

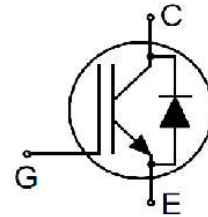


650V /15A Treh Field Stop IGBT

Features

- Max Junction Temperature 150°C
- High breakdown voltage up to 650V for improved reliability
- Short Circuit Rated
- Very Low Saturation Voltage:
 $V_{CE(SAT)} = 1.65V$ (Typ.) @ $I_C = 15A$
- Soft current turn-off waveforms

| | | |
|-----------------------|------|---|
| V_{CE} | 650 | V |
| I_C | 15 | A |
| $V_{CE(SAT)} I_C=15A$ | 1.65 | V |

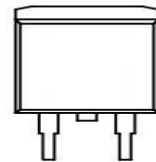


Applications

- Soft switching applications
- Air conditioning
- Motor drive inverter



D²PAK
CASE 418B
STYLE 1



Ordering Information

| Product | Package | Packaging |
|----------------|---------|-----------|
| SPD15N65T1T0TL | TO-252 | Tube |



Maximum Ratings (T_j= 25°C unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|--|------------------|------------|------|
| Collector-Emitter Breakdown Voltage | V _{CE} | 650 | V |
| DC collector current, limited by T _{jmax} T _C = 25°C T _C = 100°C | I _C | 30 15 | A |
| Diode Forward current, limited by T _{jmax} T _C = 25°C T _C = 100°C | I _F | 30 15 | A |
| Continuous Gate-emitter voltage | V _{GE} | ±20 | V |
| Transient Gate-emitter voltage | V _{GE} | ±30 | V |
| Turn off safe operating area V _{CE} ≤ 650V, T _j ≤ 150°C | - | 60 | A |
| Pulsed collector current, V _{GE} =15V, t _p limited by T _{jmax} | I _{CM} | 45 | A |
| Short Circuit Withstand Time, V _{GE} = 15V, V _{CE} ≤ 400V | T _{sc} | 5 | μs |
| Power dissipation , T _j =25°C | P _{tot} | 27 | W |
| Operating junction temperature | T _j | -40...+150 | °C |
| Storage temperature | T _s | -55...+150 | °C |
| Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s | - | 260 | °C |

Thermal Resistance

| Parameter | Symbol | Max. Value | Unit |
|---|---------------------|------------|------|
| IGBT thermal resistance, junction - case | R _{θ(j-c)} | 4.9 | K/W |
| Diode thermal resistance, junction - case | R _{θ(j-c)} | 5.8 | K/W |
| Thermal resistance, junction - ambient | R _{θ(j-a)} | 62.5 | K/W |



Electrical Characteristics of the IGBT ($T_j = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|--|---|-----------------------------------|------|------|-----------|---------|
| Static Characteristics (Tested on wafers) | | | | | | |
| BV_{CES} | Collector to Emitter Breakdown Voltage | $V_{GE} = 0V, I_C = 1mA$ | 650 | - | - | V |
| $V_{CE(SAT)}$ | Collector to Emitter Saturation Voltage | $I_C = 15A, V_{GE} = 15V$ | - | 1.65 | 1.95 | V |
| $V_{GE(th)}$ | G-E Threshold Voltage | $V_{GE} = V_{CE}, I_C = 250\mu A$ | 4.1 | 5.0 | 5.7 | V |
| I_{CES} | Collector Cut-Off Current | $V_{CE} = 650V, V_{GE} = 0V$ | - | - | 10 | μA |
| I_{GES} | G-E Leakage Current | $V_{GE} = \pm 20V, V_{CE} = 0V$ | - | - | ± 200 | nA |
| g_{fs} | Transconductance | $V_{CE}=20V, I_C=15A$ | - | 10 | - | S |

