

Fast Switching EmCon Diode

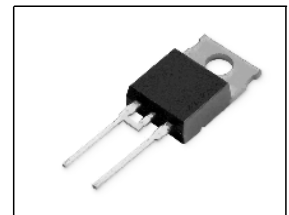
Feature

- 1200 V EmCon technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- Easy paralleling
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC⁰⁾ for target applications

Product Summary

| | | |
|------------|------|----|
| V_{RRM} | 1200 | V |
| I_F | 4 | A |
| V_F | 1.65 | V |
| T_{jmax} | 150 | °C |

PG-TO220-2-2.



| Type | Package | Ordering Code | Marking | Pin 1 | PIN 2 | PIN 3 |
|-----------|---------------|---------------|---------|-------|-------|-------|
| IDP04E120 | PG-TO220-2-2. | Q67040-S4388 | D04E120 | C | A | - |

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

| Parameter | Symbol | Value | Unit |
|--|----------------|--------------|------|
| Repetitive peak reverse voltage | V_{RRM} | 1200 | V |
| Continuous forward current | I_F | 11.2 7.1 | A |
| $T_C=25\text{ °C}$ | | | |
| $T_C=90\text{ °C}$ | | | |
| Surge non repetitive forward current | I_{FSM} | 28 | |
| $T_C=25\text{ °C}$, $t_p=10\text{ ms}$, sine halfwave | | | |
| Maximum repetitive forward current | I_{FRM} | 16.5 | |
| $T_C=25\text{ °C}$, t_p limited by T_{jmax} , $D=0.5$ | | | |
| Power dissipation | P_{tot} | 43.1 20.6 | W |
| $T_C=25\text{ °C}$ | | | |
| $T_C=90\text{ °C}$ | | | |
| Operating and storage temperature | T_j, T_{stg} | -55...+150 | °C |
| Soldering temperature | T_S | 260 | °C |
| wavesoldering, 1.6mm (0.063 in.) from case for 10s | | | |

Thermal Characteristics

| Parameter | Symbol | Values | | | Unit |
|---|------------|--------|------|------|------|
| | | min. | typ. | max. | |
| Characteristics | | | | | |
| Thermal resistance, junction - case | R_{thJC} | - | - | 2.9 | K/W |
| Thermal resistance, junction - ambient, leaded | R_{thJA} | - | - | 62 | |
| SMD version, device on PCB: @ min. footprint @ 6 cm ² cooling area ¹⁾ | R_{thJA} | - | - | 62 | |
| | | - | 35 | - | |

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

| Parameter | Symbol | Values | | | Unit |
|--|--------|--------|-------------|------------|---------------|
| | | min. | typ. | max. | |
| Static Characteristics | | | | | |
| Reverse leakage current $V_R=1200\text{V}$, $T_j=25^\circ\text{C}$ $V_R=1200\text{V}$, $T_j=150^\circ\text{C}$ | I_R | - | - | 100 350 | μA |
| Forward voltage drop $I_F=4\text{A}$, $T_j=25^\circ\text{C}$ $I_F=4\text{A}$, $T_j=150^\circ\text{C}$ | V_F | - | 1.65 1.7 | 2.15 - | V |

⁰J-STD20 and JESD22

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.

