

OEM-xx-yy-M1000-USB
Dual Technology RFID Main Board

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Issue 1.0
– 11. November 2020 –

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Printed in Germany

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1 Function Description

1.1 RFID Technologies

The device is available with these combinations of RFID electronics:

Target Product	Order Code	Electronics Order Code	RFID Core Module(s)
Desktop Reader NEO 2 LF	R-DT-NEO2-LF	OEM-LF-M1000-USB	OEM-LF1S-M900-TTL
Desktop Reader EVO 2 HF	R-DT-EVO2-HF	OEM-DES-M1000-USB	OEM-DES-M900-TTL
Desktop Reader EVO 2 HF/LF	R-DT-EVO2-HF/LF	OEM-DES/LF-M1000-USB	OEM-DES-M900-TTL, OEM-LF1S-M900-TTL

1.2 Operation Modes

When you plug in the device into an USB port, it will connect as VCP and HID Device in parallel.

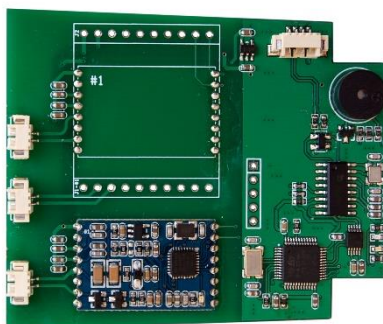
1.2.1 Read/Write Mode

You can freely send commands to any of the RFID electronics and perform read and write operations.

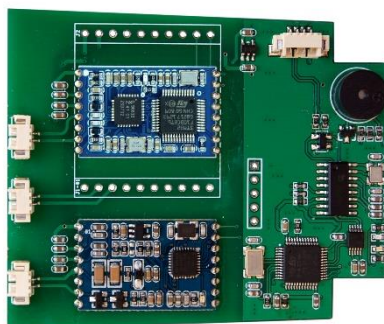
1.2.2 HID Mode

After configuring the device with the HID Configuration Command, the device automatically scans for tags, performs (if configured) other RFID operations and (if configured) converts the data into another form or representation.

1.3 Identification



OEM-LF-M1000-USB



OEM-DES/LF-M1000-USB

1.4 Reference Documents, Communication Protocols

These documents describe the communication between your software and the RFID electronics.

LF-RFID: OEM-LF1S Hitag 1 & Hitag S Communication Protocol x.y EN.pdf

HF-RFID: OEM-DES Devices Communication Protocol_x.y_EN.pdf

HID Mode: The command to set the HID Mode is described in this document.

1.5 Glossary

VCP = Virtual Com Port

HID = Human Interface Device, e.g. keyboard, mouse, joystick

2 Communication Interface

2.1 Communication Parameters

The communication parameters of the virtual com-port (VCP) are fixed set to:

Parameter	Value
Start bit	1
Data bit	8
Stop bit	1
Baudrate	9600 bps
Parity	No Parity

2.2 USB Interface Electronics

The device contains the CoreChips SL2.1A USB Hub Controller.

Internally this is connected to a CH340E single USB-TTL Converter and an STM32F103 μ C.

3 HID Mode Configuration Command

This command configures the HID operation mode. One Byte switches the HID mode ON or OFF. The other Bytes configure what data is read and how the data is converted.

