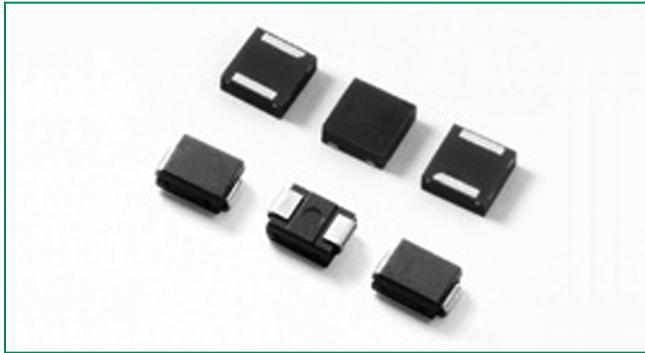


HF RoHS **PLED Series**



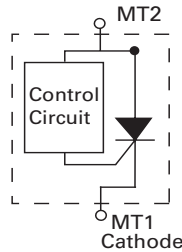
Description

The open LED protector provides a switching electronic shunt path when an LED in an LED array fails as an open circuit. This ensures that the entire array of LEDs will continue to function even if a single LED in the array does not. This provides higher reliable lighting functions in applications such as headlights, aircrafts, aircraft runway lighting, roadside warning lights, etc. This device is compatible with one, two and three watt LEDs that have a nominal 3V forward characteristic. The PLED series is available in two surface mount packages, the DO-214 and the Quad Flat Pak No-lead (QFN). The QFN's low profile, chip scale package (CSP) is ideal for dense board applications.

Agency Approvals - PENDING

| Agency | Agency File Number |
|--------|--------------------|
| | E133083 |

Schematic Symbol



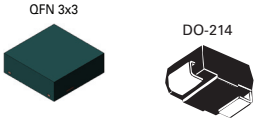
Features & Benefits

- Fast switching
- Automatically resets after power cycle
- Available in low profile, small footprint QFN and Standard DO214AA packages
- Compatible with industrial lighting environments
- Compatible with PWM dimming speeds of up to 10 KHz
- RoHS compliant and halogen-free

