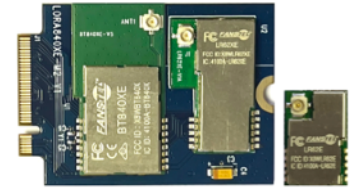


LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

LoRa Sensor, Beacon Applications

LR62E and LR62XE LoRa transceiver module uses a Semtech SX1262 sub-GHz radio transceiver. A Skyworks SKY65313 power amplifier is added to LR62XE. It is paired with Fanstel BT840F, a Nordic nRF52840 BLE 5.3 module. The Cortex M4F MCU in BT840F manages LR62XE through SPI interface. BT840F GPIOs can be used for sensor data input or control output. Android OS app is available for field set up through Bluetooth interface.



BT840F + LR62XE pair can be used in LoRaWAN™ application. LoRaWan stacks are not available from Fanstel.

Cloud Connection, LoRa Gateway

The 2nd application example is in a gateway for connecting to a cloud server(AWS, Microsoft, Google, Fanstel development server, etc.) through Ethernet, WiFi, or LTE network.

BLE 5.2 module manages LR62XE through SPI interface.

LR62E Specifications:

- Semtech SX1262 transceiver with an u.FL.
- +20.3 dBm TX power (USA).

LR62E1 Specifications:

- Semtech SX1262 transceiver with an u.FL.
- Uses a TCXO instead of crystal for better frequency stability.

LR62C Specifications:

- Semtech SX1262 transceiver with a chip antenna.
- Uses a TCXO instead of crystal.

LR62XE Specifications:

- Semtech SX1262 transceiver with Skyworks SKY65313 power amplifier
- Size: 10 (14) x 22.3mm, L- shape.
- +29.2 dBm TX power (USA).

M262840F/M262X840F/M262X840XE Combo:

- Combo modules for M.2 connector, B key.
- M262840F: LR62E, BT840F combo.
- M262X840F: LR62XE, BT840F combo.
- M262X840XE: LR62XE, BT840XE combo.
- Nordic nRF52 with ARM Cortex M4F at 64 MHz.
- Over-the-Air (OTA) firmware update
- Flash/RAM: 1024KB/256KB
- 34 GPIOs
- 12 bit/200KSPS ADC, 8 configurable channels with programmable gain.
- 3X SPI Master/Slave (8Mbps)
- 3X 4-channel pulse width modulator (PWM)
- 2X 2-wire Master/Slave (I²C compatible)
- UART (with CTS/RTS and DMA)
- 128-bit AES HW encryption
- 5 x 32 bits, 3 x 24 bits Real Time Counters (RTC)
- Available NFC-A tag interface for OOB pairing
- Size: 30x42 mm for M.2 connector, B-key
- Operation temperature: -40 °C to +85 °C

Evaluation Board

- EV-LR62E for LR62E with BM833(nRF52833).
- EV-LN60G for LR62E or LR62XE with BT840F or BT840XE(M.2 module not included).

Model Summaries

LoRa module	LR62E	LR62C	LR62XE	LR62XE1
Size	10.2x15.0mm	10.2x15.0mm	10(14) x22.3mm	
32 MHz	Crystal	TCXO	Crystal	TCXO
Antenna LoRa/BLE	u.FL	Chip	u.FL	u.FL
Max TX power, EIRP	+20.3 dBm/+22.3 dBm	+20.1 dBm/+21.4 dBm	+29.2/ +31.2 dBm	
Certifications	FCC,ISED,RCM	FCC,ISED	FCC,ISED,RCM	
Availability	Production	Production	Production	
LoRa-BLE Combo	M262840F	M262C840F	M262X840XE	M262X1840XE
BLE module/Flash/RAM	BT840F/1MB/512KB	BT840F/1MB/512KB	BT840XE/1MB/256KB	BT840XE/1MB/256KB
Size	30x42mm, M.2, B key	30x42mm, M.2, B key	30x42mm, M.2, B key	30x42mm, M.2, B key
Antenna LoRa/BLE	u.FL/PCB	Chip/PCB	u.FL/u.FL	u.FL/u.FL
LoRa max TX, conducted/radiated	+20.3 dBm/+22.3 dBm	+20.1 dBm/+21.4 dBm	+29.2 dBm/+31.2dBm	
BLE max TX, conducted/radiated	+8.5 dBm/+8.8 dBm	+8.5 dBm/+8.8 dBm	+21.0 dBm/+27.0 dBm	
Certifications	FCC,IC,RCM		FCC,IC,RCM	
Availability	Production		Production	

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Of Contents

1. Introduction.....	3
2. Product Overview	4
Semtech SX1262.....	4
LR62E.....	5
LR62C	5
LR62E1.....	5
LR62XE	5
M262X840XE, SuperPower BLE and LoRa Combo.....	6
M262X840F	7
M262840F	7
Mechanical Drawings	8
LR62E, LR62E1, LR62XE Pin Functions	9
M262840F/M262X840XE Pin Functions.....	11
3. Transmission Performance.....	13
Transmission Power Settings	13
LR62C Transmission Performance Estimate.....	13
4. Settings for High Duty Cycle LR62XE Transmission.....	14
Temperature Tests, 4.5V DC, 500ms ON/1000ms OFF	15
5. Evaluation Boards	16
Evaluation Board EV-LR62E	16
Evaluation Board EV-LN60G	17
Loading Firmware into Evaluation Board Through a Nordic DK.....	18
Nordic Development Environment.....	18
Download and set up Basic Software tools for EV-LN60G	19
M262833 M.2 M.2 Module Schematics	20
Evaluation Board EV-LR62E Schematics.....	21
Evaluation Board EV-LN60G Schematics	22
Battery Power Application.....	24
6. Miscellaneous.....	25
Soldering Temperature-Time Profile for Re-Flow Soldering	25
Cautions, Design Notes, and Installation Notes	25
Packaging.....	28
FCC Label	28
7. Revision History	29
8. Contact Us.....	30

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

1. Introduction

LR62XE LoRa module with Semtech SX1262 transceiver are ideal for long range wireless applications. It can be paired with BT840F BLE module in LoRa sensor or beacon design. A smart phone can set up sensor or beacon easily through Bluetooth interface.

BT840F is powerful, highly flexible, ultra low power Bluetooth Low Energy (BLE) modules using Nordic nRF52840 SoCs. With an ARM Cortex™ M4F MCU, 1024KB flash, 256KB RAM, embedded 2.4GHz multi-protocol transceiver, and an integrated antenna, it allows faster time to market with reduced development cost.

The second application example is in a gateway for connecting to cloud server. A LoRa sensor or beacon can be connected to a cloud server through Ethernet, WiFi, or LTE network.

