MN52H-C33

Bluetooth® Low Energy Module

Datasheet Version A

Ordering Code

MN52H-C33 module for Box packaging: MN-833A1-01A-CB

BLE Solution: Nordic NRF52833

RF IC	Crystal	Chip antenna
Nordic NRF52833/V1	32MHz/20ppm Embedded	Embedded

Overview and Benefits

Overview

The MN52H-C33 from Aradconn is a highly flexible, ultra-low power, Bluetooth Low Energy module based on the nRF52833 SoC from Nordic Semiconductor. With an Arm® Cortex®-M4 with FPU 32-bit processor, embedded 2.4GHz transceiver, and integrated chip antenna. Providing full use of the nRF52833's capabilities and peripherals, which include I2C, SPI, UART, I2S, ADC, GPIO, PWM,NFC and USB interfaces.

Benefits

- **Bluetooth qualification and Regulatory certification reduce the burden to enter the market.**
- **Complete RF solution with no additional RF design, allowing faster time to launch a new product, and providing long working distance.**

  MN52H-C: up to 550 meters in open space. @1 Mbps
- **Compact size: (L) 15.5 x (W) 10.1 x (H) 2.1mm.**
- **Provides flexibility in the OEM's application development choice with full support for using Nordic SDK and firmware tools.**

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1. Features and Application

1.1 Features

- **2.4 GHz transceiver**
  - -96 dBm sensitivity in 1Mbps Bluetooth® low energy mode
  - -103 dBm sensitivity in 125kbps Bluetooth® low energy mode(long range)
  - -20 to +8dBm TX power, configurable in 4 dB steps
  - Supported data rates:
    - Bluetooth® 5 – 2 Mbps, 1 Mbps, 500 kbps, and 125 kbp
    - IEEE 802.15.4-2006 – 250 kbps
    - Proprietary 2.4 GHz – 2 Mbps, 1 Mbp
  - Angle-of-arrival (AoA) and angle-of-departure (AoD) direction finding
  - 4.9 mA peak current in TX (0 dBm)
  - 4.6 mA peak current in RX
  - RSSI (1 dB resolution)
- **Arm® Cortex®-M4 32-bit processor with FPU, 64 MHz**
  - 217 EEMBC CoreMark® score running from flash memory
  - 52 µA/MHz running from flash memory
  - Serial wire debug (SWD)
- **Flexible power management**
  - 1.7 V–5.5 V supply voltage range
  - On-chip DC/DC and LDO regulators with automated low current modes
  - 0.6 µA at 3 V in System OFF mode, no RAM retention
  - 1.5 µA at 3 V in System ON mode, no RAM retention, wake on RTC
- **Memory**
  - 512kB flash/128 kB RAM
- **USB 2.0 full speed (12 Mbps) controller**
- **High-speed 32 MHz SPI**
- **Nordic SoftDevice ready with support for concurrent multi-protocol**
- **Type 2 near field communication (NFC-A) tag with wakeup-on-field and touch-to-pair capabilities**
- **12-bit, 200 ksps ADC - 8 configurable channels with programmable gain**
- **64 level comparator**
- **15 level low power comparator with wakeup from System OFF mode**
- **Temperature sensor**
- **42 general purpose I/O pins**

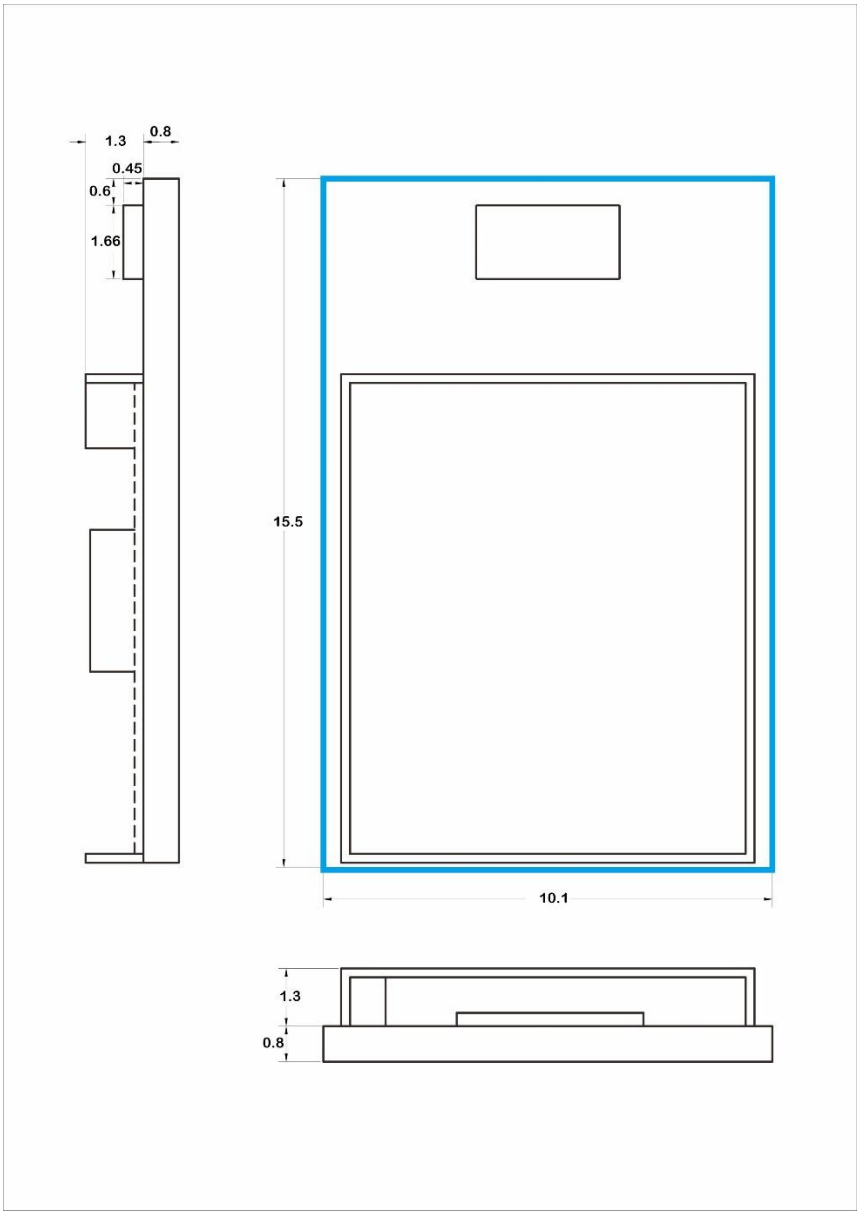
- **4x 4-channel pulse width modulator (PWM) unit with EasyDMA**
- **Digital microphone interface (PDM)**
- **5x 32-bit timer with counter mode**
- **Up to 4x SPI master/3 x SPI slave with EasyDMA**
- **Up to 2x I2C compatible 2-wire master/slave**
- **I2S with EasyDMA**
- **2 X UART (CTS/RTS) with EasyDMA**
- **Programmable peripheral interconnect (PPI)**
- **Quadrature decoder (QDEC)**
- **AES HW encryption with EasyDMA**
- **3x real-time counter (RTC)**
- **Single crystal operation**

1.2 Application

Iot	• Smart home sensors and controllers • Industrial IoT sensors and controllers
Advanced wearables	• Health / fitness sensor and monitor device • Wireless payment enabled devices
Interactive entertainment devices	• Remote control • Gaming controller
Advanced computer peripherals and I/O devices	• Mouse • Keyboard • Multi-touch trackpad

