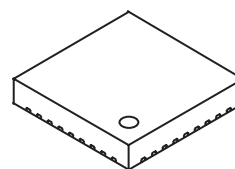


High Power 6 × 5 Antenna Switch MMIC for PDC Full Packet

Description

The CXM3502ER is a high power antenna switch MMIC for PDC full packet handsets. There are two modes which are TDMA mode and Packet mode. The CXM3502ER is suited to connect Tx/Rx/Duplexer to one of 4 antennas. The CXM3502ER has a CMOS decoder for RF switch control. The Sony Junction-gate PHEMT (JPHEMT) process is used for low insertion loss and low voltage operation.

36 pin VQFN (Plastic)



Features

- Low insertion loss
- Low loss bypass mode in TDMA
- High linearity: Harmonic < -60dBc
- CMOS compatible input control
- Small package: 36-pin VQFN (4.3mm × 4.3mm)

Applications

6 × 5 antenna switch for digital cellular such as PDC full packet handsets

Structure

GaAs junction-gate PHEMT

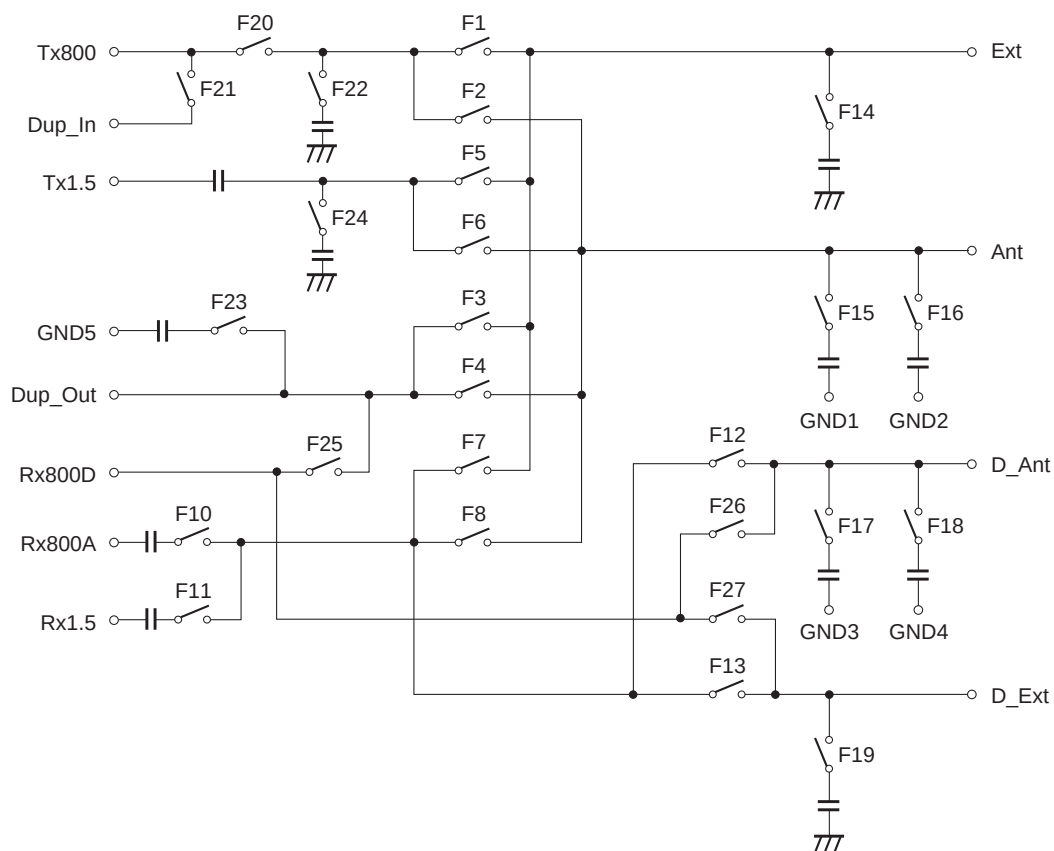
Absolute Maximum Ratings (Ta = 25°C)

