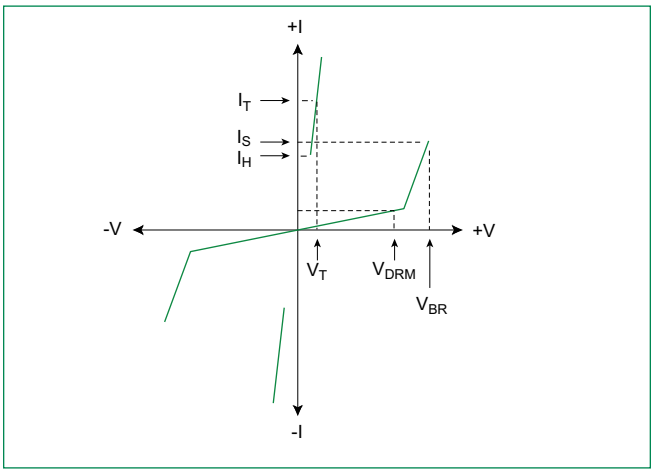
Thermal Considerations

Package		Symbol	Parameter	Value	Unit
QFN 3x3 	DO-214 	T_J	Operating Junction Temperature Range	-40 to +150	°C
		T_S	Storage Temperature Range	-65 to +150	°C
		$R_{\Theta JA}$	Thermal Resistance: Junction to Ambient	DO-214: 90[1] DO-214: 40[2] QFN: 120[1] QFN: 60[3]	°C/W

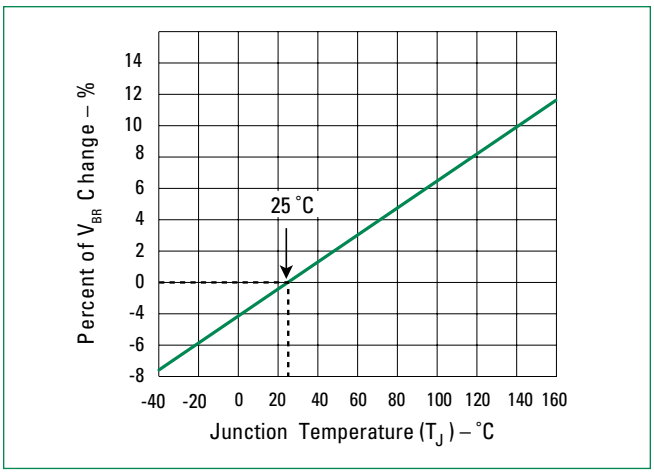
Notes:
1) Standard FR-4 PCB with Copper Pads (Recommended Size)
2) Aluminum PCB
Thickness: 1.6mm
Grade: 1-2 W/mK Thermal Conductivity
Trace thickness: 2 oz
Insulation layer thickness: 215 um
Solder Pad Dimensions: 2.0mm x 2.8mm (Recommended Size)

3) Aluminum PCB
Thickness: 1.6mm
Grade: 1-2 W/mK Thermal Conductivity
Trace thickness: 2 oz
nsulation layer thickness: 60 um
Solder Pad Dimensions: 1.27mm x 2.54mm (Recommended Size)

