

UHF RFID System



BLUEBOX ADVANT UHF Desktop



USB (Virtual COM, HID Keyboard)

Preface

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Safety Instructions / Warning - Read before start-up!

- The device may only be used for the intended purpose designed by the manufacturer. The operation manual should be conveniently kept available at all times for each user.
- Unauthorized changes and the use of spare parts and additional devices that have not been sold or recommended by the manufacturer may cause fire, electric shocks or injuries. Such unauthorized measures shall exclude any liability by the manufacturer.
- The liability-prescriptions of the manufacturer in the issue valid at the time of purchase are valid for the device. The manufacturer shall not be held

legally responsible for inaccuracies, errors, or omissions in the manual or automatically set parameters for a device or for an incorrect application of a device.

- Repairs may be executed by the manufacturer only.
- Only qualified personnel should carry out installation, operation, and maintenance procedures.
- Use of the device and its installation must be in accordance with national legal requirements and local electrical codes.
- When working on devices the valid safety regulations must be observed.

This manual applies to the following devices:

Description:

Read / write UHF RFID device with integrated antenna.
USB (Virtual COM + HID Keyboard) communication interface.

Order Number:

3122U-I



and (from) firmware versions:

Order Number	Carrier	Front End
3122U-I	2.29	1.32

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1 Introduction

The **BLUEBOX GEN2 DESKTOP UHF** hereinafter named **BLUEBOX** is a read/write UHF RFID device that communicates with a 'host' system (typically a PC) through an USB interface. The **BLUEBOX** acts as a joint through a set of commands between the host system and a RFID tag (or transponder) present near the antenna. A software driver must be installed at the 'host' (PC) level to allow the USB connection of the **BLUEBOX** to appear as a serial port (COM). It is also possible to configure the **BLUEBOX** to send a message as an HID Keyboard with Italian layout (keyboard emulation).

Hereinafter the list of the supported O.S.

- Windows XP SP3 32/64 bit
- Windows Vista 32/64 bit
- Windows 7 32/64 bit
- Windows 8/8.1 32/64 bit
- Windows 10 32/64 bit

2 Technical Specifications

2.1 Electrical Features

Power Supply	USB
Power Ratings	2.5W
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 0.1W (20dBm), software configurable 1 dB step
RF Input Sensitivity	-58 dBm ... -81dBm, software programmable 1dB step
Antenna	Integrated
Reading Distance	10 cm ¹
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	USB Virtual COM, USB HID Keyboard
Status Display	4 LEDs
Connections	USB

2.2 Mechanical Features

Dimensions	145x75x35 mm
Material	PC
Protection Class	IP54

2.3 Environmental Conditions

Operating Temperature	-20°C ... +65°C
Storage Temperature	-40°C ... +85°C
Humidity	Up to 95%, non condensing

¹ Reading distance depends on transponder type, antenna and environmental conditions.

3 Operating Features

In 'continuous' mode the **BLUEBOX** is characterized by the coexistence of 2 'parallel' and asynchronous activities: the tag identification (inventory) and the communication with the 'host' system. The 'continuous' identification activity interacts with the communication activity through a buffer that contains the code of the last identified tags or that is empty indicating the absence of tags. Due to synchronization and filtering reasons, the buffer is handled for each identified tag by a parameter defined as 'hold time' (same as 'filter time' defined below, to be set in the range of 0 ... 99 seconds or 0 ... 99 minutes, default value 1 second) and allows to extend 'artificially' the presence of the tag after it leaves the antenna's influence area; this behavior is observable looking at the 'ANT' LED status that is 'on' indicating the presence of tags. Through the command 'data request' it is possible to get the data contained in the buffer (tag/s ID); the indication of the reading antenna can be enabled/disabled through a flag defined in the general parameters.

The **BLUEBOX** handles also a 100 elements FIFO queue which is combined with the 'filter time' general parameter (to be set in a range of 0 ... 99 seconds or 0 ... 99 minutes, default value 1 second) that prevents the queue saturation in case of a tag 'continuous' presence. When a tag is identified, the **BLUEBOX** verifies if it belongs to the list of read tags. If the tag do not belong to the list (it is defined as 'new'), its code will be inserted in the queue, a filter time assigned to the tag will be started. Otherwise (the tag belong to the list of read tags), the **BLUEBOX** verifies if the relative filter time is expired. In this case (the filter time is expired), the tag is defined as 'new' and will be processed as described above, otherwise only the relative filter time will be rearmed. Through the command 'queue data request' and the relative 'ack', it is possible to get the data contained in the queue (tag ID) and unload it; the indication of the reading antenna can be enabled/disabled through a flag defined in the general parameters.

In 'continuous' mode the **BLUEBOX** can be configured to obtain the behavior of a 'spontaneous' reader that will send a message on the USB Virtual COM line. This feature is enabled (on) / disabled (off) by the switch 2 of the dip switch SW1 or using a flag in the general configuration of the reader. It can be also configured to obtain the behavior of an HID Keyboard that will send a message as keyboard emulation. This feature is enabled (on) / disabled (off) by the switch 3 of the dip switch SW1 or using a flag in the general configuration of the reader.

The **BLUEBOX** allows the execution of 'on request' functions. During the execution of these functions, the 'continuous' identification activity will be suspended temporarily; the involved commands are relative to device configuration and tag read/write specific activities.

If not required, the 'continuous' identification activity can be disabled through a flag defined in the general parameters. In this case, the **BLUEBOX** will only execute the 'on request' commands already defined above.

Four 'test' mode are also defined:

- 'RF Power' test: allows the user to easily and quickly test the minimum RF output power needed to read a tag in a fixed position. The reader sweeps from the minimum RF output power to maximum RF output power or until it finds a tag, increasing the RF power of 1 dB every 500ms with fixed Q selection algorithm and Q=0. It is an 'on request' function which temporarily suspends the 'continuous' mode.
- 'RF Sensitivity' test: allows the user to easily and quickly test the minimum RF input sensitivity needed to read a tag in a fixed position. The reader sweeps from the minimum RF input sensitivity to maximum RF input sensitivity or until it finds a tag, increasing the RF sensitivity of 1 dB every 500ms with fixed Q selection algorithm and Q=0. It is an 'on request' function which temporarily suspends the 'continuous' mode.
- Read Reflected Power: allows the user to read the reflected power of the antenna at a given frequency to check the antenna connection.
- Read RSSI: allows the user to read the signal strength received by the antenna at a given frequency to check the presence of external RF sources.

3.1 General Parameters

Hereinafter the configurable general parameter of the **BLUEBOX**.

