ENERGY RECOVERY PRODUCTS™

SLM Series 90-160 W

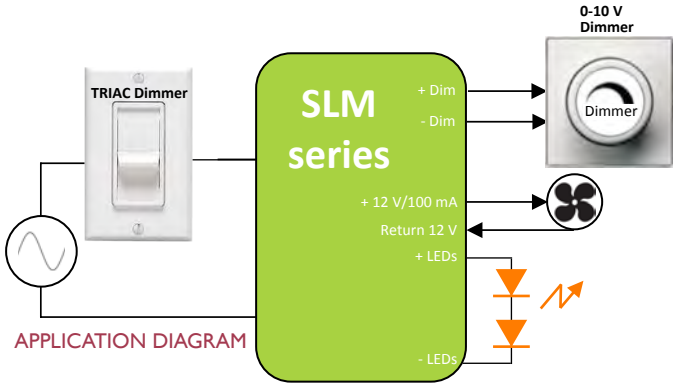
Tri-Mode Dimming (TRIAC, ELV & 0-10 V) High Power CC LED Drivers with 0.01-100% Dimming Range

Input Voltage	Max. Output Power	Output Voltage	Output Current	Efficiency	Max. Case Temperature	THD	Power Factor	Dimming Method	Dimming Range	Startup Time
120 to 277 Vac typical	160 W	21 to 85 Vdc	1.8 A to 3.9 A CC	≥ 90% typical	90°C (measured at the hot spot)	< 20%	> 0.9	Reverse-Phase & 0 - 10V	0.01 - 100% (% of Iout)	0.5 sec

CC: Constant Current

PRODUCT DESCRIPTION

The SLM series of LED drivers is ideally suited for LED lighting applications in stage and studio environments. These devices are compatible with most industry standard, reverse-phase (trailing edge) wall-based dimmers, and 0-10V wall-based dimmers and offer deep dimming from 100% down to 0.01%.



APPLICATION DIAGRAM

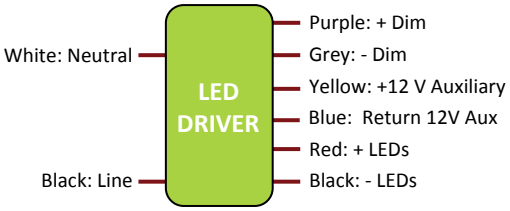
FEATURES

- Compatible with ELV (reverse-phase or trailing-edge) and 0-10 V dimmers
- TRIAC and ELV dimming only at 120 Vac
- 12 V/100 mA auxiliary output
- Protections: output open load, short-circuit (latch-off), and over-temperature with auto recovery
- Conducted and radiated EMI: Compliant with FCC CFR Title 47 Part 15 Class A (120 and 277 Vac) and EN55015 (CISPR 15) at 220/230/240 Vac
- Enables ENERGY STAR® and DLC (DesignLight Consortium®) luminaire compliance
- IP64-rated case with silicone-based potting
- 90°C maximum case hot spot temperature
- Double-insulated power supply between input and output (class II)
- Worldwide safety approvals


ALUMINUM CASE:
L 101.6 x W 50.8 x H 38.5mm
(L 4 x W 2 x H 1.52 in)

APPLICATIONS

- Stage lighting
- Studio lighting
- LED display signage



WIRING DIAGRAM

Tri-Mode Dimming (TRIAC, ELV & 0-10 V) High Power CC LED Drivers with 0.01-100% Dimming Range

1 - INPUT SPECIFICATION (@25°C ambient temperature)

	Units	Minimum	Typical	Maximum	Notes
Input Voltage Range (Vin)	Vac	90	120/220/230/ 240/277	305	The rated output current for each model is achieved at Vin ≥ 115 Vac and at Vin ≥ 209 Vac, at nominal load.
Input Frequency Range	Hz	47	60	63	
Power Factor (PF)		0.9	> 0.9		At nominal input voltage and with nominal LED voltage
Inrush Current	Meets NEMA-410 requirements				At any point on the sine wave and 25°C
Leakage Current	µA			500 µA	Measured at nominal input voltage per IEC60950-1
Input Harmonics	Complies with IEC61000-3-2 for Class C equipment				
Total Harmonics Distortion (THD)				20%	• At nominal input voltage and nominal LED voltage • Complies with DLC (DesignLight Consortium) technical requirements v2.1
Efficiency	%	-	90%	-	Measured with nominal input voltage, a full sinusoidal wave form and without dimmer connected
Isolation	Meets UL60950-1 for class II reinforced/double insulation power supply ⧈				

