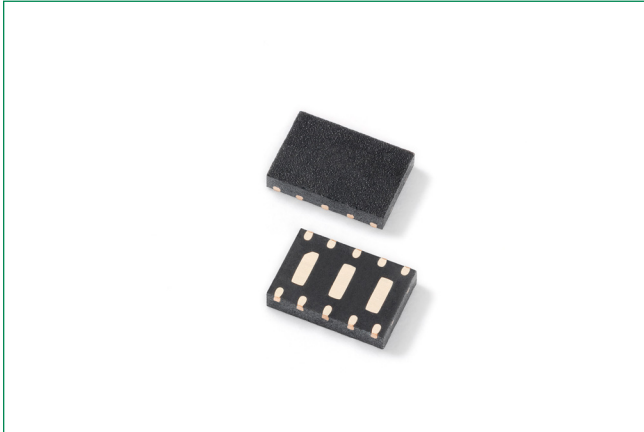
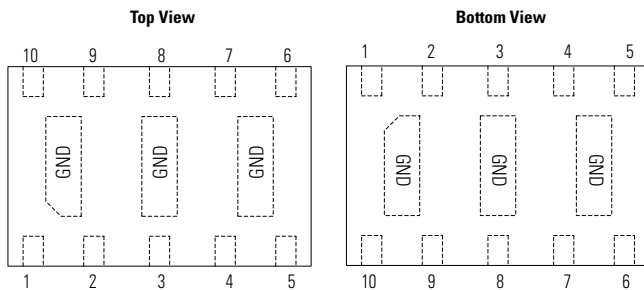


AQ2555NUTG Series

Lightning Surge Protection

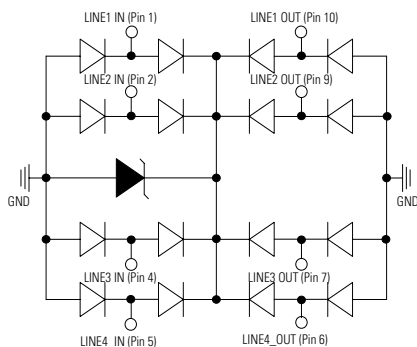


Pinout



Note: PIN3, PIN8 are same potential with GND

Functional Block Diagram



Life Support Note:

Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

Description

The AQ2555NUTG is a low-capacitance, TVS Diode Array designed to provide protection against ESD (electrostatic discharge), CDE (cable discharge events), EFT (electrical fast transients), and lightning induced surges for high-speed, differential data lines. It's packaged in a μ DFN package (3.0 x 2.0mm) and each component can protect up to 4 channels or 2 differential pairs, up to 45A (IEC 61000-4-5 2nd edition,) and up to 30kV ESD (IEC 61000-4-2). The "flow-through" design minimizes signal distortion, reduces voltage overshoot, and provides a simplified PCB design.

The AQ2555NUTG with its low capacitance and low clamping voltage makes it ideal for high-speed data interfaces such as 1GbE applications found in notebooks, switches, etc.

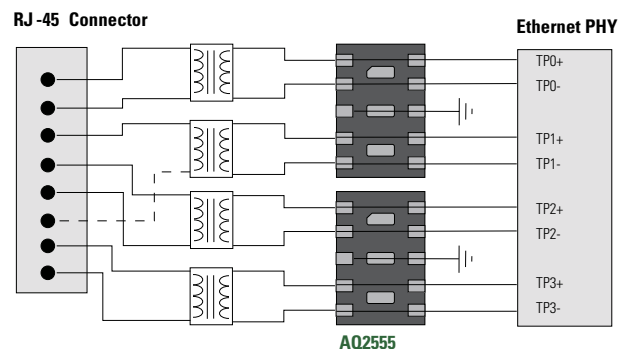
Features

- ESD, IEC 61000-4-2, ± 30 kV contact, ± 30 kV air
- •EFT, IEC 61000-4-4, 50A (5/50ns)
- Lightning, IEC 61000-4-5 2nd edition, 45A (tP=8/20 μ s)
- Low capacitance of 2.5pF@0V (TYP) per I/O
- Low leakage current of 0.1 μ A (TYP) at 2.5V
- PPAP capable
- μ DFN-10 package is optimized for high-speed data line routing
- Provides protection for two differential data pairs (4 channels) up to 45A
- Low operating and clamping voltage
- AEC-Q101 qualified
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level(MSL -1)

