

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

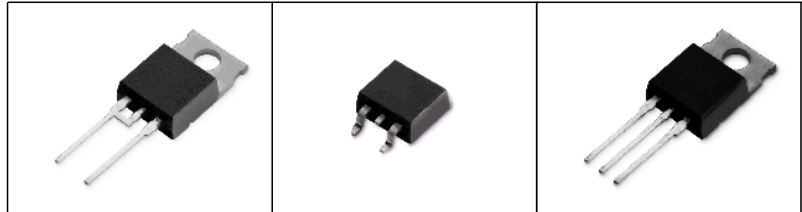
Product Summary

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

P-TO220-2-2.

P-TO220-3.SMD

P-TO220-3-1.



| 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 $T_j = 25^\circ\text{C}$, 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 $T_C=25^\circ\text{C}$, $t_p=10\text{ms}$ | I_{FSM} | 36 | |
| Repetitive peak forward current $T_j=150^\circ\text{C}$, $T_C=100^\circ\text{C}$, $D=0.1$ | I_{FRM} | 45 | |
| Non repetitive peak forward current $t_p=10\mu\text{s}$, $T_C=25^\circ\text{C}$ | I_{FMAX} | 100 | |
| i^2t value, $T_C=25^\circ\text{C}$, $t_p=10\text{ms}$ | $\int I^2 dt$ | 6.5 | A^2s |
| 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. | |
| Characteristics | | | | | |
| 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 ² cooling area ¹⁾ | | - | 35 | - | |

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

| Parameter | Symbol | Values | | | Unit |
|--|--------|--------|------|------|---------------|
| | | min. | typ. | max. | |
| Static Characteristics | | | | | |
| 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 | | | | μA |
| $V_R=300\text{V}, T_j=25^\circ\text{C}$ | | - | 15 | 200 | |
| $V_R=300\text{V}, T_j=150^\circ\text{C}$ | | - | 20 | 1000 | |

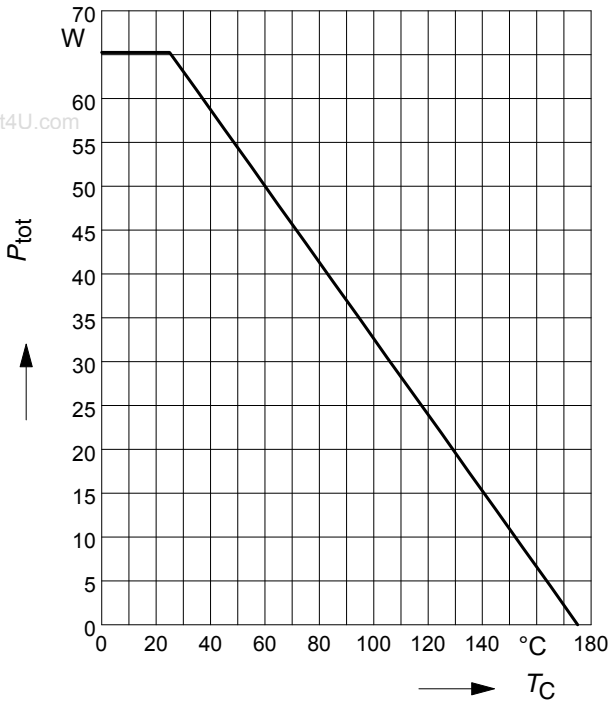
¹Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

