IQD-DB1M-01A

IQRF DALI Bridge

User's guide

Description

The IQD-DB1M-01A indoor DALI bridge enables to communicate with equipment with the DALI interface via the IQRF wireless Mesh network. It works as a bidirectional data tunnel to transfer data frames between IQRF and DALI. It is intended for mounting into soffits.

It is an IQRF Interoperable device according to the IQRF DALI Standard.

Key features

- NFC chip for easy including into the network
- Indoor only, for mounting into soffits
- Small dimensions, 22 mm height
- Configurable via RF
- Powered from mains
- DALI protocol encapsulated into IQRF protocol
- Interoperable, observing IQRF DALI Standard

Applications

- Wirelessly controlled lighting
- Lamps
- Building automation
- For STD as well as STD+LP networks
- Internet of Things

Block diagram
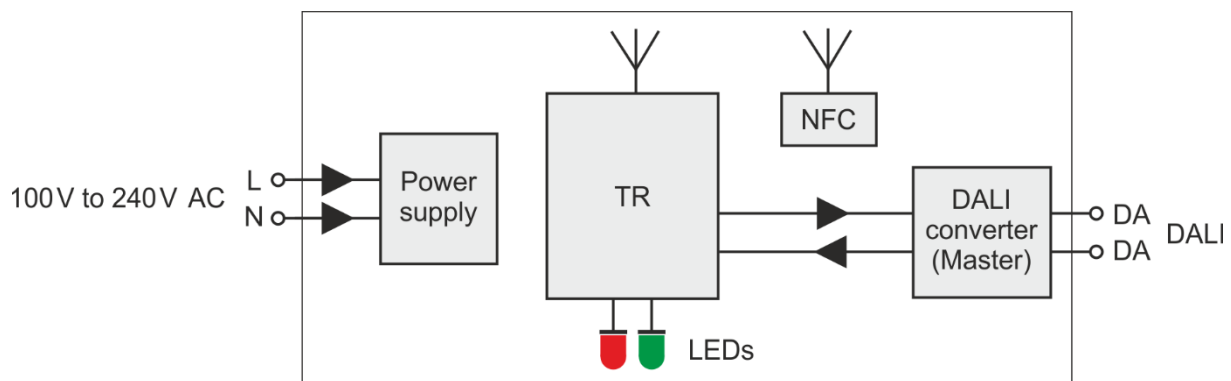
Technical specifications

Typical values (until otherwise specified)

Supply voltage	100 V to 240 V AC (mains)
Supply wattage	0.25 W max.
RF transceiver	TR-76D
RF antenna	Flexible printed circuit inside the case
RF band	868 MHz
	916 MHz on request
Effective radiated power	Programmable in 8 levels up to the following values:
868 MHz band	-1.4 dBm
916 MHz band	*To be defined*
RF range	Up to 130 m 1
Other RF parameters	See TR-76D datasheet
IQMESH network Node type	STD
Custom DPA Handler	HWPID = 0804
Alternative DSM channel	67
Default Access Password	All 16 B filled with zeros
Temperature	
Operating	-10 °C to +60 °C
Storage	-10 °C to +60 °C
Relative humidity	5 % to 80 %, without condensation
Case	
Material	ABS plastic
Size	88 mm x 38 mm x 22 mm
Ingress protection	IP20, for mounting into soffit
Flammability	UL 94 HB
Weight	48 g

