LED Driver
USCO PRO

USCO PRO

Highlights & Features

- Wide range constant current design
- Universal AC input voltage from 120-277Vac
- High efficiency up to 95%
- Wide operating temperature range -40°C to +55°C
- With IP66/IP67 protection from most outdoor applications
- Build-in Active PFC and confirm to harmonic current IEC/EN 61000-3-2, Class C
- Adjustable constant current level through programmable tool
- Common mode 6kV/ differential mode 6kV surge immunity
- Suitable for Dry / Damp / Wet location
- 0-10V dimming available

Model Number: USCO-□□□□□□GA

Dimensions (L x W x H):

USCO-600400GA	308.4x116.7x50.8 mm (12.14"x4.60"x2.00" inch)

Safety Standards

IP66 IP67

CB Certified for worldwide use

General Description

Delta LED drivers come in different series to suit different application needs. The USCO PRO series features program output current level. All the models come in full corrosion resistance aluminum casing and major international safety certifications. USCO PRO series offers the capability to achieve different level of LED brightness via built-in 0-10V dimming function to meet various application and energy optimization needs. The products are designed and rigorously tested to work with various outdoor LED lighting conditions. Featuring high surge immunity (CM: 6kV, DM: 6kV) and complying to IP66/IP67 make Delta USCO PRO series an essential part of an energy efficient LED lighting power solution for both indoor and outdoor applications.

Model Information

Model Number	Input Voltage Range	Rated Output Voltage	Program Output Current	Constant Power Current
USCO-600400GA	120-277Vac Typical 108-305Vac Range	150-300Vdc	1000-3000mA	2000-3000mA

Model Numbering

US	C	O	–	□□□	□□□	G	A
Safety Approval – UL, ENEC, CE	Constant current	Outdoor		Output Power 600: 600W	Output Current 400: 4000mA(3000mA for this model)	Programmable	Variable A – Delta Standard

All parameters are specified at 25°C ambient for all products unless otherwise indicated.
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DELTA

LED Driver
USCO PRO

Specifications

Model Number	USCO-600400GA

Input Ratings / Characteristics

Normal Input Voltage		120-277Vac
Input Voltage Range		108-305Vac
Normal Input Frequency		50-60Hz
Input Frequency Range		47-63Hz
Max. Input Current	120Vac	5.8A
Efficiency [1]	120Vac	93.0%@2000mA
	230Vac	94.8%@2000mA
	277Vac	95.0%@2000mA
Inrush Current (Apk / 50% - µS @ Cold Start)	120Vac	8A/8.3mS
	230Vac	15A/8.3mS
	277Vac	18A/8.3mS
Max. no. of LED Drivers circuit breaker at 230Vac	B16	3
	C16	5
Power Factor		> 0.99 @120Vac full load, > 0.98 @ 230Vac full load > 0.98 @ 277Vac Full Load, > 0.95 @ 120/230/277Vac&> 50% Load
Total Harmonic Distortion		THD < 20% with load ≥ 50% at 120/230/277Vac input
Leakage Current		< 0.7mA peak @ 277Vac
Standby Power		0.5W @ Dim to off, 230Vac
Input Over-Voltage		Can survive input over-voltage stress of 320VAC for 48 hours and 350Vac for 2 hours

1)   100% Load (typical) and tested after 30 minutes warm up.

Output Ratings / Characteristics

Output Voltage Range	150-300Vdc
Max. No Load Output Voltage	380Vpeak
Output Power Range	600W
Adjustable Output Current (AOC)	1000-3000mA
	With steps of 1mA, configurable via software
Minimum Output Current	200mA (Min dim level)
Current Accuracy	± 5% (@ Typical output current range)
Line Regulation	± 1% (@ 120-277Vac input)
Load Regulation	± 3% (@ Min-Max output voltage)
Output Current LF Ripple	10% (ripple = peak-average/average) at full load
Start-up Time	1000ms max. @ 120-277Vac (full load)

