

W-DMX™ OEM Partner

OEM IMPLEMENTATION GUIDE GENERATION 5

Revision 2
May 2018

Nano series:





W-DMX™ OEM Partner

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Date: 04/04/2018
Document Revision: 2
Document Status: Company Confidential

This document describes the mechanical and electrical properties, as well as the electrical interface, of the W-DMX™ OEM G5 series: Nano. Refer to Appendix 1 for a complete listing of Order Codes and descriptions.

The manual is for OEM implementation only and is not for end users. The module is for OEM installation only and is not allowed to be operated as a standalone device.

The W-DMX™ system is the most advanced wireless lighting control system on the market today. With over 500,000 units sold, and over 50 OEM customers worldwide, the W-DMX™ wireless protocol has become the world's unofficial standard for Wireless DMX and RDM control.

The system is built with Adaptive Frequency Hopping technology, allowing to dynamically avoid other users of the radio spectrum, in order to ensure that we do not cause interference with other radio devices, like WLAN Wi-Fi networks, intercoms, among others. All radio cards come with this functionality as standard, with zero-configuration required.

All products support RDM communication, with a full managed proxy implementation. All RDM devices, when connected through the supporting W-DMX™ models will be exposed through the system to an upstream controller automatically.

DataSafe and InvisiWire technologies, which collectively ensure that data is more redundant to interference, is available as standard, making the systems respond just as a wire would.

Our G5 technology is backward compatible with G3 and G4S transmitters and receivers.



FCC STATEMENT

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

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Please refer to our Non-Disclosure Agreement for complete information about Wireless Solution's confidentiality and non-disclosure policies.

Warning! ESD sensitive device



The W-DMX OEM PCB is sensitive to ESD.

Follow proper ESD control procedures when handling the W-DMX OEM PCB.



TABLE OF CONTENTS

1 STANDARDS COMPLIANCE	6
1.1 FCC DECLARATION OF CONFORMITY	6
1.1.1 OEM INTEGRATOR INSTRUCTIONS	7
1.2 INDUSTRY CANADA LICENSE-EXEMPT	8
1.3 OEM PRODUCTS' COMPLIANCE	8
1.4 USITT DMX-512A COMPLIANCE	8
1.5 PRODUCT MARKING	9
2 MECHANICAL DIMENSIONS	10
2.1 NANO SERIES	10
4 POWER SUPPLY CONSIDERATIONS FOR TRANSCIEVERS AND RECEIVERS	12
4.1 RECEIVERS	12
4.2 TRANSMITTERS	12
4.3 POWER INDICATOR	12
5 INTERFACE CONNECTORS	13
5.1 PINOUT REFERENCE	13
5.1.2 <i>Nano series Pinout</i>	14
5.1.3 <i>Migrating from G4 to G5</i>	15
6 DMX INTERFACE AND SPECIFICATION	16
6.1 CONFORMITY TO ANSI E1.11-2008	16
6.1.1 <i>Loss of data handling procedure.</i>	16
6.1.2 <i>Packet processing latency.</i>	17
6.1.3 <i>NULL START Code functionality.</i>	17
6.1.4 <i>Slot footprint.</i>	17
7 USER INTERFACE	18
7.1 FUNCTION SWITCH	18
7.1.1 <i>Link</i>	18
7.1.2 <i>Unlink</i>	18
7.1.3 <i>Transceiver direction</i>	18
7.1.4 <i>Control Mode</i>	19
7.1.5 <i>Function Switch Timing</i>	19
7.1.6 <i>Status Indicator LED</i>	19
7.1.6.2 <i>Nano indicator LED</i>	20
7.2 LED OVERLAY INTERFACE, G5 CARDS	22
7.2.1 <i>LED order</i>	22
7.3 W-DMX™ OEM SPI PROTOCOL (OSP) INTERFACE	23
7.3.1 <i>Pin Configuration</i>	23
7.3.2 <i>SPI Settings</i>	23
7.3.3 <i>Packet Format</i>	23
7.3.4 <i>Command Byte</i>	24
7.3.5 <i>Status Bytes</i>	24
7.3.6 <i>Available commands</i>	25
7.3.7 <i>Additional OSP commands</i>	25
7.3.8 <i>Command and Status Enumerations for use in C code</i>	26
7.4 W-DMX™ RDM INTERFACE	27
7.5 USB DONGLE CONNECTION	27



