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### Description

The CXM3513ER can be used in wireless communication systems, for example, triple-band W-CDMA handsets. This IC has a decoder with 3 CMOS control inputs. The Sony JPHEMT process is used for low insertion loss and low distortion characteristic.

(Applications: Antenna switch for cellular handsets, triple-band W-CDMA)

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### Features

- ◆ Low insertion loss: 0.36dB @900MHz, 0.43dB @1.95GHz
- ◆ 3 CMOS compatible control lines

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### Package

Small package size: 20-pin VQFN (2.4mm × 3.2mm × 0.9mm)

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### Structure

GaAs JPHEMT MMIC

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### Absolute Maximum Ratings

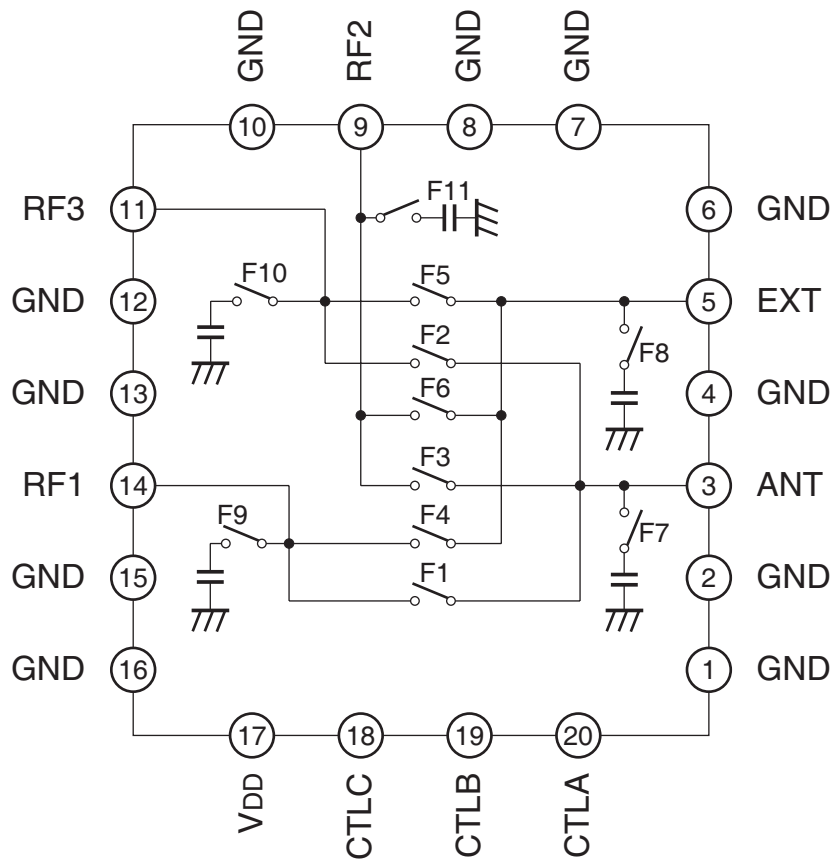
(Ta = 25°C)

◆ Bias voltage	V <sub>DD</sub>	7	V
◆ Control voltage	V <sub>ctl</sub>	5	V
◆ Operating temperature	T <sub>opr</sub>	-35 to +85	°C
◆ Storage temperature	T <sub>stg</sub>	-65 to +150	°C

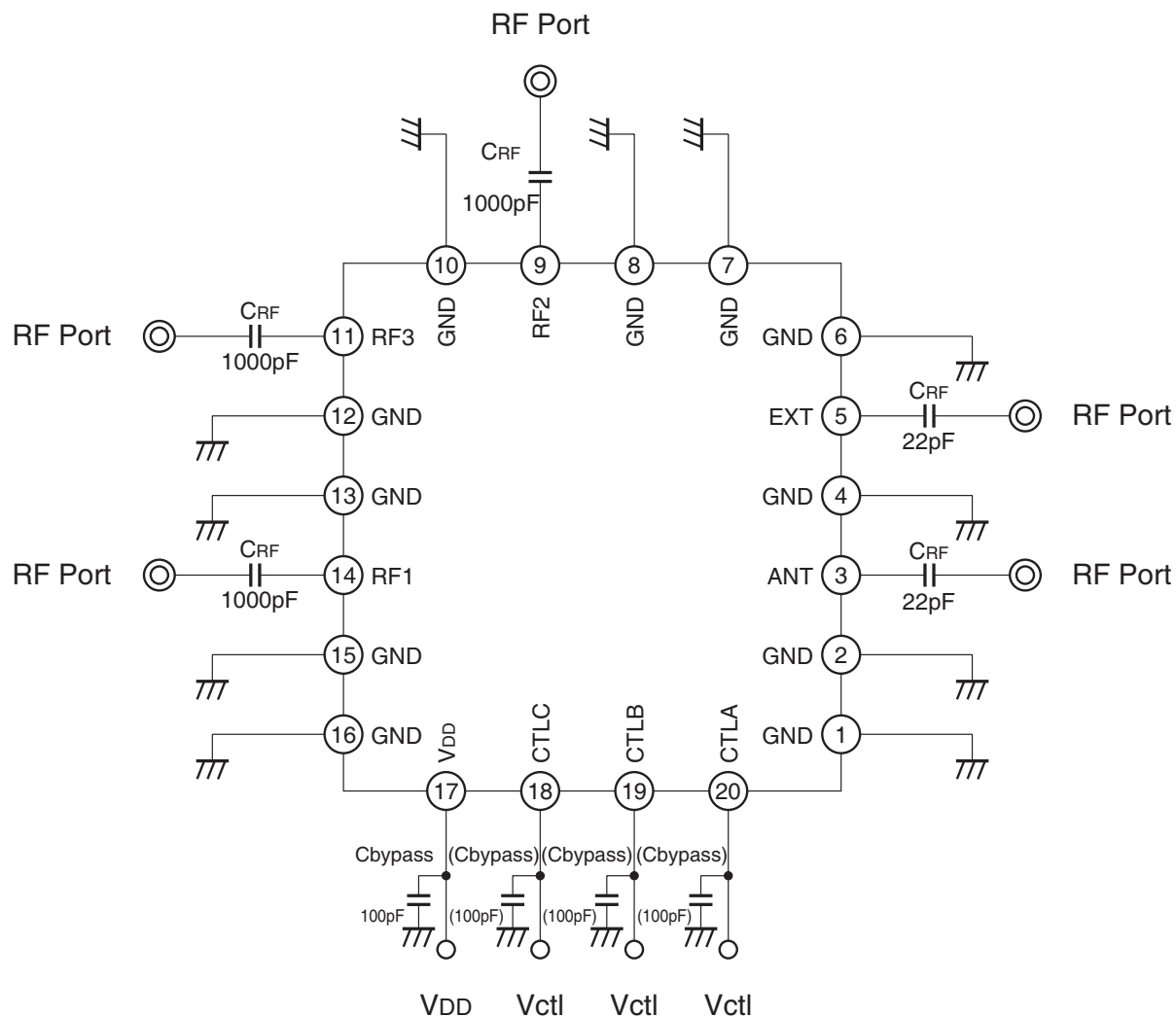
This IC is ESD sensitive device. Special handling precautions are required.

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Block Diagram and Pin Configuration



**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.

## Truth Table

State	CTL A	CTL B	CTL C	Mode	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
1	H	L	L	ANT-RF3	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	ON
2	L	L	L	EXT-RF3	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	ON	OFF	ON
3	H	L	H	ANT-RF2	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
4	L	L	H	EXT-RF2	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	ON	ON	OFF
5	H	H	L	ANT-RF1	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	ON
6	L	H	L	EXT-RF1	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	ON	ON

## DC Bias Conditions

(Ta = -35 to +85°C)

Item	Min.	Typ.	Max.	Unit
Vctl (H)	1.44	1.85	V <sub>DD</sub>	V
Vctl (L)	0	—	0.3	V
V <sub>DD</sub>	2.7	2.85	3.2	V

## Electrical Characteristic

(Ta = 25°C, V<sub>DD</sub> = 2.85V)

Item	Symbol	State	Condition	Min.	Typ.	Max.	Unit
Insertion Loss	IL	ANT-RF1	830 to 885MHz		0.36	0.56	dB
		EXT-RF1	830 to 885MHz		0.36	0.56	dB
		ANT-RF2	1750 to 1880MHz		0.39	0.64	dB
		EXT-RF2	1750 to 1880MHz		0.40	0.65	dB
		ANT-RF3	1920 to 2170MHz		0.43	0.68	dB
		EXT-RF3	1920 to 2170MHz		0.45	0.70	dB
Isolation	ISO	ANT-RF1	830 to 885MHz	25	30		dB
		EXT-RF1	830 to 885MHz	28	33		dB
		ANT-RF2	1750 to 1880MHz	28	33		dB
		EXT-RF2	1750 to 1880MHz	25	30		dB
		ANT-RF3	1920 to 2170MHz	24	29		dB
		EXT-RF3	1920 to 2170MHz	24	29		dB
VSWR	VSWR	ANT	50Ω		1.1	1.4	—
		EXT	50Ω		1.1	1.4	—
1dB compression input power	P1dB		V <sub>DD</sub> = 2.85V		32		dBm
Switching speed	TSW				5	10	us
ACLR	ACLR1		±5MHz, 3.84MHz BW, *1, *2, *3		-60	-50	dBc
	ACLR2		±10MHz, 3.84MHz BW, *1, *2, *3		-65	-55	dBc
Harmonics	2fo		*1, *2, *3		-90	-70	dBc
	3fo		*1, *2, *3		-90	-70	dBc
Bias current	I <sub>dd</sub>		V <sub>DD</sub> = 2.85V		105	210	μA
Control current	I <sub>ctl</sub>		V <sub>ctl</sub> (H) = 2.85V		0.1	5	μA
IMD2	IMD2_1_1	ANT-RF1	f <sub>ud</sub> = f <sub>Rx</sub> - f <sub>Tx</sub> , *4		-107	-97	dBm
		EXT-RF1	f <sub>ud</sub> = f <sub>Rx</sub> - f <sub>Tx</sub> , *4		-105	-95	dBm
	IMD2_1_2	ANT-RF2	f <sub>ud</sub> = f <sub>Rx</sub> - f <sub>Tx</sub> , *5		-105	-95	dBm
		EXT-RF2	f <sub>ud</sub> = f <sub>Rx</sub> - f <sub>Tx</sub> , *5		-105	-95	dBm
	IMD2_1_3	ANT-RF3	f <sub>ud</sub> = f <sub>Rx</sub> - f <sub>Tx</sub> , *6		-110	-100	dBm
		EXT-RF3	f <sub>ud</sub> = f <sub>Rx</sub> - f <sub>Tx</sub> , *6		-107	-97	dBm
	IMD2_2_1	ANT-RF1	f <sub>ud</sub> = f <sub>Rx</sub> + f <sub>Tx</sub> , *4		-115	-105	dBm
		EXT-RF1	f <sub>ud</sub> = f <sub>Rx</sub> + f <sub>Tx</sub> , *4		-115	-105	dBm
	IMD2_2_2	ANT-RF2	f <sub>ud</sub> = f <sub>Rx</sub> + f <sub>Tx</sub> , *5		-115	-105	dBm
		EXT-RF2	f <sub>ud</sub> = f <sub>Rx</sub> + f <sub>Tx</sub> , *5		-110	-100	dBm
	IMD2_2_3	ANT-RF3	f <sub>ud</sub> = f <sub>Rx</sub> + f <sub>Tx</sub> , *6		-115	-105	dBm
		EXT-RF3	f <sub>ud</sub> = f <sub>Rx</sub> + f <sub>Tx</sub> , *6		-110	-100	dBm

Item	Symbol	State	Condition	Min.	Typ.	Max.	Unit
IMD3	IMD3_1_1	ANT-RF1	$f_{ud} = 2 \times f_{Tx} - f_{Rx}$ , *4		-107	-97	dBm
		EXT-RF1	$f_{ud} = 2 \times f_{Tx} - f_{Rx}$ , *4		-107	-97	dBm
	IMD3_1_2	ANT-RF2	$f_{ud} = 2 \times f_{Tx} - f_{Rx}$ , *5		-107	-97	dBm
		EXT-RF2	$f_{ud} = 2 \times f_{Tx} - f_{Rx}$ , *5		-107	-97	dBm
	IMD3_1_3	ANT-RF3	$f_{ud} = 2 \times f_{Tx} - f_{Rx}$ , *6		-107	-97	dBm
		EXT-RF3	$f_{ud} = 2 \times f_{Tx} - f_{Rx}$ , *6		-107	-97	dBm
	IMD3_2_1	ANT-RF1	$f_{ud} = 2 \times f_{Tx} + f_{Rx}$ , *4		-110	-100	dBm
		EXT-RF1	$f_{ud} = 2 \times f_{Tx} + f_{Rx}$ , *4		-110	-100	dBm
	IMD3_2_2	ANT-RF2	$f_{ud} = 2 \times f_{Tx} + f_{Rx}$ , *5		-110	-100	dBm
		EXT-RF2	$f_{ud} = 2 \times f_{Tx} + f_{Rx}$ , *5		-110	-100	dBm
	IMD3_2_3	ANT-RF3	$f_{ud} = 2 \times f_{Tx} + f_{Rx}$ , *6		-110	-100	dBm
		EXT-RF3	$f_{ud} = 2 \times f_{Tx} + f_{Rx}$ , *6		-110	-100	dBm

\*1 Pin = 25dBm, Vctl = 0/1.85V, VDD = 2.85V, 830 to 840MHz

\*2 Pin = 25dBm, Vctl = 0/1.85V, VDD = 2.85V, 1750 to 1785MHz

\*3 Pin = 25dBm, Vctl = 0/1.85V, VDD = 2.85V, 1920 to 1980MHz

\*4 Pin = 20dBm, Vctl = 0/1.85V, VDD = 2.85V, fTx = 830 to 840MHz, Pin = -15dBm, fRx = 875 to 885MHz

