



ACE010504EL

Low Capacitance Array for Surge & ESD Protection

Description

The ACE010504EL has a low typical capacitance of 1.9pF and operates with virtually no insertion loss to 3.0GHz. This makes the device ideal for protection of high-speed data lines such as USB 2.0, Firewire, DVI, and gigabit Ethernet interfaces. The low capacitance array configuration allows the user to protect four high-speed data or transmission lines. The low inductance construction minimizes voltage overshoot during high current surges. It is used to meet the ESD immunity requirements of IEC61000-4-2, Level 4 ($\pm 15\text{kV}$ air, $\pm 8\text{kV}$ contact discharge).

It has been specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from overvoltage caused by ESD (electrostatic discharge), CDE (Cable Discharge Events), and lightning.

Features

- Protects four I/O lines and one Vcc line
- Low capacitance
- Working voltages : 5V
- Low leakage current
- Response Time is < 1 ns
- Low capacitance ($< 3.5\text{pF}$) for high-speed interfaces
- No insertion loss to 3.0GHz
- Meets MSL 1 Requirements
- Solid-state silicon avalanche technology
- ROHS compliant
- WeiPan technology

Applications

- Digital Visual Interface (DVI)
- 10/100/1000 Ethernet
- USB 1.1/2.0/OTG
- IEEE 1394 Firewire Ports
- Projection TV Monitors and Flat Panel Displays
- Notebook Computers
- Set Top Box
- Projection TV



ACE010504EL

Low Capacitance Array for Surge & ESD Protection

Protection solution to meet

- IEC61000-4-2 (ESD) $\pm 30\text{kV}$ (air), $\pm 30\text{kV}$ (contact)
- IEC61000-4-4 (EFT) 40A (5/50ns)
- IEC61000-4-5 (Lightning) 35A (8/20 μs)

Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
VCC pin to Pin 2; Peak Pulse Power (tp=8/20 μs waveform)	P_{PPP}	500	W
I/O pin to Pin 2; Peak Pulse Current(tp=8/20 μs waveform)	I_{PP}	20	A
VCC pin to Pin 2; Peak Pulse Current(tp=8/20 μs waveform)	I_{PP}	35	A
ESD Rating per IEC61000-4-2:	Contact	30	KV
	Air	30	
Lead Soldering Temperature	T_L	260 (10sec)	$^{\circ}\text{C}$
Operating Temperature Range	T_J	-55 ~ 150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55 ~ 150	$^{\circ}\text{C}$

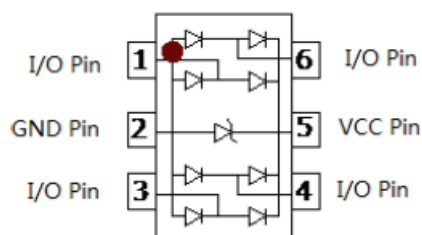
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

*Other voltages may be available upon request.

1. Non-repetitive current pulse, per Figure 1.

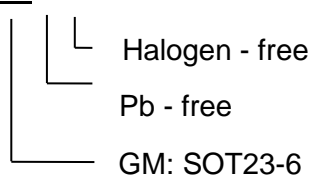
Packaging Type

SOT23-6



Ordering information

ACE010504EL XX + H





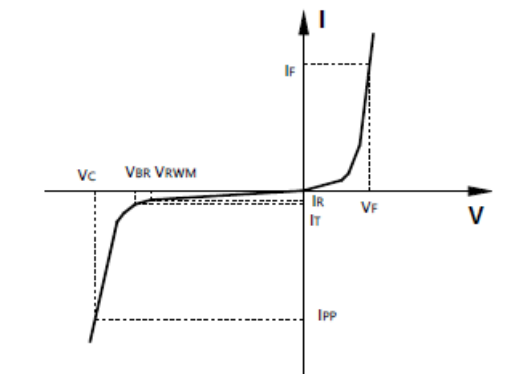
Electrical Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Reverse Working Voltage	V_{RWM}	Any I/O to Ground			5.0	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1\text{mA}$, Any I/O to Ground	6.0			V
Reverse Leakage Current	I_R	$V_{RWM} = 5\text{V}$, Any I/O to Ground			1	μA
Diode Forward Voltage	V_F	$I_F = 15\text{mA}$		0.85	1.2	V
Clamping Voltage	V_C	$I_{PP} = 1\text{A}$, $t_p = 8/20\mu\text{s}$, any I/O pin to Ground			12.7	V
		$I_{PP} = 20\text{A}$, $t_p = 8/20\mu\text{s}$, any I/O pin to Ground		12	17	V
		$I_{PP} = 35\text{A}$, $t_p = 8/20\mu\text{s}$, VCC pin to Ground		12	17	V
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu\text{s}$			20	A
Junction Capacitance	C_J	$V_R = 0\text{V}$, $f = 1\text{MHz}$, between I/O pins		1.1	2.5	pF
		$V_R = 0\text{V}$, $f = 1\text{MHz}$, any I/O pin to Ground		2.1	4.5	pF

Junction capacitance is measured in $V_R=0\text{V}, F=1\text{MHz}$

Symbol	Parameter
V_{RWM}	Working Peak Reverse Voltage
V_{BR}	Breakdown Voltage @ I_T
V_C	Clamping Voltage @ I_{PP}
I_T	Test Current
I_{RM}	Leakage current at V_{RWM}
I_{PP}	Peak pulse current
C_O	Off-state Capacitance
C_J	Junction Capacitance

