

CXM3648UR

Description

The CXM3648UR is a high power and high isolation DPDT switch for wireless communication systems. This IC has a 1.8 V CMOS compatible decoder. The Sony GaAs junction gate pHEMT (JPHEMT) MMIC process is used for low insertion loss and high linearity. (Application: LTE/CDMA/GSM/UMTS Handsets)

Features

- ◆ Low Insertion loss: 0.30 dB (Typ.) (Cellular Band)
0.41 dB (Typ.) (IMT2000)
- ◆ High Isolation: 32dB (Typ.) @Band7
- ◆ Low voltage operation: $V_{DD} = 2.5\text{ V}$
- ◆ No DC blocking capacitors required on RF ports
- ◆ 1 Control input
- ◆ Small package size: UQFN-12 pin (2.0 mm × 2.0 mm)
- ◆ Lead-Free and RoHS compliant

Structure

GaAs JPHEMT MMIC switch, CMOS decoder

Moisture Sensitivity

Moisture Sensitivity Level for this part is MSL= 2

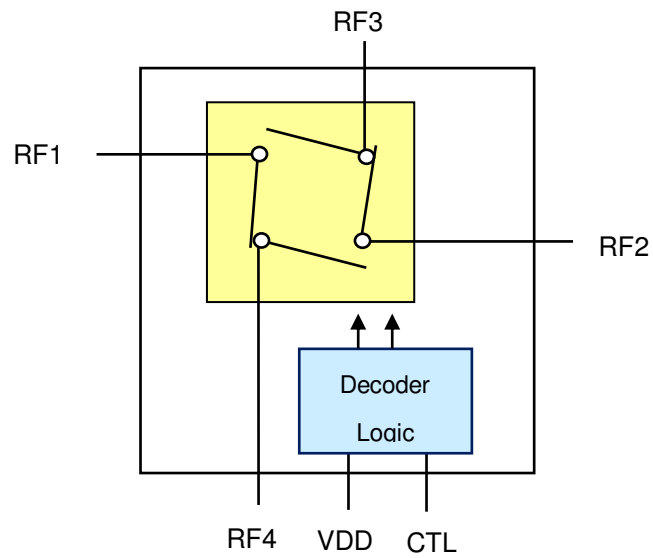
Absolute Maximum Ratings

◆ Bias voltage	V_{DD}	4	V	(Ta = 25 °C)
◆ Control voltage	V_{ctl}	4	V	(Ta = 25 °C)
◆ Maximum input power		36	dBm	(Duty cycle = 12.5 to 50 %, Ta = 25 °C)
◆ Operating temperature	T_{opr}	−35 to +90	°C	
◆ Storage temperature	T_{stg}	−65 to +150	°C	

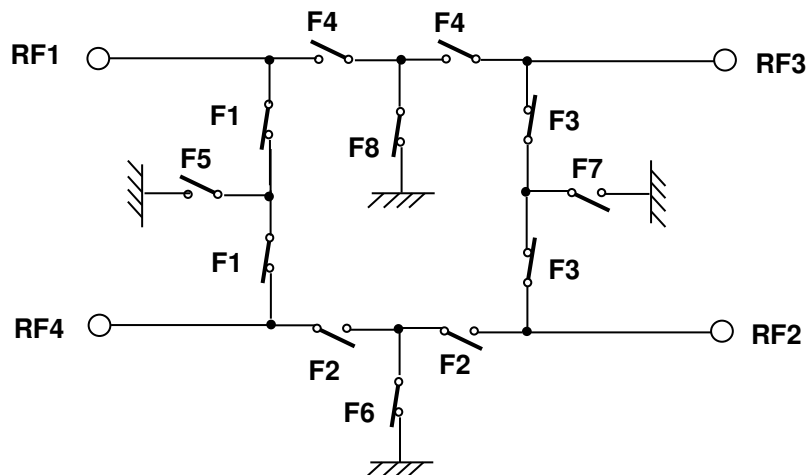
This IC is ESD sensitive device. Special handling precautions are required.

