

Bluetooth Module
MBL0402E

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Firmtech

Bluetooth Module

MBL0402E

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1. General Description

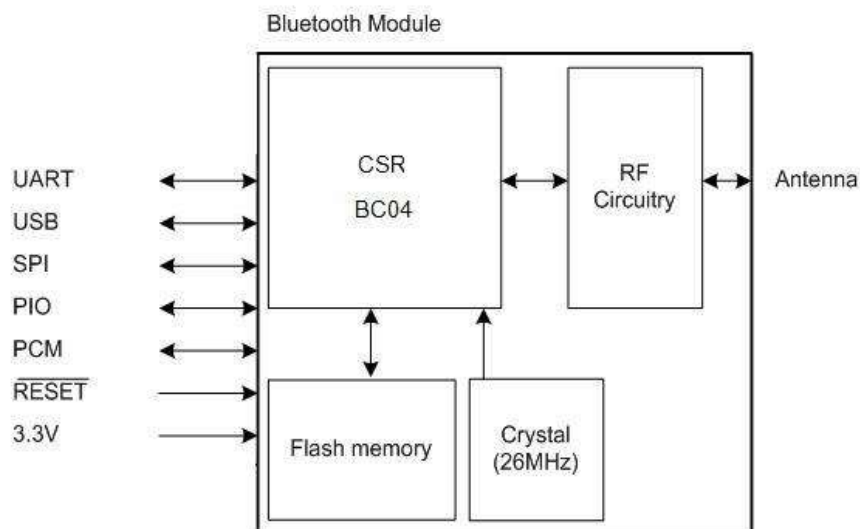
Features :

- Class 2 Module
- Fully Qualified Bluetooth v2.1+EDR
- CSR BlueCore® 4 External
- UART interface
- SPI interface for debug
- Integrated 26MHz Crystal
- Support for 802.11 coexistence

Applications :

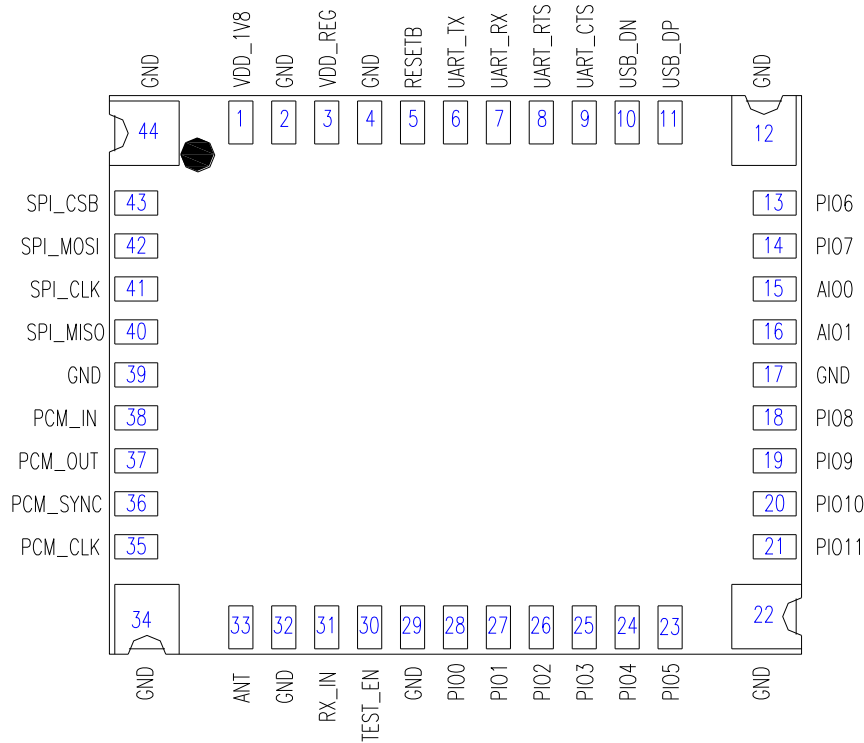
- Personal Digital Assistants
- Digital Cameras
- Computer Accessories (compact Flash Cards, PCMCIA Cards, SD Cards and USB Dongles)

