

CXM3580UR

Description

The CXM3580UR is a SP4T+ SP5T antenna switch module for GSM/UMTS/CDMA /LTE multi-mode handset. The CXM3580UR has a built-in dual low pass filter and 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. The device has low BOM with no DC blocking capacitor. (Application: GSM/UMTS/CDMA multi-mode handset)

Features

- ◆ Low insertion loss: 0.40 dB (Typ.) TRx (Cellular band)
 0.55 dB (Typ.) TRx (IMT Tx band)
- ◆ High linearity: IIP3 = 68 dBm
- ◆ Low voltage operation: V_{DD} = 2.5 V
- ◆ No DC blocking capacitor
- ◆ Small packing (size): UQFN-26P (2.6 mm × 3.4 mm × 0.60 mm Max.)
- ◆ Lead-free and RoHS compliant

Structure

- ◆ GaAs Junction gate pHEMT (JPHEMT) MMIC switch, CMOS decoder

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

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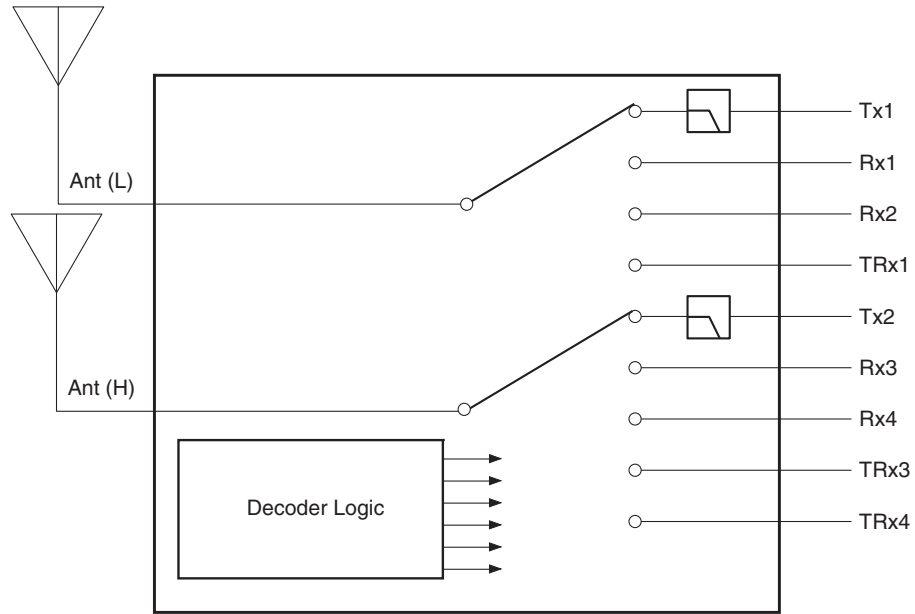
**Absolute Maximum Ratings**

(Ta = 25 °C)

