



# ACE00581A

## Ultra Low Capacitance 4 -Line ESD Protection Array

### Description

The ACE00581A is 4-channel very low capacitance ESD transient voltage suppressor which provides a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge. It is particularly well-suited to protect systems with high speed communication lines from ESD, EFT, and lightning.

The ACE00581A consists of eight low capacitance steering diodes and a TVS diode in a SLP package. Each channel of ACE00581A could safely dissipate ESD strikes of  $\pm 15\text{KV}$  air discharge as well as  $\pm 8\text{KV}$  contact discharge, meeting the requirement of the IEC 61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the device provides protection for contact discharges to greater than  $\pm 8\text{KV}$ .

### Features

- Transient protection for data lines to  
IEC 61000-4-2 (ESD)  
 $\pm 15\text{kV}$  (air)  
 $\pm 8\text{kV}$  (contact)  
IEC 61000-4-4 (EFT) 40A (5/50ns)
- Protects five bidirectional I/O lines
- Working voltage: 5V
- Low leakage current
- Low operating and clamping voltages
- Low capacitance: 0.3 pF typical

### Applications

- Cellular Handsets and Accessories
- Cordless Phone
- PDA
- Notebooks and Handhelds
- Portable Instrumentation
- Digital Cameras
- MP3 Player High Definition Multi-Media Interface Protection
- HDMI/USB Power and Data Line
- Monitors and Notebook Computers
- HDSL, IDSL Secondary IC Side Protection
- 10/100/1000 Ethernet



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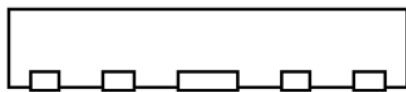
## Ultra Low Capacitance 4 -Line ESD Protection Array

### Absolute Maximum Ratings

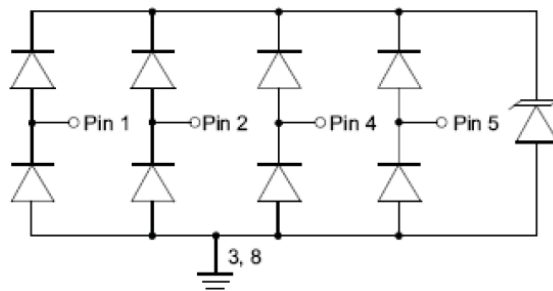
Parameter	Symbol	Max	Unit
Peak Pulse Power ( $t_p = 8/20 \mu s$ )	Ppk	60	W
Maximum Peak Pulse Current ( $t_p = 8/20 \mu s$ )	Ipp	4	A
ESD per IEC 61000 – 4 – 2 (Air )	Vpp	$\pm 15$	KV
ESD per IEC 61000 – 4 – 2 (Contact )	Vpp	$\pm 8$	KV
Operating Junction Temperature	T <sub>J</sub>	-55 ~ 125	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ 150	°C
Lead Soldering Temperature	T <sub>L</sub>	260 ( 10sec )	°C

### Packaging Type

DFN-10



( Length = 2.5mm )



### Ordering information

ACE00581A XX + H

- └─ Halogen - free
- └─ Pb - free
- └─ TN: DFN-10



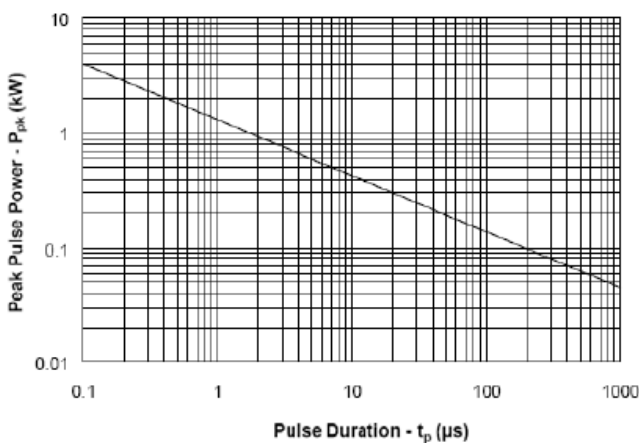
### Electrical Characteristics

$T_A=25^\circ\text{C}$ , unless otherwise specified.