8 IN-SYSTEM SOFTWARE UPDATES (BOOT LOADER SUPPORT)	28
8.1 DESIGN CONSIDERATIONS	28
8.1.1 <i>Bidirectional connection</i>	28
8.1.2 <i>A means of resetting the device</i>	28
8.2 <i>Reference design</i>	28
9 REFERENCE DESIGNS	29
9.1 G5 MINIMAL IMPLEMENTATION, OEM MODE	29
10 SPECIFICATIONS	30
10.1 ELECTRICAL SPECIFICATIONS	30
11 ORDERING CODES	32



1 Standards Compliance

1.1 FCC Declaration of Conformity

We,

Wireless Solution Sweden Sales AB
Stureparksvägen 7
451 55 Uddevalla
Sweden

declare under our sole responsibility that the product(s)

FCC ID: 2APCT-WDMXG5SB

Model: A40890G5-SPI

Name: Nano G5

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: 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 and correct the interference by one or more of the following measures:

- Reorient or locate 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.



FCC warning – module

The module is limited to OEM installation ONLY.

The module is limited to installation in mobile application.

The FCC Approval with FCC ID: 2APCT-DMXG5SB is only approving usage in mobile applications and with the antenna configuration stated in section 3A. A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.

RF Exposure Warning for North America, and Australia **Warning!**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

1.1.1 OEM Integrator instructions

The OEM Integrator is responsible for:

- Ensuring that the end-user has no manual instructions to remove or install the module.
- The Host equipment is equipped with information about the W-DMX modules FCC ID, if the modules label is not visible when it is installed, the wording such as the following “Contains FCC ID: 2APCT-DMXG5SB” or a similar wording that express the same meaning may be used
- The Host equipment must have the following information about the W-DMX module “This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.”
- The Host equipment manual must include the following information about the W-DMX module
Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.
- The Host equipment manual must include the “RF Exposure Warning” as stated above
- The final host / module combination may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

If the host manufacturer needs assistance in meeting the FCC Part 15B requirements, Wireless Solution will provide guidance.



1.2 Industry Canada license-exempt

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux CNR exempts de licence d'Industry Canada. Le fonctionnement est soumis aux deux conditions suivantes:

- (1) Ce dispositif ne peut causer des interférences; et
- (2) Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 2.5 de RSS 102 et la conformité à l'exposition de RSS-102 rf, utilisateurs peut obtenir l'information canadienne sur l'exposition et la conformité de rf.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter., This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur. Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

Host label:

The host equipment has to contain a label with the content
Contains IC: 23731-DMXG5SB

1.3 OEM Products' compliance

Wireless Solution has to the greatest extent possible made regulatory compliance for end products incorporating the W-DMX OEM TRX cards effortless for the OEM.

The W-DMX OEM TRX cards provide compliance with worldwide RF regulations with a few requirements outlined in this section:

1.4 USITT DMX-512A Compliance

This device complies with the USITT DMX-512A standard as described in ANSI E1.11-2008.



See section 6.1 for details.

1.5 Product Marking

The following text and graphics has to be added to the product marking for compliance in the US and Europe:

“This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. See instructions if interference to radio or television reception is suspected.”

Original graphics in several file formats are available from Wireless Solution.

