RP-MR220
Datasheet

(No. BRP0006)
V1.1

REVISION HISTORY

Version	Date	Description
VER.1.0	2010.8.13	▪ First Version Release
VER.1.1	2011.1.31	▪ Sec 2.2 - Figure 1 is changed. ▪ Sec 2.6 - Current consumption is changed. ▪ Sec 3 - Schematic is changed.

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1. INTRODUCTION

RP-MR220 is an IEEE802.15.4 transceiver module.

2. SPECIFICATIONS

This specification is applied to IEEE802.15.4 ZigBee Transceiver Module which has PA, and 16MHz X-TAL. This module is Single chip SOC embedded MCU(i8051).

2.1. Description

Item	Description
Application	Transceiver Module
Frequency Range	2.4 ~ 2.4835 GHz
Technical Standard	IEEE802.15.4
Type	SMD
Size	14.9 X 17.9 X 2.6 mm
RF OUTPUT TYPE	Pin Port Out

2.2. Drawing

Unit :mm

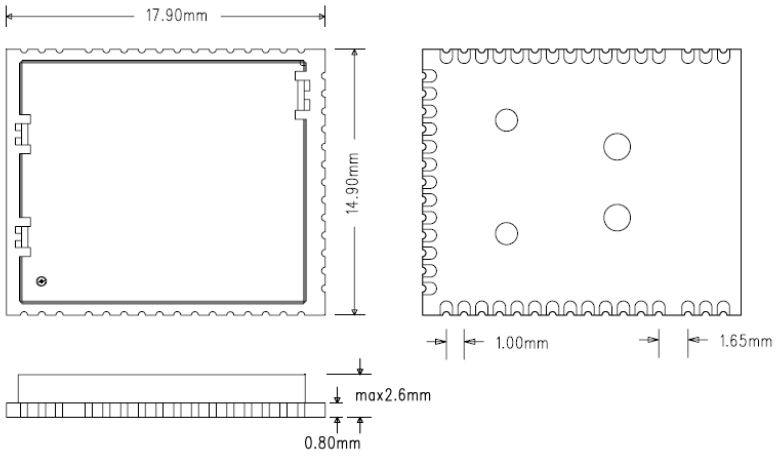
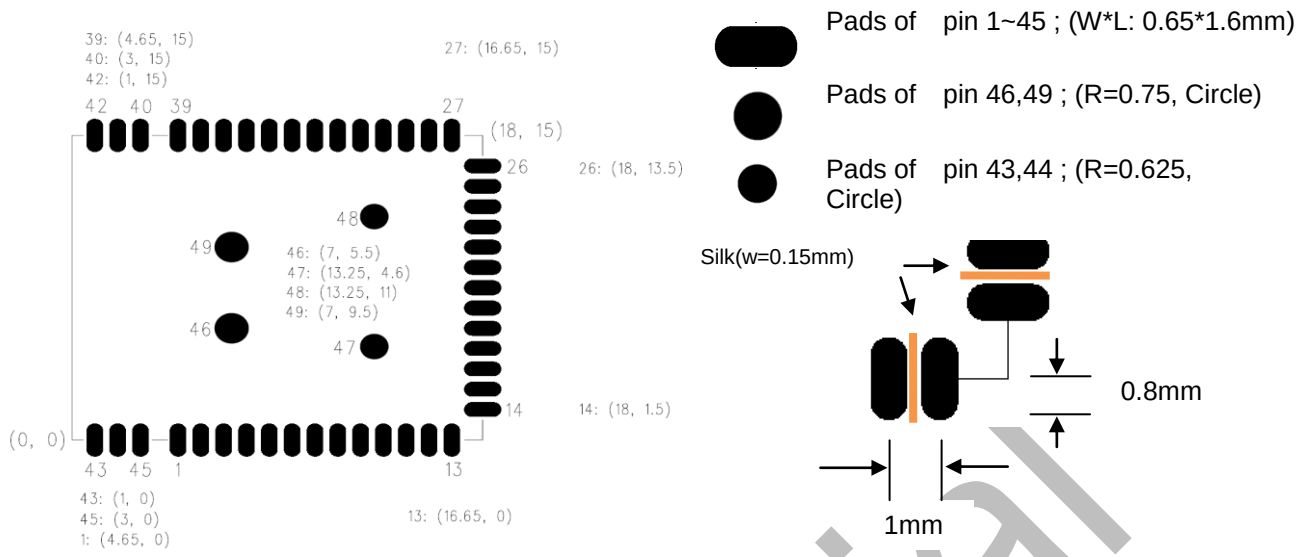


