05018

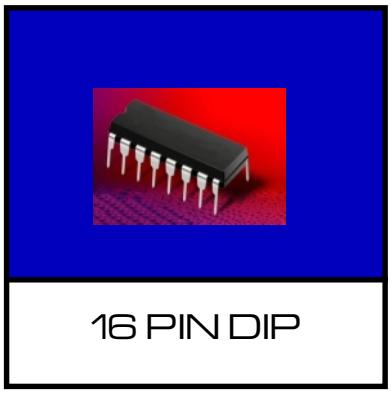
PROTEK DEVICES
. . . engineered solutions for the transient environment™

LCD05C thru LCD24C

HIGH SPEED TVS DIODE ARRAY

APPLICATIONS

✔ Ethernet - 10/100 Base T
✔ RS-485
✔ xDSL & ATM
✔ SCSI & USB
✔ Audio/Video I/O Ports



16 PIN DIP

IEC COMPATIBILITY (EN61000-4)

✔ 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
✔ 61000-4-4 (EFT): 40A - 5/50ns
✔ 61000-4-5 (Surge): 24A, 8/20µs Level 2 (Line to Ground) & Level 3 (Line to Line)

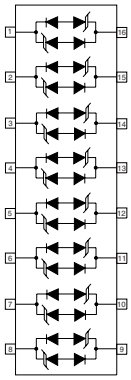
FEATURES

✔ 800 Watts Peak Pulse Power per Line (t_p=8/20µs)
✔ Bidirectional Configuration
✔ ESD Protection > 40 kilovolts
✔ Available in Five Voltage Types: 5.0V to 24V
✔ Standard Dual-In-Line Package
✔ ***PROTECTS UP TO EIGHT (8) LINES***
✔ ***LOW CAPACITANCE: 15pF***

MECHANICAL CHARACTERISTICS

✔ Molded 16 Pin Dual-in-Line Package
✔ Weight 1.2grams (Approximate)
✔ Flammability Rating UL 94V-0
✔ Packaged in Tubes 25 per
✔ Marking: Logo, Part Number, Date Code & Pin 1 Indicated by DOT on Top of Package

CIRCUIT DIAGRAM



DEVICE CHARACTERISTICS

MAXIMUM RATINGS @ 25°C Unless Otherwise Specified			
PARAMETER	SYMBOL	VALUE	UNITS
Peak Pulse Power (t_p = 8/20µs) - See Figure 1	P_{PP}	800	Watts
Operating Temperature	T_J	-55°C to 150°C	°C
Storage Temperature	T_{STG}	-55°C to 150°C	°C
T Clamping (0 Volts To $V_{(BR)}$ MIN.)	T_C	< 10 x 10^{-9}	Sec

ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

PART NUMBER (Notes 1)	RATED STAND-OFF VOLTAGE V_{WM} VOLTS	MINIMUM BREAKDOWN VOLTAGE @ 1mA $V_{(BR)}$ VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2) @ I_P = 1 A V_C VOLTS	MAXIMUM CLAMPING VOLTAGE (See Fig. 2) @ 8/20µs V_C @ I_{PP}	MAXIMUM LEAKAGE CURRENT @V_{WM} I_D µA	MAXIMUM CAPACITANCE @ 0V, 1 MHz C pF	TEMPERATURE COEFFICIENT OF $V_{(BR)}$ $\theta V_{(BR)}$ mV/°C
LCD05C	5.0	6.0	9.8	24V @ 45A	100	15	3
LCD08C	8.0	8.5	12.3	25.5V @ 40A	10	15	9
LCD12C	12.0	13.3	19.0	32V @ 34A	4	15	16
LCD15C	15.0	16.7	25.5	38V @ 27A	4	15	17
LCD24C	24.0	26.7	40.0	48V @ 22A	4	15	26

Note 1: Tested on pin pairs 1 & 16, 2 & 15, 3 &14, 4 & 13, 5 & 12, 6 & 11, 7 & 10 and 8 & 9.

