
PUCK DOT
USER GUIDE
RFID
Active

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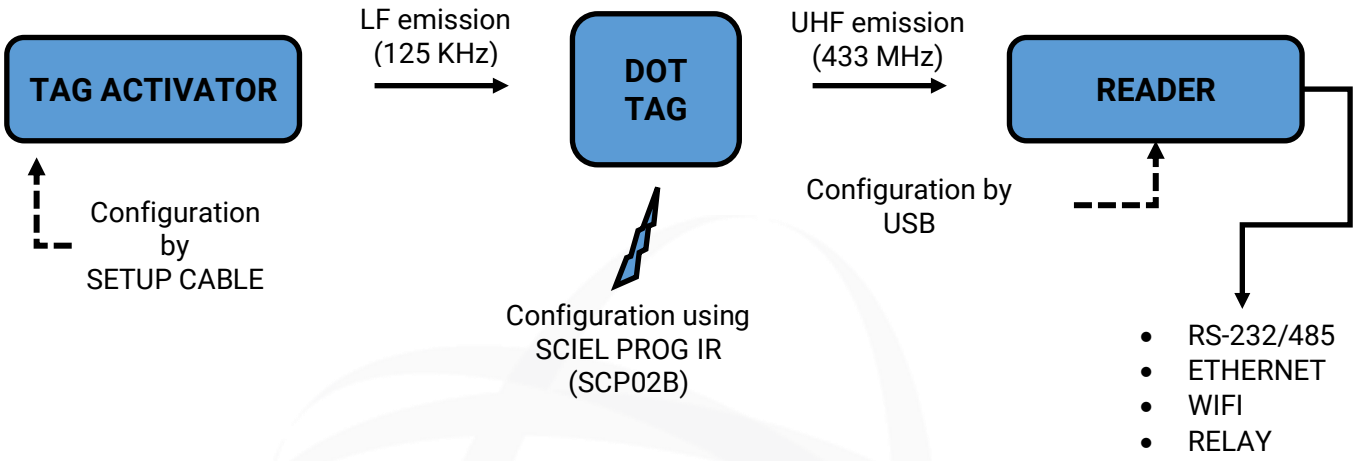
1.1 OPERATING PRINCIPLE

DOT technology is comprised of three key components: TAG ACTIVATOR, TAG DOT or PUCK DOT, and the Active RFID reader.



Step 1: ACTIVATOR wakes up TAG DOT via a low-frequency (LF, 125 KHz) emission, and transmits its identifier (ID) and a command.

Step 2: TAG DOT receives the emission from TAG ACTIVATOR. It retrieves TAG ACTIVATOR's ID and measures the signal strength (LF RSSI) with which it was received.

Step 3: TAG DOT emits the received information (ID + signal strength) wirelessly via UHF (433 MHz) in standard ELA Innovation format.

Step 4: The reader receives the wireless frame from TAG DOT. It adds two pieces of information: the signal strength with which the frame was received (HF RSSI), and its identifier (reader ID is 01 by default).

Step 5: The reader process the data (see MCHD documentation for more information): filters, masks, and records the data.

Step 6: Depending on parameters and product type (IP, Wi-Fi, R, LITE...), the reader can transmit the information via RS-232/485, Ethernet, Wi-Fi, or it may activate one or more output relays.

1.2 INFORMATION FORMAT

DOT technology is compatible with the ELA standard defined in the documentation for MCHD.
All ELA readers can receive emissions from DOT tags.

Constraint: it is only possible to implement relay triggering (or open collector) with DOT parameters starting with reader software version v30.1.5.

DOT tags may be configured with two different frame lengths

- 24 bits
- 32 bits

1.2.1 24-bit mode

- TAG ID coded on 12 bits (a total of 4095 different identifiers)
- ACTIVATOR ID coded on 7 bits (a total of 126 different identifiers)
- LF values coded on 5 bits (a total of 32 different RSSI values

Breakdown of 24-bit DOT frame output by a reader:

[	**A**	**A**	**B**	**B**	**B**	**C**	**C**	**C**	**D**	**D**	**]**
Frame start	HF RSSI		TAG ID			LF ID + LF VALUE			READER ID		Frame end

	TAG ID								LF ID + LF VALUE											
Quarter	**B**				**B**				**B**				**C**				**C**				**C**			
No. bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
	TAG ID												TAG ACTIVATOR ID								LF VALUE			

1.2.2 32-bit mode

- TAG ID coded on 16 bits (a total of 65,534 different identifiers)
- ACTIVATOR ID coded on 11 bits (a total of 2048 different identifiers)
- LF values coded on 5 bits (a total of 32 different RSSI values

Breakdown of 32-bit DOT frame output by a reader:

[	**A**	**A**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**D**	**D**	**]**
Frame start	HF RSSI		TAG ID				LF ID + LF VALUE				READER ID		Frame end

	TAG ID												LF ID + LF VALUE															
Quarter	**B**				**B**				**B**				**B**				**C**				**C**				**C**				**C**			
No. bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
	TAG ID																TAG ACTIVATOR ID												LF VALUE			

1.2.3 Specific frames

- Low battery: The DOT tag indicates that its battery status is low by sending a specific frame, comprised of its ID followed by all sensor information set to “1”. Example for a tag with ID “**E01**”: [96**E01FFF**01].
- LF out-of-range: When the tag is out of wireless range of TAG ACTIVATOR (in LF + HF modes), it emits its ID followed by all sensor information set to “0”. Example for a tag with ID “**E01**”: [96**E01000**01].

1.3 BENEFITS OF DOT TECHNOLOGY

DOT technology offers two new major benefits: remote TAG activation and much more accurate distance estimation than other solutions.

Remote activation: the TAG DOT features very long battery life and fast response time. By default, the tag only emits when instructed by the TAG ACTIVATOR, which avoids premature battery wear and radio frequency saturation.

Example: A COIN ID module with an emission recurrence of 220 ms only has a few months of autonomy. On the other hand, a TAG DOT not continuously subject to TAG ACTIVATOR solicitation can offer autonomy of several years, but could also emit with recurrence of 200 ms when necessary.

Saturation is also much easier to handle: if a TAG only emits when solicited, it only uses the communication band at that time. As a result, it is possible to increase TAG density in a given area.

Distance estimation: the use of a very low frequency band to wake up the TAG offers the advantage of achieving a very long wavelength (communication reaching several kilometers). This means that the objects likely to affect communication reliability are no longer on the scale of an office, but on that of buildings. This property enables making accurate estimations of the distance between a TAG DOT and TAG ACTIVATOR. Distance estimation creates many possibilities to resolve various challenges for which narrow-band Active RFID is not suited.

2 MAIN CHARACTERISTICS

2.1 TAG ACTIVATOR (REF: ACIOM75-2 / ACIOM123)

TECHNICAL SPECIFICATIONS

Power	12 or 24VDC
Current draw	@12V – 25°C: 35mA continuous without emission @12V – 60°C: 1A continuous MAX @12V – 25°C: 4A in App (40 ms)
Frequency	125 KHz
Wireless range	Software configurable
Operating temperature	-20°C to +60°C
Configuration	EDOT software with SETUP CABLE accessory (ref. ACIOM89)
Antenna connectors	Screw-terminal on internal board, 2 x 2 points (plug-in terminal block, 3.81 thread)
Power connector	Screw-terminal on internal board, 1 x 4 points, 2 cable glands
Casing	White ABS: 160 x 80 x 55 mm
Weight	230 g
Protection index	IP65 - Protected against water jets
Standards	EN 301 489 – 3: 2002 V1.4.1, EN 300 220 – 2007: V2.1.2, CE, RoHS
Interfaces	RS-232 TTL port for configuration Logical input for triggered emissions
Accessories	2 x 2-point plugs for terminal block - Included 1 x 4-point plug for terminal block - Included Internal antenna – included for ACIOM123 12V external DC POWER2 (12V - 2.2A) - not included ACTIVATOR ANT external antenna (ref. ACIOM76) – not included ACTIVATOR PANEL ANT long-range external antenna (ref. ACIOM113) – not included

2.2 TAG DOT (REF: IDF2470)

TECHNICAL SPECIFICATIONS

Power supply	3 VDC – Internal battery (CR2032) – changeable by user
Frequency	433.92 MHz emission – 125 KHz reception
Wireless range	2 configurable power levels – 0 or 10 dBm
Operating temperature	-30°C to +70°C
Configuration	EDOT software with SCIEL PROG IR tool (SCP02B)
Compatible reader	SCIEL READER products
LED indicator	Red LED indicates reception of LF activation signal
Battery management	Low battery ID code (configurable), emission alternated with tag ID
Casing	Loop for keyring or neck strap Length 60 mm, width 40 mm, height 18 mm, weight 30 g, ABS plastic
Weight	27g
Protection index	IP65 - Protected against water jets
Standards	EN 301 489 – 3: 2002 V1.4.1, EN 300 220 – 2007: V2.1.2, CE, RoHS

2.3 PUCK DOT (REF: IDF2570)

TECHNICAL SPECIFICATIONS

Power supply	3.6V DC – Internal battery (Li-SOCI2)
Frequency	433.92 MHz emission – 125 KHz reception
Wireless range	2 configurable power levels – 0 or 10 dBm
Operating temperature	-30°C to +70°C
Configuration	EDOT software with SCIEL PROG IR tool (SCP02B)
Compatible reader	SCIEL READER products
LED indicator	Red LED indicates reception of LF activation signal
Battery management	Low battery ID code (configurable), emission alternated with tag ID
Casing	ø 57 mm base - height 18 mm - IP 68 waterproof – weight 36 g DELRIN (POM C) - Compatible with food products (90/128/EEC) 2 mounting holes, ø 4 mm center distance 49 mm
Weight	36 g
Protection index	IP68 – Protected from long term immersion
Standards	EN 301 489 – 3: 2013 V1.6.1, EN 300 220 – 2012: V2.4.1, CE, RoHS
Accessory	PUCK HOLDER (ACIOM117) – not included

2.4 SETUP CABLE (REF: ACIOM89)

TECHNICAL SPECIFICATIONS

Communication	RS-232 –TTL – 5V
Interface	USB-A Female 4-point connector, 2.54 thread with guide
Length	1.8 m
Weight	70g
Operating temperature	-30°C to +70°C
Standards	USB 2.0 certified CE, RoHS

2.5 ACTIVATOR ANT (REF: ACIOM76)

TECHNICAL SPECIFICATIONS

Interface	Screw-terminal, 2 points with 3.81 mm thread
Cable length	4 m (other lengths possible with MOQ)
Dimensions L x W x H	145 x 26 x 12 mm
Weight	80 g
Material	Antenna body made of polyamide
Protection index	IP65 - Protected against water jets
Operating temperature	-30°C to +70°C
Standards	CE, RoHS

2.6 ACTIVATOR PANEL ANT (ref: ACIOM113)

TECHNICAL SPECIFICATIONS

Interface	Screw-terminal, 2 points with 3.81 mm thread
Connections	Cable gland
Dimensions L x W x H	558 x 278 x 130 mm
Weight	4.200 g
Material	Polycarbonate
Protection index	IP65 - Protected against water jets
Customization	Contact us
Operating temperature	-30°C to +70°C
Standards	CE, RoHS

3 TECHNICAL CHARACTERISTICS

3.1 TAG ACTIVATOR

3.1.1 Operation

A. TAG ACTIVATOR emits radio frames at regular recurrence, like a beacon. Communication is one-way. The frequency recurrence is configurable from 200 ms to 1 hour.

B. TAG ACTIVATOR has two antenna outputs that may each have different ID and emission output, with the same recurrence.

C. TAG ACTIVATOR is configurable via an RS-232 link using the SETUP CABLE accessory (ref. ACIOM89) and the E-DOT software (see "Configuration with E-DOT for more information).

D. If the ID and power output for the two antennas are the same, then both antennas emit simultaneously. Otherwise they alternate at a frequency of the recurrence divided by two.

Example:

E. TAG ACTIVATOR may be activated on logical input with 5 operating modes:
   a. ON PERMANENT: TAG ACTIVATOR is operational continuously, regardless of the status of its input.
   b. ON with LEVEL: TAG ACTIVATOR is operational if input is 1.
   c. OFF with LEVEL: TAG ACTIVATOR is not operational if input is 1.
   d. ON with RISING FRONT: TAG ACTIVATOR switches to operating mode for a configurable period of time (from 200 ms to 1 hr) if input switches from 0 to 1.
   e. ON with DESCENDING FRONT: TAG ACTIVATOR switches to operating mode for a configurable period of time (from 200 ms to 1 hr) if input switches from 1 to 0.

F. Specific commands may be sent to TAG DOT via TAG ACTIVATOR, thus taking full advantage of two-way TAG communication. The following commands are available:
   a. MODE NORMAL: TAG ACTIVATOR is in normal operating mode. When the TAG receives this command, it responds with its ID + ACTIVATOR ID + LF RSSI. This is the default operating mode.
   b. OFF TEMPO: TAG ACTIVATOR sends a delayed standby command to TAG DOT*. The tag stops responding to TAG ACTIVATOR signals for 5 normal TAG ACTIVATOR emissions. This counter is reset to 0 each time an OFF TEMP command is received.
   c. OFF DEFINITIF: when the tag receives this command, it switches to standby mode and can only exit if it receives an ON DEFINITF command.
   d. ON DEFINITIF: wakes up the tag from standby mode.

G. TAG ACTIVATOR can send commands either to one tag or to a list of tags. In normal operation, commands sent by TAG ACTIVATOR are in broadcast mode.

*The Tag must also be set for this function.

