

UWB/Bluetooth LE Combo Module Data Sheet

NXP SR040 + QN9090 Chipset

Design Name: Type2DK

Tentative P/N : LBUA2ZZ2DK-SMP


Tentative P/N : LBUA2ZZ2DK -EVK

Revision History

Revision Code	Date	Description	Comments
-	2023.10.10	First Issue	

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 Please be aware that an important notice concerning availability, standard warranty and use in critical applications of Murata products and disclaimers thereto appears at the end of this specification sheet.

1. Scope

This specification is applied to the NXP SR040 + QN9090 UWB + Bluetooth LE Combo module

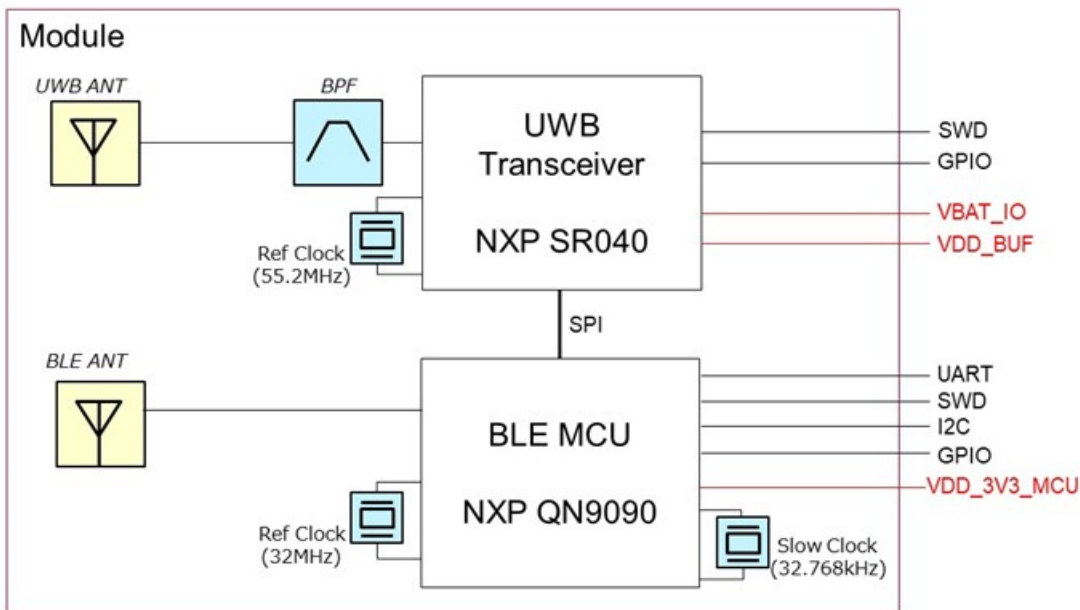
2. Key Features

- Main IC : UWB NXP SR040, MCU + Bluetooth LE NXP QN9090
- Compliant with IEEE802.15.4z HRP PHY
- Compliant with Bluetooth LE 5.0
- Supports UWB bands, Ch5 and 9.
- Surface mount type 19.6 x 18.2 mm(Typical), H = 2.3 mm(Max.)
- Weight : 1.296 g
- MSL : 3
- RoHS compliant

3. Ordering Information

Ordering Part Number	Description
LBUA2ZZ2DK-SMP	In case of sample order
LBUA2ZZ2DK-EVK	Evaluation Kit

4. Block Diagram



5. Certification Information

5.1. Radio Certification

USA

FCC ID: VPYLB2DK

Canada

IC: 772C-LB2DK

Europe

EN300328 conducted test report is prepared.

*This test report is applicable to the customer's final product.

EN302065 conducted test report is prepared.

*This test report is for reference only and not applicable to the customer's final product.

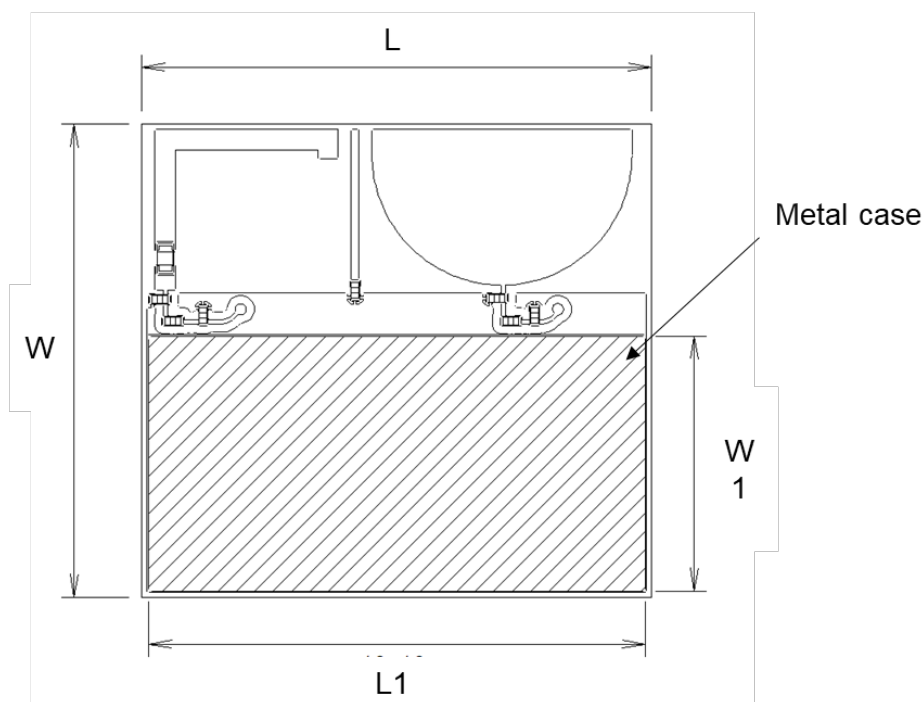
Japan

Japanese type certification is prepared.

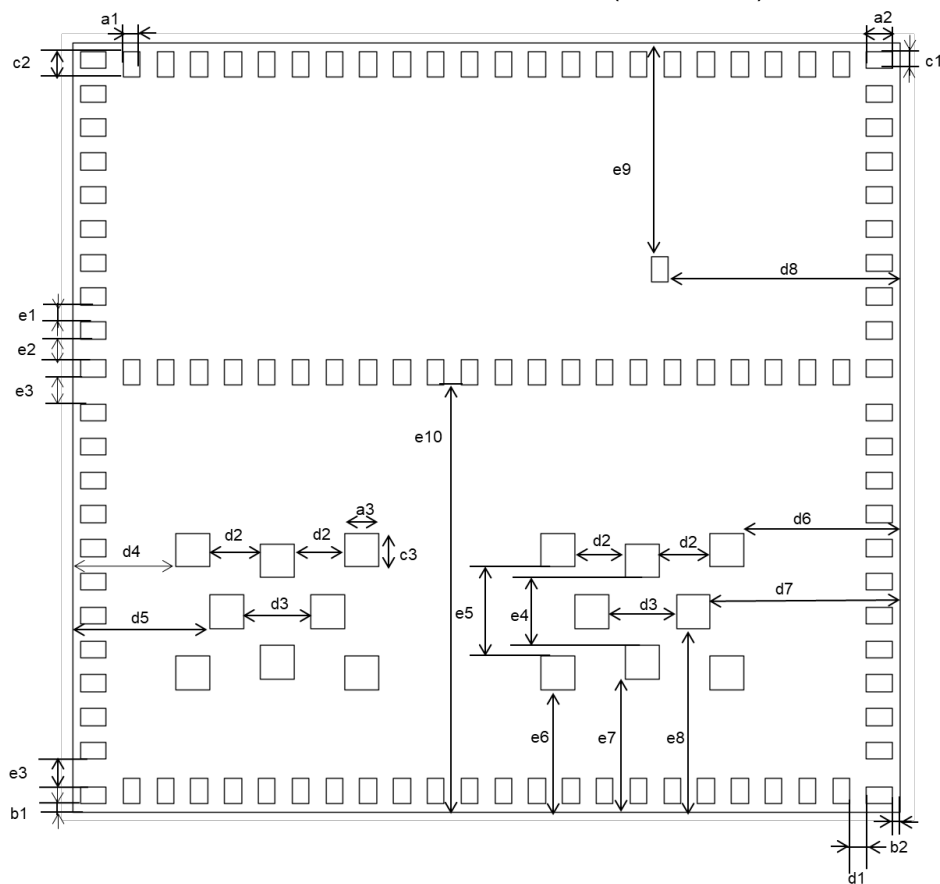
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6. Dimensions, Marking and Terminal Configurations

