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Version: 1
Issued Date: 2022/10/24

Datasheet

产品名称 (Product):　　BT 5.1 module

产品型号 (Model No.):　HOLYIOT-22029 -nRF52833

1. Description

HOLYIOT-22029 BLE 5.1 module is based on Nordic nRF52833 SoC, the nRF52833 SoC is a powerful, highly flexible ultra-low power multi-protocol SoC ideally suited for Bluetooth® low energy (previously called Bluetooth Smart), ANT and 2.4GHz ultra low-power wireless applications. The nRF52833 SoC is built around a 32-bit ARM® Cortex™-M4F CPU with FPU.Flash512kB + 128kB RAM. Angle-of-arrival (AoA) and angle-of-departure (AoD), 128-bit AES/ECB/CCM/AAR co-processor . It offers a wealth of peripherals that include NFC, USB and multiple interface options

The embedded 2.4GHz transceiver supports Bluetooth low energy, ANT and proprietary 2.4 GHz protocol stack. It is on air compatible with the nRF51 Series, nRF24L and nRF24AP Series products from Nordic Semiconductor.

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

Bluetooth 5.1 long range

Processing power and flash flexibility

Multiprotocol radio

Hardware :

SWD programmer (SWDIO,SWCLK,VDD,GND)

nRF52833 aQFN™73 package, 7 x 7 mm

Size : 19mm*13.5mm

BLE stack & RF 2.4Ghz

Features :

Bluetooth
®
5.1, IEEE 802.15.4-2006, 2.4 GHz transceiver
• -96 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)
- 4.6 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 CoreMark from flash memory
- 38 µA/MHz running CoreMark from RAM
- Watchpoint and trace debug modules (DWT, ETM, and ITM)
- Serial wire debug (SWD)
- Rich set of security features
- Secure boot ready
- Flash access control list (ACL)
- Debug control and configuration
- Access port protection (CTRL-AP)
- Secure erase
- 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
- 0.6 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
- 512 kB flash and 128 kB RAM
- Advanced on-chip interfaces
- USB 2.0 full speed (12 Mbps) controller
- High-speed 32 MHz SPI
- Type 2 near field communication (NFC-A) tag with wake-on field
- Touch-to-pair support
- Programmable peripheral interconnect (PPI)
- 42 general purpose I/O pins
- EasyDMA automated data transfer between memory and peripherals
- Nordic SoftDevice ready with support for concurrent multiprotocol
- 12-bit, 200 ksps ADC – 8 configurable channels with programmable gain
- 64 level comparator

• 15 level low-power comparator with wake-up from System OFF mode
• Temperature sensor
• 4x four channel pulse width modulator (PWM) unit with EasyDMA
• Audio peripherals – I2S, digital microphone interface (PDM)
• 5x 32-bit timer with counter mode
• Up to 4x SPI master/3x SPI slave with EasyDMA
• Up to 2x I2C compatible two-wire master/slave
• 2x UART (CTS/RTS) with EasyDMA
• Quadrature decoder (QDEC)
• 3x real-time counter (RTC)
• Single crystal operation

Application:

• Advanced computer peripherals and I/O devices
• Mouse
• Keyboard
• Multi-touch trackpad
• Advanced wearables
• Health/fitness sensor and monitor devices
• Wireless payment enabled devices
• 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-22029 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®5.1, IEEE 802.15.4-2006, 2.4 GHz transceiver, 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:

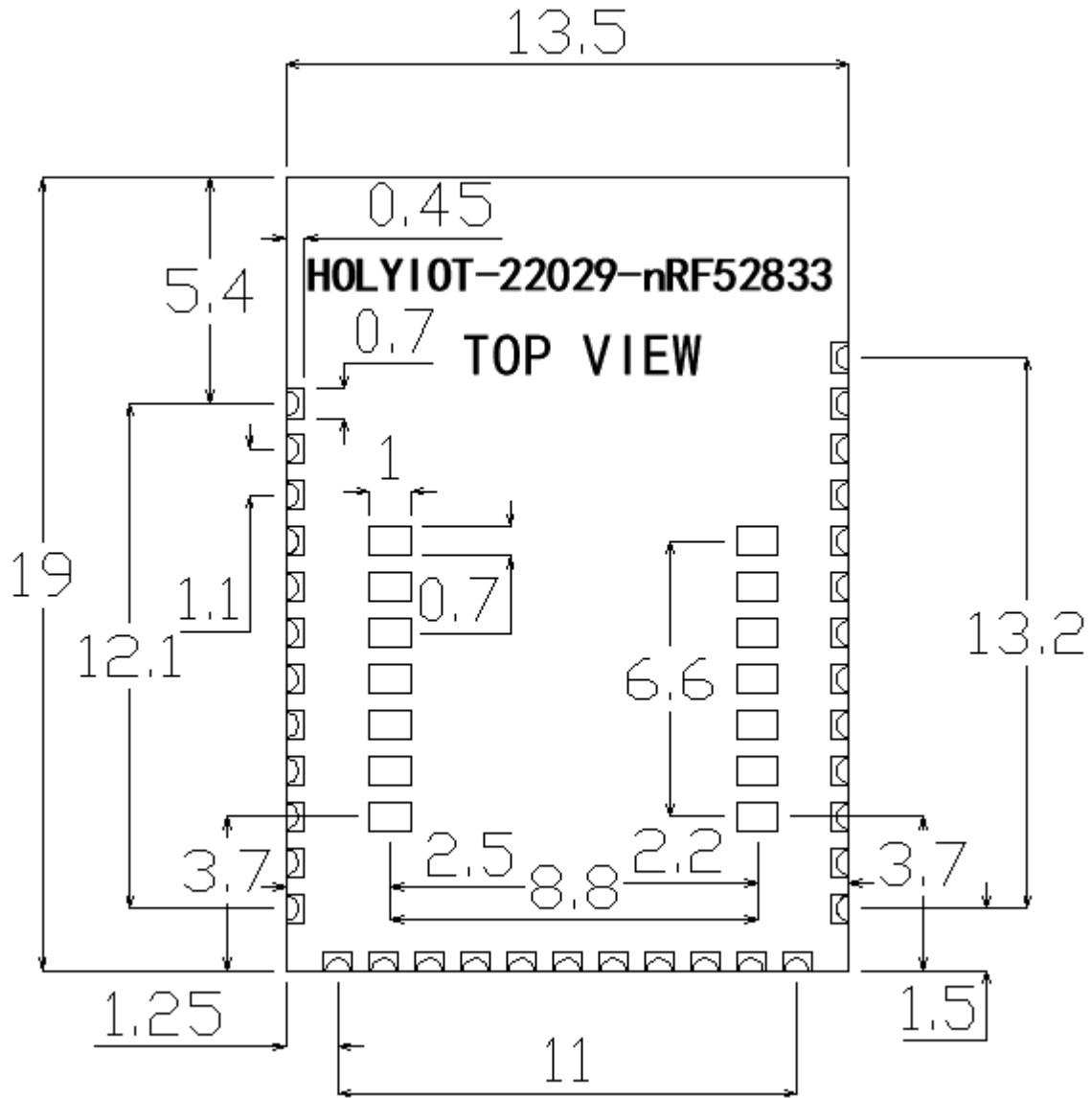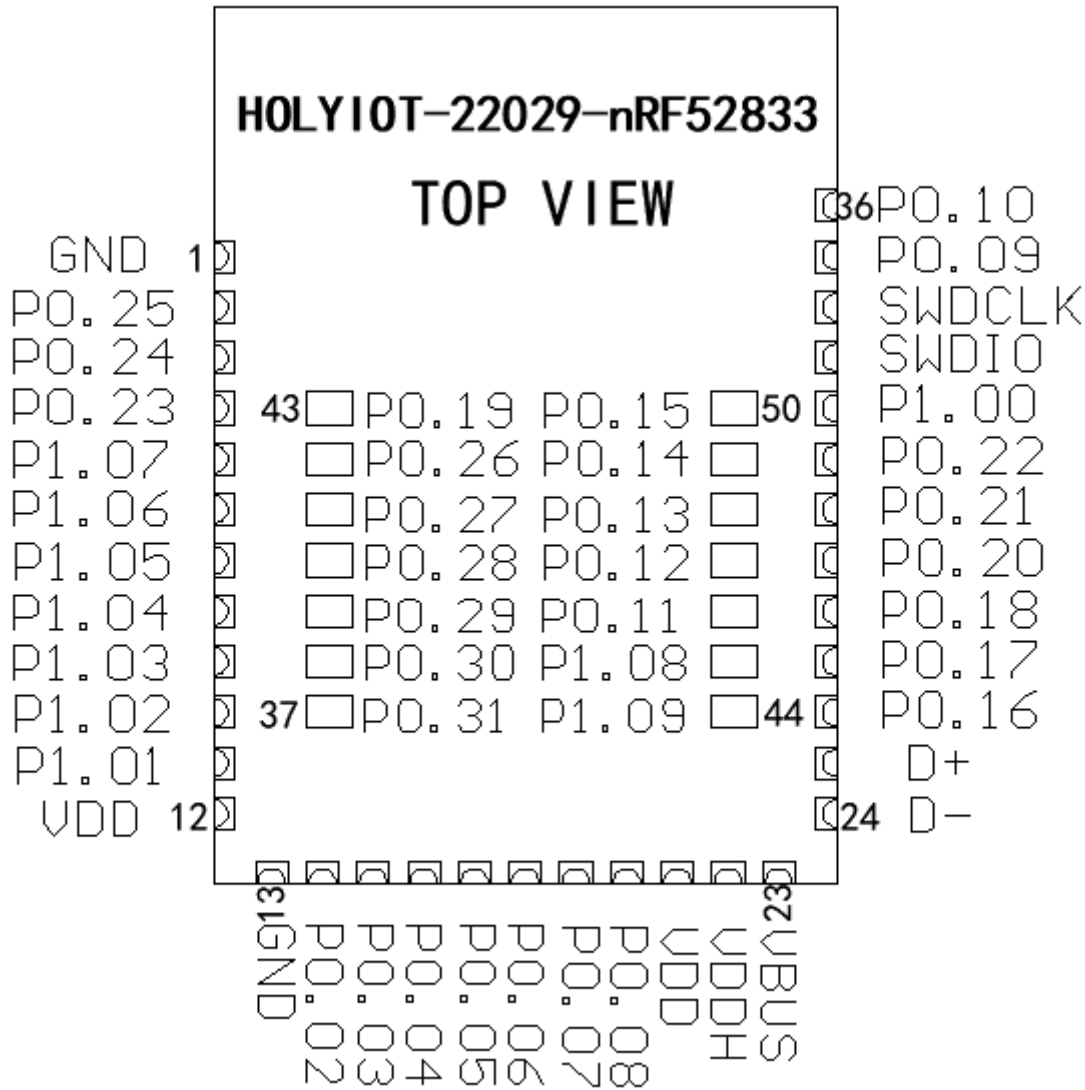https://www.nordicsemi.com/Software-and-Tools/Software/S132

