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Datasheet

产品名称 (Product):   BT 5.1 module

产品型号 (Model No.): HOLYIOT-21052 -nRF52820

1. Description

nRF52820 is an ultra-low power *Bluetooth®* 5.2 System on Chip (SoC) with built-in USB supporting Bluetooth Low Energy, Bluetooth mesh, Thread, and Zigbee.

The nRF52820 device compliments the extensive nRF52 Series platform with a lower-end option offering built-in USB and a fully-featured 2.4 GHz multiprotocol radio. It is capable of all advanced Bluetooth Low Energy features including Long Range, high-speed 2 Mbps, and Direction Finding.

nRF52820 features a 64 MHz Arm® Cortex®-M4 processor with 256 kB of flash memory and 32 kB of RAM. A wide range of analog and digital interfaces is integrated, such as an analog comparator, SPI, UART, TWI, QDEC, and USB. With a supply voltage of 1.7 V to 5.5 V, the device is enabled to be powered by rechargeable batteries or USB. It is qualified for operating at an extended temperature range of -40°C to 105°C.

Multiprotocol radio (bluetooth low energy, ANT, 2.4G proprietary)

Hardware :

SWD programmer (SWDIO,SWCLK,VDD,GND)

nRF52820 -QDAA

Size : 9.20mm*15.04mm

BLE stack & RF 2.4Ghz

Features :

•*Bluetooth* 5.1, IEEE 802.15.4-2006, 2.4 GHz transceiver
- -95 dBm sensitivity in 1 Mbps Bluetooth Low Energy mode
- -103 dBm sensitivity in 125 kbps Bluetooth Low Energy mode (long range)
- -20 to +8 dBm TX power, configurable in 4 dB steps
- On-air compatible with nRF52, nRF51, nRF24L, and nRF24AP Series

- Supported data rates:
  - Bluetooth 5.1 – 2 Mbps, 1 Mbps, 500 kbps, and 125 kbps
  - IEEE 802.15.4-2006 – 250 kbps
  - Proprietary 2.4 GHz – 2 Mbps, 1 Mbps
- Angle-of-arrival (AoA) and angle-of-departure (AoD) direction finding using Bluetooth
- Single-ended antenna output (on-chip balun)
- 128-bit AES/ECB/CCM/AAR co-processor (on-the-fly packet encryption)
- 4.9 mA peak current in TX (0 dBm)
- 4.7 mA peak current in RX
- RSSI (1 dB resolution)

• Arm® Cortex®-M4 32-bit processor, 64 MHz
- 144 EEMBC CoreMark® score running from flash memory
- 33 µA/MHz running CoreMark from flash memory
- 33 µA/MHz running CoreMark from RAM
- Serial wire debug (SWD)

Flexible power management
- 1.7 V to 5.5 V supply voltage range
- On-chip DC/DC and LDO regulators with automated low current modes
- Automated peripheral power management
- Fast wake-up using 64 MHz internal oscillator
- 0.3 µA at 3 V in System OFF mode, no RAM retention
- 1.2 µA at 3 V in System ON mode, no RAM retention, wake on RTC
- 256 kB flash and 32 kB RAM
- Advanced on-chip interfaces
  - USB 2.0 full speed (12 Mbps) controller
  - Programmable peripheral interconnect (PPI)
  - 18 general purpose I/O pins
  - EasyDMA automated data transfer between memory and peripherals
- Nordic SoftDevice ready with support for concurrent multiprotocol
- 64 level comparator
- Temperature sensor
- 4x 32-bit timer with Counter mode
- Up to 2x SPI master/slave with EasyDMA
- Up to 2x I2C compatible two-wire master/slave
- UART (CTS/RTS) with EasyDMA
- Quadrature decoder (QDEC)
- 2x real-time counter (RTC)
- Single crystal operation
- Operating temperature from -40 to 105 °C
- Package variants
  - QFN40 package, 5 x 5 mm
  - WLCSP package, 2.531 x 2.531 mm

Application:

Advanced computer peripherals and I/O devices

- Mouse
- Keyboard
- Multi-touch trackpad
- Internet of things (IoT)
    - Smart home sensors and controllers
    - Industrial IoT sensors and controllers
- Interactive entertainment devices
    - Remote controls
    - Gaming controllers

2. **Introduction**

2.1 Programmer

HOLYIOT-21052 module use the Serial Wire Debug(SWD port), the module which layout the SWDIO, SWCLK, VDD, GND for debug and flash your own firmware, more info about the SWD, please visit https://www.silabs.com/community/mcu/32-bit/knowledge-base.entry.html/2014/10/21/serial_wire_debugs-qKCT

You can using the Jlink or Jtag for programmer.

