LE1201 / LE1201A
Bluetooth Low Energy (BLE) module

Introduction

Able Trend Technology introduces the pioneer of the Bluetooth Low Energy (BLE) compliant wireless module LE1201 that is a high performance, cost effective, low power and compact solution. The Bluetooth Smart module provides a complete 2.4GHz Bluetooth system based on TI CC2541 chipset, which is a single chip radio and baseband IC for Bluetooth 2.4GHz systems. This module is fully compliant to Bluetooth v4.0 Single-Mode BLE for data communications.

The integrated 2.4GHz RF transceiver offers full BLE compatibility as well as excellent receiver sensitivity and robustness, thus building a reliable interface to the antenna. The pre-qualified module enables its user to create a Bluetooth low energy product within the shortest possible time to market. LE1201 can be powered directly with a standard 3V coin cell battery or pair of AAA batteries.

Key Features

- Bluetooth 4.0 single mode compliant radio Master and slave mode support
- L2CAP, GAP, ATT and GATT support Security manager
- Excellent Link Budget, Enabling Long-Range Applications Without External Front End
- Programmable Output Power up to 0 dBm
- Excellent Receiver Sensitivity, Selectivity, and Blocking Performance
- Advertising, broadcasting, connections Built-in profiles
- Suitable for Systems Targeting Compliance With Worldwide Radio Frequency Regulations: ETSI EN 300 328 and EN 300 440 Class 2 (Europe), FCC CFR47 Part 15 (US), and ARIB STD-T66 (Japan)
- Integrated battery monitor and temperature sensor
- BQB certification and QDID ready

Applications

- Human-Interface Devices (Keyboard, Mouse, Remote Control)
- Sports and Leisure Equipment
- Mobile Phone Accessories
- Consumer Electronics
- Heart rate sensors
- Pedometers
- Watches
- Blood pressure and glucose meters
- Weight scales
- Key fobs
- Households sensors and collector devices
- Security tags
- Wireless keys
- Proximity sensors
- Indoor GPS broadcasting devices

Product Specification

Model Name	LE1201 (LE1201A)
Product Description	Bluetooth Low Energy Module
Bluetooth Standard	Bluetooth v4.0 Compliant Single-Mode BLE
Chipset	TI CC2541
Dimension	17mm x 22mm x 2.0mm
Operating Conditions	
Operating Voltage	2.5~3.3V
Temperature	-10+70°C (-40+85°C)
Storage Temperature	-55~+125°C
Electrical Specifications	
Frequency Range	2402~2480MHz
Modulation	2 Mbps, GFSK, 500-kHz deviation 2 Mbps, GFSK, 320-kHz deviation 1 Mbps, GFSK, 250-kHz deviation 1 Mbps, GFSK, 160-kHz deviation 500 kbps, MSK 250 kbps, GFSK, 160-kHz deviation 250 kbps, MSK
Maximum RF Transmit Power	0dBm
RF power control range	20dB
Receive Sensitivity	-90dBm

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
I_{core}	Core current consumption	RX mode, standard mode, no peripherals active, low MCU activity		17.9		mA
		RX mode, high-gain mode, no peripherals active, low MCU activity		20.2		
		TX mode, –20 dBm output power, no peripherals active, low MCU activity		16.8		
		TX mode, 0 dBm output power, no peripherals active, low MCU activity		18.2		
		Power mode 1. Digital regulator on; 16-MHz RCOSC and 32-MHz crystal oscillator off; 32.768-kHz XOSC, POR, BOD and sleep timer active; RAM and register retention		270		µA
		Power mode 2. Digital regulator off; 16-MHz RCOSC and 32-MHz crystal oscillator off; 32.768-kHz XOSC, POR, and sleep timer active; RAM and register retention		1		
		Power mode 3. Digital regulator off; no clocks; POR active; RAM and register retention		0.5		
		Low MCU activity: 32-MHz XOSC running. No radio or peripherals. Limited flash access, no RAM access.		6.7		mA
I_{peri}	Peripheral current consumption (Adds to core current I_{core} for each peripheral unit activated)	Timer 1. Timer running, 32-MHz XOSC used		90		µA
		Timer 2. Timer running, 32-MHz XOSC used		90		
		Timer 3. Timer running, 32-MHz XOSC used		60		
		Timer 4. Timer running, 32-MHz XOSC used		70		
		Sleep timer, including 32.753-kHz RCOSC		0.6		
		ADC, when converting		1.2		mA

