Product Description

The LumenRadio W-DALI Node module is an innovative solution at the forefront of modern lighting control. It enables IEC 62386 without the constraints of physical cabling, providing wireless control of DALI-2 compatible luminaires and devices.
Harnessing the robust capabilities of LumenRadio's MiraMesh technology, the W-DALI Node module ensures reliable radio communication through its self-forming and self-healing wireless mesh architecture. MiraMesh is already trusted by numerous installations worldwide, spanning from lighting control to industrial sensor networks and building automation.
Operating within the internationally approved ISM band at 2.4GHz, the W-DALI Node module offers an operational range of up to 500 meters in line-of-sight conditions. This extensive reach, coupled with its scalable network architecture, allows for flexible deployment scenarios, catering to diverse installation needs.
At its essence, the W-DALI Node module prioritizes seamless integration and compatibility. A W-DALI network consist of a root gateway such as LumenRadio W-DALI DIN rail and a number of W-DALI Node modules. The gateway communicates over traditional DALI-2 with a controller, and the Node modules in turn do the same with the luminaire or other device in which it is integrated. This "wireless cable" approach allows it to seamlessly integrate into existing wired systems. Additionally, each node supports up to 10 wired devices on its local bus, meaning that a luminaire with an integrated W-DALI Node can act as a bridge to the gateway for a local traditional DALI-2 bus.
The W-DALI Node module requires very limited external circuitry for integration, meaning that it can easily be integrated into a DALI-2 compatible device.

Features

- IEC 62386 compliant
- Plug and play integration into a DALI 2 compatible device
- Instant wireless setup and fully compatible with LumenRadio W-DALI DIN rail and W-DALI Node
- Built upon LumenRadios patented MiraMesh technology
- Self-optimizing network – the mesh network will always find the best way to send messages through the network between devices.
- Compliant against ETSI EN 300 328 (v2.2.2)
- Compact size with few external components required.
- Over-the-air firmware upgrades
- Minimal external circuitry needed

Specifications

- Range: up to 500m free line of sight between root and meshing unit.
- Range: up to 250m free line of sight between two meshing units.
- Output (ERP): Max 20 dBm
- Sensitivity: -93dBm
- Frequency band: 2.45 GHz, ISM band (2402-2480 MHz)
- Up to 10 wired devices on each local Node bus
- Number of hops: 8 hops in the meshing network
- Dimensions: 33.5 x 18.5 x 3.77mm
- Supply voltage 3.0 - 3.6V
- Peak average current consumption 150mA in high power mode

LumenRadio AB
Johan Willins gata 6
SE-416 64 Gothenburg
Sweden

www.lumenradio.com
sales@lumenradio.com
W-DALI webpage

Phone: +46 31 301 03 70
Fax: +46 31 301 03 80

Contents

Specifications

- RF Output: Max 20 dBm
- Sensitivity: -96 dBm
- 115.5 dB link budget
- u.FL/IPEX external antenna connector
- Frequency band: 2.45 GHz, ISM band (2402-2480 MHz)
- Dimensions: 33.5 x 18.5 x 3.77 mm

Absolute maximum ratings

Maximum ratings are the extreme limits to which the W-DALI Node module can be exposed for a limited amount of time without permanently damaging it. Exposure to absolute maximum ratings for prolonged periods of time may affect the reliability of the device.

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD	Supply voltage	-0.3		3.9	V
TA	Operating temperature	-30		75	℃
VIO	IO Input voltage VDD < 3.6 V			VDD + 0.3	V
VIO	IO Input voltage VDD > 3.6 V			3.9	V
VSS	Ground pad voltage			0.0	V
TS	Storage temperature	-40		+125	℃
RFin	RF input power			+10	dBm
ESD	ESD all pins, Human Body Model			1	kV

Recommended operating conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD	Supply voltage	3.0	3.3	3.6	V
Vrise	Supply rise time (0 V to 3.7 V)			60	ms
IDD	Supply peak current capability		150	250	mA

Please see Integration Overview for a more specific guideline.

Digital I/O pins

Symbol	Parameter	Min.	Typ.	Max.	Unit
VIL	Input voltage logic low	0		0.3*VDD	V
VIH	Input voltage logic high	0.7*VDD		VDD	V
VOL	Output voltage logic low	0		0.4	V
VOH	Output voltage logic high	VDD-0.4		VDD	V

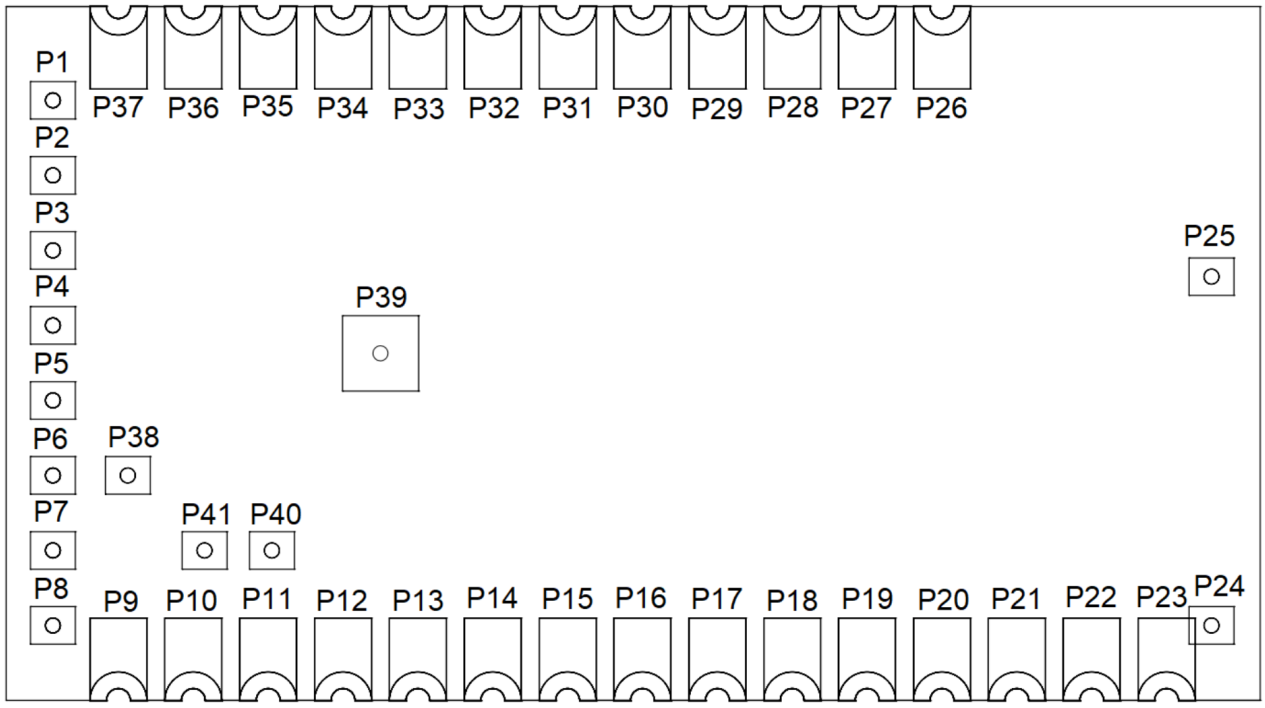
RF performance

RF performance below is valid at an ambient temperature of 25℃ and a supply voltage of 3.3 V.

Symbol	Parameter	Min.	Typ.	Max.	Unit
f-range	Operating frequency range	2402		2480	MHz
RXsens	Receiver sensitivity (0.1%BER)		-96		dBm
TXpout	TC output power		19.5		dBm

Pin assignments

Pin functions



Module seen from top.

