPR	ACPR1		±900KHz, 30KHz BW*1		-60	-50	dBc
	ACPR2		±1.98MHz, 30KHz BW*1		-65	-55	dBc
	ACPR1		±1.25MHz, 30KHz BW*2		-60	-50	dBc
	ACPR2		±1.98MHz, 30KHz BW*2		-65	-55	dBc
Harmonics	2fo		*3		-95	-80	dBc
	3fo		*3		-90	-75	dBc
Bias current	I _{DD}		V _{DD} = 2.85V		80	150	μA
Control current	I _{ctl}		V _{ctl} (H) = 1.85V		10	20	μA

*1 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 898 to 925MHz, ROHDE & SCHWARZ SMIQ06B is used as a signal source, and the modulation and filter settings conform to IS-95.

*2 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 1920 to 1980MHz, ROHDE & SCHWARZ SMIQ06B is used as a signal source, and the modulation and filter settings conform to IS-95.

*3 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 830 to 840MHz, 1920 to 1980MHz

(Ta = -35 to +85°C, The temperature characteristics are design guaranteed.)

Item	Symbol	State	Condition	Min.	Typ.	Max.	Unit	
Insertion loss	IL	1	RF4 – RF3, 843 to 925MHz			0.60	dB	
			1920 to 1980MHz			0.80	dB	
			2110 to 2170MHz			0.85	dB	
		2	RF4 – RF2, 843 to 925MHz			0.60	dB	
				1920 to 1980MHz			0.80	dB
				2110 to 2170MHz			0.85	dB
		3	RF1– RF3, 843 to 925MHz			0.60	dB	
				1920 to 1980MHz			0.80	dB
				2110 to 2170MHz			0.85	dB
		4	RF1 – RF2, 843 to 925MHz			0.60	dB	
				1920 to 1980MHz			0.80	dB
				2110 to 2170MHz			0.85	dB
Isolation	ISO.	2	RF4 – RF3, 843 to 925MHz	18			dB	
			1920 to 2170MHz	13			dB	
		1	RF4 – RF2, 843 to 925MHz		23			dB
				1920 to 2170MHz	18			dB
		4	RF1 – RF3, 843 to 925MHz		23			dB
				1920 to 2170MHz	16			dB
		3	RF1 – RF2, 843 to 925MHz		18			dB
				1920 to 2170MHz	13			dB
VSWR	VSWR		50Ω		1.2		—	
Switching speed	TSW					15	μs	
1dB compression input power	P1dB		V _{DD} = 2.85V		32		dBm	
ACPR	ACPR1		±900KHz, 30KHz BW*1			-45	dBc	
	ACPR2		±1.98MHz, 30KHz BW*1			-50	dBc	
	ACPR1		±1.25MHz, 30KHz BW*2			-45	dBc	
	ACPR2		±1.98MHz, 30KHz BW*2			-50	dBc	
Harmonics	2fo		*3			-75	dBc	
	3fo		*3			-70	dBc	
Bias current	I _{DD}		V _{DD} = 2.85V			180	μA	
Control current	I _{ctl}		V _{ctl} (H) = 1.85V			40	μA	

*1 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 898 to 925MHz, ROHDE & SCHWARZ SMIQ06B is used as a signal source, and the modulation and filter settings conform to IS-95.

*2 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 1920 to 1980MHz, ROHDE & SCHWARZ SMIQ06B is used as a signal source, and the modulation and filter settings conform to IS-95.

*3 Pin = 25dBm, 0/1.85V control, V_{DD} = 2.85V, 830 to 840MHz, 1920 to 1980MHz

(Ta = 25°C, The IMD characteristics are design guaranteed.(with recommended circuit))

Item	Symbol	State	Condition	Min.	Typ.	Max.	Unit
IMD	IMD2	1 2	*1, Blocking f= 45MHz		-103	-93	dBm
			*1, Blocking f= 1715MHz		-106	-96	dBm
	IMD3		*1, Blocking f= 790MHz		-106	-96	dBm
			*1, Blocking f= 2550MHz		-105	-95	dBm
	IMD2		*2, Blocking f= 190MHz		-105	-95	dBm
			*2, Blocking f= 4050MHz		-115	-105	dBm
	IMD3		*2, Blocking f= 1740MHz		-104	-94	dBm
			*2, Blocking f= 5980MHz		-104	-94	dBm
	IMD2	3 4	*1, Blocking f= 45MHz		-103	-93	dBm
			*1, Blocking f= 1715MHz		-108	-98	dBm
	IMD3		*1, Blocking f= 790MHz		-105	-95	dBm
			*1, Blocking f= 2550MHz		-113	-103	dBm
	IMD2		*2, Blocking f= 190MHz		-105	-95	dBm
			*2, Blocking f= 4050MHz		-108	-98	dBm
IMD3	*2, Blocking f= 1740MHz			-104	-94	dBm	
	*2, Blocking f= 5980MHz			-105	-95	dBm	

