# ULTRA LOW CAPACITANCE TVS DIODE ARRAY

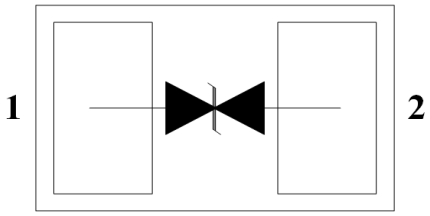
## Features:

- 51 Watts Peak Pulse Power per Line (tp=8/20μ s)
- Protects One Bidirectional I/O Line
- Low Clamping Voltage
- RoHS Compliant

## Applications:

- Cellular Handsets & Accessories
- Keypads, Side Keys, Audio Ports
- Portable Instrumentation'
- Notebooks, Desktops, and Servers
- Digital Lines
- Tablet PC

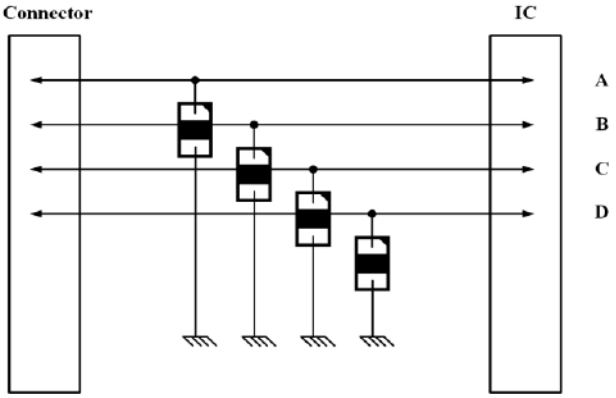
## DFN1006DN Configuration




## MECHANICAL CHARACTERISTICS

- DFN1006DN Package
- Molding Compound Flammability Rating : UL 94V-O
- Weight 0.5 Millgrams (Approximate)
- Reel Size : 7 inch
- Lead Finish : Lead Free

## Typic Application Schematic




## IEC COMPATIBILITY

- IEC61000-4-2 (ESD) ±17kV (air), ±15kV (contact)
- IEC61000-4-4 (EFT) 40A (5/50ηs)
- IEC61000-4-5 (LIGHTING) 3.4A (8/20μ s)

# DEVICE CHARACTERISTICS

## MAXIMUM RATINGS (@ 25℃ Unless Otherwise Specified)

| PARAMETER | SYMBOL | VALUE | UNITS |
|---|---|---|---|
| Peak Pulse Power (tp=8/20μs waveform) | $P_{PP}$ | 51 | Watts |
| Lead Soldering Temperature | $T_L$ | 260 (10 sec.) | ℃ |
| Operating Temperature Range | $T_J$ | -40 ~ 125 | ℃ |
| Storage Temperature Range | $T_{STG}$ | -55 ~ 150 | ℃ |

## ELECTRICAL CHARACTERISTICS PER LINE

| PART NUMBER | DEVICE MARKING | $V_{RWM}$ (V) (max.) | $V_B$ (V) (min.) | $I_T$ (mA | $V_C$ (@1A) (max.) | $V_C$ (@2A) (max.) | $V_C$ (@3.4A) (A) | $I_R$ (μ A) (max.) | $C_T$ (pF) (typ.) |
|---|---|---|---|---|---|---|---|---|---|
| KWULC0521CDN | HA | 5 | 6 | 1 | 9.8 | 11.8 | 15 | 0.1 | 0.24 |

# TYPIC CHARACTERISTICS

**Figure 1. 8 x 20μ s Waveform**

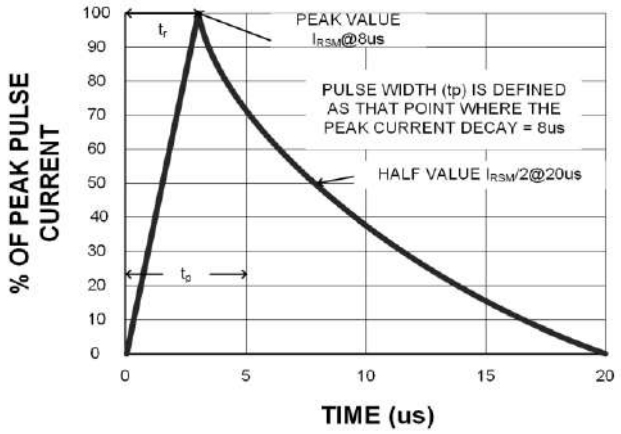



**Figure 2. Power Derating Curve**

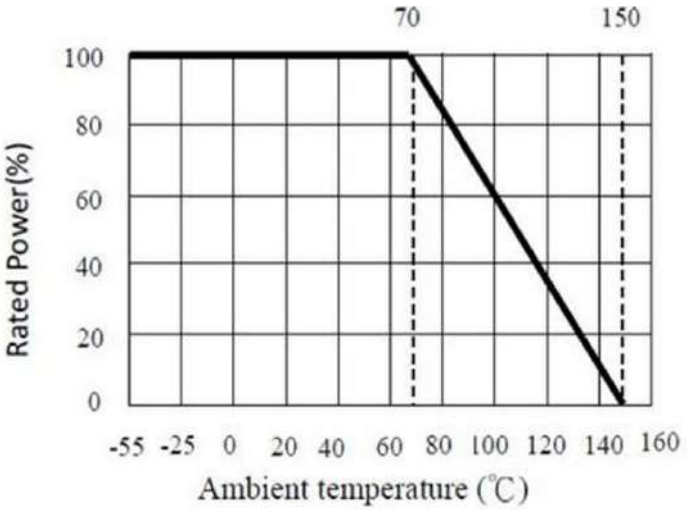
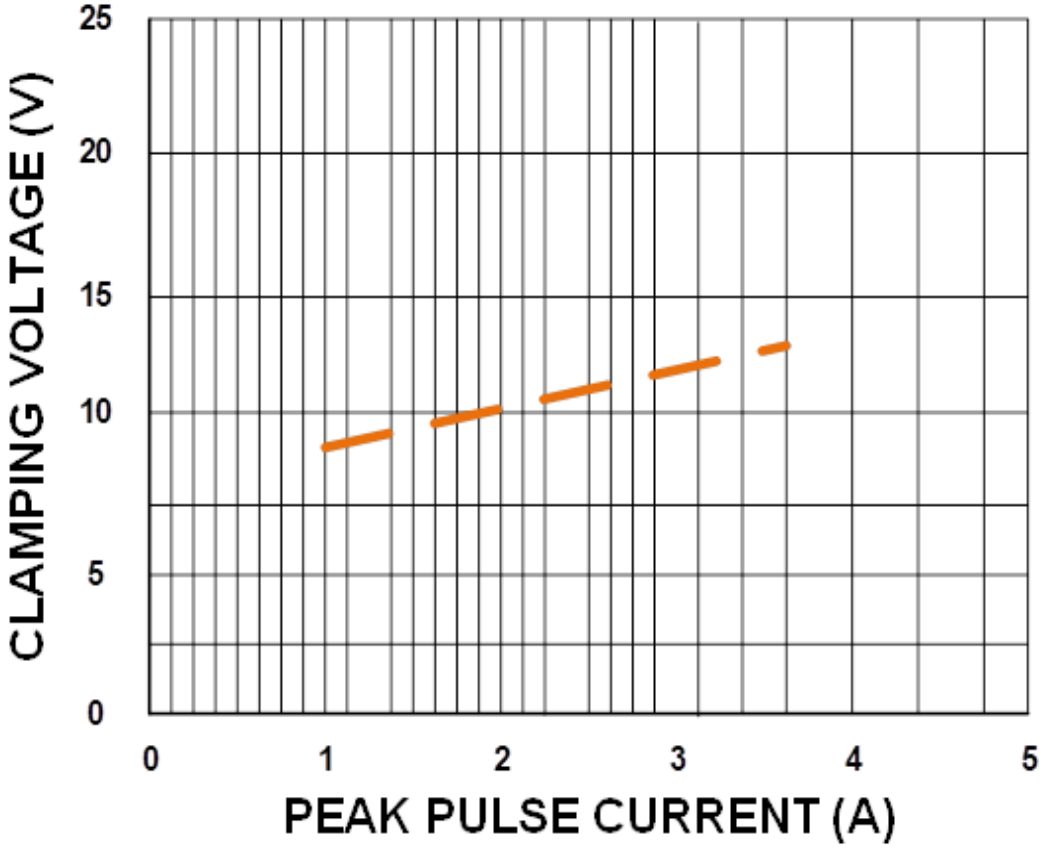



**Figure 3. Clamping Voltage vs. Peak Pulse Current (tp=8/20μ s)**



# TYPIC CHARACTERISTICS

**Figure 4. Typic Breakdown Voltage vs. Temperature**

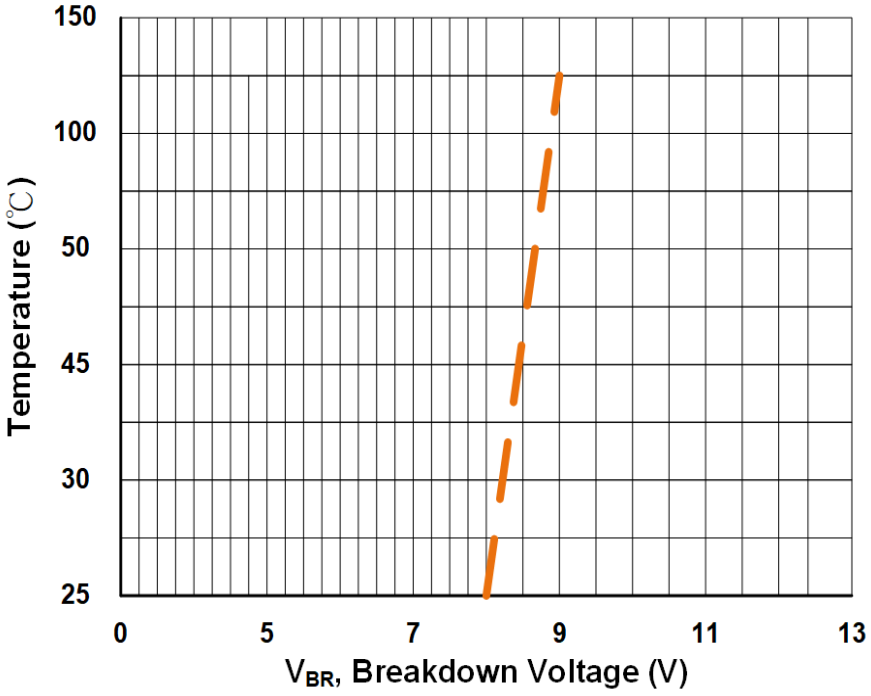
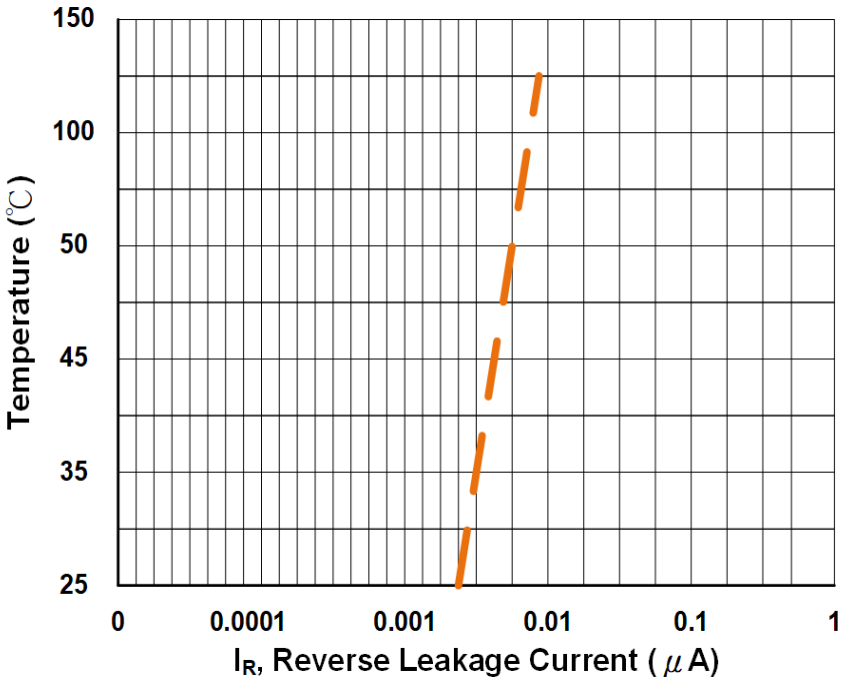
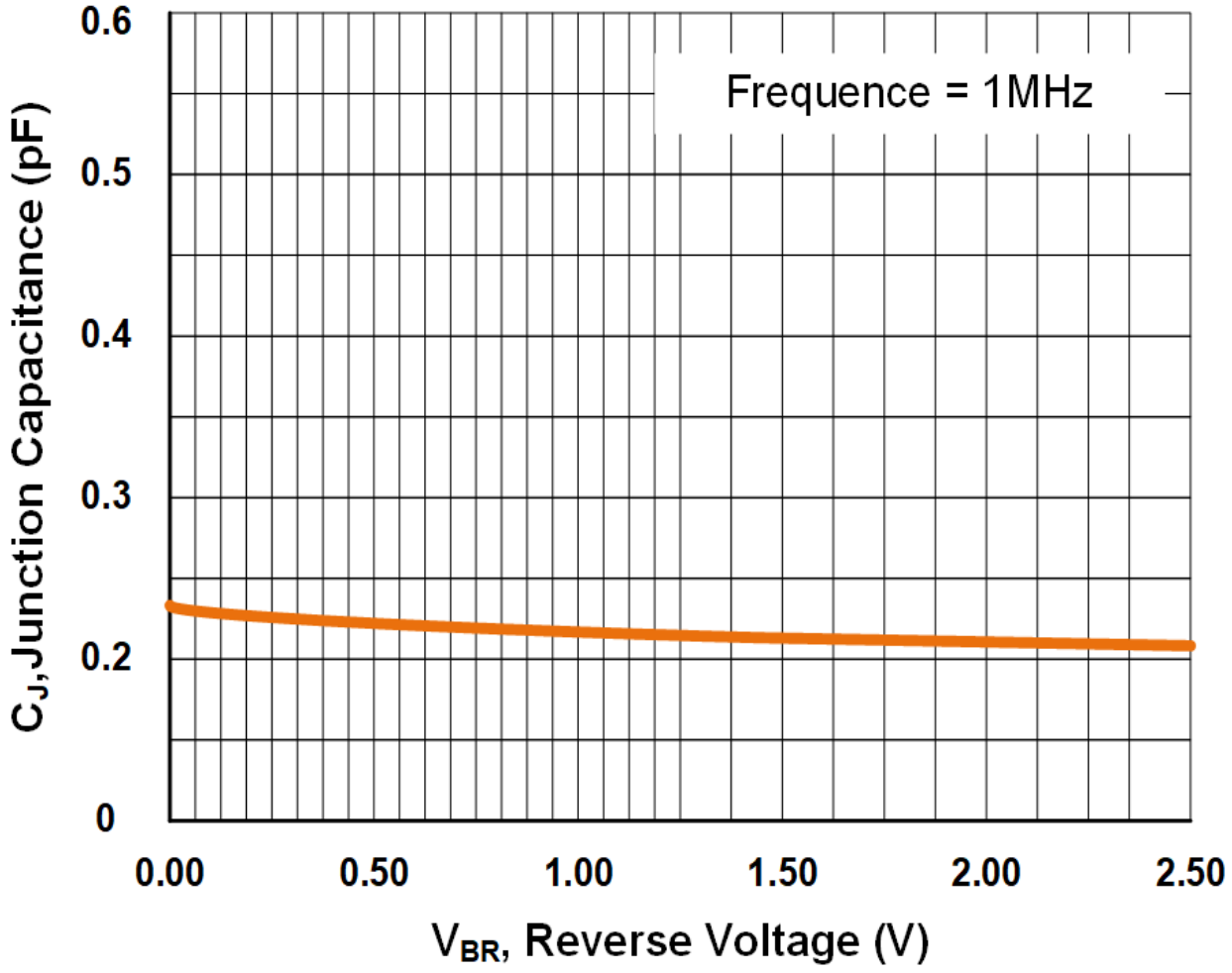



**Figure 5. Typic Reverse Current vs. Temperature**



# TYPIC CHARACTERISTICS

**Figure 7. Typic Capacitance vs. Reverse Voltage**



# TYPIC CHARACTERISTICS

## Figure 8. Eye diagram on HDMI 2.0, USB 3.0 and USB 3.1

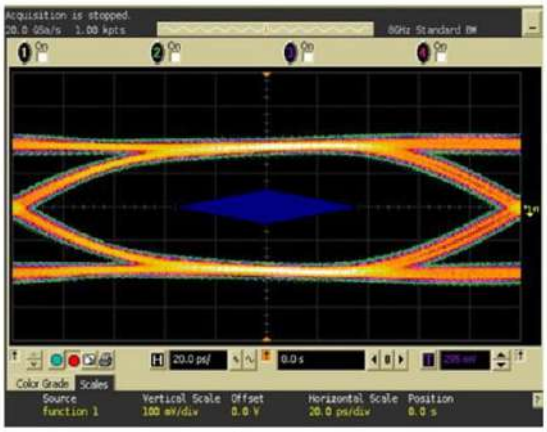


Fig. 8.1. @HDMI 2.0 mask at 5.94 Gbps per channel (Without Component)

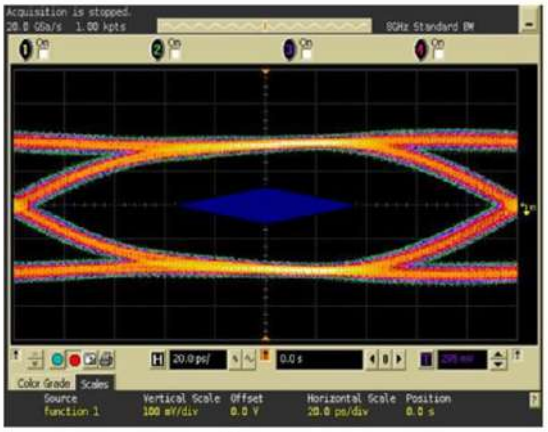


Fig. 8.2. @HDMI 2.0 mask at 5.94 Gbps per channel (With Component)

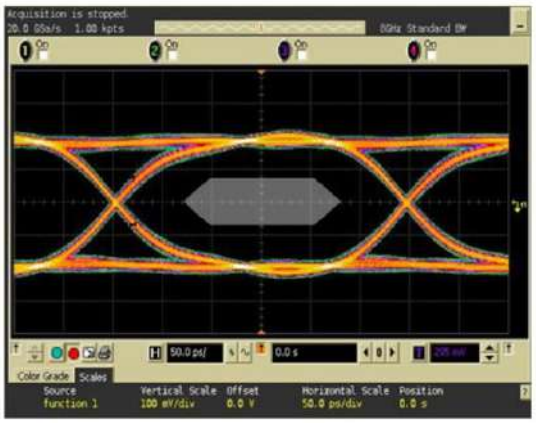


Fig. 8.3. @USB 3.0 mask at 5.0 Gbps per channel (Without Component)

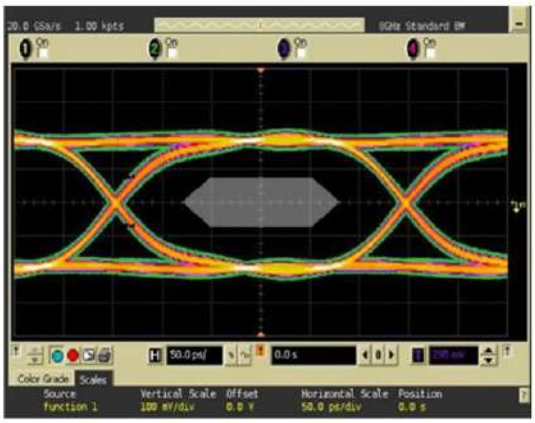


Fig. 8.4. @USB 3.0 mask at 5.0 Gbps per channel (With Component)

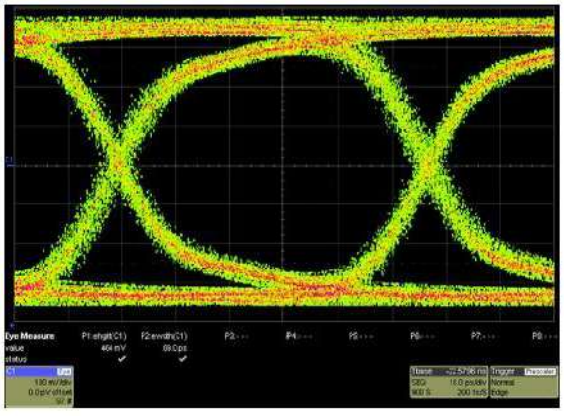


Fig. 8.5. @USB 3.1 mask at 10.0 Gbps per channel (Without Component)

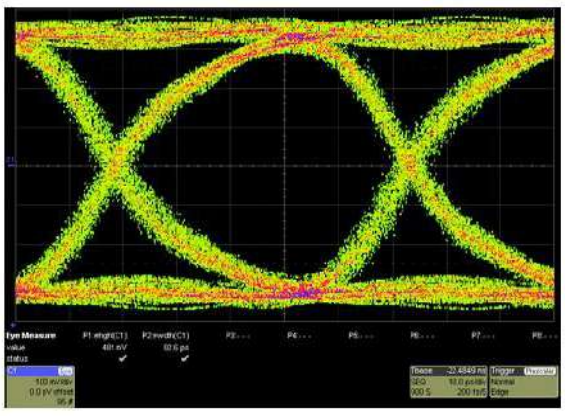


Fig. 8.6. @USB 3.1 mask at 10.0 Gbps per channel (With Component)

# APPLICATION INFORMATION

## Figure 9. Layout Guidelines

Steps must be taken for proper placement and signal trace routing of the ESD protection device in order to ensure the maximum ESD survivability and signal integrity for the application. Such steps are listed below.

1. Place the ESD protection device as close as possible to the I/O connector to reduce the ESD path to ground and improve the protection performance.

1.1. In USB 3.0/3.1 applications, the ESD protection device should be placed between the AC coupling capacitors and the I/O connector on the TX differential lanes as shown in below drawing In this configuration, no DC current can flow through the ESD protection device preventing any potential latch-up condition. For more information on latchup considerations, see below description on below drawing.

2. Make sure to use differential design methodology and impedance matching of all high speed signal traces.

2.1. Use curved traces when possible to avoid unwanted reflections.

2.2. Keep the trace lengths equal between the positive and negative lines of the differential data lanes to avoid common mode noise generation and impedance mismatch.

2.3. Place grounds between high speed pairs and keep asmuch distance between pairs as possible to reduce crosstalk.

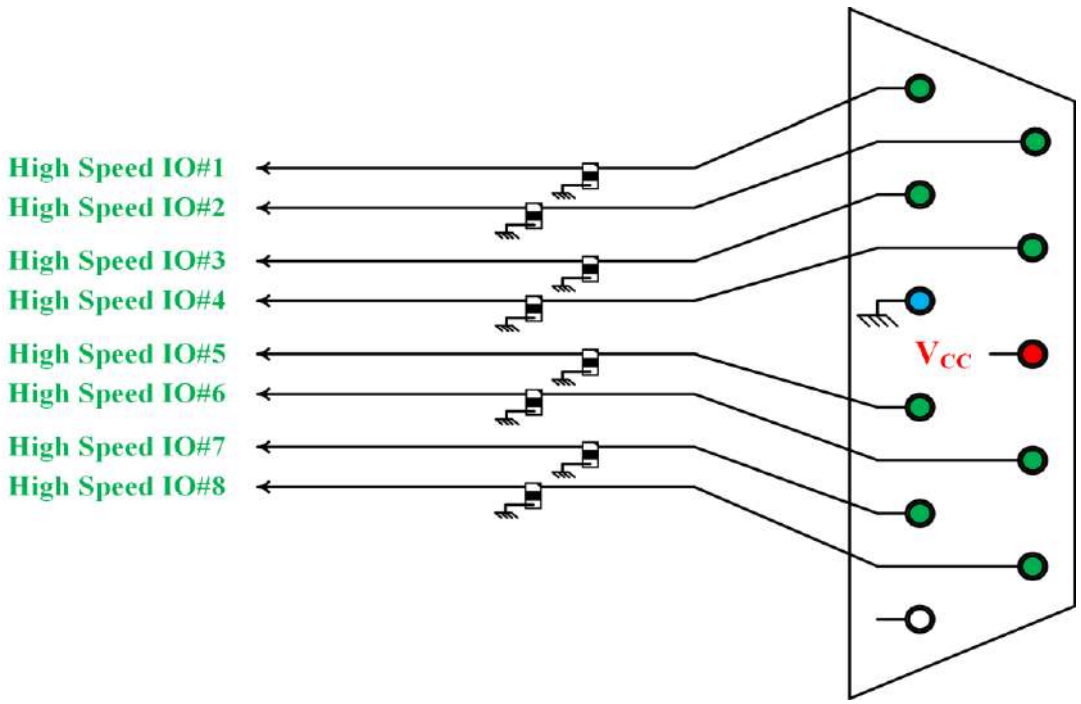
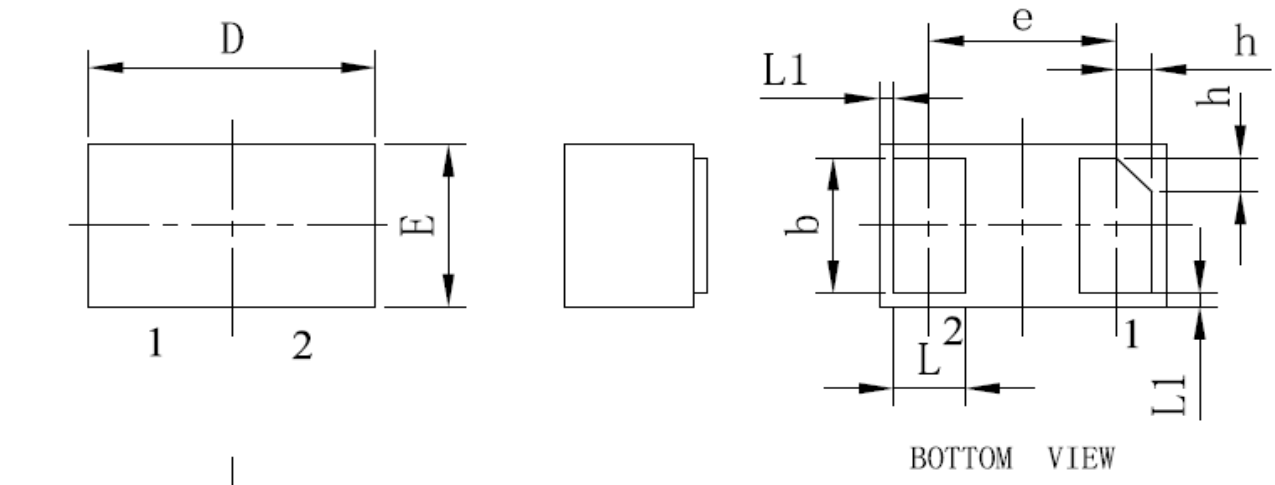
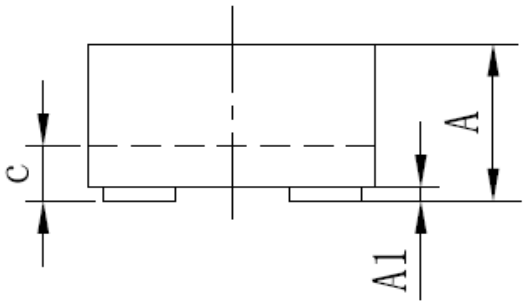



Fig. 9.1. High Spped I/O Layout Diagram

# DFN1006DN PACKAGE OUTLINE & DIMENSIONS




| SYMBOL | MILLIMETER | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 0.45 | 0. 50 | 0. 55 |
| A1 | 0 | 0.02 | 0. 05 |
| b | 0. 45 | 0.50 | 0. 55 |
| c | 0. 12 | 0.15 | 0. 18 |
| D | 0. 95 | 1. 00 | 1. 05 |
| e | 0. 65BSC | | |
| E | 0. 55 | 0. 60 | 0. 65 |
| L | 0. 20 | 0.25 | 0. 30 |
| L1 | 0.05REF | | |
| h | 0. 07 | 0.12 | 0. 17 |