

High Power NPT & Rugged Type IGBT Module

Description

DAWIN'S IGBT module devices are optimized to reduce losses and switching noise in high frequency power conditioning electrical systems. These IGBT modules are ideally suited for power inverters, motors drives and other applications where switching losses are significant portion of the total losses.

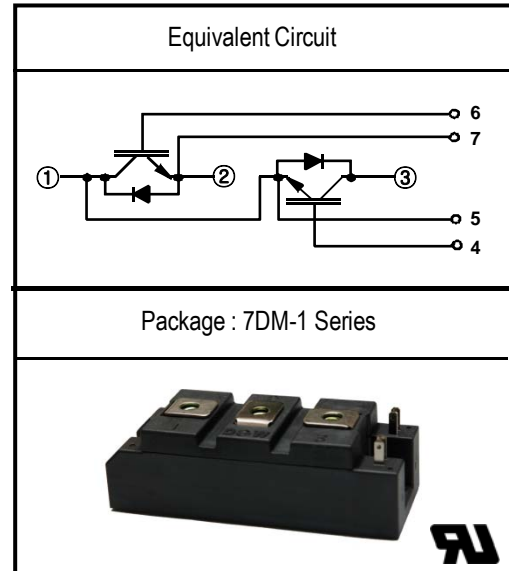
Features

- ☞ High Speed Switching
- ☞ $BV_{CES} = 600V$
- ☞ Low Conduction Loss : $V_{CE(sat)} = 1.95 V$ (typ.)
- ☞ Fast & Soft Anti-Parallel FWD
- ☞ Short circuit rated : Min. 10uS at $T_c=100^\circ C$
- ☞ Reduced EMI and RFI
- ☞ Isolation Type Package

Applications

Motor Drives, High Power Inverters, Welding Machine, Induction Heating, UPS , CVCF, Robotics , Servo Controls, High Speed SMPS

Equivalent Circuit and Package



Please see the package out line information

Absolute Maximum Ratings @ $T_j=25^\circ C$ (Per Leg)

| Symbol | Parameter | Conditions | Ratings | Unit |
|-------------|----------------------------------|---------------------|-----------|------------|
| V_{CES} | Collector-Emitter Voltage | - | 600 | V |
| V_{GES} | Gate-Emitter Voltage | - | ± 20 | V |
| I_C | Collector Current | $T_c = 25^\circ C$ | 125 | A |
| | | $T_c = 75^\circ C$ | 100 | A |
| $I_{CM(1)}$ | Pulsed Collector Current | - | 200 | A |
| I_F | Diode Continuous Forward Current | $T_c = 100^\circ C$ | 100 | A |
| I_{FM} | Diode Maximum Forward Current | - | 200 | A |
| T_{SC} | Short Circuit Withstand Time | $T_c = 100^\circ C$ | 10 | uS |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 480 | W |
| T_j | Operating Junction Temperature | - | -40 ~ 150 | $^\circ C$ |
| T_{stg} | Storage Temperature Range | - | -40 ~ 125 | $^\circ C$ |
| V_{iso} | Isolation Voltage | AC 1 minute | 2500 | V |
| | Mounting screw Torque :M6 | - | 4.0 | N.m |
| | Power terminals screw Torque :M5 | - | 2.0 | N.m |