2. Mechanical specifications

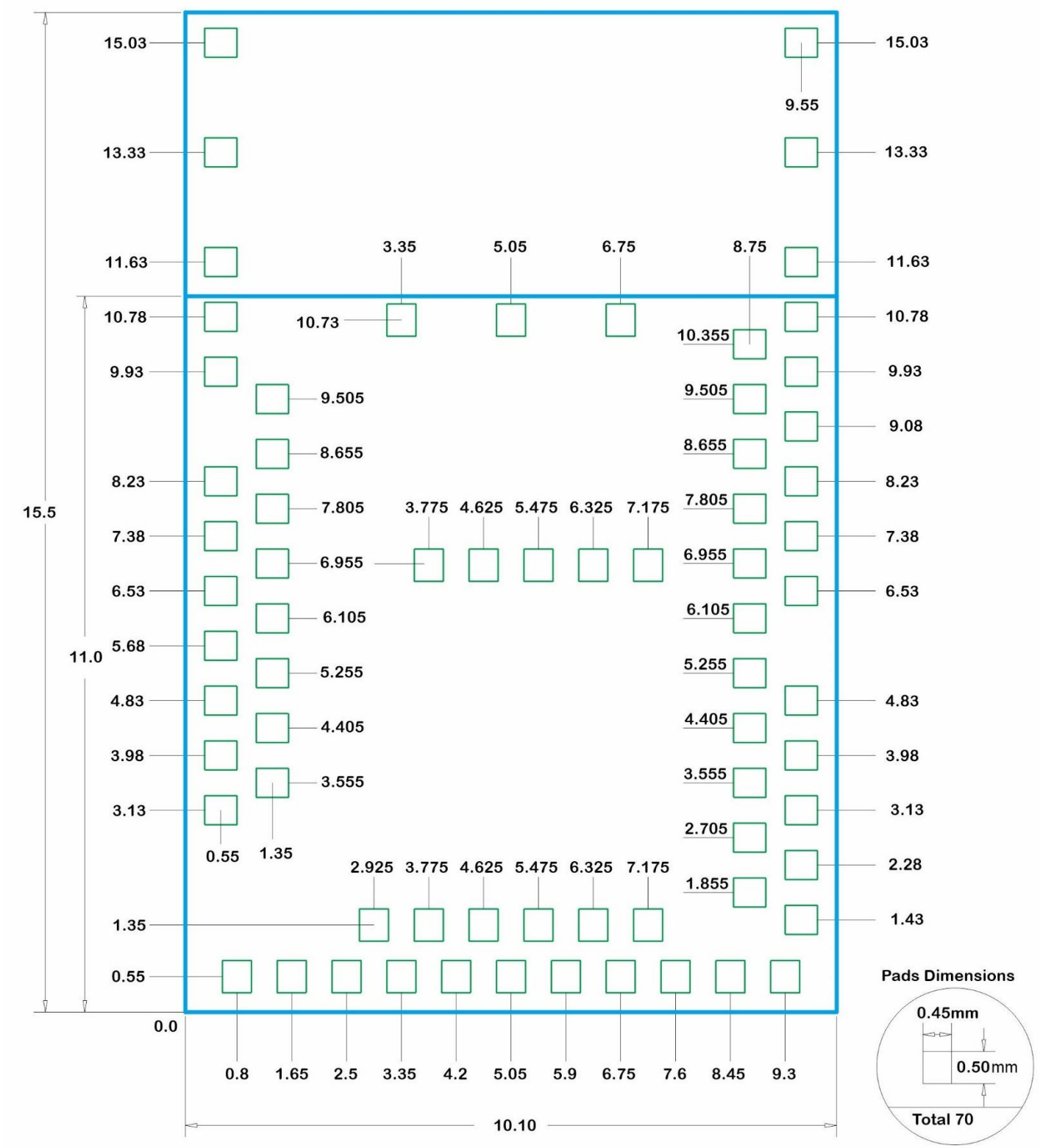
2.1 Dimensions



All dimensions are in millimeters.

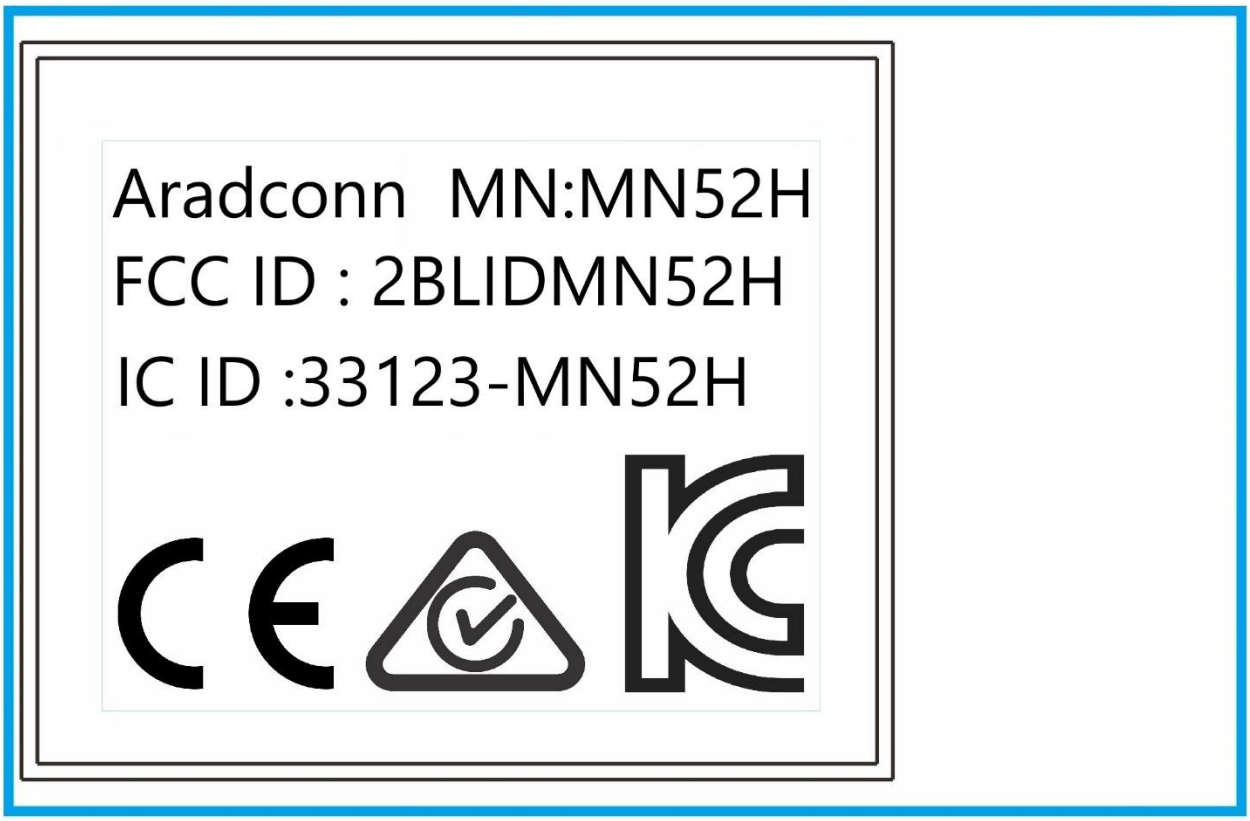
Item	Dimension	Tolerance
Length	15.5mm	±0.30 mm
Width	10.1mm	±0.30mm
Height	2.1mm	±0.30mm

2.2 Footprint

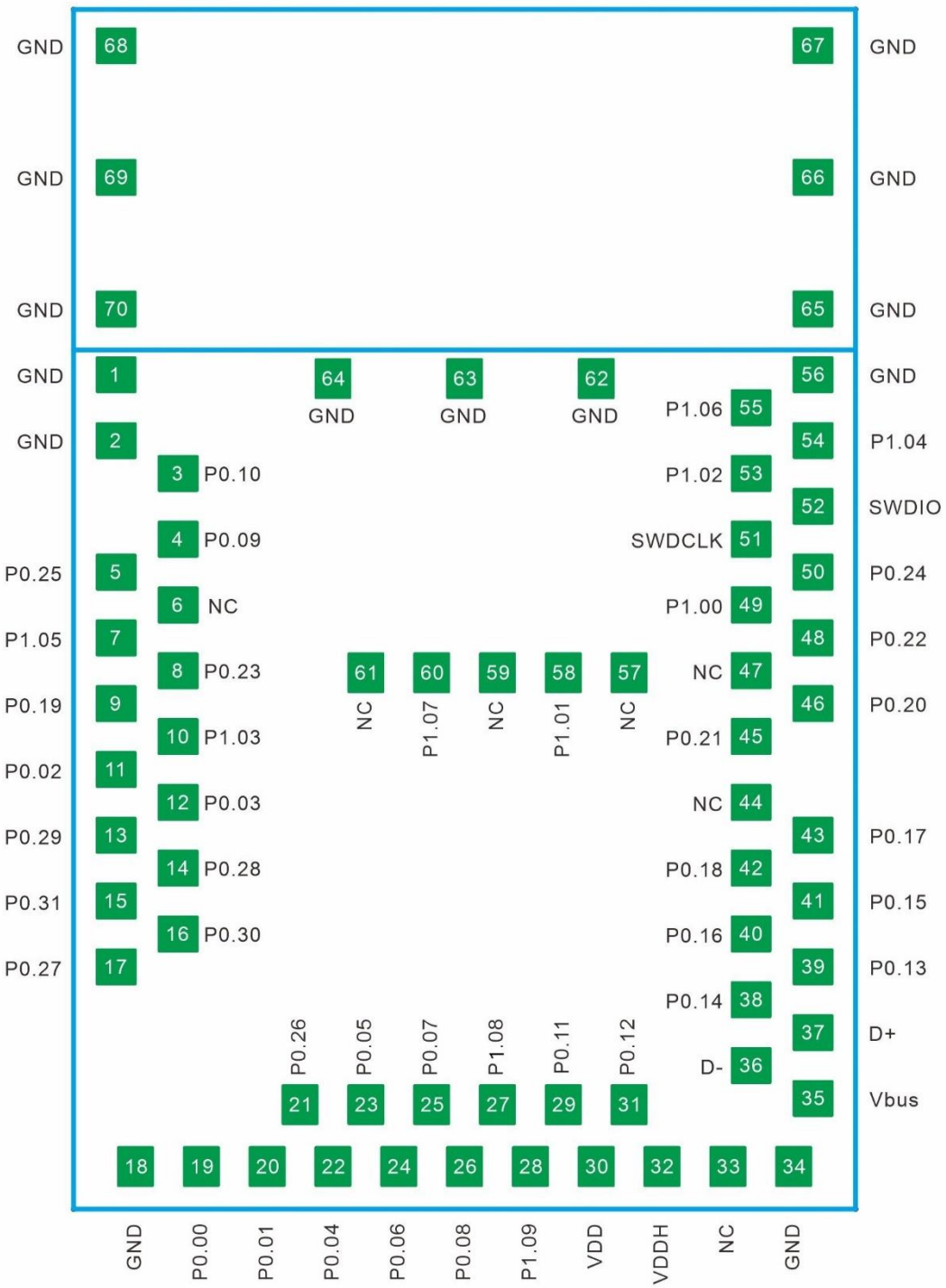


All dimensions are in millimeters.