Parameter	Description	Range	Default
Network Address	Network address of the reader.	000 ... 255	255
Baud Rate	Communication baud rate on USB Virtual COM interface.	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	19200
Data Bits	Data bits on USB Virtual COM interface.	7, 8	8
Stop Bits	Stop bits on USB Virtual COM interface.	1, 2	1
Parity	Parity on USB Virtual COM interface.	None, even, odd	None
Filter Time	Tag queue management filter time.	0 ... 99 seconds	1 sec

		0 ... 99 minutes	
Reading Antenna Information	Reading antenna information.	Disabled, enabled	Disabled
Transponder Type Information	Transponder type information.	Disabled, enabled	Disabled
'Spontaneous' Mode	Spontaneous message activation/deactivation (see the 'spontaneous' message parameters). It is OR'ed with the solder jumper W2 setting.	Disabled, enabled	Disabled
'Continuous' Mode	'Continuous' mode activation/deactivation.	Disabled, enabled	Enabled

The general parameters are managed through the 'Read General Parameters' and 'Write General Parameters' commands as described in protocol technical manuals where the parameters 1...7 fields with default values are:

1	2	3	4	5	6	7
Network Address	Serial1	Serial2	0x00	0x00	Filter Time	Flags
0xFF	0x48	0x10	0x00	0x00	0x01	0x00

Where:

Parameter	Description
Network Address	Network address of the reader (0x00 ... 0xFF).
Serial1	RS232/RS485 communication settings. <ul style="list-style-type: none"> High nibble: baud rate: <ul style="list-style-type: none"> 0x0: 1200 bps; 0x1: 2400 bps; 0x2: 4800 bps; 0x3: 9600 bps; 0x4: 19200 bps; 0x5: 38400 bps; 0x6: 57600 bps; 0x7: 115200 bps. Low nibble: data bits: <ul style="list-style-type: none"> 0x7: 7 bits; 0x8: 8 bits.
Serial2	RS232/RS485 communication settings. <ul style="list-style-type: none"> High nibble: stop bits: <ul style="list-style-type: none"> 0x1: 1 bits;

Parameter	Description
	<ul style="list-style-type: none"> ○ 0x2: 2 bits. • Low nibble: parity: <ul style="list-style-type: none"> ○ 0x0: None; ○ 0x1: Even; ○ 0x2: Odd.
Filter Time	Reading management filter time (0 setting is internally overwritten with 1 second): <ul style="list-style-type: none"> • Decimal 0 ... 99 for time in seconds (0 ... 99 seconds); • Decimal 100 ... 199 for time in minutes (0 ... 99 minutes).
Flags	Flags. Single bits are dedicated to disable (0 value) or enable (1 value) functions: <ul style="list-style-type: none"> • Bit 7: Not used; • Bit 6: Not used; • Bit 5: Reading antenna information in Data Request, Queue Request and Inventory commands; • Bit 4: Transponder type information in Data Request and Queue Request commands; • Bit 3: To enable the 'spontaneous' mode (see the 'spontaneous message parameters'); • Bit 2: Not used; • Bit 1: Not used; • Bit 0: To disable the 'continuous' mode.

3.2 Configuration Parameters

Hereinafter the configurable operational parameters of the **BLUEBOX**.

3.2.1 Keyboard Emulation

Hereinafter the configurable keyboard emulation parameters of the **BLUEBOX**.

Parameter	Description	Range	Default
Intrachar Time	The time between chars.	0 ... 990 ms 10 ms step	20 ms
End of Message	The end char added to the tag's code message.	NUL, CR, TAB	NUL
Start of Text	The start text char added to the tag's code message.	See description	NUL
End of Text	The end text char added to the tag's code message.	See description	NUL
Message Index	The start position index in the tag's code message.	0 ... 255	0

Parameter	Description	Range	Default
Message Length	The length of the tag's code message (0 means all the message starting from the index).	0 ... 255	0

The keyboard emulation parameters are stored in configuration page nr. 0x06 and are managed through the 'Read Configuration Parameters' and 'Write Configuration Parameters' commands as described in protocol technical manuals where the parameters 1...7 fields and default values are:

1	2	3	4	5	6	7
Intrachar Time	End of Message	0x00	Start of Text	End of Text	Message Index	Message Length
0x02	0x00	0x00	0x00	0x00	0x00	0x00

Where:

Parameter	Description
Intrachar Time	Time between chars in the range 0 (0x00) ... 990 (0x63) ms with 10 ms steps.
End of Message	The end of message char added to the tag's code message: <ul style="list-style-type: none"> 0x00: NUL (no end char); 0x09: TAB (tabulation); 0x0D: CR (carriage return).
Start of Text	The char added at the beginning of the tag's code message. It must be in the range 0x20...0x7D except values 0x27,0x3C,0x3E,0x60. Value 0x00 means no Start of Text char.
End of Text	The char added at the end of the tag's code message (before End of Message). It must be in the range 0x20...0x7D except values 0x27,0x3C,0x3E,0x60. Value 0x00 means no End of Text char.
Message Index	The start position index in the tag's code message except of Start of Text, End of Text and End of Message chars.
Message Length	The length of the tag's code message except of Start of Text, End of Text and End of Message chars. Value 0 means all the tag's code message starting from Message Index to the end of message.



The changed keyboard emulation parameters become effective only after a reset of the **BLUEBOX**. Reset the **BLUEBOX** using the 'Reset Device' command or via a hardware reset.

3.2.2 'Spontaneous' Message

Hereinafter the configurable 'spontaneous' message parameters of the **BLUEBOX**.

Parameter	Description	Range	Default
Message on Serial RS232 / RS485	'Spontaneous' message on Serial RS232/RS485 interface activation/deactivation.	Disabled, enabled	Enabled
Message on HID Keyboard	'Spontaneous' message on HID Keyboard interface activation/deactivation.	Disabled, enabled	Enabled

The 'spontaneous' message parameters are stored in configuration page nr. 0x09 and are managed through the 'Read Configuration Parameters' and 'Write Configuration Parameters' commands as described in protocol technical manuals where the parameters 1...7 fields with default values are:

1	2	3	4	5	6	7
0x00	Interface	0x00	0x00	0x00	0x00	0x00
0x00	0x00	0x00	0x00	0x00	0x00	0x00

Where:

Parameter	Description
Interface	<p>The interface where to send the 'spontaneous' message activation/deactivation. Single bits are dedicated to enable (0 value) or disable (1 value) an interface:</p> <ul style="list-style-type: none"> • Bit 7: Not used; • Bit 6: Not used; • Bit 5: Not used; • Bit 4: Not used; • Bit 3: Not used; • Bit 2: HID keyboard; • Bit 1: Not used; • Bit 0: Serial RS232/RS485.



The changed 'spontaneous' message parameters become effective only after a reset of the **BLUEBOX**. Reset the **BLUEBOX** using the 'Reset Device' command or via a hardware reset.

3.2.3 RF and EPC C1G2 (Class-1 Generation-2)

Hereinafter the configurable RF parameters of the **BLUEBOX**.