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---------------------------------|-------------|---|-----|------|-----|------|
| Dynamic | | | | | | |
| Input capacitance | C_{ies} | $V_{CE} = 25V, V_{GE} = 0V,$ $f = 1MHz$ | - | 1910 | - | pF |
| Output capacitance | C_{oes} | | - | 80 | - | |
| Reverse transfer capacitance | C_{res} | | - | 46 | - | |
| Gate charge | Q_G | $V_{CC} = 480V, I_C = 15A,$ $V_{GE} = 15V$ | - | 92 | - | nC |
| Short circuit collector current | $I_{C(SC)}$ | $V_{GE}=15V, t_{SC} \leq 5\mu s$ $V_{CC}=400V,$ $T_{j, start}=25^\circ C$ | - | 98 | - | A |



Switching Characteristic, Inductive Load (T_j= 25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---------------------|---------------------|---|------|------|------|------|
| Dynamic | | | | | | |
| Turn-on Delay Time | t _{d(on)} | T _j =25°C V _{CC} = 400V, I _C = 15A, V _{GE} = 0/15V, R _g =12Ω | - | 15 | - | ns |
| Rise Time | t _r | | - | 25 | - | ns |
| Turn-off Delay Time | t _{d(off)} | | - | 60 | - | ns |
| Fall Time | t _f | | - | 46 | - | ns |
| Turn-on Energy | E _{on} | | - | 0.75 | - | mJ |
| Turn-off Energy | E _{off} | | - | 0.1 | - | mJ |

Electrical Characteristics of the DIODE (T_j= 25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|--------------------------|-----------------|--|-----|-----|-----|------|
| Dynamic | | | | | | |
| Diode Forward Voltage | V _{FM} | I _F = 15A | - | 1.7 | - | V |
| Reverse Recovery Time | T _{rr} | I _F = 15A VR = 300V, di/dt =200A/μs | - | 50 | - | ns |
| Reverse Recovery Current | I _{rr} | | - | 4 | - | A |
| Reverse Recovery Charge | Q _{rr} | | - | 83 | - | nC |