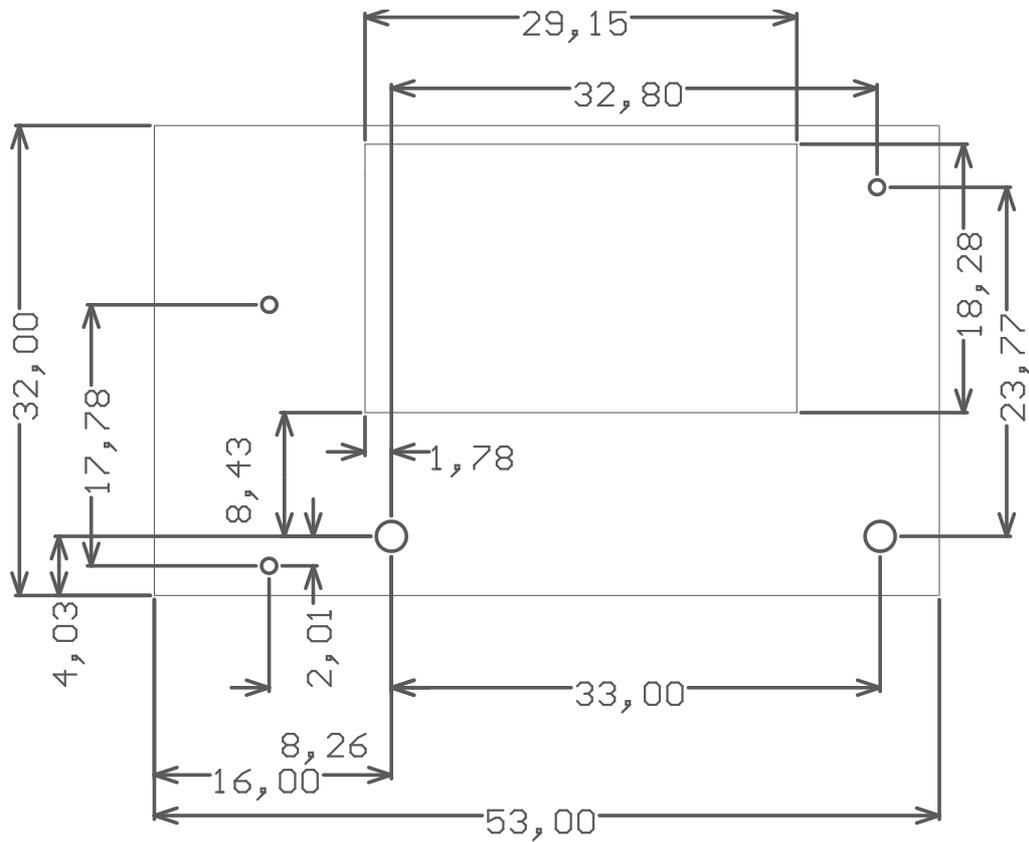




2 Mechanical Dimensions

2.1 Nano series

The card features two 3.2mm diameter mounting holes, one next to the MCX connector and one other opposite.



Mounting hole locations:

Screw #	X (mm)	Y (mm)
1	16	4
2	49	4



3 Antenna

Note that several aspects, including physical placement, should to be considered with external antenna. While antenna placement is relatively flexible with the standard antenna, it is recommended to consult Wireless Solution prior to making the final antenna placement decision, to ensure optimal performance.

The combination of W-DMX™ accessories our RP-MCX to RP-N connector with a 3 dBi omni-directional antenna is suitable for both indoor equipment and outdoor equipment

Short selection of cables and antenna from W-DMX™

Order Code	Name
A40920F	W-DMX 20cm Antenna cable RP-MCX – Chassis RP-N Female Connector
A40518G4BF	Outdoor 3dBi Omni Antenna. Dual Band



4 Power Supply considerations for transceivers and receivers

In Transmit and Receive mode, there are very different power requirements. Please read the following information carefully together with the electrical specifications at the end of this document.

4.1 Receivers

For a receiver only implementation a simple linear voltage regulator such as the common 7805 series is sufficient. Be sure to choose a package with sufficient cooling capabilities. A TO-220 or D-Pak is usually a good choice. If the device is used as an RDM receiver, it is especially important to make sure the supply can handle the brief peaks when the device respond on RDM requests.

4.2 Transmitters

As transceivers can draw high currents when transmitting, a more sophisticated solution is generally required. It is especially important to make sure the supply can handle the peaks during radio transmissions.

The W-DMX radio cards have built in under voltage detection which protects the system from permanent electrical damage, but data loss might still occur.

.

4.3 Power Indicator

All OEM cards are equipped with an on-board green power indicator LED, which lights up when the card is powered properly.



5 Interface Connectors

Pin 1, 2, and 3 of J1 will function as a DMX/RDM input on a Transmitter card and as a DMX/RDM output on a Receiver card.

No provisions are made on the W-DMX OEM TRX card for the secondary DMX data connections, or any other form of data, that is sometimes carried by Pin 4 & 5 on 5 pin DMX XLR connectors, and as such these two extra pins should never be connected to any pin on the radio card.

J1 and J3 are both commonly available standard dual row 2.54mm (0.1”) pitch pin headers J1 and J3 are located in such way so that they together fit in a 24 pin header.