Note : (1) Repetitive rating : Pulse width limited by max. junction temperature

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

| Symbol | Parameter | Conditions | Values | | | Unit |
|------------------------------|---|--|--------|------|-----------|---------------|
| | | | Min. | Typ. | Max. | |
| BV_{CES} | C - E Breakdown Voltage | $V_{GE} = 0V, I_C = 1.0mA$ | 600 | - | - | V |
| $\Delta BV_{CES}/\Delta T_J$ | Temperature Coeff. of Breakdown Voltage | $V_{GE} = 0V, I_C = 1.0mA$ | - | 0.6 | - | V/°C |
| $V_{GE(th)}$ | G - E threshold voltage | $I_C = 500\mu A, V_{CE} = V_{GE}$ | 4 | - | 7 | V |
| I_{CES} | Collector cutoff Current | $V_{CE} = 600V, V_{GE} = 0V$ | - | - | 1.0 | mA |
| I_{GES} | G - E leakage Current | $V_{GE} = \pm 20V$ | - | - | ± 100 | nA |
| $V_{CE(sat)}$ | Collector to Emitter saturation voltage | $I_C = 100A, V_{GE} = 15V @ T_c = 25^\circ\text{C}$ | - | 1.95 | 2.5 | V |
| | | $I_C = 100A, V_{GE} = 15V @ T_c = 100^\circ\text{C}$ | - | 2.2 | - | V |
| C_{ies} | Input capacitance | $V_{GE} = 0V, f = 1MHz$ | - | 4000 | - | pF |
| C_{oes} | Output capacitance | $V_{CE} = 30V$ | - | 950 | - | pF |
| C_{res} | Reverse transfer capacitance | | - | 230 | - | pF |
| $t_{d(on)}$ | Turn on delay time | $V_{CC} = 300V, I_C = 100A$ | - | 80 | - | nS |
| t_r | Turn on rise time | $V_{GE} = 15V$ | - | 45 | - | nS |
| $t_{d(off)}$ | Turn off delay time | $R_G = 10\Omega$ | - | 80 | - | nS |
| t_f | Turn off fall time | Inductive Load, @ $T_c=25^\circ\text{C}$ | - | 90 | 150 | nS |
| E_{on} | Turn on Switching Loss | | - | 4.35 | - | mJ |
| E_{off} | Turn off Switching Loss | | - | 8.65 | - | mJ |
| E_{ts} | Total Switching Loss | | - | 13 | - | mJ |
| T_{sc} | Short Circuit Withstand Time | $V_{CC} = 300V, V_{GE} = 15V$ @ $T_c = 100^\circ\text{C}$ | 10 | - | - | μS |
| Q_g | Total Gate Charge | $V_{CC} = 300V$ | - | 360 | 540 | nC |
| Q_{ge} | Gate-Emitter Charge | $V_{GE} = 15V$ | - | 45 | 65 | nC |
| Q_{gc} | Gate-Collector Charge | $I_C = 100A$ | - | 165 | 250 | nC |

Electrical Characteristics of FRD @ $T_c=25^\circ\text{C}$ (unless otherwise specified)

| Symbol | Parameter | Conditions | Values | | | Unit | |
|----------|-----------------------|--|-------------------------|------|------|------|----|
| | | | Min. | Typ. | Max. | | |
| V_{FM} | Diode Forward Voltage | $I_F=100\text{A}$ | $T_c=25^\circ\text{C}$ | - | 1.5 | 2.0 | V |
| | | | $T_c=100^\circ\text{C}$ | - | 1.35 | - | |
| t_{rr} | Diode Reverse | $I_F=100\text{A}, V_R=300\text{V}$ $di/dt=-200\text{A}/\mu\text{S}$ | $T_c=25^\circ\text{C}$ | - | 85 | - | nS |
| | Recovery Time | | $T_c=100^\circ\text{C}$ | - | 100 | - | |
| I_{rr} | Diode Peak Reverse | | $T_c=25^\circ\text{C}$ | - | 10 | - | A |
| | Recovery Current | | $T_c=100^\circ\text{C}$ | - | 17 | - | |
| Q_{rr} | Diode Reverse | | $T_c=25^\circ\text{C}$ | - | 360 | - | nC |
| | Recovery Charge | | $T_c=100^\circ\text{C}$ | - | 1100 | - | |

Thermal Characteristics and Weight

| Symbol | Parameter | Conditions | Values | | | Unit |
|-----------------|--|------------|--------|------|------|---------------------------|
| | | | Min. | Typ. | Max. | |
| $R_{\theta JC}$ | Junction-to-Case(IGBT Part, Per 1/2 Module) | | - | - | 0.26 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Junction-to-Case(DIODE Part, Per 1/2 Module) | | - | - | 0.6 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta CS}$ | Case-to-Sink (Conductive grease applied) | | 0.05 | - | - | $^\circ\text{C}/\text{W}$ |
| Weight | Weight of Module | | - | - | 200 | g |

