

### 1-Line, Uni-directional, Transient Voltage Suppressors

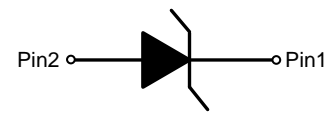
#### Descriptions

The ESD12H401TR-M is a uni-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components that may be subjected to ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning. It is particularly well-suited for cellular phones, portable device, digital cameras, power supplies and many other portable applications because of its small package

The ESD12H401TR-M may be used to provide ESD protection up to  $\pm 30\text{KV}$  Air,  $\pm 30\text{KV}$  contact compliance to IEC61000-4-2, and withstand peak pulse current up to 70 A (8/20 $\mu\text{s}$ ) according to IEC61000-4-5.



**DFN1610-2L**



**Circuit diagram**

#### Features

- Stand-off voltage:  $\pm 12\text{V}$  Max
- Transient protection for each line according to IEC61000-4-2 (ESD):  $\pm 30\text{KV}$  Air,  $\pm 30\text{KV}$  contact IEC61000-4-5 (Surge): 70A (8/20 $\mu\text{s}$ )
- Solid-state silicon technology
- Low leakage current

#### Applications

- Cell phone handsets and accessories
- Personal Digital Assistants (PDAs)
- Notebooks, Desktops, and Servers
- Portable Instrumentation
- Digital Cameras
- CAR/MID DVD/MP3/MP4/PMP Players

#### Order information

Device	Marking	Shipping
ESD12H401TR-M	12P	3000/Tape&Reel

**Absolute maximum ratings**

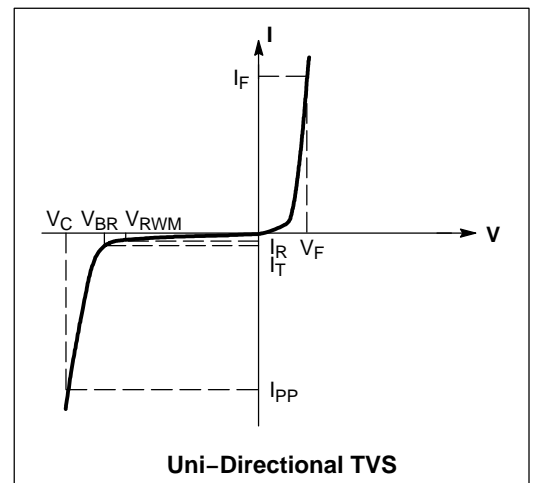
Parameter	Symbol	Rating	Unit
Peak pulse current ( $t_p = 8/20\mu s$ )	$I_{PP}$	70	A
ESD according to IEC61000-4-2 air discharge	$V_{ESD}$	$\pm 30$	kV
ESD according to IEC61000-4-2 contact discharge		$\pm 30$	
Operating temperature	$T_{OP}$	-40~85	$^{\circ}C$
Operation junction temperature	$T_J$	125	$^{\circ}C$
Lead temperature	$T_L$	260	$^{\circ}C$
Storage temperature	$T_{STG}$	-55~150	$^{\circ}C$

**Electrical characteristics (TA=25  $^{\circ}C$ , unless otherwise noted)**

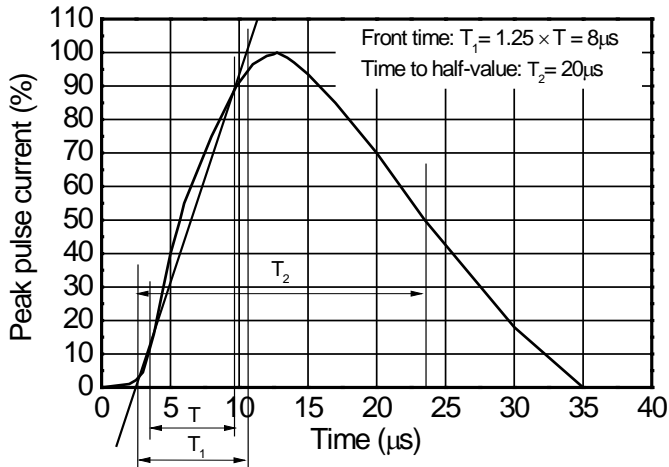
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	$V_{RWM}$			12.0	V	$I_R = 0.2\mu A$
Breakdown Voltage	$V_{BR}$	13.5	14.5		V	$I_T = 1mA$
Reverse Leakage Current	$I_R$			0.2	$\mu A$	$V_R = 12V$
Forward Voltage	$V_F$		0.7		V	$I_F = 10mA$
Clamping Voltage	$V_C$ (PIN 1 TO PIN 2)		22.0	26.0	V	$I_{PP} = 70A(8/20\mu s \text{ pulse})$
Clamping Voltage	$V_C$ (PIN 2 TO PIN 1)		10.0	12.0	V	$I_{PP} = 150A(8/20\mu s \text{ pulse})$

**Electrical performance curve**

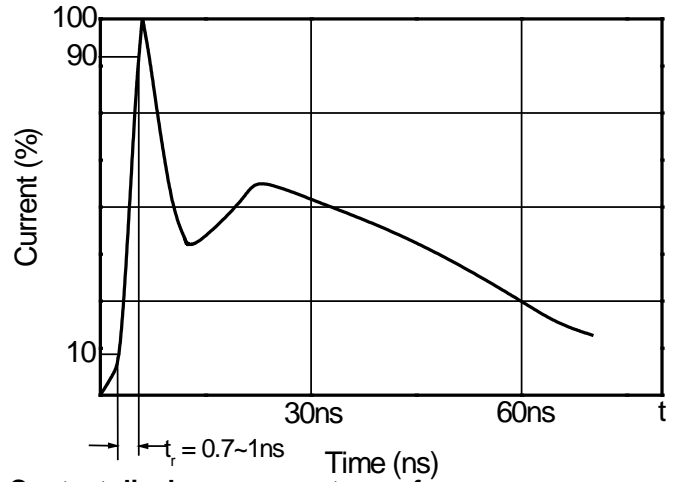
Symbol	Parameter
$V_{RWM}$	Peak Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current
$I_{PP}$	Maximum Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$P_{PP}$	Peak Pulse Power
$C_J$	Junction Capacitance
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$



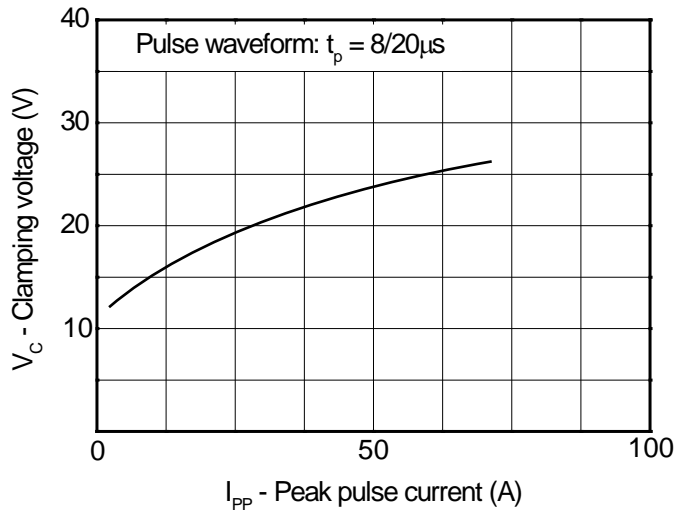
### Typical characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)



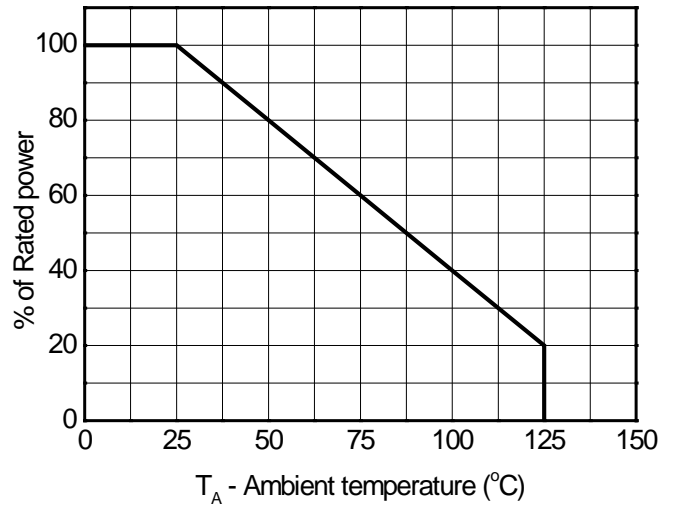
8/20 $\mu\text{s}$  waveform per IEC61000-4-5



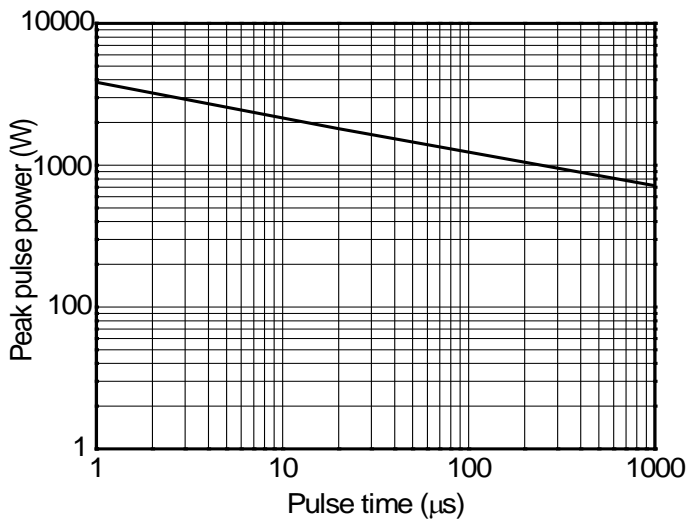
Contact discharge current waveform per IEC61000-4-2



