

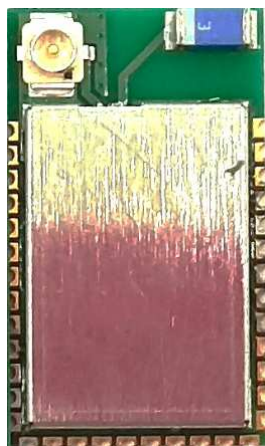


BLE Module

Datasheet

DFBM-NQ62X-DT0R

*A Bluetooth Low Energy System On Chip
Module.*





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DFBM-NQ62X-DT0R BLE SoC Module

This document describes the DFBM-NQ62X-DT0R wireless BLE SoC module hardware specification. The modules provide cost effective, low power, and flexible platform to add BLE for embedded devices for a variety of applications, such as wireless sensors and thermostats. It uses BLE SoC, which integrating the 2.4GHz transceiver, a 32 bit ARM® Cortex M4F CPU, flash memory, and analog and digital peripherals.

1. Features

1-1. General

- BLE chip with a single chip antenna or an external RF connector
- Integrate a 32 bit ARM® Cortex M4F CPU, 512KB flash memory and 64KB RAM
- Extra 512KB flash memory for user data storage (Optional)
- 32.768KHz Real Time Clock (Optional)
- 12-bit 200kspc ADC - 8 configurable channels with programmable gain
- 30 General Purpose I/O Pins
- Two-wire Master (I2C compatible) support 100K bps and 400K bps
- UART baud rate up to 921600 bps
- SPI bit rate up to 4M bps
- Quadrature Decoder (QDEC)
- LGA 36 pin package
- Dimension 19.0mm(L) x 11.0mm(W) x 1.8 mm(H)
- RoHS compliant

1-2. Bluetooth

- Bluetooth 4.2 specification compliant
- AES HW encryption



DFBM-NQ62X-DT0R

Detail Part Number of Module

Part Number	Antenna Type		Storage Flash (512KB)	Real Time Clock (RTC)
	Chip Antenna	RF Connector		
DFBM-NQ620-DT0R	○		○	○
DFBM-NQ621-DT0R		○	○	○
DFBM-NQ622-DT0R	○			○
DFBM-NQ623-DT0R		○		○
DFBM-NQ624-DT0R	○			
DFBM-NQ625-DT0R		○		