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

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

1 Power dissipation

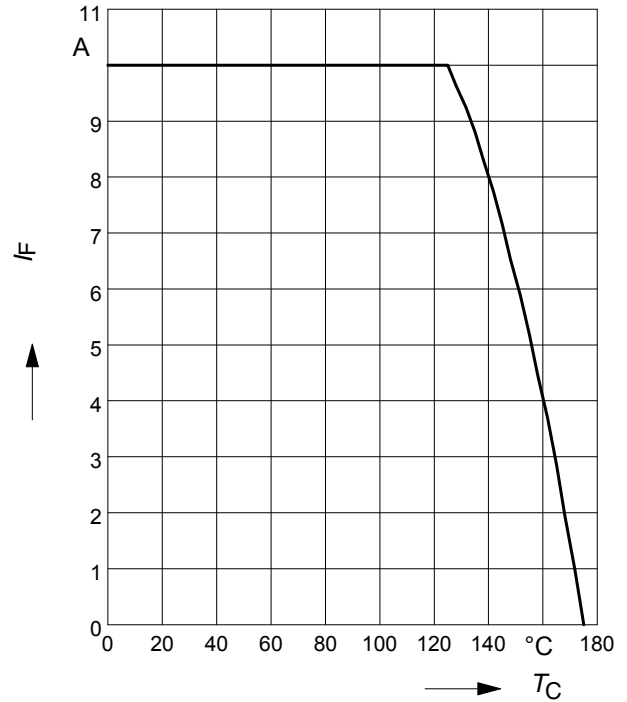
$P_{tot} = f(T_C)$



2 Diode forward current

$I_F = f(T_C)$

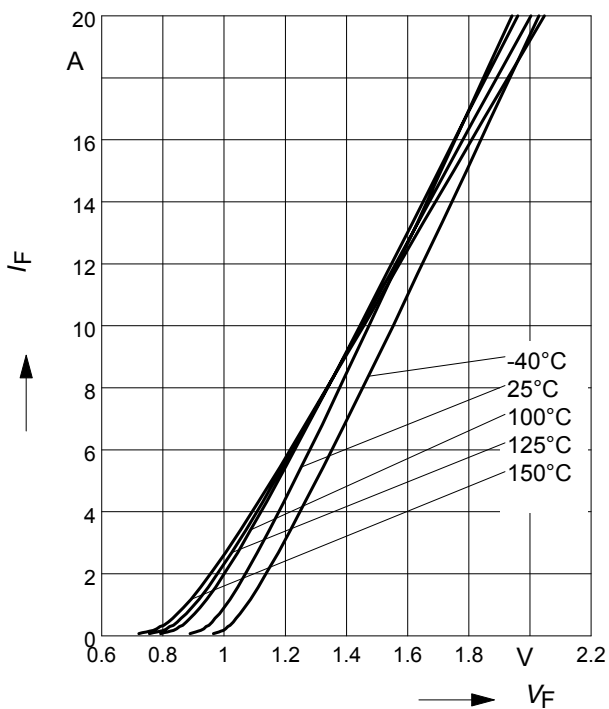
parameter: $T_j \leq 175^\circ\text{C}$



3 Typ. forward characteristic

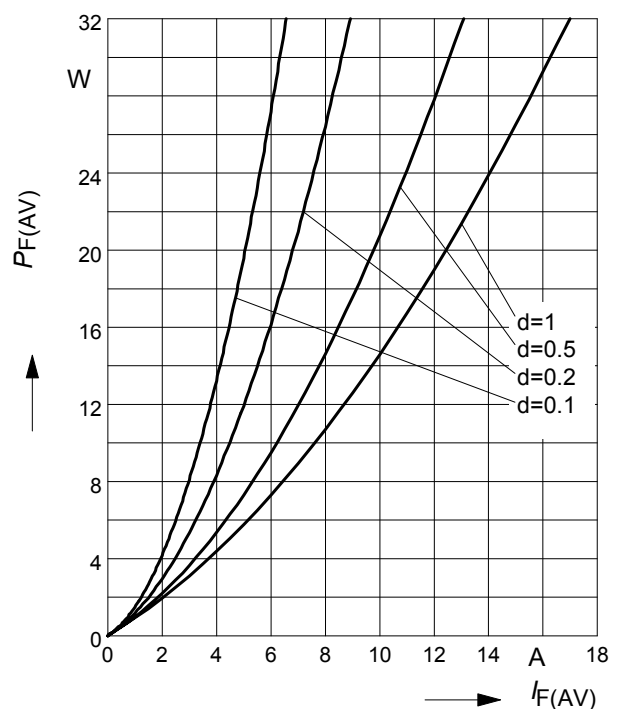
$I_F = f(V_F)$

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



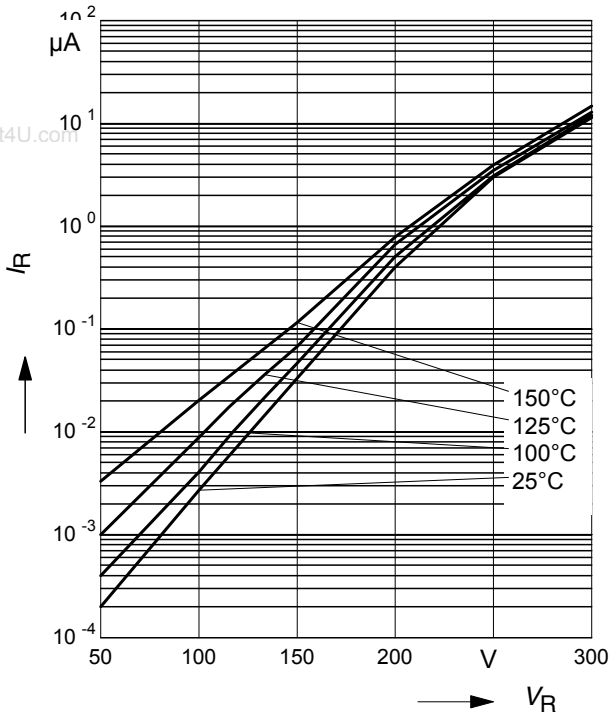
4 Typ. forward power dissipation vs. average forward current