Certificated Services/Profiles

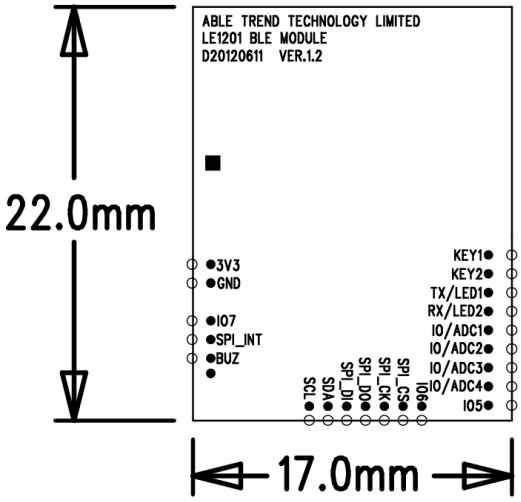
HOST Subsystem

Logical Link Control and Adaptation Protocol	
Generic Access Profile	
4.0 Host Controller Interface	
Generic Attribute Profile	Attribute Protocol Supported over LE Generic Attribute Profile Client Generic Attribute Profile Server Service Changed
Attribute Protocol	Attribute Protocol Client Attribute Protocol Server Attribute Protocol Supported over LE
Security Manager Protocol	

Profile Subsystem

Interoperability Test Specification	
Health Thermometer Profile	Profile supported over LE Thermometer
Health Thermometer Service	
Device Information Service	
Find Me Profile	Find Me Target Profile supported over LE
Immediate Alert Service	Service Supported over LE
Link Loss Service	Service supported over LE
Proximity Profile	Profile supported over LE Proximity Reporter
Tx Power Service	Service supported over LE
Heart Rate Profile	Heart Rate Sensor Profile supported over LE
Heart Rate Service	Service supported over LE
Time Profile	Profile Supported over LE Time Client
Phone Alert Status Profile	Phone Alert Status Client Profile Supported over LE
Alert Notification Profile	Alert Notification Client Profile Supported over LE
Blood Pressure Profile	Blood Pressure Sensor Profile supported over LE
Blood Pressure Service	Service supported over LE
Battery Service	Service supported over LE
HID Service	Service supported over LE
Scan Parameters Service	Service supported over LE
HID over GATT Profile	HID Device Profile supported over LE
Scan Parameters Profile	Profile supported over LE Scan Server