3. Block Diagram

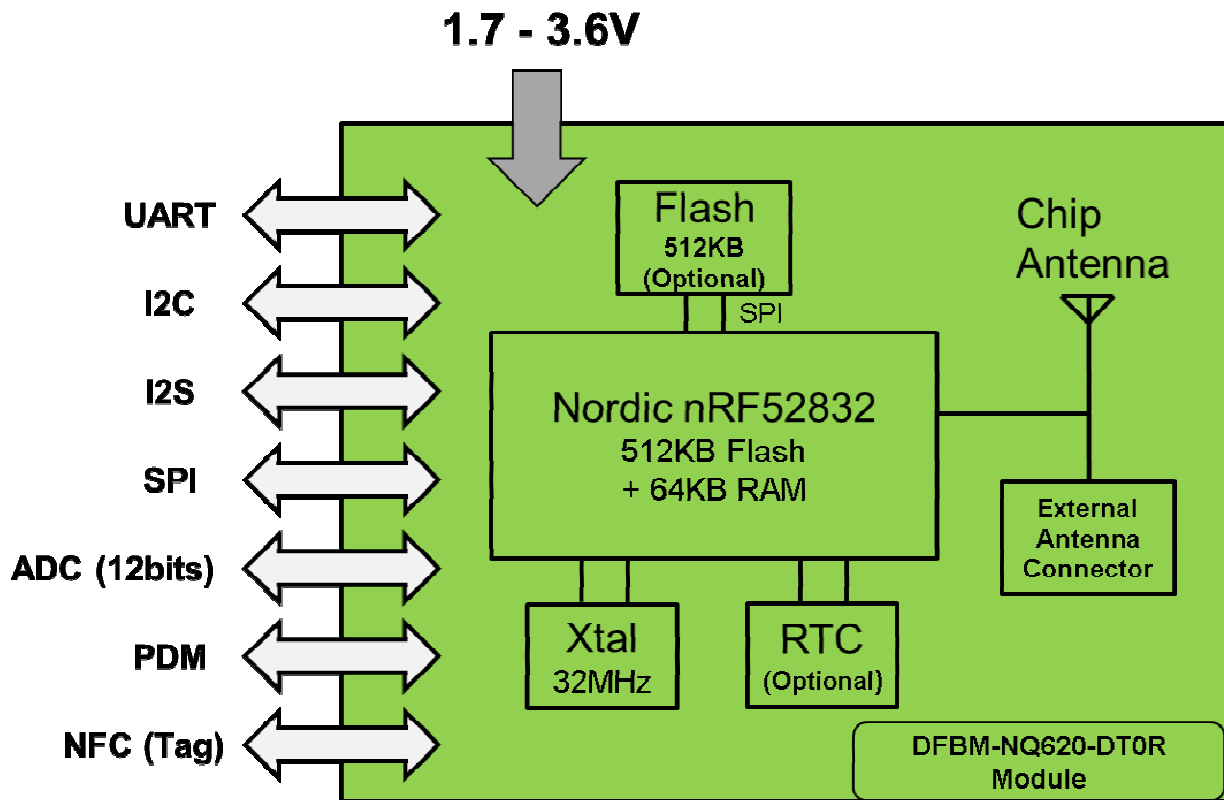


Figure 3-1. DFBM-NQ620-DT0R Block Diagram

4. General Specification

Standard	Bluetooth: V4.2
Frequency	2.402 ~ 2.48 GHz
Modulation	GFSK
Data Rate	BLE: 0.25, 1, 2 Mbps
Operating Temperature	-40~+85 °C
Storage Temperature	-40~+125 °C
Antenna Impedance	50 ohm
Package Size	19.0 X 11.0 X 1.8 mm
Host Interface	UART, SPI, I2C

Table 4-1. General Specification

5. Electrical Characteristics

5-1. Absolute Maximum Rating

Symbol	Min.	Max.	Units
VDD_3V3	-0.3	3.9	V
V _{GPIO}	-0.3	3.9	V
ESD-HBM		4	KV
ESD-CDM		750	V

Table 5-1. Absolute Maximum Rating

5-2. Recommended Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD_3V3	Supply Voltage	1.7	3.3	3.6	V
	System On, Standby mode		3.5		mA
	TX Current at POUT = +0 dBm		6.5		mA
	RX Current		7.0		mA
	Current in SYSTEM OFF, no RAM retention.		1.2		uA
	Current in SYSTEM OFF mode 32 kB RAM retention.		1.0		uA
	SYSTEM-ON base current with 32 kB RAM enabled.		1.5		uA

Table 5-2. Bluetooth Power Consumption

6. RF Characteristics

6-1. Bluetooth RF characteristics

Condition: VDD_3V3=VIO=3.3V, T=25°C

Item	Condition	Min.	Typ.	Max.	Unit
RF Characteristics					
Output Power		-20	0	4	dBm
Initial Frequency Offset		-75		75	KHz
Carrier Frequency Offset and Drift	CFOD	-150		150	KHz
Modulation Characteristics	Modulation Index (F1 / F2)	0.8			N/A
	F1 Average	225		275	KHz
	F2 Maximum	185			KHz
Sensitivity	PER < 30.8%	-96		-70	dBm
Maximum Input Level	PER < 30.8%	-10			dBm

Table 6-4. Bluetooth RF Characteristics

6-2. Antenna Performance

Item	Specification
Working Frequency Range	2450 ± 50 MHz
Peak Gain (dBi)	Chip Antenna: +2dBi External Antenna: +2dBi
Antenna Type	Chip Antenna / External Antenna (Dipole)
VSWR	Less than 2.8