Fig. 1 FBSOA characteristics

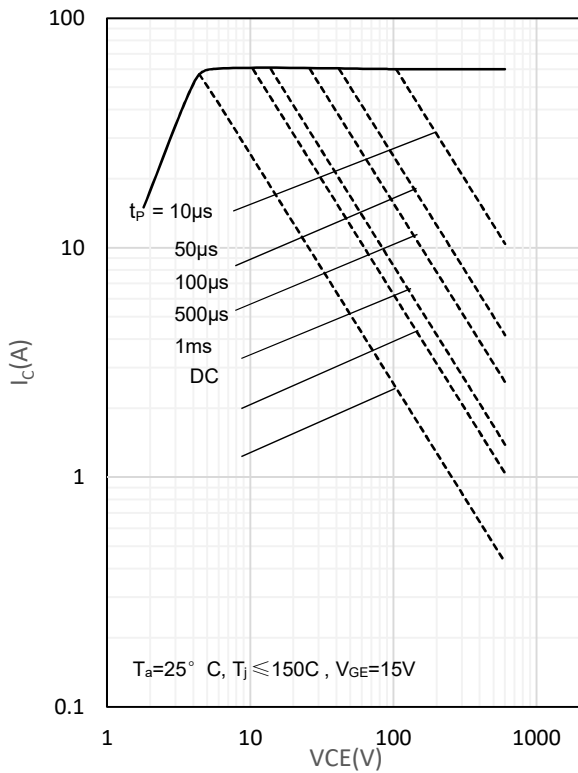


Fig. 2 Load Current vs. Frequency

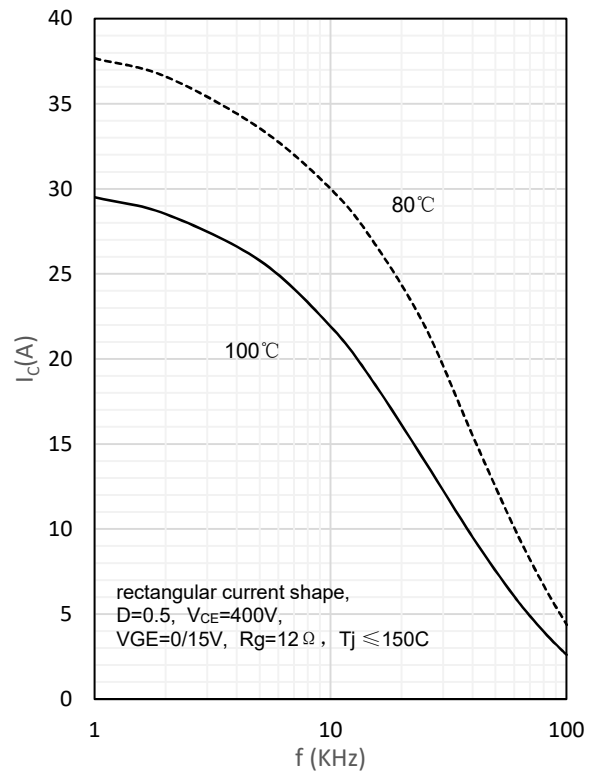


Fig. 3 Output characteristics

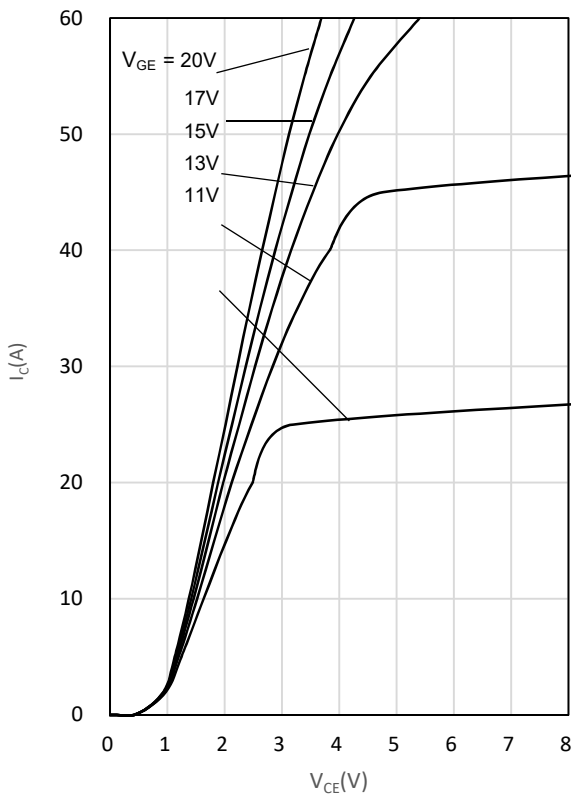


Fig. 4 Saturation voltage characteristics

