Aug.25,2006

To: Qualcomm Inc.

PRELIMINARY SPECIFICATIONS
OF
TRANSMITTER MODULE

P/N : T0312QZ1880
D/N :

CUSTOMER'S APPROVAL

CUSTOMER : _____

APPROVED BY : _____

DATE : _____

NOTES : _____

The above products are designed, developed and manufactured as contemplated for general use, including without limitation, ordinary industrial use, general office use,personal use, and household use. But are not designed, developed and manufactured as contemplated (1)for use accompanying fatal risks or dangers that, unless extremely high safety is secured,could have a serious effect to the public, and could lead directly to death, personal injury, severe physical damage or other loss(i.e., nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system), or(2) for use requiring extremely high reliability (i.e., submersible repeater and artificial satellite).You shall not use the above products for the above-mentioned uses. If your equipment is likely to be used for the above-mentioned uses, please consult with our sales representative before use. Fujitsu shall not be liable against you and/or any third party for any claims or damages arising in connection with the above-mentioned uses of the above products.

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FUJITSU MEDIA DEVICES LIMITED

Preliminary

PRELIMINARY SPECIFICATIONS OF TRANSMITTER MODULE

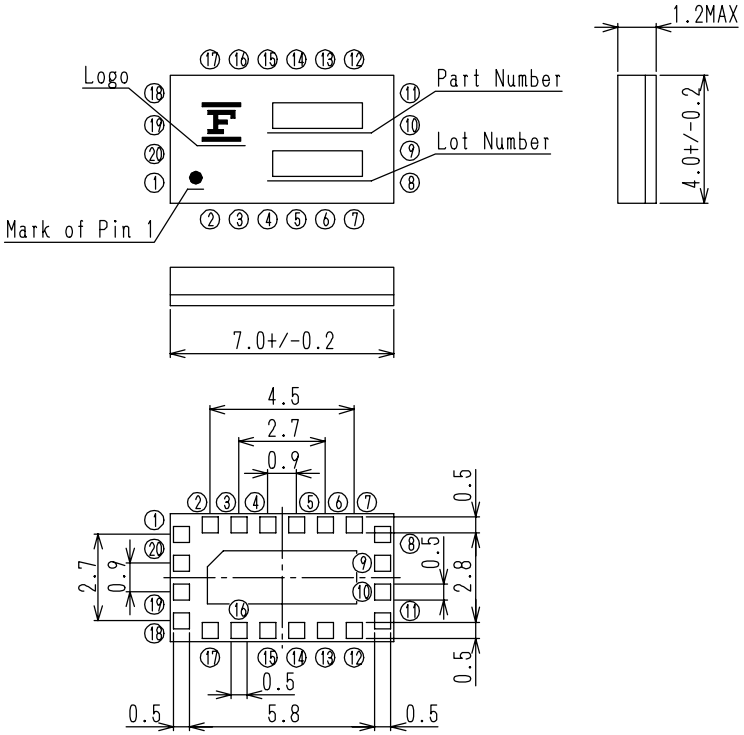
1.Applications

This document specifies a transmitter module of UMTS1900 band.

2.Product Number

T0312QZ1880

3.Mechanical Specifications



Unit : mm

Figure.1

<Table.1>

Pin Allocation		
Pin No.	Symbol	Description
1	Ven	PA Enable/Disable Voltage
6	Rx	Rx Output Port
10	ANT	Antenna Port
14	CPL	Coupler Output Port
15	Vcc2	PA Supply Voltage
16	Vcc1	PA Supply Voltage
18	RFin	RF Input Port
19	Vmode0	PA Mode Control Voltage
20	Vmode1	PA Mode Control Voltage
2, 3, 4, 5, 7, 8, 9, 11, 12, 13, 17, 21	GND	Ground

4. Electrical Characteristics

4-1. DC Characteristics

4-1-1. Absolute Maximum Ratings

< Table.2 >

No	Parameter	Symbol	Value	Unit
1	Supply Voltage (Vcc)	Vcc	+4.5	V
2	Control Voltage (Ven, Vmode0, Vmode1)		+3.0	V
3	Input RF Power	RFin	+12	dBm
		ANT	+30	dBm
		Rx	+10	dBm
4	Storage Temperature		-30 to +150	degC

Absolute maximum rating does not guarantee belows electrical specifications.