<DIMENSIONS : TOP>



<DIMENSIONS : BOTTOM(TOP VIEW)>



<DIMENSIONS : SIDE>

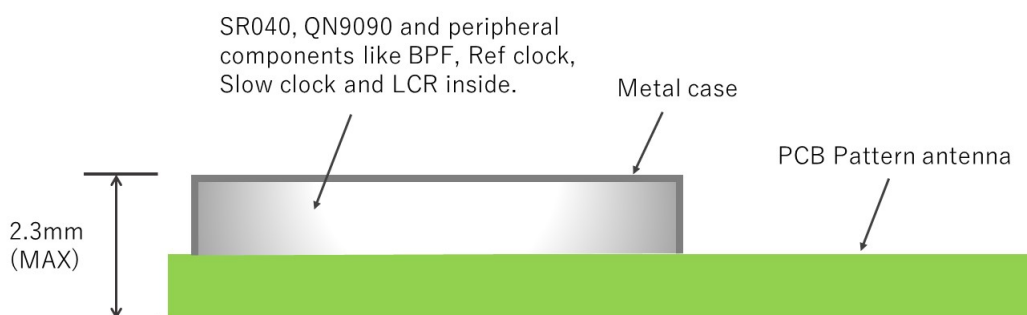


(unit:mm)

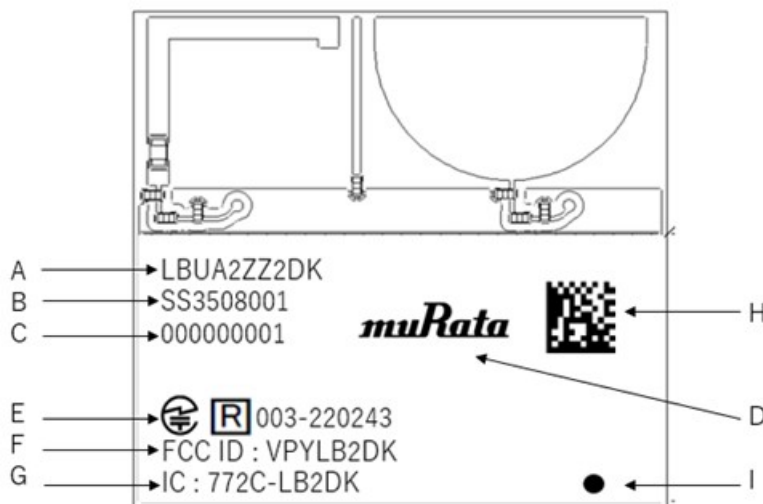
Mark	Dimensions	Mark	Dimensions	Mark	Dimensions
L	19.6 +/- 0.2	W	18.2 +/- 0.2	L1	18.95 +/- 0.1
W1	9.65 +/- 0.1	T	2.3 max		-
a1	0.4 +/- 0.1	a2	0.6 +/- 0.1	a3	0.8 +/- 0.1
b1	0.2 +/- 0.1	b2	0.2 +/- 0.1	c1	0.4 +/- 0.1
c2	0.6 +/- 0.1	c3	0.8 +/- 0.1	d1	0.4 +/- 0.1
d2	1.2 +/- 0.1	d3	1.6 +/- 0.1	d4	2.45 +/- 0.1
d5	3.25 +/- 0.1	d6	3.7 +/- 0.1	d7	4.5 +/- 0.1
d8	5.5 +/- 0.1	e1	0.4 +/- 0.1	e2	0.5 +/- 0.1
e3	0.65 +/- 0.1	e4	1.6 +/- 0.1	e5	2.1 +/- 0.1
e6	2.9 +/- 0.1	e7	3.15 +/- 0.1	e8	4.35 +/- 0.1
e9	5.05 +/- 0.1	e10	10.1 +/- 0.1		-

Structure

Structure <Side View>



Marking

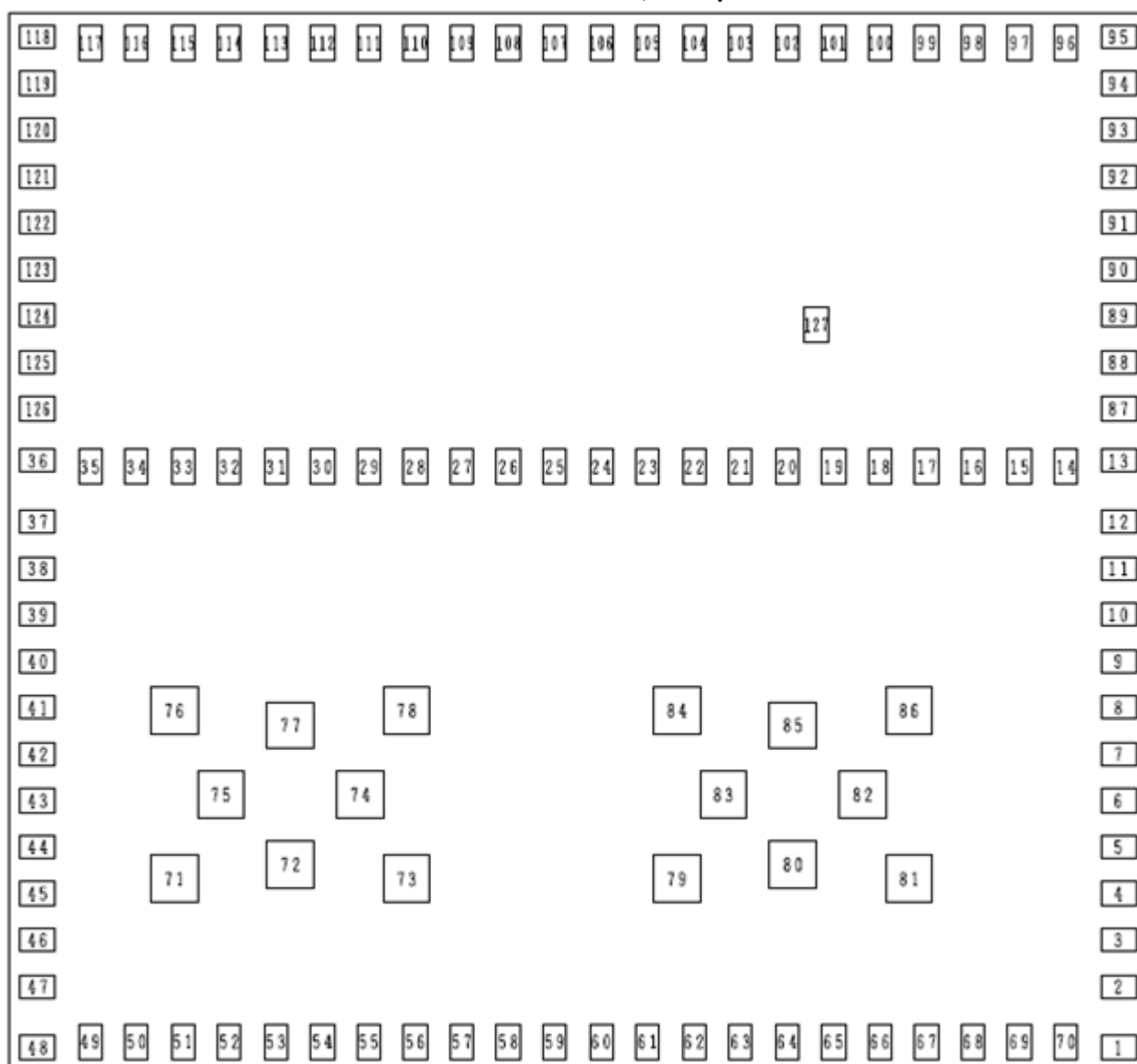


Marking	Meaning
A	Module Type
B	Lot Number
C	Serial Number
D	Murata Logo
E	TELEC Mark / ID
F	FCC ID
G	IC ID
H	2D Code
I	Pin 1 Marking