3.1 Telegram from PC to RFID Device

AA = Start of Telegram
 00 = Device Address
 0D = Bytes of Payload (Command + Parameters)
 FD = Command Code
 3F = 3F (0011.1111) = OFF
 C0 (1100.0000) = ON
 00 = 00: HF 14443A LSB
 01: HF Ultralight Data
 02: HF Mifare Data
 03: HF Mifare Data + UID
 04: HF 15693 UID
 05: HF 15693 UID + Data
 06: HF 14443A MSB
 07: HF 14443A LSB-DEC
 08: HF 14443A MSB-DEC
 09: HF Reserved for future use
 0A: HF Reserved for future use
 0B: HF Reserved for future use
 0C: HF Reserved for future use
 0D: HF Reserved for future use
 0E: HF Reserved for future use
 0F: HF Reserved for future use
 10: LF Read UID LSB of read-only tag type
 11: LF Read UID MSB of read-only tag type
 12: LF Read UID LSB of Hitag1/S tag type
 13: LF Read UID MSB of Hitag1/S tag type
 14: LF Read UID LSB-DEC of Hitag1/S tag type
 15: LF Read UID MSB-DEC of Hitag1/S tag type
 16: LF Read UID LSB and Memory Page from Hitag1/s tag type
 17: LF Read UID MSB and Memory Page from Hitag1/s tag type
 18: LF Read UID LSB-DEC and Memory Page from Hitag1/s tag type
 19: LF Read UID MSB-DEC and Memory Page from Hitag1/s tag type
 1A: LF Reserved for future use
 1B: LF Reserved for future use
 1C: LF Reserved for future use
 1D: LF Reserved for future use
 1E: LF Reserved for future use
 1F: LF Read FDX-B information
 20: Legic Read UID
 21: Legic Read ISO 15693 UID
 22: ISO 14443 A
 23: ISO 14443 B
 24: INSIDE Secure
 25: SONY FeliCa subset
 40: UHF Read EPC
 00 = Memory Position, Blocks (Mifare) or Pages (Ultralight, ISO15693)
 FF FF FF FF FF FF = Key A
 10 = 10: HEX
 20: ASCII
 60 = 60: Key A
 61: Key B
 00 = left MSB nibble: Data Position, right LSB nibble: Data Length
 BCC
 BB = End of Telegram

* the μ C will not send actively commands to the UHF-RFID, but transfer automatic telegrams to the HID port

3.2 Reply from RFID Device

AA 00 02 00 80 82 BB

The Bytes in Detail

AA = Start of Telegram
 00 = Device Address
 02 = Bytes of Payload
 00 = Status, 00 = OK
 80 = Status detail, 80 Setting successful
 82 = BCC
 BB = End of Telegram

3.3 Examples

3.3.1 Shut OFF the HID Operation Mode:

AA 00 0D FD 3F 00 00 FF FF FF FF FF FF 10 60 00 BF BB

The Bytes in Detail

AA = Start of Telegram
 00 = Device Address
 0D = Bytes of Payload (Command + Parameters)
 FD = Command Code
 3F = 3F (0011.1111) = Switch HID Operation Mode OFF
 00 = 00: HF 14443A LSB
 00 = Memory Position, Blocks (Mifare) or Pages (Ultralight, ISO15693)
 FF FF FF FF FF FF = Key A
 10 = 10: HEX
 60 = 60: Key A
 00 = left MSB nibble: Data Position, right LSB nibble: Data Length
 BF = BCC
 BB = End of Telegram

3.3.2 Read Data from Mifare RFID Tag

AA 00 0D FD 3F 00 09 4B FB 5A D0 7C 63 20 60 54 F7

The Bytes in Detail

AA = Start of Telegram
 00 = Device Address
 0D = Bytes of Payload (Command + Parameters)
 FD = Command Code
 3F = C0 (1100.0000) = ON
 00 = 02: HF Mifare Data
 09 = Memory Position, Blocks (Mifare) or Pages (Ultralight, ISO15693)
 4B FB 5A D0 7C 63 = Key A
 20 = Convert to ASCII
 60 = 60: Key A
 54 = left MSB nibble: Data Position 5th Byte, right LSB nibble: Data Length 4 Bytes
 F7 = BCC
 BB = End of Telegram

3.4 Important Note

When set to HID operation mode, you cannot perform read/write commands.