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



5 Typ. reverse current vs. reverse voltage

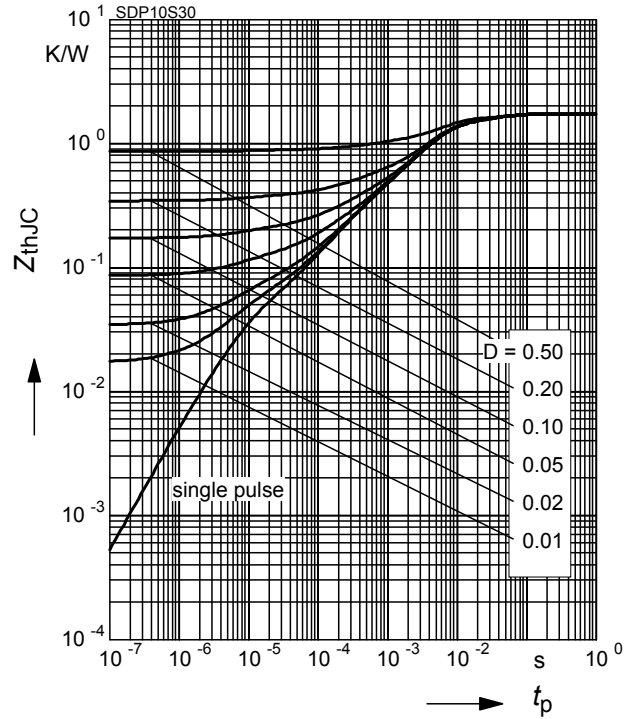
$$I_R = f(V_R)$$



6 Transient thermal impedance

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

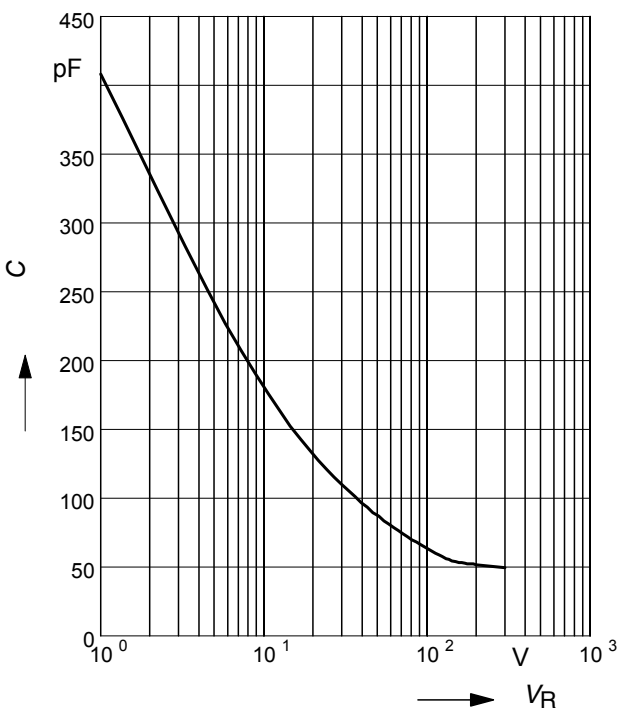
parameter : $D = t_p/T$