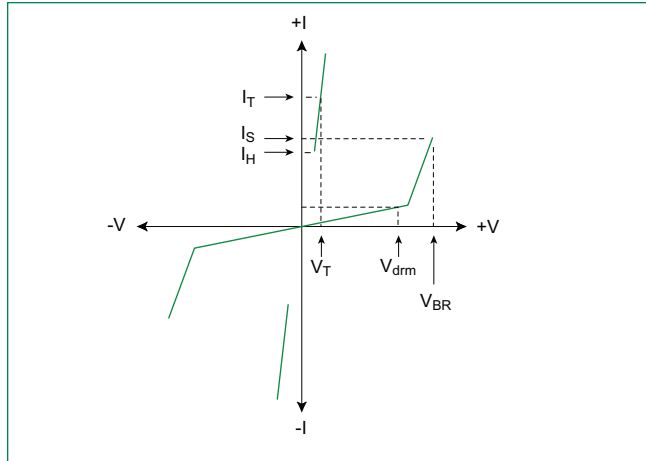
Electrical Characteristics

| Part Number | Marking | V_{BR} breakdown | | V_{DRM} breakdown | I_H | I_S | $I_T @ V_T$ | $V_T @ I_T = 1$ Amp | Critical rate of rise dV/dt |
|-------------|---------|--------------------|-----|---------------------|-------|-------|-------------|---------------------|-----------------------------|
| | | Volts | | Volts | mAmps | mAmps | Amps | Volts | Volts |
| | | Min | Max | Min | Min | Max | Max | Max | Max |
| PLED6Q12 | PL6 | 6 | 16 | 6 | 5 | 100 | 1.0 | 1.5 | 250V/ μ s |
| PLED6S | PL6 | 6 | 16 | 6 | 5 | 100 | 1.0 | 1.5 | 250V/ μ s |
| PLED9Q12 | PL9 | 9 | 18 | 9 | 5 | 100 | 1.0 | 1.5 | 250V/ μ s |
| PLED9S | PL9 | 9 | 18 | 9 | 5 | 100 | 1.0 | 1.5 | 250V/ μ s |
| PLED13Q12 | PL13 | 13 | 26 | 13 | 5 | 100 | 1.0 | 1.5 | 250V/ μ s |
| PLED13S | PL13 | 13 | 26 | 13 | 5 | 100 | 1.0 | 1.5 | 250V/ μ s |
| PLED18Q12 | PL18 | 18 | 33 | 18 | 5 | 100 | 1.0 | 1.5 | 250V/ μ s |
| PLED18S | PL18 | 18 | 33 | 18 | 5 | 100 | 1.0 | 1.5 | 250V/ μ s |

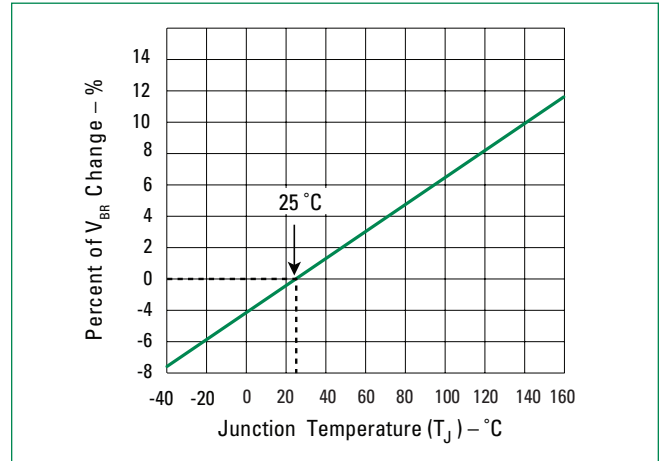
Thermal Considerations

| Package | Symbol | Parameter | Value | Unit |
|---|-----------------|---|------------------------|------|
|  | 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 QFN: 120 | °C/W |

