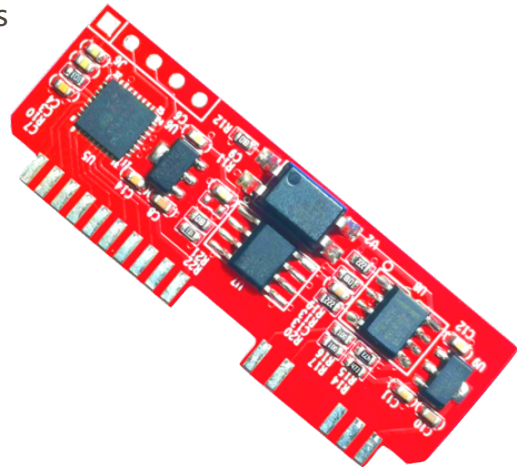


MDM100

DMX512 to PWM PCB module with RDM features
for LED control gears

4-channel 8-bit and 16-bit dimming mode
RDM management features



General Description

MDM100 is a DMX512 to PWM output PCBA module. It accepts DMX512 bus commands and converts them into 4-channel PWM output signals. PWM signals can be used as dimming inputs to power circuits inside of LED control gears or dimmers. It also supports RDM features for easy system commissioning and management.

Features

- Support address auto-assignment via RDM protocol.
- Support 4-channel 8-bit and 16-bit dimming modes (each channel can support up to 2 PWM signals to achieve high-resolution dimming or hybrid-dimming).
- Passed RDM integrity compliance and stress test with DMXter4A.

- On-board RS485 transceiver with AC 3000Vrms isolation circuit.
- Control side 3.3V power supply (default), optional LDO built-in to support wide range DC input (4.5~13.2Vdc)
- RS485 side 5.0V power supply (default), optional LDO built-in to support wide range DC input (7.0~13.2Vdc)
- Accept firmware, hardware, and mechanical customization.

Applications

- DMX512-A/RDM LED constant current / constant voltage control gears/Dimmers
- DMX512-A/RDM to PWM (or 0-10VDC analog) signal converters

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Functional Block Diagram

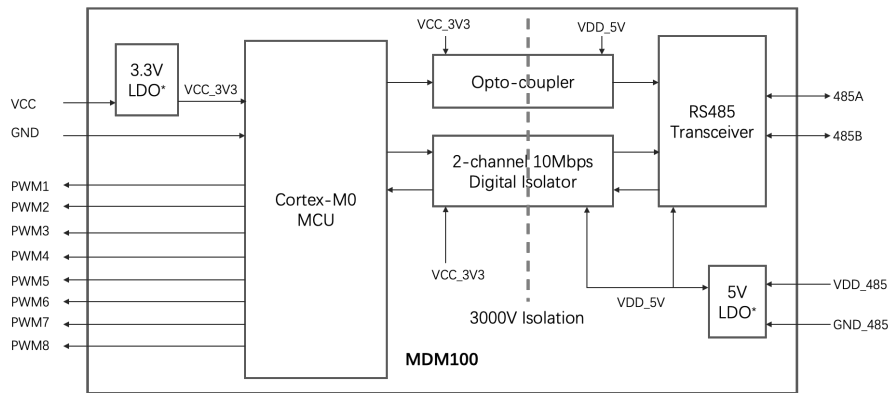


Figure 1 Functional Block Diagram

Characteristics

Parameter	Specification
DMX512-A/RDM Compliance	ANSI-ESTA E1.20, ANSI-ESTA E1.37-1, ANSI-ESTA E1.37-2
Control Side power supply	Voltage: default 3.3Vdc (3.15~3.45Vdc); 4.5~13.2Vdc with optional LDO on-board Current: < 25mA, typical 15mA
RS485 Side power supply	Voltage: default 5.0V(4.75~5.25Vdc); 7.0~13.2Vdc with optional LDO on-board Current: <80mA, typical 50mA @ transmitting signals, 35mA @ receiving signals
PWM1~PWM8	VoH: VCC-0.4~VCC (VCC will be replaced with VCC_3V3 generated by internal LDO) VoL: 0~0.4V Frequency : default 4KHz Resolution : 1/12000
RS485 interface	Meet TIA/EIA-485 standard.
Operation Environment	Temperature : -40~85C , Humidity : 8% ~ 70%
Storage Environment	Temperature : -40~105C , Humidity : 8% ~ 90%
Mechanical	Size (L*W*H) : 46.36mm*16.64mm*1mm , PCB thickness 1.0mm
Mounting type	Dual-side edge pad, soldering
Weight	15±1g