Figure 1. Outline Top View



NOTE) Silk paste inserting for Short protection, when soldering

Figure 2. PCB drawing_Top View

2.3. Soldermask Opening Guide

PAD TYPE	PAD SIZE	MASK open	RESULT
	W: 0.65mm L: 1.60mm	W:0.615mm L:1.76~1.8mm	W: About 95% L: About 110~115%
	R=0.75mm	R=0.35mm	46.7%
	R=0.625mm	R=0.25mm	40%

2.4. Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
AVDD	Chip core supply voltage	-0.3 to 1.65	V
3V_IN	I/O supply voltage	-0.3 to 3.60	V
3V_PA	POWER AMP VCC	-0.3 to 5.5V	V
RFin	Input RF level	-5	dBm
TSTG	Storage Temperature	-40 to 85	℃

2.5. DC Characteristics

Symbol	Parameter	Min	Typ.	Max	Unit
AVDD	Chip core supply voltage (AVDD_1.5V,DVDD_1.5V)	1.35	1.5	1.65	V
3V_IN	I/O supply voltage(VDDIO)	2.7	3.0	3.3	V
3V_PA	POWER AMP VCC	2.7	3.0	3.3	
VIH	High level input voltage	0.7X VDDIO		VDDIO	V
VIL	Low level input voltage	0		0.3X VDDIO	V
VOH	High level output voltage	VDDIO -0.5		VDDIO	V
VOL	Low level output voltage	0		0.4	V
Is_RX	Supply current Rx		36		mA
Is_standby	Standby current		8		mA
TA	Air temperature	-30		85	℃

2.6. Electrical Specifications

(Condition: EVM Board , at 25℃, 3V_IN=3.0V, VDD(AVDD,DVDD=1.5V,MSV="H")

Parameter	Min	Typ.	Max	Unit
Current consumption				
*1) Active MCU with TX Mode(CW Mode) (AES, Peripheral, SADC Disabled) # MG2450 # Pwr Amp @+8dBm output +18.5dBm output power @+7dBm output +18.5dBm output power @+6dBm output +17.5dBm output power @+5dBm output +16.5dBm output power @+4dBm output +15.5dBm output power @+3dBm output +14.5dBm output power @+2dBm output +13.5dBm output power @+1dBm output +12.5dBm output power @+0dBm output +11.5dBm output power		 240 225 205 195 180 170 160 150		mA
*2)PM1		25		uA
*2)PM2		1.7		uA
*2)PM3		0.3^{3}		uA
AES		2.1		mA
Peripheral		2.2		mA
Sensor ADC		1		mA
RF Characteristics				
RF Frequency Range	2.4		2.4835	GHz
Transmit data rate(normal mode)		250		kbps
Transmit data rate(turbo mode)		500		kbps
Transmit data rate(premium mode)		1000		kbps
Transmit chip rate		2000		kbps
Maximum output power			20	dBm
Programmable output power range		30		dB
Receiver sensitivity Normal mode Turbo mode Premium mode		 -100 -95 -91		dBm
Adjacent Channel Rejection +5MHz -5MHz		 47 47		dBc

Alternate Channel Rejection +10MHz -10MHz		 53 51		dBc
Co-Channel Rejection		-9.6		dBc
Blocking/Desensitization +/- 5 MHz +/- 10 MHz +/- 15 MHz +/- 20 MHz +/- 30 MHz +/- 50 MHz		 -42 -36 -46 -35 -42 -45		dBm
Spurious Emission(30Hz~1GHz)		-50		dBm
Spurious Emission(1GHz~2.5GHz)		-40		dBm
Spurious Emission(2.5GHz~12.7GHz)		-50		dBm
2nd Harmonics		-40		dBm
3nd Harmonics		-70		dBm
Frequency Error Tolerance			±200	KHz
Error Vector Magnitude(EVM)			35	%
Saturation(Maximum Input Level)		5		dBm
RSSI Dynamic Range		90		dB
RSSI Accuracy		±1.2	+6/-3	dB
RSSI Linearity		±0.2	±6	dB
RSSI Average Time		128		usec
Symbol Rate Error Tolerance		TBD		ppm
Optimum Load Impedance		TBD		Ω
Frequency Synthesizer				
Phase Noise @±100KHz offset @±1MHz offset @±2MHz offset @±3MHz offset @±5MHz offset		 -81.9 -108.6 -113.3 -120.3 -124.2		dBc/Hz
PLL Lock Time		110		usec
PLL Jitter		16		Psec

