

### Silicon Carbide Schottky Diode

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery
- No temperature influence on the switching behavior
- No forward recovery

#### Product Summary

|           |     |    |
|-----------|-----|----|
| $V_{RRM}$ | 300 | V  |
| $Q_C$     | 23  | nC |
| $I_F$     | 10  | A  |



| Type     | Package       | Ordering Code | Marking | Pin 1 | PIN 2 | PIN 3 |
|----------|---------------|---------------|---------|-------|-------|-------|
| SDP10S30 | P-TO220-3-1.  | Q67040-S4372  | D10S30  | n.c.  | C     | A     |
| SDB10S30 | P-TO220-3.SMD | Q67040-S4373  | D10S30  | n.c.  | C     | A     |
| SDT10S30 | P-TO220-2-2.  | Q67040-S4447  | D10S30  | C     | A     |       |

#### Maximum Ratings, at $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified

| Parameter   | Symbol         | Value       | Unit             |
|---|----------------|-------------|------------------|
| Continuous forward current, $T_C=100^\circ\text{C}$   | $I_F$          | 10          | A                |
| RMS forward current, $f=50\text{Hz}$  | $I_{FRMS}$     | 14          |                  |
| Surge non repetitive forward current, sine halfwave<br>$T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$ | $I_{FSM}$      | 36          |                  |
| Repetitive peak forward current<br>$T_j=150^\circ\text{C}$ , $T_C=100^\circ\text{C}$ , $D=0.1$    | $I_{FRM}$      | 45          |                  |
| Non repetitive peak forward current<br>$t_p=10\mu\text{s}$ , $T_C=25^\circ\text{C}$               | $I_{FMAX}$     | 100         |                  |
| $i^2t$ value, $T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$  | $\int I^2 dt$  | 6.5         | A <sup>2</sup> s |
| Repetitive peak reverse voltage   | $V_{RRM}$      | 300         | V                |
| Surge peak reverse voltage  | $V_{RSM}$      | 300         |                  |
| Power dissipation, $T_C=25^\circ\text{C}$   | $P_{tot}$      | 65          | W                |
| Operating and storage temperature   | $T_j, T_{stg}$ | -55... +175 | $^\circ\text{C}$ |

**Thermal Characteristics**

| Parameter   | Symbol     | Values |      |      | Unit |
|---|------------|--------|------|------|------|
|   |            | min.   | typ. | max. |      |
| <b>Characteristics</b>                                      |            |        |      |      |      |
| Thermal resistance, junction - case                         | $R_{thJC}$ | -      | -    | 2.3  | K/W  |
| SMD version, device on PCB:                                 | $R_{thJA}$ |        |      |      |      |
| P-TO263-3-2: @ min. footprint                               |            | -      | -    | 62   |      |
| P-TO263-3-2: @ 6 cm <sup>2</sup> cooling area <sup>1)</sup> |            | -      | 35   | -    |      |

**Electrical Characteristics**, at  $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified

| Parameter                                | Symbol | Values |      |      | Unit          |
|--|--------|--------|------|------|---------------|
|  |        | min.   | typ. | max. |               |
| <b>Static Characteristics</b>            |        |        |      |      |               |
| Diode forward voltage                    | $V_F$  |        |      |      | V             |
| $I_F=10\text{A}, T_j=25^\circ\text{C}$   |        | -      | 1.5  | 1.7  |               |
| $I_F=10\text{A}, T_j=150^\circ\text{C}$  |        | -      | 1.5  | 1.9  |               |
| Reverse current                          | $I_R$  |        |      |      | $\mu\text{A}$ |
| $V_R=300\text{V}, T_j=25^\circ\text{C}$  |        | -      | 15   | 200  |               |
| $V_R=300\text{V}, T_j=150^\circ\text{C}$ |        | -      | 20   | 1000 |               |