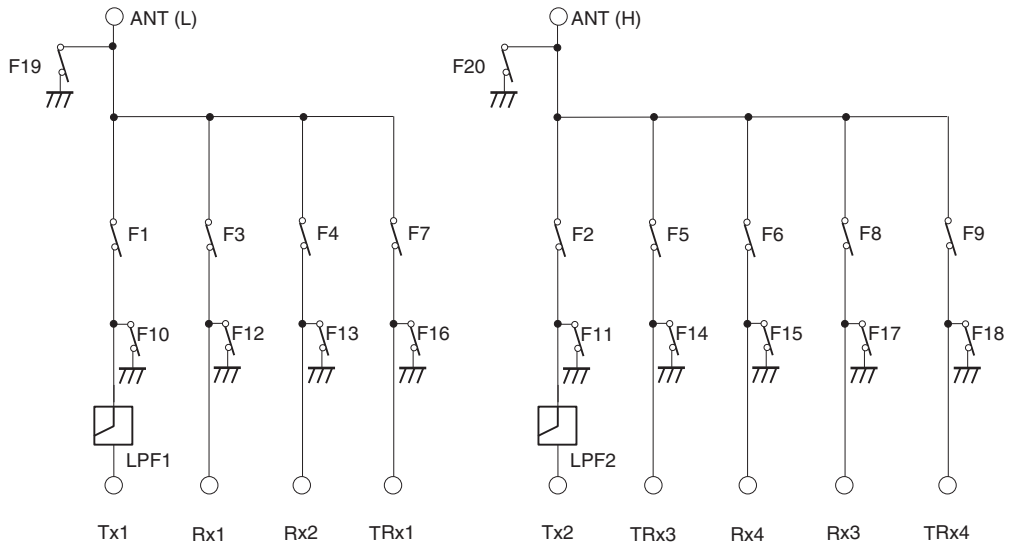
Bias voltage	V _{DD}	4	V
Control voltage	V _{ctl}	4	V
Input power max. (Tx1)		36	dBm (Duty cycle = 12.5 % to 50 %)
Input power max. (Tx2)		34	dBm (Duty cycle = 12.5 % to 50 %)
Input power max. (TRx)		32	dBm
Input power max. (Rx)		13	dBm
Operating temperature range		-35 to +90	°C
Storage temperature range		-65 to +150	°C

