# 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

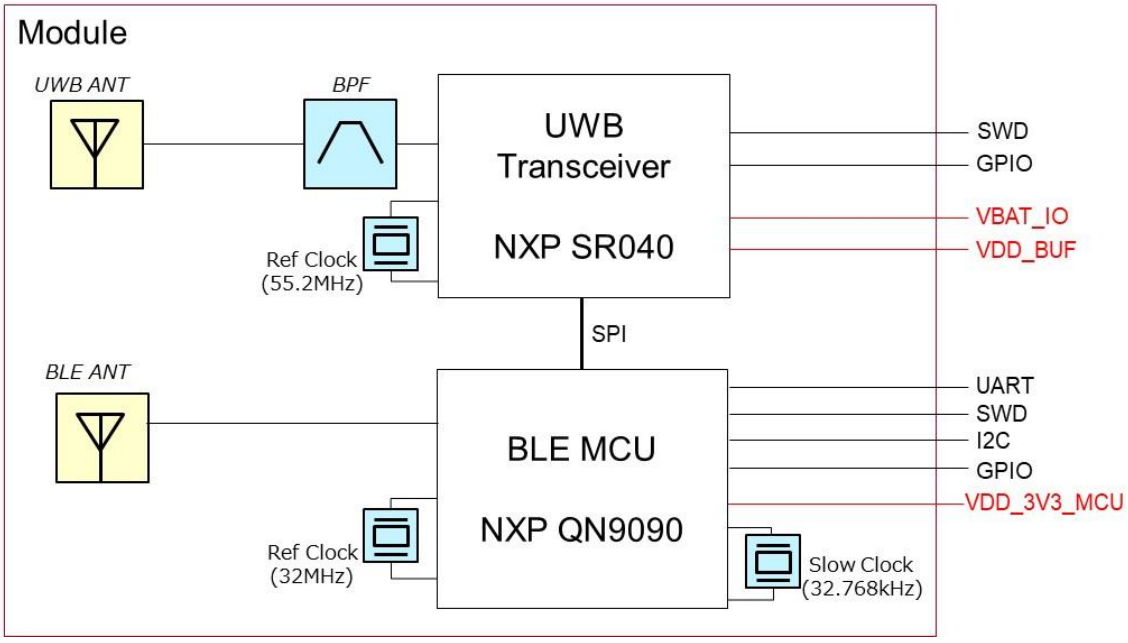
## 2. Key Features

- 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

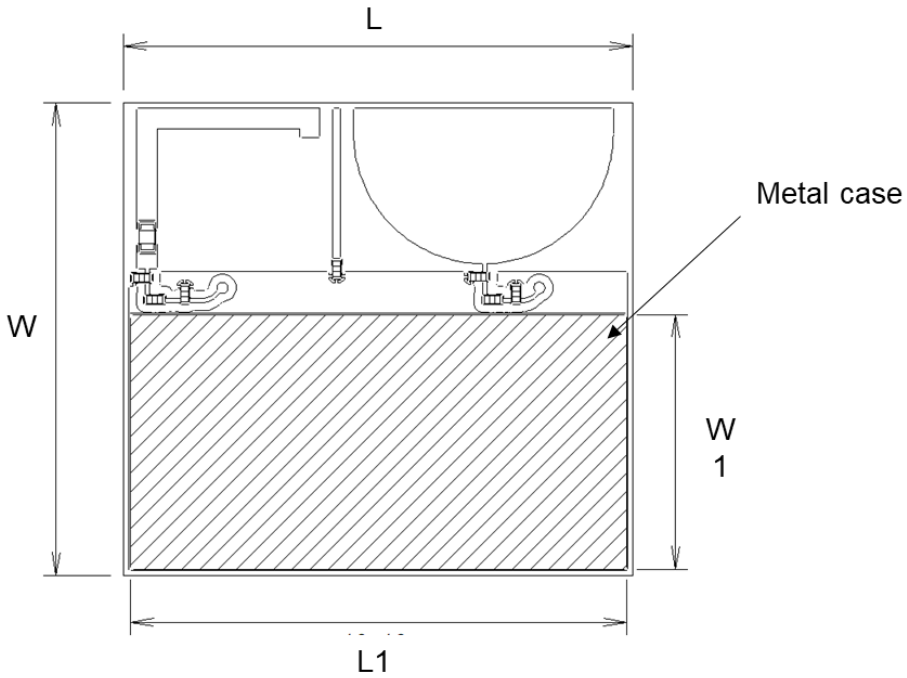
**Europe**
EN300328 conducted test report is prepared.
*This test report is applicable to the customer's final product.

EN302065 conducted test report is prepared.
*This test report is for reference only and not applicable to the customer's final product.

