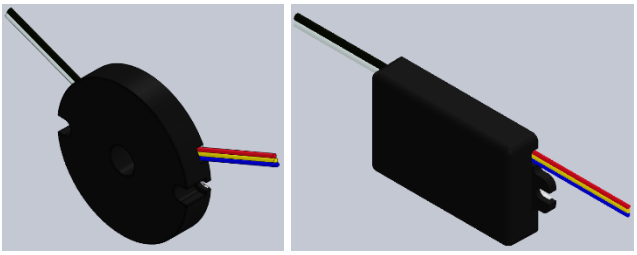
120V LED Driver

MICRODRIVER

SMJR-M-A-YYY-LPX

SMJR-M-B-YYY-LPX



Product Brief

Description

The Seoul Semiconductor MICRODRIVER phase cut drivers are ideal for downlight, spot and track light as well as wall sconce and flush mount fixtures. These incredibly small drivers can fit into the smallest of spaces within the fixture. The MICRODRIVER takes up less than 15% of the space required by a conventional DC LED driver. These Drivers also feature low flicker and high power factor.

Features and Benefits

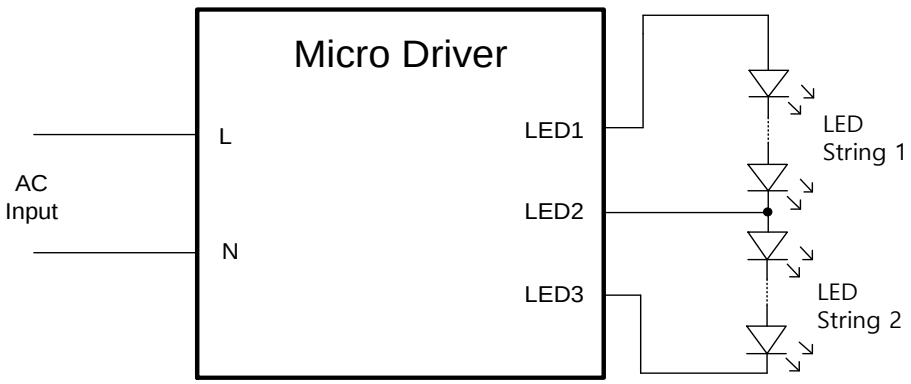
- Very low height 10.50”
- Low output ripple for Title 24 compliance
- AC Phase cut dimming or analog dimming
- Over temperature protection
- Ultra Low Inrush current
- >0.9 Power Factor

Product Selection

Part No.	TYP Light output[lm] @ CRI 90	Current [mA]	P[W]
SMJR-M-A-079-LPX(1)	780	79	8.5
SMJR-M-A-107-LPX	1070	107	11.5
SMJR-M-B-140-LPX	1390	140	15.0
SMJR-M-B-171-LPX	1720	170	18.5
SMJR-M-B-225-LPX	2280	225	24.5

Light Output is a for reference guide only. Actual light out will depend on specific LED and BIN selected
*** NOTE(1): LPX The last part number. LPS = square type, LPR = round type.**

Typical Circuit diagram



Contents

Performance Characteristics

Absolute Maximum Ratings, T_a = 25ºC

Parameter	Symbol	Unit	Lower Limit	Upper Limit
Operating Case Temperature (SMJR-M-A series)	T_c	ºC	-40	92
Operating Case Temperature (SMJR-M-B series)	T_c	ºC	-40	82
Operating Ambient Temperature	T_a	ºC	-40	50
Storage Ambient Temperature	T_{stg}	ºC	-40	85
Humidity	H	%	20	90
Input Voltage Range	Vin	Vrms	-	190

Notes :

Stress beyond those listed Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated in the following operational sections of the specifications is not implied. Exposure to absolute maximum rating condition(s) for extended periods may affect device reliability.

Specification

Specification, Ta = 25ºC

Model	079	107	140	171	225
Input Current	79mA	107mA	140mA	171mA	225mA
Operating Voltage	LED String 1 = 35V LED String 2 = 62V				
Output Current Accuracy	±5%				
Percent Flicker	Less Than 10%				
Startup Time	<300ms				
Input Voltage	120Vac ± 10%				
Input Frequency	50~60Hz				
Efficiency(Typ.)	85%				
Power Factor(Typ.)	PF > 0.9				
Inrush Current(max.)	<300mA				
Line Regulation	±10%				
Over Temperature Protection	LED current reduce to the half of total LED current > 160°, Recycle input power on to recover				
IP Rating	IP 65				

Compliance

Model	079	107	140	171	225
Safety	UL8750				
Isolation Voltage	Non-Isolated				
EMC EMISSION	FCC Part 15 Class B				
EMC IMMUNITY	IEC61000-4-2(Criteria B Level 3) IEC61000-4-4(Criteria B Level 2) IEC61000-4-5(Criteria C Level 1) IEC61000-4-6(Criteria A Level 2) ANSI C62.41.2-2002 Category A 2.5kV				

Notes :

All parts use Halogen free materials. However, wire is non-halogen free material.