Crystal Frequency Accuracy Requirement	-30		+30	ppm
ESR		TBD		Ω
Recommend C0		TBD		pF
Recommend CL		TBD		pF
On-chip RC Regulator				
Frequency		32.78		KHz
Frequency Accuracy		TBD		ppm
Sensor ADC				
Number of Bits		8		bits
Conversion Time		256		usec
Parameter	Min	Typ	Max	Unit
Differential Nonlinearity(DNL)		±1.7		LSB
Integral Nonlinearity(INL)		±2.4		LSB
SINAD(Sine Input)		51.0		dB
On-Chip Voltage Regulator				
Supply range for Regulator	1.9	3.0	3.6	V
Regulated Output		1.5		V
Maximum Current			140[5]	mA
No Load Current		15		uA
Start-up Time		260[6]		usec

2.7. Electrical Interface

Terminal	NAME	Inter face	I/O	Description
1	ACH0	Analog	I/O	Sensor ADC input
2	ACH1	Analog	I/O	Sensor ADC input
3	ACH2	Analog	I/O	Sensor ADC input
4	ACH3	Analog	I/O	Sensor ADC input
5	AVDD_1.5V	Power	I/O	1.5V Power Supply input/output
6	AGND	Ground	-	RF Ground
7	MS0	Digital	I	Mode select
8	MS1	Digital	I	Mode select
9	MS2	Digital	I	Mode select
10	MSV	Digital	I	Mode select of voltage(0=1.5V)
11	RESETB	Digital	I	Reset (Active Low)
12	3V_IN	Power	I	3V Power supply
13	DGND	Ground	-	Ground for digital core and I/O
14	P1[7]	Digital	O	RX_EN (Don't connect)
15	P1[6]	Digital	B	TX_EN (Don't connect)
16	P1[5]	Digital	B	Port P1.5
17	P1[4]	Digital	B	Port P1.4 /QUADZB/Sleep Timer OSC Buffer Input.
18	P1[3]	Digital	B	Port P1.3/QUADZA/Sleep Timer OSC Buffer Output/RTCLKOUT
19	P1[2]	Digital	B	Port P1.2
20	P1[1]	Digital	B	Port P1.1/TXD1
21	P1[0]	Digital	B	Port P1.0/RXD1
22	P3[7]	Digital	B	Port P3.7/12mA Drive capability /PWM3/CTS1/SPICSN(slave only)
23	P3[6]	Digital	B	Port P3.6/12 mA Drive capability /PWM2/RTS1/SPICLK
Terminal	NAME	Inter face	I/O	Description
24	P3[5]	Digital	B	Port P3.5/T1/CTS0/QUADYB/SPIDO
25	P3[4]	Digital	B	Port P3.4/T0/RTS0/QUADYA/SPIDI
26	P3[3]	Digital	B	Port P3.3/INT1(active low)
27	P3[2]	Digital	B	Port P3.2/INT0(active low)
28	P3[1]	Digital	B	Port P3.1/TXD0/QUADXB
29	P3[0]	Digital	B	Port P3.0/RXD0/QUADXA

30	DGND	Ground	-	Ground for digital core and I/O
31	DVDD_1.5V	Power	I/O	1.5V Power Supply input/output
32	P0[7]	Digital	B	Port P0.7/I2STX_MCLK
33	P0[6]	Digital	B	Port P0.6/I2STX_BCLK
34	P0[5]	Digital	B	Port P0.5/I2STX_LRCK
35	P0[4]	Digital	B	Port P0.4/I2STX_DO
36	P0[3]	Digital	B	Port P0.3/I2SRX_MCLK
37	P0[2]	Digital	B	Port P0.2/I2SRX_BCLK
38	P0[1]	Digital	B	Port P0.1/I2SRX_LRCK
39	P0[0]	Digital	B	Port P0.0/I2SRX_DI
40,41,42	AGND	Ground	-	RF Ground
43	RF OUT	Anolog	O	RF OUTPUT(MAX 20dBm)
44	AGND	Ground	-	RF Ground
45	3V_PA	Power	I	3V_POWER AMP INPUT
46,49	AGND	Ground	-	RF Ground
47,48	DGND	Ground	-	Ground for digital core and I/O

