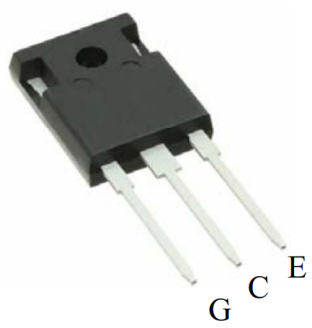
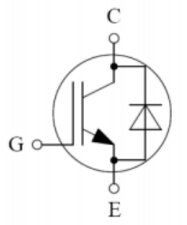



## IGBT Discrete

| | | |
|---|---|---|
| $V_{CE}$ | 1200 | V |
| $I_C$ | 25 | A |
| $V_{CE(SAT)}$ $I_C$=20A | 2.75 | V |

### Circuit




### Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

### Features

- High breakdown voltage to 1200V for improved reliability
- Maximum junction temperature 175℃
- Positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- High short circuit capability(10us)

## Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Emitter Breakdown Voltage | $V_{CE}$ | 1200 | V |
| DC Collector Current, limited by $T_{jmax}$<br>$T_C$= 25°C<br>$T_C$= 100°C | $I_C$ | 50<br>25 | A |
| Diode Forward Current, limited by $T_{jmax}$<br>$T_C$= 25°C<br>$T_C$= 100°C | $I_F$ | 50<br>25 | A |
| Continuous Gate-Emitter Voltage | $V_{GE}$ | ±20 | V |
| Transient Gate-Emitter Voltage<br>(tp≤10μs,D<0.010) | $V_{GE}$ | ±30 | V |
| Turn off Safe Operating Area $V_{CE}$≤1200V,<br>$T_j$≤ 150°C | | 200 | A |
| Pulsed Collector Current, $V_{GE}$=15V,<br>tp limited by $T_{jmax}$ | $I_{CM}$ | 200 | A |
| Diode Pulsed Current, tp limited by $T_{jmax}$ | $I_{Fpuls}$ | 200 | A |
| Short Circuit Withstand Time,<br>$V_{GE}$= 15V, $V_{CC}$=900V, $V_{CEM}$≤1200V | $T_{sc}$ | 10 | μs |
| Power Dissipation , Tj=175°C,Tc=25°C | $P_{tot}$ | 250 | W |

| | | | |
|---|---|---|---|
| Operating Junction Temperature | $T_j$ | -40...+175 | °C |
| Storage Temperature | $T_s$ | -55...+150 | °C |
| Soldering Temperature, wave soldering 1.6mm (0.063in.) from case for 10s | | 260 | °C |

## Electrical Characteristics of the IGBT（$T_j$= 25℃unless otherwise specified）:

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Collector-Emitter Breakdown Voltage | $BV_{CES}$ | $V_{GE}$=0V, $I_C$=250μA | 1200 | | - | V |
| Gate Threshold Voltage | $V_{GE(th)}$ | $V_{GE}$=$V_{CE}$, $I_C$=250uA | 3 | | 6 | V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}$=15V, $I_C$=20A<br>$T_j$=25°C,<br>$T_j$=125°C<br>$T_j$=150°C | | 2.75<br>3.30<br>3.95 | 3.80 | V |
| Zero Gate Voltage Collector Current | $I_{CES}$ | $V_{CE}$=1200V, $V_{GE}$=0V<br>$T_j$= 25°C,<br>$T_j$=150°C | | | 0.25<br>6.00 | mA |
| Gate-Emitter Leakage Current | $I_{GES}$ | $V_{CE}$= 0V, $V_{GE}$= ± 20V | | | ±100 | nA |

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Dynamic** | | | | | | |
| Input Capacitance | $C_{ies}$ | $V_{CE}$= 30V, $V_{GE}$= 0V, f = 1MHz | - | 3.80 | - | nF |
| Reverse Transfer Capacitance | $C_{res}$ | | - | 0.15 | - | |
| Gate Charge | $Q_G$ | $V_{CC}$=600V,$I_C$=25A, $V_{GE}$=15V | - | 0.21 | - | uC |
| Short Circuit Collector Current | $I_{SC}$ | $V_{GE}$=15V, tsc≤10us, Vcc=900V,Tj≤150°C | - | 200 | - | A |