Block Diagram

SP4T + SP5T Antenna Switch Module



SP4T + SP5T 3TRx/2Tx/4Rx

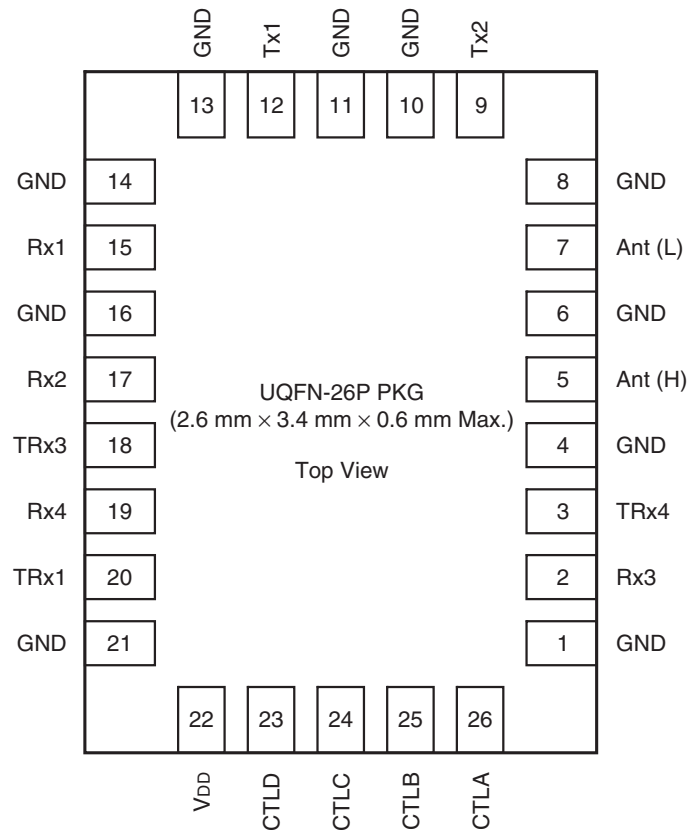


Truth Table

State	Active Path	CTL State				SW State (*1)																			
		CTLA	CTLB	CTLC	CTLD	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
1	Tx1-ANT (L)	H	H	L	L	H	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	H
2	Tx2-ANT (H)	H	L	L	L	L	H	L	L	L	L	L	L	L	H	L	H	H	H	H	H	H	H	H	L
3	Rx1-ANT (L)	L	L	L	L	L	L	H	L	L	L	L	L	L	H	H	L	H	H	H	H	H	H	L	H
4	Rx2-ANT (L)	L	L	H	L	L	L	L	H	L	L	L	L	L	H	H	H	L	H	H	H	H	H	L	H
5	TRx3-ANT (H)	L	H	H	L	L	L	L	L	H	L	L	L	L	H	H	H	H	L	H	H	H	H	L	
6	Rx4-ANT (H)	J	H	L	L	L	L	L	L	L	H	L	L	L	H	H	H	H	H	L	H	H	H	L	
7	TRx1-ANT (L)	H	L	H	J	L	L	L	L	L	L	H	J	J	H	H	H	H	H	H	L	H	H	L	H
8	Rx3-ANT (H)	H	L	H	H	L	L	L	L	L	L	L	H	L	H	H	H	H	H	H	H	L	H	H	L
9	TRx4-ANT (H)	H	H	H	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	L	H	L

*1 State "L" means a switch "OFF", state "H" means a switch "ON".

Pin Configuration



DC Bias Conditions

(Ta = 25 °C)

Item	Min.	Typ.	Max.	Unit
V _{DD}	2.5	2.8	3.3	V
V _{ctl} (H)	1.35	1.8	3.1	V
V _{ctl} (L)	0	—	0.45	V

Electrical Characteristics

(V_{DD} = 2.5 V, T_a = 25 °C)

Item	Symbol	Path	Condition	Min.	Typ.	Max.	Unit
Insertion loss	IL	Ant (L) – Tx1	*1	—	1.00	1.25	dB
		Ant (H) – Tx2	*2	—	0.95	1.25	
		Ant (L) – Rx1	*3	—	0.63	0.73	
		Ant (L) – Rx2	*3	—	0.63	0.73	
		Ant (H) – Rx3	*4	—	0.50	0.65	
		Ant (H) – Rx4	*4	—	0.79	0.94	
		Ant (L) – TRx1	*5	—	0.40	0.55	
		Ant (H) – TRx3	*6, *7	—	0.50	0.75	
		Ant (H) – TRx4	*6, *7	—	0.55	0.75	
VSWR	VSWR	All ports in Active paths	600 to 2170 MHz	—	—	1.50	—
Harmonics	2fo	Ant (L) – Tx1	*1	—	—	–36	dBm
				—	—	–36	
	3fo	Ant (H) – Tx2	*2	—	—	–36	
				—	—	–36	
	2fo	Ant – TRx1, TRx3, TRx4	*5, *6	—	—	–36	
				—	—	–36	
Attenuation	ATT	Ant (L) – Tx1	1648 to 1830 MHz	30	—	—	dB
			2472 to 2745 MHz	27	—	—	
			3296 to 3660 MHz	20	—	—	
			4120 to 12750 MHz	17	—	—	
		Ant (H) – Tx2	3420 to 3820 MHz	25	—	—	
			5130 to 5730 MHz	25	—	—	
			6840 to 12750 MHz	20	—	—	
Inter modulation product power in Rx band	IMD2	Ant – TRx1, TRx3, TRx4	*8, *9, *10, *13, *14, *17, *18	—	—	–105	dBm
	IMD3		*8, *11, *12, *15, *16, *19, *20	—	—	–105	
Input IP3	IP3	Ant – TRx1, TRx3, TRx4	*8, *21	—	68	—	dBm
			*8, *22	—	68	—	
Switching time	T _s		50 % Ctl to 90 % RF	—	3	5	μs
Control current	I _{ctl}		V _{ctl} = 1.8 V	—	5	20	μA
Supply current	IDD		V _{DD} = 2.5 V	—	0.20	0.40	mA