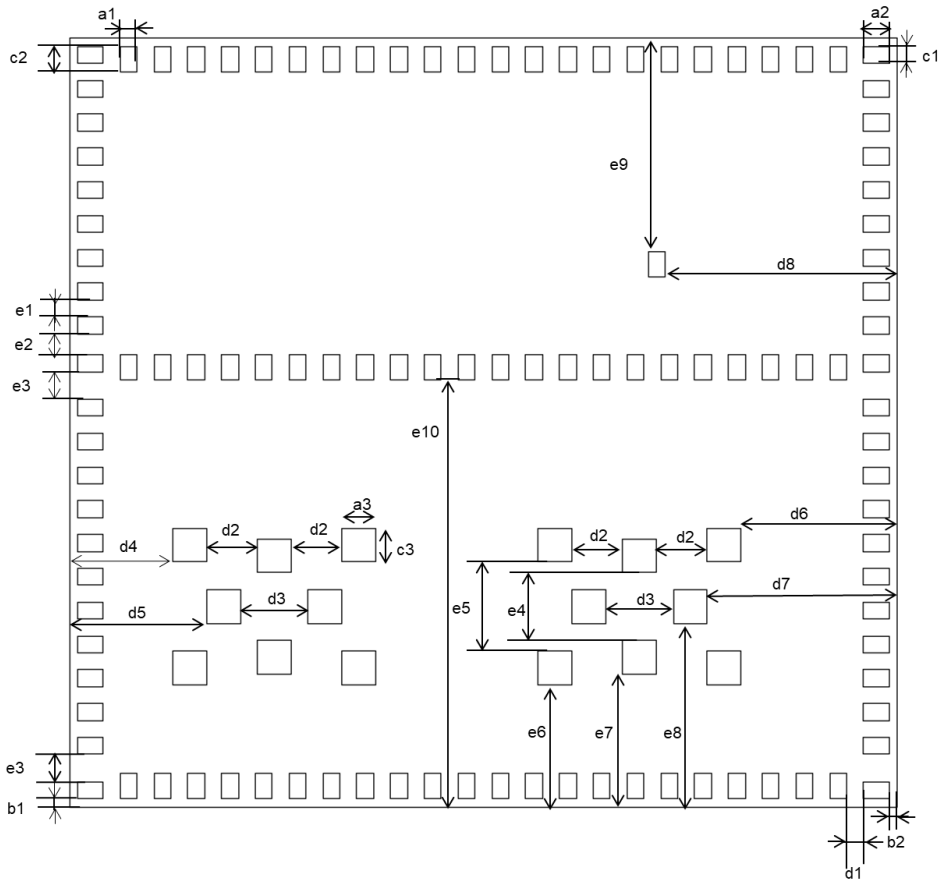
**Japan**
Japanese type certification is prepared.
Ⓡ 003-220243

## 6. Dimensions, Marking and Terminal Configurations

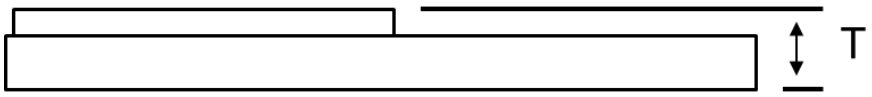
<DIMENSIONS : TOP>




<DIMENSIONS : BOTTOM(TOP VIEW)>




<DIMENSIONS : SIDE>

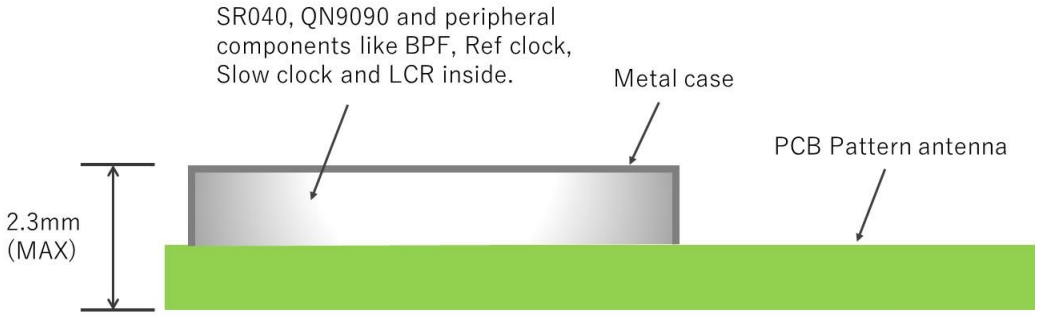



(unit:mm)

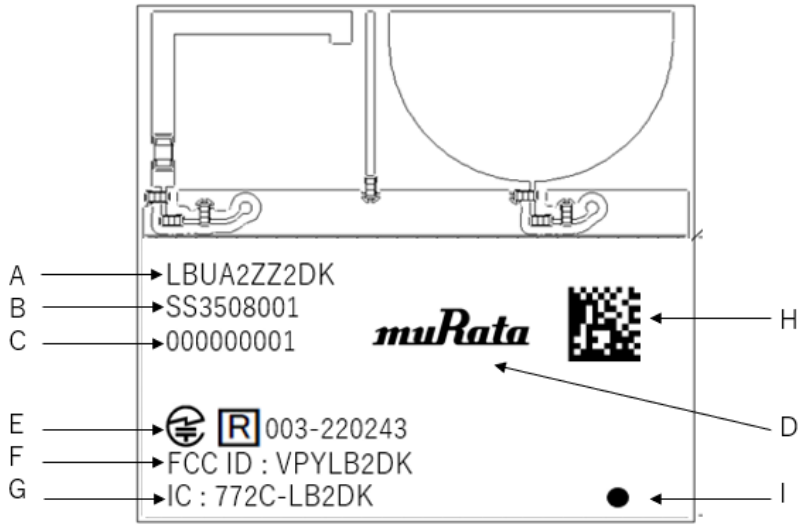
| Mark | Dimensions | Mark | Dimensions | Mark | Dimensions |
|---|---|---|---|---|---|
| L | 19.6 +/- 0.2 | W | 18.2 +/- 0.2 | L1 | 18.95 +/- 0.1 |
| W1 | 9.65 +/- 0.1 | T | 2.3 max | | - |
| a1 | 0.4 +/- 0.1 | a2 | 0.6 +/- 0.1 | a3 | 0.8 +/- 0.1 |
| b1 | 0.2 +/- 0.1 | b2 | 0.2 +/- 0.1 | c1 | 0.4 +/- 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