No	Name	Type	Description
P1	VSS	Power	Ground (0 V)
P2-P3	N.C.	No connection	Do not connect
P4	TxD	UART transmit	Reserved for future use
P5	RxD	UART recieve	Reserved for future use
P6	N.C.	No connection	Do not connect
P7	VSS	Power	Ground (0 V)
P8	N.C.	No connection	Do not connect
P9	VSS	Power	Ground (0 V)
P10	SUBNET	Digital input	High: subnet 2, Low: subnet 1. Internal Pull up

No	Name	Type	Description
P11	CTRL	Digital input	High: idle, Low: active. Internal Pull up
P12-P18	N.C.	No connection	Do not connect
P19	N.C.	No connection	Do not connect
P20	SWDIO	Serial Wire Debug IO	See pin description below
P21	SWDCLK	Serial Wire Debug CLK	See pin description below
P22	ANT	Antenna selection pin	High: internal, Low: external. Internal Pull up
P23-P27	VSS	Power	Ground (0 V)
P28-P30	N.C.	No connection	Do not connect
P31	DALI RX 2	DALI recieve pin 2	Active high
P32	DALI RX 1	DALI recieve pin 1	Active high
P33	DALI TX 2	DALI transmit pin 2	Active low
P34	DALI TX 1	DALI transmit pin 1	Active low
P35	N.C.	No connection	Do not connect
P36	VDD	Power	Supply (3.3 V)
P37	VSS	Power	Ground (0 V)
P38	N.C.	No connection	Do not connect
P39	VSS	Heatsink	Connect to VSS
P40-41	N.C.	No connection	Do not connect

DALI TX pin description

Pins P33, P34 are both used for transmitting DALI serial data and shall be connected to each other externally. The polarity is active low, similar to the DALI protocol polarity, and thus an external pull up is recommended to avoid undefined behaviour during power off.

An external transistor circuit is needed to sink the required DALI Bus PSU current, see the typical application circuits section for an example.

DALI RX pin description

Pins P31 and P32 are both used for recieving DALI serial data and shall be connected to each other externally. An external pull up is recommended. The polarity is active high, meaning that an active DALI bus (low voltage) shall correspond to high voltage on the input pins. Thus, external polarity flip and voltage shift circuitry is necessary, which can be achieved with only a few components. See the typical application circuits section for an example.

CTRL pin description

The CTRL pin is used for two functions. The first being to trigger a reset to factory default upon release of the pin after being held low for >3s during operation. This will disconnect the module from any mesh network that has been set up. The second function is to put the module in bootloader mode if the pin is held low during power on. This is a reserved mode that shall be avoided but is included here for transparency.

The CTRL pin is active low and has an internal pull up.

CTRL pin action	Effect
0 V for >3s	Factory reset of W-DALI Node module

CTRL pin action	Effect
0 V during power on	W-DALI Node module enters bootloader mode (reserved)

Subnet pin description

The subnet pin can be used to select between subnet 1 or 2 for W-DALI network setup with a LumenRadio W-DALI RIN rail gateway without the W-DALI app.

The SUBNET pin has an internal pull up.

SUBNET pin level	Effect
Low	Node module will join gateway set to subnet 1
High or floating	Node module will join gateway set to subnet 2

UART pin description

Pins P4 and P5 expose a UART interface to the W-DALI Node module. It is reserved for future use.

ANT pin description

The state of the ANT pin is read during startup of the device. It has an internal pull-up which defaults it to the internal antenna if it is floating. If externally connected to 0 V, the module will instead use the external antenna through the u.FL RF antenna connector. Always keep an antenna connected to the port if operating in external antenna mode. Failure to do so may result in damage of the radio.

SWDIO, SWDCLK pin description

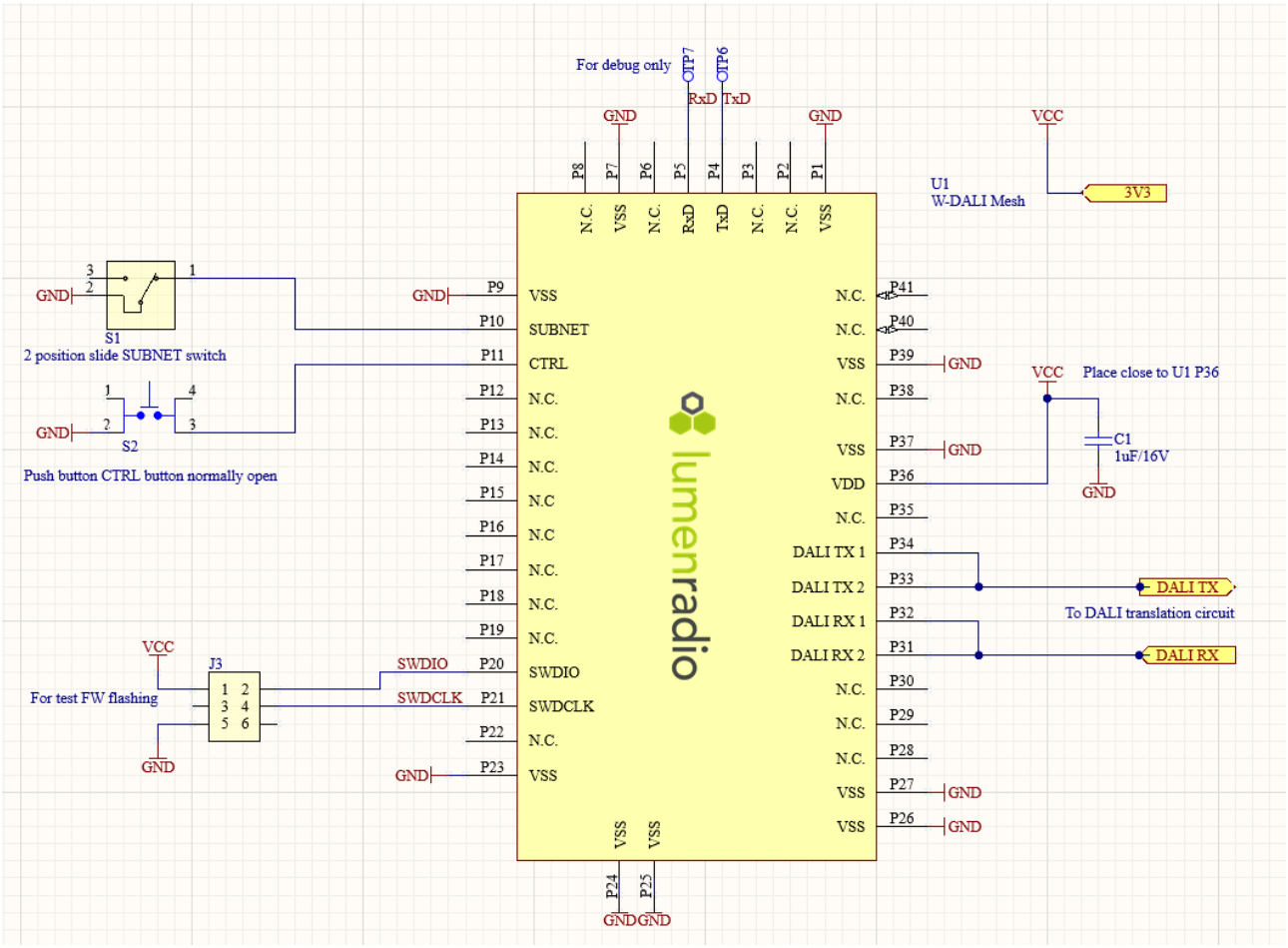
Pins P20, P21 expose the serial wire debug interface of the internal nRF5240 chip. The W-DALI Mesh OEM module comes flashed, licensed and ready to go without programming, but as an OEM integrator it is beneficial to run a custom radio test firmware during system certification according to applicable radio standards. The debug interface can be used to flash the module with test firmware. LumenRadio can provide firmware and guidance for efficient radio certification of the OEM product.

RF antenna connector

The top of the W-DALI Node module features an RF antenna connector of u.FL type which allows the use of an external antenna for improved range.

Typical application circuits

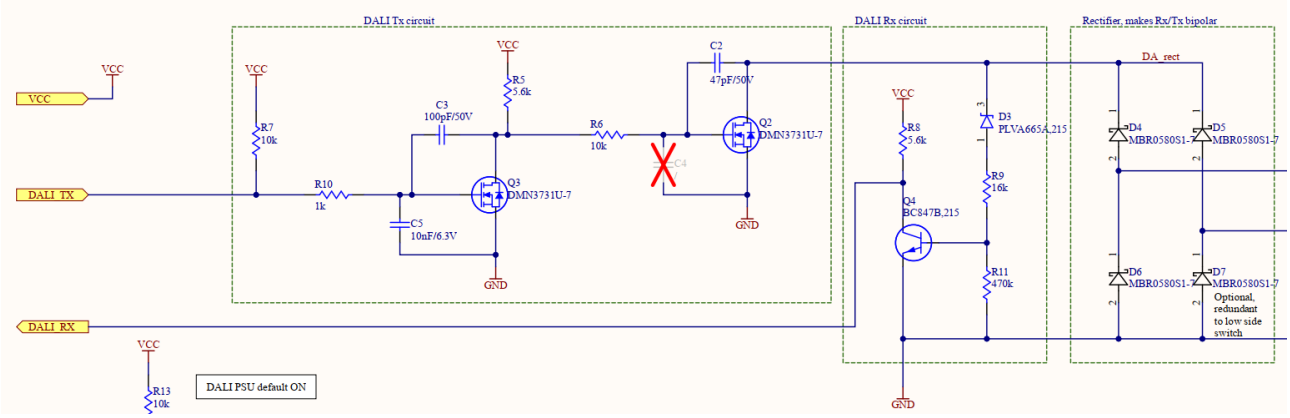
Example: W-DALI Mesh module



Integration of the W-DALI Mesh module is straight forward.