Mechanical

Physical View

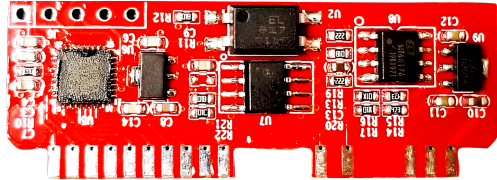


Figure 2 Top

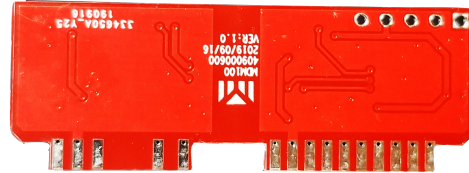


Figure 3 Bottom

Size

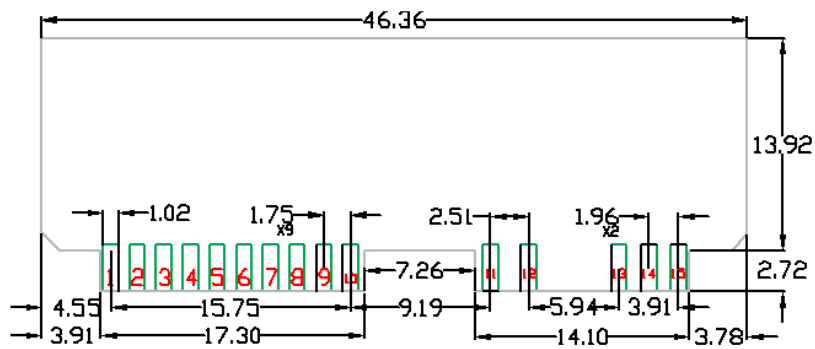


Figure 4 Size (Top view, Unit :mm)

PCB Footprint

To be added.

Pin Definitions

Pin number

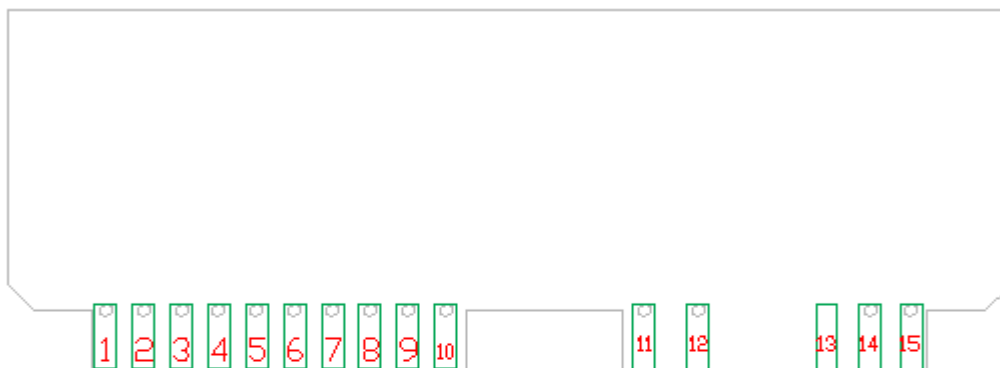


Figure 5 Pin numbering (Top View)

Pin signals

No.	Name	Description
1	PWM4	Primary dimming signal PWM4
2	PWM3	Primary dimming signal PWM3
3	PWM6	Auxiliary dimming signal PWM6
4	PWM5	Auxiliary dimming signal PWM5
5	PWM2	Primary dimming signal PWM2
6	PWM1	Primary dimming signal PWM1
7	PWM8	Auxiliary dimming signal PWM8
8	PWM7	Auxiliary dimming signal PWM7
9	GND	Control side reference ground
10	VCC	Control side power supply
11	485B	RS485 inverting receiver input and inverting driver output
12	485A	RS485 non-inverting receiver input and non-inverting driver output
13	NC	Reserved, no connect
14	GND_485	RS485 side reference ground
15	VDD_485	RS485 side power supply

Operation

This module implements DMX512-A and RDM protocol according to these standards.

- ANSI-ESTA E1.20
- ANSI-ESTA E1.37-1,
- ANSI-ESTA E1.37-2

RDM PID Support List

RDM PID (Parameter ID) somehow determines the RDM feature support of a product. The following PIDs are implemented on this PCBA as default.

Standard	PID	Value (hex)	GET/SET	Requirement Level	Support
E1.20	DISC_UNIQUE_BRANCH	0x0001		Must	Yes
E1.20	DISC_MUTE	0x0002		Must	Yes
E1.20	DISC_UN_MUTE	0x0003		Must	Yes
E1.20	SUPPORTED_PARAMETERS	0x0050	GET	Must*	Yes
E1.20	PARAMETER_DESCRIPTION	0x0051	GET	Must*	Yes