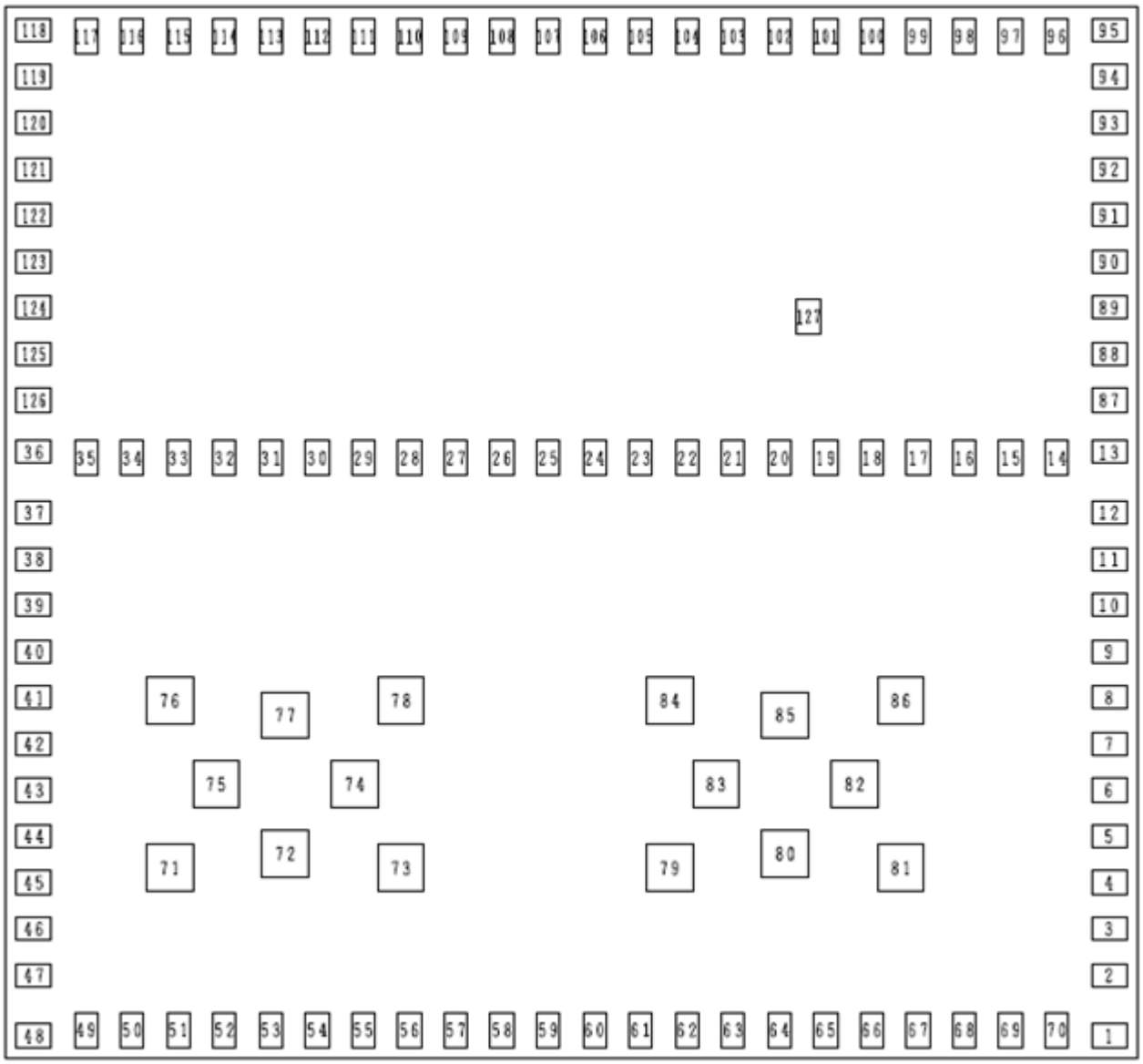



| Marking | Meaning |
|---|---|
| A | Module Type |
| B | Lot Number |
| C | Serial Number |
| D | Murata Logo |
| E | TELEC Mark / ID |
| F | FCC ID |
| G | IC ID |
| H | 2D Code |
| I | Pin 1 Marking |

## 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_LEDR | 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 resister in the SR040 |
| 3 | SR_SWDCLK | | SR040 | SWCLK | SR040 Serial Wire Debug (SWD) data, internal pull-up resister 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 | QM9090 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_LEDR | | 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 | | | |
| 83 | GND | GND | | | |
| 84 | GND | GND | | | |
| 85 | GND | GND | | | |
| 86 | GND | GND | | | |
| 87 | GND | GND | | | |
| 88 | NC | | | | |
| 89 | NC | | | | |
| 90 | NC | | | | |
| 91 | NC | | | | |
| 92 | NC | | | | |
| 93 | NC | | | | |
| 94 | NC | | | | |
| 95 | NC | | | | |
| 96 | NC | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 97 | NC | | | | |
| 98 | NC | | | | |
| 99 | NC | | | | |
| 100 | NC | | | | |
| 101 | NC | | | | |
| 102 | NC | | | | |
| 103 | NC | | | | |
| 104 | NC | | | | |
| 105 | NC | | | | |
| 106 | NC | | | | |
| 107 | NC | | | | |
| 108 | NC | | | | |
| 109 | NC | | | | |
| 110 | NC | | | | |
| 111 | NC | | | | |
| 112 | NC | | | | |
| 113 | NC | | | | |
| 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<br>1.9(*1) | | 3.6 | V |
| | VBAT_IO | 2.4<br>1.9(*1) | | 3.6 | V |