7. Module Pin Descriptions

7.1. Pin Assignments

<PIN MAP : TOP VIEW, 127pins>



Pin No.	Pin name	Pin No.	Pin name	Pin No.	Pin name	Pin No.	Pin name
1	GND	33	GND	65	VDD_BUF	97	NC
2	SR_SWDIO	34	GND	66	GND	98	NC
3	SR_SWDCLK	35	GND	67	GND	99	NC
4	GND	36	GND	68	GND	100	NC
5	GND	37	GND	69	GND	101	NC
6	SR_UART_TX	38	GND	70	SR_SWO	102	NC
7	SR_UART_RX	39	GND	71	GND	103	NC
8	GND	40	SCLK	72	GND	104	NC
9	GND	41	MISO	73	GND	105	NC
10	GND	42	MOSI	74	GND	106	NC
11	GND	43	CS	75	GND	107	NC
12	GND	44	PIO4/ACC_CS	76	GND	108	NC
13	GND	45	PIO5/SE_EN	77	GND	109	NC
14	GND	46	PIO6/ACC_INT1	78	GND	110	NC
15	GND	47	PIO7/ACC_INT2	79	GND	111	NC
16	GND	48	GND	80	GND	112	NC
17	GND	49	GND	81	GND	113	NC
18	GND	50	PIO8/UART_TX	82	GND	114	NC
19	GND	51	PIO9/UART_RX	83	GND	115	NC
20	GND	52	PIO10/SCL	84	GND	116	NC
21	SRLED	53	PIO11/SDA	85	GND	117	NC
22	GND	54	PIO12/SWDCLK	86	GND	118	NC
23	GND	55	PIO13/SWDIO	87	GND	119	NC
24	SWD_RESETN	56	GND	88	NC	120	NC
25	GND	57	PIO17/VIBRATION	89	NC	121	NC
26	VDD_3V3_MCU	58	PIO18/VIBALERT	90	NC	122	NC
27	GND	59	PIO19/LEDB	91	NC	123	NC
28	GND	60	PIO20/LEDG	92	NC	124	NC
29	GND	61	PIO21/SWO_LED	93	NC	125	NC
30	GND	62	GND	94	NC	126	NC
31	GND	63	GND	95	NC	127	NC
32	GND	64	VBAT_IO	96	NC		

7.2. Pin Description

No.	Pin Name	Type	Connect to	Connection to IC pin name	Description
1	GND	GND			
2	SR_SWDIO		SR040	SWDIO	SR040 Serial Wire Debug (SWD) data, internal pull-up resistor in the SR040
3	SR_SWDCLK		SR040	SWCLK	SR040 Serial Wire Debug (SWD) data, internal pull-up resistor in the SR040
4	GND	GND			
5	GND	GND			
6	SR_UART_TX		SR040	P12	N/A, left open if not used.
7	SR_UART_RX		SR040	P11	N/A, left open if not used.
8	GND	GND			
9	GND	GND			
10	GND	GND			
11	GND	GND			
12	GND	GND			
13	GND	GND			
14	GND	GND			
15	GND	GND			
16	GND	GND			
17	GND	GND			
18	GND	GND			
19	GND	GND			
20	GND	GND			
21	SRLED		SR040	P10/CTS/PA_ENBL	Test point
22	GND	GND			
23	GND	GND			
24	SWD_RESETN	I	QN9090	RSTN	QN9090 Reset, 10kOhm pull up inside.
25	GND	GND			
26	VDD_3V3_MCU		QN9090	VBAT, VDDE	Supply voltage for QN9090 DC-DC switching regulator input and I/O.
27	GND	GND			
28	GND	GND			
29	GND	GND			
30	GND	GND			
31	GND	GND			

32	GND	GND			
33	GND	GND			
34	GND	GND			
35	GND	GND			
36	GND	GND			
37	GND	GND			
38	GND	GND			
39	GND	GND			
40	SCLK	I/O	QN9090, SR040	PIO0 (QN9090), P17/SCLK (SR040)	SPI clock, connected to QN9090 and SR040.
41	MISO	I/O	QN9090, SR040	PIO1 (QN9090), P20/SDIO (SR040)	SPI MISO, connected to QN9090 and SR040.
42	MOSI	I/O	QN9090, SR040	PIO2 (QN9090), P21/SDI (SR040)	SPI MOSI, connected to QN9090 and SR040.
43	CS	I/O	QN9090, SR040	PIO3 (QN9090), P14/CS_N (SR040)	SPI CS, connected to QN9090 and SR040.
44	PIO4/ACC_CS	I/O	QN9090	PIO4	QN9090 GPIO4 / SPI CS for external Accelerometer (Optional), left open if not used.
45	PIO5/SE_EN	I/O	QN9090	PIO5/ISP_ENTRY	QN9090 GPIO5 / left open if not used.
46	PIO6/ACC_INT1	I/O	QN9090	PIO6	QN9090 GPIO6 / Interrupt input 1 from Accelerometer (Optional), left open if not used.
47	PIO7/ACC_INT2	I/O	QN9090	PIO7	QN9090 GPIO7 / Interrupt input 2 from Accelerometer (Optional), left open if not used.
48	GND	GND			
49	GND	GND			
50	PIO8/UART_TX		QN9090	PIO8/TXD0	QN9090 GPIO8 / USART0_TXD (Universal Synchronous/Asynchronous Receiver/Transmitter 0 - transmit data output, left open if not used.
51	PIO9/UART_RX		QN9090	PIO9/RXD0	QN9090 GPIO9 / USART0_RXD (Universal Synchronous/Asynchronous Receiver/Transmitter 0 - receive data input, left open if not used.
52	PIO10/SCL		QN9090	PIO10	QN9090 GPIO10 / left open if not used
53	PIO11/SDA		QN9090	PIO11	QN9090 GPIO11 / left open if not used
54	PIO12/SWDCLK		QN9090	PIO12/SWCLK	QN9090 GPIO12 / Serial Wire Debug Clock
55	PIO13/SWDIO		QN9090	PIO13/SWDIO	QN9090 GPIO13 / Serial Wire Debug Input/Output
56	GND	GND			
57	PIO17/VIBRATION		QN9090	PIO17/ADC3	QN9090 GPIO17 / left open if not used
58	PIO18/VIBALERT		QN9090	PIO18/ADC4	QN9090 GPIO18 / left open if not used
59	PIO19/LEDB		QN9090	PIO19/ADC5	QN9090 GPIO19 / connect to LED blue of 3 color type LED, left open if not used
60	PIO20/LEDG		QN9090	PIO20/LEDG	QN9090 GPIO20 / connect to LED green of 3 color type LED, left open if not used
61	PIO21/SWO_LEDRED		QN9090	PIO21/ACM	QN9090 GPIO19 / connect to LED red of 3 color type LED, left open if not used
62	GND	GND			