E1.20	DEVICE_INFO	0x0060	GET	Must	Yes
E1.20	DEVICE_MODEL_DESCRIPTION	0x0080	GET	Optional	Yes
E1.20	MANUFACTURER_LABEL	0x0081	GET	Optional	Yes
E1.20	DEVICE_LABEL	0x0082	GET/SET	Optional	Yes
E1.20	SOFTWARE_VERSION_LABEL	0x00C0	GET	Optional	Yes
E1.20	BOOT_SOFTWARE_VERSION_ID	0x00C1	GET	Optional	Yes
E1.20	BOOT_SOFTWARE_VERSION_LABEL	0x00C2	GET	Optional	Yes
E1.20	DMX_PERSONALITY	0x00E0	GET/SET	Optional	Yes
E1.20	DMX_PERSONALITY_DESCRIPTION	0x00E1	GET	Optional	Yes
E1.20	DMX_START_ADDRESS	0x00F0	GET/SET	Optional	Yes
E1.20	SLOT_DESCRIPTION	0x0121	GET	Optional	Yes
E1.20	IDENTIFY_DEVICE	0x1000	GET/SET	Must	Yes
E1.37	CURVE	0x0343	GET/SET	Optional	Yes
E1.37	CURVE_DESCRIPTION	0x0344	GET	Optional*	Yes
E1.37	LOCK_PIN	0x0640	GET/SET	Optional	Yes

Manufacturer/Product-specific information

The following information requirements are related to manufacturer and product, so for a real product they should be customized in our firmware.

- **UID (Unique ID):** UID is required for each product unit and should be unique. Referring to ANSI-ESTA E1.20 standard, the 48-bit UID is combined by 16-bit manufacturer ID and 32-bit device ID. Manufacturer ID could be requested from ESTA without charge. The device ID is allocated by the manufacturer.
- **Device Model ID:** 16-bit Device model ID should be specified for each different Product model by the manufacturer. It will be included in "DEVICE_INFO" parameter message.
- **DMX signal lost behavior:** If DMX signal is not received in a period of time, the PWM outputs of MDA100 will keep without change.
- **DMX not present on startup:** If DMX signal is not received on startup, the PWM outputs are set to 20%.
- **DMX error handling:** If DMX signal error is detected, just act on the next good packet.

DMX Personalities

MDM100 support 2 DMX512 personalities which are "4CH-RGBW" and "8CH-RGBW 16Bit".

"4CH-RGBW" is the default 8-bit dimming mode. "8CH-RGBW 16Bit" is the 16-bit high-resolution dimming mode using 2 DMX512 slots to represent one PWM output level.

Anyway, please notice the difference between "4CH" or "8CH" and the PWM output channel. "4CH" or "8CH" here are actually DMX512 slots.

RDM controller can retrieve this personalities information from "DEVICE_INFO" parameter message.

RDM controller can set or get the current personality with "DMX_PERSONALITY" parameter.

RDM controller can get the description of personality with "DMX_PERSONALITY_DESCRIPTION" parameter.

PWM Output Dimming Signals

PWM1/PWM2/PWM3/PWM4 are designed as 4 primary PWM outputs for 4 channels. The duty cycle of each PWM represents the output channel level specified by DMX slots.

Under 8-bit dimming mode, 1 output channel is assigned to 1 DMX slot.

Under 16-bit dimming mode, 1 output channel is assigned to 2 DMX slots. Dimming mode is determined by DMX personalities.

PWM5/PWM6/PWM7/PWM8 are designed as 4 auxiliary PWM outputs and not functional as default. These could be used to achieve high-resolution dimming performance under 16-bit dimming mode is selected.

Dimming Curve

4 dimming curves could be selected by using "CURVE" parameter message. The product hardware should have the ability to support at least one of them for proper operation.

- 0: Logarithmic (default)
- 1: Linear
- 2: Square
- 3: Customer

Application Considerations

DMX RS485 Wiring

DMX common wire could be connected to RS485 side reference ground.

Product Startup Time

MDA100 will bring the expected PWM output in less than 100ms after power-up. But the product startup time should consider more latencies caused by other functions.

Features Customization

All manufacturer or product-specific information or behavior are required to be implemented in a customized way.

Ordering Information

Model Naming

Model string:

M DM 100 -XXX

Rules:

- M: Module
- DM : DMX/RDM interface
- 100 : Product major model number
- XXX : customization code, not available for standard product

Model list

Model	Order number	Description	Special features
MDA100	MDA100	DMX512-A to PWM PCB module with RDM support	Default implementation

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About Meijay Technologies

Meijay Technologies Co., Ltd. is a professional digital lighting solution manufacturer, providing products and solutions including lighting control modules, controllers, sensors and control systems based on DALI, DMX/RDM, zigbee, BLE, LoRa and other protocols. The company is a long-term member of DALI Alliance. We have ProbitLab2, a professional DALI-2 certification testing equipment, which can provide customers with one-stop DALI-2 product design to certification services.



Document Revision History

Rev	Rev Date	Description	Author	Approver
1.0	2022/2/15	First release.	JT	
1.1	2022/2/15	Add function block diagram	JT	