5.1 Pinout reference

Nano/Micro/Pico:





5.1.2 Nano series Pinout

Pin number	Function	Comment
J1:1	GND	
J1:2	Data - / RxD	RxD if J3:12 is connected to 3.3V, internal pull-down
J1:3	Data + / TxD	RxD if J3:12 is connected to 3.3V, internal pull-down
J1:4	Function switch	Pull up to 3.3V internally
J1:5	OEM LED	3.3V when On
J1:6	5V, 5-15V, 5-26V	Depending on card model
J1:7	GND	
J1:8	3.3V	Different compared to G4
J1:9	Reception Indicator / Mode	Different compared to G4
J1:10	Direction	For TRX cards
J3 is only for cards with -SPI extension		
J3:1	Reset	
J3:2	RX_NOT_TX	Output, High as RX, low as TX
J3:3	Reserved	N/C internal use
J3:4	Reserved	N/C internal use
J3:5	Slave IRQ	IRQ signal when radio card is SPI slave, not implemented
J3:6	Overlay CS	CS Signal for overlay, active high
J3:7	SLAVE CS	CS Signal when radio card is SPI slave, not implemented
J3:8	SCK	Serial Clock signal
J3:9	MISO	Master In, Slave out signal
J3:10	MOSI	Master Out, Slave in signal
J3:11	RS485 DIR	Direction for RS485 driver
J3:12	RS485 DISABLE	Connect to 3.3V when internal RS485 driver should be turned off

IMPORTANT: DMX direction for cards

All transceiver cards can operate as transmitter or receiver, by setting the voltage on pin 10 in the following 3 configurations

Pin 10 voltage	Function
GND	Transmitter (like G4 type O cards)
3.3V (Open)	Receiver (like G4 type O cards)
1.65V	Transmitter or receiver (like G4 type R cards) Direction is fetched from non-volatile storage; direction is changed if the button (pin 4) is connected to GND during power up To accomplish this, it is easiest to use two 4.7kOhm resistors, put one 4.7kOhm from pin 8 (3.3V) to pin 10 and one 4.7kOhm resistor from pin 7(GND) to pin 10.



5.1.3 Migrating from G4 to G5

PLEASE NOTE:

- Pin 6 can handle 5 to 26V input on following transceiver cards
A40890G5SPI
- OEM LED output 3.3V when the LED should be on, adjust resistor to give enough current to the LED, maximum output current is 0.5mA
- Pin 9 does not indicate MODE on the receiver, on receiver it is indicating reception
- Shutdown voltage:
To ensure stable operation, the voltage need to be according to the pinout list. But the card may be operational all the way down towards 1.5V, to ensure that the cards is disabled, power need to be reduced to 0V
- OSP interface are improved and the radio card will be SPI Slave during communication, to enable this, the Overlay signal need to be pulled low during power up, this will prevent the radio card from being master and output the Overlay signal. Further documentation of the OSP protocol will be available at a later date.
- Overlay interface has been changed



6 DMX Interface and Specification

The L5 series provide DMX as non-isolated RS-485 signal available on pins Data+ and Data-. In addition, the L6 series also provides the option of TTL level signals on the same pins. This enables a designer to bypass the need for RS485 converters.

To select TTL levels instead of RS485, pull the RS485/TTL Sel. pin (J3:12/Slot In:16) high. Refer to the connector description for pin numbering.

Note that all normal DMX/RDM timing requirements apply regardless of signal levels.

6.1 Conformity to ANSI E1.11-2008

The W-DMX G5 conforms to the USITT DMX-512A standard with the following specifications:

6.1.1 Loss of data handling procedure.

6.1.1.1 Loss of DMX or Radio Link

Recovery of DMX at the receiving end after loss and resumption of DMX signal at the transmitter is within 5 ms.

Recovery after complete loss of the radio link is less than 50ms when there are normal reception conditions.

The TRX OEM receiver cards will turn their DMX/RDM output into high impedance state upon loss of DMX at the transmitter, or loss of radio link at the receiver.

The W-DMX G5 radio protocol employs what is known as Data Safe which has redundancy on in the packets sent over the air and send each DMX slot at least twice, and distributes them on different frequencies, thereby greatly improving reliability and data fidelity, and greatly reducing the chance of data loss caused by spurious interference when compared to other Wireless DMX products. However, no radio system is 100% noise proof and if higher data reliability where no bytes can be allowed to be wrong, the user needs to implement some kind of error correction scheme above the DMX layer.

6.1.1.2 Loss of Power

Configuration information is stored in non-volatile memory and will not be lost upon loss of power to the card. This information includes system setup and settings for power level and frequency hopping pattern, as well as connection information for the previous transmitter the unit was connected to. The non-volatile memory will retain its information for a minimum of 10 years without power.