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LED Driver
USCO PRO

Model Number	USCO-600400GA

Mechanical

Casing	Aluminum, Color : Natural
Dimensions (L x W x H) [mm] [inch]	308.4x116.7x50.8 12.14"x4.60"x2.00"
Unit Weight [kg]/ [lb]	3.05/6.72
Cooling System	Convection
Input Cable	Line: Brown, Neural: Blue, PE: Yellow/Green, Cable Length 300mm
Output Cable	Positive: Brown, Negative: Blue, NTC/PRG: Black, Cable Length 280mm
Dimming Cable	Dim(+): Violet, Dim(-): Gray, +12V: Black/White, Cable Length 300mm
Noise (30cm distance)	Sound Pressure Level (SPL) < 24dBA

Environment

Ambient Temperature	Operating	-40°C to +45°C For 120Vac
		-40°C to +55°C For 220Vac–240Vac/277Vac
	Storage	-40°C to +85°C
Maximum Case Temperature		+85°C
Relative Humidity	Operating	10 to 90% RH (Non-Condensing)
	Storage	5 to 95% RH (Non-Condensing)
Environmental Locations		Dry / Damp / Wet
IP		IP66/IP67
Shock Test (Non-Operating)		IEC 60068-2-27, Half Sine Wave: 50G for a duration of 11ms, 3 shocks for each 3 directions
Vibration (Non-Operating)		IEC 60068-2-6, Random: 5Hz to 500Hz (2.09G); 20 min per axis for all X, Y, Z direction

Protections

Over Voltage	380Vpeak
	Auto-Recovery when the fault is removed
Overload / Overcurrent	Reduce output current. Auto-Recovery when the fault is removed
Short Circuit	Auto-Recovery when the fault is removed
Over Temperature	Auto-Recovery when the fault is removed
Ingress Protection Classification	IP66/IP67
Suitable for Luminaires Class	Class I. Insulation Class according to IEC 60598

Reliability Data

Lifetime	50,000 hours at case temp. tc & full load. Refer to "Lifetime VS Case Temperature"
Lifetime @ tc	+70°C

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USCO PRO

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Safety Standards / Directives

Electrical Safety	IEC 61347-1, IEC 61347-2-13 (independent) EN 61347-1, EN 61347-2-13 UL 8750, type "HL" & type "TL"			
CE	In conformance with EMC Directive and Low Voltage Directive			
Material and Parts	RoHS Directive 2011/65/EU Compliant			
Galvanic Isolation	Mains (Input)	Earth (Case)	Output/PROG	DIM ± & +12V
Mains (Input)	N/A	1554Vac	3000Vac	4242Vdc
Earth (Case)	1554Vac	N/A	1554Vac	1554V(leakage current < 20mA)
Output/PROG	3000Vac	1554Vac	N/A	1554Vac
DIM ± & +12V	4242Vdc	1554V(leakage current < 20mA)	1554Vac	N/A

EMC Compliance

Emissions (CE & RE)	Compliance to EN 55015 Class B; 47 CFR FCC Part 15, Subpart B, Class B	
Immunity	Compliance to EN 61547	
Electrostatic Discharge	IEC 61000-4-2	Air Discharge: 8kV Contact Discharge: 4kV Criteria A[1] or Criteria B[2]
Radiated Field	IEC 61000-4-3	Level 2 80MHz-1GHz, 3V/m with 1kHz Sine Wave / 80% Modulation Criteria A[1]
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 2:1KV, Criteria A[1] or Criteria B[2]
Surge	IEC 61000-4-5	Common Mode3): 6kV; Differential Mode4): 6kV, Criteria A1) or Criteria B2):
Conducted	IEC 61000-4-6	Level 2 150kHz-80MHz, 3Vrms :Criteria A1)
Power Frequency Magnetic Fields	IEC 61000-4-8	Level 2 3A/Meter : Criteria A1)
Voltage Dips	IEC 61000-4-11	100% dip; 0.5 cycle , Criteria A1) or Criteria B2) 30% dip; 10 cycle, Criteria A1) or Criteria B2)
Harmonic Current Emission	IEC 61000-3-2	Class C (230Vac @ ≥ 50% load)
Voltage Fluctuation & Flicker	IEC 61000-3-3	