FIGURE 1
PEAK PULSE POWER VS PULSE TIME

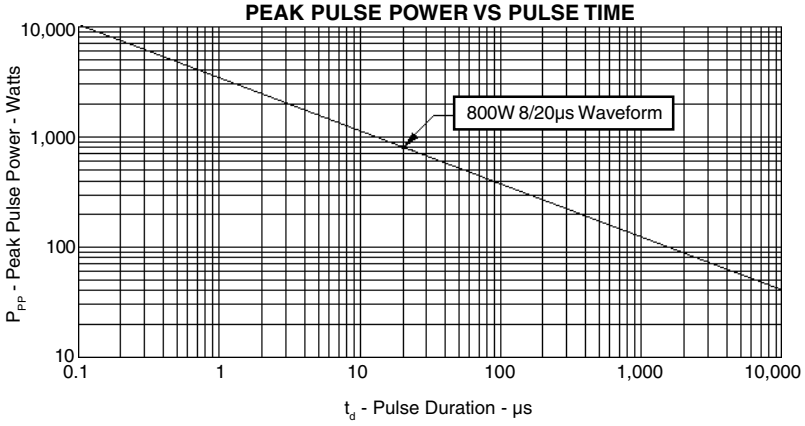
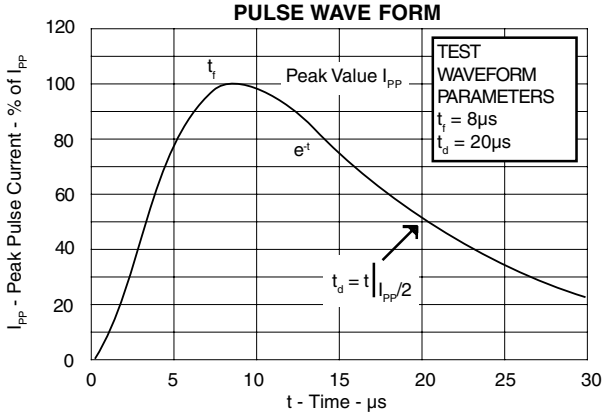


FIGURE 2
PULSE WAVE FORM



GRAPHS

FIGURE 3
POWER DERATING CURVE

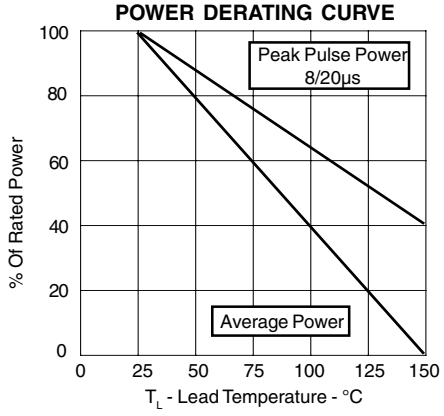
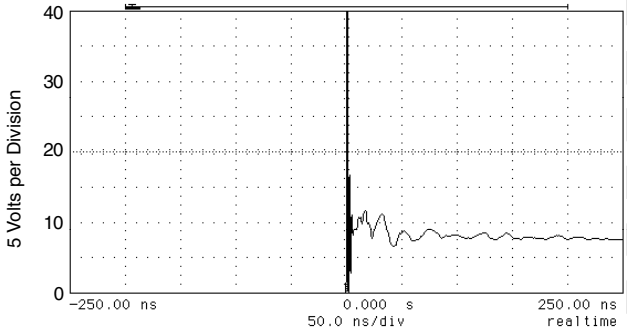
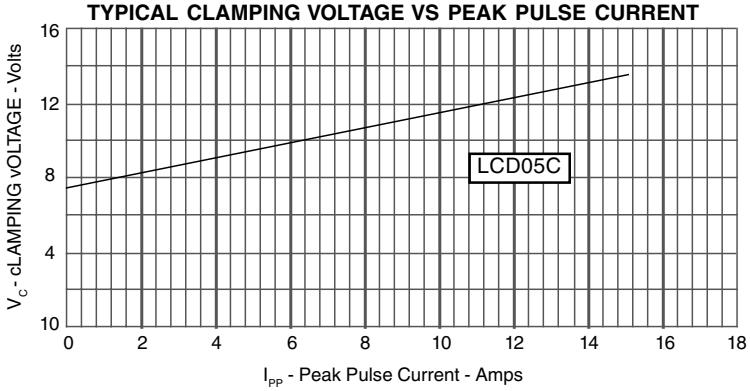


FIGURE 4
OVERSHOOT & CLAMPING VOLTAGE FOR SM16LC05



ESD Test Pulse: 25 kilovolt, 1/30ns (waveform)

FIGURE 5
TYPICAL CLAMPING VOLTAGE VS PEAK PULSE CURRENT



DEVICE SPECIFIC APPLICATION NOTE

The LCD Series are low capacitance, bidirectional TVS arrays that are designed to protect I/O or high speed data lines from the damaging effects of ESD or EFT. This product series has a surge capability of 800 Watts P_{PP} per line for an 8/20µs waveshape and offers ESD protection > 40kV.

BIDIRECTIONAL COMMON MODE CONFIGURATION (Figure 1)
Ideal for use in USB applications, the LCD Series provides up to eight (8) lines of protection in a common mode configuration as depicted in Figure 1.

Circuit connectivity is as follows:
- ✔ Pins 1, 2, 3, 4, 5, 6, 7, and 8 are connected to ground.
- ✔ Pins 16 and 15 connected to Port #1 D- and D+.
- ✔ Pins 14 and 13 connected to Port #2 D+ and D-.
- ✔ Pins 12 and 11 connected to Port #3 D- and D+.
- ✔ Pins 10 and 9 connected to Port #4 D+ and D-.