2.3 Module Marking



3. Pin Assignment



Pin No.	Name	Pin function	Description
(1)	GND	Ground	The pad must be connected to a solid ground plane
(2)	GND	Ground	The pad must be connected to a solid ground plane
(3)	P0.10	Digital I/O	General-purpose I/O
	NFC2	NFC input	NFC antenna connection
(4)	P0.09	Digital I/O	General-purpose I/O
	NFC1	NFC input	NFC antenna connection
(5)	P0.25	Digital I/O	General-purpose I/O
(6)	NC		No connect
(7)	P1.05	Digital I/O	General-purpose I/O
(8)	P0.23	Digital I/O	General-purpose I/O
(9)	P0.19	Digital I/O	General-purpose I/O
(10)	P1.03	Digital I/O	General-purpose I/O
(11)	P0.02	Digital I/O	General-purpose I/O
	AIN0	Analog input	Analog input
(12)	P0.03	Digital I/O	General-purpose I/O
	AIN1	Analog input	Analog input
(13)	P0.29	Digital I/O	General-purpose I/O
	AIN5	Analog input	Analog input
(14)	P0.28	Digital I/O	General-purpose I/O
	AIN4	Analog input	Analog input
(15)	P0.31	Digital I/O	General-purpose I/O
	AIN7	Analog input	Analog input
(16)	P0.30	Digital I/O	General-purpose I/O
	AIN6	Analog input	Analog input
(17)	P0.27	Digital I/O	General-purpose I/O
(18)	GND	Ground	The pad must be connected to a solid ground plane
(19)	P0.00	Digital I/O	General-purpose I/O
	XL1	Analog input	Connection to 32.768kHz crystal (LFXO)
(20)	P0.01	Digital I/O	General-purpose I/O
	XL2	Analog input	Connection to 32.768kHz crystal (LFXO)
(21)	P0.26	Digital I/O	General-purpose I/O
(22)	P0.04	Digital I/O	General-purpose I/O
	AIN2	Analog input	Analog input
(23)	P0.05	Digital I/O	General-purpose I/O
	AIN3	Analog input	Analog input
(24)	P0.06	Digital I/O	General-purpose I/O
(25)	P0.07	Digital I/O	General-purpose I/O
(26)	P0.08	Digital I/O	General-purpose I/O
(27)	P1.08	Digital I/O	General-purpose I/O
(28)	P1.09	Digital I/O	General-purpose I/O
(29)	P0.11	Digital I/O	General-purpose I/O
(30)	VDD	Power	Power-supply
(31)	P0.12	Digital I/O	General-purpose I/O
Pin No.	Name	Pin function	Description

(32)	VDDH	Power	High voltage power supply
(33)	NC		No connect
(34)	GND	Ground	The pad must be connected to a solid ground plane
(35)	VBUS	Power	5V input for USB 3.3V regulator
(36)	D-	USB	USB D-
(37)	D+	USB	USB D+
(38)	P0.14	Digital I/O	General-purpose I/O
(39)	P0.13	Digital I/O	General-purpose I/O
(40)	P0.16	Digital I/O	General-purpose I/O
(41)	P0.15	Digital I/O	General-purpose I/O
(42)	P0.18	Digital I/O	General-purpose I/O
	nRESET		Configurable as pin RESET
(43)	P0.17	Digital I/O	General-purpose I/O
(44)	NC		No connect
(45)	P0.21	Digital I/O	General-purpose I/O
(46)	P0.20	Digital I/O	General-purpose I/O
(47)	NC		No connect
(48)	P0.22	Digital I/O	General-purpose I/O
(49)	P1.00	Digital I/O	General-purpose I/O
(50)	P0.24	Digital I/O	General-purpose I/O
(51)	SWDCLK	Debug	Serial wire debug clock input for debug and programming
(52)	SWDIO	Debug	Serial wire debug I/O for debug and programming
(53)	P1.02	Digital I/O	General-purpose I/O
(54)	P1.04	Digital I/O	General-purpose I/O
(55)	P1.06	Digital I/O	General-purpose I/O
(56)	GND	Ground	The pad must be connected to a solid ground plane
(57)	NC		No connect
(58)	P1.01	Digital I/O	General-purpose I/O
(59)	NC		No connect
(60)	P1.07	Digital I/O	General-purpose I/O
(61)	NC		No connect
(62)	GND	Ground	The pad must be connected to a solid ground plane
(63)	GND	Ground	The pad must be connected to a solid ground plane
(64)	GND	Ground	The pad must be connected to a solid ground plane
(65)	GND	Ground	The pad must be connected to a solid ground plane
(66)	GND	Ground	The pad must be connected to a solid ground plane
(67)	GND	Ground	The pad must be connected to a solid ground plane
(68)	GND	Ground	The pad must be connected to a solid ground plane
(69)	GND	Ground	The pad must be connected to a solid ground plane
(70)	GND	Ground	The pad must be connected to a solid ground plane

3.1 GPIO Recommended usage

<table>
<tr><th>Module PIN N0.</th><th>NRF52833 GPIO</th><th>Recommended usage</th></tr>
<tr><td>03</td><td>P0.10</td><td rowspan="18">These GPIO are Standard driver only

<table><tr><th>Description(Standard driver)</th><th>Min.</th><th>Typ.</th><th>Max.</th><th>Unit</th></tr><tr><td>VDD ≥1.7, output set low</td><td>1</td><td>2</td><td>4</td><td>mA</td></tr><tr><td>VDD≥ 1.7, output set high</td><td>1</td><td>2</td><td>4</td><td>mA</td></tr></table>
These GPIO are low frequency I/O only :
A frequency over 10kHz (UART, SPI, I2C,I2S PWM) are not recommended.</td></tr>
<tr><td>04</td><td>P0.09</td></tr>
<tr><td>05</td><td>P0.25</td></tr>
<tr><td>07</td><td>P1.05</td></tr>
<tr><td>08</td><td>P0.23</td></tr>
<tr><td>09</td><td>P0.19</td></tr>
<tr><td>10</td><td>P1.03</td></tr>
<tr><td>11</td><td>P0.02</td></tr>
<tr><td>12</td><td>P0.03</td></tr>
<tr><td>13</td><td>P0.29</td></tr>
<tr><td>14</td><td>P0.28</td></tr>
<tr><td>15</td><td>P0.31</td></tr>
<tr><td>16</td><td>P0.30</td></tr>
<tr><td>53</td><td>P1.02</td></tr>
<tr><td>54</td><td>P1.04</td></tr>
<tr><td>55</td><td>P1.06</td></tr>
<tr><td>58</td><td>P1.01</td></tr>
<tr><td>60</td><td>P1.07</td></tr>
</table>

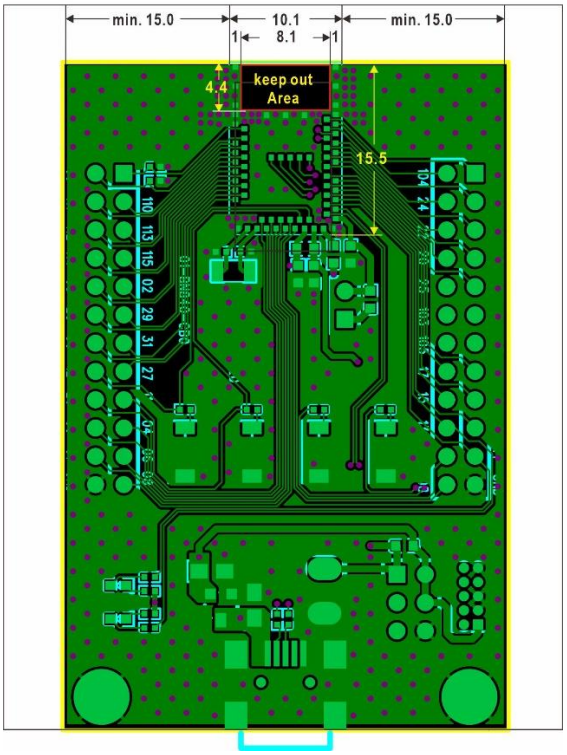
4 Layout design notes

4.1 Recommended RF layout and ground plane

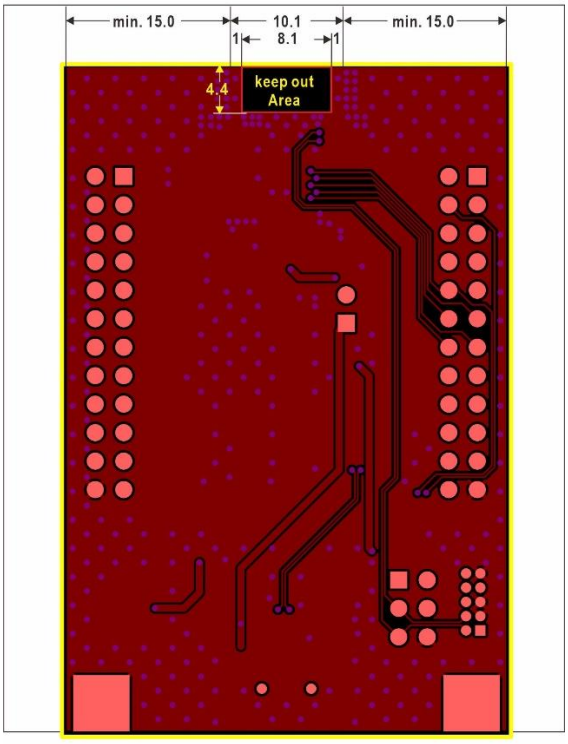
It is recommended to place the module:

- In the center (horizontal) of any mother PCB edge, with GND planes to the left and right
- Keep out Area should be included in the corresponding position of the antenna in each layer.
- Add via hole around GND pads on the mother PCB as many as you can, especially on the four corners and antenna area.