Block Diagram

DPDT Antenna Switch



MMIC Switch



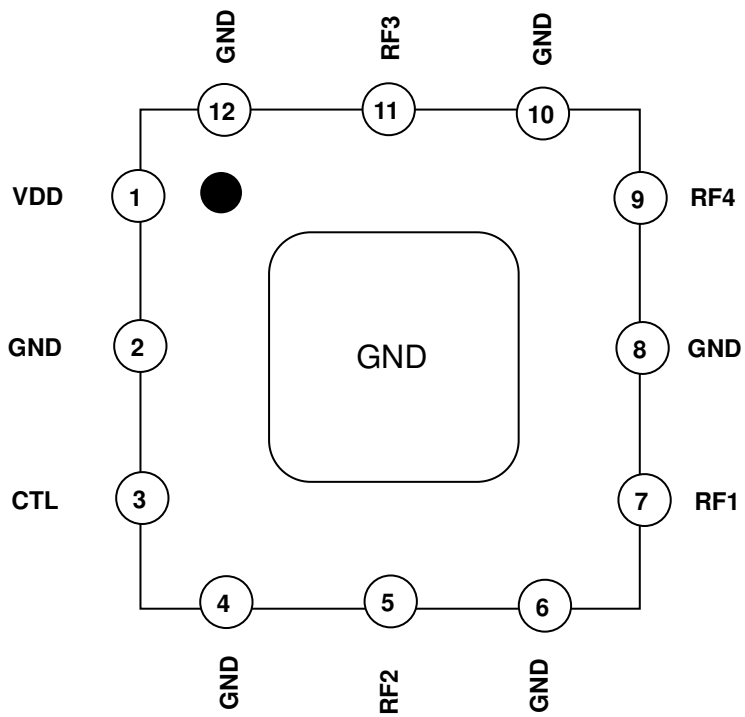
Truth Table

CTL	Active path	F1,F3	F2,F4	F5,F7	F6,F8
L	RF1-RF4 RF2-RF3	ON	OFF	OFF	ON
H	RF1-RF3 RF2-RF4	OFF	ON	ON	OFF

Pin Configuration

UQFN-12P PKG (2.0mm x 2.0mm)

(Top View)



DC Bias Condition

Parameter	Min.	Typ.	Max.	Unit
V _{DD}	2.5	2.7	3.3	V
V _{ctl} (H)	1.35	1.8	3.3	
V _{ctl} (L)	0	—	0.45	

Target Electrical Characteristics

(Ta = 25 °C, V_{DD} = 2.5 V, V_{ctl} = 0/1.8 V)

Item	Symbol	Path	Condition	Min.	Typ.	Max.	Unit
Insertion Loss	IL	RF1-RF4 RF2-RF3	*1, *2, *6, *8	—	0.32	0.42	dB
			*3, *4, *7, *9	—	0.43	0.53	
			*5	—	0.48	0.63	
		RF1-RF3 RF2-RF4	*1, *2, *6, *8	—	0.30	0.40	
			*3, *4, *7, *9	—	0.41	0.51	
			*5	—	0.45	0.60	
Isolation	ISO	RF1-RF4 RF2-RF3	*1, *2, *6, *8	35	40	—	dB
			*3, *4, *7, *9	32	35	—	
			*5	28	31.5	—	
		RF1-RF3 RF2-RF4	*1, *2, *6, *8	35	50	—	
			*3, *4, *7, *9	32	36.5	—	
			*5	28	32	—	
VSWR	VSWR	All ports in active paths	700 to 2700 MHz	—	—	1.5	—
Harmonics	2fo	RF1-RF4, RF3 RF2-RF3, RF4	*6	—	-50	-41	dBm
	3fo			—	-44	-41	
	2fo		*7	—	-49	-41	
	3fo			—	-48	-41	
	2fo		*2, *3, *5	—	—	-50	
	3fo			—	—	-50	
Inter modulation distortion in Rx Band	IMD2	RF1-RF4, RF3 RF2-RF3, RF4	*10, *11, *12, *15, *16, *19, *20, *23, *24	—	—	-105	dBm
	IMD3		*10, *13, *14, *17, *18, *21, *22, *25, *26	—	—	-105	
Switching speed	Ts		50 % Ctl to 90 % RF	—	7	10	μs
Wakeup time	Twu		V _{DD} = 2.5 V to 90 % RF, Pin = 0 dBm	—		20	μs
Control current	I _{ctl}		V _{ctl} = 1.8 V	—	1	5	μA
Supply current	I _{dd}		V _{DD} = 2.7 V	—	0.15	0.35	mA