Note 1: Test arrangement: bidirectional communication with a counterpart TR-72DA transceiver plugged in DK-EVAL-04A kit, both devices in free space, 1.6 m above the ground, antennas in the bridge and the counterpart oriented parallelly. For **non-parallel** arrangement, the range is **seriously lower**. See chapter *Antenna*.
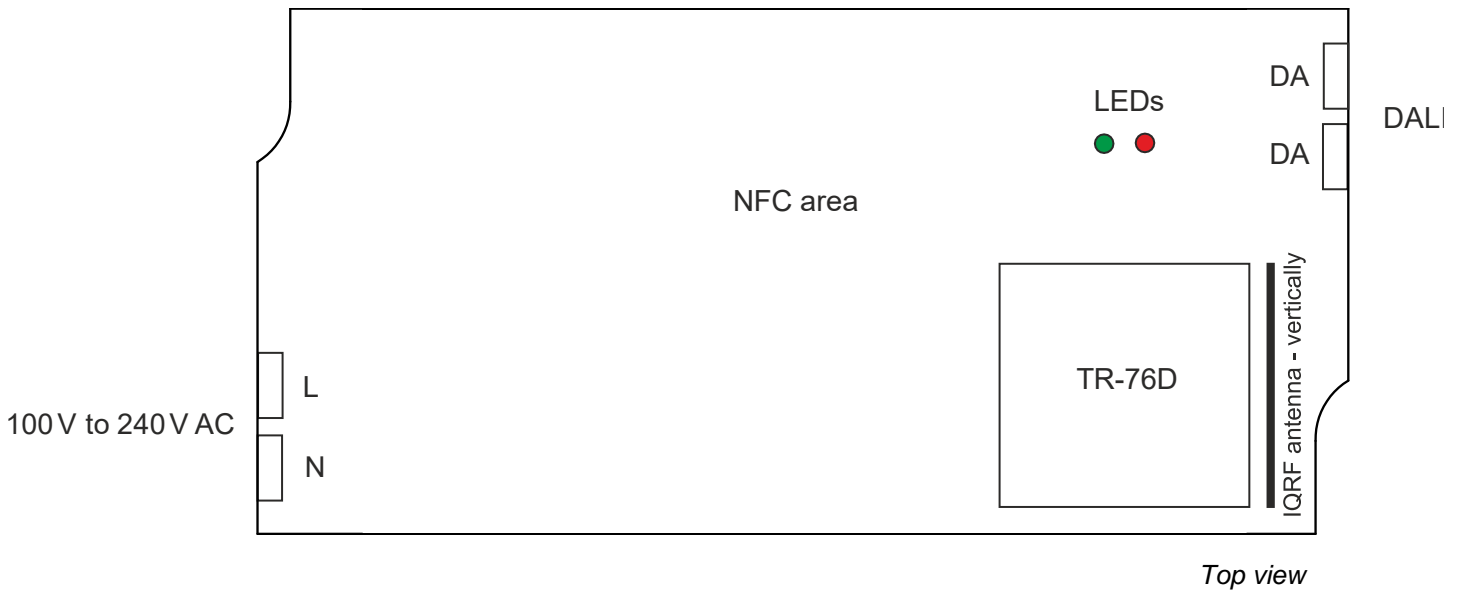
Absolute maximum ratings

Stresses beyond those values may cause permanent damage to the device. Exposure to maximum rating conditions for extended periods may affect device reliability.

Supply voltage	260 V AC max.
Temperature	-20 °C to +70 °C

Hardware

Layout

Top view

Power supply

> **Warning**
>
> Installing and all other handling the bridge must be done only by a person authorized to work with dangerous voltage.

The bridge must be supplied via a 2-wire cable certified for powering from mains, connected to the spring clamp connector. See the diagram in chapter *Layout*. The cable is not delivered with the bridge.

LEDs

Both LEDs (red and green) are intended for system indication, especially during the installation, maintenance and service. The LEDs are distinctly visible only inside the case. See the diagram in chapter *Layout* for LED locations.

NFC

The NFC non-volatile memory (EEPROM) with a contactless interface enables wireless Near-Field Communication between the bridge and a portable device like a mobile phone when it is located very close (up to a few centimeters) to the NFC area. This is primarily intended for bonding (including the bridge into the IQMESH network).

IQRF antenna

The antenna is implemented as a meander on a flexible printed circuit inside the case. The bridge must be **installed with respect to orientation of the antenna**:

Correct   Incorrect

Correct   Incorrect

Software

The TR inside the bridge is equipped with the following software:

- **Operating system** IQRF OS
- **DPA plug-in** `DPA-Node-STD…`
- Custom DPA Handler according to the HWPID assigned to IQD-DB1M-01A.

All software inside the bridge (see above) is upgradeable. However, the possible upgrade must be done by a person familiar with the IQRF technology. Refer to the *IQRF DPA Framework Technical guide*, chapter *Over The Air (OTA) upgrade of IQRF OS and DPA*.

> The **TR** inside the bridge must be equipped with **the same IQRF OS version** and with **the same DPA version** as all other TRs in the given network.