Upon loss of power to the card the RS-485 DMX ports of the device will go into a high impedance state, as mandated by the DMX standard.

Resumption of wireless transmission and reception of data takes place within a second after power is reapplied to the card, depending on configuration.



6.1.2 Packet processing latency.

The W-DMX™ systems have an average latency of 3ms from when data comes in to the radio transmitter to when data is transmitted from the radio receiver when running in G5 radio mode.

6.1.3 NULL START Code functionality.

The W-DMX™ system forwards all packets regardless of start code in G5 mode, with the exception of RDM start codes, which are processed internally on RDM enabled devices. In other radio modes only NULL START Code packages is forwarded.

6.1.4 Slot footprint.

The W-DMX system has a slot footprint of zero.



7 User Interface

The W-DMX™ system offers the following user interface options:

1. A push button (called function switch) and one or more status LEDs.
2. Overlay Interface
3. OEM SPI Protocol (OSP) interface
4. RDM interface

The developer is free to implement one or more of the above options. Note that option 1 and 2 can also be controlled or read from a microcontroller, but in such a case using the OSP is recommended.

IMPORTANT! The Function Switch and the LED indicator are the minimum requirement for a working OEM implementation. Without a way to interact with the system the user may be left with an inoperable device.

7.1 Function Switch

The function switch can be a simple momentary push button connected between pin J1:4 and ground or a transistor controlled by a micro controller. Refer to the table below for exact timings required.

7.1.1 Link

When the button is pressed for 1 to 2 seconds, the transmitter will pair with unlinked receivers within range.

7.1.2 Unlink

On a transmitter holding the button for more than 3s and then releasing it will cause any linked receivers to unlink.

On a receiver holding the button for more than 3s will cause that receiver to unlink.

7.1.3 Transceiver direction

The W-DMX™ transceiver cards come in two configurations: transmitter and receiver. Cards configured as OEM, or Pin 10, rely on the state of pin J1:10 to set the direction of operation (TX or RX). An RDM enabled transmitter will periodically switch to radio receive mode to listen for replies without the need of any user interaction.

Pulling pin J1:10 low selects transmitter mode and pulling it high or leaving it floating selects receiver mode. Changing the pin state will immediately change the radio card configuration.

Cards configured as Flex Button read the state of pin J1:4 at start up and will, if the pin is low, switch mode. A receiver becomes a transmitter and vice versa. When J1:4 is held low at boot, the boot loader will be bypassed, giving control to the main program immediately. Thus the pin only has to be held low for a very short period of time.



7.1.4 Control Mode

Transmitters will enter a control mode when the button is held low for more than 10s. In this mode further button presses will cycle through G3, G4S, G5; G4S and G5 5.8GHz modes and G4S and G5 5.2GHz radio modes. 5GHz options are only available in certain radio cards.

Pushing the button for more than 3s leaves Control Mode and saves the new mode.

7.1.5 Function Switch Timing

The functionality provided by the Function Switch input and its timing parameters are described in the table below.

	Time min	Time max
Transceiver		
Idle / Normal Operation	-	-
Link Receivers	100ms	-
Unlink all receivers	3s	-
Toggle direction at boot (Flex Button Mode only)	100ms	-
Enter control mode	10s	-
Stepping between radio modes	100ms	2s
Store radio mode and leave control mode	3s	-
Receiver		
Idle/Normal Operation	-	-
Unlink from a transmitter	3s	-

7.1.6 Status Indicator LED

The Status LED indicates the current status of the wireless connection and the presence of DMX data. The status is valid after start-up process has finished after ~1.7s (worst case) from power on.

The LED is active high, and should be connected between J1:5 and ground, for example J1:7 (on a Nano or Micro) via a series resistor.

The indications below are valid during steady state, that is in normal running mode after the boot loader has finished.

/ "Off" denotes a dark LED and / "On" denotes a lit LED.