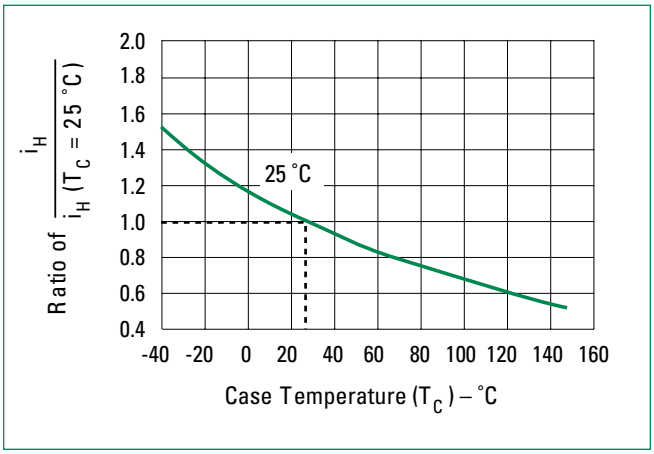
V-I Characteristics



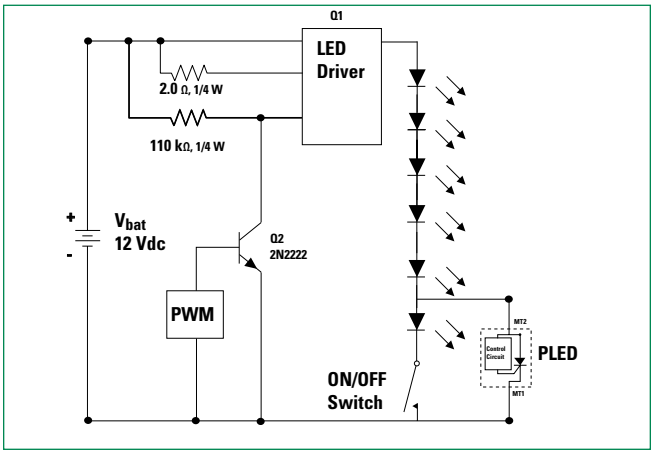
V_{BR} vs. Junction Temperature



Normalized DC Holding Current vs. Case Temperature

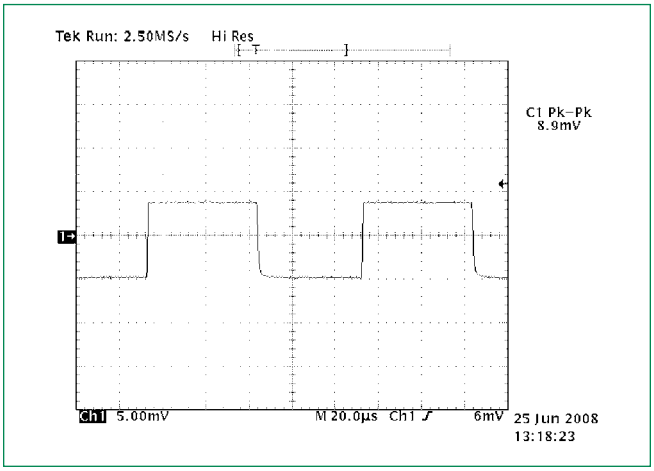


LED Interference Test Circuit

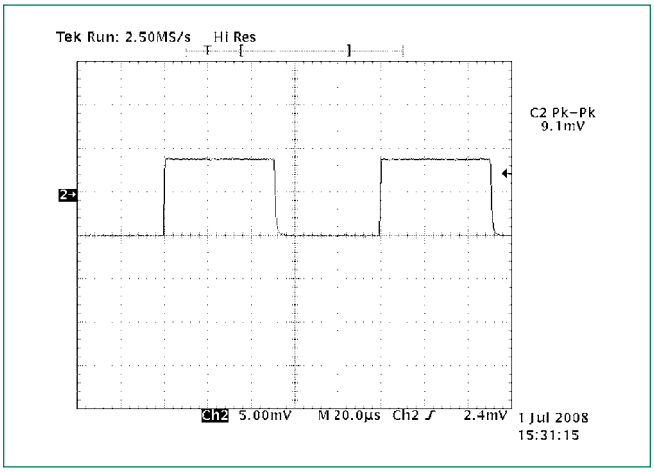


Revised: 04/02/20

6 LEDs in Series 50% Duty Cycle 10kHz

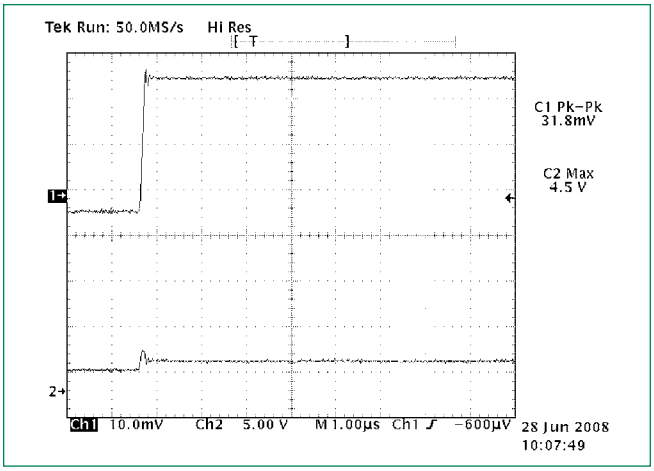


5 LEDs and 1 PLED in Series 50% Duty Cycle 10kHz



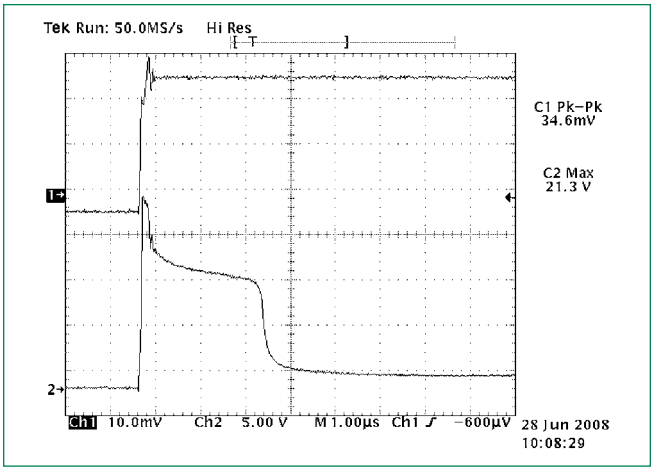
Note:
These two graphs show the current magnitude through the LED string with and without the PLED included. There is no noticeable effect on the LED current magnitude when the PLED is included in the circuit as compared to the LED current magnitude when the PLED is not in the circuit. (The conversion 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 device (4.5 V)