3.1.2 Electrical characteristics

A. Logical input with 100K PULL-UP - Level 1 Input impedance 12K 1 ms response time at 63% Stays at 1 or 0 for at least 1 ms Recommended pulse time greater than 5 ms (3 ms minimum)

B. Remote TAG ACTIVATOR antennas up to 6 m (maximum) Shielded twisted-pair cable section from 0.5 to 1.5 mm² Electrical insulation greater than 48V AC and 24V DC

C. Specifications designed to ensure optimal results

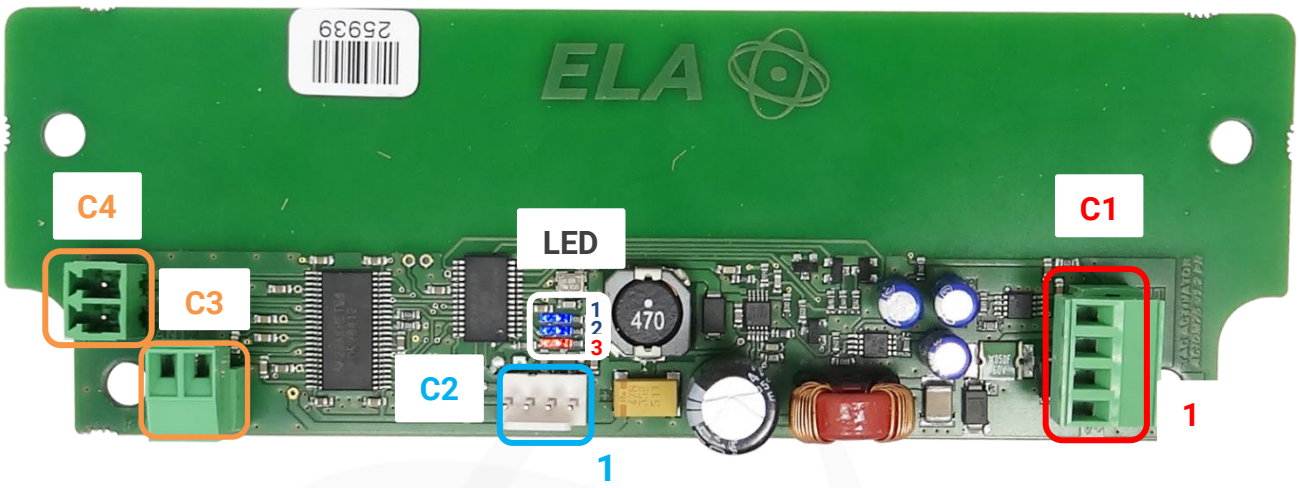
USAGE	OBSERVED WEAKNESS	SOLUTION
No shielding	Radiation possible from cable antenna	
No twisted-pair	Radiation possible from cable antenna Signal attenuation	Reduce maximum length by 50%
Smaller diameter	Signal attenuation	To be characterized according to diameter
Greater length	Signal attenuation	Increase the section
Greater diameter	Not tested - problem with terminal	Not characterized

D. Power cables: Diameter 1.5 mm² (copper), maximum length: 10 m for 12V DC and 30 m for 24V DC

E. The terminal size limits the possibility to increase cable diameter

F. Power supply: 11.5V DC to 30V DC for parameters 0 to 2, and 21V DC to 30V DC for parameters 0 to 3.

3.1.3 Hardware description



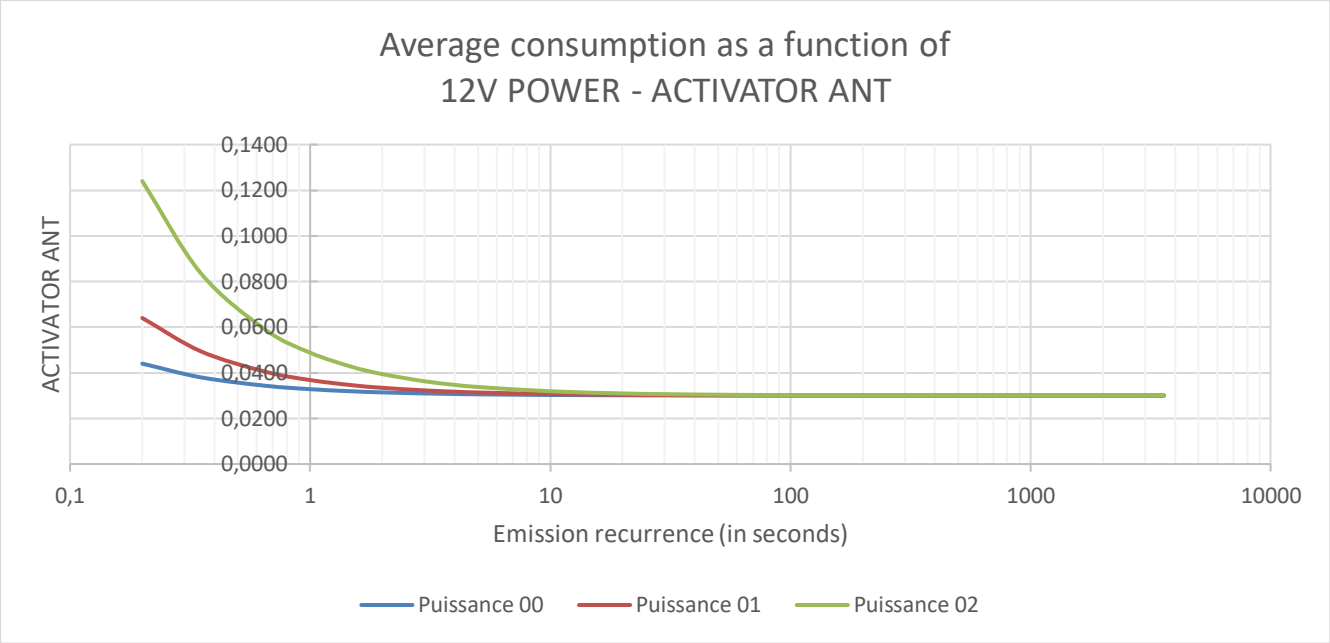
Connector C1		4-point screw-terminal - Power
PIN No.	NAME	DESCRIPTION
1	V+	Positive power terminal
2	GND	Negative power terminal (ground)
3	GND	Negative power terminal (ground)
4	INT	Command input

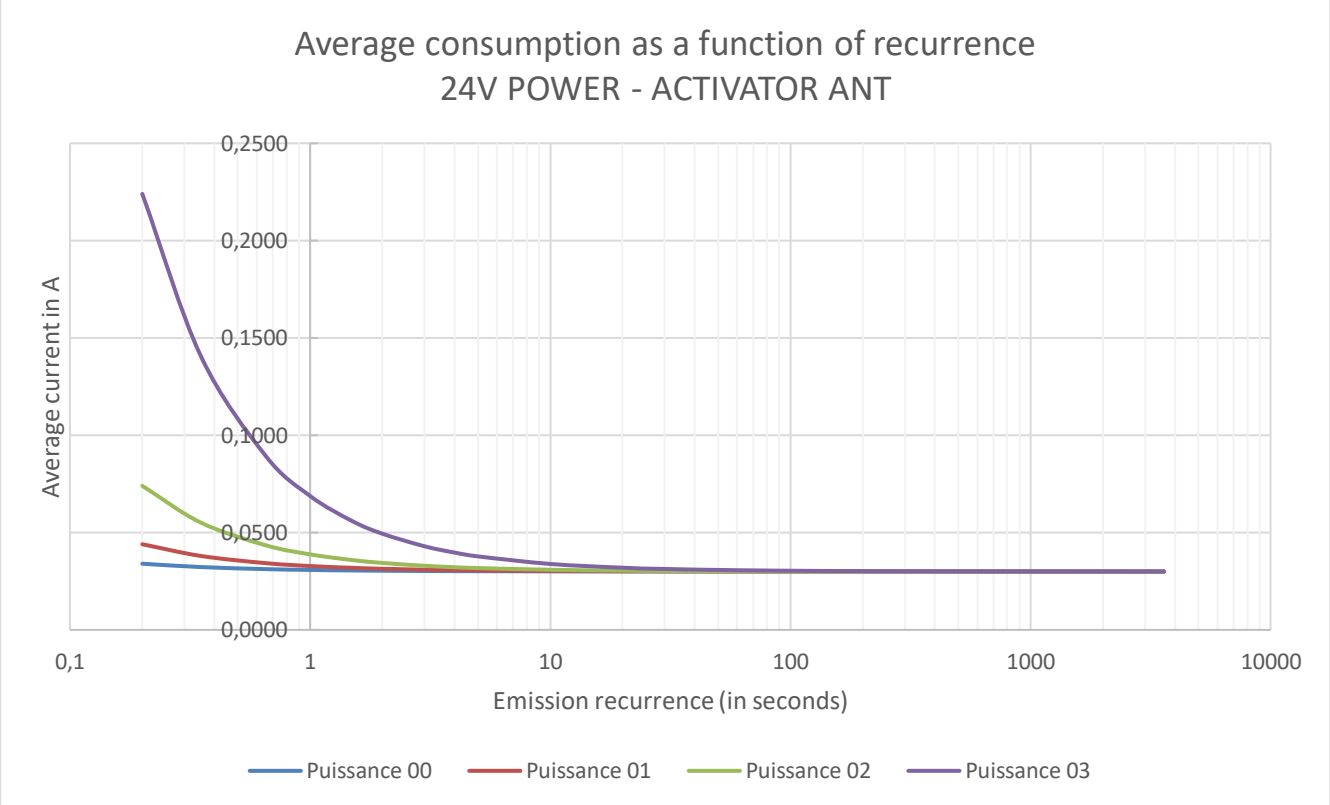
Connector C2		White, 4-points - Configuration
PIN No.	NAME	DESCRIPTION
1	+3.3V	Power output 3.3V – 10mA (max)
2	GND	Negative power terminal (ground)
3	TX (out)	RS-232 communication port (TTL levels)
4	RX (in)	

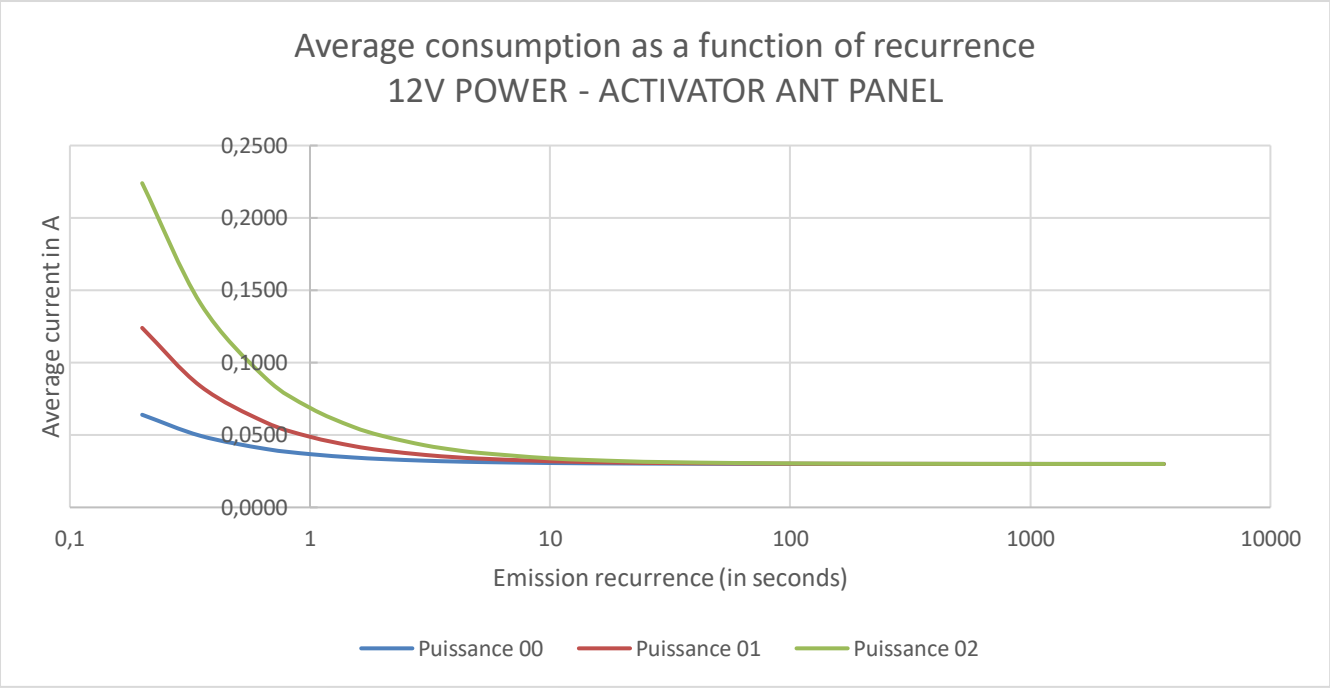
Connector C3, C4		2-point screw-terminal - Antennas
PIN No.	NAME	DESCRIPTION
-	ANT1	Plug for antenna 1 *Cable direction not important*
-		
-	ANT2	Plug for antenna 2 *Cable direction not important*
-		

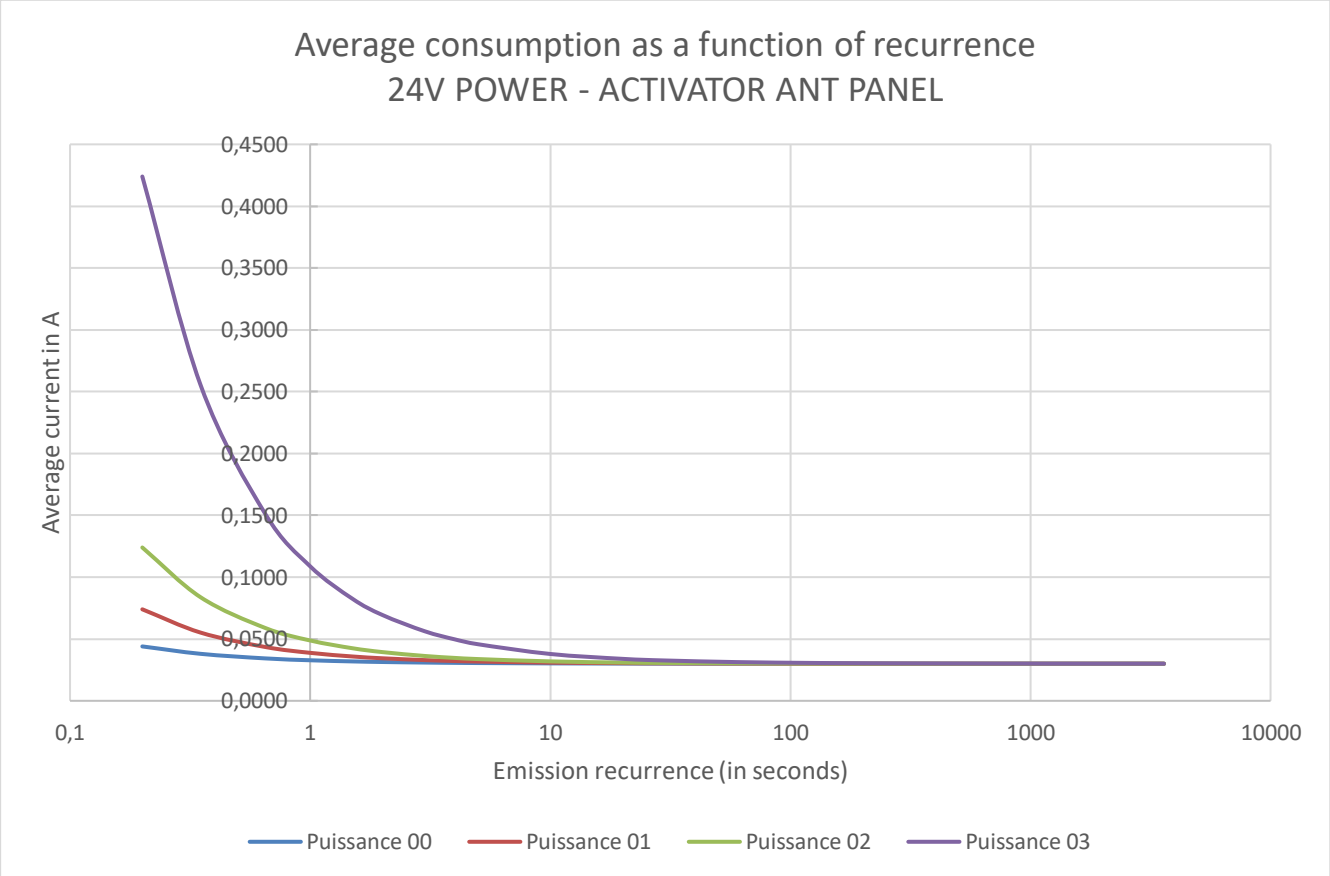
LED functional description		
No.	Color	Description
LED 1	BLUE	Emission on antenna 1
LED 2	BLUE	Emission on antenna 2
LED 3	RED	Fixed: Power on BLINKING: System error

3.1.4 Consumption based on parameters






Average consumption as a function of recurrence
12V POWER - ACTIVATOR ANT PANEL
Average current in A
0,2500
0,2000
0,1500
0,1000
0,0500
0,0000
0,1
1
10
100
1000
10000
Emission recurrence (in seconds)
Puissance 00
Puissance 01
Puissance 02


Average consumption as a function of recurrence
24V POWER - ACTIVATOR ANT PANEL
Average current in A
0,4500
0,4000
0,3500
0,3000
0,2500
0,2000
0,1500
0,1000
0,0500
0,0000
0,1
1
10
100
1000
10000
Emission recurrence (in seconds)
Puissance 00
Puissance 01
Puissance 02
Puissance 03

3.1.5 Installation recommendations

- TAG ACTIVATOR with antenna: see “ACTIVATOR ANT installation recommendations”
- Mounting casing on wall: position the cable gland downwards to avoid water infiltration

- Casing with four punched fixation holes: use the appropriate screw size

3.1.6 Configuration

The following section is written for advanced users.
For an ergonomic interface with the PC, see the configuration section for the EDOT software.

