Supplementary information for EU Devices in the LoRaWAN® Showcase catalogue. Version 2.0

Version of Questionnaire form from the Customer/ Device Manufacturer

Version	Date	Author	Update
1.0	30.07.2020	Jon Ortego	Initial release from manufacture
2.0	13.07.2021	Jon Ortego	Firmware update v3.0

Supplementary Information on certified device

1 Supplementary information	
1.1 Manufacturer or Brand name	IMST GmbH
1.2 Website	https://wireless-solutions.de/
1.3 Sales / Marketing contact person, email:	Jon Ortego, sales@imst.de
1.4 Technical contact person, email:	Heinz Syrzisko, syrzisko@imst.de
1.5 Commercial Product name	iM881A-XL
1.6 Product code used when ordering / article number	404774
1.7 Product Version : Hardware version: Firmware version:	 A 3.0
1.8 In what countries is the product available	EU
1.9 What date was / is the market introduction for this device / product?	13.07.2021
1.10 Is the device already working on a public LoRaWAN network. If yes specify at which public operator, country and number of deployed devices on that network:	☐ Yes: ☐ No
1.11 What functionality does the device provide and which sensor(s) does it contain?	Use case: Module Short behavior description: The iM881A-XL is a compact and low-cost radio module that operates in the unlicensed 868 MHz band, including a powerful Cortex® M0+ controller and the LoRa® transceiver of Semtech® Corporation. It has been specifically designed for battery driven devices.
1.12 Accuracy & resolution for every sensor or measurement made by the device	
Name: sensor accuracy (incl. unit): +/- resolution (incl. unit): measurement parameter: measurement range	
Name: sensor accuracy (incl. unit): +/-	

resolution (incl. unit): measurement parameter: measurement range	
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1.13 Uplinks are: Periodic: Period: Explanation: Keep alive message period: Event triggered how:	☐
1.14 Parameter configuration of device (e.g. transmission or measurement interval, threshold levels, etc.)	☐ Remotely: ☐ Over-the-air with LoRaWAN data downlinks ☐ Specify if other: ☒ Locally: serial interface ☐ Via CLI: specify type of connector: ☐ Via NFC: ☐ Specify if other:
1.15 Does the application server send downlinks to the devices?	☐ Yes: (why/how often/typical size) Depending on user application ☐ No
1.16 Operating temperature of device - x °C to + x °C	Minimum - 40 °C Maximum + 85 °C
1.17 Is the payload structure available for decoding?	☐ Yes: ☐ No Please attach the payload structure (+example of decoded payload)
1.18 Is there a decode-API available	☐ Yes: ☐ No Please attach the API documentation
1.19 Is the firmware upgradeable and how?	☒ Yes: (how) Serial Interface
1.20 How can the device be reset to factory default settings?	Serial Interface

1.21 How can the device be forced to re-initiate the join procedure?	Reset of the device, if OTAA device or serial interface.
1.22 Product certifications (IP rating, ATEX, ...)	1. IP rating: 2. ATEX compliance: Other:
1.23 Which regulatory certifications are available (RED, CE, EMC)?	☐ RED ☐ CE ☐ EMC Attach proof of certification to the mail in which this document is sent to a public operator
1.24 Power Supply	☒ External power supply: connection: voltage: 3.0v amperage: ☐ Internal battery: battery type: chemical composition: Battery self-discharge (%/year): Battery shelf life: capacity: weight: rechargeable: ☐ Yes: ☐ No
1.25 Powering device on and off How is the device turned ON? How is the device turned OFF?	
1.26 Dimensions of device (Length x width x height)	20.0 x 25.0 x 2mm
1.27 Weight of full device	2 g
1.28 Mounting of device 1. How to mount? 2. How to mount for best antenna propagation	SMD Component

2 LoRaWAN Device Information

2.1 DevEUI Range (IEEE Compliance)	From :70-B3-D5-8F-F0-00-00-00 To : 70-B3-D5-8F-FF-FF-FF-FF
2.2 LoRaWAN Class	☒ Class A ☐ Class B ☒ Class C
2.3 For Class C Device: Device Under Test restores previous RF settings at boot?	☐ Yes ☒ No
2.4 In what LoRaWAN region/frequency ranges is the product available	☒ EU863-870 ☐ US902-928 ☐ AS923 ☐ IN865-867 ☐ KR920-923 ☐ Other
2.5 Is the LoRaWAN test mode supported?	☒ Yes ☐ No, why not
2.6 Tested and certified against which LoRaWAN Specification(s)	☐ V1.0 ☐ V1.0.1 ☐ V1.0.2 revB ☐ V1.0.3 ☐ V1.1.x ☐ Other : v1.0.4
2.7 Link to document on the LoRa Alliance website	Link: https://lora-alliance.org/showcase/im881a-xl
2.8 Which TX power is used in production devices by default? - if LW 1.0.2 rev A or older is used: - if LW 1.0.2 rev B or newer is used	☐ TXPower 0 (20dBm) ☐ TXPower 1 (14dBm) ☐ TXPower 2 (11dBm) ☐ TXPower 3 (8dBm) ☐ TXPower 4 (5dBm) ☐ TXPower 5 (2dBm) ☐ other TXPower (dBm) ☒ TXPower 0 (MaxEIRP) ☐ TXPower 1 (MaxEIRP-2dB) ☐ TXPower 2 (MaxEIRP-4dB) ☐ TXPower 3 (MaxEIRP-6dB) ☐ TXPower 4 (MaxEIRP-8dB) ☐ TXPower 5 (MaxEIRP-10dB) ☐ TXPower 6 (MaxEIRP-12dB) ☐ TXPower 7 (MaxEIRP-14dB) ☐ other TXPower (Max EIRP : dB)

