1-Line, Bi-directional, Ultra-low Capacitance Transient Voltage Suppressor

Features

- Stand-off voltage: 5V Max.
- Transient protection for each line according to
  IEC61000-4-2(ESD): ±30kV (contact)
  IEC61000-4-5(surge): 12A (8/20μs)
- Ultra-low capacitance: C_J = 0.2pF typ.
- Ultra-low leakage current: I_R < 1nA typ.
- Low clamping voltage: V_{CL} = 12.0V typ. @ I_{PP} = 16A (TLP)
- Solid-state silicon technology

Applications

- USB 2.0 and USB 3.0
- HDMI 1.3, HDMI 1.4 and HDMI 2.0
- SATA and eSATA interface
- DVI
- IEEE 1394
- Portable Electronics and Notebooks
- Ethernet port: 10/100/1000 Mb/s
- Desktop and Notebooks PCs

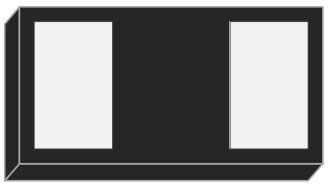
Descriptions

AE0511UAL1 is an ultra-low capacitance TVS (Transient Voltage Suppressor) designed to protect high speed data interfaces. It has been specifically designed to protect sensitive electronic components which are connected to data and transmission lines from over-stress caused by ESD (Electrostatic Discharge).

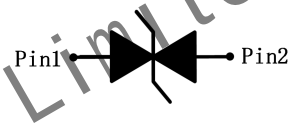
AE0511UAL1incorporates one pair of ultra-low capacitance steering diodes plus a TVS diode.

AE0511UAL1may be used to provide ESD protection up to ±30KV (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 12A (8/20μs) according to IEC61000-4-5.

AE0511UAL1 is available in DFN0603-2L package. Standard products are Pb-free and Halogen-free.



DFN0603-2L



Circuit diagram

BY5= Device code

Marking (Top View)

Order information

Device	Package	Shipping
AE0511UAL1	DFN0603-2L	10000/Tape&Reel

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power (t_p = 8/20μs)	P_{pk}	168	W
Peak pulse current (t_p = 8/20μs)	I_{PP}	12	A
ESD according to IEC61000-4-2 air discharge	V_{ESD}	±30	kV
ESD according to IEC61000-4-2 contact discharge		±30	
Junction temperature	T_J	125	°C
Operating temperature	T_{OP}	-40~85	°C
Lead temperature	T_L	260	°C
Storage temperature	T_{STG}	-55~150	°C