Applications

- 10/100/1000 Ethernet
- WAN/LAN Equipment
- Desktops, Servers and Notebooks
- LVDS Interfaces
- Integrated Magnetics
- Automotive Application

Application Example



AQ2555NUTG Series

Lightning Surge Protection

Absolute Maximum Ratings

| Symbol | Parameter | Value | Units |
|------------|--------------------------------------|------------|-------|
| I_{PP} | Peak Current ($t_p=8/20\mu s$) | 45 | A |
| P_{Pk} | Peak Pulse Power ($t_p=8/20\mu s$) | 1000 | W |
| T_{OP} | Operating Temperature | -40 to 150 | °C |
| T_{STOR} | Storage Temperature | -55 to 150 | °C |

Caution: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics ($T_{OP}=25^\circ C$)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---------------------------------|--------------------------|--|----------|-----|-----|----------|
| Reverse Standoff Voltage | V_{RWM} | $I_R \leq 1\mu A$ | | | 2.5 | V |
| Reverse Leakage Current | I_R | $V_{RWM} = 2.5V, T = 25^\circ C$ | | 0.1 | 0.5 | μA |
| Snap Back Voltage | V_{SB} | $I_{SB} = 50mA$ | 2.0 | | | V |
| Clamp Voltage | V_C | $I_{PP} = 1A, t_p = 8/20\mu s$, Any I/O to Ground | | 4.5 | | V |
| | | $I_{PP} = 10A, t_p = 8/20\mu s$, Any I/O to Ground | | 7.5 | | |
| | | $I_{PP} = 25A, t_p = 8/20\mu s$, Any I/O to Ground | | 12 | | |
| | | $I_{PP} = 45A, t_p = 8/20\mu s$, Line-to-Line ¹ , two I/O Pins connected together on each line | | 19 | | |
| Dynamic Resistance ² | R_{DYN} | TLP, $t_p=100ns$, Any I/O to Ground | | 0.1 | | Ω |
| ESD Withstand Voltage | V_{ESD} | IEC 61000-4-2 (Contact) | ± 30 | | | kV |
| | | IEC 61000-4-2 (Air) | ± 30 | | | kV |
| Diode Capacitance | $C_{I/O \text{ to GND}}$ | Between I/O Pins and Ground $V_R = 0V, f = 1MHz$ | | 2.5 | | pF |
| | $C_{I/O \text{ to I/O}}$ | Between I/O Pins $V_R = 0V, f = 1MHz$ | | 1.2 | | pF |

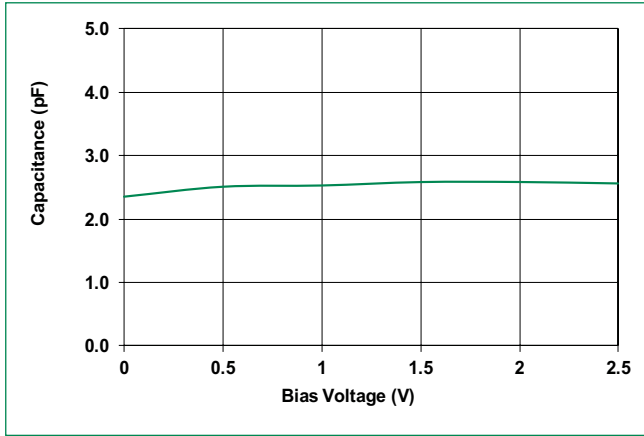
Notes:

- Rating with 2 pins connected together per suggested diagram (For example, pin1 is connected to pin 10, pin 2 is connected to Pin 9, Pin 4 is connected to pin 7 and pin 5 is connected to pin 6)
- Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window $t1=70ns$ to $t2=90ns$

