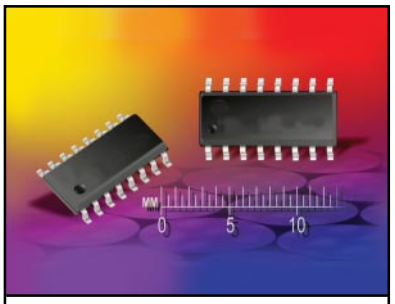
PROTEK DEVICES
Only One Name Means ProTek'Tion™

SM16LC03 thru SM16LC36C

LOW CAPACITANCE TVS ARRAY

APPLICATIONS

- ✔ Wireless Communication Circuits
- ✔ RS-422, RS-432 & RS-485
- ✔ Low Voltage ASICs
- ✔ Ethernet - 10/100 Base T



SO-16

IEC COMPATIBILITY (EN61000-4)

- ✔ 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
- ✔ 61000-4-4 (EFT): 40A - 5/50ns
- ✔ 61000-4-5 (Surge): 12A, 8/20µs Level 1 (Line-Ground) & Level 2 (Line-Line)

FEATURES

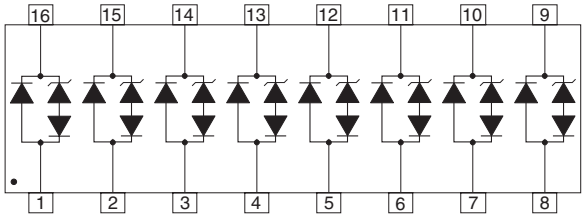
- ✔ 500 Watts Peak Pulse Power per Line (tp=8/20µs)
- ✔ Unidirectional & Bidirectional Configuration
- ✔ ESD Protection > 40 kilovolts
- ✔ Available in Multiple Voltage Types: 3.3V to 36V
- ✔ Protects Up to Eight (8) Lines
- ✔ ***LOW CAPACITANCE: 15pF***
- ✔ RoHS Compliant in Lead-Free Versions

MECHANICAL CHARACTERISTICS

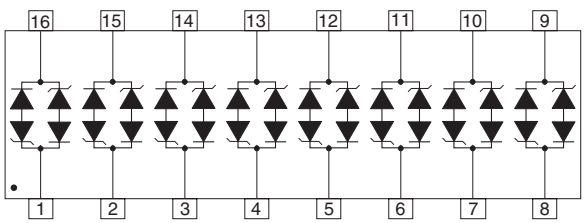
- ✔ Molded JEDEC SO-16 Package
- ✔ Weight 0.15 grams (Approximate)
- ✔ Available in Tin-Lead or Lead-Free Pure-Tin Plating(Annealed)
- ✔ Solder Reflow Temperature:
  - Tin-Lead - Sn/Pb, 85/15: 240-245°C
  - Pure-Tin - Sn, 100: 260-270°C
- ✔ Flammability rating UL 94V-0
- ✔ 16mm Tape and Reel Per EIA Standard 481
- ✔ Marking: Logo, Part Number, Date Code & Pin One Defined By Dot on Top of Package

PIN CONFIGURATIONS

UNIDIRECTIONAL CONFIGURATION



BIDIRECTIONAL CONFIGURATION



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}	500	Watts
Operating Temperature	T_J	-55°C to 150°C	°C
Storage Temperature	T_{STG}	-55°C to 150°C	°C
Forward Voltage @ 50mA, 300µs - Square Wave (Note 1)	V_F	1.5	Volts
Soldering Temperature for 10 seconds	T_L	265	°C

Note 1: Only applies to unidirectional devices.

ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified							
PART NUMBER (Notes 1 & 2)	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
SM16LC03	3.3	4.5	7.0	20.0V @ 35A	125	15	-3
SM16LC03C	3.3	4.5	7.0	20.0V @ 35A	125	15	-3
SM16LC05	5.0	6.0	9.8	24.0V @ 42A	20	15	3
SM16LC05C	5.0	6.0	9.8	24.0V @ 42A	20	15	3
SM16LC08	8.0	8.5	13.4	26.0V @ 30A	10	15	9
SM16LC08C	8.0	8.5	13.4	26.0V @ 30A	10	15	9
SM16LC12	12.0	13.3	19.0	33.0V @ 21A	2	15	16
SM16LC12C	12.0	13.3	19.0	33.0V @ 21A	2	15	16
SM16LC15	15.0	16.7	25.5	39.0V @ 15A	2	15	17
SM16LC15C	15.0	16.7	25.5	39.0V @ 15A	2	15	17
SM16LC24	24.0	26.7	40.0	57.0V @ 10A	2	15	26
SM16LC24C	24.0	26.7	40.0	57.0V @ 10A	2	15	26
SM16LC36	36.0	40.0	53.0	72.0V @ 7.0A	2	15	36
SM16LC36C	36.0	40.0	53.0	72.0V @ 7.0A	2	15	36

Note 1: Part numbers with a “C” suffix are bidirectional devices, i.e., SM16LC05C.
Note 2: *Unidirectional Devices Only:* Do not surge from pins 16 to 1, 15 to 2, 14 to 3, 13 to 4, 12 to 5, 11 to 6, 10 to 7 and 9 to 8. PIV typically greater than 100V for each rectifier diode.

GRAPHS

FIGURE 1
PEAK PULSE POWER VS PULSE TIME

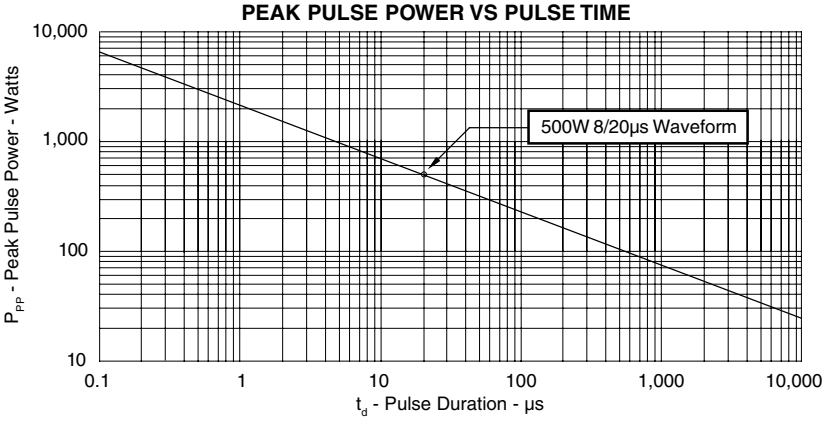


FIGURE 2
PULSE WAVE FORM

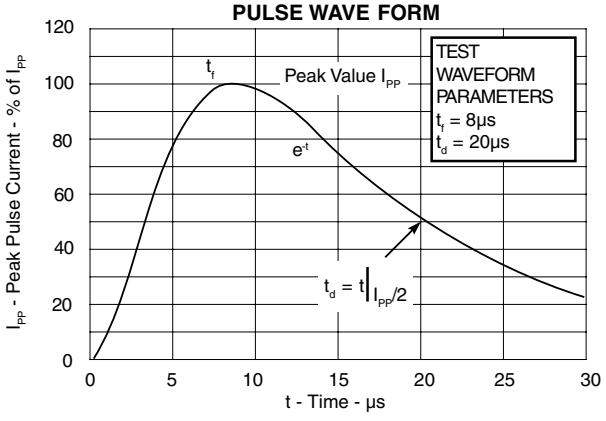


FIGURE 3
POWER DERATING CURVE

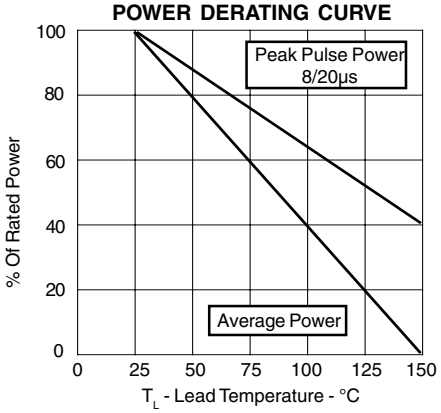
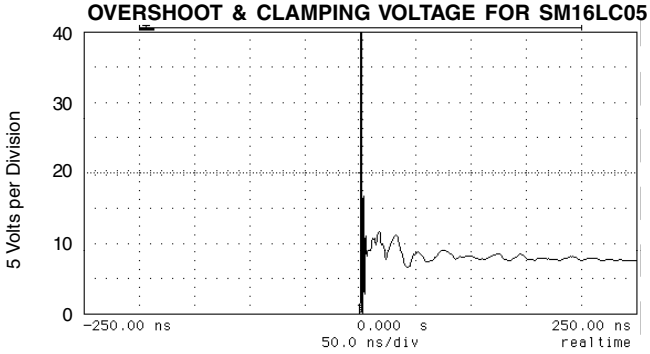


FIGURE 4
OVERSHOOT & CLAMPING VOLTAGE FOR SM16LC05



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

FIGURE 5
INSERTION LOSS - SM16LC12

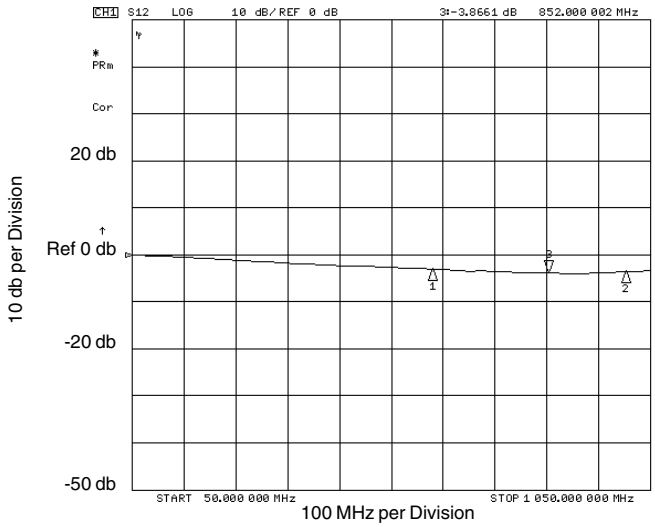
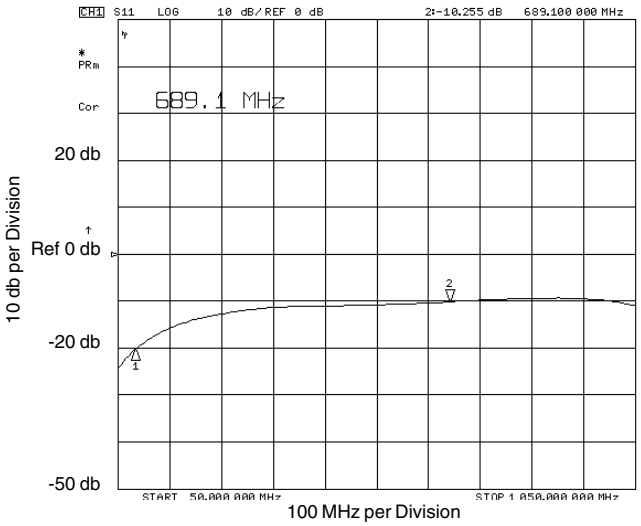


FIGURE 6
RETURN LOSS - SM16LC12



APPLICATION NOTE

The SM16LC & SM16LCxxC Series are TVS arrays designed to protect I/O or data lines from the damaging effects of ESD, EFT and other types of surges. This product series provides both unidiretional and bidirectional protection, with a surge capability of 500 Watts P_{PP} per line for an 8/20µs waveform and ESD protection > 40kV.

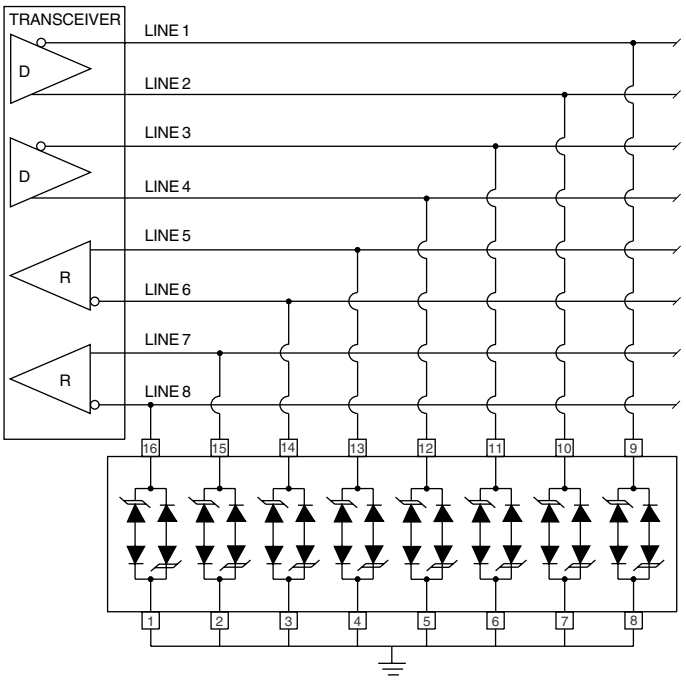
BIDIRECTIONAL COMMON-MODE CONFIGURATION (Figure 1)

Ideal for RS-485 applications, the SM16LCxxC Series provides up to eight (8) lines of protection in a common-mode configuration as depicted in Figure 1. This low capacitance series allows the transceiver or telecommunications circuit to operate safely without significant signal distortion.

Circuit connectivity is as follows:

- ✔ Lines 1 is connected to Pin 9.
- ✔ Line 2 is connected to Pin 10.
- ✔ Line 3 is connected to Pin 11.
- ✔ Line 4 is connected to Pin 12.
- ✔ Line 5 is connected to Pin 13.
- ✔ Line 6 is connected to Pin 14.
- ✔ Line 7 is connected to Pin 15.
- ✔ Line 8 is connected to Pin 16.
- ✔ Pins 1-8 are connected to ground.

Figure 1. Birectional Common-Mode Protection



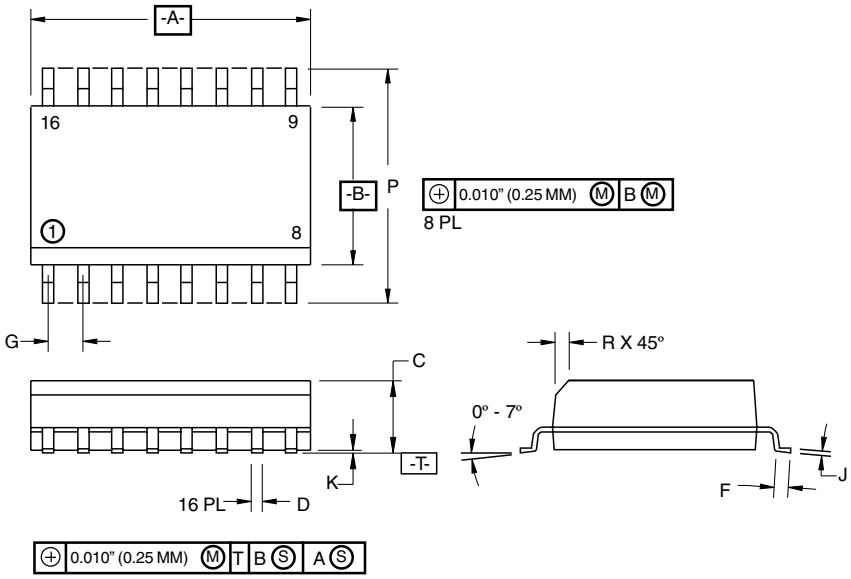
CIRCUIT BOARD LAYOUT RECOMMENDATIONS

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

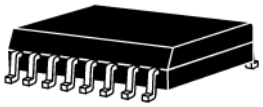
- ✔ The protection device should be placed near the input terminals or connectors, the device will divert the transient current immediately before it can be coupled into the nearby traces.
- ✔ The path length between the TVS device and the protected line should be minimized.
- ✔ All conductive loops 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



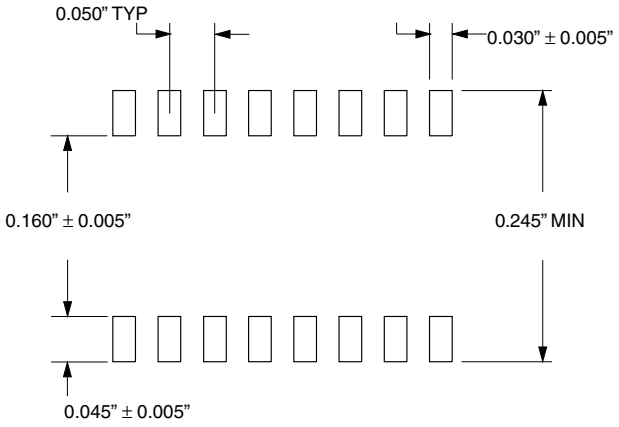
SO-16



PACKAGE DIMENSIONS

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC	1.27 BSC	0.05 BSC	0.05 BSC
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

MOUNTING PAD



NOTES

1. - T - = Seating Plane and Datum Surface.
2. Dimensions “A” and “B” are Datum.
3. Dimensions “A” and “B” do not include mold protrusions.
4. Maximum mold protrusion is 0.015” (0.380 mm) per side.
5. Dimensioning and tolerances per ANSI Y14.5M, 1982.
6. Dimensions are exclusive of mold flash and metal burrs.

TAPE & REEL/BULK ORDERING NOMENCLATURE

1. Surface mount product is taped and reeled in accordance with EIA-481.
2. Suffix-T7 = 7 Inch Reel - 1,000 pieces per 16mm tape, i.e., *SM16LC05-T7.*
3. Suffix-T13 = 13 Inch Reel - 2,500 pieces per 16mm tape, i.e., *SM16LC05-T13.*
4. Suffix - LF = Lead-Free, Pure-Tin Plating, i.e., *SM16LC05C-LF-T7.*
5. No Suffix = Product Shipped in Tubes of 48 pcs per Tube.

Outline & Dimensions: Rev 1 - 11/01, 06007

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