2 - OUTPUT SPECIFICATION (@25°C ambient temperature)

	Units	Minimum	Typical	Maximum	Notes
MAIN CONSTANT CURRENT OUTPUT					
Output Voltage (Vout)	Vdc	21		85	See ordering information for details
Output Current (Iout)	mA	1800		3900	• See ordering information for details • The rated output current for each model is achieved at Vin ≥ 115 Vac and at Vin ≥ 209 Vac, at nominal load.
Output Current Regulation	%	-5	±2.5	5	• At nominal AC line voltage • Includes load and current set point variations
Output Current Overshoot	%	-	-	10	The driver does not operate outside of the regulation requirements for more than 500 ms during power on with nominal LED load and without dimmer.
Ripple Current	≤ 40% of rated output current for each model ≤ 45% for SLM160W-3.9-40 ≤ 50% for SLM160W-1.8-85				• Measured at nominal LED voltage and nominal input voltage without dimming. • Calculated in accordance with the IES Lighting Handbook, 9th edition.
Dimming Range (% of Iout)	%	0.1		100	The dimming range will be dependent on each specific dimmer.
Start-up Time	s		0.5		With nominal LED voltage, nominal AC line voltage and without dimmer attached

12 V AUXILIARY CONSTANT VOLTAGE OUTPUT					
Output Voltage (Vout)	Vdc	10.2	12	13.2	The voltage regulation is +10%/-15% and the ripple voltage shall be ≤ 0.4V.
Output Current (Iout)	mA		100		

OUTPUT CONTROLS	
+Dim Signal, -Dim Signal	The +Dim/-Dim signal pins can be used to adjust the output setting via a standard commercial wall dimmer, an external control voltage source (0 to 10 Vdc), or a variable resistor when using the recommended number of LEDs. The dimming input permits 0.1% to 100% dimming.

Tri-Mode Dimming (TRIAC, ELV & 0-10 V) High Power CC LED Drivers with 0.01-100% Dimming Range

3 - ENVIRONMENTAL CONDITIONS

	Units	Minimum	Typical	Maximum	Notes
Operating Case Temperature (Tc)	°C	-20		+90	Case temperature measured at the hot spot •tc (see label in page)
Storage Temperature	°C	-40		+85	
Humidity	%	5	-	95	Non-condensing
Cooling	Forced air cooling is required for continuous power exceeding 120 W				
Acoustic Noise	dBA			24	Measured at a distance of 1 foot (30 cm) without and with approved dimmers
Mechanical Shock Protection	per EN60068-2-27				
Vibration Protection	per EN60068-2-6 & EN60068-2-64				
MTBF	> 200,000 hours when operated at nominal input and output conditions, and at Tc ≤ 70°C				
Lifetime (See graphs "Lifetime vs. Case and Ambient Temperature" in section)	•50,000 hours at Tc = 70°C •Measured at the hot spot (see hot spot •tc on label in page)				

4 - EMC COMPLIANCE AND SAFETY APPROVALS

EMC Compliance			
Conducted and Radiated EMI		•FCC CFR Title 47 Part 15 Class A at 120 Vac and Class A at 277 Vac •EN55015 (CISPR 15) at 220/230/240 Vac	
Harmonic Current Emissions		IEC61000-3-2	For Class C equipment
Voltage Fluctuations & Flicker		IEC61000-3-3	
Immunity Compliance	**ESD (Electrostatic Discharge)**	IEC61000-4-2	6 kV contact discharge, 8 kV air discharge, level 3
	RF Electromagnetic Field Susceptibility	IEC61000-4-3	3 V/m, 80 - 1000 MHz, 80% modulated at a distance of 3 meters
	Electrical Fast Transient	IEC61000-4-4	± 2 kV on AC power port for 1 minute, ±1 kV on signal/control lines
	Surge	IEC61000-4-5	± 2 kV line to line (differential mode) /± 4 kV line to common mode ground (tested to secondary ground) on AC power port, ±0.5 kV for outdoor cables
	Conducted RF Disturbances	IEC61000-4-6	3 V, 0.15-80 MHz, 80% modulated
	Voltage Dips	IEC61000-4-11	>95% dip, 0.5 period; 30% dip, 25 periods; 95% reduction, 250 periods
Transient Protection	**Ring Wave**		ANSI/IEEE c62.41.1-2002 & c62.41.2-2002 category A, 2.5 kV ring wave