(*1 : 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 |

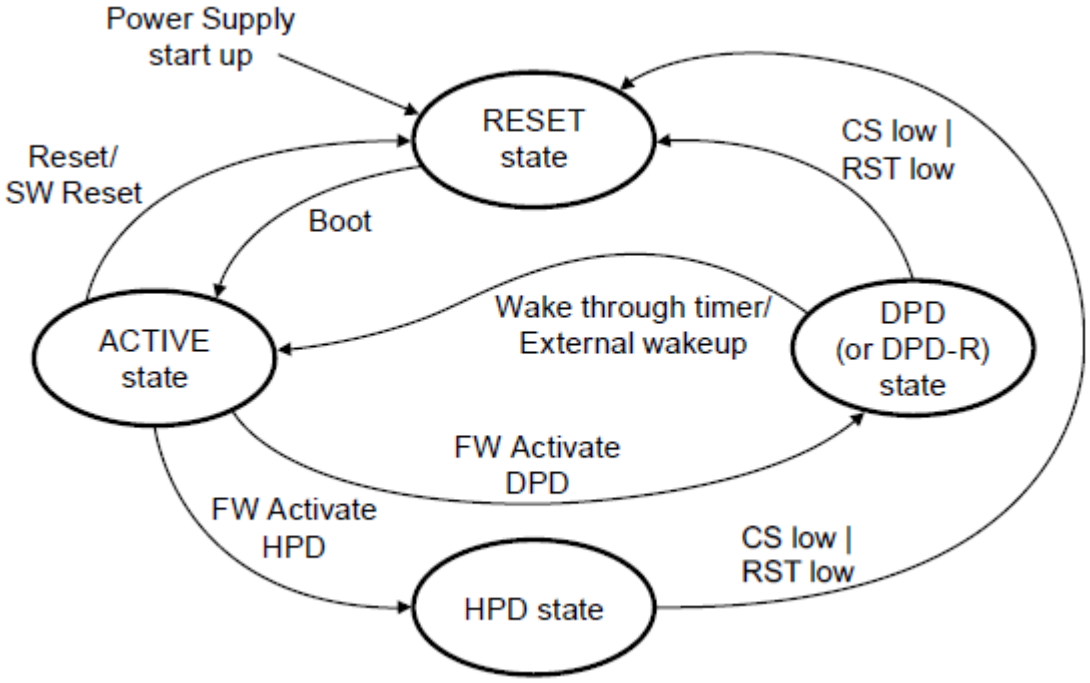
| | | | | | | |
|---|---|---|---|---|---|---|
| | | 20% to 80%, VDD_3V3_MCU =1.9V Fast speed | 1.2 | - | 4 | ns |
| $t_{fall}$ | Fall time | 20% to 80%, VDD_3V3_MCU =3.3V Slow speed | 1.1 | - | 3.3 | ns |
| | | 20% to 80%, VDD_3V3_MCU =1.9V Slow speed | 1.6 | - | 5 | ns |
| | | 20% to 80%, VDD_3V3_MCU =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

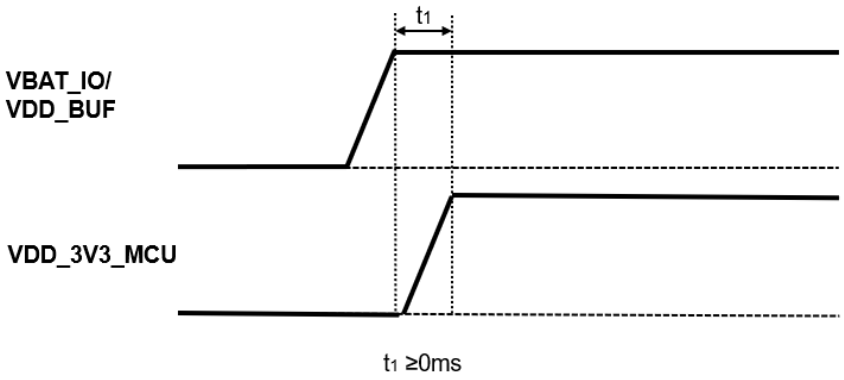
SR040 has different power states and transition of those power states.