Parameter	Description	Range	Default
RF Region	RF geographical region.	Europe (ETSI compliant region), North America (FCC compliant region)	Europe (ETSI compliant region)
RF Output Power	RF output power in dBm.	0 ... 20 dBm	20 dBm
RF Input Sensitivity	RF input sensitivity in dBm.	-58 ... -81 dBm	-76 dBm
RF Channel	RF channel. Channel 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): FHSS on 4 channels (1, 4, 7, 10) in 865.7 – 867.5 MHz, 600kHz span. North America (FCC): FHSS on 50 channels (1 ... 50) in 902.75 – 927.25MHz, 500kHz span. 	0 ... 10 (ETSI) 0 ... 50 (FCC)	0
Antenna 1 Activation	Activation of antenna 1.	Disabled, enabled	Enabled
RF Channel Allocation Time	The maximum period of consecutive transmission on the same RF channel. 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): 4 secs in 'continuous' mode, no allocation time in 'continuous' mode triggered by input. North America (FCC): 0.4 secs. 	0.00 ... 0.99 seconds 0 ... 99 seconds	0
RF Channel Pause Time	The minimum time between two consecutive transmissions in the same RF channel. 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): 100 ms in 'continuous' mode, no pause time in 'continuous' mode triggered by input. North America (FCC): no pause time. 	0.00 ... 0.99 seconds 0 ... 99 seconds	0
RF Chip Standby Mode	Activation / deactivation of the standby mode of the RF chip during RF off conditions to reduce power consumption and temperature increase.	Disabled, enabled	Enabled

List of region frequencies:

RF Channel	Europe (ETSI compliant region) [MHz]	North America (FCC compliant region) [MHz]
1	865.7	902.75
2	865.9	903.25
3	866.1	903.75
4	866.3	904.25
5	866.5	904.75
6	866.7	905.25
7	866.9	905.75
8	867.1	906.25
9	867.3	906.75
10	867.5	907.25
11		907.75
12		908.25
13		908.75
14		909.25
15		909.75
16		910.25
17		910.75
18		911.25
19		911.75
20		912.25
21		912.75
22		913.25
23		913.75
24		914.25
25		914.75
26		915.25
27		915.75
28		916.25

RF Channel	Europe (ETSI compliant region) [MHz]	North America (FCC compliant region) [MHz]
29		916.75
30		917.25
31		917.75
32		918.25
33		918.75
34		919.25
35		919.75
36		920.25
37		920.75
38		921.25
39		921.75
40		922.25
41		922.75
42		923.25
43		923.75
44		924.25
45		924.75
46		925.25
47		925.75
48		926.25
49		926.75
50		927.25

Hereinafter a cross-table between RF channel internal numeration and ETSI numeration according with EN 302208-1.

Internal RF Channel	ETSI EN 302208-1 RF Channel
1	4
2	5
3	6

Internal RF Channel	ETSI EN 302208-1 RF Channel
4	7
5	8
6	9
7	10
8	11
9	12
10	13



According to ETSI EN 302208-1 only channels 4, 7, 10 and 13 (internal numerated as 1, 4, 7 and 10) could be used at high power! Other RF channels are present only for test purposes and should not be used in normal operation!



According to integrated antenna specifications only Europe (ETSI) region could be set in readers with EU integrated antenna (items 3122U).

Hereinafter the configurable EPC C1G2 (Class-1 Generation-2) parameters of the **BLUEBOX**.

Parameter	Description	Range	Default
Inventory Mode	How the reader does an inventory in 'continuous' mode.	Fast Multi Tag, Fast Single Tag, Standard Multi Tag, Standard Single Tag	Standard Multi Tag
Link Frequency	Link Frequency as defined in EPC Class 1 Generation 2 protocol.	40, 160, 256, 320, 640 kHz	160 kHz
Bit Coding	Bit coding as defined in EPC Class 1 Generation 2 protocol.	FM0, Miller 2, Miller 4, Miller 8	Miller 2
Q Selection Algorithm	The Q selection algorithm used for setting the slot-counter parameter as defined in EPC Class 1 Generation 2 protocol.	Dynamic Fixed	Dynamic
Q Value	The Q value used in fixed Q selection algorithm or the starting Q value used in dynamic Q selection algorithm as defined in EPC Class 1 Generation 2 protocol.	0 ... 15	3

Parameter	Description	Range	Default
Q Initial	The minimum allowed Q value in dynamic Q algorithm mode.	0 ... 15	0
Q Final	The maximum allowed Q value in dynamic Q algorithm mode.	0 ... 15	4
Q Adjust Rounds	The maximum Q adjust rounds in dynamic Q algorithm mode.	0 ... 5	3
Inventory Cycles	The inventory cycles in inventory command.	0 ... 5	3
Search Mode	How the reader singulates (select) tags in 'continuous' mode.	Dual Target, Single Target	Dual Target
Session	The session used as defined in EPC Class 1 Generation 2 protocol.	S0, S1, S2, S3	S0
Target	The target used as defined in EPC Class 1 Generation 2 protocol.	A, B	A
EPC size	The size of the recognized EPC in bytes. 0 means all EPC sizes,	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62	0
ReadAfterDetect Info Activation	Activation of the ReadAfterDetect mode in 'continuous' mode.	None, TID, Custom	None
ReadAfterDetect Password	The password to be used to access to tag's memory in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info). Use a '0' password if the access password is not requested.	0x00 0x00 0x00 0x00 ... 0xFF 0xFF 0xFF 0xFF	0x00 0x00 0x00 0x00
ReadAfterDetect Bank	The tag's memory bank to access in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info).	Reserved, TID, User	Reserved
ReadAfterDetect Address	The tag's memory start address to access in the specified memory bank in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info).	0x00 0x00 0x00 0x00 ... 0xFF 0xFF 0xFF 0xFF	0x00 0x00 0x00 0x00
ReadAfterDetect Length	The number of tag's memory blocks (2-bytes length) to access in the specified memory bank in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info). In case of Reserved or User	0 ... 255	0

Parameter	Description	Range	Default
	bank selected 0 means no tag's memory block access, in case of TID bank selected 0 means auto-length (class identifier, manufacturer identifier, serial number).		
ReadAfterDetect EPC Bank Info	The EPC bank info to include in the tag's ID in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info).	PC, EPC, CRC	PC, EPC, CRC

The RF and EPC C1G2 (Class-1 Generation-2) parameters are stored in configuration pages nr. 0x01, 0x02, 0x04 and 0x82 and are managed through the 'Read Configuration Parameters' and 'Write Configuration Parameters' commands as described in protocol technical manuals.

The parameters 1...7 fields with default values are of page 0x01 are:

1	2	3	4	5	6	7
RF Input Sensitivity	Flags	0x00	0x00	0x00	0x00	0x00
0x4C	0x00	0x00	0x00	0x00	0x00	0x00

Where:

Parameter	Description
RF Input Sensitivity	Absolute value of the RF input sensitivity.
Flags	Flags. Single bits are dedicated to disable (0 value) or enable (1 value) functions: <ul style="list-style-type: none"> • Bit 7: Not used; • Bit 6: Not used • Bit 5: Not used; • Bit 4: Not used; • Bit 3: Not used; • Bit 2: Not used • Bit 1: Not used; • Bit 0: To disable the RF chip standby mode.