Safety Agency Approvals		
UL	UL8750 recognized	
cUL	CSA C22.2 No.250.13-14	

Safety					
	Units	**Minimum**	**Typical**	**Maximum**	**Notes**
Hi Pot (High Potential)	Vdc	2500			•Insulation between the input (AC line and Neutral) and the output •Tested at the RMS voltage equivalent of 1768 Vac

Tri-Mode Dimming (TRIAC, ELV & 0-10 V) High Power CC LED Drivers with 0.01-100% Dimming Range

5 - PROTECTION FEATURES

Under-Voltage (Brownout)
The SLM series provides protection circuitry such that an application of an input voltage below the minimum stated in paragraph 1 (Input Specification) shall not cause damage to the driver.

Short Circuit
The SLM series is protected such that a short from any output to return shall not result in a fire hazard or shock hazard. In the event of a short, the driver shuts down and latches off as a result of short circuit fault for main output. Removal of fault and AC recycling returns the driver to normal operation.

Internal Over temperature Protection
The SLM series incorporates circuitry that prevents internal damage due to an over temperature condition. An over temperature condition may be a result of an excessive ambient temperature or as a result of an internal failure. When the over temperature condition is removed, the driver shall automatically recover.

Output Open Load
When the LED load is removed, the output voltage of the SLM series is limited to 1.3 times the maximum output voltage of each model.

230 Vac Protection
The SLM series is compatible with ELV dimming only at 120 Vac. 230 Vac ELV dimming is not supported in the SLM series. However, in the event that someone tries to TRIAC-dim or ELV-dim the SLM series at 230 Vac, it has been added a protection to clamp the internal bus and keep it in safe operating mode.

Tri-Mode Dimming (TRIAC, ELV & 0-10 V) High Power CC LED Drivers with 0.01-100% Dimming Range

6 - PHASE-CUT DIMMING

The SLM series offers dual dimming compatibility with reverse-phase (trailing-edge) phase-cut ELV dimmers and 0–10V dimmers. ELV dimming is only offered at 120 Vac.
Figures 1 and 2 show the typical output current versus conduction angle at nominal input voltage.

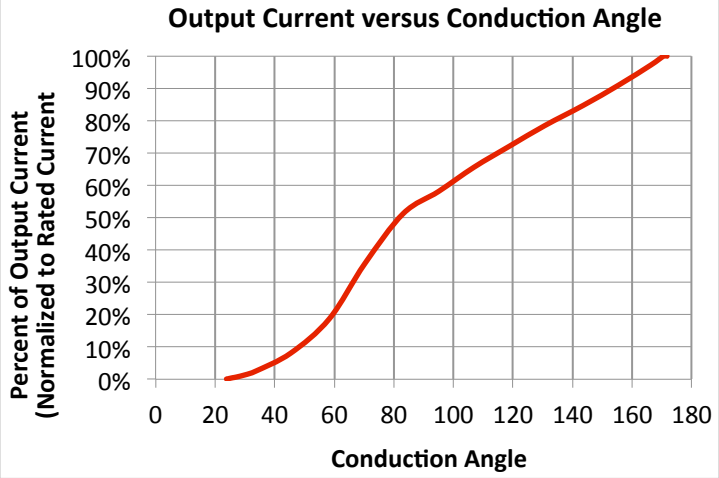


Figure 1

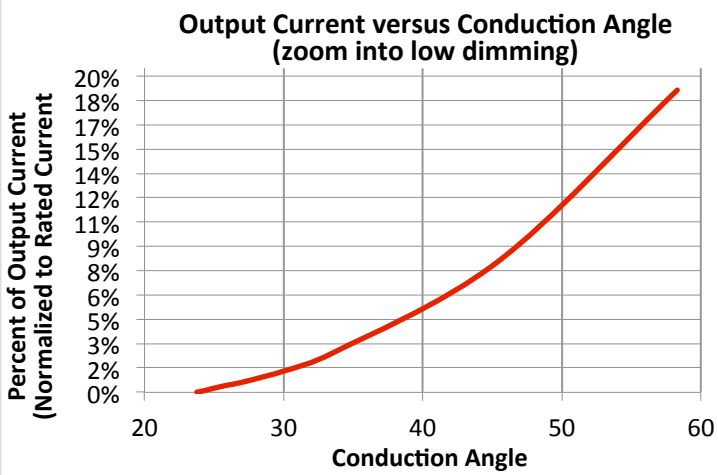


Figure 2

7 - COMPATIBLE PHASE-CUT ELV DIMMERS

Leviton: Vizia VPE06
Leviton: IllumaTech IPE04
Lutron: Diva DVELV-303P
Lutron: Skylark SELV-300P
Lutron: Mestro MAELV-600
Lutron: Faedra FAELV-500
Lightolier: Sunrise ZP260QE

