LED驱动规格书

1200FGH500C-UART

V1.1

2024/7/2

Powerland Signatures					Customer Approval Signature
Prepared	Checked		Approved	Marketing	
	ME	研发经理			

Please return us one copy of the document with your approval signature.

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Features

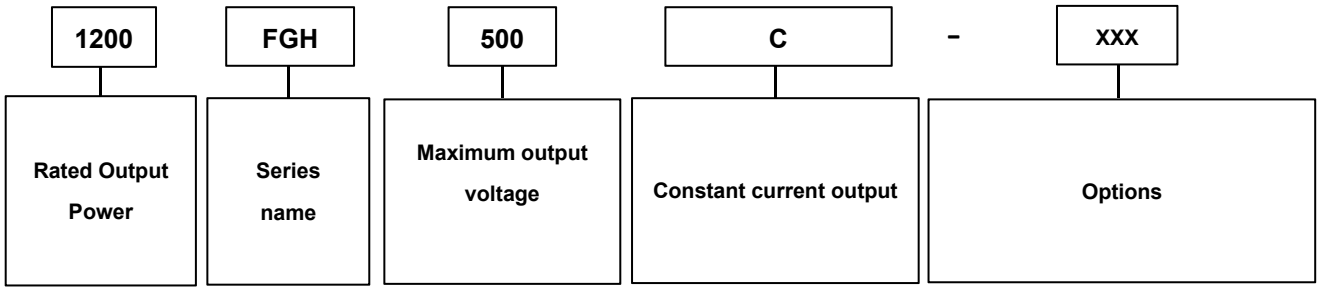


- CC programmable outputs
- High efficiency: 96% typical @400Vac, full load
- High power factor: 0.97 typical. @ 400Vac, full load
- Digital Dimming
- With Lightning Protection & all-round protections (OVP, OCP,SCP,OTP)
- IP65

Description

This specification describes the performance characteristics of a 1200W/4.5A versatile power supply for LED Driver.

Model Name Definition



Specifications

Part Number	Max. Output Power	Programmable Current Range per channel	Output Voltage Range	Efficiency
1200FGH500C-UART	1200W	1.6-4.5A	200-500V	96%@400Vac

Note: Efficiency value is typical value.

Input Specifications

Parameter	Min.	Typ.	Max.	Notes
Input AC Voltage	360Vac	400Vac	440Vac	
Input Frequency	47 Hz	50/60 Hz	63 Hz	
Leakage Current	-	-	0.75 mA	At 400Vac / 60Hz input , grounding effectively
Input AC Current	-	-	3.4A	Measured at full load and 400 Vac input.
Inrush Current	-	-	35A	At 400Vac input, 25°C cold start.
PF	0.90	-	-	At 400Vac, 80%-100% load
THD	-	-	30%	At 400Vac, 80%-100% load

Output Specifications

Parameter	Min.	Typ.	Max.	Notes
Output Current Tolerance	-5%Io set	-	5%Io set	At 25°C and full load condition
Total Output Current Ripple (pk-pk)	-	-	10%Io max	At 25°C and full load condition, 20 MHz BW
Startup Overshoot Current	-	-	10%Io max	At 25°C and full load condition
Line Regulation	-	-	±3%	Measured at full load
Load Regulation	-	-	±3%	
Turn-on Delay Time	-	-	1s	Measured 400Vac input to 90% output current
Temperature Coefficient of Io set	-0.03%/°C	-	0.03%/°C	Case temperature = 0°C ~Tc max
OTP Tc(Note1)	85°C	90°C	95°C	Output current will drop to 50% lowest
SCP				Self recovery（auxiliary sources 12V）, Locked(main circuit)
12V Auxiliary Output Voltage	11V	12 V	13V	OVP voltage less than 20V
12V Auxiliary Output Source Current	0 mA	-	500 mA	Return terminal is “Dim−“