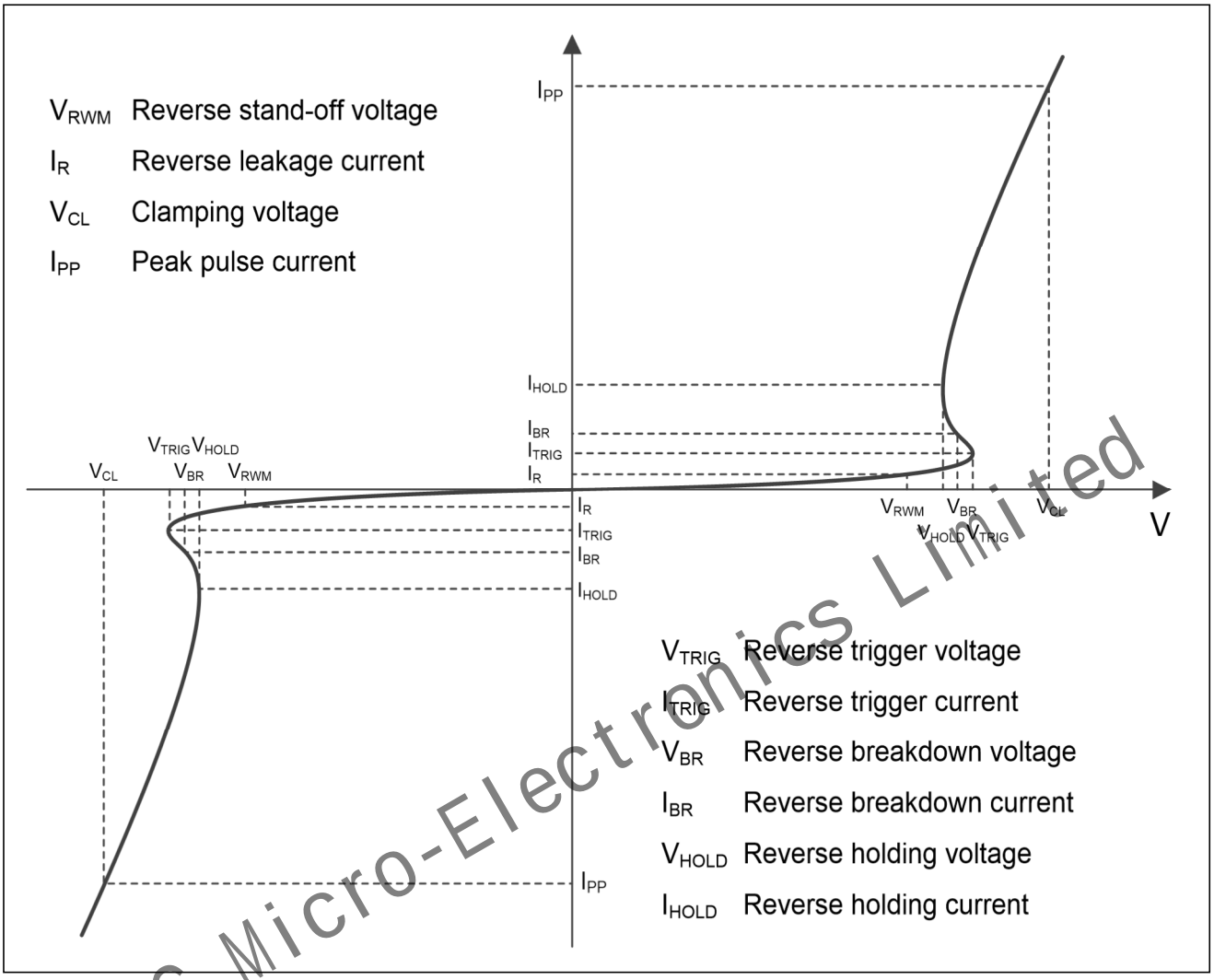
Electrical characteristics (T_A = 25 °C, unless otherwise noted)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse maximum working voltage	V_{RWM}				5.0	V
Reverse leakage current	I_R	V_{RWM} = 5V		<1	100	nA
Reverse breakdown voltage	V_{BR}	I_T = 1mA	5.5			V
Forward voltage	V_F	I_F = 10mA		0.7		V
Clamping voltage[1]	V_{CL}	I_{PP} = 16A, t_p = 100ns		12		V
Clamping voltage[2]	V_{CL}	V_{ESD} = +8kV		13		V
Dynamic resistance[1]	R_{DYN}			0.4		Ω
Clamping voltage[3]	V_{CL}	I_{PP}=1A, t_p= 8/20μs		6.2	7.5	V
		I_{PP}= 12A,t_p= 8/20μs		12.2	14	V
Junction capacitance	C_J	V_R = 0V, f = 1MHz Any I/O pin to GND		0.2	0.45	pF

Notes:

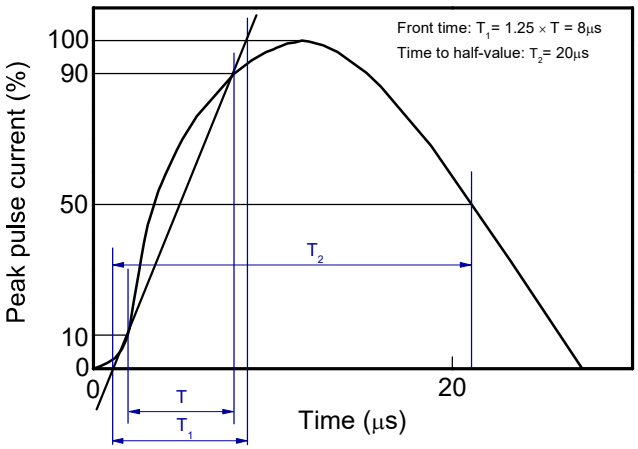
1) *TLP parameter: Z_0 = 50Ω, t_p = 100ns, t_r = 2ns, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.*
2) *Contact discharge mode, according to IEC61000-4-2.*
3) *Non-repetitive current pulse, according to IEC61000-4-5.*

Electrical characteristics (T_A=25 °C, unless otherwise noted)

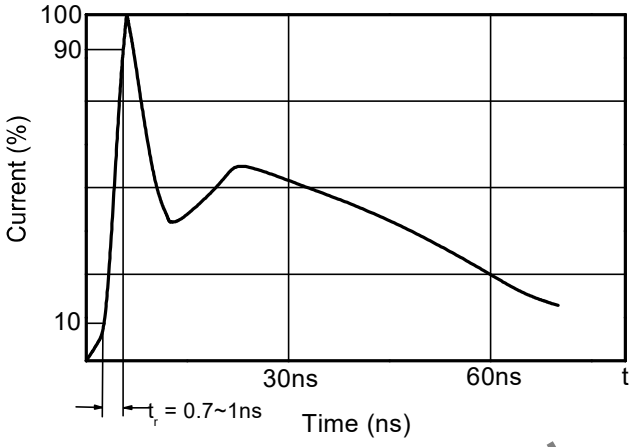


Definitions of electrical characteristics

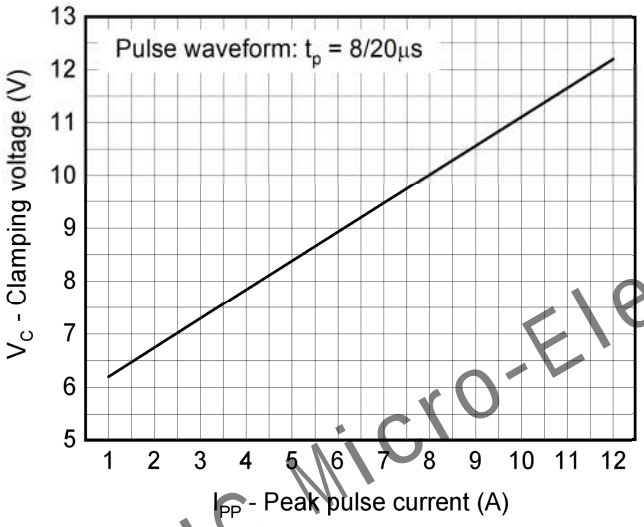
Typical characteristics (TA = 25 oC, unless otherwise noted)