### 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



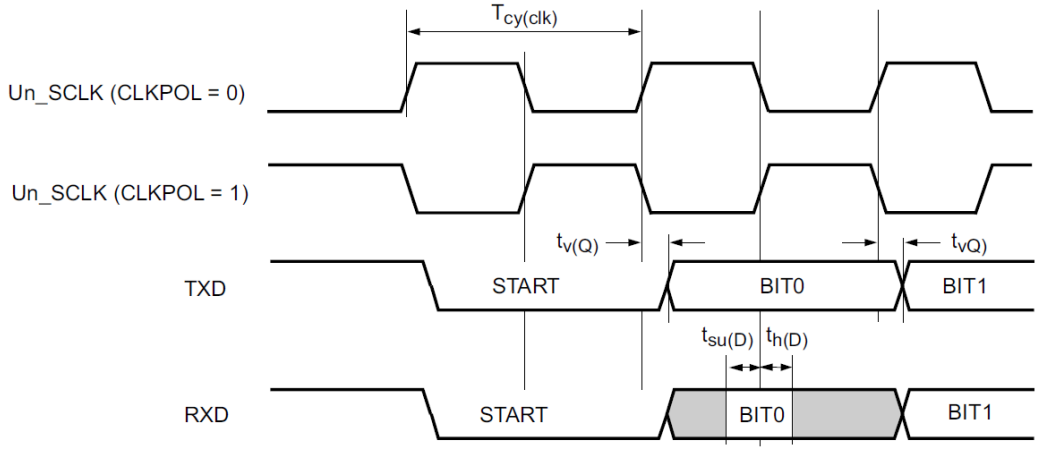

## 11. Interface

USART master timing

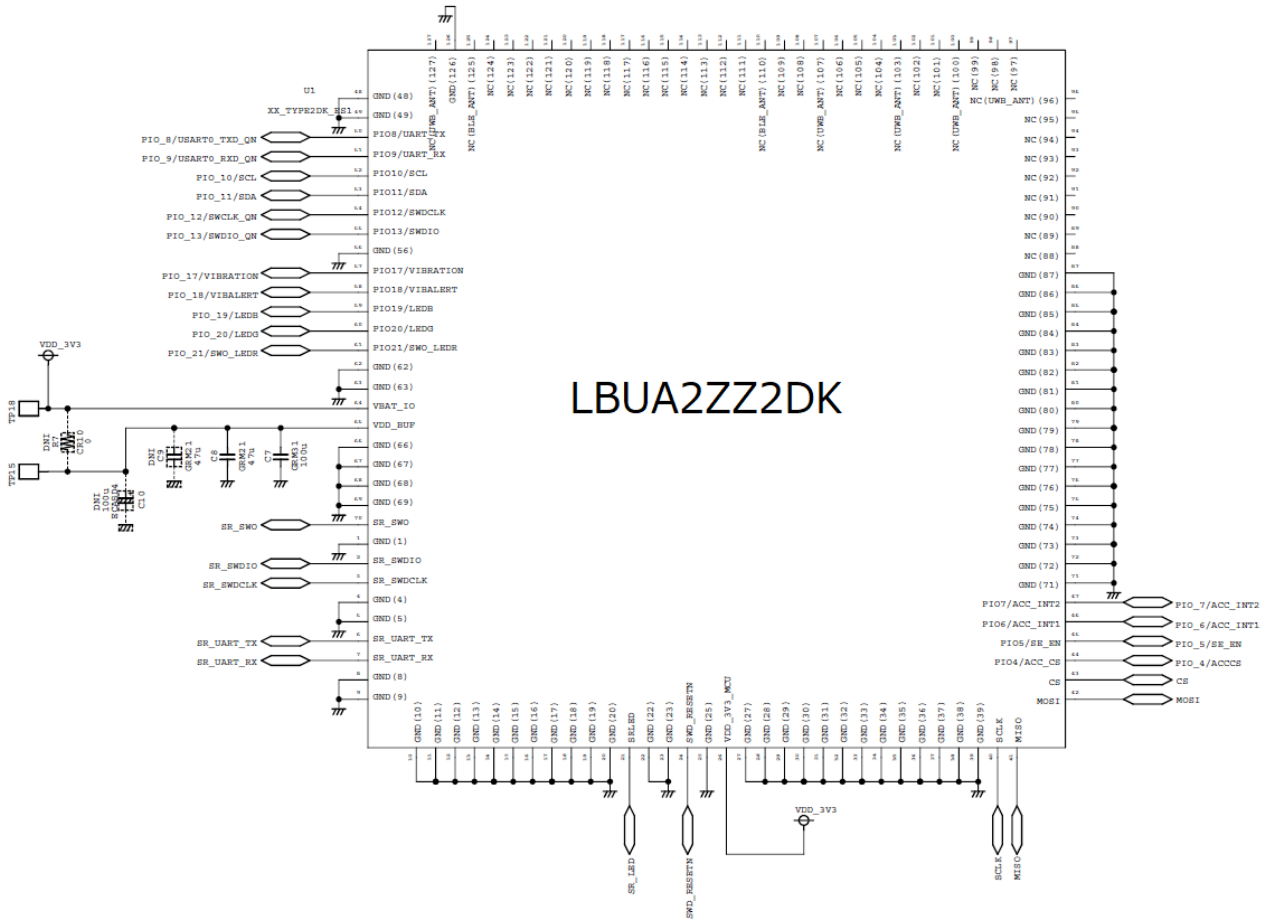
| Symbol | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| $t_{SU(D)}$ | Data set-up time | 45 | — | — | ns |
| $t_{h(D)}$ | Data hold time | 5 | — | — | ns |
| $t_{V(Q)}$ | Data output valid time | 0 | — | 25 | ns |
| $t_{cy(SCLK)}$ | SCLK frequency | — | — | 5 | MHz |