Functional Description

Topology and Fundamental Operation

The MICRODRIVER uses a patented Seoul Semiconductor AC Topology using low frequency current steering without the use of magnetic components. During the peaks of the sinewave energy is stored in an electrolytic capacitor. The stored energy is used to power the LEDs during the trough between the peaks to provide an equivalent dc flux to provide very lower measured ripple. The MICRODRIVER supports both leading Edge and Trailing edge dimmer compatibility

Bleeding Function

The MICRODRIVER includes a bleeding functions which enables operation with multiple dimmers. The main functions provide the dimmers with sufficient current to maintain the minimum holding current for various TRIACs and to simulate filament turn on current for some active smart dimmers in common use. A list of tested dimmers is provided below.

Thermal Shutdown

The MICRODRIVER includes a thermal shutdown function. This protection protects the MICRODRIVER from overheating caused by excessive power dissipation. An internal temperature sensor continuously monitors the junction temperature. If the temperature exceeds about 160°C, the LED current will be reduced to the half of the total current.

LEDs Selection and Configuration

The MICRODRIVER output is actually a high voltage waveform in 2 strings. The wave form is using Seoul Semiconductor patented AC waveform with a net light flux that has very low measurable Flicker. For 120Vac input the device is optimized with a String 1 35V and String 2 62V. The converter current is actually divided between the 2 strings with String 1 current measuring approximately 120% of the converter running current and String 2 70% of the converter running current.

The MICRODRIVER can be used with any LED however the best performance and cost optimization is using Seoul Semiconductor MJT LEDs. For the lowest cost solution the recommended LED to us is the MJT 3528 series and for the smallest LES(Light Emitting surface) for spot lights or narrow beam solution use the ICOP Y11 LEDs. The Following Table provides Part numbers and recommended schematic for connecting the LEDs for each solution:

LEDs Selection and Configuration

Small LES LED Connection

LED	WICOP Y11 9V Part Number SZ8-Y11-WN-C8-ZZ*				
CRI	80				
CCT	4000K				
Current[mA]	79	107	140	171	225
Power[W]	8.5	11.5	15.0	18.5	24.5
MICRODRIVER	079	107	140	171	225
Target lumen	880	1190	1560	1920	2540
LED Qty. on 1 step	4	4	4	4	4
LED Qty. on 2 step	7	7	7	7	7
Total[ea]	15	22	33	37	55
Schematic	Fig. 1	Fig. 2	Fig. 3	Fig. 4	Fig. 5

Light Output is a for reference guide only. Actual light out will depend on specific LED and BIN selected

*ZZ is the color temperature eg 2k7=2700CCT, 4k =4000CCT

Lowest Cost LED Connection

LED	MJT3528 9V Part Number SAW9A32E-ZZ*				
CRI	90				
CCT	2700K				
Current[mA]	79	107	140	171	225
Power[W]	8.5	11.5	15.0	18.5	24.5
MICRODRIVER	079	107	140	171	225
Target lumen	**780**	**1070**	**1390**	**1720**	**2280**
LED Qty. on 1 step	4	4	4	4	4
LED Qty. on 2 step	7	7	7	7	7
Total[ea]	15	22	33	37	55
Schematic	Fig. 1	Fig. 2	Fig. 3	Fig. 4	Fig. 5

Light Output is a for reference guide only. Actual light out will depend on specific LED and BIN selected

