

DOSEMI

IGBT

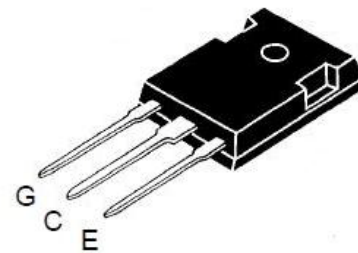
DG10N12T2

Molding Type Discretes

1200V/10A IGBT with Anti-Parallel Diode

General Description

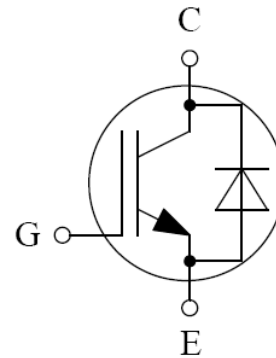
DOSEMI IGBT Power Discretes provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and electronic welders.



TO-247

Features

- Low $V_{CE(sat)}$ NPT IGBT technology
- Low switching loss
- Maximum junction temperature 150°C
- 10 μ s short circuit capability
- Square RBSOA
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Tight parameter distribution
- Lead free package



Equivalent Circuit Schematic

Typical Applications

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

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol | Description | DG10N12T2 | Units |
|------------|---|-------------|------------------|
| V_{CES} | Collector-Emitter Voltage | 1200 | V |
| V_{GES} | Gate-Emitter Voltage | ± 20 | V |
| I_C | Collector Current @ $T_C=25^\circ\text{C}$ | 20 | A |
| | @ $T_C=100^\circ\text{C}$ | 10 | |
| I_{CM} | Pulsed Collector Current $t_p=1\text{ms}$ | 20 | A |
| I_F | Diode Continuous Forward Current | 10 | A |
| I_{FM} | Diode Maximum Forward Current $t_p=1\text{ms}$ | 20 | A |
| P_D | Maximum Power Dissipation @ $T_j=150^\circ\text{C}$ | 321 | W |
| T_{jmax} | Maximum Junction Temperature | 150 | $^\circ\text{C}$ |
| T_{jop} | Operating Junction Temperature | -40 to +150 | $^\circ\text{C}$ |
| T_{stg} | Storage Temperature Range | -40 to +125 | $^\circ\text{C}$ |
| T_S | Soldering Temperature, 1.6mm from case for 10s | 260 | $^\circ\text{C}$ |

Electrical Characteristics of IGBT $T_C=25^\circ\text{C}$ unless otherwise noted**Off Characteristics**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---------------|-------------------------------------|--|------|------|------|---------------|
| $V_{(BR)CES}$ | Collector-Emitter Breakdown Voltage | $T_j=25^\circ\text{C}$ | 1200 | | | V |
| I_{CES} | Collector Cut-Off Current | $V_{CE}=V_{CES}, V_{GE}=0\text{V}, T_j=25^\circ\text{C}$ | | | 25 | μA |
| I_{GES} | Gate-Emitter Leakage Current | $V_{GE}=V_{GES}, V_{CE}=0\text{V}, T_j=25^\circ\text{C}$ | | | 100 | nA |

On Characteristics

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---------------|---|--|------|------|------|-------|
| $V_{GE(th)}$ | Gate-Emitter Threshold Voltage | $I_C=500\mu\text{A}, V_{CE}=V_{GE}, T_j=25^\circ\text{C}$ | 5.0 | 5.9 | 6.5 | V |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage | $I_C=10\text{A}, V_{GE}=15\text{V}, T_j=25^\circ\text{C}$ | | 2.05 | 2.50 | V |
| | | $I_C=10\text{A}, V_{GE}=15\text{V}, T_j=125^\circ\text{C}$ | | 2.40 | | |

Switching Characteristics

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|--------------|------------------------------|--|------|------|------|----------|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC}=600V, I_C=10A,$ $R_G=82\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$ | | 181 | | ns |
| t_r | Rise Time | | | 58 | | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 255 | | ns |
| t_f | Fall Time | | | 347 | | ns |
| E_{on} | Turn-On Switching Loss | | | 1.79 | | mJ |
| E_{off} | Turn-Off Switching Loss | | | 0.73 | | mJ |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC}=600V, I_C=10A,$ $R_G=82\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$ | | 185 | | ns |
| t_r | Rise Time | | | 59 | | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 266 | | ns |
| t_f | Fall Time | | | 480 | | ns |
| E_{on} | Turn-On Switching Loss | | | 2.13 | | mJ |
| E_{off} | Turn-Off Switching Loss | | | 0.94 | | mJ |
| C_{ies} | Input Capacitance | $V_{CE}=30V, f=1MHz,$ $V_{GE}=0V$ | | 0.70 | | nF |
| C_{oes} | Output Capacitance | | | 0.11 | | nF |
| C_{res} | Reverse Transfer Capacitance | | | 0.05 | | nF |
| Q_G | Gate Charge | $V_{CC}=400V, I_C=10A,$ $V_{GE}=15V$ | | 84 | | nC |
| I_{SC} | SC Data | $t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$ | | 90 | | A |
| R_{Gint} | Internal Gate Resistance | | | / | | Ω |