Electrical characteristics are measured with all RF ports terminated in 50 Ω.

- *1 Pin = 25 dBm, 704 to 787 MHz (Band 13, Band 17)
- *2 Pin = 26 dBm, 824 to 960 MHz (Band 5, Band 8)
- *3 Pin = 26 dBm, 1710 to 1990 MHz (Band 1 Tx, Band 2 Tx, Band 3 Tx, Band 4 Tx)
- *4 Pin = 10 dBm, 2110 to 2170 MHz (Band 1 Rx, Band 4 Rx)
- *5 Pin = 26 dBm, 2500 to 2690 MHz (Band 7)
- *6 Pin = 35 dBm, 824 to 915 MHz (GSM850/900 Tx)
- *7 Pin = 32 dBm, 1710 to 1910 MHz (GSM1800/1900 Tx)
- *8 Pin = 10 dBm, 869 to 960 MHz (GSM850/900 Rx)
- *9 Pin = 10 dBm, 1805 to 1990 MHz (GSM1800/1900 Rx)
- *10 Measured with the recommended circuit.

IMD Condition

Band	fRx on RF [MHz]	fTx +20 dBm on RF3/RF4 [MHz]	fBlocker –15 dBm on RF1/RF2 [MHz]		IMD condition
Band 1	2140	1950	IMD2 (fRx – fTx)	190	*11
			IMD2 (fRx + fTx)	4090	*12
			IMD3 (2fTx – fRx)	1760	*13
			IMD3 (2fTx + fRx)	6040	*14
Band 2	1960	1880	IMD2 (fRx – fTx)	80	*15
			IMD2 (fRx + fTx)	3840	*16
			IMD3 (2fTx – fRx)	1800	*17
			IMD3 (2fTx + fRx)	5720	*18
Band 5	880	835	IMD2 (fRx – fTx)	45	*19
			IMD2 (fRx + fTx)	1715	*20
			IMD3 (2fTx – fRx)	790	*21
			IMD3 (2fTx + fRx)	2550	*22
Band 7	2655	2535	IMD2 (fRx – fTx)	120	*23
			IMD2 (fRx + fTx)	5190	*24
			IMD3 (2fTx – fRx)	2415	*25
			IMD3 (2fTx + fRx)	7725	*26

Triple Beat Ratio(V_{DD} = 2.5 V, Ta = 25 °C)

Item	Symbol	Path	Condition					Min.	Typ.	Max.	Unit
			Input power at RF3/RF4 [dBm]	Tx1 at RF3/RF4 [MHz]	Tx2 at RF3/RF4 [MHz]	Jammer at RF1/RF2 -30 dBm [MHz]	Triple beat product at RF [MHz]				
Triple beat ratio	TBR	RF1-RF4, RF3 RF2-RF3, RF4	21.5	835.5	836.5	881.5	881.5 ± 1	81	—	—	dBc
			21.5	1880	1881	1960	1960 ± 1	81	—	—	
			13.5	1732	1733	2132	2132 ± 1	81	—	—	

* Electrical characteristics are measured with all RF ports terminated in 50 Ω.
Measured with the recommended circuit.