7 Typ. capacitance vs. reverse voltage

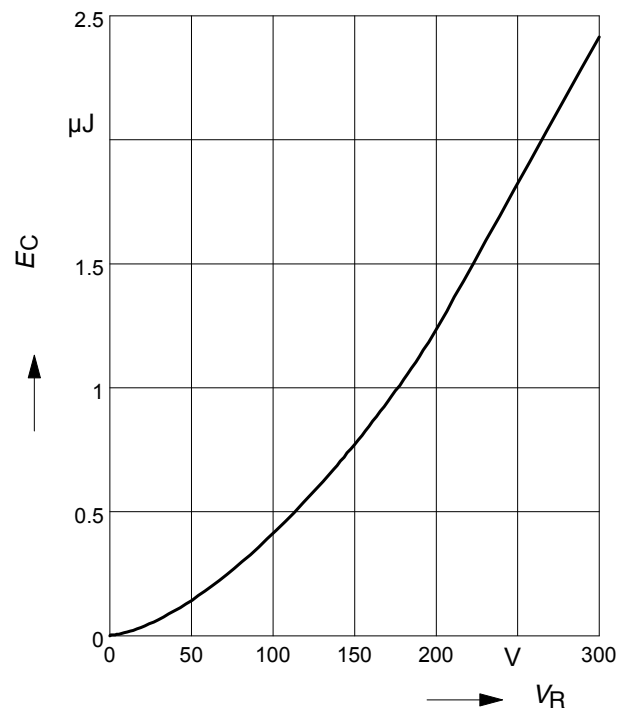
$$C = f(V_R)$$

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



8 Typ. C stored energy

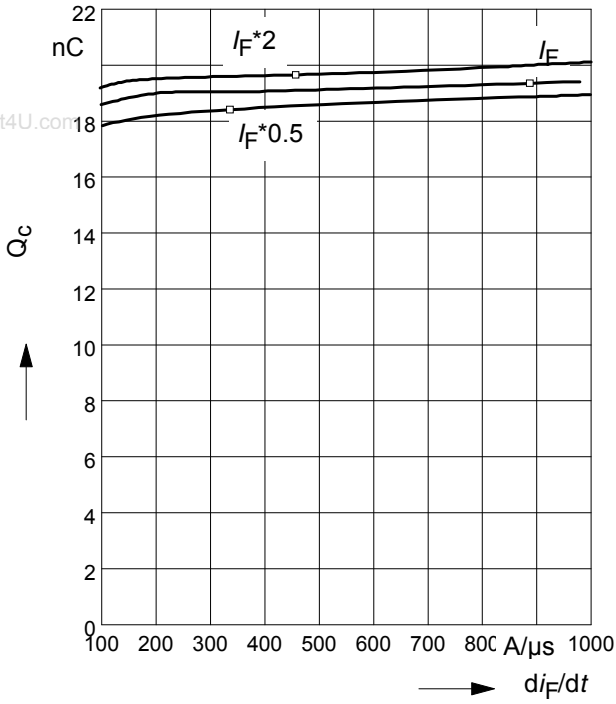
$$E_C = f(V_R)$$



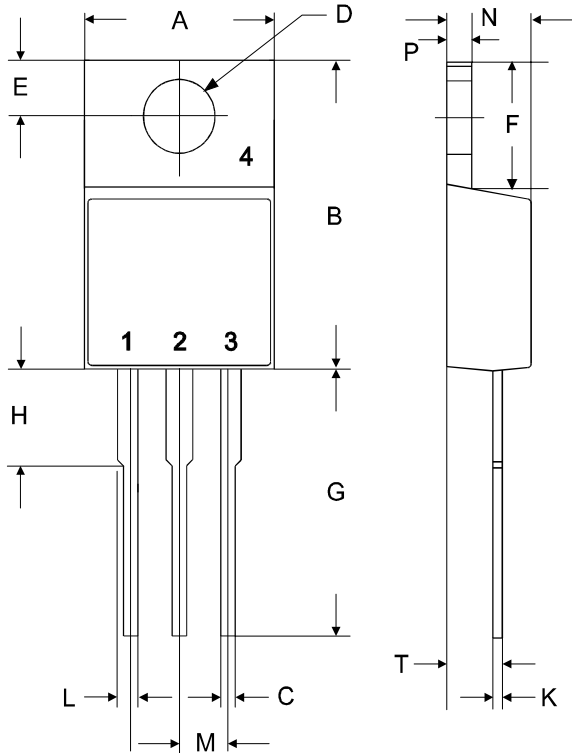
9 Typ. capacitive charge vs. current slope