The parameters 1...7 fields with default values of page 0x02 are:

1	2	3	4	5	6	7
RF Region	RF Output Power	RF Channel	Antennas Activation	EPC C1G2	RF Maximum Allocation Time	RF Minimum Pause Time
0x02	0x14	0x00	0x01	0x30	0x00	0x00

Where:

Parameter	Description
RF Region	RF geographical region: <ul style="list-style-type: none"> 0x01: North America (FCC compliant); 0x02: Europe (ETSI compliant).
RF Output Power	RF output power.
RF Channel	RF channel. Channel 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): FHSS on 4 channels (1, 4, 7, 10) in 865.7 – 867.5 MHz, 600kHz span. North America (FCC): FHSS on 50 channels (1 ... 50) in 902.75 – 927.25MHz, 500kHz span. The allowed values are 0x00 ... 0x0A if ETSI compliant region is selected and 0x00 ... 0x32 if FCC compliant region is selected.
Antennas Activation	A byte whose bits are dedicated to disable (0 value) or enable (1 value) the antennas to use: <ul style="list-style-type: none"> Bit 7: Not used. Bit 6: Not used. Bit 5: Not used. Bit 4: Not used. Bit 3: Not used. Bit 2: Not used. Bit 1: Not used. Bit 0: Antenna 1.
EPC C1G2	A byte whose bits are dedicated to manage Q value and session/target parameters: <ul style="list-style-type: none"> Bit 7 ... bit 4: Q value in fixed Q selection algorithm or starting Q value in dynamic Q selection algorithm, as defined EPC Class 1 Generation 2 protocol (0x0=0 ... 0xF=15); Bit 3 ... bit 2: Session as defined in EPC Class 1 Generation 2 protocol (00b=S0, 01b=S1, 10b=S2, 11b=S3); Bit 1: Q selection algorithm (0=dynamic, 1=fixed); Bit 0: Target as defined in EPC Class 1 Generation 2 protocol (0=A, 1=B).
RF Maximum Allocation Time	The maximum period of consecutive transmission on the same RF channel. 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): 4 secs in 'continuous' mode, no allocation time in 'continuous' mode triggered by input. North America (FCC): 0.4 secs. The allowed values are: <ul style="list-style-type: none"> Decimal 0 ... 99 for time in mseconds (0 ... 990 mseconds); Decimal 100 ... 199 for time in seconds (0 ... 99 seconds).
RF Minimum Pause Time	The minimum time between two consecutive transmission in the same RF channel. 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): 100 ms, in 'continuous' mode, no pause time in 'continuous' mode triggered by input. North America (FCC): no pause time.

Parameter	Description
	The allowed values are: <ul style="list-style-type: none"> Decimal 0 ... 99 for time in mseconds (0 ... 990 mseconds); Decimal 100 ... 199 for time in seconds (0 ... 99 seconds).

The parameters 1...7 fields with default values of page 0x04 are:

1	2	3	4	5	6	7
Inventory Mode	Link Frequency	Bit Coding	0x00	EPC Size	0x00	0x00
0x02	0x02	0x01	0x00	0x00	0x00	0x00

Where:

Parameter	Description							
Inventory Mode	<p>A byte whose bits are dedicated to manage the inventory mode, the search mode and the ReadAfterDetect info activation parameters:</p> <ul style="list-style-type: none">• Bit 7: Not used.• Bit 6: Search mode (how the reader singulates tags in 'continuous' mode):<ul style="list-style-type: none">○ 0b: Dual Target (the reader singulates tags in both A and B states).○ 1b: Single Target (the reader singulates only tags that are in A state).• Bit 5: Activation of the ReadAfterDetect with custom info as defined in ReadAfterDetect Password, Bank, Address, Length and EPC Info parameters (0b=OFF, 1b=ON).• Bit 4: Activation of the ReadAfterDetect with auto TID info (0b=OFF, 1b=ON).• Bit 3 ... bit 0: Inventory mode (how the reader does an inventory in 'continuous' mode):<ul style="list-style-type: none">○ 0x0: Fast Multi Tag: Inventory mode that does not take the tag to the Opened but to the Acknowledged state. This inventory mode is not as secure as the standard mode, but it is faster.○ 0x1: Fast Single Tag: The same inventory mode like the Fast Multi Tag, but with the slot count of 1. This has the effect that no anticollision procedure is performed.○ 0x2: Standard Multi Tag: Inventory mode like defined in the EPC C1G2 standard.○ 0x4: Standard Single Tag: The same inventory mode like the Standard Multi Tag, but with the slot count of 1. This has the effect that no anticollision procedure is performed.							
	Allowed values are:							
	<table><tr><th>Inventory Mode</th><th>ReadAfterDetect with Custom Info</th><th>ReadAfterDetect with Auto TID</th><th>Search Mode</th></tr><tr><td>Fast Multi Tag, Fast Single Tag</td><td>Disabled</td><td>Disabled</td><td>Dual Target, Single Target</td></tr></table>	Inventory Mode	ReadAfterDetect with Custom Info	ReadAfterDetect with Auto TID	Search Mode	Fast Multi Tag, Fast Single Tag	Disabled	Disabled
Inventory Mode	ReadAfterDetect with Custom Info	ReadAfterDetect with Auto TID	Search Mode					
Fast Multi Tag, Fast Single Tag	Disabled	Disabled	Dual Target, Single Target					

Parameter	Description			
	Standard Multi Tag, Standard Single Tag	Disabled	Disabled	Dual Target, Single Target
	Standard Multi Tag, Standard Single Tag	Disabled	Enabled	Dual Target, Single Target
	Standard Multi Tag, Standard Single Tag	Enabled	Disabled	Dual Target, Single Target
Link Frequency	Link Frequency: <ul style="list-style-type: none">0x00: 40 kHz;0x02: 160 kHz;0x04: 256 kHz;0x05: 320 kHz;0x06: 640 kHz.			
Bit Coding	Bit coding: <ul style="list-style-type: none">0x00: FM0;0x01: Miller 2;0x02: Milller 4;0x03: Miller 8. Allowed values are:			
	Link Frequency		Bit Coding	
	40 kHz		FM0, Miller 2, Miller 4, Miller 8	
	160 kHz		FM0, Miller 2, Miller 4, Miller 8	
	256 kHz		Miller 4, Miller 8	
	320 kHz		Miller 4, Miller 8	
	640 kHz		Miller 4, Miller 8	
	DRM (Dense Reader Mode):			
Link Frequency		Bit Coding		
256 kHz		Miller 4, Miller 8		
320 kHz		Miller 4, Miller 8		
EPC Size	The size of the recognized EPC in bytes. 0 means all EPC sizes.			