Dimensions



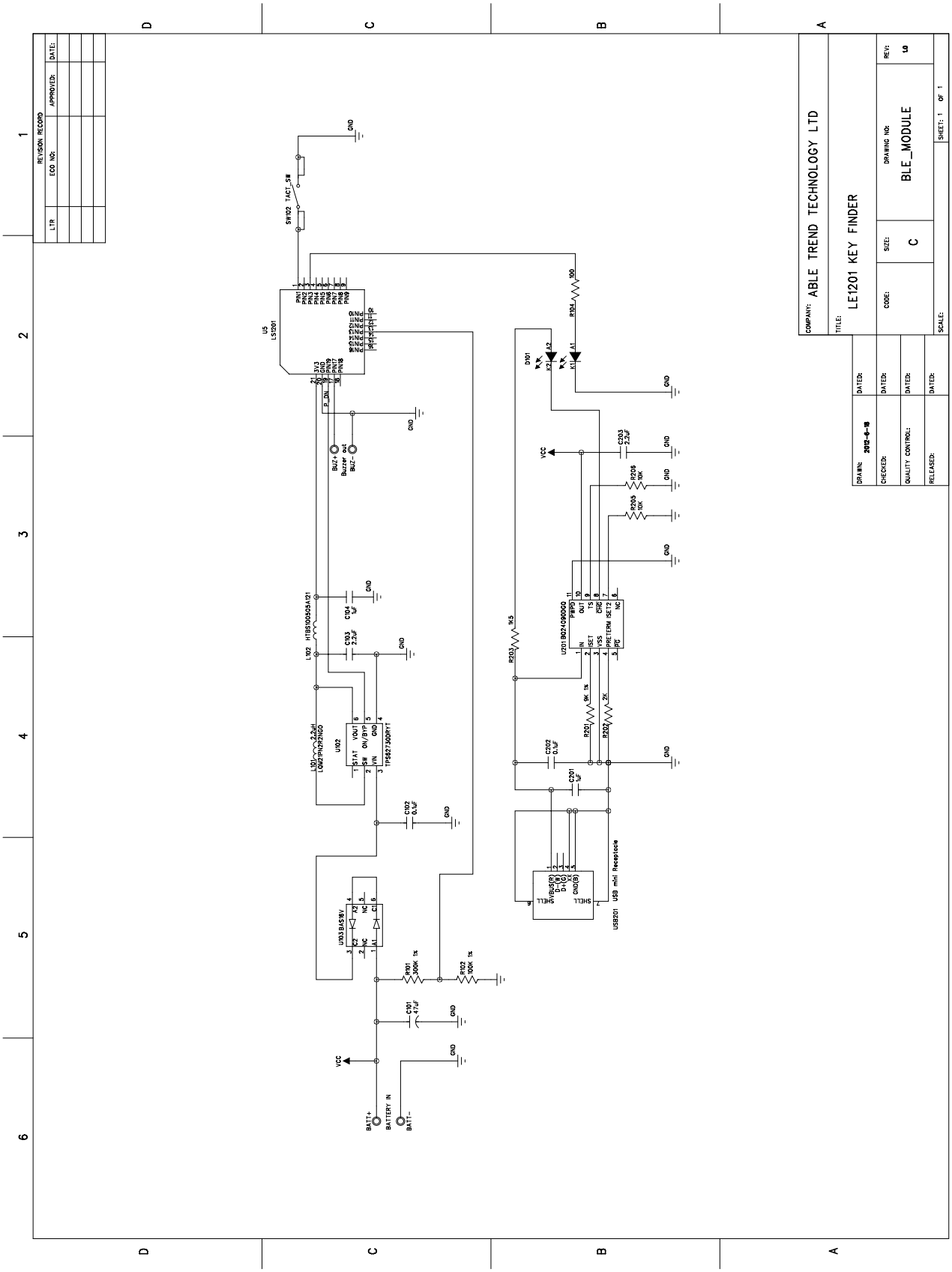
Top View

Pin Assignment

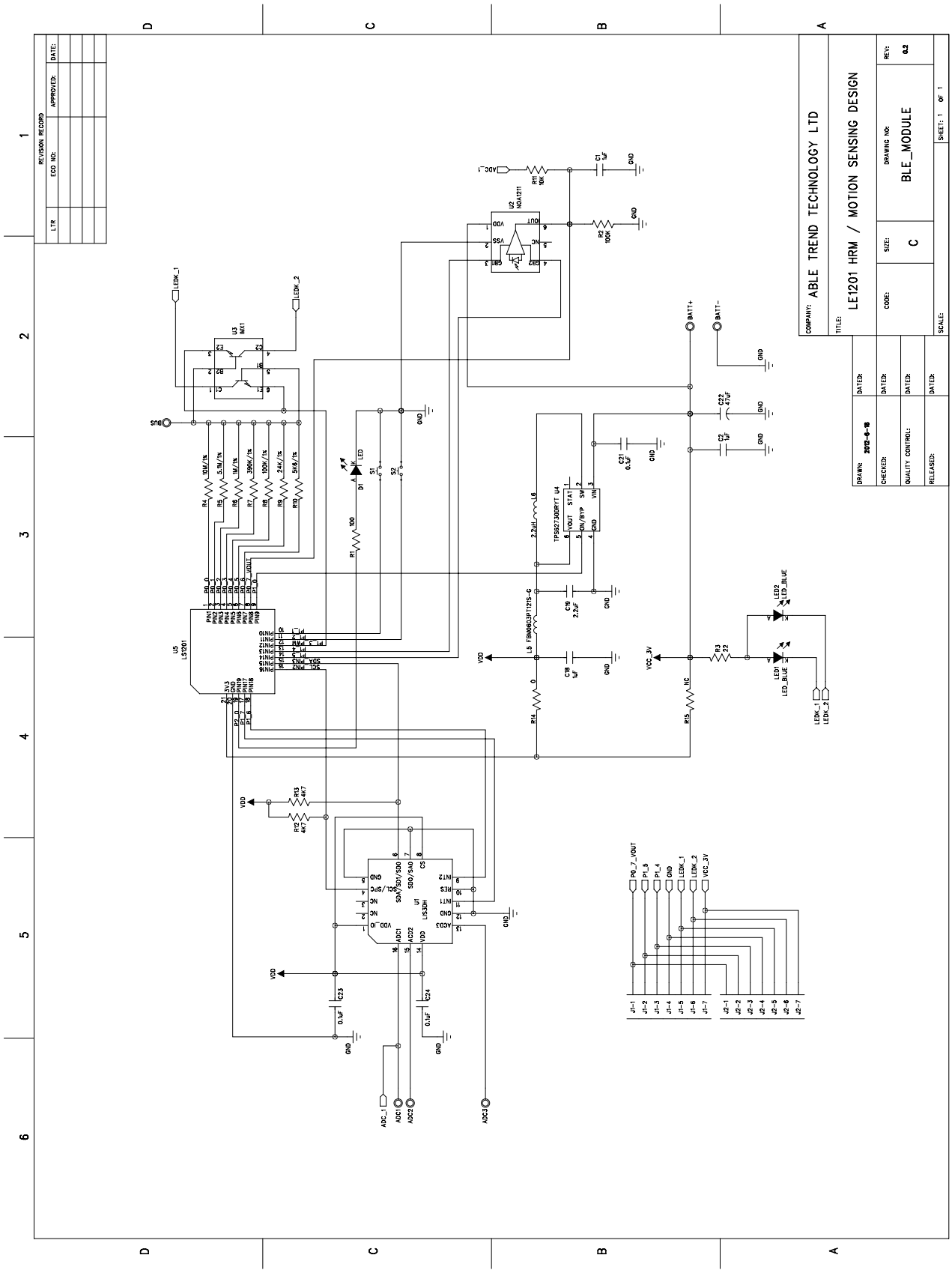
Pin	Name	Description
1	KEY1	Tact Switch Input / Configurable IO
2	KEY2	Tact Switch Input / Configurable IO
3	TXD/LED	UART Transmit / LED / Configurable IO
4	RXD/LED	UART Receive / LED / Configurable IO
5	GPIO_ADC1	Configurable IO / ADC In
6	GPIO_ADC2	Configurable IO / ADC In
7	GPIO_ADC3	Configurable IO / ADC In
8	GPIO_ADC4	Configurable IO / ADC In
9	GPIO5	Configurable IO
10	GPIO6	Configurable IO
11	SPI_CS	Slave-Select / Configurable IO
12	SPI_CK	SPI-Clock / Configurable IO
13	SPI_DO	SPI_DataOut / Configurable IO
14	SPI_DI	SPI_DataIn / Configurable IO
15	I2C_SDA	SDA
16	I2C_SCL	SCL
17	BU_OP	Buzzer Output / Configurable IO
18	SPI_INT	Interrupt IN / Configurable IO
19	GPIO7	Configurable IO
20	GND	Ground
21	3V3	3.3V POWER

