Etek Microelectronics

# ES052R2PL

**Transient Voltage Suppressor**

## Features

- Solid-state silicon-avalanche technology
- Low operating and clamping voltage
- Up to two I/O Lines of Protection
- Ultra low capacitance
- Low operating voltage:5V
- Low Leakage Current

## IEC COMPATIBILITY (EN61000-4)

- **IEC 61000-4-2 (ESD) ±20kV (air), ±15kV (contact)**
- **IEC 61000-4-4 (EFT) 40A (5/50ns)**
- **IEC 61000-4-5 (Lightning)4A (8/20μs)**

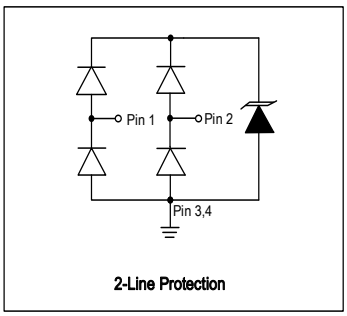
## Mechanical Characteristics

- DFN1610-6L package
- Marking : Marking Code
- Packaging : Tape and Reel per EIA 481
- RoHS Compliant

## Applications

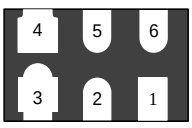
- Digital Visual Interface(DVI)
- MDDI Ports
- Display Port TM Interface
- PCI Express
- High Definition Multi-Media Interface(HDMI)
- HDMI Interfaces

## Circuit Diagram




2-Line Protection

## Schematic & PIN Configuration




DFN1610-6L

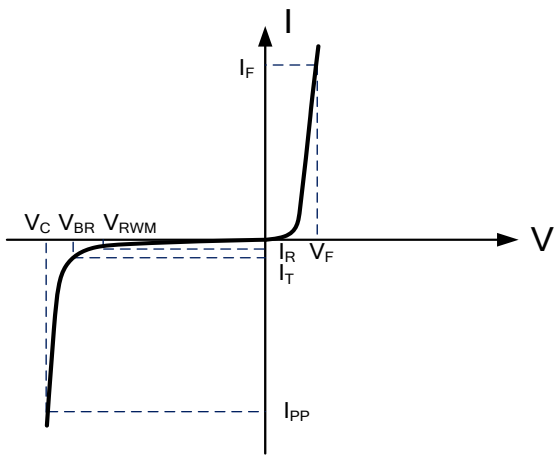
| Pin | Identificaion |
|---|---|
| 1,2 | Input line |
| 5,6 | Output Lines (No Internal Connection) |
| 3,4 | Ground |

## Absolute Maximum Rating

| Rating | Symbol | Value | Units |
|---|---|---|---|
| Peak Pulse Power ( $t_p$ = 8/20μs ) | $P_{PP}$ | 48 | Watts |
| Peak Pulse Current ( $t_p$ = 8/20μs ) | $I_{PP}$ | 4 | A |
| Operating Temperature | $T_J$ | -55 to + 125 | ℃ |
| Storage Temperature | $T_{STG}$ | -55 to +150 | ℃ |

## Electrical Parameters (T=25℃)

| Symbol | Parameter |
|---|---|
| $I_{PP}$ | Reverse Peak Pulse Current |
| $V_C$ | Clamping Voltage @ $I_{PP}$ |
| $V_{RWM}$ | Reverse Stand-Off Voltage |
| $I_R$ | Reverse Leakage Current @ $V_{RWM}$ |
| $V_{BR}$ | Breakdown Voltage @ $I_T$ |
| $I_T$ | Test Current |
| $I_F$ | Forward Current |
| $V_F$ | Forward Voltage @ $I_F$ |



## Electrical Characteristics

| Parameter | Symbol | Conditions | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|---|
| Reverse Stand-Off Voltage | $V_{RWM}$ | | | | 5 | V |
| Reverse Breakdown Voltage | $V_{BR}$ | $I_T$=1mA | 6 | | 9 | V |
| Reverse Leakage Current | $I_R$ | $V_{RWM}$=5V, T=25℃ | | | 500 | nA |
| Forward Voltage | $V_F$ | $I_F$=10mA | 0.6 | | 1.2 | V |
| Clamping Voltage | $V_C$ | $I_{PP}$=4A, $t_p$=8/20μs | | 10.5 | 12 | V |
| Dynamic Resistance[1,2] | $R_{DYN}$ | TLP=0.2/100ns | | 0.34 | | Ω |
| ESD Clamping Voltage[1] | $V_C$ | $I_{PP}$ = 4A, tp = 0.2/100ns (TLP) | | 9.13 | | V |
| ESD Clamping Voltage[1] | $V_C$ | $I_{PP}$ = 16A, tp = 0.2/100ns (TLP) | | 13.2 | | V |
| Junction Capacitance | $C_j$ | $V_R$ = 0V, f = 1MHz I/O pin to GND | | 0.5 | 0.7 | pF |
| | | $V_R$ = 0V, f = 1MHz Between I/O pins | | 0.25 | 0.35 | pF |

Notes：1、TLP Setting：$t_p$=100ns, $t_r$=0.2ns, $I_{TLP}$ and $V_{TLP}$ sample window:$t_1$=70ns to $t_2$=90ns.
2、Dynamic resistance calculated from $I_{PP}$=4A to $I_{PP}$=16A using “Best Fit”.