- Use at least 1uF ceramic decoupling capacitor close to the upply pin
- Expose SWDIO and SWDCLK pins for custom firmware flashing - useful for certification tests
- Connect both DALI TX and both DALI RX pins to the interface circuitry - see example below
- Connect SUBNET and CTRL pin to mechanical switches or to control MCU

Example: DALI bus interface circuitry



Refdes	Item name	Manufacturer	Part number
D3	Zener diode 6.5 V 250 mW	Nexperia Inc.	PLVA665A,215
D4-D7	Schottky diode 80 V 500 MA	Diodes Inc.	MBR0580S1-7
Q2-Q3	Mosfet N-CH 30 V	Diodes Inc.	DMN3731U-7
Q4	NPN 45 V 100 mA	NXP Semi.	BC847B
R5,R8	5k6 Ohm resistor	Generic	-
R6,R7	10k0 Ohm resistor	Generic	-
R9	16k Ohm resistor	Generic	-
R10	1k0 Ohm resistor	Generic	-
R11	470k Ohm resistor	Generic	-
C2	47pF 50V MLCC	Generic	-
C3	100pF MLCC	Generic	-
C5	10nF MLCC	Generic	-

A DALI interface circuit to connect the W-DALI module to a DALI bus can be constructed as in the design above.

DALI Tx circuit: Purpose: allow device to sink the required current during DALI transmission. DALI TX offpage is connected directly to the corresponding pins of W-DALI module. R7 is used as an external pull up to keep the bus at defined inactive state if the DALI module is restarted or similar. R10, C3, and C5 are all used to trim the on and off slope of Q3 FET which acts as a signal polarity inverter. It in turn controls the gate of Q2, which is the main current sinking FET and must be able to continously sink 260 mA if it is used to connect to a DALI bus according to IEC 62386. C2, R6, and R5 can all be trimmed fo adapt signal slope.

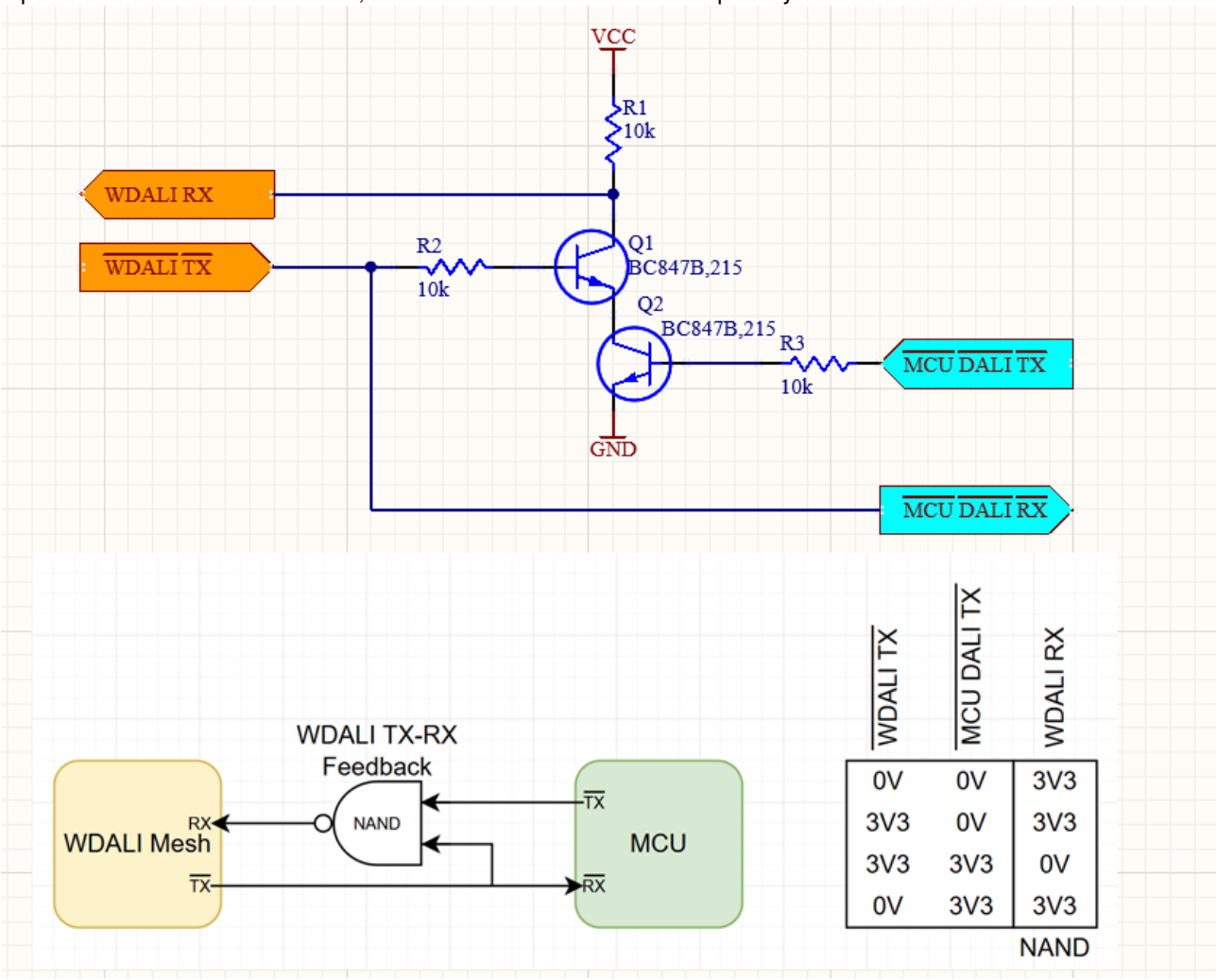
DALI Rx circuit: The purpose of this circuit is to separate W-DALI module from the high voltages of the DALI bus. It also polarity flips the signal voltage so that 3.3 V at DALI_RX pin corresponds to an active bus. Q4 is operated in saturation mode and its base voltage is controlled by the R9 and R11 divider together with the D3 zener. If the DA_rect voltage is below the D3 breakdown voltage, no current will flow through the Q4 base and DALI_RX net will be pulled high. If the bus is inactive with a voltage higher than the D3 breakdown voltage, reverse current will flow through D3 and correspondingly, through R9, D11 and Q4 base. This will result in a low voltage on DALI_RX due to the current through R8 and Q4 to GND.

DA Rect: This diode bridge rectifies the DALI bus voltage. Diodes need to be dimensioned to handle the necessary current on the bus.

