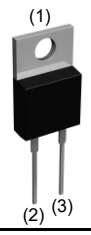
# SCS310AGHR

**Automotive Grade SiC Schottky Barrier Diode** Datasheet

| | |
|---|---|
| $V_R$ | 650V |
| $I_F$ | 10A |
| $Q_C$ | 24nC |

## ●Outline

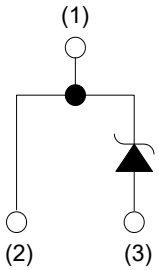
**TO-220ACGE**




## ●Features

1) AEC-Q101 qualified
2) High surge current capability
3) Low leakage current
4) Reduced temperature dependence
5) High-speed switching possible
6) Shorter recovery time

## ●Inner circuit




(1) Cathode
(2) Cathode
(3) Anode

## ●Applications

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

## ●Packaging specifications

| | | |
|---|---|---|
| Type | Packaging | Tube |
| | Reel size (mm) | - |
| | Tape width (mm) | - |
| | Basic ordering unit (pcs) | 50 |
| | Packing code | C16 |
| | Marking | SCS310AG |

## ●Absolute maximum ratings ($T_{vj}$=25°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 | ($T_c$= 135°C)*1 | $I_F$ | 10 | A |
| Surge non-repetitive forward current | PW=10ms sinusoidal, $T_{vj}$=25°C | $I_{FSM}$ | 82 | A |
| | PW=10ms sinusoidal, $T_{vj}$=150°C | | 69 | A |
| | PW=10μs square, $T_{vj}$=25°C | | 300 | A |
| Repetitive peak forward current | | $I_{FRM}$ | 45*2 | A |
| $i^2t$ value | 1≤PW≤10ms, $T_{vj}$=25°C | $\int i^2dt$ | 33 | $A^2s$ |
| | 1≤PW≤10ms, $T_{vj}$=150°C | | 23 | $A^2s$ |
| Total power dissipation | | $P_D$ | 71*3 | W |
| Virtual junction temperature | | $T_{vj}$ | 175 | °C |
| Range of storage temperature | | $T_{stg}$ | −55 to +175 | °C |

*1 Limited by maximum $T_{vj}$ and for Max. $R_{thJC}$. *2 $T_c$=100°C, $T_{vj}$=150°C, Duty cycle=10% *3 $T_c$=25°C


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## ●Electrical characteristics ($T_{vj}$=25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| DC blocking voltage | $V_{DC}$ | $I_R$ = 50μA | 650 | - | - | V |
| Forward voltage | $V_F$ | $I_F$ = 10A, $T_{vj}$ = 25°C | - | 1.35 | 1.50 | V |
| | | $I_F$ = 10A, $T_{vj}$ = 150°C | - | 1.44 | 1.71 | V |
| | | $I_F$ = 10A, $T_{vj}$ = 175°C | - | 1.50 | - | V |
| Reverse current | $I_R$ | $V_R$ = 650V, $T_{vj}$ = 25°C | - | 0.03 | 50 | μA |
| | | $V_R$ = 650V, $T_{vj}$ = 150°C | - | 2 | 200 | μA |
| | | $V_R$ = 650V, $T_{vj}$ = 175°C | - | 6 | - | μA |
| Total capacitance | C | $V_R$ = 1V, f = 1MHz | - | 500 | - | pF |
| | | $V_R$ = 650V, f = 1MHz | - | 46 | - | pF |
| Total capacitive charge | $Q_C$ | $V_R$ = 400V, di/dt = 350A/μs | - | 24 | - | nC |
| Switching time | $t_C$ | $V_R$ = 400V, di/dt = 350A/μs | - | 15 | - | ns |
| Non-repetitive Avalanche Energy | $E_{ava}$ | L = 1mH | - | 130 | - | mJ |

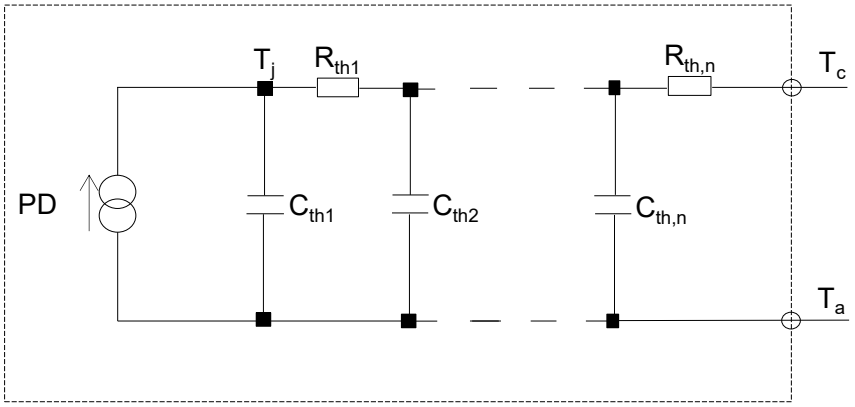
## ●Thermal characteristics

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Thermal resistance | $R_{thJC}$ | - | - | 1.5 | 2.1 | K/W |

## ●Typical Transient Thermal Characteristics

| Symbol | Value | Unit |
|---|---|---|
| $R_{th1}$ | $1.55\times10^{-2}$ | K/W |
| $R_{th2}$ | $1.46\times10^{-1}$ | |
| $R_{th3}$ | $1.32\times10^{0}$ | |

| Symbol | Value | Unit |
|---|---|---|
| $C_{th1}$ | $2.63\times10^{-4}$ | Ws/K |
| $C_{th2}$ | $1.00\times10^{-3}$ | |
| $C_{th3}$ | $2.13\times10^{-3}$ | |





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## ●Electrical characteristic curves

Fig.1 $V_F$ - $I_F$ Characteristics

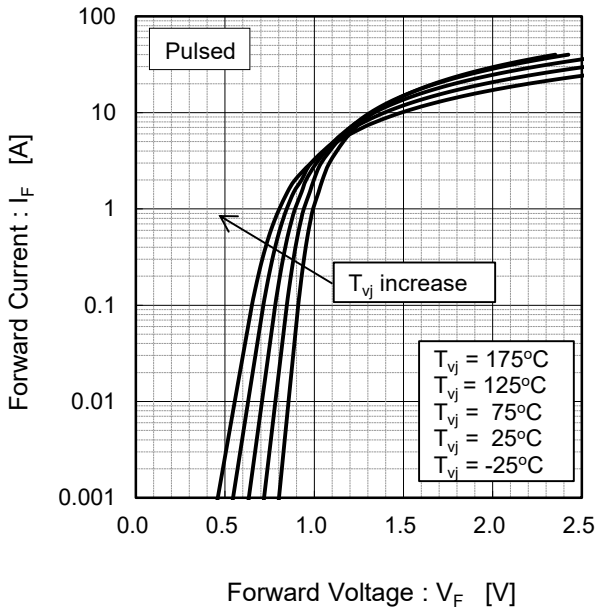



Fig.2 $V_F$ - $I_F$ Characteristics

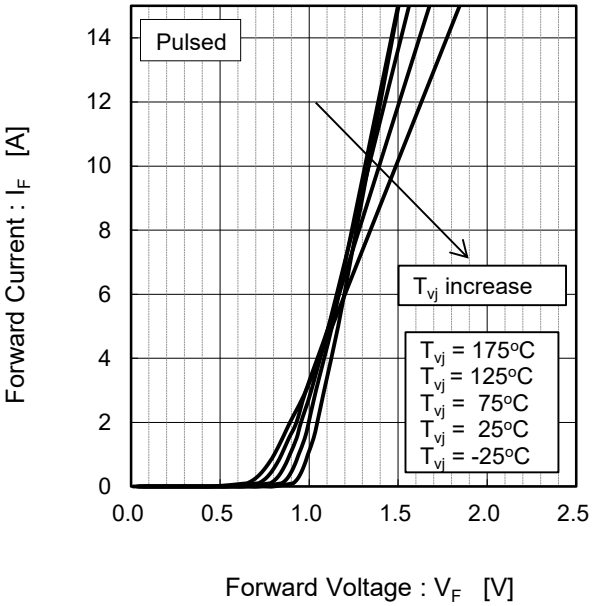



Fig.3 $V_R$ - $I_R$ Characteristics

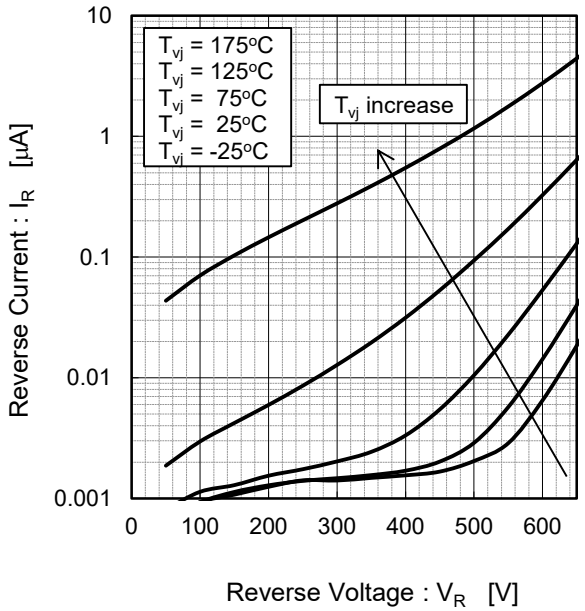
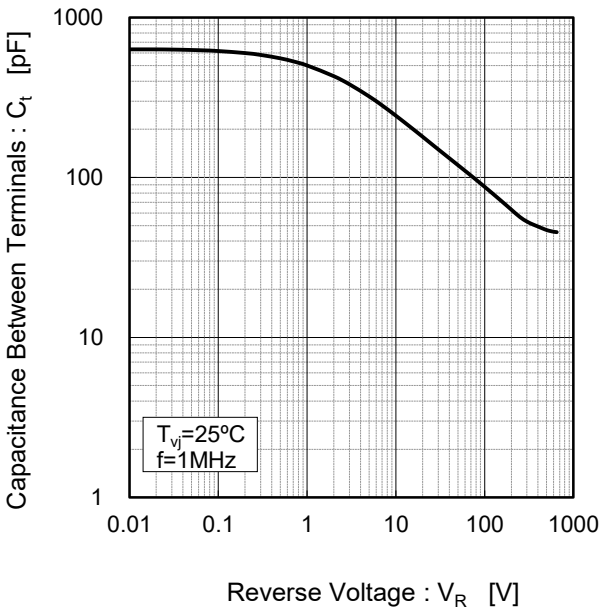



Fig.4 $V_R$-$C_t$ Characteristics





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## ●Electrical characteristic curves

Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

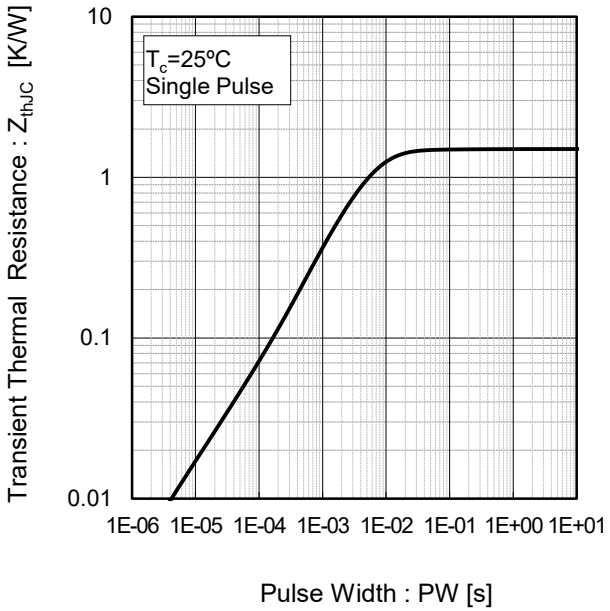



Fig.6 Power Dissipation

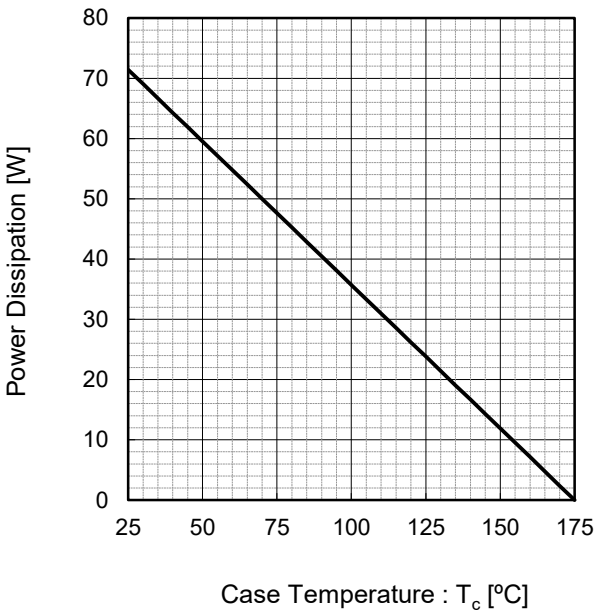
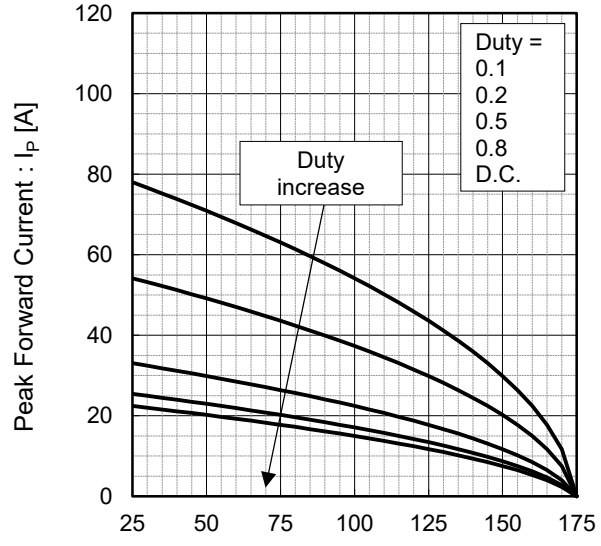
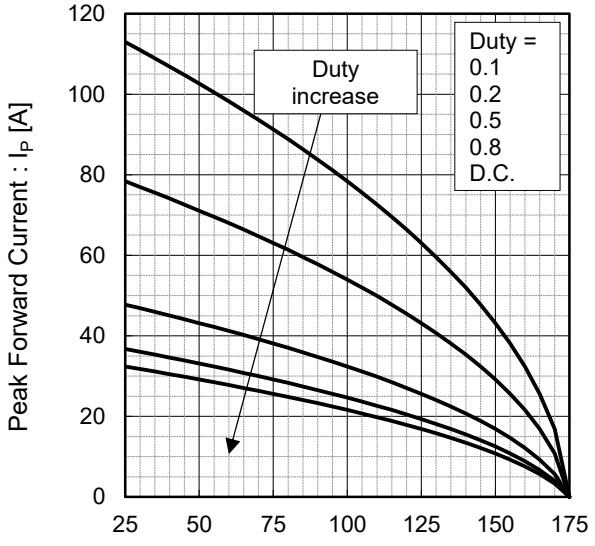



Fig.7*4 Maximum peak forward current derating curve $I_P$ - $T_c$




*4 Based on max Vf, max $R_{thJC}$
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)




*5 Based on typ Vf, typ $R_{thJC}$
Typical value, not guaranteed
Valid for switching of above 10kHz, excluding D.C. curve


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## ●Electrical characteristic curves

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

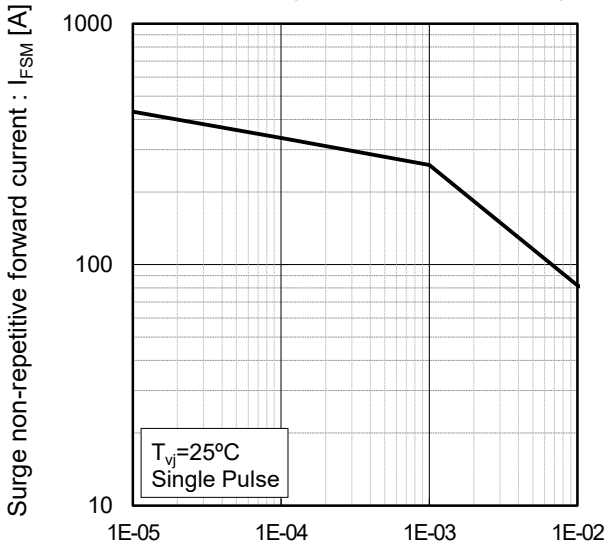
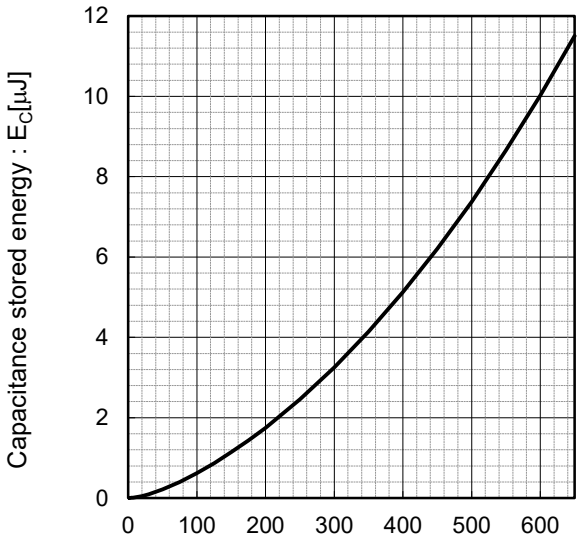
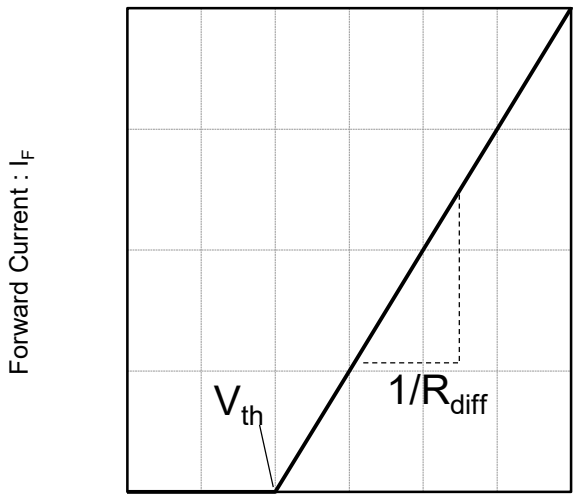



Fig.10 Typical capacitance stored energy




## ●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 |
|---|---|---|
| $a_0$ | $9.66\times10^{-1}$ | V |
| $a_1$ | $-1.1\times10^{-3}$ | V/°C |
| $b_0$ | $3.52\times10^{-2}$ | Ω |
| $b_1$ | $7.46\times10^{-5}$ | Ω/°C |
| $b_2$ | $7.68\times10^{-7}$ | Ω/°C$^2$ |

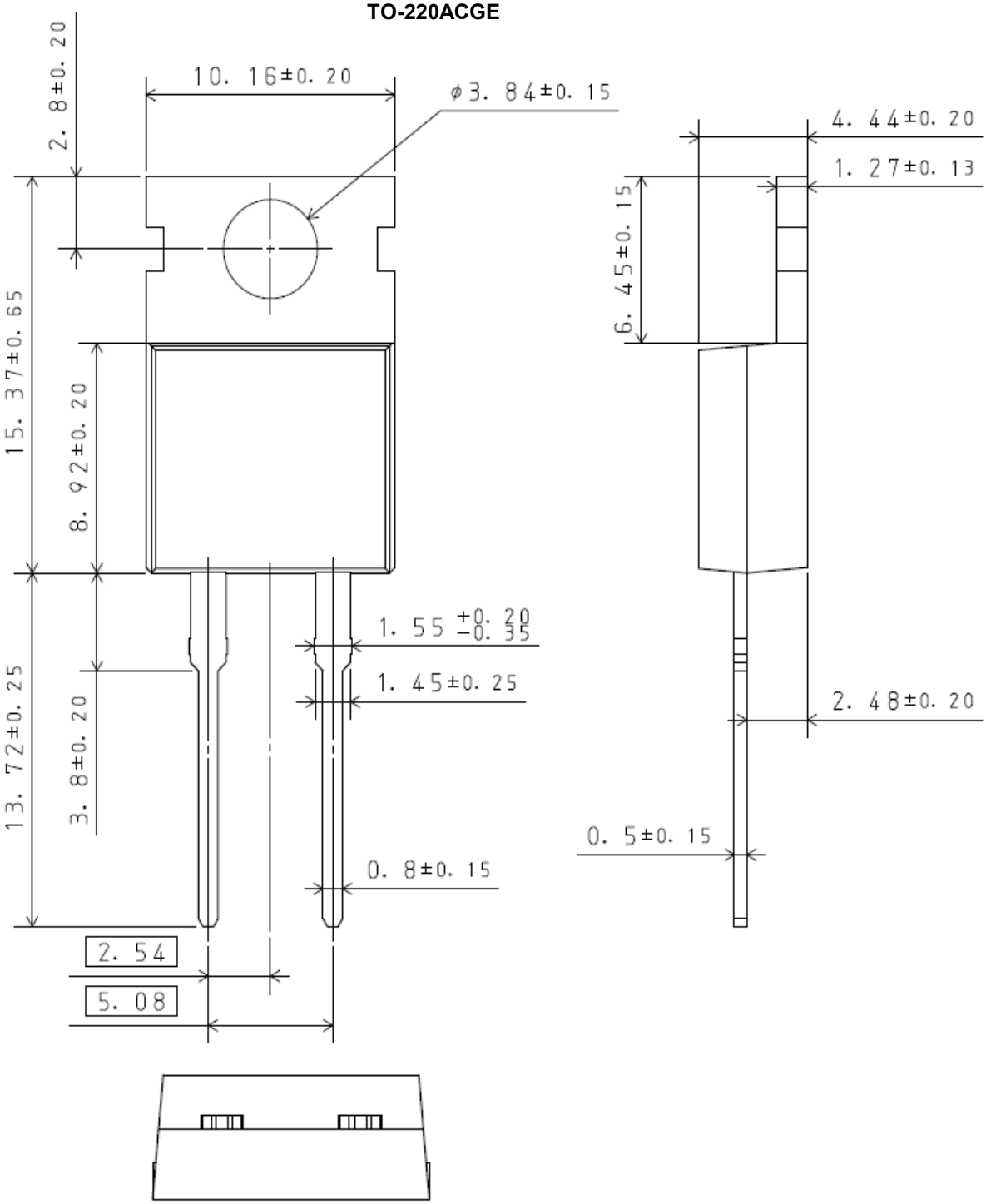
$T_{vj}$ in ºC; -55 ºC < $T_{vj}$ < 175ºC ; $I_F$ < 20 A


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●**Dimensions* (Unit : mm)** *Dimensions do not inculude mold flash, protrusion or gate burrs.

**TO-220ACGE**

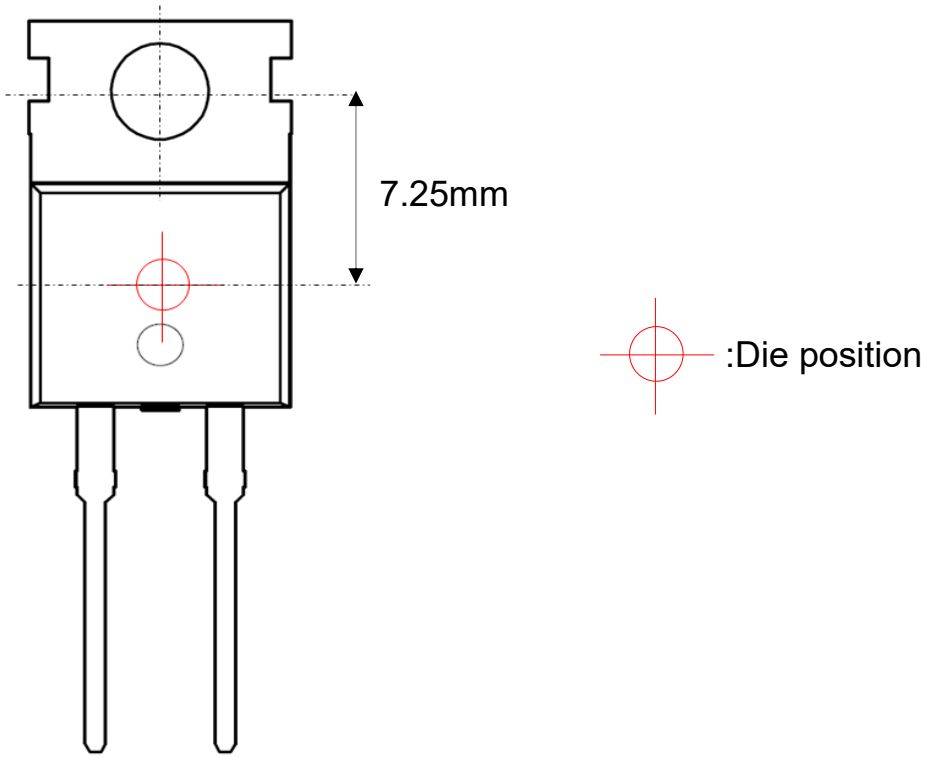




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## ●Die Bonding Layout




・Front view of the packaging.

・Dimensions are design values.

・If the heat sink is to be installed, it should be in contact with the die bonding point.

Unit: mm


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