Table 6-5. Antenna Characteristics

7. Pin Description

Pin	Definition	Function	Description
1	GND	Gnd	Ground
2	P0.25	Digital I/O	Bluetooth general purpose I/O pin
3	P0.26	Digital I/O	Bluetooth general purpose I/O pin
4	P0.27	Digital I/O	Bluetooth general purpose I/O pin
5	P0.28	Digital I/O	Bluetooth general purpose I/O pin
6	P0.29	Digital I/O	Bluetooth general purpose I/O pin
7	P0.30	Digital I/O	Bluetooth general purpose I/O pin
8	P0.31	Digital I/O	Bluetooth general purpose I/O pin
9	GND	Gnd	Ground
10	VDD_3V3	Power	VDD power supply input
11	GND	Gnd	Ground
12	GND	Gnd	Ground
13	GND	Gnd	Ground
14	P0.02	Digital I/O	Bluetooth general purpose I/O pin
15	P0.03	Digital I/O	Bluetooth general purpose I/O pin
16	P0.04	Digital I/O	Bluetooth general purpose I/O pin
17	P0.09	Digital I/O	Bluetooth general purpose I/O pin
18	P0.10	Digital I/O	Bluetooth general purpose I/O pin
19	P0.11	Digital I/O	Bluetooth general purpose I/O pin
20	P0.12	Digital I/O	Bluetooth general purpose I/O pin
21	P0.13	Digital I/O	Bluetooth general purpose I/O pin
22	P0.14	Digital I/O	Bluetooth general purpose I/O pin
23	P0.15	Digital I/O	Bluetooth general purpose I/O pin
24	GND	Gnd	Ground



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25	P0.16	Digital I/O	Bluetooth general purpose I/O pin
26	P0.17	Digital I/O	Bluetooth general purpose I/O pin
27	P0.18	Digital I/O	Bluetooth general purpose I/O pin
28	P0.19	Digital I/O	Bluetooth general purpose I/O pin
29	P0.20	Digital I/O	Bluetooth general purpose I/O pin
30	P0.21	Digital I/O	Bluetooth general purpose I/O pin
31	SWDCLK	Digital input	Hardware debug and flash programming I/O
32	SWDIO	Digital I/O	System reset (active low). Also hardware debug and flash programming I/O
33	P0.22	Digital I/O	Bluetooth general purpose I/O pin
34	P0.23	Digital I/O	Bluetooth general purpose I/O pin
35	P0.24	Digital I/O	Bluetooth general purpose I/O pin
36	GND	Gnd	Ground