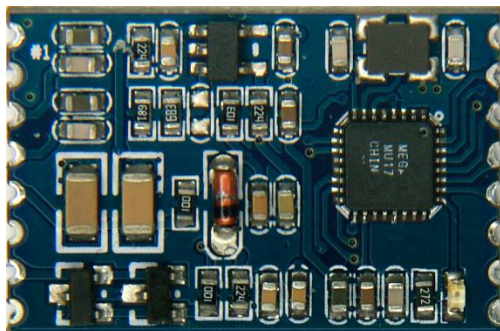
4 LF RFID Module on Mainboard M1000

4.1 Designation

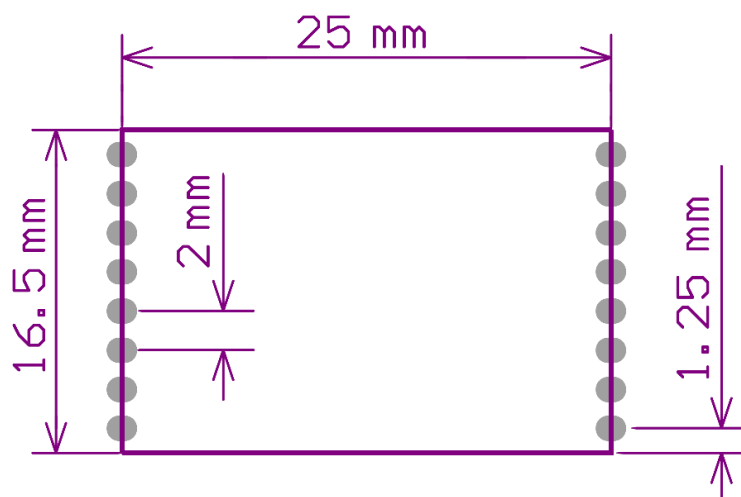
For the LF RFID electronics the device OEM-LF1S-M900-TTL is used.

Hardware Description: TBD

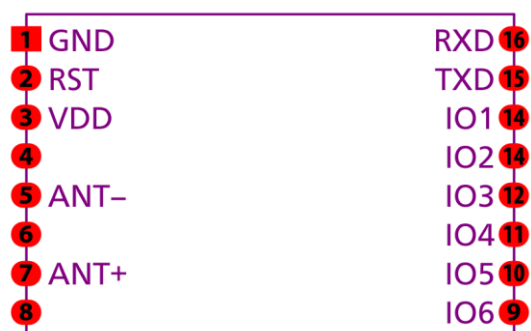
4.2 Identification



4.3 Dimensions



4.4 Pinout



4.5 Command Protocol Description

Please see this document: OEM-LF1S Hitag 1 & Hitag S Communication Protocol x.y EN.pdf

5 HF RFID Module on Mainboard M1000

5.1 Designation

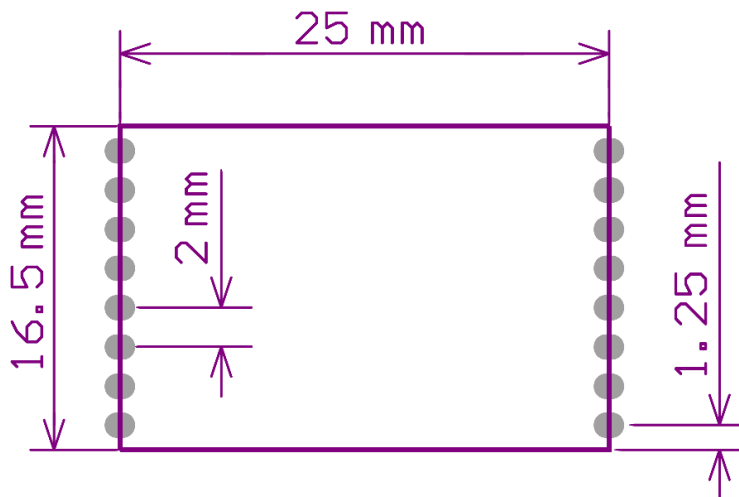
For the HF RFID electronics the device OEM-DES-M900-TTL is used.