TOP VIEW

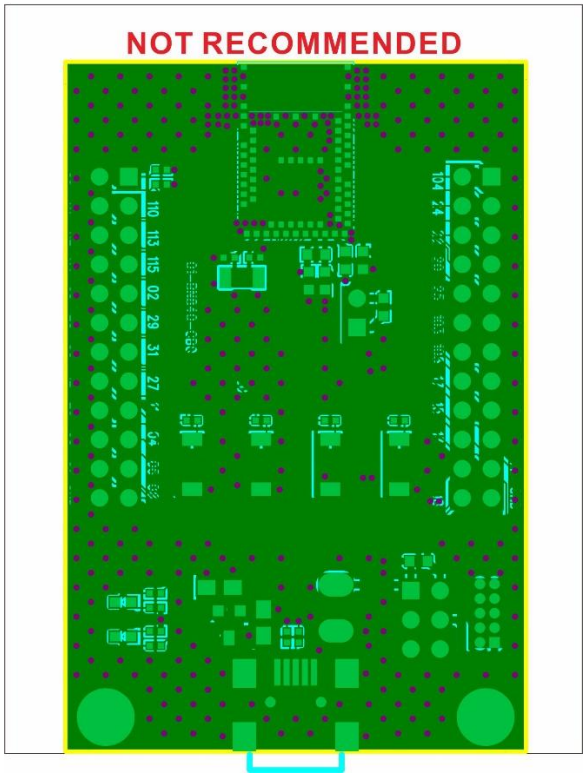


Bottom VIEW

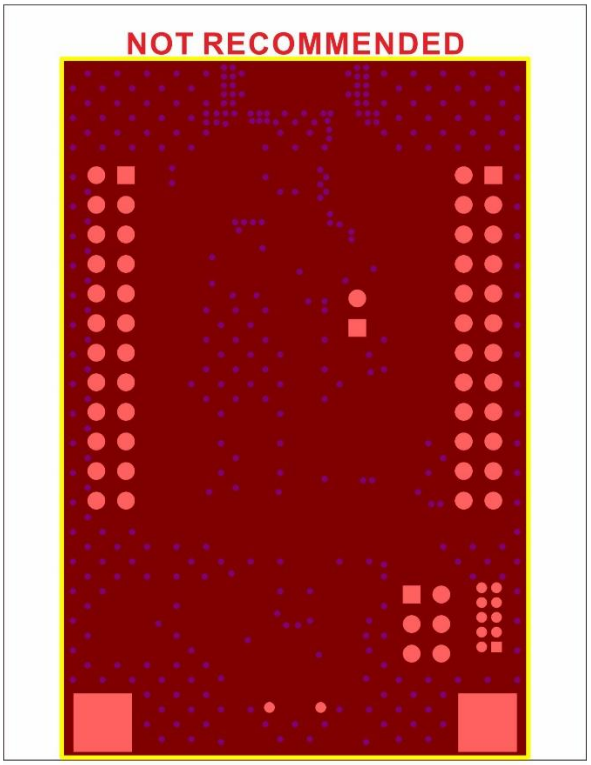


4.2 Not Recommended RF layout and ground plane

TOP VIEW



Bottom VIEW



4.3 Antenna keep out when proximity to Metal

• The minimum safe distance for metals without seriously compromising the antenna tuning is 4cm (bottom, top, left, right).

• Metal close to the antenna (bottom, top, left, right) will degrade RF performance. Any metal closer than 2 cm will significantly degrade RF performance.

5. Electrical Specification

5.1 Absolute Maximum Ratings

Maximum ratings are the extreme limits to which the chip can be exposed for a limited amount of time without causing permanent damage. Prolonged exposure to absolute maximum ratings may affect the device's reliability.

Parameter	Min.	Max.	Unit
Supply voltage			
VDD	-0.3	+3.9	V
VDDH	-0.3	+5.8	
VBUS	-0.3	+5.8	
VSS		0	V
I/O pin voltage			
$V_{I/O}$, VDD ≤3.6 V	-0.3	VDD+0.3	V
$V_{I/O}$, VDD >3.6 V	-0.3	3.9	V
NFC antenna pin current			
NFC 1/2		80	mA
Radio			
RF input level		10	dBm
Environmental			
Storage temperature	-40	+125	°C
MSL (moisture sensitivity level)		2	
ESD HBM (human body model)		4	KV
ESD CDM (charged device model)		750	V
Flash memory			
Endurance		10000	Write/erase cycles
Retention		10 years at 85°C	

5.2 Operation Conditions

Parameter	Min.	Nom.	Max.	Units
VDD (independent of DCDC)	**1.7**	**3.0**	**3.6**	**V**
VDDH (independent of DCDC)	**2.5**	**3.7**	**5.5**	**V**
VBUS (USB supply voltage)	**4.35**	**5.0**	**5.5**	**V**
VDD rise time (0V to 1.7V)			**60**	**ms**
VDDH rise time (0V to 3.7V)			**100**	**ms**
Operating temperature	**-40**	**25**	**85**	**°C**

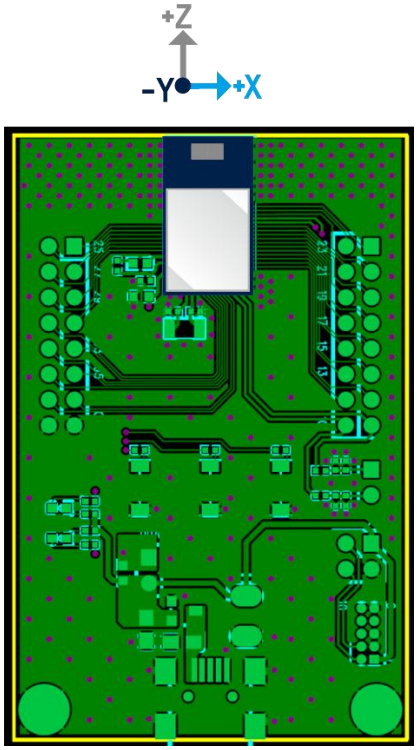
Important: The on-chip power-on reset circuitry may not function properly if the rise times exceed the specified maximum.

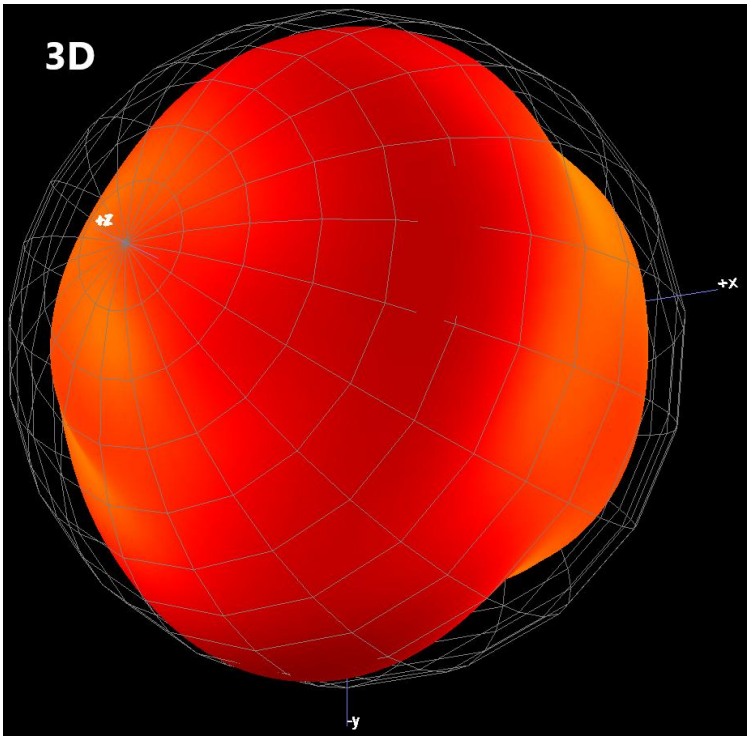
5.3 Radio Specifications

Parameter	Description	Min.	Typ.	Max.	Unit
Operating frequencies	BLE	2402		2480	MHz
Channel spacing	BLE		2		MHz
Frequency deviation	BLE 1Mbps		±250		kHz
	BLE 2Mbps		±500		kHz
On-the-air data rate		125		2000	kHz
Transmitter					
TX power	Setting at +8dBm		+8		dBm
RF power control range	-20 ~+8dBm, in 4db step	-20		+8	dBm
TX current (TX only)	DCDC@3V/+8 dBm		14.2		mA
	Setting at +8dBm		30.4		mA
Receiver					
Receive Sensitivity	1Msps BLE ideal transmitter Packet <=37bytes BRE=0.1%		-96		dBm
	2Msps BLE ideal transmitter Packet <=37bytes BRE=0.1%		-92		dBm
	125ksps BLE ideal transmitter Packet <=37bytes BRE=0.1%		-103		dBm
RX current (RX only)	DCDC@3V/1Msps BLE		4.6		mA
	LDO@3V/1Msps BLE		9.6		mA
	DCDC@3V/2Msps BLE		5.2		mA
	LDO@3V/2Msps BLE		10.7		mA
RSSI	RSSI Accuracy Valid range	-90		-20	dBm
	RSSI resolution		1		dB
	Sample period		0.25		us
Antenna gain			1.05		dBi

5.4 Antenna information

The antenna test report is based on the BN52H-C33 with a ground plane size of 60 mm x 40 mm.