Performance Curves

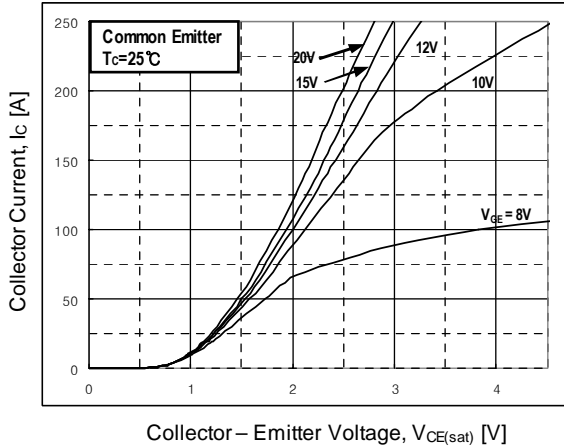


Fig 1. Typical Output characteristics

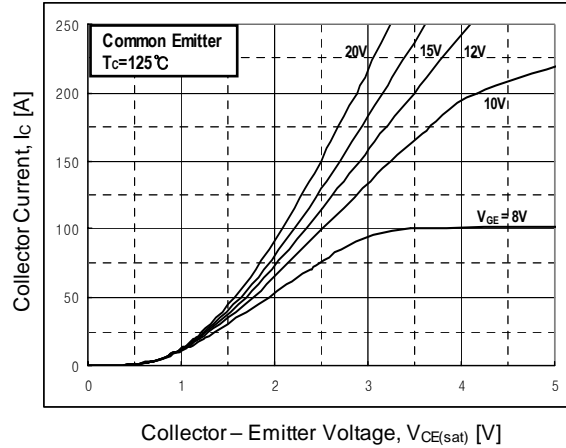


Fig 2. Typical Output characteristics

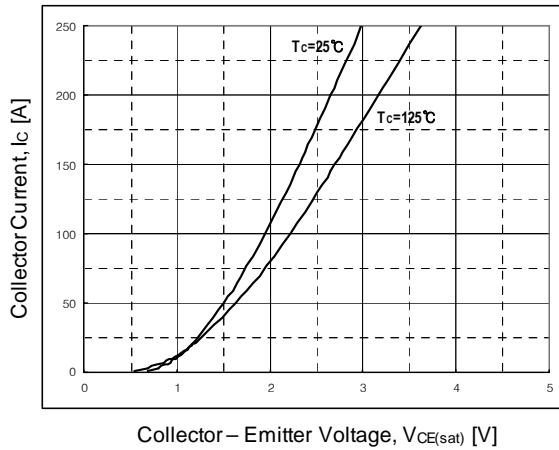


Fig 3. Typical Saturation Voltage characteristics

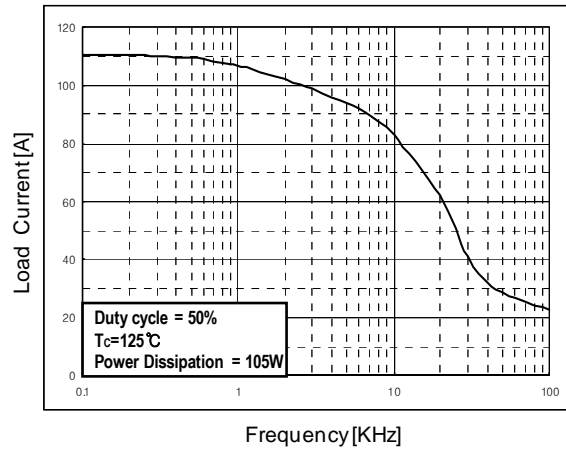


Fig 4. Load Current vs. Frequency

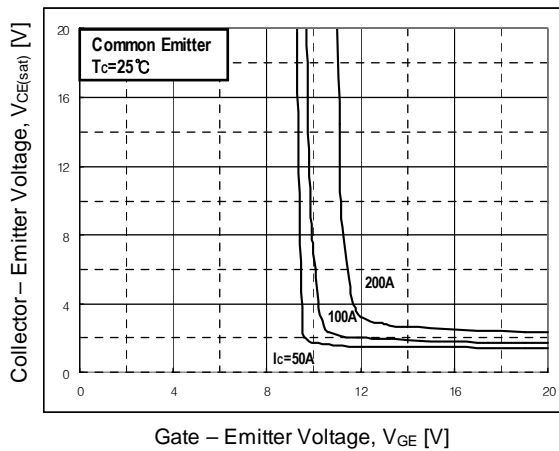