4-1-2. Operating Conditions

< Table.3 >

No	DC Supply	Conditions	Min	Typ	Max	Unit
1	Vcc	High, Medium, Low	3.2	3.4	4.2	V
2	Ven (Digital Contorol)	Low	0.0	-	0.5	V
		High	2.15	2.4	3.1	V
		Current	-	0.2	1.0	mA
3	Source Impedance to Tx Port		-	1:1	2.5:1	-
4	Load Impedance to Rx Port		-	1:1	2.5:1	-
5	Load Impedance to Antenna Port		-	1:1	3.0:1	-
6	Load Impedance to Coupler Port		-	1:1	2.5:1	-
7	Vmode0 & Vmode1	Low	0.0	-	0.5	V
		High	2.15	2.4	3.1	V
		Current	-	0.25	1.0	mA
8	Quiescent Current	Medium Power Mode	-	16	22	mA
		Low Power Mode	-	7	11	mA
9	Leakage Current	Vcc=High, Ven=Low, Vmode0&1=X	-	-	10	uA
10	Turn on/off Time	DC ; Icc to within 90% of the final value	-	-	20	us
		RF ; Pout within 1 dB of the final value	-	-	6	us
11	Gain Switching Time	High <-> Mid <-> Low	-	-	10	us
12	Case Temperature		-20	-	+90	degC

4-1-3. Modes of Operation

< Table.4 >

No	Mode of Operation	Ven	Vmode0	Vmode1	Vcc
1	Power Down	Low	Low	Low	ON
2	Stand-by Mode	Low	X	X	ON
3	High Power Mode (13.5dBm ≤ Pout ≤ 24.5dBm) HPM	High	Low	Low	ON
4	Medium Power Mode (4dBm ≤ Pout ≤ 13.5dBm) MPM	High	High	Low	ON
5	Low Power Mode (Pout ≤ 4dBm) LPM	High	High	High	ON

4-2. RF Performance

4-2-1. Main 3G UMTS1900 Front End Module Performance Specifications

< Table.5 >

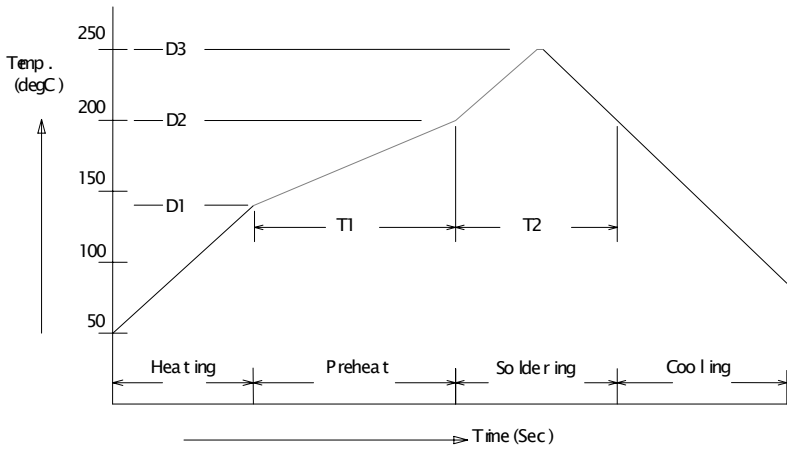
No	Parameter	Conditions	Min	Typ	Max	Unit
RFin to Antenna Port						
1	Operating Frequency Range (Tx Band)	PCS_Tx_Band	1850	1880	1910	MHz
2	Maximum Output Power	PCS_Tx_Band	24.5	-	-	dBm
3	Gain in Tx Band	HPM Pout=24.5dBm	18	-	27	dB
		MPM Pout≤13.5dBm	8	-	27	dB
		LPM Pout≤4dBm	-	7	-	dB
4	Gain Linearity in Tx Band	HPM 13.5dBm≤Pout≤24.5dBm	-	-		dB
		MPM 4dBm≤Pout≤13.5dBm	-	-		dB
		LPM -50dBm≤Pout≤4dBm	-	-		dB
5	Ripple in Tx Band	1850 – 1910 MHz	-	-		dB
		Any 5MHz Bandwidth	-	-		dB
6	Impedance Looking into RFin Port	PCS_Tx_Band	-	1:1	2.5:1	-
7	Stability, Spurious Levels	Tx Source VSWR≤5:1 Antenna Load VSWR≤5:1 All angles	-	-	-70	dBc
8	Adjacent Channel Leakage Power Ratio, ACLR	+/-5MHz offset, -23dBm ≤ Pout ≤ 24.5dBm	-	-	-36	dBc
		+/-10MHz offset, -23dBm ≤ Pout ≤ 24.5dBm	-	-	-46	dBc
9	Harmonics (2f0 , 3f0)	-23dBm ≤ Pout ≤ 24.5dBm	-	-	-35	dBm/ MHz