USART slave timing

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

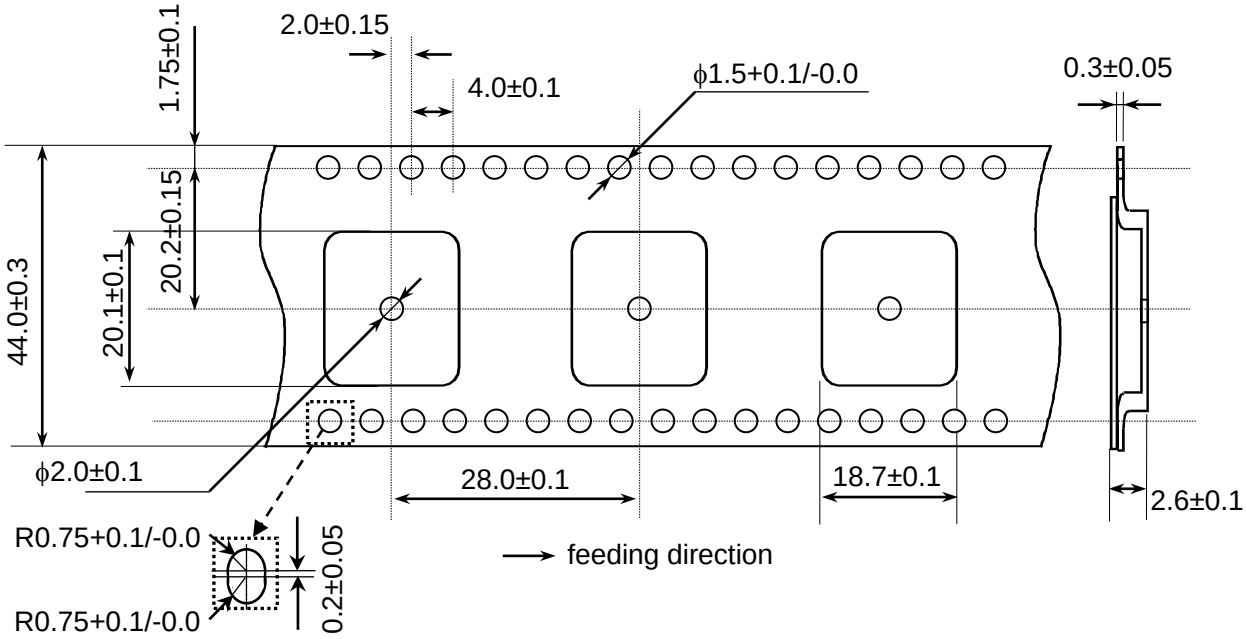


## 12. Reference Circuit



## 13.Tape and Reel Packing

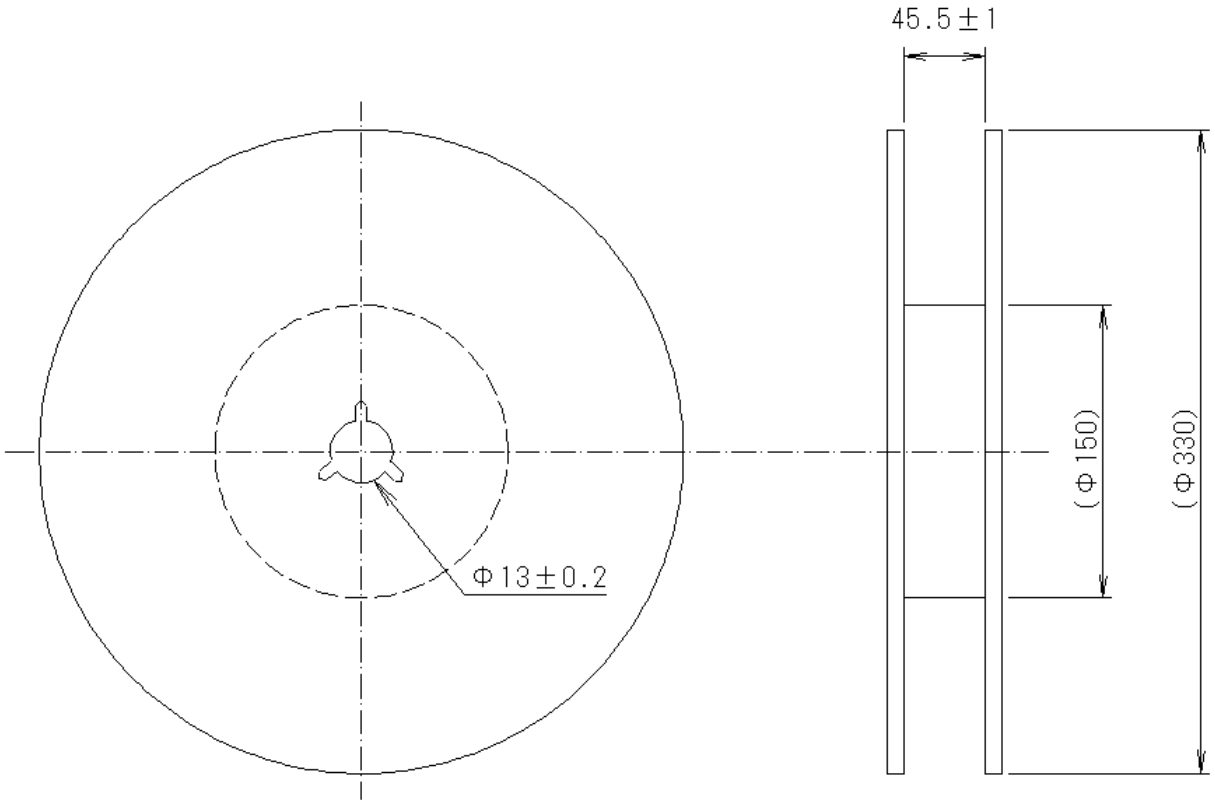
(1) Dimensions of Tape (Plastic tape)




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 +/-0.15mm
3) Measuring of cavity positioning is based on cavity center in accordance with JIS/IES standard.