Example: MCU interface circuitry

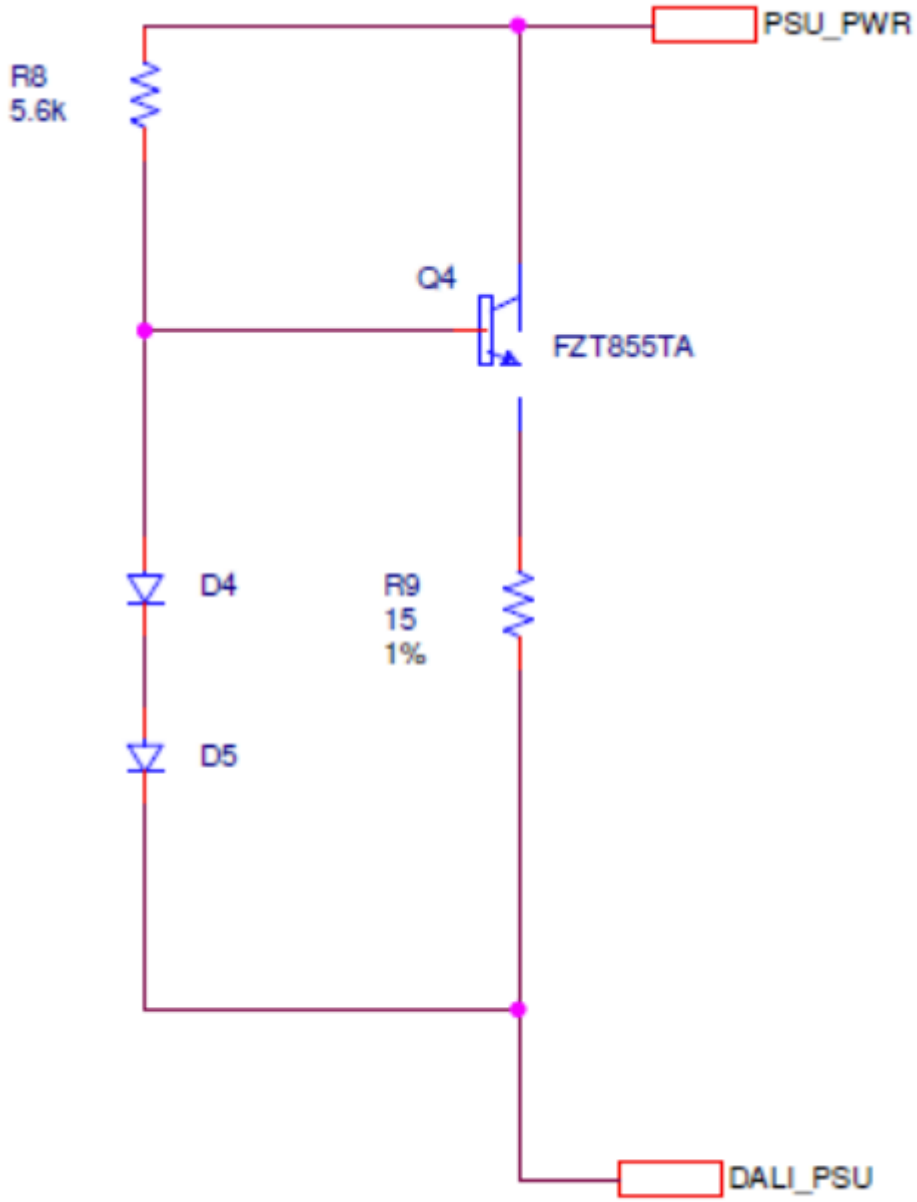
The W-DALI Mesh module may be interfaced directly with a controller MCU. It is important to provide a feedback circuit from W-DALI TX to W-DALI RX, as it is constantly monitored for colission detection. Furthermore, the WDALI

RX pin is inverted, and thus active high in contrast to the DALI protocol which is active low. To provide this interface functionality, a simple NAND gate can be used to combine the MCU TX and WDALI TX signals into WDALI RX. An example of this circuit is shown below, valid for a 3.3 V MCU with same polarity as DALI bus.



Refdes	Item name	Manufacturer	Part number
R1-R3	10k Ohm resistor	Generic	-
Q1, Q2	NPN 45 V 100 mA	NXP Semi.	BC847B

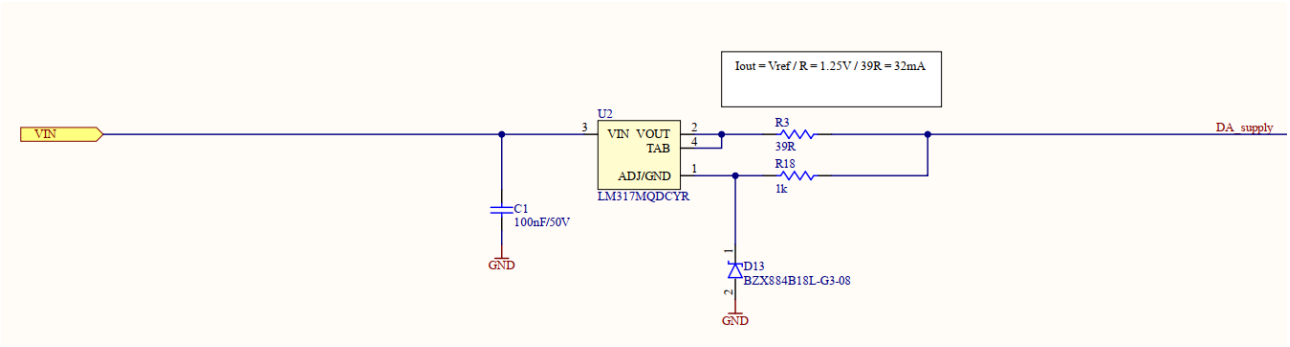
Example: DALI PSU (simple)



This is a simplistic but adequate low power DALI PSU circuit design. The minimum supply current for the DALI bus utilizing the above circuit is 30 mA with a short circuit current of approx. 50 mA. If higher supply current capabilities are required for power of a sensor from the DALI bus a more advanced DALI PSU design is required. In the circuit above the voltage drop of the base-emitter is matched by the voltage drop of diode D4. The voltage drop over D5 is therefore equal to the voltage drop of R9 which resistance will dimension the short circuit current. When the short circuit current is reached the voltage dop over R9 becomes larger than the voltage drop over D5. When this happens

the two diodes will start to conduct and the current will flow through the diodes and not to the base of Q4 which then turns off.

Example: DALI PSU (precise)



A more advanced PSU design can be achieved using the above circuit, which allow for more precise control over guaranteed PSU current while keeping the max current close to the guaranteed.

The VIN pin of U2 is supplied with a constant voltage source of 17-21 V. U2 tries to regulate the output voltage such that the voltage on pin 1 is 1.25 V below VOUT, i.e the voltage drop over output resistance R3 shall not exceed 1.25 V. If there is little current through R3 such that the drop over R3 is lower than 1.25 V, the VOUT pin voltage will increase until i reaches the input rail minus dropout voltage and act as a constant voltage supply. If output current is too high, such that the voltage on pin 1 will become lower than 1.25 V below VOUT, U2 will respond by lowering the output voltage and in such a way act as a current limiting circuit. Pin 1 has a high impedence input and thus the value of R18 is not critical.

The zener diode D13 is not needed if VIN is stable and always within specification, but if VIN may temporarily increase beyond the allowed DALI bus voltage, it can be used to limit the output voltage.

Functional description

Supported DALI commands

The list below specifies the currently supported list of substandards of IEC 62386. Any future additions are made available to already deployed modules via LumanRadios Firmware Over The Air feature in the W-DALI app.

IEC 62386 subpart:	Description	Status
101	General requirements – System components	16 and 24bit fame formats supported Backward frames supported Proprietary forward frames or other frame formats not supported
102	General requirements – Control Gear	7 device types are supported per device Memory banks 0 and 1 are supported
103	General requirements – Control devices	Memory banks 0 and 1 are supported

IEC 62386 subpart:	Description	Status
202	Self-contained emergency lighting	Supported
205	Incandescent lamp dimmer	Supported
207	LED (DT6)	Supported
208	Switching	Supported
209	Colour control (DT8)	Supported
250	Integrated Bus Power Supply	Supported
251	Luminaire Data	Supported
252	Energy Data	Supported
253	Diagnostics & Maintenance Data	Supported
301	Push buttons	Supported
302	Absolute input devices	Supported
303	Occupancy sensors	Supported
304	Light sensors	Supported

W-DALI reads the following parts of the memory banks as defined in the standards:

IEC 62386 subpart:	Read memory banks
201	6 memory cells
202-204	15 memory cells
205	28 memory cells
206	32 memory cells
207	7 memory cells
208	51 memory cells

Furthermore, the following limitations apply:

- Max 64 part 102 devices (including devices having the same short addresses).
- Max 64 part 103 devices (including devices having the same short addresses).
- RESET is blocked by default.

W-DALI App

Any product with an integrated W-DALI module is compatible with the W-DALI App from LumenRadio. It will simplify commissioning of the system and can be used to perform upgrade of device FW.