No	Parameter	Conditions	Min	Typ	Max	Unit
10	Power Added Efficiency, PAE in Tx Band	Pout=24.5dBm, Vcc=3.4V High Power Mode	20	-	-	%
		Pout=13.5dBm, Vcc=3.4V Medium Power Mode	10	-	-	%
		Pout=4dBm, Vcc=3.4V Low Power Mode	3	-	-	%
11	Intermodulation	CW Interferer -40dBc @				
		5MHz ; Intermod Products	-	-	-35	dBc
		10MHz ; Intermod Products	-	-	-45	dBc
12	Noise Power from Tx	GPS Band (1570 - 1580MHz)	-	-	-165	dBm/ Hz
		ISM (2400 – 2484MHz)	-	-	-165	dBm/ Hz
13	Attenuation	0 – 869MHz	25	-	-	dB
		869 – 894MHz	42	-	-	dB
		894 – 1570MHz	25	-	-	dB
		1570 – 1580MHz	33	-	-	dB
		1580 – 1785MHz	20	-	-	dB
		1930 – 1990MHz	50	-	-	dB
		2110 – 2170MHz	42	-	-	dBc
		2300 – 2400MHz	42	-	-	dB
		2400 – 2500MHz	35	-	-	dB
		3700 – 3820MHz	27	-	-	dB
		5550 – 5730MHz	27	-	-	dB

No	Parameter	Conditions	Min	Typ	Max	Unit
Antenna to Rx Port						
1	Operating Frequency Range (Rx Band)	PCS_Rx_Band	1930	1960	1990	MHz
2	Insertion Loss Rx Band	1930 – 1990MHZ	-	-	3.5	dB
3	Impedance Looking into Rx Band	PCS_Rx_Band	-	1:1	2.5:1	-
4	Ripple Rx Band	PCS_Rx_Band	-	-	1.0	dB
		Any 5MHz within Rx band	-	-	0.5	dB
5	Attenuation	10 – 1850MHz	30	-	-	dB
		1850 – 1910MHz	35	-	-	dB
		2075 – 2400MHz	15	-	-	dB
		2400 – 2484MHz	30	-	-	dB
		5620 – 5820MHz	15	-	-	dB
6	IM2	See note	-	-	-104	dBm
7	IM3	See note	-	-	-107	dBm
Noise Power from Tx to Rx Port						
1	Noise Power	1930 – 1990MHz	-	-	-181	dBm/ Hz
		1850 – 1910MHz	-	-	-28	dBm
Coupler Output Port						
1	Coupled Power to PWR_DET Input	Pout=24.5dBm , HPM	4	6	8	dBm
2	Mismatch Error	VSWR=3:1	-	1	2	dB
3	Isolation	Antenna to Coupler Output Port	-	40	-	dB