Clamping voltage vs. Peak pulse current

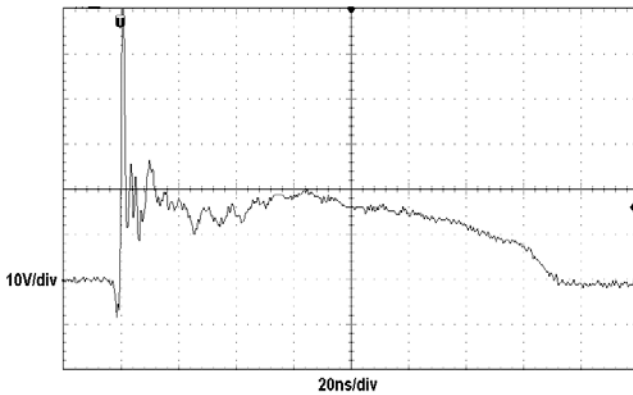
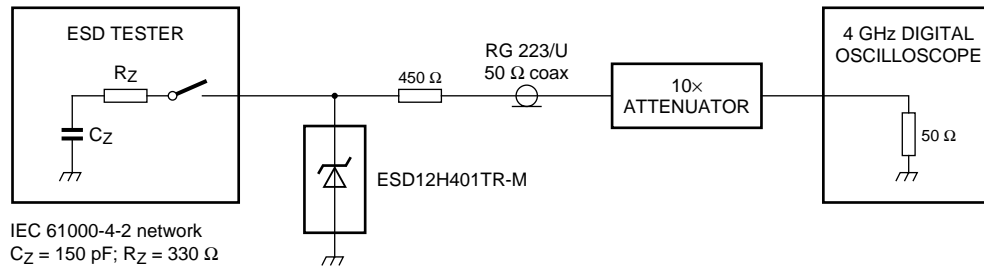


Power derating vs. Ambient temperature

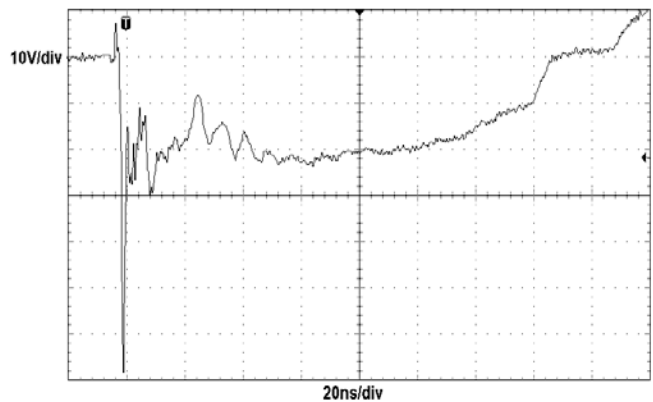


Non-repetitive peak pulse power vs. Pulse time

### ESD clamping test setup and waveforms

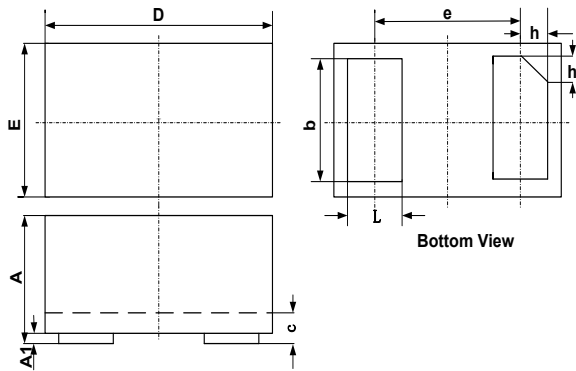


**ESD clamping**  
 (+8kV contact discharge per IEC61000-4-2)



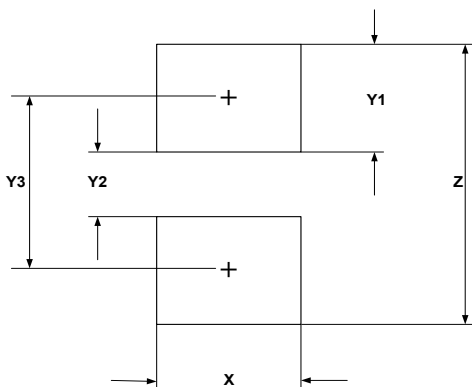
**ESD clamping**  
 (-8kV contact discharge per IEC61000-4-2)

### DFN1610-2L Package Outline Drawing Unit:mm



SYM	DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
b	0.75	0.80	0.85	0.030	0.032	0.034
c	0.10	0.15	0.20	0.004	0.006	0.008
D	1.55	1.60	1.65	0.062	0.064	0.066
e	1.10 BSC			0.044 BSC		
E	0.95	1.00	1.05	0.038	0.040	0.042
L	0.35	0.40	0.45	0.014	0.016	0.018
h	0.15	0.20	0.25	0.006	0.008	0.010

### Suggested Land Pattern Unit:mm



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
X	1.00	0.040
Y1	0.62	0.025
Y2	0.60	0.024
Y3	1.22	0.049
Z	1.85	0.074