1) Criteria A: Normal performance within the specification limits
2) Criteria B: Temporary degradation or loss of function, which is self-recoverable

3) Asymmetrical: Common mode (Line to earth)
4) Symmetrical: Differential mode (Line to line)

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USCO PRO

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0-10V Dimming Specification

Absolute Maximum Voltage	± 20V
Source Current	200µA ± 50µA
Dimming Input Range	1) 0-10V, 1.2V (± 0.1V) is 10% of Io_set or 200mA minimum, ≥ 8.5V is 100% of Io_set. 2) Lower than 1.1V (± 0.1V) → DIM to OFF is programmable. 0.1V Hysteresis. 3) Short is 0% (DIM to OFF) 4) Open is 100% 5) See 0-10V Dimming Curve
Dimming Current Tolerance	± 10% of maximum setting output current. Ex. Io_set: 1000mA, tolerance is ± 100mA.

Default Settings of the Driver (can be changed with programmable tools)

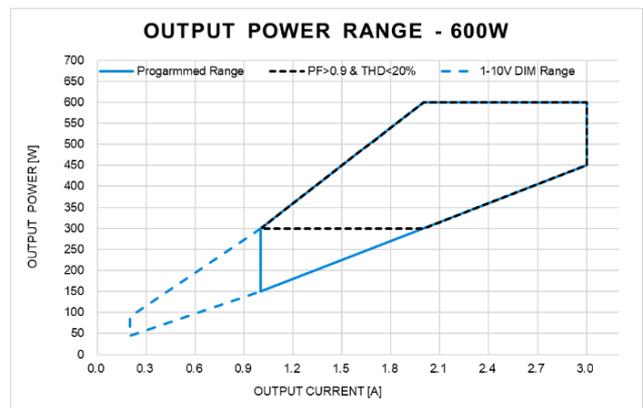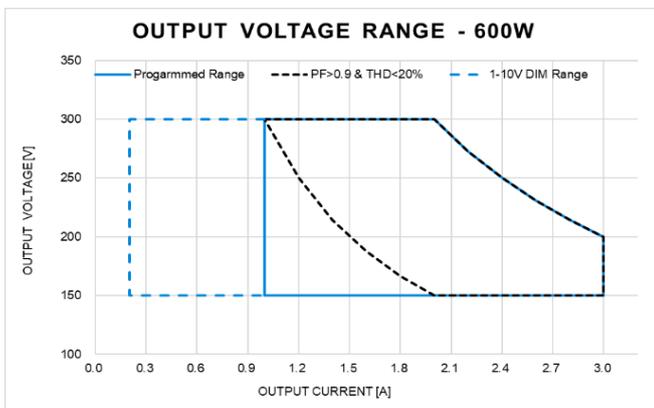|		
Adjustable Output Current (AOC)		2460mA
0-10V DIM		Enabled (DIM to OFF). Selectable for Min. Dim Level and Min. & Max. Dim Voltage though tools
Smart Timer DIM		Disabled (Only one function will be enabled between 0-10V & Smart Time Dim)
Module Temperature Protection (MTP)		Disabled. Settable though programmable tools
Constant Lumen Output (CLO)		Disabled. Settable though programmable tools.
End of Life indication (EOL)		Disabled. Settable though programmable tools
Auxiliary Output Voltage	+12V Output Range	+12.6Vdc (10.8 – 13.86Vdc)
	+12V Output Current	200mA
	Maximum Output Power	2.4W

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www.DeltaPSU.com (Aug 2022, Rev. 07)