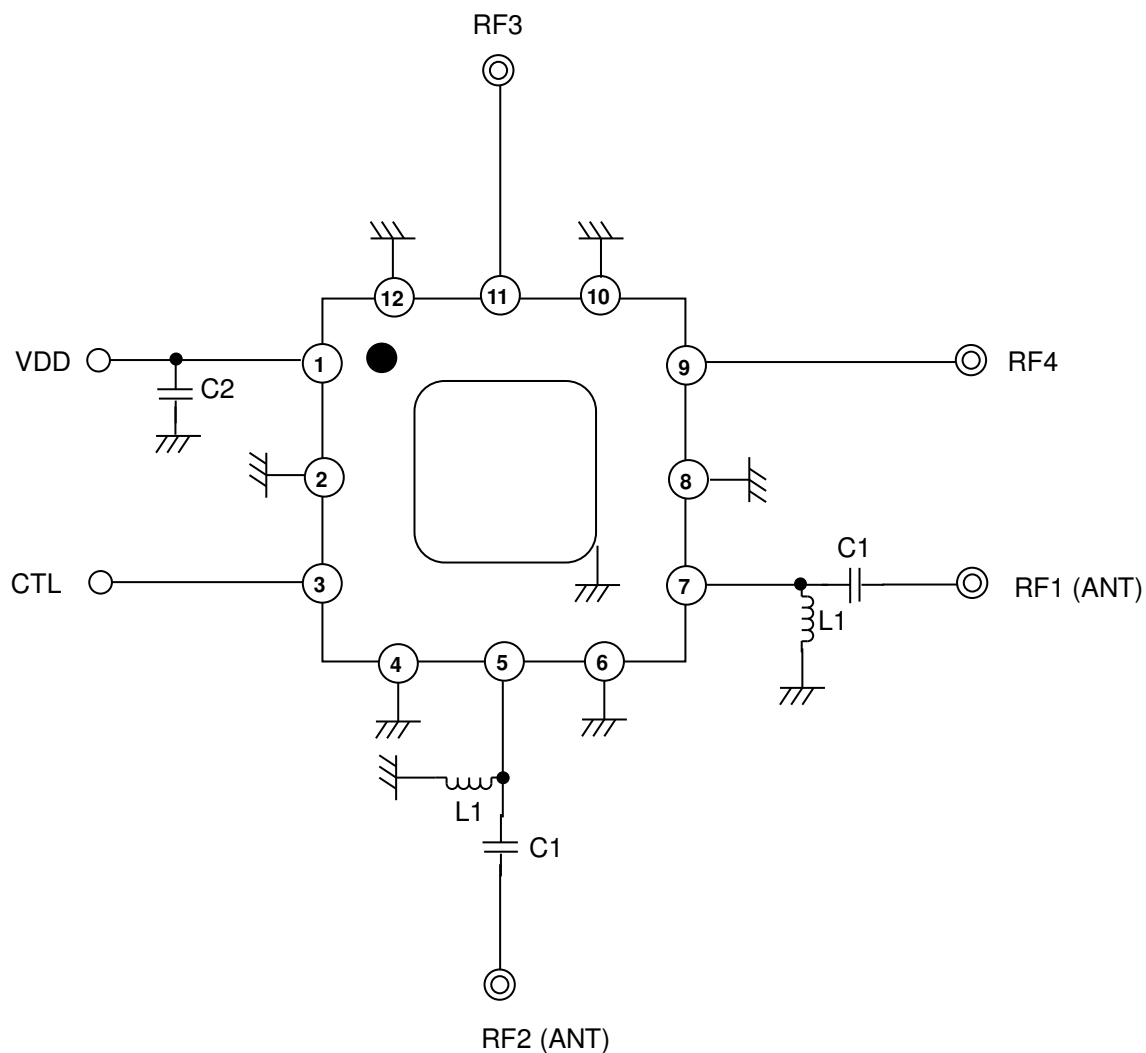
IIP2(V_{DD} = 2.5 V, Ta = 25 °C)

Item	Symbol	Path	Condition			Min.	Typ.	Max.	Unit
			Tx at RF3/RF4 24 dBm [MHz]	Jammer at RF1/RF2 -20 dBm [MHz]	IM2 product at RF [MHz]				
Input IP2	IIP2	RF1-RF4, RF3 RF2-RF3, RF4	836.61	1718.22	881.61	113.5	—	—	dBm
			836.61	45	881.61	95.5	—	—	
			1885	3850	1965	95.5	—	—	
			1885	80	1965	95.5	—	—	
			1732.5	3865	2132.5	95.5	—	—	
			1732.5	400	2132.5	95.5	—	—	

* Electrical characteristics are measured with all RF ports terminated in 50 Ω.
Measured with the recommended circuit.