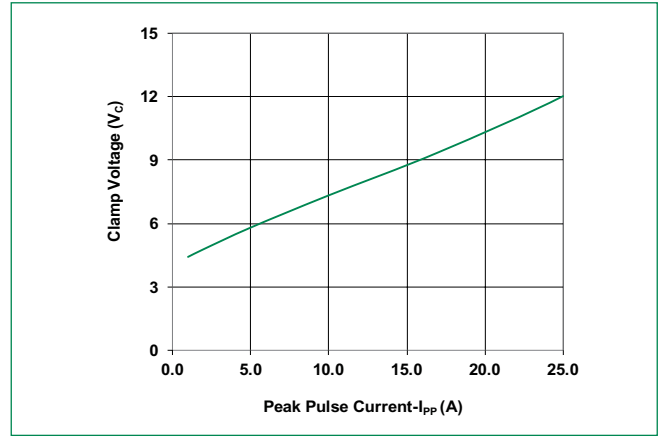
AQ2555NUTG Series

Lightning Surge Protection

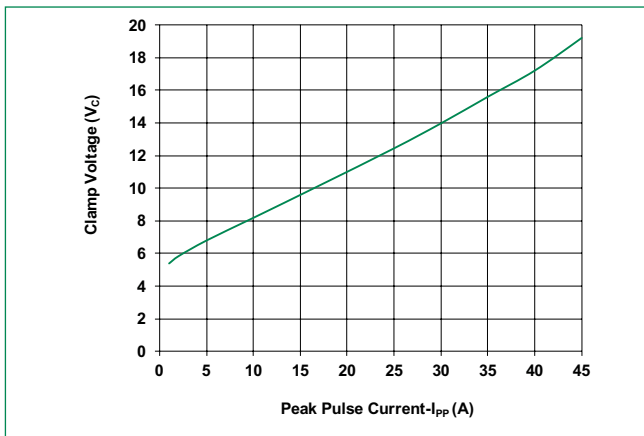
Capacitance vs. Reverse Bias



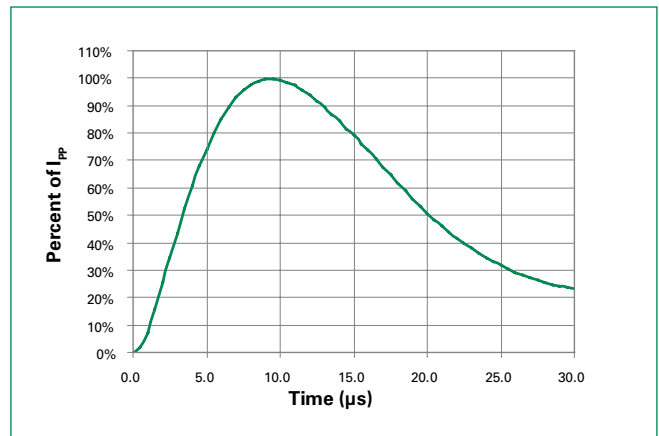
Clamping Voltage vs. IPP (I/O to GND)



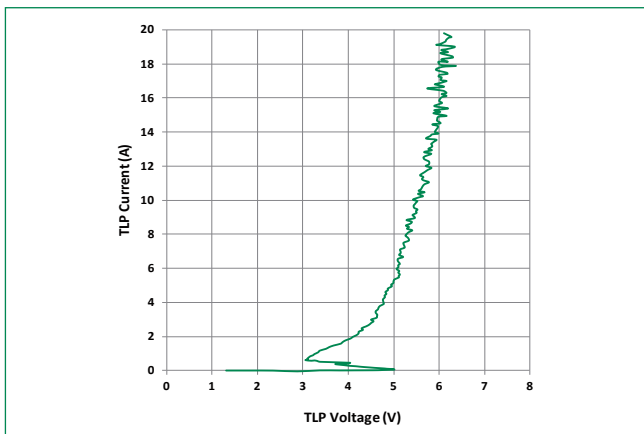
Clamping Voltage vs. IPP (Line-to-Line)