2.9 Which TX powers are supported by the device in production - if LW 1.0.2 rev A or older is used: - if LW 1.0.2 rev B or newer is used	 ☐ TXPower 0 (20dBm) ☐ TXPower 1 (14dBm) ☐ TXPower 2 (11dBm) ☐ TXPower 3 (8dBm) ☐ TXPower 4 (5dBm) ☐ TXPower 5 (2dBm) ☐other TXPower (dBm) ☒ TXPower 0 (MaxEIRP) ☒ TXPower 1 (MaxEIRP-2dB) ☒ TXPower 2 (MaxEIRP-4dB) ☒ TXPower 3 (MaxEIRP-6dB) ☒ TXPower 4 (MaxEIRP-8dB) ☒ TXPower 5 (MaxEIRP-10dB) ☒ TXPower 6 (MaxEIRP-12dB) ☒ TXPower 7 (MaxEIRP-14dB) (Max EIRP : 16 dB)
2.9 Which LoRaWAN Specification is currently supported on the production devices?	☐V1.0 ☐V1.0.1 ☐V1.0.2 revA ☐V1.0.2 revB ☒V1.0.4 ☐V1.1.x ☐Other:
2.10 Will you re-certify your device when a new major LoRaWAN specification version is released	☒Yes. ☐No, why :
2.11 Has Interoperability prequalification testing been done?	☐Yes. ☒No, why : Missing information for this. Which Network Servers ☐Actility ☐Loriot ☐TTI ☐Other: Specify: Please attach all the test reports.
2.12 Is Activation Type OTAA the default	☐Yes. ☒No, why : Depending on user application.
2.13 For OTAA, is AppKey unique for each device?	☐Yes. ☒No.

2.14 Is ADR implemented? Recommendation: ADR should always be activated. Exceptions can be made for moving devices but will need to be explained.	☒Activated ☐Deactivated, why : ☒Configurable by user (recommendation: Activated by default) ☐Mixed, explain:
2.15 What values did you implement for: - ADR_ACK_LIMIT: - ADR_ACK_DELAY:	64recommended value: 64 32recommended value: 32
2.16 Do you use unconfirmed and/or confirmed uplinks and what is the data rate, timing and power back off algorithm? Upon reception of a confirmed downlink message, is the next uplink sent immediately after the downlink ?Answers (radio buttons)	☐unconfirmed ☐confirmed, when and why: ☒Both, which is used when and why: Depending on user application. Data rate, timing and power back-off algorithm (only if you use confirmed uplinks): In the absence of ACK the end-device will try to retransmit the same data again, with a configurable maximum number of retries. Each data rate will be used twice and will be be lowered after that till DR0 is achieved. ☒Yes. ☐No, why :
2.17 Is the device doing a periodical rejoin? (only for OTAA)	☐Yes (frequency): ☒No. Why? How to trigger a rejoin? see 1.21
2.18 Is the first join request sent on SF12?	☐Yes. ☒No, why: Explain the JoinRequest sequence if no JoinAccept is received - data rate, timing and power back-off algorithm. It will be retransmitted on a new random frequency channel if no join accept is received. The maximum number of retries is fixed to 12. The first transmission happens with SF7. Each data rate will be used twice and will be lowered after that.
2.19 On what SF and power setting is the first uplink (after join procedure) done?	SF: Configurable TXPower: Configurable
2.20 Are you doing periodically reset of Uplink frame counter?	☐Yes (frequency/why): ☒No.
2.21 If LoRaWAN 1.0.x, DevNonce behaviour :	☒ Based on a random value ☐ Monotonically increasing never-wrapping counter
2.22 Uplink DataRate (0-7 supported)	Min: 0 Max: 7

