

## 1A, 200V-1000V High Efficient Surface Mount Rectifiers

### FEATURES

- Glass passivated junction chip
- Ideal for automated placement
- Low power loss, high efficiency
- Fast switching for high efficiency
- Low profile package
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

### APPLICATIONS

- Freewheeling application
- Switching mode converters and inverters, computer and telecommunication.

### MECHANICAL DATA

- Case: Thin SMA
- Molding compound meets UL 94V-0 flammability rating
- Moisture sensitivity level: level 1, per J-STD-020
- Terminal: Pure tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 0.029 g (approximately)

| KEY PARAMETERS |            |      |
|----------------|------------|------|
| PARAMETER      | VALUE      | UNIT |
| $I_{F(AV)}$    | 1          | A    |
| $V_{RRM}$      | 200-1000   | V    |
| $I_{FSM}$      | 35         | A    |
| $T_{J\ MAX}$   | 150        | °C   |
| Package        | Thin SMA   |      |
| Configuration  | Single Die |      |



Thin SMA

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)            |                                   |             |        |        |        |        |      |
|--|-----------------------------------|-------------|--------|--------|--------|--------|------|
| PARAMETER  | SYMBOL                            | HS1DAL      | HS1GAL | HS1JAL | HS1KAL | HS1MAL | UNIT |
| Marking code on the device   |                                   | HS1DAL      | HS1GAL | HS1JAL | HS1KAL | HS1MAL |      |
| Repetitive peak reverse voltage  | $V_{RRM}$                         | 200         | 400    | 600    | 800    | 1000   | V    |
| Reverse voltage, total rms value   | $V_{R(RMS)}$                      | 140         | 280    | 420    | 560    | 700    | V    |
| Forward current  | $I_{F(AV)}$                       | 1           |        |        |        |        | A    |
| Surge peak forward current, single half sine-wave superimposed on rated load per diode | 8.3ms at $T_A = 25^\circ\text{C}$ | $I_{FSM}$   | 35     |        |        |        | A    |
|  | 1.0ms at $T_A = 25^\circ\text{C}$ |             | 90     |        |        |        | A    |
| Junction temperature   | $T_J$                             | -55 to +150 |        |        |        |        | °C   |
| Storage temperature  | $T_{STG}$                         | -55 to +150 |        |        |        |        | °C   |

| THERMAL PERFORMANCE                    |                 |     |               |
|--|-----------------|-----|---------------|
| PARAMETER                              | SYMBOL          | TYP | UNIT          |
| Junction-to-lead thermal resistance    | $R_{\theta JL}$ | 29  | $^{\circ}C/W$ |
| Junction-to-ambient thermal resistance | $R_{\theta JA}$ | 51  | $^{\circ}C/W$ |
| Junction-to-case thermal resistance    | $R_{\theta JC}$ | 22  | $^{\circ}C/W$ |

**Thermal Performance Note:** Units mounted on PCB (5mm x 5mm Cu pad test board)

| ELECTRICAL SPECIFICATIONS ( $T_A = 25^{\circ}C$ unless otherwise noted) |                  |  |          |      |      |         |
|---|------------------|--|----------|------|------|---------|
| PARAMETER   |                  | CONDITIONS                               | SYMBOL   | TYP  | MAX  | UNIT    |
| Forward voltage per diode <sup>(1)</sup>                                | HS1DAL           | $I_F = 0.5A, T_J = 25^{\circ}C$          | $V_F$    | 0.80 | -    | V       |
|   |                  | $I_F = 1A, T_J = 25^{\circ}C$            |          | 0.85 | 1.00 | V       |
|   |                  | $I_F = 0.5A, T_J = 125^{\circ}C$         |          | 0.65 | -    | V       |
|   |                  | $I_F = 1A, T_J = 125^{\circ}C$           |          | 0.71 | 0.80 | V       |
|   | HS1GAL           | $I_F = 0.5A, T_J = 25^{\circ}C$          |          | 0.84 | -    | V       |
|   |                  | $I_F = 1A, T_J = 25^{\circ}C$            |          | 0.91 | 1.30 | V       |
|   |                  | $I_F = 0.5A, T_J = 125^{\circ}C$         |          | 0.68 | -    | V       |
|   |                  | $I_F = 1A, T_J = 125^{\circ}C$           |          | 0.76 | 0.86 | V       |
|   | HS1JAL           | $I_F = 0.5A, T_J = 25^{\circ}C$          |          | 0.92 | -    | V       |
|   |                  | $I_F = 1A, T_J = 25^{\circ}C$            |          | 1.02 | 1.70 | V       |
|   |                  | $I_F = 0.5A, T_J = 125^{\circ}C$         |          | 0.73 | -    | V       |
|   |                  | $I_F = 1A, T_J = 125^{\circ}C$           |          | 0.83 | 1.02 | V       |
|   | HS1KAL<br>HS1MAL | $I_F = 0.5A, T_J = 25^{\circ}C$          |          | 1.32 | -    | V       |
|   |                  | $I_F = 1A, T_J = 25^{\circ}C$            |          | 1.49 | 1.70 | V       |
|   |                  | $I_F = 0.5A, T_J = 125^{\circ}C$         |          | 0.98 | -    | V       |
|   |                  | $I_F = 1A, T_J = 125^{\circ}C$           |          | 1.16 | 1.39 | V       |
| Reverse current @ rated $V_R$ per diode <sup>(2)</sup>                  |                  | $T_J = 25^{\circ}C$                      | $I_R$    | -    | 1    | $\mu A$ |
|   |                  | $T_J = 125^{\circ}C$                     |          | -    | 35   | $\mu A$ |
| Reverse recovery time   |                  | $I_F = 0.5A, I_R = 1.0A, I_{rr} = 0.25A$ | $t_{rr}$ | -    | 50   | ns      |
|   |                  |  |          | -    | 75   | ns      |
|   |                  |  |          | -    | -    | -       |
|   |                  |  |          | -    | -    | -       |
| Junction capacitance per diode  |                  | 1 MHz, $V_R = 4.0V$                      | $C_J$    | 20   | -    | pF      |
|   |                  |  |          | 17   | -    | pF      |
|   |                  |  |          | 13   | -    | pF      |
|   |                  |  |          | 8    | -    | pF      |

**Notes:**

- (1) Pulse test with PW=0.3 ms
- (2) Pulse test with PW=30 ms

| <b>ORDERING INFORMATION</b>        |                |                   |
|------------------------------------|----------------|-------------------|
| <b>ORDERING CODE<sup>(1)</sup></b> | <b>PACKAGE</b> | <b>PACKING</b>    |
| HS1xAL M3G                         | Thin SMA       | 3,500 / 7" reel   |
| HS1xAL M2G                         | Thin SMA       | 14,000 / 13" reel |

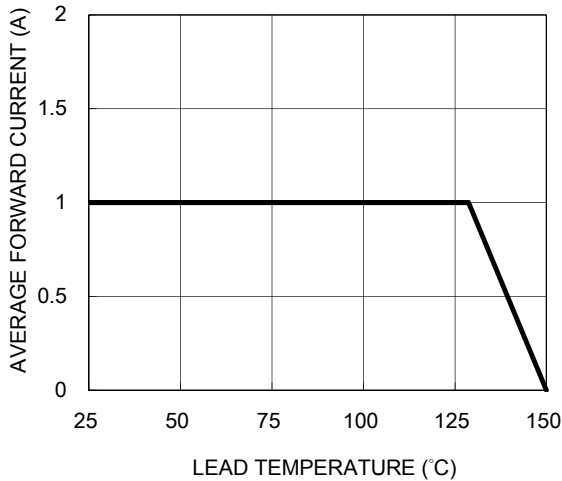
**Notes:**

(1) "x" defines voltage from 200V(HS1DAL) to 1000V(HS1MAL)

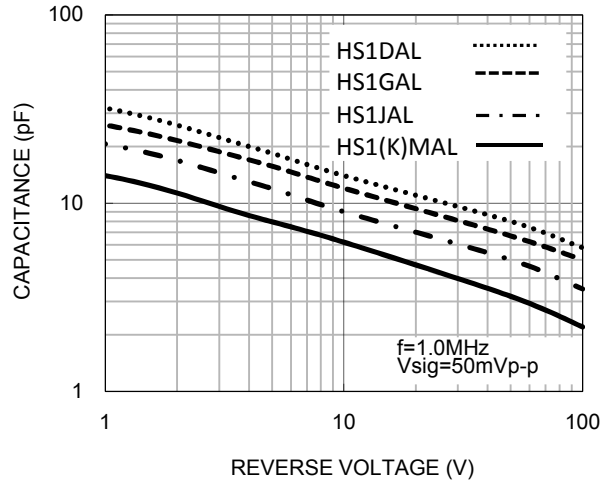
**CHARACTERISTICS CURVES**

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

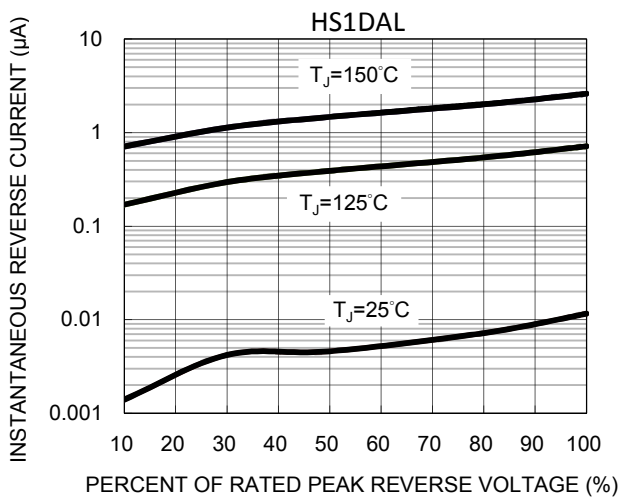
**Fig.1 Forward Current Derating Curve**



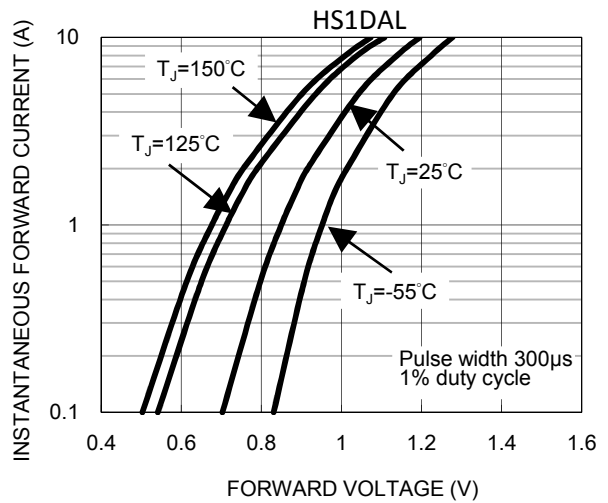
**Fig.2 Typical Junction Capacitance**



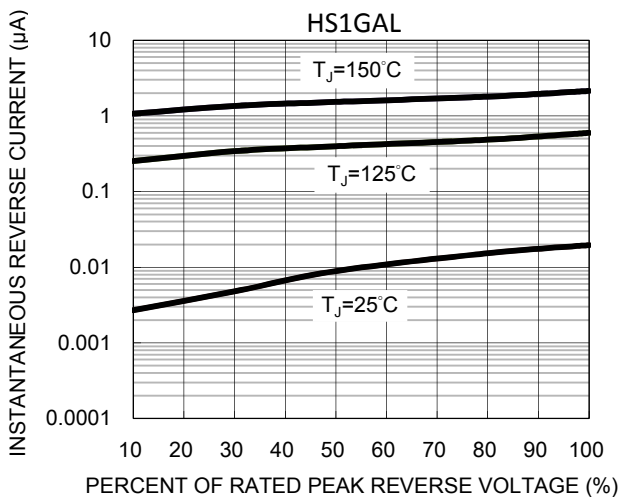
**Fig.3 Typical Reverse Characteristics**



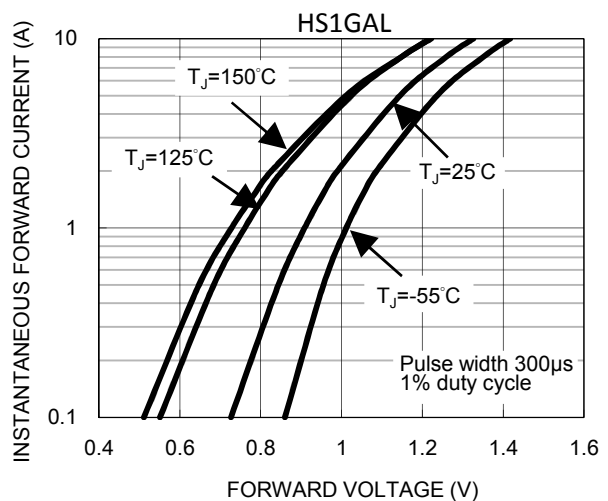
**Fig.4 Typical Forward Characteristics**



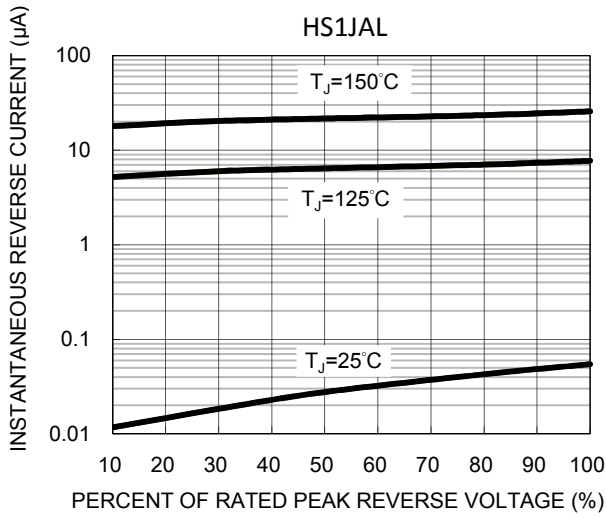
**Fig.5 Typical Reverse Characteristics**



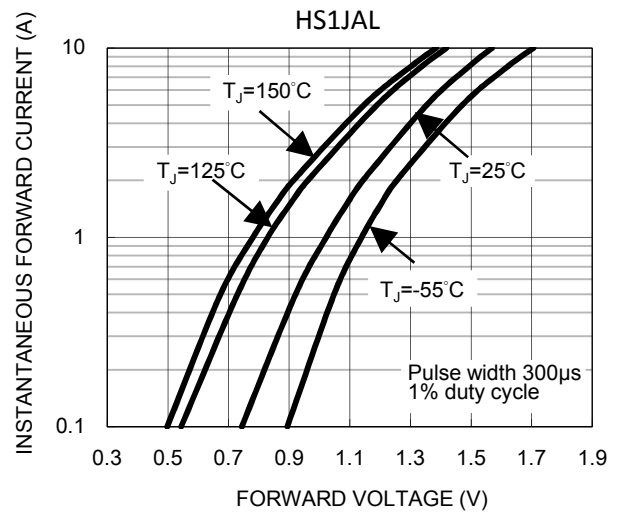
**Fig.6 Typical Forward Characteristics**



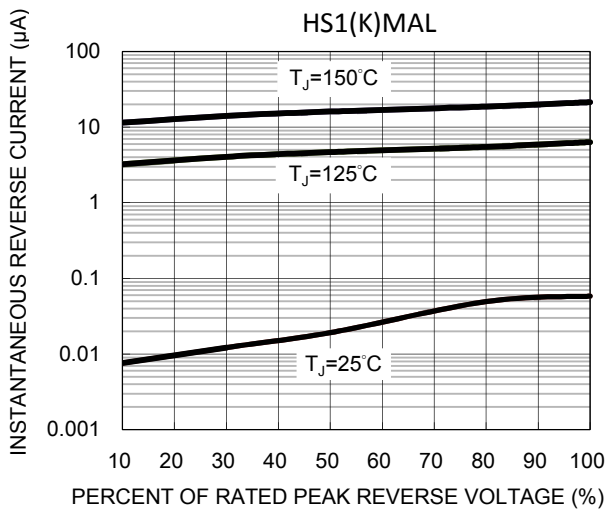
**Fig.7 Typical Reverse Characteristics**



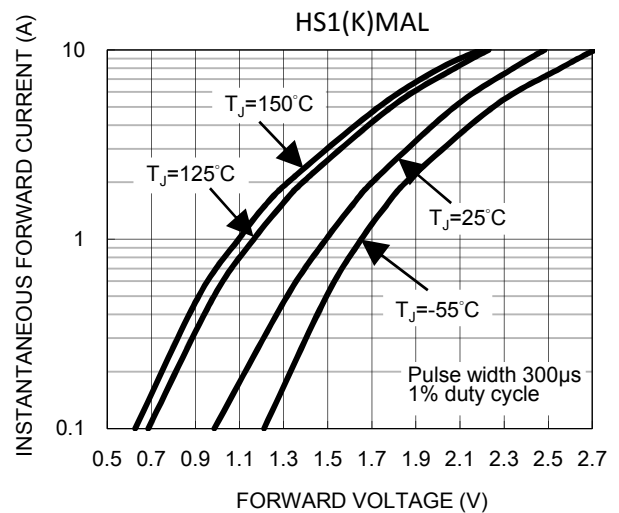
**Fig.8 Typical Forward Characteristics**



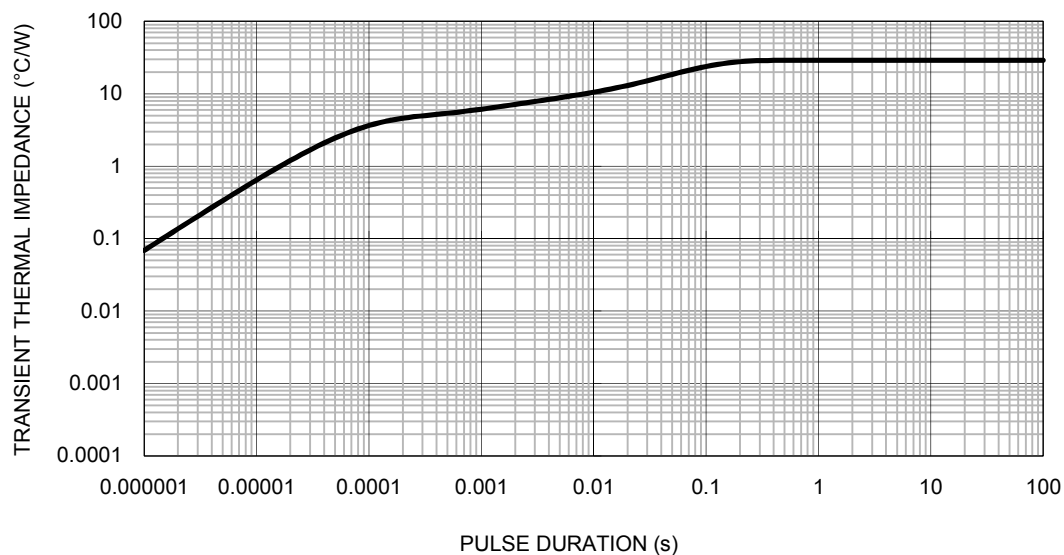
**Fig.9 Typical Reverse Characteristics**



**Fig.10 Typical Forward Characteristics**

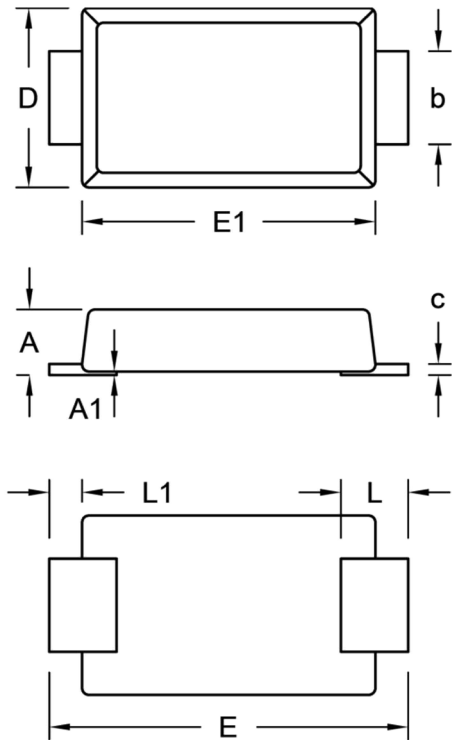


**Fig.11 Typical Transient Thermal Impedance**



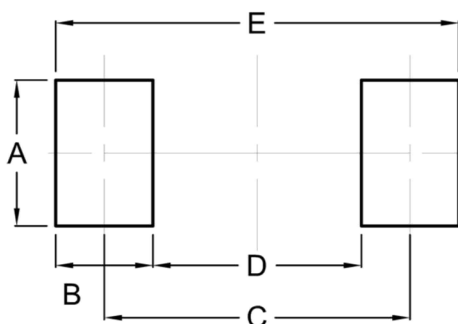
**PACKAGE OUTLINE DIMENSIONS**

Thin SMA



| DIM. | Unit (mm) |      | Unit (inch) |       |
|------|-----------|------|-------------|-------|
|      | Min.      | Max. | Min.        | Max.  |
| A    | 0.90      | 1.00 | 0.035       | 0.039 |
| A1   | 0.00      | 0.10 | 0.000       | 0.004 |
| b    | 1.25      | 1.45 | 0.049       | 0.057 |
| c    | 0.10      | 0.22 | 0.004       | 0.009 |
| D    | 2.50      | 2.70 | 0.098       | 0.106 |
| E    | 5.05      | 5.35 | 0.199       | 0.211 |
| E1   | 4.15      | 4.35 | 0.163       | 0.171 |
| L    | 0.75      | 1.20 | 0.030       | 0.047 |
| L1   | 0.30      | 0.60 | 0.012       | 0.024 |

**SUGGESTED PAD LAYOUT**



| Symbol | Unit (mm) | Unit (inch) |
|--------|-----------|-------------|
| A      | 2.10      | 0.083       |
| B      | 1.40      | 0.055       |
| C      | 4.40      | 0.173       |
| D      | 3.00      | 0.118       |
| E      | 5.80      | 0.228       |

**MARKING DIAGRAM**



P/N = Marking Code  
 YW = Date Code  
 F = Factory Code

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