

|       |       |
|-------|-------|
| $V_R$ | 650V  |
| $I_F$ | 2.15A |
| $Q_C$ | 6nC   |

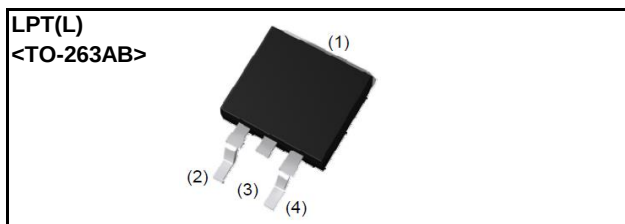
### ●Features

- 1) Low forward voltage
- 2) Negligible recovery time/current
- 3) Temperature independent switching behavior
- 4) High surge current capability
- 5) Low leakage current

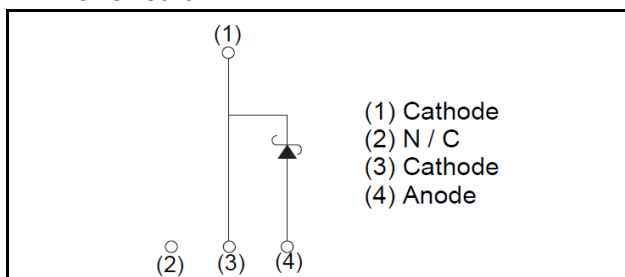
### ●Applications

- Switch Mode Power Supply
- Uninterruptible Power Supply
- Solar Inverter
- Motor Drive
- Air Conditioner
- EV Charger

### ●Outline



### ●Inner circuit



### ●Packaging specifications

| Type | Packaging                 | Embossed tape |
|------|---------------------------|---------------|
|      | Reel size (mm)            | 330           |
|      | Tape width (mm)           | 24            |
|      | Basic ordering unit (pcs) | 1.000         |
|      | Packing code              | TLL           |
|      | Marking                   | SCS302AJ      |

### ●Absolute maximum ratings ( $T_j = 25^\circ\text{C}$ )

| Parameter                                                |                                                        | Symbol        | Value            | Unit             |
|----------------------------------------------------------|--------------------------------------------------------|---------------|------------------|------------------|
| Reverse voltage (repetitive peak)                        |                                                        | $V_{RM}$      | 650              | V                |
| Reverse voltage (DC)                                     |                                                        | $V_R$         | 650              | V                |
| Continuous forward current ( $T_c = 150^\circ\text{C}$ ) |                                                        | $I_F$         | 2.15             | A                |
| Surge non-repetitive forward current                     | PW=10ms sinusoidal, $T_j=25^\circ\text{C}$             | $I_{FSM}$     | 19               | A                |
|                                                          | PW=10ms sinusoidal, $T_j=150^\circ\text{C}$            |               | 16               | A                |
|                                                          | PW=10μs square, $T_j=25^\circ\text{C}$                 |               | 70               | A                |
| Repetitive peak forward current                          |                                                        | $I_{FRM}$     | 12 <sup>*1</sup> | A                |
| $i^2t$ value                                             | $1 \leq PW \leq 10\text{ms}$ , $T_j=25^\circ\text{C}$  | $\int i^2 dt$ | 1                | A <sup>2</sup> s |
|                                                          | $1 \leq PW \leq 10\text{ms}$ , $T_j=150^\circ\text{C}$ |               | 1                | A <sup>2</sup> s |
| Total power dissipation                                  |                                                        | $P_D$         | 24 <sup>*2</sup> | W                |
| Junction temperature                                     |                                                        | $T_j$         | 175              | °C               |
| Range of storage temperature                             |                                                        | $T_{stg}$     | -55 to +175      | °C               |

\*1  $T_c=100^\circ\text{C}$ ,  $T_j=150^\circ\text{C}$ , Duty cycle=10% \*2  $T_c=25^\circ\text{C}$

**●Electrical characteristics ( $T_j = 25^\circ\text{C}$ )**

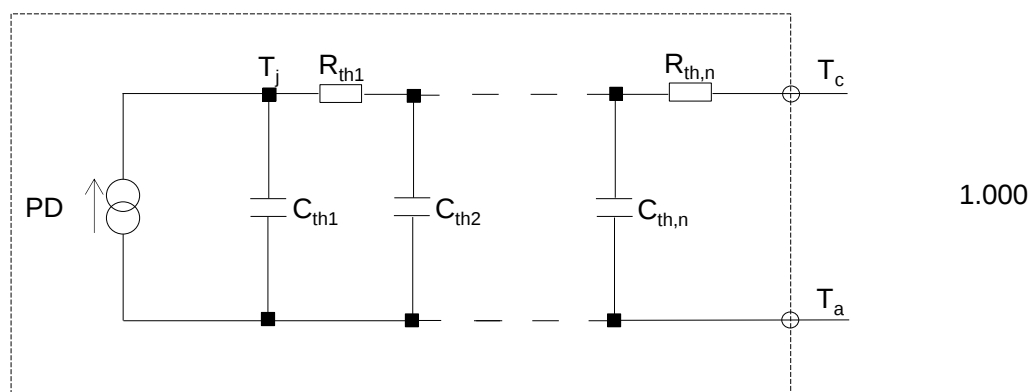
| Parameter                       | Symbol    | Conditions                                           | Values |        |      | Unit          |
|---------------------------------|-----------|------------------------------------------------------|--------|--------|------|---------------|
|                                 |           |                                                      | Min.   | Typ.   | Max. |               |
| DC blocking voltage             | $V_{DC}$  | $I_R = 10.8\mu\text{A}$                              | 650    | -      | -    | V             |
| Forward voltage                 | $V_F$     | $I_F = 2.15\text{A}, T_j = 25^\circ\text{C}$         | -      | 1.35   | 1.50 | V             |
|                                 |           | $I_F = 2.15\text{A}, T_j = 150^\circ\text{C}$        | -      | 1.44   | 1.71 | V             |
|                                 |           | $I_F = 2.15\text{A}, T_j = 175^\circ\text{C}$        | -      | 1.50   | -    | V             |
| Reverse current                 | $I_R$     | $V_R = 650\text{V}, T_j = 25^\circ\text{C}$          | -      | 0.0065 | 10.8 | $\mu\text{A}$ |
|                                 |           | $V_R = 650\text{V}, T_j = 150^\circ\text{C}$         | -      | 0.43   | 43   | $\mu\text{A}$ |
|                                 |           | $V_R = 650\text{V}, T_j = 175^\circ\text{C}$         | -      | 1.29   | -    | $\mu\text{A}$ |
| Total capacitance               | $C$       | $V_R = 1\text{V}, f = 1\text{MHz}$                   | -      | 110    | -    | pF            |
|                                 |           | $V_R = 650\text{V}, f = 1\text{MHz}$                 | -      | 10     | -    | pF            |
| Total capacitive charge         | $Q_C$     | $V_R = 400\text{V}, di/dt = 350\text{A}/\mu\text{s}$ | -      | 6      | -    | nC            |
| Switching time                  | $t_C$     | $V_R = 400\text{V}, di/dt = 350\text{A}/\mu\text{s}$ | -      | 11     | -    | ns            |
| Non-repetitive Avalanche Energy | $E_{ava}$ | $L = 1\text{mH}$                                     | -      | 18     | -    | mJ            |

**●Thermal characteristics**

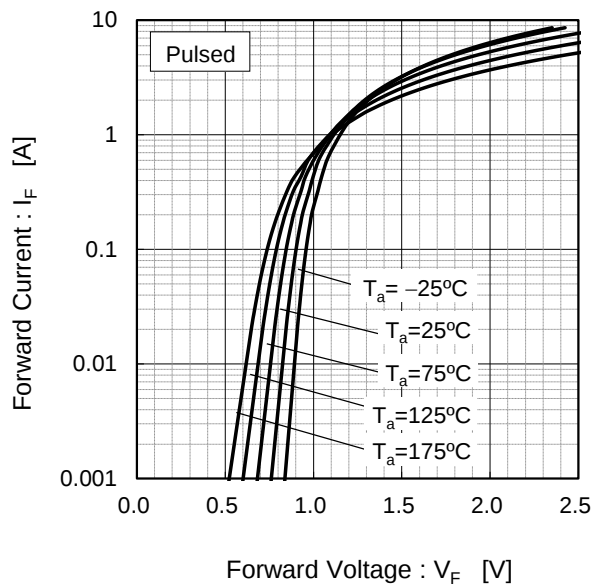
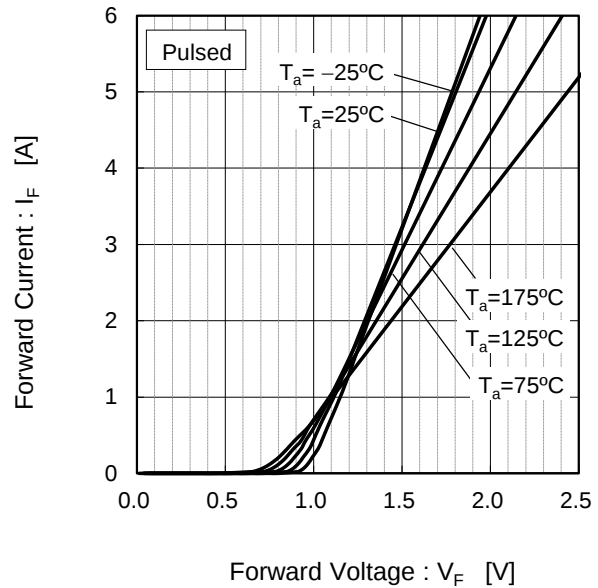
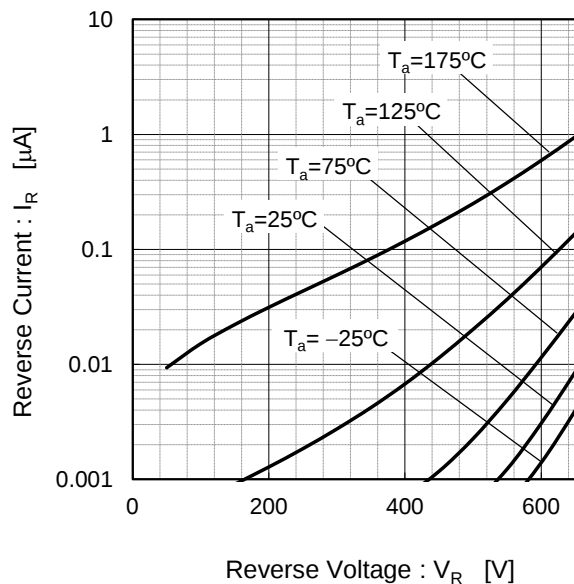
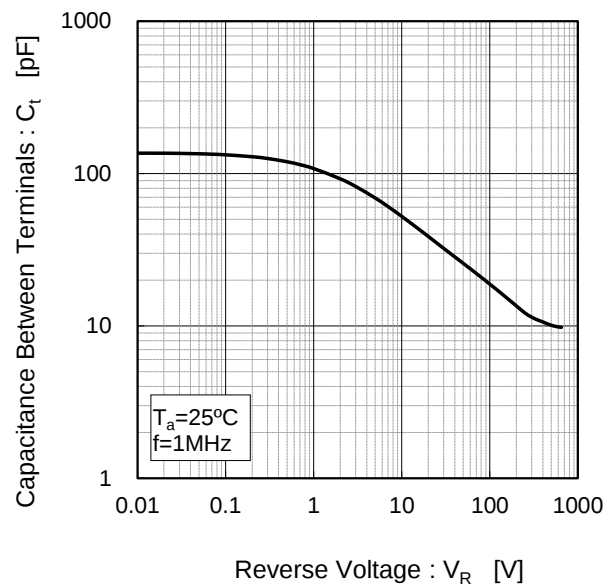
| Parameter          | Symbol        | Conditions | Values |      |      | Unit                      |
|--------------------|---------------|------------|--------|------|------|---------------------------|
|                    |               |            | Min.   | Typ. | Max. |                           |
| Thermal resistance | $R_{th(j-c)}$ | -          | -      | 4.6  | 6.1  | $^\circ\text{C}/\text{W}$ |

**●Typical Transient Thermal Characteristics**

| Symbol    | Value    | Unit | Symbol    | Value    | Unit |
|-----------|----------|------|-----------|----------|------|
| $R_{th1}$ | 9.89E-01 | K/W  | $C_{th1}$ | 3.94E-05 | Ws/K |
| $R_{th2}$ | 3.57E+00 |      | $C_{th2}$ | 1.06E-03 |      |
| $R_{th3}$ | 1.11E-02 |      | $C_{th3}$ | 3.34E-01 |      |



# ●Electrical characteristic curves

Fig.1  $V_F - I_F$  CharacteristicsFig.2  $V_F - I_F$  CharacteristicsFig.3  $V_R - I_R$  CharacteristicsFig.4  $V_R - C_t$  Characteristics

# ●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

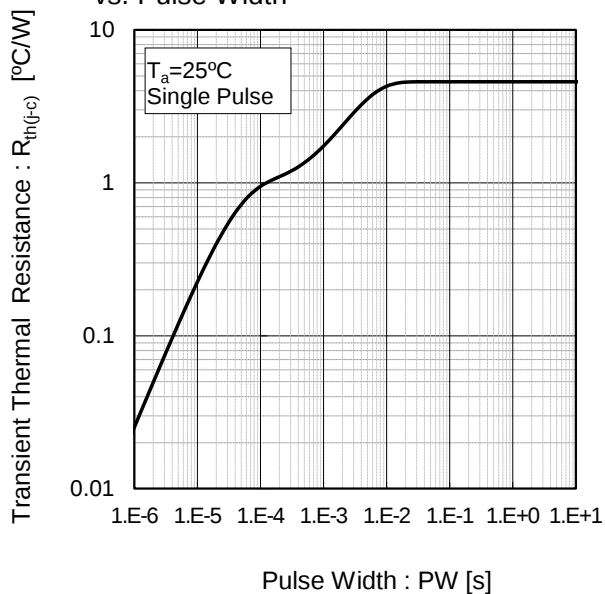


Fig.6 Power Dissipation

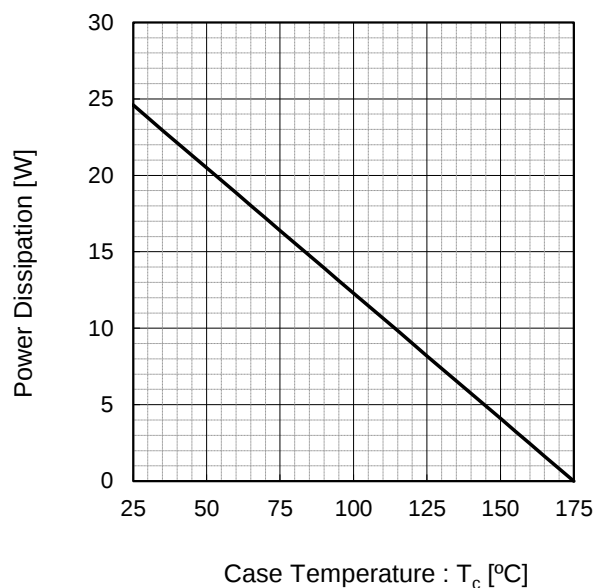
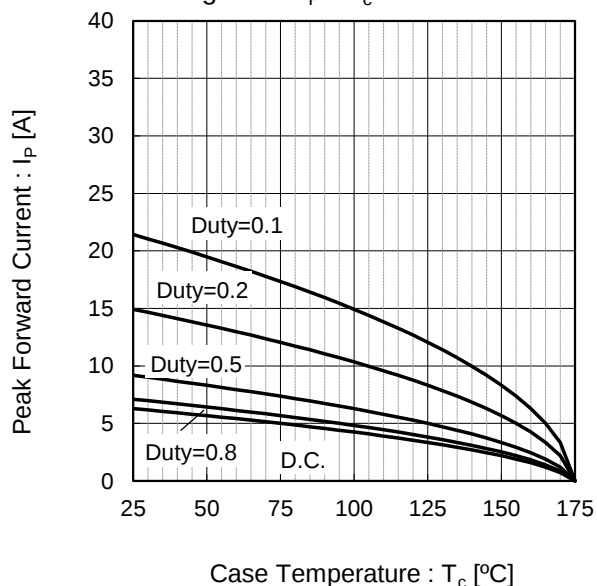
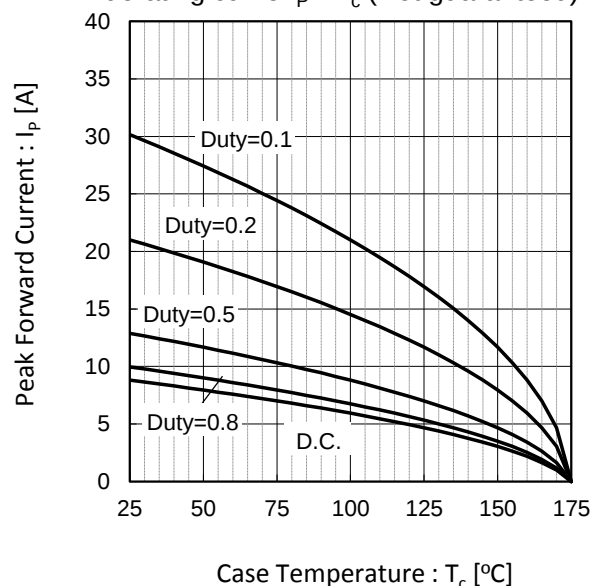


Fig.7\*3 Maximum peak forward current derating curve  $I_p - T_c$



\*3 Based on max  $V_f$ , max  $R_{th(j-c)}$   
Valid for switching of above 10kHz,  
excluding D.C. curve.

Fig.8\*4 Typical peak forward current derating curve  $I_p - T_c$  (Not guaranteed)



\*4 Based on typ  $V_f$ , typ  $R_{th(j-c)}$   
Typical value, not guaranteed  
Valid for switching of above 10kHz,  
excluding D.C. curve

## ●Electrical characteristic curves

Fig.9 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform)

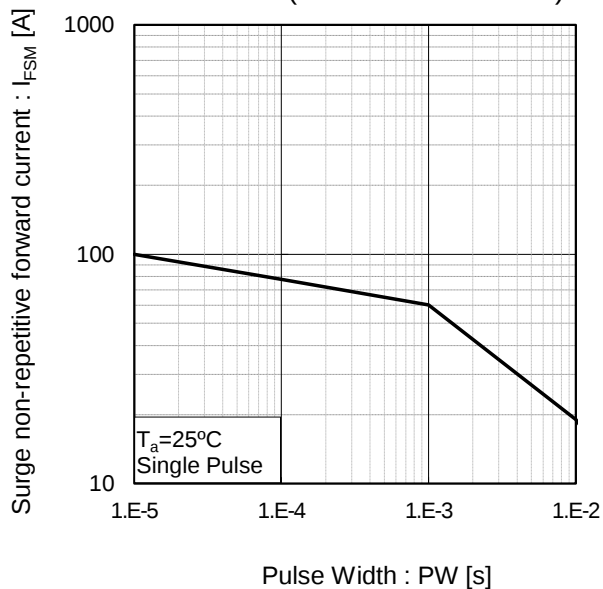
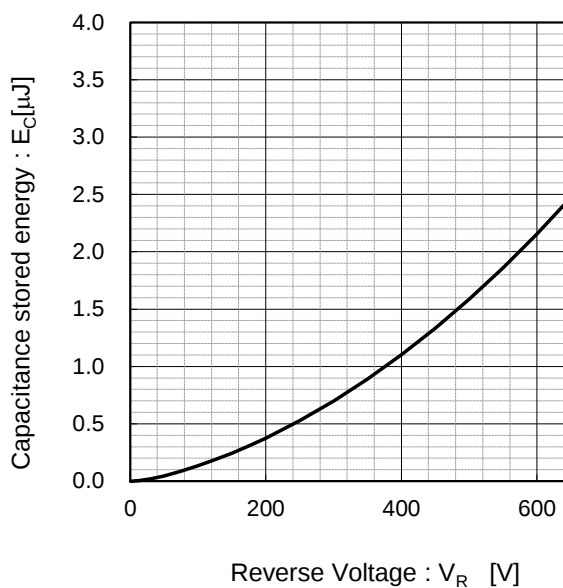
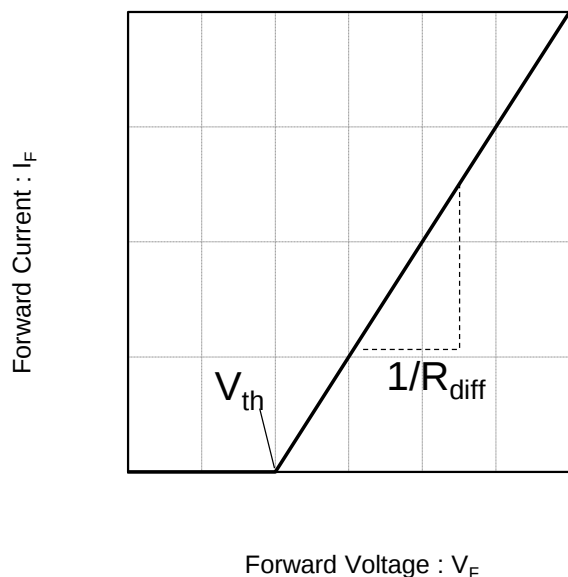


Fig.10 Typical capacitance store energy



## ●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



$$V_F = V_{th} + R_{diff} I_F$$

$$V_{th}(T_j) = a_0 + a_1 T_j$$

$$R_{diff}(T_j) = b_0 + b_1 T_j + b_2 T_j^2$$

| Symbol | Typical Value | Unit                      |
|--------|---------------|---------------------------|
| $a_0$  | 9.66E-01      | V                         |
| $a_1$  | -1.10E-03     | V/ $^\circ\text{C}$       |
| $b_0$  | 1.64E-01      | $\Omega$                  |
| $b_1$  | 3.47E-04      | $\Omega/^\circ\text{C}$   |
| $b_2$  | 3.57E-06      | $\Omega/^\circ\text{C}^2$ |

$T_j$  in  $^\circ\text{C}$ ;  $-55^\circ\text{C} < T_j < 175^\circ\text{C}$ ;  $I_F < 4 \text{ A}$

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## SCS302AJ - Web Page

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|                             |                 |
|-----------------------------|-----------------|
| Part Number                 | SCS302AJ        |
| Package                     | TO-263AB (LPTL) |
| Unit Quantity               | 1000            |
| Minimum Package Quantity    | 1000            |
| Packing Type                | Taping          |
| Constitution Materials List | inquiry         |
| RoHS                        | Yes             |

# Mouser Electronics

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