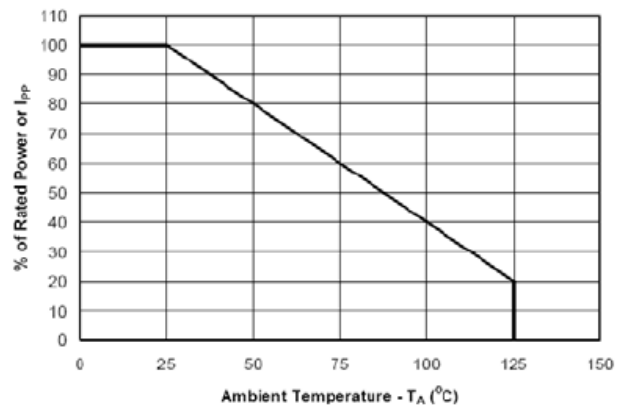
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Reverse Stand – Off Voltage	$V_{RWM}$				5	V
Forward Voltage @ $I_F$	$V_F$	$I_F= 10\text{mA}$	0.45	0.86	1.2	V
Reverse Breakdown Voltage	$V_{BR}$	$I_t = 1\text{mA}$	6.0	7.5		V
Reverse Leakage Current	$I_R$	$V_{RWM} = 5\text{V}$ , $T=25^\circ\text{C}$		0.02	1	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{pp} = 1\text{A}$ , $t_p = 8/20 \mu\text{s}$			12	V
Junction Capacitance	$C_j$	$V_R= 0\text{V}$ , $f = 1\text{MHz}$ Any I/O pin to Ground		0.5	0.7	pF
		$V_R= 0\text{V}$ , $f = 1\text{MHz}$ Between I/O pins		0.3		

### Typical Performance Characteristics

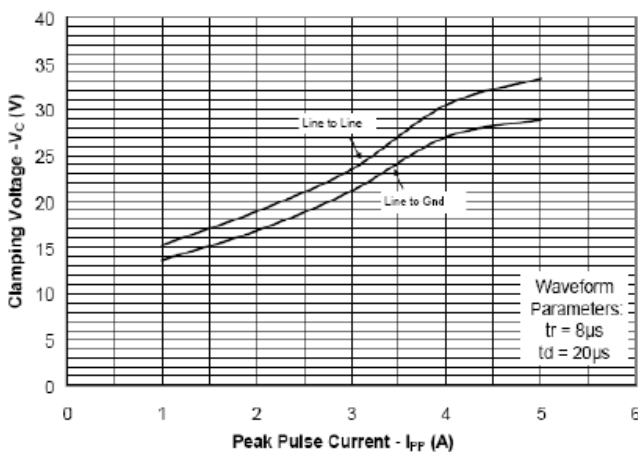
Non-Repetitive Peak Pulse Power vs. Pulse Time



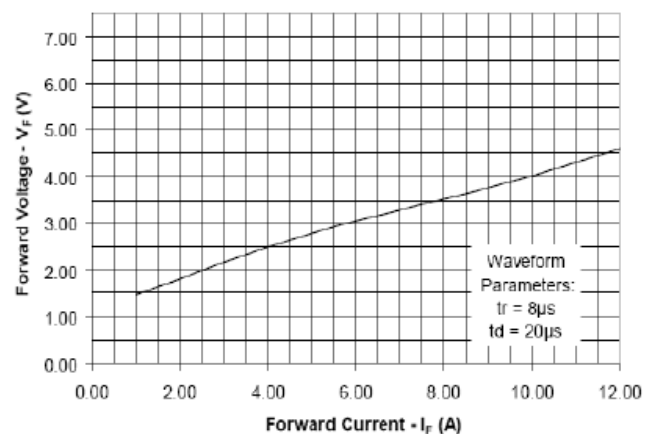
Power Derating Curve



Clamping Voltage vs. Peak Pulse Current



Forward Voltage vs. Forward Current



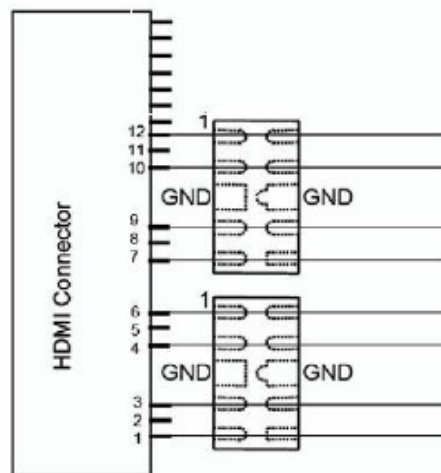


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#### Schematic & Pin Configuration

As Figure Shown is an example of how to route the high speed differential traces through the ACE00581A. The solid line represents the PCB trace. The PCB traces are used to connect the pin pairs for each line (pin 1 to pin 10, pin 2 to pin 9, pin 4 to pin 7, pin 5 to pin 6). For example, line 1 enters at pin 1 and exits at Pin 10 and the PCB trace connects pin 1 and 10 together. This is true for lines connected at pins 2, 4, and 5 also. Ground is connected at pins 3 and 8. One large ground pad should be used in lieu of two separate pads.