5.Soldering and Cleaning

5-1.Reflow Soldering Profile



No	Item	Temperature (degC)	Time (sec)
1	Pre – heat	D1 – D2 : 140 to 200	T1 : 60 to 120
2	Soldering	D3: ≧ 220	T2 : 80 max
3	Peak – Temp.	D4 : 250 max	

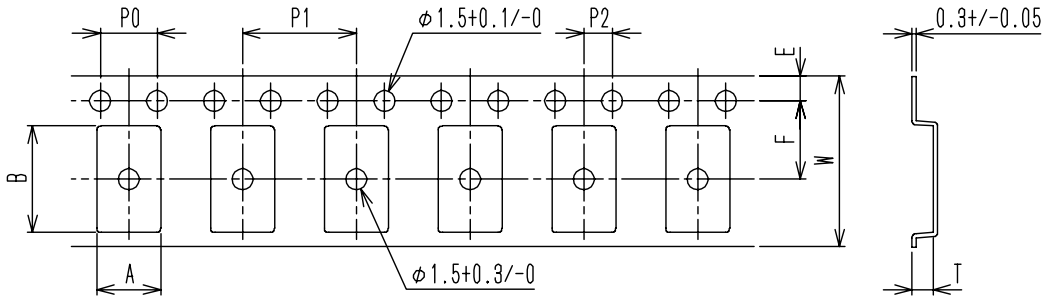
Note: *Recommended maximum reflow soldering cycle is 2 times.
*If your soldering conditions differ from our recommendation, please consult with us.

Figure.2 Reflow Profile

5-2. Soldering Iron Condition

(1) Temperature : 350 degC max
(2) Duration : 4 sec max (1part)
(3) Capacity : 30 W max

6.Tape Packing
6-1.Carrier Tape Appearance and Dimension



	A	B	W	F	E	P0	P1	P2	T
Dimensions	4.5	7.5	12.0	5.5	1.75	4.0	8.0	2.0	1.5
Tolerance	+/-0.1	+/-0.1	+/-0.3	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1

Figure. 3 Carrier Reel Appearance and Dimensions

6-2. Taping Configuration

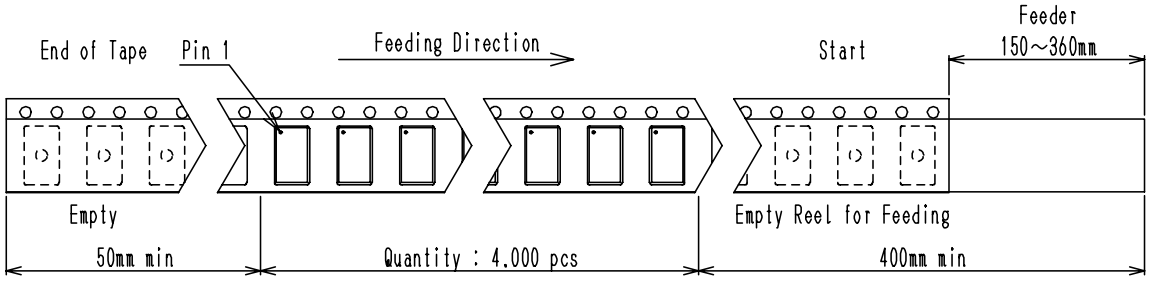
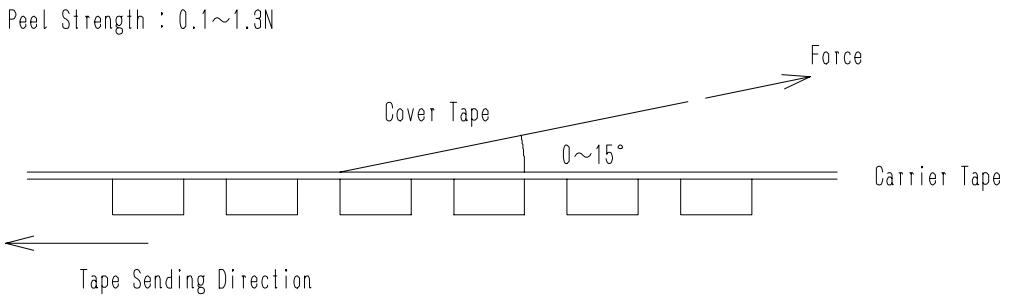


