LumenRadio

CRMX™

implementation guide for OEMs

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Authors: Michael Karlsson & Peter Kirkup

CONFIDENTIALITY NOTE

GENERAL

CRMX distributes DMX and RDM, with full frame integrity and provides range and reliability that surpass all other systems available today. The CRMX modules are designed to be small enough to fit into any standard fixture or controller and have an interface that easily connects to existing user interfaces. CRMX modules are also compatible with W-DMX™ equipment for easy integration into legacy systems. CRMX is trademarked, patent pending, CE, SRRC and FCC/IC approved. CRMX™ is the future of wireless DMX distribution – a wireless system that communicates reliably with perfect fidelity. CRMX is the most powerful wireless lighting control system on the market, with groundbreaking features to ensure unrivalled reliability.

Table of Contents

Introduction 3

Features 3

Pinout 4
CRMX form factor module 4
W-DMX form factor module 5

Specifications 6

Typical application circuit 7
Power indicator 7

User interface 8
Link switch input (Pin 7) 8
Status LED output (Pin 6) 8
Flex mode selection (OE-GFX1) 10
Digital input signal method (Pin 20) 10
Link switch input method (Pin 7) 10
SPI interface (Pins 14, 16 & 17) 11

DMX interface 13
DMX Frame rate and size 13
DMX Start Codes 13
DMX output high impedance/tri-state 13
DMX and RDM termination and line bias 14

Firmware upgrade 15
Bootloader 15
Upgrade cable 15

OEM module configuration 16
Output power (OE-GTX1, OE-GFX1) 16

Mechanical dimensions 17

Antennas 18
Polarization 18
Internal vs External Antennas 18
Connector selection 19
On-board antennas 19
Antenna Location 19

Product Marking 22

Product Documentation & Menu Systems 22

Logo Syndication 22

Production Testing 22

Common Implementation Problems 23

Certifications 24

Order codes 24

Revision history 25

Introduction

CRMX is an acronym for Cognitive Radio MultipleXer and is the first smart wireless system to automatically and continuously adapt to its surroundings in real time. CRMX was specifically developed to meet the demand for reliable, easy to use, and cost effective wireless lighting controls.
LumenRadio launched its unique CRMX wireless technology for sale on an OEM basis in April of 2009. CRMX has since then been the only smart radio that automatically adapts to its surroundings in a smart way.
CRMX have been developed by veterans in the wireless lighting control business with years of experience of the high demands of the entertainment and architainment businesses.

CRMX is available for OEM implementations as a number of different models depending on the need for the specific implementation. LumenRadio offers extensive design support for CRMX OEM module customers. We recommend that the engineering entity responsible for the mechanical and electrical integration at the earliest possible stage in the design process contacts LumenRadio to maximize the potential for an optimal solution.

Note that LumenRadio AB reserves the right to approve the final design of the CRMX OEM module integration as part of its Terms of Sale.

All CRMX receivers are compatible, and have been tested, with W-DMX™ G2, G3, G4 and G4S transmitters. Compatibility with protocols and systems other than those manufactured by LumenRadio AB is confirmed at time of publication, and may require a firmware upgrade for compatibility.

For OEMs that are currently using legacy W-DMX receivers and taking the step into the world of CRMX, CRMX receivers are available as a module that is form, fit and function compatible with W-DMX, making it easy for OEMs to upgrade their current products without any hassle.

For OEMs with high volume products, an alternative development guide is available covering the CRMXchip – the industries first wireless DMX receiver ASIC. Please contact sales@lumenradio.com for details.

Features

- Supports ANSI E1.11 - DMX512-A
- Supports ANSI E1.20 – RDM (Remote Device Management)*
- Cognitive coexistence – dynamically avoids occupied frequencies
- DMX fidelity and frame integrity
- DMX frame rate and frame size auto sensing
- Fixed 5 ms end-to-end latency
- W-DMX compatible receiver
- Standard 2.54 mm x 2.54 mm (0.1″ x 0.1″) 2x10 position interface connector
- MCX type RF connector
- All configuration data is stored in non-volatile memory, 20 years data retention.
- W-DMX compatible connector interface[1]
- All CRMX products are firmware upgradeable

[1] Only on select models

Pinout

NOTE: legacy W-DMX form factor is not recommended for new designs.