2. Block Diagram



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3. Pin Description



< TOP VIEW >

Pin	Pin Name	Direction	Description
1	VDD_1V8	I	Internal regulator
2	GND	I	Ground
3	VDD_REG	I	Power supply 3.3V
4	GND	I	Ground
5	RESETB	I	Reset if low. Input debounced so must be low for >5ms to cause a reset
6	UART_TX	O	UART data output
7	UART_RX	I	UART data input
8	UART_RTS	O	UART request to send, active low
9	UART_CTS	I	UART clear to send, active low
10	USB_DN	I/O	USB data minus
11	USB_DP	I/O	USB data plus with selectable internal 1.5kΩ pull-up resistor

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12	GND	I	Ground
13	PIO6	I/O	Programmable input/output line
14	PIO7	I/O	Programmable input/output line
15	AIO0	I/O	Analogue programmable input/output line
16	AIO1	I/O	Analogue programmable input/output line
17	GND	I	Ground
18	NC	-	-
19	PIO9	I/O	Programmable input/output line
20	PIO10	I/O	Programmable input/output line
21	PIO11	I/O	Programmable input/output line
22	GND	I	Ground
23	PIO5	I/O	Programmable input/output line
24	PIO4	I/O	Programmable input/output line
25	PIO3	I/O	Programmable input/output line
26	PIO2	I/O	Programmable input/output line
27	PIO1	I/O	Programmable input/output line
28	PIO0	I/O	Programmable input/output line
29	GND	I	Ground
30	TEST_EN	I	For test purposes only (leave unconnected)
31	RX_IN		Single ended receiver input
32	GND	I	Ground
33	ANT	I/O	Antenna
34	GND	I	Ground
35	PCM_CLK	I/O	Synchronous data clock
36	PCM_SYNC	I/O	Synchronous data sync
37	PCM_OUT	O	Synchronous data output
38	PCM_IN	I	Synchronous data input
39	GND	I	Ground
40	SPI_MISO	O	SPI data output
41	SPI_CLK	I	SPI clock
42	SPI_MOSI	I	SPI data input
43	SPI_CSB	I	SPI chip select, active low
44	GND	I	Ground

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4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Parameter	Min.	Typ.	Max.	Unit
Storage Temperature Range	-40		+85	°C
Supply Voltage : VDD_REG	-0.4		+5.6	V
Supply Voltage : VDD_1V8	-0.4		+2.2	V
Other Terminal Voltages	(VSS-0.4)		VDD+0.4	V

4.2 Recommended Operating Conditions

Ta = 20 °C, unless otherwise noted.

Parameter	Min.	Typ.	Max.	Unit
Operating Temperature Range	-20		+70	°C
Supply Voltage : VDD_REG	2.7	3.3	3.6	V
Supply Voltage : VDD_1V8	1.7	-	1.9	V

Digital Terminals : USB

Parameter	Min.	Typ.	Max.	Unit
VDD_REG	3.1		3.6	V
V _{IL} input logic level low	-	-	0.3*VDD_REG	V
V _{IH} input logic level high	0.7*VDD_REG	-	-	V
V _{OL} output logic level low	0	-	0.2	V
V _{OH} output logic level high	2.8	-	VDD_REG	V

* The voltage level on the VDD_REG supply terminals must be an absolute minimum of 3.1V when using USB interface.

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Digital Terminals : the other digital terminals

Parameter	Min.	Typ.	Max.	Unit
VDD_REG	2.7	-	3.0	V
V _{IL} input logic level low	-0.4	-	0.8	V
V _{IH} input logic level high	0.7*VDD_REG	-	VDD_REG+0.4	V
V _{OL} output logic level low (I _o = 4.0mA)	-	-	0.2	V
V _{OH} output logic level high (I _o = -4.0mA)	VDD_REG-0.2	-	-	V

4.3 Power Consumption

Operation mode	Connection Type	UART Rate (kbps)	Typ. (Avg)	Unit
Page scan, Time interval=1.28s	-	115.2	0.42	mA
Inquiry and page scan	-	115.2	0.76	mA
ACL No traffic	Master	115.2	4.6	mA
ACL 1.28s sniff	Master	38.4	0.37	mA
SCO HV1	Master	38.4	39.2	mA
SCO HV3	Master	38.4	20.3	mA
Standby Host Connection	-	38.4	0.04	mA

Conditions : Ta = 20 °C, VDD_REG = 3.15 V

* The current values above are the reference values of CSR BC04 EXT chip.