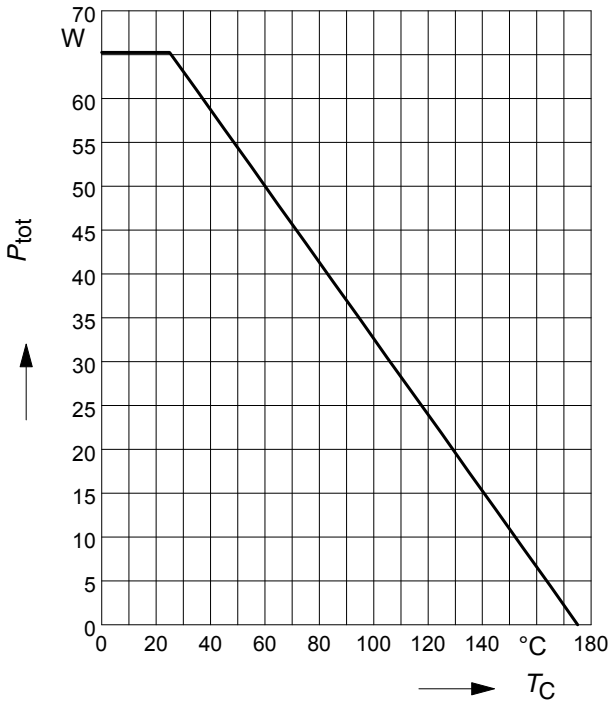
<sup>1)</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics, at  $T_j = 25\text{ °C}$ , unless otherwise specified

| Parameter   | Symbol   | Values |                 |      | Unit |
|---|----------|--------|-----------------|------|------|
|   |          | min.   | typ.            | max. |      |
| <b>AC Characteristics</b>   |          |        |                 |      |      |
| Total capacitive charge <sup>1)</sup><br>$V_R=200V, I_F=10A, di_F/dt=-200A/\mu s, T_j=150\text{ °C}$                                    | $Q_C$    | -      | 23              | -    | nC   |
| Switching time <sup>2)</sup><br>$V_R=200V, I_F=10A, di_F/dt=-200A/\mu s, T_j=150\text{ °C}$   | $t_{rr}$ | -      | n.a.            | -    | ns   |
| Total capacitance<br>$V_R=0V, T_C=25\text{ °C}, f=1MHz$<br>$V_R=150V, T_C=25\text{ °C}, f=1MHz$<br>$V_R=300V, T_C=25\text{ °C}, f=1MHz$ | $C$      | -      | 600<br>55<br>40 | -    | pF   |

