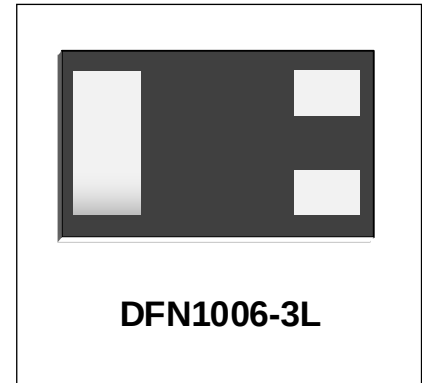


### Features

- 50 Watts Peak Power per Line ( $t_p = 8/20\mu s$ )
- Protects two I/O lines
- Low operating voltage: 5V
- Low capacitance ( $<1.0pF$ )
- Solid-state technology

### IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD)  $\pm 30kV$  (air),  $\pm 30kV$  (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 4A (8/20 $\mu s$ )



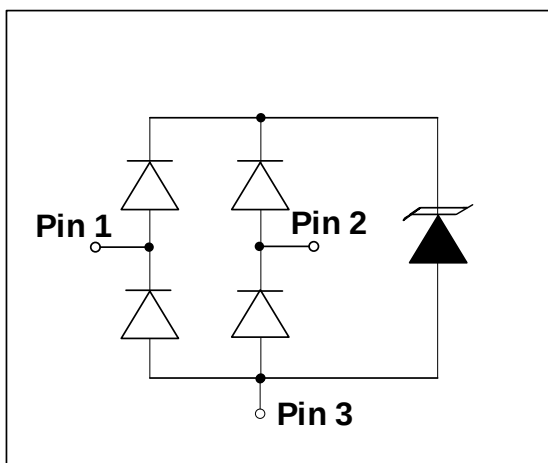
### Mechanical Characteristics

- JEDEC DFN1006-3L package
- Molding compound flammability rating: UL 94V-0
- Marking : Making Code
- Packaging : Tape and Reel per EIA 481
- RoHS Compliant

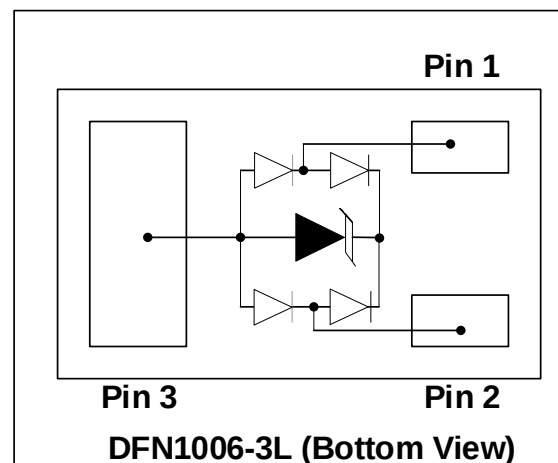
### Applications

- FireWire & USB
- Sensitive Analog Inputs
- Portable Electronics
- LAN/WAN equipment
- Video Line Protection
- Microcontroller Input Protection

### Circuit Diagram



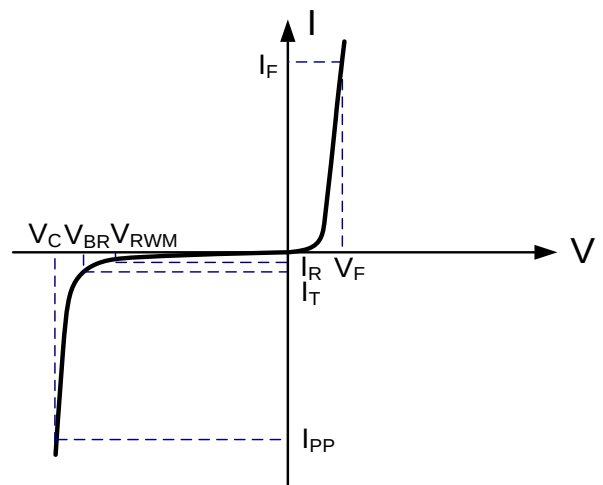
### Schematic & PIN Configuration



| Absolute Maximum Rating              |           |             |             |
|--------------------------------------|-----------|-------------|-------------|
| Rating                               | Symbol    | Value       | Units       |
| Peak Pulse Power ( $t_p=8/20\mu s$ ) | $P_{PP}$  | 50          | Watts       |
| Operating Temperature                | $T_J$     | -55 to +125 | $^{\circ}C$ |
| Storage Temperature                  | $T_{STG}$ | -55 to +150 | $^{\circ}C$ |