Item	Symbol	Path	Condition	Min.	Typ.	Max.	Unit
Isolation	ISO	Ant (L) – Ant (H) (TRx1 Active)	824 MHz –960 MHz	30	—	—	dB
			1710 MHz –2170 MHz	25	—	—	
		TRx1 – TRx3, TRx4 (TRx1 Active)	824 MHz –960 MHz	30	—	—	
			1710 MHz –2170 MHz	25	—	—	
		TRx1 – Rx1, Rx2, Rx3 (TRx1 Active)	824 MHz –960 MHz	35	—	—	
			1710 MHz –2170 MHz	25	—	—	
		TRx1 – Rx4 (TRx1 Active)	824 MHz –960 MHz	30	—	—	
			1710 MHz –2170 MHz	23	—	—	
		Ant (H) – Ant (L) (TRx3 Active)	824 MHz –960 MHz	30	—	—	
			1710 MHz –2170 MHz	24	—	—	
		TRx3 – TRx1, TRx4 (TRx3 Active)	824 MHz –960 MHz	30	—	—	
			1710 MHz –2170 MHz	25	—	—	
		TRx3 – Rx1, Rx3 (TRx3 Active)	824 MHz –960 MHz	35	—	—	
			1710 MHz –2170 MHz	25	—	—	
		TRx3 – Rx2, Rx4 (TRx3 Active)	824 MHz –960 MHz	30	—	—	
			1710 MHz –2170 MHz	25	—	—	
		Ant (H) – Ant (L) (TRx4 Active)	824 MHz –960 MHz	30	—	—	
			1710 MHz –2170 MHz	25	—	—	
		TRx4 – TRx1, TRx3 (TRx4 Active)	824 MHz –960 MHz	30	—	—	
			1710 MHz –2170 MHz	25	—	—	
		TRx4 – Rx1, Rx2, Rx4 (TRx4 Active)	824 MHz –960 MHz	35	—	—	
			1710 MHz –2170 MHz	25	—	—	
		TRx4 – Rx3 (TRx4 Active)	824 MHz –960 MHz	30	—	—	
			1710 MHz –2170 MHz	23	—	—	
		Ant (L) – Ant (H) (Rx1, Rx2 Active)	869 MHz –960 MHz	20	—	—	
			1805 MHz –1990 MHz	20	—	—	
		Ant (H) – Ant (L) (Rx3, Rx4 Active)	869 MHz –960 MHz	20	—	—	
			1805MHz –1990 MHz	20	—	—	
Tx1 – Ant (L), Ant (H) (Rx1, Rx2, Rx3, Rx4)	824 MHz –915MHz	20	—	—			
Tx2 – Ant (L), Ant (H) (Rx1, Rx2, Rx3, Rx4)	1710 MHz –1910 MHz	20	—	—			
Ant (L) – Ant (H) (Tx1 Active)	824 MHz –915 MHz	30	—	—			
Tx1 – Rx1, Rx2, Rx3, Rx4 (Tx1 Active)	824MHz – 915 MHz	35	—	—			
Tx1 – TRx1, TRx3, TRx4 (Tx1 Active)	824 MHz –915 MHz	45	—	—			
Tx1 – Tx2 (Tx1 Active)	824 MHz –915 MHz	20	—	—			
	1648 MHz –1830 MHz	20	—	—			

Item	Symbol	Path	Condition	Min.	Typ.	Max.	Unit
Isolation	ISO	Ant (H) – Ant (L) (Tx2 Active)	1710 MHz –1910 MHz	25	—	—	dB
		Tx2 – Rx1, Rx2, Rx3, Rx4 (Tx2 Active)	1710 MHz –1910 MHz	30	—	—	
		Tx2 – TRx1, TRx4 (Tx2 Active)	1710 MHz –1910 MHz	40	—	—	
		Tx2 – TRx3 (Tx2 Active)	1710 MHz –1910 MHz	35	—	—	
		Tx2 – Tx1 (Tx2 Active)	1710 MHz –1910 MHz	20	—	—	

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

Corresponding Band of GSM Tx/Rx (GSM).