Hardware Description: OEM-DES-M900 Hardware Description_x.y_EN.pdf

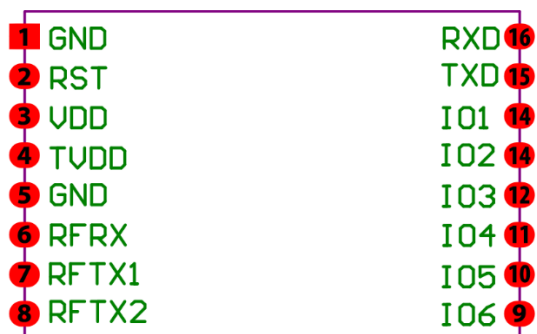
5.2 Identification



5.3 Dimensions



5.4 Pinout



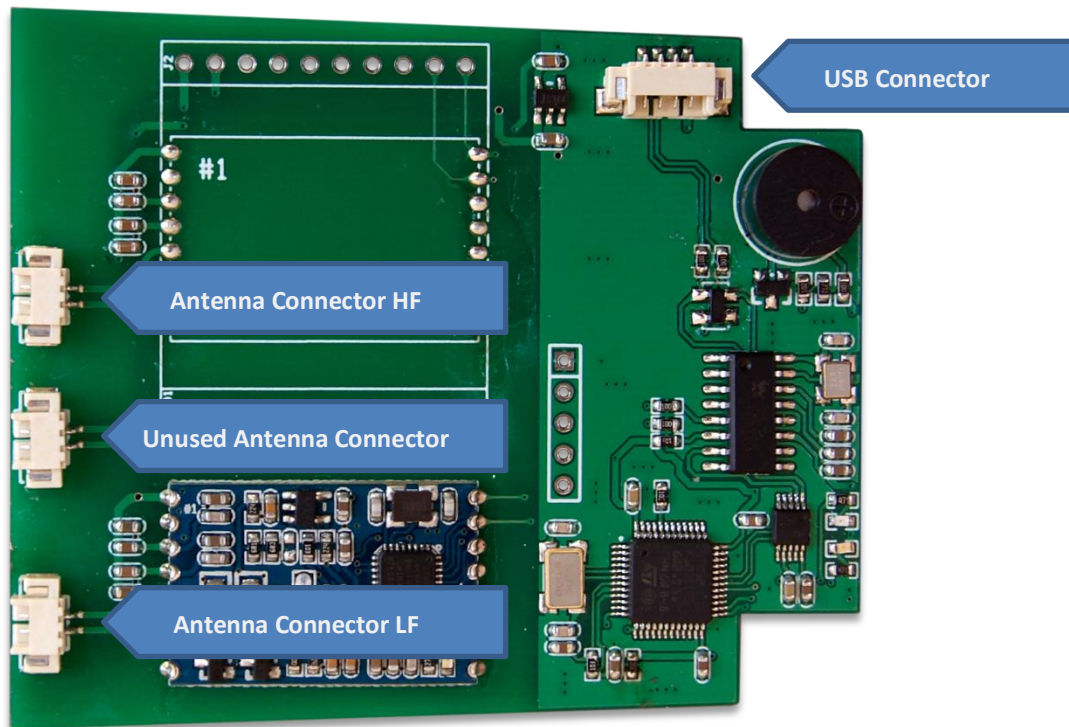
5.5 Command Protocol Description

Please see this document: OEM-DES Devices Communication Protocol_x.y_EN.pdf

6 Hardware Settings

With this electronics there are no hardware settings.

7 Connections



7.1 Pinout of USB Interface

Pin	USB Name	Wire Colour
1 (leftmost on photo)	Data-	White
2	Data+	Green
3	GND	Black
4	+5 Vdc	Red

8 Status Indications

8.1 On Startup

The LED will light up blue for a brief moment while the buzzer gives an audible indication of a successful start.

8.2 LED orange/blue

Orange standard, idle

Blue in standard read/write operation mode: device receives command
In HID operation mode: device detects an RFID tag

8.3 Buzzer

In HID mode the buzzer signals detection of RFID tags.