CRMX form factor module

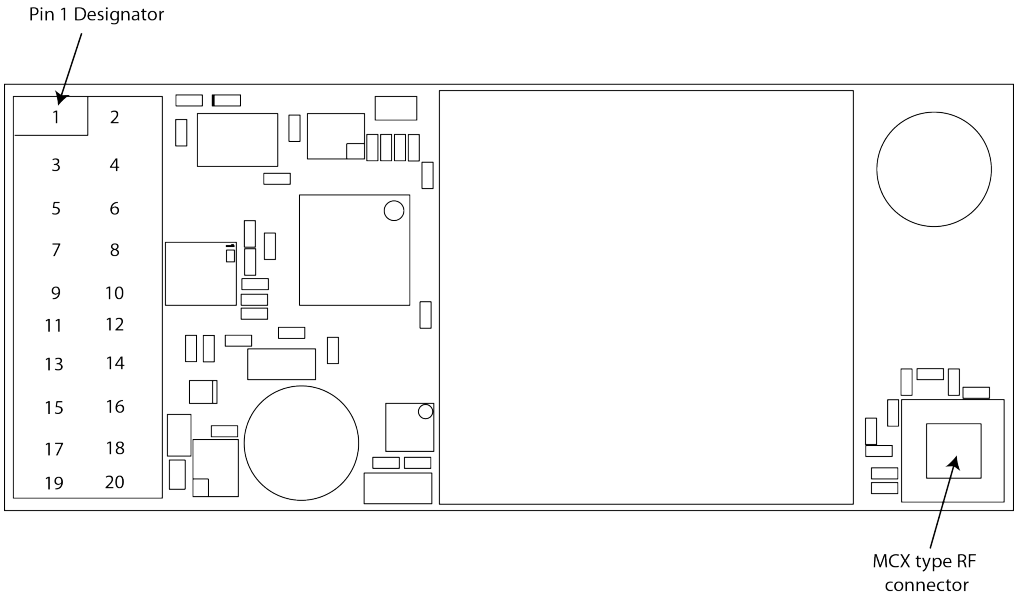


Figure 1. CRMX form factor module

Pin	Type	Description
1	Reserved	Do not connect, unimplemented feature
2	Reserved	Do not connect, unimplemented feature
3	Power	DC input 6-12V **Warning!**[2]
4	Power	GND
5	Power	DC input 5V (regulated voltage only) **Warning!**[3]
6	O	Status LED output (3.3V)
7	I	Link switch input
8	I/O	DMX+
9	I/O	DMX-
10	Power	GND
11	Reserved	Do not connect, unimplemented feature
12	Reserved	Do not connect, unimplemented feature
13	Reserved	Do not connect, unimplemented feature
14	O	SPI SCK
15	Reserved	Do not connect, unimplemented feature
16	O	SPI MOSI
17	O	SPI SS
18	Reserved	Do not connect, unimplemented feature
19	Reserved	Do not connect, unimplemented feature
20	I	Flex mode selection pin[3]

[2] Do not connect power to pin 3 and 5 at same time! The module **will** be damaged.
[3] Only on OE-GFX1

W-DMX form factor module

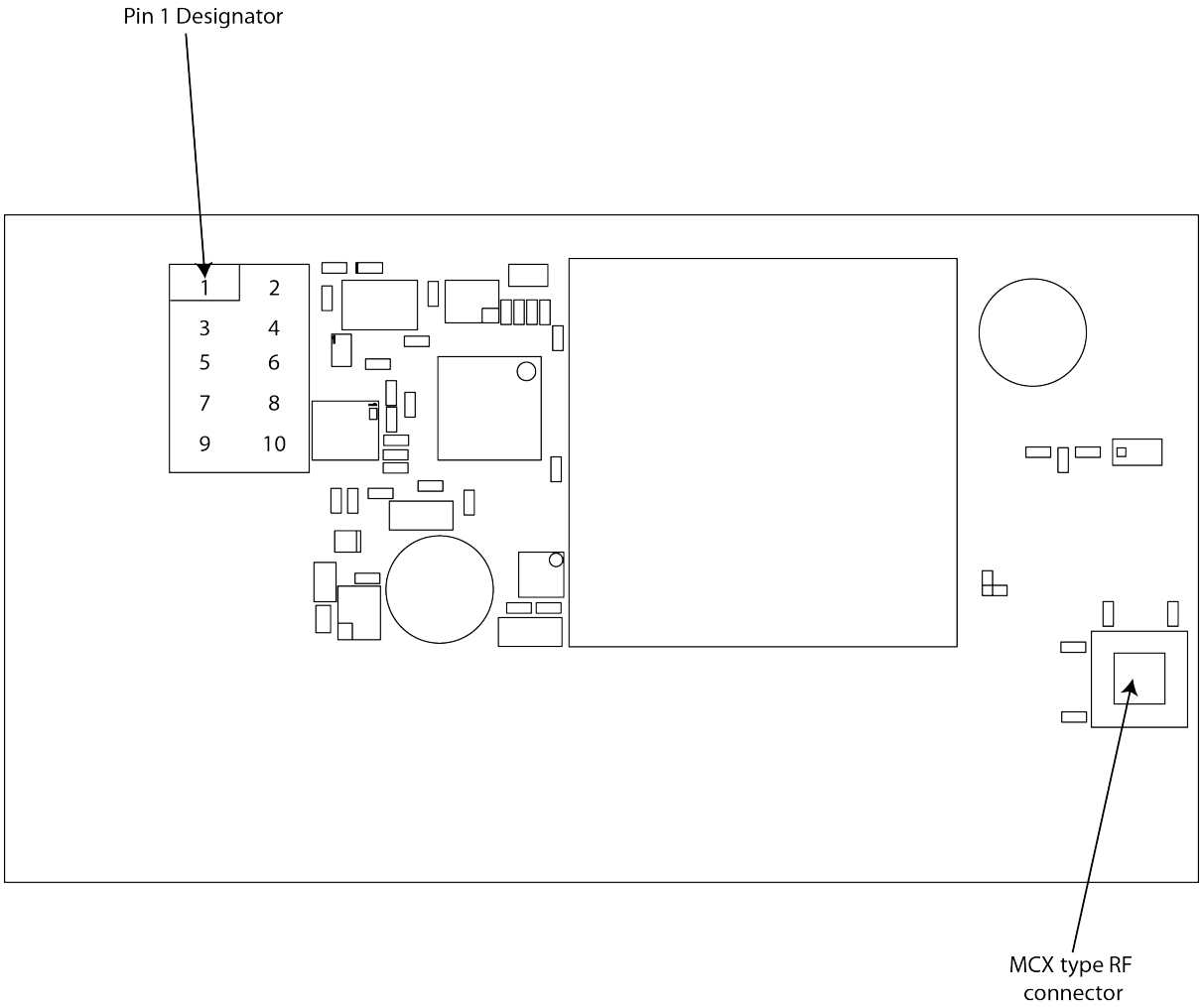


Figure 2. W-DMX form factor module

Pin	Type	Description	W-DMX Pin
1	Reserved	Do not connect, unimplemented feature	10
2	O	Signal strength indicator	9
3	Power	DC input 6-12V **Warning!**[4]	8 [5]
4	Power	GND	7
5	Power	DC input 5V (regulated voltage only) **Warning!**[3]	6
6	O	Status LED output (5V)	5
7	I	Link switch input	4
8	I/O	DMX+	3
9	I/O	DMX-	2
10	Power	GND	1

[4] Do not connect power to pin 3 and 5 at same time! The module **will** be damaged.
[5] Optional, supported voltage range supplied by W-DMX may differ depending on order code.