General Specifications

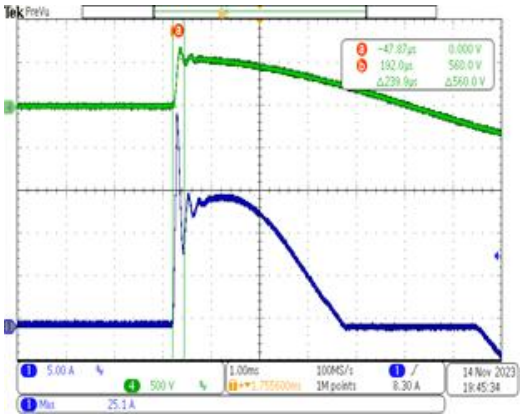
Parameter	Min.	Typ.	Max.	Notes
Standby power	-	-	1.5 W	Measured at 400Vac/50Hz; Dimming off
MTBF	234,000 Hours	-	-	Measured at 400Vac input, 80%Load and 25 ° C ambient temperature (MIL-HDBK- 217F)
Lifetime	61320 Hours	-	-	Measured at 400Vac input, 80%Load and 60°C case temperature; See lifetime vs. Tc curve for the details
Operating Case Temperature Tc(Note1)	-40°C	-	90°C	
Operating Ambient Temperature Ta	-40°C	-	50°C	See Output Load Vs Ambient Temperature
Storage Temperature	-40°C	-	+85°C	Humidity: 5%RH to 90%RH
Dimensions： Inches (L × W × H) Millimeters (L × W × H)	11.46×4.52×2.18 291×114.8×55.4			
Net Weight/pcs	-	3.3kg	-	

Note1:There are three points could be maximum Tc point, depending on different Vac input and Vdc output.These three points(Tc,Tc1,Tc2) position are shown in below mechanical drawing.

Safety &EMC Compliance

Safety Category	Standard
UL/CUL	UL8750,CAN/CSA-C22.2 No. 250.13-12
CE	EN61347-1
EMI Standards	**Notes**
EN55015	Class B
	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.
EMS Standards	**Notes**
EN 61000-4-2	Electrostatic Discharge (ESD): 8 kV air discharge, 4 kV contact discharge，criteria B
EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test-RS，criteria A
EN 61000-4-4	Electrical Fast Transient / Burst-EFT: level 3, criteria B
EN 61000-4-5	Surge Immunity Test: AC Power Line: line to line 4 kV, line to earth 6 kV，criteria B
EN 61000-4-6	Conducted Radio Frequency Disturbances Test-CS，criteria A
EN 61000-4-11	Voltage Dips，criteria B
EN 61547	Electromagnetic Immunity Requirements Applies To Lighting Equipment

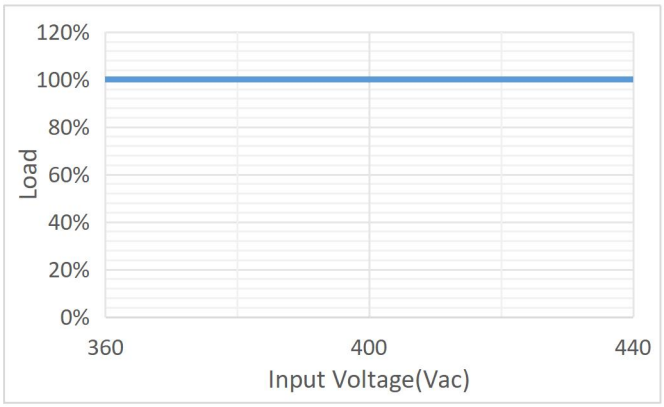
Inrush Current（@Full load and cold start）



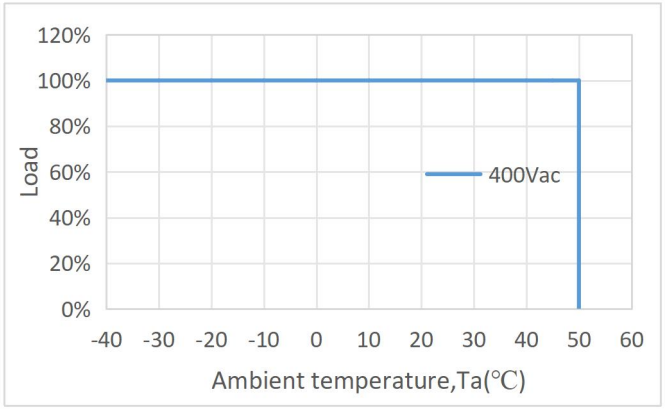
Vin(Vac)	Fin(Hz)	Spec(A)	Ipeak(A)	T duration(ms)
400	50	35	25.1	0.24