2.23 RX1 Data Rate Offset	☒Default LoRaWAN in regards of ISM band ☐Other:
2.24 RX1 Delay	☒Default LoRaWAN in regards of ISM band ☐Other:
2.25 RX2 Data Rate	☒Default LoRaWAN in regards of ISM band ☐Other:
2.26 RX2 Frequency	☒Default LoRaWAN in regards of ISM band ☐Other:
2.27 RX1 Delay on JoinRequest (OTAA devices only)	☒Default LoRaWAN in regards of ISM band ☐Other:
2.28 Mobility Profile (how your device moves)	☐Near static ☐Walking speed ☐Vehicle speed ☐Random
2.29 Frame Counters Up To 32-bits	☒Frame counter-up ☒Frame counter-down
2.30 Which MAC commands does the device support	☒LinkCheckReq / LinkCheckAns ☒TXParamSetupReq / TXParamSetupAns ☒LinkADRReq / LinkADRAns ☒DutyCycleReq / DutyCycleAns ☒RXParamSetupReq /RXParamSetupAns ☒DevStatusReq / DevStatusAns ☒NewChannelReq / NewChannelAns ☒TXTimingSetupReq / TXTimingSetupAns
2.31 LoRaWAN Stack Type (optional)	☐Semtech/Stackforce ☐Semtech/Stackforce with modifications ☐IBM ☐IBM with modifications ☒Proprietary- Other, name it:
2.32 LoRaWAN Stack Version (optional)	
2.33 LoRa Radio Hardware (optional)	☐Proprietary: SX chip used: ☐LoRaWAN Modem/Module: Manufacturer: Part Number: Firmware revision:

2.34 Multicast support (optional)	☒Yes: Multicast DevAddr: Configurable Multicast AppSKey: Configurable Multicast NwkSKey: Configurable Payload: Configurable Port: Configurable ☐No.

3 Radio Frequency Information

3.1 Type of Antenna	☐Wire ☐PCB ☒External ☐Other: (which type)
3.2 Antenna gain [dBi or dBd]	dBi or dBd
3.3 Did you measure and take into account the loss between the modem and the antenna?	☒Yes, Configurable dB loss ☐No, why:
3.4 For LW 1.0.2 rev A or older devices: which TXPower setting should be used on the network for your device*:	☐ TXPower 0 (20dBm) ☐ TXPower 1 (14dBm) ☐ TXPower 2 (11dBm) ☐ TXPower 3 (8dBm) ☐ TXPower 4 (5dBm) ☐ TXPower 5 (2dBm) ☐other txpower (dBm)
3.5 Did you calibrate your device with the antenna gain and measured loss in between the chipset and antenna? This so that your device emits with maximal power when using TXPower 1 for LW 1.0.2 rev A or older devices (= 14dBm) and TXPower 0 for LW 1.0.2 rev B or newer devices (= MaxEIRP or 16.15dBm EIRP)*.	☒Yes, Configurable dB loss ☐No, why:

4 Battery and TX Power Information

Please indicate if you do not want Section 4 displayed on the LoRa Alliance Website ☐Yes
If yes please supply contact details for the operators to request the information for Section 4

4.1 Battery consumption of the device (including modem, sensors and all other electronics	TX current: 28 mA (Tx @ 3.0 V/ +13 dBm) RX current: 11,2 mA Idle time current: 1,4 µA (module in sleep, RTC running)
4.2 Estimated battery life in years based on the number of transmissions (including sensor readings) at SF7, SF10 & SF12 with your battery self-discharge and aging over time taken into account. **Assumptions:** - Product shelf life before use: Maximum 1 year. - At an environment temperature of 20°C. - LoRaWAN specification used for battery life calculation: - TX power setting (txpower) used for battery life calculation: - Payload size used for battery life calculation (should be average payload size of production device): - Additional assumptions or comments on battery life (Typical usage	Battery life in years Transmission Periodicity (transmissions/day) SF7 SF10 SF12 144 96 48 24 12 4 1 ☐LW1.0.1 ☐LW1.0.2 revA ☐LW1.0.2 revB ☐Other : ☐LW1.0.1 ☐LW1.0.2 revA ☐LW1.0.2 revB ☐Other : bytes Depending on the user application

4.3 Which TX power setting (TXPower) was used in the RF test? - If LW 1.0.2 rev A or older device: - If LW 1.0.2 rev B or newer device:	☐ TXPower 0 (20dBm) ☐ TXPower 1 (14dBm) ☐ TXPower 2 (11dBm) ☐ TXPower 3 (8dBm) ☐ TXPower 4 (5dBm) ☐ TXPower 5 (2dBm) ☐other TXPower (dBm) ☐ TXPower 0 (MaxEIRP) ☐ TXPower 1 (MaxEIRP-2dB) ☐ TXPower 2 (MaxEIRP-4dB) ☐ TXPower 3 (MaxEIRP-6dB) ☐ TXPower 4 (MaxEIRP-8dB) ☐ TXPower 5 (MaxEIRP-10dB) ☐ TXPower 6 (MaxEIRP-12dB) ☐ TXPower 7 (MaxEIRP-14dB) ☐other TXPower (MaxEIRP- dBdBm)
4.4 Is this the same TX power setting (TXPower) used by default in production devices (before network ADR)?	☐Yes, ☐No, why:
4.5 Maximum ERP measured: (ERP = EIRP - 2.15 dB; LoRaWAN allows 14 dBm ERP)	dBm
4.6 TRP measured: (TRP is based on EIRP) This gives an idea about the directivity of the antenna.	dBm
3.10 TIS measured on RX1:	For RX1-SF12BW125 on 868.3MHz dBm
3.11 TIS measured on RX2	For RX2-SF12BW125 on 869.525 MHz: dBm