*ZZ is the color temperature eg 2k7=2700CCT, 4k =4000CCT

LEDs Selection and Configuration

Fig 1

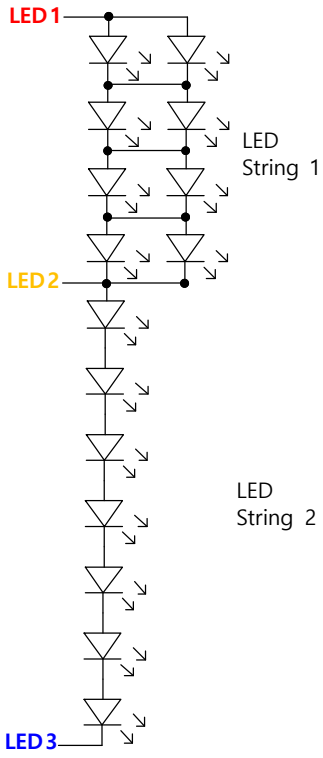


Fig 2

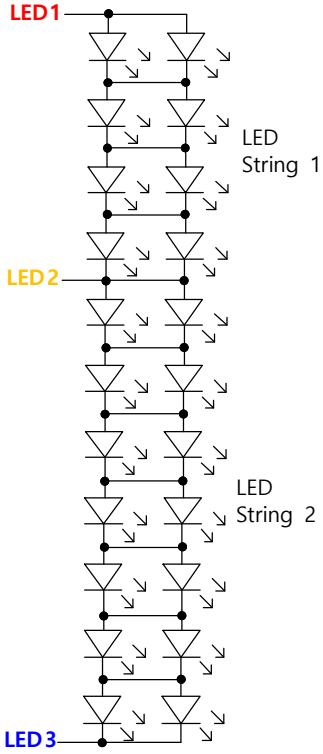
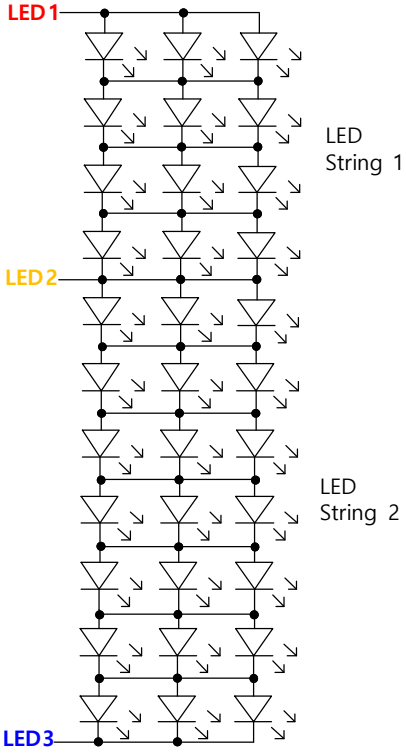


Fig 3



LED1 (Red Wire Connection)

LED2 (Blue Wire Connection)

LED3 (Yellow Wire Connection)

LEDs Selection and Configuration

Fig 4

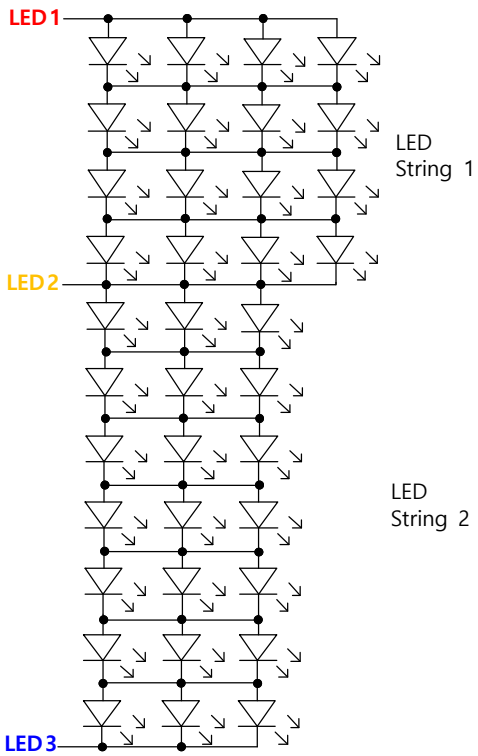
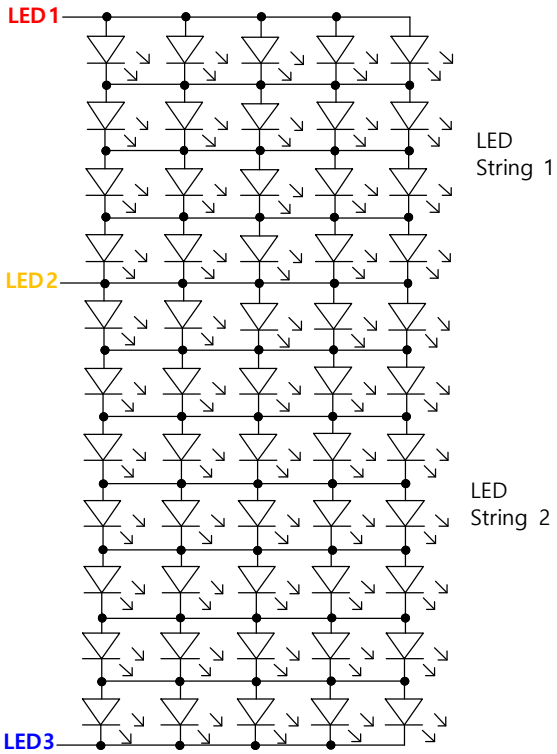


Fig 5



LED1 (Red Wire Connection)

LED2 (Blue Wire Connection)