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LED Driver
USCO PRO

Lifetime VS Case Temperature

LIFE TIME VS CASE TEMPERATURE

USCO-600400GA

(X-axis: Case temperature(℃), Y-axis: Life time(KHours))
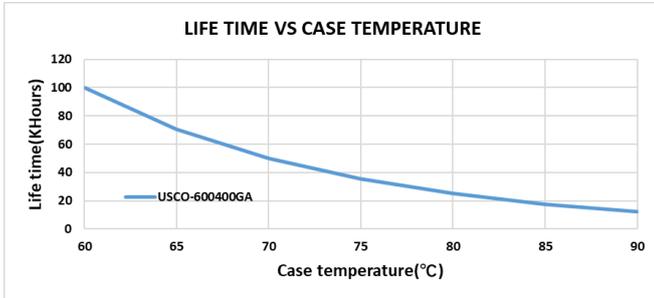
Operation Window for programing

OUTPUT VOLTAGE RANGE - 600W

Programmed Range — PF>0.9 & THD<20% — 1-10V DIM Range

(X-axis: OUTPUT CURRENT [A], Y-axis: OUTPUT VOLTAGE[V])

OUTPUT POWER RANGE - 600W

Programmed Range — PF>0.9 & THD<20% — 1-10V DIM Range

(X-axis: OUTPUT CURRENT [A], Y-axis: OUTPUT POWER [W])

DIMMING CURVE

Min DIM
DIM to OFF
Hysteresis (0.1V)

(X-axis: Dimming Voltage (V), Y-axis: Iout (%))

OUTPUT LOAD VS INPUT VOLTAGE

OUTPUT LOAD VS INPUT VOLTAGE CURVE

(X-axis: input voltage(Vac), Y-axis: Load(%))

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LED Driver
USCO PRO

OUTPUT LOAD VS AMBIENT TEMPERATURE

OUTPUT LOAD VS AMBIENT TEMPERATURE CURVE
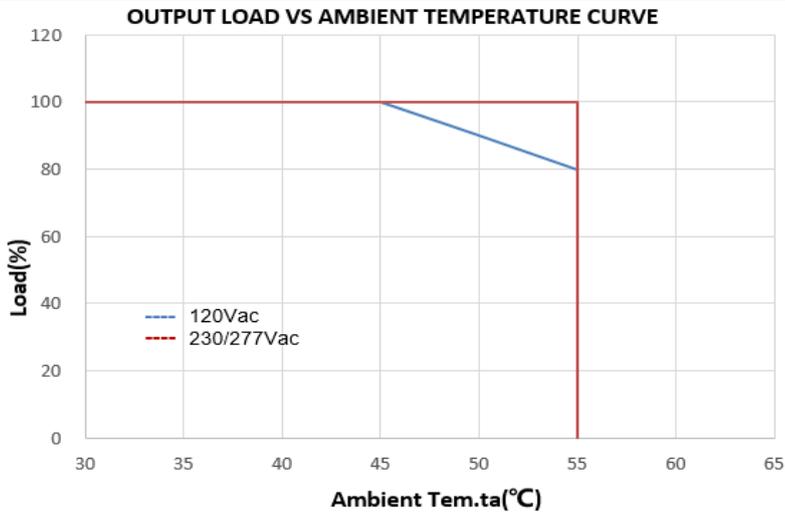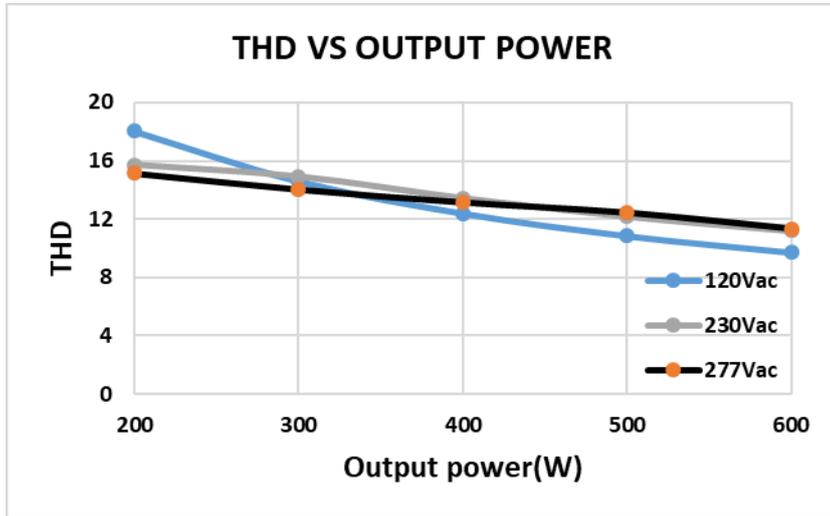