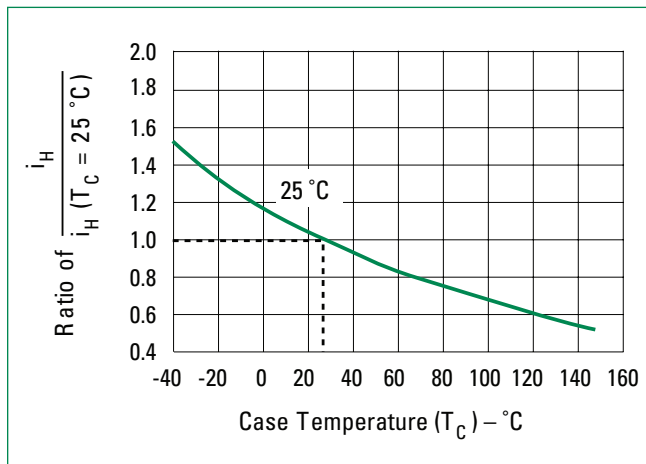
V-I Characteristics



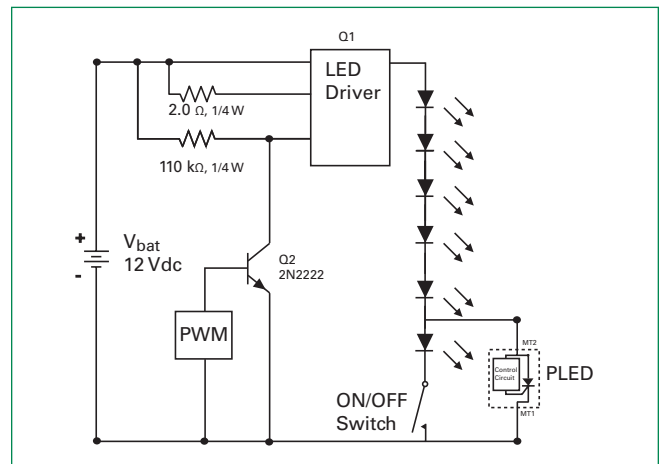
V_{BR} vs. Junction Temperature



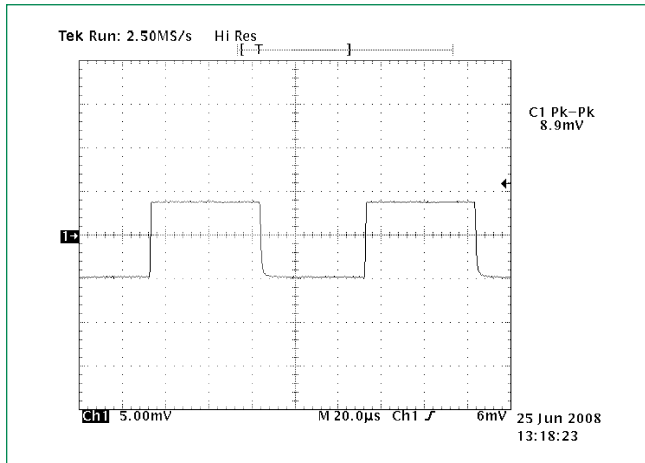
Normalized DC Holding Current vs. Case Temperature