Configuration

For security, some operations (e.g. the Autonetwork) require setting the proper **Access Password**. The Access Password of the bridge must be set the same as for the Coordinator in the given network. It must wirelessly be written into the **TR configuration** of the transceiver inside the bridge, using IQRF IDE and CATS. See the *IQMESH Network Deployment Technical guide*, chapter *CATS Service Tools.* Another possibility is via the network. See the *IQMESH Network Deployment Technical guide*, chapter *Change of TR Configuration.*

The **Access Password** is the only parameter from TR configuration which must be set before bonding the bridge by Autonetwork. All other configuration parameters are **preconfigured** from the factory or will be **inherited** wirelessly from the network Coordinator (automatically during bonding). See Default Access Password for the value preconfigured from the factory.

Additionally, the Access Password is also intended for possible subsequent **maintenance**, such as authorization in *DPA Service Mode* (DSM) and encryption and decryption of backup data during the *Backup / Restore* process intended for an easy future **replacement** of the bridge in the network (e.g. after the damage of the bridge).

If the bridge is bonded via the Smart Connect, the Access Password is inherited from the Coordinator automatically.

Product identification

The DALI bridge product type can be identified in the IQRF Repository as an IQRF interoperable device through the HWPID.

Installation

> **Warning**
>
> Installing and all other handling the bridge must be done only by a person authorized to work with dangerous voltage.

The bridge should be put into operation by a person familiar with IQRF technology in some measure.

Including into the network

The bridge can be used in both IQMESH network types: STD as well as STD+LP.

The bridge must be included (bonded) into the desired IQMESH network. From the bonding point of view, the two states of the bridge are recognized: **bonded** or **not bonded**.

LED indication

The behavior is depicted in the time diagrams below where individual lines relate to **LEDR** and **LEDG**. Possible actions of the network **Coordinator** (typically inside a gateway) are depicted in purple.

The bonding states are indicated **after power on** by LEDR and LEDG.

Bonded

A bonded bridge is indicated by a single flash of the red LEDR.

Not bonded

A not bonded bridge is indicated by rapid LEDR flashes, **waiting for** (a new) **bonding**.

Error

Other ways of LEDR and LEDG behavior indicate **errors** (e.g. an incomplete bonding). To recover from an error state, unbond the bridge or restore the factory settings of the bridge and try to bond it once more. If not helped, it is probably a question of a more serious fault. Contact IQRF support in such a case.

Bonding

A bridge to be bonded **must** always be in the **not bonded** state. Thus, before a new bonding, the possibly bonded bridge (e.g. still remaining bonded to another network from a previous application) must be unbonded first.

It is possible to bond the bridge via **Smart Connect** or Autonetwork.

Smart Connect

To bond the bridge using the Smart Connect, perform the following steps:

- The bridge is identified by the so-called **IQRF Smart Connect Code**. For Smart Connect bonding, this code must be transferred into the Coordinator (gateway) in advance. It can be accomplished in various ways, e.g. via the QR code or via NFC. See chapter *IQRF Smart Connect in practice* for details.
- Place the bridge to be **in range with** at least one **Node already bonded** in the network (with routing enabled and not sleeping). It may but need **not** be the **final location** of the bridge.
- Switch the power supply on. The LEDR starts rapidly flashing and the bridge is waiting for bonding.
- Launch the Smart Connect procedure (▼) at the Coordinator.
- Wait until the Smart Connect process is finished. Successful bonding is indicated by a single LEDG flash for 0.5 s.
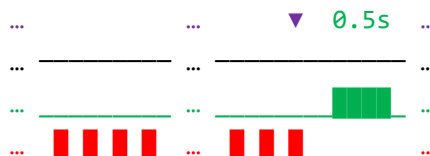
- Relocate the bridge to the **final location** (if needed).
- Perform **Discovery** at the Coordinator (to update routing paths with respect to the new topology).

Autonetwork

To bond the unbonded bridge using the Autonetwork, perform the following steps:

- Ensure setting the Access Password according to the network Coordinator. See chapter *Configuration*.
- Place the bridge to its **final location**.
- Switch the power supply on. The LEDR starts rapidly flashing and the bridge is waiting for bonding.
- Launch the *Autonetwork* process at the Coordinator. See the *IQMESH Network Deployment Technical guide*, chapter *Autonetwork*.