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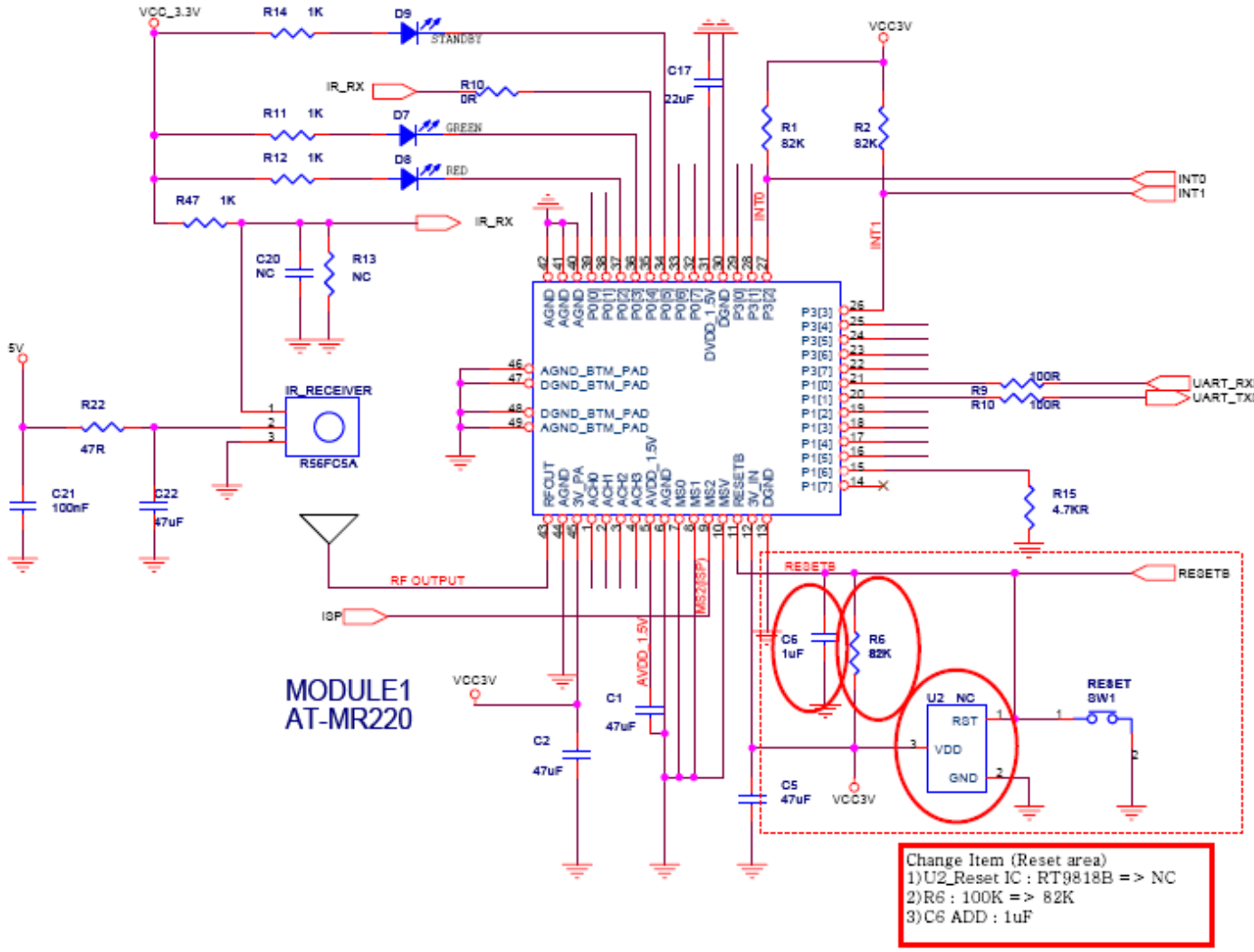
3. SCHEMATIC for APPLICATIONS