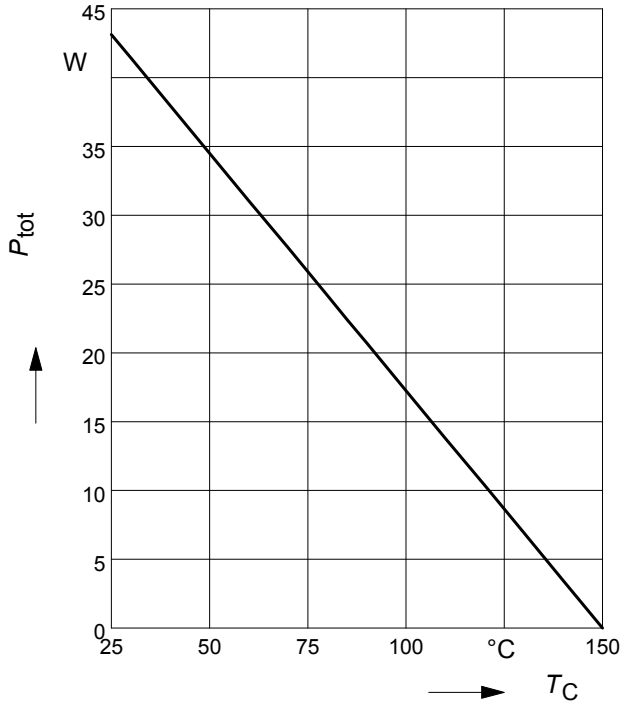
Electrical Characteristics, at $T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|--|-----------|--------|-------------------|------|------|
| | | min. | typ. | max. | |
| Dynamic Characteristics | | | | | |
| Reverse recovery time $V_R=800\text{V}$, $I_F=4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=25^\circ\text{C}$ $V_R=800\text{V}$, $I_F=4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=125^\circ\text{C}$ $V_R=800\text{V}$, $I_F=4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$ | t_{rr} | - | 115 180 185 | - | ns |
| Peak reverse current $V_R=800\text{V}$, $I_F = 4\text{ A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=25^\circ\text{C}$ $V_R=800\text{V}$, $I_F =4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=125^\circ\text{C}$ $V_R=800\text{V}$, $I_F =4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$ | I_{rrm} | - | 7.15 8 8.1 | - | A |
| Reverse recovery charge $V_R=800\text{V}$, $I_F=4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=25^\circ\text{C}$ $V_R=800\text{V}$, $I_F =4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=125^\circ\text{C}$ $V_R=800\text{V}$, $I_F =4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$ | Q_{rr} | - | 330 575 630 | - | nC |
| Reverse recovery softness factor $V_R=800\text{V}$, $I_F=4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=25^\circ\text{C}$ $V_R=800\text{V}$, $I_F=4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=125^\circ\text{C}$ $V_R=800\text{V}$, $I_F=4\text{A}$, $di_F/dt=750\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$ | S | - | 6 7.8 7.8 | - | |