The parameters 1...14 fields with default values of page 0x82 are:

1	2	3	4	5	6	7
ReadAfterDetect Password0	ReadAfterDetect Password1	ReadAfterDetect Password2	ReadAfterDetect Password3	ReadAfterDetect Bank	ReadAfterDetect Address0	ReadAfterDetect Address1
0x00	0x00	0x00	0x00	0x00	0x00	0x00

8	9	10	11	12	13	14
ReadAfterDetect Address2	ReadAfterDetect Address3	ReadAfterDetect Length	ReadAfterDetect EPC Bank Info	Q	Q Adjust Rounds	Inventory Cycles
0x00	0x00	0x00	0x03	0x05	0x03	0x03

Where:

Parameter	Description
ReadAfterDetect Password0 ReadAfterDetect Password3	The password to be used to access to tag's memory in ReadAfterDetect mode. Use a '0' password if the access password is not requested.
ReadAfterDetect Bank	The tag's memory bank to access in ReadAfterDetect mode: <ul style="list-style-type: none"> 0x00: Reserved; 0x02: TID; 0x03: User.
ReadAfterDetect Address0 ... ReadAfterDetect Address3	The tag's memory start address to access in the specified memory bank in ReadAfterDetect mode.
ReadAfterDetect Length	The number of tag's memory blocks (2-bytes length) to access in the specified memory bank in ReadAfterDetect mode. In case of Reserved or User bank selected, 0 means no tag's memory block access; in case of TID bank selected, 0 means auto-length (class identifier, manufacturer identifier, serial number).
ReadAfterDetect EPC Bank Info	The EPC bank info to include in the tag's ID in ReadAfterDetect mode. A byte whose bits are dedicated to disable (0 value) or enable (1 value) functions: <ul style="list-style-type: none"> Bit 7: Not used;

Parameter	Description
	<ul style="list-style-type: none"> • Bit 6: Not used; • Bit 5: Not used; • Bit 4: Not used; • Bit 3: Not used; • Bit 2: CRC field; • Bit 1: EPC field; • Bit 0: PC field.
Q	Minimum and maximum Q value to be used in dynamic Q selection algorithm: <ul style="list-style-type: none"> • High nibble: minimum Q value (0x0 ... 0xF); • Low nibble: maximum Q value (0x0 ... 0xF).
Q Adjust Rounds	Maximum Q adjust rounds in dynamic Q selection algorithm.
Inventory Cycles	The inventory cycles in inventory command.



The changed ReadAfterDetect parameters become effective only after a reset of the **BLUEBOX**. Reset the **BLUEBOX** using the 'Reset Device' command or via a hardware reset.

4 Keyboard Emulation

In 'continuous' mode, if the 'keyboard emulation' feature is set on (see dip switch settings in Hardware Settings paragraph and Operating Features), the **BLUEBOX** will send the following message on the USB HID keyboard line every time that it will find a 'new' tag.

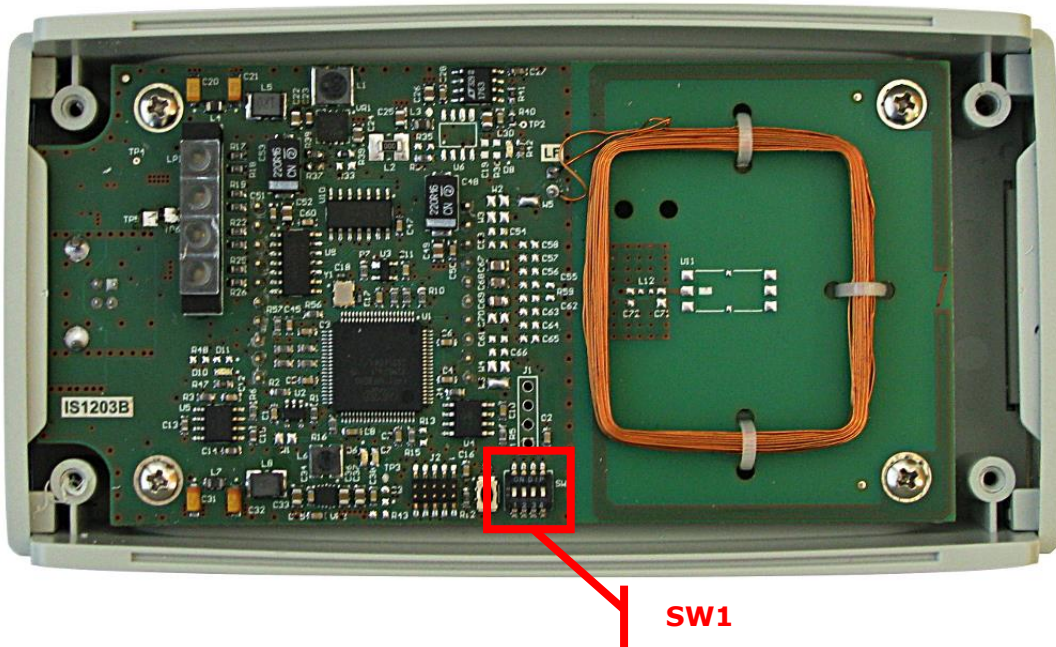
4.1 Standard Coding

**<starttext> <code s h> <code s+1 l> ... <code i h> <code i+1 l> ...
<code n/2 h> <code n/2+1 l> <endtext> <endmessage>**

Where:

<starttext>	The char added at the beginning of the tag's code message (Start of Text field in keyboard configuration). It must be in the range 0x20...0x7D except values 0x27,0x3C,0x3E,0x60. Value 0x00 means no Start of Text char.
s	The start position (Message Index field in keyboard configuration).
i	s ... n/2 (n is the Message Length field in keyboard configuration).
<code i h> <code i l>	i-th byte of the UID of the identified tag. ASCII encoded byte.
<endtext>	The char added at the end of the tag's code message and before End of Message (End of Text field in keyboard configuration). It must be in the range 0x20...0x7D except values 0x27,0x3C,0x3E,0x60. Value 0x00 means no End of Text char.
<endmessage>	The end of message char added to the tag's code message (End of Message field in keyboard configuration): <ul style="list-style-type: none"> • 0x00: NUL (no end char added); • 0x09: TAB (tabulation); • 0x0D: CR (carriage return).

5 Hardware Settings
















SW1

Dip 1	On: force 255, 19200, 8, n, 1.
Dip 2	On: enables 'spontaneous' mode on USB Virtual COM serial line.
Dip 3	On: enables 'keyboard emulation' mode on HID Keyboard line.
Dip 4	Not used.

6 Status Indications

At the top of **BLUEBOX** are placed LEDs which shows to the user about current activities and device status.

LED	Color	State	Meaning
SYSTEM	 (green)	Blinking	System running
	 (red)	On	System error (or system initialization)
	 (orange)	On	System upgrade
	 (off)	Off	Power supply for the device is missing or hardware defect
HOST	 (green)	Blinking	No HOST connection
	 (green)	On	HOST connection
	 (red)	On	System initialization
	 (off)	Off	Power supply for the device is missing or hardware defect (or system upgrade)
ANT	 (green)	Blinking	Antenna active, no tag detected
	 (green)	Slow Blink	Antenna not active
	 (green)	On	Antenna active, tag detected
	 (red)	On	Antenna error (or system initialization)
	 (off)	Off	Power supply for the device is missing or hardware defect (or system upgrade)

LED state definition

State	Definition
On	The indicator is constantly on
Off	The indicator is constantly off

State	Definition
Blinking	The indicator turns on and off with a frequency of 2 Hz: on for 250 ms, followed by off for 250 ms
Slow Blink	The indicator turns on and off with a frequency of 1 Hz: on for 500 ms, followed by off for 500 ms

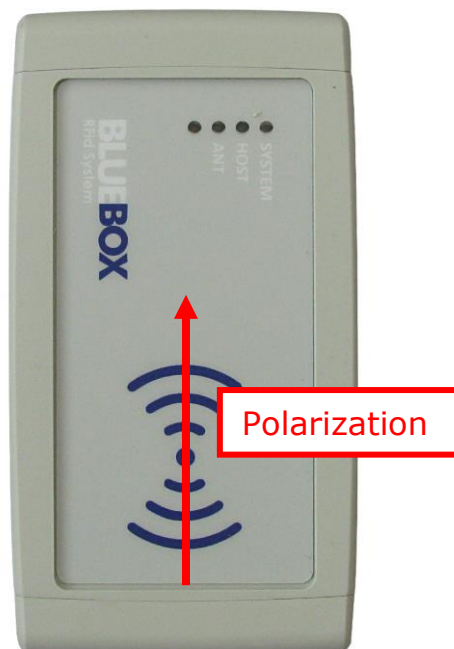
7 Antennas

The **BLUEBOX** is available with internal antenna directly integrated on the device cover (items 3122U-I).