9 Maintenance, Repair and Disposal

9.1 Maintenance

The electronics are maintenance-free. Protect it against dirt and liquids.

9.2 Repair

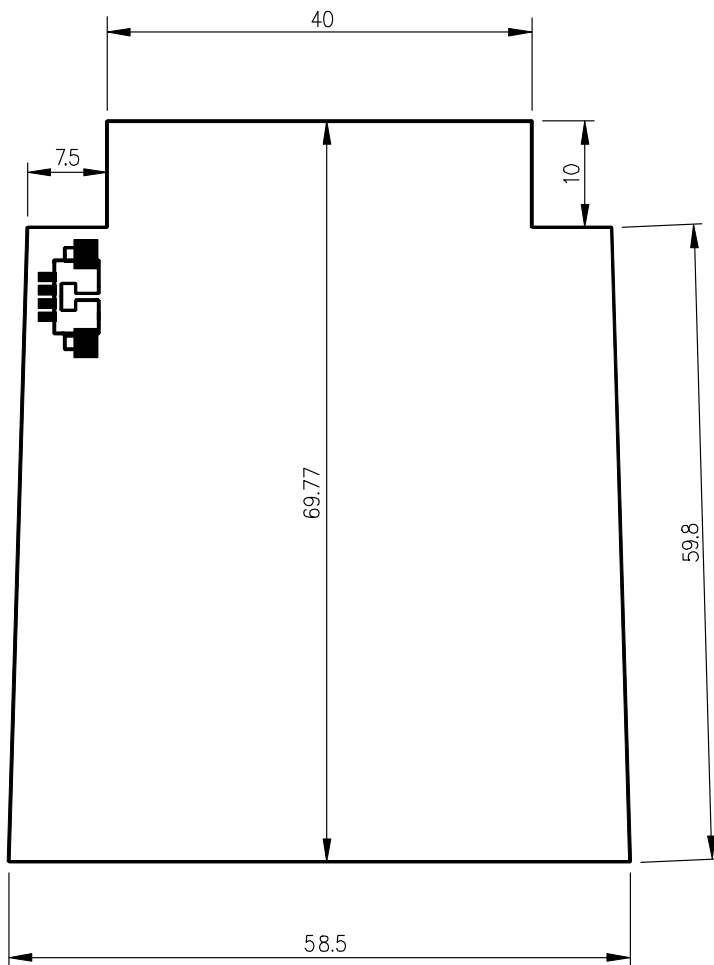
There are no user-serviceable parts. Do not attempt repairs. Do not allow any unauthorized service center or personnel to repair or modify the product.

In the event your electronics fail, contact IDTRONIC GmbH via the service e-mail address:

9.3 Disposal

After use dispose of the device in an environmentally friendly way in accordance with the applicable national regulations.

Do not dispose of this device in normal household waste. Contact your local council for information on disposal options for electronic devices in your area.

10 Mechanical Drawings

11 Revision History

Version	Date	Notes
1.0	2020-11-11	Initial draft of hardware description for end-customers