# Typical Characteristics

**Figure 1: Peak Pulse Power vs. Pulse Time**

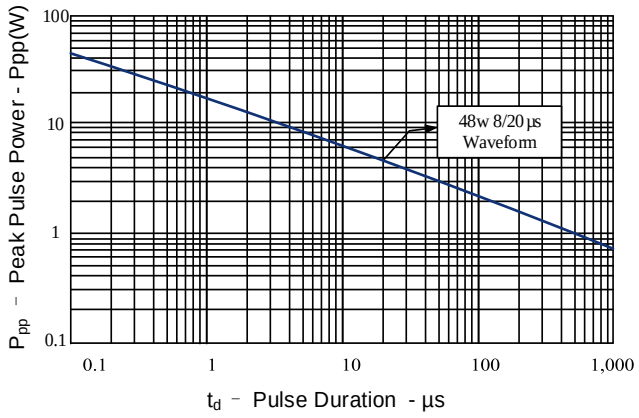



**Figure 2: Power Derating Curve**

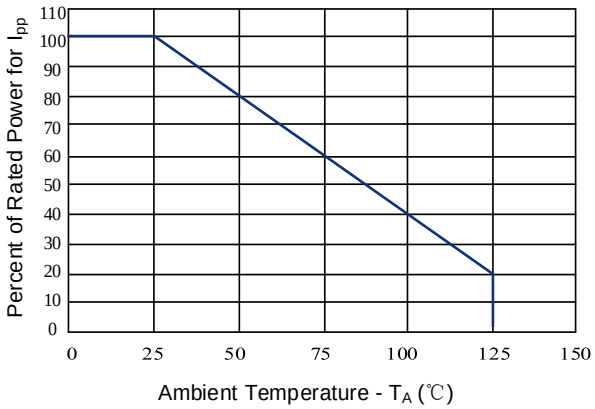



**Figure 3: Clamping Voltage vs. Peak Pulse Current**

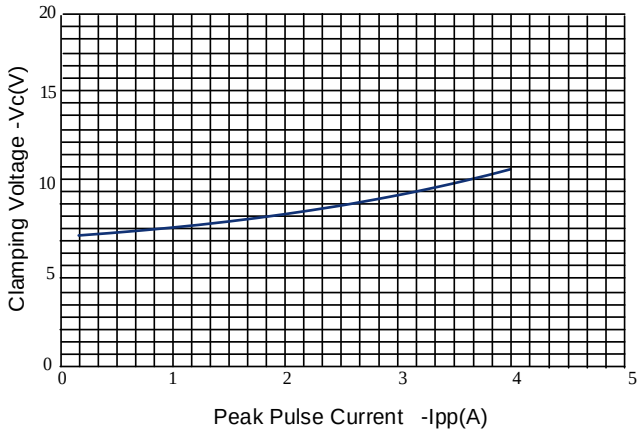



**Figure 4: Normalized Junction Capacitance vs. Reverse Voltage**

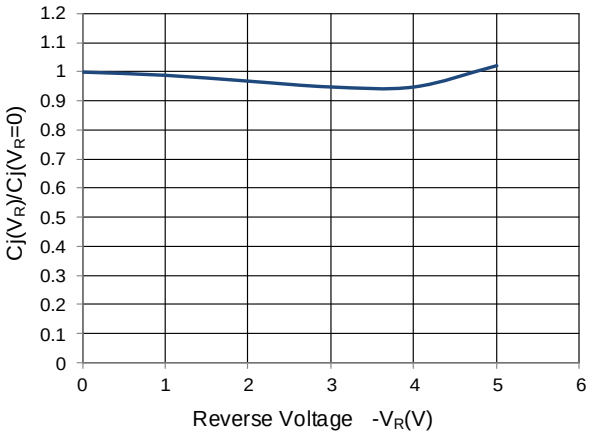



**Figure 5: 8/20μs Pulse Waveform**

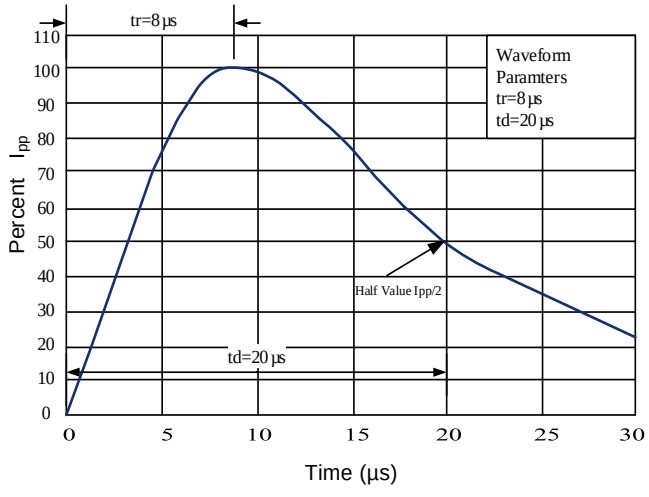
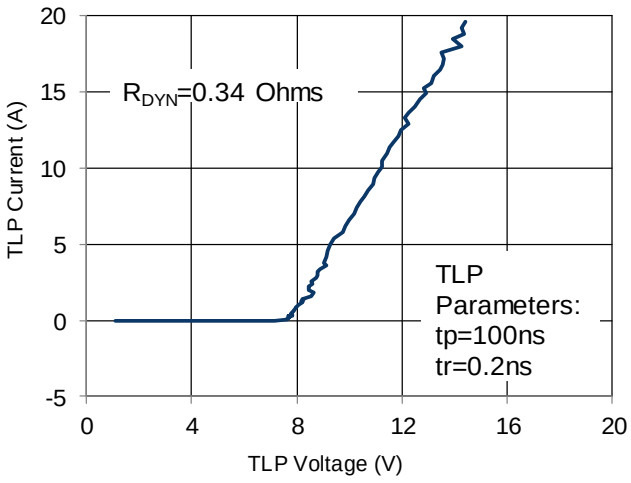
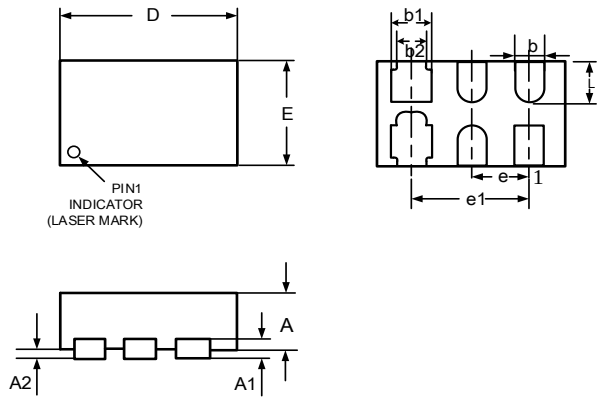


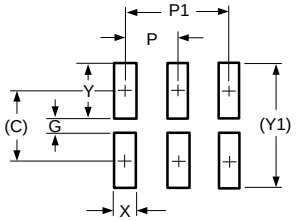

**Figure 6: TLP I-V Curve**



## Outline Drawing – DFN1610-6L




| DIMENSIONS | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| D | 1.55 | 1.65 | 0.061 | 0.065 |
| E | 0.95 | 1.05 | 0.037 | 0.041 |
| L | 0.33 | 0.43 | 0.013 | 0.017 |
| b | 0.15 | 0.25 | 0.006 | 0.010 |
| b1 | 0.35 | 0.45 | 0.014 | 0.018 |