1 Power dissipation

$$P_{tot} = f(T_C)$$

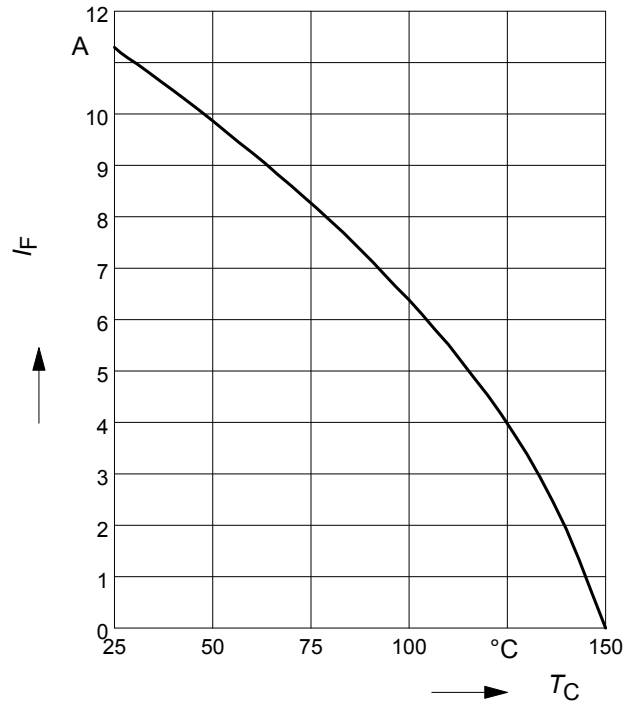
parameter: $T_j \leq 150^\circ\text{C}$



2 Diode forward current

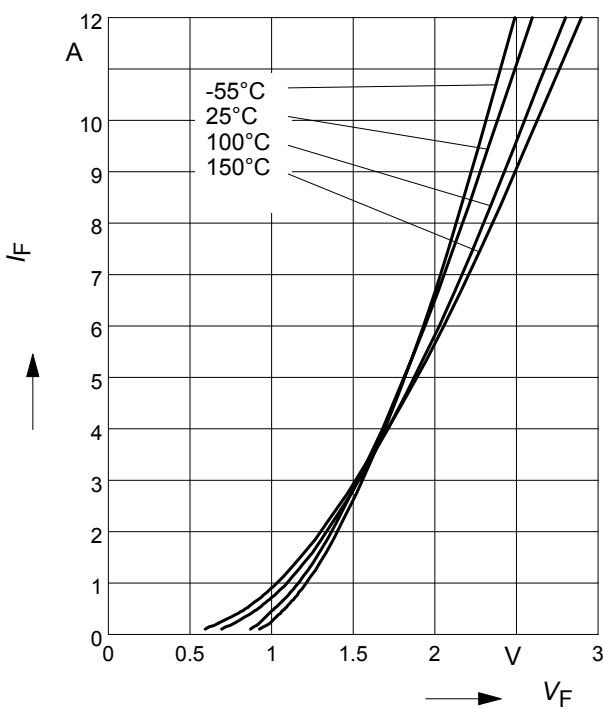
$$I_F = f(T_C)$$

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



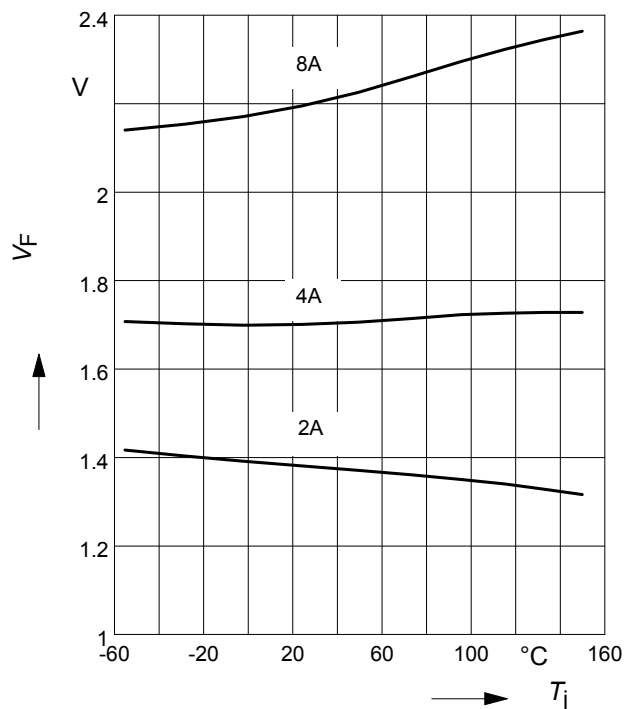
3 Typ. diode forward current

$$I_F = f(V_F)$$



4 Typ. diode forward voltage

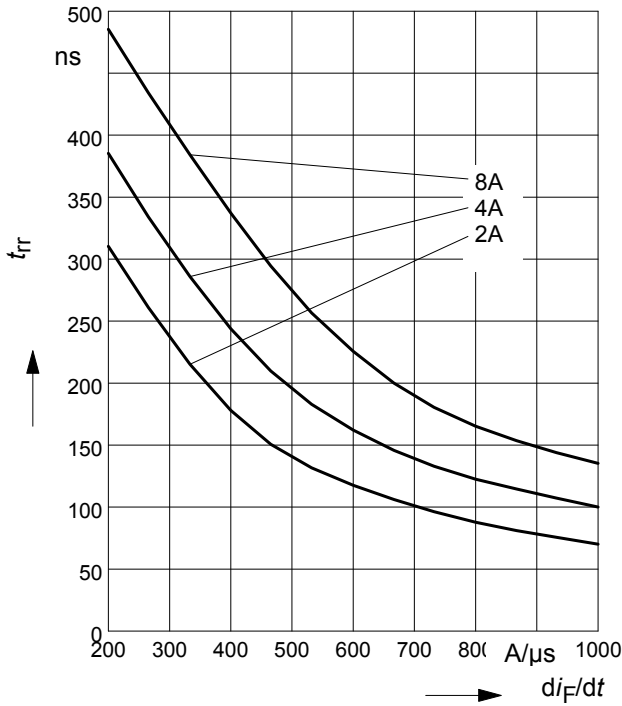
$$V_F = f(T_j)$$



5 Typ. reverse recovery time

$$t_{rr} = f(di_F/dt)$$

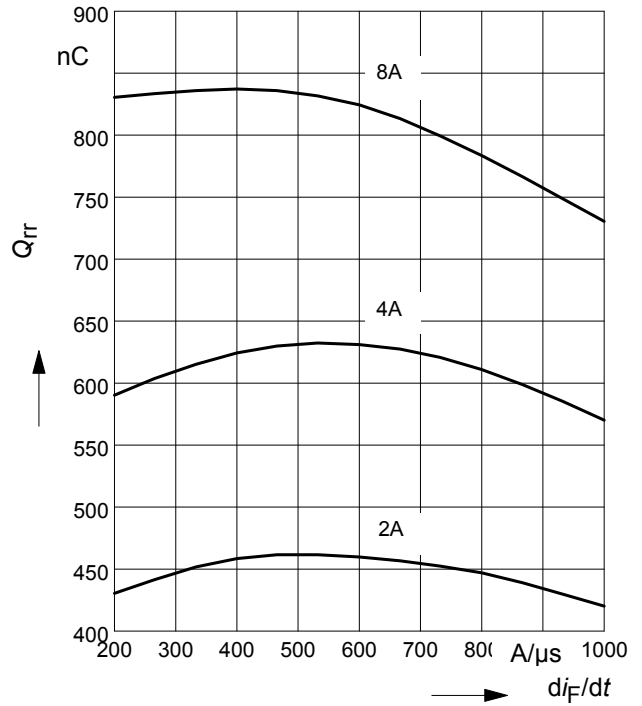
parameter: $V_R = 800V, T_j = 125^\circ C$