Performance Curve

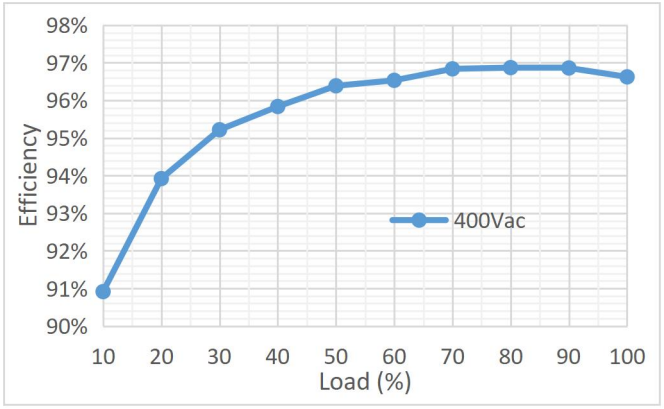
Derating Curve



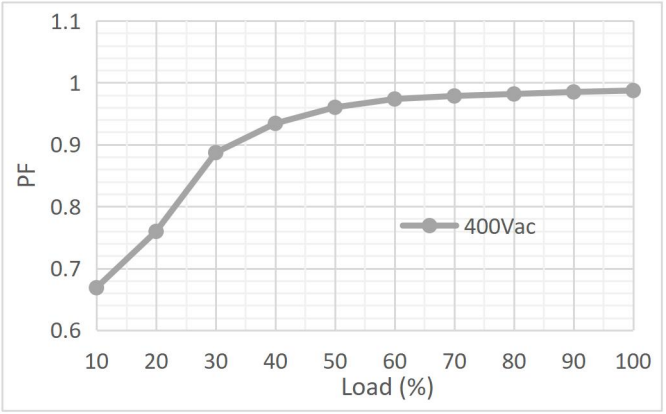
Output Load Vs Ambient Temperature



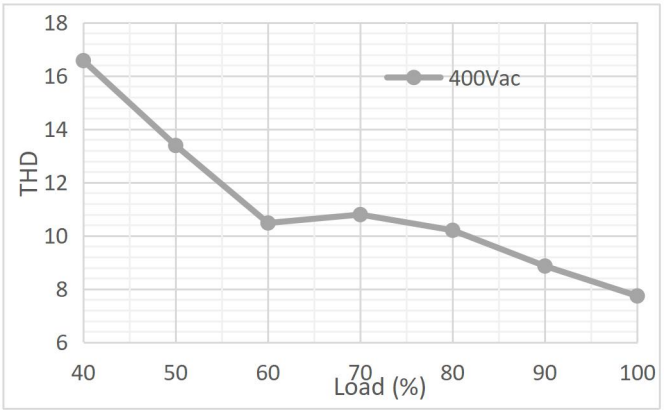
Efficiency Vs Different Loads(400Vdc 3A)



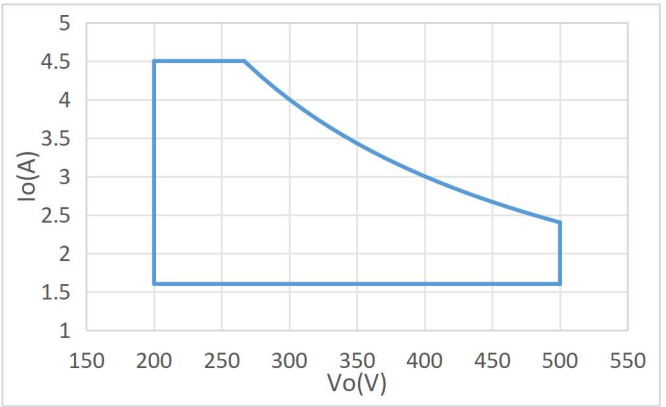
Power Factor Vs Different Loads(400Vdc 3A)