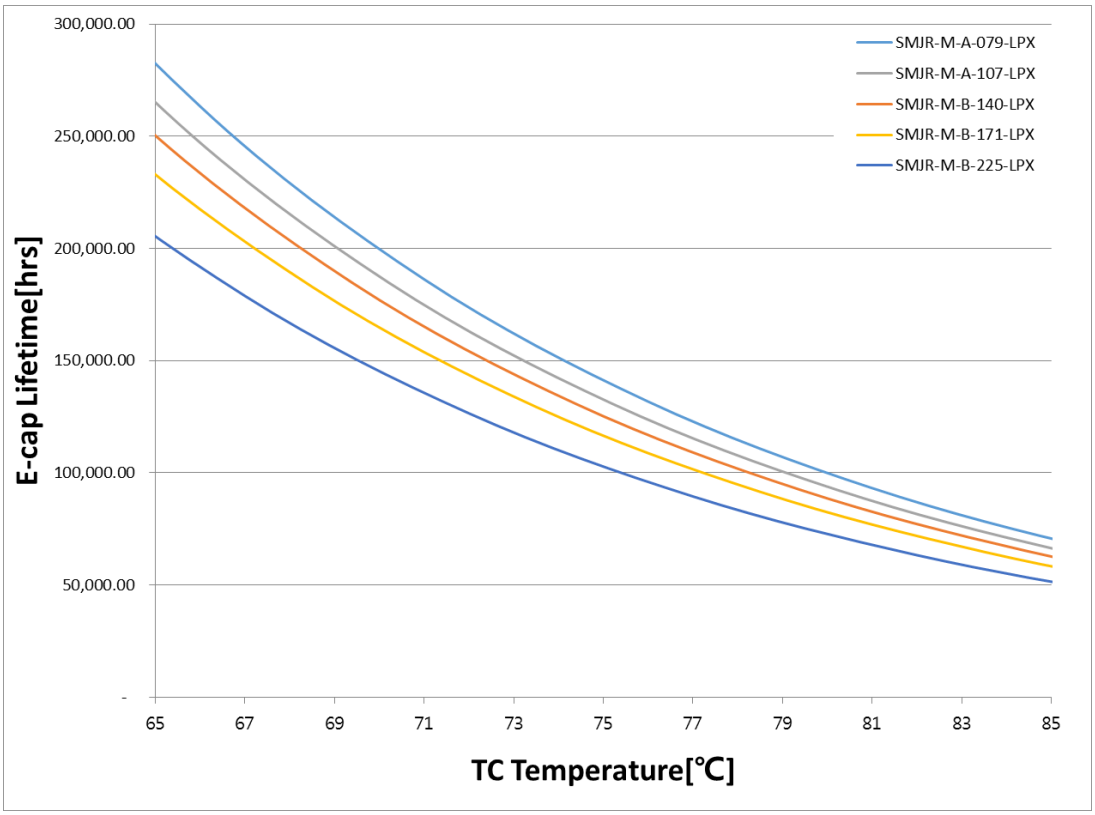
LED3 (Yellow Wire Connection)