Table 7-1. Pin Description

8. Reference Circuit

8-1. Standard Mode

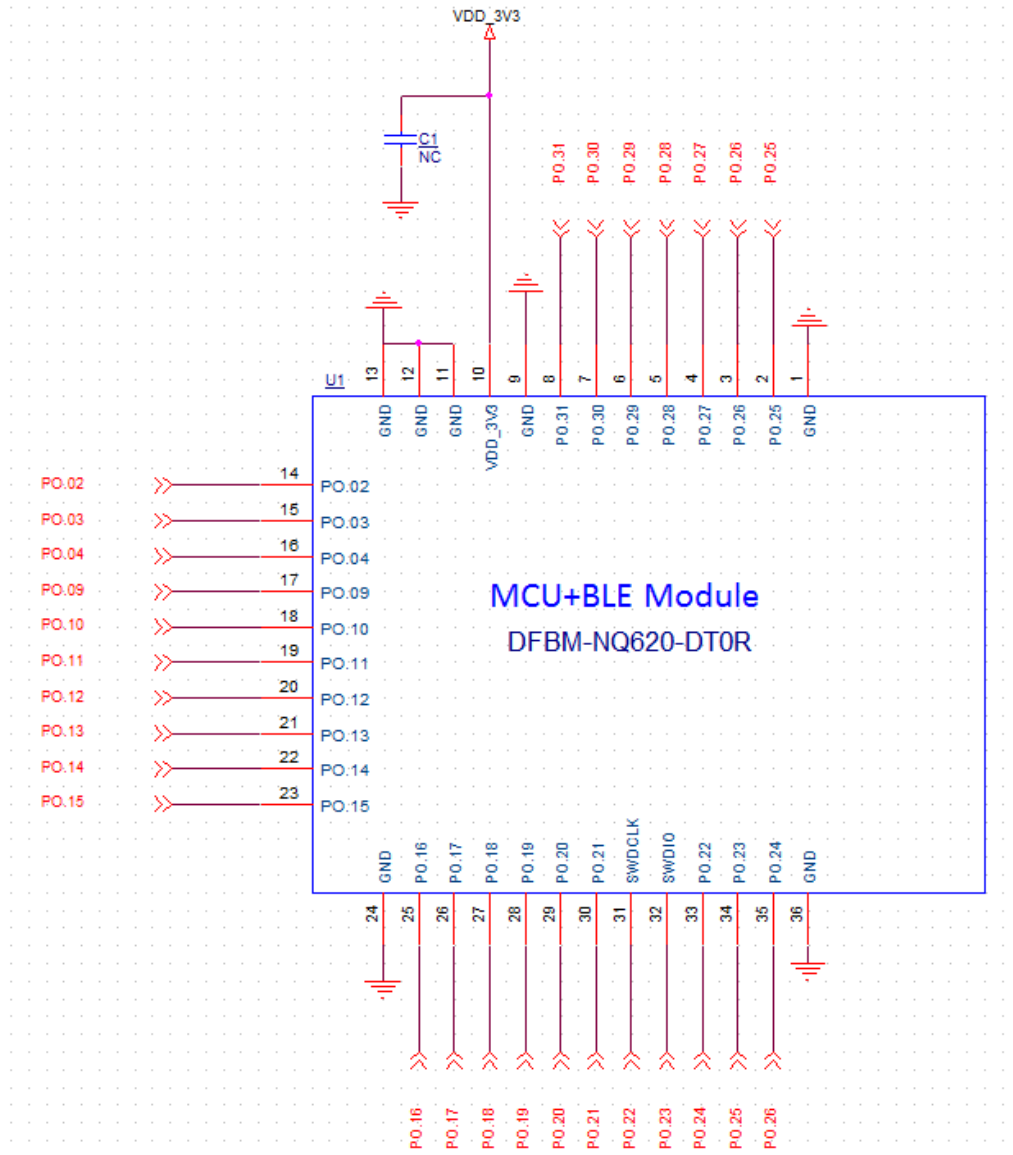


Figure 8-1. DFBN-NQ62X-DT0R Reference Circuit

9. Module Dimensions

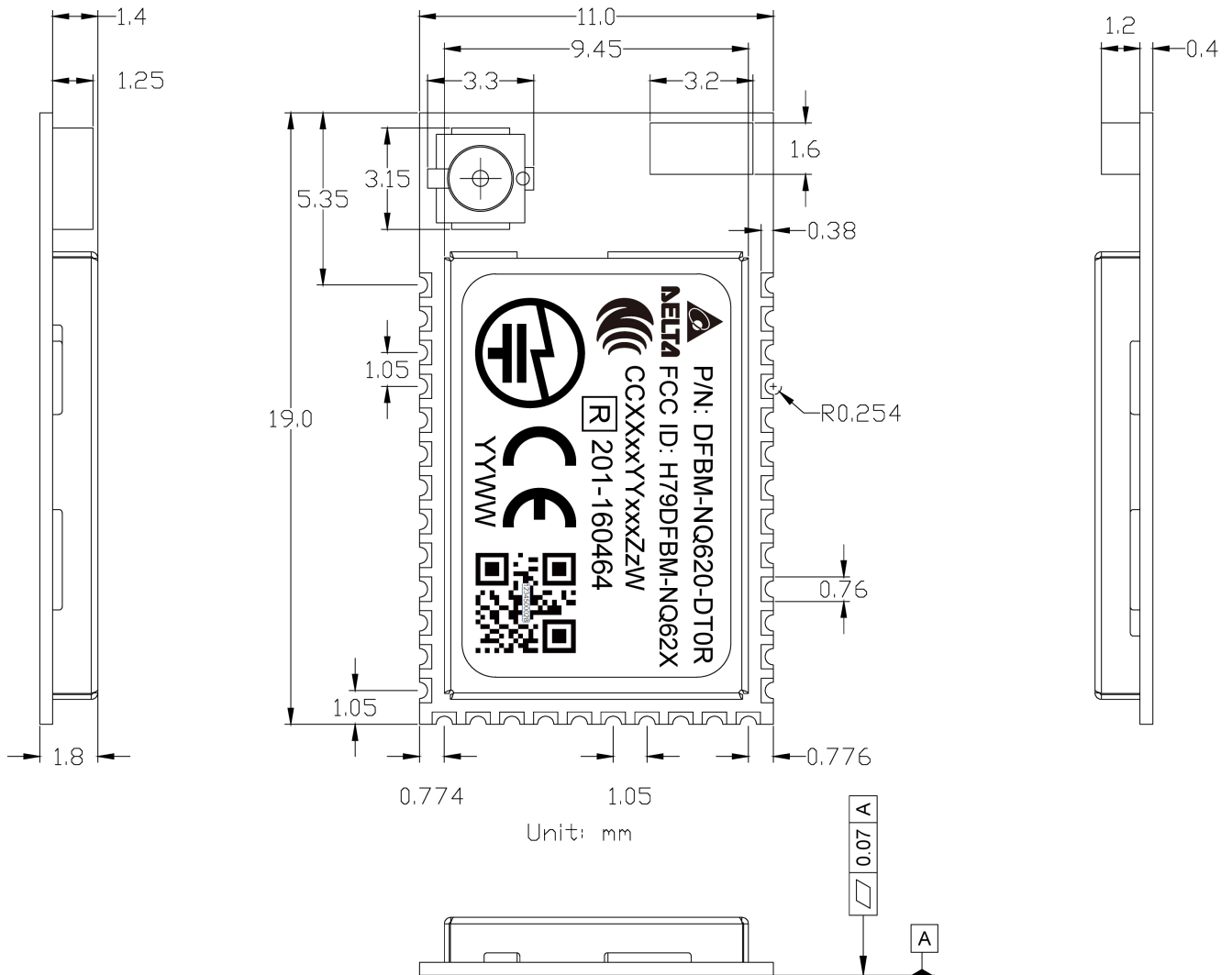


Figure 9-1. DFBM-NQ62X-DT0R Module Dimension

10. Recommend Soldering Conditions

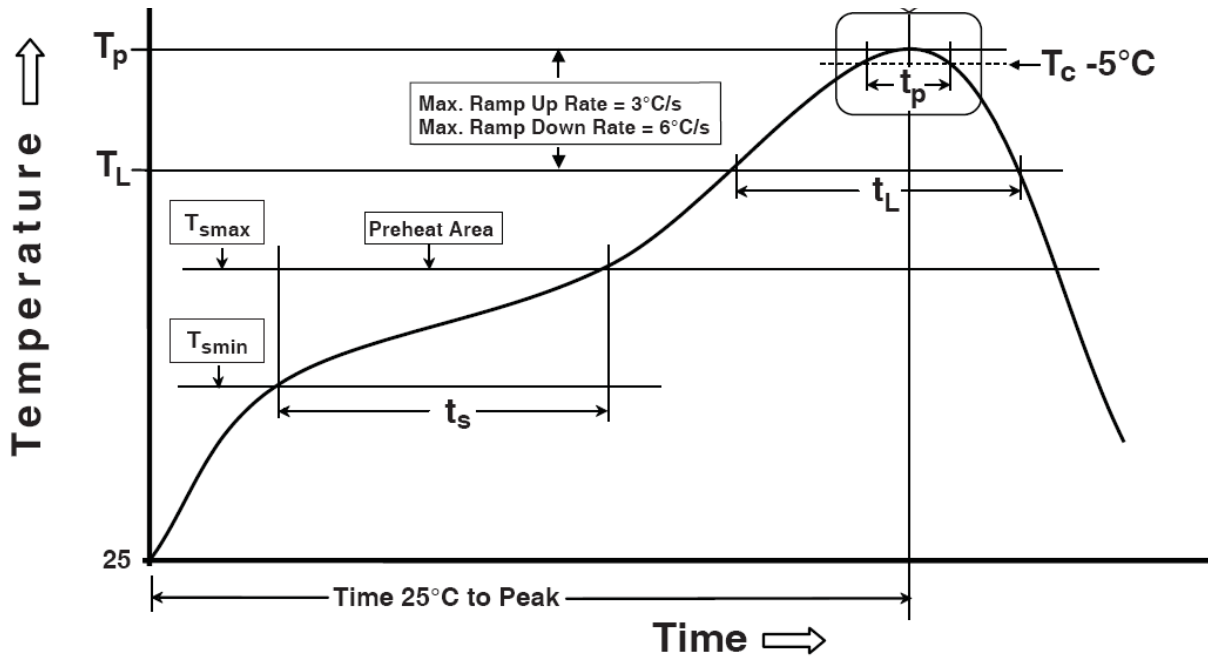


Figure 10-1. Reflow temperature Profile

No.	Item	Temperature (°C)	Time (sec)
1	Pre-heat	T_{smin} : 150 °C ~ T_{smax} : 200°C	t_s : 60 ~ 120
2	Soldering	T_L : $\geq 217^\circ\text{C}$	t_L : 60~150
3	Peak-Temp.	T_p : 260 °C	t_p : 30

Table 10-2. Reflow temperature Profile Parameters

11. Layout Guide

1. All traces can fan out directly.
2. To have basic radiation performance. Recommend to keep antenna area (below red block, 11.0 mm x 4.2 mm) clean and 5 mm extended.
3. To have better radiation performance, more clearance area is needed. Recommend to keep any metal out from antenna clearance and 20 mm extended.
4. Thickness of system board will make antenna resonant frequency shift. Recommend thickness of system board is 1.0mm which resonant frequency is 2.5GHz. Resonant frequency will be close to 2.45GHz after assembly in plastic housing.

