

### Description

The FESDBM12VAI is a 12V bi-directional TVS diode, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive data and power line. The FESDBM12VAI complies with the IEC 61000-4-2 (ESD) standard with  $\pm 30\text{kV}$  air and  $\pm 30\text{kV}$  contact discharge. It is assembled into an ultrasmall 1.0 x 0.6 x 0.5mm lead-free DFN package. The small size and high ESD surge protection make FESDBM12VAI an ideal choice to protect cell phone, digital cameras, audio players and many other portable applications.

### Features

- ◆ Ultra small package: 1.0 x 0.6 x 0.5mm
- ◆ Protects one data or power line
- ◆ Ultra low leakage : nA level
- ◆ Operating voltage : 12V
- ◆ Low clamping voltage
- ◆ 2-pin leadless package
- ◆ Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test  
Air discharge:  $\pm 30\text{kV}$   
Contact discharge:  $\pm 30\text{kV}$
  - IEC61000-4-5 (Lightning) 6A (8/20 $\mu\text{s}$ )
- ◆ RoHS Compliant

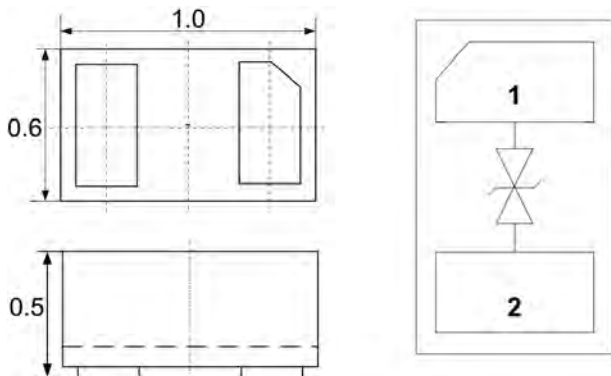
### Mechanical Characteristics

- ◆ Package: DFN1006-2 (1.0 x 0.6 x 0.5mm)
- ◆ Case Material: "Green" Molding Compound.
- ◆ Moisture Sensitivity: Level 3 per J-STD-020
- ◆ Terminal Connections: See Diagram Below
- ◆ Marking Information: See Below

### Applications

- ◆ Cellular Handsets and Accessories
- ◆ Personal Digital Assistants
- ◆ Notebooks and Handhelds
- ◆ Portable Instrumentation
- ◆ Digital Cameras
- ◆ Peripherals
- ◆ Audio Players

### Dimensions and Pin Configuration



Package Dimensions      Circuit and Pin Schematic

### Marking Information



22L = Device Marking Code

### Ordering Information

Part Number	Marking	Packaging	Reel Size
FESDBM12VAI	22L	10000/Tape & Reel	7 inch



## Absolute Maximum Ratings ( $T_A=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Peak Pulse Power(8/20 $\mu\text{s}$ )	Ppk	120	W
Peak Pulse Current(8/20 $\mu\text{s}$ )	I <sub>PP</sub>	6	A
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V <sub>ESD</sub>	$\pm 30$ $\pm 30$	kV
Operating Temperature Range	T <sub>J</sub>	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	T <sub>stg</sub>	-55 to +150	$^{\circ}\text{C}$

## Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise specified)

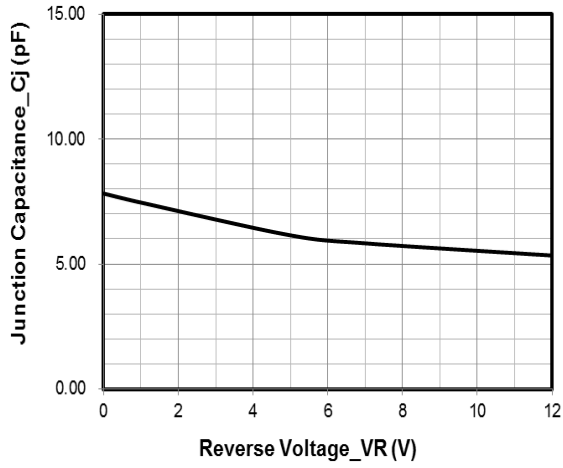
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse maximum working voltage	V <sub>RWM</sub>				12	V
Reverse leakage current	I <sub>R</sub>	V <sub>RWM</sub> = 12V			0.2	$\mu\text{A}$
Reverse breakdown voltage	V <sub>BR</sub>	I <sub>T</sub> = 1mA	13.3			V
Clamping voltage <sup>1)</sup>	V <sub>CL</sub>	I <sub>PP</sub> = 16A, t <sub>p</sub> = 100ns		19		V
Dynamic resistance <sup>1)</sup>	R <sub>DYN</sub>			0.25		$\Omega$
Clamping voltage <sup>2)</sup>	V <sub>CL</sub>	V <sub>ESD</sub> = 8kV		19		V
Clamping voltage <sup>3)</sup>	V <sub>CL</sub>	I <sub>PP</sub> = 1A, t <sub>p</sub> = 8/20 $\mu\text{s}$			16	V
		I <sub>PP</sub> = 6A, t <sub>p</sub> = 8/20 $\mu\text{s}$			20	V
Junction capacitance	C <sub>J</sub>	V <sub>R</sub> = 0V, f = 1MHz		7.5	10	pF

Notes:

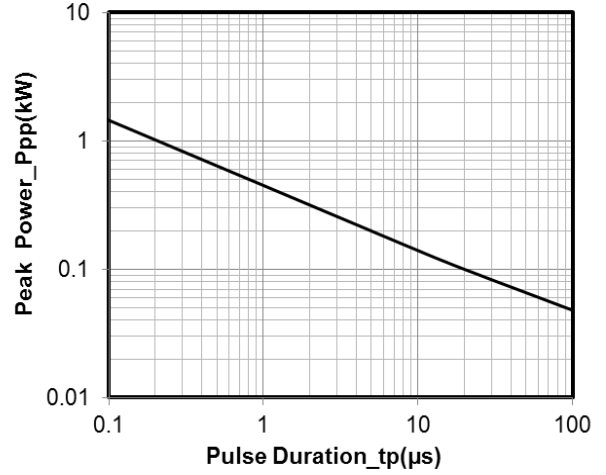
- 1) TLP parameter: Z<sub>0</sub> = 50 $\Omega$ , t<sub>p</sub> = 100ns, t<sub>r</sub> = 2ns, averaging window from 60ns to 80ns. R<sub>DYN</sub> is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.



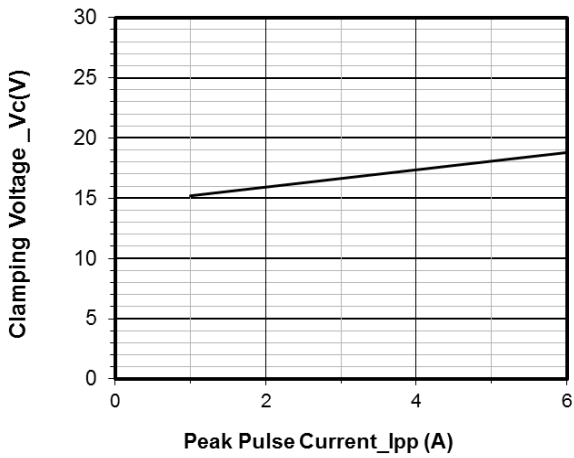
## Typical Performance Characteristics (TA=25°C unless otherwise Specified)



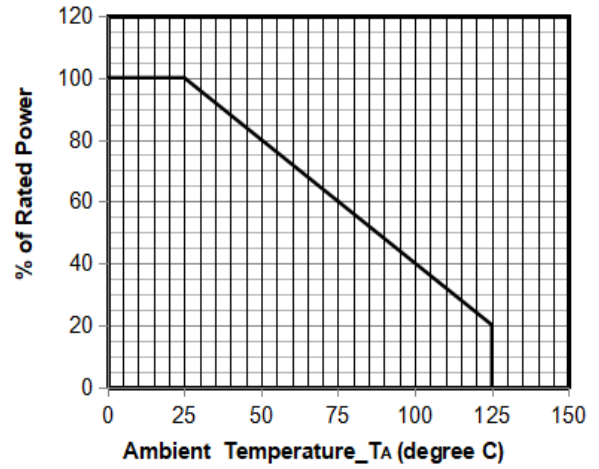
Junction Capacitance vs. Reverse Voltage



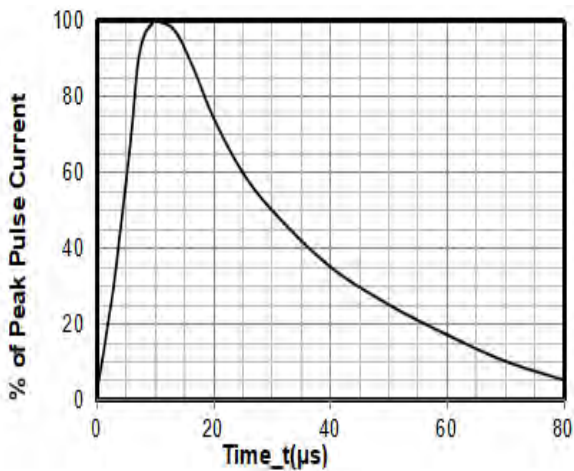
Peak Pulse Power vs. Pulse Time



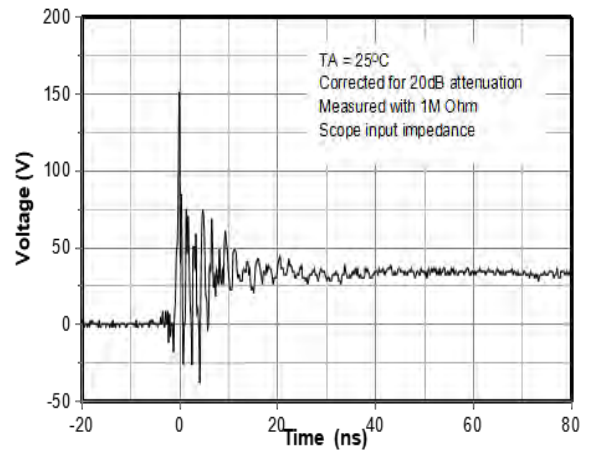
Clamping Voltage vs. Peak Pulse Current



Power Derating Curve



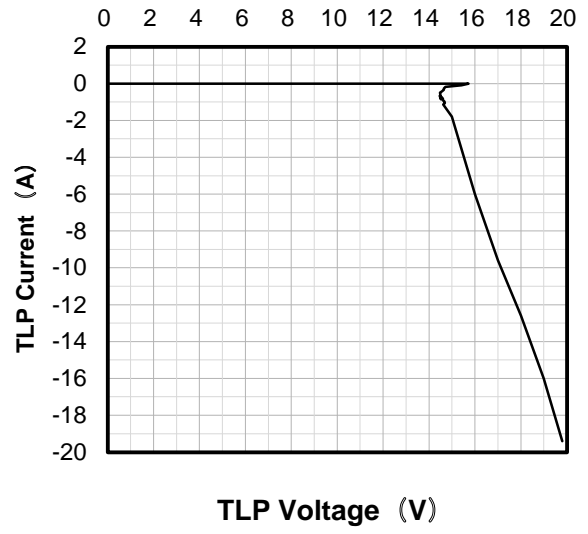
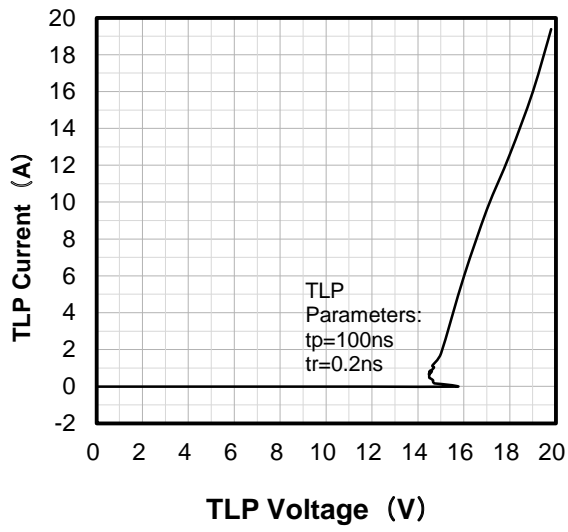
8 X 20μs Pulse Waveform



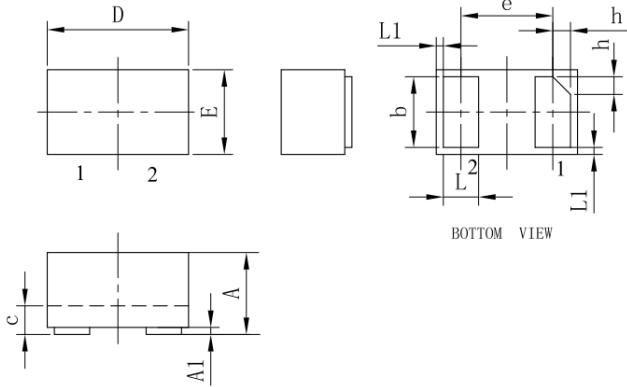
ESD Clamping Voltage  
8 kV Contact per IEC61000-4-2



# FESDBM12VAI

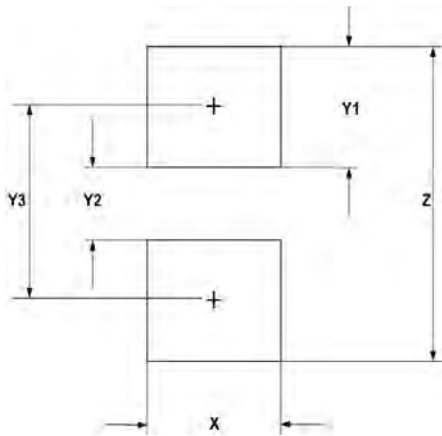


## DFN1006-2 Package Outline Drawing



SYM	DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.450	0.500	0.550	0.018	0.020	0.022
A1	0.000	0.020	0.050	0.000	0.001	0.002
b	0.450	0.50	0.550	0.018	0.020	0.022
c	0.120	0.150	0.180	0.005	0.006	0.007
D	0.950	1.000	1.050	0.037	0.039	0.041
e	0.65 BSC			0.026 BSC		
E	0.55	0.60	0.65	0.022	0.024	0.026
L	0.20	0.25	0.30	0.008	0.010	0.012
L1	0.05REF			0.002REF		
h	0.07	0.12	0.17	0.003	0.005	0.007

## Suggested Land Pattern



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
X	0.60	0.024
Y1	0.50	0.020
Y2	0.30	0.012
Y3	0.80	0.032
Z	1.30	0.052