



Bluetooth v4.0 BLE

(Bluetooth Low Energy)

HBT2X3N

Data Sheet

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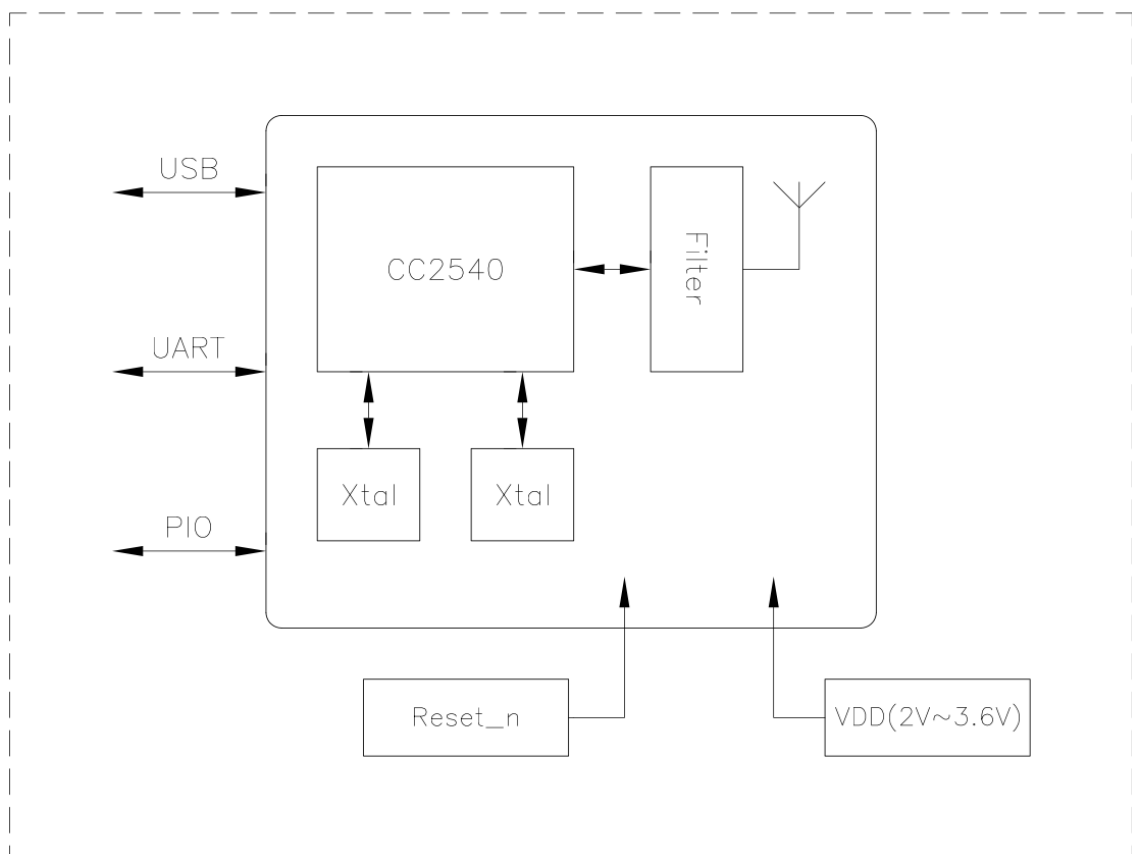
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1. General

1.1 Overview

This Specification Covers Bluetooth Module (class-2) Which True Single-Chip BLE Solution : CC 2540 Can Run Both Application and BLE Protocol Stack, Includes Peripherals to Interface With Wide Range of Sensors, Etc. All Detailed Specification Including Pin outs and Electrical Specification May be Changed Without Notice.