W-DALI general functionality

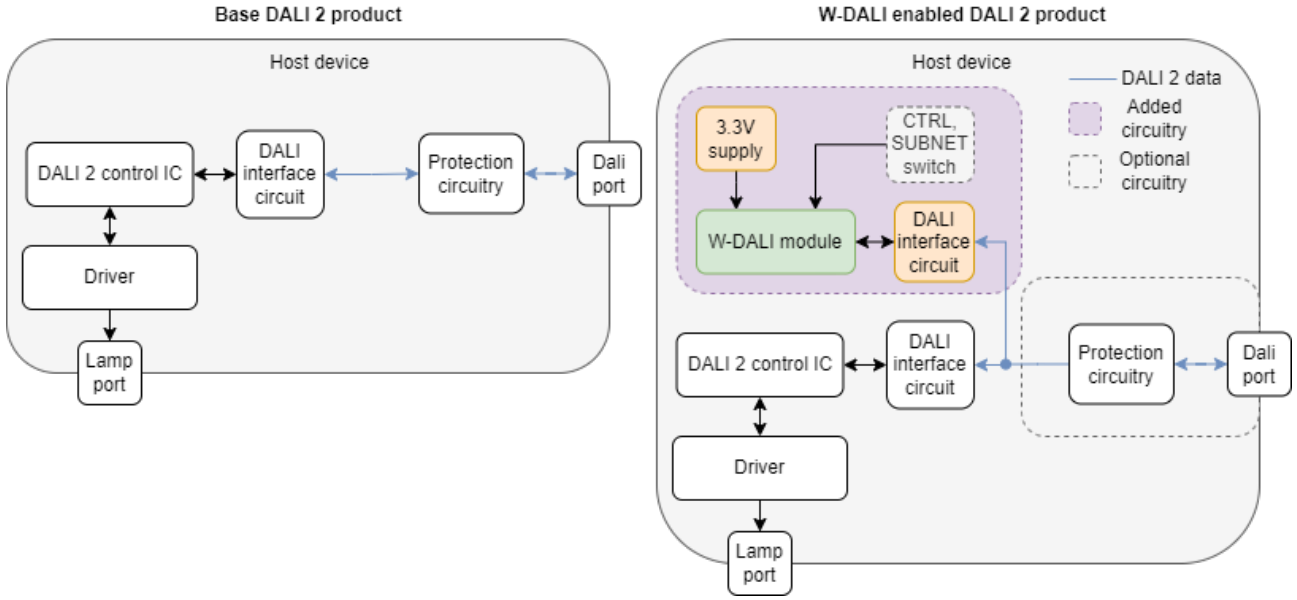
The W-DALI Mesh OEM module ships with identical firmware as the W-DALI Node. Please see the W-DALI Node manual.

Integration overview

This section provides a top level view of the complete process of integrating the W-DALI Node module into a product.

Block diagram

A typical OEM integration may look like the block diagram below. The base OEM product has a IEC 62386-interface to which the LumenRadio W-DALI OEM module is connected together with some limited external circuitry for DALI interface and power supply. By introducing the W-DALI module, the external DALI-2 port and related protection circuitry may be removed to obtain a pure W-DALI device. Note that an internal DALI PSU is needed in this case. Optionally, the external DALI-2 port may be kept which will allow for connection of up to 9 additional DALI-2 units on a local bus, all kept individually adressable from the DALI-2 controller connected to the W-DALI Root.



Step by step

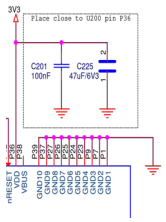
Given a base product with an existing DALI-2-interface, the replacement of the external DALI terminal interface with the LumenRadio W-DALI module could include the following steps:

- Provide a suitable 3.3 V power supply. See section `Power supply recommendations` for details.
- Provide interface circuitry between W-DALI module and IEC 62386 bus of host product. See typical application circuits section for details.
- Decide between internal and external PSU
- Decide if to keep external DALI terminal
- Integrate the W-DALI module on a host PCB. See Layout considerations for details.
- Perform compliance testing for market access

Power supply recommendations

The W-DALI Module is designed for 3.3 V operation. All pins should not have any power applied to them before the +3.3 V rail is applied.

To ensure reliable operation, the supply pin should be decoupled with a 100nF ceramic capacitor close to the supply pin. It is also recommended to add a high value ceramic bulk capacitor, such as 47uF, which will reduce the current ripple of the 3.3 V net.



During radio transmission, current consumption will rise sharply to 150 mA typical, 250 mA max. A typical slew rate value is 300 A/s during radio transmission.

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD	Supply voltage	3.0	3.3	3.6	V
Vrise	Supply rise time (0 V to 3.7 V)			60	ms
IDD	Supply peak current capability		150	250	mA
IDD_rate	Supply current slew rate		300		A/s

Common mistakes

The integration of the W-DALI Node module is straightforward, but for optimal RF performance it is important to follow the power supply recommendations and layout considerations. Failure to do so may result in inferior RF performance. Some important highlights to avoid the most common mistakes are shown below:

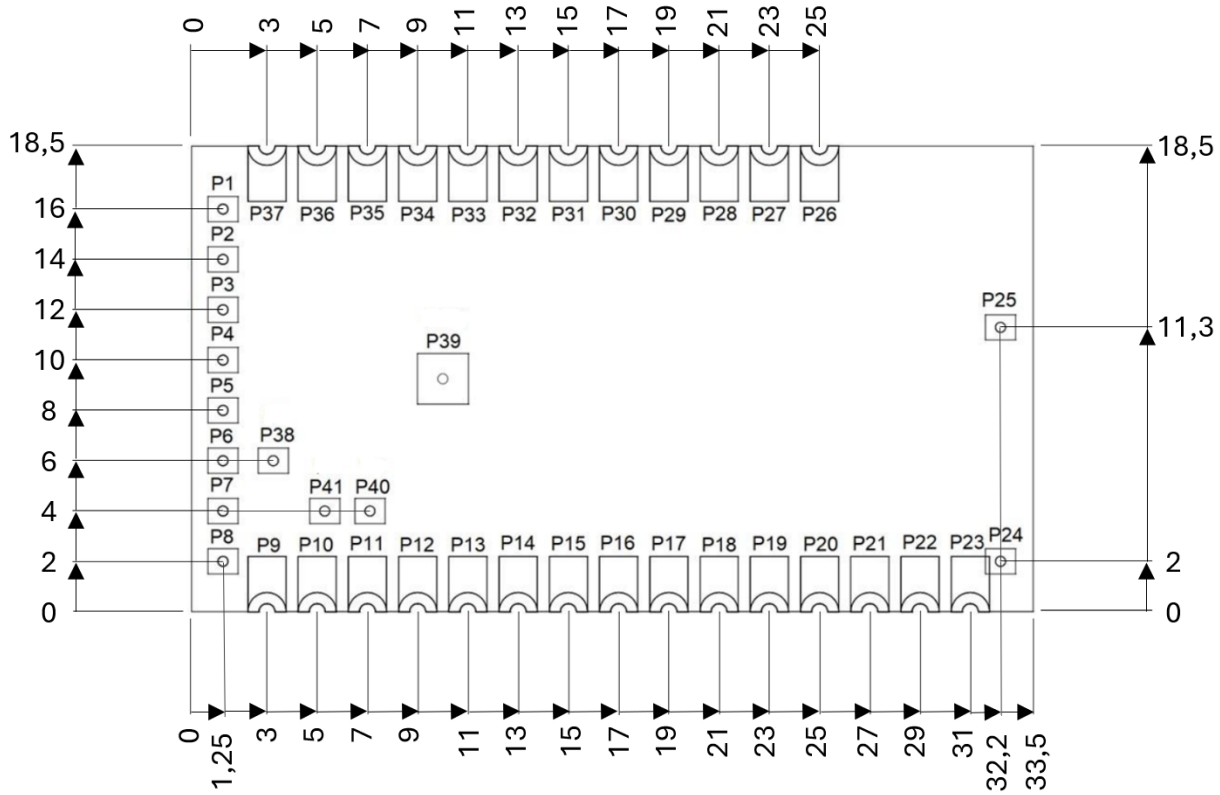
- The carrier PCB shall be of the recommended type and have a proper ground plane
- Product enclosure and carrier PCB shall adhere to the clearance recommendations
- Product enclosure shall not block radio-signals
- Power supply pins shall have sufficient decoupling

Layout considerations

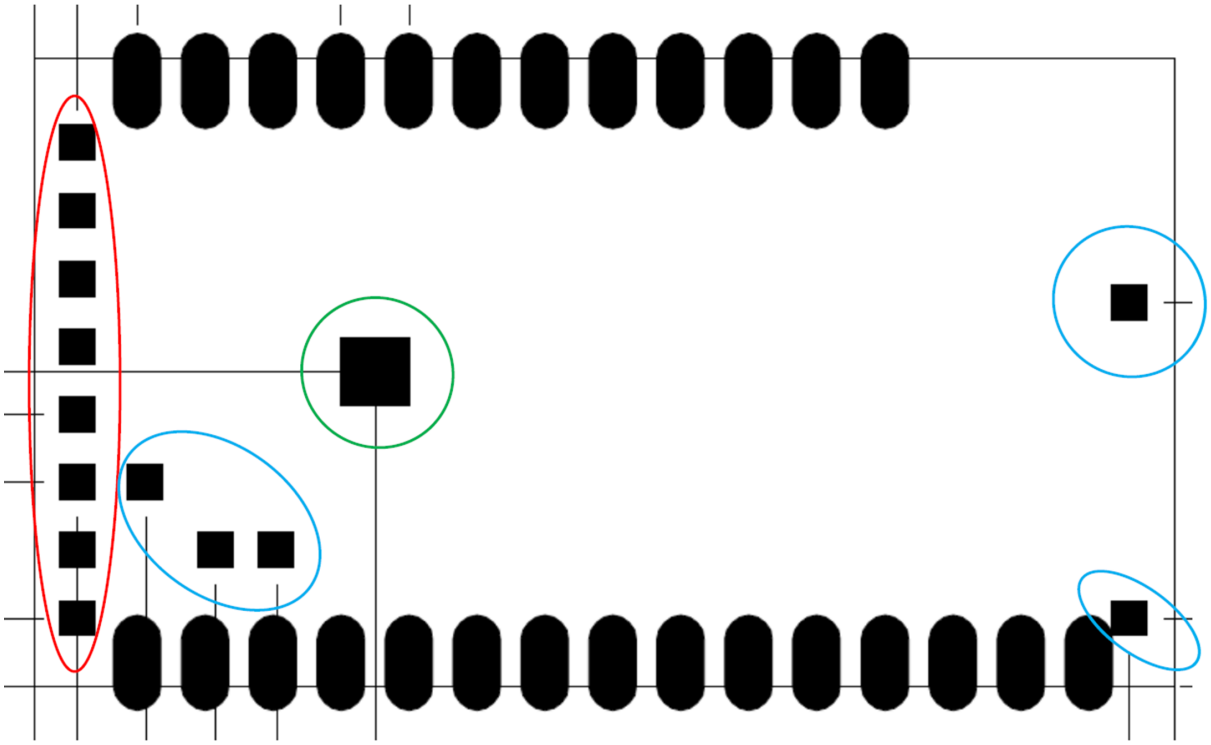
Electrical and mechanical design files are available for download at the support page.

Any measurement on this page is implicitly written in millimeters, if not specified otherwise.

W-DALI OEM module pad dimensions



Recommended footprint



- Main pads - oblong 1.4 x 2.79 (oblong edge a half circle with diameter 1.4)
- Small rectangles left edge 1.0 x 0.8 (red)
- Small squares right edge 1.02 x 1.02 (blue)
- Large square 2.0 x 2.0 (green)

Layout considerations for the carrier board

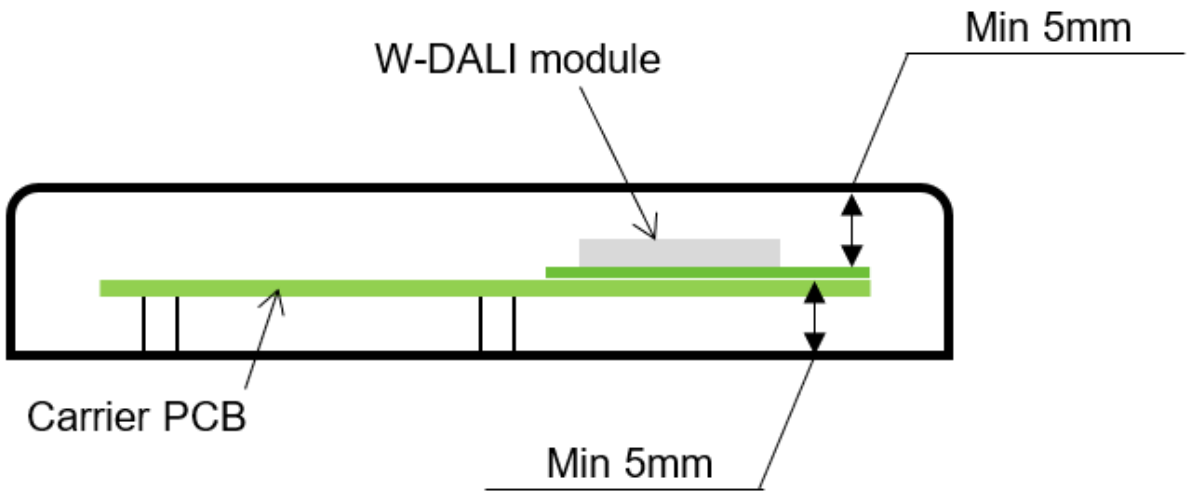
The W-DALI module has been specifically designed to achieve optimal RF performance. To maintain this, we stress the following guidelines:

- The use of ground planes on the main board cannot be emphasized enough. Good decoupling of any high-speed digital circuitry is a must. Many embedded microprocessors today have clock frequencies with clocks or overtones that reach well into the GHz range. It is perfectly possible for an embedded design to pass any EMC certification and still cause disturbances that will block the RF reception of the W-DALI module. The sensitivity of the W-DALI module receiver is -96 dBm; it is therefore recommended to keep disturbances below -100 dBm in the frequency range of operation.
- It is essential that all power paths are of low impedance. This means that the power and GND pads must be connected to the source with a sufficient amount of copper (use wide traces and proper via coupling).
- A near field probe connected to a spectrum analyzer will show if there are any disturbances present on the 2.45 GHz band generated by the microprocessor or any other device that is placed on the main board. Pay special attention to pre-built LAN-products; they pass EMC certifications, but some of them radiate poorly on 2.45 GHz. If disturbances can be seen on a spectrum analyzer - then the W-DALI module will have impaired reception.

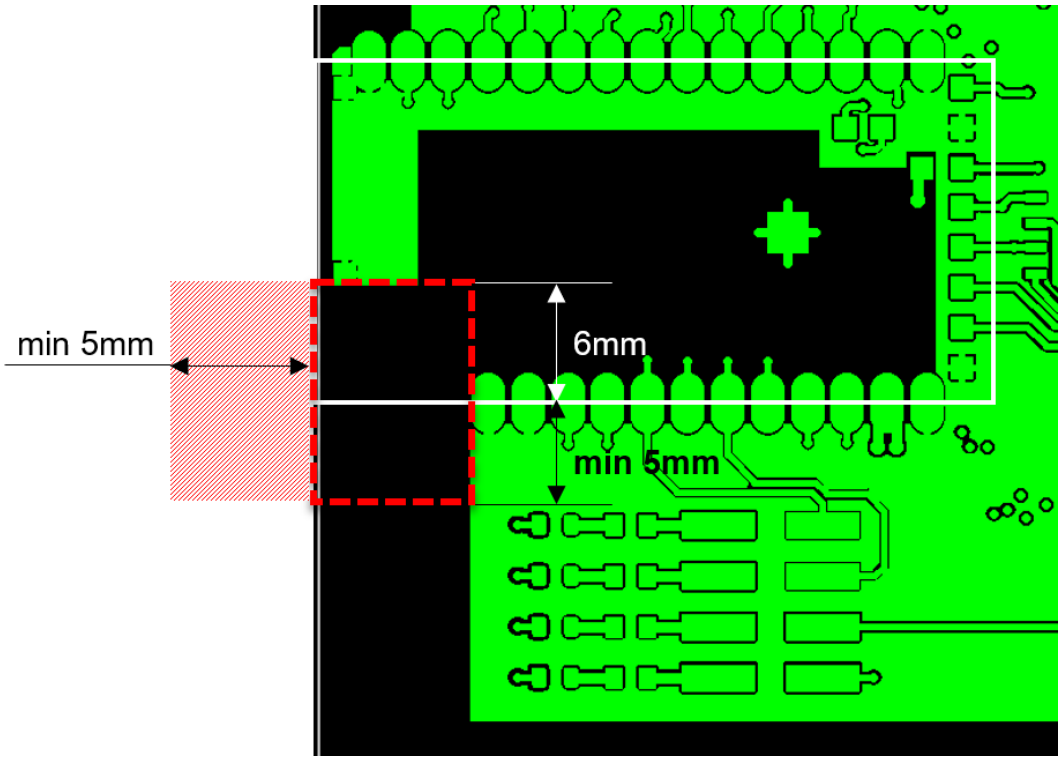
- The W-DALI module has supply voltage decoupling on the circuit board. The supply voltage must still be properly filtered. If interference or intermittent communication failures occur, check the supply voltage for dropouts, switch supply ripple, etc.
- The TOP layer within the footprint must be free of copper. There is a ground plane on the W-DALI module, but there are also supply lines. It is an unnecessary risk to rely on solder mask lacquer for isolation.

Guidelines for optimal performance of internal antenna

- The W-DALI module has been tested on 1.6 mm carrier boards of the brands ITEQ IT180 and Isola 370HR. For optimal performance it is recommended to use those for the carrier board design or a PCB with similar specification.
  - Iteq IT-180
  - Isola 370HR
- A minimum of 5 mm distance to solid objects under and above the W-DALI module antenna area. Note that carrier board thickness can be included in the total distance to solid objects under the antenna. That is, for a 1.6 mm carrier board, standoffs needs to be min 3.4 mm.
- Minimum dimensions for ground plane clearance for optimum antenna performance are shown below:

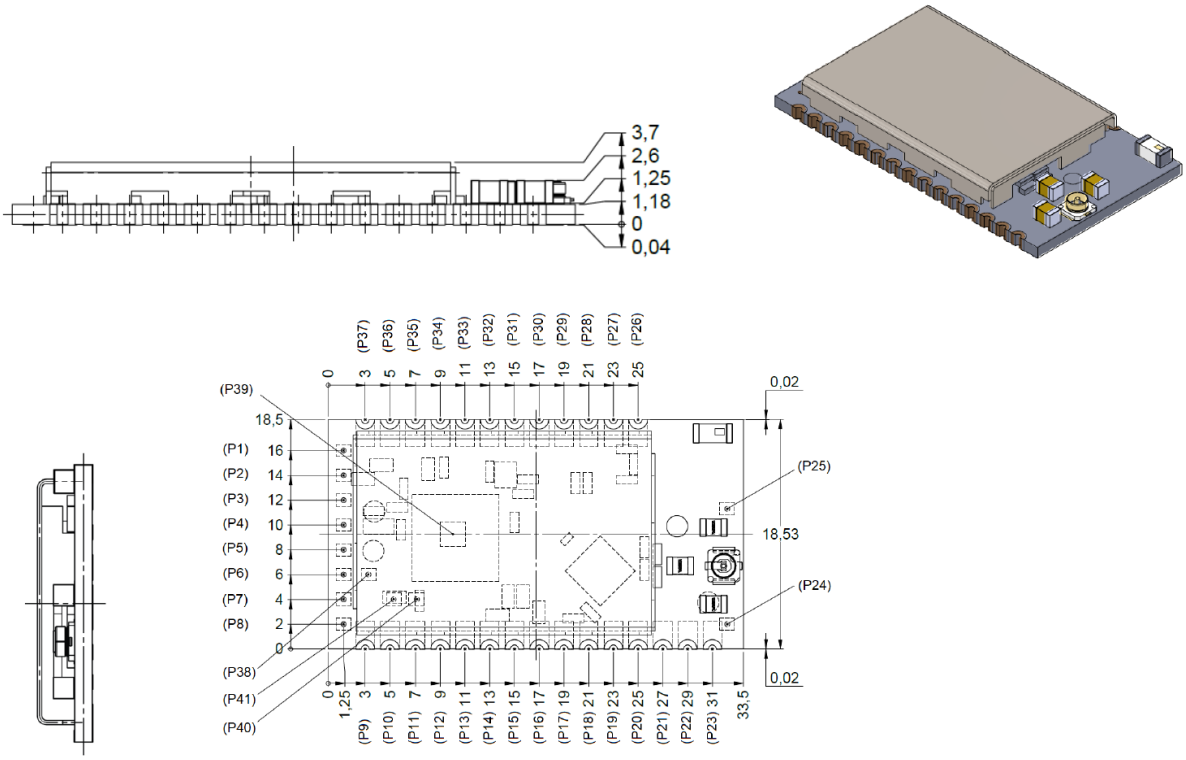


- Red diagonal striped area is a keep out area “air gap” from any solid objects or carrier board PCB material.


min 5mm
6mm
min 5mm

Mechanical specification

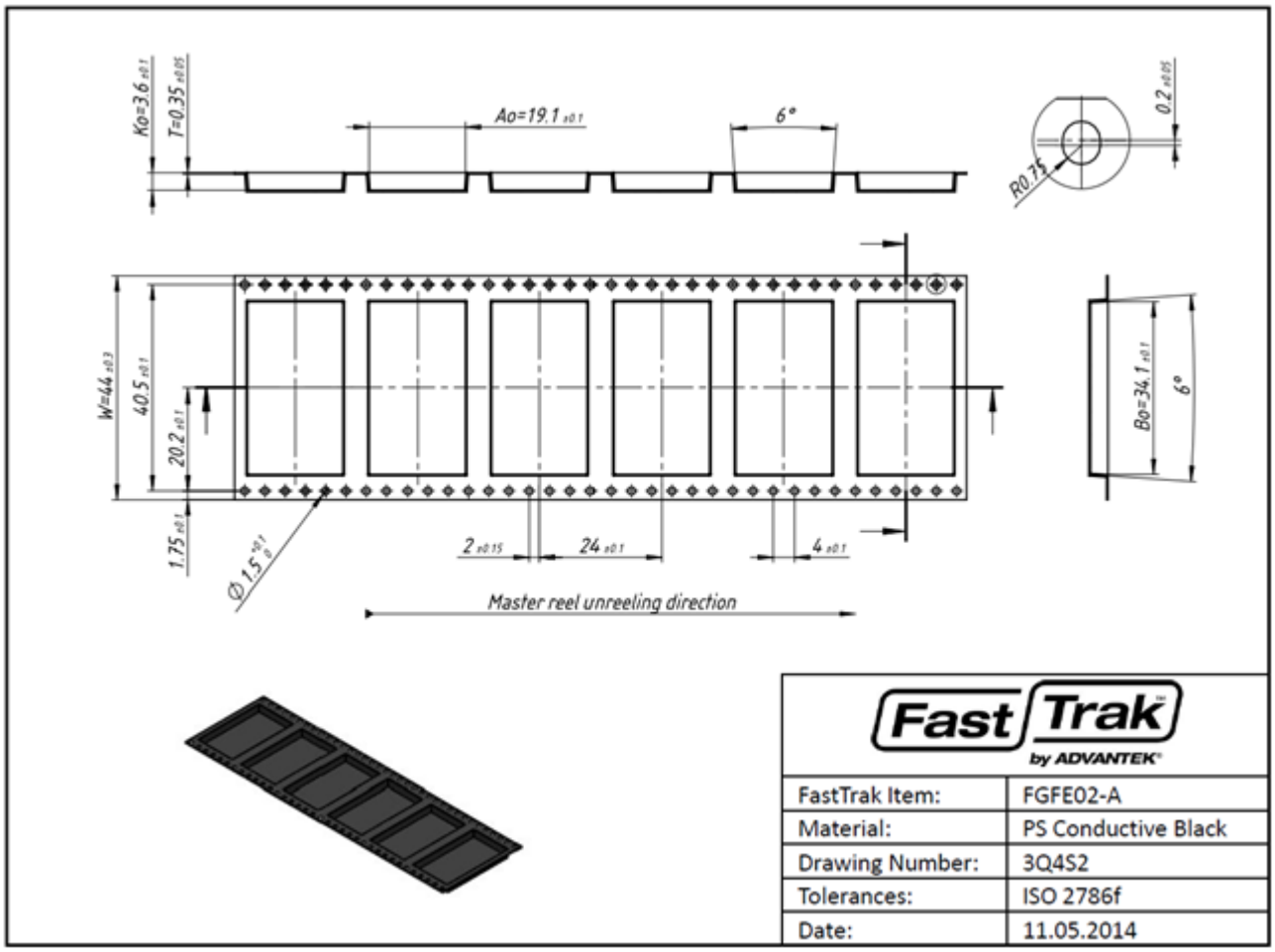
Measurements



All dimensions in mm. The W-DALI Mesh OEM module is implemented on the LumenRadio MWA-N3 radio module. Mechanical design files in .stp and .dxf format is available for download at the LumenRadio online support page.

Module packaging

Carrier tape dimensions



Reel marking

Every reel has an identifier sticker booth on the reel and the reel package.

The identifier sticker contains the following information:

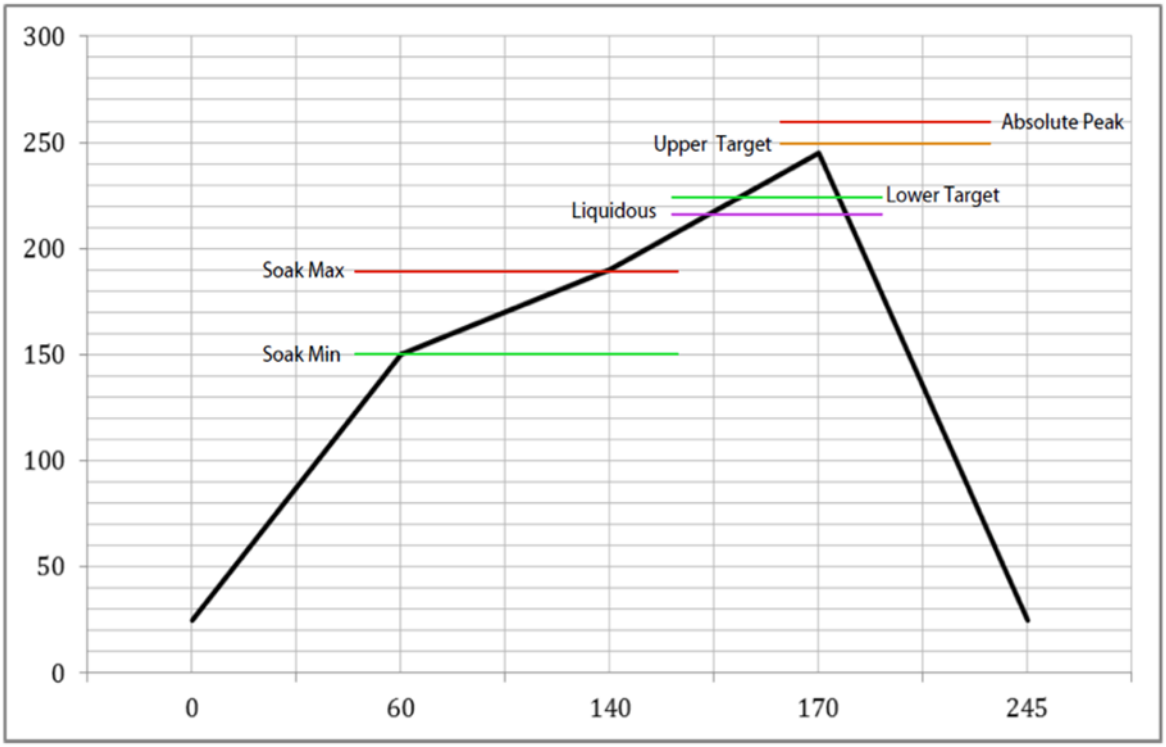
PRODUCT	SOFTWARE VERS.	
XXX-XXXX	SW: XXXX	
PACKED DATE		QUANTITY
XXXX-XX-XX XX:XX:XX		XXX

XXXXXX (serial number)

FCC ID: XRSTIMOMWAN201
IC ID: 8879A-TIMOMWAN201

Reflow soldering specification

The W-DALI module is a surface mounted device (SMD) designed to be easily integrated into high-volume production lines including reflow soldering to a PCB. It is ultimately the responsibility of the customer to choose the appropriate solder paste and to ensure oven temperatures during reflow meet the requirements of the solder paste. The W-DALI module conforms to JSTD-020D1 standards for reflow temperatures.



Temperatures should not exceed the minimums or maximums presented in the table below

Specification	Value	Unit
Temperature Inc./Dec. rate (max)	3	℃/s
Temperature Decrease rate (target)	2-3	℃/s
Soak Temp increase rate (goal)	0.5-1.0	℃/s
Flux soak period (min)	70	s
Flux soak period (max)	120	s
Flux soak temp (min)	150	℃
Flux soak temp (max)	190	℃
Time above Liquidous (min)	50	s
Time above Liquidous (max)	70	s
Time in target reflow range (goal)	30	s
Time at absolute peak (max)	5	s
Liquidous temnperature (SAC305)	218	℃
Lower target reflow temperature	225	℃
Upper target reflow temperature	250	℃
Absolute peak temperature	260	℃

Product verification guideline

FCC information

W-DALI Mesh FCC ID: XRSTIMOMWAN301

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

IMPORTANT NOTE:
In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labelling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20cm may be maintained between the antenna and users. The final end product must be labelled in a visible area with the following: “Contains FCC ID: XRSTIMOMWAN301”.

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter (W-DALI Mesh) installed.

Industry Canada statement

IC: 8879A-TIMOMWAN301
This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- this device may not cause interference, and
- this device must accept any interference, including interference that may cause undesired operation of the device.
  Le présent appareil est conforme aux CNR d’Industrie Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes:
- l’appareil ne doit pas produire de brouillage, et
- l’utilisateur de l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.
  FCC Caution Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate this equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

FCC Declaration of Conformity

We LumenRadio AB, Johan Willins Gatan 6, 41648 Gothenburg, Sweden, declare under our sole responsibility that W-DALI Mesh comply with Part 15 of FCC Rules.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This device is intended only for OEM integrators under the following conditions:

- The antenna must be installed such that 20 cm is maintained between the antenna and users
- The transmitter module may not be co-located with any other transmitter or antenna

Caution Exposure:
This device meets the exemption from the routine evaluation limits in section 2.5 of RSS102 and users canobtain Canadian information on RF exposure and compliance.
Le dispositif répond à l'exemption des limites d'évaluation de routine dans la section 2.5 de RSS102et les utilisateurs peuvent obtenir des renseignements canadiens sur l'exposition aux RF et le respect.
This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.
Cet équipement doit être installé et utilisé avec une distance minimale de 20 centimètres entre le radiateur et votre corps.
The final end product must be labeled in a visible area with the following:
The Industry Canada certification label of a module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the Industry Canada certification number of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:
Contains transmitter module: 8879A-TIMOMWAN301
where 8879A-TIMOMWAN301 is the module's certification number.

CE

W-DALI Mesh comply with the Essential Requirements of RED (Radio Equipment Directive) of the European Union (2014/53/EU). W-DALI Mesh meet the ETSI EN 300 328 V2.2.2 conformance standards for radio performance.

Other compliances

For other local compliance regulations (CE, UL, CSA, SRRC, C-Tick, etc.) you are responsible as the product manufacturer to ensure all required compliance testing is completed. LumenRadio are happy to advise on compliance testing – please contact LumenRadio for details.

RoHS / REACH

The W-DALI Mesh module complies with directive 2011/65/EU, 2015/863/EU (RoHS) of the European Parliament and the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment. The W-DALI Mesh module modules do not contain the SVHC (Substance of Very High Concern), as defined by Directive EC/1907/2006 Article according to REACH Annex XVII.

Radio validation tool

The purpose of this tool is to evaluate RF performance. It can be used to certify for both the ETSI and FCC standards. The tool is also helpful during hardware development to verify the RF behaviour.
To be able to use the radio validation tool, you need to have access to the serial debug and programming pins of the module see pin assignment in order to upload the radio test FW using J-Link.
The radio validation tool is available for download at the LumenRadio online support page.

Contact and ordering information

LumenRadio AB
Johan Willins Gatan 6
SE-416 48 Gothenburg
Sweden
Phone: +46 31 301 03 70
www.lumenradio.com
sales@lumenradio.com
The LumenRadio support team can be reached through our support portal.

Product	Order code
W-DALI Module reeled 1pcs	810-4110
W-DALI Node DEV kit	TBA