**1 Power dissipation**

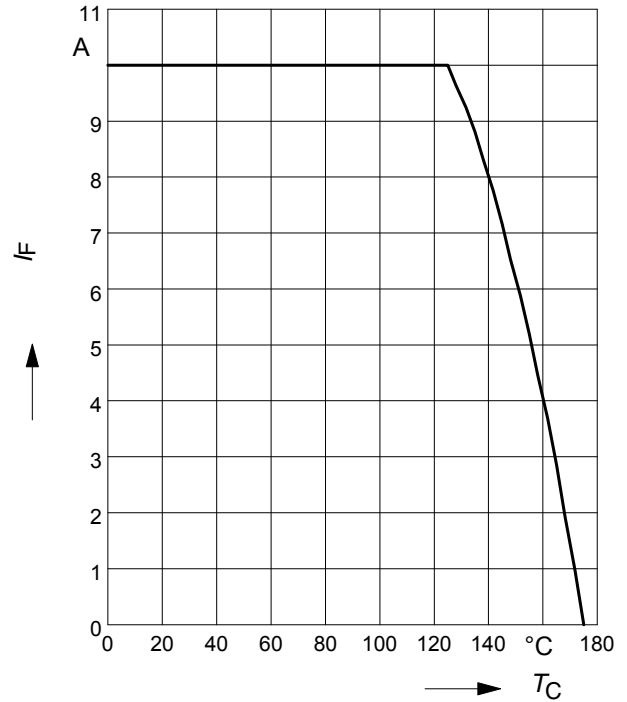
$P_{tot} = f(T_C)$



**2 Diode forward current**

$I_F = f(T_C)$

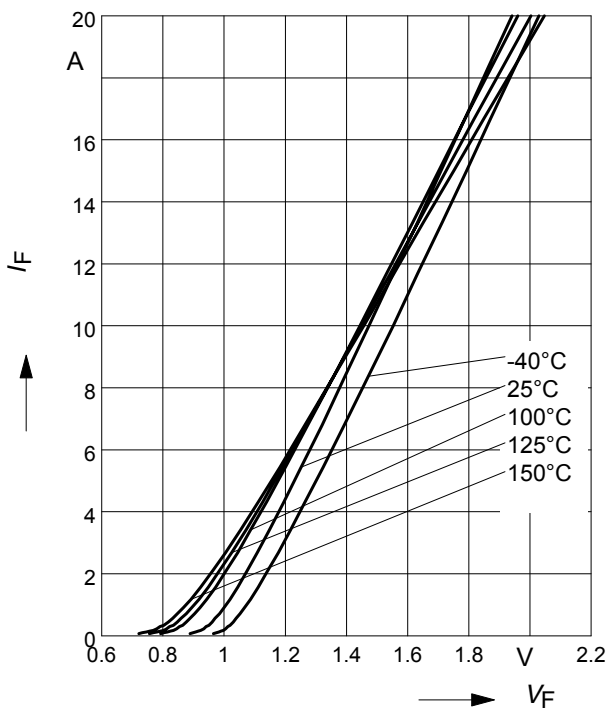
parameter:  $T_j \leq 175^\circ\text{C}$



**3 Typ. forward characteristic**

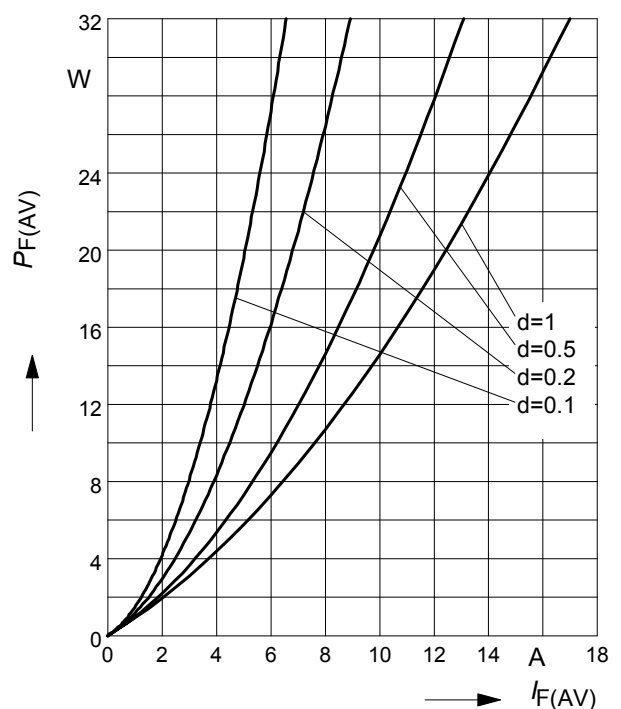
$I_F = f(V_F)$

parameter:  $T_j$ ,  $t_p = 350 \mu\text{s}$



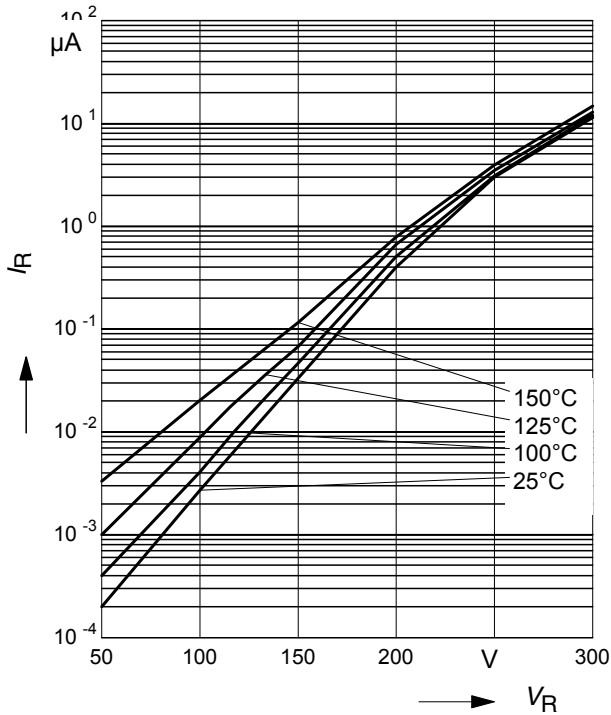
**4 Typ. forward power dissipation vs. average forward current**

$P_{F(AV)} = f(I_F)$   $T_C = 100^\circ\text{C}$ ,  $d = t_p/T$



**5 Typ. reverse current vs. reverse voltage**

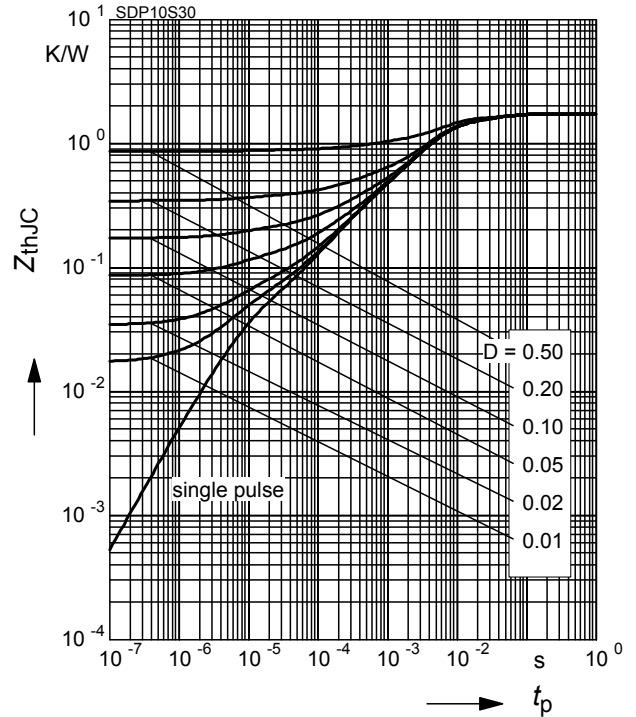
$$I_R = f(V_R)$$



**6 Transient thermal impedance**

$$Z_{thJC} = f(t_p)$$

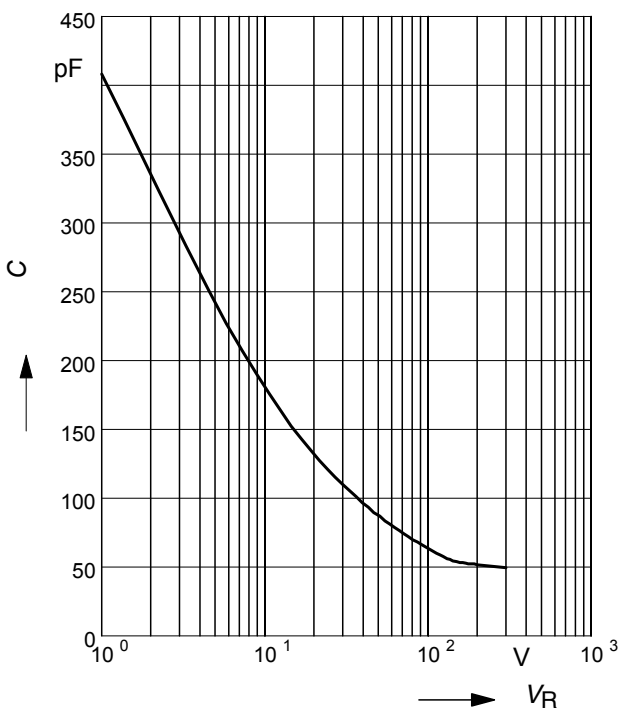
parameter :  $D = t_p/T$



**7 Typ. capacitance vs. reverse voltage**

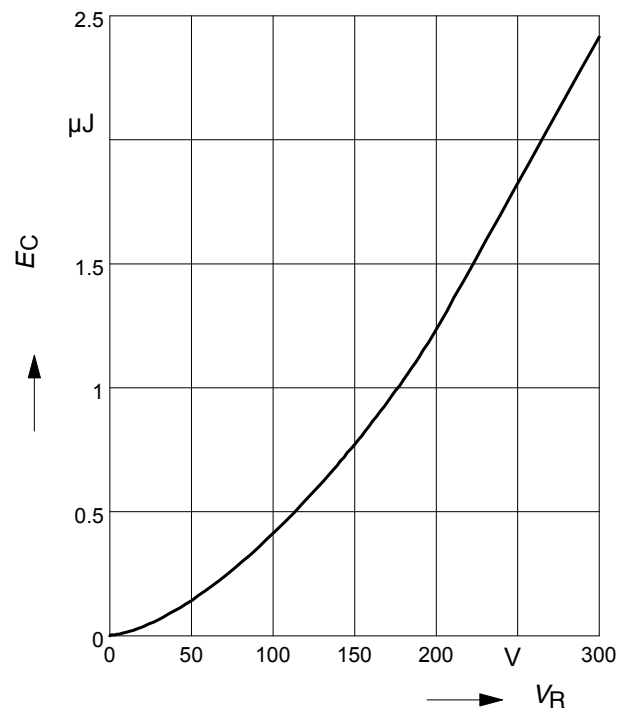
$$C = f(V_R)$$

parameter:  $T_C = 25^\circ C, f = 1 MHz$



**8 Typ. C stored energy**

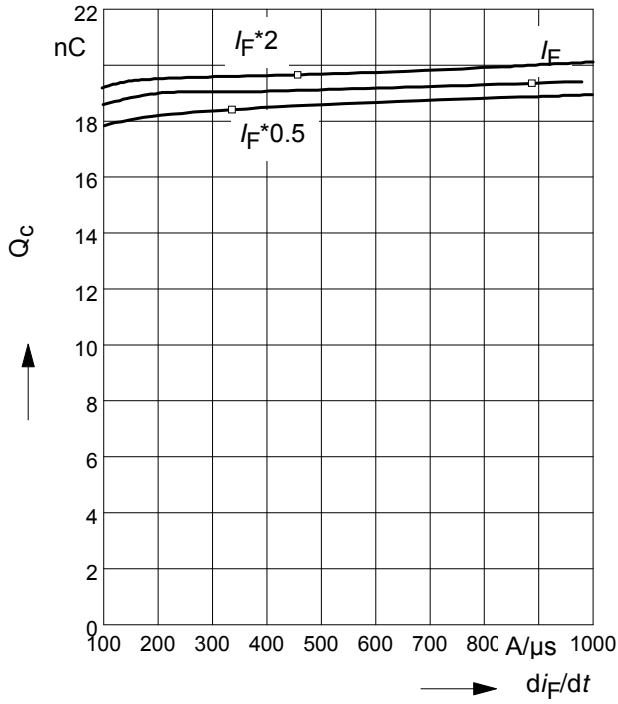
$$E_C = f(V_R)$$

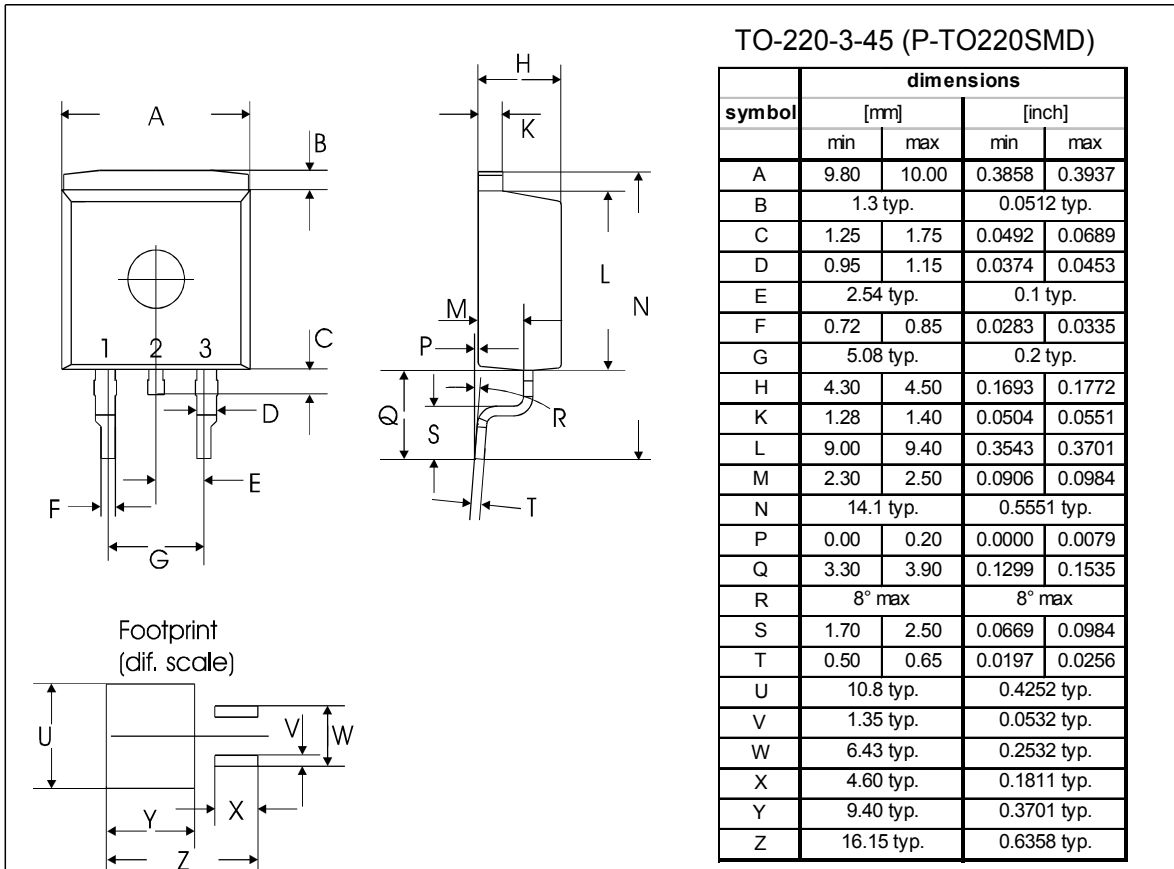
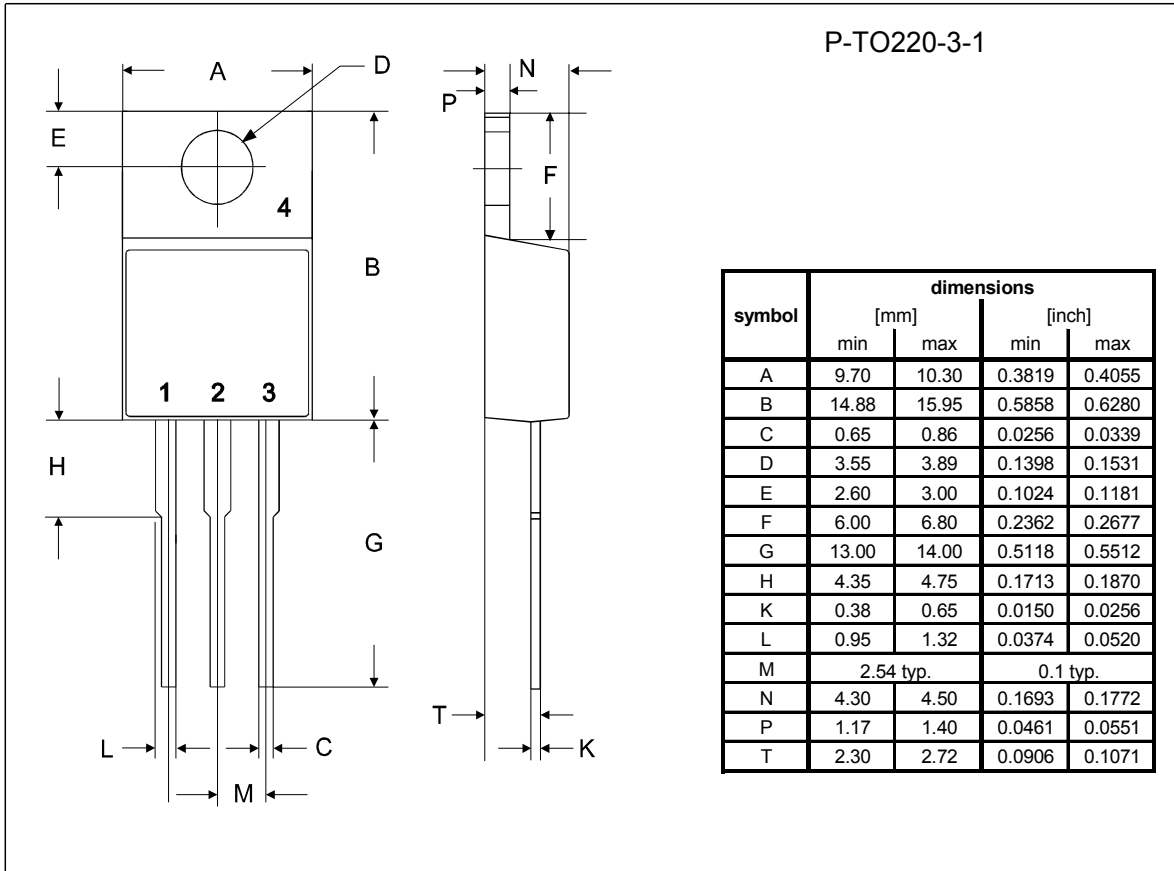


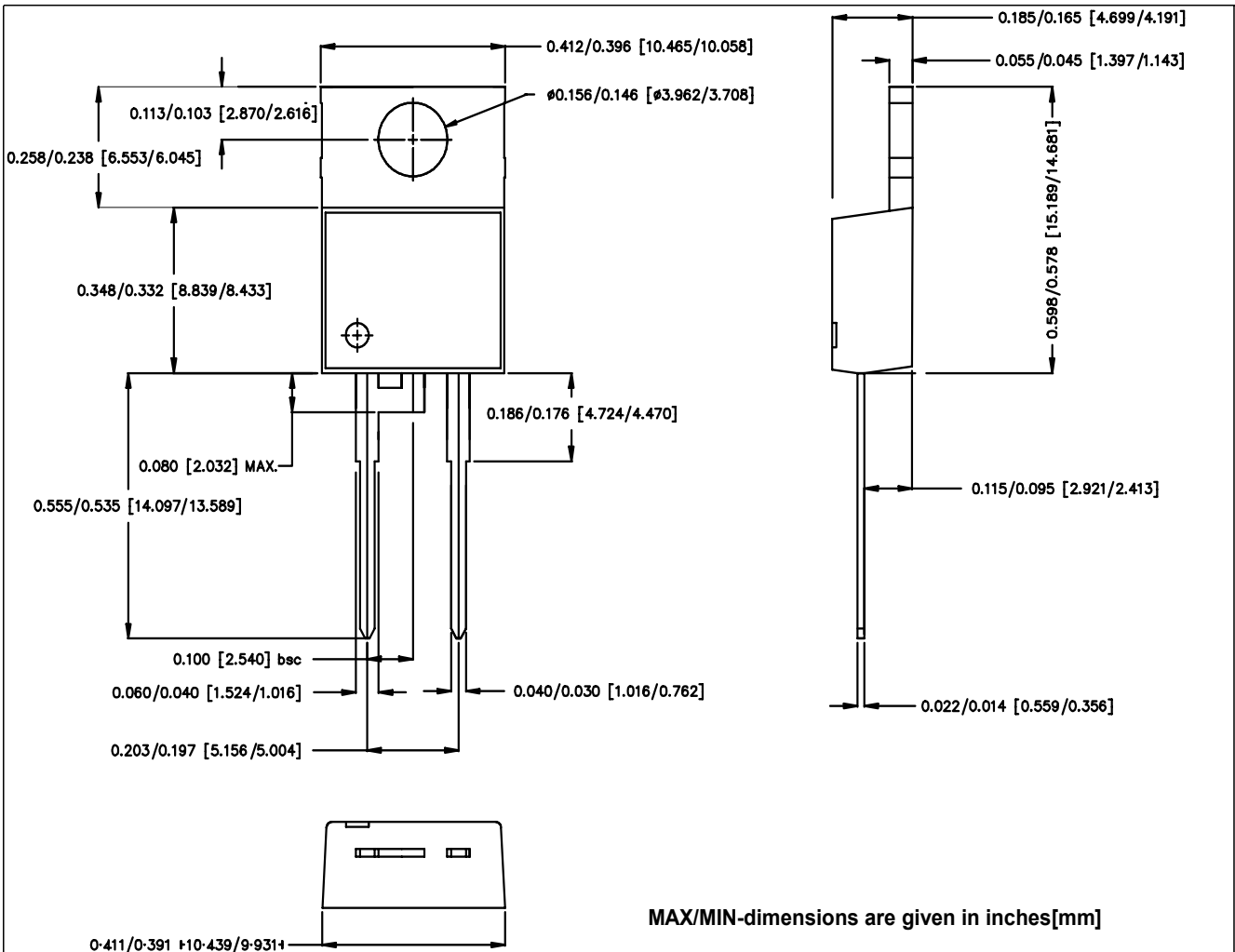
9 Typ. capacitive charge vs. current slope

$$Q_c = f(di_F/dt)$$

parameter:  $T_j = 150\text{ }^\circ\text{C}$









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