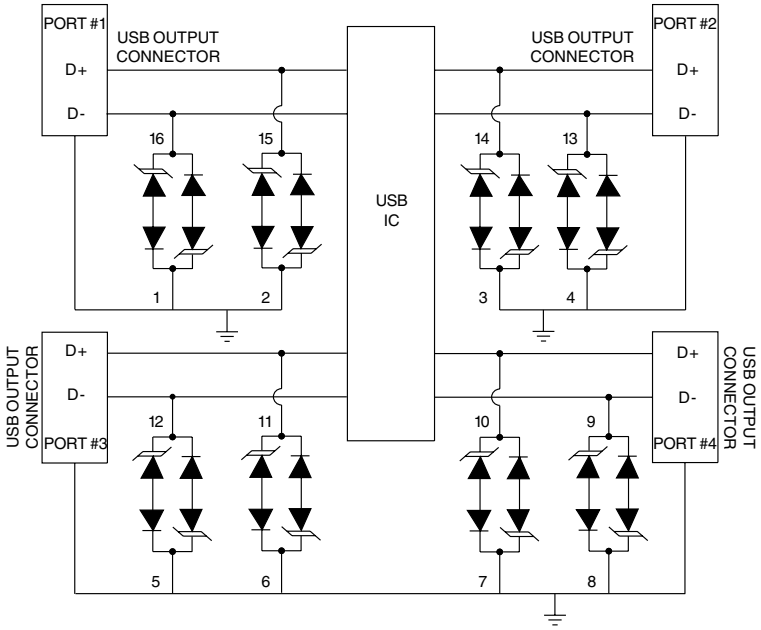


Figure 1. Typical Common- Mode USB Protection Circuit

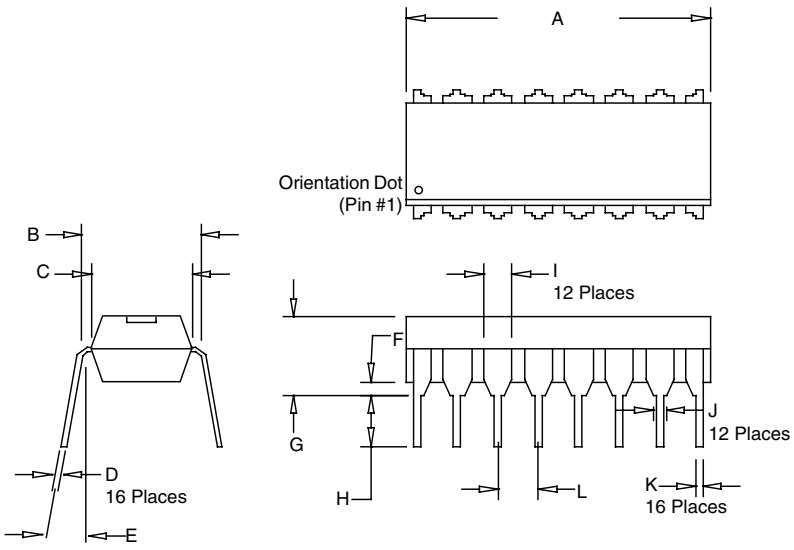
Circuit board Layout Recommendations

Circuit board layout is critical for Electromagnetic Compatibility (EMC) protection. The following guidelines are recommended:

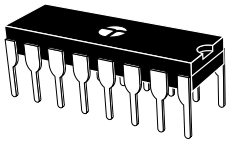
- ✔ The protection device should be placed near the input terminals or connectors, the device will divert the transient current immediately before it can be coupled into the nearby traces.
- ✔ The path length between the TVS devices and the protected line should be minimized
- ✔ All conductive loops including power and ground loops should be minimized
- ✔ The transient current return path to ground should be kept as short as possible to reduce parasitic inductance.
- ✔ Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

PACKAGE OUTLINE & DIMENSIONS

PACKAGE OUTLINE



16 PIN DIP



DIMENSIONS

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	19.8	-	0.780
B	6.10	6.60	0.240	0.260
C	7.37	7.87	0.290	0.310
D	0.25	0.50	0.010	0.020
E	0°	10°	0°	10°
F	0.51	-	0.020	-
G	-	5.08	-	0.200
H	3.17	-	0.125	-
I	-	1.78	-	0.070
J	0.84 TYP	0.84 TYP	0.033 TYP	0.033 TYP
K	0.38	0.53	0.015	0.021
L	2.54 TYP	2.54 TYP	0.100 TYP	0.100 TYP

NOTES:
1. Dimensions are exclusive of mold flash and metal burrs.

06003 Rev 1 - 11/01

BULK ORDERING INFORMATION:
No Suffix: Bulk Quantities - 25 pieces per tube.

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