It is possible to port LoRaWAN™ stacks to Nordic nRF52 BLE SoCs. LoRaWAN™ stacks are not available from Fanstel.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

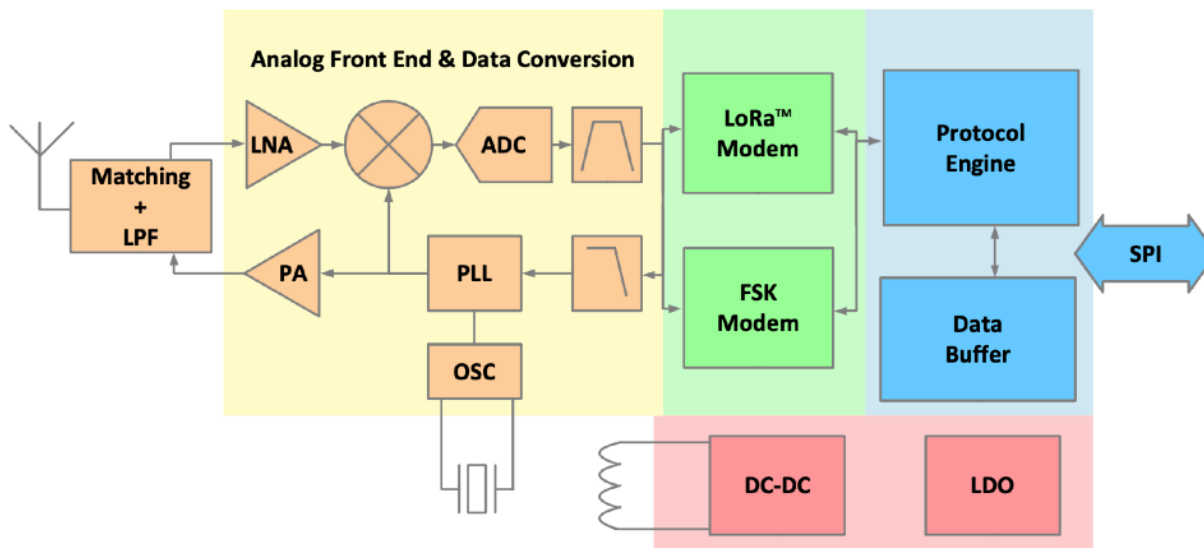
2. Product Overview

Semtech SX1262

Semtech SX1262 data sheets can be downloaded from this webpage.

<https://www.fanstel.com/wirelessdocument>

A block diagram is below.



LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

LR62E

- A LoRa module with Semtech SX1262, 915 MHz.
- An u.FL connector for external antenna.
- 10 castellated pins.
- Size: 10.2x15mm.
- Certified with antenna ANT025 and ANT025P.



LR62C

- A LoRa module with Semtech SX1262, 915 MHz.
- Uses a TCXO instead of a crystal for improved frequency stability.
- An instigated chip antenna.
- 10 castellated pins.
- Size: 10.2x15mm.

LR62E1

- A LoRa module with Semtech SX1262, 915 MHz.
- Uses a TCXO instead of a crystal for improved frequency stability.
- An u.FL connector for external antenna.
- 10 castellated pins.
- Size: 10.2x15mm.
- Certified with antenna ANT025, ANT025P, and TE Connectivity 2195835-5.
- This module is made to order.



LR62XE

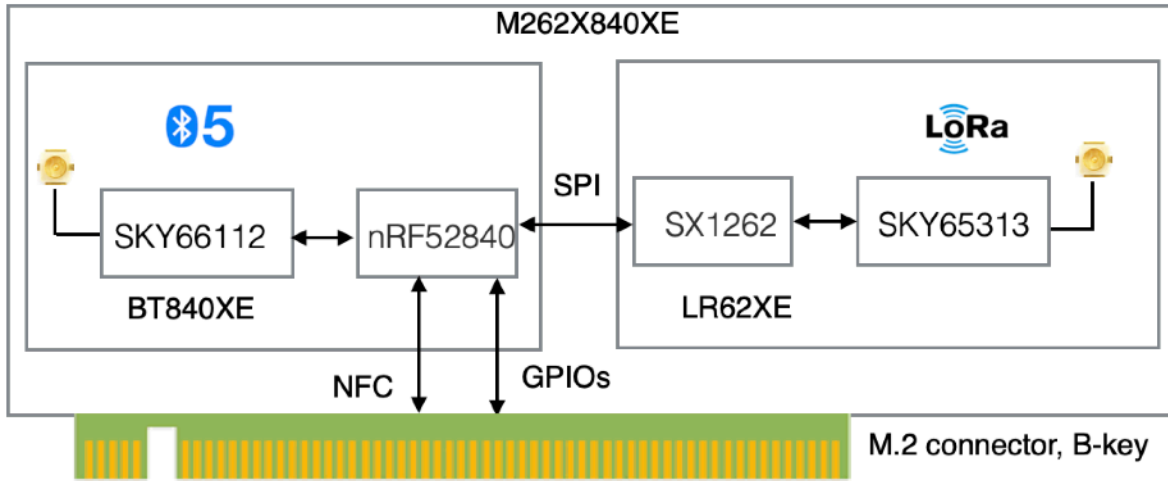
- A LoRa module with Semtech SX1262 and a Skyworks SKY65313 power amplifier, 915 MHz.
- An u.FL connector for external antenna.
- 10 castellated pins.
- Size: 10.2 (14) x22.3mm.
- Certified with antenna ANT025, ANT025P.



LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

M262X840XE, SuperPower BLE and LoRa Combo

The following is a block diagram of M262X840XE.



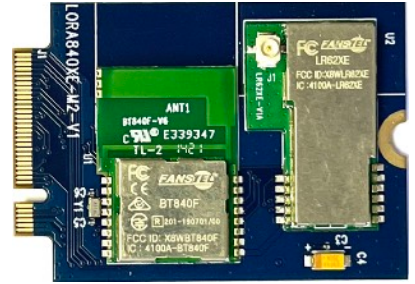
- BT840XE with + 21dBm TX power, an u.FL connector for external antenna.
- LR62XE with +29.2 dBm TX power, an u.FL connector for external antenna.
- Size: 30x42mm
- For M.2 connector, 67 pins, B key.



LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

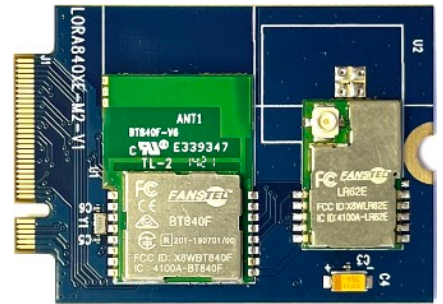
M262X840F

- BT840F with + 8.5dBm TX power, an integrated PCB antenna.
- LR62XE with +29.2 dBm TX power, an u.FL connector for external antenna.
- Size: 30x42mm
- For M.2 connector, 67 pins, B key.



M262840F

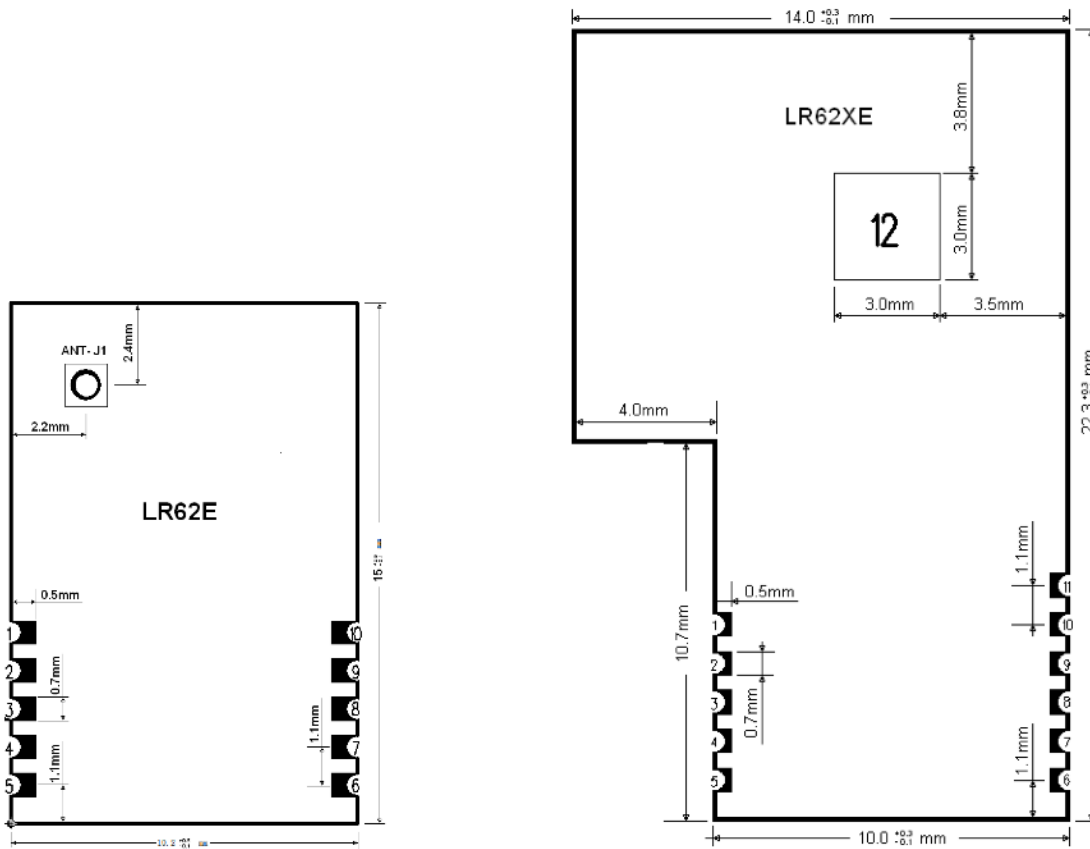
- BT840F with + 8.5dBm TX power, an integrated PCB antenna.
- LR62E with +20.3 dBm TX power, an u.FL connector for external antenna.
- Size: 30x42mm
- For M.2 connector, 67 pins, B key.



LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Mechanical Drawings

The followings are mechanical drawings of LR62E, LR62E1, and LR62XE, top view.



Library components for PADS and EAGLE can be downloaded from

<http://www.fanstel.com/download-document/>

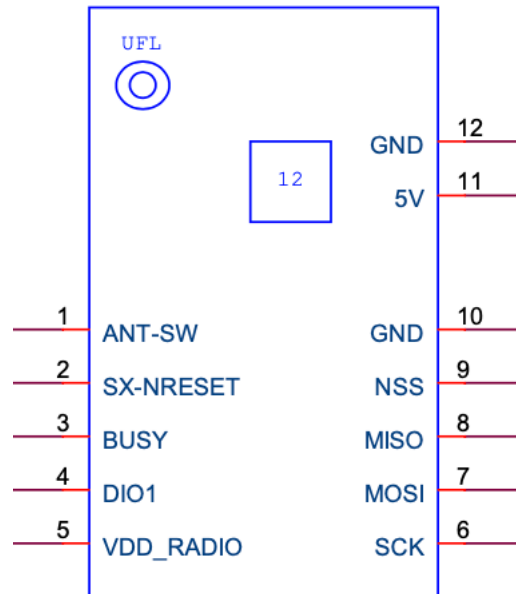
For other PCB layout tools, please download evaluation board Gerber files and extract library component.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

LR62E, LR62E1, LR62XE Pin Functions

The followings are LR62E and LR62XE pin assignment. Pin functions are in a table below. Please refer to Semtech SX1262 Product Specifications for detailed descriptions and features supported. It can be downloaded from:

<https://www.fanstel.com/wirelessdocument>



LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

LR62XE		SX1262	
pin#	pin name	pin#	Descriptions
1	ANT-SW		Antenna switch for transmission or reception.
2	SX-NRESET	15	Reset signal, active low
3	BUSY	14	Busy indicator
4	DIO1	13	Multiple purpose Digital IO
5	VDD	1	DC input voltage, 1.8V to 3.7V
6	SCK	18	SPI clock
7	MOSI	17	SPI Slave input
8	MISO	16	SPI Slave Output
9	NSS	19	SPI Slave Select
10	GND	20	Ground
11	5V		Power amplifier regulated DC power input, 4.5V.
12	GND		Power amplifier ground

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

M262840F/M262X840XE Pin Functions

M.2	nRF52840	BT840F	M262X840F	
pin#	pin#	pin#	Name	Descriptions
1				DC input for 3.3V regulator; 3.2V to 15V. 4.35V minimum if connected to USB-VBUS externally.
2	Y2	F4	BLE-VDDH	High voltage input for nRF52840/nRF5340, 2.5V to 5.5V
3				DC input for 3.3V regulator; 3.2V to 15V. 4.35V minimum if connected to USB-VBUS externally.
4	B1	9	VDD-3V3	Regulated 3.3V DC input, 800 mA minimum
5	AD2	F6	USB-VBUS	USB power supply, 4.35V to 5.5V.
6	B1	9	VDD-3V3	Regulated 3.3V DC input, 800 mA minimum
7	AD6	E4	USB DP	USB data pin
8		15	BLE-SWDCLK	Serial Wire Debug clock input for BLE
9	AD4	E5	USB DN	USB data pin
10	AC24	16	BLE-SWDIO	Serial Wire Debug data for BLE
11	B6	10	GND	Ground
12				
13				
14				
15				
16				
17				
18				
19				
20			GND	Ground
21	T2	11	P011	BLE GPIO
22			GND	Ground
23	AD22	12	P100	BLE GPIO
24	AD8	13	P013	BLE GPIO
25	U1	E6	P012	BLE GPIO
26	Y23	D5	P101	BLE_UART RXD
27	R1	E3	P109	BLE GPIO
28	AC13	14	P018/RESET	Reset for BT40F, Reset or P018 for BT840F
29	AC17	E2	P021	BLE GPIO
30	AC9	D4	P014	BLE GPIO
31	AC19	D1	P023	BLE GPIO
32	AC11	D3	P016	BLE-OTA
33	AD20	C1	P024	BLE GPIO
34	AC15	D2	P019	BLE GPIO
35	W24	C5	P102	BLE_UART-TXD
36	AD10	C4	P015	BLE GPIO
37	AD18	C2	P022	BLE GPIO
38	AD12	C3	P017	BLE GPIO
39	N1	B5	P008	BLE GPIO

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

40	AD16	E1	P020	BLE GPIO
41	L1	B4	P006	BLE GPIO
42	A8	B3	P031	BLE GPIO, analog input
43	P2	A6	P108	BLE GPIO
44	B9	B2	P030	BLE GPIO, analog input
45	M2	A5	P007	BLE GPIO
46	AC21	B1	P025	BLE GPIO
47	K2	A4	P005	BLE GPIO, analog input
48				No Connect
49	J1	A3	P004	BLE GPIO, analog input
50				No Connect
51	A10	A2	P029	BLE GPIO, analog input
52				No Connect
53	B11	A1	P028	BLE GPIO, analog input
54				No Connect
55	G1	1	P026	BLE_I2C, SDA
56				No Connect
57	H2	2	P027	BLE_I2C, SCL
58				No Connect
59	J24	8	P010	BLE_GPIO, NFC2
60				No Connect
61	L24	7	P009	BLE_GPIO, NFC1
62				No Connect
63	B13	6	P003	BLE_GPIO, AIN1
64				No Connect
65	A12	5	P002	BLE_GPIO, AIN 0
66				No Connect
67				No Connect
68				No Connect
69				No Connect
70				No Connect
71				No Connect
72				No Connect
73				No Connect
74				No Connect
75				No Connect

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

3. Transmission Performance

Transmission Power Settings

The conditions for LR62XE to transmit at +29.2 dBm:

- Regulated 5V, 1.5 Amp DC power to the 5V pin.
- Regulated 3.3V DC power to the VDD pin.
- Set SX1262 TX power to +9 dBm.
- An external LoRa antenna ANT025 or an equivalent shall be connected to the u.FL connector during development testing and deployment

The conditions for LR62XE to transmit at +28.5 dBm. These settings can reduce power consumption and increase the transmission duty cycle.