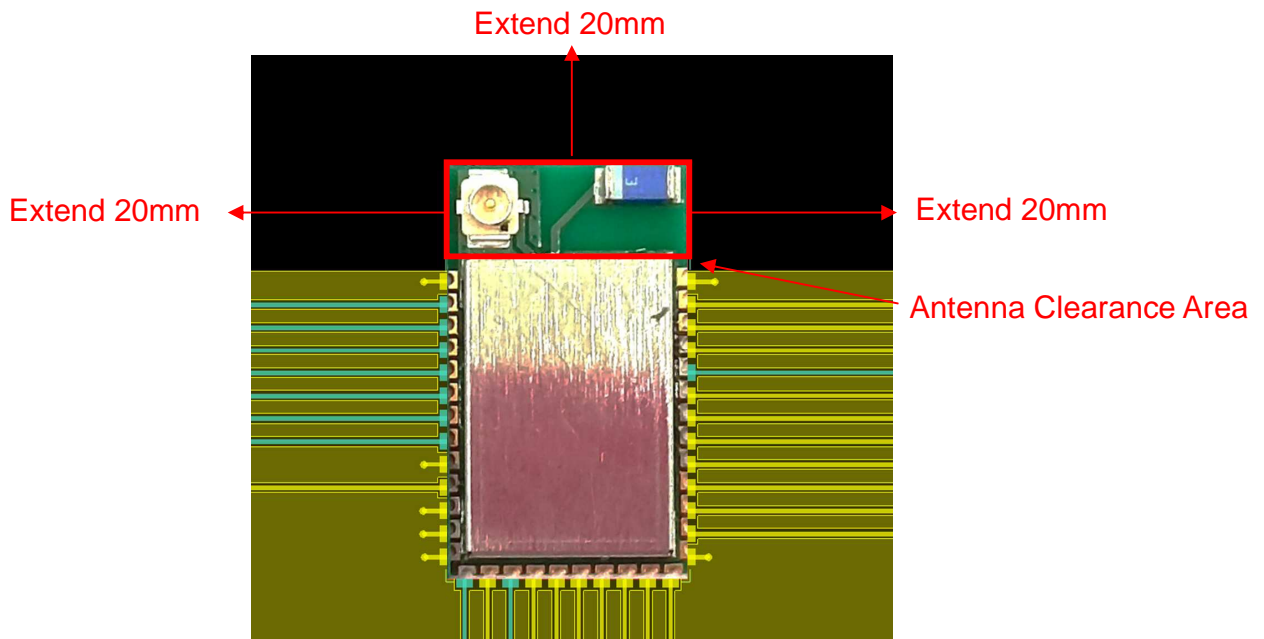


Figure 11-1. Layout Guide

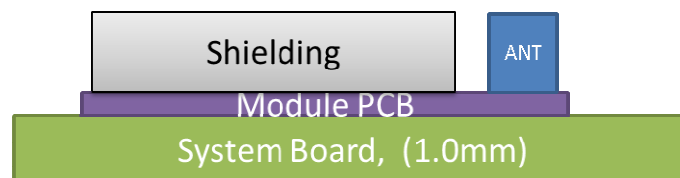
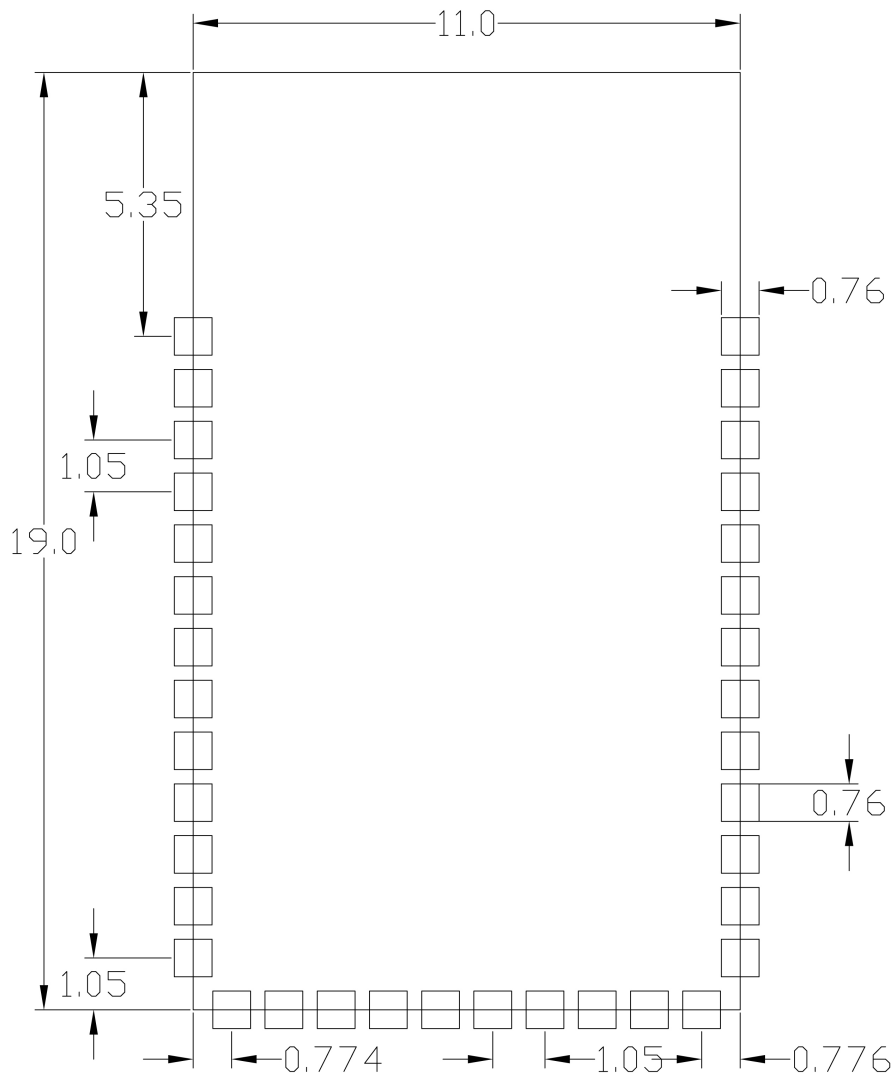


Figure 11-2. Thickness of system board

12. Recommended Land Pattern



Unit: mm

Figure 12-1. Recommended Stencil Aperture



13. Required End Product Labeling

Any device incorporating this module must include an external, visible, permanent marking or label which states: "Contains FCC ID: H79DFBM-NQ62X."

14. Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as shown in this manual.

15. Federal Communications Commission (FCC)

Statement

15.21

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

15.105(b)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:



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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1) this device may not cause interference and
- 2) this device must accept any interference, including interference that may cause undesired operation of the device.

RF Radiation Exposure Statement:

This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.