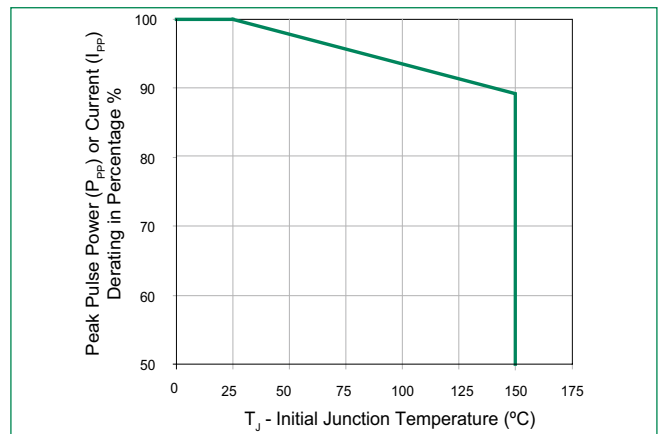
8/20μs Pulse Waveform



Transmission Line Pulsing(TLP) Plot



Power Derating Curve

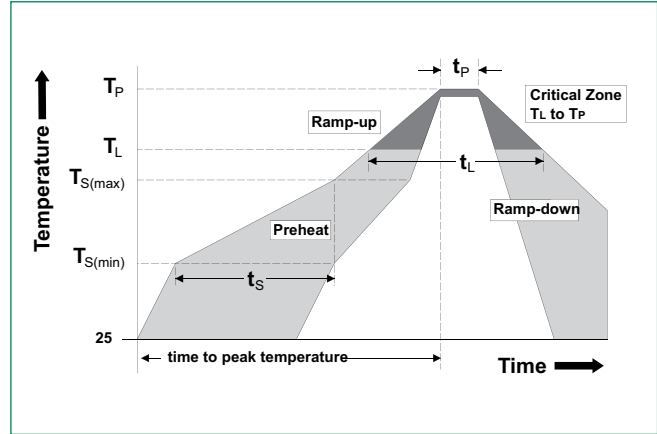


AQ2555NUTG Series

Lightning Surge Protection

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 – 120 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 |



Ordering Information

| Part Number | Package | Min. Order Qty. |
|-------------|--------------------------|-----------------|
| AQ2555NUTG | μ DFN-10 (3.0x2.0mm) | 3000 |

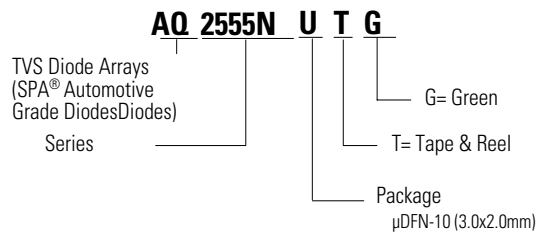
Product Characteristics

| | |
|---------------------------|--|
| Lead Plating | Pre-Plated Frame |
| Lead Material | Copper Alloy |
| Substrate material | Silicon |
| Body Material | Molded Compound |
| Flammability | UL Recognized compound meeting flammability rating V-0 |

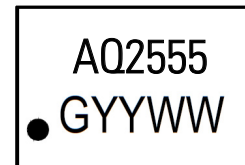
Notes:

- All dimensions are in millimeters
- Dimensions include solder plating.
- Dimensions are exclusive of mold flash & metal burr.