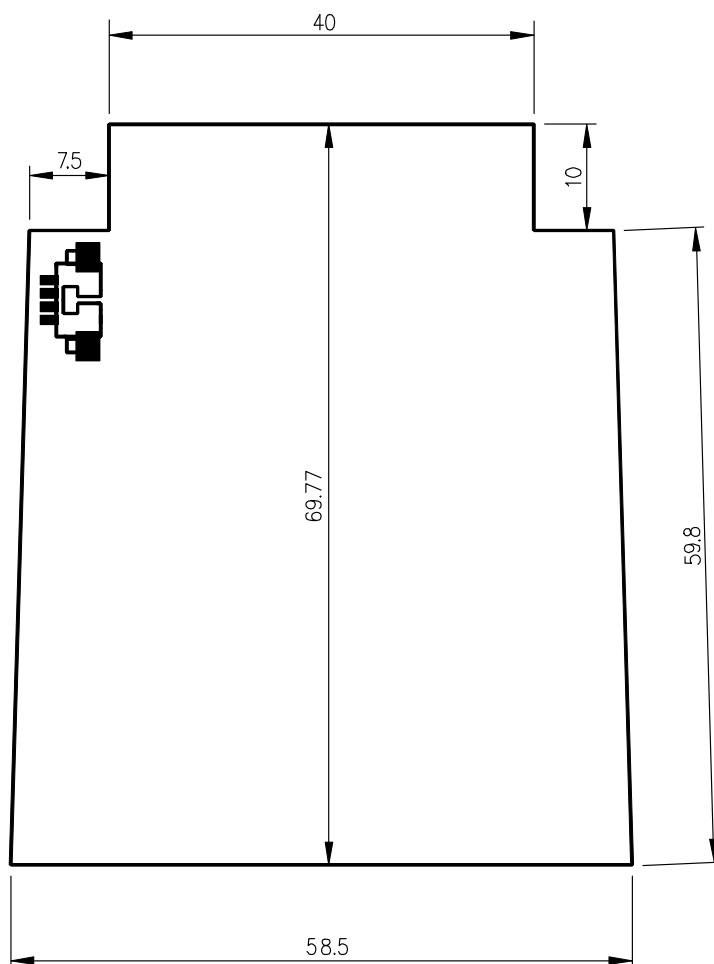
12 Technical Data · Preliminary

Electrical Specifications

Power Supply	USB VCP + HID
Power Consumption	< 150 mA, up to 400 mA with UHF-RFID
Operating Frequencies	125 kHz + 13.56 MHz or 13.56 MHz + 868 MHz
Baudrate	9600 bps
Antenna	Internal
RFID Technologies	LF, HF in combinations of a maximum of 2

Mechanical Specifications

Dimensions Electronics	69.77 × 58.5 × 5 mm without cables
Weight	App 90 g incl. USB cable
USB Cable Length	App. 120 cm



Supported Standards / Tags LF-RFID

Read-only	EM4200 and compatible
FDX-B	Read information
Read/write	Hitag 1, Hitag S

Supported Standards / Tags with HF-RFID Module	
ISO 14443 A and compatible	Read/write: MIFARE® Classic Mini / 1K /4K, MIFARE Ultralight®, MIFARE Ultralight® C, MIFARE® DESFire®EV1, MIFARE® Smart MX, MIFARE® Plus S / X, MIFARE® Pro X, NTAG 21x Read UID only of all other ISO14443A RFID tags
ISO 14443 B and compatible	SRI4K, SRIX4K, AT88RF020, 66CL160S, SR176
ISO 15693 and compatible	EM4135, EM4043, EM4x33, EM4x35, I-Code SLI / SLIX, M24LR16/64, TI Tag-it HF-I, SRF55Vxx (my-d vicinity)
ISO 18000-3M3	I-Code ILT

Applicable Standards	
EMC	EN 301489-1:2012-04 (v1.9.21) EN 301489-3:2019-03 (V2.1.1)
Radio Regulation	EN 300330-1:2015-03 (V1.8.1), LF-RFID, HF-RFID EN 300330-2:2015-03 (V1.6.1), LF-RFID, HF-RFID
Safety	EN 60950-1:2014-08 (valid till 2020-12-19) EC 62368-1:2018-10 (V3.0, valid as of 2020-12-20)
RoHS 2	EC Guideline 2011/65/EU and amendment 2015/863/EU, updated by 2017/2102/EU EN 50581:2012 (valid till 2024-07-07) EN 63000:2018
REACH	EU Guideline 1907/2006, updated by 2020/171/EU

SDK Information	
Supported OS	Windows XP, Vista, 7, 8, 8.1, 10
Supported Languages	Binary command protocol, VS2005 C++
Demo Software	Windows

Other functions and details to be continued and upgraded.