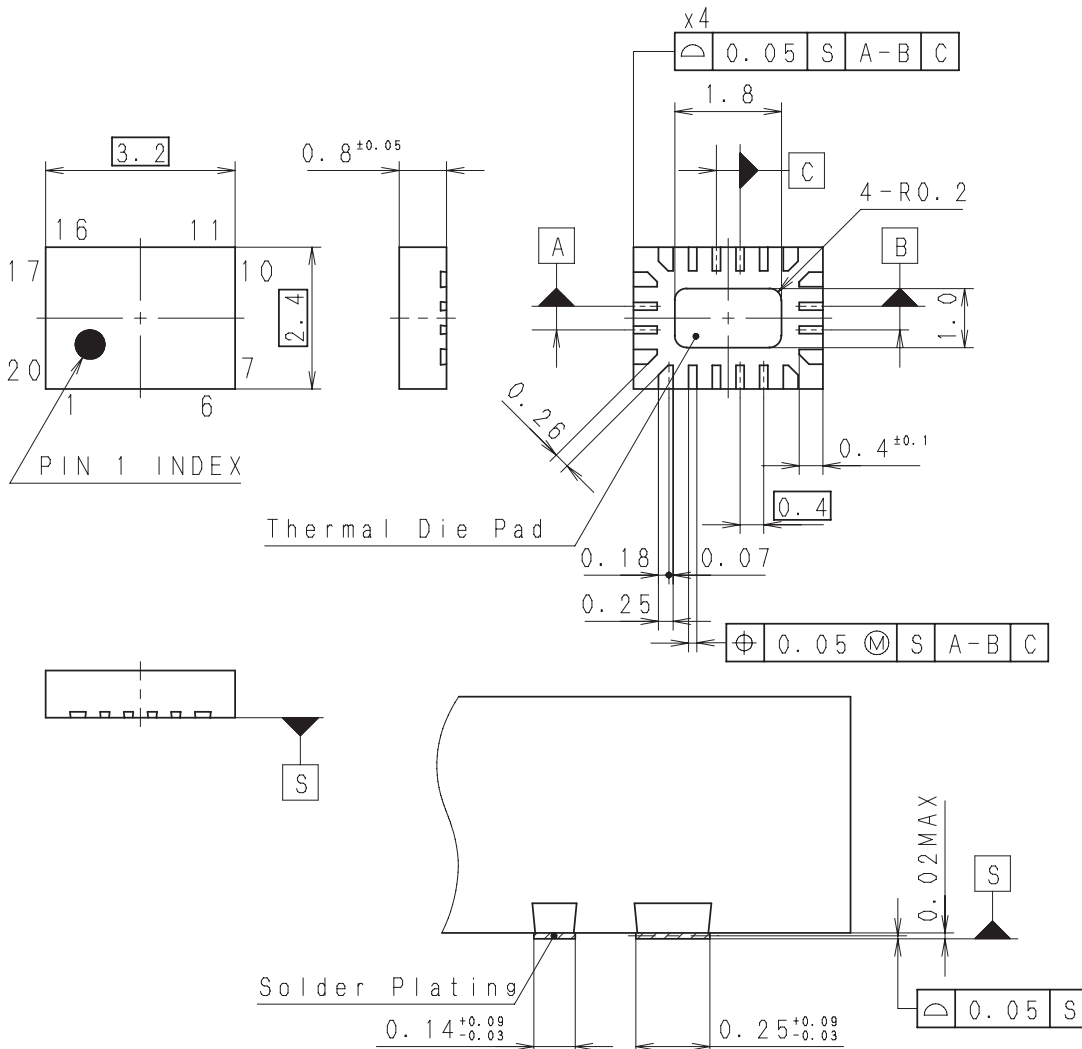
\*5 Pin = 20dBm, Vctl = 0/1.85V, VDD = 2.85V, fTx = 1750 to 1785MHz, Pin = -15dBm, fRx = 1845 to 1880MHz

\*6 Pin = 20dBm, Vctl = 0/1.85V, VDD = 2.85V, fTx = 1920 to 1980MHz, Pin = -15dBm, fRx = 2110 to 2170MHz

Package Outline

(Unit: mm)

20PIN VQFN (PLASTIC)



TERMINAL SECTION

Note:Cutting burr of lead are 0.05mm MAX.

PACKAGE STRUCTURE

SONY CODE	VQFN-20P-03
JEITA CODE	_____
JEDEC CODE	_____

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	COPPER ALLOY
PACKAGE MASS	0.02g

AP-4000-20020S Rev.0

LEAD PLATING SPECIFICATIONS

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