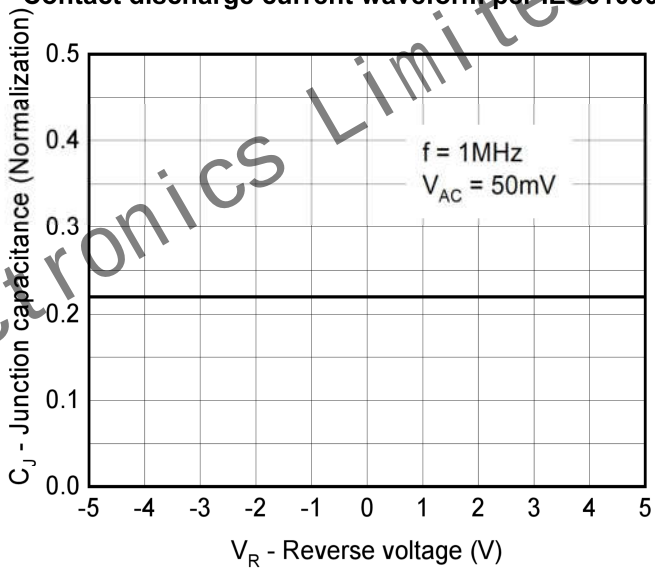
8/20μs waveform per IEC61000-4-5



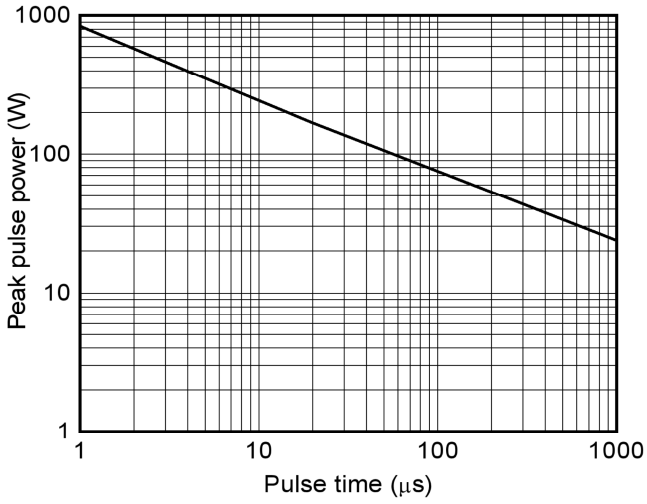
Contact discharge current waveform per IEC61000-4-2



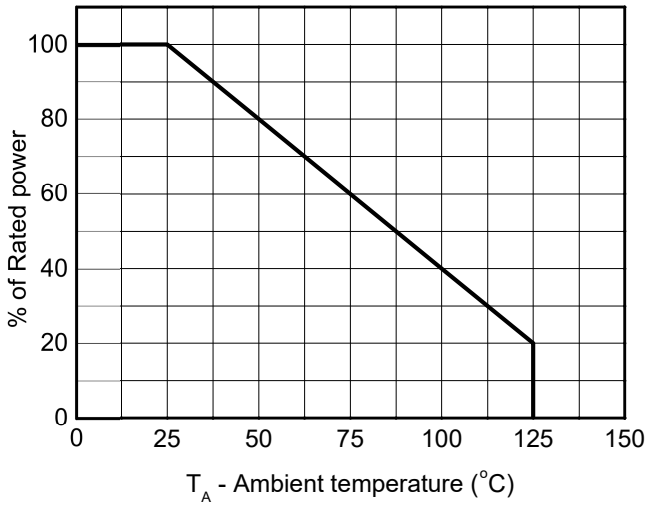
Clamping voltage vs. Peak pulse current



Capacitance vs. Reverse voltage



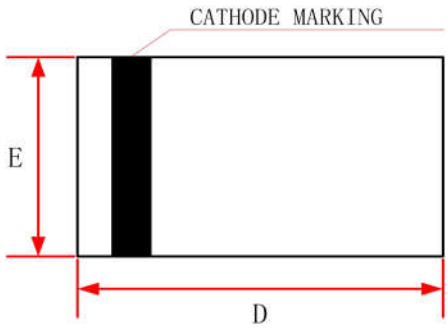
Non-repetitive peak pulse power vs. Pulse time