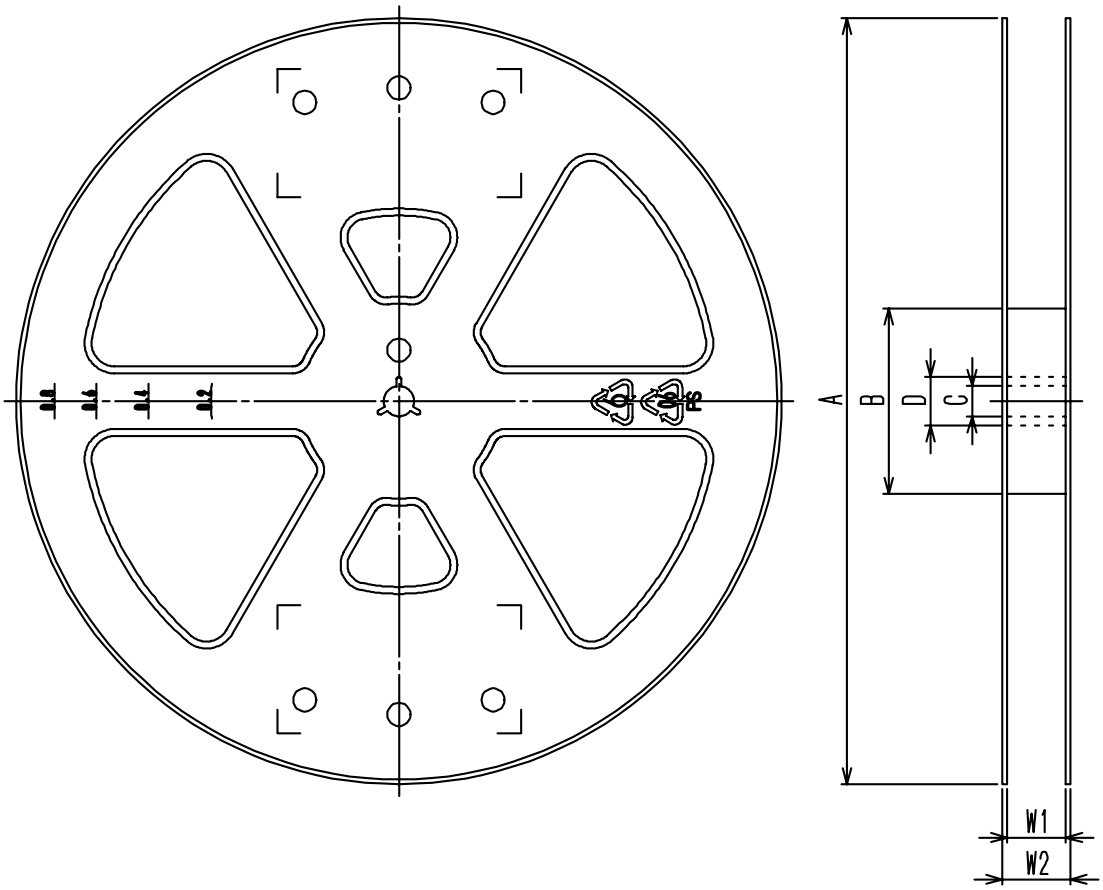
Figure. 4 Taping Configuration

Preliminary

6-3.Tape Peel Strength



6-4.Reel Configuration and Product Label



※Label indicates P/N , Quantity , and Lot Number. (unit:mm)

