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STR40

2.4G Wireless Multi-protocl SiP Module
+20dBm Output,Dual Antenna,Dual M33F-Core

The STR40 ultra-low power Bluetooth Low Energy/ANT/2.4GHz Proprietary Multi-protocol modules,designed for longer distance communication, built-in maximum + 20dBm RF output, based on the nRF5340 from Nordic Semiconductor. The module with an ARM® Cortex™ M33F 32 bit Dual-core processor, embedded 2.4GHz transceiver, and integrated antenna, provide a complete solution with no additional RF design, allowing faster time to market, while simplifying designs, reducing BOM costs, also reduce the burden of Regulatory approvals to enter the world market. Making you more quickly into the bluetooth smart application and remove the worries.The ultra-small package size is especially suitable for strict requirements on module size.

Features

➢ Nordic nRF5340 with ARM Cortex M33F Dual-core processor

➢ nRF21540 RF front-end with PA and LNA

➢ Multiprotocol support :Bluetooth 5 and Higher, Bluetooth Mesh,ANT/ANT+,2.4GHz proprietary, 802.15.4,Thread ,Zigbee and Matter

➢ Bluetooth 5.0: 2/1Mbps, 500 kbps, 125 kbps

➢ IEEE 802.15.4-2006: 250 kbps

➢ 2.4 GHz Proprietary: 2 Mbps, 1 Mbps

➢ Bluetooth 5.1 Direction Finding AOA/AOD

➢ Bluetooth 5.2 LE Audio

➢ 38 General purpose I/O pins

➢ No external components required

➢ Dimensions：12mm x 6.6mm x 1.4mm with On-chip Antenna

➢ On-chip high-performance antenna, can also expand external antenna

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Typical Applications:

➢ 2.4 GHz Bluetooth low energy systems

➢ 2.4 GHz Proprietary systems

➢ Auracast, LE Audio applicaiton

➢ Hearing Aid application

➢ Matter applicaiton, Smart Home

➢ LE wireless microphone

➢ Health Care and Medical

➢ Lighting products

➢ Smart Energy Management

➢ Office/Hotel Automation

Quick Specifications:

Multi-protocol	
Version	Bluetooth 5 and Higher/ANT/2.4GHz Proprietary/802.15.4/Zigbee
Security	Arm TrustZone CryptoCell-312
Radio	
Frequency	2.360GHz to 2.500GHz
Modulations	GFSK at 2/1 Mbps, Long range 125/500kbps, 802.15.4- 250 kbps
Transmit power	MAX +20dBm
Receiver sensitivity	-97.5dBm@BLE 1M
Antenna	On-chip Antenna / Ext. Antenna
Current Consumption	
TX only @ +20 dBm	~100 mA
RX only @ 1 Mbps @ 3V, DC/DC enabled	~5.6 mA （RF front-end enable）
Application CPU @ 64MHz from flash @ 3V	3.4 mA
Network CPU @ 64MHz from flash @ 3V	2.5 mA
System On, wake on any event	1.5 µA
System Off, wake on reset	1.1µA
Operating conditions	
Power supply	2.7~3.6V
Operating temperature	-25~+85 °C