(Unit : mm)

(2) Dimensions of Reel




(unit : mm)

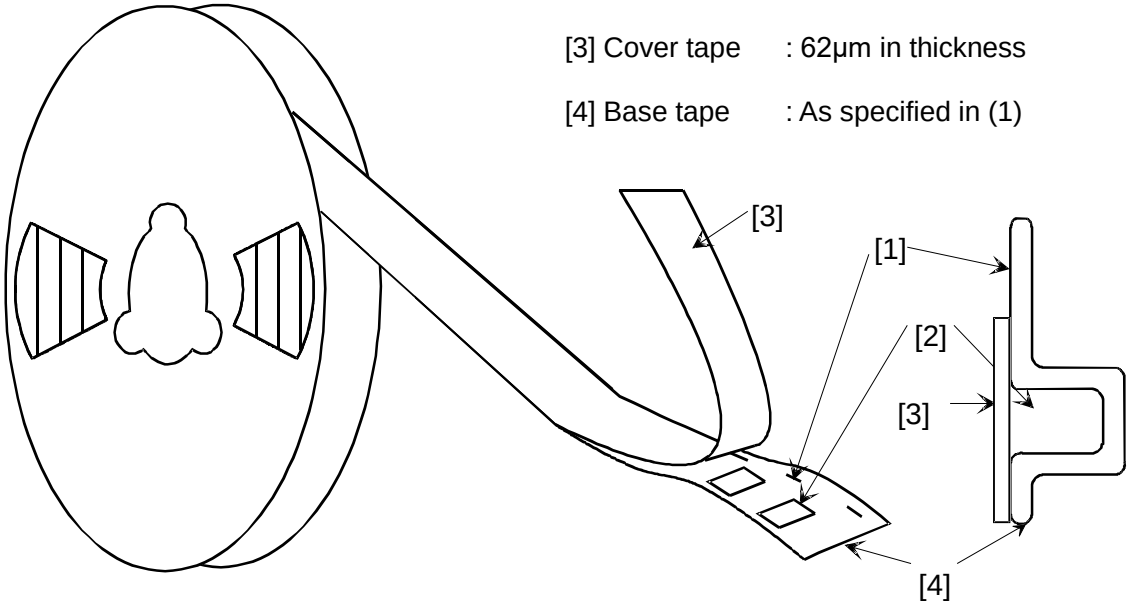
(3) Taping Diagrams

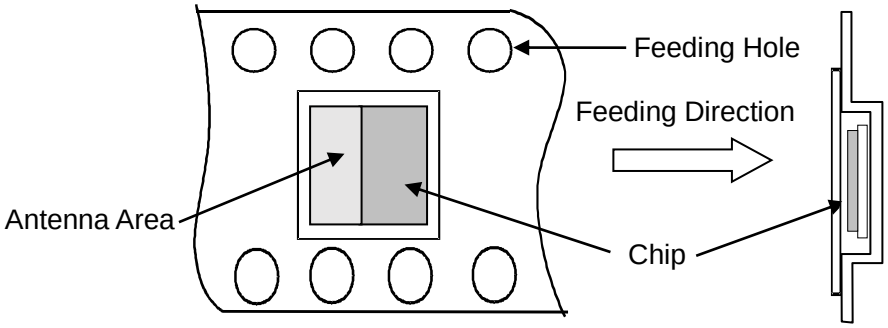
[1] Feeding Hole : As specified in (1)

[2] Hole for chip : As specified in (1)

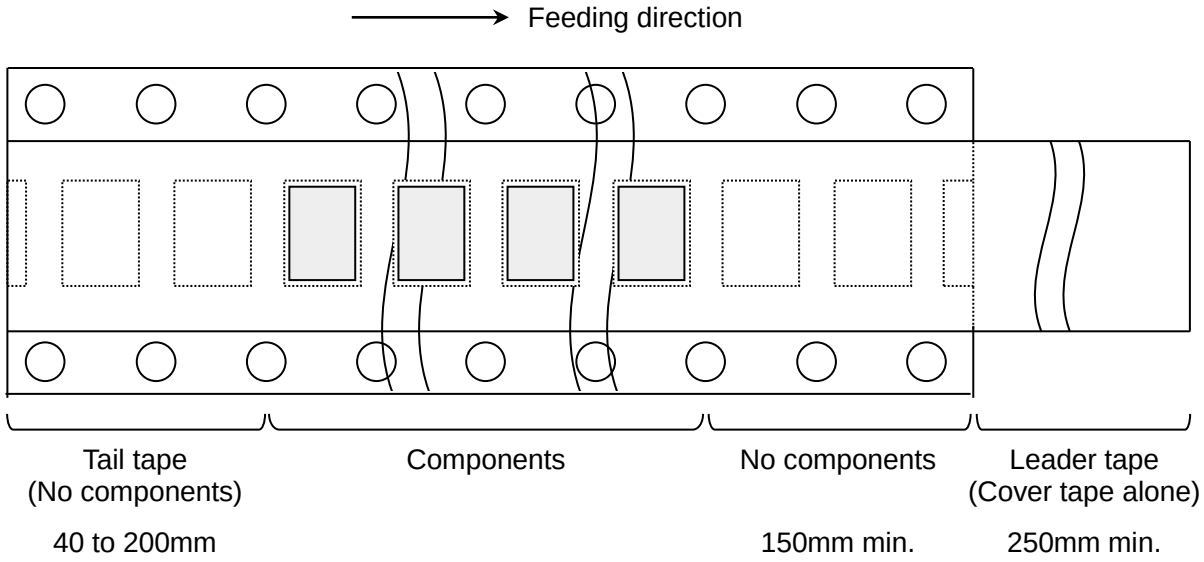
[3] Cover tape : 62μm in thickness

[4] Base tape : As specified in (1)