63	GND	GND			
64	VBAT_IO		SR040		Power supply for SR040 digital I/Os and power supply for the chip via current limiter, Current limiter connected between VDD_BUF pins inside of the SR040.
65	VDD_BUF		SR040		Power supply for SR040, connected to VBAT_IO in the SR040 via programmable current limiter, supply for global LDO and PA.
66	GND	GND			
67	GND	GND			
68	GND	GND			
69	GND	GND			
70	SR_SWO		SR040	P13	Test point, left open if not used
71	GND	GND			
72	GND	GND			
73	GND	GND			
74	GND	GND			
75	GND	GND			
76	GND	GND			
77	GND	GND			
78	GND	GND			
79	GND	GND			
80	GND	GND			
81	GND	GND			
82	GND	GND			
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96	NC				

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114	NC				
115	NC				
116	NC				
117	NC				
118	NC				
119	NC				
120	NC				
121	NC				
122	NC				
123	NC				
124	NC				
125	NC				
126	NC				
127	NC				

8. Absolute Maximum Ratings

Parameter		Min	Max	Unit
Storage Temperature		-40	+85	deg.C
Supply Voltage	VDD_3V3_MCU	-	3.6	V
	VDD_BUF	-	3.6	V
	VBAT_IO	-	3.6	V

* Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability. No damage assuming only one parameter is set at limit at a time with all other parameters are set within operating condition.

9. Operating Conditions

9.1. Operating conditions

Parameter		Min	Typ	Max	Unit
Operating Temperature Range		-30	+25	+85	deg.C
Supply Voltage	VDD_3V3_MCU	1.9		3.6	V
	VDD_BUF	2.4 1.9 ^(*)		3.6	V
	VBAT_IO	2.4 1.9 ^(*)		3.6	V

(*) : 1.9~2.4V, Device fully functional. Tx PA of UWB chipset peak power shall not set higher than 9dBm)

9.2. Digital I/O Requirements

Pin Characteristics for GPIO in QN9090

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{pu(int)(PIO)}$	Internal pull-up resistance on pins PIOx	-	40	50	60	kΩ
$V_{pu(int)(RSTN)}$	Internal pull-up resistance on pins RSTN	-	40	50	60	kΩ
$V_{pdn(int)(PIO)}$	Internal pull-down resistance on pins PIOx	-	40	50	60	kΩ
IO						
V_{IH}	High level input voltage	VDD_3V3_MCU = 3.3V	0.7* VDD_3V3_MCU	-	VDD_3V3_MCU	V
V_{IL}	Low level input voltage	VDD_3V3_MCU = 3.3V	-	-	0.27* VDD_3V3_MCU	V
Output on pins PIO LS, with 1mA load(PIO 0 to 9 and 12 to 16)						
V_{OH}	High level output voltage (1mA load)	VDD_3V3_MCU = 3.6V	3.4	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 3.0V	2.8	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 2.4V	2.2	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 1.9V	1.65	-	VDD_3V3_MCU	V
V_{OL}	Low level output voltage	VDD_3V3_MCU = 3.3V	0	-	0.4	V
Output on pins PIO LS, with 2mA load(PIO 0 to 9 and 12 to 16)						
V_{OH}	High level output voltage (2mA load)	VDD_3V3_MCU = 3.6V	3.3	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 3.0V	2.65	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 2.4V	2.0	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 1.9V	1.4	-	VDD_3V3_MCU	V
V_{OL}	Low level output voltage	-	0	-	0.4	V
Output on pins PIO HS, with 3mA load(PIO 17 to 21)						

V _{OH}	High level output voltage (1mA load)	VDD_3V3_MCU = 3.6V	3.35	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 3.0V	2.75	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 2.4V	2.1	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 1.9V	1.6	-	VDD_3V3_MCU	V
V _{OL}	Low level output voltage	VDD_3V3_MCU = 3.3V	0	-	0.4	V
Output on pins PIO HS, with 5mA load(PIO 17 to 21)						
V _{OH}	High level output voltage (1mA load)	VDD_3V3_MCU = 3.6V	3.4	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 3.0V	2.8	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 2.4V	2.2	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 1.9V	1.65	-	VDD_3V3_MCU	V
V _{OL}	Low level output voltage	VDD_3V3_MCU = 3.3V	0	-	0.4	V
Output on pins PIO I2C, with 1mA load(PIO 10 and 11)						
V _{OH}	High level output voltage (1mA load)	VDD_3V3_MCU = 3.6V	3.45	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 3.0V	2.82	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 2.4V	2.3	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 1.9V	1.52	-	VDD_3V3_MCU	V
V _{OL}	Low level output voltage	VDD_3V3_MCU = 3.3V	0	-	0.4	V
Output on pins PIO I2C, with 2mA load(PIO 10 and 11)						
V _{OH}	High level output voltage (1mA load)	VDD_3V3_MCU = 3.6V	3.3	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 3.0V	2.66	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 2.4V	2.1	-	VDD_3V3_MCU	V
		VDD_3V3_MCU = 1.9V	1.52	-	VDD_3V3_MCU	V
V _{OL}	Low level output voltage	VDD_3V3_MCU = 3.3V	0	-	0.4	V

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
PIO I2C(PIO 10 and 11)						
t _{rise}	Rise time	20% to 80%, VDD_3V3_MCU =3.3V Slow speed	12	-	22	ns
		20% to 80%, VDD_3V3_MCU =1.9V Slow speed	14	-	28	ns
		20% to 80%, VDD_3V3_MCU =3.3V Fast speed	1.7	-	5	ns
		20% to 80%, VDD_3V3_MCU =1.9V Fast speed	3.2	-	7.5	ns
t _{fall}	Fall time	20% to 80%, VDD_3V3_MCU =3.3V Slow speed	14	-	29	ns
		20% to 80%, VDD_3V3_MCU =1.9V Slow speed	18	-	34	ns
		20% to 80%, VDD_3V3_MCU =3.3V Fast speed	1.1	-	2.6	ns
		20% to 80%, VDD_3V3_MCU =1.9V Fast speed	2	-	4.7	ns
Output on pins PIO HS(PIO 17 to 21)						
t _{rise}	Rise time	20% to 80%, VDD_3V3_MCU =3.3V Slow speed	1.6	-	4	ns
		20% to 80%, VDD_3V3_MCU =1.9V Slow speed	2.4	-	6	ns
		20% to 80%, VDD_3V3_MCU =3.3V Fast speed	0.8	-	3	ns

		20% to 80%, VDD_3V3_MCU =1.9V Fast speed	1.2	-	4	ns
t _{fall}	Fall time	20% to 80%, VDD_3V3_MCU =3.3V Slow speed	1.1	-	3.3	ns
		20% to 80%, VDD_3V3_MCU =1.9V Slow speed	1.6	-	5	ns
		20% to 80%, VDD_3V3_MCU =3.3V Fast speed	0.6	-	3	ns
		20% to 80%, VDD_3V3_MCU =1.9V Fast speed	0.9	-	3.5	ns
Output on pins PIO LS(PIO 0 to 9 and 12 to 16)						
t _{rise}	Rise time	20% to 80%, VDD_3V3_MCU =3.3V Slow speed	2.2	-	5	ns
		20% to 80%, VDD_3V3_MCU =1.9V Slow speed	3.3	-	7.5	ns
		20% to 80%, VDD_3V3_MCU =3.3V Fast speed	1.6	-	4	ns
		20% to 80%, VDD_3V3_MCU =1.9V Fast speed	2.5	-	6.5	ns
t _{fall}	Fall time	20% to 80%, VDD_3V3_MCU =3.3V Slow speed	1.2	-	3.5	ns
		20% to 80%, VDD_3V3_MCU =1.9V Slow speed	1.9	-	5	ns
		20% to 80%, VDD_3V3_MCU =3.3V Fast speed	0.7	-	3	ns
		20% to 80%, VDD_3V3_MCU =1.9V Fast speed	1.1	-	3.5	ns