Specifications

	Min	Typical	Max	Unit
DMX latency	5	5	5	ms
Supported DMX frame rate (receiver)	1		830[6]	Hz
Supported DMX frame rate (transmitter)	0.8		7352	Hz
DC input (unregulated)	6		12	V
DC input (regulated)	4.9	5.0	5.1	V
Current consumption (receiver)			100	mA
Current consumption (transmitter)			300	mA
Link switch input low level			0.8	V
Link switch input high level	2		5	V
Status LED indicator pin voltage		3.3		V
Status LED indicator current			20	mA
Operational frequency range	2402		2480	MHz
Frequency hopping rate		1562		Hz
RF output power in high power mode		300[7]		mW
RF output power in normal power mode		100		mW
RF output power in low power mode		35		mW
RF output power in ultra low power mode		10		mW
Sensitivity at 0.1% packet error rate		-96		dBm
Recovery time upon loss of signal			1	s
Operating temperature range	-20 -4		+70 +158	°C °F
Humidity (non-condensing)	0		90	%

[6] Limited by the DMX512-A standard
[7] Allowed in US & Canada only

Typical application circuit

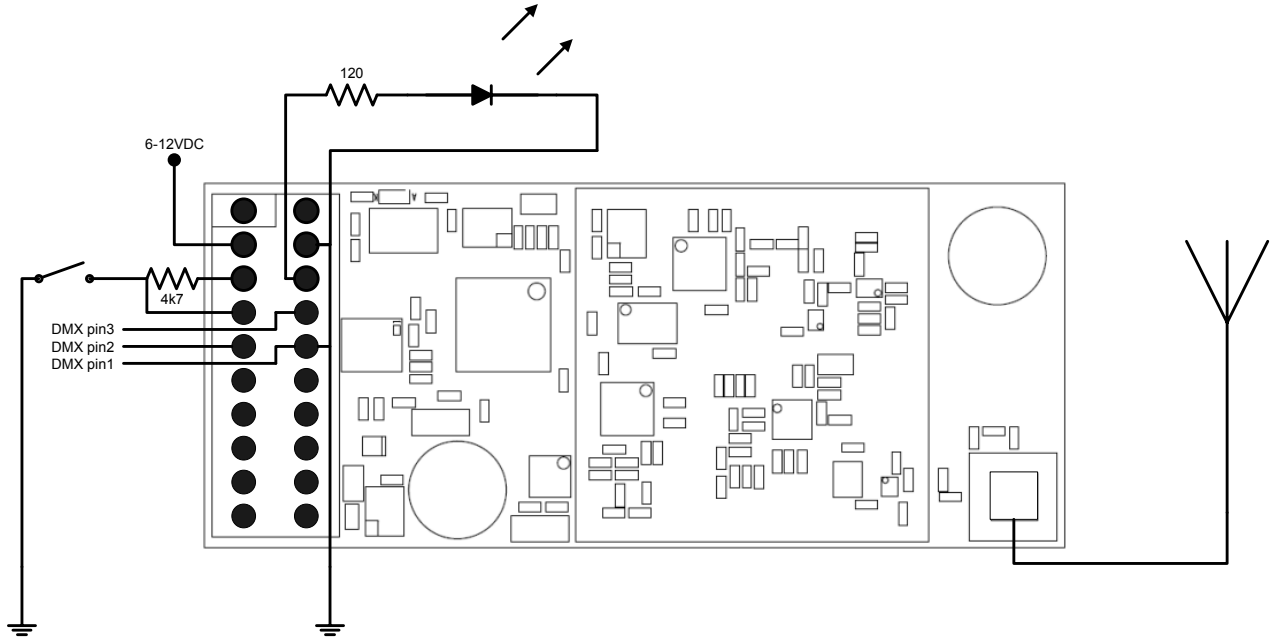


Figure 3. Typical application circuit

NOTE: The user interface (switch and LED) circuit or equivalent is **mandatory** for proper operation of the CRMX modules.

Power indicator

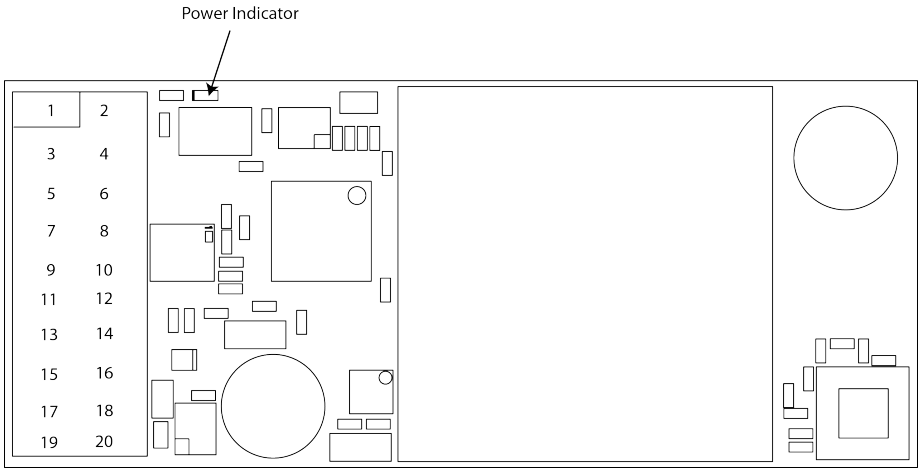


Figure 4. Power indicator location

An on-board power indicator in the form of a green LED can be found on the module and is located as illustrated in Figure 4.
The power indicator is lit green when the module is operating within the power supply requirements outlined on page 6, Specifications.

User interface

Integrating a CRMX module requires some controls to be presented to the user. A minimalistic user interface can be created using a normally open momentary switch for operation, and a LED for status indication. For details about how to connect these, refer to Figure 3. Typical application circuit. More advanced implementations may choose to route the Switch and LED circuits to a host processor, and make use of the SPI interface detailed on page 11.

NOTE: Provision of a user interface is **mandatory** for proper operation of the CRMX modules.

