

# 1000W, 10V - 100V Surface Mount Transient Voltage Suppressor

## FEATURES FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated junction
- Built-in strain relief
- Excellent clamping capability
- Fast response time: Typically less than 1.0ps from 0 volt to BV min
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

## KEY PARAMETERS

| PARAMETER                  | VALUE          | UNIT |
|----------------------------|----------------|------|
| $V_{WM}$                   | 8.55 – 85.5    | V    |
| $V_{BR}$ (uni-directional) | 9.5 - 105      | V    |
| $V_{BR}$ (bi-directional)  | 9.5 - 105      | V    |
| $P_{PPSM}$                 | 1000           | W    |
| $T_{J\ MAX}$               | 175            | °C   |
| Package                    | DO-214AA (SMB) |      |
| Configuration              | Single die     |      |

## APPLICATIONS

- Switching mode power supply (SMPS)
- Adapters
- TV
- Monitor



## MECHANICAL DATA

- Case: DO-214AA (SMB)
- Molding compound meets UL 94V-0 flammability rating
- Moisture sensitivity level: level 1, per J-STD-020
- Part no. with suffix "H" means AEC-Q101 qualified
- Packing code with suffix "G" means green compound (halogen-free)
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 0.11 g (approximately)



**DO-214AA (SMB)**

## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| PARAMETER                                                                           | SYMBOL     | PART NUMBER | UNIT |
|-------------------------------------------------------------------------------------|------------|-------------|------|
| Non-repetitive peak impulse power dissipation with 10/1000us waveform               | $P_{PPSM}$ | 1000        | W    |
| Steady state power dissipation at $T_A=25^\circ\text{C}$ <sup>(1)</sup>             | $P_{tot}$  | 5           | W    |
| Peak forward surge current, 8.3 ms single half sine-wave superimposed on rated load | $I_{FSM}$  | 100         | A    |
| Forward Voltage @ $I_F=50\text{A}$ for Uni-directional only <sup>(2)</sup>          | $V_F$      | 3.5/5.0     | V    |
| Junction temperature                                                                | $T_J$      | -55 to +175 | °C   |
| Storage temperature                                                                 | $T_{STG}$  | -55 to +175 | °C   |

### Notes:

1. Non-repetitive Current Pulse Per Fig. 3 and Derated above  $T_A=25^\circ\text{C}$  Per Fig. 2
2.  $V_F=3.5\text{V}$  for Devices of  $V_{BR} \leq 50\text{V}$  and  $V_F=5.0\text{V}$  Max. for Devices  $V_{BR} > 50\text{V}$

### Devices for Bipolar Applications

1. For Bidirectional use CA suffix

**THERMAL PERFORMANCE**

| PARAMETER                              | SYMBOL          | LIMIT | UNIT |
|----------------------------------------|-----------------|-------|------|
| Junction-to-lead thermal resistance    | $R_{\theta JL}$ | 20    | °C/W |
| Junction-to-ambient thermal resistance | $R_{\theta JA}$ | 100   | °C/W |