5. RF Characteristics

Conditions : VDD_REG = 3.3V, Ta = 20 °C, unless otherwise noted.

5.1 Transceiver

Item	Condition	Min	Typ	Max	Unit
Frequency range		2402		2480	MHz
Impedance at ANT pin			50		Ohm

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5.2 Transmitter

Item	Condition	Min	Typ	Max	Unit
RF transmit power		-4		4	dBm
Power density				20	dBm
20dB bandwidth for modulated carrier				1000	kHz
Adjacent channel transmit power	$F=F_0 \pm 2\text{MHz}$			-20	dBm
Adjacent channel transmit power	$\pm 3\text{MHz}$			-40	dBm
Adjacent channel transmit power	$\pm 4\text{MHz}$			-40	dBm
Out-band Spurious Emission	30MHz ~ 1GHz			-36	dBm
Out-band Spurious Emission	1GHz ~ 12.75GHz			-30	dBm
Out-band Spurious Emission	1.8GHz ~ 1.9GHz			-47	dBm
Out-band Spurious Emission	5.1GHz ~ 5.3GHz			-47	dBm
$\Delta f_{1\text{avg}}$ Maximum Modulation		140		175	kHz
$\Delta f_{2\text{max}}$ Minimum Modulation		115			kHz
$\Delta f_{2\text{avg}} / \Delta f_{1\text{avg}}$		0.8			-
Initial Carrier Frequency Tolerance	DH1 packet	-40		40	kHz
Carrier Frequency Drift	Longest(DH5)	-25		25	kHz

5.3 Receiver

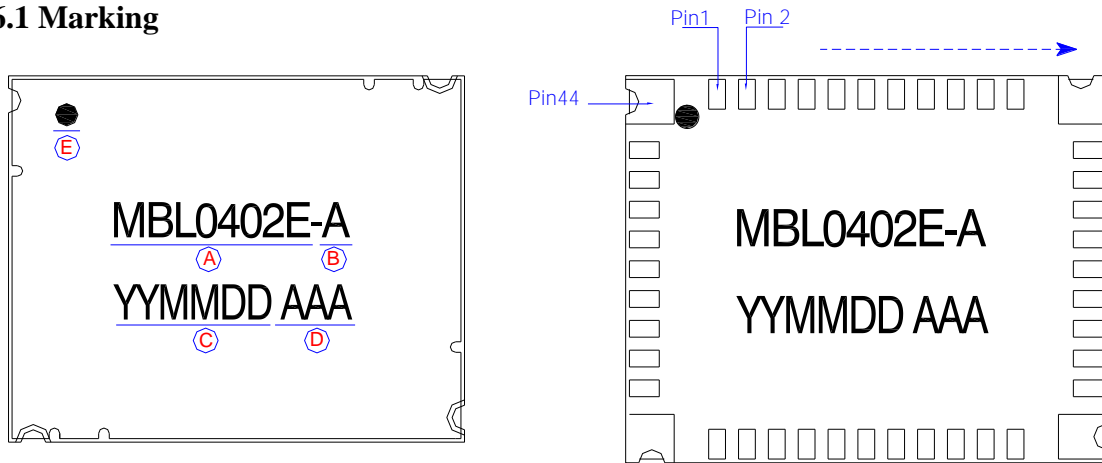
Item	Condition	Min	Typ	Max	Unit
Sensitivity at 0.1% BER	Single-slot	-74	-82		dBm
Sensitivity at 0.1% BER	Multi-slot	-74	-81		dBm
Maximum received signal at 0.1% BER		-20	-5		dBm
Maximum level of intermodulation interferers	$f_1 - f_2 = 5\text{ MHz}$, $P_{\text{wanted}} = -64\text{ dBm}$	-39			

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6. Marking and Physical Dimension