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Block diagram:
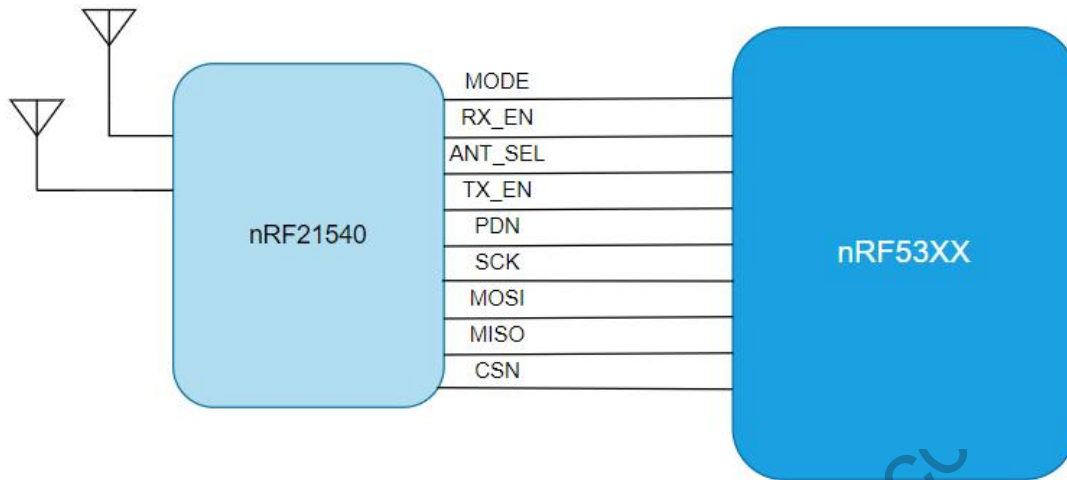
Pin Description of Module（ Bottom View）:
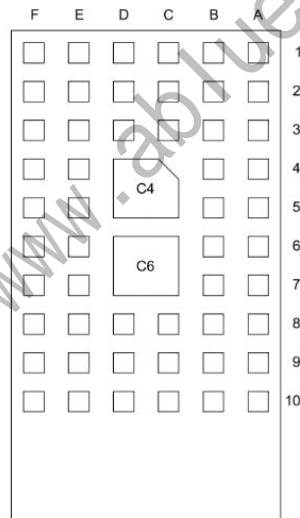
Pin No.	Name	Description	Note
A1	P0.21	Digital I/O	
A2	P0.28/AIN7	I/O/Analog input	
A3	P0.29	I/O/Analog input	
A4	SWDIO	HW debug and programming	
A5	RESET	Digital IO /Reset	Configurable as pin reset
A6	P0.27/AIN6	I/O/Analog input	
A7	P0.25/AIN4	I/O/Analog input	
A8	P1.09	Digital I/O	
A9	P0.25/AIN5	I/O/Analog input	
A10	GND	Ground	

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B1	P0.30	Digital I/O	
B2	P1.08	Digital I/O	
B3	GND	Ground	
B4	SWDCLK	HW debug and programming	
B5	GND	Ground	
B6	P0.12/TRACECLK	Digital I/O	
B7	P1.05	Digital I/O	
B8	P1.04	Digital I/O	
B9	P1.06	Digital I/O	
B10	P0.20	Digital I/O	
C1	P1.01	Digital I/O	
C2	P1.10	Digital I/O	
C3	P0.19	Digital I/O	
C4	GND	Ground	
C5	N.C.		
C6	GND	Ground	
C7	N.C.		
C8	P0.17/QSPI_CLK	Digital I/O	Quad SPI
C9	P0.18/QSPI_CS	Digital I/O	Quad SPI
C10	P0.11/TRACEDATA0	Digital I/O	
D1	P0.05/AIN1	I/O/Analog input	
D2	P1.00	Digital I/O	
D3	P1.11	Digital I/O	
D4	N.C.		
D5	N.C.		
D6	N.C.		
D7	N.C.		
D8	P0.10/TRACEDATA2	Digital I/O	
D9	P0.16/QSPI3	Digital I/O	Quad SPI
D10	P0.10/TRACEDATA1	Digital I/O	
E1	P0.07/AIN3	I/O/Analog input	
E2	P0.06/AIN2	I/O/Analog input	
E3	GND	Ground	
E4	P0.04/AIN0	I/O/Analog input	
E5	P1.02/I2C	Digital I/O	
E6	P1.03/I2C	Digital I/O	
E7	P0.08/TRACEDATA3	Digital I/O	
E8	GND	电源地	
E9	P0.13/QSPI0	Digital I/O	Quad SPI
E10	P0.14/QSPI1	Digital I/O	Quad SPI
F1	VBUS	USB Power	USB PHY supply: 4.35 V to 5.5 V ,in Connect to USB Host device 5 V supply
F2	D_N	USB Data-	USB D-
F3	D_P	USB Data+	USB D+
F4	P0.02/NFC1	Digital I/O	NFC Input

F5	P0.03/NFC2	Digital I/O	NFC Input
F6	VDD_nRF	Power Supply 2.7~3.6V	
F7	GND	Ground	
F8	ANT2_OUT	External Antenna	Connect to external antenna
F9	GND	Ground	
F10	P0.15/QSPI2	Digital I/O	Quad SPI

*nRF21540 is with dual antenna, ANT1 is inside the module and ANT2 is outside. The two antennas are switched through software configuration.