Link switch input (Pin 7)

The switch found in Figure 3. Typical application circuit on page 4 is used to operate transmitters and receivers by closing the switch (or by any other means putting a low logical level on the input pin) and follow the timing requirements in the sections below. The switch should pull pin 7 to ground when closed. Pin 7 shall **always** be pulled high by a resistor external to the module when the switch is open.

Transmitter

Function	Switch closed time
Link receivers	10 ms – 500 ms
Unlink receivers	> 3 s

Receiver

Function	Switch closed time
Unlink from transmitter	> 3 s

Status LED output (Pin 6)

The status LED indicates the different basic statuses of the radio module. The LED indicator pin is a 3.3V output pin capable of sourcing 20mA. An appropriate current limiting resistor must be connected in series with the LED.
The indication of the LED is dependent on the type or mode (transmitter/receiver)[8] of the radio module.

Transmitter

Flashing: off (0V) 100 ms / on (3.3V) 100 ms: linking with available receivers

Flashing: off (0V) 200 ms / on (3.3V) 200 ms: unlinking all currently linked receivers

Flashing: off (0V) 900 ms / on (3.3V) 100 ms: Active radio link, no DMX present

Constant on (3.3V): Active radio link, DMX data present

[8] Note that some models of the module may only support one mode of operation.

Receiver (all except OE-WDFP)

Constant off (0V): Not linked to any transmitter

Flashing: off (0V) 100 ms / on (3.3V) 100 ms: linked to a transmitter, but no active radio link

Flashing: off (0V) 900 ms / on (3.3V) 100 ms: Active radio link, no DMX present

Constant on (3.3V): Active radio link, DMX data present

Receiver (OE-WDFP only)

Constant off (0V): Not linked to any transmitter

Flashing: off (0V) 100 ms / on (3.3V) 100 ms: linked to a transmitter, but no active radio link

Flashing: on (3.3V) 1000 ms / off (0V) 100 ms: Active radio link, no DMX present

Constant on (3.3V): Active radio link, DMX data present

Flex mode selection (OE-GFX1)

The mode of operation of a OE-GFX1 module can be selected by a number of methods. The module is supplied with the Flex Mode input pin method active.

Mode	Description
Digital input pin	Pin 20 of the pin header connector will control the flex mode (factory default)
Link switch input	Flex mode is changed via usage of the link switch input

Digital input signal method (Pin 20)

On OE-GFX1 boards pin 20 controls the mode of operation.

Logical level	Voltage	Mode of operation
High	2.5 – 5 VDC	Receiver
Low	0 - 0.5 VDC	Transmitter

This is the factory default option, this functionality can optionally be disabled; transmitter/receiver mode selection is then made via the push button switch (aka. link switch input method). Read more in the section below.
IMPORTANT: When this option is enabled, this pin **SHALL** be connected to an external pull-up or pull-down resistor for proper operation.

Link switch input method (Pin 7)

When this option is enabled the flex mode input pin is disabled. In this mode, the flex mode (mode of operation) is selected via the link switch input.
In this section the terms “short push” and “long push” are used. Please refer to the table below for details.

Type	Switch closed time
Short push	10 ms – 500 ms
Long push	> 3 s

When the radio module is in either transmitter or receiver mode, follow this procedure to change the mode of operation:

1. Five (5) short pushes followed by one (1) long push will enter flex mode selection.
2. Now the status LED will start flashing to indicate the currently selected flex mode (refer to diagrams below for details).
3. Each short push in this mode will toggle the currently selected flex mode.
4. To save the selection, perform a long push.

If no selection is made within 15 seconds from the last push, mode selection will be cancelled and normal operation will resume in the previously selected flex mode.

Flashing: off (0V) 5 ms / on (3.3V) 5 ms: Receiver mode selected

Flashing: off (0V) 500 ms / on (3.3V) 500 ms: Transmitter mode selected

SPI interface (Pins 14, 16 & 17)

The CRMX form factor modules provide an SPI interface with additional information that can be used in more advanced user interfaces.

The CRMX radio module is SPI master and can be connected to a shift register for additional status indication or connected to a microcontroller for more advanced user interfaces or integration into fixture menu system.

Each SPI transfer consists of 16 bits being sent with bit 0 first.

Bit	Description
0-7	Signal strength, 0-255 (0-100%)
8	Signal strength indicator segment 80% (1 = signal strength >=80%, 0 = signal strength <80%)
9	Signal strength indicator segment 60% (1 = signal strength >=60%, 0 = signal strength <60%)
10	Signal strength indicator segment 40% (1 = signal strength >=40%, 0 = signal strength <40%)
11	Signal strength indicator segment 20% (1 = signal strength >=20%, 0 = signal strength <20%)
12	RF Link (1 = active radio link, 0 = no radio link (for instance transmitter is out of range))
13	Linked (1 = receiver is linked to transmitter (or transmitter is linking), 0 = receiver not linked to transmitter)
14	RDM (1 = RDM activity, 0 = idle)
15	DMX (1 = DMX present, 0 = DMX not present)

Connection to host MCU

The CRMX module can be connected to a host fixture microcontroller, allowing for CRMX status visualization and user interaction to be integrated into the fixture menu system.

Connection to additional status LEDs

If connected to a 74HCT595 shift register the CRMX module allows up to 8 additional status LEDs to be used, whereof 4 of them make a signal strength bar-graph. An example of how to connect a 74HCT595 to get the full status indication and signal strength can be seen in Figure 5. Status indicators and signal strength indicator.