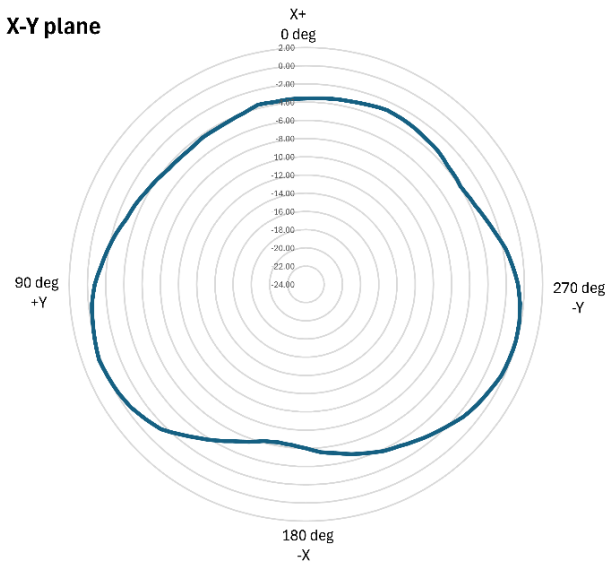


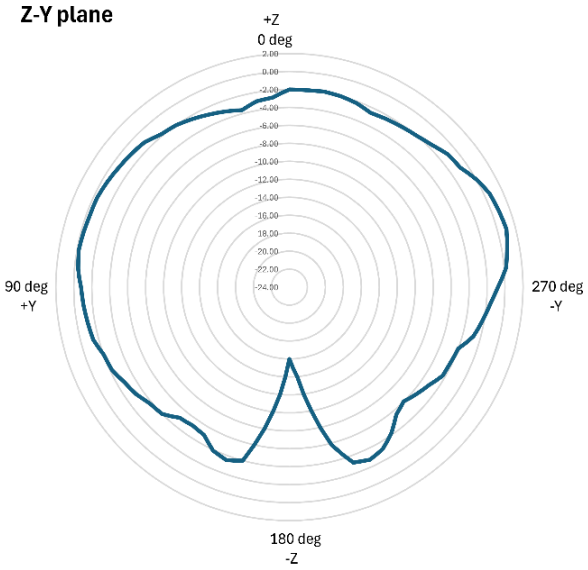


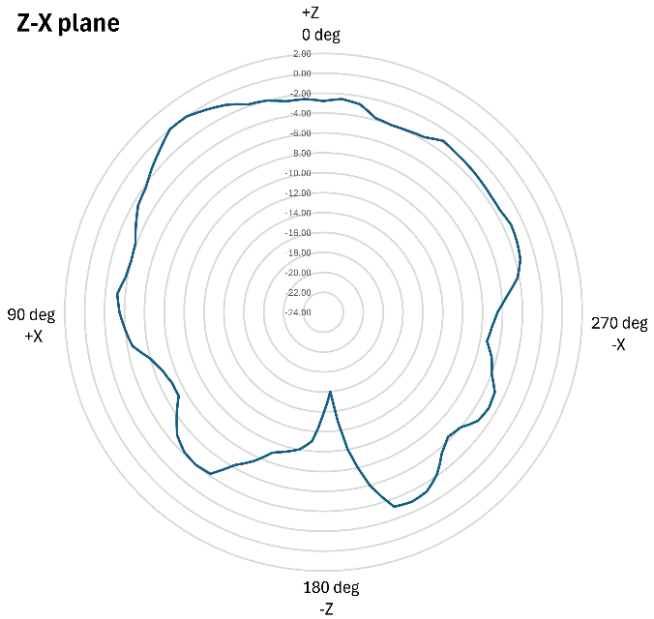
5.4.2 Antenna Gain and Efficiency

Frequency	Gain(dBi)	Efficiency
2400MHZ	-0.21	42
2410MHZ	0.22	45
2420MHZ	0.52	47
2430MHZ	0.92	50
2440MHZ	1.05	51
2450MHZ	0.87	50
2460MHZ	0.62	48
2470MHZ	0.43	44
2480MHZ	0.19	40
2490MHZ	-0.27	35

5.4.3 Antenna Pattern 2D







5.5 CPU Specifications

The ARM® Cortex®-M4 processor with floating-point unit (FPU) has a 32-bit instruction set.

Memory	Flash	RAM			
	512KB	128KB			
Parameter	Description	Min.	Typ.	Max.	Unit
CoreMark	running from flash, cache enabled		217		CoreMark
CoreMark /MHz	running from flash, cache enabled		3.4		CoreMark/ MHz
CoreMark/mA	running from flash, cache enabled, DCDC 3V		65.8		CoreMark/ mA
CPU current	CPU running CoreMark@64MHZ from Flash , Clock=HFXO, LDO		5.6		mA
	CPU running CoreMark@64MHZ from Flash , Clock=HFXO, DCDC		2.4		mA
	CPU running CoreMark@64MHZ from Ram , Clock=HFXO, LDO		4.7		mA
	CPU running CoreMark@64MHZ from Ram , Clock=HFXO, DCDC		3.1		mA

5.6 Power Management

Parameter	Description	Min.	Typ.	Max.	Unit
System OFF	No RAM retention, Wake on reset		0.6		uA
	No RAM retention, Wake on LPCOMP		0.9		uA
	Full 128 kB RAM retention, Wake on reset		1.3		uA
System ON	No RAM retention, Wake on any event		1.1		uA
	Full RAM retention, Wake on any event		1.8		uA
	No RAM retention, Wake on RTC		1.5		uA
MCU + Radio	running CoreMark from Flash, Clock = HFXO, Cache enabled, 0 dBm TX @ 1 Mb/s BLE , DC/DC mode		8.5		mA
	running CoreMark from Flash, Clock = HFXO, Cache enabled, RX @ 1 Mb/s BLE , DC/DC mode		8.3		mA
	running CoreMark from Flash, Clock = HFXO, Cache enabled, 0 dBm TX @ 1 Mb/s BLE , LDO mode		16.7		mA
	running CoreMark from Flash, Clock = HFXO, Cache enabled, RX @ 1 Mb/s BLE , LDO mode		16.2		mA

5.7 System Clock

The MN52H-33 requires two clocks, a high frequency clock and a low frequency clock.

- The high frequency clock (HFCLK)

HFCLK is provided on-module by a high-accuracy 32 MHz/±20 ppm crystal for radio and CPU operation.

- The low frequency clock (LFCLK)

LFCLK can be provided internally by an RC oscillator (±250 ppm) with calibration, or externally by a 32.768 kHz crystal.

Internal 32.768 kHz RC oscillator (LFRC)

Description	Min.	Typ.	Max.	Unit
Nominal frequency		32.768		kHz
Frequency tolerance for LFRC after calibration (calibration performed at least every 8 seconds)			±500	ppm
Run current for 32.768 kHz RC oscillator		0.7		uA
Startup time for 32.768 kHz RC oscillator		1000		us

External 32.768 kHz crystal oscillator (LFXO)

Parameter	Description	Min.	Typ.	Max.	Unit
	Crystal frequency		32.768		kHz
	Frequency tolerance requirement for BLE stack			±500	ppm
	Frequency tolerance requirement for ANT stack			±50	ppm
	Run current for 32.768 kHz crystal oscillator		0.23		uA
CL	Load capacitance			12.5	pF
C0	Shunt capacitance			2	pF
RS	Equivalent series resistance			100	Kohm
PD	Drive level			0.5	uW
Cpin	Input capacitance on XL1 and XL2 pads		4		pF