Tri-Mode Dimming (TRIAC, ELV & 0-10 V) High Power CC LED Drivers with 0.01-100% Dimming Range

8 - 0-10V DIMMING

The SLM drivers operate only with 0-10V dimmers that sink current. They are not designed to operate with 0-10V control systems that source current, as used in theatrical/entertainment systems. Developed in the 1980's, the 0-10V sinking current control method is adopted by the International Electrotechnical Commission (IEC) as apart of their IEC Standard 60929 Annex E.

The method to dim the output current of the driver is done via the +Dim/-Dim Signal pins. The +Dim/-Dim Signal pins respond to a 0 to 10 V signal, delivering 1% to 100% of the output current based on rated current for each model. A pull-up resistor is included internal to the driver. When the +Dim input (purple) is short circuited to the –Dim wire (grey) or to the –LED wire (black), there is no output current. When the +Dim input (purple) is ≤ 1 V, the output current is programmed to ≤ 10% of rated current. If the +Dim input is >10V or open circuited, the output current is programmed to 100% of the rated current.
When not used, the –Dim wire (grey) and to the +Dim wire (purple) can be capped or cut off. In this configuration, no dimming is possible and the driver delivers 100% of its rated output current.

The maximum source current (flowing from the driver to the 0-10V dimmer) supplied by the +Dim Signal pin is ≤ 2.5 mA. The tolerance of the output current while being dimmed shall be +/-8% typical until down to 2V.

Figure 3 shows the 0-10V dimming transfer function.

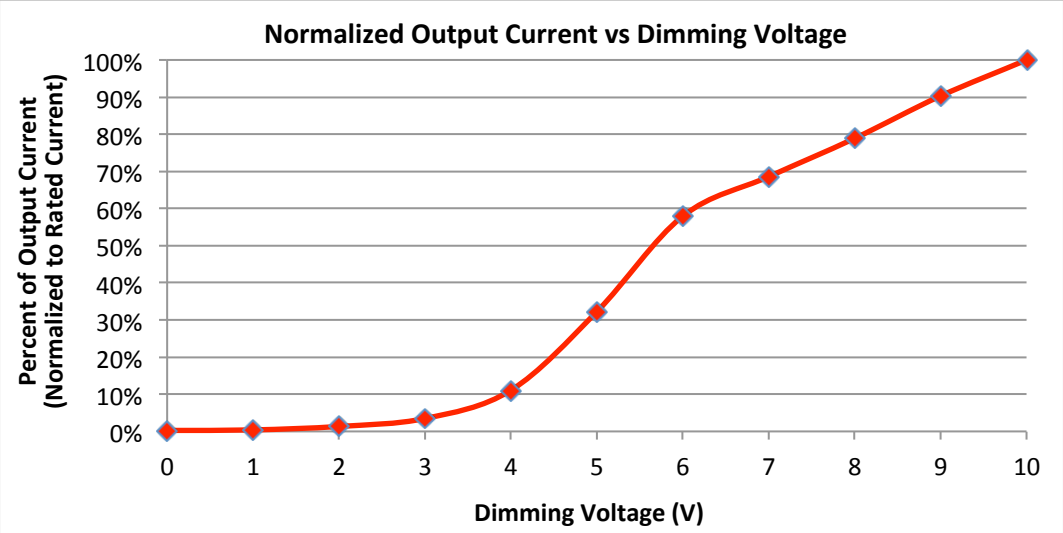


Figure 3

9 - COMPATIBLE 0-10V DIMMERS

- Lutron, Nova series (part number NFTV)
- Lutron, Diva series (part number DVTV)
- Leviton: IllumaTech IP710-DL

Tri-Mode Dimming (TRIAC, ELV & 0-10 V) High Power CC LED Drivers with 0.01-100% Dimming Range

10 - MECHANICAL DETAILS

Packaging Options: Aluminum extruded case

I/O Connections: Flying leads, 18 AWG on power leads, 18 AWG on control leads, 203 mm (8 in) long, 105°C rated, stranded, stripped by approximately 9.5mm, and tinned. All the wires, on both input and output, have a 300 V insulation rating.