PLED device zeners and then turns fully on 10kHz

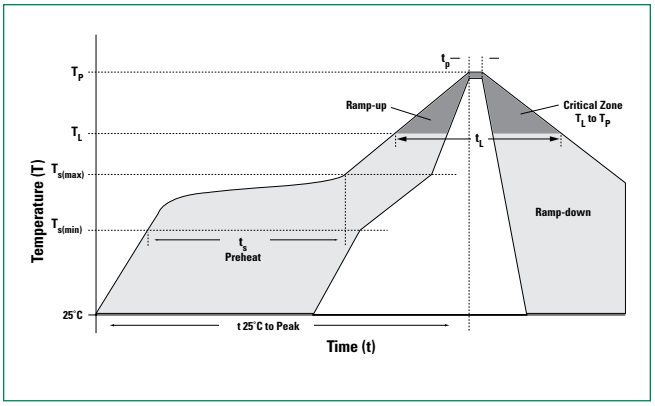


Channel 1: current through LEDs (346 mA) and PLED device once it is fully turned on 2.5 µsec later
Channel 2: voltage across PLED device (21.3 V before PLED crowbars with 2 V drop)

PLED Open LED Protectors
PLED Series

Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	**- Temperature Min ($T_{s(min)}$)**	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus Temp (T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	**- Temperature (T_L) (Liquidus)**	217°C
	- Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		30 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes max
Do not exceed		260°C



Physical Specifications

Terminal Material	Copper Alloy
Terminal Finish	100% Matte Tin Plated
Body Material	UL Recognized epoxy meeting flammability classification 94V-0

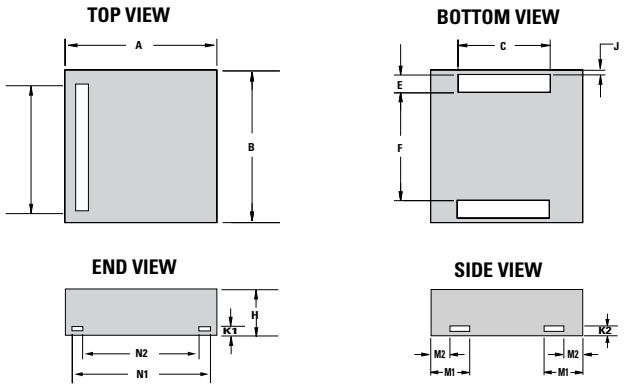
Environmental Specifications

High Temperature Voltage Blocking	MIL-STD-750: Method 1040, Condition A 80% min V_{DRM} (VAC-peak), 150°C, 504 hours
Temperature Cycling	MIL-STD-750: Method 1051 -65°C to 150°C, 15-minute dwell, 100 cycles
Biased Temperature & Humidity	EIA/JEDEC: JESD22-A101 52VDC, 85°C, 85%RH, 1008 hours
High Temperature Storage	MIL-STD-750: Method 1031 150°C, 1008 hours
Low Temperature Storage	-65°C, 1008 hours
Thermal Shock	MIL-STD-750: Method 1056 0°C to 100°C, 5-minute dwell, 10-second transfer, 10 cycles
Resistance to Solder Heat	MIL-STD-750: Method 2031 260°C, 10 seconds