Phase Cut Dimmer Compatibility

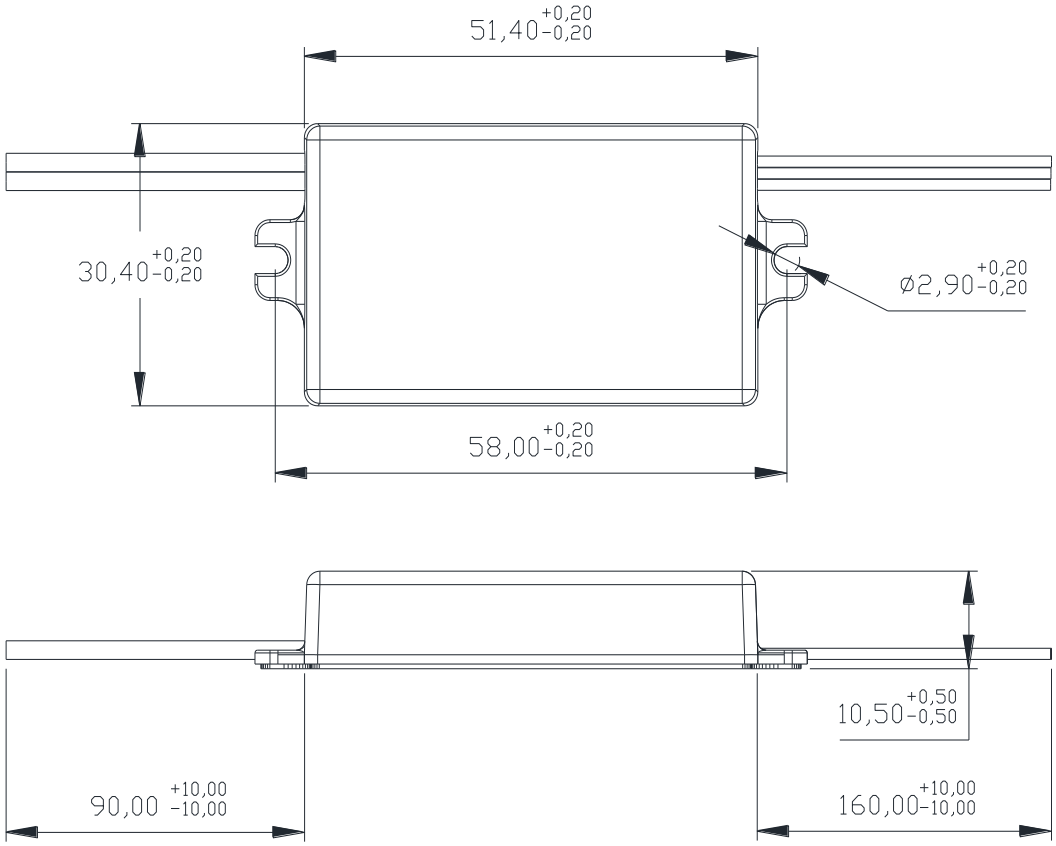
Brand	Model	Dimming type	Op. voltage[V]	Dim. Range[%]	Visible Flicker During Dimming			Uniform Dimming
					At Max Level	Min ~ Max	At Min Level	
Lutron	SCL-153P	Leading	120	5-96	No	No	No	OK
	S-600P	Leading	120	5-96	No	No	No	OK
	GLV24	Leading	120	5-90	No	No	No	OK
	DVCL-153P	Leading	120	5-96	No	No	No	OK
	CTCL-153P	Leading	120	5-96	No	No	No	OK
	DV600P	Leading	120	5-95	No	No	No	OK
	TGCL-153P	Leading	120	5-96	No	No	No	OK
	LGCL-153PL	Leading	120	5-94	No	No	No	OK
	TBL03	Leading	120	5-99	No	No	No	OK
	MACL-153M	Leading	120	5-96	No	No	No	OK
	PD-6WCL	Leading	120	5-96	No	No	No	OK
	SELV-300P	Trailing	120	10-92	No	No	No	OK
	MAELV-600	Trailing	120	10-92	No	No	No	OK
Leviton	6631	Leading	120	5-98	No	No	No	OK
	6683	Leading	120	5-99	No	No	No	OK
	VPE06	Trailing	120	10-92	No	No	No	OK
Legrand	RHCL453PTCCV6	Leading	120	5-96	No	No	No	OK
IKEA	EED100PRE	Leading	120	5-99	No	No	No	OK
	EED200BRE	Leading	120	5-99	No	No	No	OK
	EED150LRP	Leading	120	5-99	No	No	No	OK
	EED20PRE	Leading	120	5-99	No	No	No	OK
WONDER	WDN300F-1	Leading	120	5-99	No	No	No	OK