## Switching Characteristic, Inductive Load（$T_j$= 25℃unless otherwise specified）:

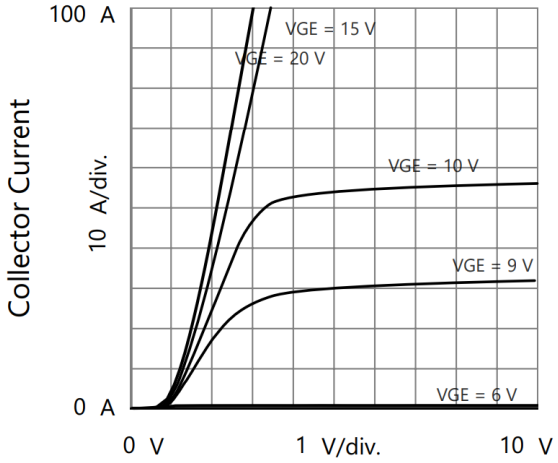
| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Turn-on Delay Time | $t_{d(on)}$ | $V_{CC}$= 600V, $I_C$=25A, $V_{GE}$= -15V~15V, $R_g$=5Ω | - | 48 | - | ns |
| Rise Time | $t_r$ | | - | 36 | - | ns |
| Turn-on Energy | $E_{on}$ | | - | 2.8 | - | mJ |
| Turn-off Delay Time | $t_{d(off)}$ | | - | 200 | - | ns |
| Fall Time | $t_f$ | | - | 40 | - | ns |
| Turn-off Energy | $E_{off}$ | | - | 1.7 | - | mJ |

## Electrical Characteristics of the DIODE（$T_j$= 25℃unless otherwise specified）:

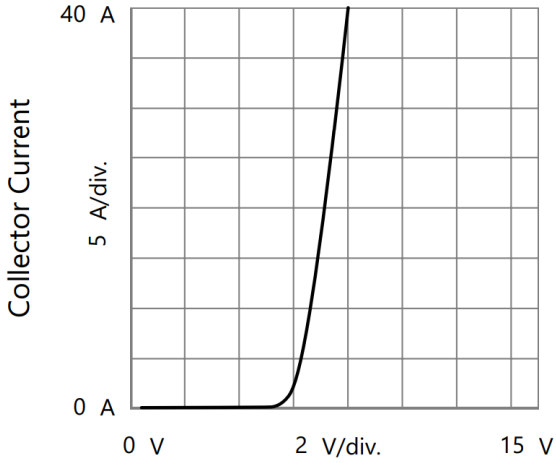
| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Diode Forward Voltage | $V_{FM}$ | $I_F$= 20A | - | 2.5 | - | V |
| Reverse Recovery Current | $I_{rr}$ | $I_F$=20A, $V_R$=200V, di/dt= -200A/μs, | - | 7 | - | A |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 2.40 | - | uC |
| Reverse Recovery Energy | Erec | | - | 1.00 | | mJ |

## Thermal Resistance

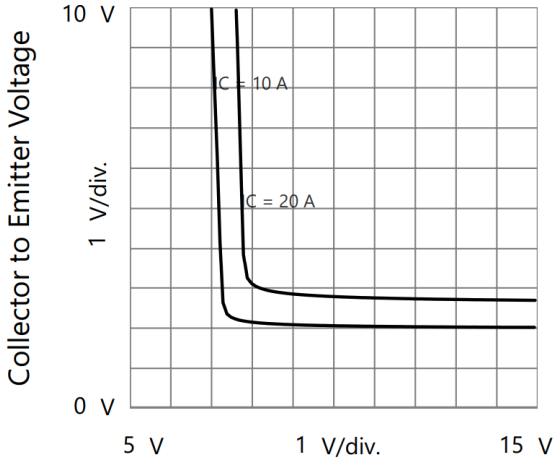
| Parameter | Symbol | Max. Value | Unit |
|---|---|---|---|
| IGBT Thermal Resistance, Junction - Case | $R_{th}$(j-c) | 0.65 | K/W |
| Diode Thermal Resistance, Junction - Case | $R_{th}$(j-c) | 0.80 | K/W |
| Thermal Resistance, Junction - Ambient | $R_{th}$(j-a) | 40 | K/W |