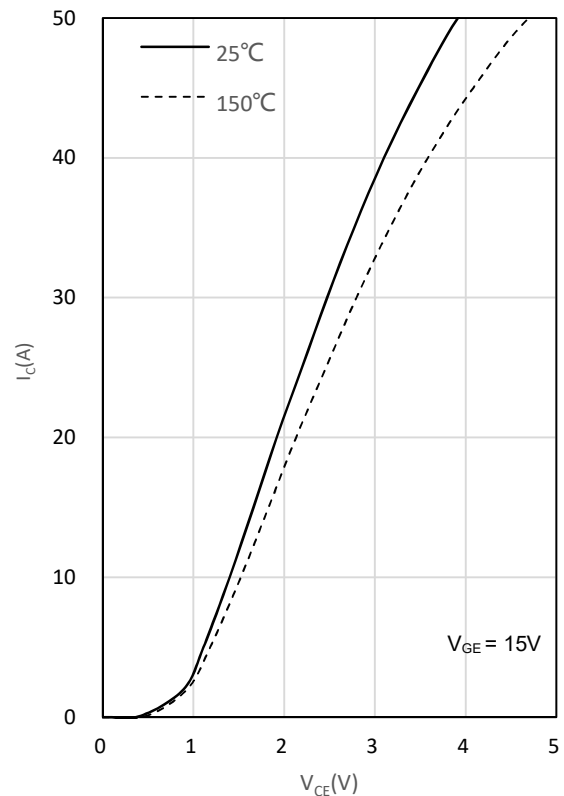


Fig. 5 Switching times vs. gate resistor

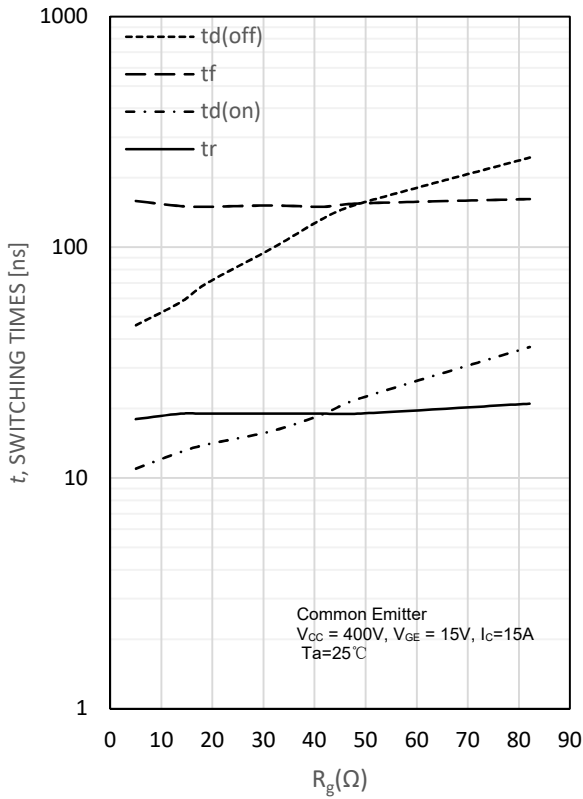


Fig. 6 Switching times vs. collector current

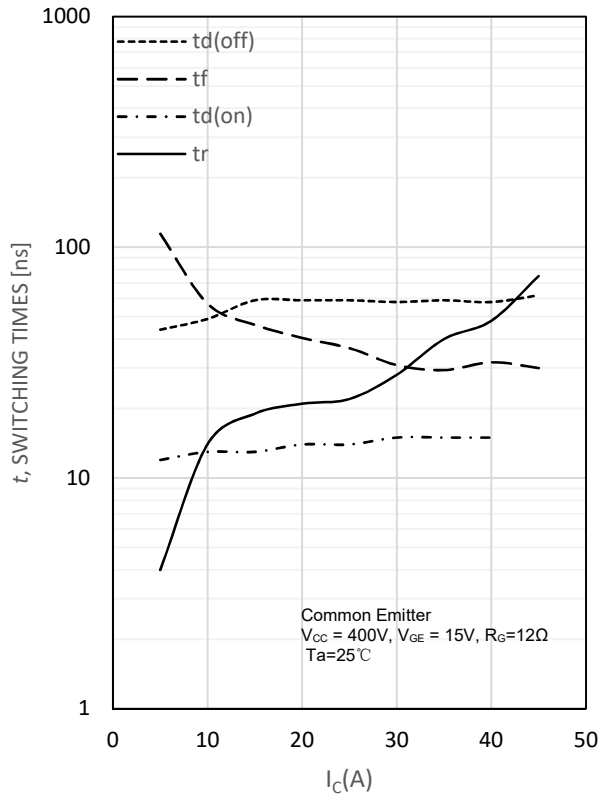


Fig. 7 Switching loss vs. gate resistor