- *1 Pin = 35 dBm, 824 to 915 MHz (GSM850/900 Tx)
- *2 Pin = 32 dBm, 1710 to 1910 MHz (GSM1800/1900 Tx)
- *3 Pin = 10 dBm, 869 to 960 MHz (GSM850/900 Rx)
- *4 Pin = 10 dBm, 1805 to 1990 MHz (GSM1800/1900 Rx)

Corresponding Band of TRx (UMTS/CDMA).

- *5 Pin = 26 dBm, 824 to 960 MHz (Band 5, Band 6, Band 8)
- *6 Pin = 26 dBm, 1710 to 1990 MHz (Band 1 Tx, Band 2 Tx, Band 4 Tx)
- *7 Pin = 10 dBm, 2110 to 2170 MHz (Band 1 Rx, Band 4 Rx)
- *8 Measured with the recommended circuit

IMD Condition

Band	fRx on TRx	fRx +20dBm on TRx	fBlocker -15dBm on Ant		IMD Condition
Band I	2140 MHz	1950 MHz	IMD2 (fRx-fTx)	190 MHz	*9
			IMD2 (fRx+fTx)	4090 MHz	*10
			IMD3 (2fTx-fRx)	1760 MHz	*11
			IMD3 (2fTx+fRx)	6040 MHz	*12
Band II	1960 MHz	1880 MHz	IMD2 (fRx-fTx)	80 MHz	*13
			IMD2 (fRx+fTx)	3840 MHz	*14
			IMD3 (2fTx-fRx)	1800 MHz	*15
			IMD3 (2fTx+Rx)	5720 MHz	*16
Band V	880 MHz	835 MHz	IMD2 (fRx-fTx)	45 MHz	*17
			IMD2 (fRx+fTx)	1715 MHz	*18
			IMD3 (2fTx-fRx)	790 MHz	*19
			IMD3 (2fTx+fRx)	2550 MHz	*20

IIP3 Condition

Band	f1 +27 dBm on TRx	f2 +27 dBm on TRx	IIP3 Condition $IIP3 = (3 \times P_{out} - IM3)/2$
Band I	1950 MHz	1951 MHz	*21
Band V	835 MHz	836 MHz	*22

Triple Beat Ratio

(V_{DD} = 2.5 V, T_a = 25 °C)

Item	Symbol	Path	Condition				Min.	Typ.	Max.	Unit
Triple Beat Ratio	TBR		Tx1 at TRx* ¹ 21.5 dBm [MHz]	Tx2 at TRx* ¹ 21.5 dBm [MHz]	Jammer at Ant -30 dBm [MHz]	Triple Beat Product at TRx* ¹ [MHz]				dBc
		Ant-TRx1,3, 4	835.5	836.5	881.5	881.5±1	81	—	—	
			1880	1881	1960	1960±1	81	—	—	