6 Typ. reverse recovery charge

$$Q_{rr} = f(di_F/dt)$$

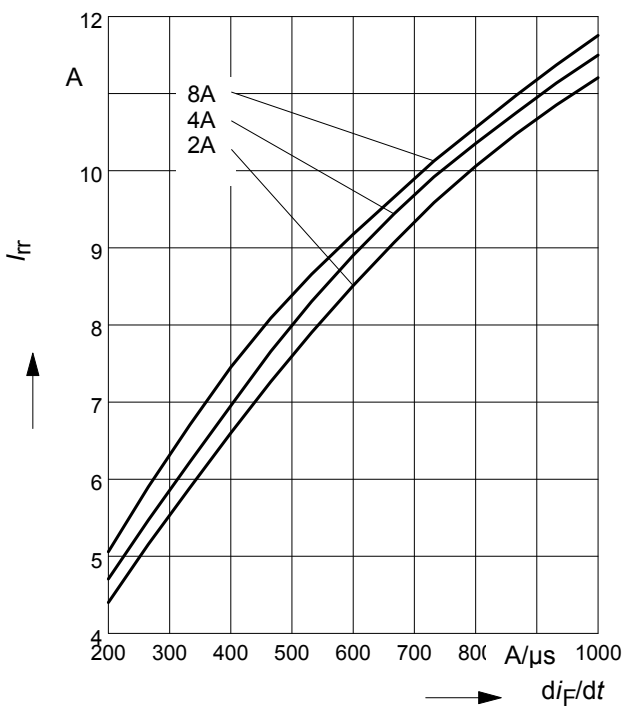
parameter: $V_R = 800V, T_j = 125^\circ C$



7 Typ. reverse recovery current

$$I_{rr} = f(di_F/dt)$$

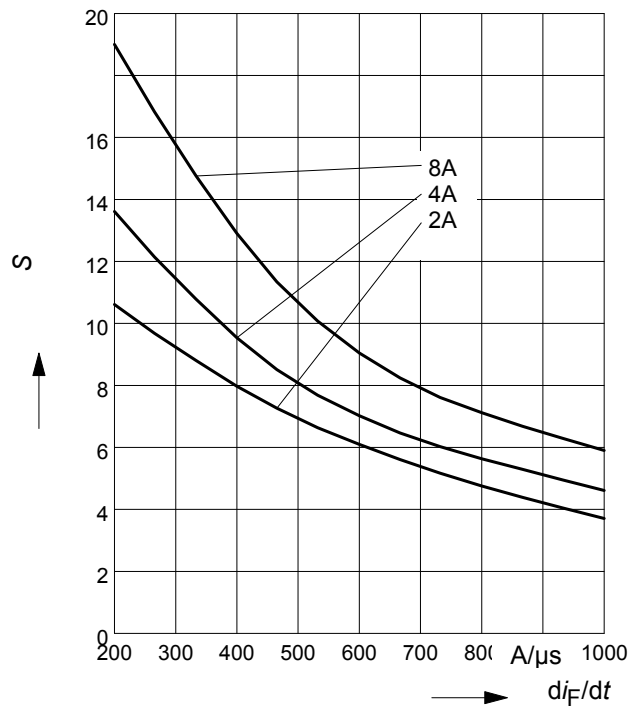
parameter: $V_R = 800V, T_j = 125^\circ C$