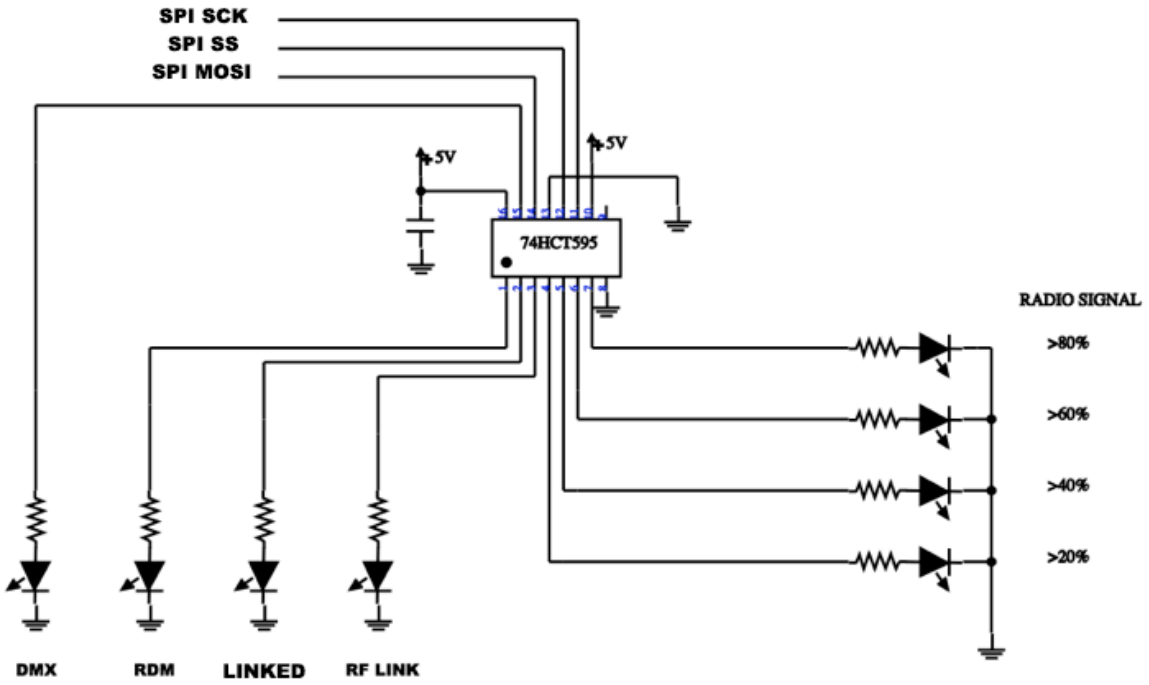


Figure 5. Status indicators and signal strength indicator

DMX interface

The DMX interface of the CRMX radio module is RS485 level, 250kbps slew-rate limited, compliant with the ANSI E1.11 DMX512-A and ANSI E1.20 RDM standards. An alternative TTL level DMX interface is available for high volume orders – please contact sales@lumenradio.com for details.

DMX Frame rate and size

CRMX radio modules will auto sense the DMX input frame rate and frame size and accept all variations that are within the USITT DMX-512 (1986 & 1990) and 512-A standards.

Minimum DMX frame size is 1 slot and maximum is 512 slots.

Minimum DMX input frame rate for normal operation is 0.8 frames per second and maximum is 7352 frames per second.

Input frame rates below 0.8 frames per second, i.e. more than 1.25s has elapsed since the last frame, will be treated as a loss of DMX and the DMX output transceivers will be set in a high-impedance/tri-state until another DMX frame is detected.

CRMX will propagate DMX through the system maintaining the input frame rate and frame size with the exception of frame rates that are above those allowed by the DMX 512-A standard.

Input DMX frame rates above 830 frames per second will propagate through the system at 830 frames per second to ensure that the DMX output is compliant with the DMX512-A standard.

DMX Start Codes

DMX packets with start codes other than the DMX default 0x00 (also known as the Null Start Code) and the RDM start code 0xCC will be propagated through the system, and subject to the same rules and limitations, as the null start code packets.

DMX output high impedance/tri-state

The DMX output transceivers will be set in a high-impedance state, also known as tri-state, under the following 3 conditions:

- The receiver is in an unlinked state
- The radio link has been lost
- DMX input to the system has been lost i.e. 1.25s has elapsed since last received DMX frame.

DMX and RDM termination and line bias

DMX and RDM termination and line bias circuitry is not provided as part of the CRMX OEM modules themselves but left to the device manufacturer to provide as required for each particular application and device.

For DMX termination requirements we suggest that ”ANSI E1.11 – 2008 / Entertainment Technology - USITT DMX512-A - Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories” or later revisions are used for reference.

For RDM termination and line bias circuitry requirements we suggest that ”ANSI E1.20 - 2006 / Entertainment Technology-RDM-Remote Device Management over USITT DMX512 Networks” or later revisions are used for reference.

IMPORTANT: Biasing, as described in the ANSI E1.11 standard, is recommended for all implementations, but is **mandatory** for transmitter implementations as well as all RDM implementations.

Firmware upgrade

All LumenRadio CRMX products are firmware upgradeable. For most OEM applications, firmware upgrade is performed over the DMX interface using a special firmware upgrade cable.

Firmware upgrades can provide additional features, bug fixes, etc. It is always recommended to keep the firmware up to date on units, particularly to ensure optimal support for alternate transmitter protocols. For more info about firmware upgrade, contact the LumenRadio technical support team at support@lumenradio.com.

Bootloader

When powered up with the link switch closed, the module will enter a bootloader mode. As such, it is critical that your product design does not power the module up in this state unless the user has instigated the firmware upload (either by holding the switch themselves or selecting such an option from your user interface). Bootloader mode can be exited by rebooting the module with a power cycle.

Upgrade cable

The LumenRadio OEM module upgrade cable is provided in the development kit. Additional cables can be ordered separately, for order code, see table at the end of this document.

The cable offers a USB connection from a PC to the DMX port (the cable has a 5 pin XLR male connector).

OEM module configuration

OEM modules with bootloader version 3.3.0 or later supports OEM partners to configure the modules to a desired behavior. Configuration is done via the LumenRadio firmware upgrade cable using a – LumenRadio supplied – command line application.

Output power (OE-GTX1, OE-GFX1)

The output power of transmitter or flex modules can be configured. Depending on the region of the world where the product will be used, the regulatory limitations of the output power may vary. For instance, in the EU 100mW is the maximum allowed, and in USA 1W is allowed.

The module is supplied with an output power of 100mW pre-configured to allow for sales in any part of the world without the need for reconfiguration. If desired this can be changed. The radio modules support four different output power levels. Note: do not change the output power unless you have verified output power regulations. For more information, contact LumenRadio at support@lumenradio.com.