7.1.6.2 Nano indicator LED

OEM LED indication of link as a transmitter:



On 900ms / Off 100ms = no DMX present



Continuously On = DMX present



On 100ms / Off 100ms = linking receivers



On 500ms / Off 500ms = unlinking all receivers

OEM LED indication of link as a receiver:



Continuously Off = not assigned to a transmitter



On 900ms / Off 100ms = assigned to a transmitter, but no DMX present



Continuously On = assigned to a transmitter and DMX present



On 100ms / Off 100ms = link to transmitter lost or linking to

OEM LED indication of mode as a transmitter:



Continuously On = G4S mode



Continuously Off = G3 mode



OEM LED indication of mode as a receiver:



After a low pass filter ¹

The signal has a 1s period, that goes low in 100ms steps to indicate reception rate:

100% reception: High

90% reception: 900ms high, 100ms low

60% reception 600ms high, 400ms low

¹ The low pass filter should filter pulses that are up to 50 us long. Pin 9 can drive up to 0.5mA and for filter purpose, there is a 330ohm resistor on the PCB between the driver and the pin.

There will be a pulse for each received radio package, if the pulse is high or low depends on the current signal level, there will be an error of up to 2 pulses for each second, so the error is neglectable if the reception is measured with pulse counting.



7.2 LED Overlay Interface, G5 cards

This is applicable to G5 cards with SPI functionality (two pin headers).

It is possible to implement a display interface similar to the one used on the W-DMX™ BlackBox/WhiteBox range.

The overlay interface consists of an SPI interface that shifts out data for the LEDs as described below. To avoid flicker a latched shift register is recommended.

The SPI speed is 2.5MHz and Overlay CS is pulled high before the output start and pulled low after the SPI output has ended, SCK and MOSI is output signals.

7.2.1 LED order

Name	Bit	Text	Color	Description
Power	0	PWR	Blue	Power, blinking in control mode
RDM	1	RDM	Green	RDM on/off
Green of Mode LED	2	Mode	Green	Mode indicator, part of a RGB LED
Red of Mode LED	3	Mode	Red	Mode indicator, part of a RGB LED
Blue of Mode LED	4	Mode	Blue	Mode indicator, part of a RGB LED
2 Universe	5	UNIV	Green	Is receiving a 2 universe link
Link	6	LINK	Green	Link established
Data	7	DATA	Green	DMX Data present
Transmit Mode	8	TX	Green	Radio Transmitter
Receive Mode	9	RX	Green	Radio Receiver
Reserved	10			
Signal 1	11		Red	Signal Strength
Signal 2	12		Yellow	Signal Strength
Signal 3	13		Green	Signal Strength
Signal 4	14		Green	Signal Strength
Signal 5	15		Green	Signal Strength

The *MODE* RGB LED functions are soon to be expanded, and have the following functions at present:

Off: G3 mode

Green steady: G4S mode



7.3 W-DMX™ OEM SPI Protocol (OSP) Interface

Wireless Solution's W-DMX™ G5 devices (marked with –SPI) support a simple SPI based communication interface that enables an external microcontroller to easily configure a radio card for operation. Commands available includes logging in and out, changing radio mode and power, reading out serial number and model.

The radio card assumes the role of SPI bus master and the external MCU is operating in slave mode.

IMPORTANT! No other traffic is allowed on the SPI bus between the OSP communication bursts! Any stray bits will cause DMX data corruption.

7.3.1 Pin Configuration

The OSP uses the following signals:

MOSI	Data out from the W-DMX™ device
MISO	Data in to the W-DMX™ device
SCK	Clock signal from the W-DMX™ device
GND	Ground return path

Please refer to the pinout guide for corresponding pins.

7.3.2 SPI Settings

Parameter	Min	Type	Max	Unit	Comment
SPI Mode					0. Clock idles low. Data valid on leading clock edge
Data Bit Rate		2.5			
IRQ low to CS low		500	960	MHz	
Time between bursts	580		960	uS	
Bit order				uS	Most significant Bit first
Byte order, Status Byte					Least significant Byte first
Byte Order, Data byte					MSB first, String left to right

7.3.3 Packet Format

An OSP packet consists of at least a packet header of two status bytes and a command, and a number of data bytes depending on the command.

The status bytes are shifted out from the W-DMX™ device at the same time as the command byte is shifted in.

The W-DMX™ device will send/receive data in bursts of first two bytes for the header and then up to eight bytes at a time. The OEM CS signal will go low before every burst and high afterwards. For the OSP_DEVICE_LABEL command that means one burst of two bytes and then four bursts of eight bytes each.



7.3.4 Command Byte

The first byte sent from the external uC determines the action to be taken. It has the following format.