8 Typ. reverse recovery softness factor

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

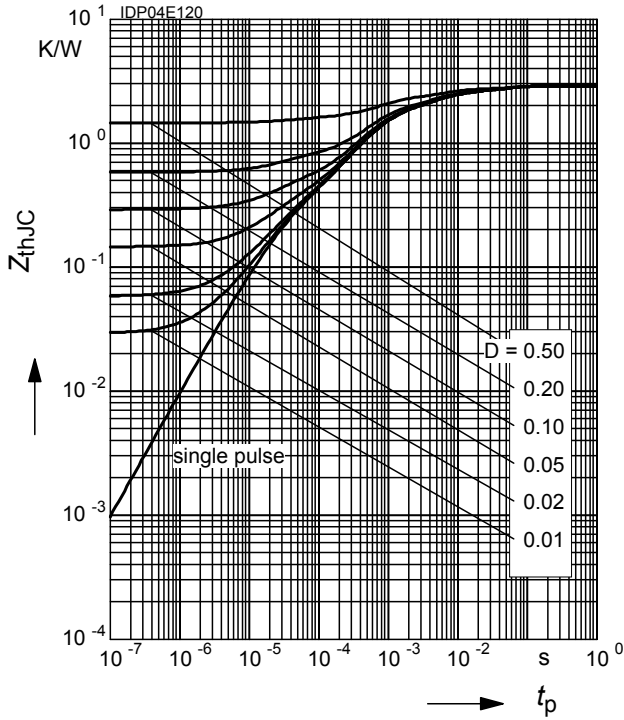
parameter: $V_R = 800V, T_j = 125^\circ C$



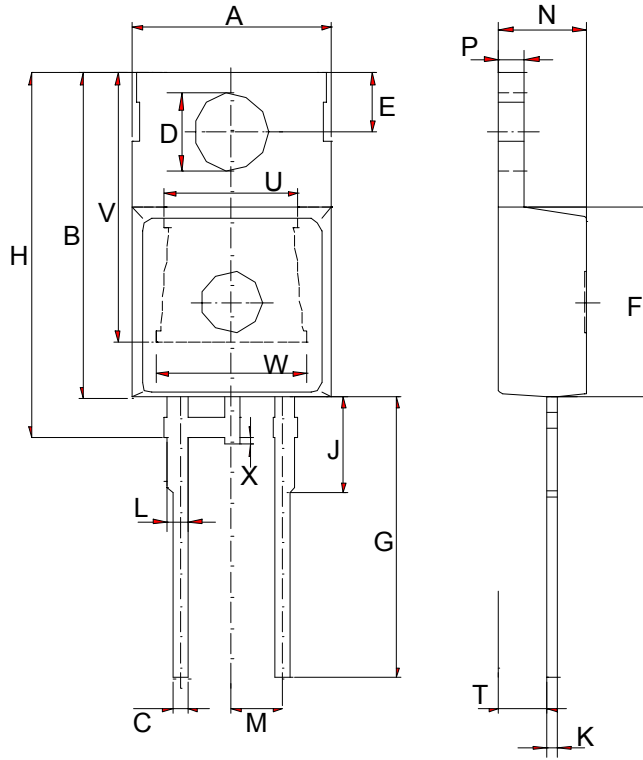
9 Max. transient thermal impedance

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

parameter : $D = t_p/T$



TO-220-2-2



| symbol | dimensions | | | |
|--------|------------|-------|------------|--------|
| | [mm] | | [inch] | |
| | min | max | min | max |
| A | 9.70 | 10.10 | 0.3819 | 0.3976 |
| B | 15.30 | 15.90 | 0.6024 | 0.6260 |
| C | 0.65 | 0.85 | 0.0256 | 0.0335 |
| D | 3.55 | 3.85 | 0.1398 | 0.1516 |
| E | 2.60 | 3.00 | 0.1024 | 0.1181 |
| F | 9.00 | 9.40 | 0.3543 | 0.3701 |
| G | 13.00 | 14.00 | 0.5118 | 0.5512 |
| H | 17.20 | 17.80 | 0.6772 | 0.7008 |
| J | 4.40 | 4.80 | 0.1732 | 0.1890 |
| K | 0.40 | 0.60 | 0.0157 | 0.0236 |
| L | 1.05 typ. | | 0.41 typ. | |
| M | 2.54 typ. | | 0.1 typ. | |
| N | 4.4 typ. | | 0.173 typ. | |
| P | 1.10 | 1.40 | 0.0433 | 0.0551 |
| T | 2.4 typ. | | 0.095 typ. | |
| U | 6.6 typ. | | 0.26 typ. | |
| V | 13.0 typ. | | 0.51 typ. | |
| W | 7.5 typ. | | 0.295 typ. | |
| X | 0.00 | 0.40 | 0.0000 | 0.0157 |

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