4. REALIBILITY & RF SPECIFICATION

4.1.Reliability

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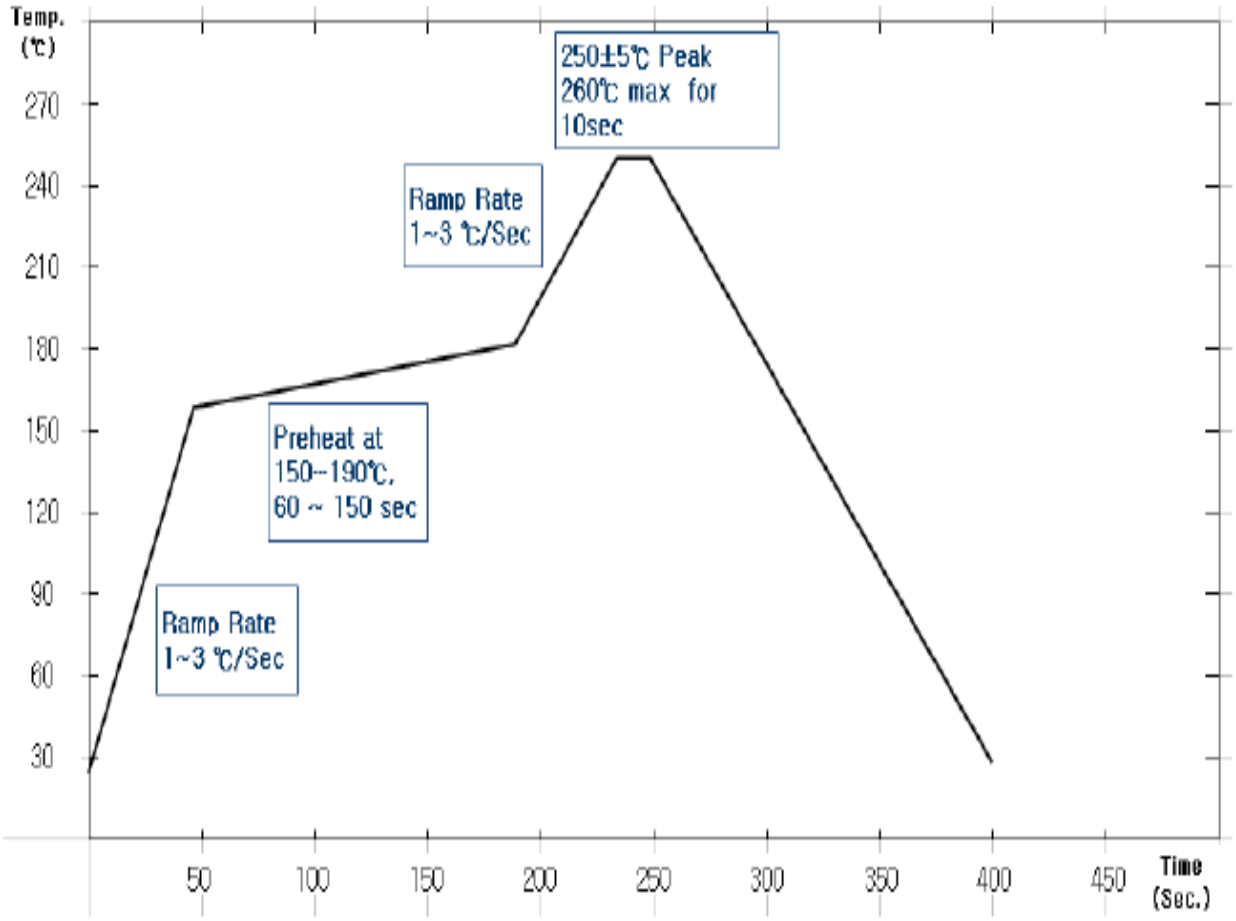
No.	Test item	Test condition
1	Reflow Thermal Cycle	Normal Pbfree reflow Condition.2 times
2	Thermal Shock Cycle	30min. at -30℃, 30min. at 85℃ , 100Cycles Recovery Time 2hours
3	Vibration Test	50Hz -> 500Hz -> 50Hz , 15min/Cycle X,Y,Z : Each 12 times [Total : 9hours]
4	High Temperature Storage Test	96 hours at 85℃±2℃, Recovery Time 2hours
5	Low Temperature Storage Test	96 hours at -30℃±2℃, Recovery Time 2hours
6	High Temperature & Humidity Storage Test	96 hours at 60℃±2℃ & 95%RH±2%RH. Recovery Time 2hours
7	Operating Temperature TEST	96hours at -30℃~85℃
8	High Temperature & Humidity Operating Test	24hours at 60℃ & 85%±2%RH.
9	Drop Test	Height min 76㎝, All sides onto Iron plate(T=min2mm).