## Electrical Parameters (T=25 $^{\circ}C$ )

| 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

| ES05MUC                           |           |                                                 |         |         |         |          |
|-----------------------------------|-----------|-------------------------------------------------|---------|---------|---------|----------|
| Parameter                         | Symbol    | Conditions                                      | Minimum | Typical | Maximum | Units    |
| Reverse Stand-Off Voltage         | $V_{RWM}$ |                                                 |         |         | 5.0     | V        |
| Breakdown Voltage                 | $V_{BR}$  | $I_T=1mA$                                       | 6.0     |         | 9.0     | V        |
| Forward Voltage                   | $V_F$     | $I_F=10mA$                                      | 0.6     |         | 1.0     | V        |
| Reverse Leakage Current           | $I_R$     | $V_{RWM}=5V, T=25^{\circ}C$                     |         |         | 500     | nA       |
| Clamping Voltage                  | $V_C$     | $I_{PP}=4A, t_p=8/20\mu s$                      |         | 10.5    | 12      | V        |
| Dynamic Resistance <sup>1,2</sup> | $R_{DYN}$ | TLP=0.2/100ns                                   |         | 0.56    |         | $\Omega$ |
| ESD Clamping Voltage <sup>1</sup> | $V_C$     | $I_{PP} = 4A,$<br>$t_p = 0.2/100ns$ (TLP)       |         | 10.5    |         | V        |
| ESD Clamping Voltage <sup>1</sup> | $V_C$     | $I_{PP} = 16A,$<br>$t_p = 0.2/100ns$ (TLP)      |         | 17.0    |         | V        |
| Junction Capacitance              | $C_j$     | Between I/O pins and Ground $V_R=0V$ , $f=1MHz$ |         | 0.5     | 1.0     | pF       |
|                                   |           | Between I/O pins $V_R=0V, f=1MHz$               |         | 0.2     | 0.5     | 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