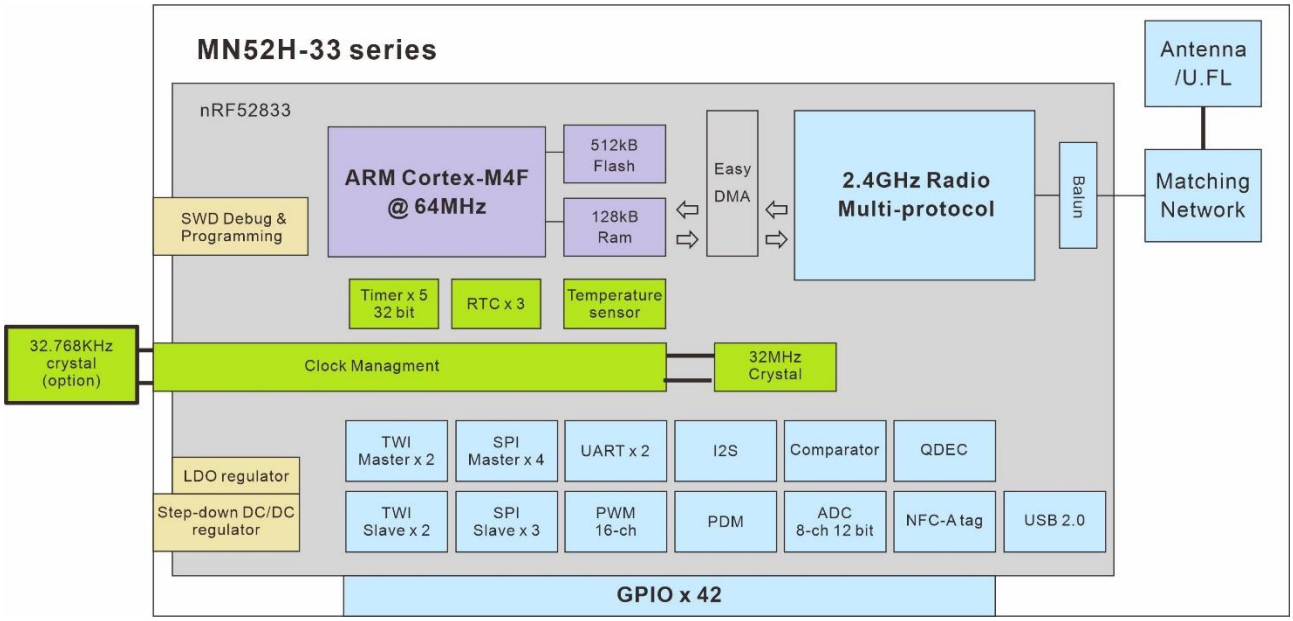
An external crystal provides the lowest power consumption and greatest accuracy.

Using the internal RC oscillator with calibration provides acceptable performance for BLE stack at a reduced cost and slight increase in power consumption.

Important:

- The ANT protocol requires the use of an external crystal for high accuracy.
- Nordic SDK example program P0.00/P0.01 as external LFXO, you need an external crystal to work.
- Nordic SDK example program P0.00/P0.01 as external LFXO, if you would like to reduce material cost, save layout space or requires 2 more GPIO for application. you need program p0.00/p0.01 as internal LFRC.

5.8 Block Diagram



6. BN52H-C33 evaluation board

6.1 BN52H-C33 component placement

BN52H-C33 is a full-featured evaluation board for MN52H-C33 that supports:

M1:MN52H-C33 module

J6: A power over mini-USB

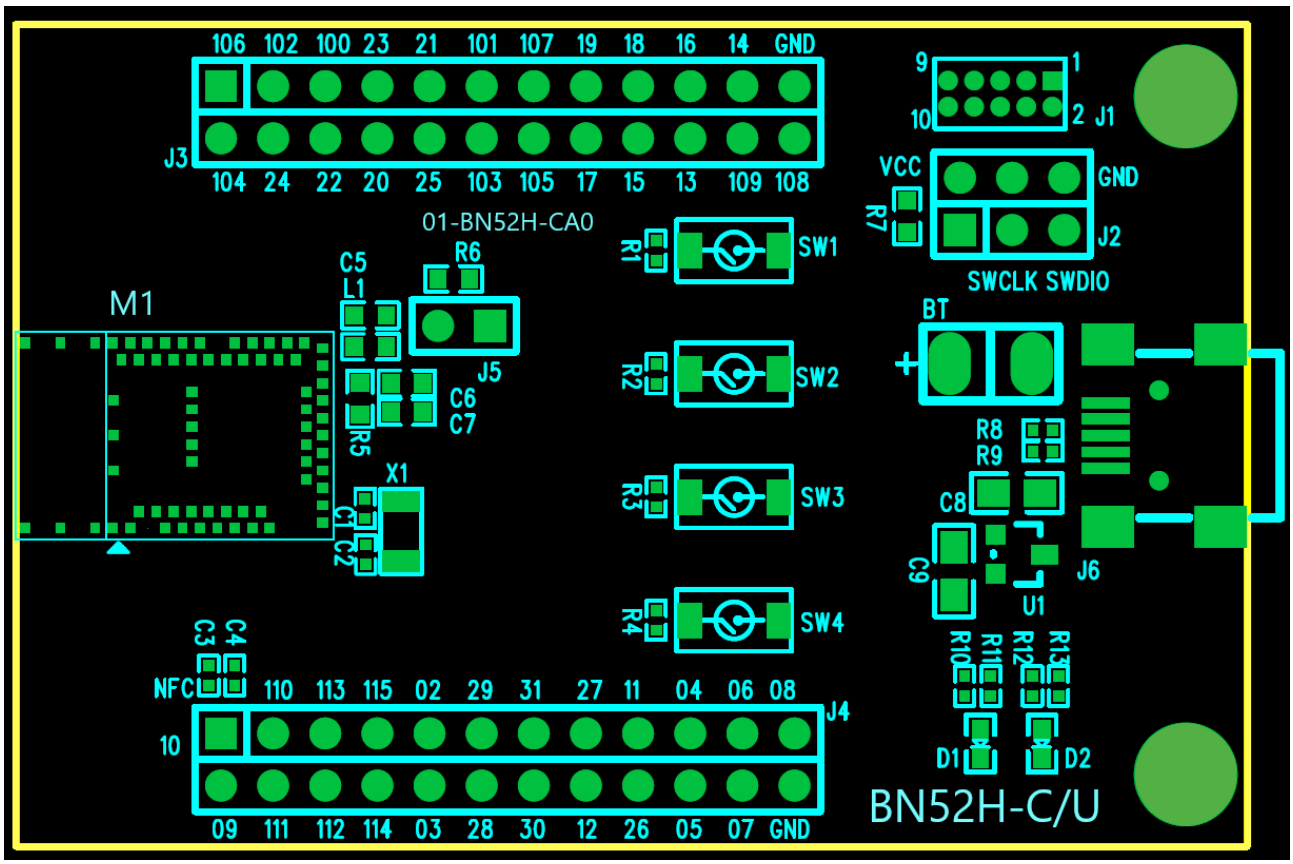
J3/J4: Complete I/O pinout to headers

J1: On-board programming and debugging interface

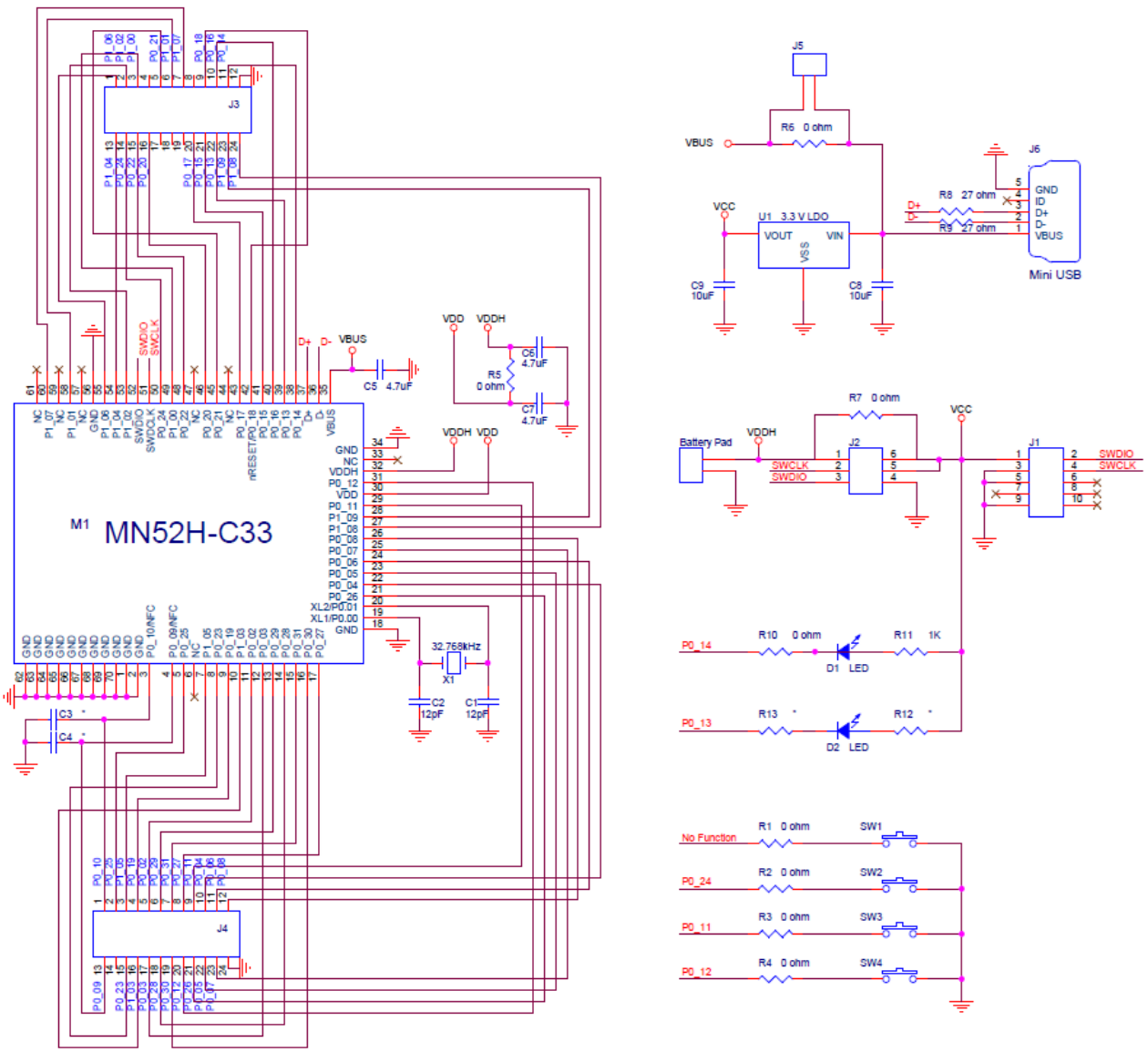
X1:32.768 kHz crystal

D1: One user LED

SW1/SW2/SW3/SW4: Four user buttons



6.2 BN52H-C33 schematic

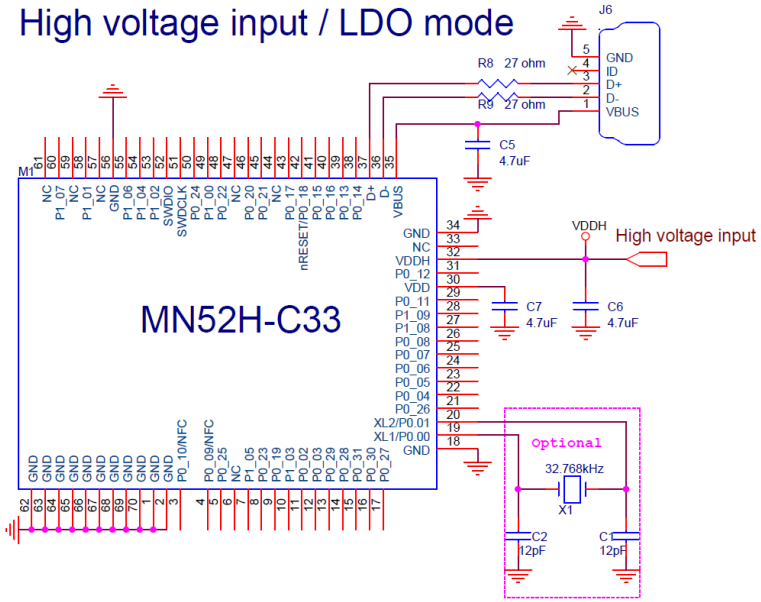


REMARK:

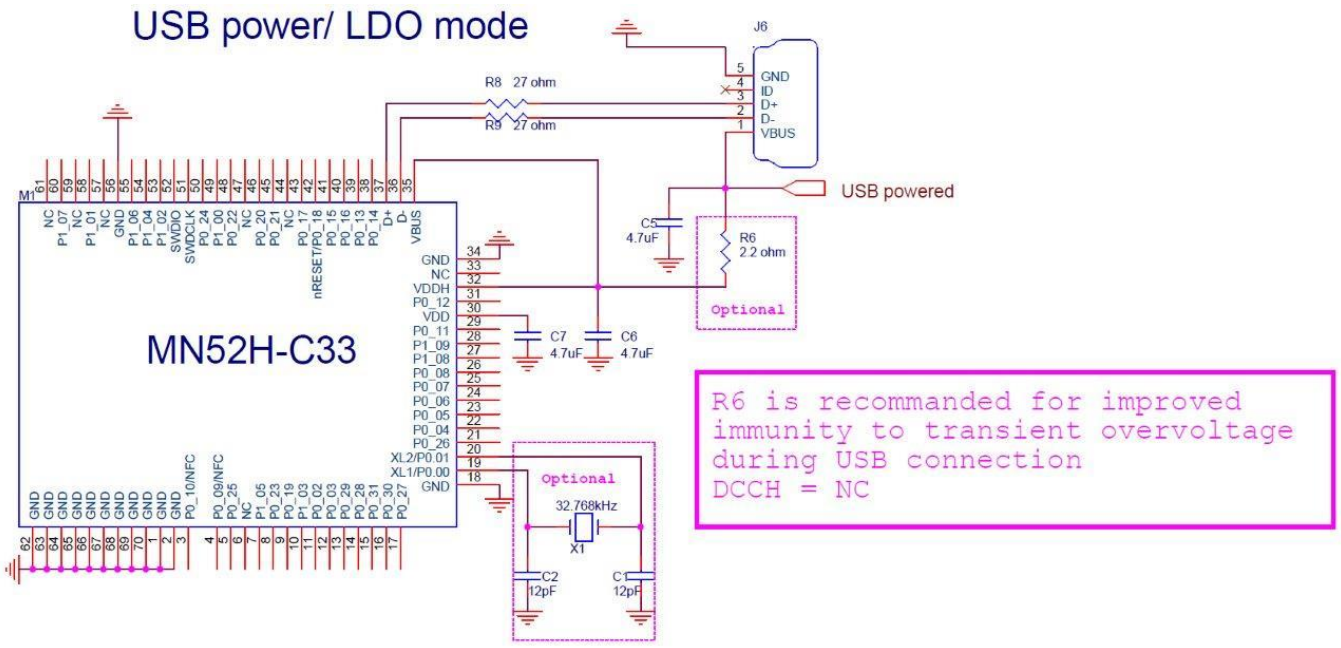
- **When using internal 32.768kHz RC oscillator, please remove X1 / C1 / C2 and calibration performed at least every 8 seconds.**

7. Reference Circuit for power mode

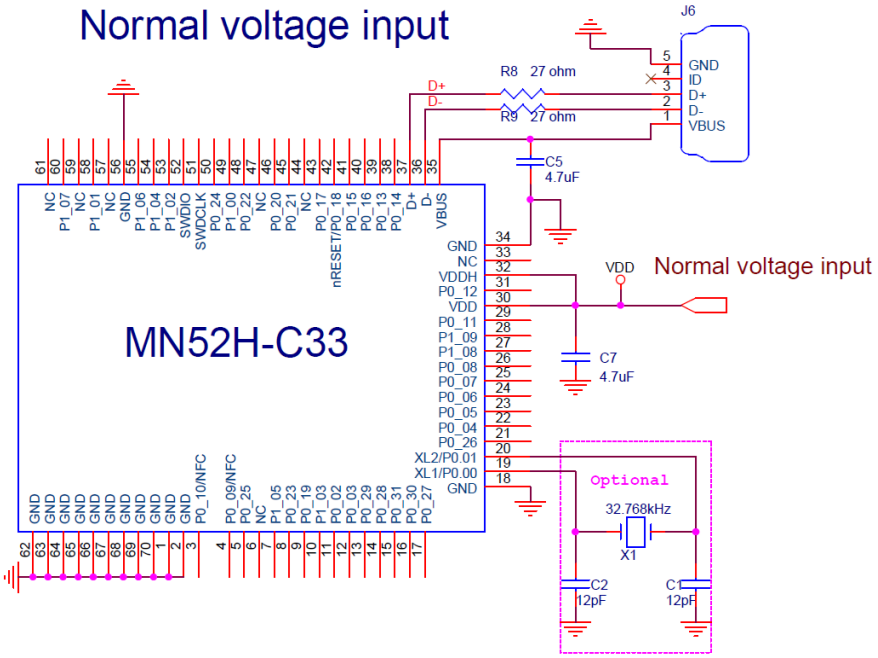
7.1 High voltage mode : Input from VDDH (2.5V~5.5V)