Level	Output power
High	300 mW
Normal	100 mW (factory default)
Low	35 mW
Minimum	10 mW

Mechanical dimensions

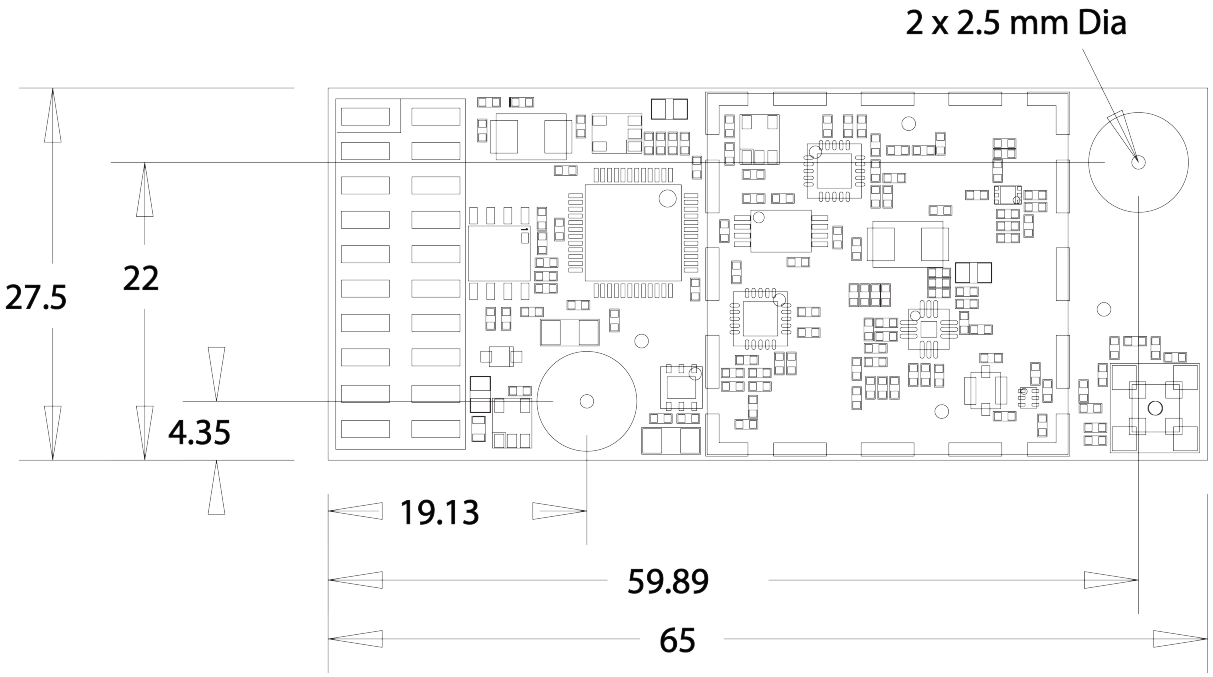


Figure 6. LumenRadio form factor dimensions

The two holes on the module are designed for 2.54mm (0.1") snap in standoffs. For example the Richco DLCBST series may be used.

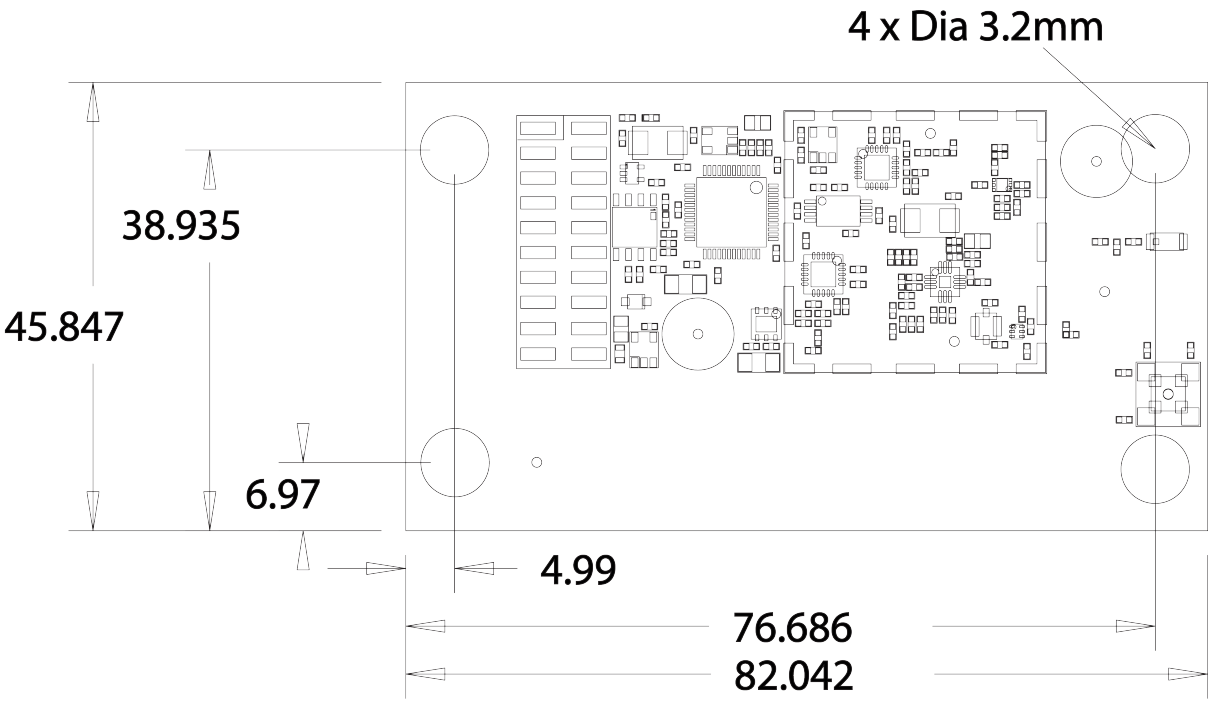


Figure 7. WDFP form factor dimensions

An AutoCad file (DXF format) with all relevant dimensions is available upon request.