3.1.6.1 General description

Configuration of TAG ACTIVATOR using USB SETUP CABLE and EDOT software (see section 5.3), or ETER type hyperterminal software enabling configuration using command codes.

TTL level serial link

- Communication speed 9600 baud
- No parity bit
- 1 stop bit
- No flow control

3.1.6.2 Command composition:

Send command in ASCII format between brackets Comprised of 3 parts:

1. 2 digits for command type: write = 01, read = 00
2. 2 digits for parameter address
3. 2 or 4 digits for parameter values

Either [AABB] or [AABBCC], or even [AABBCCCC] with:

- AA: 00 for read, 01 for write
- BB: Memory address in hexadecimal (00 to FF)
- CC or CCCC: Address value

Example:

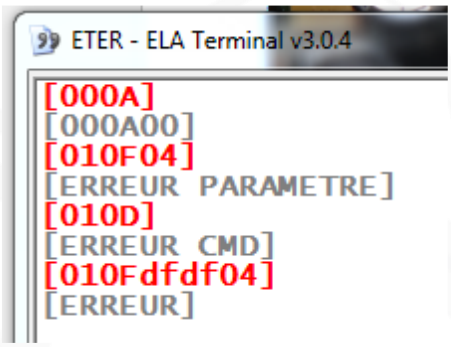
- [0142]: Factory reset command
- [010A00]: Change recurrence to 200 ms
- [011D0001]: Change Antenna ID n°1 to 0001
- [002D]: Read Antenna 2 ID

3.1.6.3 TAG ACTIVATOR response

TAG ACTIVATOR responds to commands received in brackets, of the type **[….]**, and using the same format. The response may be positive or negative. If the response is positive, TAG ACTIVATOR responds using the same command, with additional information in the case of a read:
=> [000A]: Sent to read the recurrence (interval) parameter:
<= [000A**00**]: Returns recurrence parameter "00".

Types of negative responses:

- ⇨ [ERREUR]: Incorrect command format
- ⇨ [ERREUR CMD]: Unknown parameter
- ⇨ [ERREUR PARAMETRE]: Incorrect parameter value

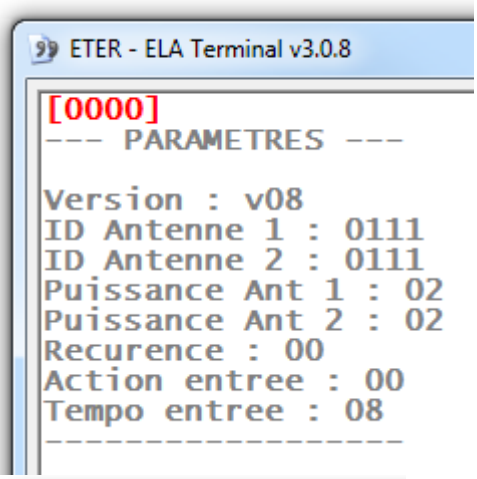


3.1.6.4 Register table

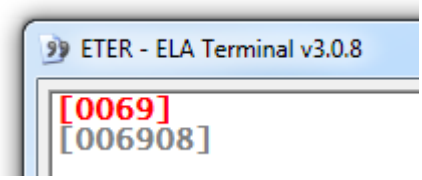
ADR	L/E	DESCRIPTION	PARAMETERS		FACTORY PARAM.
00	L	Display parameters			
69	L	Display version			
0A	L/E	Emission recurrence	00: 200 ms 01: 350 ms 02: 650 ms 03: 1 s 04: 1.5 s 05: 2 s 06: 3 s 07: 4 s 08: 5 s 09: 10 s 0A: 20 s 0B: 30 s	0C: 1 min 0D: 2 min 0E: 3 min 0F: 4 min 10: 5 min 11: 10 min 12: 15 min 13: 20 min 14: 30 min 15: 45 min 16: 1 hr	0A
1D	L/E	Antenna 1 ID	0000: No emission From 0001 to0FFF		ID: 0001
2D	L/E	Antenna 2 ID	0000: No emission From 0001 to0FFF		ID: 0001
0E	L/E	Antenna 1 power	00: Minimum value 01: Average value 02: Nominal value 03: Maximum value		02: Nominal
0F	L/E	Antenna 2 power	00: Minimum value 01: Average value 02: Nominal value 03: Maximum value		02: Nominal
B1	L/E	Emission activation by logical input	00: ON permanent 01: OFF permanent 02: Rising front 03: Descending front 04: High level 05: Low level		00: Always active
B2	L/E	Emission activation time by front Only if [01B102] or [01B103]	Same as parameters for address 0A		08: 5 sec
42	E	Restore factory parameters			
D0	L	System status in verbose mode			
D1	L	System status			

3.1.6.5 Detailed parameter description

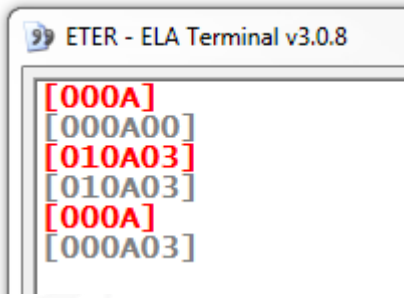
1. **00** Display parameters: only available as read command, displays parameters of TAG ACTIVATOR.



2. **69** Display version: only available as read command, displays TAG ACTIVATOR software version.



3. **0A** Emission recurrence: configuration of emission recurrence, identical for both antennas. The default value is 200 ms.



PARAM	RECURRENCE	PARAM	RECURRENCE
00	200 ms	**0C**	1 min
01	350 ms	**0D**	2 min
02	650 ms	**0E**	3 min
03	1 s	**0F**	4 min
04	1.5 s	**10**	5 min
05	2 s	**11**	10 min
06	3 s	**12**	15 min
07	4 s	**13**	20 min
08	5 s	**14**	30 min
09	10 s	**15**	45 min
0A	20 s	**16**	1 hr
0B	30 s		

4. **1D** Antenna 1 ID: 4-digit (16 bits) parameter, ID used to send a command to DOT TAG.
   32-bit format: 16 bits used for Activator ID (11 bits) + Send command (5 bits)

Digits	A				A				B				B			
No. bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
BROADCAST function	0	COMMAND			0	TAG ACTIVATOR ID										
Function ADDRESSER	1	COMMAND			ID of TAG to command											

No.	Bit 14	Bit 13	Bit 12	Function name	Description
0	0	0	0	NORMAL MODE	Normal tag operation
1	0	0	1	OFF DEFINITIF	Place tag into permanent standby
2	0	1	0	ON DEFINITIF	Permanently wakes up tag from standby
3	0	1	1	OFF TEMPORISE	Places tag in standby mode for 5 pulses
4	1	0	0	SORTIE PILOTE	Sets output to 1 for 1 second (DOT TAG only)
5	1	0	1	RESERVE	Reserved for future applications
6	1	1	0	RESERVE	Reserved for future applications
7	1	1	1	RESERVE	Reserved for future applications

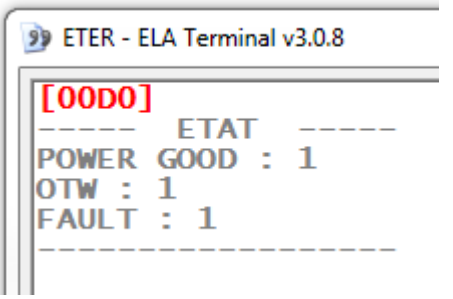
- NORMAL MODE: Tag ID emission + TAG ACTIVATOR ID and LF level value received.
- OFF DEFINITIF: Tag placed in permanent standby, may not be activated by TAG ACTIVATOR
- ON DEFINITIF: Reactivate (wake) tag after permanent standby
- OFF TEMPORISER: Tag placed in delayed standby as long as it remains with TAG ACTIVATOR coverage

Example:

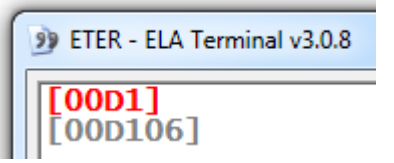
- [011D0002] =>ID 0x002 on Antenna 1 in normal mode with ID 0x002 on Antenna 1
- [012D100F] => Operation in OFF DEFINITIF mode with ID 0x00F on Antenna 2
- [011DBE01] => Address for OFF TEMPORISE command to TAG DOT “E01” on Antenna 1

5. 2D Antenna 2 ID: Same operation as Antenna 1.
6. 0E Power on Antenna 1: Modifies Antenna 1 emission power to decrease or increase range. Parameters 0, 1, and 2 are available for all power levels. Parameter 3, maximum power only available for 24V.
7. 0F Power on Antenna 2: Same parameter as Antenna 1.
8. B1 Logical input: Modifies operation of TAG ACTIVATOR logical input.
9. B2 Activation time on front: Duration of activation after receiving a front for Logical input configured for front.
10. 42 Factory reset: Restores default factory parameters.

11. D0 Verbose system status: System status with details.



12. D0 Verbose system status: Coded system status to facilitate machine-to-machine interface.



No. bits	7	6	5	4	3	2	1	0
Function						FAULT	OTW	POWER GOOD

3.2 DOT TYPE TAGS

DOT TAG and DOT PUCK share the same firmware, operate in the same manners, and have the same configuration options.

3.2.1 Operation

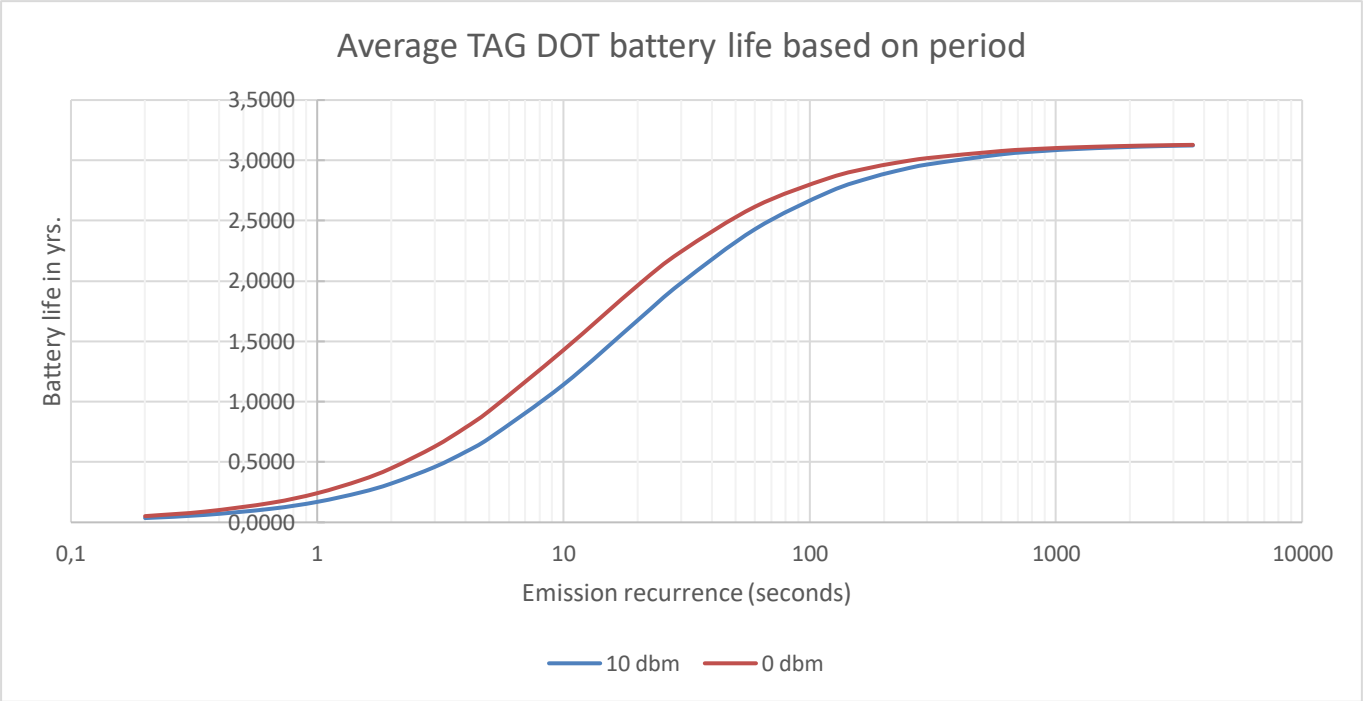
DOT system tags offer two distinct operating modes: “LF ONLY” or “LF + HF’.
In “LF ONLY” mode, the tag only emits when it is activated by a TAG ACTIVATOR.
In “LF + HF” mode, the tag emits the same way as for “LF ONLY” mode when the tag is within wireless range of a TAG ACTIVATOR. When the tag leaves the activation zone, it emits with at a fixed, programmable recurrence. When emission takes places outside the LF zone, the tag only sends its ID code (without ACTIVATOR ID and LF value).

