

TRENCHSTOP™ 2 low $V_{ce(sat)}$ second generation IGBT

Maximum Ratings

For optimum lifetime and reliability, Infineon recommends operating conditions that do not exceed 80% of the maximum ratings stated in this datasheet.

| Parameter | Symbol | Value | Unit |
|---|-------------|----------------------|--------------------|
| Collector-emitter voltage, $T_{vj} \geq 25^{\circ}\text{C}$ | V_{CE} | 1200 | V |
| DC collector current, limited by T_{vjmax} $T_c = 25^{\circ}\text{C}$ value limited by bondwire $T_c = 135^{\circ}\text{C}$ | I_C | 80.0 40.0 | A |
| Pulsed collector current, t_p limited by T_{vjmax} | I_{Cpuls} | 160.0 | A |
| Turn off safe operating area $V_{CE} \leq 1200\text{V}$, $T_{vj} \leq 175^{\circ}\text{C}$, $t_p = 1\mu\text{s}$ | - | 160.0 | A |
| Diode forward current, limited by T_{vjmax} $T_c = 25^{\circ}\text{C}$ value limited by bondwire $T_c = 100^{\circ}\text{C}$ | I_F | 80.0 40.0 | A |
| Diode pulsed current, t_p limited by T_{vjmax} | I_{Fpuls} | 160.0 | A |
| Gate-emitter voltage Transient Gate-emitter voltage ($t_p \leq 10\mu\text{s}$, $D < 0.010$) | V_{GE} | ± 20 ± 30 | V |
| Short circuit withstand time $V_{GE} = 15.0\text{V}$, $V_{CC} \leq 600\text{V}$ Allowed number of short circuits < 1000 Time between short circuits: $\geq 1.0\text{s}$ $T_{vj} = 175^{\circ}\text{C}$ | t_{SC} | 10 | μs |
| Power dissipation $T_c = 25^{\circ}\text{C}$ Power dissipation $T_c = 135^{\circ}\text{C}$ | P_{tot} | 500.0 133.0 | W |
| Operating junction temperature | T_{vj} | -40...+175 | $^{\circ}\text{C}$ |
| Storage temperature | T_{stg} | -55...+150 | $^{\circ}\text{C}$ |
| Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s | | 260 | $^{\circ}\text{C}$ |

Thermal Resistance

| Parameter | Symbol | Conditions | Value | | | Unit |
|-----------|--------|------------|-------|------|------|------|
| | | | min. | typ. | max. | |

 R_{th} Characteristics

| | | | | | | |
|--|---------------|--|---|---|------|-----|
| IGBT thermal resistance, junction - case | $R_{th(j-c)}$ | | - | - | 0.30 | K/W |
| Diode thermal resistance, junction - case | $R_{th(j-c)}$ | | - | - | 0.50 | K/W |
| Thermal resistance junction - ambient | $R_{th(j-a)}$ | | - | - | 40 | K/W |

TRENCHSTOP™ 2 low $V_{ce(sat)}$ second generation IGBTElectrical Characteristic, at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified

| Parameter | Symbol | Conditions | Value | | | Unit |
|--------------------------------------|---------------|--|--------|--------------|-----------|---------------|
| | | | min. | typ. | max. | |
| Static Characteristic | | | | | | |
| Collector-emitter breakdown voltage | $V_{(BR)CES}$ | $V_{GE} = 0\text{V}, I_C = 0.50\text{mA}$ | 1200 | - | - | V |
| Collector-emitter saturation voltage | V_{CEsat} | $V_{GE} = 15.0\text{V}, I_C = 40.0\text{A}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$ | - - | 1.75 2.30 | 2.15 - | V |
| Diode forward voltage | V_F | $V_{GE} = 0\text{V}, I_F = 40.0\text{A}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$ | - - | 1.90 1.85 | 2.30 - | V |
| Gate-emitter threshold voltage | $V_{GE(th)}$ | $I_C = 1.50\text{mA}, V_{CE} = V_{GE}$ | 5.1 | 5.8 | 6.5 | V |
| Zero gate voltage collector current | I_{CES} | $V_{CE} = 1200\text{V}, V_{GE} = 0\text{V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$ | - - | - 3000 | 250 - | μA |
| Gate-emitter leakage current | I_{GES} | $V_{CE} = 0\text{V}, V_{GE} = 20\text{V}$ | - | - | 100 | nA |
| Transconductance | g_{fs} | $V_{CE} = 20\text{V}, I_C = 40.0\text{A}$ | - | 15.0 | - | S |

Electrical Characteristic, at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified

| Parameter | Symbol | Conditions | Value | | | Unit |
|--|-----------|--|-------|-------|------|------|
| | | | min. | typ. | max. | |
| Dynamic Characteristic | | | | | | |
| Input capacitance | C_{ies} | $V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$ | - | 2385 | - | pF |
| Output capacitance | C_{oes} | | - | 235 | - | |
| Reverse transfer capacitance | C_{res} | | - | 132 | - | |
| Gate charge | Q_G | $V_{CC} = 960\text{V}, I_C = 40.0\text{A},$ $V_{GE} = 15\text{V}$ | - | 190.0 | - | nC |
| Internal emitter inductance measured 5mm (0.197 in.) from case | L_E | | - | 13.0 | - | nH |

Switching Characteristic, Inductive Load

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|--------------|---|-------|------|------|------|
| | | | min. | typ. | max. | |
| IGBT Characteristic, at $T_{vj} = 25^{\circ}\text{C}$ | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $T_{vj} = 25^{\circ}\text{C},$ $V_{CC} = 600\text{V}, I_C = 40.0\text{A},$ $V_{GE} = 0.0/15.0\text{V},$ $R_{G(on)} = 12.0\Omega, R_{G(off)} = 12.0\Omega,$ $L_{\sigma} = 90\text{nH}, C_{\sigma} = 67\text{pF}$ L_{σ}, C_{σ} from Fig. E Energy losses include "tail" and diode reverse recovery. | - | 32 | - | ns |
| Rise time | t_r | | - | 43 | - | ns |
| Turn-off delay time | $t_{d(off)}$ | | - | 328 | - | ns |
| Fall time | t_f | | - | 51 | - | ns |
| Turn-on energy | E_{on} | | - | 3.10 | - | mJ |
| Turn-off energy | E_{off} | | - | 2.90 | - | mJ |
| Total switching energy | E_{ts} | | - | 6.00 | - | mJ |