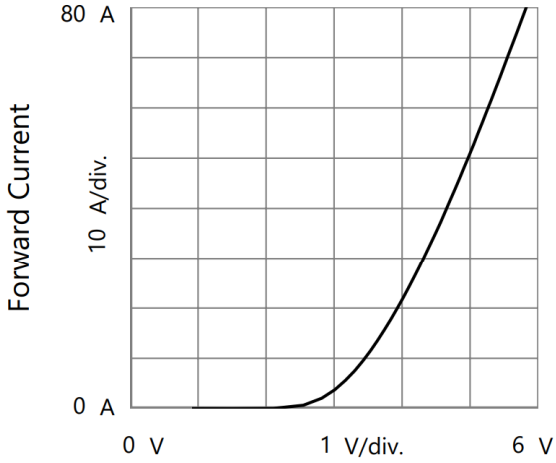

Collector to Emitter Voltage
Output Characteristics



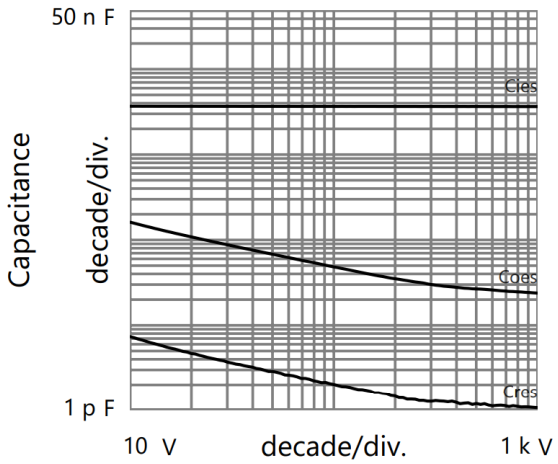

Gate to Emitter Voltage
Transfer Characteristics



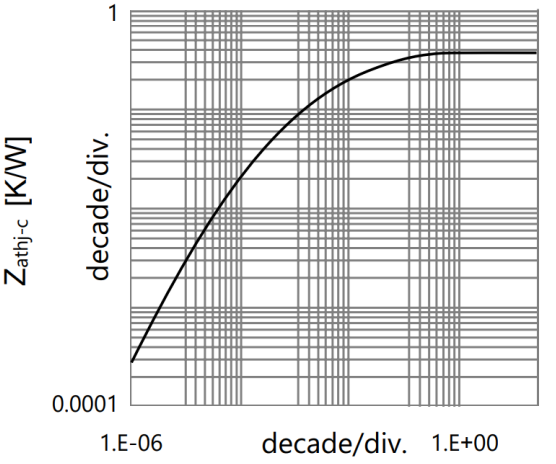

Gate to Emitter Voltage
Collector to Emitter Voltage vs. Gate to Emitter Voltage




Forward Voltage
Freewheeling Diode Forward Characteristics

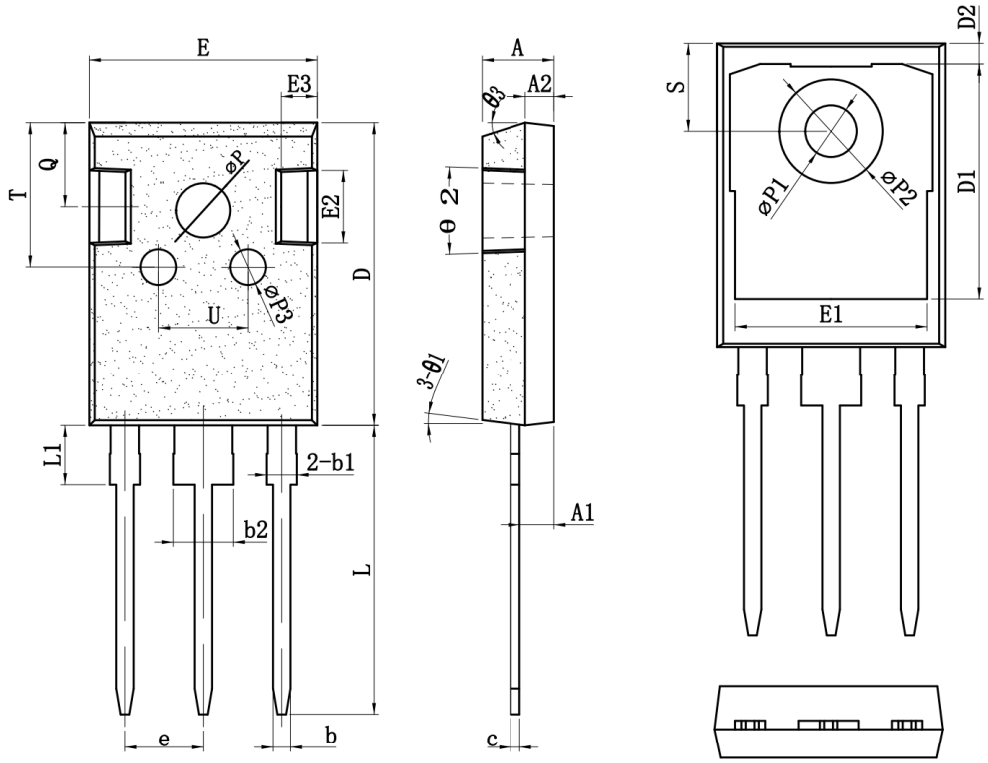



Collector to Emitter Voltage
Capacitances




t [S]
IGBT Transient Thermal Impedance

# TO-247_3L PACKAGE OUTLINE




COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | TYP | MAX | SYMBOL | MIN | TYP | MAX |
|---|---|---|---|---|---|---|---|
| A | 4.60 | 5.00 | 5.40 | e | 2.10 | 5.44 | 5.70 |