(4) Leader and Tail tape



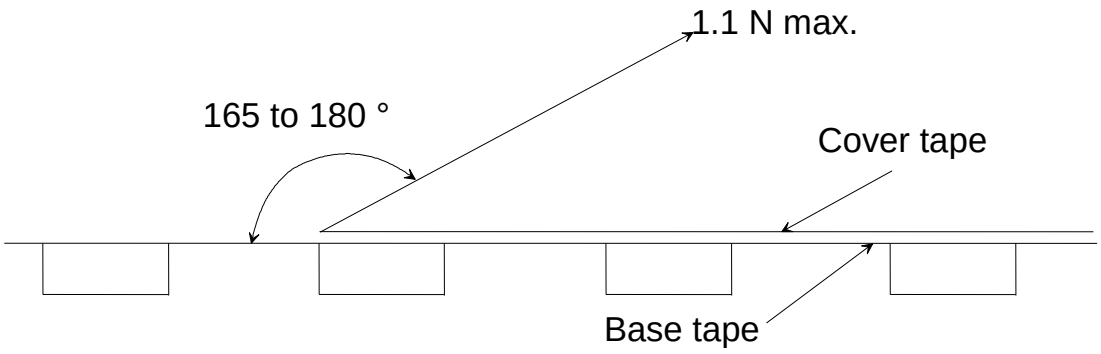

(5) The tape for chips are wound clockwise, the feeding holes to the right side as the tape is pulled toward the user.
(6) The cover tape and base tape are not adhered at no components area for 250mm min.

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

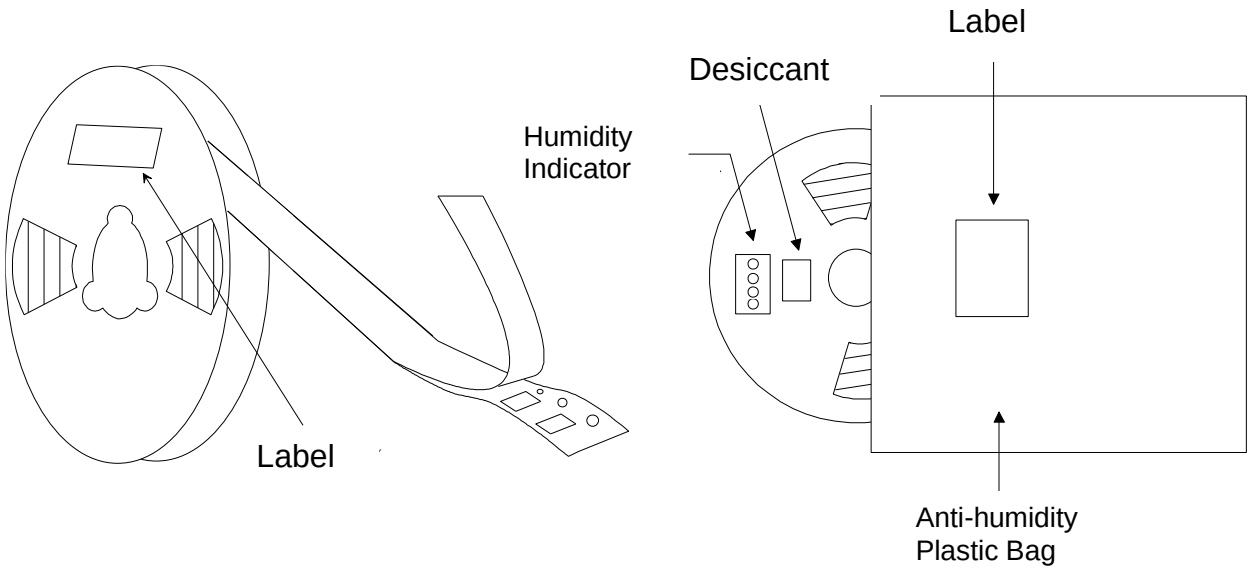
(8) Packaging unit : 500pcs./ reel

(9) material : Base tape : Plastic
Real : 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.

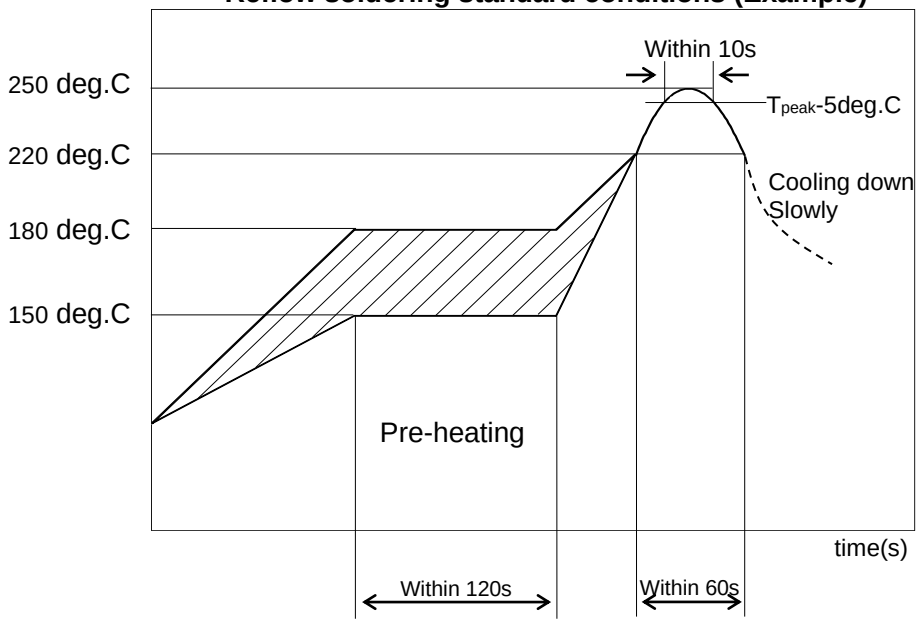
## 14.4 Notice for Chip Placer:

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.

**Reflow soldering standard conditions (Example)**




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.
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- 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.

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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.
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