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

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

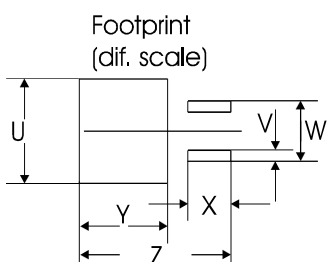
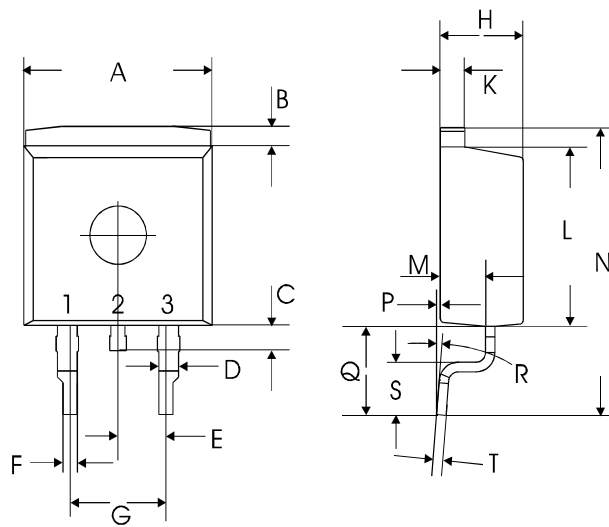