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

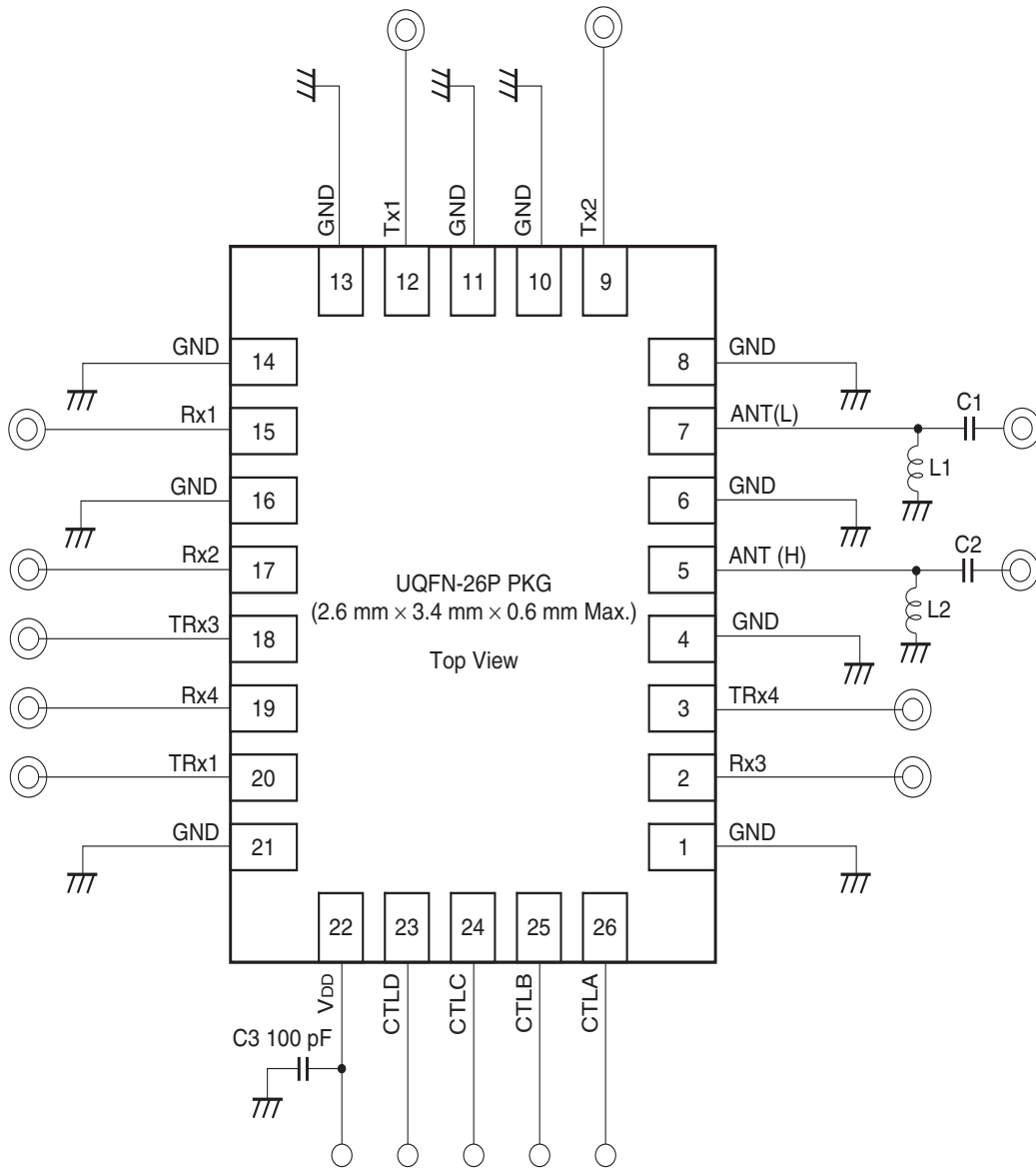
IIP2

(V_{DD} = 2.5 V, T_a = 25 °C)

Item	Symbol	Path	Condition			Min.	Typ.	Max.	Unit
Input IP2	IIP2		Tx at TRx* ¹ 24 dBm [MHz]	Jammer at Ant -20 dBm [MHz]	IM2 Product at TRx* ¹ [MHz]				dBm
		Ant-TRx1, 3, 4	836.61	1718.61	881.61	113.5	—	—	
			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	—	—	

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

Recommended Circuit




- Note) 1. No DC blocking capacitors are required on all RF ports.
 2. DC levels of all RF ports are GND.
 3. L1 (22 nH) and C1 (56 pF) are recommended on Ant port for ESD protection. (Tentative)
 4. L2 (12 nH) and C2 (12 pF) are recommended on Ant port for ESD protection. (Tentative)
 5. C3 capacitor (100 pF) is recommended.