2.2 Software development Tool

It supports the standard Nordic Software Development Tool-chain using Segger Embedded Studio, Keil, IAR and GCC. More info please visit https://www.nordicsemi.com/Software-and-Tools/Development-Tools

2.3 Protocols

This module support Bluetooth 5, Bluetooth Low Energy,Bluetooth mesh,Thread,802.15.4,ANT, 2.4GHz proprietary. So we can use different protocols for different situations.

Software Development Kit

Nordic Semiconductor's Software Development Kits (SDK) are your starting point for software development on the nRF51 and nRF52 Series. It contains source code libraries and example applications covering wireless functions, libraries for all peripherals, bootloaders, wired and OTA FW upgrades, RTOS examples, serialization libraries.

More info please visit https://www.nordicsemi.com/Software-and-Tools/Software/nRF5-SDK

You can also download the SDK for coding development .

2.4 SoftDevices

Nordic Semiconductor protocol stacks are known as SoftDevices. SoftDevices are pre-compiled, pre-linked binary files. SoftDevices can be programmed in nRF5 series devices, and are freely downloadable from the Nordic website. Please download that here:

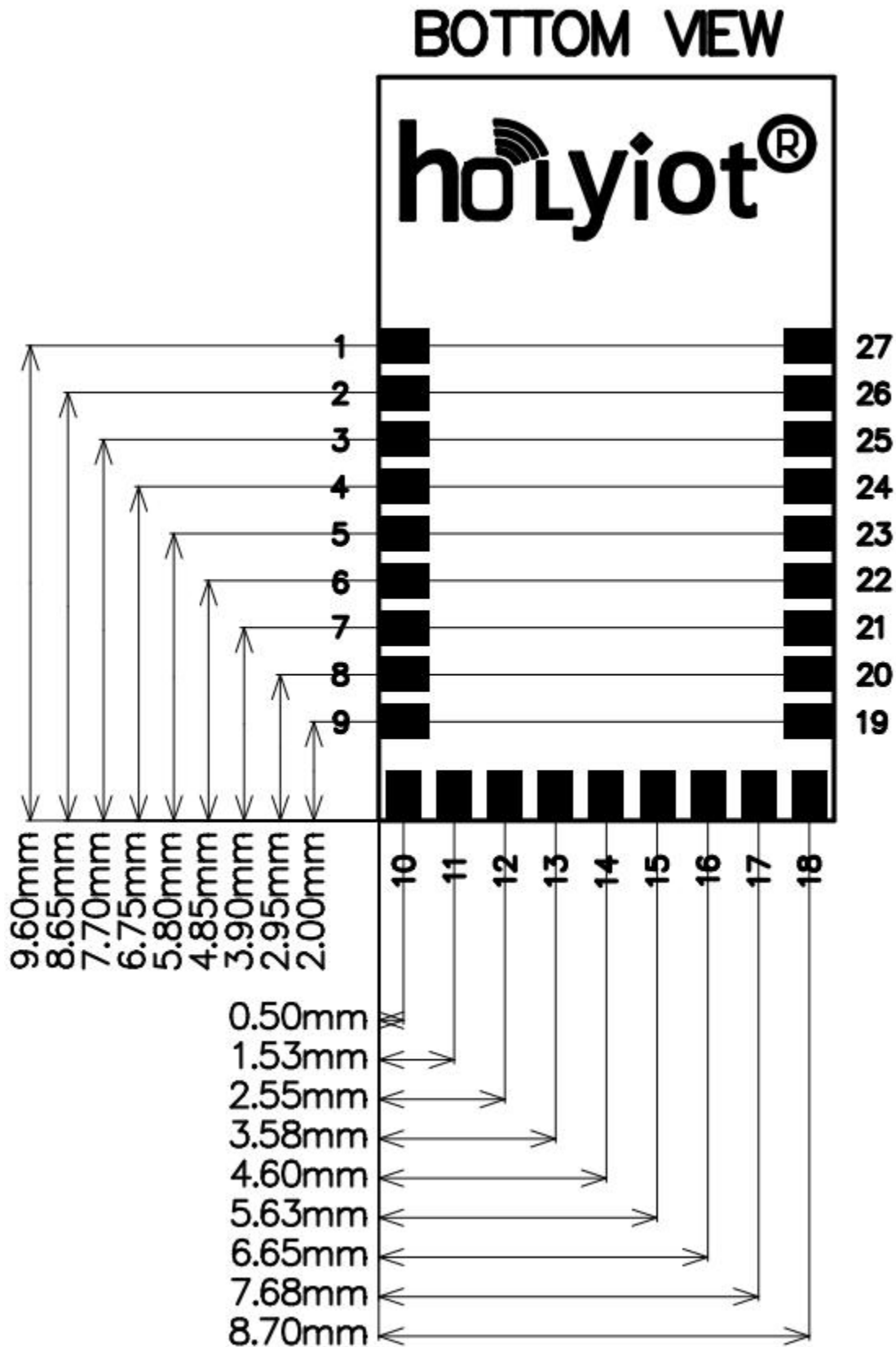https://www.nordicsemi.com/Software-and-Tools/Software/S132
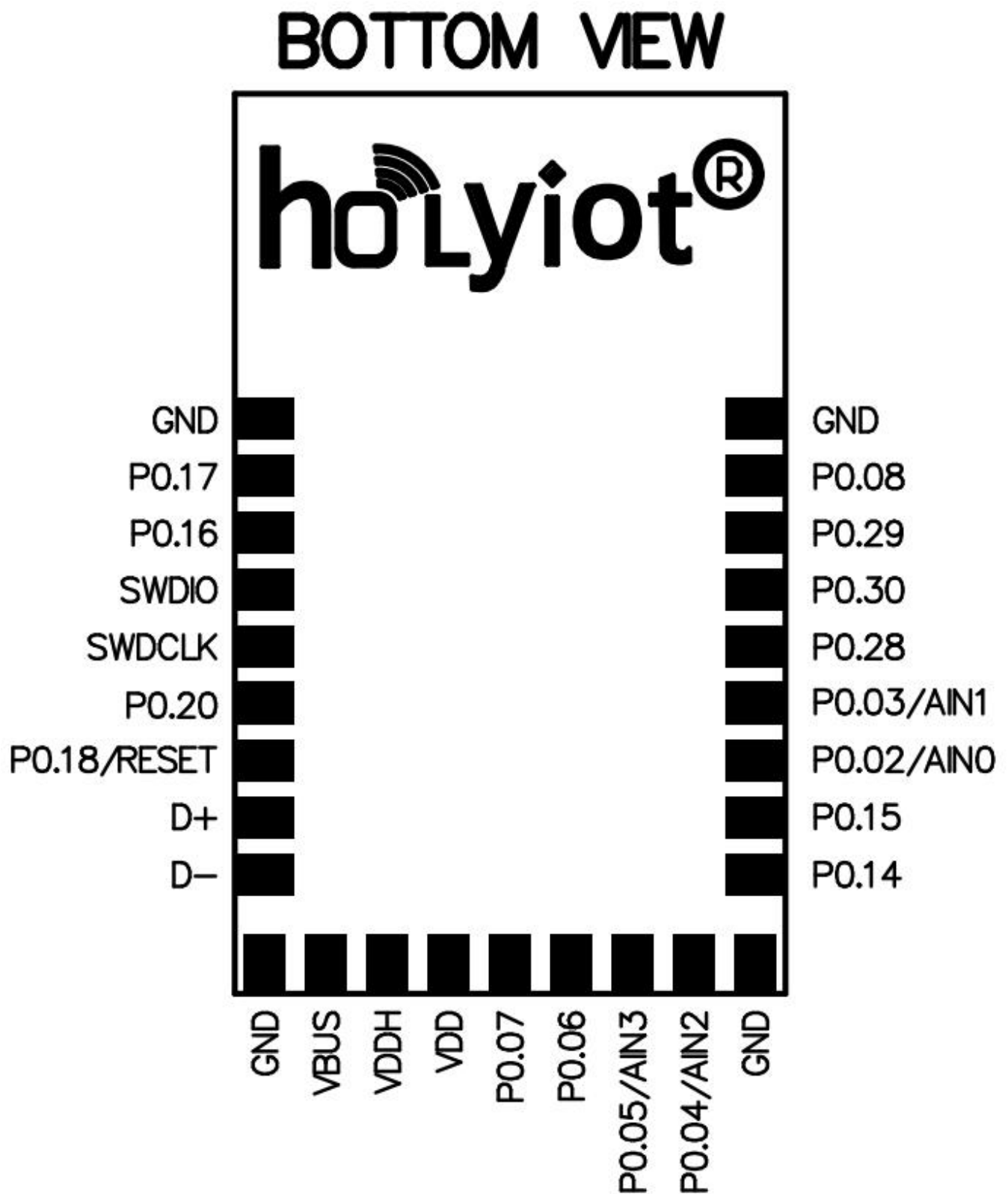
Over-The-Air DFU

The SoC is supported by an Over-The-Air Device Firmware Upgrade (OTA DFU) feature. This allows for in the field updates of application software and SoftDevice.