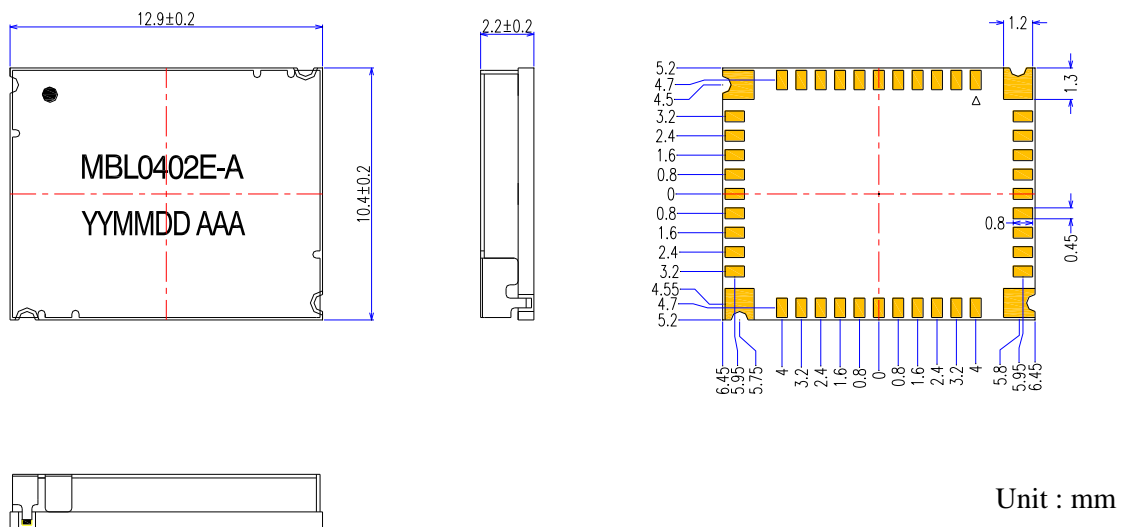
6.1 Marking



Index	Mark	Description
A	MBL0402E	Part Number
B	A	Type Code
C	YYMMDD	Manufactured Year/Month/Day
D	AAA	Customer Code (Optional)
E	-	Mark for Pin #1

* CAUTION: Pin Numbering is clockwise from the Pin #1 mark when viewed from the top.