• 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

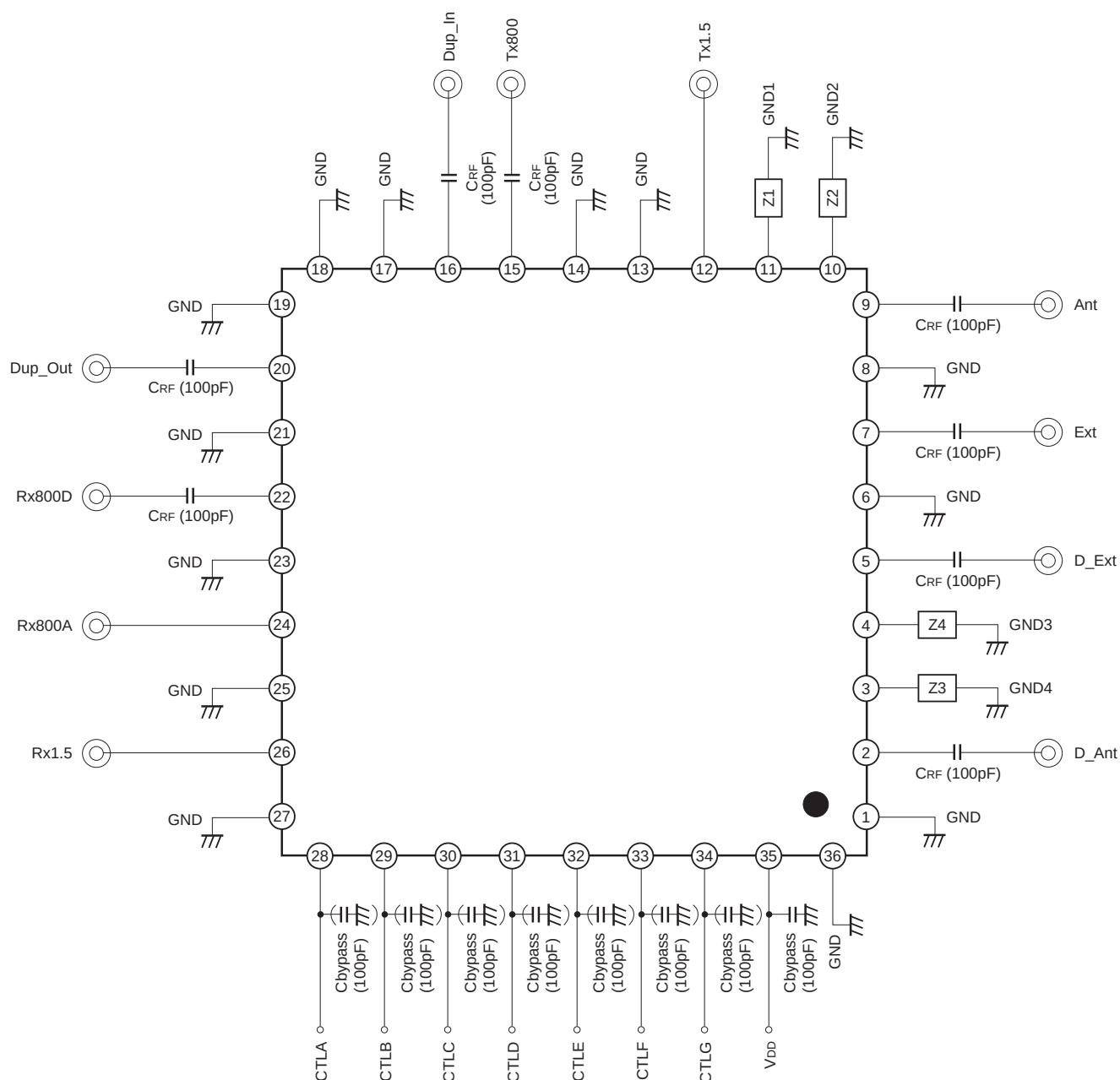
GaAs MMIC's are ESD sensitive devices. Special handling precautions are required.
The actual ESD test data will be available later.

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Block Diagram



Pin Configuration and Recommended Circuit



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

CRF: This capacitor is used for RF de-coupling and must be used for all applications. 100pF is recommended.