Performance Characteristics

E-cap Life time vs TC temperature



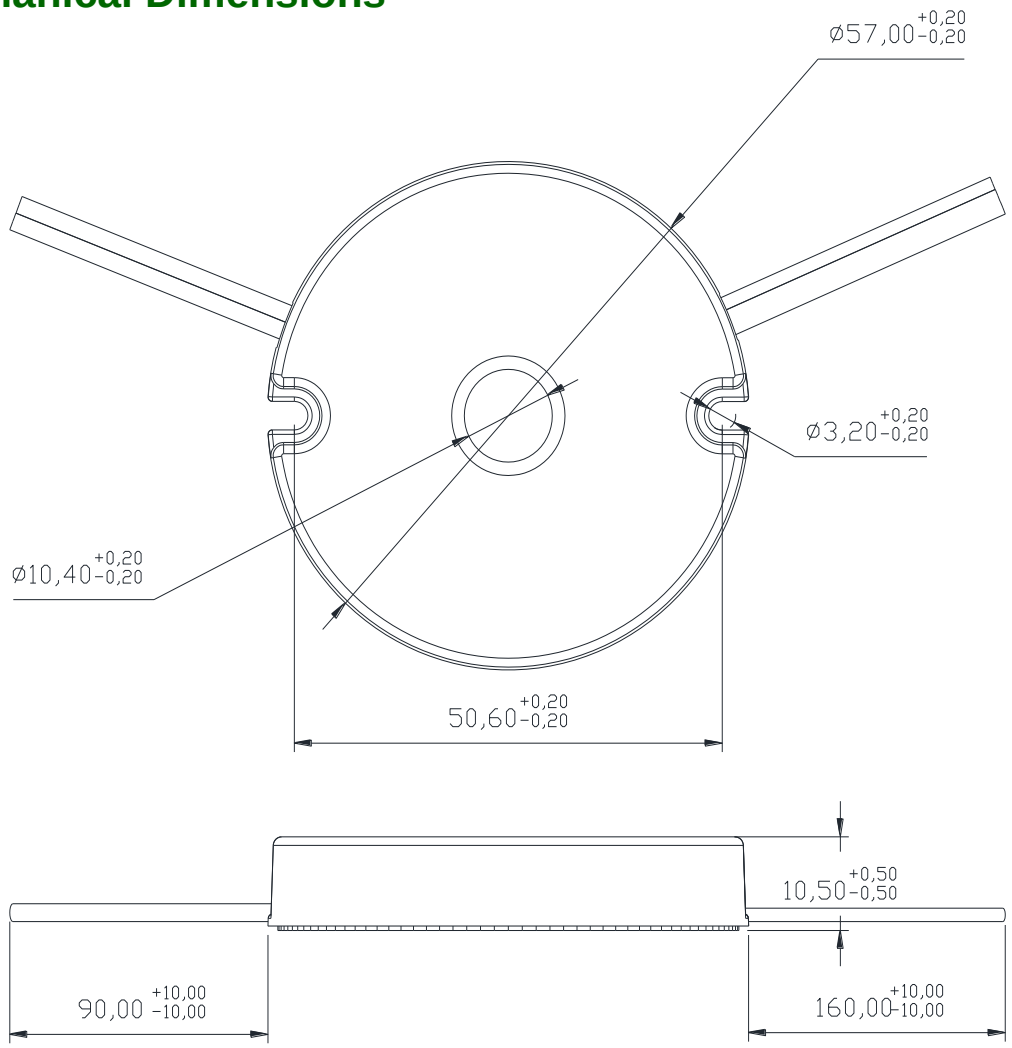
Mechanical Dimensions



Notes :

(1) Unit : mm.
(2) Weight : XX ± 2g

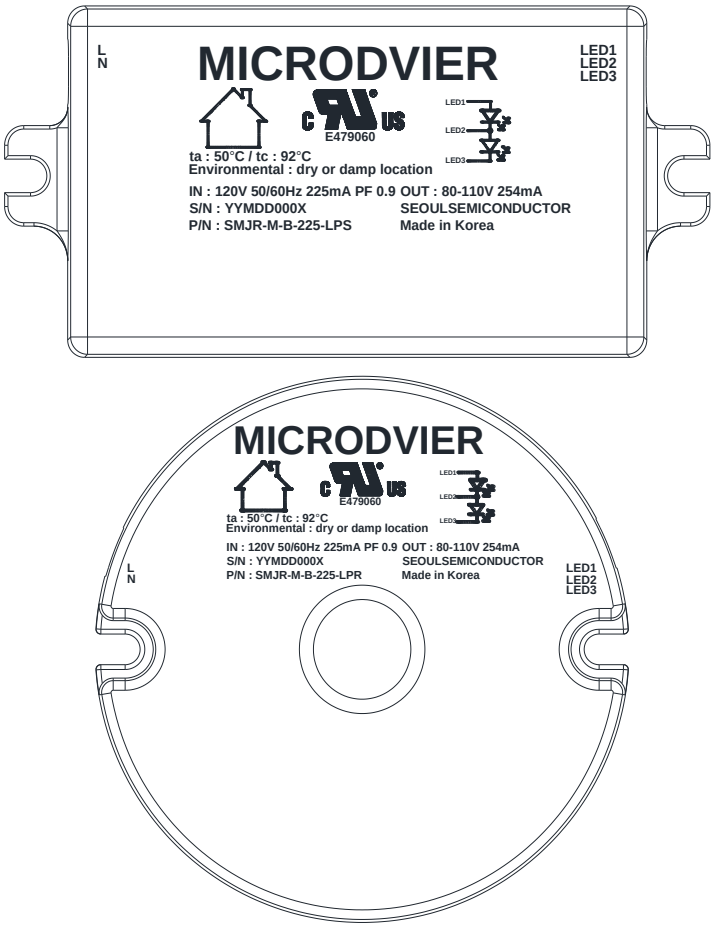
Mechanical Dimensions



Notes :