- Regulated 4.5V, 1.5 Amp DC power to the 5V pin.
- Regulated 3.3V DC power to the VDD pin.
- Set SX1262 TX power to +9 dBm.
- An external LoRa antenna ANT025 or an equivalent shall be connected to the u.FL connector during development testing and deployment

The conditions for LR62E to transmit at +20.3 dBm:

- Regulated 3.3V DC power to the VDD pin.
- Set SX1262 TX power to +22 dBm.

The conditions for LR62E1/LR62C to transmit at +20.1 dBm:

- Regulated 3.3V DC power to the VDD pin.
- Set SX1262 TX power to +22 dBm.

LR62C Transmission Performance Estimate

Fanstel measures WiFi and Bluetooth ranges in a low obstruction environment. Because of much longer ranges, we can not find a low obstruction environment for LoRa range measurements. LR62E, LR62E1, and LR62XE have an u.FL connector. TX power can be measured precisely. ANT025 is a dipole antenna, characteristics is documented.

The characteristics of the chip antenna on LR62C is documented. Because of limited antenna area, the performance of the chip antenna is degraded. Using data measured from 3 meters away by the FCC test labs. The peak EIRP:

LR62E1 + ANT025: +20.1 dBm.

LR62C: +16.9 dBm.

The EIRP of LR62C is about 3.2 dB lower. The LoRa range is estimated at about 30% lower than that of the LR62E1 + ANT025.

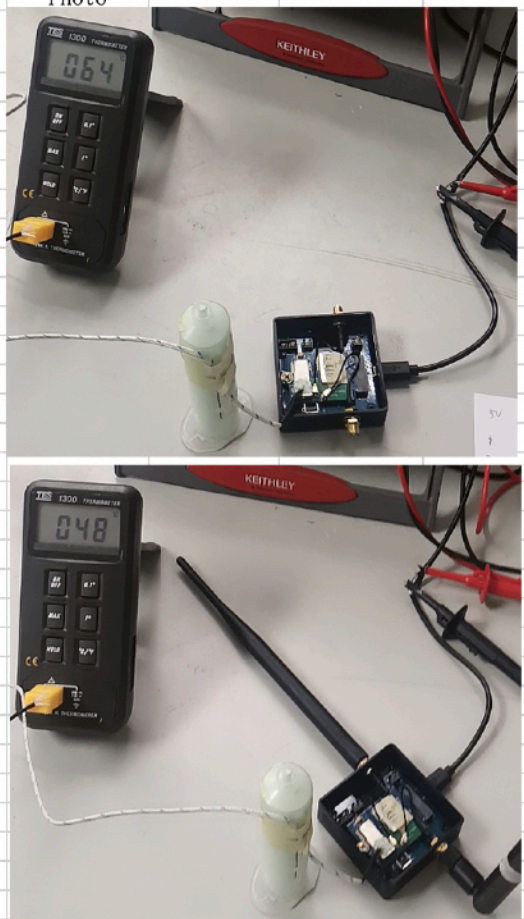
LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

4. Settings for High Duty Cycle LR62XE Transmission

In a typical LoRaWAN application, the transmission duty cycle is low. Power consumption and heat dissipation is not an issue. If you use an LR62XE for a long range data transfer, precaution is required.

At the maximum transmission power, +29.2 dBm, LR62XE consumes about 3 watts of power.

- We measure the temperature of the LR62XE module RFI shield.
- We remove the RFI shield and measure temperature on the surface of SKY65313 power amplifier.
- Temperature on the RFI shield is about 3°C lower than that on the SKY65313.

DC Voltage	Test codes		Time, minutes	Temperature	Photo
5V	lora_only_norx_8_16	60mm adapter cable	1	53	
			2	54	
	3	58			
	4	61			
	5	62			
	6	63			
	7	64			
	8	64			
	9	64			
	10	64			
	11	64			
	12	64			
	13	64			
	14	64			
			Install antenna	15	
			16	60	
			17	58	
			18	57	
			19	56	
			20	55	
			21	53	
			22	51	
			23	49	
			24	48	
			25	48	
			26	48	
			27	48	
			28	48	
			29	48	
			30	48	

To minimize LR62XE heat dissipation, always connect an external LoRa antenna ANT025 or an equivalent to the u.FL connector. Temperature of the LR62XE RFI shield is measured.

- LR62XE transmits with 33% duty cycle, 8ms ON/16 ms OFF and repeat continuously.
- The LR62XE module is on M262X840XE M.2 module inside an enclosure of BRX840XE LoRa-BLE bridge.
- A 60 mm long u.FL to SMA adapter cable is connected to LR62XE u.FL connector.
- The LoRa antenna is installed at the 16th minute.
- The RFI shield temperature is 16°C lower with an LoRa antenna connected.
- If the u.FL to SMA adapter is not connected, the RFI temperature increases much quicker and higher.
- We repeat the measurement for 500ms ON/1000ms OFF, the results are similar.
- We suggest to limit the transmission duty cycle to 20% for 5V DC power supply. A LoRa antenna shall be connected.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Temperature Tests, 4.5V DC, 500ms ON/1000ms OFF

We repeat the tests with the following changes.

- The DC power supply voltage is reduced to 4.5V.
- The duty cycle is the same, 33%. However, LR62XE transmits for 500 ms, stops for 1000 ms and repeats continuously.
- The steady state temperature with an antenna connected is reduced from 48°C to 41°C.

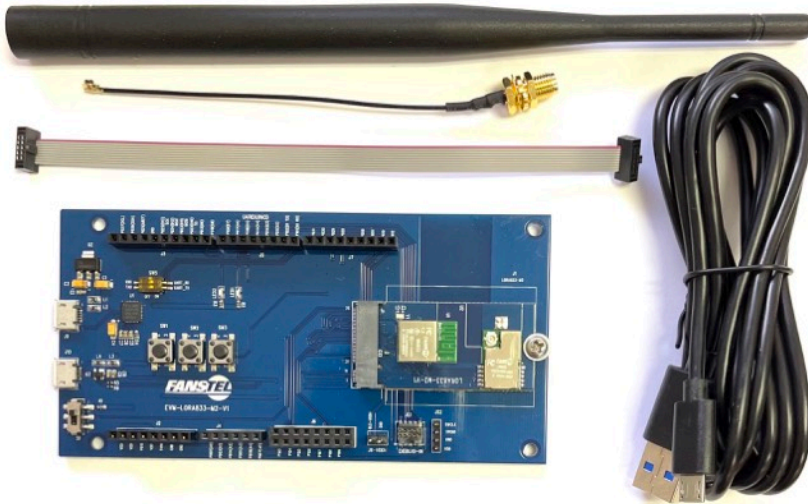
DC Voltage	Test codes		Time, minutes	Temperature
4.5V	lora_only_norx_500_1000	60mm adapter cable	1	45
			2	53
	3		54	
	4		55	
	5		55	
	6		55	
	7		55	
	8		55	
	9		55	
	10		55	
	11		55	
	12		55	
	13		55	
	14		55	
	15		55	
		Install antenna	16	52
			17	50
			18	49
			19	48
			20	48
			21	47
			22	46
			23	44
			24	41
			25	41
			26	41
			27	41
			28	41
			29	41
			30	41

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

5. Evaluation Boards

Evaluation Board EV-LR62E

An evaluation board can be used to evaluate performance of module and to develop and test your firmware before an application-specific host board is developed. An EV-LR62E include the followings:



- An EV board with M262833, LR62E + BM833 (nRF52833) module INSTALLED.
- A 10-pins flat cable.
- An USB cable
- A 915 MHz LoRa antenna.
- An u.FL to SMA adapter cable.