Power Factor VS Output Power
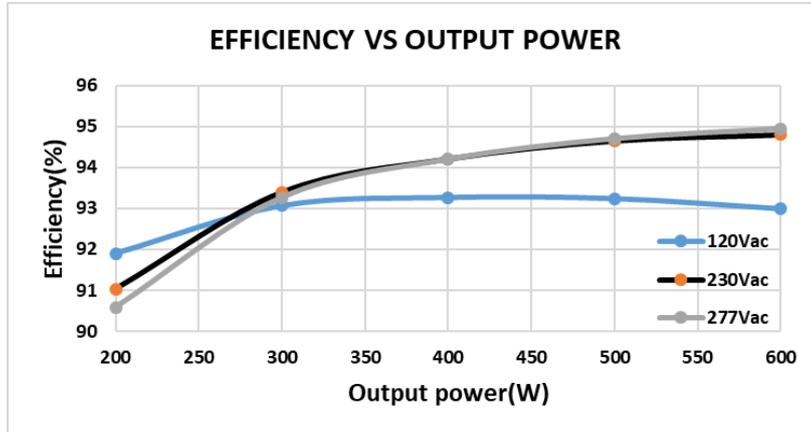
USCO-600400GA – 2000mA
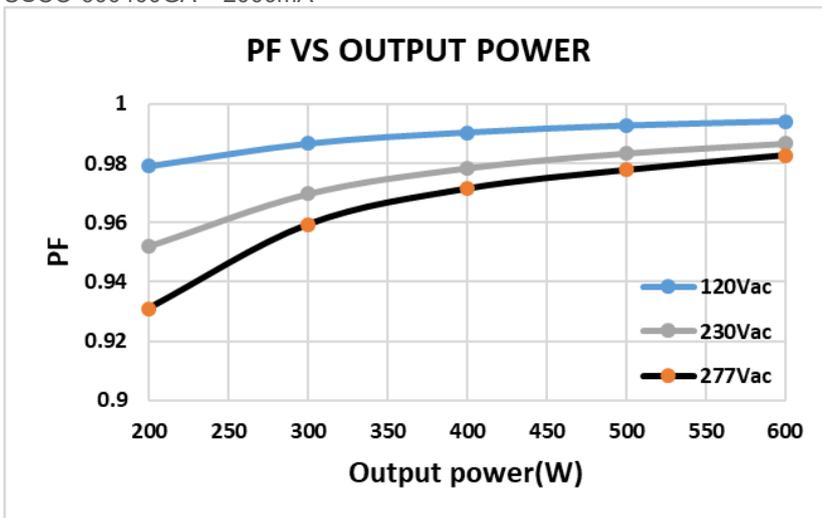
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USCO PRO

Total Harmonic Distortion VS Output Power

USCO-600400GA – 2000mA


Efficiency VS Output Power

USCO-600400GA

LED Driver
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Wiring Connection