Name	Bits	Description
OSP_COMMAND_MASK	0-6	Command, see the list of available commands
OPS_MODE_MASK	7	Mode, 0=GET, 1=SET

7.3.5 Status Bytes

Two status bytes are sent out from the W-DMX™ device at the same time as the command is shifted in. The lower byte is sent first.

The two status bytes have the following format:

Name	Bits	Description
OPS_STATUS_SIGNAL	0-2	Signal strength or output power
OPS_STATUS_DIR	3	0=Tx, 1=Rx
OPS_STATUS_LINK	4	0=No link, 1=Linked
OPS_STATUS_LOGGED_IN	5	1=Logged in
OPS_STATUS_DATA	6	1=DMX data present
OPS_STATUS_RDM	7	1=RDM enabled
OPS_STATUS_CTRL	8	1=Control Mode
	9-15	Reserved for future use



7.3.6 Available commands

The seven least significant bits of the command byte sets the command. Not all commands are available on all G5 models. A receiver only card supports the subset represented in the Rx column. Any unsupported mode/command combination is ignored. Size is number of data bytes after the header.

Command	ID	G E T	S E T	T R X	R X	S I Z E	Comment
OSP_STATUS	0x00	X		X	X	0	Returns the status bytes
OSP_RADIO_LOGIN	0x10		X	X		0	Initiates login
OSP_RADIO_LOGOUT	0x11		X	X	X	0	Initiates logout
OSP_RADIO_MODE	0x12	X	X	X		1	Sets the radio mode: 0. Receiver Mode 1. G3 Compatible 2. – 3. G4 Compatible 4. G4S 2.4 GHz 5. G4S 5.8 GHz 6. G4S 2.4 GHz Repeater 7. G4S 5.8 GHz repeater 8. G5 2.4 GHz 9. G5 5.8 GHz 10. G5 5.2 GHz 11. G5 2.4 GHz Double Up 12. G5 5.8 GHz Double Up 13. G5 5.2 GHz Double Up
OSP_RADIO_POWER_24	0x13	X	X	X		1	0=lowest, 3=highest
OSP_RADIO_POWER_58		X	X	X		1	0=lowest, 3=highest
OSP_RADIO_POWER_52		X	X	X		1	0=lowest, 3=highest
OSP_RADIO_AFHSS		X	X	X		1	Adaptive Frequency Hopping
OSP_RADIO_SIGNAL		X		X	X	1	Receive signal strength, 0-5
OSP_DEVICE_RESET			X	X		0	Reset device
OSP_DEVICE_LABEL		X		X		3 2	Gets the device label string, same as for RDM
OSP_DEVICE_MODEL		X		X		3 2	Returns the device model String
OSP_DEVICE_FW		X		X	X	4	One byte major, one byte minor, two bytes revision
OSP_DEVICE_SERIAL		X		X	X	5	Five bytes, BCD coded
OSP_RDM_UID		X		X		6	Six bytes RDM UID
OSP_RDM_DOWNSTREAM		X	X	X		1	Enable/Disable RDM propagation. See the W-DMX RDM Manual for details.

7.3.7 Additional OSP commands

Additional OSP commands will be published in later revisions of this document, when they are introduced.



7.3.8 Command and Status Enumerations for use in C code

```
/** \enum OSP_CONTROL_BYTES
    \brief The two byte header
    */
enum OSP_CONTROL_BYTES {
    // The first status byte
    OSP_STATUS_SIGNAL = 0x01,
    OSP_STATUS_DIR = 0x08,
    OSP_STATUS_LINK = 0x10,
    OSP_STATUS_LOGGED_IN = 0x20,
    OSP_STATUS_DATA = 0x40,
    OSP_STATUS_RDM = 0x80,

    // The second status byte
    OSP_STATUS_CTRL = 0x100,
    // Reserved for future use
};

/** \enum OSP_COMMANDS
    \brief List of OSP commands and mode masks
    */
enum OSP_COMMANDS {
    // Masks
    OSP_MODE_MASK = 0x80, //< Mode of operation, 0=GET, 1=SET
    OSP_COMMAND_MASK = 0x7f, //< Command is the 7 LSB

    // GET or SET mode
    OSP_MODE_GET = 0x00, //< GET Mode
    OSP_MODE_SET = 0x80, //< SET Mode

    // No command
    OSP_STATUS = 0x00, //< No command, just get status

    // Category Radio Control
    OSP_RADIO_LOGIN = 0x10, //< SET
    OSP_RADIO_LOGOUT = 0x11, //< SET
    OSP_RADIO_MODE = 0x12, //< GET/SET
    OSP_RADIO_POWER_24 = 0x13, //< GET/SET
    OSP_RADIO_POWER_58 = 0x14, //< GET/SET
    OSP_RADIO_POWER_52 = 0x??, //< GET/SET
    OSP_RADIO_AFHSS = 0x15, //< GET/SET
    OSP_RADIO_SIGNAL = 0x16, //< GET/SET

    // Category: Device control
    OSP_DEVICE_RESET = 0x20, //< SET
    OSP_DEVICE_LABEL = 0x21, //< GET/SET
    OSP_DEVICE_MODEL = 0x22, //< GET
    OSP_DEVICE_FW = 0x23, //< GET
    OSP_DEVICE_SERIAL = 0x24, //< GET

    // Category: RDM control
    OSP_RDM_UID = 0x30, //< GET
    OSP_RDM_DOWNSTREAM = 0x31, //< GET/SET
};
```