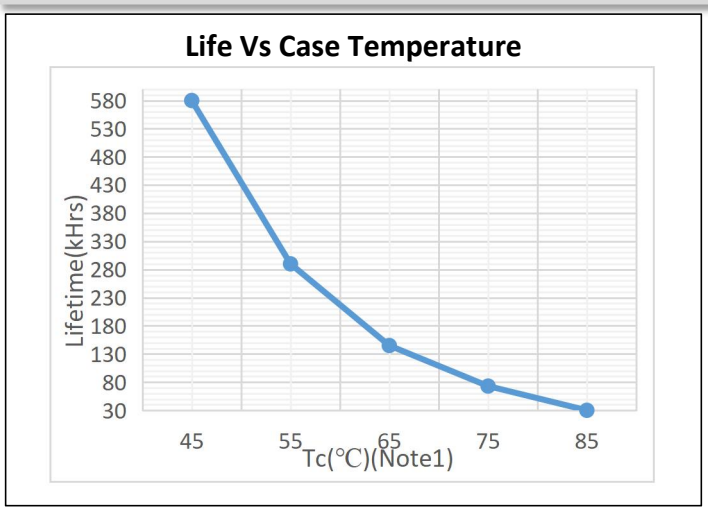


THD Vs Different Loads(400Vdc 3A)