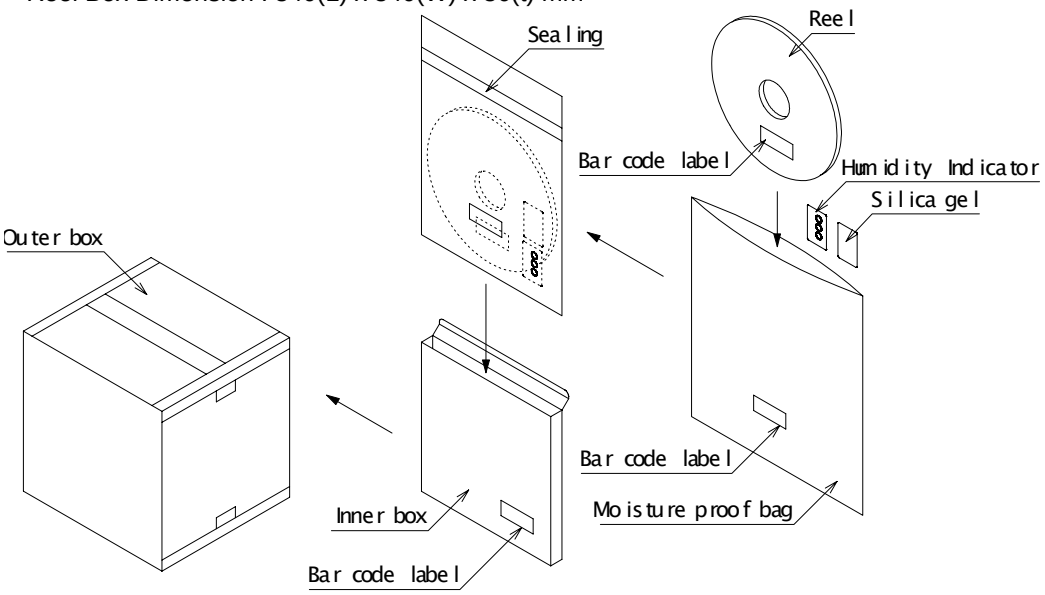
Symbol	A	B	C	D	W1	W2
Dimensions	330.0	80.0	13.0	21.0	13.4	17.4
Tolerance	+/- 2.0	+/- 1.0	+/- 0.2	+/- 0.8	+/- 1.0	+/- 1.0

Figure.5

					TITLE	T0312QZ1880
					Number	RFDpj05/029
EDIT	DATE	DRAW	CHECK	DESCRIPTION	FUJITSU MEDIA DEVICES LIMITED	8/10
Design:		Check:		Approve: DATE:		

6-5.Package

Products shall be delivered on tape and reel(quantity 3,000 pcs),
and each reel shall be packaged in a moisture proof bag and put in a reel box.
Reel Box Dimension : 340(L) x 340(W) x 30(t) mm



Carrier tape	Polystyrene+Styrenebutadiene
Caver tape	Polyester
Reel	Polystyrene+Carbon
Humidity Indicator	Paper
Moisture proof bag	PET/Al/PE 3Layer bag
Inner box	cardboard
Outer box	cardboard