Recommended Land Pattern


PKG: 3.4 mm × 2.6 mm
Pin pitch: 0.4 mm

Metal mask thickness: 110 μm

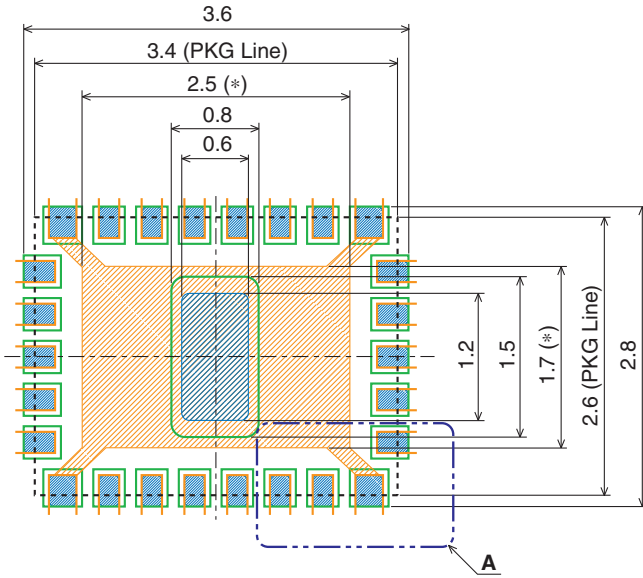
 : Metal area in board (*1)

*1: GND plane is recommended

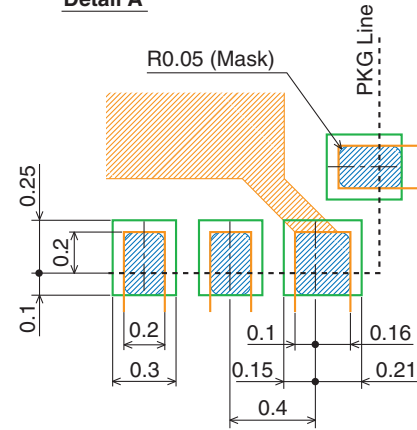
 : Land

 : Mask (Open area)

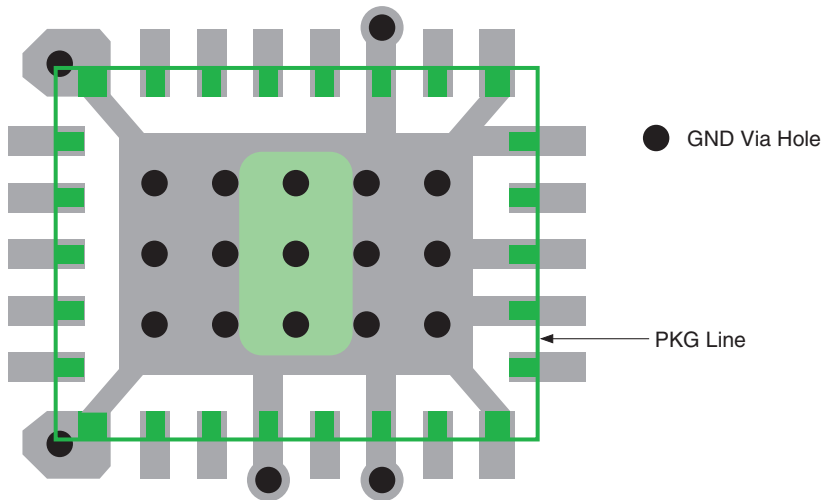
 : Resist (Open area)