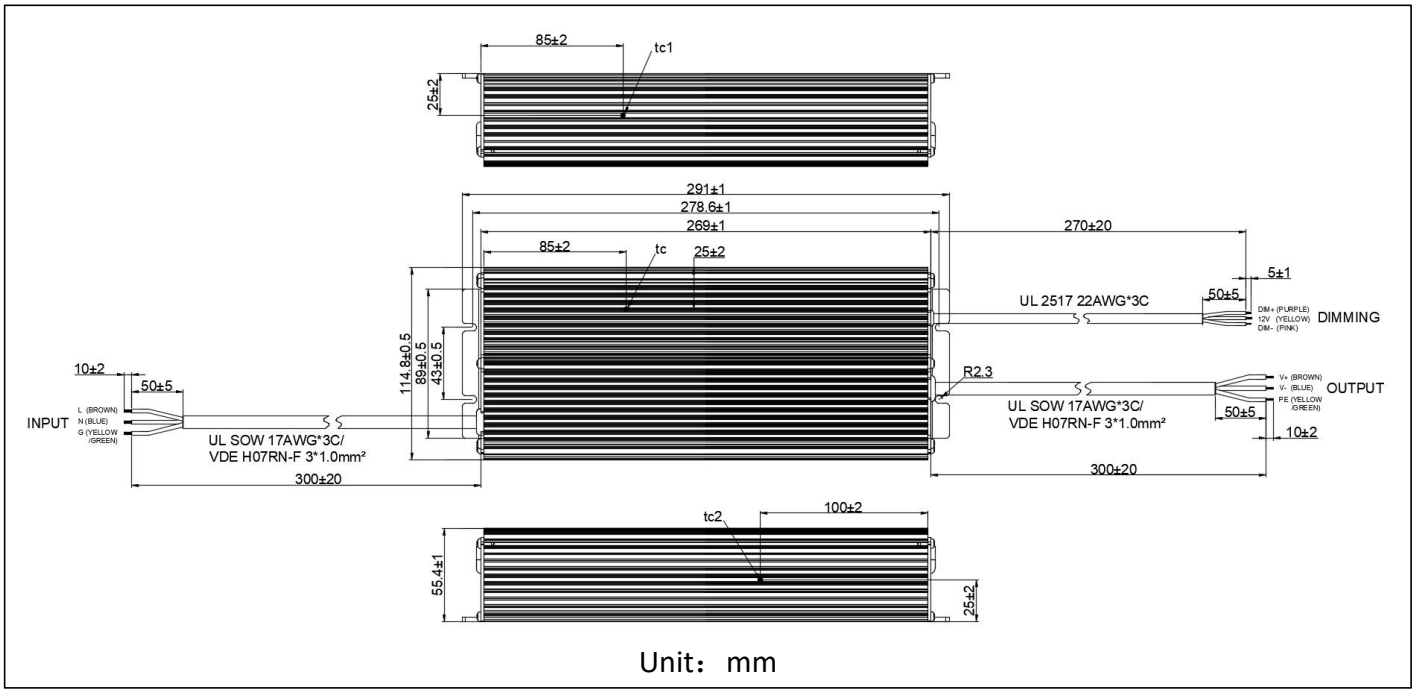


I/V Operating Area





Mechanical Drawing



Digital Dimming V1.0 Communication Protocol

I. Hardware Interface Design

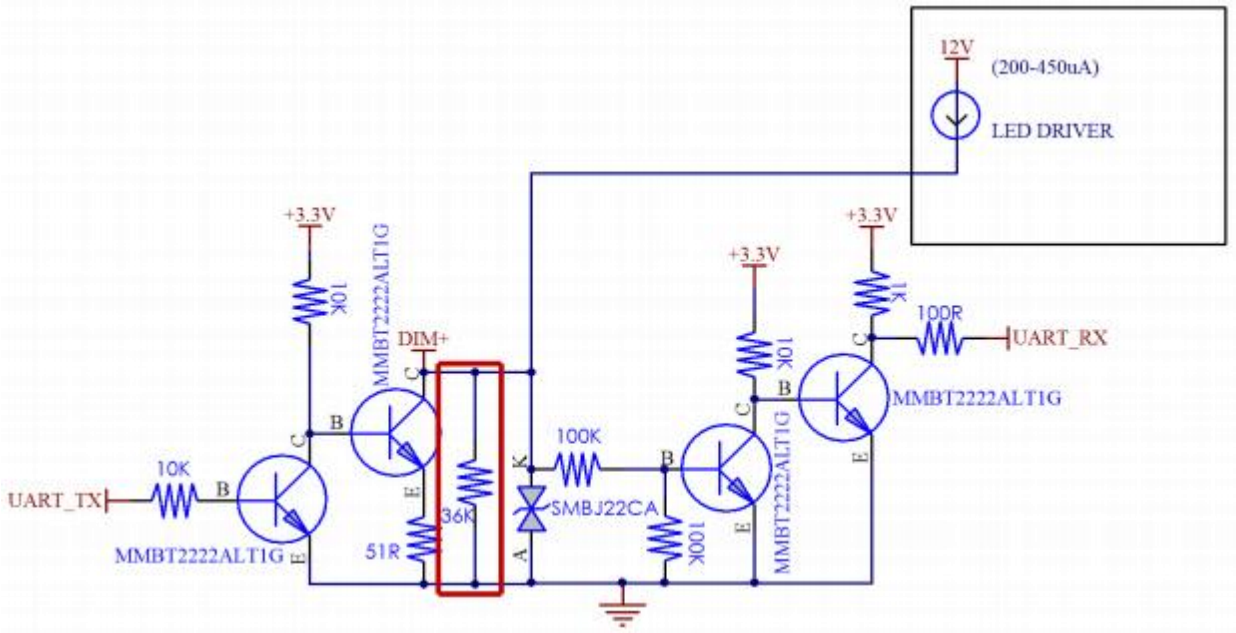
. Digital Dimming utilizes a Master-Slave single line UART communication bus

. To communicate with the driver via UART_TX and UART_RX, a conversion circuit is needed

. DIM+ is internally pulled high by the 12V auxiliary supply, which regulates a 100-200uA constant current supply on the DIM+ line.

. To ensure the reliability of communication, a 36kΩ resistor is required, paralleled between DIM+ and GND.

Reference design shown below:



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II. Data and Frame Definition

. A standard UART interface is utilized

. Each byte data is consisted of 1 start bit, 8 data bits and 1 stop bit

. The Baud rate is 9600

. The Interval between data frames is a minimum of 120ms with a recommendation of over 150ms. (Including intervals between send-frame and send-frame, send- frame and receive-frame)

III. Software Protocol Definition

. A Data frame includes head, command, offset address, data length, data, checksum, and two ends.