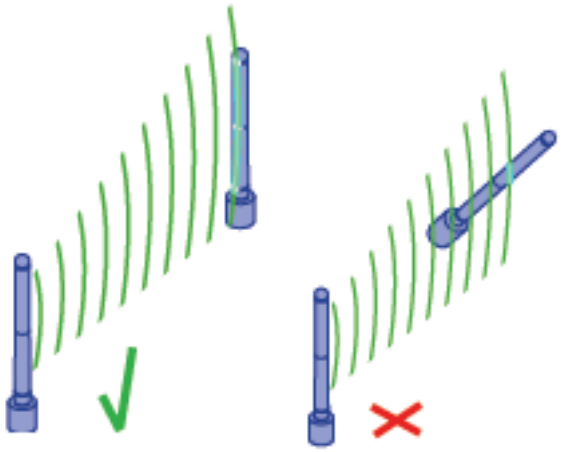
Antennas

The choice of antenna type, antenna connector type, and its location and orientation is crucial to proper performance of the CRMX OEM modules and a satisfactory user experience. Optimalisation of radio wave propagation, mechanical and environmental protection are the major considerations involved in the decision process.

Polarization

The antennas typically used for OEM applications, commonly called whip or rubber-ducky have inherently what is referred to as vertical polarization. Given vertical polarization of both the transmitter and receiver antennas they must also be placed in the same orientation to provide optimal signal strength.

Off-axis antennas will still receive signal, but it will not be the optimum strength. A 90 degree deviation can result in a 50% reduction in received signal strength. It is therefore highly recommended to provide directional control of the antenna fitted to your product.



Internal vs External Antennas

Internal 'whip' antennas can provide an extremely space efficient solution, as well as not compromising a products aesthetic design with the addition of external antenna connectors and antenna. However, there are a number of hazards that should be considered before this solution is selected. The polarization issue mentioned above is most evident in fixtures with internal antennas as they do not provide a mechanism to reorient the antenna. Internal antennas also often end up placed closed to grounded planes, such as a metal

part of an enclosure. This can lead to significant signal degradation. In addition, the internal solution provides no means for a user to uprate the antenna for high gain applications. These issues may not be major for your intended application, but are worth considering before deciding on the use of an internal antenna.

Connector selection

The most common connector types used together with CRMX modules are detailed below. The RP-TNC type of connector is the optimal choice for equipment not intended for permanent outdoor or wet locations. The RP-TNC is compact and cost efficient yet offers a rugged solution that will stand up to demanding use in most production and touring environments. The RP-TNC is the typical choice for devices intended for the touring and stage and studio production market.

LumenRadio can also supply the RP-SMA type connector and antenna although we **DO NOT** recommend this type of connector for new designs as its ruggedness and mechanical properties are inadequate for most applications.

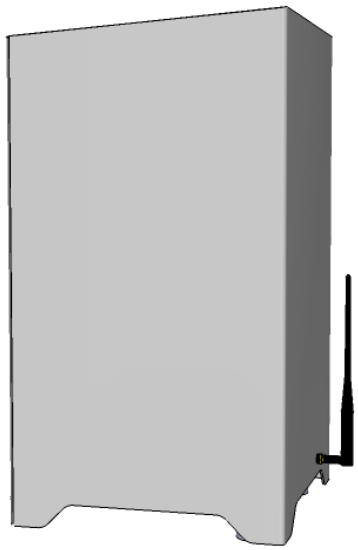
For permanent installations or rugged outdoor use, the N type connector is recommended due to its physical properties. N type connectors are also most common on externally mounted antennas.

Connector	Product connector	Antenna connector
RP-TNC	RP-TNC male	RP-TNC female
RP-SMA	RP-SMA male	RP-SMA female
N	N female	N male

On-board antennas

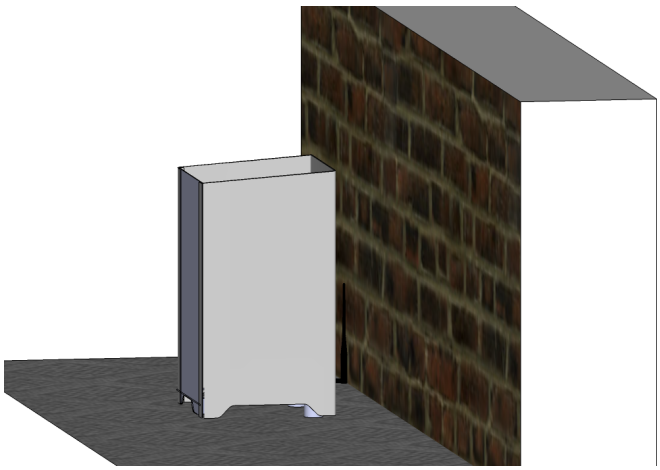
LumenRadio CRMX modules do not provide an on-board antenna solution, however physically small 'Chip' antennas are available from third party suppliers should they be required for your product. Contact support@lumenradio.com for advice and antenna qualification.

Antenna Location

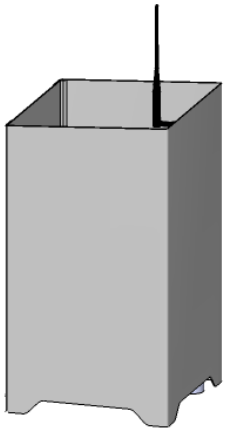


A location of the antenna that affords unobstructed line-of-sight to the other RF devices in the system is the optimal solution.

It is also advisable to elevate the antenna location as far above ground/earth as possible. The closer to the ground/earth the antenna is placed the more RF energy will be absorbed by the ground/earth and lost. Care should be taken when considering the placement of an antenna within your product. One major consideration is the presence of ground planes or likely physical placement of the fixture within a real world environment. The above is an example of poor placement on an uplighter product, which caused extremely low signal quality, particularly when the fixture was placed in a real world use against a wall:



As you can see, the antenna is shielded by the unit itself from the main direction of signal, and by the wall. By considering the end use case for the fixture, and the grounded plane of metal provided by the fixture, an alternative antenna placement was implemented to raise the antenna's location within the product.