- **Module Temperature Protection (MTP)**

The LEDs are thermally protected by the driver's NTC (Negative Temperature Coefficient resistor) interface, which ensures the output current will be reduced when a critical temperature is reached. Connect an NTC on the LED module to the LED driver associated wires as shown in the wiring diagram below.
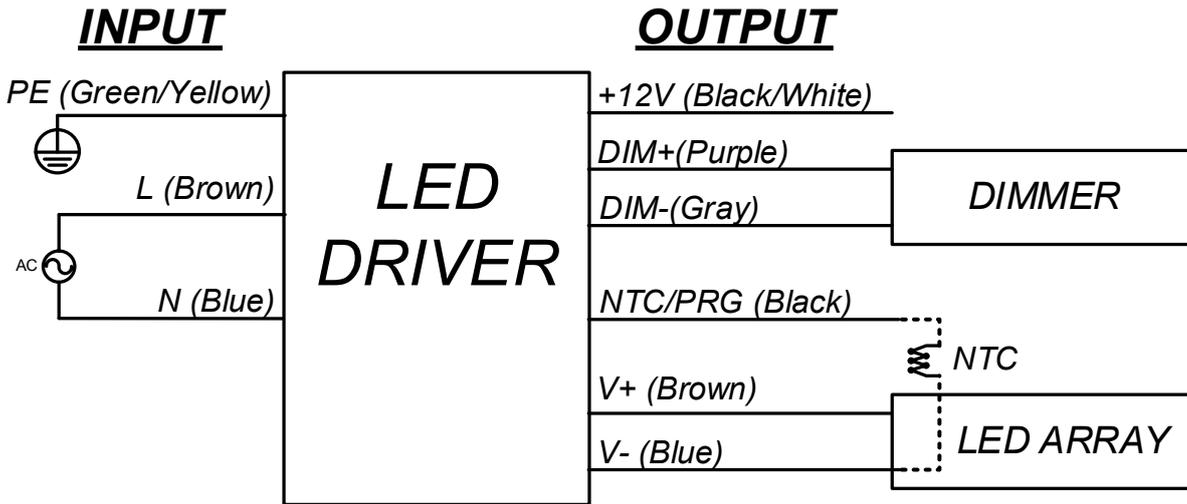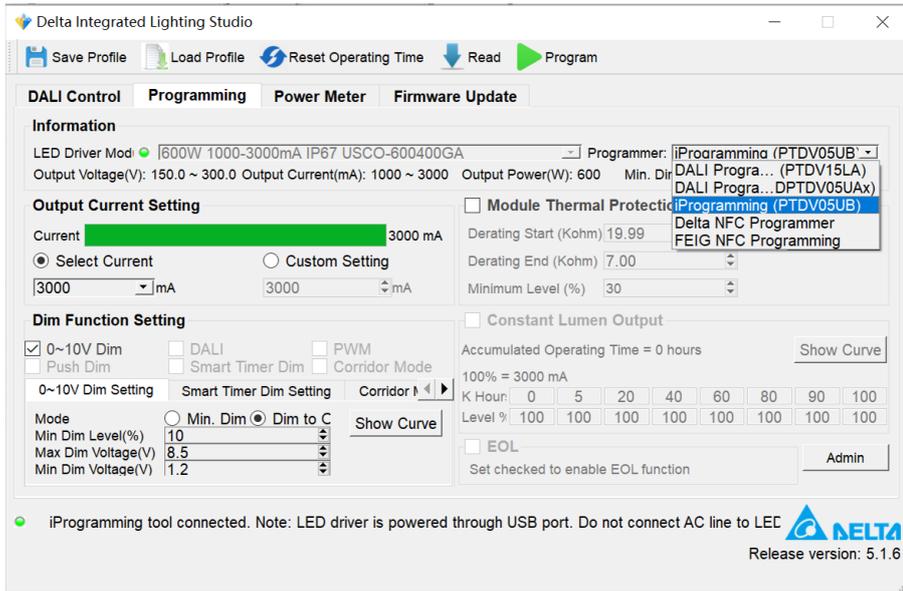