# 3. Product Descriptions

3.1 Mechanical drawings

3.2 Pin assignments

| PIN No.	PIN define	Functions
1	GND	Ground
2	P0.17	General purpose I/O
3	P0.16	General purpose I/O
4	SWDIO	Serial wire debug I/O for debug and programming
5	SWDCLK	Serial wire debug clock input for debug and programming
6	P0.20	General purpose I/O
7	P0.18 nRESET	General purpose I/O Configurable as pin RESET
8	D+	USB D+
9	D-	USB D-
10	GND	Ground
11	VBUS	5 V input for USB 3.3 V regulator
12	VDDH	High voltage power supply
13	VDD	Power supply
14	P0.07	General purpose I/O
15	P0.06	General purpose I/O
16	P0.05 AIN3	General purpose I/O Analog input
17	P0.04 AIN2	General purpose I/O Analog input
18	GND	Ground
19	P0.14	General purpose I/O
20	P0.15	General purpose I/O
21	P0.02 AIN0	General purpose I/O Analog input
22	P0.03 AIN1	General purpose I/O Analog input
23	P0.28	General purpose I/O
24	P0.30	General purpose I/O
25	P0.29	General purpose I/O
26	P0.08	General purpose I/O
27	GND	Ground

4. Mounting our board on the host PCBA

We suggest that you mount our RF board(HOLYIOT-21052 -52820) on the board like that:

1. For the best Bluetooth performance, the antenna of the area need to extend about several mm without ground under the antenna of the edge of the host PCB.

2. The second choice is that place our board at the corner of host PCB, the antenna of board need to extend several mm outside of the Ground plane of the host PCB.
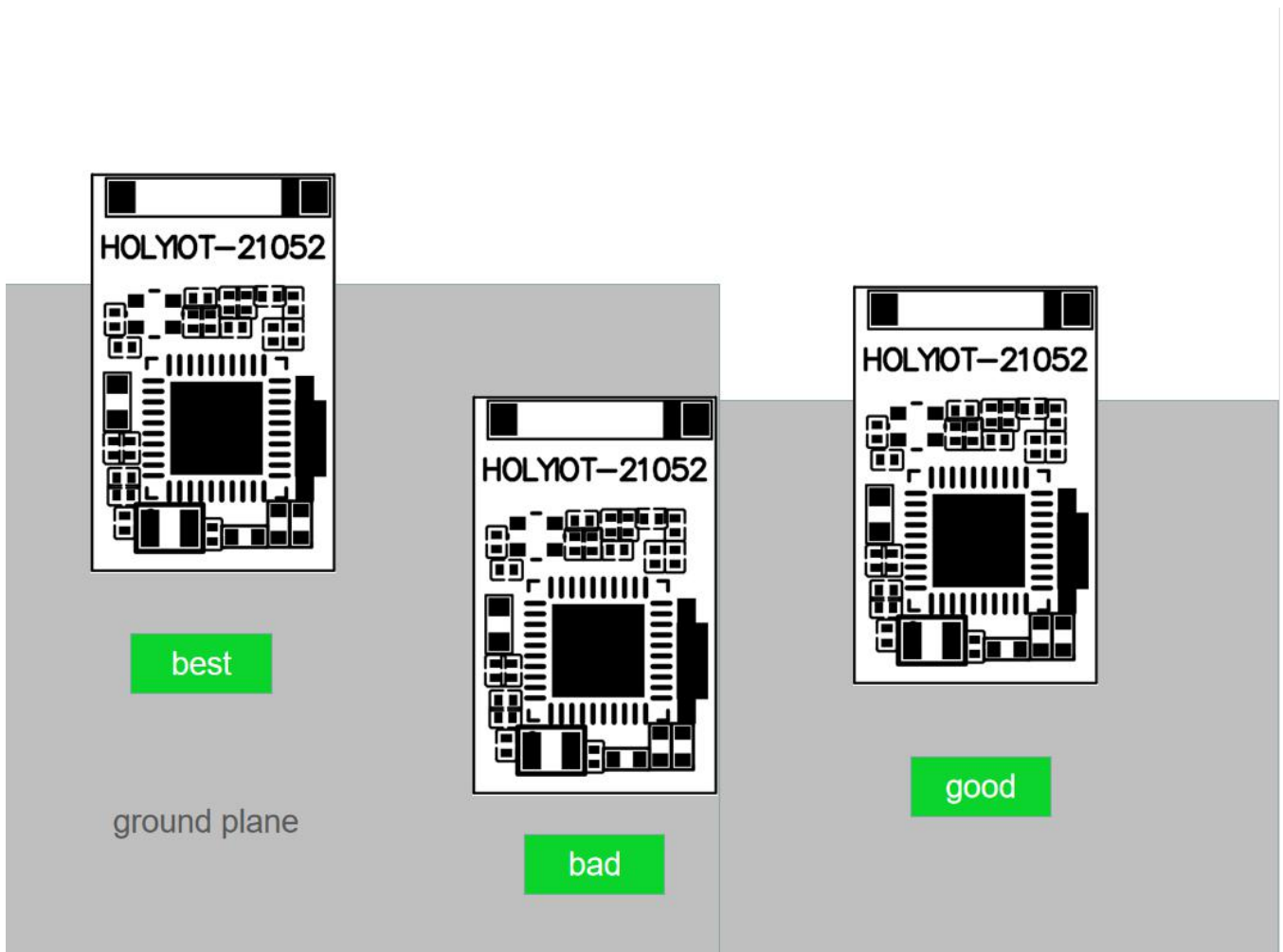
5. Miscellaneous