Physical protection of the antenna and antenna connector is of particular importance in portable equipment where the antenna and antenna connector could be subject to mechanical damage during handling and transportation.

It is under almost all circumstances advantageous to place the antenna connector such that it is protected by some other protruding mechanical feature and not left to itself to fend off mechanical impact during handling and transportation.

A common solution that provides both protection and ease of use is to place the antenna in a notch or cavity on the host device so that it can be folded down below the mechanical outline of the host device during handling and transportation.

If no such arrangement is possible the antenna should be removed during transportation and handling and instructions to do so should be included in the user documentation for the host device.

Product Marking

Products containing the CRMX modules shall be marked such that it is easy to identify the presence of CRMX technology within the product. A "CRMX inside" artwork is available as a sample from LumenRadio.

In marketing materials the radio link shall be referred to as either a "wireless link", "CRMX wireless DMX" or "CRMX inside". Additional body text is acceptable to explain this is a DMX receiver. The wireless link must not be referred to as "WDMX" or "W-DMX", nor only "Wireless DMX" in any literature related to products using the CRMX modules.

There are also requirements for product marking related to FCC compliance, see page 24 for details.

Product Documentation & Menu Systems

When referring to the CRMX modules and related behaviors within documentation and menu systems, the system should be referred to as a "wireless link" and/or "CRMX" (or derivations thereof), and must not be referred to as "WDMX" or "W-DMX" , nor only "Wireless DMX". "CRMX wireless DMX" is accepted.

Suggested terms and definitions are contained in the table below:

Term	Definition
CRMX Wireless link	The top level term used to describe the CRMX radio system
Linked	The CRMX radio system has been linked with a compatible transmitter.
Unlinked	The CRMX radio system is awaiting linking from a compatible transmitter.

Logo Syndication

By using CRMX modules in your product, you become one of LumenRadios valued partners. Our website and catalog carry an array of partners logos and it is expected that your logo will be included alongside these. Marketing information, logos and case studies can be sent to sales@lumenradio.com for inclusion in future marketing efforts.

Production Testing

All CRMX modules are factory tested before being shipped. However, it is advised to perform some level of testing as part of your products overall test process. LumenRadio would be happy to advise on production testing – please contact support@lumenradio.com for advice.

Common Implementation Problems

CRMX modules have been implemented in a wide variety of products. Below are some lessons learned from previous implementations, which may aid you in the design process.

Observe the mounting hole dimensions

CRMX modules are supplied with holes of 2.54mm (0.1"), designed for M2.5 fixings. The use of M3 fixings is not recommended, and drilling out the PCB to fit these will damage the module and invalidate any warranty claims.

Provide the user with antenna flexibility

Radio antennas such as the rubber duck or whip antennas commonly fitted to products using the CRMX modules are subject to polarization. Fitting these into a mechanically constrained part of your product restricts the user from adjusting the polarity on your product to match the rest of their wireless system. Optimal product design allows for user configurable antenna polarity.

Ensure you provide the user with the necessary interfaces

The link switch and LED are used throughout the product's lifetime, for linking and indication of any signal problems. These are **mandatory** parts and should be exposed to the user in a friendly and accessible way.

Follow the branding guidelines

To ensure users are familiar with the interface and compatibility with other CRMX systems, a consistent documentation and descriptive menu implementation is preferred. Guidelines for this are provided on page 18.

Ensure you do not exceed the supply voltage

When using the unregulated input, the absolute maximum supported voltage on the input stage of the module is 12.0VDC. This note is particularly relevant when designing a battery-operated product – certain battery technologies provide greater than their rated voltage when at peak charge (for example, Lithium Ion 12.0V batteries have been found to supply >13VDC immediately after charging).

Provide a method for the user to reflash the module

Although firmware updates are infrequent, it may be necessary from time to time to reflash the module with an upgraded firmware. Firmware upload is provided over the RS485 line when the module is in bootloader mode. Providing access to this functionality via your hardware is highly advised.

Ship the product with the wireless unlinked

It is important to remember to ship your product in the unlinked state, so aid the user experience in getting the system up and running. If you perform a link during production testing, remember to add an unlink stage to your production operations prior to shipping.

Certifications

The CRMX modules conform to regulatory requirements for radio equipment for most part of the world, and have been CE, FCC and SRRC certified.

FCC

The CRMX modules are certified for FCC as a single-modular transmitter.

CRMX modules are FCC certified radio module that carries a "Modular" grant
CRMX radio modules complies to the "Intentional Radiator" portion (Part 15c) for FCC certification: Part 15.247 Transmitter tests.

An end product, incorporating a CRMX module, does not require additional testing or authorization for the CRMX transmitter (or transceiver, in the case of RDM or Flex products).
Host end products can use the FCC ID of the certified module as the FCC ID of the host end product
A label displaying the CRMX module's FCC ID,XRSCRMXNOVA101, must be affixed and visible on the host end product for approval
FCC IDs are required for host end products with radio transmitters.

CE

The CRMX modules complies with the Essential Requirements of the R&TTE Directive of the European Union (1999/5/EC). This equipment meets the ETSI EN 300 328 V1.7.1 conformance standard 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 support@lumenradio.com for details.

Order codes

Model no.	Comments	Order code
OE-GRX1	Single universe DMX receiver	800-8001
OE-GTX1	Single universe DMX transmitter	800-8002
OE-GFX1	Single universe DMX receiver/transmitter (configurable)	800-8006
OE-BRX1	Single universe DMX/RDM receiver	800-8005
OE-WDFP	Single universe DMX receiver in legacy W-DMX footprint	800-8901
	LumenRadio USB Firmware Upgrade Cable	102-4001

Revision history

Document revision	Release date	Comment	Status
A	2012-02-17	First revision	Release
B	2014-03-07	Major rewrite and additional data	Release