4.2.RF Inspection Specification

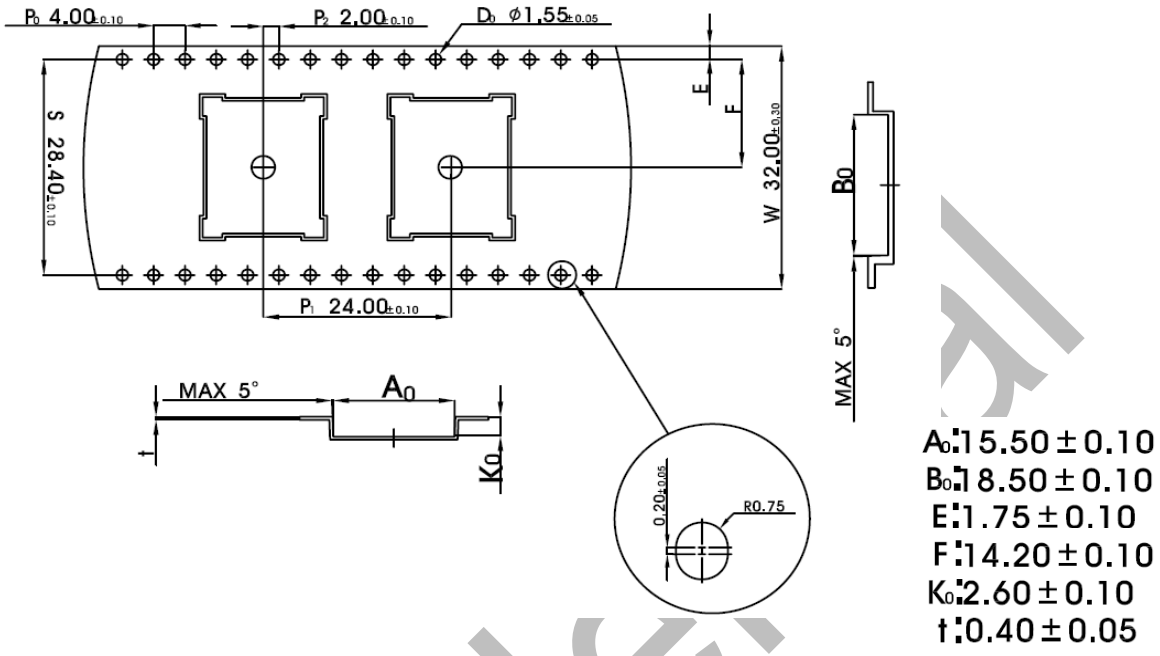
ITEM	UNIT	MIN	TYP	MAX	
Frequency tolerance	kHz	-100		+100	AT 25℃
MAXIMUM TX OUTPUT POWER	dBm	16	18	20	At 25℃
			20		AT -30℃
			16		AT 60℃
			15		AT 85℃
TX EVM	%			35	AT -30~85℃
RX PER SENSITIVITY	dBm	-93	-97		AT 25℃
			-98		AT -30℃
			-95		AT 60℃
			-93		AT 85℃

5. REFLOW PROFILE



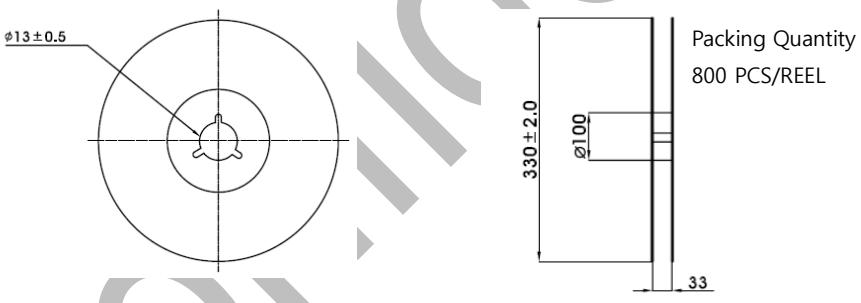
6. PACKAGE

6.1. Dimensions of Tape



A0: 15.50 ± 0.10
B0: 18.50 ± 0.10
E: 1.75 ± 0.10
F: 14.20 ± 0.10
K0: 2.60 ± 0.10
t: 0.40 ± 0.05

6.2. Dimensions of Reel



Packing Quantity
800 PCS/REEL

6.3. Taping Style