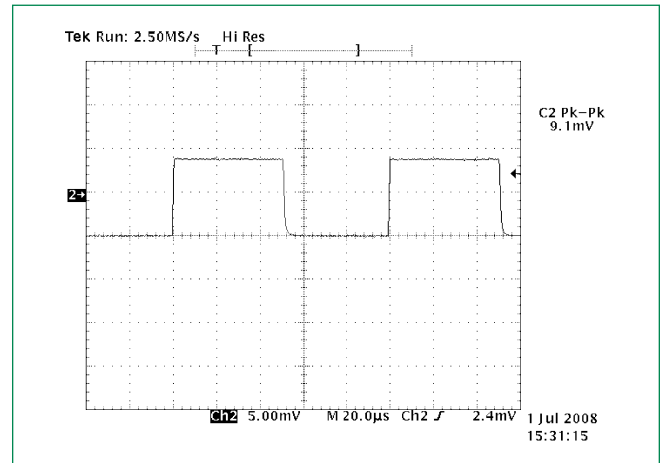
LED Interference Test Circuit



6 LEDs in Series 50% Duty Cycle 10Khz

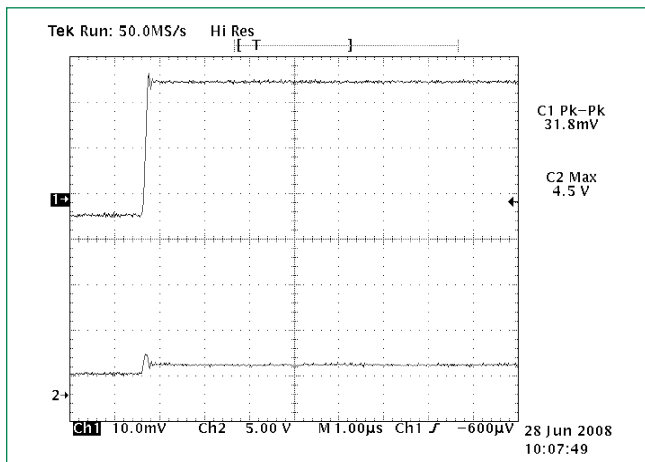


5 LEDs and 1 PLED in Series 50% Duty Cycle 10Khz



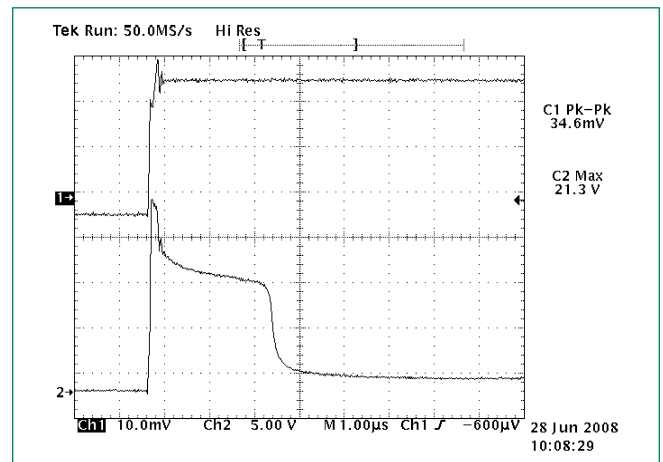
Note: These two graphs show the current magnitude through the LED string with and without the PLED included. There is no noticeable effect on the LED current magnitude when the PLED is included in the circuit as compared to the LED current magnitude when the PLED is not in the circuit. (The conversion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

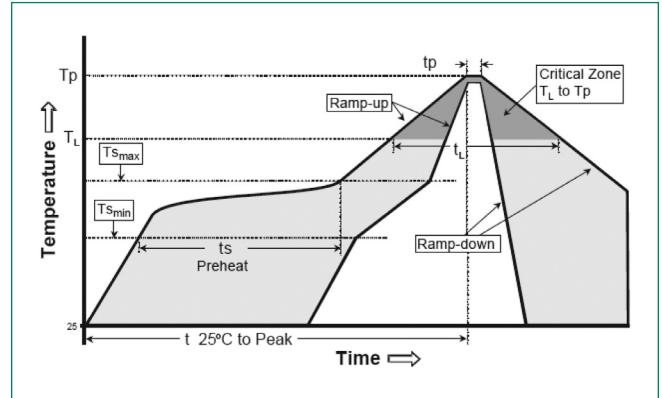
PLED device zeners and then turns fully on 10Khz



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)