PIO I2C values are for PIO10 and PIO11. IO cell in GPIO mode. Slow speed is EHS=0; Fast speed is EHS=1

Values are for PIO17-21. Slow speed is SLEW(1:0) = 00b. Fast speed is SLEW(1:0) = 11b

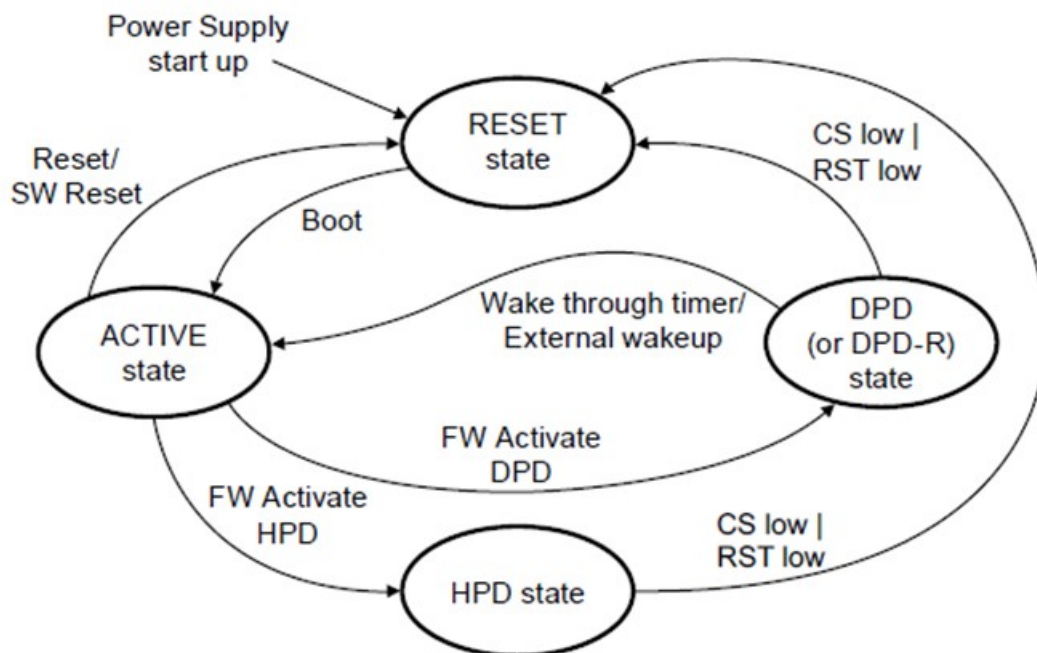
Values are for PIO0-9 and PIO12-16. Slow speed is SLEW(1:0) = 00b. Fast speed is SLEW(1:0) = 11b

The slew rate is configured in the IOCON block. See QN9090(T)/QN9030(T) User Manual.

10. System power status and power sequence

10.1. State Diagram and Power modes in SR040

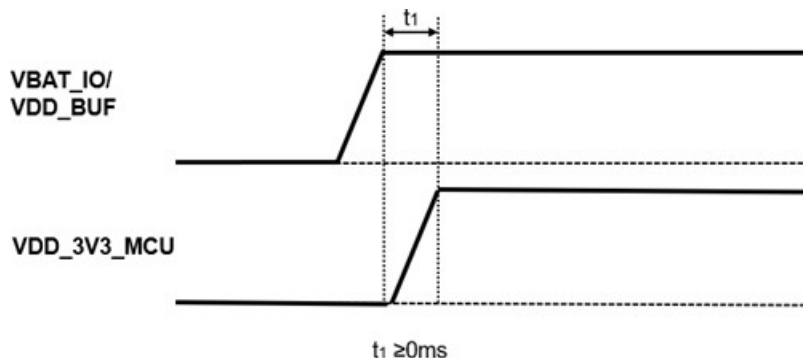
SR040 has different power states and transition of those power states.



10.2. Current limiter

The current limiter is intended for applications with coin cell battery supply, to maximize the lifetime of the battery. It minimizes battery stress by limiting the maximal current drawn by the IC. The current limit is configurable by SW. The following shows how the current limiter is connected in the application.

10.3. Power Up Sequence



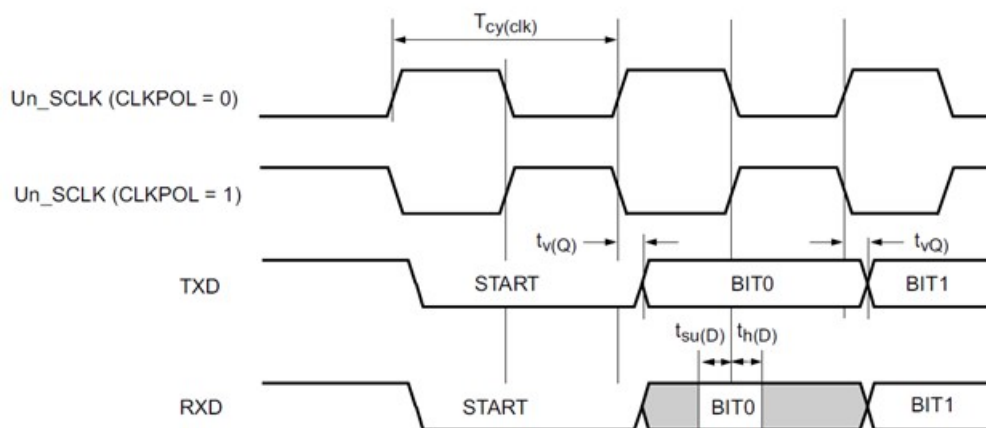
11. Interface

USART master timing

Symbol	Parameter	Min	Typ	Max	Unit
$t_{\text{SU(D)}}$	Data set-up time	45	—	—	ns
$t_{\text{H(D)}}$	Data hold time	5	—	—	ns
$t_{\text{V(Q)}}$	Data output valid time	0	—	25	ns
$t_{\text{cy(SCLK)}}$	SCLK frequency	—	—	5	MHz