The read range of an RFID system always depends on various factors like antenna size, transponder size, transponder IC type, orientation between transponder and reader antenna, position of the transponder versus the reader antenna, noise environment, metallic environment, etc. Therefore all data about read ranges can only be typical values measured under laboratory conditions. In real live applications the read range may differ from the data mentioned in the datasheet.

7.1 Integrated Antenna

The reader with integrated antenna has a maximum reading distance of about 400 mm measured between the **BLUEBOX** cover and an ALIEN ALN-9640 tag. The antenna is linearly polarized, also the tags are linearly polarized, and this means that the tag's antenna and the reader's antenna must be in a certain position each other to communicate.



8 Document Revision History

Date	Revision	Description
12/05/14	1.00	Initial release.
23/06/14	1.01	Added the RFID front-end firmware release in the first page. Changed the power ratings in section 2. Added the integrated antenna section (7.1) in section 7.
14/07/14	1.02	Corrections in section 1. Added the list of the O.S. in section 1. Corrections in the technical specification table (section 2). Added the device reset command (section 4.1). Corrections in the operating features (section 3), added parameters in the general configuration page, RF configuration page and EPC C1G2 page and related commands (sections 4.2, 4.4, 4.5, 4.7, 4.9 and 4.10). Added the North America (FCC compliant region) frequencies in section 3. Added the BlockWrite command description in section 4.19. Added the regions of operation description as appendix (appendix B). Added the .inf file as appendix C.
30/03/15	1.03	New firmware release reference in the first page. Corrections in section 1, USB Virtual COM and HID Keyboard are not mutual exclusive but the reader is managed as an USB Composite Device CDC + HID. Added 57600bps and 115200bps baudrate support in section 3.1, 4.2 and 4.7. Added the Program EPC command (section 4.18). Replaced the .inf file with the new version in appendix C. Added a driver installation guide on Windows 8 OS (appendix D).
15/07/15	1.04	Changed the firmware version reference in the first page. Added the list of devices object of this manual in preface section. Added the RF sensitivity parameter in technical specification table (section 2), in RF parameters section

Date	Revision	Description
		(section 3.2) and RF parameters commands management (sections 4.4 and 4.12). Moved Q value and Session in EPC C1G2 (Class-1 Generation-2) parameters section (section 3.3).
08/10/15	1.05	Changed the firmware version reference in the first page Replaced the table of the ordering codes and moved it in the preface section. Added the ReadAfterDetect configuration parameters description in section 3.3 and EPC C1G2 #2 configuration page management commands (section 4.6 and 4.13).
04/10/16	1.06	Updated the reader's firmware versions object of this manual. Added the operating features and description of the configurable parameters (section 3). Deleted the communication protocol section. Deleted the supported transponders appendix.
21/10/16	1.07	Updated the reader's firmware versions object of this manual. Added the ReadAfterDetect with custom info activation in EPC C1G2 parameters in section 3.1.3. Added the ReadAfterDetect with auto TID info activation in EPC C1G2 parameters in section 3.1.3. Added the search mode in EPC C1G2 parameters in section 3.1.3. Update the inventory mode range in EPC C1G2 parameters in section 3.1.3.
10/01/17	1.08	Corrected the status display specification in electrical features table.
02/08/17	1.09	Updated the reader's firmware versions object of this manual. Corrections in operating features section. Corrected the baudrate settings in general parameters sections. Added a warning to changed configuration parameters that become effective only after a device reset. Corrected the default setting of Q final in RF and EPC C1G2 parameters. Added the 640 kHz link frequency setting in RF and EPC C1G2 parameters.

Date	Revision	Description
		Added a cross reference table between link frequency settings and bit coding settings in RF and EPC C1G2 parameters.
07/06/18	1.10	<p>Updated the reader's firmware versions object of this manual.</p> <p>Added the RF power test, RF sensitivity test, read reflected power and read RSSI test modes description in operating features section.</p> <p>Added Start of Text and End of Text char in keyboard emulation and configuration parameters.</p>
10/07/18	1.11	<p>Updated the reader's firmware versions object of this manual.</p> <p>Added Message Index and Message Length fields in keyboard emulation and configuration parameters.</p> <p>Added the Decimal D-18 encoding in keyboard emulation and configuration parameters.</p>

A. Regions of Operation

The **BLUEBOX** reader has been designed to work in various regions with differing frequency requirements. This document covers operation in North America and Europe.



In each region, the reader is not locked to only operate in the specific frequencies listed in the respective frequency plan tables shown in next paragraphs. The user is responsible to correctly use the **BLUEBOX** in the relative region.

A.1. Operation in North America

The FCC specifies frequency hopping across the North American spectrum allocated to UHF RFID (902–928 MHz, with hopping occurring between 902.75–927.25 MHz in 500 KHz steps). This specification states that no listen-before-talk is performed, the maximum continuous transmit time on a channel is 0.4 seconds.

RF Channel	Frequency [MHz]
1	902.75
2	903.25
3	903.75
...	...
49	926.75
50	927.25

A.2. Operation in Europe

For European operation, the **BLUEBOX** reader supports the frequency plan listed in the table below and is compliant with the ratified ETSI EN 302-208 specification V.1.4.1. This specification states that no listen-before-talk is performed, the maximum continuous transmit time on a channel is four seconds, and the reader enforces the 100 ms off time before reusing the same channel. In some applications (i.e. conveyor systems) it may be necessary for interrogators to transmit while tags are not present. To accommodate such requirements, the device shall include within interrogators a means to minimize the overall length of transmission commensurate with the application. This may

include the provision of trigger mechanisms within interrogators to initiate transmissions.