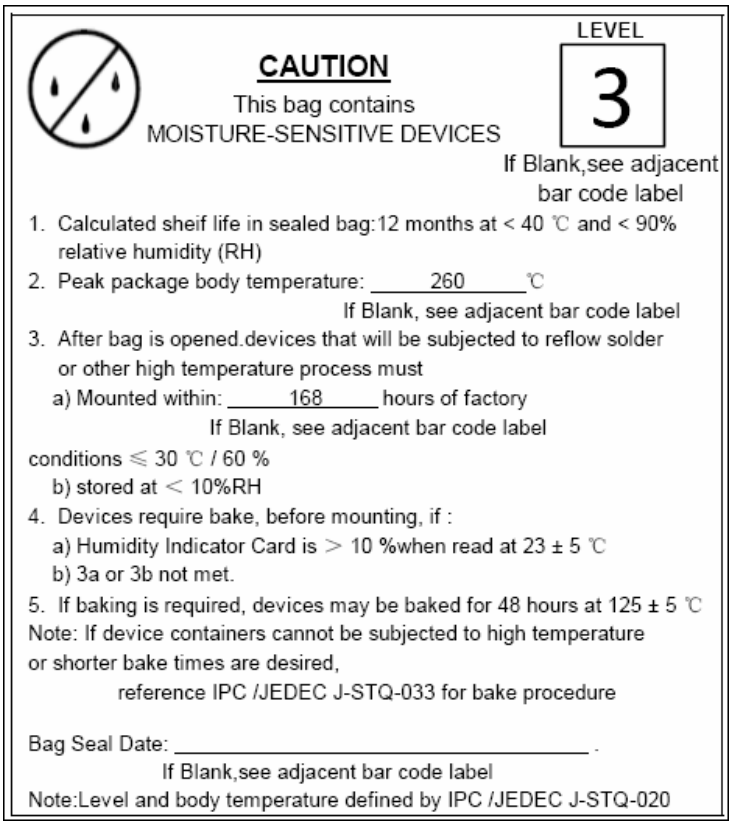
Reference Designs

Key Finder



Pedometer with Heart Rate Meter





CAUTION

This bag contains
MOISTURE-SENSITIVE DEVICES

LEVEL 3

If Blank,see adjacent bar code label

1. Calculated sheif life in sealed bag:12 months at < 40 ℃ and < 90% relative humidity (RH)
2. Peak package body temperature: 260 ℃
   If Blank, see adjacent bar code label
3. After bag is opened.devices that will be subjected to reflow solder or other high temperature process must
   a) Mounted within: 168 hours of factory
   If Blank, see adjacent bar code label
   conditions ≤ 30 ℃ / 60 %
   b) stored at < 10%RH
4. Devices require bake, before mounting, if :
   a) Humidity Indicator Card is > 10 %when read at 23 ± 5 ℃
   b) 3a or 3b not met.
5. If baking is required, devices may be baked for 48 hours at 125 ± 5 ℃

Note: If device containers cannot be subjected to high temperature or shorter bake times are desired,
reference IPC /JEDEC J-STQ-033 for bake procedure

Bag Seal Date: _____ .
If Blank,see adjacent bar code label

Note:Level and body temperature defined by IPC /JEDEC J-STQ-020

The module MUST go through 125°C baking for at least 9 hours before SMT AND IR reflow process!