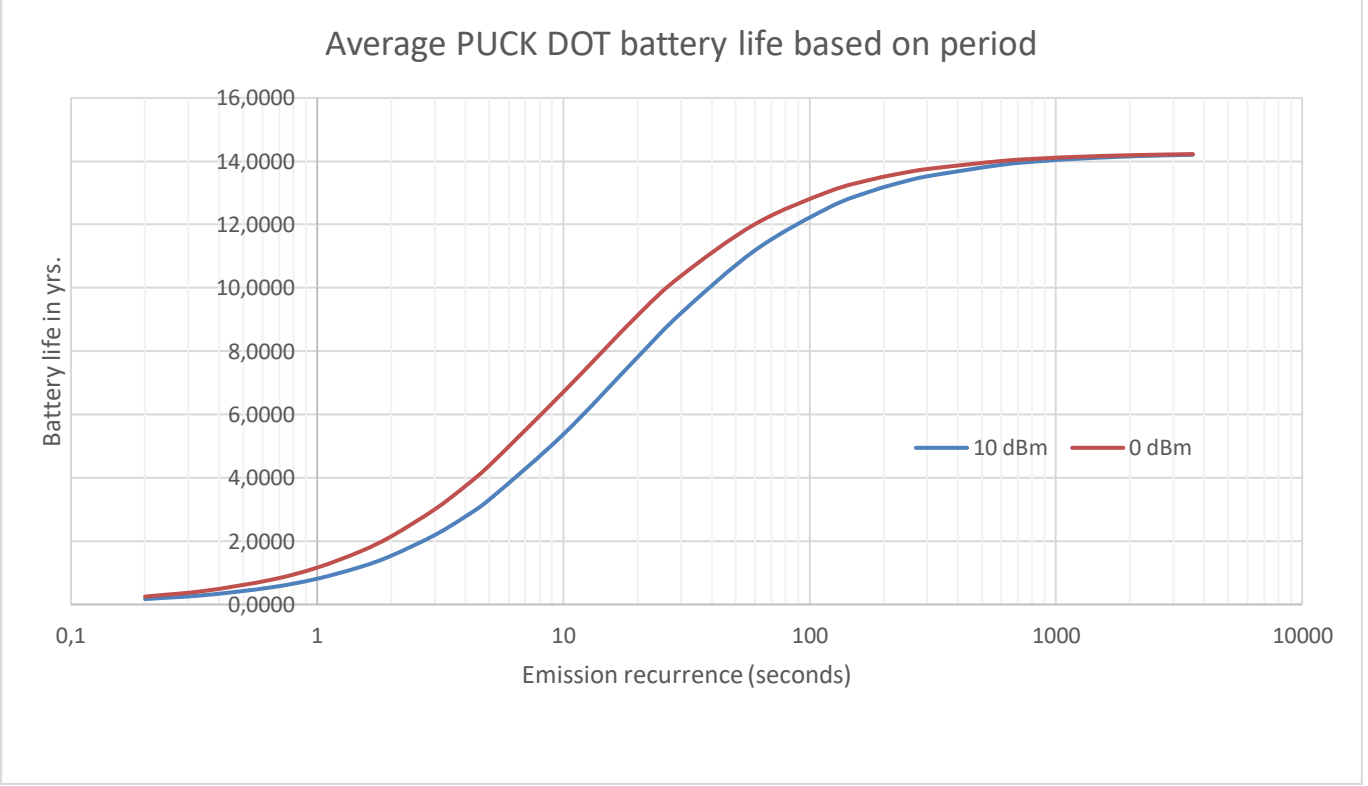
3.2.2 Configuration

DOT TAG and DOT PUCK are configured with the SCIEL PROG IR tool and EDOT software.

3.2.3 Electrical characteristics

3.2.3.1 Battery life based on configuration

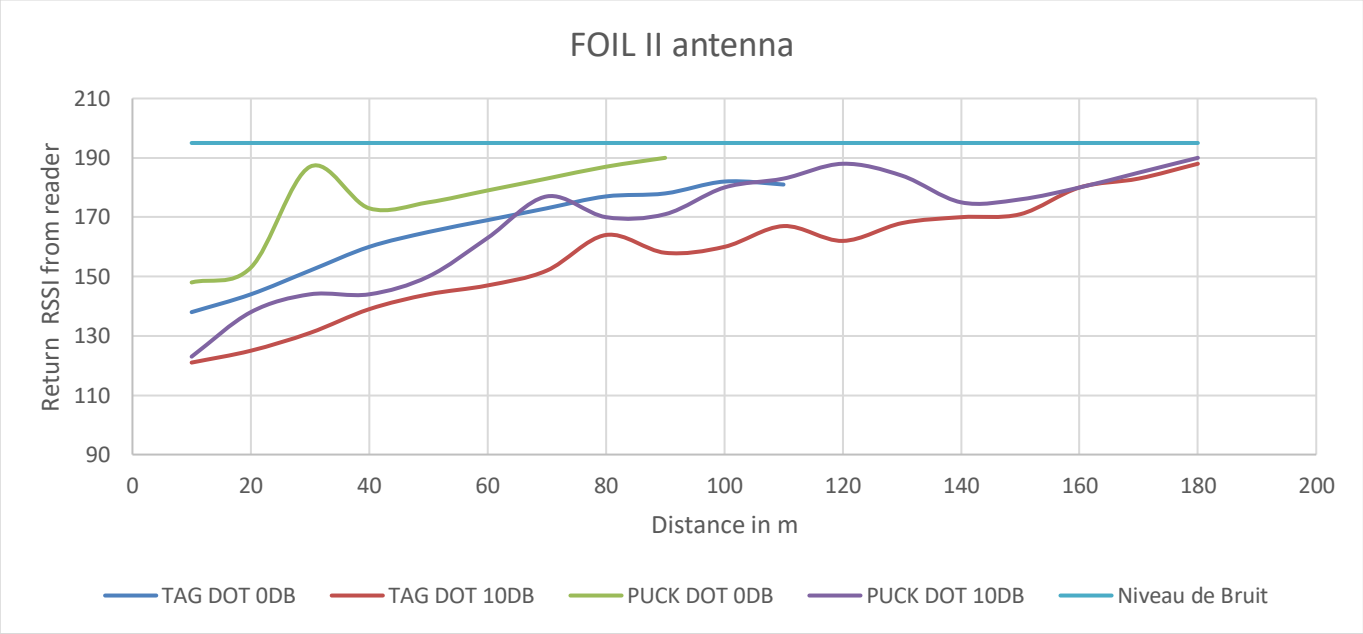


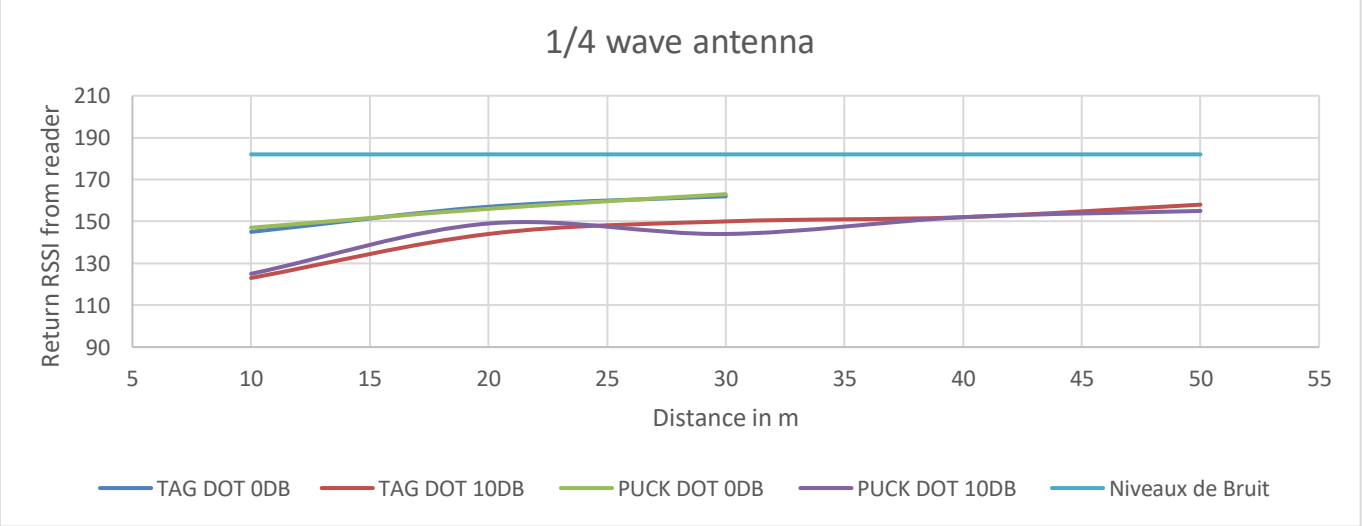


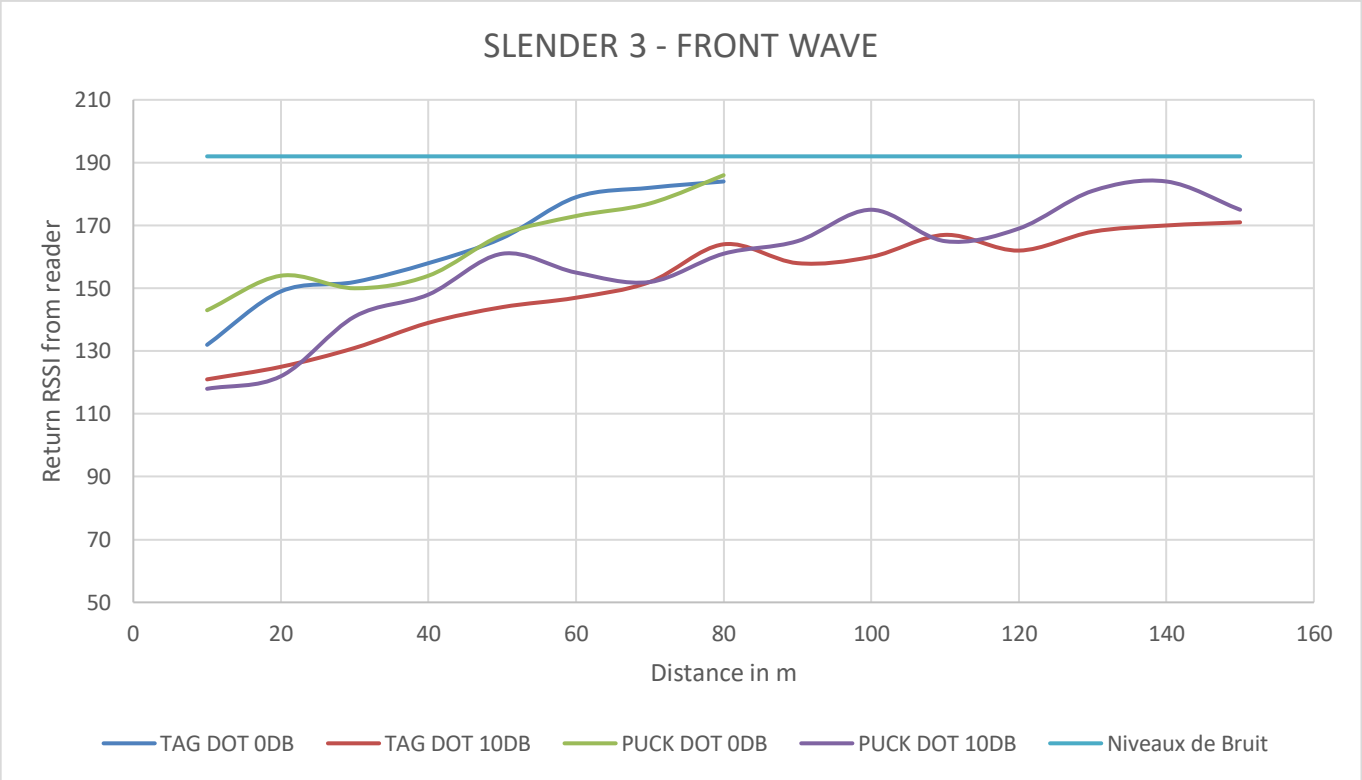
3.2.3.2 HF detection range

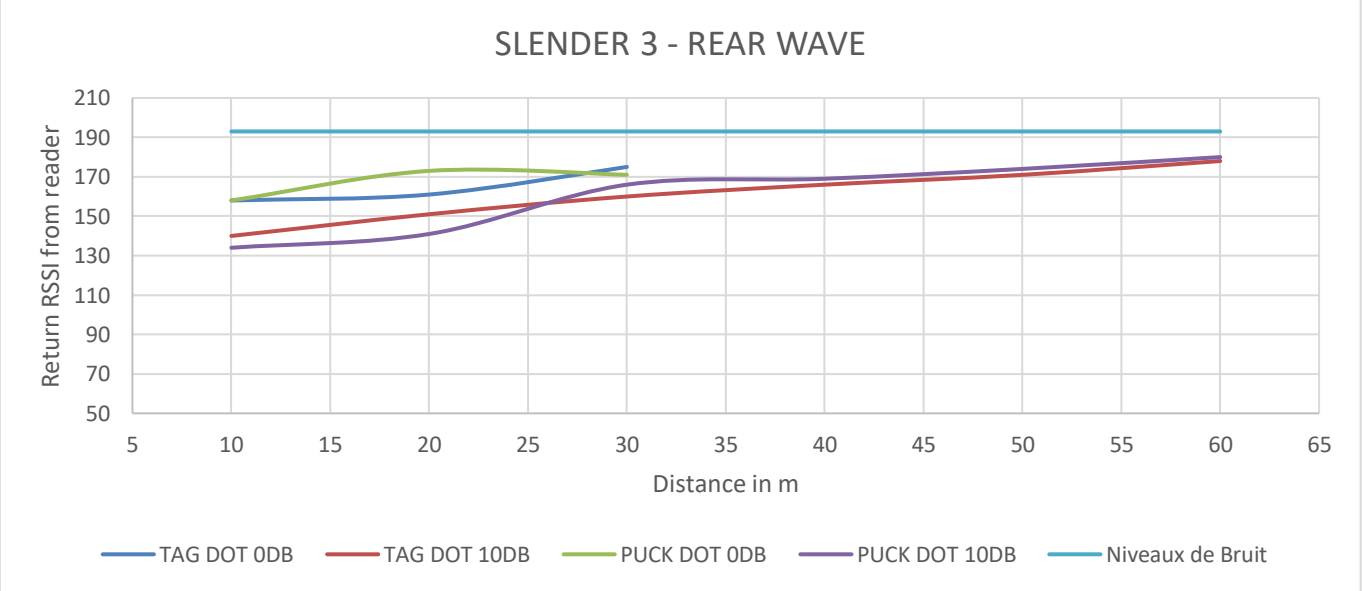
The following results are obtained under “line-of-sight” conditions, thus similar to ideal conditions. All these measurements are made with antennas and readers offered by ELA Innovation. With the parameter having the most influence, and representing real environments, being ambient electromagnetic interference or noise level, that value is given for each test.

Tests were made using a SCIEL READER RU connected to a PC.

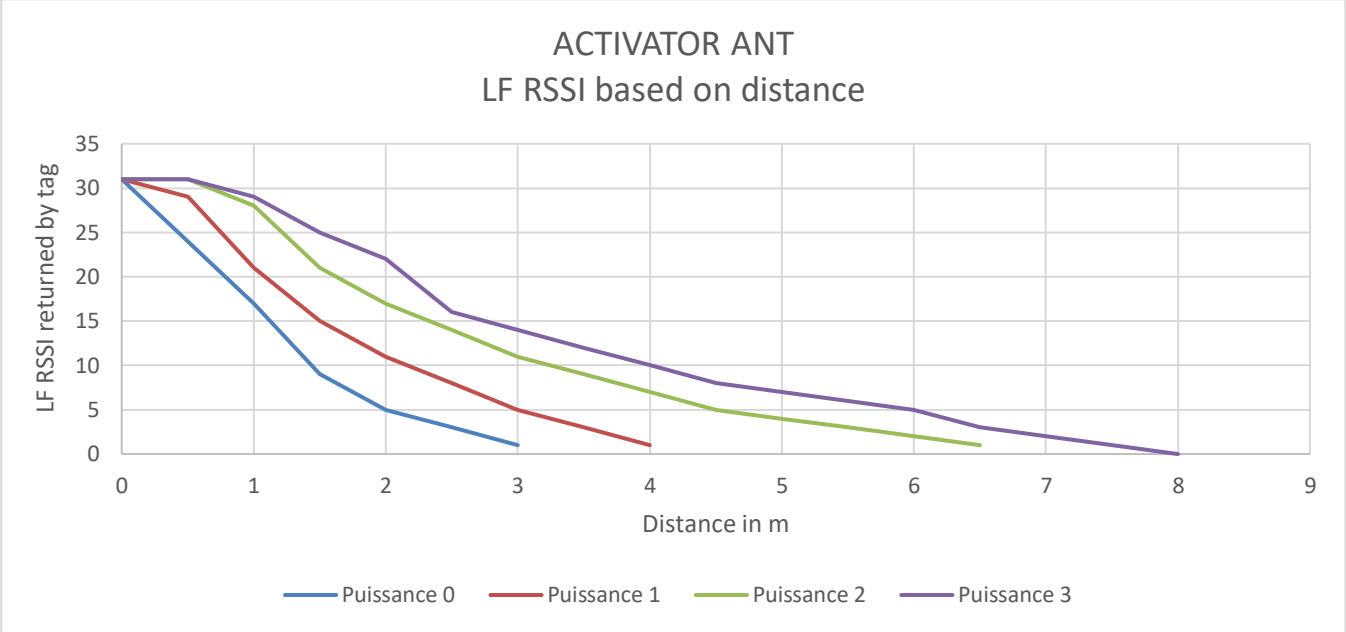


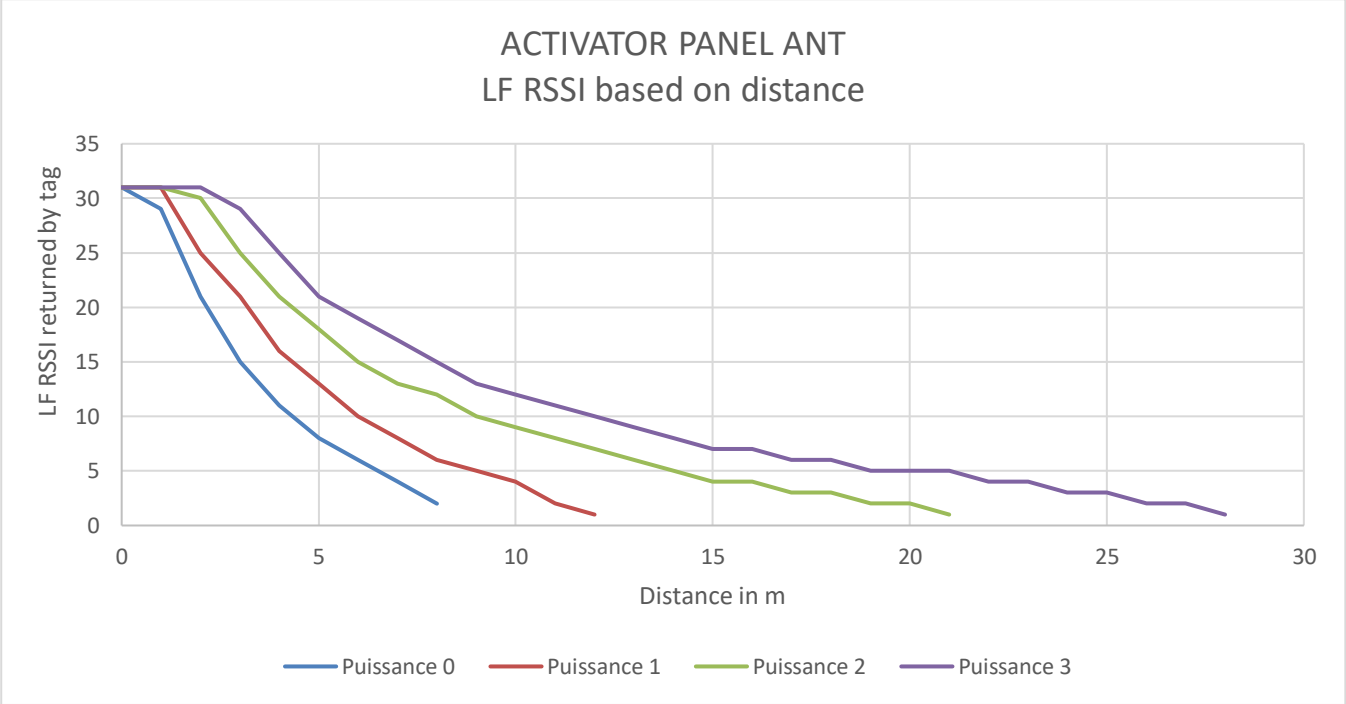



SLENDER 3 - FRONT WAVE
Return RSSI from reader
210
190
170
150
130
110
90
70
50
0
20
40
60
80
100
120
140
160
Distance in m
TAG DOT 0DB
TAG DOT 10DB
PUCK DOT 0DB
PUCK DOT 10DB
Niveaux de Bruit


SLENDER 3 - REAR WAVE
Return RSSI from reader
210
190
170
150
130
110
90
70
50
5
10
15
20
25
30
35
40
45
50
55
60
65
Distance in m
TAG DOT 0DB
TAG DOT 10DB
PUCK DOT 0DB
PUCK DOT 10DB
Niveaux de Bruit

3.2.3.3 LF detection range





3.2.4 Installation recommendations

3.2.4.1 *General*

- As the environment can disturb HF antenna directivity, it is essential to pay attention to the area surrounding the tag as follows:
  - Do not place the tag in a corner angle (changes directivity).
  - Do not place the tag inside a metal enclosure (highly attenuates signal).
- The LF reception part of the tag is far less attenuated by metal cages. However, it is necessary to respect the same recommendation concerning antenna distance.
- The DOT system operates at 125 KHz and may thus be easy disturbed by other high-power electrical equipment or by equipment with very high levels electromagnetic emissions.
  - Examples: Neon, cathode tubes, electrical motors...
  - In order to achieve maximum performance, we recommend keeping tags as far from these sources of interference as possible. As these types of equipment vary widely with respect to emissions, the distances below are provided for information only and may be different:
    - Neons: 50 cm
    - Multi-purpose rotating tools (such as Dremel tools): 30 cm
    - AC-350W motors: 1 cm
    - Flat screens 20 cm
- It seems reasonable to implement an additional margin of 40 cm. If interference persists, it may be preferable to characterize the equipment causing the interference.

3.2.4.2 PUCK DOT

- The HF antenna for PUCK DOT is located on the front side. We recommend keeping the antenna away from metallic surfaces, but the tag's design enables it to be mounted on metallic surfaces using the PUCK HOLDER accessory offered by ELA Innovation. We recommend keeping a distance of about 20 mm from any metallic surface.

- PUCK DOT directivity is such that its radio emission is stronger on its front side. In order to increase the distance to the reader, you must therefore orient the tag towards the reader.

3.3 ACTIVATOR ANT

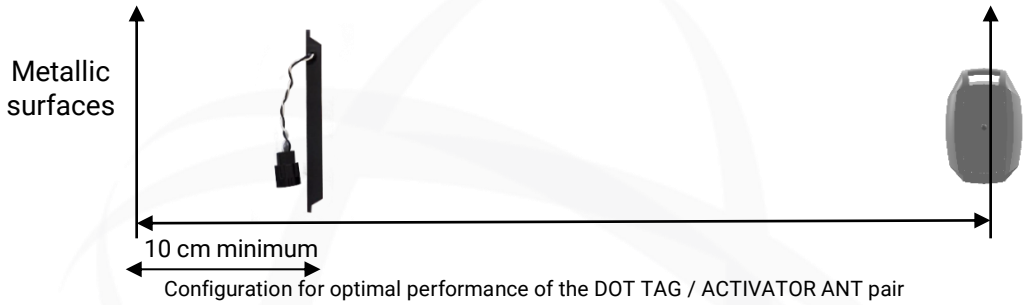
3.3.1 Operation

ACTIVATOR ANT is the typical antenna used in the DOT system. In particular, it is included with TAG ACTIVATOR STANDALONE. It may be installed at a distance from TAG ACTIVATOR to make it possible to extend zone coverage or to create a different additional zone.

The antenna measures 145 x 26 x 12 mm and is designed for outdoor use.

3.3.2 Installation recommendations

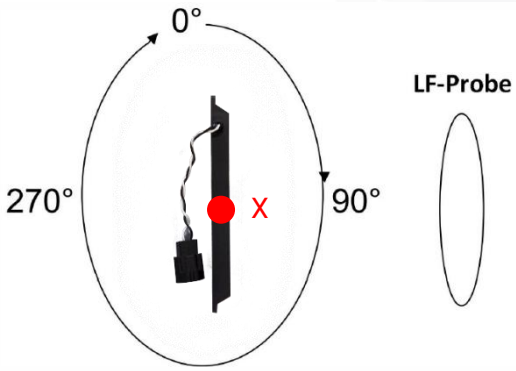
The antenna must be mounted on a non-metallic surface. The minimal distance between the antenna and a metallic surface varies, depending on the quantity and type of metal. A minimum of 10 cm is recommended. If installation constraints do not allow you to respect this recommendation, the system will not achieve maximum performance.

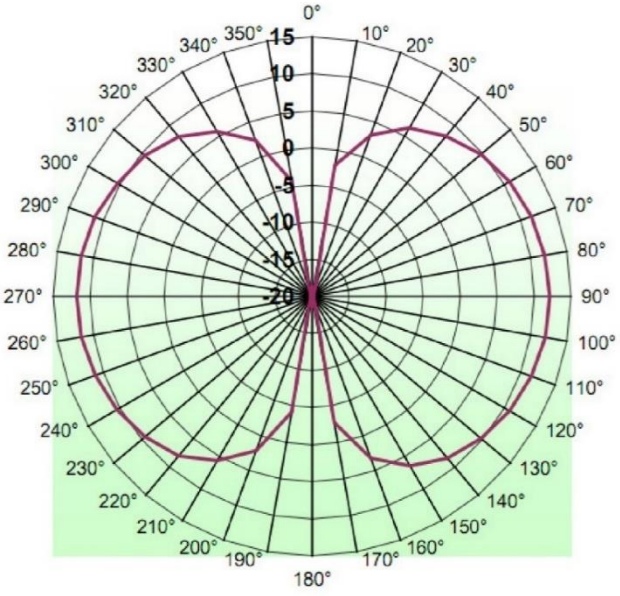


Configuration for optimal performance of the DOT TAG / ACTIVATOR ANT pair

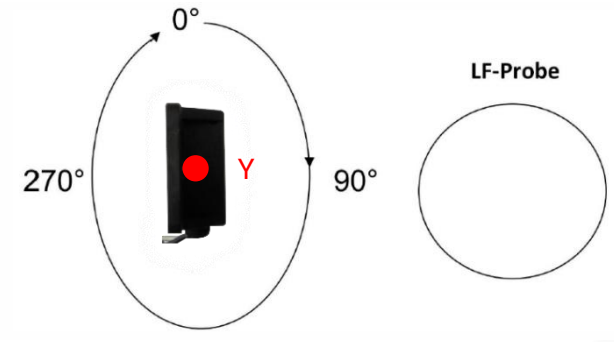
3.3.3 Directivity

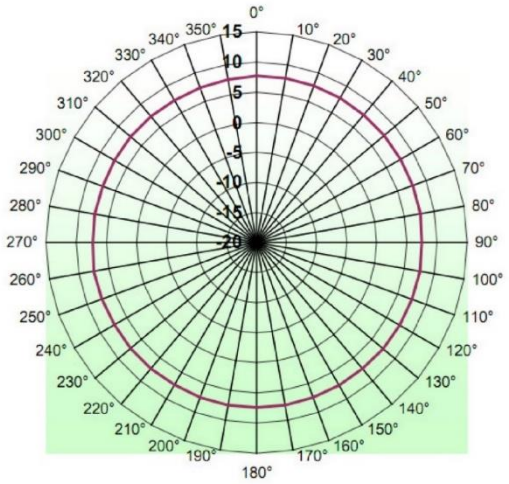
4.4.2.3 Directivity X



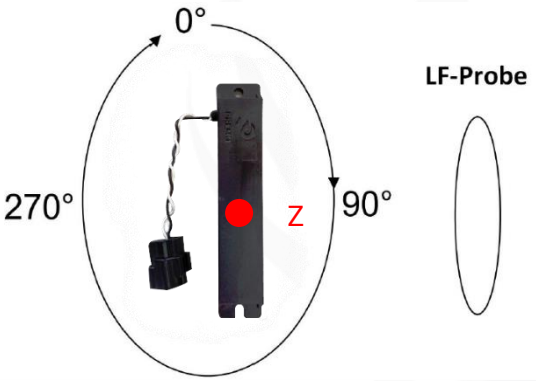


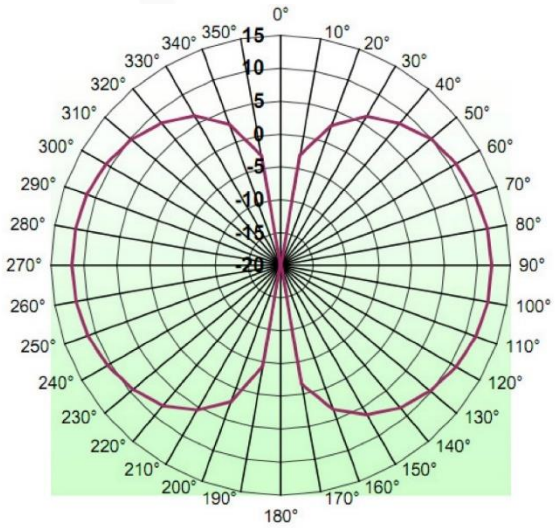
3.3.3.1 Directivity Y





3.3.3.2 Directivity Z

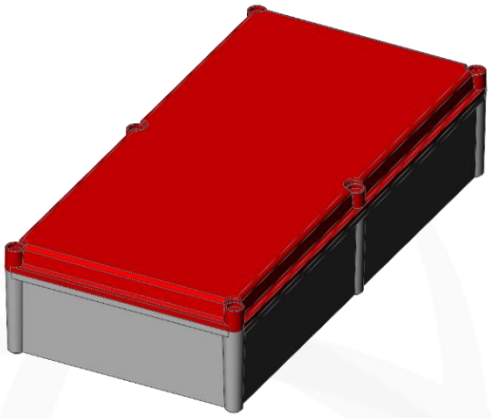




3.4 ACTIVATOR PANEL ANT

3.4.1 Operation

ACTIVATOR PANEL ANT is a low-frequency antenna that increases the wireless range for using DOT system products. The maximum detection range is about 20 meters. The antenna is located in the cover of the casing, as shown in red in the photo below. The remaining space enables you to place TAG ACTIVATOR, the reader, and other additional systems if necessary.



3.4.2 Hardware description

- **GREEN**: Matching circuit
- **PURPLE**: Antenna connector
- **ORANGE**: Test connector, can be used for short-range antenna (max. 2-3 meters).
- **RED**: Placement of TAG ACTIVATOR, OEM version.
- **BLUE**: Multi-plug. 1 pins are connected. 2 pins are connected.

ACTIVATOR PANEL ANT also has a place reserved for SCIEL READER LITE, enabling optimal integration for a complete system.

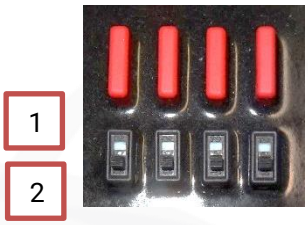
3.4.3 Installation recommendations

The antenna must be mounted on a non-metallic surface. The minimal distance between the antenna and a metallic surface varies, depending on the quantity and type of metal. A minimum of 20 cm is recommended. The system will not achieve maximum performance if installation constraints prevent you from respecting this recommendation.

As the antenna is located in the case's lid, it is naturally raised by 10 cm.

3.4.4 Adaptation

ACTIVATOR PANEL ANT is equipped with the above matching circuit, making it possible to improve performance when metal objects are nearby.



This circuit can largely compensate for the presence of metal near the antenna. Selectors are disabled when set to position 1, towards the bottom in the picture. These condensers are added, not combined. Therefore, the more metal there is, the more switches you need to set. As such, 5 different states exist: from 0 to 4 condensers activated.

In an extreme case, such as with the antenna placed on a steel beam, you should set all switches to position 2.

Attention: The matching circuit does not compensate if too much metal is present. It is essential to place the antenna correctly before using this circuit.

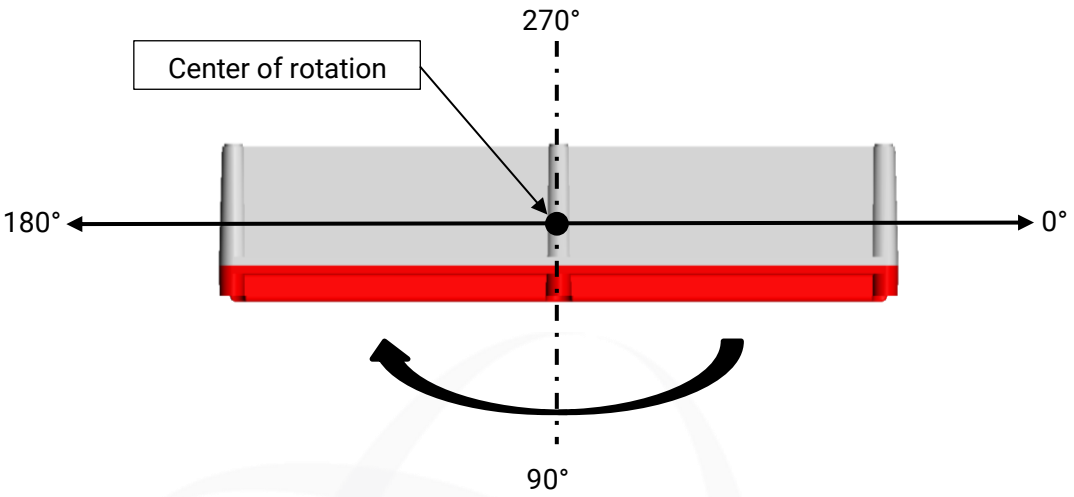
How to perform adjustment:

1. Take a TAG DOT and measure the activation distance using the LED indicator on the tag.
2. Activate an additional switch and follow these steps based on changes in distance:
   a. Distance increases: Repeat step 2.
   b. Distance decreases: Disable the last switch you changed and keep that configuration.
   c. Distance does not change: Repeat step 2.

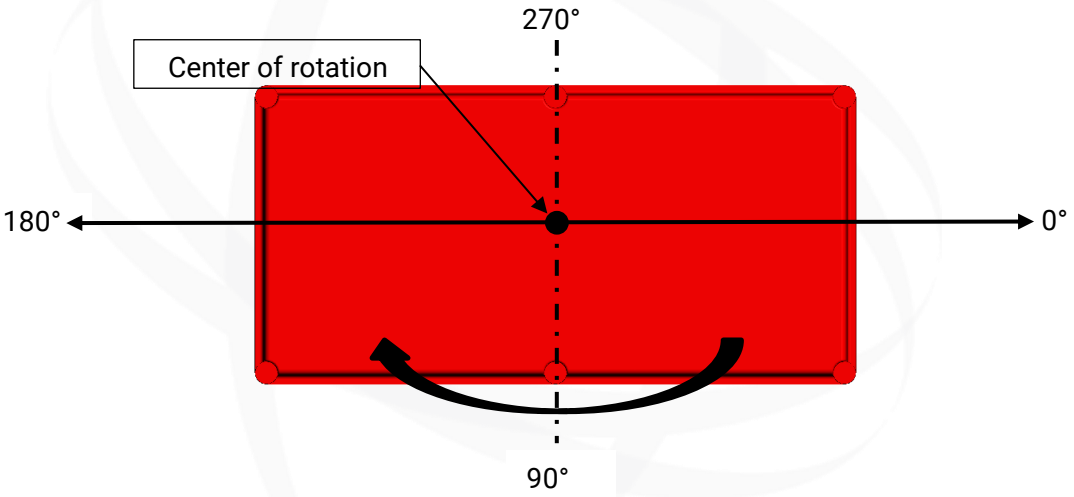
3.4.5 Mounting example with TAG ACTIVATOR OEM:

3.4.6 Directivity

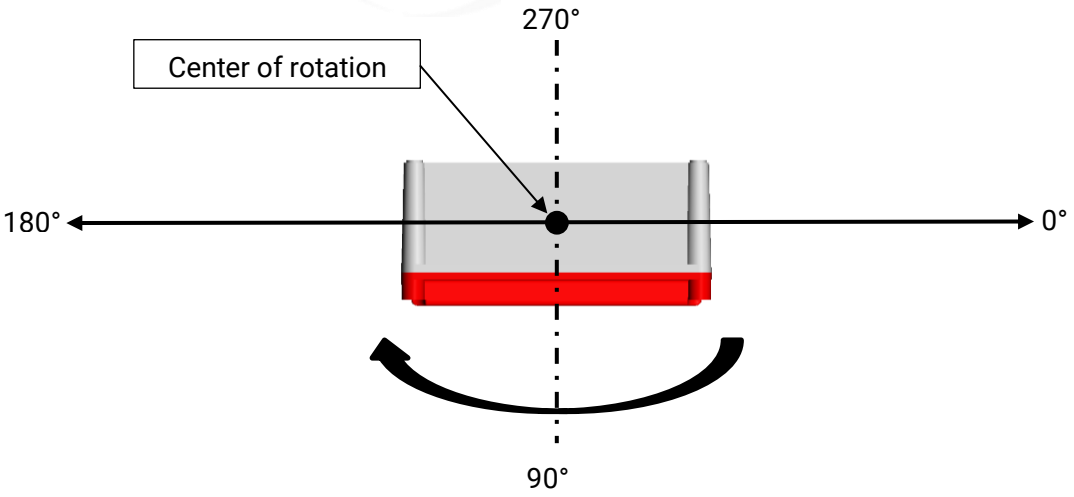
Vertical position (overhead view) with rotation on X axis.

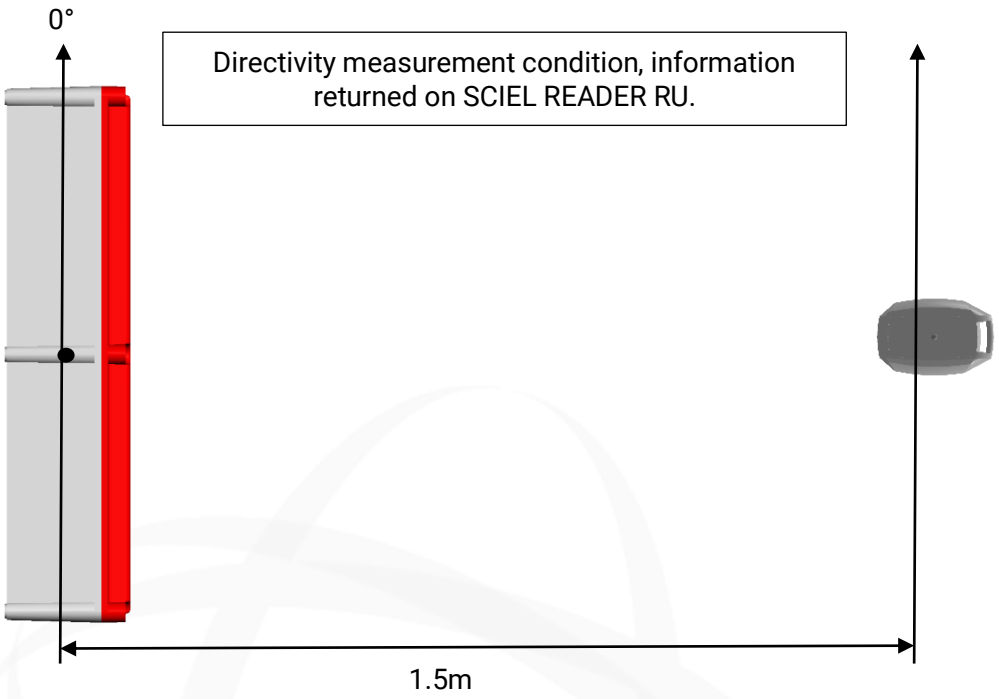


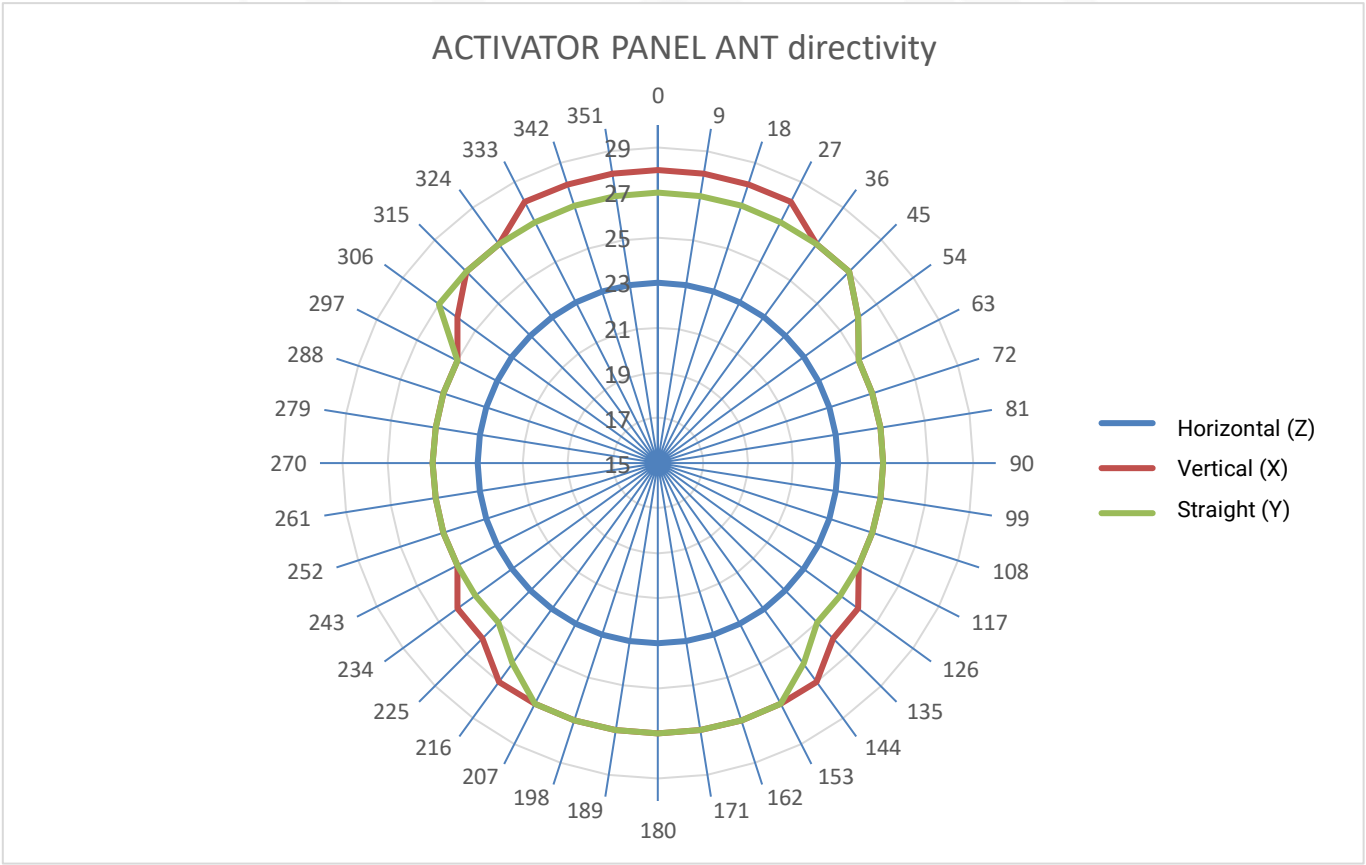
Horizontal position (overhead view) with rotation on Z axis.



Right position (overhead view) with rotation on Y axis.




0°
Directivity measurement condition, information returned on SCIEL READER RU.
1.5m


ACTIVATOR PANEL ANT directivity
0
9
18
27
36
45
54
63
72
81
90
99
108
117
126
135
144
153
162
171
180
189
198
207
216
225
234
243
252
261
270
279
288
297
306
315
324
333
342
351
29
27
25
23
21
19
17
15
Horizontal (Z)
Vertical (X)
Straight (Y)

4 CONFIGURATION WITH EDOT

4.1 GENERAL

EDOT is the configuration software for the DOT system. This application offers 3 tabs:

1. TAG DOT configuration with SCIEL PROG IR.
2. TAG ACTIVATOR configuration with SETUP CABLE.
3. Configuration of reader to activate reader relay according to conditions specific to DOT TAG. (LF value and Activator ID). See AN_DOT-SYSTEME_RELAI_vA for more details about using this tab.

EDOT offers two operating modes that give you access to various features. The first mode is referred to as “BASIC”, allowing configuration of the system’s main functions. The other mode is referred to as “EXPERT”, which gives access to all configuration options. Because “EXPERT” mode allows you to access all options, we recommend that you limit its use.

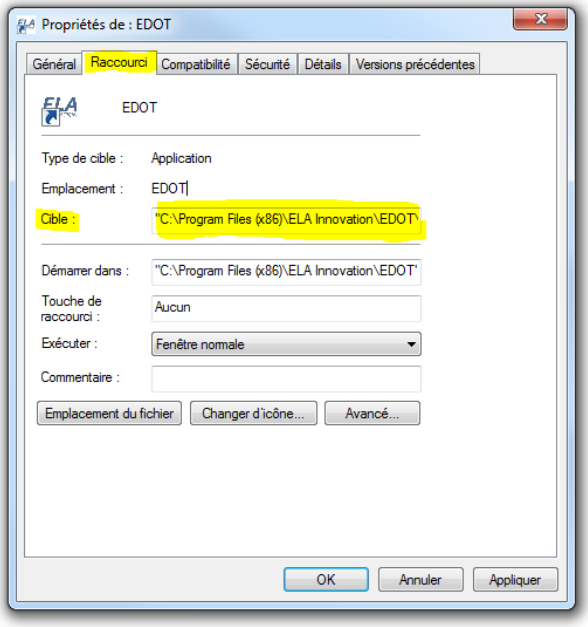
4.1.1 Switching to “EXPERT” mode

You may switch to “EXPERT” mode after installing the software, by including an argument when launching it. The argument is: “EXPERT”.

To launch the application in this mode automatically:

1. Right-click on the EDOT shortcut, and select Properties.
2. On the “Shortcut” tab, add the word “EXPERT” into the target.

Example:
Target: "C:\Program Files (x86)\ELA Innovation\EDOT\EDOT_32.exe" EXPERT



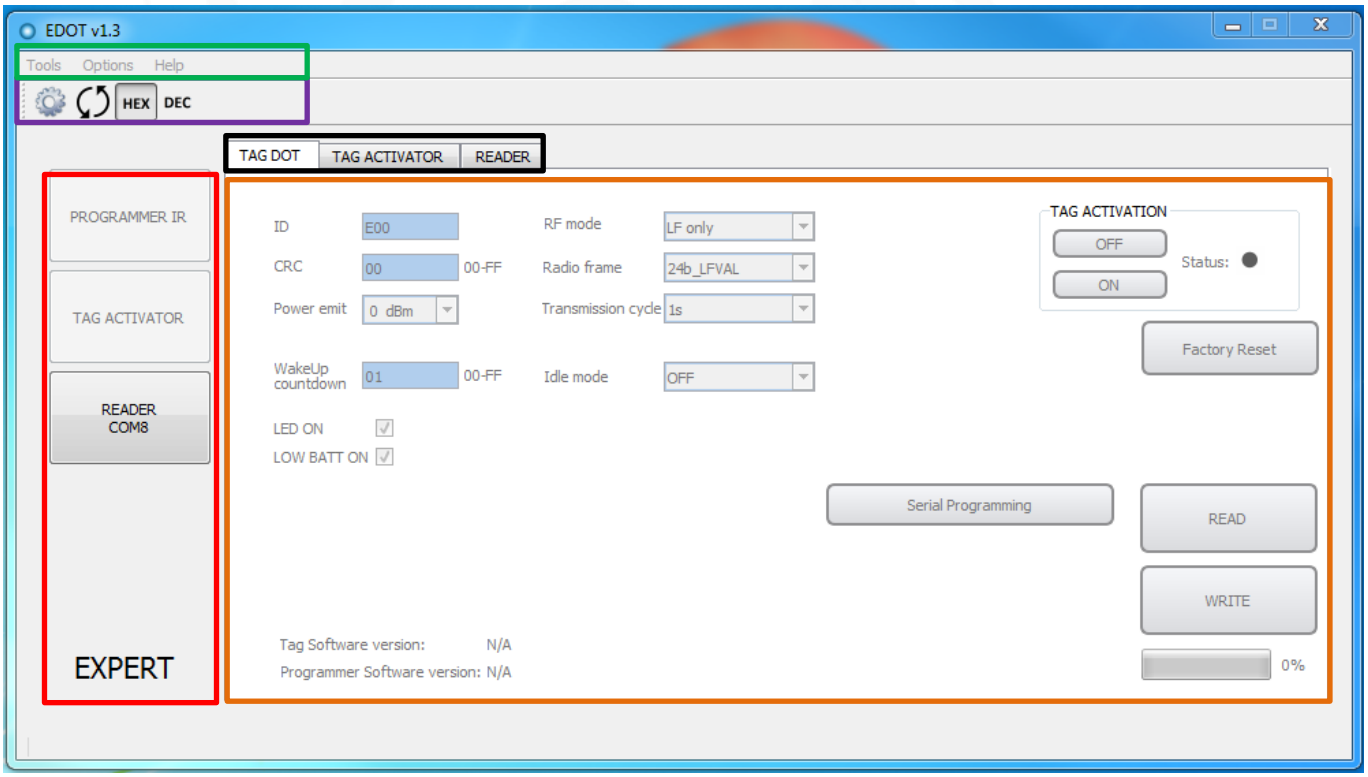
A space is required before the word “EXPERT”

4.1.2 Operation on COM ports

When starting, EDOT scans the COM ports present on the PC and identifies the connected device. Connection is established if a device compatible with the ELA Innovation DOT system is found.

4.1.3 Interface description

- Red frame: List of available devices for the DOT system. When present, the Expert label in the lower left-hand corner indicates that the user interface is in Expert (advanced) mode.
- Green frame: contains several pull-down menus:
  - Tools:
    - Configure: allows you to manually configure a COM port if automatic detection does not work. (to be included in a future version)
    - Refresh COM: updates the list of devices connected to the computer (to be done when connecting new devices).
  - Display:
    - HEX: Switches interface display to hexadecimal.
    - DEC: Switches interface display to decimal.
  - Help:
    - About: Information about the software.
- Purple frame: shortcuts to pull-down menus.
- Black frame: choice of tabs for configuring various devices.
- Orange frame: configuration of various parameters for the selected device.



4.2 TAG DOT TAB

4.2.1 Fields to fill in

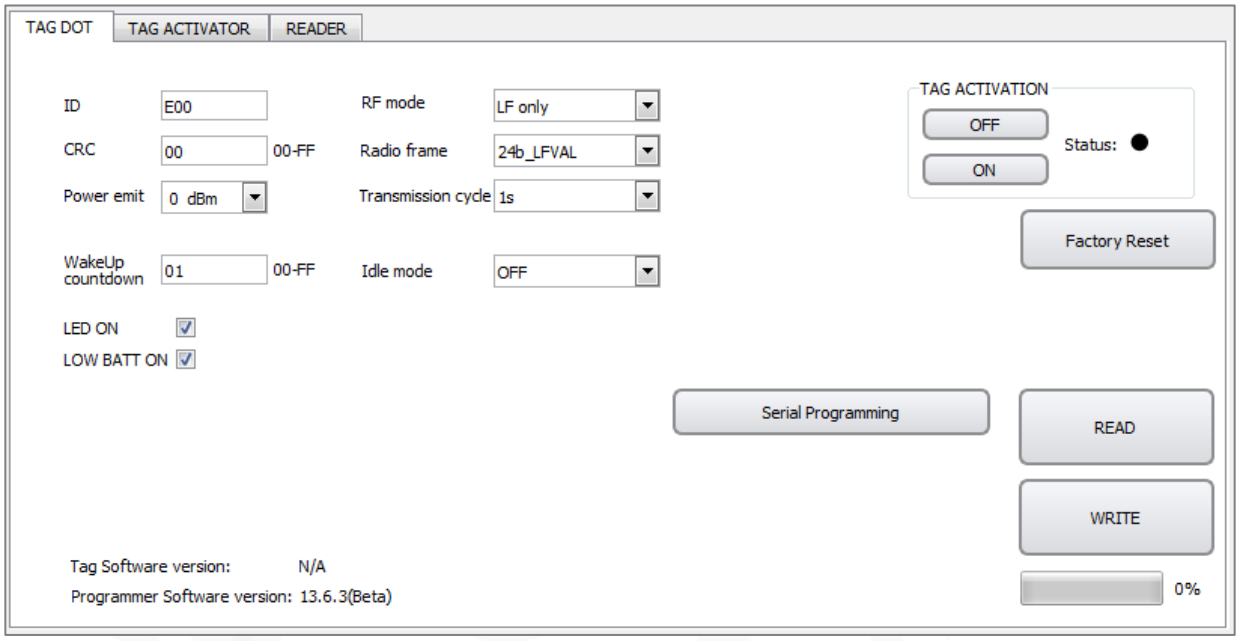
- CODE ID: identification number TAG DOT:
  - 24 BITS: values from 001 to FFF (or 1 to 4095 in decimal), or 4094 possible tags.
  - 32 BITS: values from 0001 to FFFF (or 1 to 65,535 in decimal), or 65,534 available tags.
- LED ON: LED is activated during emission if this checkbox is ticked.
- LOW BAT ON: LED is activated during emission if this checkbox is ticked.
- RF Mode:
  - LF only: Emission only as commanded by TAG ACTIVATOR.
  - HF+LF: Emission as commanded by TAG ACTIVATOR and on configured recurrence if outside LF range.
- Recurrence: Adjustment of emission recurrence in HF+LF operating mode (only outside TAG ACTIVATOR field).
- Standby command (IDLE MODE):
  - OFF: TAG DOT does take into account standby commands sent by TAG ACTIVATOR.
  - Tempo: TAG DOT only takes into account delayed standby commands sent by TAG ACTIVATOR.
  - ON: TAG DOT takes into account all standby commands from TAG ACTIVATOR (delayed standby and permanent standby).
- Radio mode:
  - 24b_VALBF: TAG in 24 bits with low-frequency RSSI values.
  - 32b_VALBF: TAG in 32 bits with low-frequency RSSI values.
  - 24b_woVALBF: TAG in 24 bits without low-frequency RSSI values (TAG ACTIVATOR ID kept).
  - 32b_woVALBF: TAG in 32 bits without low-frequency RSSI values (TAG ACTIVATOR ID kept).
- Delta CRC: Adds a CRC value in order to create sub-networks (see MCHD documentation for more details).
- Power emit:
  - 0 dbm: HF min emission power
  - 10 dbm: HF max emission power (distance multiplied by 2)
- WakeUp countdown: Emits only once on X (X is the value) upon reception of the TAG ACTIVATOR.

4.2.2 Buttons

- ACTIVATION ON/OFF: Activates or deactivates TAG DOT
- Status:
  - Black: Undetermined status (to be included in a future version)
  - Green: TAG active
  - Red: TAG inactive
- FACTORY RESET: Resets all TAG DOT parameters to their original values, except for TAG SET operations performed by ELA Innovation.
- READ TAG: Reads all TAG DOT parameters present on the programming tool and fills in the fields in the interface.
- WRITE TAG: Configures the TAG DOT with the fields present in the interface.
- Serial programming: Configures the TAG and automatically increments the ID of the TAG by keeping the other parameters. Sets identically a TAG series by changing the ID.

4.2.3 Indicator fields

- TAG soft version: Indicates TAG's firmware version. This information is important when contacting technical support.
- Programmer soft version: Indicates the firmware version of the programming tool, as well as its hardware version.
- Progress bar (lower right-hand corner): Indicates the progress percentage when reading or writing TAG parameters.



4.3 TAG ACTIVATOR TAB

4.3.1 Hardware setup

To use the EDOT interface to configure TAG ACTIVATOR, you must use the SETUP CABLE.
The TAG ACTIVATOR unit must also be powered with 12-24V via its power supply.

4.3.2 Fields to fill in, common for both antennas

- Emission Recurrence: adjusts the TAG ACTIVATOR emission recurrence from 200 ms to 1 hour.
- Format 24 bits / 32 bits: indicates TAG DOT operation mode to limit the number of TAG ACTIVATOR identifier.
- Activation: Configuration of logical input
  - ON: permanently active, regardless of input status.
  - OFF: permanently inactive, regardless of input status.
  - Rising Front: active for the duration of the “Activation duration” parameter for a rising front on the logical input.
  - Descending Front: active for the duration of the “Activation duration” parameter for a descending front on the logical input.
  - High Levels: active as long as input is set to 1.
  - Low Levels: active as long as input is set to 0.
- Activation duration: only available when the Activation option is on the “Rising Front” or “Descending Front” parameter. Configurable time from 200 ms to 1 hour.

4.3.3 Fields to fill in for each antenna

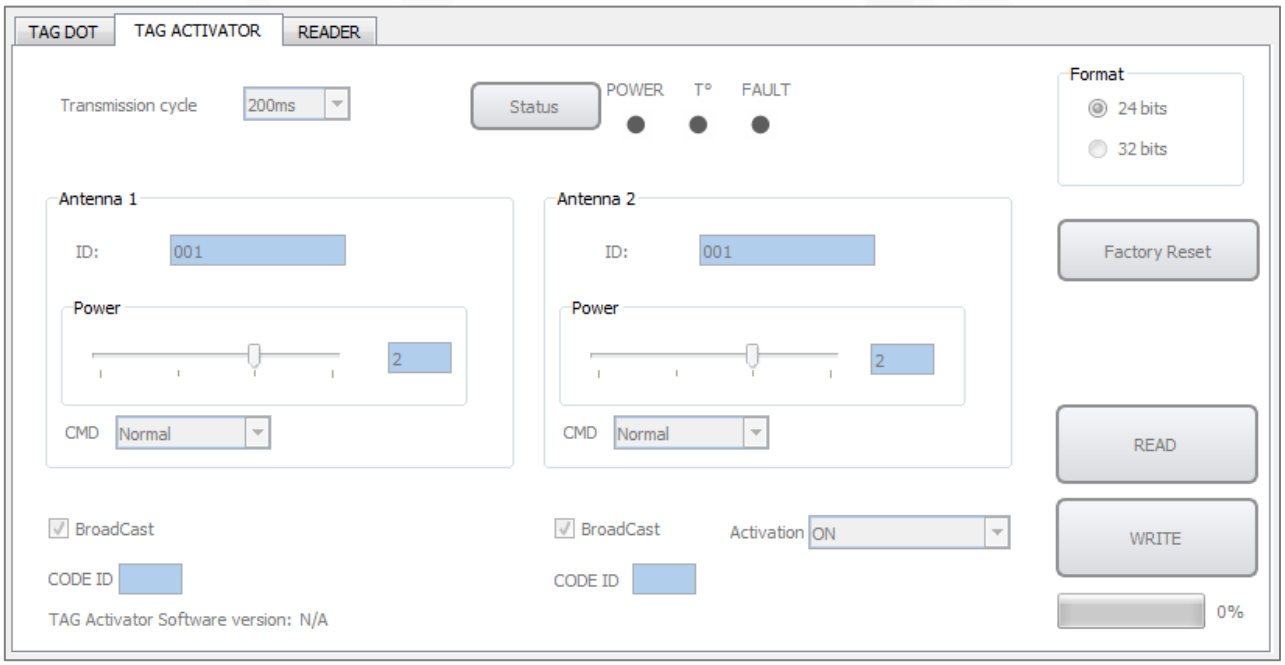
- ID numbers: Available if Broadcast option is selected.
  - 24 bits: configuration of antenna ID from 001 to 07F (or 001 to 127), or 126 available ID values.
  - 32 bits: configuration of antenna ID from 001 to 7FF (or 001 to 2047), or 2046 available ID values.
- Power: LF emission power, from 00 to 03. (24V power is required for 03)
- CMD: Command to be sent to DOT TAG:
  - Normal: typical emissions without a particular command. The tag responds with its ID, ACTIVATOR ID, and the LF value for each pulse.
  - OFF DEFINITIF: command for TAG to switch to permanent standby mode if allowed by its options (see DOT TAG configuration).
  - ON DEFINITIF: the only command that enables a DOT TAG to exit its OFF DEFINITIF state.
  - OFF TEMPO: the tag switches to OFF TEMPO mode. (See DOT TAG section).
  - Driven output: tag output switches to 1 for 0,5 seconds each time this command is received.
- Broadcast:
  - Active: the command is executed by all tags receiving this emission.
  - Inactive: only the TAG with the ID code in its “CODE ID” will execute the command.
- CODE ID: Only available if Broadcast option is not selected. Enter the ID of the tag to command.

4.3.4 Buttons

- Status: checks the diagnostics aspects of TAG ACTIVATOR (Red = problem, Green = good, Black = not read)
  - POWER: Power supply insufficient for the parameter.
  - T°: system overheating.
  - FAULT: overheating, excessive consumption, short-circuit on antenna output.
- Factory Reset: Resets all ACTIVATOR parameters to their original values, excluding TAG SET operations performed by ELA Innovation.
- READ ACTIVATOR: Reads all reader parameters and fills in all the interface fields with that information.
- WRITE ACTIVATOR: Configures the TAG ACTIVATOR with the fields present in the interface.

4.3.5 Indicator fields

- TAG ACTIVATOR soft version: Indicates TAG ACTIVATOR's firmware version. This information is important when contacting technical support.
- Progress bar (lower right-hand corner): Indicates the progress percentage when reading or writing TAG ACTIVATOR parameters.



4.4 READER TAB

The READER tab is used to configure relay triggering in the DOT system (see AN_SYSTEM-DOT_RELAIS application note for more details).

4.4.1 Indicator fields to fill in

Indicator fields enable you to estimate the relay triggering distance as a function of system parameters.

Note: these parameters do NOT change the configuration of the reader, they only guide you through your configuration choices.

- Antenna model:
  - Small Antenna: internal antenna included in the TAG ACTIVATOR STANDALONE version, or the external antenna on an ACTIVATOR ANT
  - Large Antenna: ACTIVATOR PANEL ANT
- Power supply: parameter corresponding to the power used (03 power level can only be used with 24V)
- Power level: configuration of power level for antenna

4.4.2 Fields to fill in

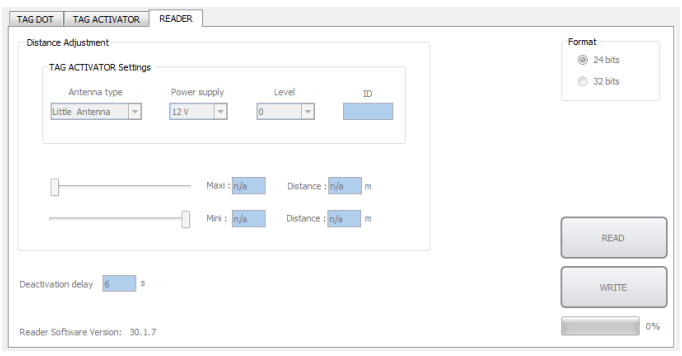
- Formats: 24 bits / 32 bits enables you to configure the reader with the corresponding tag format
- Deactivation delay: configures the time period for the relay before contact release when the last TAG is detected. We recommend at least 2 seconds, with a maximum time of 254 seconds
- Max.: maximum detection distance
- Min.: minimum detection distance
- ID: TAG ACTIVATOR's number to retrieves

4.4.3 Buttons

- READ ACTIVATOR: reads all reader parameters and fills in all the interface fields with that information.
- WRITE ACTIVATOR: configures the reader with the fields present in the interface.

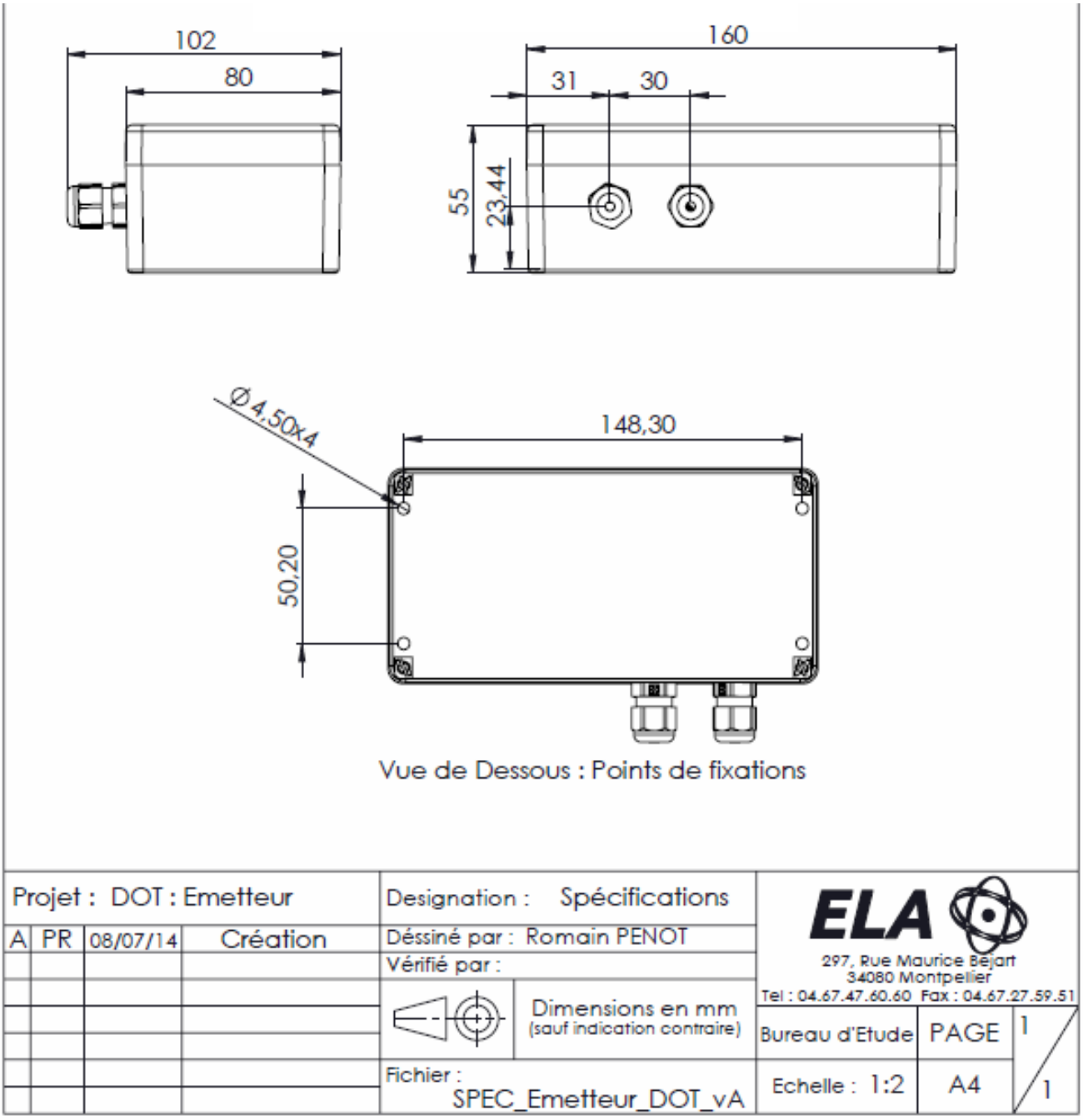
4.4.4 Indicator fields

- Reader soft version: indicates reader's firmware version
- Progress bar (lower right-hand corner): indicates the progress percentage when reading or writing reader parameters.

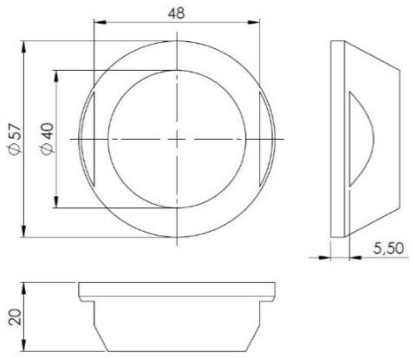


5 MECHANICAL SPECIFICATIONS

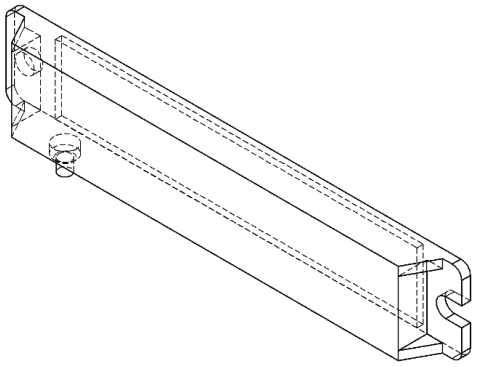
5.1 TAG ACTIVATOR

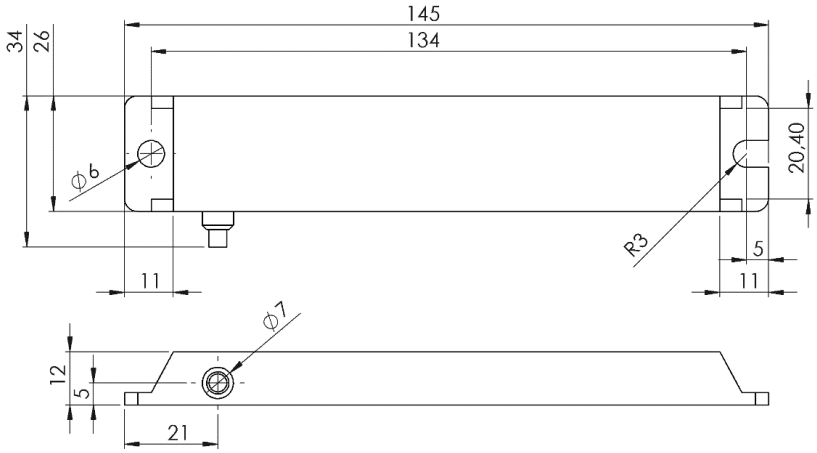


5.2 PUCK DOT



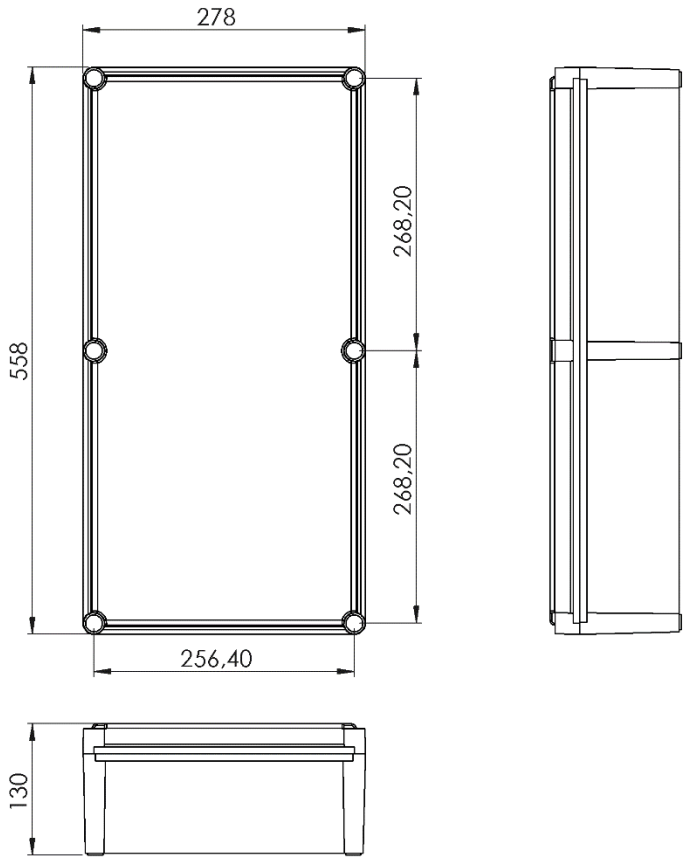
5.3 ACTIVATOR ANT





Projet : ACTIVATOR ANT				Designation : Spécifications	ELA	
A	PR	25/11/16	Création	Déssiné par : Romain PENOT	297, Rue Maurice Bejart 34080 Montpellier Tel : 04.67.47.60.60 Fax : 04.67.27.59.51	
				Vérifié par :		
				Dimensions en mm (sauf indication contraire)	Bureau d'Etude	PAGE 1/1
				Fichier : SPEC_ACTIVATOR_ANT_vA	Echelle : 1:1	A4

5.4 ACTIVATOR PANEL ANT



Projet : ACTIVATOR PANEL ANT				Designation : Spécifications	ELA 297, Rue Maurice Bejart 34080 Montpellier Tel : 04.67.47.60.60 Fax : 04.67.27.59.51		
A	PR	29/11/16	Création	Déssiné par : Romain PENOT			
				Vérifié par :			
				Dimensions en mm (sauf indication contraire)	Bureau d'Etude	PAGE	1 / 1
				Fichier : SPEC_ACTIATOR_PANEL_ANT_vA	Echelle : 1:5	A4	

6 REFERENCES AND VERSIONS

MODEL	P/N REFERENCE	SPECIFICATIONS
TAG ACTIVATOR STANDALONE	ACIOM123B	Electronic DOT badge activation module; 1 integrated antenna; 2 antenna outputs with cable glands; 12 or 24V DC power supply; IP65 waterproof polycarbonate casing, 160 x 100 x 60 mm; configuration with USB setup cable and EDOT software
TAG ACTIVATOR	ACIOM75B	Version in casing, without antenna
TAG ACTIVATOR OEM	ACIOM43B	Electronic board version without casing, with mounted antenna
TAG DOT	IDF2470	LF and UHF 433 MHz two-band activatable badge; ABS casing, 60 x 40 x 18 mm; user-replaceable battery; keyring or neck strap loop; LED activation indicator; configuration using SCIEL PROG IR tool and EDOT software
PUCK DOT	IDF2570	LF and UHF 433 MHz two-band activatable tag; long-range UHF emission up to 150 meters; long battery life; LF detection range from 7 to 15 meters, depending on the antenna; white DELRIN casing; IP68 waterproof; diameter 56 mm; thickness: 19 mm; 2 mounting holes; configuration with SCIEL PROG IR tool and EDOT software
ACTIVATOR ANT	ACIOM76	Activation antenna, with 5-meter cable; 2-point terminal connector; dimensions 145 x 26 x 12 mm; 2 mounting holes; black ABS casing, potted, waterproof
ACTIVATOR PANEL ANT	ACIOM113	DOT Activator Antenna; long-range; ABS casing; dimensions 130 x 278 x 558 mm; 4 antenna adjustment switches; IP67 waterproof; 2 cable glands; 1 SMA connector for RFID antenna
SETUP CABLE	ACIOM89	USB configuration cable for Tag ACTIVATOR