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

Truth Table

A: Rx/Tx

B: Main/diversity

C: External/antenna

D: 800MHz digital/800MHz analog

E: 800MHz/1.5GHz

F: TDMA/duplex

State	On Pass	A	B	C	D	E	F	G	F1	F2	F3	F4	F5	F6	F7	F8	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23	F24	F25	F26	F27
1	Tx800 – Ext	H	–	L	–	L	L	H	H	L	L	L	L	L	L	L	L	L	L	L	L	H	L	H	L	H	H	L	L	H	H	L	L	L
2	Tx800 – Ant	H	–	H	–	L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	H	L	L	H	L	H	H	L	L	H	H	L	L	L
3	Tx1.5 – Ext	H	–	L	–	H	–	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	H	L	H	H	L	L	H	H	L	L	L	L
4	Tx1.5 – Ant	H	–	H	–	H	–	H	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L	L	H	H	L	L	H	H	L	L	L	L
5	Rx800D – Ext	L	L	L	L	L	L	H	L	L	H	L	L	L	L	L	L	L	L	L	L	H	L	H	L	H	L	L	H	L	H	H	L	L
6	Rx800A – Ext	L	L	L	H	L	L	H	L	L	L	L	L	L	H	L	H	L	L	L	L	H	L	H	L	H	L	L	H	H	H	L	L	L
7	Rx1.5 – Ext	L	L	L	–	H	–	H	L	L	L	L	L	L	H	L	L	H	L	L	L	L	H	L	H	H	L	L	H	H	H	L	L	L
8	Rx800D – Ant	L	L	H	L	L	L	H	L	L	L	H	L	L	L	L	L	L	L	L	H	L	L	H	L	H	L	L	H	L	H	H	L	L
9	Rx800A – Ant	L	L	H	H	L	L	H	L	L	L	L	L	L	H	H	L	L	L	L	H	L	L	H	L	H	L	L	H	H	H	L	L	L
10	Rx1.5 – Ant	L	L	H	–	H	–	H	L	L	L	L	L	L	L	H	L	H	L	L	H	L	L	L	H	H	L	L	H	H	H	L	L	L
11	Rx800D – D_Ext	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	H	H	L	H	L	L	L	L	H	H	H	L	L	H
12	Rx800A – D_Ext	L	H	L	H	L	L	H	L	L	L	L	L	L	L	L	H	L	L	H	H	H	L	H	L	L	L	L	H	H	H	L	L	L
13	Rx1.5 – D_Ext	L	H	L	–	H	–	H	L	L	L	L	L	L	L	L	L	H	L	H	H	L	H	L	H	L	L	L	H	H	H	L	L	L
14	Rx800D – D_Ant	L	H	H	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	H	H	L	L	L	H	L	L	H	H	H	L	H	L
15	Rx800A – D_Ant	L	H	H	H	L	L	H	L	L	L	L	L	L	L	L	H	L	H	L	H	H	L	L	L	H	L	L	H	H	H	L	L	L
16	Rx1.5 – D_Ant	L	H	H	–	H	–	H	L	L	L	L	L	L	L	L	L	L	H	H	L	H	L	L	L	H	L	L	H	H	H	L	L	L
17	Tx800 – Dup_In Dup_Out – Ext Rx800D – Ext	–	L	L	L	L	H	H	L	L	H	L	L	L	L	L	L	L	L	L	L	H	L	H	L	H	L	H	H	L	H	H	L	L
18	Tx800 – Dup_In Dup_Out – Ant Rx800D – Ant	–	L	H	L	L	H	H	L	L	L	H	L	L	L	L	L	L	L	L	H	L	L	H	L	H	L	H	H	L	H	H	L	L
19	Tx800 – Dup_In Dup_Out – Ext Rx800D – D_Ext	–	H	L	L	L	H	H	L	L	H	L	L	L	L	L	L	L	L	L	L	H	L	H	L	L	L	H	H	L	H	L	L	H
20	Tx800 – Dup_In Dup_Out – Ant Rx800D – D_Ant	–	H	H	L	L	H	H	L	L	L	H	L	L	L	L	L	L	L	L	H	L	L	L	L	H	L	H	H	L	H	L	H	L

