SONY

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
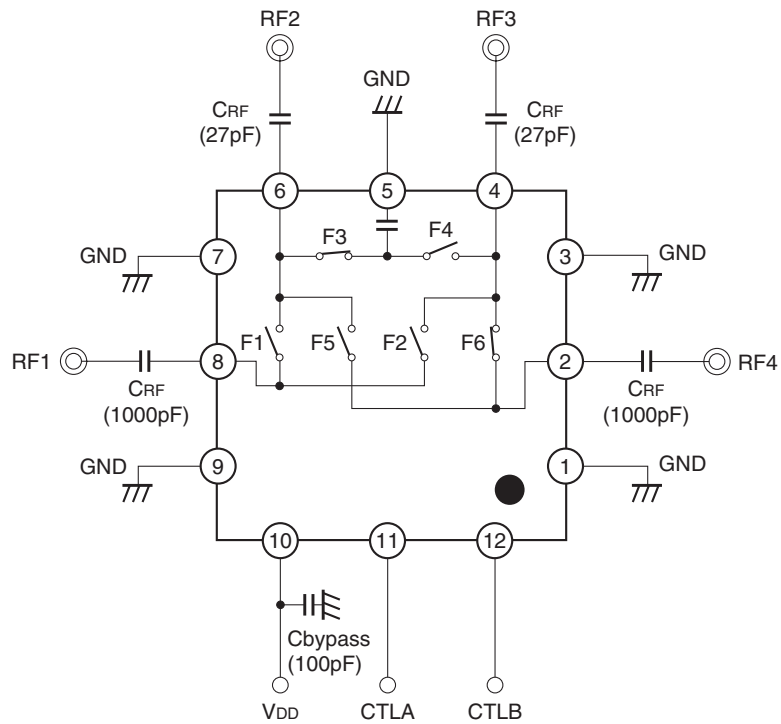
GaAs JPHEMT MMIC

Absolute Maximum Ratings

(Ta = 25℃)

◆ Bias voltage	V_{DD}	7	V
◆ Control voltage	Vctl	5	V
◆ Operating temperature	Topr	–35 to +85	℃
◆ Storage temperature	Tstg	–65 to +150	℃

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

E05X06A61

Block Diagram and Recommended Circuit

When using this IC, the following external components should be used:
   C_{RF}: 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 Characterstics (1)

(Ta = 25℃)

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	Ictl		Vctl (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℃, The temperature characteristics are design guranteed.)

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	Ictl		Vctl (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℃, 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		−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 4	[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, V_{DD} = 2.85V

[2]　Rxf = 2.14GHz, Txf= 1.95GHz(Pin1= 20dBm), Pin2= −15dBm, 0/1.85V control, V_{DD} = 2.85V

Electrical Characterstics (2)

(Ta = 25℃)

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	Ictl		Vctl (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℃, The temperature characteristics are design guranteed.)

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		VDD = 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	IDD		VDD = 2.85V			180	μA
Control current	Ictl		Vctl (H) = 1.85V			40	μA

[1] Pin = 25dBm, 0/1.85V control, VDD = 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, VDD = 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, VDD = 2.85V, 830 to 840MHz, 1920 to 1980MHz

(Ta = 25℃, 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, V_{DD} = 2.85V

*2 Rxf = 2.12GHz, Txf= 1.93GHz(Pin1= 23dBm), Pin2= −15dBm, 0/1.85V control, V_{DD} = 2.85V
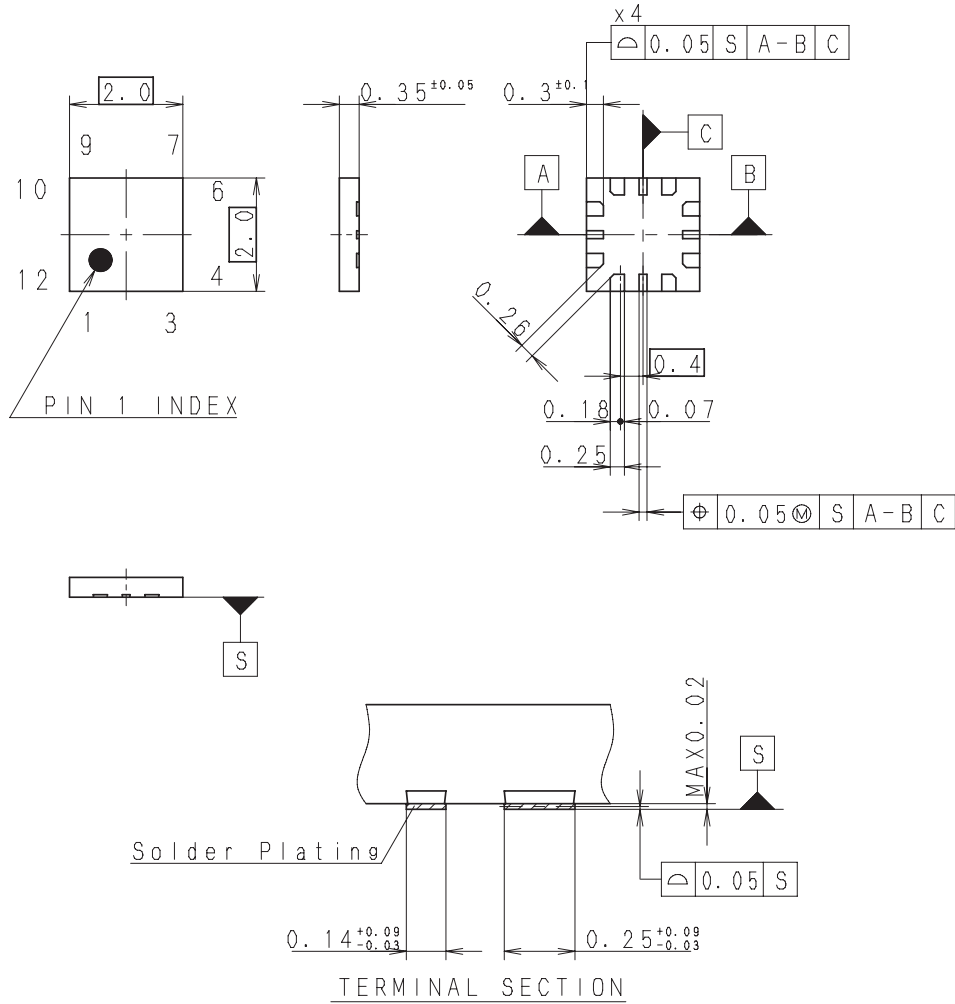
DC Bias Conditions

(Ta = −35 to +85℃)

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

Package Outline

(Unit: mm)

12PIN XQFN (PLASTIC)

PIN 1 INDEX

TERMINAL SECTION

Solder Plating

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