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.
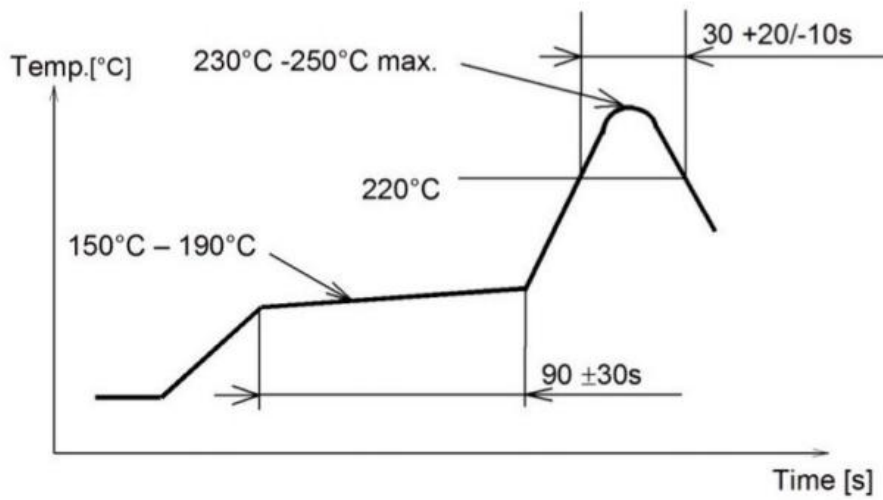
6. Absolute maximum ratings

Maximum ratings are the extreme limits to which the chip can be exposed for a limited amount of time without permanently damaging it. Exposure to absolute maximum ratings for prolonged periods of time may affect the reliability of the device.

Absolute maximum ratings:

	Note	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	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
Environmental QFN40 package				
Storage temperature		-40	+125	°C
MSL	Moisture Sensitivity Level		2	
ESD HBM	Human Body Model		3	kV
ESD HBM Class	Human Body Model Class		2	
ESD CDM	Charged Device Model		1	kV
Environmental WLCSP 2.531 x 2.531 mm package				
Storage temperature		-40	+125	°C
MSL	Moisture Sensitivity Level		1	
ESD HBM	Human Body Model		3	kV
ESD HBM Class	Human Body Model Class		2	
ESD CDM	Charged Device Model		1	kV
Flash memory				
Endurance		10 000		write/erase cycles
Retention at 85 °C		10		years
Retention at 105 °C	Limited to 1000 write/erase cycles	3		years
Retention at 105 °C-85 °C, execution split	Limited to 1000 write/erase cycles	6.7		years
	75% execution time at 85 °C or less			

ATTENTION

OBSERVE PRECAUTION FOR HANDLING ELECTROSTATIC SENSITIVE DEVICE

HBM (Human Body Model): Class 3A