Recommended Circuit

(Top View)



- *1 No DC blocking capacitors are required on all RF ports. (Except sourcing DC bias)
- *2 The DC levels of all RF ports are GND.
- *3 L1 (27nH) and C1(12pF) are recommended on Ant port for ESD protection.
- *4 C2(100pF) is recommended on VDD pin for Decoupling Capacitor.

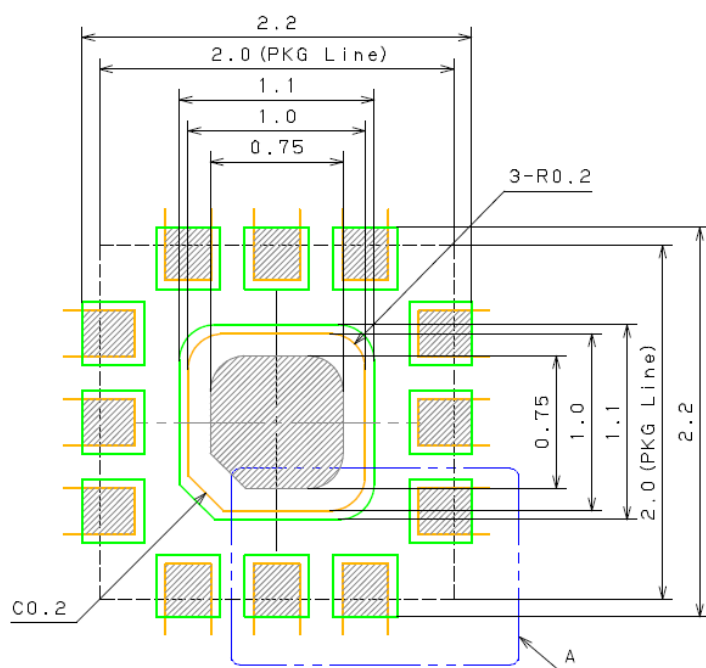
Recommended Land Pattern

UQFN-12P-02 Macro drawing (Reference)

•PKG : 2.0mmx2.0mm *Metal mask thickness : 110μm
•Pin pitch : 0.5mm

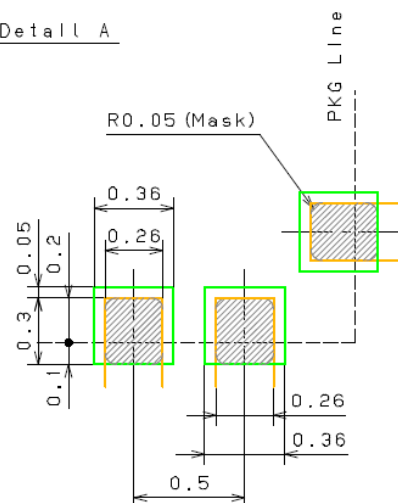
Confidential

29/0ct. /' 10



-  : Land
-  : Mask (Open area)
-  : Resist (Open area)