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 |



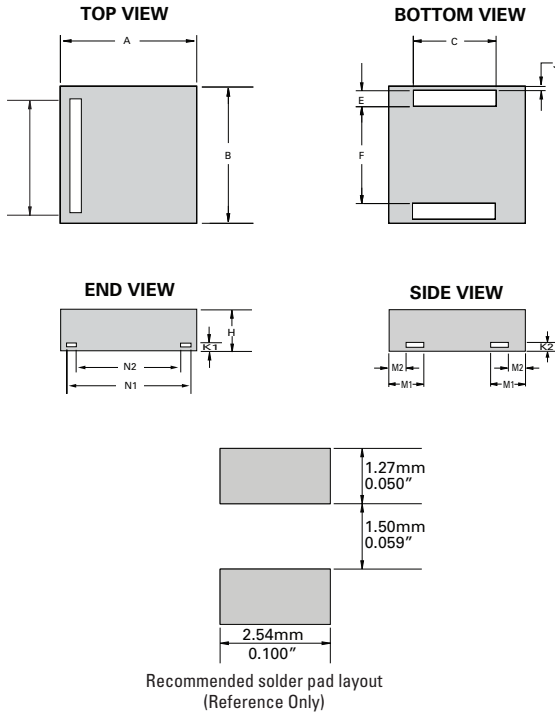
Physical Specifications

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

Environmental Specifications

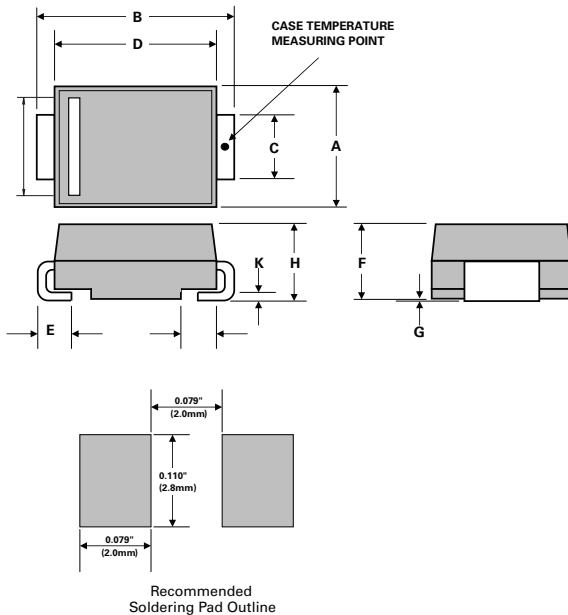
| | |
|--|---|
| High Temperature Voltage Blocking | MIL-STD-750: Method 1040, Condition A 80% min V_{DRM} (VAC-peak), 150°C, 504 hours |
| Temperature Cycling | MIL-STD-750: Method 1051 -65°C to 150°C, 15-minute dwell, 100 cycles |
| Biased Temperature & Humidity | EIA/JEDEC: JESD22-A101 52VDC, 85°C, 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 |

Dimensions - QFN (3x3) Package



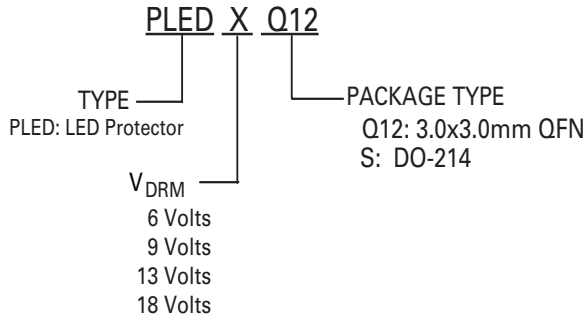
| Dimensions | Inches | | | Millimeters | | |
|------------|--------|-------|-------|-------------|-------|-------|
| | Min | Typ | Max | Min | Typ | Max |
| A | 0.114 | 0.118 | 0.122 | 2.900 | 3.000 | 3.100 |
| B | 0.114 | 0.118 | 0.122 | 2.900 | 3.000 | 3.100 |
| C | 0.075 | 0.079 | 0.083 | 1.900 | 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 |

Dimensions - DO-214 AA Package

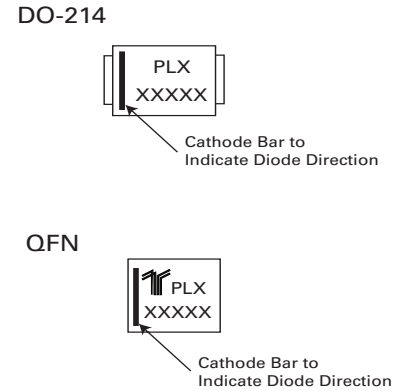


| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|------|
| | Min | Max | Min | Max |
| A | 0.130 | 0.156 | 3.30 | 3.95 |
| B | 0.201 | 0.220 | 5.10 | 5.60 |
| C | 0.077 | 0.087 | 1.95 | 2.20 |
| D | 0.159 | 0.181 | 4.05 | 4.60 |
| E | 0.030 | 0.063 | 0.75 | 1.60 |
| 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 |

Part Numbering System



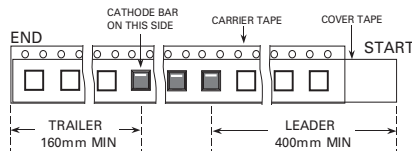
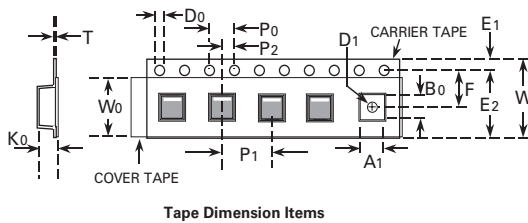
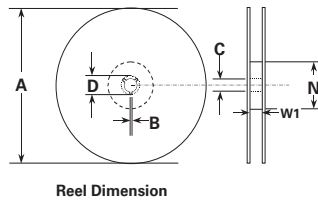
Part Marking System