**ELECTRICAL SPECIFICATIONS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Device    | Device Marking Code | Breakdown Voltage<br>$V_{BR}@I_T$<br>(V) |      | Test Current<br>$I_T$<br>(mA) | Stand-Off Voltage<br>$@V_{WM}$<br>(V) | Maximum Reverse Leakage<br>$@V_{WM}$<br>( $\mu\text{A}$ ) | Maximum Peak impulse Current<br>$I_{PP}$<br>(A)<br>(Note 2) | Maximum Clamping Voltage<br>$V_C@I_{PP}$<br>(V) |
|-----------|---------------------|------------------------------------------|------|-------------------------------|---------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------|
|           |                     | Min.                                     | Max. |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB10A  | A10E                | 9.5                                      | 10.5 | 1.0                           | 8.55                                  | 10.0                                                      | 69.0                                                        | 14.5                                            |
| 1KSMB10CA | N10E                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB11A  | A10F                | 10.5                                     | 11.6 | 1.0                           | 9.40                                  | 5.0                                                       | 64.1                                                        | 15.6                                            |
| 1KSMB11CA | N10F                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB12A  | A10G                | 11.4                                     | 12.6 | 1.0                           | 10.2                                  | 5.0                                                       | 59.9                                                        | 16.7                                            |
| 1KSMB12CA | N10G                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB13A  | A10H                | 12.4                                     | 13.7 | 1.0                           | 11.1                                  | 5.0                                                       | 54.9                                                        | 18.2                                            |
| 1KSMB13CA | N10H                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB15A  | A10I                | 14.3                                     | 15.8 | 1.0                           | 12.8                                  | 5.0                                                       | 47.2                                                        | 21.2                                            |
| 1KSMB15CA | N10I                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB16A  | A10J                | 15.2                                     | 16.8 | 1.0                           | 13.6                                  | 1.0                                                       | 44.4                                                        | 22.5                                            |
| 1KSMB16CA | N10J                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB18A  | A10K                | 17.1                                     | 18.9 | 1.0                           | 15.3                                  | 1.0                                                       | 39.2                                                        | 25.5                                            |
| 1KSMB18CA | N10K                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB20A  | A10L                | 19.0                                     | 21.0 | 1.0                           | 17.1                                  | 1.0                                                       | 36.1                                                        | 27.7                                            |
| 1KSMB20CA | N10L                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB22A  | A10M                | 20.9                                     | 23.1 | 1.0                           | 18.8                                  | 1.0                                                       | 32.7                                                        | 30.6                                            |
| 1KSMB22CA | N10M                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB24A  | A10N                | 22.8                                     | 25.2 | 1.0                           | 20.5                                  | 1.0                                                       | 30.1                                                        | 33.2                                            |
| 1KSMB24CA | N10N                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB27A  | A10O                | 25.7                                     | 28.4 | 1.0                           | 23.1                                  | 1.0                                                       | 26.7                                                        | 37.5                                            |
| 1KSMB27CA | N10O                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB30A  | A10P                | 28.5                                     | 31.5 | 1.0                           | 25.6                                  | 1.0                                                       | 24.2                                                        | 41.4                                            |
| 1KSMB30CA | N10P                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB33A  | A10Q                | 31.4                                     | 34.7 | 1.0                           | 28.2                                  | 1.0                                                       | 21.9                                                        | 45.7                                            |
| 1KSMB33CA | N10Q                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB36A  | A10R                | 34.2                                     | 37.8 | 1.0                           | 30.8                                  | 1.0                                                       | 20.0                                                        | 49.9                                            |
| 1KSMB36CA | N10R                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB39A  | A10S                | 37.1                                     | 41.0 | 1.0                           | 33.3                                  | 1.0                                                       | 18.6                                                        | 53.9                                            |
| 1KSMB39CA | N10S                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB43A  | A10T                | 40.9                                     | 45.2 | 1.0                           | 36.8                                  | 1.0                                                       | 16.9                                                        | 59.3                                            |
| 1KSMB43CA | N10T                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB47A  | A10U                | 44.7                                     | 49.4 | 1.0                           | 40.2                                  | 1.0                                                       | 15.4                                                        | 64.8                                            |
| 1KSMB47CA | N10U                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB51A  | A10V                | 48.5                                     | 53.6 | 1.0                           | 43.6                                  | 1.0                                                       | 14.3                                                        | 70.1                                            |
| 1KSMB51CA | N10V                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB56A  | A10W                | 53.2                                     | 58.8 | 1.0                           | 47.8                                  | 1.0                                                       | 13.0                                                        | 77.0                                            |
| 1KSMB56CA | N10W                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB62A  | A10X                | 58.9                                     | 65.1 | 1.0                           | 53.0                                  | 1.0                                                       | 11.8                                                        | 85.0                                            |
| 1KSMB62CA | N10X                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB68A  | A10Y                | 64.6                                     | 71.4 | 1.0                           | 58.1                                  | 1.0                                                       | 10.9                                                        | 92.0                                            |
| 1KSMB68CA | N10Y                |                                          |      |                               |                                       |                                                           |                                                             |                                                 |

**ELECTRICAL SPECIFICATIONS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Device     | Device Marking Code | Breakdown voltage<br>$V_{BR}@I_T$<br>(V)<br>(Note 1) |      | Test current<br>$I_T$<br>(mA) | Stand-Off Voltage<br>$@V_{WM}$<br>(V) | Maximum Reverse leakage<br>$@V_{WM}$<br>( $\mu\text{A}$ ) | Maximum peak impulse current<br>$I_{PP}$<br>(A)<br>(Note 2) | Maximum clamping voltage<br>$V_C@I_{PP}$<br>(V) |
|------------|---------------------|------------------------------------------------------|------|-------------------------------|---------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------|
|            |                     | Min.                                                 | Max. |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB75A   | A10Z                | 71.3                                                 | 78.8 | 1.0                           | 64.1                                  | 1.0                                                       | 9.7                                                         | 103                                             |
| 1KSMB75CA  | N10Z                |                                                      |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB82A   | B10A                | 77.9                                                 | 86.1 | 1.0                           | 70.1                                  | 1.0                                                       | 8.8                                                         | 113                                             |
| 1KSMB82CA  | O10A                |                                                      |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB91A   | B10B                | 86.5                                                 | 95.5 | 1.0                           | 77.8                                  | 1.0                                                       | 8.0                                                         | 125                                             |
| 1KSMB91CA  | O10B                |                                                      |      |                               |                                       |                                                           |                                                             |                                                 |
| 1KSMB100A  | B10C                | 95                                                   | 105  | 1.0                           | 85.5                                  | 1.0                                                       | 7.3                                                         | 137                                             |
| 1KSMB100CA | O10C                |                                                      |      |                               |                                       |                                                           |                                                             |                                                 |

**Notes:**

1.  $V_{BR}$  measure after  $I_T$  applied for 300 $\mu\text{s}$ ,  $I_T$ =square wave pulse or equivalent.
2. All terms and symbols are consistent with ANSI/IEEE C62.35.
3. For Bidirectional use CA suffix