(1) Unit : mm.
(2) Weight : XX ± 2g

MICRODRIVER Label Information

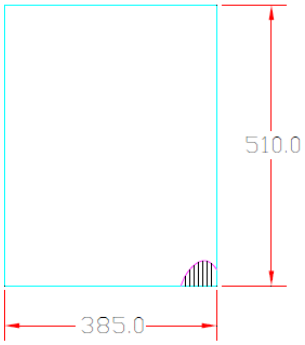


MICRODRIVER	Product Name
120V 50/60Hz 87mA PF 0.9 (1)	INPUT
80-110V 100mA(2)	OUPUT
ta:50°C / tc:92°C(3)	Environment
SEOUL SEMICONDUCTOR	Company Name
SMJR-M-A-079-LPX(4)	P/N(Part No.)
YYMDDXXXX	S/N(serial No.)
Made in korea	Area of Production

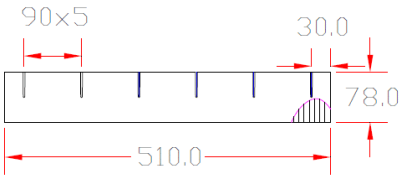
IN (1)	OUT (2)	Environment(3)	P/N(4)
120V 50/60Hz 79mA PF 0.9	80-110V 89mA	ta:50°C / tc:92°C	SMJR-M-A-079-LPX
120V 50/60Hz 107mA PF 0.9	80-110V 121mA	ta:50°C / tc:92°C	SMJR-M-A-107-LPX
120V 50/60Hz 140mA PF 0.9	80-110V 157mA	ta:50°C / tc:82°C	SMJR-M-B-140-LPX
120V 50/60Hz 171mA PF 0.9	80-110V 193mA	ta:50°C / tc:82°C	SMJR-M-B-171-LPX
120V 50/60Hz 225mA PF 0.9	80-110V 254mA	ta:50°C / tc:82°C	SMJR-M-B-225-LPX

Packing Information

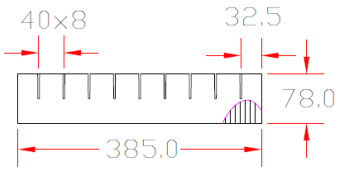
1. PAPER SPACER



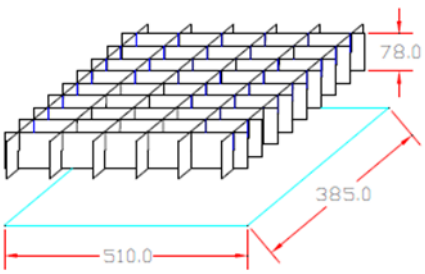
2. "+" SHAPE PAPER SPACER



<"A" PAPER SPACER>



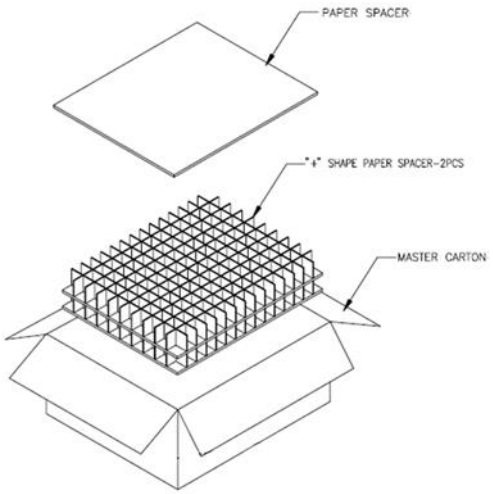
<"B" PAPER SPACER>



<"+" SHAPE PAPER SPACER>

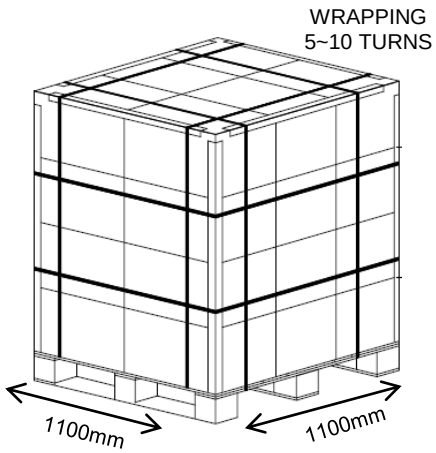
- Put into the "+" paper space
- Each layer has 40 pcs.
- There are 4 layers in each box.

3. Box information & packing



- BOX size : 525 * 400 * 345mm
- 160 PCS MICRODRIVER per BOX 1EA
- 1Box : 40 PCS per paper spacer x 4 = 160 PCS

4. Pallet



PALLET	
SIZE	Q'TY
1100 * 1100 (mm)	4 Layer 4 Box/1Layer

Box Label Information

Model No.	**SMJR-M-B-225-LPS (1)**
Quantity	**XXX**
Date	**YYMDDXXXXX-XXXXXXX(2)**
SEOUL	**SEOUL SEMICONDUCTOR CO.,LTD.**

Notes

(1) The model number designation is explained as follow
SMJR : Seoul Semiconductor internal code
M : MICRODRIVER
X : A or B
YYY: Model No.(079,107,140,171,225)
LPS : Shape (S=Square type, R=Round type)

(2) YYMDD : YY = Year (17, 18……..) / M = Month (1,2,3,4,5,6,7,8,9,A,B,C) / DD = data
XXXXX : Lot No.
XXXXXXX : SSC Model Sap code

It is attached to the bottom right corner of the outer box.