| b2 | 0.25 | 0.35 | 0.010 | 0.014 |
| e | 0.50BSC | | 0.020BSC | |
| e1 | 1.00BSC | | 0.039BSC | |
| A | 0.45 | 0.55 | 0.018 | 0.022 |
| A1 | 0.15REF | | 0.006REF | |
| A2 | 0.00 | 0.05 | 0.000 | 0.002 |




| DIMENSIONS | | |
|---|---|---|
| DIM | INCHES | MILLIMETERS |
| C | 0.024 | 0.60 |
| G | 0.004 | 0.10 |
| P | 0.020 | 0.50 |
| P1 | 0.039 | 1.00 |
| X | 0.012 | 0.30 |
| Y | 0.020 | 0.50 |
| Y1 | 0.043 | 1.10 |

**Notes:**
Controlling Dimension: Millimeter.

## Marking Codes

| Part Number | Marking Code |
|---|---|
| ES052R2PL | 2R2P |

## Package Information

Qty：10k/Reel

## Revision History

| No. | Version | Date | Revision Item | Request | Function and characteristic checking | Package dimension checking | Typos checking |
|---|---|---|---|---|---|---|---|
| 1 | 1.0 | 2019-10-15 | Released Version | Qi Shu Kun | Qi Shu Kun | Liu Jia Ying | Liu Jia Ying |
| | | | | | | | |
| | | | | | | | |