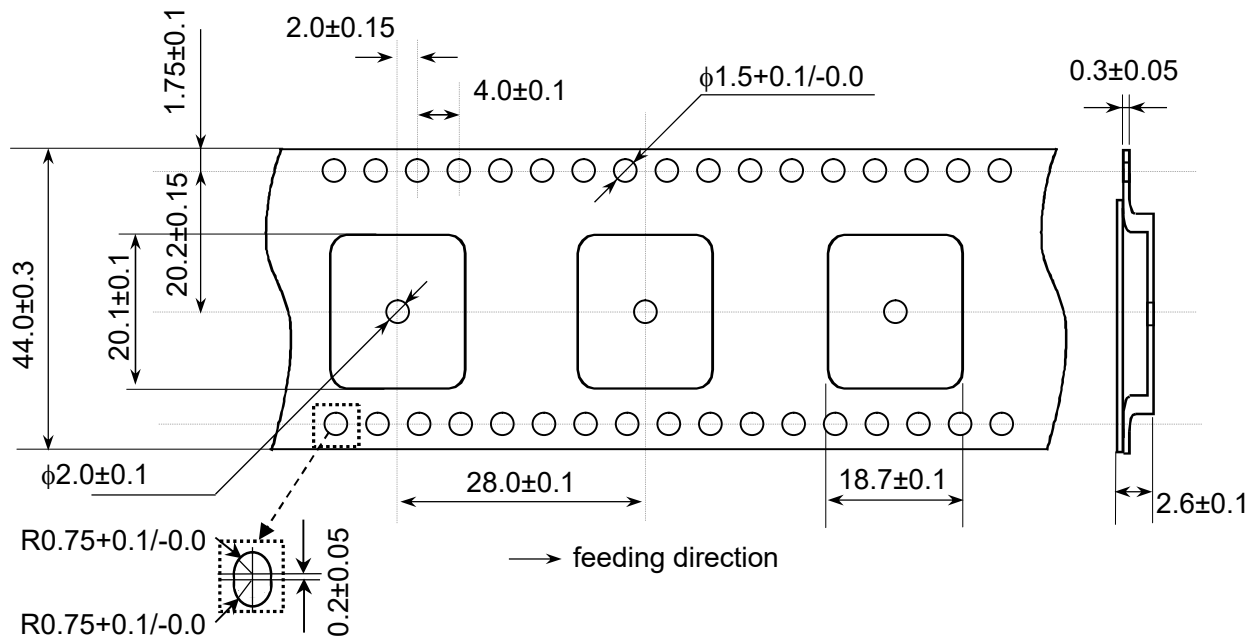
USART slave timing

Symbol	Parameter	Min	Typ	Max	Unit
$t_{\text{SU(D)}}$	Data set-up time	5	—	—	ns
$t_{\text{H(D)}}$	Data hold time	5	—	—	ns
$t_{\text{V(Q)}}$	Data output valid time	0	—	55	ns
$t_{\text{cy(SCLK)}}$	SCLK frequency	—	—	5	MHz



13. Tape and Reel Packing

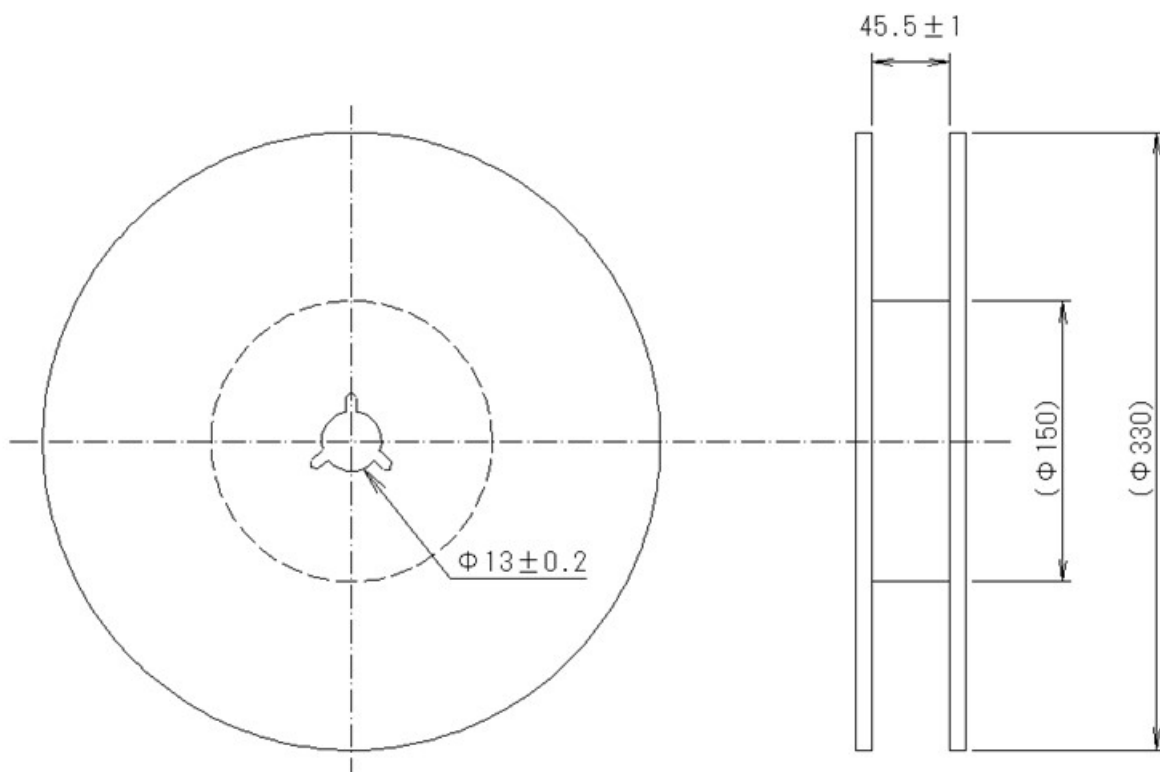
(1) Dimensions of Tape (Plastic tape)



- 1) The corner and ridge radiuses (R) of inside cavity are 0.3mm max.
- 2) Cumulative tolerance of 10 pitches of the sprocket hole is ± 0.15 mm
- 3) Measuring of cavity positioning is based on cavity center in accordance with JIS/IES standard.

(Unit : mm)

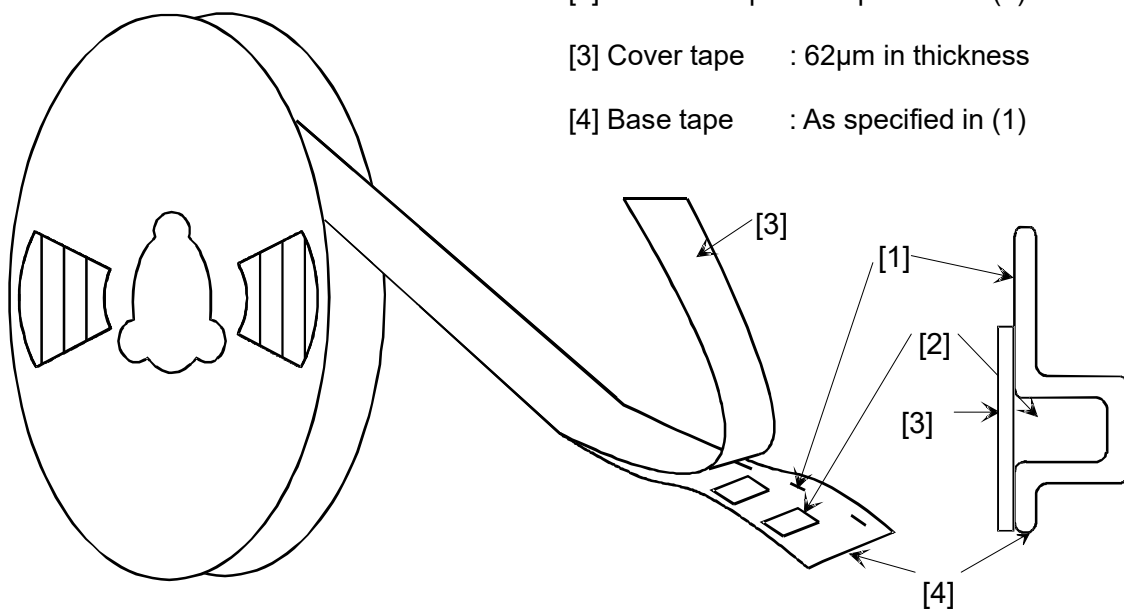
(2) Dimensions of Reel

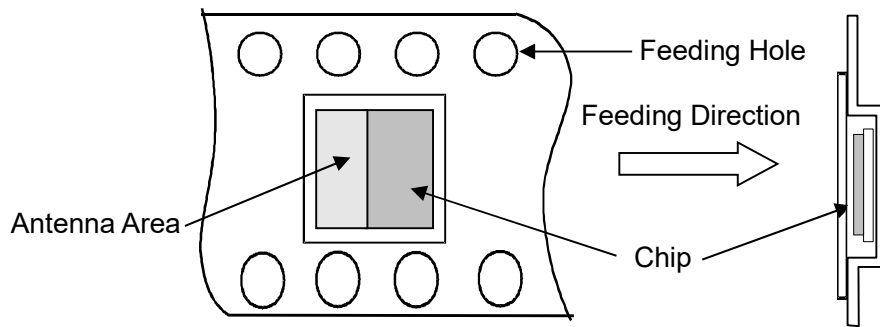


(unit : mm)