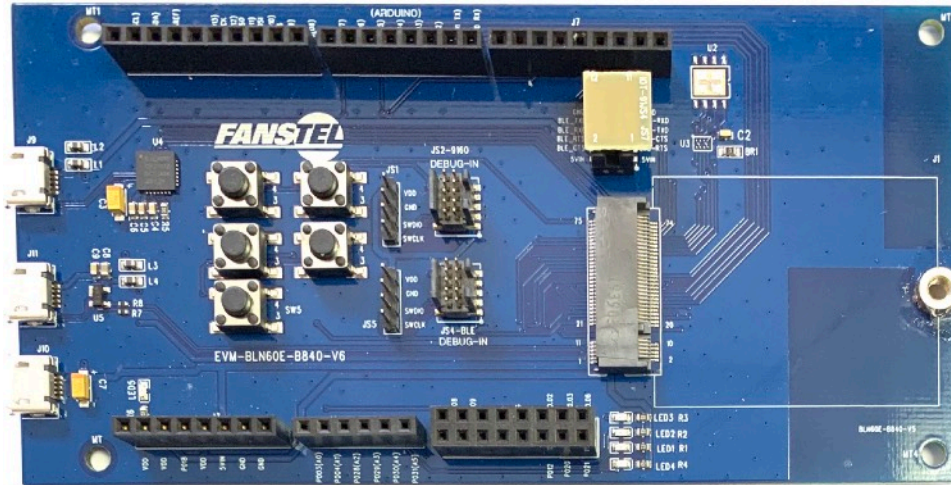
This evaluation board is for LR62E only.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Evaluation Board EV-LN60G

EV-LN60G can be used to evaluate LR62E or LR62XE with a Nordic nRF52840 module, BT840F or BT840XE. An EV-LN60G includes the following:

- An EV board without an M.2 module.



- A 10-pins flat cable.
- An USB cable

Additional hardware required but not included in EV-LN60G.

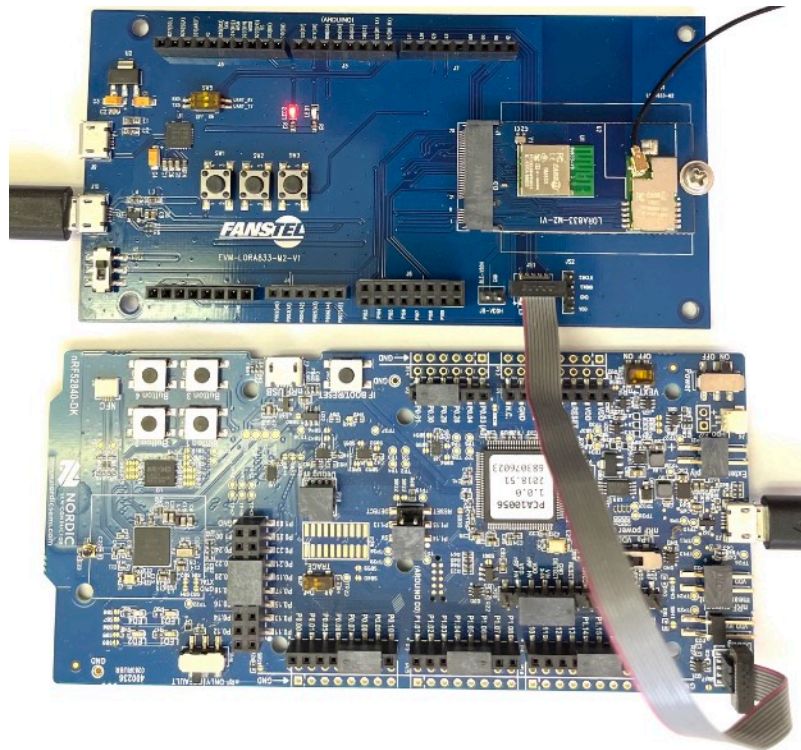
- M262840F (LR62E + BT840F) module and a LoRa antenna ANT025 or ANT025P (IP67). Or,
- M262X840F (LR62XE + BT840F) module and a LoRa antenna ANT025 or ANT025P (IP67). Or,
- M262X840XE (LR62XE + BT840XE) module, a LoRa antenna ANT025 or ANT025P (IP67), and a 0 dBi BLE antenna ANT000.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Loading Firmware into Evaluation Board Through a Nordic DK

To program BT840F BLE module.

- Connect Nordic nRF52840DK debug out to Fanstel evaluation board debug in using the 10-pin flat cable as shown below.



- Connect Nordic nRF52DK to PC.
- Connect a DC power source to micro or mini USB port of evaluation board.

Nordic Development Environment

Nordic Semiconductor provides a complete range of hardware and software development tools for the nRF52 Series devices. nRF52DK or nRF52840DK board is recommended for firmware development. Document and Software development tools can be downloaded by the following links.

Get started with Nordic chip and all online documents.

http://infocenter.nordicsemi.com/index.jsp?topic=/com.nordic.infocenter.nrf52/dita/nrf52/development/nrf52_dev_kit.html&cp=1_1

Nordic SDK with many example projects.

https://developer.nordicsemi.com/nRF5_SDK/

Nordic development zone.

<https://devzone.nordicsemi.com/tutorials/b/getting-started/posts/development-with-gcc-and-eclipse>

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Download and set up Basic Software tools for EV-LN60G

nRF command line tool 10.2.1 or newer.

<https://www.nordicsemi.com/Software-and-Tools/Development-Tools/nRF-Command-Line-Tools/Download>

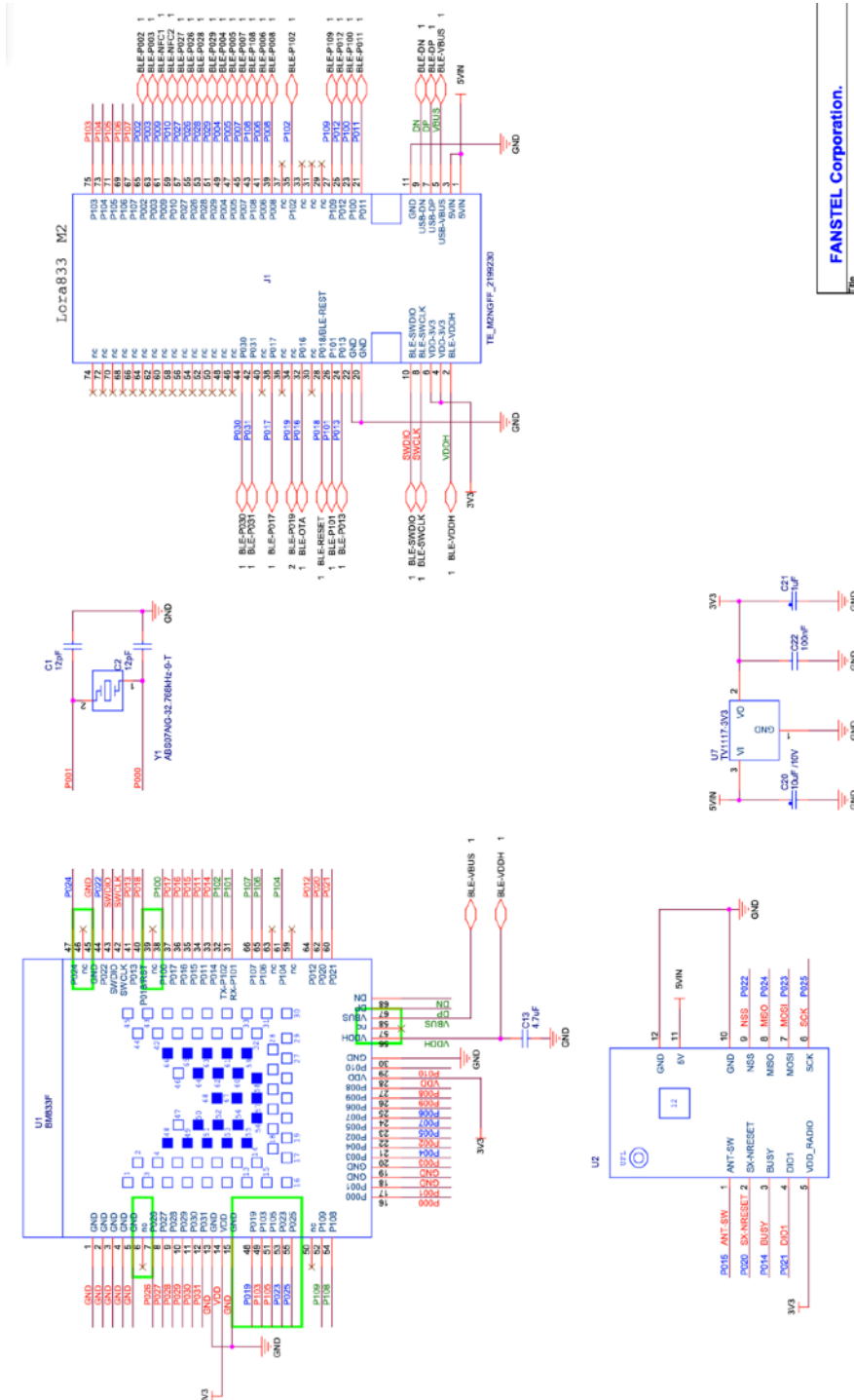
nRF Connect desktop 3.2.0 or newer.