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

HOLYIOT-22029-nRF52833
TOP VIEW

| PIN No.	PIN define	Functions
1	GND	Ground
2	P0.25	Digital I/O(general purpose I/O)
3	P0.24	Digital I/O(general purpose I/O)
4	P0.23	Digital I/O(general purpose I/O)
5	P1.07	Digital I/O(general purpose I/O)
6	P1.06	Digital I/O(general purpose I/O)
7	P1.05	Digital I/O(general purpose I/O)
8	P1.04	Digital I/O(general purpose I/O)
9	P1.03	Digital I/O(general purpose I/O)
10	P1.02	Digital I/O(general purpose I/O)
11	P1.01	Digital I/O(general purpose I/O)
12	VDD	Power

13	GND	Ground
14	P0.02 (AIN0)	Digital I/O(general purpose I/O[2]) Analog input
15	P0.03 (AIN1)	Digital I/O(general purpose I/O[2]) Analog input
16	P0.04 (AIN2)	Digital I/O(general purpose I/O[2]) Analog input
17	P0.05 (AIN3)	Digital I/O(general purpose I/O[2]) Analog input
18	P0.06	Digital I/O(general purpose I/O)
19	P0.07 TRACECLK	Digital I/O(general purpose I/O) Trace clock
20	P0.08	Digital I/O(general purpose I/O)
21	VDD	Power
22	VDDH	Power High voltage power supply
23	VBUS	Power 5 V input for USB 3.3 V regulator
24	D-	USB D-
25	D+	USB D+
26	P0.16	Digital I/O(general purpose I/O)
27	P0.17	Digital I/O(general purpose I/O)
28	P0.18 nRESET	Digital I/O(general purpose I/O) Configurable as pin RESET
29	P0.20	Digital I/O(general purpose I/O)
30	P0.21	Digital I/O(general purpose I/O)
31	P0.22	Digital I/O(general purpose I/O)
32	P1.00 TRACEDATA0	Digital I/O(general purpose I/O) Trace buffer TRACEDATA[0]
33	SWDIO	Debug Serial wire debug I/O for debug and programming
34	SWDCLK	Debug Serial wire debug clock input for debug and programming
35	P0.09 NFC1	Digital I/O(general purpose I/O[1] NFC1 input(antenna connection)
36	P0.10 NFC2	Digital I/O(general purpose I/O[1] NFC2 input(antenna connection)

| 37	P0.31 (AIN7)	Digital I/O(general purpose I/O[2]) Analog input
38	P0.30 (AIN6)	Digital I/O(general purpose I/O[2]) Analog input
39	P0.29 (AIN5)	Digital I/O(general purpose I/O[2]) Analog input
40	P0.28 (AIN4)	Digital I/O(general purpose I/O[2]) Analog input
41	P0.27	Digital I/O(general purpose I/O)
42	P0.26	Digital I/O(general purpose I/O)
43	P0.19	Digital I/O(general purpose I/O)
44	P1.09 TRACEDATA3	Digital I/O(general purpose I/O) Trace buffer TRACEDATA[3]
45	P1.08	Digital I/O(general purpose I/O)
46	P0.11 TRACEDATA2	Digital I/O(general purpose I/O) Trace buffer TRACEDATA[2]
47	P0.12 TRACEDATA1	Digital I/O(general purpose I/O) Trace buffer TRACEDATA[1]
48	P0.13	Digital I/O(general purpose I/O)
49	P0.14	Digital I/O(general purpose I/O)
50	P0.15	Digital I/O(general purpose I/O)

4. Mounting our board on the host PCBA

We suggest that you mount our RF board(HOLYIOT-22029 -nRF52833) 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.
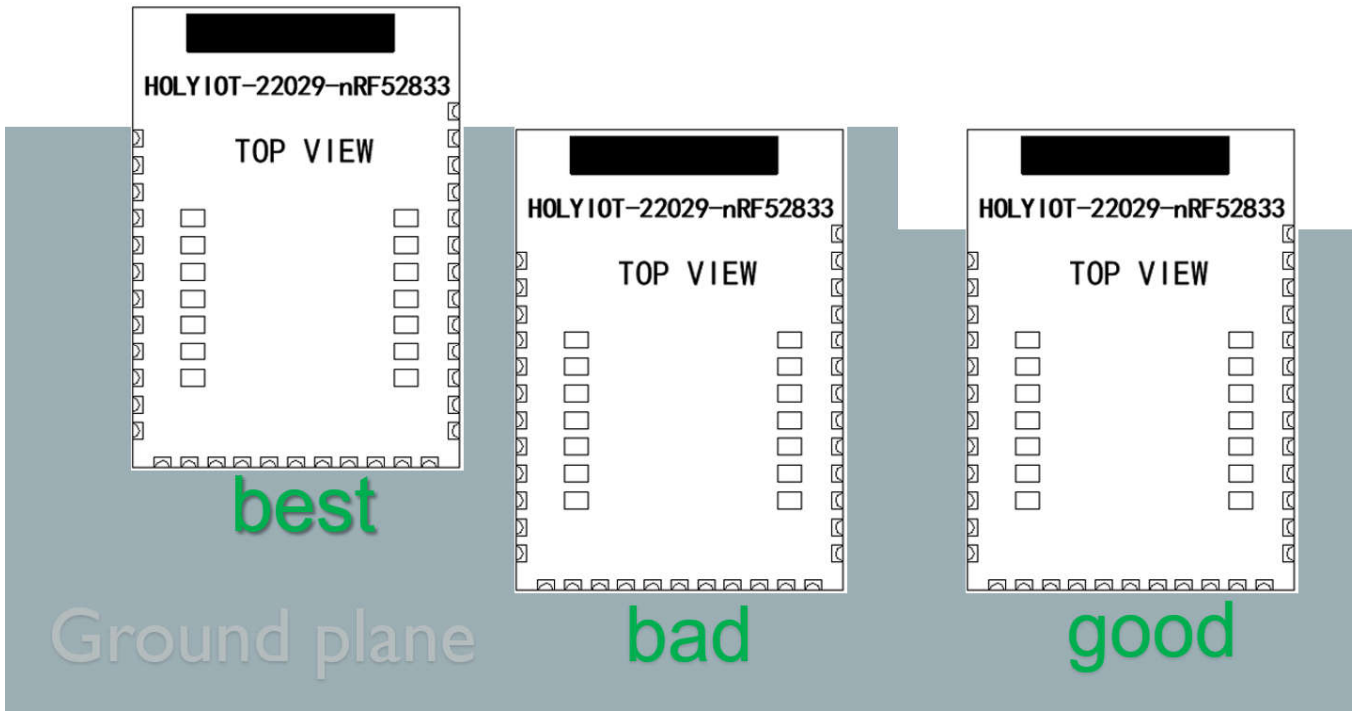
5. Miscellaneous