. Checksum = command + offset address + data length + data

Available Commands:

. Set Max Current

o Allows user to set output current as a percentage of the maximum current

. Read Output Current

o Returns actual current in DC mA

. Read Output Voltage

o Returns actual voltage in Vdc

. Read Digital Dimming Level

o Read Digital Dimming brightness level, returns value between 0-200

o Value = dim percentage * 200

. Read LED Output Power

o Read Active Power for Driver LED Output in Watts

. Read Driver Input Frequency

o Read driver input frequency (Hz)

. Read Driver Input Current

- Read driver input current in AC mA

. Read Driver Input Voltage

- Read driver input voltage in Vac

. Read Driver Input Power

o Read driver input active power in Watts

. Read Total Lamp-On Time

o Read Total Lamp-On Time in hours.

o Lamp on time is defined as the time that the driver has been powered and not in a dim-to-off state.

. Read Driver Active Energy

o Read driver active energy in Watt Hours

. Read Internal Temperature

o ReadsAD value of driver internal NTC, see Appendix 1 for corresponding AD and temperature values

. Read Driver Operating Time

o Reads driver operating time, or time that the driver has been powered, without consideration to the dim level

. Read Driver Power Failure Mode

o Detects no output

. Digital Dimming

o Allows for dimming of driver over Digital Dimming bus

. Read Model Information

o Returns driver model and rated power level

Information Update Rate:

Without considering UART timing, the driver updates variables approximately every 150ms. If the dimming command or set max current command are used It can take up to 2 seconds for the current and voltage readings to move to their final state. If read before 2 seconds, an intermittent state will be reflected.

Compatible Drivers:

Digital Dimming V1.0 is available on 1200FGH drivers ending in Lx.

IV. Command List

Checksum = Command + Offset Address + Data Length + Data Bit

Header	Command	Offset Address	Data Length	Data	Checksum	End	End	Definition
0x3A	0x31	0x00	0x01	0x00-0x64		0x0D	0x0A	Set Maximum Current as percentage
	0x32	0x00	0x01	If right, return 0x55, if wrong, no return				Response to command 0x31
	0x3A	0x00	0x01	0x02	0x3D			Read Output Current
		0x01	0x01	0x02	0x3E			Read Output Voltage
		0x05	0x01	0x01	0x41			Read Digital Dimming brightness level 0-200 (percentage * 200)
		0x06	0x01	0x02	0x43			Read LED Output Power (W)
		0x0B	0x01	0x01	0x47			Read driver input frequency (Hz)
		0x0C	0x01	0x01	0x48			Read driver power factor
		0x0D	0x01	0x02	0x4A			Read driver input current (AC mA)
		0x0E	0x01	0x02	0x4B			Read driver input voltage (Vac)
		0x0F	0x01	0x02	0x4C			Read driver input power (W) (Active Power)
		0x10	0x01	0x03	0x4E			Read Total Lamp On-Time (h)
		0x11	0x01	0x05	0x51			Read driver active energy (Wh)
		0x12	0x01	0x01	0x4E			Read driver internal temperature (NTC) (℃)
		0x13	0x01	0x01	0x4F			Read external temperature (NTC) (℃)
		0x14	0x01	0x03	0x52			Read total driver operating time (h)
		0x15	0x01	0x01	0x51			Read digital LED power failure mode bit0=1: short circuit, bit1 = 1: open circuit

Header	Command	Offset Address	Data Length	Data	Checksum	End	End	Definition
0x3A	0x3C	0x00	0x01	0x00 - 0xC8		0x0D	0x0A	Digital Dimming, (dims the driver, Percentage * 200)
	0x35	0x0B	0x01	0x05	0x46			Read model information
	0x36	0x0B	0x05	5 Bytes				Return model information

V. Command Definition

. Command 0x31 - Set Constant Power Max. Current

Set constant power maximum current to fit for LED applications.

This data exists in the EEPROM and is not recommended for frequent use. To dim the driver, please use the 0x3C dimming command.