Ingress Protection: IP64 rated

Mounting Instructions: The driver must be secured on a flat surface through the four mounting tabs, shown here below in the case outline drawings

11 - OUTLINE DRAWINGS

Dimensions: L 101.6 x W 50.8 x H 38.5 mm (L 4.0 x W 2.0 x H 1.52 in)

Volume: 198.7 cm^3 (12.13 in^3)

Weight:

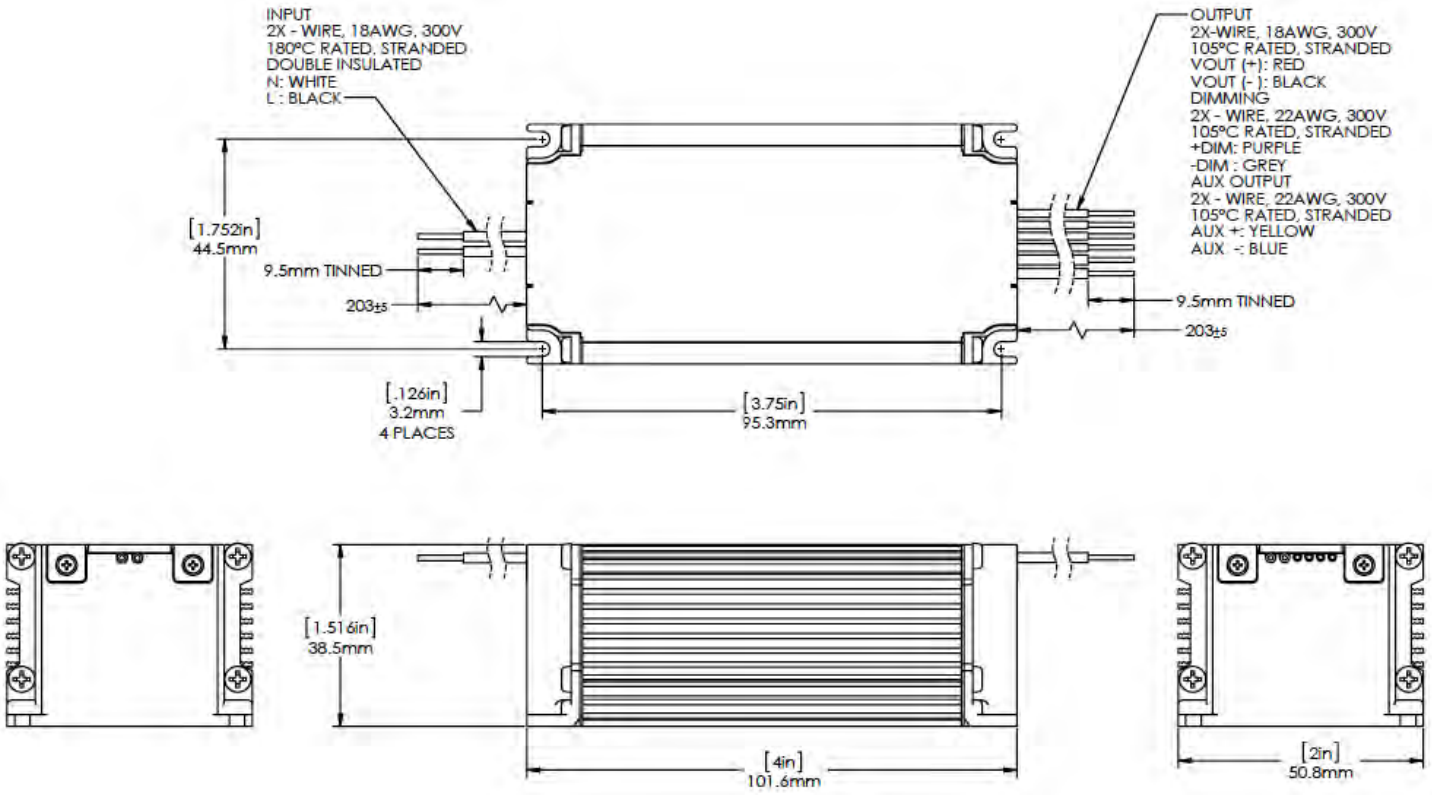


Figure 4

Tri-Mode Dimming (TRIAC, ELV & 0-10 V) High Power CC LED Drivers with 0.01-100% Dimming Range

12 - ORDERING INFORMATION - MODEL DESCRIPTION

SLM□□□□–□□□□–□□

Series
- 100 (up to 100 W)
- 130 (121 - 130 W)
- 150 (141 - 150 W)

Nominal Vin
- W (120 to 277 Vac)

Iout

Vout Max.

