



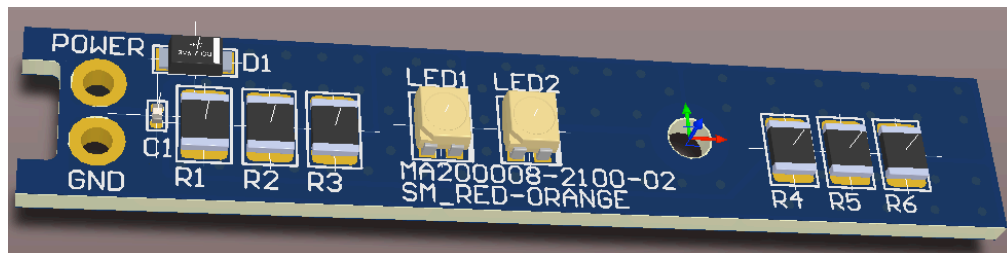
AEC-Q101/200
Compliant

RoHS
Compliant



Technical Data Sheet TDS01

AUTOMOTIVE TWO LED SIDE MARKER



Key Features

Applications

Front and Rear Side Repeater
Front and Rear Side Marker

Electrical

Nominal Operating Voltage: 6-16V

Extended Operating Voltage:

- 19V for 1 hour
- 27V for 1 minute
- -14V for 1 hour

Environmental

Nominal Operation Temp: -40° – 85°C
-40° – 105°C

Reliability

All components are AEC-Q101/200
Components and process are Pb-Free
RoHs Compliant
USCAR Compliant

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A standard **automotive** specific LED electronics board for **Side Marker** applications utilizes Surface mount components and process.

MLS AUTOMOTIVE introduces the 1st standard plug and play 2 LED electronics assembly for automotive Side Marker applications. With this standard (off the shelf) solution, MLS offers its customers an easy cost effective LED module that can be used across multiple platforms and require ZERO investment in terms of design, tooling, and testing.

The Side Marker Circuit Board Assembly utilizes best in class Surface Mount LEDs. It's designed to adopt LEDs from at least two different Automotive LED suppliers to ensure uninterrupted supplies and maximum flexibility. The electronics driver circuitry is based on simple but robust and highly reliable resistor/diode topology. The Side Marker module offers 3 different types of power connector to give users highest degree of freedom in choosing the connection scheme that best fits their design.

We are very proud to have the Side Marker assembly fully designed and built by MLS AUTOMOTIVE engineering team using the latest design, simulation, testing, and manufacturing tools. All components used in the assembly are carefully selected and validated to Automotive Standards such as AEC-Qxxx and USCAR. All components are RoHs compliant and Pb-free. The assembly process is fully automated using Pb-free reflow process and following IPC specification.

Product Nomenclature

Part number designation is explained as follow:

Standard Format: **AB-CDE-Fx-HIG-xKLx (SD-FSM-L2-PRO-2RT6)**

Where:

- AB - designates the product family (SD: standard design; CD: custom design)
- CDE - designates application (FSM: front side marker; RSM: rear side marker)
- Fx - designates level of integration (L1: Level 1; L2: Level 2; L3: Level 3)
- H - designates LED supplier (P: Philips; O: Osram; N: Nichia)
- IG - designates LED color (RO: red orange; AM: amber; SR: super red)
- x - designates number of LEDs (1, 2, 3, 4)
- K - designates driver type (R: resistor; C: constant current)
- L - designates connector type (P: pin terminals; W: wire jumpers; S: Side Entry Connector; T: Top Entry Connector)
- x - designates usable lumen (@50°C junction temperature)

Example: **SD-RSM-L2-P RO-2 RT 6**

Standard Design	Rear Side Marker	L2	Philips	Red Orange	2 LEDs	Resistor Driver	Top Entry	6 Lumen
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Selection Guide

Table 1 – Selection Guide

Part Number	Description	Total Flux ¹ (lm)		Total Power ² (W)	
		Min	Max	Min	Max
SD-FSM-L2-xAM-2RPx	2 LEDs Amber Front Side Marker with Pin Terminals	8.0	12.0	0.25	0.52
SD-FSM-L2-xAM-2RWx	2 LEDs Amber Front Side Marker with Wire Jumpers	8.0	12.0	0.25	0.52
SD-FSM-L2-xAM-2RSx	2 LEDs Amber Front Side Marker with Side Entry Connector	8.0	12.0	0.25	0.52
SD-FSM-L2-xAM-2RTx	2 LEDs Amber Front Side Marker with Top Entry Connector	8.0	12.0	0.25	0.52
SD-RSM-L2-xRO-2RPx	2 LEDs Red Orange Rear Side Marker with Pin Terminals	5.0	12.0	0.25	0.52
SD-RSM-L2-xRO-2RWx	2 LEDs Red Orange Rear Side Marker with Wire Jumpers	5.0	12.0	0.25	0.52
SD-RSM-L2-xRO-2RSx	2 LEDs Red Orange Rear Side Marker with Side Entry connector	5.0	12.0	0.25	0.52
SD-RSM-L2-xRO-2RTx	2 LEDs Red Orange Rear Side Marker with Top Entry connector	5.0	12.0	0.25	0.52

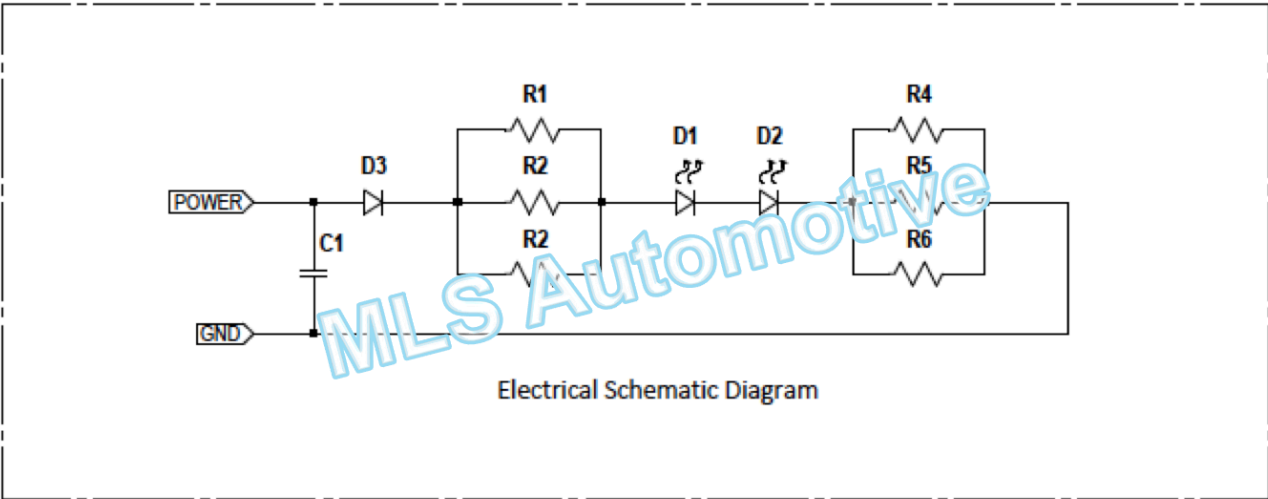
- (1) Total flux per module measured using integrating sphere with the module energized at 13.5V DC.
- (2) Total module power with module energized at 13.5V DC. Total power calculated such as $P_{total} = 13.5V \times I_{LED}$.
- (3) Contact MLS Technical Sales representative if flux value other than what is shown in Table 1 is desired (www.mls-automotive/contact-us)

End Of Line Optical Testing Conditions

MLS Automotive tests the finished electronics assembly using an end of line CCT based camera system with the assembly powered at $13.5V \pm 0.5V$ and at an ambient temperature of $23^{\circ}C \pm 2^{\circ}C$. This datasheet specifies performance at a constant DC voltage of 13.5V and an estimated LED junction temperature of 50°C, except where noted.

Circuit Schematic

Figure 1 – Electrical Circuit Schematic



Electrical Schematic Diagram

Bill of Material

Table 2 – Bill Of Material

Component	Designation	Description
LED	LED1, LED2	PLLC4, 1/2W or less
Resistor	R1 – R6	1/2W, 1202
Diode	D3	Rectifier 600V
Capacitor	C1	Ceramic, 0402

Mechanical Drawing

Figure 2 – 2D Drawing, with Pin Terminals

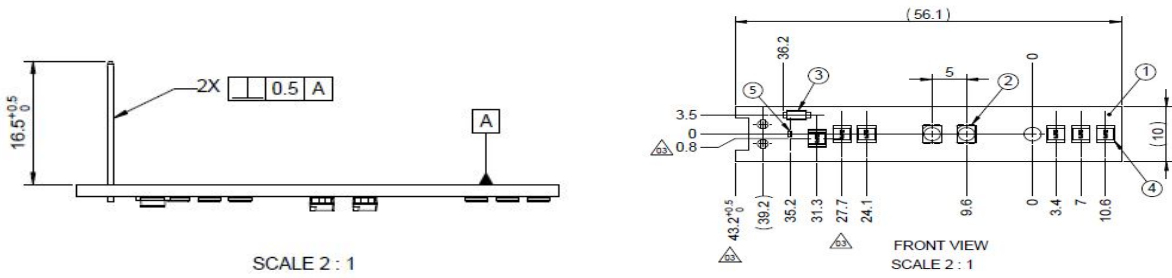


Figure 3 – 2D Drawing, with Sid Entry Connector

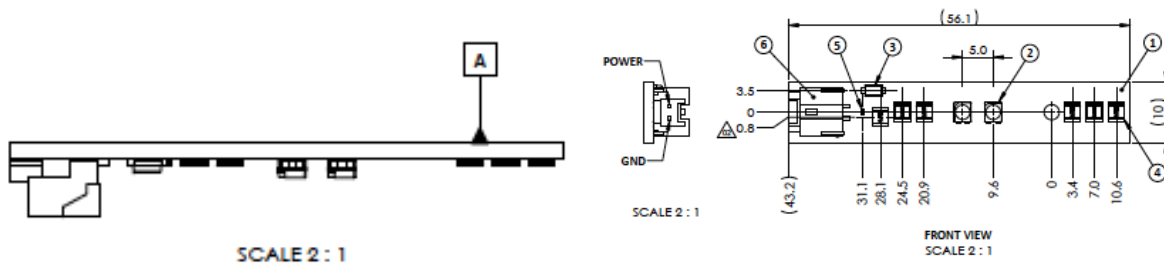
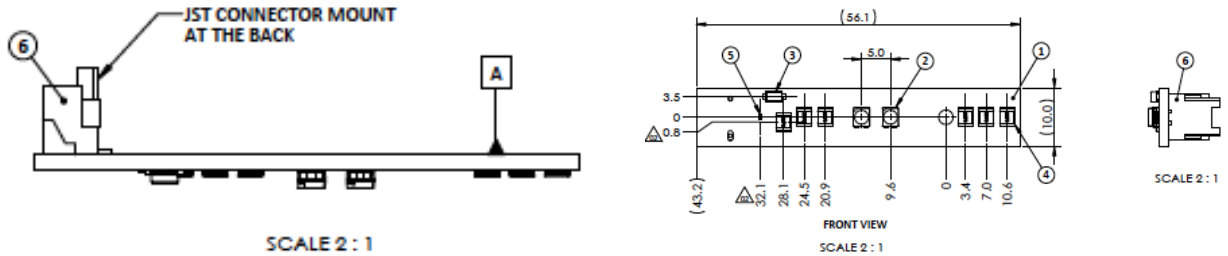


Figure 4 – 2D Drawing, with Top Entry Connector



Product Rating

Table 3 – Product Rating

Parameter	Minimum Value	Maximum Value	Ambient Temp (°C)	Duration (S)
Nominal Input Voltage (DC)	6V	16V	-40 – 85/105	-
Over Voltage (DC)	-	19V	-40 – 50	3600
Jump Start (DC)	-	27V	-40 – 50	60
Reverse Voltage (DC)	-	-50V	-40 – 50	120
Nominal Operating Temperature	-40°C	85/105°C	-	-
Nominal Storage Temperature	-40°C	100°C	-	-
LED Junction Temperature ⁽¹⁾	-	125/150°C	-	-
PCB Temperature	-55°C	135°C	-40 - 85	-

- (1) LED junction temperature is derived from LED manufacture data sheet. MLS uses maximum LED junction temperature as published by the LED supplier to determine maximum LED drive current under WORST CASE ambient and input voltage conditions.
- (2) Voltage tolerance $\pm 1V$
- (3) Temperature tolerance $\pm 2^{\circ}C$

Reliability

MLS follows the most stringent automotive reliability testing criteria to validate the long-term performance and durability for all released electronics modules. In addition, MLS uses only automotive grade electronics components (LED, resistors, capacitors, etc.), which have been tested and qualified to the relevant AEC-QXXX specification and/or similar specifications.

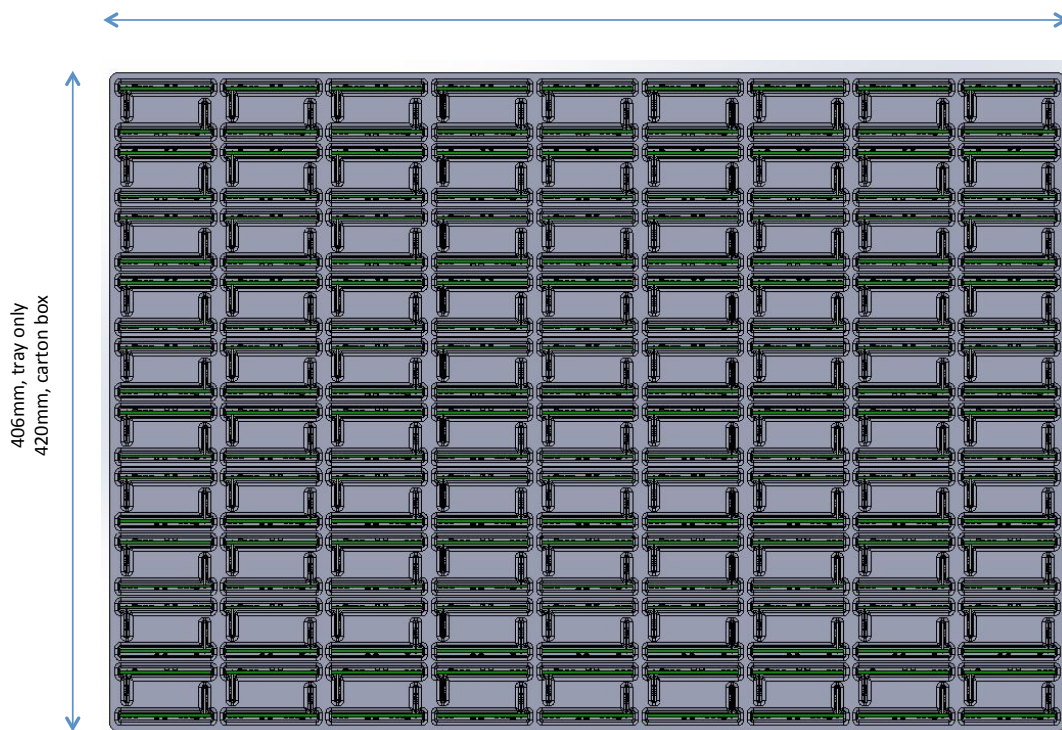
The complete list of reliability tests, conditions, and result is included in product PPAP and can be provided separately upon request. Table 4 shows a list of MLS Standard reliability testing matrix.

Table 4 – Standard Reliability Test Matrix

Test	Test Condition
Jump start	19V/ 1 hour
Over Voltage	27V/ 1 minute
Reverse Voltage	-14V/ 2 minutes
Power Thermal Cycle	-40°C to 85°C/ 300 cycles
Thermal Shock	-40°C to 85°C/ 1000 cycles
High Temp Operating Life	85°C/ 100 hrs
Low Temp Operating Life	-40°C/ 100 hrs

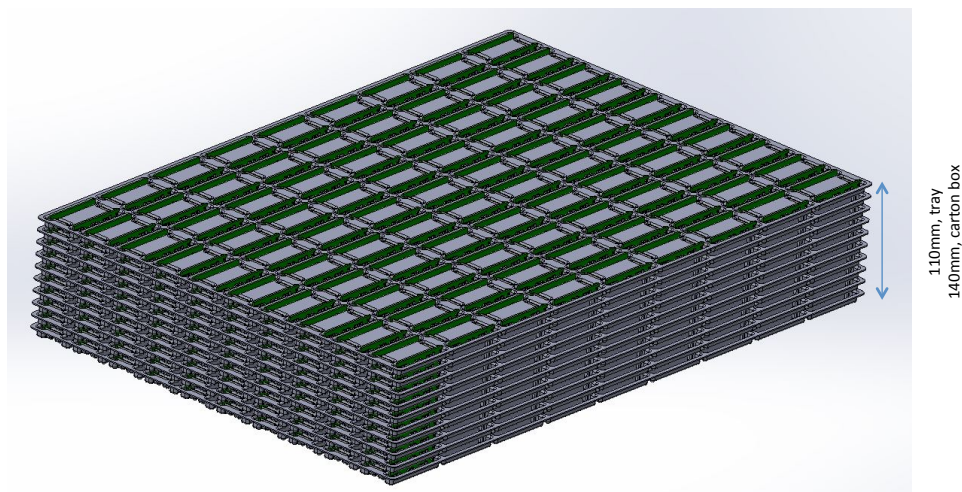
Product Packaging Information

589mm, tray only
600mm, carton box



180pc/tray

Stack up 10 layers = 1800pc total



Company Information

MLS AUTOMOTIVE is a leading supplier of Electronics Modules for Automotive applications. MLS AUTOMOTIVE factories are ISO 9001 and TS16949 certified. MLS AUTOMOTIVE is a vertically integrated company, capable of designing, producing and integrating the different building blocks associated with a LED Module.

MLS Automotive mission is to provide customers with best-in-class engineering services and highest level of automotive quality LED electronics modules. With multiple factories in Malaysia, Sales and Technical Center in the United States, we strive to be the world's leading global automotive LED design and manufacturing partner. MLS Automotive offers its customers >15 years of design and manufacturing experience in LED lighting solutions. More information about the company's product line and capability can be found at www.mls-automotive.com

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