

|       |      |
|-------|------|
| $V_R$ | 650V |
| $I_F$ | 15A  |
| $Q_C$ | 23nC |

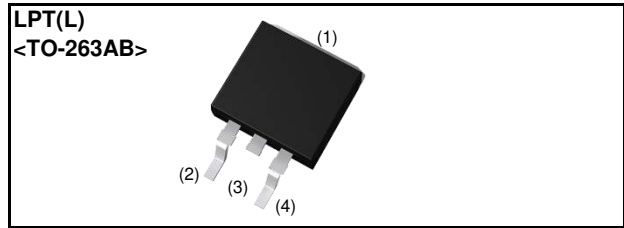
### ●Features

- 1) Shorter recovery time
- 2) Reduced temperature dependence
- 3) High-speed switching possible

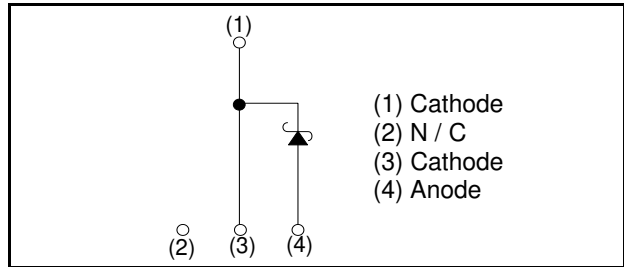
### ●Applications

- PFC Boost Topology
- Secondary Side Rectification
- Data Center
- PV Power Conditioners

### ●Outline



### ●Inner circuit



### ●Packaging specifications

| Type | Packaging                 | Embossed tape |
|------|---------------------------|---------------|
|      | Reel size (mm)            | 330           |
|      | Tape width (mm)           | 24            |
|      | Basic ordering unit (pcs) | 1000          |
|      | Packing code              | TLL           |
|      | Marking                   | SCS215AJ      |

### ●Absolute maximum ratings ( $T_{vj} = 25^\circ\text{C}$ unless otherwise specified)

| Parameter  | Symbol        | Value   | Unit             |                      |
|--|---------------|---|------------------|----------------------|
| Reverse voltage (repetitive peak)                        | $V_{RM}$      | 650   | V                |                      |
| Reverse voltage (DC)                                     | $V_R$         | 650   | V                |                      |
| Continuous forward current ( $T_c = 128^\circ\text{C}$ ) | $I_F$         | 15 *1   | A                |                      |
| Surge non-repetitive forward current                     | $I_{FSM}$     | PW=10ms sinusoidal, $T_{vj}=25^\circ\text{C}$         | 52               | A                    |
|  |               | PW=10ms sinusoidal, $T_{vj}=150^\circ\text{C}$        | 41               | A                    |
|  |               | PW=10 $\mu\text{s}$ square, $T_{vj}=25^\circ\text{C}$ | 200              | A                    |
| Repetitive peak forward current                          | $I_{FRM}$     | 60 *2   | A                |                      |
| $i^2t$ value   | $\int i^2 dt$ | PW=10ms, $T_{vj}=25^\circ\text{C}$                    | 14               | $\text{A}^2\text{s}$ |
|  |               | PW=10ms, $T_{vj}=150^\circ\text{C}$                   | 8.4              | $\text{A}^2\text{s}$ |
| Total power dissipation                                  | $P_D$         | 100 *3  | W                |                      |
| Virtual Junction temperature                             | $T_{vj}$      | 175   | $^\circ\text{C}$ |                      |
| Range of storage temperature                             | $T_{stg}$     | -55 to +175   | $^\circ\text{C}$ |                      |

\*1 Limited by maximum  $T_{vj}$  and for Max.  $R_{thJC}$ .

\*2  $T_c=100^\circ\text{C}$ ,  $T_{vj}=150^\circ\text{C}$ , Duty cycle=10% \*3  $T_c=25^\circ\text{C}$

● **Electrical characteristics** ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)

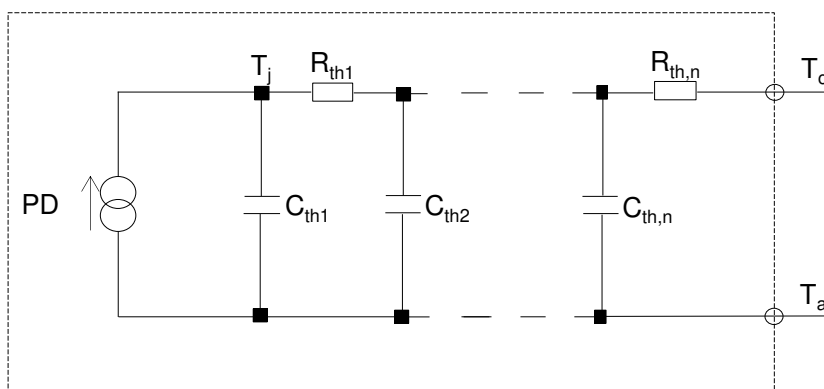
| Parameter               | Symbol   | Conditions                                       | Values |      |      | Unit          |
|-------------------------|----------|--|--------|------|------|---------------|
|                         |          |  | Min.   | Typ. | Max. |               |
| DC blocking voltage     | $V_{DC}$ | $I_R=3.0\text{mA}$                               | 650    | -    | -    | V             |
| Forward voltage         | $V_F$    | $I_F=15\text{A}, T_{vj}=25^{\circ}\text{C}$      | -      | 1.35 | 1.55 | V             |
|                         |          | $I_F=15\text{A}, T_{vj}=150^{\circ}\text{C}$     | -      | 1.55 | -    | V             |
|                         |          | $I_F=15\text{A}, T_{vj}=175^{\circ}\text{C}$     | -      | 1.63 | -    | V             |
| Reverse current         | $I_R$    | $V_R=600\text{V}, T_{vj}=25^{\circ}\text{C}$     | -      | 3    | 300  | $\mu\text{A}$ |
|                         |          | $V_R=600\text{V}, T_{vj}=150^{\circ}\text{C}$    | -      | 45   | -    | $\mu\text{A}$ |
|                         |          | $V_R=600\text{V}, T_{vj}=175^{\circ}\text{C}$    | -      | 105  | -    | $\mu\text{A}$ |
| Total capacitance       | C        | $V_R=1\text{V}, f=1\text{MHz}$                   | -      | 550  | -    | pF            |
|                         |          | $V_R=600\text{V}, f=1\text{MHz}$                 | -      | 56   | -    | pF            |
| Total capacitive charge | $Q_C$    | $V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$ | -      | 23   | -    | nC            |
| Switching time          | $t_c$    | $V_R=400\text{V}, di/dt=350\text{A}/\mu\text{s}$ | -      | 18   | -    | ns            |

● **Thermal characteristics**

| Parameter          | Symbol        | Conditions | Values |      |      | Unit |
|--------------------|---------------|------------|--------|------|------|------|
|                    |               |            | Min.   | Typ. | Max. |      |
| Thermal resistance | $R_{th(j-c)}$ | -          | -      | 1.2  | 1.5  | K/W  |

● **Typical Transient Thermal Characteristics**

| Symbol    | Value                | Unit | Symbol    | Value                | Unit |
|-----------|----------------------|------|-----------|----------------------|------|
| $R_{th1}$ | $2.3 \times 10^{-1}$ | K/W  | $C_{th1}$ | $2.4 \times 10^{-3}$ | Ws/K |
| $R_{th2}$ | $7.3 \times 10^{-1}$ |      | $C_{th2}$ | $3.4 \times 10^{-3}$ |      |
| $R_{th3}$ | $5.3 \times 10^{-1}$ |      | $C_{th3}$ | $6.4 \times 10^{-2}$ |      |



●Electrical characteristic curves

Fig.1  $V_F - I_F$  Characteristics

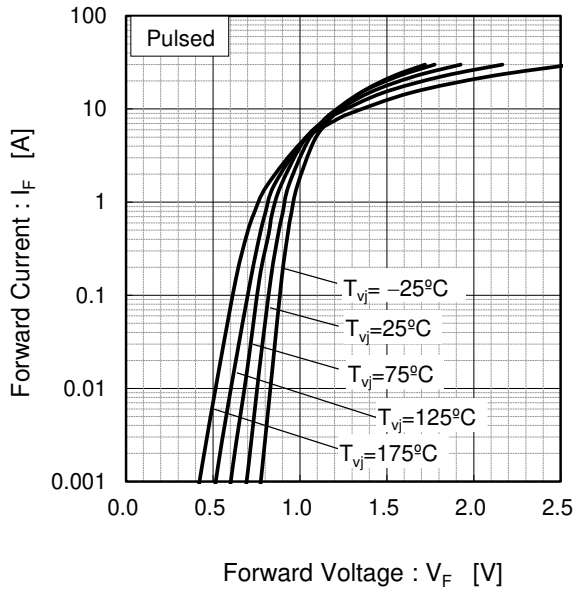


Fig.2  $V_F - I_F$  Characteristics

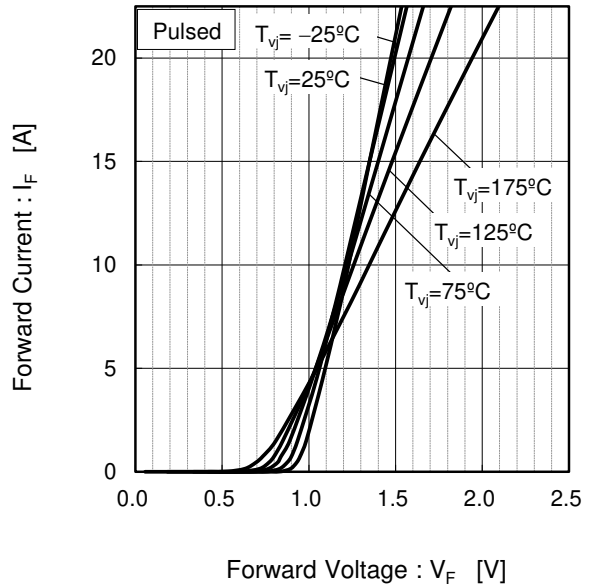


Fig.3  $V_R - I_R$  Characteristics

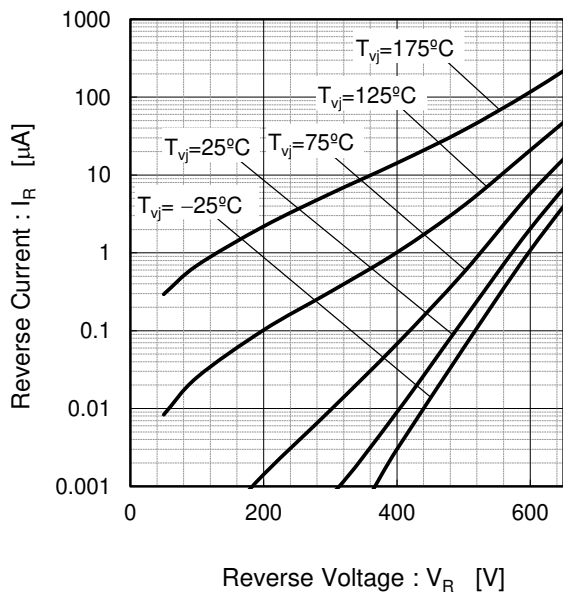
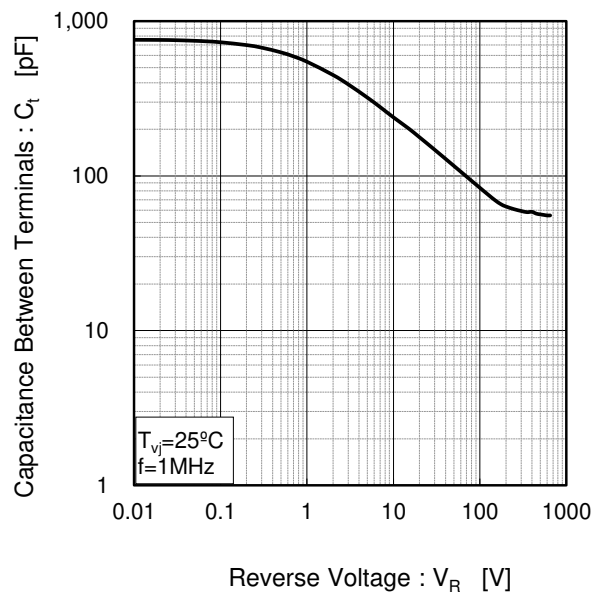


Fig.4  $V_R - C_t$  Characteristics



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Impedance vs. Pulse Width

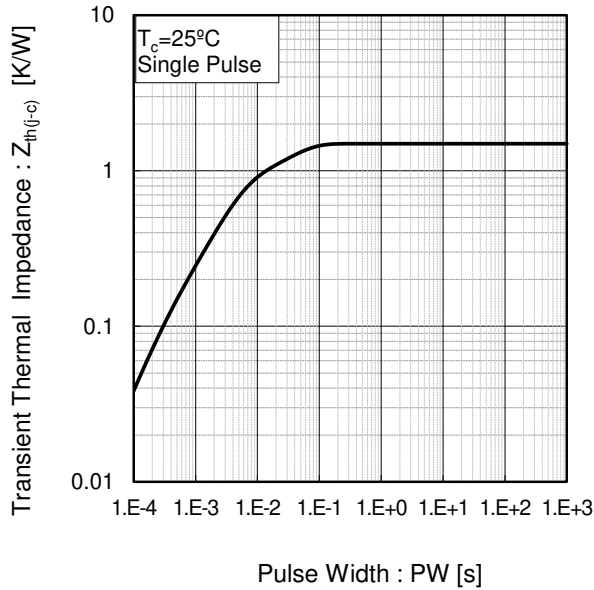


Fig.6 Power Dissipation

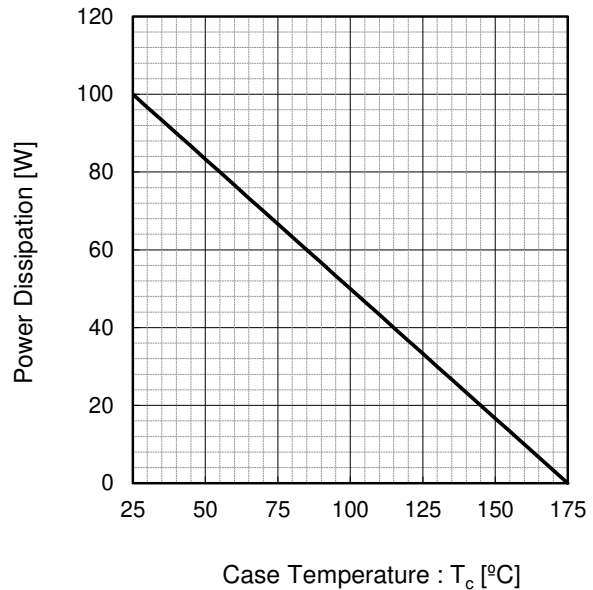
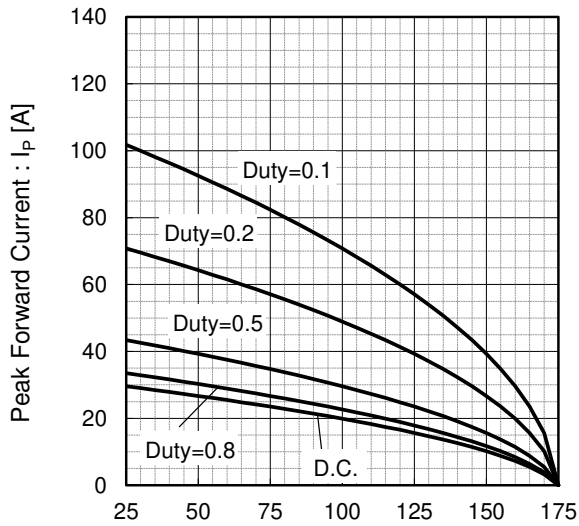
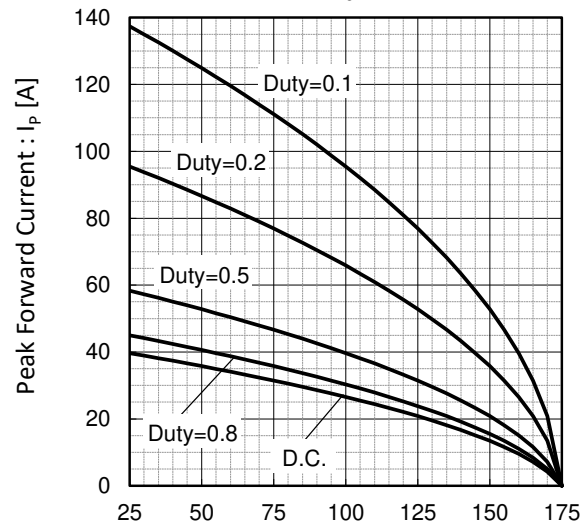


Fig.7\*4 Maximum peak forward current derating curve  $I_P - T_C$



Case Temperature :  $T_C$  [°C]  
 \*4 Based on max Vf, max  $Z_{th(j-c)}$   
 Valid for switching of above 10kHz,  
 excluding D.C. curve.

Fig.8\*5 Typical peak forward current derating curve  $I_P - T_C$  (Not guaranteed)



Case Temperature :  $T_C$  [°C]  
 \*5 Based on typ Vf, typ  $Z_{th(j-c)}$   
 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)

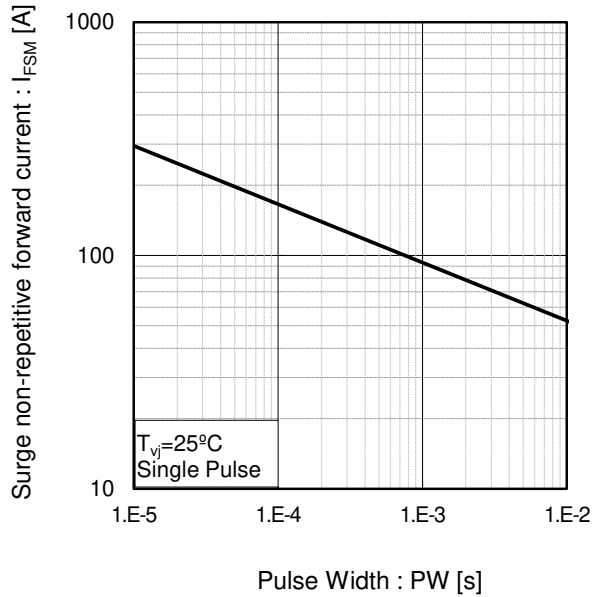
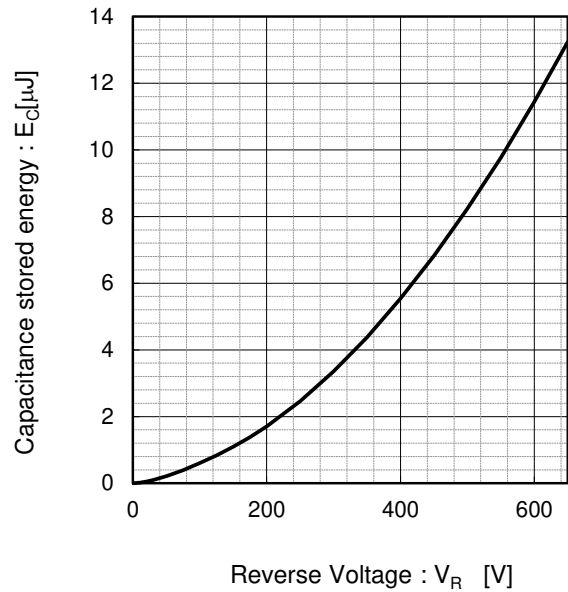
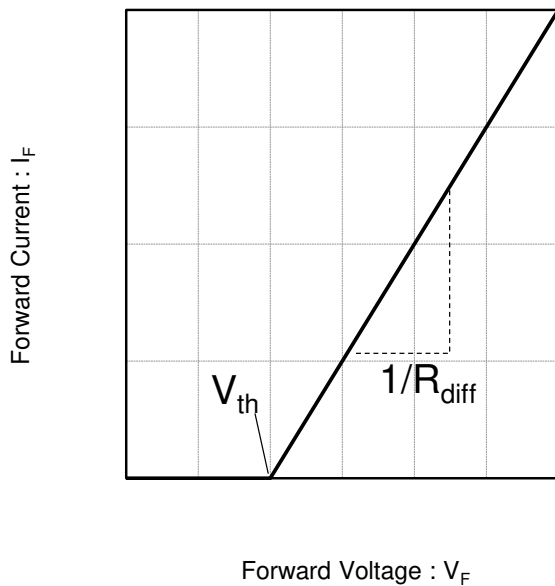


Fig.10 Typical capacitance store energy



●Simplified forward characteristic model

Fig.11 Equivalent forward current curve



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

$$V_{th} ( T_{vj} ) = a_0 + a_1 T_{vj}$$

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

| Symbol | Typical Value         | Unit              |
|--------|-----------------------|-------------------|
| $a_0$  | $9.4 \times 10^{-1}$  | V                 |
| $a_1$  | $-1.1 \times 10^{-3}$ | V/°C              |
| $b_0$  | $2.7 \times 10^{-2}$  | Ω                 |
| $b_1$  | $6.8 \times 10^{-5}$  | Ω/°C              |
| $b_2$  | $7.2 \times 10^{-7}$  | Ω/°C <sup>2</sup> |

$T_{vj}$  in °C;  $-55 \text{ °C} < T_{vj} < 175 \text{ °C}$  ;  $I_F < 30 \text{ A}$

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