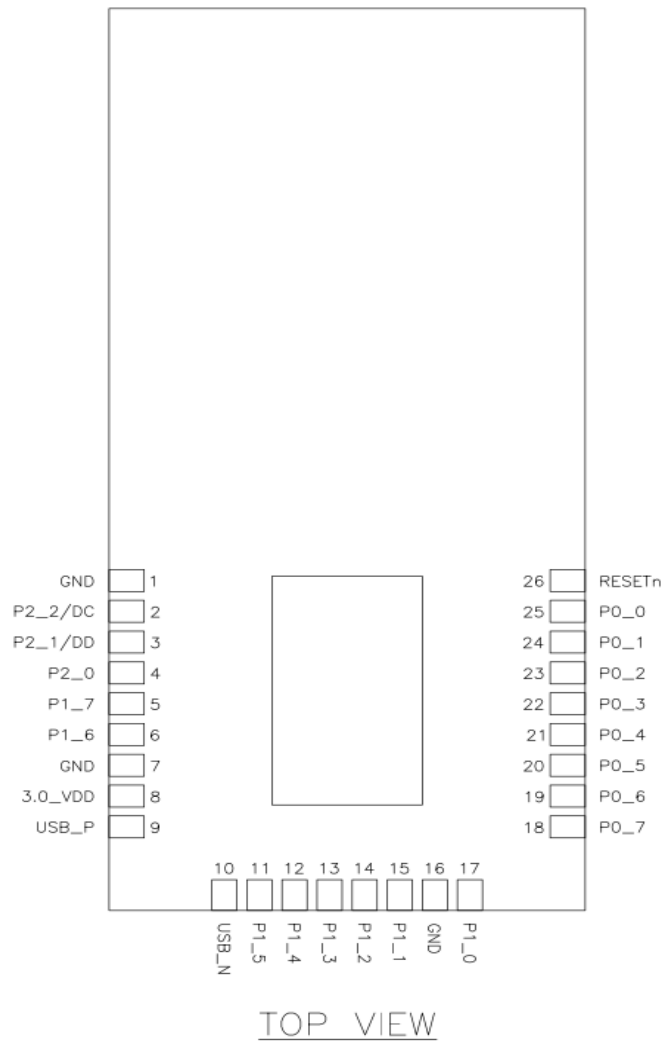
1.2 Features

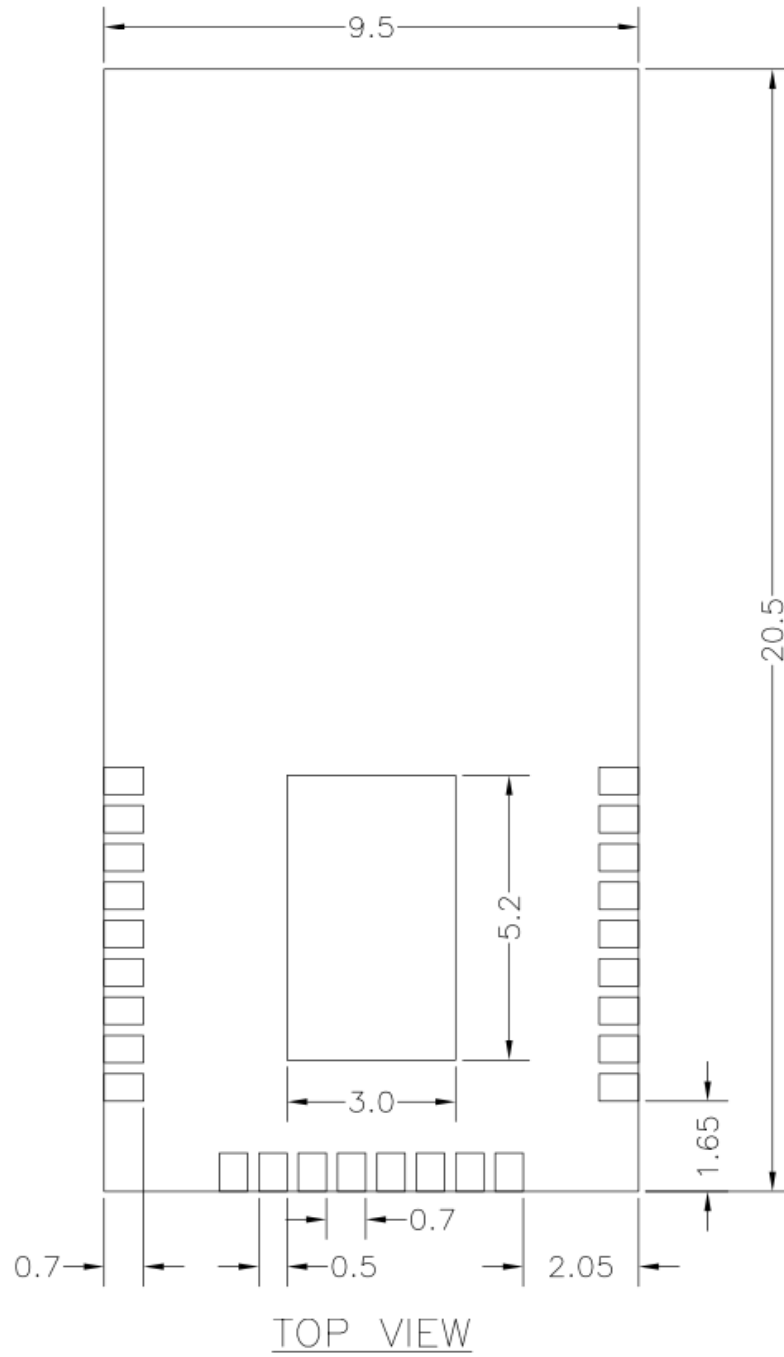
- Fully Qualified Bluetooth BLE System
- 9.5mmX 20.5mmX 1.0mm(Included Antenna)
- Bluetooth Low Energy Technology Compatible
- High Performance and Low Power 8051 Microcontroller Core
- In System Programmable Flash, 256KB or 128KB / 8KB SRAM
- Wide Supply Voltage Range(2V ~ 3.6V)
- Internal Crystal (32Mhz), and STC(32.768KHz)
- Peripherals
 - 12 bit ADC With Eight Channels and Configurable Resolution
 - Integrated High Performance OP-AMP and Ultralow Power Comparator
 - General Purpose Timers(one 16bit, two 8bit)
 - General Purpose I/O Pins
 - 32.768KHz Sleep Timer With Capture
 - Two UART With Support for Several Serial Protocols
 - Full Speed USB Interface
 - IR Generation Circuitry
 - Five Channel DMA
 - AES Security Coprocessor
- ROHS Compliant