RF Channel	Frequency [MHz]
4	865.7
7	866.3
10	866.9
14	867.5

B. .inf File

```

;-----
; Communication Device Class driver installation file
;-----

[Version]
Signature="$Windows NT$"
Class=Ports
ClassGuid={4D36E978-E325-11CE-BFC1-08002BE10318}
Provider=%Mfc%
DriverVer=27/03/2015,1.2.0.0

[Manufacturer]
%Mfc%=DeviceList,ntamd64

[DeviceList]
%BB2ADVANT%=Reader, USB\VID_28AD&PID_0000
%BB2DESKTOP%=Reader, USB\VID_28AD&PID_0001
%BB2DESKTOPv2%=Reader, USB\VID_28AD&PID_0003&MI_00

[DeviceList.ntamd64]
%BB2ADVANT%=Reader, USB\VID_28AD&PID_0000
%BB2DESKTOP%=Reader, USB\VID_28AD&PID_0001
%BB2DESKTOPv2%=Reader, USB\VID_28AD&PID_0003&MI_00

;-----
; Installation
;-----

[Reader]
include=mdmcpq.inf
CopyFiles=FakeModemCopyFileSection
AddReg=Reader.AddReg

[Reader.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,usbser.sys
HKR,,EnumPropPages32,, "MsPorts.dll,SerialPortPropPageProvider"

[Reader.Services]
AddService=usbser, 0x00000002, DriverService

[DriverService]
DisplayName=%DRIVER.SVC%
```

```
ServiceType=1
StartType=3
ErrorControl=1
ServiceBinary=%12%\usbser.sys
```

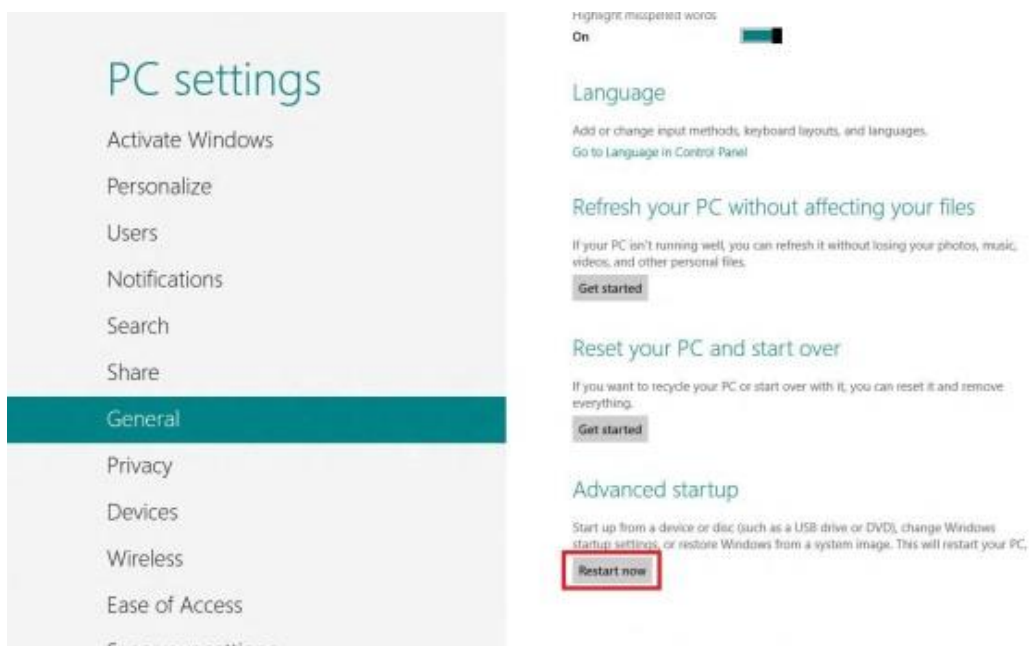
```
;-----
; String Definitions
;-----
```

```
[Strings]
Mfc          = "iDTRONIC GmbH & Soltec Soluzioni Tecnologiche Srl"
DRIVER.SVC   = "BLUEBOX Gen2 USB VCom Driver"
BB2ADVANT    = "BLUEBOX Gen2 ADVANT USB VCom Port"
BB2DESKTOP   = "BLUEBOX Gen2 DESKTOP USB VCom Port"
BB2DESKTOPv2 = "BLUEBOX Gen2 DESKTOP USB VCom Port"
```

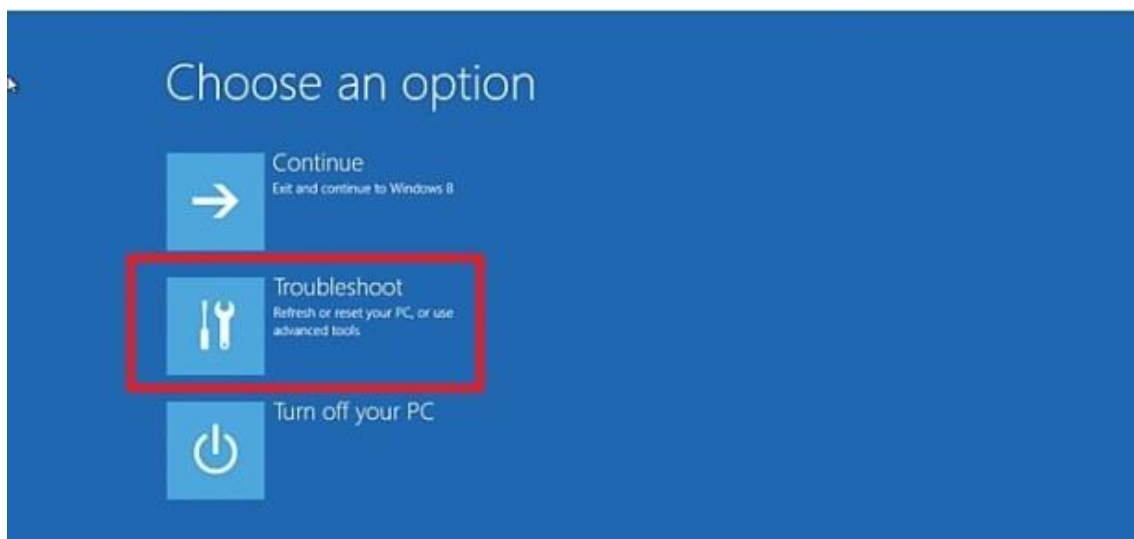
C. Driver Install on Windows 8 OS

Windows 8 does not allow installing drivers that are not signed by Microsoft. Below is described how to de-activate the driver signing check.