<https://www.nordicsemi.com/Software-and-Tools/Development-Tools/nRF-Connect-for-desktop>

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

M262833 M.2 M.2 Module Schematics

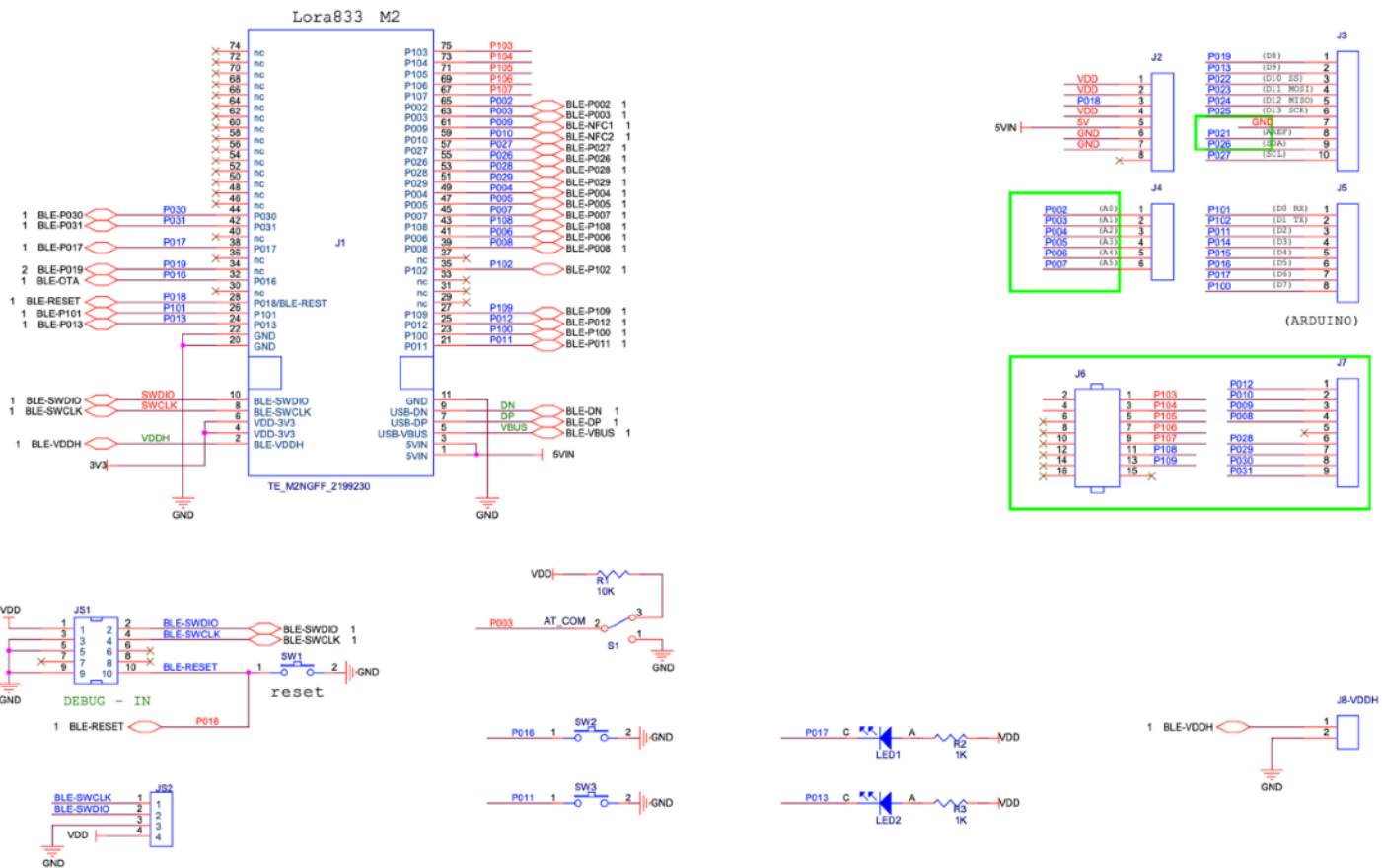
The following is the schematics of M.2 module, M262833. It can be used as a reference design if you use an LR62E and a BM833 on you host PCB. The 32.768 kHz crystal, Y1 and load capacitors are required to provide precise sleep clock during powered down.



FANSTEL Corporation.

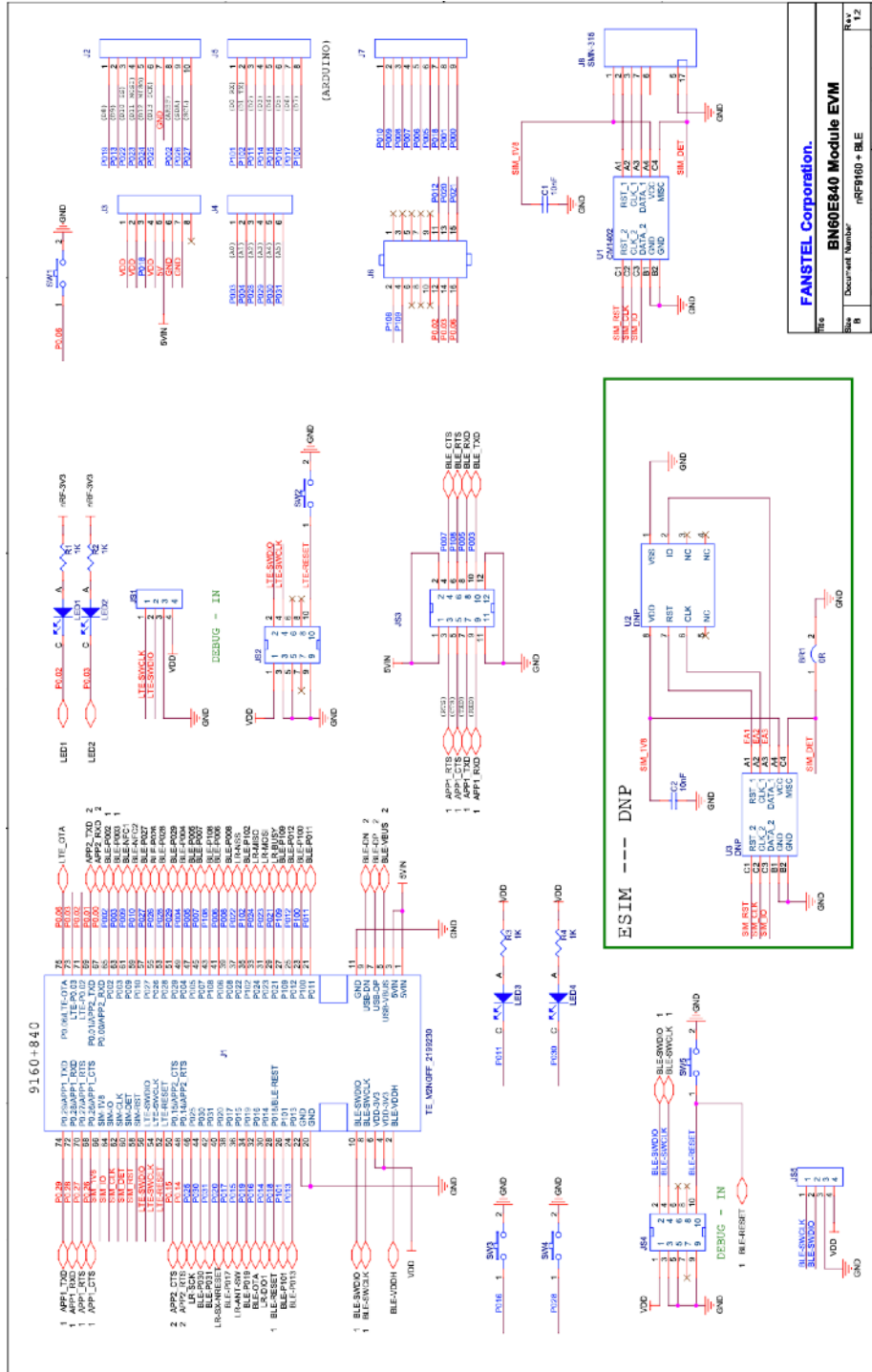
Evaluation Board EV-LR62E Schematics

The following is schematics of EV-LR62E.

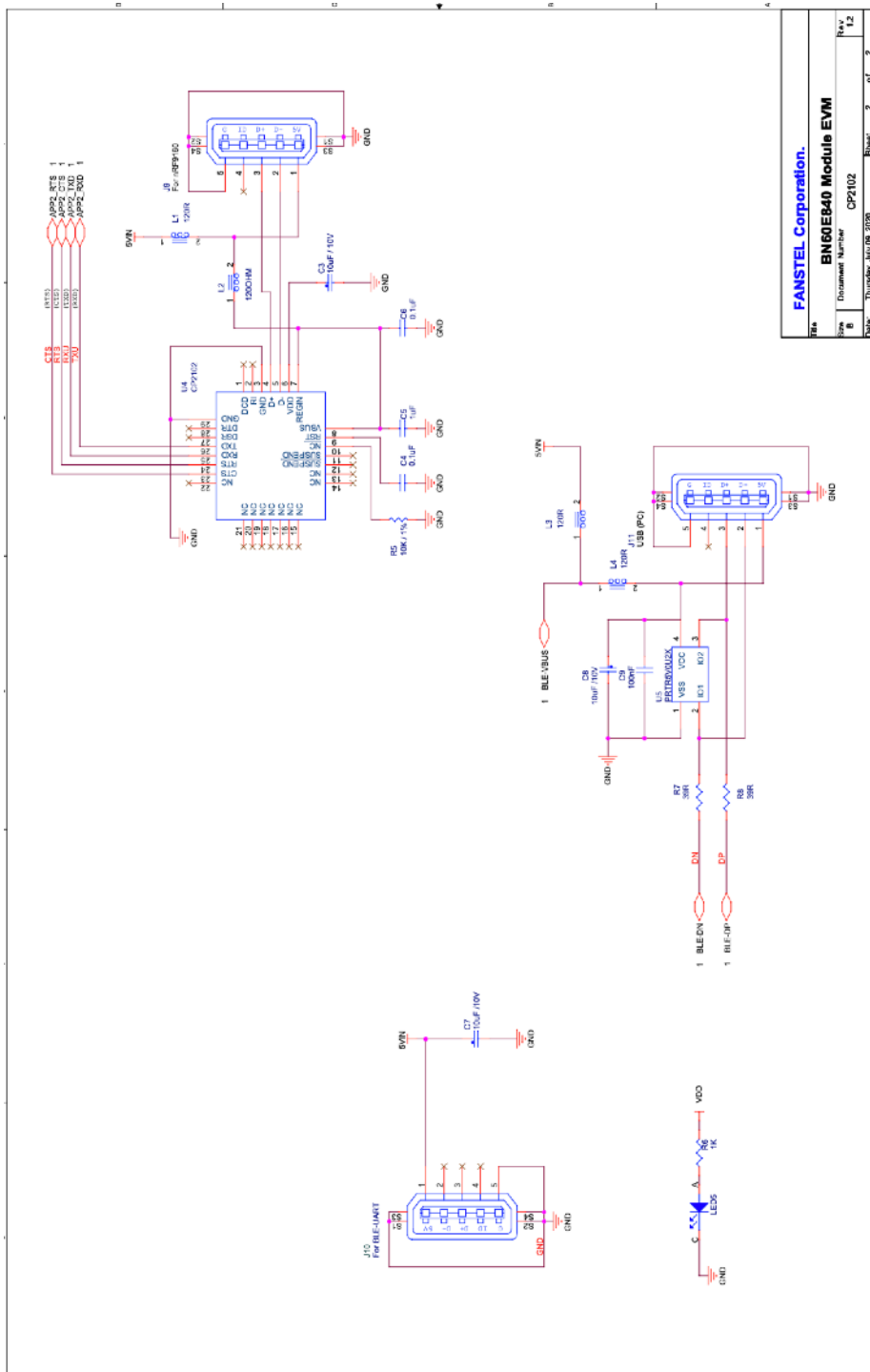


LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Evaluation Board EV-LN60G Schematics



FANSTEEL Corporation.	
BN60E840 Module EVM	
DocuPart Number	rPC9160-BLE
Doc. Template_M008_2020	Sheet 1 of 1
Rev. 1.2	



FANSTEL Corporation.	
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LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Battery Power Application

Two inductors required for DCDC converter are inside BT840F module. You can enable DCDC to lower power consumption.

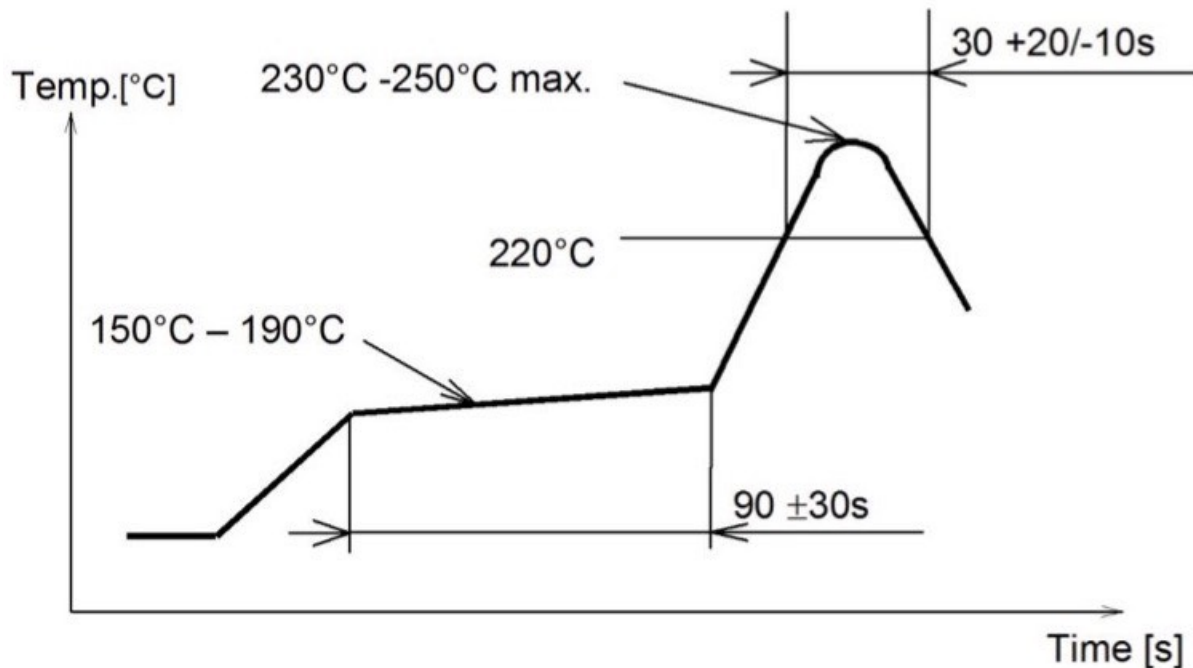
The 32.768 kHz sleep crystal and load capacitors are on the M.2 module.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

6. Miscellaneous

Soldering Temperature-Time Profile for Re-Flow Soldering

Maximum number of cycles for re-flow is 2. No opposite side re-flow is allowed due to module weight.



Cautions, Design Notes, and Installation Notes

Failure to follow the guidelines set forth in this document may result in degrading of the product's functions and damage to the product.

Design Notes

- (1) Follow the conditions written in this specification, especially the control signals of this module.
- (2) The supply voltage has to be free of AC ripple voltage (for example from a battery or a low noise regulator output). For noisy supply voltages, provide a decoupling circuit (for example a ferrite in series connection and a bypass capacitor to ground of at least 47uF directly at the module).
- (3) This product should not be mechanically stressed when installed.
- (4) Keep this product away from heat. Heat is the major cause of decreasing the life of these products.
- (5) Avoid assembly and use of the target equipment in conditions where the products' temperature may exceed the maximum tolerance.
- (6) The supply voltage should not be exceedingly high or reversed. It should not carry noise and/or spikes.
- (7) this product away from other high frequency circuits.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Notes on Antenna and PCB Layout

- (1) Don't use a module with internal antenna inside a metal case.
- (2) For PCB layout:
 - Avoid running any signal line below module whenever possible,
 - No ground plane below antenna,
 - If possible, cut-off the portion of main board PCB below antenna.

Installation Notes

- (1) Reflow soldering is possible twice based on the time-temperature profile in this data sheets. Set up the temperature at the soldering portion of this product according to this reflow profile.
- (2) Carefully position the products so that their heat will not burn into printed circuit boards or affect the other components that are susceptible to heat.
- (3) Carefully locate these products so that their temperatures will not increase due to the effects of heat generated by neighboring components.
- (4) If a vinyl-covered wire comes into contact with the products, then the cover will melt and generate toxic gas, damaging the insulation. Never allow contact between the cover and these products to occur.
- (5) This product should not be mechanically stressed or vibrated when reflowed.
- (6) If you want to repair your board by hand soldering, please keep the conditions of this chapter.
- (7) Do not wash this product.
- (8) Refer to the recommended pattern when designing a board.
- (9) Pressing on parts of the metal cover or fastening objects to the metal will cause damage to the unit.
- (10) For more details on LGA (Land Grid Array) soldering processes refer to the application note.

Usage Condition Notes

- (1) Take measures to protect the unit against static electricity. If pulses or other transient loads (a large load applied in a short time) are applied to the products, check and evaluate their operation before assembly on the final products.
- (2) Do not use dropped products.
- (3) Do not touch, damage or soil the pins.
- (4) Follow the recommended condition ratings about the power supply applied to this product.
- (5) Electrode peeling strength: Do not add pressure of more than 4.9N when soldered on PCB
- (6) Pressing on parts of the metal cover or fastening objects to the metal cover will cause damage.
- (7) These products are intended for general purpose and standard use in general electronic equipment, such as home appliances, office equipment, information and communication equipment.

Storage Notes

- (1) The module should not be stressed mechanically during storage.
- (2) Do not store these products in the following conditions or the performance characteristics of the product, such as RF performance will be adversely affected:

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

- Storage in salty air or in an environment with a high concentration of corrosive gas.
 - Storage in direct sunlight
 - Storage in an environment where the temperature may be outside the range specified.
 - Storage of the products for more than one year after the date of delivery storage period.
- (3) Keep this product away from water, poisonous gas and corrosive gas.
- (4) This product should not be stressed or shocked when transported.
- (5) Follow the specification when stacking packed crates (max. 10).

Safety Conditions

These specifications are intended to preserve the quality assurance of products and individual components. Before use, check and evaluate the operation when mounted on your products. Abide by these specifications, without deviation when using the products. These products may short-circuit. If electrical shocks, smoke, fire, and/or accidents involving human life are anticipated when a short circuit occurs, then provide the following failsafe functions, as a minimum.

- (1) Ensure the safety of the whole system by installing a protection circuit and a protection device.
- (2) Ensure the safety of the whole system by installing a redundant circuit or another system to prevent a dual fault causing an unsafe status.

Other Cautions

- (1) This specification sheet is copyrighted. Reproduction of this data sheet is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices.
- (2) Do not use the products for other purposes than those listed.
- (3) Be sure to provide an appropriate failsafe function on your product to prevent an additional damage that may be caused by the abnormal function or the failure of the product.
- (4) This product has been manufactured without any ozone chemical controlled under the Montreal Protocol.
- (5) These products are not intended for other uses, other than under the special conditions shown below. Before using these products under such special conditions, check their performance and reliability under the said special conditions carefully to determine whether or not they can be used in such a manner.
- In liquid, such as water, salt water, oil, alkali, or organic solvent, or in places where liquid may splash.
 - In direct sunlight, outdoors, or in a dusty environment
 - In an environment where condensation occurs.
 - In an environment with a high concentration of harmful gas.
- (6) If an abnormal voltage is applied due to a problem occurring in other components or circuits, replace these products with new products because they may not be able to provide normal performance even if their electronic characteristics and appearances appear satisfactory.
- (7) When you have any question or uncertainty, contact Fanstel.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

Packaging

Production modules are delivered in reel, 1000 modules in each reel.

FCC LABEL

The Original Equipment Manufacturer (OEM) must ensure that the OEM modular transmitter must be labeled with its own FCC ID number. This includes a clearly visible label on the outside of the final product enclosure that displays the contents shown below. If the FCC ID is not visible when the equipment is installed inside another device, then the outside of the device into which the equipment is installed must also display a label referring to the enclosed equipment

The end product with this module may subject to perform FCC part 15 unintentional emission test requirement and be properly authorized.

This device is intended for OEM integrator only.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

7. Revision History

- Feb, 2021, Ver. 0.90: The first draft release.
- July 2022, Ver. 1.00: Initial release.
- Jan. 2023, Ver. 1.01: Update mechanical drawings and EV board schematics.
- Dec. 2023, Ver. 1.02: Add LR62E1 module.
- Mar. 2024, Ver. 1.03: Correct LR62E and LR62E1 power supply description and add LR62C.

LR62E, LR62XE LoRa and LoRa-BLE Combo Modules

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