**650V 75A IGBT**

## ■ Applications

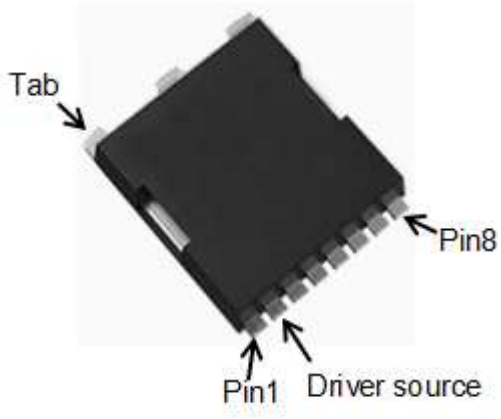
- Industrial UPS
- Welding machine
- Solar converters
- Energy Storage
- Mid to high range switching frequency converters

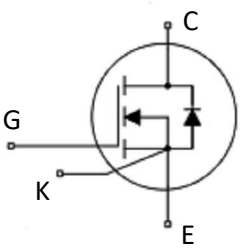
## ■ Features

- Low switching power loss
- Low switching surge and noise
- Advanced Fieldstop technology
- Low EMI
- Maximum junction temperature 175°C
- Short circuit withstand time – 5uS
- Qualified according to JEDEC for target applications
- RoHS and Halogen-Free Compliant

## ■ Product Summary

| | | |
|---|---|---|
| $V_{CES}$ | 650 | V |
| $I_C$ | 75 | A |
| $V_{CE(sat),Typ}$@15V | 1.8 | V |




**TOLL**

Gate： Pin1

Collector： Tab

Emitter： Pin3~8

Driver Source：Pin2

| Marking | Package | Packaging | Min. package quantity |
|---|---|---|---|
| MTB75N065J2S | TOLL | Tape & Reel | 2000 |

## ■ Absolute Maximum Ratings（Tc=25℃ unless otherwise noted)

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Collector-emitter Voltage | $V_{CES}$ | 650 | V |
| DC collector current，limited by $T_{jmax}$<br>Tc=25℃<br>Tc=100℃ | $I_C$ | 90<br>75 | A |
| Pulsed collector current，tp limited by $T_{jmax}$ | $I_{C\ Pulse}$ | 225 | A |
| Diode forward current，limited by $T_{jmax}$<br>Tc=25℃<br>Tc=150℃ | $I_F$ | 55<br>20 | A |
| Diode Pulsed current，tp limited by $T_{jmax}$ | $I_{F\ Pulse}$ | 160 | A |
| Continuous Gate-emitter voltage | $V_{GE}$ | ±20 | V |
| Power Dissipation （Tc=25℃） | $P_D$ | 400 | W |
| Short circuit withstand time<br>$V_{GE}$=15V,$V_{CC}$≤400V，$T_j$≤150℃ | $t_{SC}$ | 5 | μs |
| Junction Temperature | $T_j$ | 175 | ℃ |
| Storage Temperature | $T_{STG}$ | -55-150 | ℃ |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

## ■ Thermal Characteristics

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| IGBT Maximum Junction-to-Case | $R_{\theta JC}$ | 0.38 | ℃/W |
| Diode Maximum Junction-to-Case | $R_{\theta JC}$ | 0.45 | ℃/W |
| Maximum Junction-to-Ambient | $R_{\theta JA}$ | 40 | ℃/W |

Note：This transistor is sensitive to electrostatic discharge and should be handled with care.

## ■ Electrical Characteristics（Tc=25℃ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{CES}$ | $V_{GE}$=0V,$I_C$=250uA | 650 | - | - | V |
| Zero gate voltage collector current | $I_{CES}$ | $V_{CE}$=650V,$V_{GE}$=0V | - | - | 20 | uA |
| Gate-emitter leakage current | $I_{GES}$ | $V_{GE}$=±20V,$V_{CE}$=0V | - | - | ±100 | nA |
| Gate-emitter threshold voltage | $V_{GE(TH)}$ | $V_{CE}$=$V_{GE}$,$I_C$=250uA | 4 | 5 | 6 | V |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $V_{GE}$=15V,$I_C$=75A | - | 1.8 | 2.1 | V |
| | | Tj=175°C | - | 2.3 | - | V |
| Diode forward voltage | $V_F$ | $I_F$=30A | - | 1.65 | 2.3 | V |
| | | Tj=175°C | - | 2.2 | - | V |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{ies}$ | $V_{CE}$=25V,$V_{GE}$=0V, f=500KHz | - | 4.55 | - | nF |
| Output Capacitance | $C_{oes}$ | | - | 240 | - | pF |
| Reverse Transfer Capacitance | $C_{res}$ | | - | 70 | - | pF |
| Integrated gate resistor | $R_{Gint}$ | | - | 3.2 | - | Ω |
| Total Gate Charge | $Q_g$ | $V_{CC}$=400V,$I_C$=25A, $V_{GE}$=15V | - | 160 | - | nC |
| Gate−to−emitter charge | $Q_{ge}$ | | - | 20 | - | nC |
| Gate−to−collector charge | $Q_{gc}$ | | - | 65 | - | nC |
| Internal emitter inductance measured 5mm (0.197 in.) from case | $L_E$ | | - | 2 | - | nH |

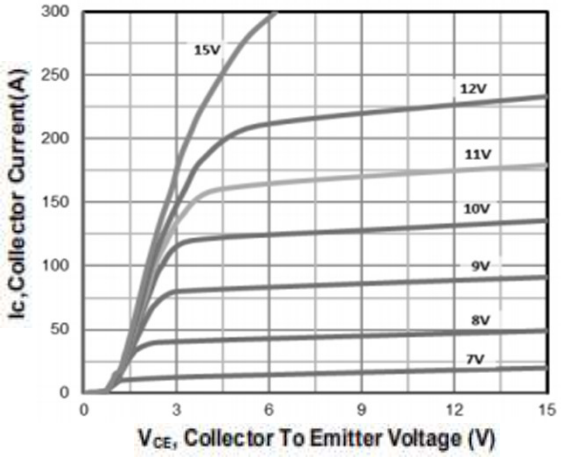
## ■ Switching Characteristic, Inductive Load, at $T_j$=25℃

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **IGBT Switching Characteristics** | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{CC}$= 400V<br>$I_C$= 75A<br>$V_{GE}$= 15V<br>$R_G$= 10Ω<br>Inductive load | - | 60 | - | ns |
| Turn-On Rise Time | $t_r$ | | - | 40 | - | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 180 | - | ns |
| Turn-Off Fall Time | $t_f$ | | - | 32 | - | ns |
| Turn-on energy | $E_{on}$ | | - | 0.95 | - | mJ |
| Turn-off energy | $E_{off}$ | | - | 0.48 | - | mJ |
| **Diode Characteristics** | | | | | | |
| Reverse Recovery Time | $t_{rr}$ | $V_R$=400V,$I_F$=30A,<br>di/dt=1000A/us | - | 30 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 0.27 | - | μC |
| Peak Reverse Recovery Current | $I_{rrm}$ | | - | 18 | - | A |

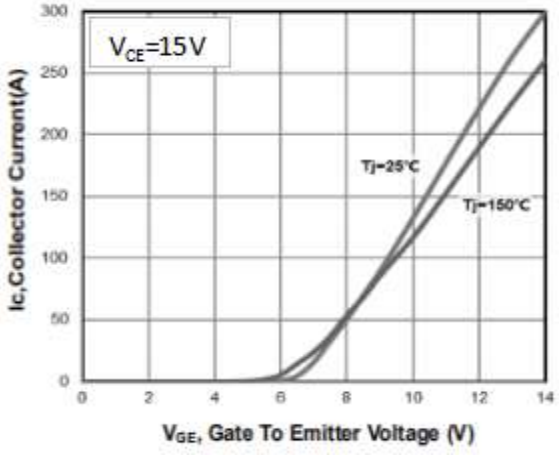
## ■ Switching Characteristic, Inductive Load, at $T_j$=150℃

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **IGBT Switching Characteristics** | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{CC}$= 400V<br>$I_C$= 75A<br>$V_{GE}$= 15V<br>$R_G$= 10Ω<br>Inductive load | - | 62 | - | ns |
| Turn-On Rise Time | $t_r$ | | - | 48 | - | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 193 | - | ns |
| Turn-Off Fall Time | $t_f$ | | - | 75 | - | ns |
| Turn-on energy | $E_{on}$ | | - | 1.45 | - | mJ |
| Turn-off energy | $E_{off}$ | | - | 0.72 | - | mJ |
| **Diode Characteristics** | | | | | | |
| Reverse Recovery Time | $t_{rr}$ | $V_R$=400V,$I_F$=30A,<br>di/dt=1000A/us | - | 40 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 0.5 | - | μC |
| Peak Reverse Recovery Current | $I_{rrm}$ | | - | 25 | - | A |

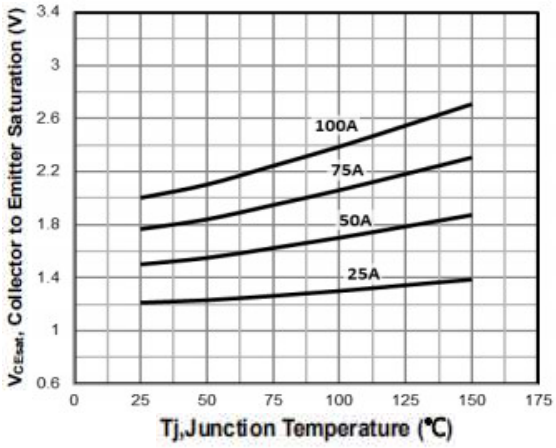
## ■ Characteristics Curves



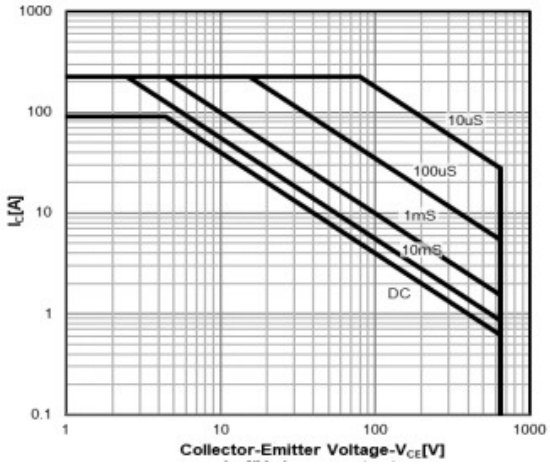

Output Characteritsics



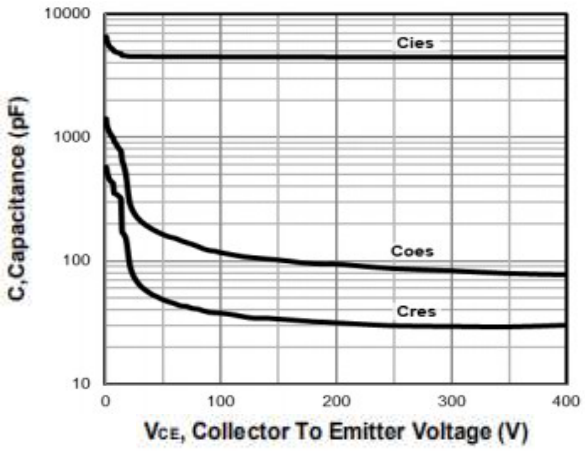

Transfer Characteritsics



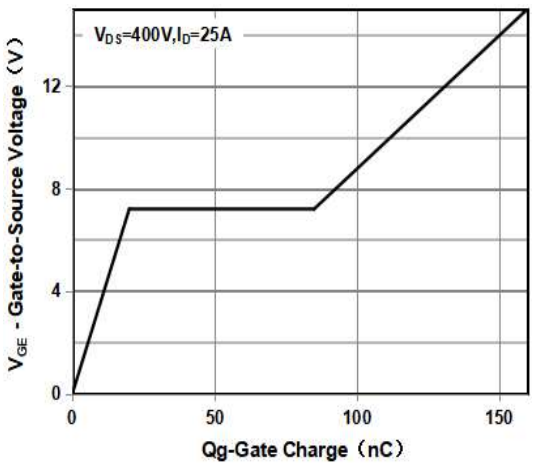

Typical collector-emitter saturation voltage as a function of junction temperature (VGE = 15V)



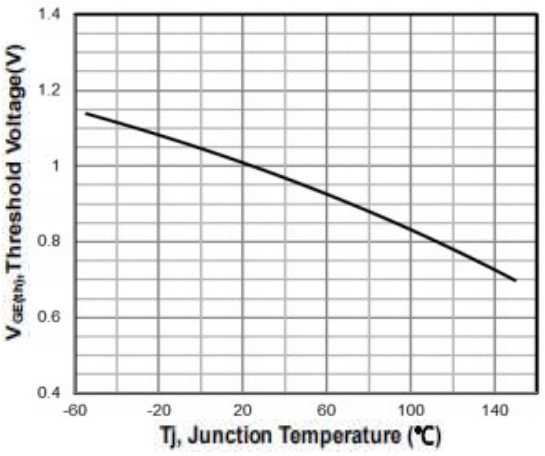

Safe operating area



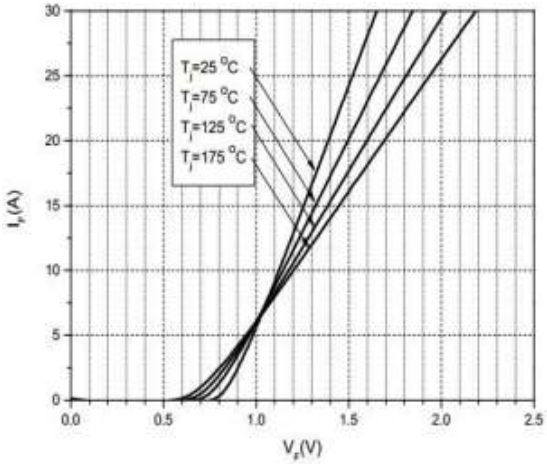

Capacitance




Typical gate charge




**Gate-emitter threshold voltage as a function of junction temperature**




**Typ. diode forward current as a function of forward voltage**

Note： The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

## ■ TOLL Package Dimensions

Unit：mm

| Symbol | Min | Nom | Max | Symbol | Min | Nom | Max |
|---|---|---|---|---|---|---|---|
| A | 2.25 | 2.3 | 2.35 | e1 | | 1.225 | |
| A1 | 1.75 | 1.8 | 1.85 | E | 9.85 | 9.9 | 9.95 |
| b | 0.65 | 0.7 | 0.75 | E1 | 8 | 8.1 | 8.2 |
| b1 | 9.75 | 9.8 | 9.85 | H | 11.6 | 11.7 | 11.8 |
| b2 | 0.7 | 0.75 | 0.8 | H1 | | 6.95 | |
| c | 0.45 | 0.5 | 0.55 | K | | 3.1 | |
| D | 10.35 | 10.4 | 10.45 | L | 1.55 | 1.65 | 1.75 |
| D1 | 11 | 11.1 | 11.2 | L1 | 0.65 | 0.7 | 0.75 |
| D2 | 3.25 | 3.3 | 3.35 | L2 | 0.5 | 0.6 | 0.7 |
| D4 | 4.5 | 4.55 | 4.6 | Q | | 6.75 | |
| e | | 1.2 | | θ | | 10° | |