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.
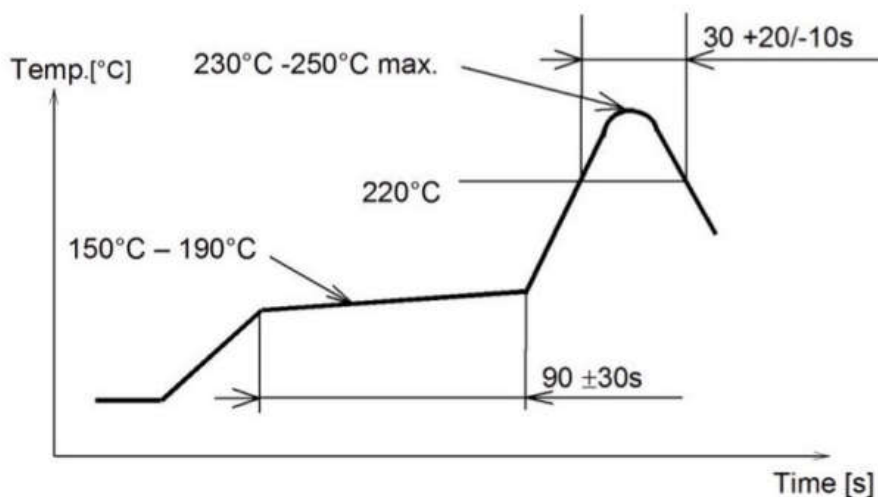
6. Absolute maximum ratings

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
NFC antenna pin current				
$I_{NFC1/2}$			80	mA
Environmental aQFN™ package				
Storage temperature		-40	+125	°C
MSL	Moisture Sensitivity Level		2	
ESD HBM	Human Body Model		4	kV
ESD HBM Class	Human Body Model Class		3A	
ESD CDM	Charged Device Model		750	V
Environmental QFN40 package				
Storage temperature		-40	+125	°C
MSL	Moisture Sensitivity Level		2	
ESD HBM	Human Body Model		4	kV
ESD HBM Class	Human Body Model Class		3A	
ESD CDM	Charged Device Model		1	kV
Environmental WLCSP 3.175 x 3.175 mm package				
Storage temperature		-40	+125	°C
MSL	Moisture Sensitivity Level		1	
ESD HBM	Human Body Model		4	kV
ESD HBM Class	Human Body Model Class		3A	
ESD CDM	Charged Device Model		750	V
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

ATTENTION
OBSERVE PRECAUTION FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICE
HBM (Human Body Model): Class 3A