

## 1.Description

The STTH3R04 series uses 400V planar Pt doping technology. The STTH3R04 is specially suited for switching mode base drive and transistor circuits.

Packaged in axial and surface mount packages, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection.

## 2.Features

- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature

## 3.Pinning Information

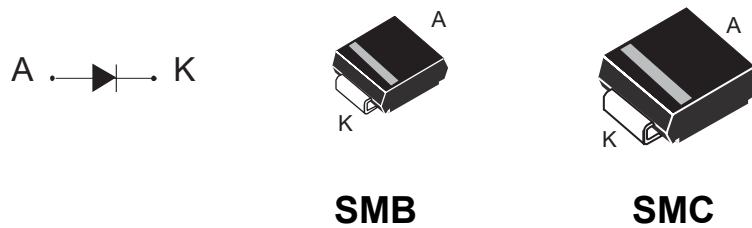


Table 1. Device summary

| Symbol        | Value |
|---------------|-------|
| $I_{F(AV)}$   | 3A    |
| $V_{RRM}$     | 400V  |
| $T_{j(max)}$  | 175°C |
| $V_{F(typ)}$  | 0.9V  |
| $t_{rr(typ)}$ | 18ns  |



#### 4. Absolute Ratings (Limiting Values)

| Parameter                                             |                                  |                       | Symbol             | Value      | Unit |
|-------------------------------------------------------|----------------------------------|-----------------------|--------------------|------------|------|
| Repetitive Peak Reverse Voltage                       |                                  |                       | V <sub>RRM</sub>   | 400        | V    |
| Average Forward Current δ = 0.5                       | SMB                              | T <sub>L</sub> =70°C  | I <sub>F(AV)</sub> | 3          | A    |
|                                                       | SMC                              | T <sub>L</sub> =100°C |                    | 3          | A    |
| Surge Non Repetitive Forward Current                  | t <sub>p</sub> =10 ms sinusoidal |                       | I <sub>FSM</sub>   | 60         | A    |
| Storage Temperature Range                             |                                  |                       | T <sub>STG</sub>   | -65 to 175 | °C   |
| Maximum Operating Junction Temperature <sup>(1)</sup> |                                  |                       | T <sub>J</sub>     | 175        | °C   |

1. On infinite heatsink with 10 mm lead length

#### 5. Thermal Parameters

| Parameter        |     | Symbol        | Max | Units              |
|------------------|-----|---------------|-----|--------------------|
| Junction To Lead | SMB | $R_{th(j-l)}$ | 25  | $^\circ\text{C/W}$ |
|                  | SMC |               | 17  | $^\circ\text{C/W}$ |

#### 6. Static Electrical Characteristics

| Parameter               |                           | Symbol      | Conditions        | Min | Typ | Max  | Unit          |
|-------------------------|---------------------------|-------------|-------------------|-----|-----|------|---------------|
| Reverse Leakage Current | $T_J = 25^\circ\text{C}$  | $I_R^{(1)}$ | $V_R = V_{RRM}$   |     |     | 5    | $\mu\text{A}$ |
|                         | $T_J = 125^\circ\text{C}$ |             |                   |     | 5   | 50   | $\mu\text{A}$ |
| Forward Voltage Drop    | $T_J = 25^\circ\text{C}$  | $V_F^{(2)}$ | $I_F = 3\text{A}$ |     |     | 1.5  | V             |
|                         | $T_J = 100^\circ\text{C}$ |             |                   |     | 1.0 | 1.25 | V             |
|                         | $T_J = 150^\circ\text{C}$ |             |                   |     | 0.9 | 1.15 | V             |

1. Pulse test:  $t_p = 5\text{ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the maximum conduction losses use the following equation:

$$P = 0.9 \times I_{F(AV)} + 0.083 I_{F(RMS)}^2$$



## 7.Dynamic Characteristics

| Parameter                |                           | Symbol   | Conditions                                                                         | Typ | Max | Unit |
|--------------------------|---------------------------|----------|------------------------------------------------------------------------------------|-----|-----|------|
| Reverse Recovery Time    | $T_J=25^{\circ}\text{C}$  | $t_{rr}$ | $I_F=1\text{A}$ , $dI_F/dt=-50\text{A}/\mu\text{s}$ , $V_R=30\text{V}$             |     | 35  | ns   |
|                          | $T_J=25^{\circ}\text{C}$  |          | $I_F=1\text{A}$ , $dI_F/dt=-100\text{A}/\mu\text{s}$ , $V_R=30\text{V}$            | 18  | 25  | ns   |
| Reverse recovery current | $T_J=125^{\circ}\text{C}$ | $I_{RM}$ | $I_F=3\text{A}$ , $dI_F/dt=-200\text{A}/\mu\text{s}$ , $V_R=320\text{V}$           | 4   | 5.5 | A    |
| Forward recovery time    | $T_J=25^{\circ}\text{C}$  | $t_{fr}$ | $I_F=3\text{A}$ , $dI_F/dt=100\text{A}/\mu\text{s}$ , $V_{FR}=1.1 \times V_{Fmax}$ |     | 75  | ns   |
| Forward recovery voltage |                           | $V_{FP}$ | $I_F=3\text{A}$ , $dI_F/dt=100\text{A}/\mu\text{s}$                                | 2.5 |     | V    |



## 8.1 Typical Characteristic

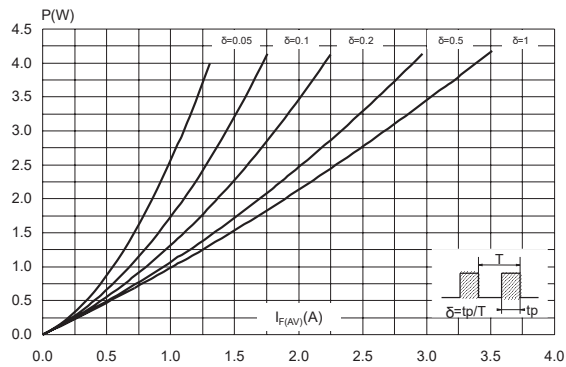


Figure 1: Conduction losses versus average forward current

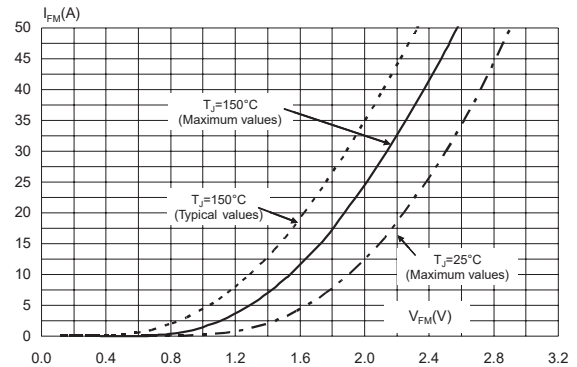


Figure 2: Forward voltage drop versus forward current

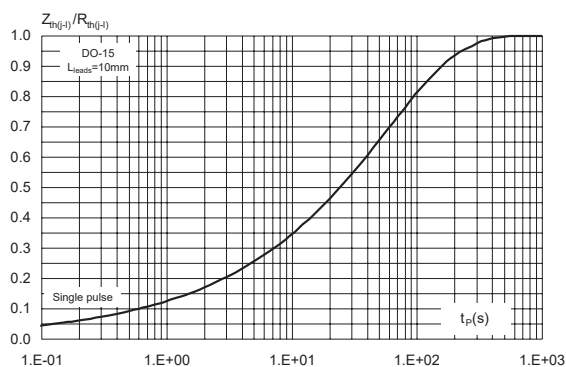


Figure 3: Relative variation of thermal impedance junction to lead versus pulse duration, DO-15 (epoxy FR4, copper thickness = 35 μm)

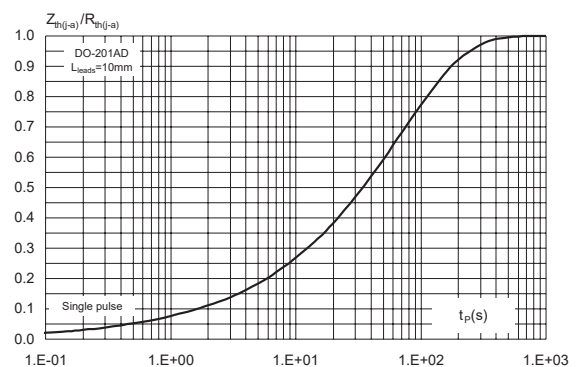


Figure 4: Relative variation of thermal impedance junction to ambient versus pulse duration, DO-201AD (epoxy FR4, copper thickness=35μm)

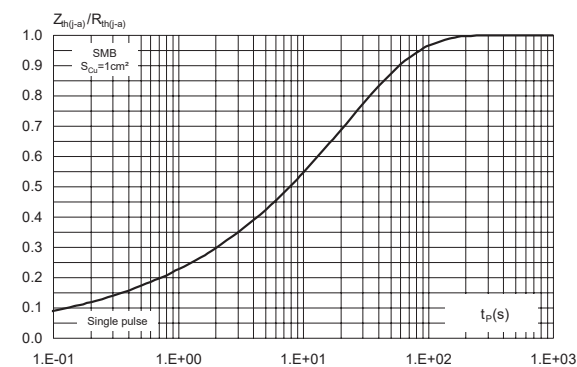


Figure 5: Relative variation of thermal impedance junction to ambient versus pulse duration, SMB (epoxy FR4, copper thickness = 35 μm)

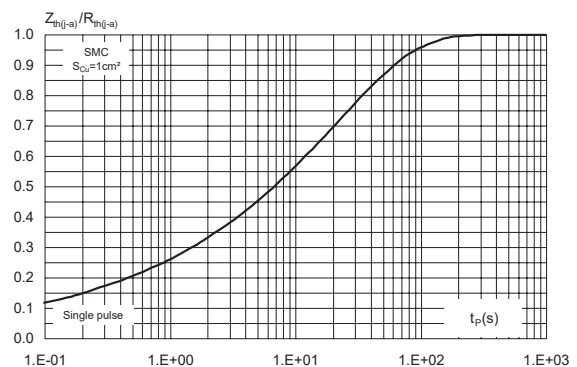


Figure 6: Relative variation of thermal impedance junction to ambient versus pulse duration, SMC



## 8.2 Typical Characteristic

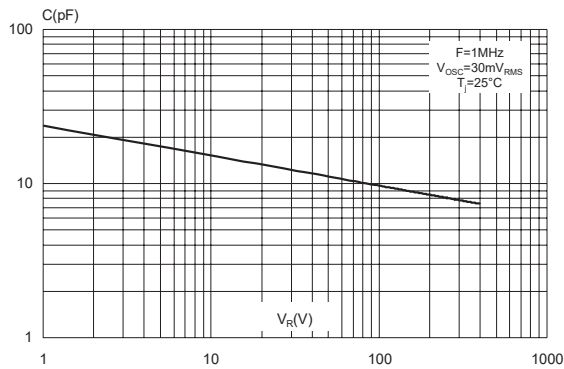


Figure 7: Junction capacitance versus reverse voltage applied (typical values)

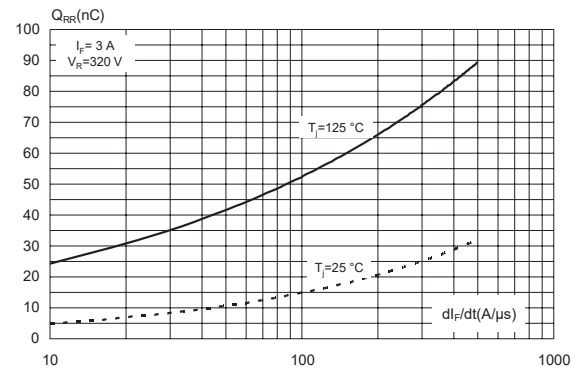


Figure 8: Reverse recovery charges versus  $dI_F/dt$  (typical values)

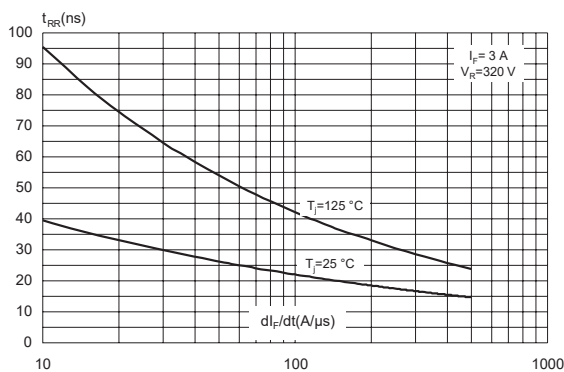


Figure 9: Reverse recovery time versus  $dI_F/dt$  (typical values)

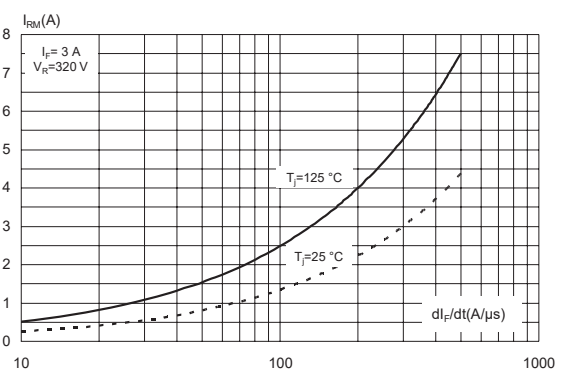


Figure 10: Peak reverse recovery current versus  $dI_F/dt$  (typical values)

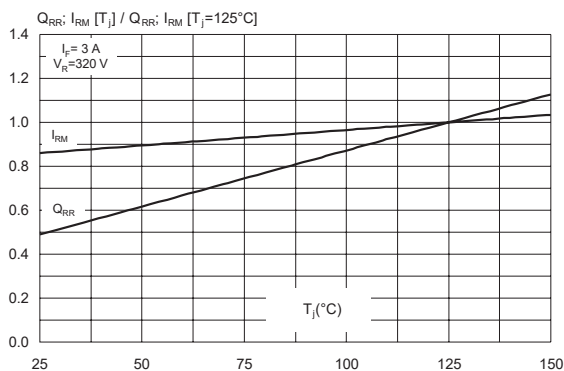


Figure 11: Relative variations of dynamic parameters versus junction temperature

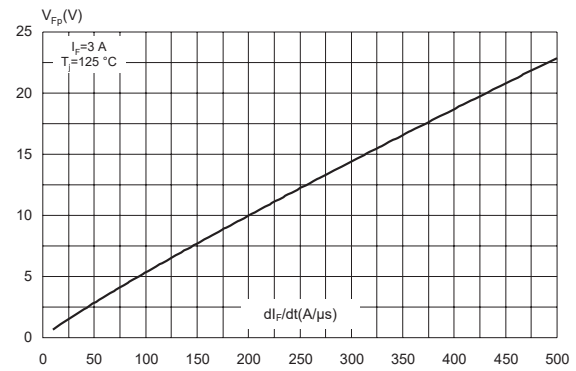
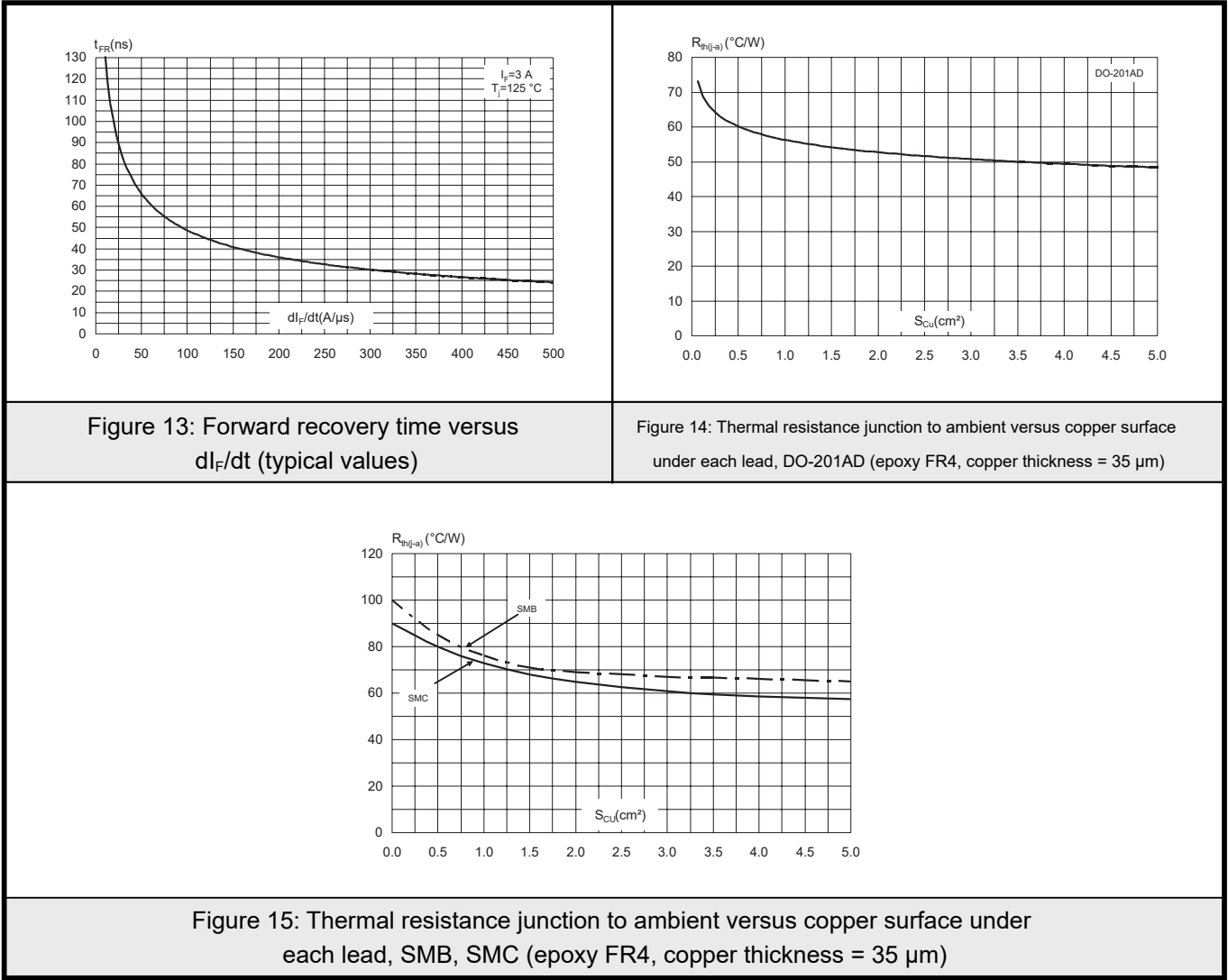


Figure 12: Transient peak forward voltage versus  $dI_F/dt$  (typical values)

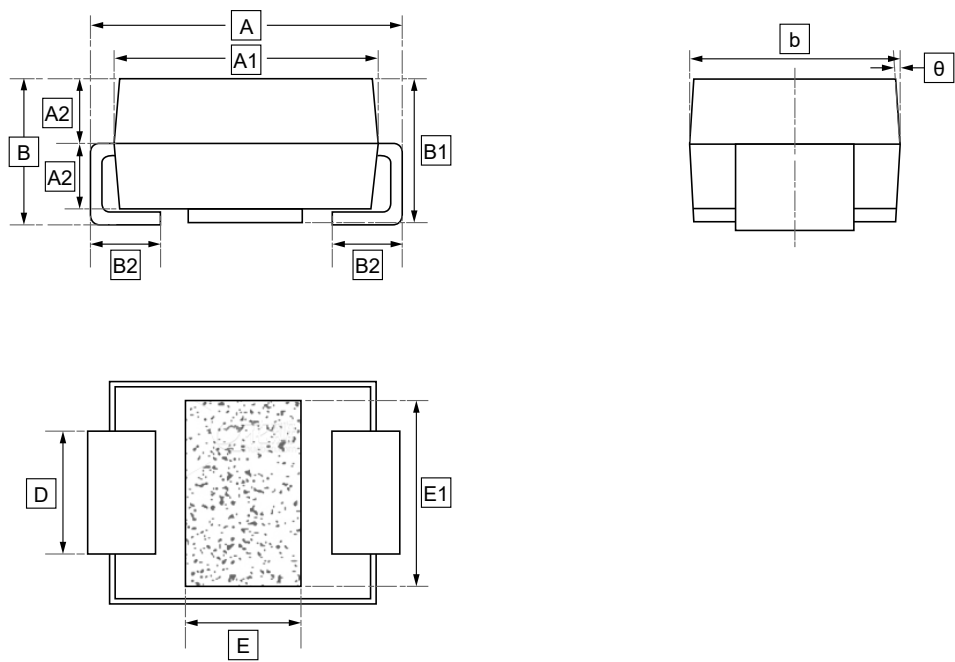


8.3 Typical Characteristic





9.1 SMB Package Outline Dimensions

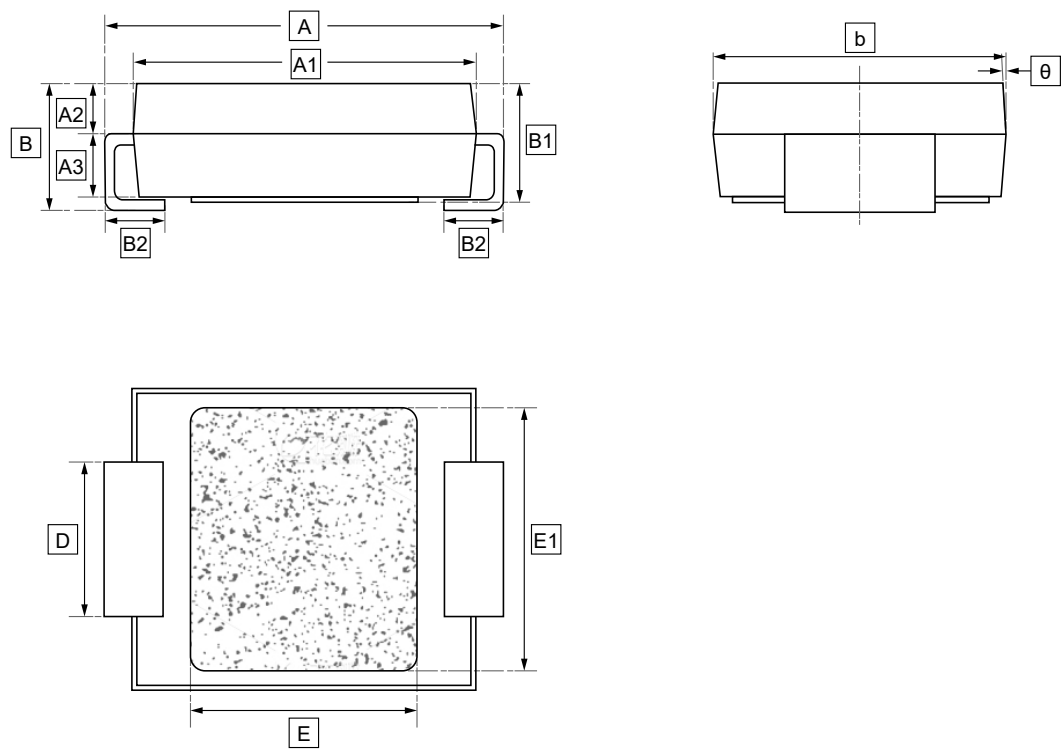


DIMENSIONS (mm are the original dimensions)

| Symbol | A   | A1  | A2   | B    | B1   | B2  | b    | D    | E   | E1  | θ  |
|--------|-----|-----|------|------|------|-----|------|------|-----|-----|----|
| Min    | 5.1 | 4.4 | 1.02 | 2.25 | 2.25 | 1.0 | 3.55 | 1.98 | 1.8 | 2.9 | 5° |
| Max    | 5.3 | 4.5 | 1.08 | 2.45 | 2.35 | 1.4 | 3.65 | 2.02 | 2.0 | 3.1 |    |



9.2 SMC Package Outline Dimensions

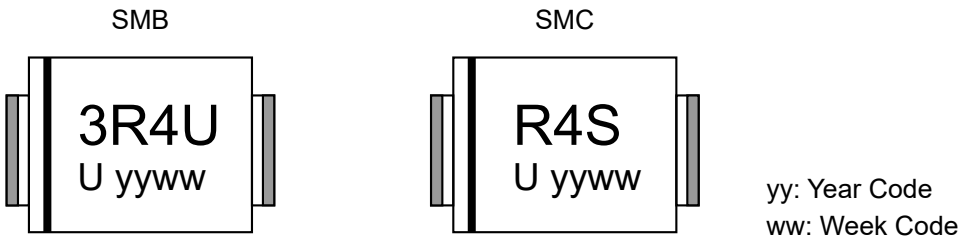


DIMENSIONS (mm are the original dimensions)

| Symbol | A   | A1  | A2   | A3   | B    | B1   | B2  | b   | D    | E   | E1  | θ  |
|--------|-----|-----|------|------|------|------|-----|-----|------|-----|-----|----|
| Min    | 7.9 | 6.8 | 0.97 | 1.17 | 2.35 | 2.25 | 1.0 | 5.8 | 2.98 | 4.4 | 5.0 | 5° |
| Max    | 8.1 | 6.9 | 1.03 | 1.23 | 2.55 | 2.35 | 1.4 | 5.9 | 3.02 | 4.6 | 5.2 |    |



10.Ordering Information



| Order Code    | Marking | Package | Base QTY | Delivery Mode |
|---------------|---------|---------|----------|---------------|
| UMW STTH3R04S | R4S     | SMC     | 2500     | Tape and reel |
| UMW STTH3R04U | 3R4U    | SMB     | 2500     | Tape and reel |



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