6.2 Dimension

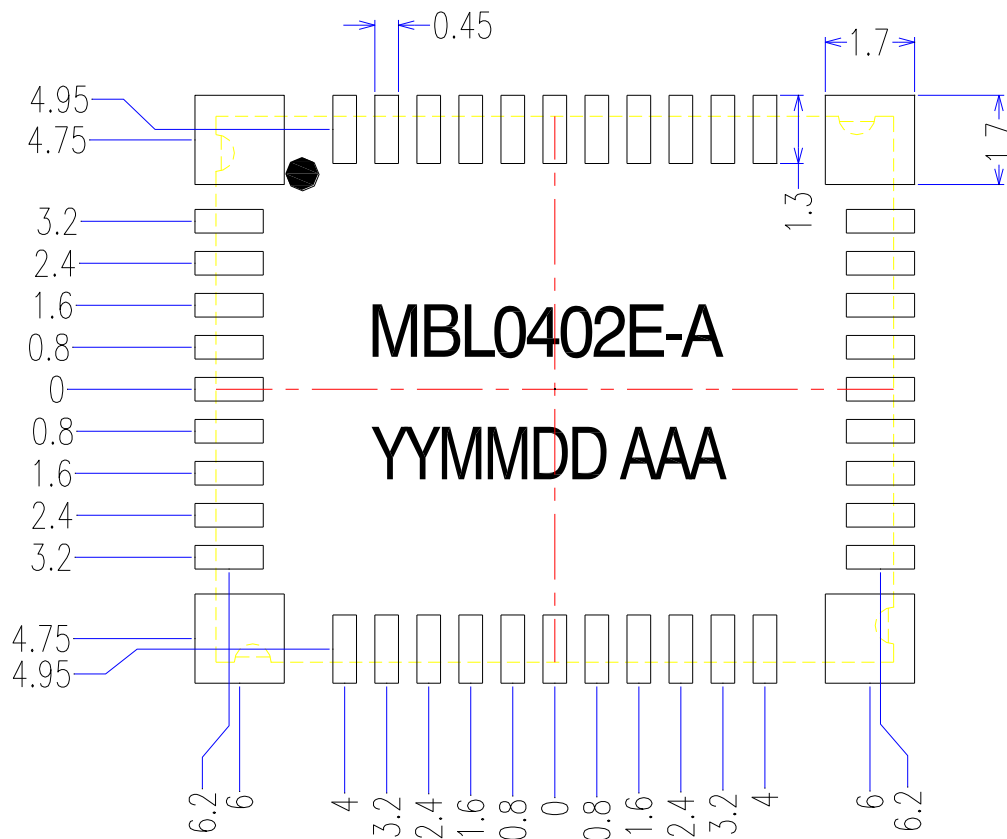


Unit : mm

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6.3 Recommended Footprint

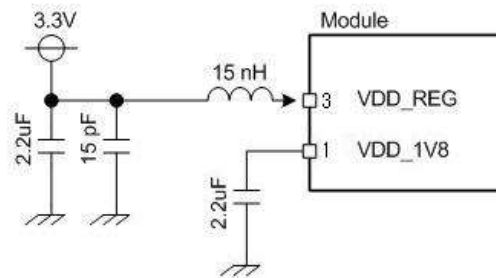
Unit : mm



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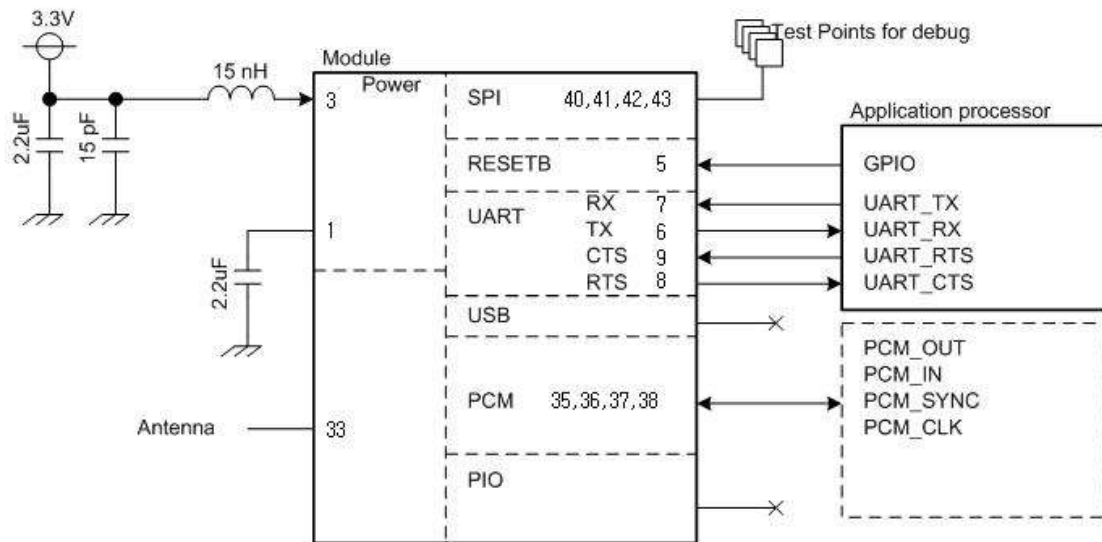
7. Power Supply