Example: Set constant power maximum current to 70% of current output (70=0x46)

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x31	0x00	0x01	0x46	0x78	0x0D	0x0A

. Command 0x32 - Response of Command 0x31

If data received successfully, reply is 0x55. If not, there is no reply.

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x32	0x00	0x01	0x55	0x88	0x0D	0x0A

. Command 0x3C - Digital Dimming Command

- Data from 0-200 corresponds to 0-100% dimming level.
- To dim driver off, send command 0. If driver does not support Dim-to-Off, 0 is the minimum dimming level.
- If the minimum dimming level is 10%, then all levels between 0-20 are 10%.
- All values over 200 are 100% dimming level.

Example: dimming to 50% (50%*200=100=0x64)

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3C	0x00	0x01	0x64	0xA1	0x0D	0x0A

. Command 0x3D - Response from Digital Dimming Command 0x3C

If data received successfully, reply is 0x55; if not, no reply.

. Command 0x3A - Query Command

The query command requests driver data registers pertaining to driver health and diagnostic information.

- Read Current:

Actual current value= Return current value (mA)

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x00	0x01	0x02	0x3D	0x0D	0x0A

- Read Voltage:

Actual voltage value = Return voltage value (Vdc)

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x01	0x01	0x02	0xA1	0x0D	0x0A

Read Dimming Level:

Actual Dimming Level, 0-200

Dimming Level = Dimming Percentage * 200

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x05	0x01	0x01	0x41	0x0D	0x0A

Read LED Output Power

Actual Active Power for Driver Output, in Watts

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x06	0x01	0x02	0x43	0x0D	0x0A

Read Driver Input Frequency

Actual driver input frequency, in Hertz.

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x0B	0x01	0x01	0x47	0x0D	0x0A

Read Driver Input Current

Actual current value = Return voltage current (AC mA)

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x0D	0x01	0x02	0x4A	0x0D	0x0A

- Read Driver Input Voltage

Actual voltage value = Return voltage value (Vac)

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x0E	0x01	0x02	0x4B	0x0D	0x0A

- Read Driver Input Active Power

Actual Driver Active Power, in Watts

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x0F	0x01	0x02	0x4C	0x0D	0x0A

- Read Total Lamp-On Time

Actual Lamp-on Time = Return Time Value, in Hours

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x10	0x01	0x03	0x4E	0x0D	0x0A

- Read Driver Active Energy

Driver active energy, measured in Watt Hours

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x11	0x01	0x05	0x51	0x0D	0x0A

- Read Internal Temperature

AD value of internal driver NTC. See Appendix 1 for correlation between AD value and temperature values in °C.

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x12	0x01	0x01	0x4E	0x0D	0x0A

Read Total Driver Operating Time

Total driver operating time, in hours. Total driver operating time is defined as time that the driver has been energized, without regard to the status of the driver output.

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x14	0x01	0x03	0x52	0x0D	0x0A

Read Failure Mode

Reads driver failure mode.

For no output, reply is 0x01

If driver is not in failure mode, reply is 0x00

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3A	0x15	0x01	0x01	0x51	0x0D	0x0A

. Command 0x3B - Query 0x3A Command Response

Example: Receive response from Query Current Value

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x3B	0x00	0x02	0x04, 0x12	0x53	0x0D	0x0A

The data 0x04 0x12 = 0 x0412 = 1042, is the actual current value (mA)

. Command 0x35 - Read LED driver information

Reads the information of the current model, including the rated power and the maximum rated current Iomax.

Example: Read LED Driver Information

Head	Command	Offset Address	Data Length	Data bit	Checksum	End	End
0x3A	0x35	0x0B	0x01	0x05	0x46	0x0D	0x0A

Driver will return 3a 36 0b 05 **31 32 30 30 57 60 0D 0A**

31 32 30 30 57 expresses 1200W

Revision History

Change Date	Rev.	Description of Change		
		Item	From	To
2024/2/26	V1.0			
2024/7/2	V1.1	Update Mechanical Drawing		
		Net Weight/pcs	3.1kg	3.3kg