Fig 5. Typical Saturation Voltage vs. VGE

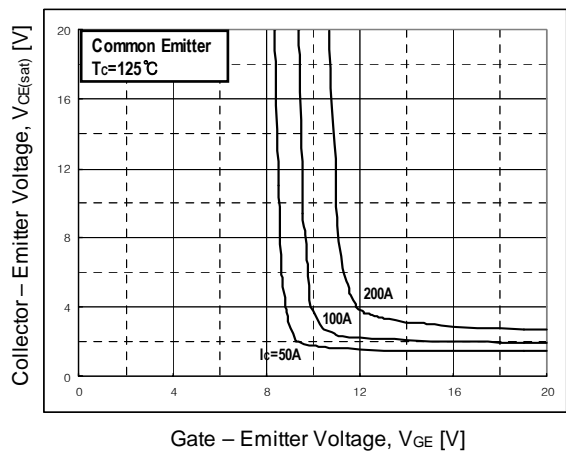
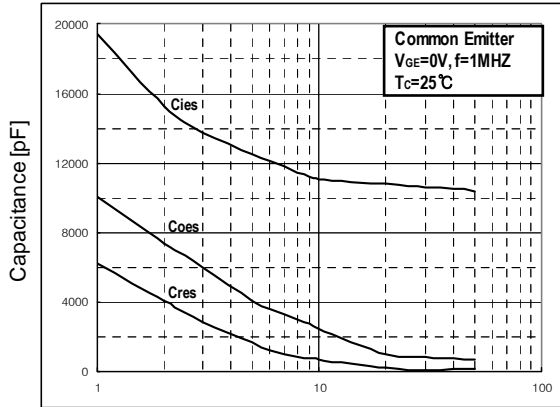
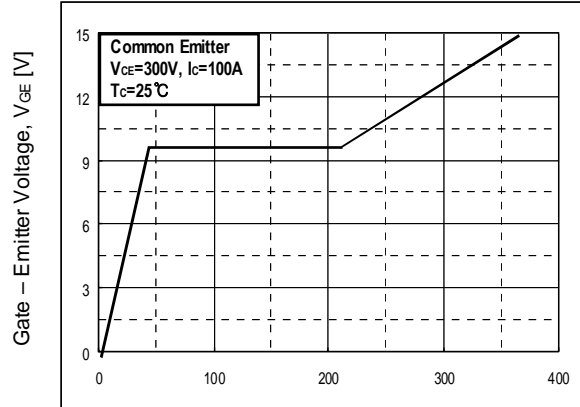


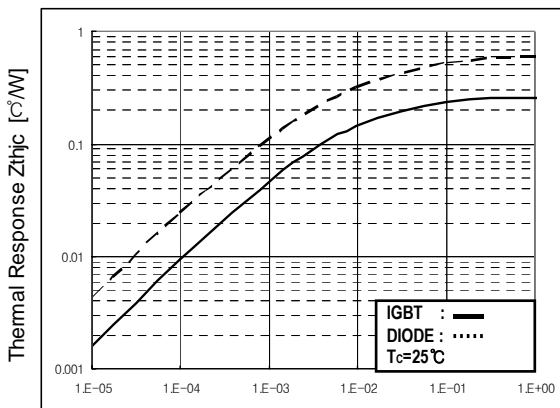
Fig 6. Typical Saturation Voltage vs. VGE



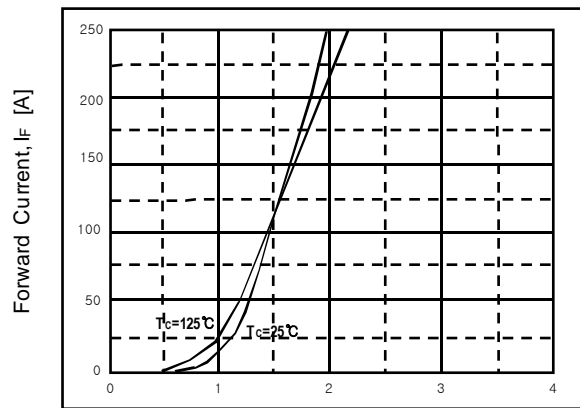
Collector – Emitter Voltage, V_{CE} [V]
Fig 7. Capacitance characteristics



