

# ESD/Surge Protection Diode Array

## Bi-directional ESD Protection for High-Speed Data Line



ON Semiconductor®

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## SMDA05C Series

The SMDA05C surge protection series is designed to protect equipment attached to up to four high speed communication lines from ESD, EFT and surge.

### Features

- SO-8 Package
- Peak Power – 300 W 8 x 20  $\mu$ s
- ESD Rating:  
IEC 61000-4-2 (ESD)  $\pm 15$  kV (Air)  $\pm 8$  kV (Contact)  
IEC 61000-4-4 (EFT) 40 A (5/50 ns)  
IEC 61000-4-5 (Surge) 12 A (8/20  $\mu$ s)
- UL Flammability Rating of 94 V-0
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Typical Applications

- High Speed Communication Line Protection
- Data and I/O Lines
- Microprocessor Based Equipment
- LAN/WAN Equipment
- Servers
- Notebook and Desktop PC
- Serial and Parallel Ports
- Peripherals

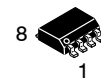
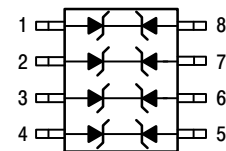
### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation 8 x 20 $\mu$ s @ $T_A = 25^\circ\text{C}$ (Note 1)	$P_{pk}$	300	W
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$
Lead Solder Temperature – Maximum 10 Seconds Duration	$T_L$	260	$^\circ\text{C}$

1. Non-repetitive current pulse 8 x 20  $\mu$ s exponential decay waveform.

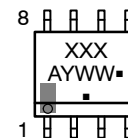
## SO-8 ESD AND SURGE PROTECTOR 300 WATTS PEAK POWER

### PIN CONFIGURATION AND SCHEMATIC



SO-8  
CASE 751-07

### MARKING DIAGRAM



A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 3 of this data sheet.

## SMDA05C Series

### SMDA05C ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	-	-	5.0	V
Reverse Breakdown Voltage @ $I_t = 1.0$ mA	$V_{BR}$	6.0	-	-	V
Reverse Leakage Current @ $V_{RWM} = 5$ Volts	$I_R$	N/A	-	20	$\mu$ A
Maximum Clamping Voltage @ $I_{PP} = 1.0$ A, 8 x 20 $\mu$ s	$V_C$	N/A	-	9.8	V
Maximum Clamping Voltage @ $I_{PP} = 5.0$ A, 8 x 20 $\mu$ s	$V_C$	N/A	-	11	V
Maximum Peak Pulse Current, 8 x 20 $\mu$ s	$I_{PP}$	-	-	17	A
Junction Capacitance @ $V_R = 0$ V, $f = 1$ MHz	$C_J$	-	-	350	pF

### SMDA12C ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	-	-	12	V
Reverse Breakdown Voltage @ $I_t = 1.0$ mA	$V_{BR}$	13.3	-	-	V
Reverse Leakage Current @ $V_{RWM} = 12$ Volts	$I_R$	N/A	-	1.0	$\mu$ A
Maximum Clamping Voltage @ $I_{PP} = 1.0$ A, 8 x 20 $\mu$ s	$V_C$	N/A	-	19	V
Maximum Clamping Voltage @ $I_{PP} = 5.0$ A, 8 x 20 $\mu$ s	$V_C$	N/A	-	24	V
Maximum Peak Pulse Current, 8 x 20 $\mu$ s	$I_{PP}$	-	-	12	A
Junction Capacitance @ $V_R = 0$ V, $f = 1$ MHz	$C_J$	-	-	120	pF

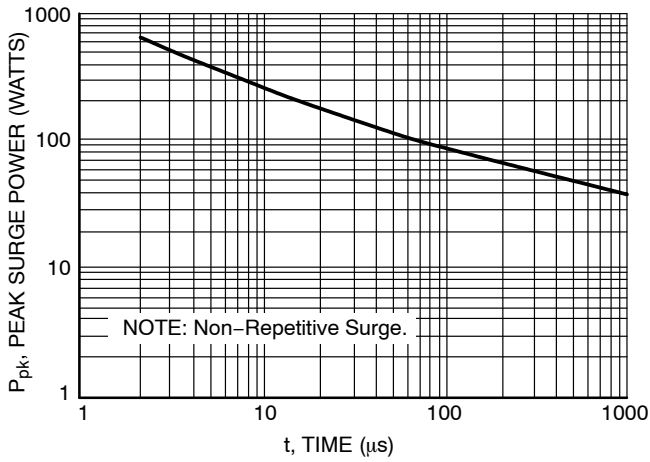
### SMDA15C ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	-	-	15	V
Reverse Breakdown Voltage @ $I_t = 1.0$ mA	$V_{BR}$	16.7	-	-	V
Reverse Leakage Current @ $V_{RWM} = 15$ Volts	$I_R$	N/A	-	1.0	$\mu$ A
Maximum Clamping Voltage @ $I_{PP} = 1.0$ A, 8 x 20 $\mu$ s	$V_C$	N/A	-	24	V
Maximum Clamping Voltage @ $I_{PP} = 5.0$ A, 8 x 20 $\mu$ s	$V_C$	N/A	-	30	V
Maximum Peak Pulse Current, 8 x 20 $\mu$ s	$I_{PP}$	-	-	10	A
Junction Capacitance @ $V_R = 0$ V, $f = 1$ MHz	$C_J$	-	-	75	pF

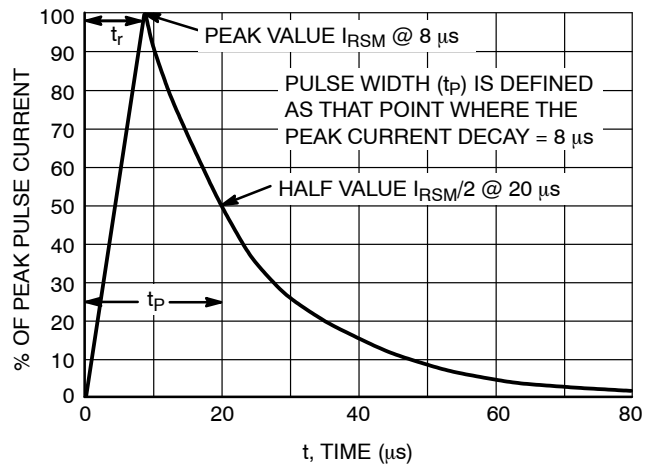
### SMDA24C ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	-	-	24	V
Reverse Breakdown Voltage @ $I_t = 1.0$ mA	$V_{BR}$	26.7	-	-	V
Reverse Leakage Current @ $V_{RWM} = 24$ Volts	$I_R$	N/A	-	1.0	$\mu$ A
Maximum Clamping Voltage @ $I_{PP} = 1.0$ A, 8 x 20 $\mu$ s	$V_C$	N/A	-	43	V
Maximum Clamping Voltage @ $I_{PP} = 5.0$ A, 8 x 20 $\mu$ s	$V_C$	N/A	-	55	V
Maximum Peak Pulse Current, 8 x 20 $\mu$ s	$I_{PP}$	-	-	5.0	A
Junction Capacitance @ $V_R = 0$ V, $f = 1$ MHz	$C_J$	-	-	50	pF

## SMDA05C Series



**Figure 1. Pulse Width**



**Figure 2.  $8 \times 20 \mu s$  Pulse Waveform**

### ORDERING INFORMATION

Device	Marking	Package	Shipping†
SMDA05CDR2G	AAA	SO-8 (Pb-Free)	2500 / Tape & Reel
SMDA12CDR2G	AAC	SO-8 (Pb-Free)	2500 / Tape & Reel
SMDA15CDR2G	AAD	SO-8 (Pb-Free)	2500 / Tape & Reel
SMDA24CDR2G	AAE	SO-8 (Pb-Free)	2500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

ON Semiconductor®



SCALE 1:1

SOIC-8 NB  
CASE 751-07  
ISSUE AK

DATE 16 FEB 2011



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
  6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

### GENERIC MARKING DIAGRAM\*



XXXXXX = Specific Device Code  
 A = Assembly Location  
 L = Wafer Lot  
 Y = Year  
 W = Work Week  
 ■ = Pb-Free Package

XXXXXX = Specific Device Code  
 A = Assembly Location  
 Y = Year  
 WW = Work Week  
 ■ = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

STYLES ON PAGE 2

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**SOIC-8 NB**  
**CASE 751-07**  
**ISSUE AK**

DATE 16 FEB 2011

- |  |   |   |   |
|--|---|---|---|
| <p><b>STYLE 1:</b><br/>         PIN 1. EMITTER<br/>         2. COLLECTOR<br/>         3. COLLECTOR<br/>         4. EMITTER<br/>         5. EMITTER<br/>         6. BASE<br/>         7. BASE<br/>         8. EMITTER</p>   | <p><b>STYLE 2:</b><br/>         PIN 1. COLLECTOR, DIE, #1<br/>         2. COLLECTOR, #1<br/>         3. COLLECTOR, #2<br/>         4. COLLECTOR, #2<br/>         5. BASE, #2<br/>         6. EMITTER, #2<br/>         7. BASE, #1<br/>         8. EMITTER, #1</p>               | <p><b>STYLE 3:</b><br/>         PIN 1. DRAIN, DIE #1<br/>         2. DRAIN, #1<br/>         3. DRAIN, #2<br/>         4. DRAIN, #2<br/>         5. GATE, #2<br/>         6. SOURCE, #2<br/>         7. GATE, #1<br/>         8. SOURCE, #1</p>                            | <p><b>STYLE 4:</b><br/>         PIN 1. ANODE<br/>         2. ANODE<br/>         3. ANODE<br/>         4. ANODE<br/>         5. ANODE<br/>         6. ANODE<br/>         7. ANODE<br/>         8. COMMON CATHODE</p>   |
| <p><b>STYLE 5:</b><br/>         PIN 1. DRAIN<br/>         2. DRAIN<br/>         3. DRAIN<br/>         4. DRAIN<br/>         5. GATE<br/>         6. GATE<br/>         7. SOURCE<br/>         8. SOURCE</p>   | <p><b>STYLE 6:</b><br/>         PIN 1. SOURCE<br/>         2. DRAIN<br/>         3. DRAIN<br/>         4. SOURCE<br/>         5. SOURCE<br/>         6. GATE<br/>         7. GATE<br/>         8. SOURCE</p>  | <p><b>STYLE 7:</b><br/>         PIN 1. INPUT<br/>         2. EXTERNAL BYPASS<br/>         3. THIRD STAGE SOURCE<br/>         4. GROUND<br/>         5. DRAIN<br/>         6. GATE 3<br/>         7. SECOND STAGE Vd<br/>         8. FIRST STAGE Vd</p>                    | <p><b>STYLE 8:</b><br/>         PIN 1. COLLECTOR, DIE #1<br/>         2. BASE, #1<br/>         3. BASE, #2<br/>         4. COLLECTOR, #2<br/>         5. COLLECTOR, #2<br/>         6. EMITTER, #2<br/>         7. EMITTER, #1<br/>         8. COLLECTOR, #1</p>                              |
| <p><b>STYLE 9:</b><br/>         PIN 1. EMITTER, COMMON<br/>         2. COLLECTOR, DIE #1<br/>         3. COLLECTOR, DIE #2<br/>         4. EMITTER, COMMON<br/>         5. EMITTER, COMMON<br/>         6. BASE, DIE #2<br/>         7. BASE, DIE #1<br/>         8. EMITTER, COMMON</p> | <p><b>STYLE 10:</b><br/>         PIN 1. GROUND<br/>         2. BIAS 1<br/>         3. OUTPUT<br/>         4. GROUND<br/>         5. GROUND<br/>         6. BIAS 2<br/>         7. INPUT<br/>         8. GROUND</p>  | <p><b>STYLE 11:</b><br/>         PIN 1. SOURCE 1<br/>         2. GATE 1<br/>         3. SOURCE 2<br/>         4. GATE 2<br/>         5. DRAIN 2<br/>         6. DRAIN 2<br/>         7. DRAIN 1<br/>         8. DRAIN 1</p>   | <p><b>STYLE 12:</b><br/>         PIN 1. SOURCE<br/>         2. SOURCE<br/>         3. SOURCE<br/>         4. GATE<br/>         5. DRAIN<br/>         6. DRAIN<br/>         7. DRAIN<br/>         8. DRAIN</p>   |
| <p><b>STYLE 13:</b><br/>         PIN 1. N.C.<br/>         2. SOURCE<br/>         3. SOURCE<br/>         4. GATE<br/>         5. DRAIN<br/>         6. DRAIN<br/>         7. DRAIN<br/>         8. DRAIN</p>  | <p><b>STYLE 14:</b><br/>         PIN 1. N-SOURCE<br/>         2. N-GATE<br/>         3. P-SOURCE<br/>         4. P-GATE<br/>         5. P-DRAIN<br/>         6. P-DRAIN<br/>         7. N-DRAIN<br/>         8. N-DRAIN</p>   | <p><b>STYLE 15:</b><br/>         PIN 1. ANODE 1<br/>         2. ANODE 1<br/>         3. ANODE 1<br/>         4. ANODE 1<br/>         5. CATHODE, COMMON<br/>         6. CATHODE, COMMON<br/>         7. CATHODE, COMMON<br/>         8. CATHODE, COMMON</p>               | <p><b>STYLE 16:</b><br/>         PIN 1. EMITTER, DIE #1<br/>         2. BASE, DIE #1<br/>         3. EMITTER, DIE #2<br/>         4. BASE, DIE #2<br/>         5. COLLECTOR, DIE #2<br/>         6. COLLECTOR, DIE #2<br/>         7. COLLECTOR, DIE #1<br/>         8. COLLECTOR, DIE #1</p> |
| <p><b>STYLE 17:</b><br/>         PIN 1. VCC<br/>         2. V2OUT<br/>         3. V1OUT<br/>         4. TXE<br/>         5. RXE<br/>         6. VEE<br/>         7. GND<br/>         8. ACC</p>  | <p><b>STYLE 18:</b><br/>         PIN 1. ANODE<br/>         2. ANODE<br/>         3. SOURCE<br/>         4. GATE<br/>         5. DRAIN<br/>         6. DRAIN<br/>         7. CATHODE<br/>         8. CATHODE</p>   | <p><b>STYLE 19:</b><br/>         PIN 1. SOURCE 1<br/>         2. GATE 1<br/>         3. SOURCE 2<br/>         4. GATE 2<br/>         5. DRAIN 2<br/>         6. MIRROR 2<br/>         7. DRAIN 1<br/>         8. MIRROR 1</p>   | <p><b>STYLE 20:</b><br/>         PIN 1. SOURCE (N)<br/>         2. GATE (N)<br/>         3. SOURCE (P)<br/>         4. GATE (P)<br/>         5. DRAIN<br/>         6. DRAIN<br/>         7. DRAIN<br/>         8. DRAIN</p>   |
| <p><b>STYLE 21:</b><br/>         PIN 1. CATHODE 1<br/>         2. CATHODE 2<br/>         3. CATHODE 3<br/>         4. CATHODE 4<br/>         5. CATHODE 5<br/>         6. COMMON ANODE<br/>         7. COMMON ANODE<br/>         8. CATHODE 6</p>  | <p><b>STYLE 22:</b><br/>         PIN 1. I/O LINE 1<br/>         2. COMMON CATHODE/VCC<br/>         3. COMMON CATHODE/VCC<br/>         4. I/O LINE 3<br/>         5. COMMON ANODE/GND<br/>         6. I/O LINE 4<br/>         7. I/O LINE 5<br/>         8. COMMON ANODE/GND</p> | <p><b>STYLE 23:</b><br/>         PIN 1. LINE 1 IN<br/>         2. COMMON ANODE/GND<br/>         3. COMMON ANODE/GND<br/>         4. LINE 2 IN<br/>         5. LINE 2 OUT<br/>         6. COMMON ANODE/GND<br/>         7. COMMON ANODE/GND<br/>         8. LINE 1 OUT</p> | <p><b>STYLE 24:</b><br/>         PIN 1. BASE<br/>         2. EMITTER<br/>         3. COLLECTOR/ANODE<br/>         4. COLLECTOR/ANODE<br/>         5. CATHODE<br/>         6. CATHODE<br/>         7. COLLECTOR/ANODE<br/>         8. COLLECTOR/ANODE</p>                                      |
| <p><b>STYLE 25:</b><br/>         PIN 1. VIN<br/>         2. N/C<br/>         3. REXT<br/>         4. GND<br/>         5. IOUT<br/>         6. IOUT<br/>         7. IOUT<br/>         8. IOUT</p>   | <p><b>STYLE 26:</b><br/>         PIN 1. GND<br/>         2. dv/dt<br/>         3. ENABLE<br/>         4. ILIMIT<br/>         5. SOURCE<br/>         6. SOURCE<br/>         7. SOURCE<br/>         8. VCC</p>  | <p><b>STYLE 27:</b><br/>         PIN 1. ILIMIT<br/>         2. OVLO<br/>         3. UVLO<br/>         4. INPUT+<br/>         5. SOURCE<br/>         6. SOURCE<br/>         7. SOURCE<br/>         8. DRAIN</p>  | <p><b>STYLE 28:</b><br/>         PIN 1. SW_TO_GND<br/>         2. DASIC OFF<br/>         3. DASIC_SW_DET<br/>         4. GND<br/>         5. V_MON<br/>         6. VBULK<br/>         7. VBULK<br/>         8. VIN</p>  |
| <p><b>STYLE 29:</b><br/>         PIN 1. BASE, DIE #1<br/>         2. EMITTER, #1<br/>         3. BASE, #2<br/>         4. EMITTER, #2<br/>         5. COLLECTOR, #2<br/>         6. COLLECTOR, #2<br/>         7. COLLECTOR, #1<br/>         8. COLLECTOR, #1</p>                        | <p><b>STYLE 30:</b><br/>         PIN 1. DRAIN 1<br/>         2. DRAIN 1<br/>         3. GATE 2<br/>         4. SOURCE 2<br/>         5. SOURCE 1/DRAIN 2<br/>         6. SOURCE 1/DRAIN 2<br/>         7. SOURCE 1/DRAIN 2<br/>         8. GATE 1</p>                           |   |   |

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