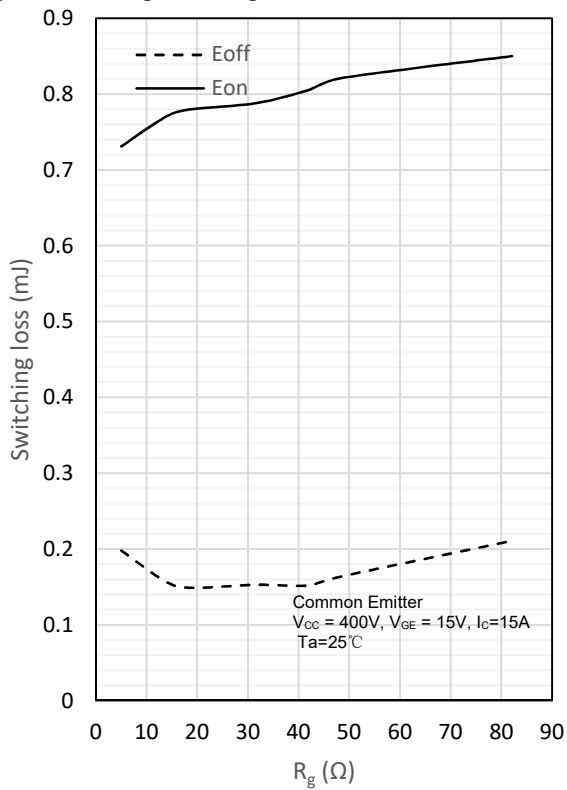


Fig. 8 Switching loss vs. collector current

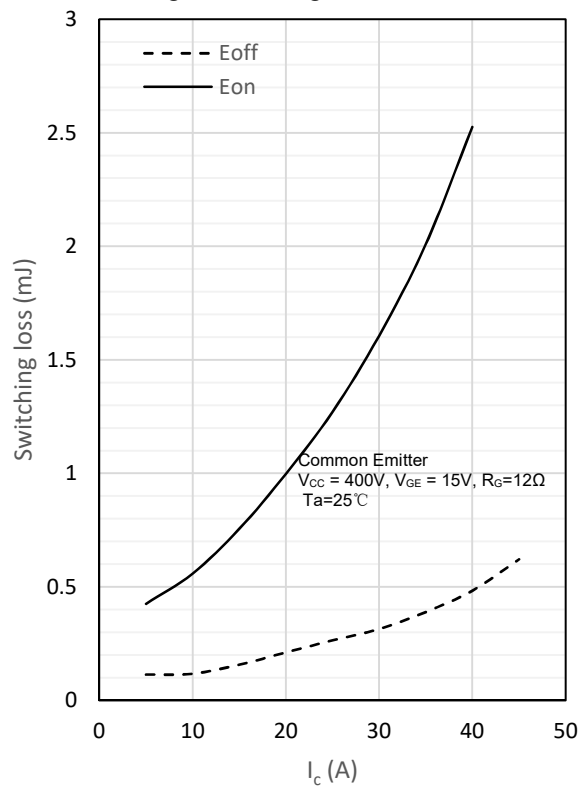


Fig. 9 Gate charge characteristics

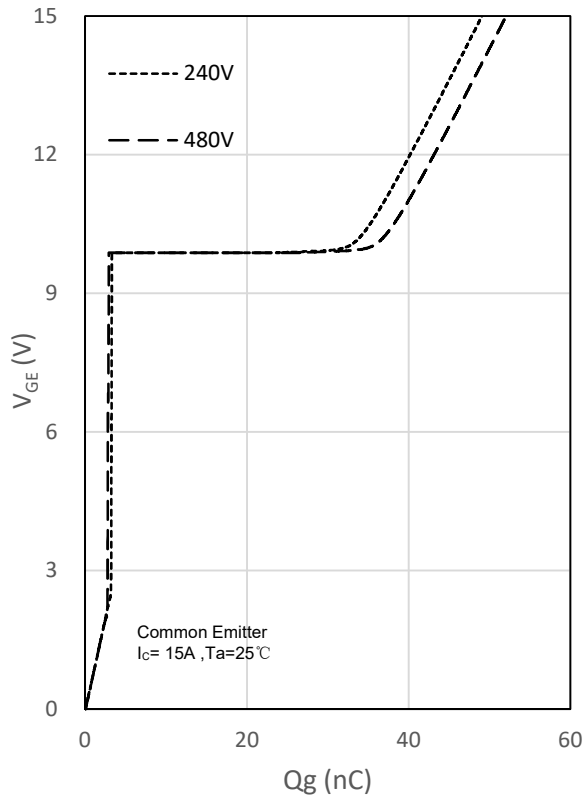


Fig. 10 Capacitance characteristics