*The nRF5340 needs to reserve 9 I/O for nRF21540 RF front-end control，already internally connected on module.Please do not use these reserved pins for other purposes.

nRF5340	nRF21540
P1.12	MODE
P1.15	ANT_SEL
P0.31	RX_EN
P1.13	TX_EN
P1.14	PDN
P0.22	SCK
P1.07	MOSI
P0.24	MISO
P0.23	CSN

General Purpose I/O:

The general purpose I/O is organized as one port enabling access and control of the 32 available GPIO pins through one port. Each GPIO can be accessed individually with the following user configurable features:

➢ Input/output direction
➢ Output drive strength
➢ Internal pull-up and pull-down resistors
➢ Wake-up from high or low level triggers on all pins
➢ Trigger interrupt on all pins
➢ All pins can be used by the PPI task/event system; the maximum number of pins that can be interfaced through the PPI at the same time is limited by the number of GPIOTE channels
➢ All pins can be individually configured to carry serial interface or quadrature demodulator signals

HW debug and flash programming of Module :

The Module support the two pin Serial Wire Debug (SWD) interface and offers flexible and powerful mechanism for non-intrusive debugging of program code. Breakpoints, single stepping, and instruction trace capture of code execution flow are part of this support.

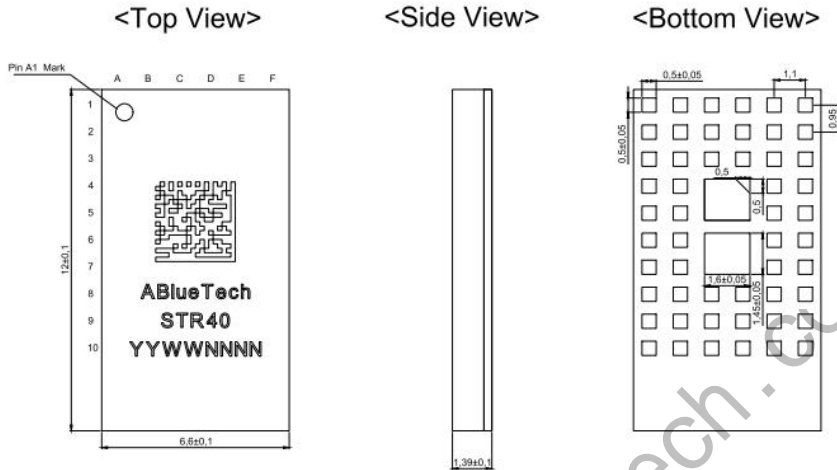| Pin	Flash Program interface
SWDIO	Debug and flash programming I/O

SWCLK	Debug and flash programming I/O

This is the hardware debug and flash programming of module, J-Link Lite support, please refer ww.segger.com.

PCB Footprint :

LGA Pakage, Pad Pitch Lateral 1.1mm, portrait 0.95mm.Details as blow.

Recommended Module Placement:

To make sure the best RF performance of the module, the area under and extending out from the antenna portion of the module should be kept clear of copper and other metal,and the placement area should be clear, no ground or PCB layout. The recommended module placement is below.

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Absolute Maximum Ratings:

Parameter	Min.	Max.	Unit
Supply voltages			
VDD	-0.3	+3.9	V
VDDH	-0.3	+5.8	V
VBUS	-0.3	+5.8	V
VSS	0	0	V
I/O pin voltage			
Voltage on GPIO pins (VDD ≤ 3.6V)	-0.3	VDD + 0.3	
Voltage on GPIO pins (V DD> 3.6V)	-0.3	+3.9	
RF input level		10	dBm
Environmental			
ESD Human Body Model		2	kV
ESD Charged Device Model		500	V
Storage temperature	-40	125	°C
Flash memory Endurance		10000	Write/erase cycles

Note: Exceeding one or more of the limiting values may cause permanent damage to the module.

Important Notice:

■ **Reserves the right to make corrections, modifications, and/or improvements to the product and/or its specifications at any time without notice.**

■ **Assumes no liability for the user's product and/or applications.**

■ **Products are not authorized for use in safety-critical applications, including but not limited to life-support applications.**

■ **We have a strict and careful check and collation, but can not guarantee this manual without any errors and omissions.**

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ATTENTION!

Electrostatic Sensitive Device

Observe Precaution for handling.

ATTENTION

OBSERVE PRECAUTION FOR HANDLING ELECTROSTATIC SENSITIVE DEVICE

HBM (Human Body Model): Class 2

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Ordering Information:

Part Number	Description
STR40	Bluetooth Low Energy System on Module
STR40-EVB	Evaluation boards for module,with key, LED, I/O extend,sock for coin cell battery.