Notes:
- *Forced air cooling is required for total continuous power exceeding 120 W*
- *For additional options of output current and output voltage, contact your sales representative or send an email to: SaveEnergy@ERPPowerLLC.com*

120 VAC

Ordering Part Number	Input Voltage Range (Vac)	Max Output Power (W)	Iout (A)	Vout min (Vdc)	Vout Nom (Vdc)	Vout Max (Vdc)	No Load Voltage (Vdc)
SLM100W: 90 to 100 W (1%-100% dimming)							
SLM100W-2.8-34	120 to 277	95.2	2.8	27	30.6	34	44.2
SLM140W: 131 to 140 W (1%-100% dimming)							
SLM140W-2.8-50	120 to 277	140.0	2.8	40	45.0	50	60
SLM150W: 141 to 150 W (1%-100% dimming)							
SLM150W-3.0-48	120 to 277	144.0	3	38.4	43.2	48	60
SLM160W: 151 to 160 W (1%-100% dimming)							
SLM160W-1.8-85	120 to 277	153.0	1.8	68	76.5	85	100
SLM160W-3.7-42	120 to 277	155.4	3.7	30	37.8	42	50
SLM160W-3.9-40	120 to 277	156.0	3.9	30	36.0	40	50
SLM160W-4.4-36	120 to 277	158.4	4.4	28	32.4	36	46.8
SLM100W: 90 to 100 W (0.01%-100% dimming)							
SLM100W-2.8-34-P01	120 to 277	95.2	2.8	27	30.6	34	44.2
SLM140W: 131 to 140 W (0.01%-100% dimming)							
SLM140W-2.8-50-P01	120 to 277	140.0	2.8	40	45.0	50	60
SLM160W: 151 to 160 W (0.01%-100% dimming)							
SLM160W-1.8-85-P01	120 to 277	153.0	1.8	68	76.5	85	100
SLM160W-4.4-36-P01	120 to 277	158.4	4.4	28	32.4	36	46.8

220-240 VAC

Ordering Part Number	Input Voltage Range (Vac)	Max Output Power (W)	Iout (A)	Vout min (Vdc)	Vout Nom (Vdc)	Vout Max (Vdc)	No Load Voltage (Vdc)
SLM100E: 90 to 100 W (1%-100% dimming)							
SLM100E-2.8-34	220 to 240	95.2	2.8	27	30.6	34	44.2
SLM140E: 131 to 140 W (1%-100% dimming)							
SLM140E-2.8-50	220 to 240	140.0	2.8	40	45.0	50	60
SLM160E: 151 to 160 W (1%-100% dimming)							
SLM160E-1.8-85	220 to 240	153.0	1.8	68	76.5	85	100
SLM160E-3.9-42	220 to 240	163.8	3.9	30	37.8	42	50
SLM160E-4.4-36	220 to 240	158.4	4.4	28	32.4	36	46.8
SLM140E: 131 to 140 W (0.01%-100% dimming)							
SLM140E-2.8-50-P01	220 to 240	140.0	2.8	40	45.0	50	60
SLM160E: 151 to 160 W (0.01%-100% dimming)							
SLM160E-1.8-85-P01	220 to 240	153.0	1.8	68	76.5	85	100
SLM160E-4.4-36-P01	220 to 240	158.4	4.4	28	32.4	36	46.8

Tri-Mode Dimming (TRIAC, ELV & 0-10 V) High Power CC LED Drivers with 0.01-100% Dimming Range

13 - LABELING

Figure 5

USA Headquarters
Tel: +1-805-517-1300
Fax: +1-805-517-1411
301 Science Drive, Suite 210
Moorpark, CA 93021, USA

CHINA Operations
Tel: +86-756-6266298
Fax: +86-756-6266299
No. 8 Pingdong Road 2
Zhuhai, Guangdong, China 519060

OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

FORSTAR®

Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А