7.1 3.3V for Bluetooth module



8. Example Application

8.1 UART Interface



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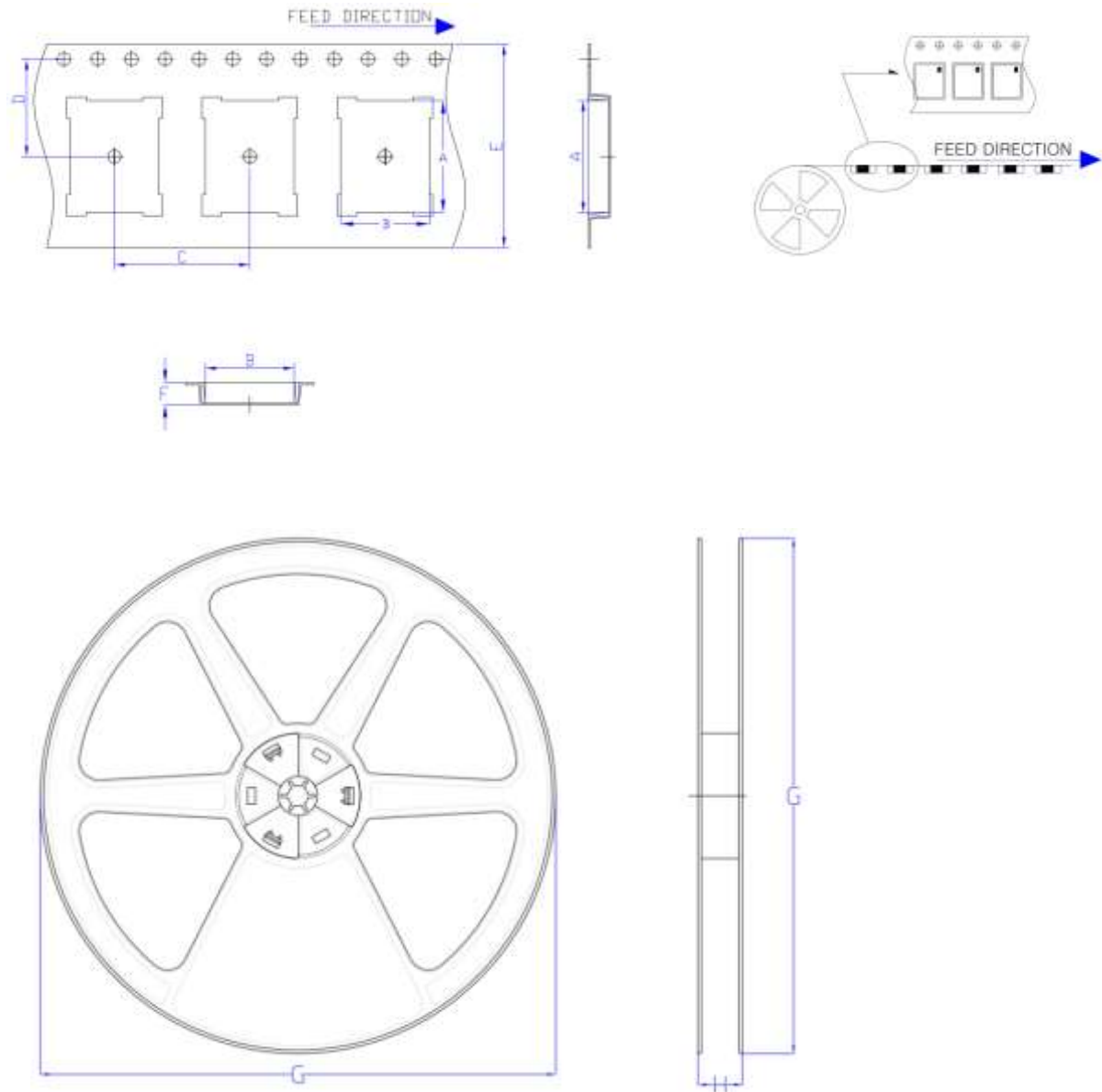
9. Reliability Test

Test Item	Test Condition		Quantity
High Temperature Storage Test	Temperature	105 'C	
	Test Time	120h	
	Operating Mode	Storage	
High Temperature Load Test	Temperature	70 'C	
	Test Time	120h	
	Operating Mode	Operation	
Low Temperature Load Test	Temperature	-20 'C	
	Test Time	120h	
	Operating Mode	Operation	
High Temperature & Humidity Test	Temperature	85 'C	
	Humidity	85 %RH	
	Measurement	25'C	
Temperature Cycle	Temperature	-40 ~ 85 'C	
	Test Time	30min, 100 cycle	
Reflow Test	Temperature	260 'C	
	Test time	3 times, 10s	
ESD	HBM	Class2 (2000V)	
	CDM	ClassIII(500V)	
PCT	Temperature	121'C	
	Humidity	100%RH	
	Pressure	2.0×105±10% Pa	
	Test Time	Condition C(96h)	
	Operating Mode	Storage	
Drop		152cm, 8 times	
Vibration		20~2000Hz,	
	Frequency	0.053G/Hz or 8g's RMS	
	Test Time	X,Y,Z each 30min	

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10. Packing Information

10.1 Carrier Tape and Reel Information



Mark	Dimension	Mark	Dimension
A	13.2 ±0.1	E	24.0 ±0.3
B	10.7 ±0.1	F	2.4 ±0.1
C	16.0 ±0.1	G	320.0 ±0.4
D	11.5 ±0.1	H	20.4 ±0.4

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11. Reflow Profile