- **Programming Setup**

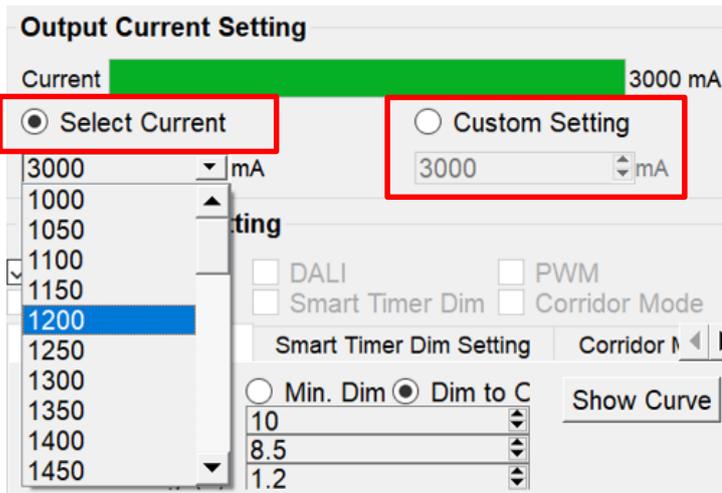Programming doesn't require powering up input voltage or connecting the LED Module to the driver
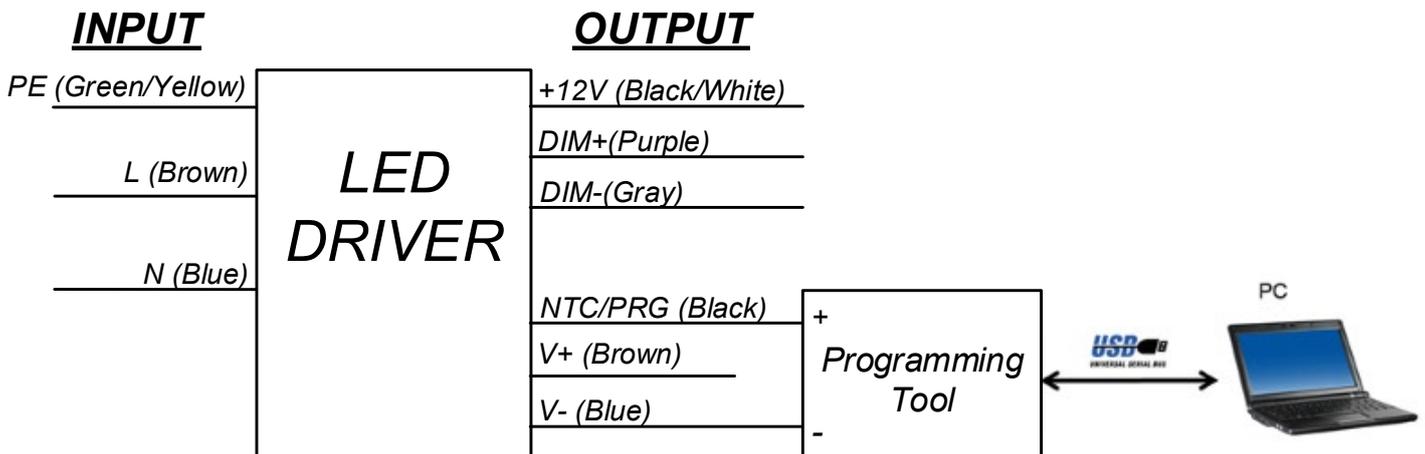
Dimming Software Function Instruction

After running Programming GUI, and select the Programmer Iprogramming(PTDV05UB), it will automatically communicate with LED driver. As a result, information of driver will be loaded and shown in corresponding columns.

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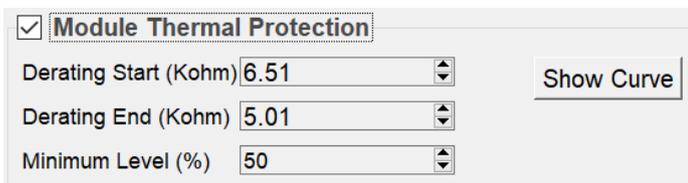
LED Driver
USCO PRO

Current Setting

Output current can be changed either by selecting output current from the drop-down list or entering current value in the right-hand column.

