SONY

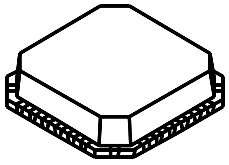
CXG1125ER

High Power 6 x 4 Antenna Switch MMIC with Integrated Control Logic for PDC Full Packet

Description

The CXG1125ER is a high power antenna switch MMIC for PDC dual 800MHz and 1.5GHz. This IC is suited to connect 2Tx/3Rx to one of 4 antennas equipped with full packet mode. The CXG1125ER has on-chip logic circuit for operation with 6 CMOS inputs. The Sony's GaAs J-FET process is used for low insertion loss and low voltage operation.

24 pin VQFN (Plastic)



Features

- Low insertion loss: 0.5dB @900MHz, 0.7dB @1.5GHz
- High linearity: Harmonic < – 65dBc
- CMOS compatible input control
- Small package: 24-pin VQFN (4.0mm × 4.0mm)

Applications

6 × 4 antenna switch for digital cellular such as PDC handsets

Structure

GaAs J-FET MMIC

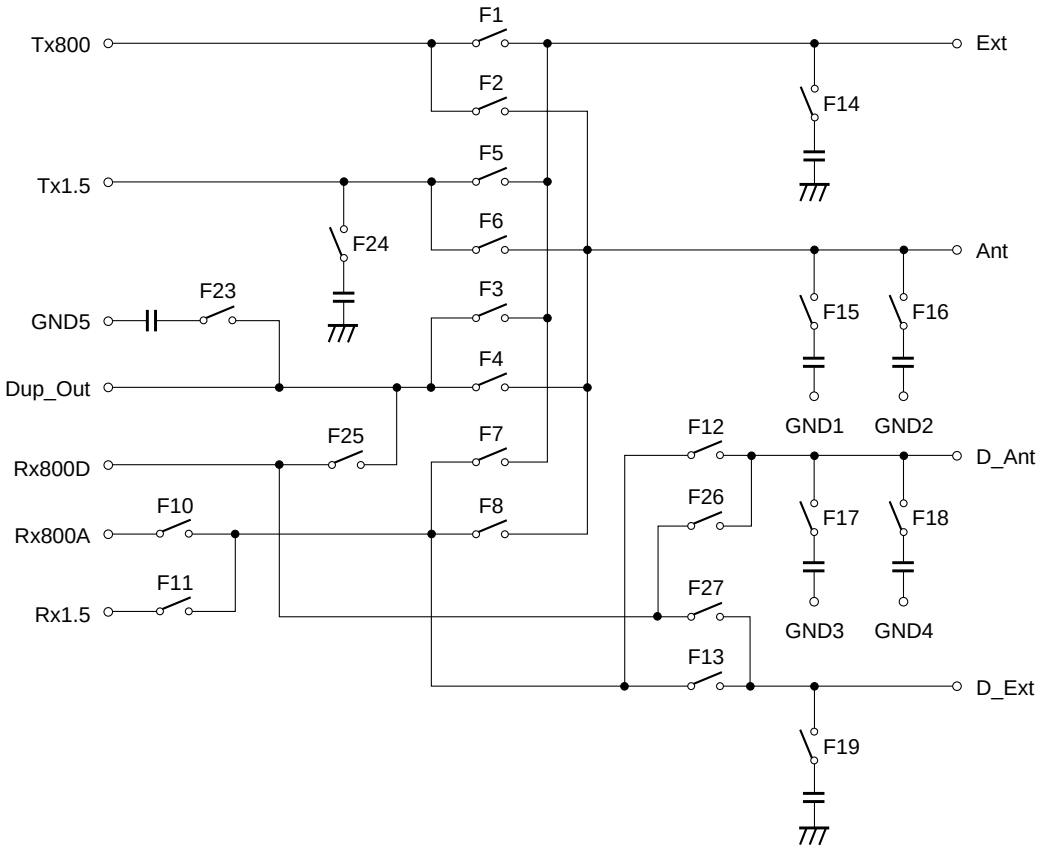
Absolute Maximum Ratings (Ta = 25°C)

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

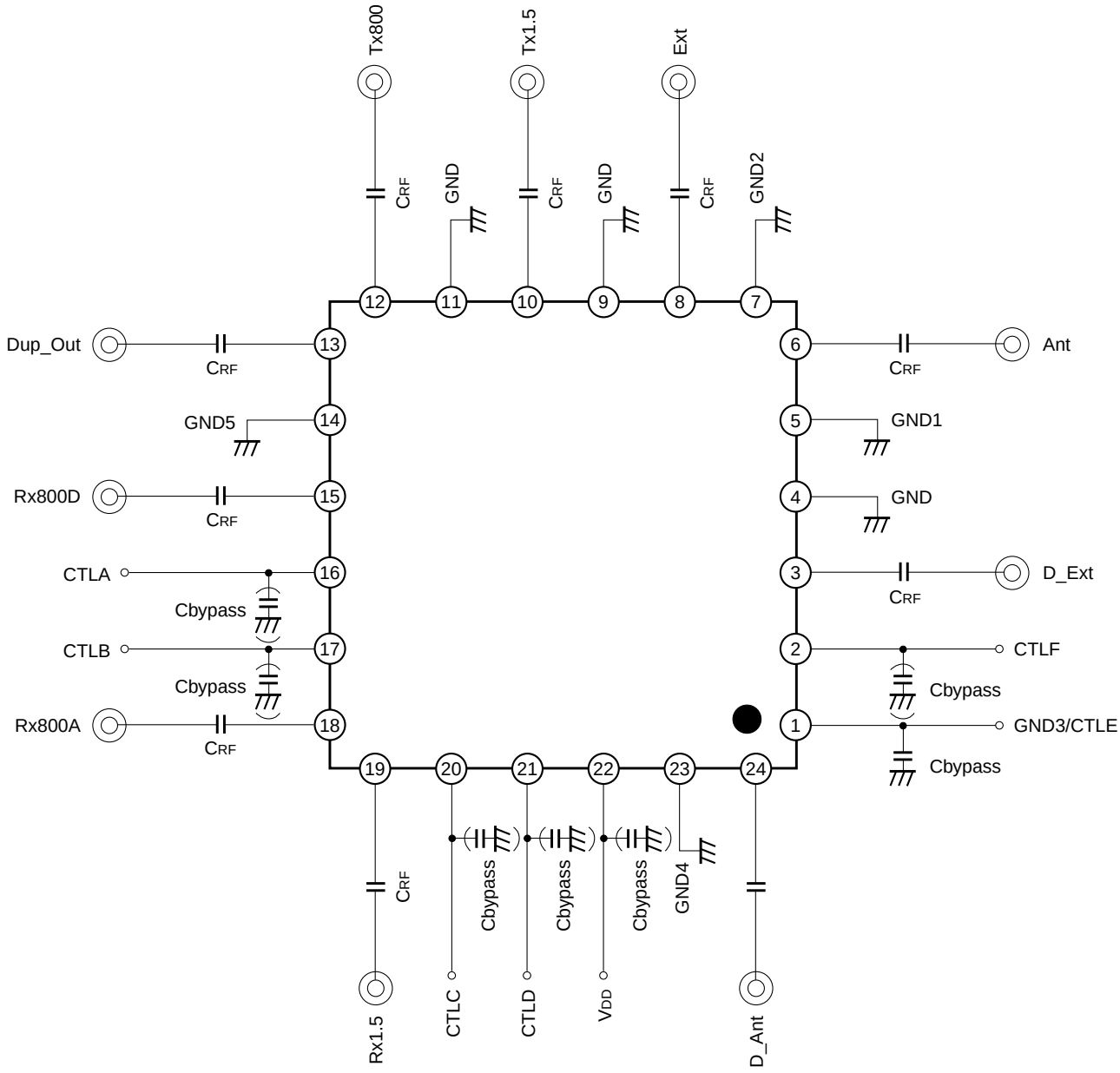
GaAs MMICs are ESD sensitive devices. Special handling precautions are required.

E02112A25-PS

Block Diagram



Pin Configuration and Recommended Circuit



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

C_{RF}: 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	F1	F2	F3	F4	F5	F6	F7	F8	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F23	F24	F25	F26	F27
1	Tx800 – Ext	H	—	L	—	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	H	L	H	L	H	H	H	L	L	L
2	Tx800 – Ant	H	—	H	—	L	L	L	H	L	L	L	L	L	L	L	L	L	L	H	L	L	H	L	H	H	H	L	L	L
3	Tx1.5 – Ext	H	—	L	—	H	—	L	L	L	L	H	L	L	L	L	L	L	L	L	L	H	L	H	H	H	L	L	L	L
4	Tx1.5 – Ant	H	—	H	—	H	—	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L	L	H	H	H	L	L	L	L
5	Rx800D – Ext	L	L	L	L	L	—	L	L	H	L	L	L	L	L	L	L	L	L	L	H	L	H	L	H	L	H	H	L	L
6	Rx800A – Ext	L	L	L	H	L	—	L	L	L	L	L	L	H	L	H	L	L	L	L	H	L	H	L	H	H	H	L	L	L
7	Rx1.5 – Ext	L	L	L	—	H	—	L	L	L	L	L	L	H	L	L	H	L	L	L	L	H	L	H	H	H	H	L	L	L
8	Rx800D – Ant	L	L	H	L	L	—	L	L	L	H	L	L	L	L	L	L	L	L	H	L	L	H	L	H	L	H	H	L	L
9	Rx800A – Ant	L	L	H	H	L	—	L	L	L	L	L	L	L	H	H	L	L	L	H	L	L	H	L	H	H	H	L	L	L
10	Rx1.5 – Ant	L	L	H	—	H	—	L	L	L	L	L	L	L	H	L	H	L	L	H	L	L	L	H	H	H	H	L	L	L
11	Rx800D – D_Ext	L	H	L	L	L	—	L	L	L	L	L	L	L	L	L	L	L	L	H	H	L	H	L	L	H	H	L	L	H
12	Rx800A – D_Ext	L	H	L	H	L	—	L	L	L	L	L	L	L	L	H	L	L	H	H	H	L	H	L	L	H	H	L	L	L
13	Rx1.5 – D_Ext	L	H	L	—	H	—	L	L	L	L	L	L	L	L	L	H	L	H	H	L	H	L	H	L	H	H	L	L	L
14	Rx800D – D_Ant	L	H	H	L	L	—	L	L	L	L	L	L	L	L	L	L	L	L	H	H	L	L	L	H	H	H	L	H	L
15	Rx800A – D_Ant	L	H	H	H	L	—	L	L	L	L	L	L	L	L	H	L	H	L	H	H	L	L	L	H	H	H	L	L	L
16	Rx1.5 – D_Ant	L	H	H	—	H	—	L	L	L	L	L	L	L	L	L	H	H	L	H	L	H	L	L	H	H	H	L	L	L
17	Dup_Out – Ext Rx800D – Ext	H	L	L	L	L	H	L	L	H	L	L	L	L	L	L	L	L	L	L	H	L	H	L	H	L	H	H	L	L
18	Dup_Out – Ant Rx800D – Ant	H	L	H	L	L	H	L	L	L	H	L	L	L	L	L	L	L	L	H	L	L	H	L	H	L	H	H	L	L
19	Dup_Out – Ext Rx800D – D_Ext	H	H	L	L	L	H	L	L	H	L	L	L	L	L	L	L	L	L	L	H	L	H	L	L	L	H	L	L	H
20	Dup_Out – Ant Rx800D – D_Ant	H	H	H	L	L	H	L	L	L	H	L	L	L	L	L	L	L	L	H	L	L	L	L	H	L	H	L	H	L

DC Bias Condition (Ta = 25°C)

Item	Min.	Typ.	Max.	Unit
V_{DD}	2.7	3.0	3.3	V
Vctl (H)	2.0	3.0	3.3	V
Vctl (L)	0.0		0.4	V

Electrical Characteristics (Ta = 25°C)

Item	Symbol	State	Port	Condition	Min.	Typ.	Max.	Unit
Insertion loss	IL	1	Tx800 – Ext	*1		0.50	0.80	dB
		2	Tx800 – Ant	*1		0.55	0.85	dB
		3	Tx1.5 – Ext	*2		0.70	1.00	dB
		4	Tx1.5 – Ant	*2		0.70	1.00	dB
		5	Rx800D – Ext	*3, *7		1.20	1.45	dB
		6	Rx800A – Ext	*3		1.25	1.55	dB
		7	Rx1.5 – Ext	*4		1.40	1.60	dB
		8	Rx800D – Ant	*3, *7		1.20	1.45	dB
		9	Rx800A – Ant	*3		1.15	1.45	dB
		10	Rx1.5 – Ant	*4		1.35	1.55	dB
		11	Rx800D – D_Ext	*3		0.55	0.85	dB
		12	Rx800A – D_Ext	*3		1.00	1.30	dB
		13	Rx1.5 – D_Ext	*4		1.15	1.35	dB
		14	Rx800D – D_Ant	*3		0.65	0.95	dB
		15	Rx800A – D_Ant	*3		1.20	1.50	dB
		16	Rx1.5 – D_Ant	*4		1.35	1.55	dB
		17	Dup_Out – Ext	*1, *8		0.90	1.20	dB
			Rx800D – Ext	*3, *7		1.20	1.50	dB
		18	Dup_Out – Ant	*1, *8		0.95	1.25	dB
			Rx800D – Ant	*3, *7		1.25	1.55	dB
		19	Dup_Out – Ext	*1		0.75	1.00	dB
			Rx800D – D_Ext	*3		0.55	0.85	dB
		20	Dup_Out – Ant	*1		0.80	1.10	dB
			Rx800D – D_Ant	*3		0.70	1.00	dB

Item	Symbol	State	Port	Condition	Min.	Typ.	Max.	Unit
Isolation	ISO.	2	Tx800 – Ext	*1	25	37		dB
		1	Tx800 – Ant	*1	25	39		dB
		4	Tx1.5 – Ext	*2	25	35		dB
		3	Tx1.5 – Ant	*2	25	30		dB
		8	Rx800D – Ext	*3, *7	25	37		dB
		9	Rx800A – Ext	*3	25	41		dB
		10	Rx1.5 – Ext	*4	25	51		dB
		5	Rx800D – Ant	*3, *7	25	39		dB
		6	Rx800A – Ant	*3	25	38		dB
		7	Rx1.5 – Ant	*4	20	26		dB
		14	Rx800D – D_Ext	*3	25	37		dB
		15	Rx800A – D_Ext	*3	25	38		dB
		16	Rx1.5 – D_Ext	*4	25	33		dB
		11	Rx800D – D_Ant	*3	25	33		dB
		12	Rx800A – D_Ant	*3	25	33		dB
		13	Rx1.5 – D_Ant	*4	25	37		dB
		18	Dup_Out – Ext	*1, *8	25	37		dB
			Rx800D – Ext	*3, *7	25	37		dB
		17	Dup_Out – Ant	*1, *8	25	38		dB
			Rx800D – Ant	*3, *7	25	38		dB
		20	Dup_Out – Ext	*1	25	37		dB
			Rx800D – D_Ext	*3	25	37		dB
		19	Dup_Out – Ant	*1	25	41		dB
			Rx800D – D_Ant	*3	25	33		dB

Item	Symbol	State	Port	Condition	Min.	Typ.	Max.	Unit
Harmonics	2fo	1	Tx800 – Ext	*5		–75	–60	dBc
		2	Tx800 – Ant	*5		–78	–60	dBc
		3	Tx1.5 – Ext	*6		–70	–60	dBc
		4	Tx1.5 – Ant	*6		–75	–60	dBc
		17	Dup_Out – Ext	*5, *8		–72	–60	dBc
		18	Dup_Out – Ant	*5, *8		–74	–60	dBc
		19	Dup_Out – Ext	*5		–73	–60	dBc
		20	Dup_Out – Ant	*5		–76	–60	dBc
	3fo	1	Tx800 – Ext	*5		–72	–60	dBc
		2	Tx800 – Ant	*5		–71	–60	dBc
		3	Tx1.5 – Ext	*6		–70	–60	dBc
		4	Tx1.5 – Ant	*6		–70	–60	dBc
		17	Dup_Out – Ext	*5, *8		–75	–60	dBc
		18	Dup_Out – Ant	*5, *8		–74	–60	dBc
		19	Dup_Out – Ext	*5		–73	–60	dBc
		20	Dup_Out – Ant	*5		–72	–60	dBc
ACP	±50kHz	1	Tx800 – Ext	*5		–67	–57	dBc
		2	Tx800 – Ant	*5		–66	–57	dBc
		3	Tx1.5 – Ext	*6		–67	–57	dBc
		4	Tx1.5 – Ant	*6		–65	–57	dBc
		17	Dup_Out – Ext	*5, *8		–66	–57	dBc
		18	Dup_Out – Ant	*5, *8		–67	–57	dBc
		19	Dup_Out – Ext	*5		–67	–57	dBc
		20	Dup_Out – Ant	*5		–67	–57	dBc
	±100kHz	1	Tx800 – Ext	*5		–74	–65	dBc
		2	Tx800 – Ant	*5		–74	–65	dBc
		3	Tx1.5 – Ext	*6		–73	–65	dBc
		4	Tx1.5 – Ant	*6		–72	–65	dBc
		17	Dup_Out – Ext	*5, *8		–74	–65	dBc
		18	Dup_Out – Ant	*5, *8		–73	–65	dBc
		19	Dup_Out – Ext	*5		–74	–65	dBc
		20	Dup_Out – Ant	*5		–73	–65	dBc

Item	Symbol	State	Port	Condition	Min.	Typ.	Max.	Unit
P1dB	P1dB	1	Tx800 – Ext	V_{DD} = 3.0V	32	34		dBm
		2	Tx800 – Ant	V_{DD} = 3.0V	32	34		dBm
		3	Tx1.5 – Ext	V_{DD} = 3.0V	32	34		dBm
		4	Tx1.5 – Ant	V_{DD} = 3.0V	32	34		dBm
		17	Dup_Out – Ext	V_{DD} = 3.0V, *8	32	34		dBm
		18	Dup_Out – Ant	V_{DD} = 3.0V, *8	32	34		dBm
		19	Dup_Out – Ext	V_{DD} = 3.0V	32	34		dBm
		20	Dup_Out – Ant	V_{DD} = 3.0V	32	34		dBm
Switching speed	TSW					2	5	µs
Bias current	I_{DD}			V_{DD} = 3.0V		1.3	1.8	mA
Control current	Ictl			Vctl (H) = 3V		40	70	µA

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

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

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

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

*5 π/4-shifted DQPSK, Pin = 29.5dBm, 0/3V control, V_{DD} = 3.0V, 940MHz to 958MHz,
ACP (±50kHz) < – 65dBc, ACP (±100kHz) < – 75dBc, 2nd harmonics < – 65dBc, 3rd harmonics < – 65dBc

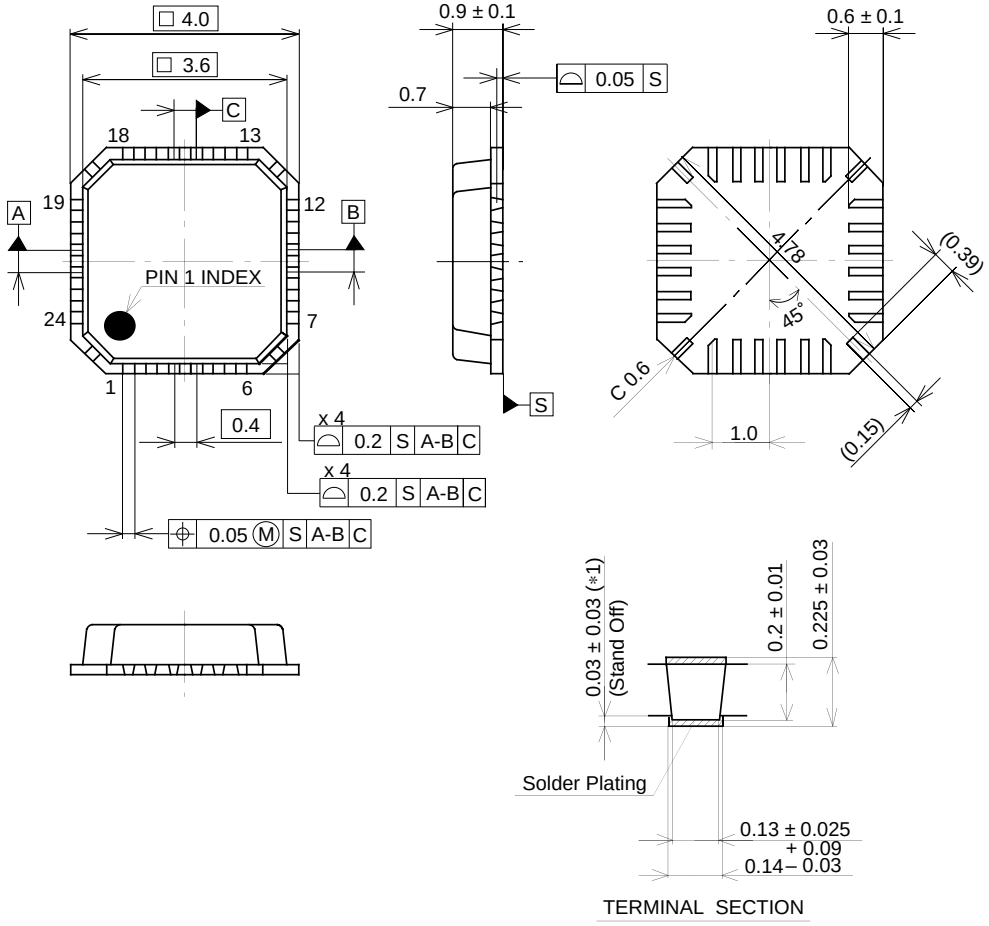
*6 π/4-shifted DQPSK, Pin = 29.5dBm, 0/3V control, V_{DD} = 3.0V, 1,429MHz to 1,453MHz,
ACP (±50kHz) < – 65dBc, ACP (±100kHz) < – 75dBc, 2nd harmonics < – 65dBc, 3rd harmonics < – 65dBc

*7 Dup_Out port open

*8 Rx800D port open

Package Outline Unit: mm

24PIN VQFN(PLASTIC)



PACKAGE STRUCTURE

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

SONY CODE	VQFN-24P-03
EIAJ CODE	————
JEDEC CODE	————

LEAD PLATING SPECIFICATIONS

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