DC Bias Condition

(Ta = 25°C)

Parameter	Min.	Typ.	Max.	Unit
V _{DD}	+2.7	+3.0	+3.3	V
V _{ctl} (H)	V _{DD} – 0.2		V _{DD} + 0.2	V
V _{ctl} (L)	0		0.5	V

Electrical Characteristics

(Ta = 25°C)

Parameter	Symbol	State	Port	Condition	Min.	Typ.	Max.	Unit
Insertion loss	IL	1	Tx800 – Ext	940MHz		0.55	0.85	dB
		2	Tx800 – Ant	940MHz		0.55	0.85	dB
		3	Tx1.5 – Ext	1.44GHz		0.50	0.80	dB
		4	Tx1.5 – Ant	1.44GHz		0.50	0.80	dB
		5	Rx800D – Ext	850MHz		0.65	0.95	dB
		6	Rx800A – Ext	850MHz		0.80	1.10	dB
		7	Rx1.5 – Ext	1.49GHz		1.00	1.30	dB
		8	Rx800D – Ant	850MHz		0.65	0.95	dB
		9	Rx800A – Ant	850MHz		0.80	1.10	dB
		10	Rx1.5 – Ant	1.49GHz		0.95	1.25	dB
		11	Rx800D – D_Ext	850MHz		0.55	0.85	dB
		12	Rx800A – D_Ext	850MHz		0.80	1.10	dB
		13	Rx1.5 – D_Ext	1.49GHz		0.95	1.25	dB
		14	Rx800D – D_Ant	850MHz		0.60	0.90	dB
		15	Rx800A – D_Ant	850MHz		0.80	1.10	dB
		16	Rx1.5 – D_Ant	1.49GHz		0.95	1.25	dB
		17, 18, 19, 20	Tx800 – Dup_In	940MHz		0.20	0.50	dB
		17	Dup_Out – Ext/ Rx800D – Ext	940MHz 850MHz		0.50 0.65	0.80 0.95	dB
		18	Dup_Out – Ant/ Rx800D – Ant	940MHz 850MHz		0.50 0.65	0.80 0.95	dB
		19	Dup_Out – Ext/ Rx800D – D_Ext	940MHz 850MHz		0.50 0.60	0.80 0.90	dB
		20	Dup_Out – Ant/ Rx800D – D_Ant	940MHz 850MHz		0.50 0.60	0.80 0.90	dB

Item	Symbol	State	Port	Condition	Min.	Typ.	Max.	Unit
Isolation	ISO.	2	Tx800 – Ext	940MHz	25	39		dB
		1	Tx800 – Ant	940MHz	20	28		dB
		4	Tx1.5 – Ext	1.44GHz	25	37		dB
		3	Tx1.5 – Ant	1.44GHz	20	26		dB
		8	Rx800D – Ext	850MHz	25	36		dB
		9	Rx800A – Ext	850MHz	25	36		dB
		10	Rx1.5 – Ext	1.49GHz	25	35		dB
		5	Rx800D – Ant	850MHz	20	28		dB
		6	Rx800A – Ant	850MHz	20	29		dB
		7	Rx1.5 – Ant	1.49GHz	20	29		dB
		14	Rx800D – D_Ext	850MHz	25	32		dB
		15	Rx800A – D_Ext	850MHz	25	32		dB
		16	Rx1.5 – D_Ext	1.49GHz	20	28		dB
		11	Rx800D – D_Ant	850MHz	25	41		dB
		12	Rx800A – D_Ant	850MHz	25	37		dB
		13	Rx1.5 – D_Ant	1.49GHz	25	33		dB
		1 to 16	Tx800 – Dup_In	940MHz	15	21		dB
		18	Dup_In – Dup_Out Dup_Out – Ext/ Rx800D – Ext	940MHz 940MHz 850MHz	25 25 25	41 38 36		dB
		17	Dup_In – Dup_Out Dup_Out – Ant/ Rx800D – Ant	940MHz 940MHz 850MHz	25 20 20	41 28 28		dB
		20	Dup_In – Dup_Out Dup_Out – Ext/ Rx800D – D_Ext	940MHz 940MHz 850MHz	25 25 25	41 38 32		dB
		19	Dup_In – Dup_Out Dup_Out – Ant/ Rx800D – D_Ant	940MHz 940MHz 850MHz	25 20 25	41 28 41		dB

Item	Symbol	State	Port	Condition	Min.	Typ.	Max.	Unit
Harmonics	2fo	1	Tx800 – Ext	*5		–75	–60	dBc
		2	Tx800 – Ant	*5		–75	–60	dBc
		3	Tx1.5 – Ext	*6		–75	–60	dBc
		4	Tx1.5 – Ant	*6		–75	–60	dBc
		17, 18, 19, 20	Tx800 – Dup_In	*5		–80	–60	dBc
		17	Dup_Out – Ext	*5		–75	–60	dBc
		18	Dup_Out – Ant	*5		–75	–60	dBc
		19	Dup_Out – Ext	*5		–75	–60	dBc
		20	Dup_Out – Ant	*5		–75	–60	dBc
	3fo	1	Tx800 – Ext	*5		–70	–60	dBc
		2	Tx800 – Ant	*5		–70	–60	dBc
		3	Tx1.5 – Ext	*6		–70	–60	dBc
		4	Tx1.5 – Ant	*6		–70	–60	dBc
		17, 18, 19, 20	Tx800 – Dup_In	*5		–80	–60	dBc
		17	Dup_Out – Ext	*5		–70	–60	dBc
		18	Dup_Out – Ant	*5		–70	–60	dBc
		19	Dup_Out – Ext	*5		–70	–60	dBc
		20	Dup_Out – Ant	*5		–70	–60	dBc
ACP	±50kHz	1	Tx800 – Ext	*5		–68	–57	dBc
		2	Tx800 – Ant	*5		–68	–57	dBc
		3	Tx1.5 – Ext	*6		–68	–57	dBc
		4	Tx1.5 – Ant	*6		–68	–57	dBc
		17, 18, 19, 20	Tx800 – Dup_In	*5		–68	–57	dBc
		17	Dup_Out – Ext	*5		–68	–57	dBc
		18	Dup_Out – Ant	*5		–68	–57	dBc
		19	Dup_Out – Ext	*5		–68	–57	dBc
		20	Dup_Out – Ant	*5		–68	–57	dBc
	±100kHz	1	Tx800 – Ext	*5		–74	–65	dBc
		2	Tx800 – Ant	*5		–74	–65	dBc
		3	Tx1.5 – Ext	*6		–74	–65	dBc
		4	Tx1.5 – Ant	*6		–74	–65	dBc
		17, 18, 19, 20	Tx800 – Dup_In	*5		–74	–65	dBc
		17	Dup_Out – Ext	*5		–74	–65	dBc
		18	Dup_Out – Ant	*5		–74	–65	dBc
		19	Dup_Out – Ext	*5		–74	–65	dBc
		20	Dup_Out – Ant	*5		–74	–65	dBc

Item	Symbol	State	Port	Condition	Min.	Typ.	Max.	Unit
Switching speed	TSW					2	5	μ s
Bias current	I _{DD}			V _{DD} = 3.0V		6	50	μ A
Control current	I _{ctl}			V _{ctl} (H) = 3V		1	20	μ A

*1 Pin = 29.5dBm, 0/3V control, V_{DD} = 3.0V, 940 to 958MHz

*2 Pin = 29.5dBm, 0/3V control, V_{DD} = 3.0V, 1,429 to 1,453MHz

*3 Pin = 7dBm, 0/3V control, V_{DD} = 3.0V, 810 to 885MHz

*4 Pin = 7dBm, 0/3V control, V_{DD} = 3.0V, 1,477 to 1,501MHz

*5 $\pi/4$ -shifted DQPSK, Pin = 29.5dBm, 0/3V control, V_{DD} = 3.0V, 940 to 958MHz,

ACP (± 50 kHz) < – 65dBc, ACP (± 100 kHz) < – 75dBc, 2nd harmonics < – 65dBc, 3rd harmonics < – 65dBc

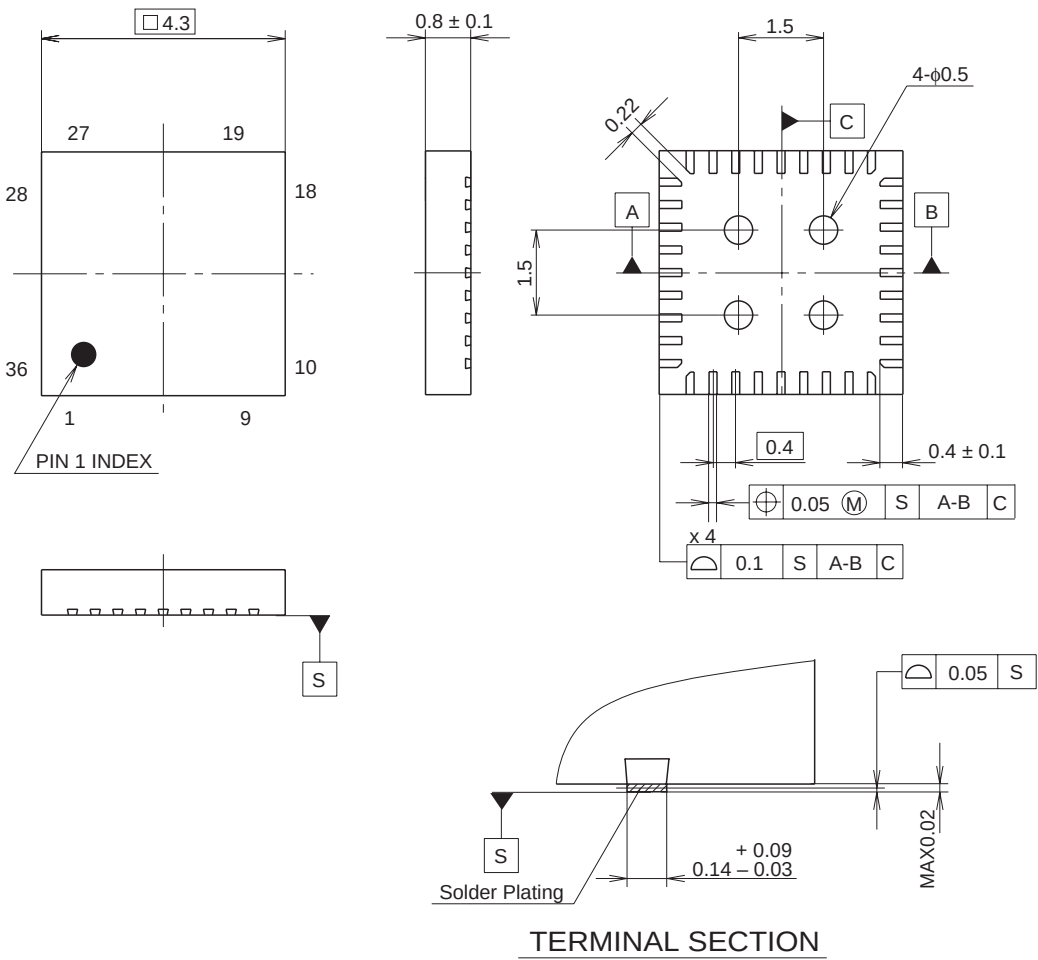
*6 $\pi/4$ -shifted DQPSK, Pin = 29.5dBm, 0/3V control, V_{DD} = 3.0V, 1,429 to 1,453MHz,

ACP (± 50 kHz) < – 65dBc, ACP (± 100 kHz) < – 75dBc, 2nd harmonics < – 65dBc, 3rd harmonics < – 65dBc

Package Outline

Unit: mm

36PIN VQFN (PLASTIC)



Note: Cutting burr of lead are 0.05mm MAX.

SONY CODE	VQFN-36P-02
EIAJ CODE	_____
JEDEC CODE	_____

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	COPPER ALLOY
PACKAGE MASS	0.04g

LEAD PLATING SPECIFICATIONS

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