TOTAL Quantity
XXX
SEOUL **SEOUL SEMICONDUCTOR CO.,LTD.**

Notes

It is attached to the bottom right corner of the outer box.

Precaution for Use

(1) Please review the MICRODRIVER Application Note for proper protective circuitry usage.

(2) Please note, MICRODRIVER products run off of high voltage, therefore caution should be taken when working near the MICRODRIVER products.

(3) Make sure proper discharge prior to starting work.

(4) DO NOT touch any of the circuit board, components or terminals with body or metal while circuit is active.

(5) Please do not add or change wires while MICRODRIVER circuit is active.

6) Please do not assemble in conditions of high moisture and/or oxidizing gas such as Cl, H_2S, NH_3, SO_2, NO_x, etc.

7) Please do not make any modification on module.

8) Please be cautious when soldering to board so as not to create a short between different trace patterns.

9) Do not impact or place pressure on this product because even a small amount of pressure can damage the product. The product should also not be placed in high temperatures, high humidity or direct sunlight since the device is sensitive to these conditions.

10) When storing devices for a long period of time before usage, please following these guidelines:
* The devices should be stored in the anti-static bag that it was shipped in from Seoul-Semiconductor with opening.
* If the anti-static bag has been opened, re-seal preventing air and moisture from being present in the bag.

11) LEDs and IC are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS). The acrich3 product should also not be installED in end equipment without ESD protection.

12) Below is a list of suggestions that Seoul Semiconductor purposes to minimize these effects.

a. ESD (Electro Static Discharge)

Electrostatic discharge (ESD) is the defined as the release of static electricity when two objects come into contact. While most ESD events are considered harmless, it can be an expensive problem in many industrial environments during production and storage. The damage from ESD to an LEDs may cause the product to demonstrate unusual characteristics such as:

Precaution for Use

- Increase in reverse leakage current lowered turn-on voltage
- Abnormal emissions from the LED at low current

The following recommendations are suggested to help minimize the potential for an ESD event.
One or more recommended work area suggestions:

- Ionizing fan setup
- ESD table/shelf mat made of conductive materials
- ESD safe storage containers

One or more personnel suggestion options:
- Antistatic wrist-strap
- Antistatic material shoes
- Antistatic clothes

Environmental controls:
- Humidity control (ESD gets worse in a dry environment)

b. EOS (Electrical Over Stress)

Electrical Over-Stress (EOS) is defined as damage that may occur when an electronic device is subjected to a current or voltage that is beyond the maximum specification limits of the device.
The effects from an EOS event can be noticed through product performance like:

- Changes to the performance of the LED package
  (If the damage is around the bond pad area and since the package is completely encapsulated the package may turn on but flicker show severe performance degradation.)
- Changes to the light output of the luminaire from component failure
- Components on the board not operating at determined drive power

Failure of performance from entire fixture due to changes in circuit voltage and current across total circuit causing trickle down failures. It is impossible to predict the failure mode of every LED exposed to electrical overstress as the failure modes have been investigated to vary, but there are some common signs that will indicate an EOS event has occurred:

- Damaged may be noticed to the bond wires (appearing similar to a blown fuse)
- Damage to the bond pads located on the emission surface of the LED package
  (shadowing can be noticed around the bond pads while viewing through a microscope)
- Anomalies noticed in the encapsulation and phosphor around the bond wires
- This damage usually appears due to the thermal stress produced during the EOS event

c. To help minimize the damage from an EOS event Seoul Semiconductor recommends utilizing:

- A surge protection circuit
- An appropriately rated over voltage protection device
- A current limiting device

Company Information

Published by

Company Information

Seoul Semiconductor (www.SeoulSemicon.com) manufacturers and packages a wide selection of light emitting diodes (LEDs) for the automotive, general illumination/lighting, Home appliance, signage and back lighting markets. The company is the world's fifth largest LED supplier, holding more than 10,000 patents globally, while offering a wide range of LED technology and production capacity in areas such as "nPola", "Acrich", the world's first commercially produced AC LED, and "Acrich MJT - Multi-Junction Technology" a proprietary family of high-voltage LEDs.

The company's broad product portfolio includes a wide array of package and device choices such as Acrich and Acirch2, high-brightness LEDs, mid-power LEDs, side-view LEDs, and through-hole type LEDs as well as custom modules, displays, and sensors.

Legal Disclaimer

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