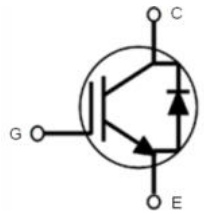
# 1200V 30A FieldStop Trench IGBT

## Description

The device is designed by advanced FieldStop Trench technology process. This IGBT offer low $V_{CE(sat)}$, high speed switching performance and excellent quality for application such as PFC,UPS, Welder, PV Inverter and other switching applications.


## Features

- FieldStop Trench Technology, Positive temperature coefficient
- $V_{CE(sat)}$=2.0V@$I_C$=30A
- $t_{rr}$=48ns (typ.)
- High Speed Switching & Low Power Loss
- High Input Impedance

## Applications

- PFC, UPS, Welder, PV Inverter

## Absolute Maximum Ratings

| Symbol | Parameter | | Ratings | Unit |
|---|---|---|---|---|
| $V_{CES}$ | Collector to Emitter Voltage | | 1200 | V |
| $V_{GES}$ | Gate to Emitter Voltage | | ±20 | V |
| $I_C$ | Collector Current | $T_C$=25℃ | 55 | A |
| | | $T_C$=100℃ | 30 | A |
| $I_{CM}$ | Pulsed Collector Current | | 100 | A |
| $I_F$ | Diode Continuous Forward Current | $T_C$=100℃ | 30 | A |
| $I_{FM}$ | Diode Maximum Forward Current | | 180 | A |
| $P_D$ | Maximum Power Dissipation | $T_C$=25℃ | 325 | W |
| | | $T_C$=100℃ | 175 | W |
| $T_J$ | Operating Junction Temperature Range | | -40~+175 | ℃ |
| $T_{STG}$ | Storage Temperature Range | | -50~+150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Ratings | Unit |
|---|---|---|---|
| $R_{th\ (J-C)}$ (IGBT) | Thermal Resistance, Junction to case for IGBT | 0.5 | ℃/W |
| $R_{th\ (J-C)}$ (Diode) | Thermal Resistance, Junction to case for Diode | 1.7 | ℃/W |
| $R_{th\ (J-A)}$ | Thermal Resistance, Junction to Ambient | 40 | ℃/W |

## Electrical Characteristics of IGBT @$T_C$=25 ℃ unless otherwise noted

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | $V_{GE}$=0V, $I_C$=250uA | 1200 | - | - | V |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage | $I_C$=30A, $V_{GE}$=15V | - | 2.0 | 2.8 | V |
| | | $I_C$=30A, $V_{GE}$=15V, $T_C$=150℃ | - | 2.45 | - | V |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{CE}$=$V_{GE}$, $I_C$=250uA | 5.0 | 5.6 | 7.0 | V |
| $I_{CES}$ | Zero Gate Voltage Collector Current | $V_{CE}$=$V_{CES}$, $V_{GE}$=0V | - | - | 1 | uA |
| $I_{GES}$ | Gate to Emitter Leakage Current | $V_{GE}$=$V_{GES}$, $V_{CE}$=0V | - | - | ±250 | nA |

## Electrical Characteristics of Diode @$T_C$=25 ℃ unless otherwise noted

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_F$ | Diode Forward Voltage | $I_F$=30A | - | 3.65 | 3.8 | V |
| | | $I_F$=30A, $T_C$=150℃ | - | 2.91 | - | V |
| $t_{rr}$ | Diode Reverse Recovery Time | $I_F$=30A, di/dt=-200A/us | - | 48 | - | ns |
| $I_{rr}$ | Diode Peak Reverse Recovery Current | | - | 6.6 | - | A |
| $Q_{rr}$ | Diode Reverse Recovery Charge | | - | 1080 | - | nC |

## Switching Characteristics @$T_C$=25 ℃ unless otherwise noted

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | $I_C$=30A, $V_{CC}$=600V, $V_{GE}$=15V, $R_G$=10Ω, Inductive Load, $T_C$=25℃ | - | 34 | - | ns |
| $t_r$ | Rising Time | | - | 39 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 170 | - | ns |
| $t_f$ | Falling Time | | - | 45 | - | ns |
| $E_{on}$ | Turn-on Switching Loss | | - | 1.08 | - | mJ |
| $E_{off}$ | Turn-off Switching Loss | | - | 0.36 | - | mJ |
| $E_{ts}$ | Total Switching Loss | | - | 1.44 | - | mJ |
| $t_{d(on)}$ | Turn-on Delay Time | $I_C$=30A, $V_{CC}$=600V, $V_{GE}$=15V, $R_G$=10Ω Inductive Load, $T_C$=150℃ | - | 33 | - | ns |
| $t_r$ | Rising Time | | - | 40 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 190 | - | ns |
| $t_f$ | Falling Time | | - | 110 | - | ns |
| $E_{on}$ | Turn-on Switching Loss | | - | 1.96 | - | mJ |
| $E_{off}$ | Turn-off Switching Loss | | - | 0.62 | - | mJ |
| $E_{ts}$ | Total Switching Loss | | - | 2.58 | - | mJ |
| $C_{ies}$ | Input Capacitance | $V_{GE}$=0V, $V_{CE}$=25V, f=1.0MHz | - | 3942 | - | pF |
| $C_{res}$ | Reverse Transfer Capacitance | | - | 72 | - | pF |
| $C_{oes}$ | Output Capacitance | | - | 72 | - | pF |
| $Q_g$ | Total Gate Charge | $I_C$=30A, $V_{CC}$=960V $V_{GE}$=15V | - | 204 | - | nC |
| $Q_{ge}$ | Gate to Emitter Charge | | - | 34 | - | nC |
| $Q_{gc}$ | Gate to Collector Charge | | - | 94 | - | nC |
| tsc | Short Circuit With stand Time | $V_{CC}$=600V,$V_{GE}$=15V | 8 | - | - | us |

## Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

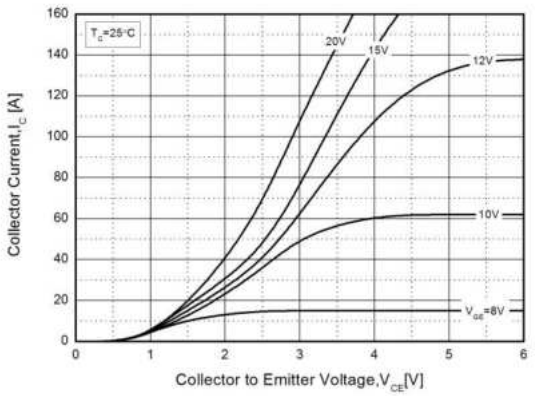



Fig. 2. Typical Saturation Voltage Characteristics

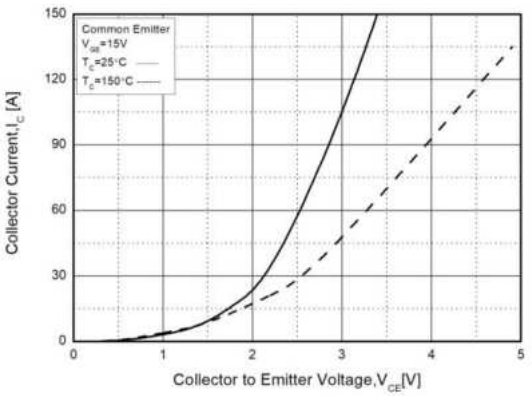



Fig. 3. Typical Saturation Voltage vs. $T_C$

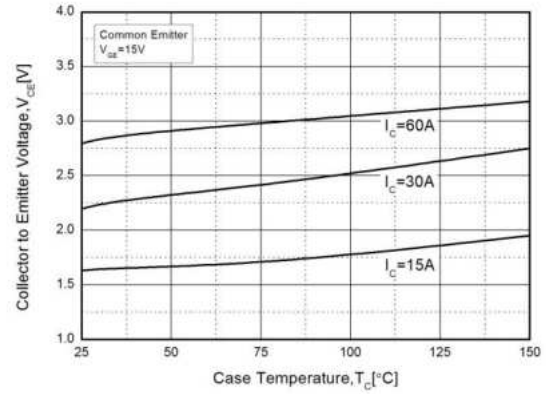



Fig. 4. Diode Forward Characteristics

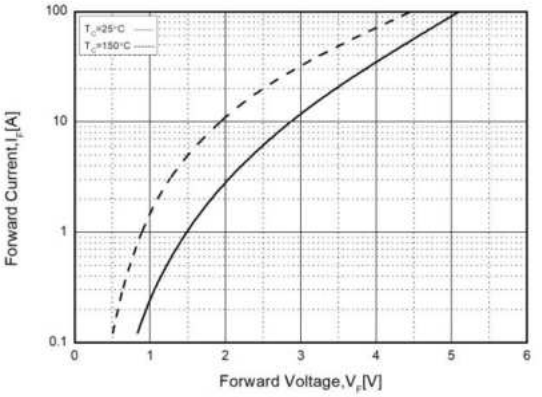



Fig. 5. Typical Capacitance Characteristics

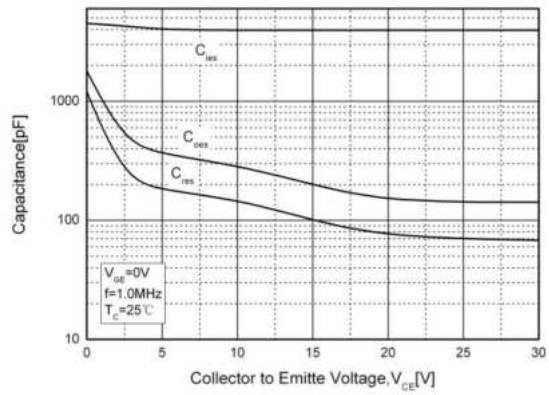
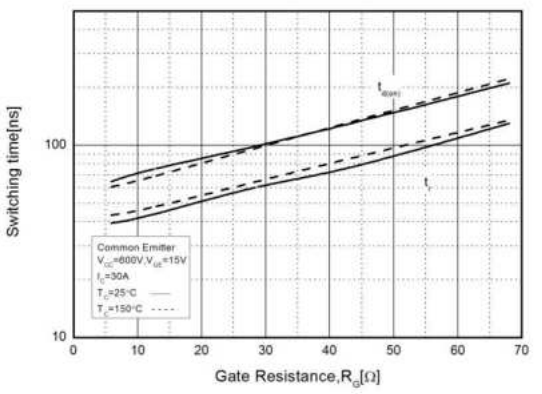



Fig. 6. Turn-on Characteristics vs. $R_G$



## Typical Performance Characteristics

Fig. 7. Turn-off Characteristics vs. $R_G$

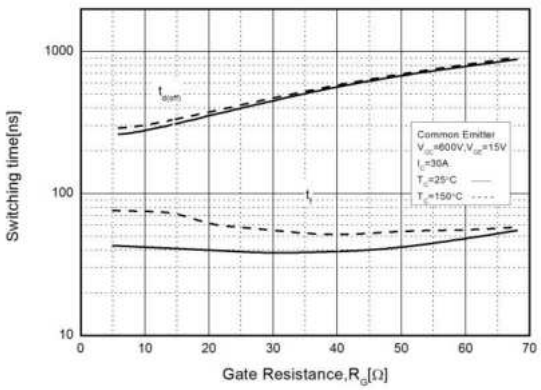



Fig. 8. Switching Loss vs. $R_G$

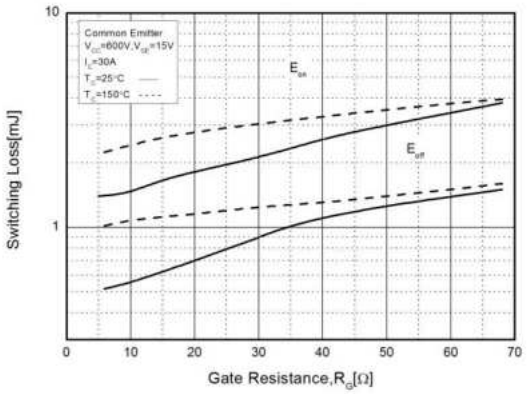



Fig. 9. Turn-on Characteristics vs. $I_C$

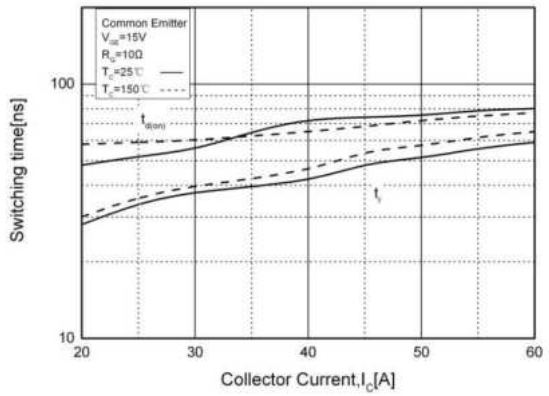



Fig. 10. Turn-off Characteristics vs. $I_C$

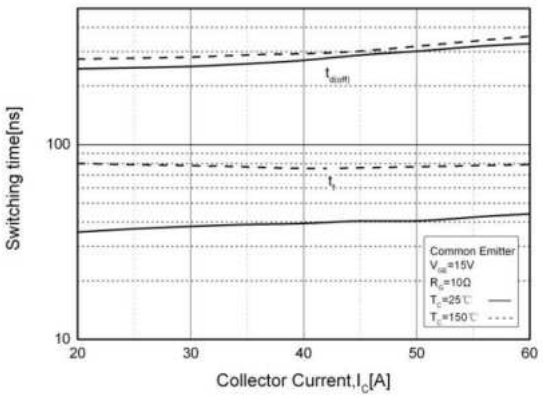
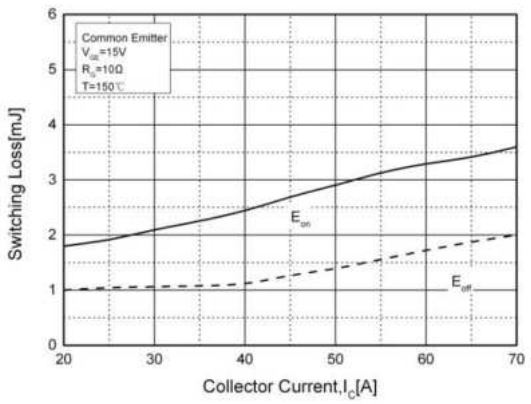



Fig. 11. Switching Loss vs. $I_C$



## Package Dimensions

**TO-3PN**

(Dimensions in Millimeters)