Figure.6

6-6. Reel Label

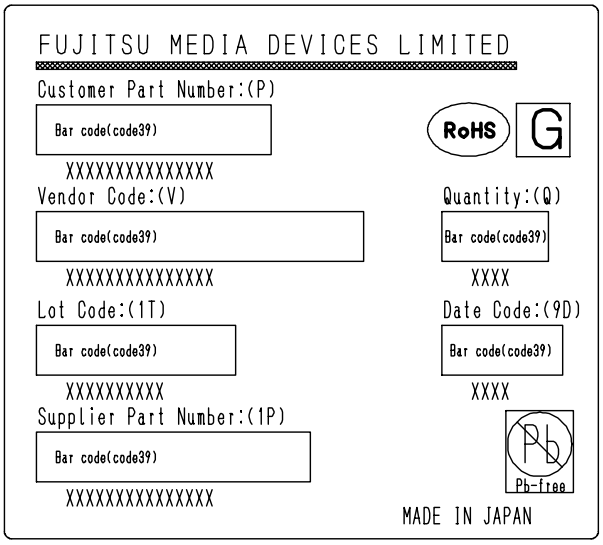


Figure.7

7. Other Information

7-1 Environmental

The product specified in the specifications does not use any kind of Ozone depletion materials, dangerous or poisonous substances regulated by low in the fabrication process.

7-2 Handling Information

Please do not apply any kind of over stress to the product during mounting or do not bend or twist.

7-3 Disposal Information

Regarding disposal of this product, please consult with the professionals.

7-4 Change of Specifications

When needed, we will change the specifications based on an agreement with purchaser.

7-5 Recommended PCB Land Pattern

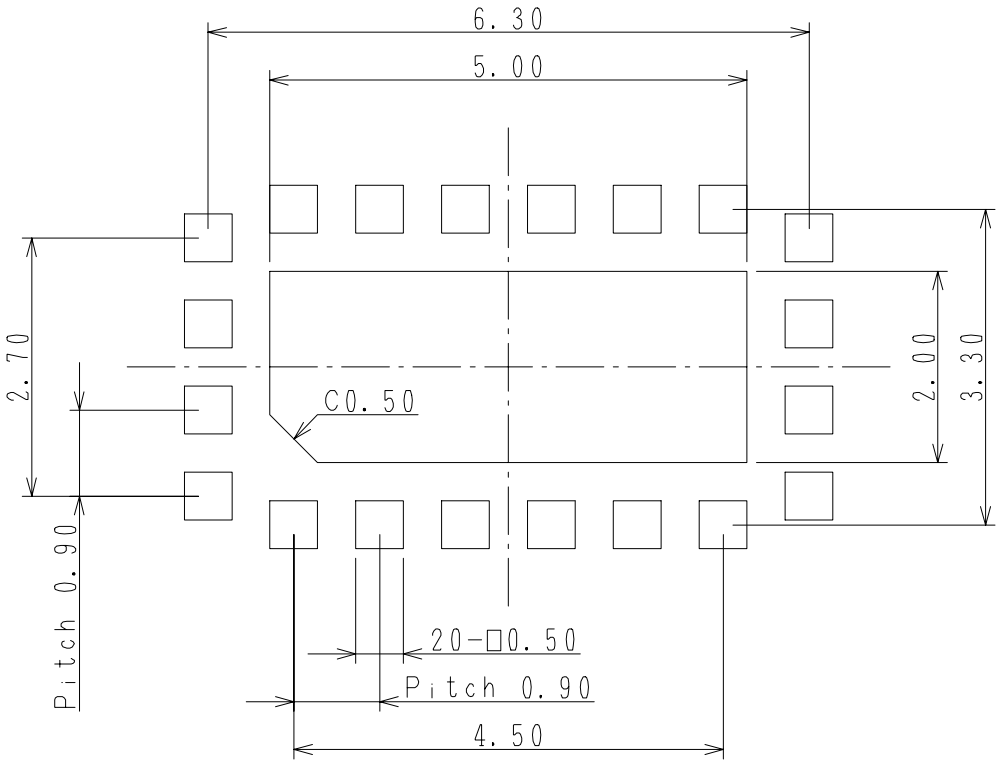


Figure.8

※Attention

Please do not dispose any supply and signal lines below the module.
Please put the through hole as a lot as possible in the big land at the center for heat radiation.
Without the recommended land pattern, the part of PCB has to put some protection film of soldering resist.