| A1 | 2.10 | 2.41 | 2.70 | L | 19.00 | 19.98 | 21.00 |
| A2 | 1.70 | 2.00 | 2.30 | L1 | - | - | 4.50 |
| b | 1.00 | 1.20 | 1.40 | ΦP | 3.30 | 3.70 | 4.00 |
| b1 | 1.80 | 2.10 | 2.40 | ΦP1 | 3.25 | 3.55 | 3.85 |
| b2 | 2.80 | 3.10 | 3.40 | ΦP2 | 6.80 | 7.18 | 7.60 |
| C | 0.45 | 0.60 | 0.75 | ΦP3 | 2.30 | 2.50 | 3.30 |
| D | 19.00 | 21.00 | 23.00 | Q | 5.50 | 5.80 | 6.30 |
| D1 | 16.00 | 16.55 | 17.00 | S | 5.60 | 6.15 | 6.30 |
| D2 | 0.95 | 1.20 | 1.45 | T | 9.50 | 10.00 | 10.50 |
| E | 15.70 | 15.80 | 16.50 | U | 6.00 | - | 8.00 |
| E1 | 12.80 | 13.25 | 13.70 | θ1 | 5° | 7° | 9° |
| E2 | 4.20 | 5.00 | 5.30 | θ2 | 1° | 3° | 5° |
| E3 | 2.20 | 2.50 | 2.80 | θ3 | 13° | 15° | 17° |

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