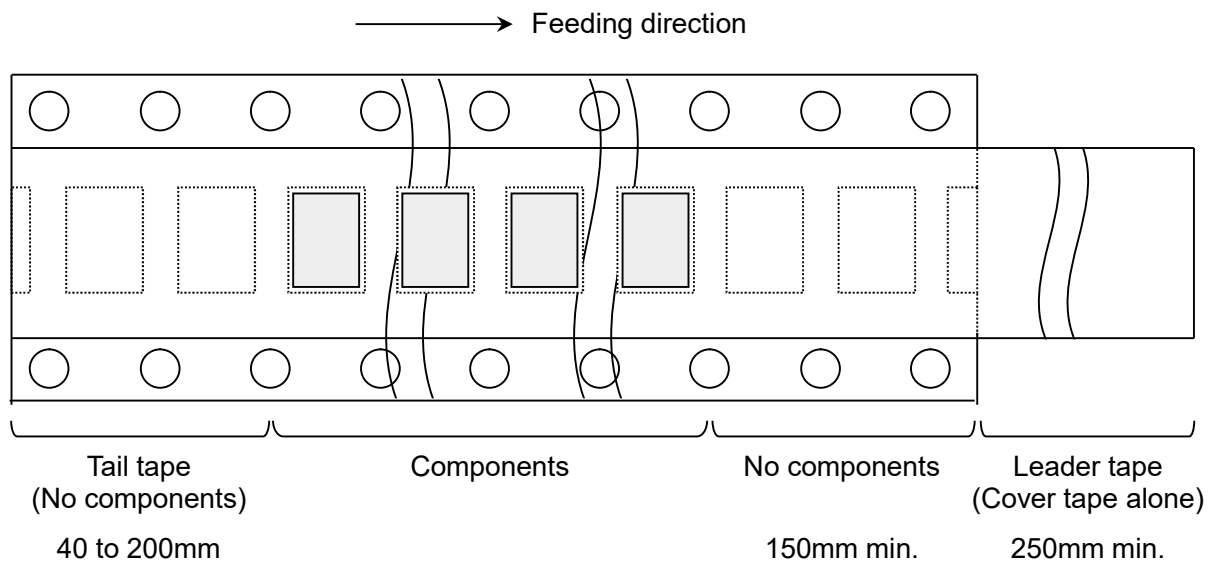
(3) Taping Diagrams

- [1] Feeding Hole : As specified in (1)
- [2] Hole for chip : As specified in (1)
- [3] Cover tape : 62 μ m in thickness
- [4] Base tape : As specified in (1)





(4) Leader and Tail tape



(5) The tape for chips are wound clockwise, the feeding holes to the right side as the tape is pulled toward the user.

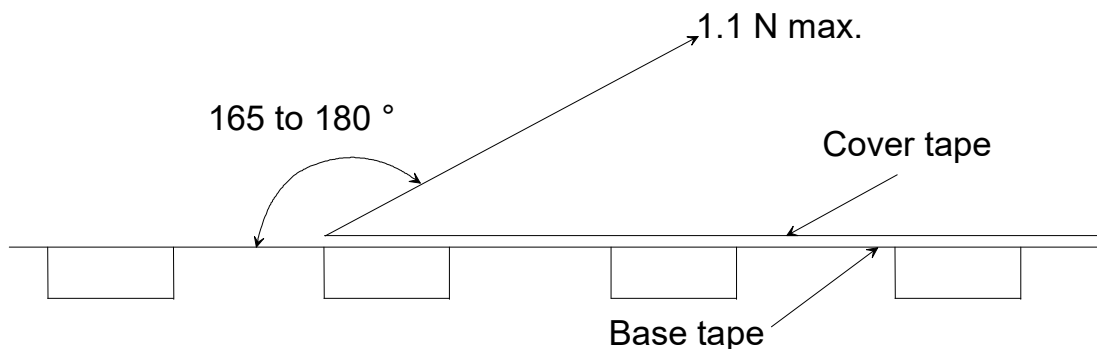
(6) The cover tape and base tape are not adhered at no components area for 250mm min.

(7) Tear off strength against pulling of cover tape : 5N min.

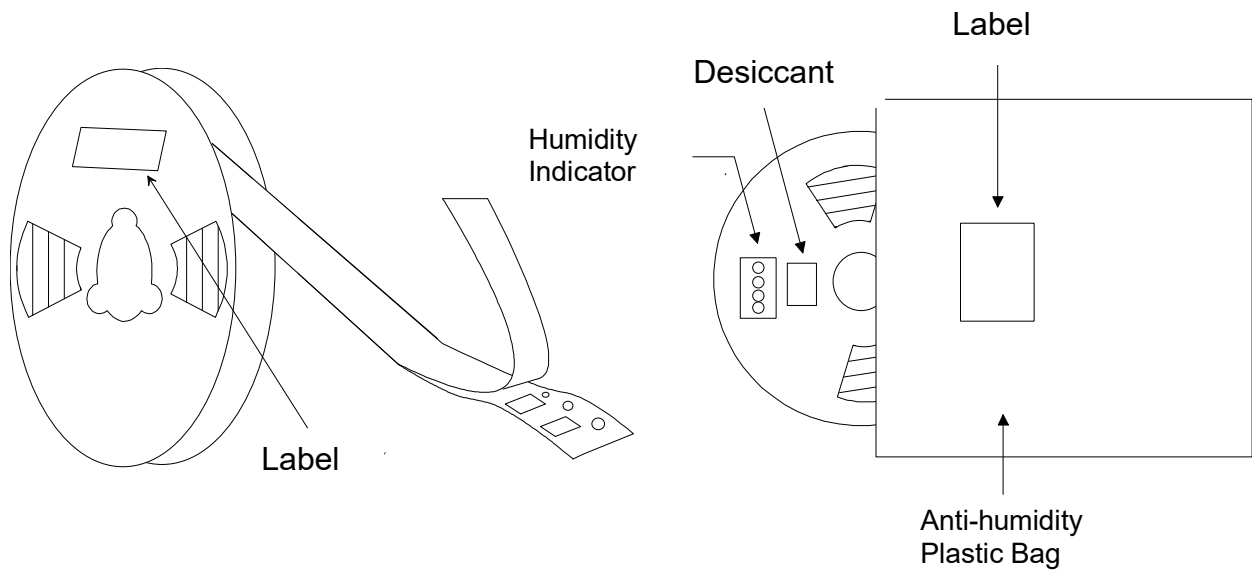
(8) Packaging unit : 500pcs./ reel

(9) material : Base tape : Plastic
Reel : Plastic
Cover tape, cavity tape and reel are made the anti-static processing.

(10) Peeling of force : 1.1N max. in the direction of peeling as shown below.



(11) Packaging (Humidity proof Packing)



Tape and reel must be sealed with the anti-humidity plastic bag. The bag contains the desiccant and the humidity indicator.

14. NOTICE

14.1 Storage Conditions:

Please use this product within 6month after receipt.

- The product shall be stored without opening the packing under the ambient temperature from 5 to 35 °C and humidity from 20 ~ 70 %RH.
(Packing materials, in particular, may be deformed at the temperature over 40 °C)
- The product left more than 6months after reception, it needs to be confirmed the solderbility before used.
- The product shall be stored in non corrosive gas (Cl₂, NH₃, SO₂, Nox, etc.).
- Any excess mechanical shock including, but not limited to, sticking the packing materials by sharp object and dropping the product, shall not be applied in order not to damage the packing materials.