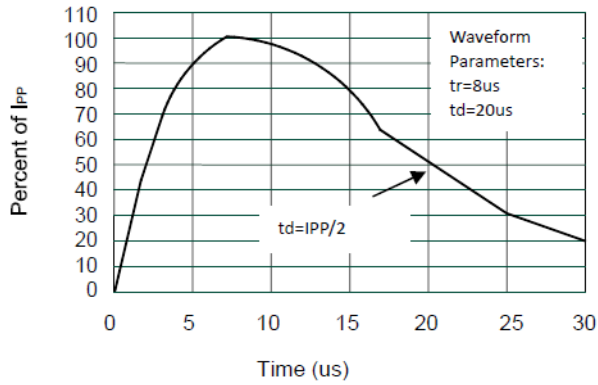




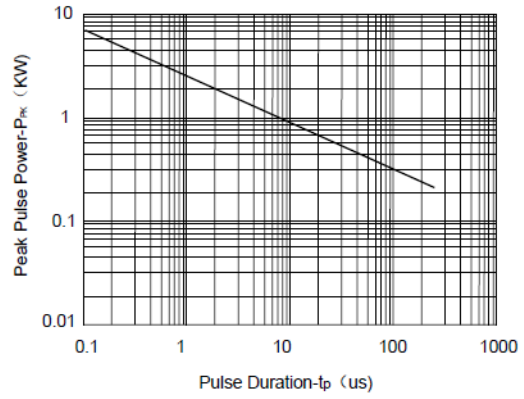
ACE010504EL

Low Capacitance Array for Surge & ESD Protection

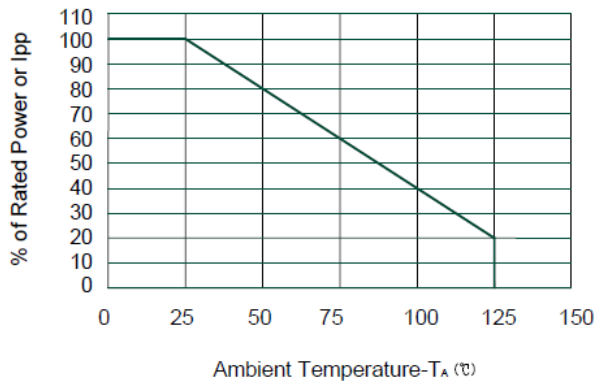
Typical Electrical Characteristics Applications



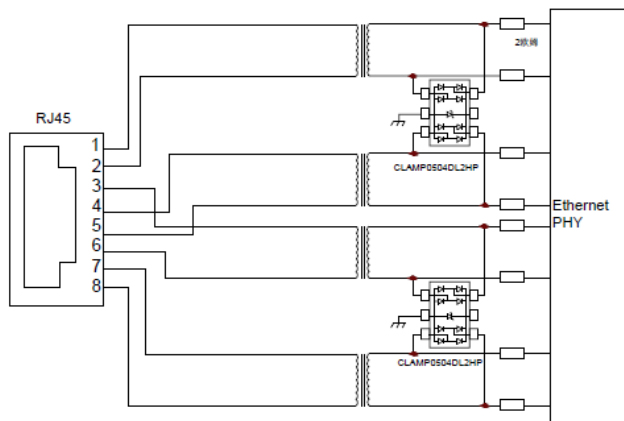
Pulse Waveform



Non-Repetitive Peak Pulse Power vs. Pulse Time



Power Derating Curve



Surge & ESD protection for Ethernet

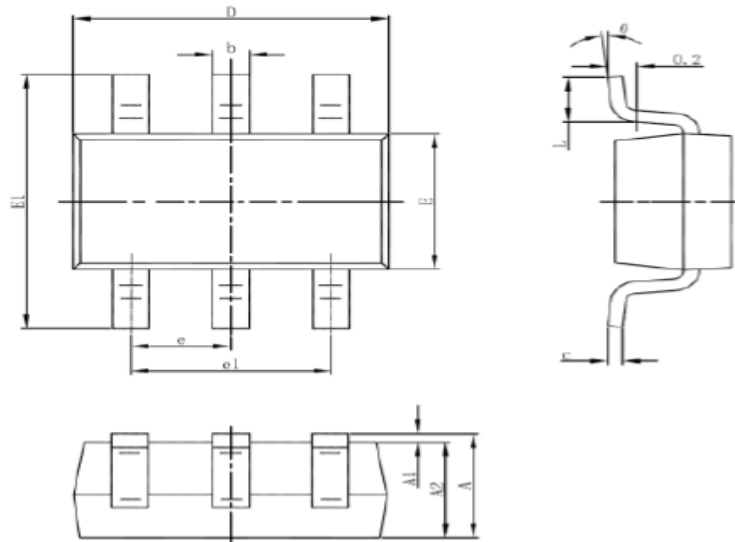


ACE010504EL

Low Capacitance Array for Surge & ESD Protection

Packing Information

SOT23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



ACE010504EL

Low Capacitance Array for Surge & ESD Protection

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 Technology 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.