P-TO220-3-1

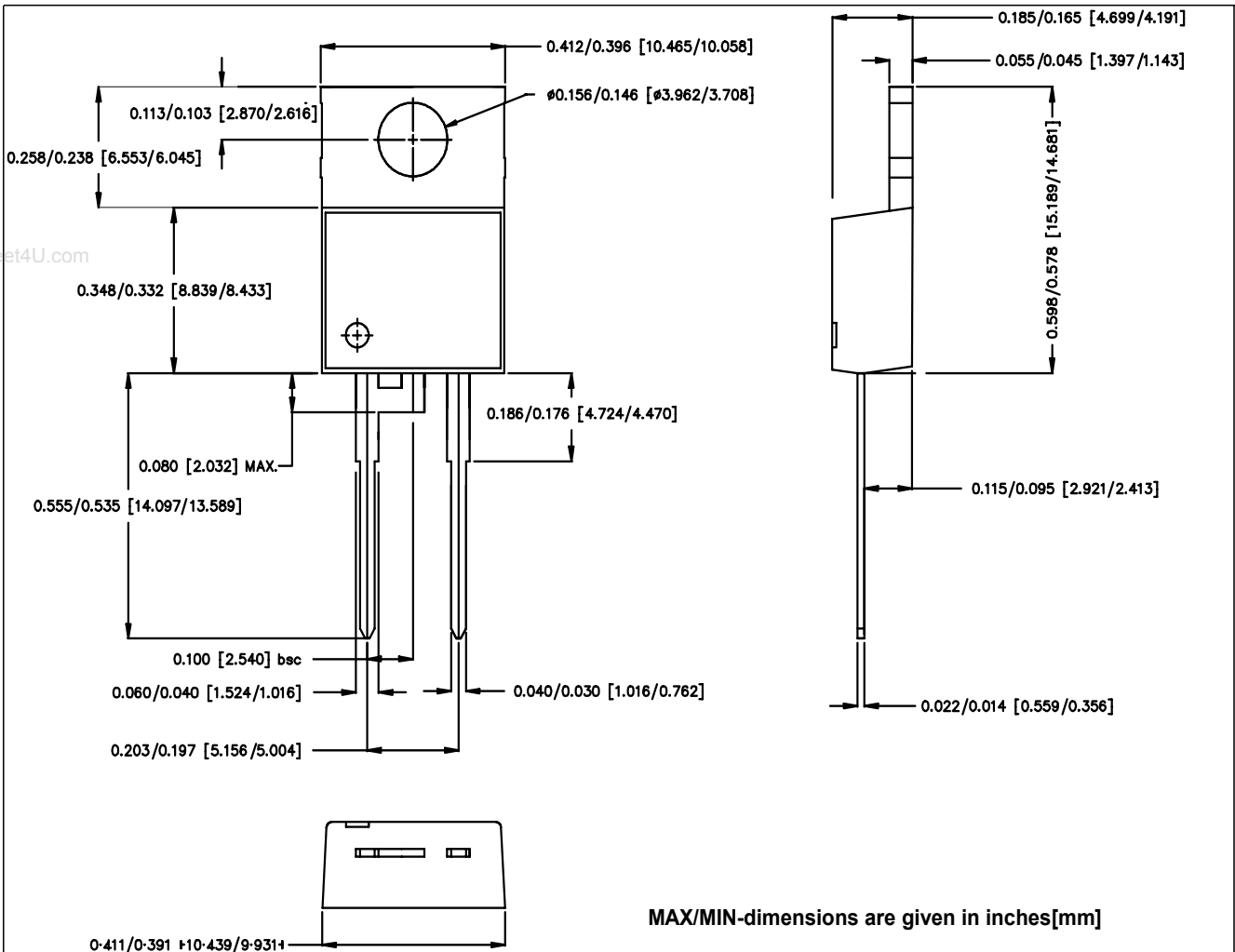


| symbol | dimensions | | | |
|--------|------------|-------|----------|--------|
| | [mm] | | [inch] | |
| | min | max | min | max |
| A | 9.70 | 10.30 | 0.3819 | 0.4055 |
| B | 14.88 | 15.95 | 0.5858 | 0.6280 |
| C | 0.65 | 0.86 | 0.0256 | 0.0339 |
| D | 3.55 | 3.89 | 0.1398 | 0.1531 |
| E | 2.60 | 3.00 | 0.1024 | 0.1181 |
| F | 6.00 | 6.80 | 0.2362 | 0.2677 |
| G | 13.00 | 14.00 | 0.5118 | 0.5512 |
| H | 4.35 | 4.75 | 0.1713 | 0.1870 |
| K | 0.38 | 0.65 | 0.0150 | 0.0256 |
| L | 0.95 | 1.32 | 0.0374 | 0.0520 |
| M | 2.54 typ. | | 0.1 typ. | |
| N | 4.30 | 4.50 | 0.1693 | 0.1772 |
| P | 1.17 | 1.40 | 0.0461 | 0.0551 |
| T | 2.30 | 2.72 | 0.0906 | 0.1071 |

TO-220-3-45 (P-TO220SMD)



| symbol | dimensions | | | |
|--------|------------|-------|-------------|--------|
| | [mm] | | [inch] | |
| | min | max | min | max |
| A | 9.80 | 10.00 | 0.3858 | 0.3937 |
| B | 1.3 typ. | | 0.0512 typ. | |
| C | 1.25 | 1.75 | 0.0492 | 0.0689 |
| D | 0.95 | 1.15 | 0.0374 | 0.0453 |
| E | 2.54 typ. | | 0.1 typ. | |
| F | 0.72 | 0.85 | 0.0283 | 0.0335 |
| G | 5.08 typ. | | 0.2 typ. | |
| H | 4.30 | 4.50 | 0.1693 | 0.1772 |
| K | 1.28 | 1.40 | 0.0504 | 0.0551 |
| L | 9.00 | 9.40 | 0.3543 | 0.3701 |
| M | 2.30 | 2.50 | 0.0906 | 0.0984 |
| N | 14.1 typ. | | 0.5551 typ. | |
| P | 0.00 | 0.20 | 0.0000 | 0.0079 |
| Q | 3.30 | 3.90 | 0.1299 | 0.1535 |
| R | 8° max | | 8° max | |
| S | 1.70 | 2.50 | 0.0669 | 0.0984 |
| T | 0.50 | 0.65 | 0.0197 | 0.0256 |
| U | 10.8 typ. | | 0.4252 typ. | |
| V | 1.35 typ. | | 0.0532 typ. | |
| W | 6.43 typ. | | 0.2532 typ. | |
| X | 4.60 typ. | | 0.1811 typ. | |
| Y | 9.40 typ. | | 0.3701 typ. | |
| Z | 16.15 typ. | | 0.6358 typ. | |



Published by
Infineon Technologies AG,
Bereichs Kommunikation
St.-Martin-Strasse 53,
D-81541 München
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