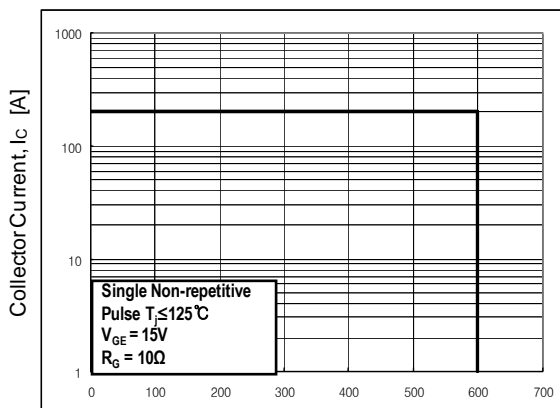
Gate Charge, Q_g [nC]
Fig 8. Gate Charge characteristics



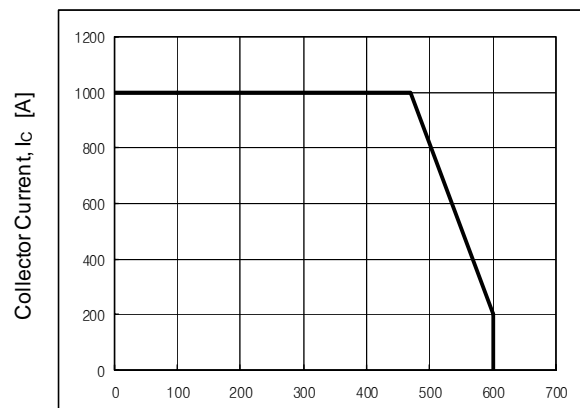
Rectangular Pulse Duration Time [sec]
Fig 9. Transient Thermal Impedance



Forward Drop Voltage, V_f [V]
Fig 10. Forward characteristics



Collector-Emitter Voltage, V_{CE} [V]
Fig 11. RBSOA Characteristic



Collector-Emitter Voltage, V_{CE} [V]
Fig 12. SCSOA Characteristic

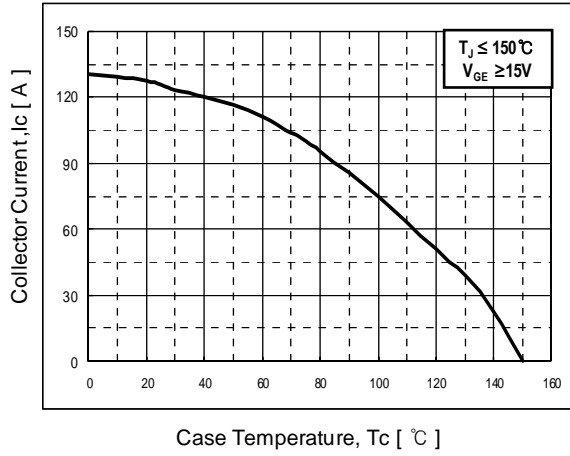


Fig 13. rated Current vs. Case Temperature

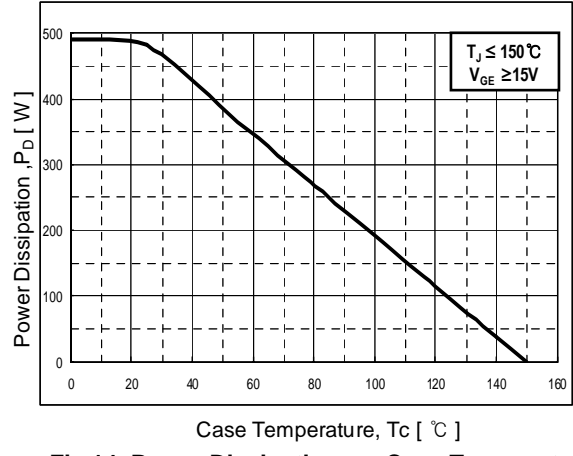


Fig 14. Power Dissipation vs. Case Temperature

Package Out Line Information

7DM-1



UNIT : mm