Part Numbering System



Part Marking System

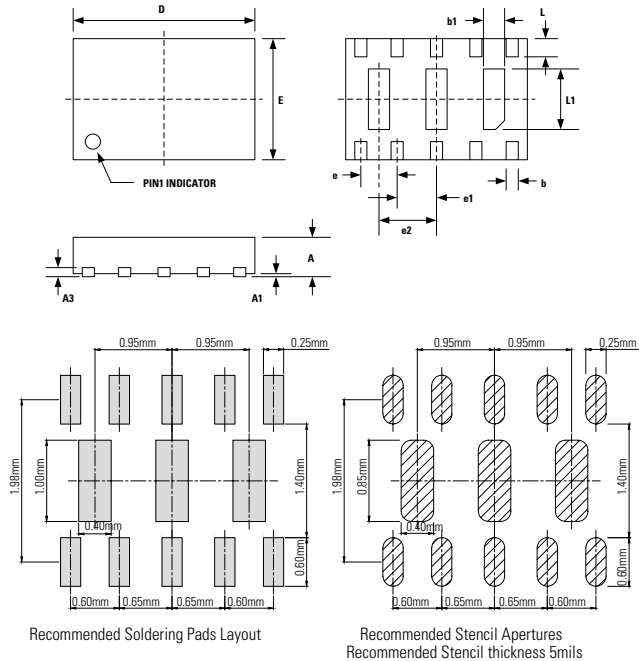


First row= Part Name= AQ2555
 Second row= Assembly Code+ Date Code

AQ2555NUTG Series

Lightning Surge Protection

Package Dimensions — μ DFN-10 (3.0x2.0mm)

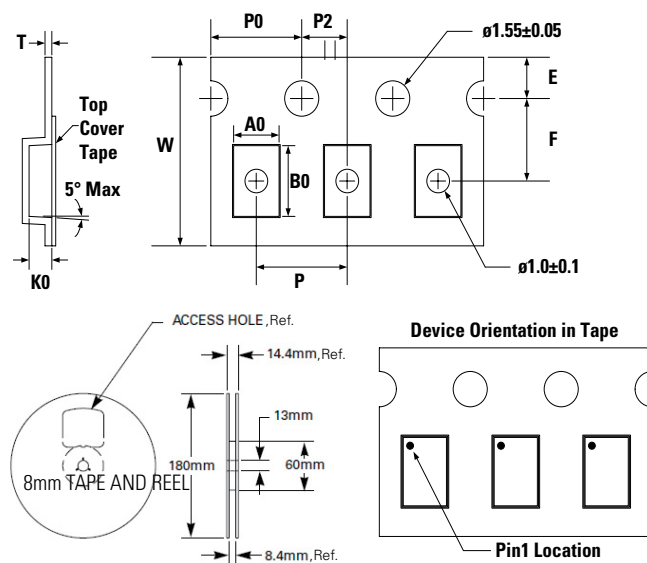


| Package | μ DFN-10 (3.0x2.0mm) | | | | | |
|---------|--------------------------|------|------|-----------|-------|-------|
| | JEDEC MO-229 | | | | | |
| | Millimeters | | | Inches | | |
| Symbol | Min | Nom | Max | Min | Nom | Max |
| A | 0.50 | 0.60 | 0.65 | 0.020 | 0.024 | 0.026 |
| A1 | 0.00 | 0.03 | 0.05 | 0.000 | 0.001 | 0.002 |
| A3 | 0.15 Ref | | | 0.006 Ref | | |
| b | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| b1 | 0.25 | 0.35 | 0.45 | 0.010 | 0.014 | 0.018 |
| D | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| E | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| e | 0.60 BSC | | | 0.024 BSC | | |
| e1 | 0.65 BSC | | | 0.026 BSC | | |
| e2 | 0.95 BSC | | | 0.037 | | |
| L | 0.25 | 0.30 | 0.35 | 0.010 | 0.012 | 0.014 |
| L1 | 0.95 | 1.00 | 1.05 | 0.037 | 0.039 | 0.041 |

Notes :

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.

Tape & Reel Specification — μ DFN-10 (3.0x2.0mm)



| Package | μ DFN-10 (3.0x2.0mm) |
|---------|--------------------------|
| Symbol | Millimeters |
| A0 | 2.30 +/- 0.10 |
| B0 | 3.20 +/- 0.10 |
| E | 1.75 +/- 0.10 |
| F | 3.50 +/- 0.05 |
| K0 | 1.0 +/- 0.10 |
| P | 4.00 +/- 0.10 |
| P0 | 4.00 +/- 0.10 |
| P2 | 2.00 +/- 0.10 |
| T | 0.3 +/- 0.05 |
| W | 8.00 +0.30/- 0.10 |

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