This product is applicable to MSL3 (Based on IPC/JEDEC J-STD-020)

- After the packing opened, the product shall be stored at <30 °C / <60 %RH and the product shall be used within 168 hours.
- When the color of the indicator in the packing changed, the product shall be baked before soldering.

Baking condition : 125 +5/-0 °C, 24 hours, 1 time

The products shall be baked on the heat-resistant tray because the material (Base Tape, Reel Tape and Cover Tape) are not heat-resistant.

14.2 Handling Conditions:

Be careful in handling or transporting products because excessive stress or mechanical shock may break products.

Handle with care if products may have cracks or damages on their terminals, the characteristics of products may change. Do not touch products with bare hands that may result in poor solder ability and destroy by static electrical charge.

14.3 Standard PCB Design (Land Pattern and Dimensions):

All the ground terminals should be connected to the ground patterns. Furthermore, the ground pattern should be provided between IN and OUT terminals. Please refer to the specifications for the standard land dimensions.

The recommended land pattern and dimensions is as Murata's standard. The characteristics of products may vary depending on the pattern drawing method, grounding method, land dimensions, land forming method of the NC terminals and the PCB material and thickness. Therefore, be sure to verify the characteristics in the actual set. When using non-standard lands, contact Murata beforehand.

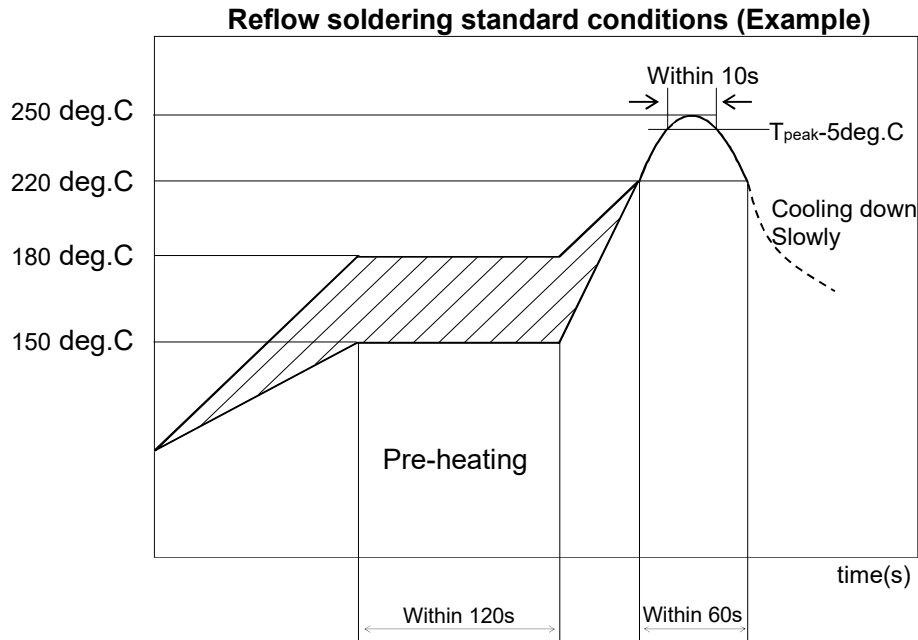
14.4 Notice for Chip Placer:

When placing products on the PCB, products may be stressed and broken by uneven forces from a worn-out chucking locating claw or a suction nozzle. To prevent products from damages, be sure to follow the specifications for the maintenance of the chip placer being used. For the positioning of products on the PCB, be aware that mechanical chucking may damage products.

14.5 Soldering Conditions:

The recommendation conditions of soldering are as in the following figure.

Soldering must be carried out by the above mentioned conditions to prevent products from damage. Set up the highest temperature of reflow within 260 °C. Contact Murata before use if concerning other soldering conditions.



Please use the reflow within 2 times.

Use rosin type flux or weakly active flux with a chlorine content of 0.2 wt % or less.

14.6 Cleaning:

Since this Product is Moisture Sensitive, any cleaning is not recommended. If any cleaning process is done the customer is responsible for any issues or failures caused by the cleaning process.

14.7 Operational Environment Conditions:

Products are designed to work for electronic products under normal environmental conditions (ambient temperature, humidity and pressure). Therefore, products have no problems to be used under the similar conditions to the above-mentioned. However, if products are used under the following circumstances, it may damage products and leakage of electricity and abnormal temperature may occur.

- In an atmosphere containing corrosive gas (Cl_2 , NH_3 , SO_x , NO_x etc.).
- In an atmosphere containing combustible and volatile gases.
- Dusty place.
- Direct sunlight place.
- Water splashing place.
- Humid place where water condenses.
- Freezing place.

If there are possibilities for products to be used under the preceding clause, consult with Murata before actual use.

As it might be a cause of degradation or destruction to apply static electricity to products, do not apply static electricity or excessive voltage while assembling and measuring.

15 PRECONDITION TO USE OUR PRODUCTS

PLEASE READ THIS NOTICE BEFORE USING OUR PRODUCTS.

Please make sure that your product has been evaluated and confirmed from the aspect of the fitness for the specifications of our product when our product is mounted to your product.

All the items and parameters in this product specification/datasheet/catalog have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment specified in this specification. You are requested not to use our product deviating from the condition and the environment specified in this specification.

Please note that the only warranty that we provide regarding the products is its conformance to the specifications provided herein. Accordingly, we shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this specification.

WE HEREBY DISCLAIM ALL OTHER WARRANTIES REGARDING THE PRODUCTS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, THAT THEY ARE DEFECT-FREE, OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS.

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The product shall not be used in any application listed below which requires especially high reliability for the prevention of such defect as may directly cause damage to the third party's life, body or property. You acknowledge and agree that, if you use our products in such applications, we will not be responsible for any failure to meet such requirements. Furthermore, YOU AGREE TO INDEMNIFY AND DEFEND US AND OUR AFFILIATES AGAINST ALL CLAIMS, DAMAGES, COSTS, AND EXPENSES THAT MAY BE INCURRED, INCLUDING WITHOUT LIMITATION, ATTORNEY FEES AND COSTS, DUE TO THE USE OF OUR PRODUCTS AND THE SOFTWARE IN SUCH APPLICATIONS.

- Aircraft equipment.
- Aerospace equipment
- Undersea equipment.
- Power plant control equipment
- Medical equipment.
- Traffic signal equipment.
- Burning / explosion control equipment
- Disaster prevention / crime prevention equipment.
- Transportation equipment (vehicles, trains, ships, elevator, etc.).
- Application of similar complexity and/ or reliability requirements to the applications listed in the above.

We expressly prohibit you from analyzing, breaking, reverse-engineering, remodeling altering, and reproducing our product. Our product cannot be used for the product which is prohibited from being manufactured, used, and sold by the regulations and laws in the world.

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Please do not use our products, our technical information and other data provided by us for the purpose of developing of mass-destruction weapons and the purpose of military use.

Moreover, you must comply with "foreign exchange and foreign trade law", the "U.S. export administration regulations", etc.

Please note that we may discontinue the manufacture of our products, due to reasons such as end of supply of materials and/or components from our suppliers.

By signing on specification sheet or approval sheet, you acknowledge that you are the legal representative for your company and that you understand and accept the validity of the contents herein. When you are not able to return the signed version of specification sheet or approval sheet within 30 days from receiving date of specification sheet or approval sheet, it shall be deemed to be your consent on the content of specification sheet or approval sheet. Customer acknowledges that engineering samples may deviate from specifications and may contain defects due to their development status. We reject any liability or product warranty for engineering samples. In particular we disclaim liability for damages caused by

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