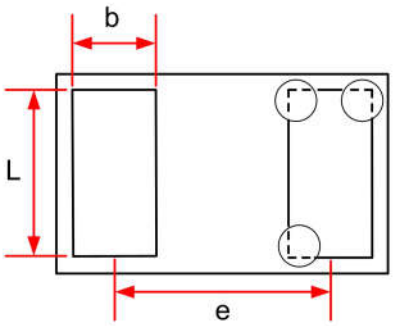
Power derating vs. Ambient temperature

PACKAGE OUTLINE DIMENSIONS

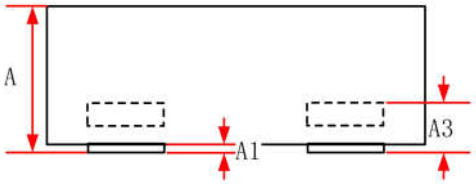
DFN0603-2L



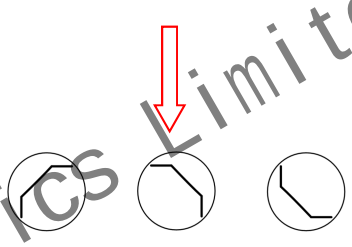
Top View



Bottom View

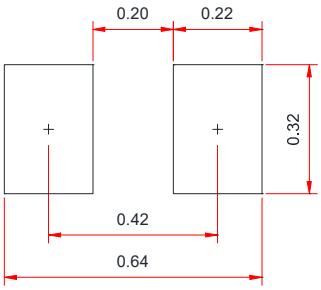


Side View



Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.230	0.300	0.350
A1	0.000	-	0.050
A3	0.102REF.		
D	0.550	0.600	0.670
E	0.250	0.300	0.370
b	0.100	0.170	0.250
L	0.180	0.240	0.280
e	0.360 BSC		

Recommended PCB Layout (Unit: mm)



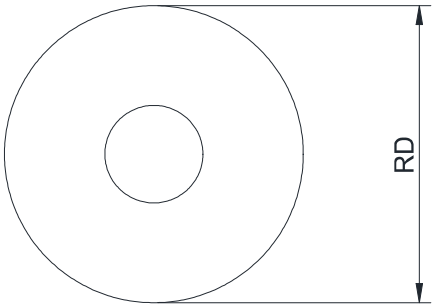
Notes:

This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met.

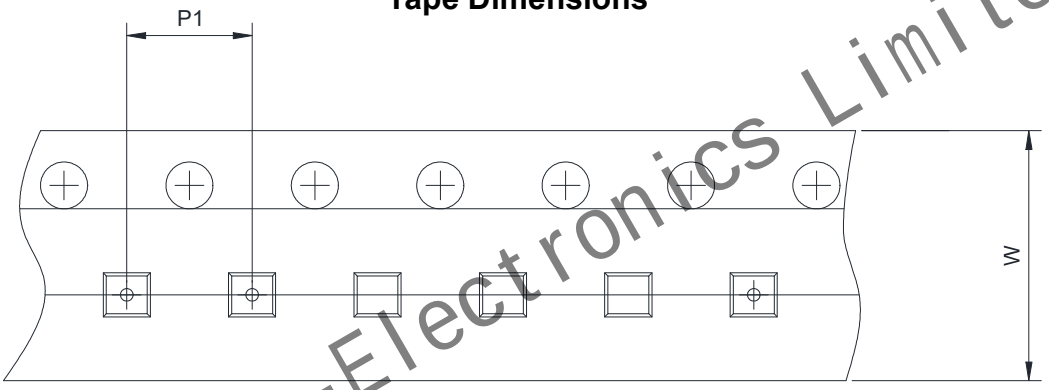
TAPE AND REEL INFORMATION

Reel Dimensions

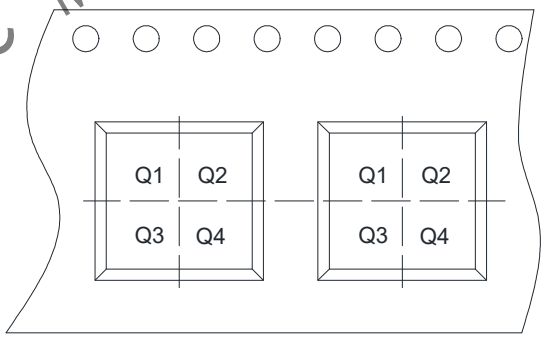
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



User Direction of Feed

RD	Reel Dimension	☑7inch	☐13inch		
W	Overall width of the carrier tape	☑8mm	☐12mm		
P1	Pitch between successive cavity centers	☑2mm	☐4mm	☐8mm	
Pin1	Pin1 Quadrant	☑Q1	☑Q2	☐Q3	☐Q4