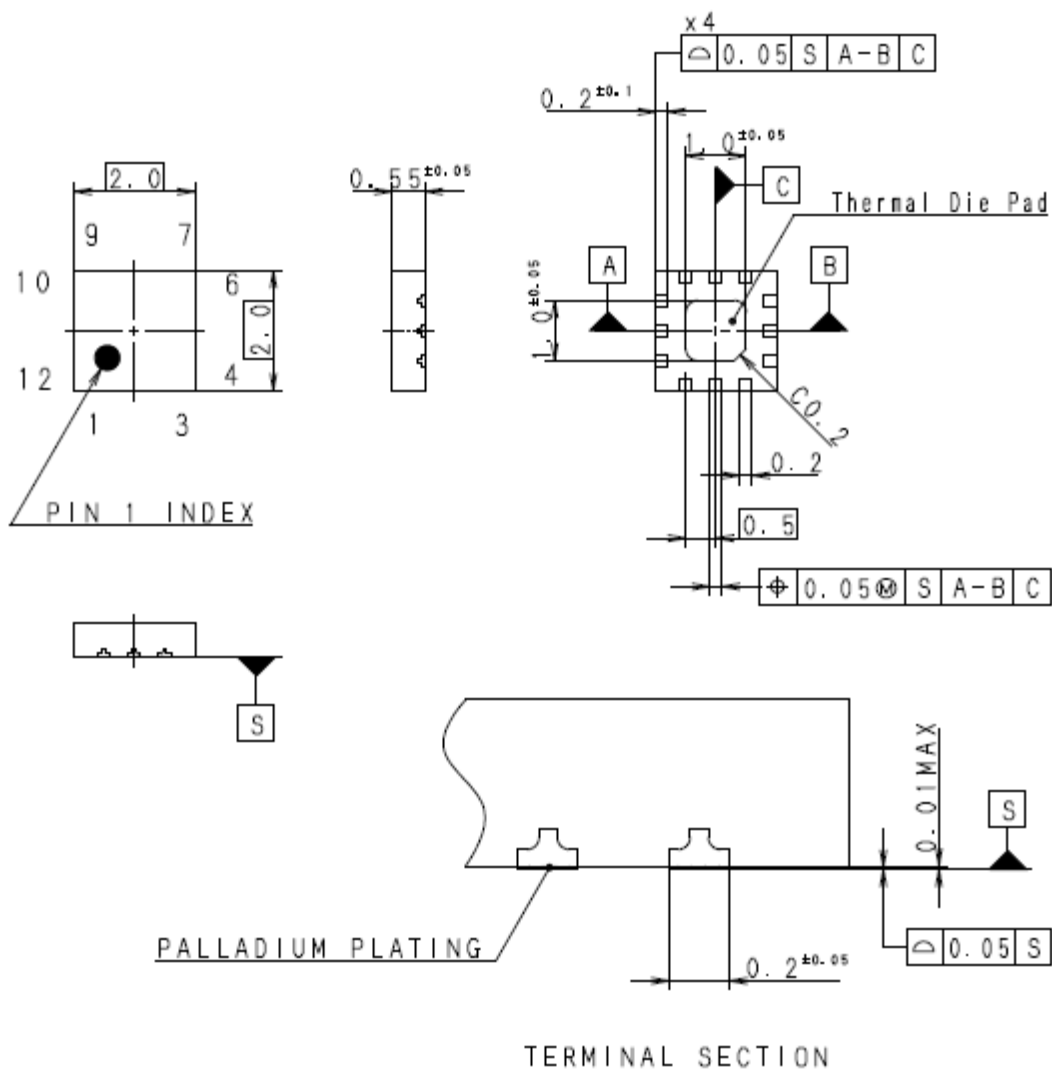
Detail A



Package Outline

(Unit: mm)

12PIN UQFN (PLASTIC)



Note: Terminal burr height 0.05mm MAX.

SONY CODE	UQFN-12P-02
JEITA CODE	_____
JEDEC CODE	_____

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	PALLADIUM PLATING
LEAD MATERIAL	COPPER ALLOY
PACKAGE MASS	0.006g

PART No.	AP-4000-12010S	Rev. 0
ISSUED	11.03.25	REVISED
PRODUCTION LINE	COMPILING DIV.	SOT ENGINEERING DIVISION.
REMARKS	PKG CODE: UR-12-A	