*1 Rxf = 880MHz, Txf= 835MHz(Pin1= 23dBm), Pin2= -15dBm, 0/1.85V control, VDD = 2.85V

*2 Rxf = 2.12GHz, Txf= 1.93GHz(Pin1= 23dBm), Pin2= -15dBm, 0/1.85V control, VDD = 2.85V



DC Bias Conditions

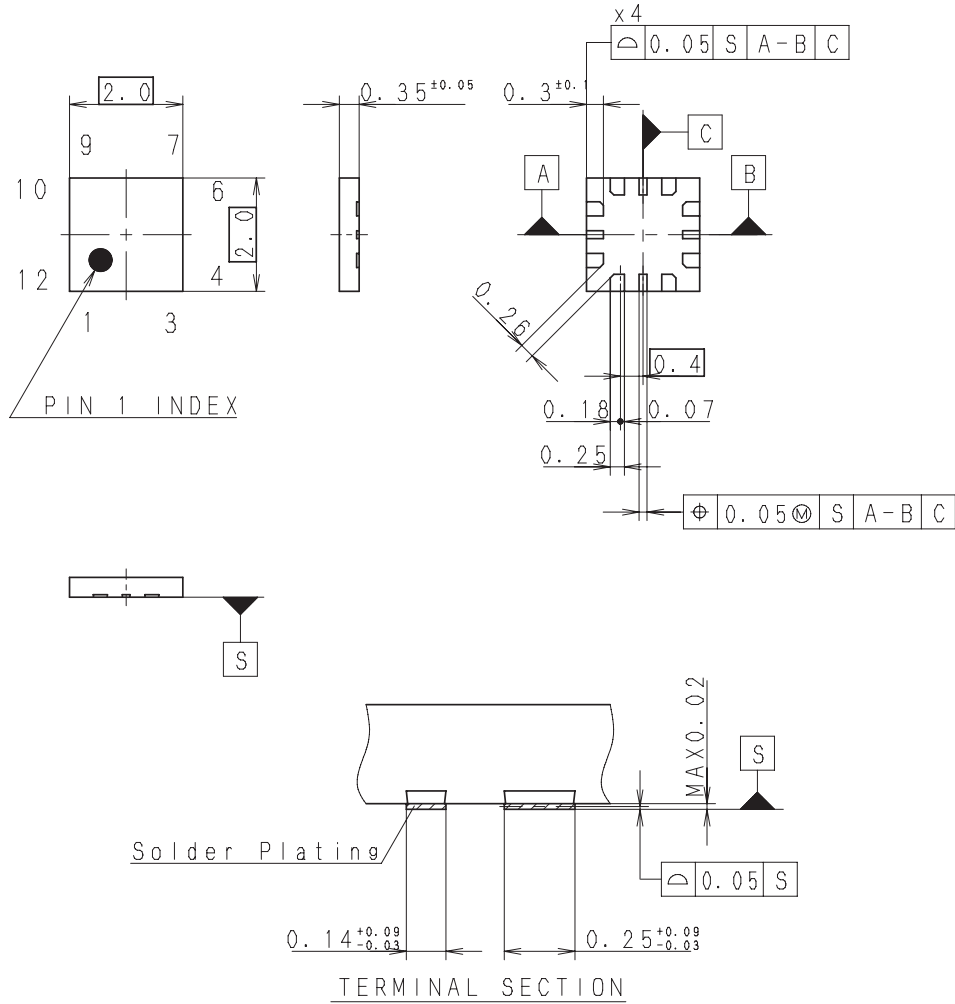
(Ta = -35 to +85°C)

Item	Min.	Typ.	Max.	Unit
Vctl (H)	1.6	1.85	3.2	V
Vctl (L)	0	—	0.4	V
VDD	2.6	2.85	3.2	V

Package Outline

(Unit: mm)

12 PIN XQFN (PLASTIC)



Note:Cutting burr of lead are 0.05mm MAX.

SONY CODE	XQFN-12P-02
JEITA 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