1.3 Application

- 2.4GHz Bluetooth Low Energy Systems Mobile Phone Accessories
- Sports and Leisure Equipment
- Consumer Electronics
- Human Interface Device(Keyboard, Mouse, Remote Control)
- USB Dongles
- Medical and Health Care Device

1.4 Pin Configuration & Outline





1.5 Device Terminal Functions

Pin No	Pin Name.	Description	Type
1	GND	GND Must be Connected to a Solid Ground Plane	Ground
2	P2_2/DC	Debug Clock	Digital I/O
3	P2_1/DD	Debug Data	Digital I/O
4	P2_0	Port 2.0	Digital I/O
5	P1_7	Port 1.7	Digital I/O
6	P1_6	Port 1.6	Digital I/O
7	GND	GND Must be Connected to a Solid Ground Plane	Ground
8	3.0_VDD	Power Supply(2.0 ~3.6V)	Power
9	USB_P	USB Plus	Digital I/O
10	USB_N	USB Minus	Digital I/O
11	P1_5	Port 1.5	Digital I/O
12	P1_4	Port 1.4	Digital I/O
13	P1_3	Port 1.3	Digital I/O
14	P1_2	Port 1.2	Digital I/O
15	P1_1	Port 1.1(20mA Drive Capability)	Digital I/O
16	GND	GND Must be Connected to a Solid Ground Plane	Ground
17	P1_0	Port 1.0(20mA Drive Capability)	Digital I/O
18	P0_7	Port 0.7	Digital I/O
19	P0_6	Port 0.6	Digital I/O
20	P0_5	Port 0.5(UART_RTS)	Digital I/O
21	P0_4	Port 0.4(UART_CTS)	Digital I/O
22	P0_3	Port 0.3(UART_TX)	Digital I/O
23	P0_2	Port 0.2(UART_RX)	Digital I/O
24	P0_1	Port 0.1	Digital I/O
25	P0_0	Port 0.0	Digital I/O
26	RESET n	Reset, Active Low(1us)	Digital Input

2 Characteristics

2.1 Electrical Characteristics

Absolute Maximum Ratings		
Rating	Minimum	Maximum
Storage temperature	-40°C	85°C
Supply voltage : VCC	-0.3V	3.9V
Other terminal voltages	VSS-0.4V	VCC+0.4V

Recommended Operating Conditions		
Operating Conditions	Minimum	Maximum
Operating temperature range	-20°C	70°C
Supply voltage range(VCC)	2.0V	3.6V

Note :

Conditions : 25°C, 3.3V supply

Current Consumption at Normal Operating(EVM Board with T=25, VDD=3.3V)				
Parameter	Test Conditions	Typical	Maximum	Unit
Consumption	Advertising(Pairing) Mode(*)	0.5	1.0	mA
	Sleep Mode(*)	14	490	uA
	UART Active & Transmit Data (1B/1000ms)	8.0	8.6	mA
	Power On(*)	0.5	0.7	uA

*Results Based on UART off Mode and No Peripherals Active.

Current Consumption at Specified Operating(EVM Board with T=25도, VDD=3.3V)				
Parameter	Test Conditions	Typical	Maximum	Unit
Consumption	RX Mode, Standard Mode	21.9	22.0	mA
	TX Mode, -23dBm Output Power	22.9	23.0	mA
	TX Mode, -6dBm Output Power	26.0	26.3	mA
	TX Mode, 0dBm Output Power	29.9	30.0	mA
	TX Mode, +4dBm Output Power	35.5	36.0	mA

*Results Based on UART off Mode and No Peripherals Active.

2.2 RF Characteristics

Transmitter

Specification	Condition	Min	Typ	Max	Unit
Frequency Range	Normal	2402		2480	MHz
Channel Spacing			2		MHz
Output Power	Normal	-24		4	dBm
Spurious Emissions				-41	dBm
Receiver Sensitivity				-85	dBm
Saturation			6		dBm
Co-Channel Rejection			-5		dB
Adjacent-Channel Rejection	±1MHz		-5		dB
Adjacent-Channel Rejection	±2MHz		30		dB
Frequency Error Tolerance		-250		250	KHz
Spurious Emission			-75		dBm

3 Terminal Description

3.1 Debug Pin

Five signals are used to implement the Debug function. 2, 3, 7, 8, 26Pin need to use. For example Firmware download, setting of Pin function and RF Function test(RF Smart Studio program).

3.2 Application Software

3.2.1 Introduction

1. BLE SPP is not a standard SPP, so an Allocation should define Service UUID, BLE Attribute for SPP Rx and Tx data, and sub-procedures to handle characteristic values.
2. These definitions are not fixed, so whenever needs they can be changed.

3.2.2 Attribute Definitions

Attribute	Value
Primary Service UUID	0xFFA0
SPP READ UUID	0xFFF1
SPP READ Properties	NOTIFY and READ
SPP READ Characteristic User Description	"BLE Data Write"
Primary Service UUID	0xFF10
PWM1 UUID	0xFF11
PWM1 Properties	READ and WRITE
PWM1 Characteristic User Description	"PWM CH0 duty ratio"
PWM2 UUID	0xFF12
PWM2 Properties	READ and WRITE
PWM2 Characteristic User Description	"PWM CH1 duty ratio"
PIO_1 UUID	0xFF13
PIO_1 Properties	READ and WRITE
PIO_1 Characteristic User Description	"PIO_1_1"
PIO_2 UUID	0xFF14
PIO_2 Properties	READ and WRITE
PIO_2 Characteristic User Description	"PIO_1_2"

Attribute	Value
PIO_5 UUID	0xFF15
PIO_5 Characteristic User Description	"PIO_1_5"

3.2.3 GAP Characteristic

Attribute	Value	Role
Device Name	"BeeT-T200C"	Peripheral
Local name field in ScanRspData packet		

3.2.4 PIO Defines

Pin No	Pin Name	Description	Direction
5	P1_7	RF Test, Always connected to GND	I
6	P1_6	Application LED Test, Always connected to GND	I
11	P1_5	Port 1.5	O
12	P1_4	PWM Channel 1	O
13	P1_3	PWM Channel 0	O
14	P1_2	Port 1.2	O
15	P1_1	Port 1.1	O
17	P1_0	Connect Status LED	O

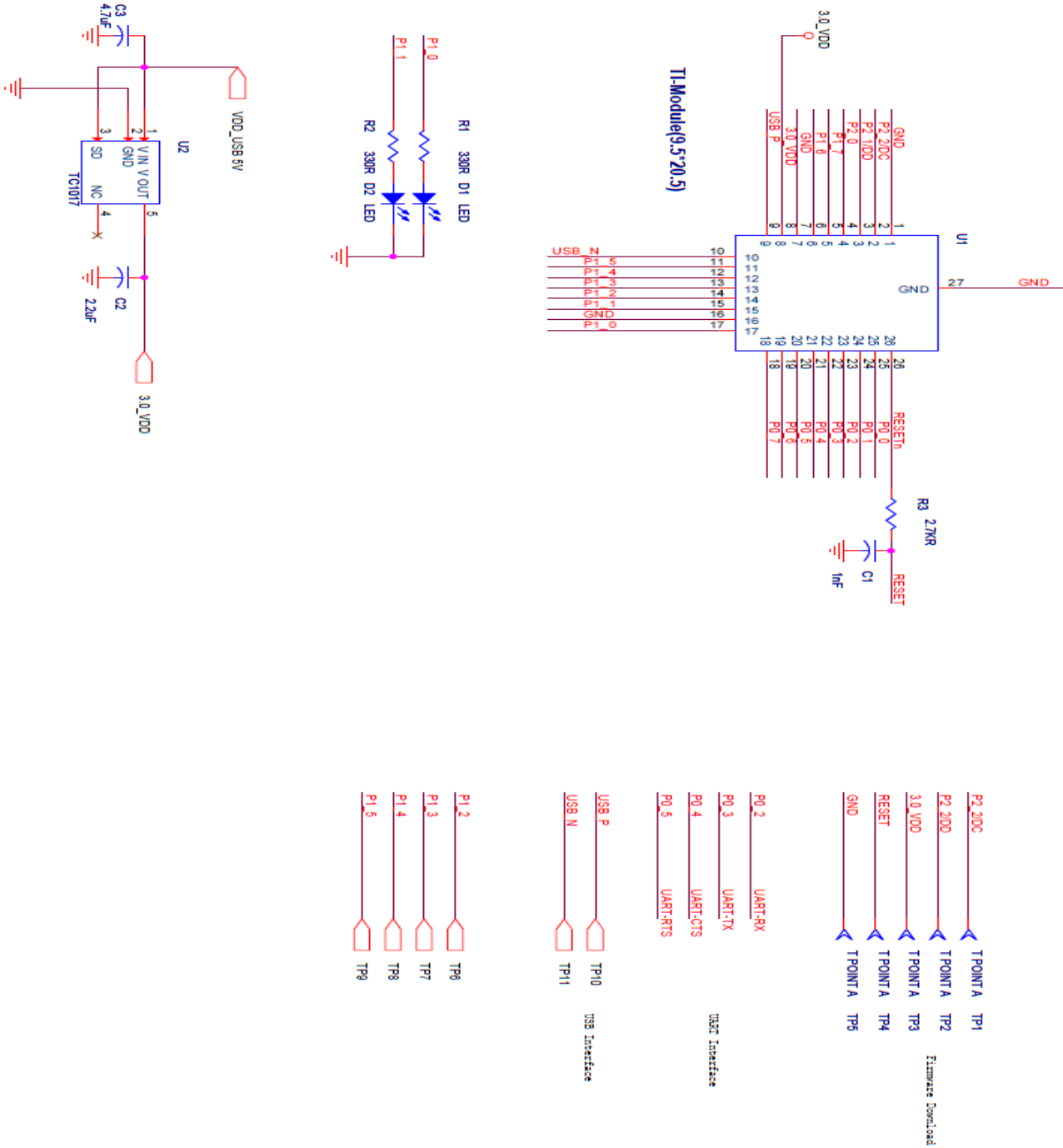
3.2.5 PWM Frequency

1/8Mhz = 8us

PWM CHx duty ratio of range : 0 ~ 100

※주의 : Pin 5,6번 (PIO_7, PIO_6)은 항상 GND와 연결되어야 합니다.

4 Application Schematic



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(Bluetooth Low Energy)

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