Tape and Reel Size

CXM3648UR-T9

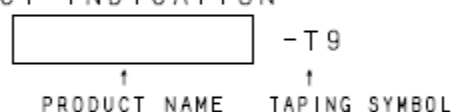
8 mm WIDTH EMBOSSED TAPING

PACKAGE CODE	EMBOSSED TAPING CODE
UQFN-12P-02	R012UN26-08-N-2
UQFN-12P-03	
UQFN-12P-04	

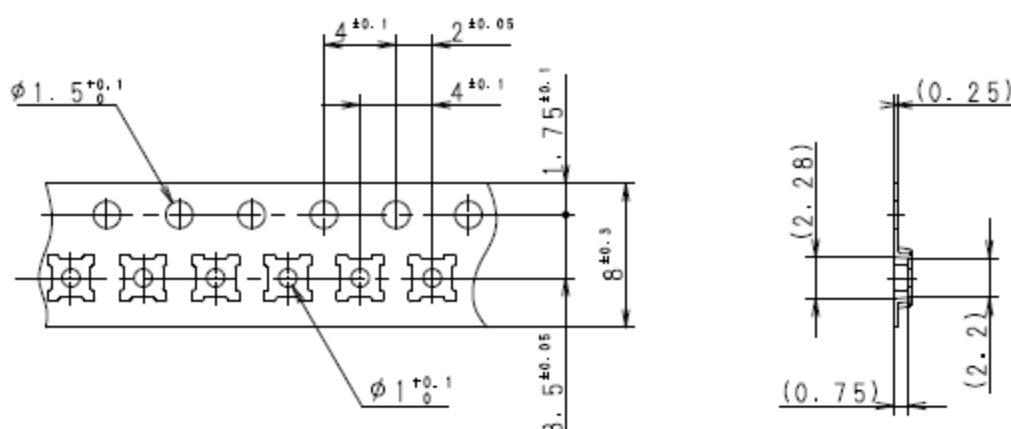
1. SCOPE

THIS SPECIFICATION DESCRIBES THE EMBOSSED TAPING FOR SMD (SURFACE MOUNTED DEVICE) IC'S, FOR SHIPMENT. THIS SPECIFICATION IS BASED ON THE STIPULATIONS OF JAPAN ELECTRONICS AND INFORMATION TECHNOLOGY INDUSTRIES ASSOCIATION (JEITA), JIS C0806-3, AND ELECTRONIC INDUSTRIES ASSOCIATION EIA-481.

2. PRODUCT INDICATION



3. TAPING SPECIFICATIONS



NOTE)1. THE R MEASUREMENT WITHOUT INDICATION IS ASSUMED TO BE 0.3 mm MAX.

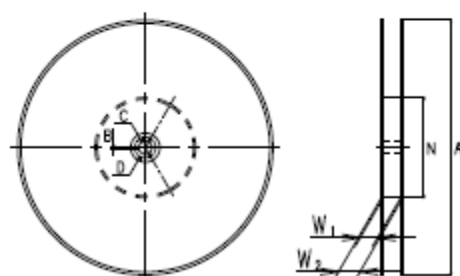
GENERAL TOLERANCE: ± 0.2

2. THE FEED HOLE CUMULATIVE PITCH ERROR IS ASSUMED ± 0.2 mm / 10 PITCH.

UNIT: mm

4. REEL DIMENSIONS

φ254 mm PLASTIC REEL



UNIT: mm

SYMBOL	A	N	C	D
REEL DIMENSION	$\phi 254 \pm 2$	$\phi 100 \pm 2$	$\phi 13 \pm 0.2$	$\phi 21 \pm 0.8$
SYMBOL	B	W ₁	W ₂	
REEL DIMENSION	2 ± 0.5	9.4 ± 1.0	13.4 ± 1.0	

MATERIAL: POLYSTYRENE CONTAINING CARBON (ANTISTATIC)

*INTRODUCTION OF REUSE REEL

(REEL THAT IS USED AGAIN AFTER COLLECTION)

WE USE THE REUSE REEL OF JEITA SPECIFICATION.

Note

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Application circuits shown, if any, are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits.