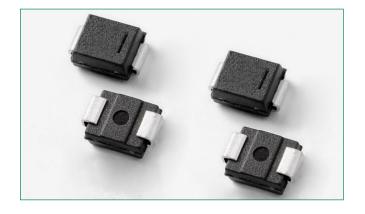
### PLEDxUSxA Series - Unidirectional









### **Agency Approvals**

Agency	Agency File Number
<b>71</b>	E133083

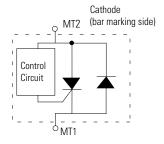
### **Description**

PLEDxUSxA open LED protectors provide an electronic switching shunt path when an LED in an LED string fails as an open circuit. This ensures that the remaining string of LEDs will continue to function if a single LED does not.

The components is designed to enable higher reliability in indoor LED lighting applications such as advertisement lighting and other applications.

This series is compatible with one, two and three watt LEDs that have a nominal 3V forward characteristic and is available in an SMB surface mount package. The DO-214AA (SMB) low profile package is ideal for dense board applications.

### **Schematic Symbol**



### **Features & Benefits**

- Ideal for protecting high brightness LED with high operating current at specified condition.
- Fast switching
- Reverse Battery/Power Protection
- Low profile, small foot print standard DO-214AA package
- Compatible with industrial lighting environments
- IEC 61000-4-2 ESD 30kV (Air), 30kV (Contact)

- ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- Compatible with PWM frequencies up to 30 kHz
- RoHS compliant and halogen-free
- Pb-free E3 means 2<sup>nd</sup> level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/ JEDEC J-STD-609A.01)
- Recognized to UL 497B as an Isolated Loop Circuit Protector

### Electrical Characteristics (All parameters are measured at T,=25°C unless otherwise noted)

Part Number	Marking	breakdown  Volts		V <sub>DRM</sub> breakdown Volts	I <sub>H</sub> mAmps	I <sub>s</sub>	I <sub>T</sub> @V <sub>T</sub>	V <sub>T</sub> @ I <sub>T</sub> = 1 Amp Volts	I <sub>o</sub> ¹ Amps	Critical rate of rise dV/dt  Volts
		Min	Max	Min	Min	Max	Max	Max	Max	Max
PLED6US2A	PL6U2	6	16	6	5	100	1.0	1.2	2	250V/µs
PLED6US3A	PL6U3	6	16	6	5	100	1.0	1.2	3	250V/µs
PLED9US3A	PL9U3	9	18	9	5	100	1.0	1.2	3	250V/µs

1. In- Operation current tested @ aluminum boards, ambient temp 85°C

### **Thermal Considerations**

Symbol Parameter		Value	Unit
$T_{J}$	Operating Junction Temperature Range	-40 to 150	°C
$T_s$	Storage Temperature Range	-65 to 150	°C
R <sub>eJA</sub>	Thermal Resistance: Junction to Ambient	DO-214AA: 90¹ DO-214AA: 40²	°C/W

### Notes:

1) Standard FR-4 PCB with Copper Pads (Recommended Size)

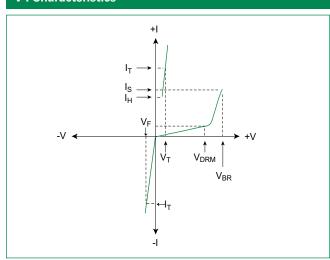
2) Aluminum PCB

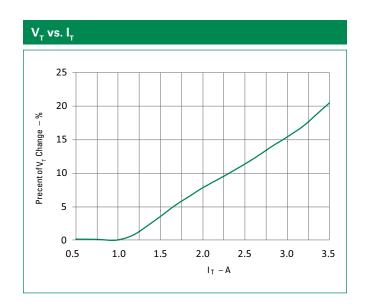
Thickness: 1.6mm Grade: 1-2 W/mK Thermal Conductivity Trace thickness: 2 oz

Insulation layer thickness: 215 um

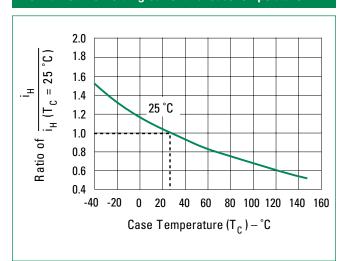
Solder Pad Dimensions: 2.0mm x 2.8mm (Recommended Size)

### **V-I Characteristics**

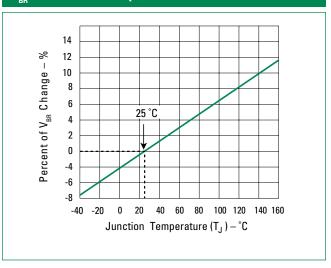




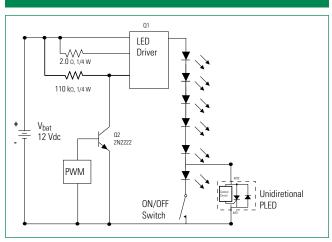
### Normalized DC Holding Current vs. Case Temperature



### **V**<sub>RR</sub> vs. Junction Temperature



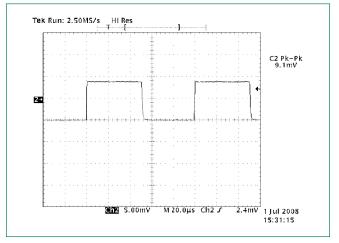
### **LED Interference Test Circuit**



### 6 LEDs in Series 50% Duty Cycle 10kHz

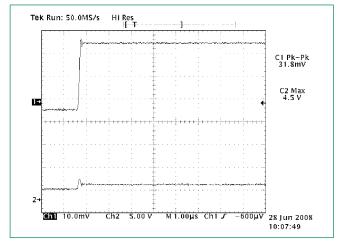
# Tek Run: 2.50MS/s Hi Res (C1 Pk-Pk 8.9mV C1 pk-Pk 8.9mV 25 Jun 2008 13:18:23

### 5 LEDs and 1 PLED in Series 50% Duty Cycle 10kHz



Note: These two graphs show the current magnitude through the LED string with and without the PLED included. There is no noticeable effect on the LED current magnitude when the PLED is included in the circuit as compared to the LED current magnitude when the PLED is not in the circuit. (The conversion factor for the test measurement in the graphs above is 10mA/mV for the Pearson coil measurement, therefore, the current magnitude in the first figure is 10mA\*8.9 = 89mA, while the second figure is 91mA.)

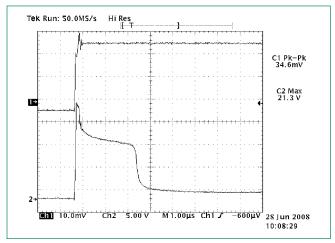
### PLED in the Off-State 10kHz



Channel 1: current through LEDs (318 mA)

Channel 2: voltage across PLED component (4.5 V)

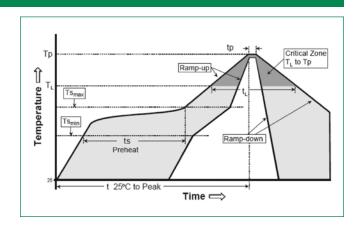
### PLED component zeners and then turns fully on 10kHz



Channel 1: current through LEDs (346 mA) and PLED component once it is fully turned on 2.5  $\mu$ sec later Channel 2: voltage across PLED component (21.3 V before PLED crowbars with 2 V drop)

### **Soldering Parameters**

Reflow Con	Pb – Free assembly		
	- Temperature Min (T <sub>s(min)</sub> )	150°C	
Pre Heat	- Temperature Max (T <sub>s(max)</sub> )	200°C	
	-Time (min to max) (t <sub>s</sub> )	60 – 180 secs	
Average rar	np up rate (Liquidus Temp (T <sub>L</sub> ) to peak	3°C/second max	
T <sub>S(max)</sub> to T <sub>L</sub> -	T <sub>S(max)</sub> to T <sub>L</sub> - Ramp-up Rate		
Reflow	- Temperature (T <sub>L</sub> ) (Liquidus)	217°C	
Renow	- Temperature (t <sub>L</sub> )	60 – 150 seconds	
Peak Temperature (T <sub>p</sub> )		260 <sup>+0/-5</sup> °C	
Time within	Time within 5°C of actual peak Temperature (t <sub>p</sub> )		
Ramp-down	6°C/second max		
Time 25°C t	8 minutes max		
Do not exce	260°C		



### Physical Specifications

Terminal Material	Copper Alloy
Terminal Finish	100% Matte Tin Plated
Body Material	UL recognized compound meeting flammability classification V-0

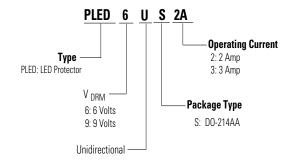
### **Environmental Specifications**

High Temperature Voltage Blocking	MIL-STD-750: Method 1040, Condition A 80% min V <sub>DRM</sub> (VDC-peak), 150°C, 1008 hours
Temperature Cycling	MILSTD-750: Method 1051 -55°C to 150°C, 15-minute dwell, 1000 cycles
Biased Temperature & Humidity	EIA/JEDEC: JESD22-A101 80%V <sub>DRM</sub> , 85°C, 85%RH, 1008 hours
Resistance to Solder Heat	MIL-STD-750: Method 2031 260°C, 10 seconds
Moisture Sensitivity	85%RH, +85°C, 168 hrs., 3 reflow cycles

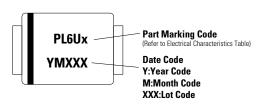
### **Packaging**

Package	Description	Packaging Quantity	Industry Standard	
S	DO-214AA	2500	EIA-481-1	

### **Part Numbering System**



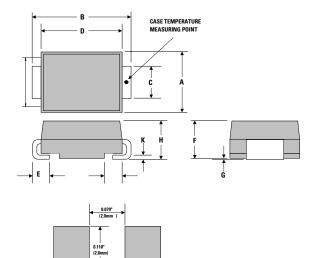
### **Part Marking System**



## PLED Open LED Protectors

High power PLED

### **Dimensions - DO-214 AA Package**



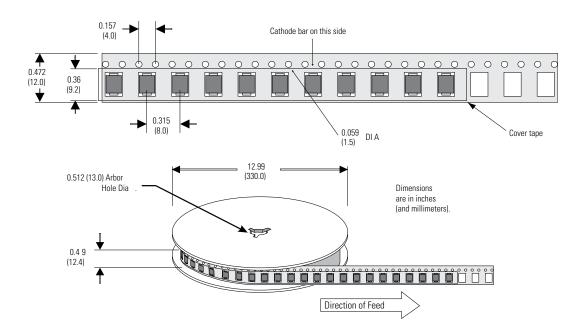
Dimensions	Inc	hes	Millimeters		
Dimensions	Min	Max	Min	Max	
Α	0.130	0.156	3.30	3.95	
В	0.201	0.220	5.10	5.60	
С	0.077	0.087	1.95	2.20	
D	0.159	0.181	4.05	4.60	
E	0.030	0.063	0.75	1.60	
F	0.075	0.096	1.90	2.45	
G	0.002	0.008	0.05	0.20	
Н	0.077	0.104	1.95	2.65	
K	0.006	0.016	0.15	0.41	

### **DO-214AA Embossed Carrier Reel Pack (RP)**

Recommended solder pad layout (Reference Only)

### Meets all EIA-481-1 Standards

0.079" (2.0mm )



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