Electrical Characteristics of Diode $T_C=25^\circ C$ unless otherwise noted

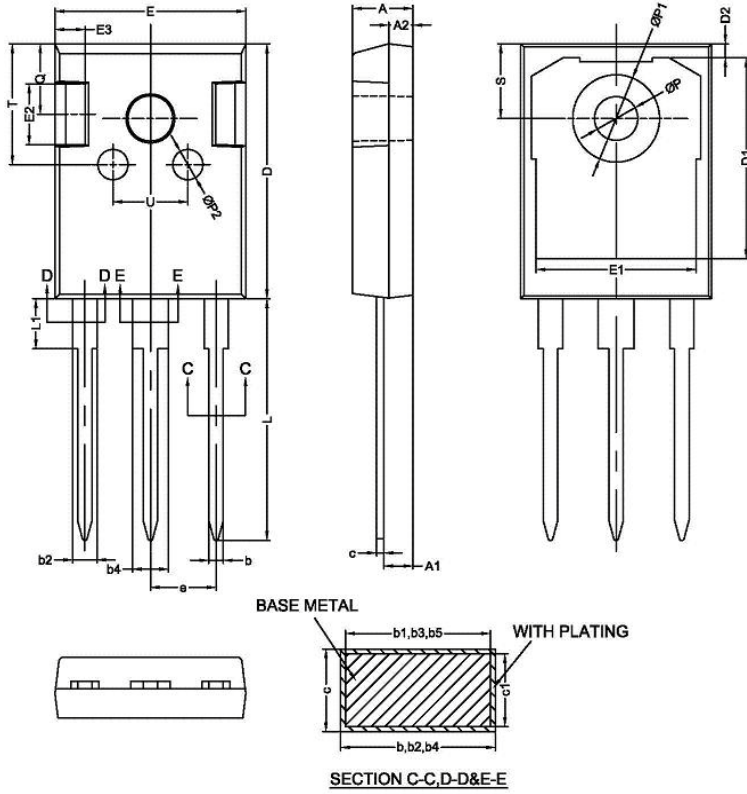
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|-----------|-------------------------------|---|-------------------|------|------|---------|
| V_F | Diode Forward Voltage | $I_F=10A, V_{GE}=0V$ | $T_j=25^\circ C$ | 1.85 | 2.30 | V |
| | | | $T_j=125^\circ C$ | 2.00 | | |
| Q_r | Recovered Charge | $I_F=10A,$ $V_R=600V,$ $R_G=82\Omega,$ $V_{GE}=-15V$ | $T_j=25^\circ C$ | 0.4 | | μC |
| | | | $T_j=125^\circ C$ | 1.4 | | |
| I_{RM} | Peak Reverse Recovery Current | | $T_j=25^\circ C$ | 8 | | A |
| | | | $T_j=125^\circ C$ | 9 | | |
| E_{rec} | Reverse Recovery Energy | $T_j=25^\circ C$ | 0.27 | | mJ | |
| | | $T_j=125^\circ C$ | 0.45 | | | |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|-----------------|------------------------------|------|-------|-------|
| $R_{\theta JC}$ | Junction-to-Case (per IGBT) | | 0.389 | K/W |
| $R_{\theta JC}$ | Junction-to-Case (per Diode) | | 0.961 | K/W |
| $R_{\theta JA}$ | Junction-to-Ambient | 40 | | K/W |

Package Dimensions

Dimensions in Millimeters



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | NOM | MAX |
|--------|---------|-------|-------|
| A | 4.90 | 5.00 | 5.10 |
| A1 | 2.31 | 2.41 | 2.51 |
| A2 | 1.90 | 2.00 | 2.10 |
| b | 1.16 | - | 1.26 |
| b1 | 1.15 | 1.2 | 1.22 |
| b2 | 1.96 | - | 2.06 |
| b3 | 1.95 | 2.00 | 2.02 |
| b4 | 2.96 | - | 3.06 |
| b5 | 2.95 | 3.00 | 3.02 |
| c | 0.59 | - | 0.66 |
| c1 | 0.58 | 0.60 | 0.62 |
| D | 20.90 | 21.00 | 21.10 |
| D1 | 16.25 | 16.55 | 16.85 |
| D2 | 1.05 | 1.20 | 1.35 |
| E | 15.70 | 15.80 | 15.90 |
| E1 | 13.10 | 13.30 | 13.50 |
| E2 | 4.90 | 5.00 | 5.10 |
| E3 | 2.40 | 2.50 | 2.60 |
| e | 5.44BSC | | |
| L | 19.80 | 19.92 | 20.10 |
| L1 | - | - | 4.30 |
| P | 3.50 | 3.60 | 3.70 |
| P1 | - | - | 7.40 |
| P2 | 2.40 | 2.50 | 2.60 |
| Q | 5.60 | - | 6.00 |
| S | 6.15BSC | | |
| T | 9.80 | - | 10.20 |
| U | 6.00 | - | 6.40 |

NOTES:
 1. ALL DIMENSIONS REFER TO JEDEC STANDARD TO-247 AD DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
 2. EJECTION MARK DEPTH 0.10^{+0.15}_{-0.05}.

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