The Autonetwork automatically bonds the bridge and performs the **Discovery** (to update routing paths with respect to the new topology). The resulting state of the bridge is either bonded (LEDR off) or unbonded (LEDR still flashing). The result can be detected at the Coordinator side, e.g. in IQRF IDE or IQRF Gateway Daemon (if applicable).

Unbonding

It is possible to unbond the bridge (exclude it from the network) in several ways. After unbonding, the bridge is automatically restarted and rapid LEDR flashes indicate the unbonded bridge.

Unbonding by DPA commands

If the bridge is accessible in the given network, it can be unbonded by DPA commands from the Coordinator as follows:

- DPA Request Remove bond: The bridge is unbonded on the Node side
- DPA Request Remove bonded node: The bridge is unbonded on the Coordinator side
- DPA Request Clear all bonds: Alternatively, all Nodes in the network are unbonded on the Coordinator side

If the bridge should be unbonded on both the Coordinator as well as the Node sides, two DPA Requests should be sent (in the order given): Remove bond and Remove bonded node.

The same can also be accomplished using the IQRF IDE development environment connected to the Coordinator (*Tools / IQMESH Network Manager / Control / IQMESH / Local section*). See the *IQMESH Network deployment Technical guide*, chapter *Unbonding*.

Unbonding by CATS

Even if the bridge is not accessible in the given network, it can be unbonded by the CATS (a service tool implemented by another TR plugged into the CK-USB-04A development kit with IQRF IDE connected) as follows:

- Connect CATS to the bridge (IQRF IDE, menu Tools / CATS Service Tools / DPA Service Mode).
- Click the *Unbond* button.
- Reset the bridge (by switching the power supply off and on).

Refer to the *IQRF IDE Help*, chapter DPA Service Mode.

Backup/Restore

To enable seamless replacing a possibly damaged bridge, the respective data must be read from the bridge before the damage. This data can be copied into a new bridge any time later. Refer to the *IQMESH Network Deployment Technical guide*, chapter *Transceiver replacement*.

Factory settings

Regardless of the actual configuration and bonding information stored in the bridge, it is possible to restore the factory setting to the default values as follows:

Factory settings by DPA command

Applicable only if the **Node is accessible in the given network**.

- DPA Request *Factory Settings*

Factory settings by CATS

Even if the Node is not accessible in the given network, it can be reconfigured to factory settings by the CATS service tool. This method is only applicable if Access Password is known.

- Connect CATS to the Node (IQRF IDE, menu *Tools / CATS Service Tools / DPA Service Mode*).
- Click the *Factory Settings* button.
- Reset the Node (e.g. by switching the power supply off and on).

Refer to the *IQRF IDE Help*, chapter *DPA Service Mode*.

Operation

Bridging

Once the bridge is successfully **bonded**, it immediately starts bridging all packets between its IQMESH and DALI interfaces. The communication is based on requests from the IQMESH Coordinator and responses from the DALI device.

IQRF DALI Standard is specified at https://www.iqrfalliance.org/techdoc_files/IQRF-StandardDALI_V000.pdf.

Macros for controlling a DALI device via the DALI bridge using IQRF IDE are available on the IQD-DB1M-01A product page.

Routing

Additionally, if the bridge is **discovered**, it routes all received packets according to the IQMESH routing rules for other Nodes in the network.

IQRF Smart Connect in practice

The Smart Connect should be performed by a person a bit familiar with IQRF technology.

IQRF Smart Connect Code

Read the IQRF Smart Connect Code from the bridge by a **mobile application** (such as IQRF Network Manager for Android). It can be accomplished in various ways, e.g. via the **QR code** or via **NFC**.

QR code

The **IQRF Smart Connect Code** can anytime be read from the **QR code** on the **label** on the bottom side of the case.

NFC

The **IQRF Smart Connect Code** can anytime be read via NFC by bringing a smartphone with the mobile application close to the NFC area at the bridge.

For some smartphone types, this step must be performed with the bridge disconnected from power supply.