7.4 W-DMX™ RDM Interface

The W-DMX™ transceivers can act as a managed RDM proxy. Please see the separate document “W-DMX™ RDM Manual” for details.

7.5 USB Dongle Connection

The W-DMX™ product range also includes an USB-dongle that can be used to configure most advanced parameters and update firmware when new releases become available. Please contact Wireless Solution for more info.

Images coming soon.



8 In-system software updates (Boot Loader Support)

All W-DMX™ devices are equipped with a boot loader, which allows the end-user to upgrade their devices with a new firmware version, even when the cards are installed in a fixture. When power is applied to the W-DMX™ device, the boot loader is entered and the Status LED is lit as an indication. In this mode, it waits for a sync signal from a W-DMX™ USB Dongle. If no signal is received within 0.5s normal operation is resumed and the system enters the main program.

If no valid program is found on the W-DMX™ card, for example because of an interrupted upgrade, the Status LED will blink slowly to indicate this.

During software upgrade the Status LED blinks once for every valid packet received.

8.1 Design Considerations

Designing for boot loader compatibility requires a few considerations that might not normally be included in a simple receiver setup:

8.1.1 Bidirectional connection

In a simple fixture external, DMX ports might not be present. For the boot loader to be able to communicate with the USB Dongle a bi-directional connection is required between the DMX terminals of the W-DMX™ device and an external connector.

Some fixtures offer an external XLR connector for DMX input, often to a separate UART on the uC. This will not work as the boot loader requires unhindered control of the data lines.

Also, most repeaters/splitters will not work as the boot loader protocol uses the non-DMX data rate of 57.6kbps.

8.1.2 A means of resetting the device

Since the W-DMX™ device enters the boot loader at start up, some way to restart the device is required in order for upgrades to work. This can be done either by power cycling the W-DMX™ card or by pulling the RESET pin low on an G5 card.

If the fixture controls the power state of the W-DMX™ device, care must be taken to ensure that the data lines are available to the device at start up.

8.2 Reference design

See section 9 for boot loader compatible reference designs.



9 Reference Designs

9.1 G5 Minimal implementation, OEM Mode

Diagrams coming soon.



10 Specifications

10.1 Electrical Specifications

Parameter	Min.	Type	Max.	Unit
DC Supply				
5V – 26V input (TRx versions)	4.5		26	V
LED Pin output source current				mA
DMX interface				
Maximum number of units on the DMX/RS-485 bus	As per the DMX Standard			
DMX data rate		250		Kbps
ESD protection, human body model		None		kV
RF characteristics (2.4 GHz)				
Maximum output power	20		26.04	dBm
Actual limit depends on local regulations	100		400	kV
Frequency range operation	2403		2479	MHz
Channel Bandwidth		1		MHz
Sensitivity at 0.1% BER		-96		dBm
Range with standard 3dBi antenna (measured)		500		m



DC Current Consumption

Code	Type (mA)	Max (mA)	Antenna	Operating Mode	Type input power (W)	Max input power (W)
A40890G5-SPI						

Environmental Requirements

Parameter	Min.	Type	Max.	Unit
Ambient Operating Temperature	-20		45	°C
Relative Humidity	20		80	%
Option: coated relative humidity	20		95	%



11 Ordering Codes

Order Code	Name	Input Voltage	Band (GHz)	Direction	Antenna	RDM
A40890G5-SPI	Nano G5	5-26V	2.4	TRX	RP-MCX	Yes



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