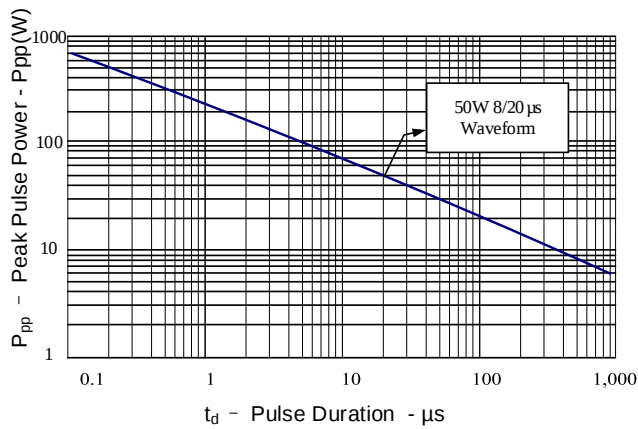


Figure 2: Power Derating Curve

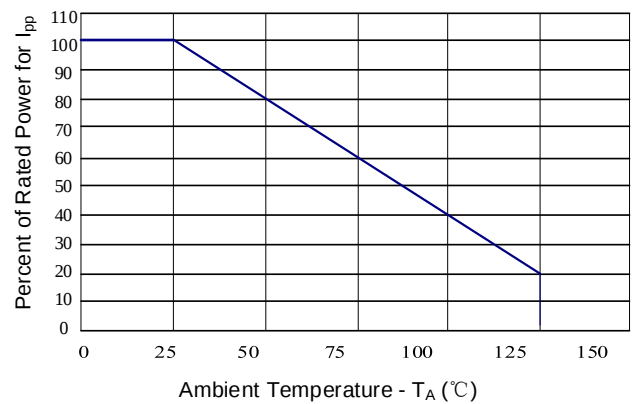


Figure 3: Clamping Voltage vs. Peak Pulse Current

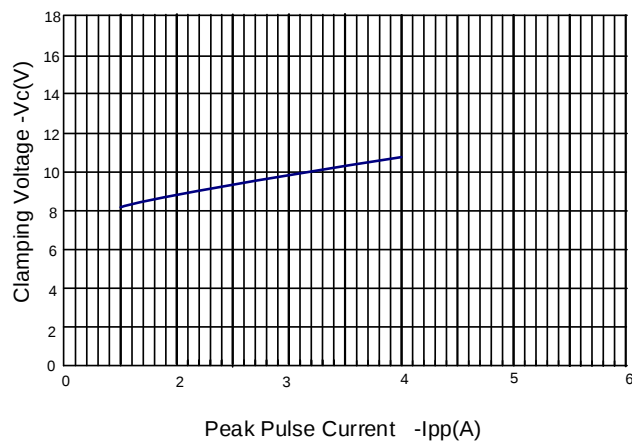


Figure 4: Capacitance vs. Reverse Voltage

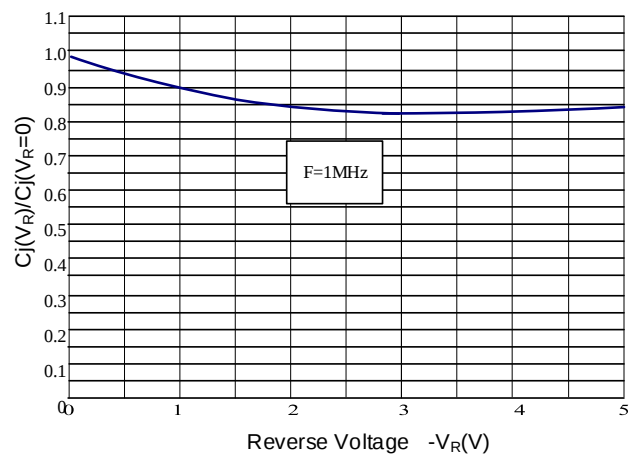


Figure 5: 8/20 $\mu$ s Pulse Waveform

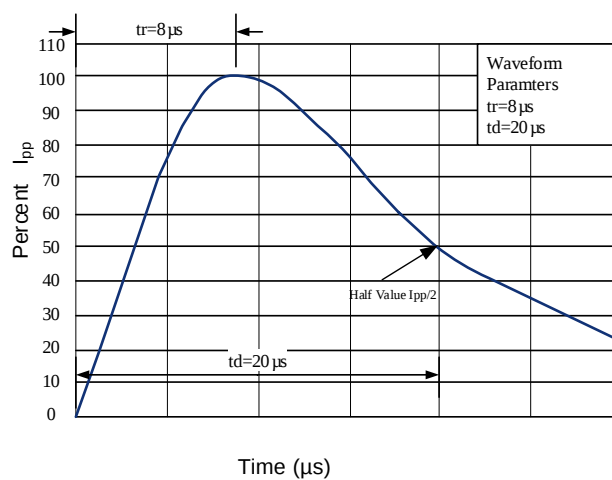
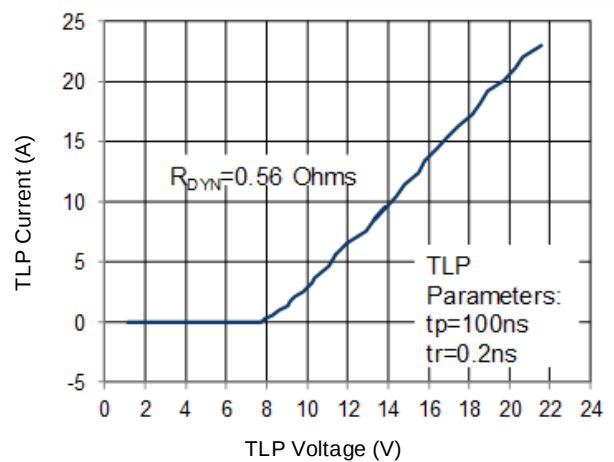
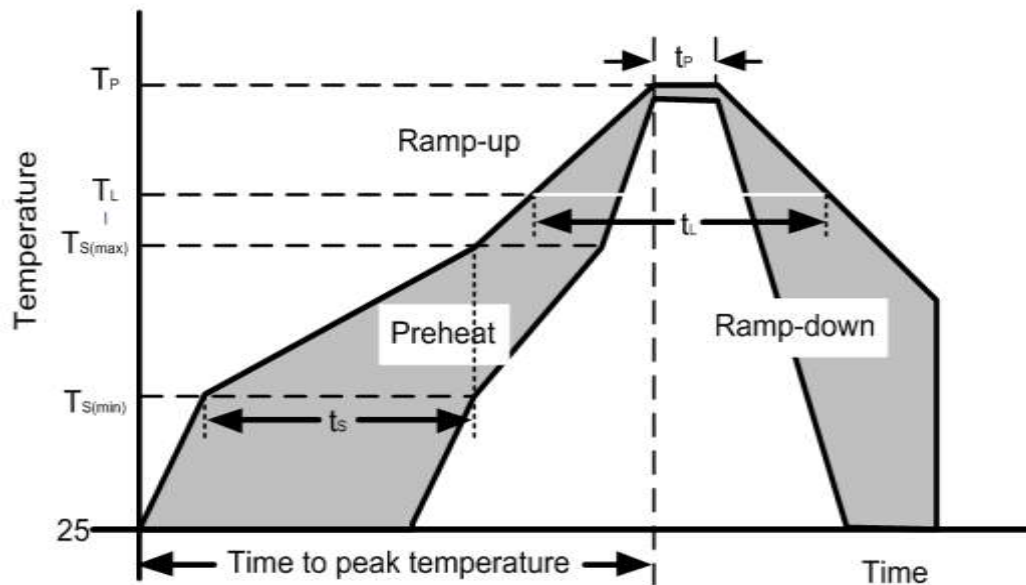