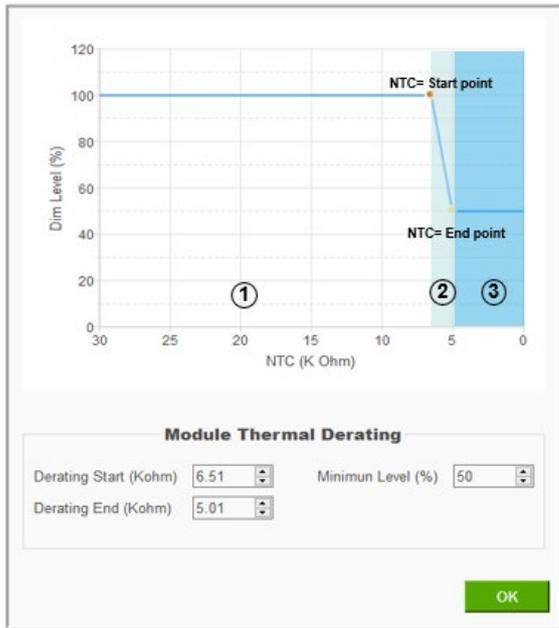## LED Module Temperature Protection (MTP) Setting

LED MTP function is disabled by default. NTC has to be connected or built in to LED module when this function is active. The max. value for "De-rating Start" is 30kΩ and De-rating End' is always less than "De-rating Start' value and greater than or equal to zero. Set the Minimum Level between 10-100%.

The derating start point and end point are defined in the form of resistor value, which are determined by the NTC you choose and desired temperature to react. After setting the MTP parameters, the protecting action will follow the derating curve.

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LED Driver
USCO PRO

Area 1: Output is 100%, NTC > Start Point (temperature of LED module below Protection threshold)
Area 2: Output decreases as curve, End Point ⩽NTC ⩽Start Point.
Area 3: Output equals min level, NTC ⩽ End Point
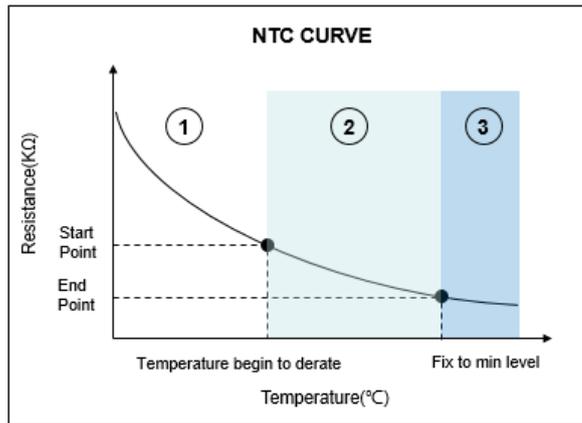
For example:
1. **Select OTP point，such as derating start 105℃,derating end 110℃.**
2. **Select a NTC resistor less than 30 kΩ at 105℃，for example select TSM1A474F4151RZ，R - T Table as follows**

Temperature (℃)	Rmax. (KΩ)	Rnor. (KΩ)	Rmin. (KΩ)	Temperature Tol. (℃)		Resistance Tol. (%)	
105	25.084	24.109	23.169	-1.30	1.30	4.0%	-3.9%
110	21.598	20.727	19.889	-1.38	1.37	4.2%	-4.0%

3. **Set derating start 24.1 kΩ,set derating end 20.7 kΩ**
4. **Click "Program" button to write data into the driver.**

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USCO PRO

Dimensions

USCO-600400GA

308.4 [12.14]

296.4 [11.67]

116.7 [4.60]

98.7 [3.89]

60.0 [2.36]

300.0 [11.81]

286.6 [11.28]

300.0 [11.81]

50.8 [2.0]

Unit: mm [inch]