7.2 USB powered mode : Input from VBUS

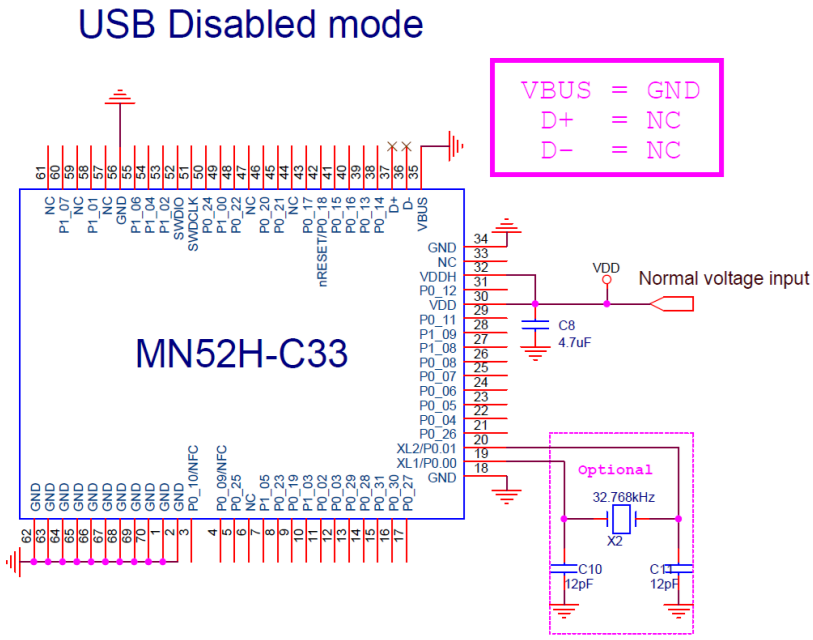


7.3 Normal voltage mode : Input from VDD (1.7V~3.6V)



Connect VDD and VDDH together

7.4 USB Disabled mode

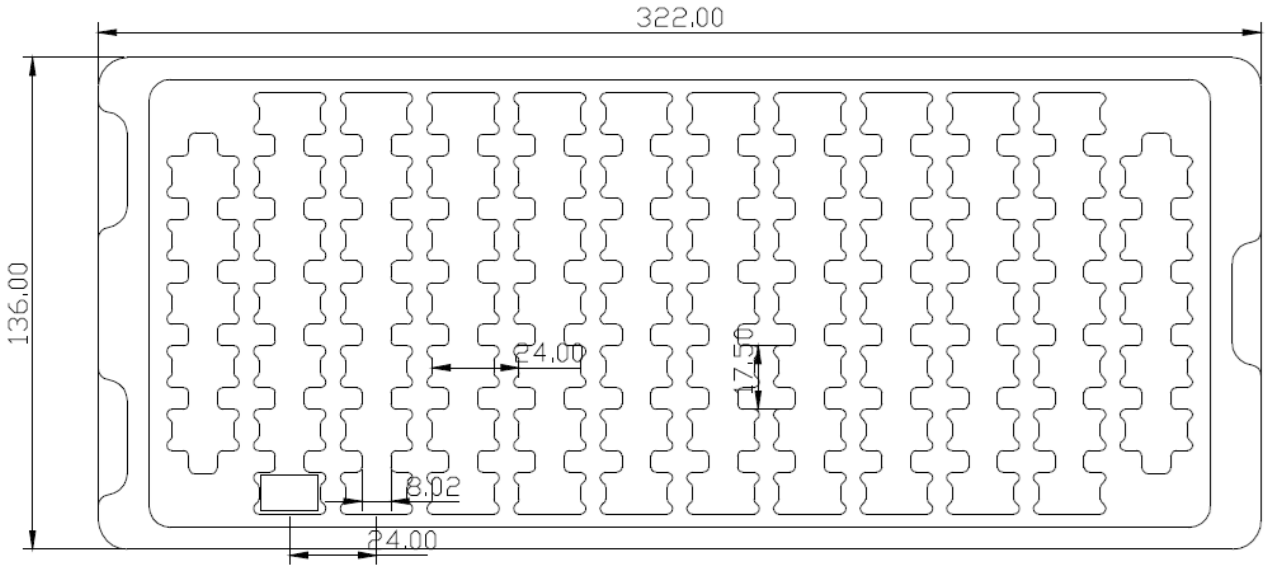


7. Product Information

7.1 Mass production information

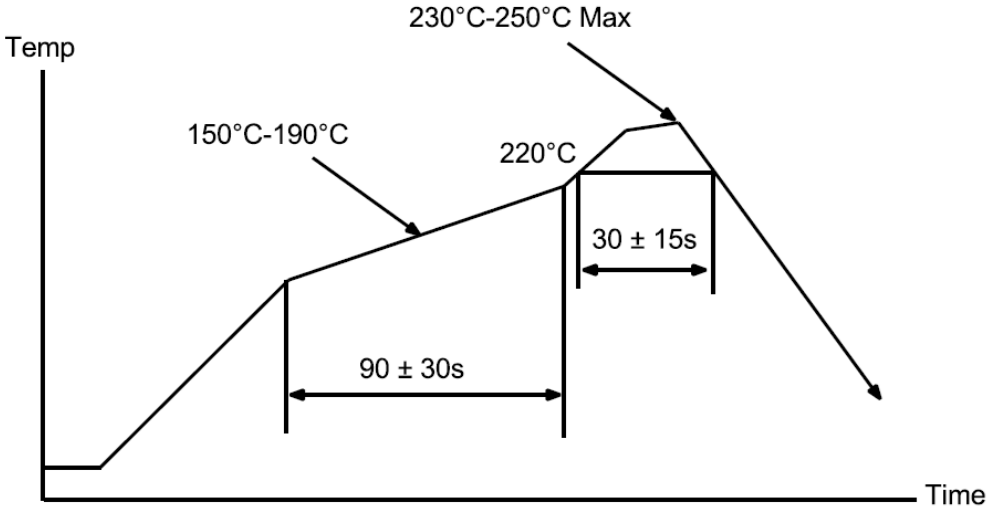
7.1.1 Tray Packaging:

Material: anti-static PET
PET thickness: 0.8mm
Dimension: 322mm x 136mm x 8.5mm



The tray is designed for direct use on an SMT automatic machine.

7.1.2 Reflow Parameters



7.2 Packing information

Type	Quantity	Dimension (L)x(W)x(H)	Gross Weight
Unit	1 pcs per tray	15.5x10.1x2.1mm	
Tray	80 pcs per tray	322x136x8.5mm	
Box	1040 pcs(13 trays)	36x20x12cm	3.0Kg

7.3 Ordering Code

Model	Ordering code	Photo
MN52H-C33	MN-833A1-01A-CB	

Ordering code: MN-833Q1-01A-CB

MN: Module/Nordic

833A1: NRF52833/AQFN/V1

01A: Aradconn standard module without customer code

CB: Chip antenna/Box packing

MN52H Series

Model	IC/Version	Antenna	Ordering code	Quantity
MN52H-C40	NRF52840/V2	Chip	MN-840A2-01A-CB	1040
MN52H-C33	NRF52833/V1		MN-833A1-01A-CB	1040
MN52H-P40	NRF52840/V2	PCB	MN-840A2-01A-PB	1040
MN52H-P33	NRF52833/V1		MN-833A1-01A-PB	1040
MN52H-U40	NRF52840/V2	U.FL Connector	MN-840A2-01A-UB	1040

8. Bluetooth qualification& Regulatory certification

8.1 Bluetooth qualification

The MN52H-C33 Bluetooth Low Energy module is based on Nordic Semiconductor's NRF52 series SOC and listed on the Bluetooth SIG website as a qualified End Product.

Model	Bluetooth Version	DID	QDID	Company
MN52H-C33	5.4	Q331704	183532 (Nordic) 228005 (Nordic)	Arad Connectivity

8.2 USA (FCC Certificate)

8.2.1 FCC ID and Labeling requirements

The MN52H series hold full modular certification, are assigned the

FCC ID number: 2BLIDMN52H

If the FCC ID is not visible when the module is installed inside OEM device, then the outside of the finished product must also display a label referring to the enclosed module. The end product must in any case be labelled on the exterior with:

Contains FCC ID: 2BLIDMN52H

8.2.2 FCC Notice:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

8.2.3 CAUTION:

The OEM should have their device which incorporates the MN52H series tested by a qualified test Lab to verify compliance with FCC Part 15 Subpart B limits for unintentional radiators.

8.2.4 RF Exposure Statement:

This module is approved for installation into mobile and/or portable host platforms.

This device is intended only for OEM integrators under the following conditions:
(1) The transmitter module may not be co-located with any other transmitter or antenna.
(If the condition above is met, further transmitter test will not be required.)

(2) The OEM integrator is still responsible for testing their end-product for any additional compliance requirements required for satisfying RF Exposure compliance when this module installed.

8.3 Canada (IC Certificate)

8.3.1 IC ID and Labeling requirements

The MN52H series hold full modular certification, are assigned the

IC ID number: 33123-MN52H

If the IC ID is not visible when the module is installed inside OEM device, then the outside of the finished product must also display a label referring to the enclosed module. The end product must in any case be labelled on the exterior with:

Contains IC ID: 33123-MN52H

8.3.2 IC Notice:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage;
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

8.3.3 RF Exposure Statement:

This module is approved for installation into mobile and/or portable host platforms.

This device is intended only for OEM integrators under the following conditions:
(1) The transmitter module may not be co-located with any other transmitter or antenna.
(If the condition above is met, further transmitter test will not be required.)

(2) The OEM integrator is still responsible for testing their end-product for any additional compliance requirements required for satisfying RF Exposure compliance when this module installed.

8.4 European Union (CE)

8.4.1 Labeling requirements

The label on the final products which contain the MN52H series module must follow CE marking requirements, should be labelled as follows:

CE logo: 

The OEM should consult with a qualified test Lab before entering their device into an EU member country to make sure all regulatory requirements have been met for their complete device.

8.4.2 Radio Equipment Directive (RED)

The MN52H series module complies with the essential requirements and other relevant provisions of Radio Equipment Directive (RED) 2019/07

8.5 Australia / New Zealand (RCM)

The MN52H series has been tested to comply with the AS/NZS 62368.1:2022

RCM logo : 

8.6 NCC Certificate (Taiwan)

8.5.1 NCC ID and Labeling requirements

MN52H 系列依天線不同,可分為 3 種型式 , 認證為 3 個不同的 NCC ID

MN52H-C NCC ID number:
MN52H-P NCC ID number:
MN52H-U NCC ID number:

請依下列標籤式樣自製標籤，標貼或印鑄於器材(產品)本體明顯處，始得販賣或公開陳列。

NCC logo and NCC ID

MN52H-C:

MN52H-P:

MN52H-U:

NCC 平台政策下的完全模組: 須符合平台政策才能適用完全模組

「平台」定義如下：若器材無安裝型式認證之模組仍具備其它複合性功能，該器材得視為平台，若無其它複合性功能，則不能視為平台。

9. RoHS & REACH Report

MN52H series modules comply with EU RoHS Directive 2011/65/EU, 2015/863/EU and do not contain or over the threshold value of SVHC (Substance of Very High Concern), as defined by Directive EC/1907/2006 Article according to REACH Annex XVII.

10. Life support warning

This module is not designed for use in life support appliances, devices, or systems where malfunction can reasonably be expected to result in a significant personal injury to the user, or as a critical component in any life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety.

Revision history

Version	Date	Notes	Name
1.0	2024/12/01	Initial Release	