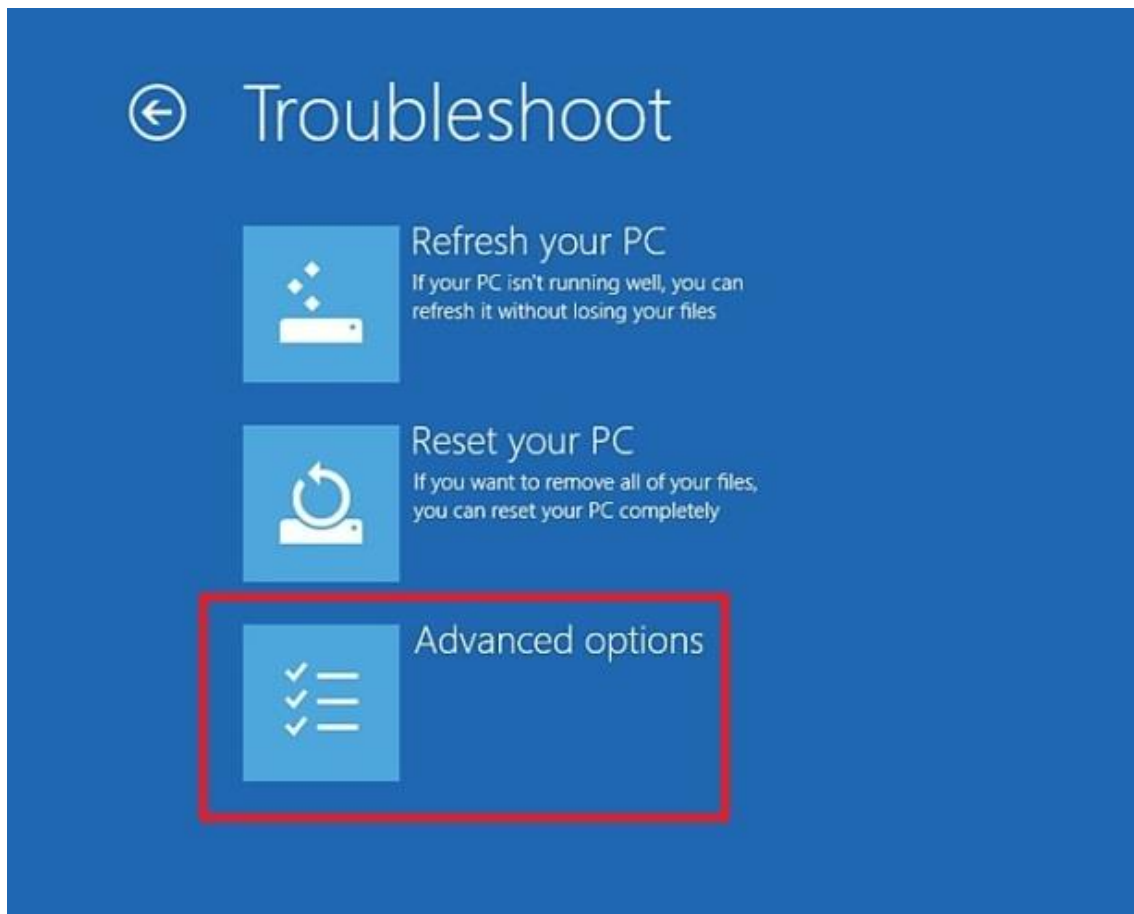
- 1) First, select "**Settings**" on the right side of your screen:
- 2) Select "**Change PC Settings**":
- 3) Navigate to "**General**" settings and then scroll down to "**Advanced Startup**". Click on "**Restart**":



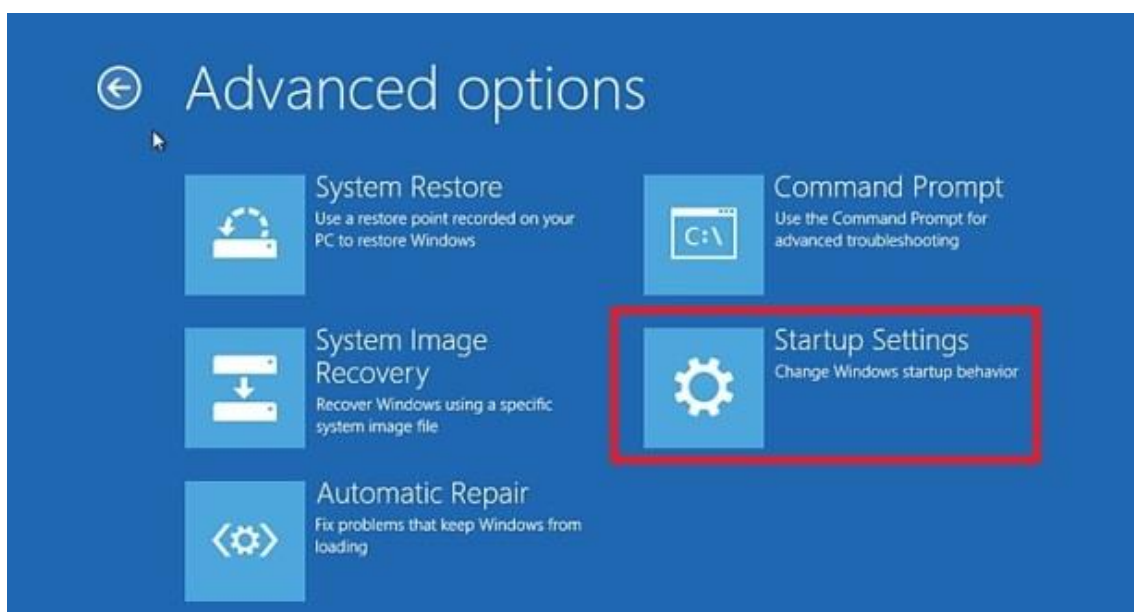
- 4) After that, Click on "**Troubleshoot**":



- 5) On the next screen, choose "**Advanced Options**":



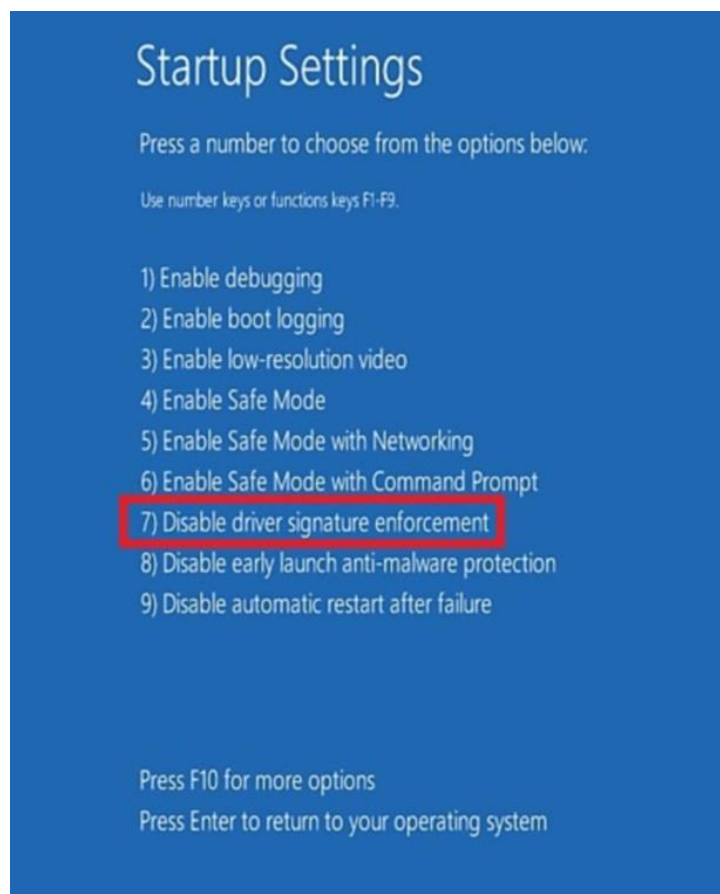
6) Then click on "**Startup Settings**":



7) Then click on the "**Restart**" button:



- 8) After your computer reboots, another screen will appear where you will be asked to press a number to choose an option. So press **7** or **F7**:



- 9) When you install the driver, this prompt will appear on screen. Select **"Install this driver software anyway"**:

