

| | |
|-------|---------------|
| V_R | 650V |
| I_F | 15A/30A* |
| Q_C | 23nC(Per leg) |

(*Per leg/ Both legs)

●Features

- 1) AEC-Q101 qualified
- 2) Low forward voltage
- 3) Negligible recovery time/current
- 4) Temperature independent switching behavior

●Applications

- On Board Charger
- DC/DC Converter
- Wireless Charger
- EV Charger

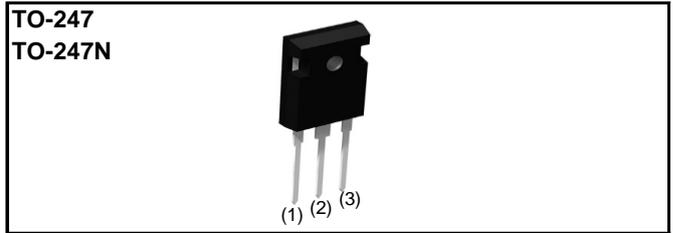
●Absolute maximum ratings ($T_j = 25^\circ\text{C}$)

| Parameter | Symbol | Value | Unit | |
|---|---------------|---|------------------|----------------------|
| Reverse voltage (repetitive peak) | V_{RM} | 650 | V | |
| Reverse voltage (DC) | V_R | 650 | V | |
| Continuous forward current *4 ($T_c = 134^\circ\text{C}$) | I_F | 15/30 | A | |
| Surge non-repetitive forward current *4 | I_{FSM} | PW=10ms sinusoidal, $T_j=25^\circ\text{C}$ | 52/100 | A |
| | | PW=10ms sinusoidal, $T_j=150^\circ\text{C}$ | 41/82 | A |
| | | PW=10μs square, $T_j=25^\circ\text{C}$ | 200/400 | A |
| Repetitive peak forward current*4 | I_{FRM} | 65/130*2 | A | |
| i^2t value*4 | $\int i^2 dt$ | PW=10ms, $T_j=25^\circ\text{C}$ | 13/55 | A^2s |
| | | PW=10ms, $T_j=150^\circ\text{C}$ | 8.4/33 | A^2s |
| Total power dissipation *4 | P_D | 110/230*3 | W | |
| Junction temperature | T_j | 175 | $^\circ\text{C}$ | |
| Range of storage temperature | T_{stg} | -55 to +175 | $^\circ\text{C}$ | |

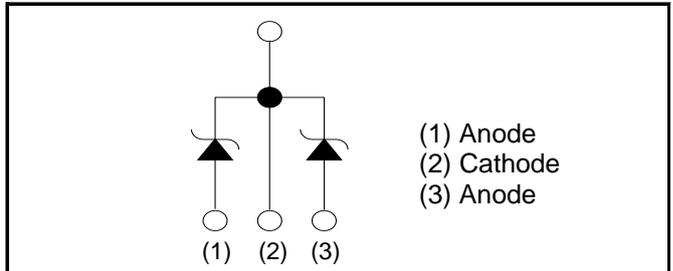
*1 Tolerances of dimensions and packing specifications slightly differ between TO-247 and TO-247N, which is unlikely to influence compatibility for mounting. Please refer to corresponding specifications of dimensions for more details.

*2 $T_c=100^\circ\text{C}$, $T_j=150^\circ\text{C}$, Duty cycle=10% *3 $T_c=25^\circ\text{C}$ *4 Per leg/ Both legs

●Outline



●Inner circuit



●Packaging specifications*1

| Package | TO-247 | TO-247N | |
|---------|---------------------------|-----------|-----|
| Type | Packing | Tube | |
| | Reel size (mm) | - | |
| | Tape width (mm) | - | |
| | Basic ordering unit (pcs) | 30 | |
| | Packing code | C | C11 |
| | Marking | SCS230AE2 | |

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

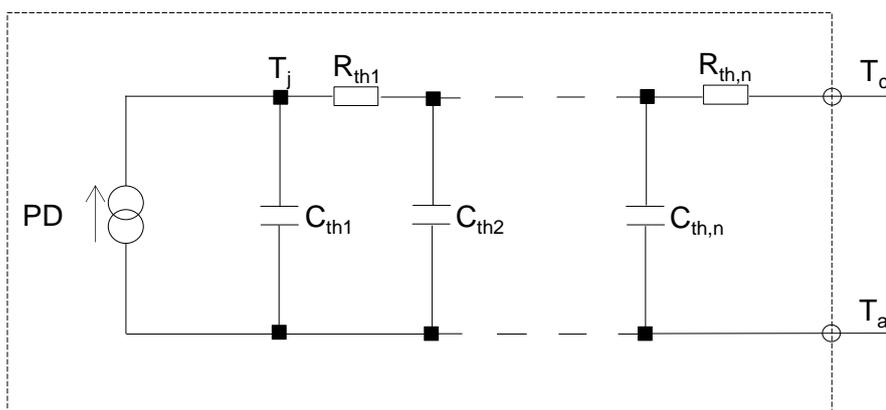
| Parameter | Symbol | Conditions | Values | | | Unit |
|-------------------------|----------|--|--------|------|------|---------------|
| | | | Min. | Typ. | Max. | |
| DC blocking voltage | V_{DC} | $I_R=3.0\text{mA}$ | 650 | - | - | V |
| Forward voltage | V_F | $I_F=15\text{A}, T_j=25^\circ\text{C}$ | - | 1.35 | 1.55 | V |
| | | $I_F=15\text{A}, T_j=150^\circ\text{C}$ | - | 1.55 | - | V |
| | | $I_F=15\text{A}, T_j=175^\circ\text{C}$ | - | 1.63 | - | V |
| Reverse current | I_R | $V_R=600\text{V}, T_j=25^\circ\text{C}$ | - | 3 | 300 | μA |
| | | $V_R=600\text{V}, T_j=150^\circ\text{C}$ | - | 45 | - | μA |
| | | $V_R=600\text{V}, T_j=175^\circ\text{C}$ | - | 105 | - | μA |
| 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 | $R_{th(j-c)}$ | Per Leg | - | 1.1 | 1.3 | $^\circ\text{C}/\text{W}$ |
| | | Both Legs | - | 0.55 | 0.65 | $^\circ\text{C}/\text{W}$ |

●Typical Transient Thermal Characteristics (Per Leg)

| Symbol | Value | Unit | Symbol | Value | Unit |
|-----------|-----------------------|------|-----------|-----------------------|------|
| R_{th1} | 2.90×10^{-1} | K/W | C_{th1} | 2.33×10^{-3} | Ws/K |
| R_{th2} | 8.03×10^{-1} | | C_{th2} | 8.15×10^{-3} | |
| R_{th3} | 8.54×10^{-3} | | C_{th3} | 5.82×10^{-1} | |



●Electrical characteristic curves

Fig.1 $V_F - I_F$ Characteristics (Per Leg)

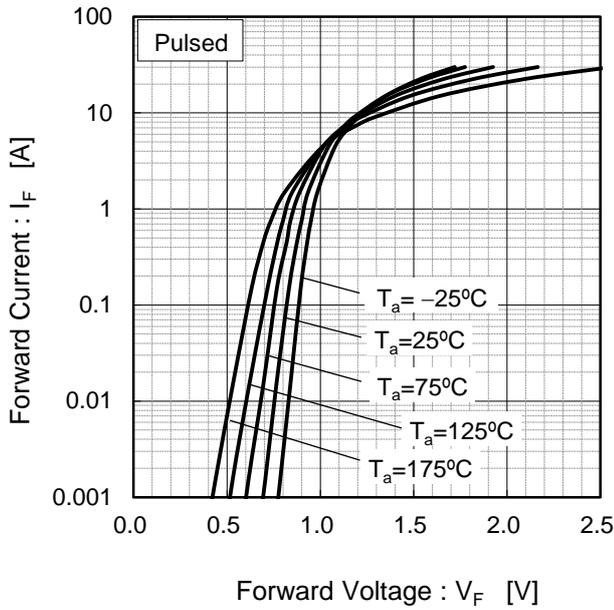


Fig.2 $V_F - I_F$ Characteristics (Per Leg)

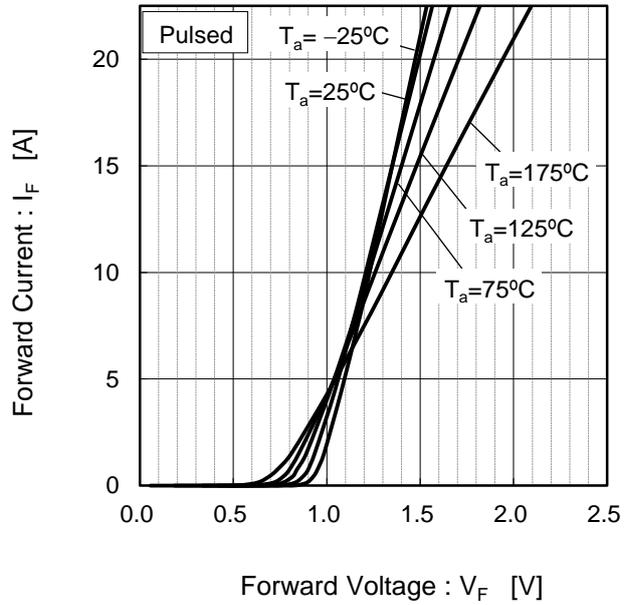


Fig.3 $V_R - I_R$ Characteristics (Per Leg)

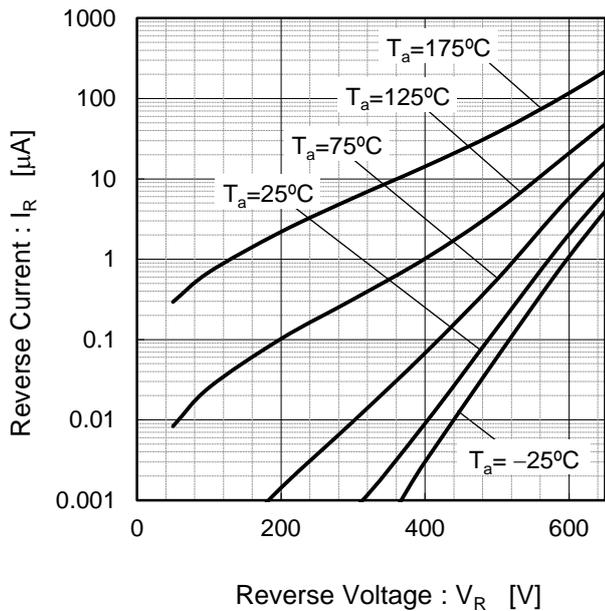
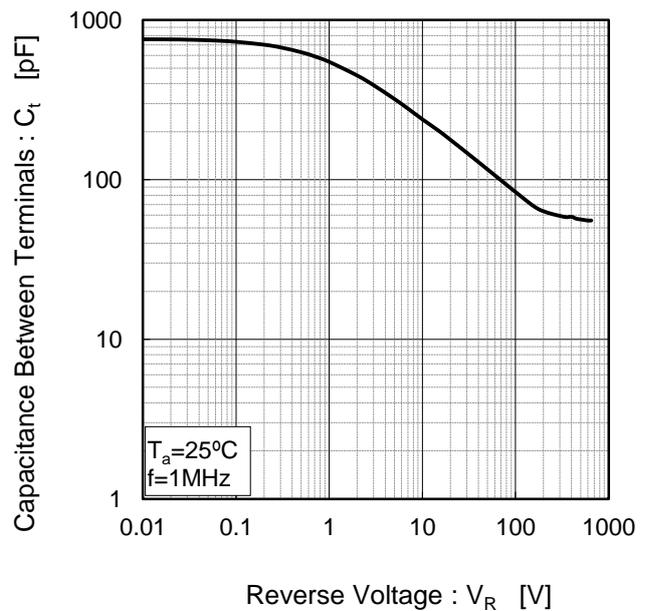


Fig.4 $V_R - C_t$ Characteristics (Per Leg)



●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width (Per Leg)

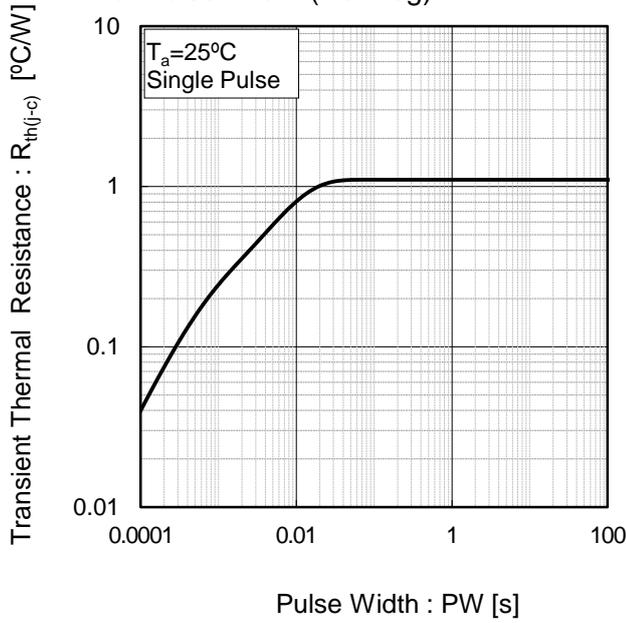


Fig.6 Power Dissipation (Per Leg)

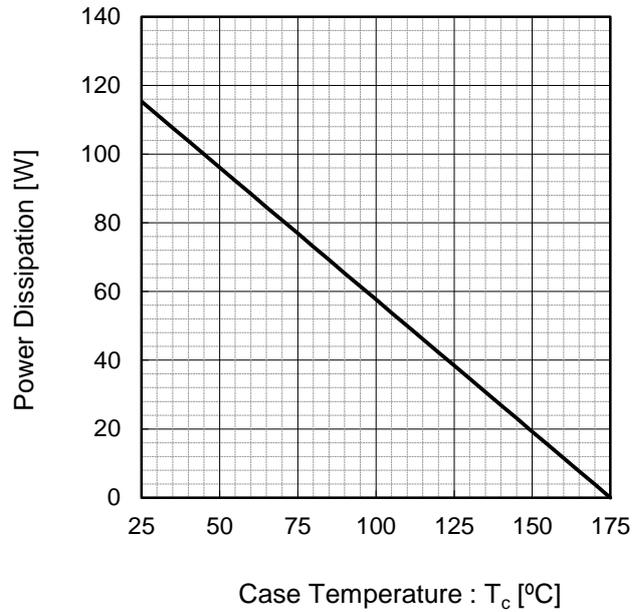
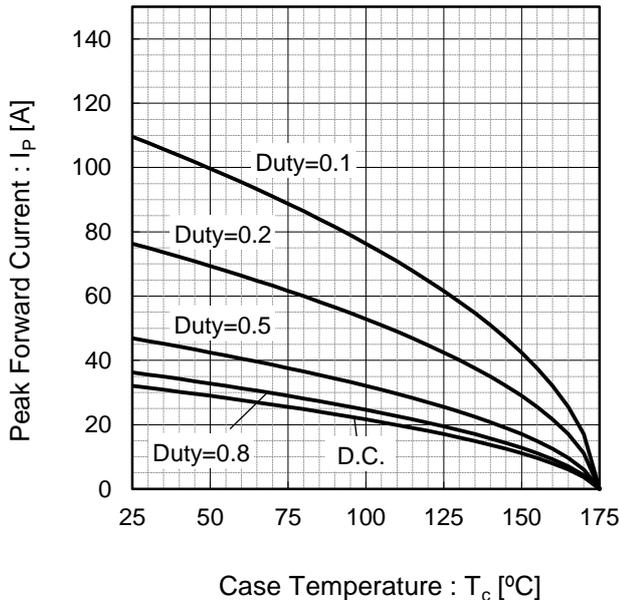
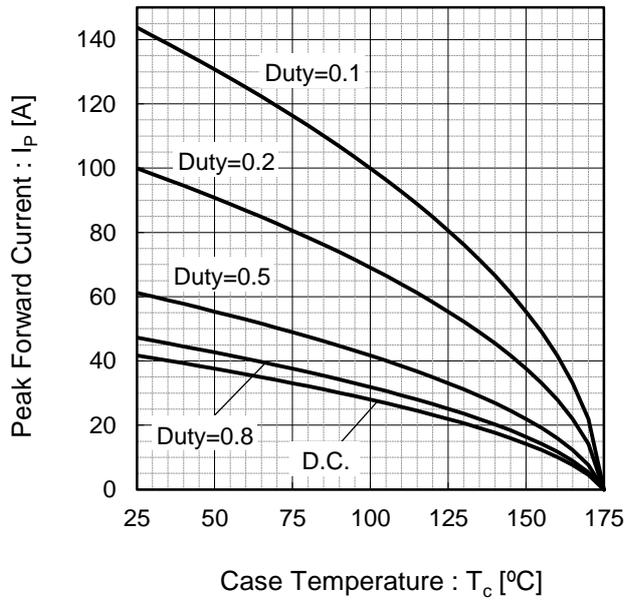


Fig.7*5 Maximum peak forward current derating curve $I_P - T_c$ (Per Leg)



Case Temperature : T_c [°C]
 *5 Based on max V_f , max $R_{th(j-c)}$
 Valid for switching of above 10kHz,
 excluding D.C. curve.

Fig.8*6 Typical peak forward current derating curve $I_P - T_c$ (Per Leg, Not guaranteed)



Case Temperature : T_c [°C]
 *6 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) (Per Leg)

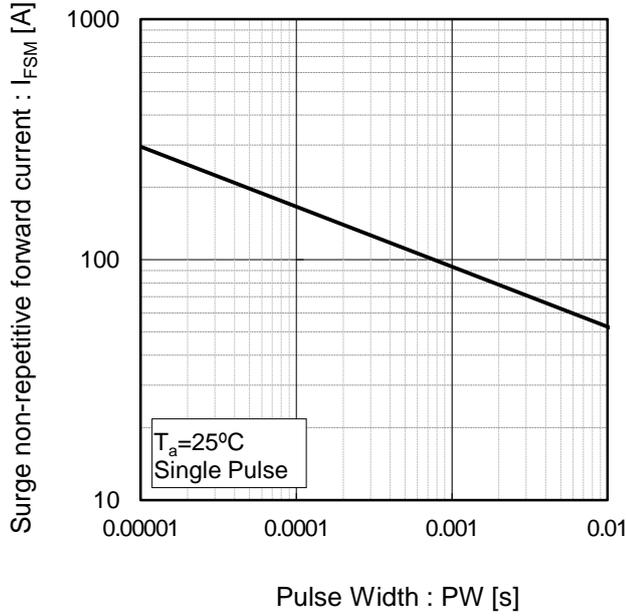
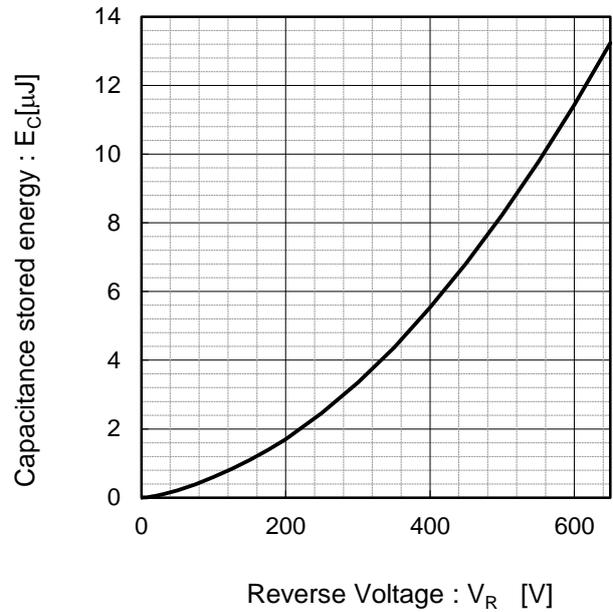
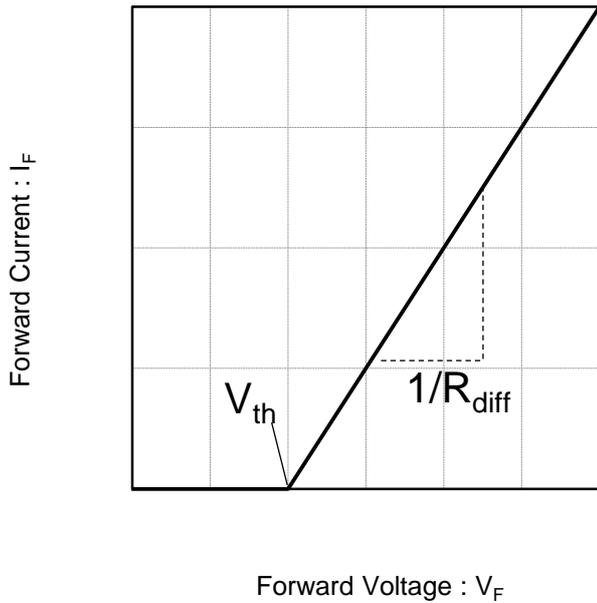


Fig.10 Typical capacitance store energy (Per Leg)



●Simplified forward characteristic model (Per Leg)

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 | 9.35×10 ⁻¹ | V |
| a ₁ | -1.12×10 ⁻³ | V/°C |
| b ₀ | 2.65×10 ⁻² | Ω |
| b ₁ | 6.80×10 ⁻⁵ | Ω/°C |
| b ₂ | 7.20×10 ⁻⁷ | Ω/°C ² |

T_j in °C; -55 °C < T_j < 175°C ; I_F < 30 A

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