IQRF Repository

The mobile application is linked to the IQRF Repository. It is public on-line **storage** and **database** containing information regarding all **IQRF interoperable products**. It provides information about and relations between the IQRF objects such as **companies**, **products**, **DPA handlers**, **standards**, **OS**, **DPA**, etc. Individual product types are identified by their **HWPID**s.

Smart Connect launch

The Smart Connect can be launched:

- Via the IQRF Gateway Daemon API
- Via the web page inside the IQRF Gateway Daemon using the IQRF Gateway webapp control application.
- Via IQRF IDE.

Mechanical drawings
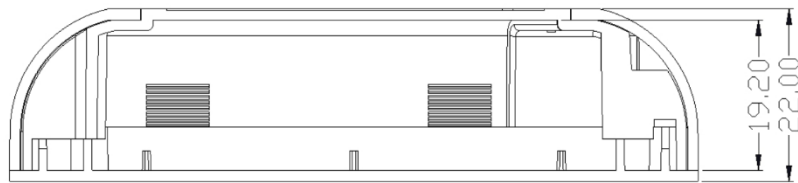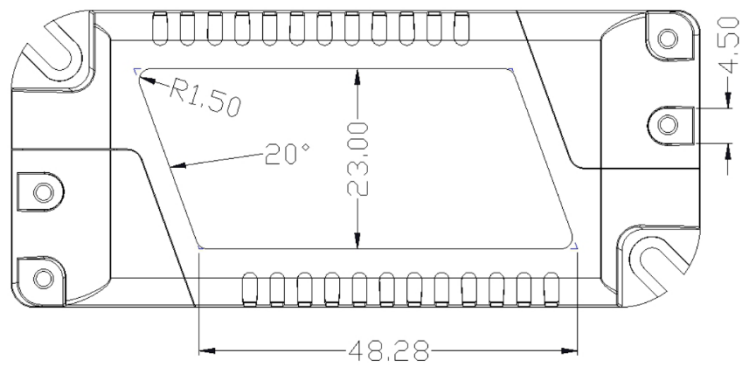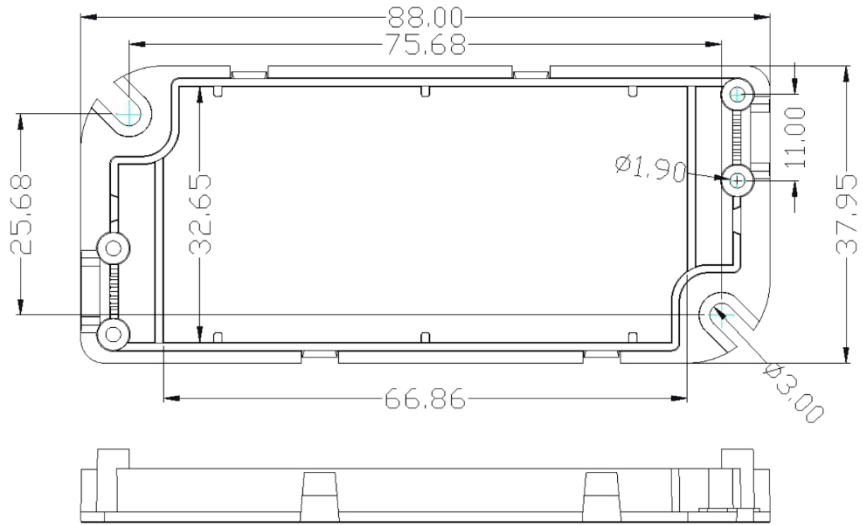
Product information

Ordering code

IQD-DB1M-01A   IQRF DALI bridge, 868 MHz band

Supplied contents

IQRF DALI bridge, without a power cord.
Delivered with current versions of all software included. Lower versions are available on request.

Document history

201114   First public release.

Sales and Service

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Technology and development

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Partners and distribution

www.iqrf.org/partners

Quality management

ISO 9001 : 2009 certified

Complies with ETSI directives EN 301 489-1 V1.9.2:2011, EN 301 489-3 V1.6.1:2013, EN 300 220-1 V3.1.1:2017, EN 300 220-2 V3.2.1:2018 and ERC Recommendation 70-03 (2017) and VO-R/10/05.2014-3.

Complies with directives 2011/65/EU (RoHS) and 2012/19/EU (WEEE).

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