**ORDERING INFORMATION**

| PART NO.              | PART NO. SUFFIX | PACKING CODE | PACKING CODE SUFFIX(*) | PACKAGE | PACKING                  |
|-----------------------|-----------------|--------------|------------------------|---------|--------------------------|
| 1KSMBxxxx<br>(Note 1) | H               | R5           | G                      | SMB     | 850 / 7" Plastic reel    |
|                       |                 | R4           |                        | SMB     | 3,000 / 13" Paper reel   |
|                       |                 | M4           |                        | SMB     | 3,000 / 13" Plastic reel |

**Note :**

1. "xxxx" defines voltage from 10V (1KSMB10A) to 100V (1KSMB100CA)

\*: Optional available

**EXAMPLE P/N**

| EXAMPLE P/N  | PART NO. | PART NO. SUFFIX | PACKING CODE | PACKING CODE SUFFIX | DESCRIPTION                          |
|--------------|----------|-----------------|--------------|---------------------|--------------------------------------|
| 1KSMB39AHR5G | 1KSMB39A | H               | R5           | G                   | AEC-Q101 qualified<br>Green compound |

## CHARACTERISTICS CURVES

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

**Fig1. Peak Pulse Power Rating Curve**



**Fig2. Pulse Derating Curve**



**Fig3. Clamping Power Pulse Waveform**

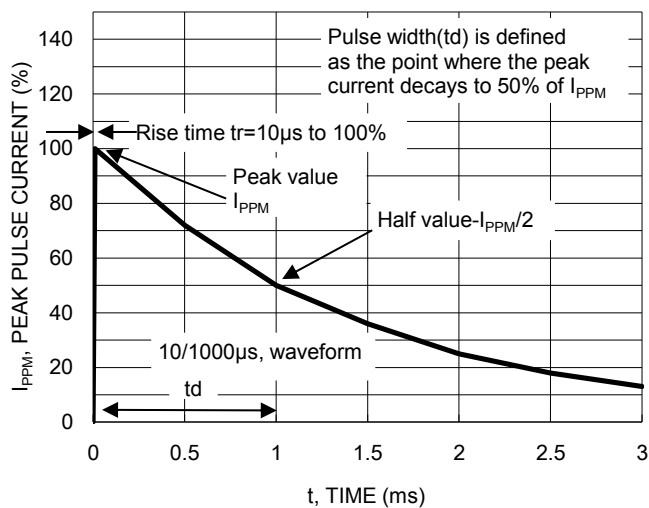
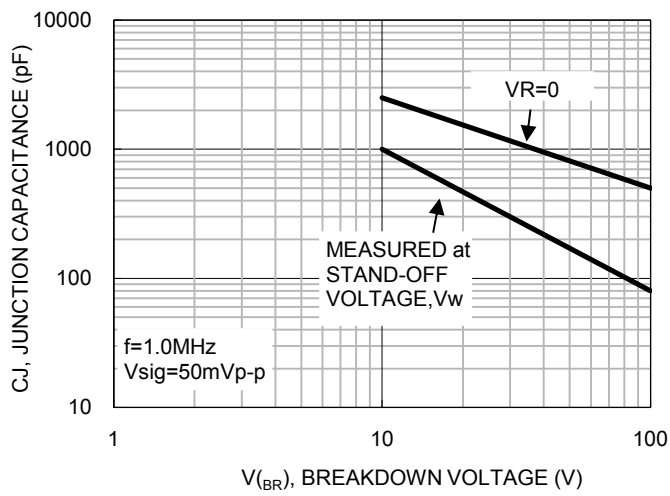


**Fig4. Maximum Non-Repetitive Forward Surge Current Unidirectional Only**



**Fig5. Typical Junction Capacitance**



## PACKAGE OUTLINE DIMENSIONS

DO-214AA (SMB)



| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min       | Max  | Min         | Max   |
| A    | 1.95      | 2.20 | 0.077       | 0.087 |
| B    | 4.05      | 4.60 | 0.159       | 0.181 |
| C    | 3.30      | 3.95 | 0.130       | 0.156 |
| D    | 1.95      | 2.65 | 0.077       | 0.104 |
| E    | 0.75      | 1.60 | 0.030       | 0.063 |
| F    | 5.10      | 5.60 | 0.201       | 0.220 |
| G    | 0.05      | 0.20 | 0.002       | 0.008 |
| H    | 0.15      | 0.31 | 0.006       | 0.012 |

## SUGGESTED PAD LAYOUT



| Symbol | Unit (mm) | Unit (inch) |
|--------|-----------|-------------|
| A      | 2.3       | 0.091       |
| B      | 2.5       | 0.098       |
| C      | 4.3       | 0.169       |
| D      | 1.8       | 0.071       |
| E      | 6.8       | 0.268       |

## MARKING DIAGRAM



P/N = Marking Code  
 G = Green Compound  
 YW = Date Code  
 F = Factory Code

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