Packaging

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

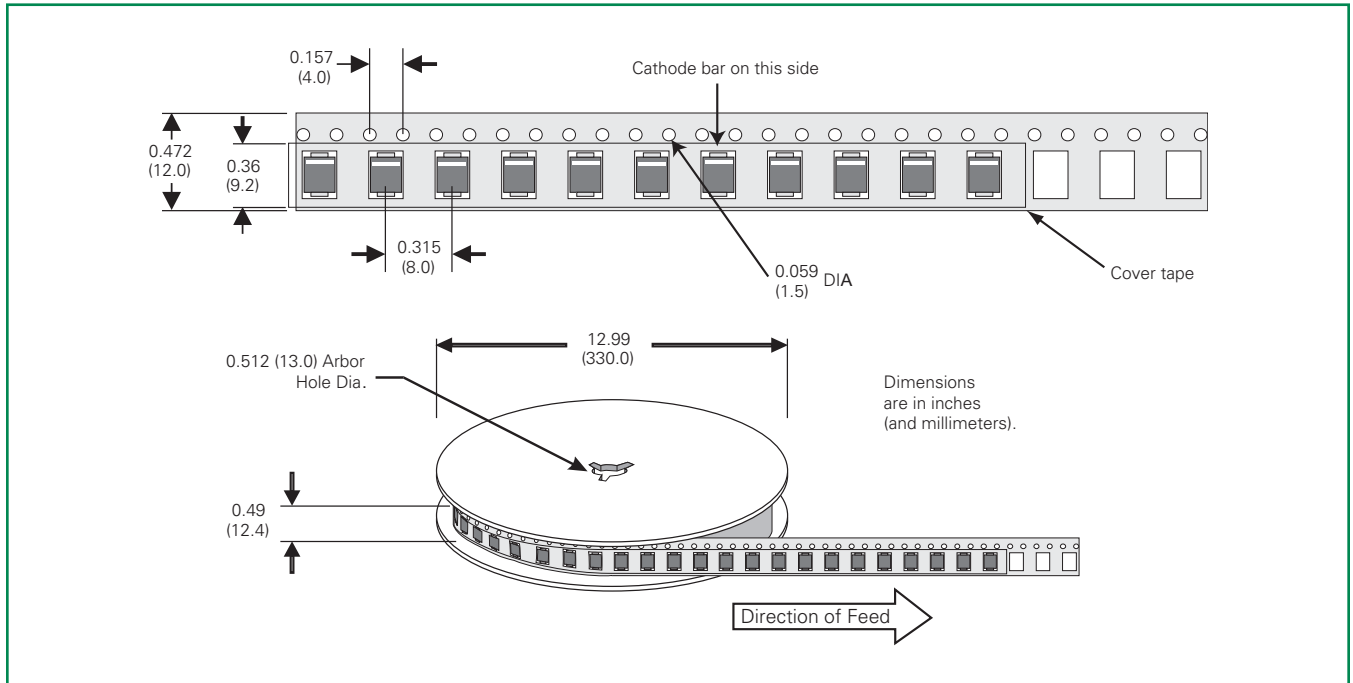
Tape and Reel Specification - QFN (3x3)



| Symbols | Description | Inches | | Millimeters | |
|---------|------------------------------|---------|---------|-------------|---------|
| | | Minimum | Maximum | Minimum | Maximum |
| 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 |

DO-214 Embossed Carrier Reel Pack (RP)

Meets all EIA-481-1 Standards



AMEYA360

Components Supply Platform

Authorized Distribution Brand :



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