Figure 6: TLP I-V Curve

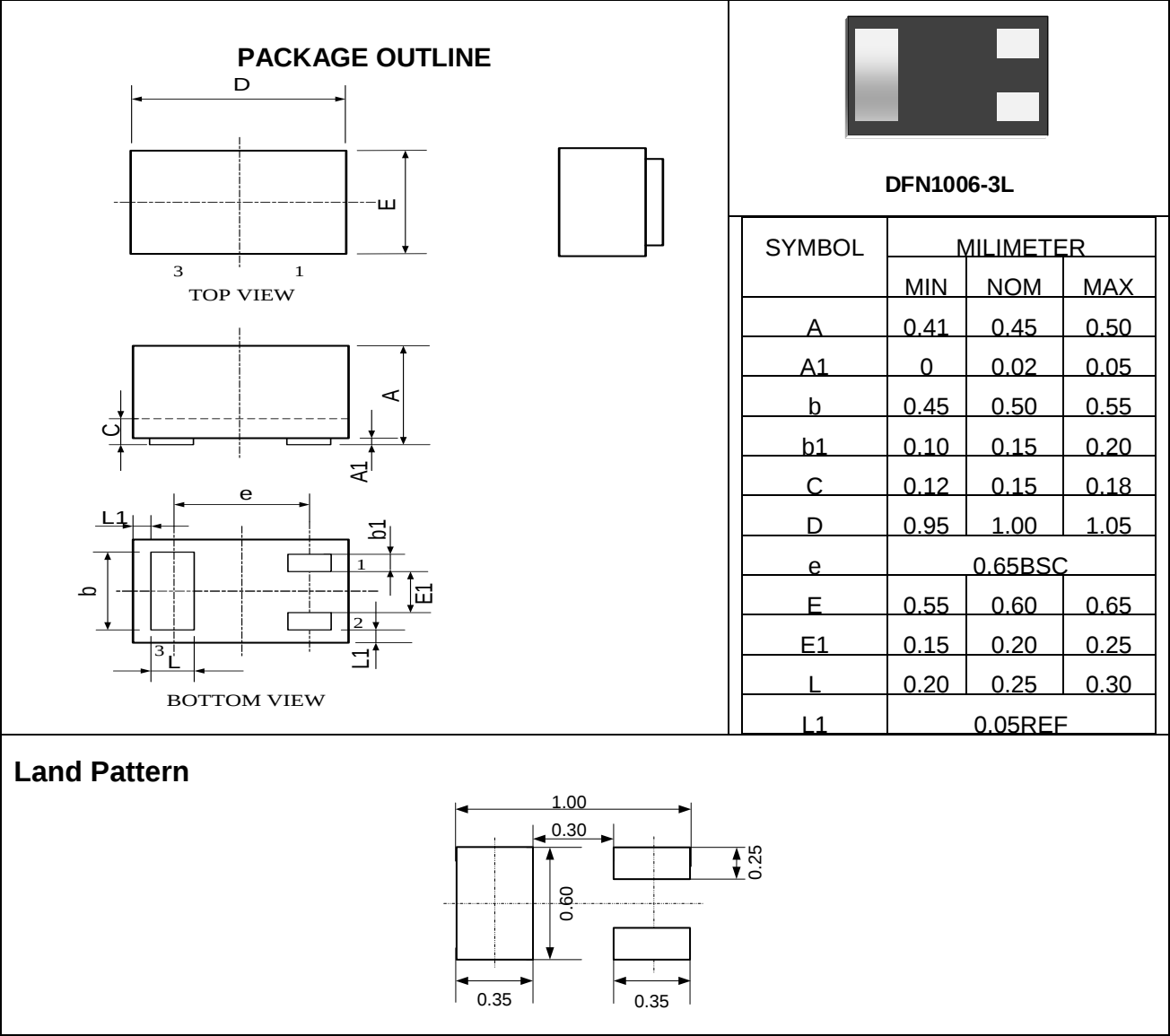


## Soldering Parameters

| 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 – 190 secs      |
| Average ramp up rate (Liquidus Temp) ( $T_L$ ) to peak |                                  | 5°C/second max     |
| $T_{S(max)}$ to $T_L$ —Ramp-up Rate                    |                                  | 5°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 actual peak Temperature ( $t_p$ )          |                                  | 20 – 40 seconds    |
| Ramp-down Rate                                         |                                  | 5°C/second max     |
| Time 25°C to peak Temperature ( $T_P$ )                |                                  | 8 minutes Max.     |
| Do not exceed                                          |                                  | 280°C              |



Outline Drawing – DFN1006-3L



Marking Codes

|             |              |
|-------------|--------------|
| Part Number | Marking Code |
| ES05MUC     | U3           |

Package Information

Qty: 10k/Reel