#### Application Information (Design Recommendations for HDMI Protection)

Adding external ESD protection to HDMI ports can be challenging. First, ESD protection devices have an inherent junction capacitance. However, adding even a small amount of capacitance will cause the impedance of the differential pair to drop. Second, large packages and land pattern requirements cause discontinuities that adversely affect signal integrity. The ACE00581A is specifically designed for protection of high-speed interfaces such as HDMI. They present  $<0.35\text{pF}$  capacitance between the pairs while being rated to handle  $\pm 8\text{KV}$  ESD contact discharges ( $15\text{KV}$  air discharge) as outlined in IEC61000-4-2. Each device is in a leadless DFN package that is less than 1.1mm wide. They are designed such that the traces flow straight through the device. The narrow package and flow-through design reduces discontinuities and minimizes impact on signal integrity. This becomes even more critical as signal speed increased.

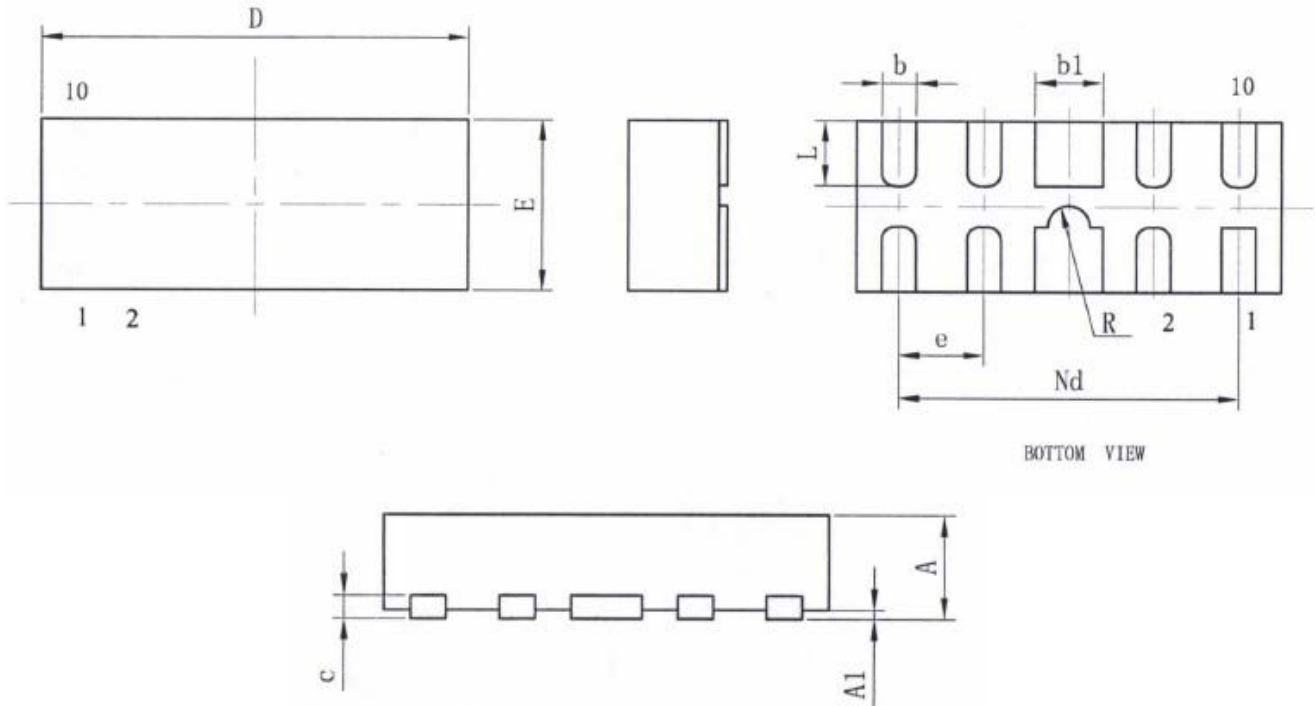


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### Packing Information

#### DFN-10



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.45	0.50	0.55
A1	—	0.02	0.05
b	0.15	0.20	0.25
b1	0.35	0.40	0.45
c	0.10	0.15	0.20
D	2.40	2.50	2.60
e	0.50BSC		
Nd	2.00BSC		
E	0.90	1.00	1.10
L	0.30	0.38	0.425
R	0.12	0.125	0.13
L/F载体尺寸 (mil)	22X30		



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### Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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