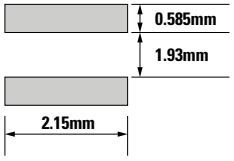
Revised: 04/02/20

PLED Open LED Protectors
PLED Series

Dimensions - QFN (3x3) Package

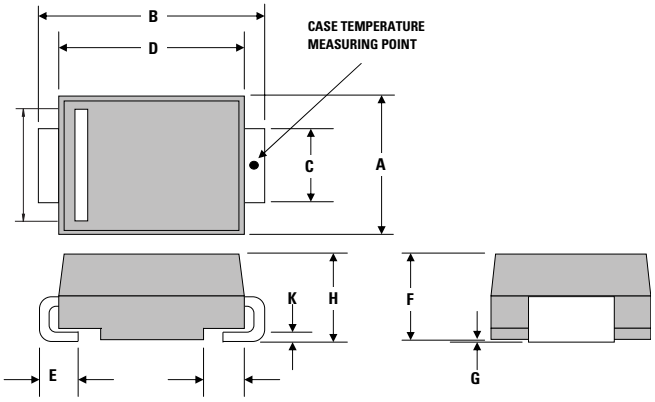


Dimensions	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.114	0.118	0.122	2.900	3.000	3.100
B	0.114	0.118	0.122	2.900	3.000	3.100
C	0.075	0.079	0.083	1.900	2.000	2.100
E	0.011	0.015	0.019	0.285	0.385	0.485
F	0.076	0.080	0.084	1.930	2.030	2.130
H	0.035	0.039	0.043	0.900	1.000	1.100
J	0.000	0.004	0.008	0.000	0.100	0.200
K1	0.004	0.008	0.012	0.100	0.200	0.300
K2	0.004	0.008	0.012	0.100	0.200	0.300
M1	0.056	0.060	0.064	1.143	1.530	1.630
M2	0.038	0.042	0.046	0.970	1.070	1.170
N1	0.096	0.100	0.104	2.440	2.540	2.640
N2	0.082	0.086	0.090	2.080	2.180	2.280

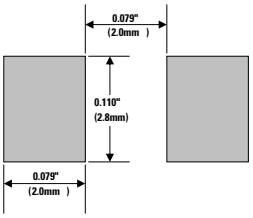


Recommended solder pad layout
(Reference Only)

Dimensions - DO-214 AA Package



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.130	0.156	3.30	3.95
B	0.201	0.220	5.10	5.60
C	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
H	0.077	0.104	1.95	2.65
K	0.006	0.016	0.15	0.41



Recommended solder pad layout
(Reference Only)

Revised: 04/02/20

PLED Open LED Protectors
PLED Series

Part Numbering System

PLED X Q12

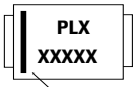
Type
PLED: LED Protector

V_{DRM}
6 Volts
9 Volts
13 Volts
18 Volts

Package Type
Q12: 3.0x3.0mm QFN
S: DO-214

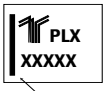
Part Marking System

DO-214



Cathode Bar to Indicate Diode Direction

QFN

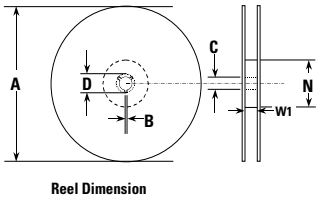


Cathode Bar to Indicate Diode Direction

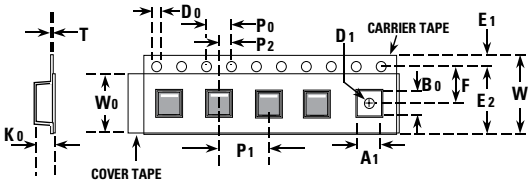
Packaging

Package	Description	Packaging Quantity	Industry Standard
Q12	QFN 3x3	5000	EIA-481-1
S	DO-214	2500	EIA-481-1

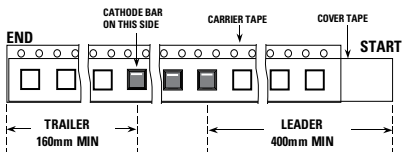
Tape and Reel Specification - QFN (3x3)



Reel Dimension



Tape Dimension Items



Leader and Trailer Dimension of the Ttape

Symbols	Description	Inches		Millimeters	
		Min	Max	Min	Max
A	Reel Diameter	N/A	12.992	N/A	330.0
B	Drive Spoke Width	0.059	N/A	1.50	N/A
C	Arbor Hole Diameter	0.504	0.531	12.80	13.50
D	Drive Spoke Diameter	0.795	N/A	20.20	N/A
N	Hub Diameter	1.969	N/A	50.00	N/A
W1	Reel Inner Width at Hub	0.488	0.567	12.40	14.40
A0	Pocket Width at bottom	0.126	0.134	3.20	3.40
B0	Pocket Length at bottom	0.126	0.134	3.20	3.40
D0	Feed Hole Diameter	0.059	0.063	1.50	1.60
D1	Pocket Hole Diameter	0.059	N/A	1.50	N/A
E1	Feed hole Position 1	0.065	0.073	1.65	1.85
E2	Feed hole Position 2	0.400	0.408	10.15	10.35
F	Feed hole center-Pocket hole	0.215	0.219	5.45	5.55
K0	Pocket Depth	0.039	0.051	1.00	1.30
P0	Feed hole Pitch	0.153	0.161	3.90	4.10
P1	Component Spacing	0.311	0.319	7.90	8.10
P2	Feed hole center-Pocket hole	0.077	0.081	1.90	2.06
T	Carrier Tape Thickness	0.010	0.014	0.25	0.35
W	Embossed Carrier Tape Width	0.453	0.484	11.50	12.30
W0	Cover Tape Width	0.358	0.366	9.10	9.30

Revised: 04/02/20

DO-214 Embossed Carrier Reel Pack (RP)

Meets all EIA-481-1 Standards