Detail A

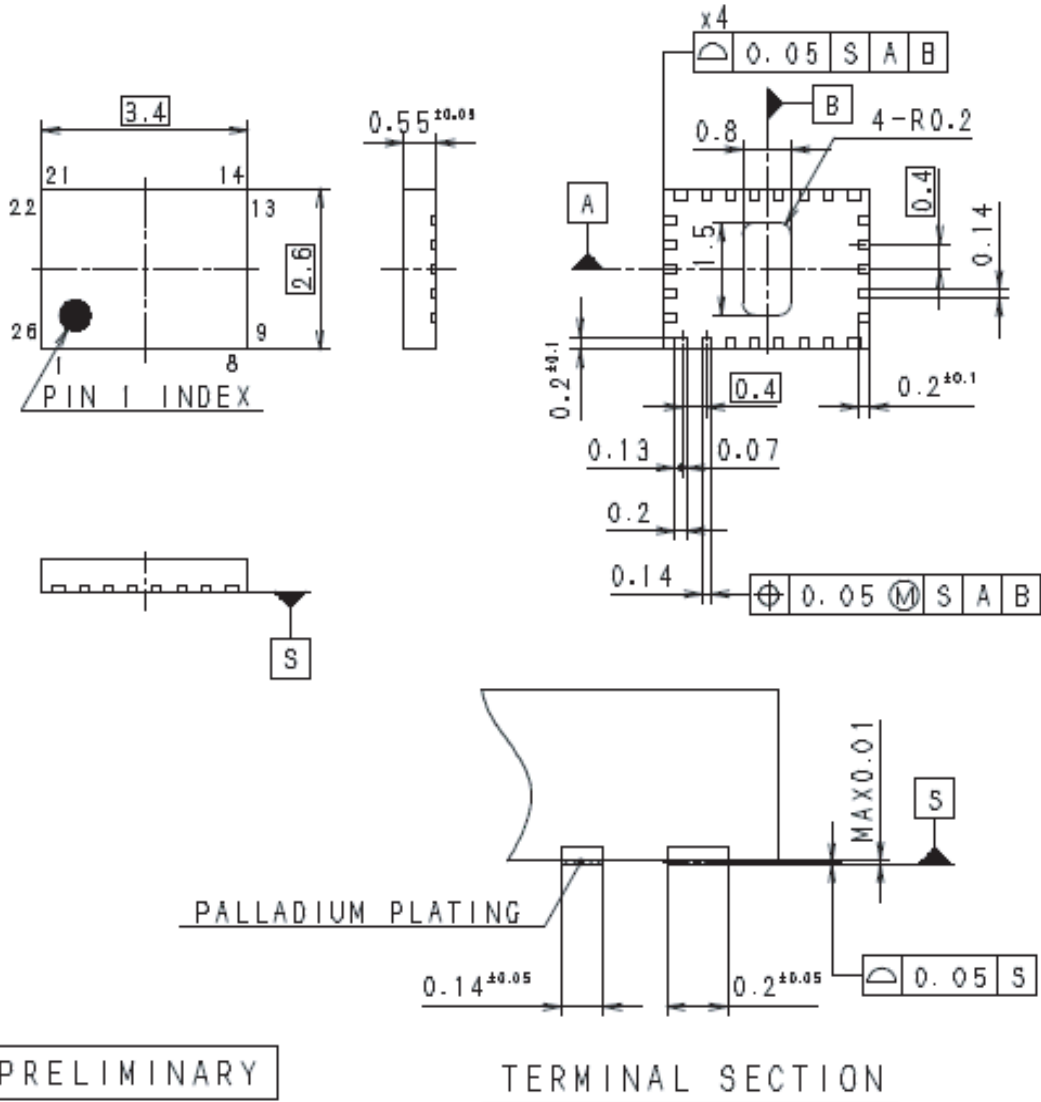


PCB GND Design for UQFN-26P (Image)



Package Outline

(Unit: mm)



Note: Cutting burr of lead are 0.05mm MAX.

SONY CODE	UQFN-26P-01
JEITA CODE	_____
JEDEC CODE	_____

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
TERMINAL TREATMENT	PALLADIUM PLATING
TERMINAL MATERIAL	COPPER ALLBY
PACKAGE MASS	****g

PART No.		Rev. 0
ISSUED	'09. 11. 10	REVISED
PRODUCTION LINE	COMPILING DIV. SONY SEMICONDUCTOR KYUSHU	
REMARKS		