

62mm Half Bridge IGBT Module

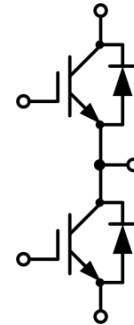
$V_{CES} = 1200V$, $I_C = 200A$, $V_{CE(sat)} = 1.67V$

Features

- 1200V Trench/Field Stop Technology
- Low switching losses
- V_{cesat} has a positive temperature coefficient

Applications

- Power Converters
- Uninterruptible power supplies
- Servo Drives
- Inverter



IGBT, Inverter Maximum Ratings

| Parameter | Symbol | Test Condition | Value | Unit |
|-----------------------------------|--------------|---|----------|------|
| Collector-Emitter voltage | V_{CES} | $T_{vj}=25^{\circ}C$ | 1200 | V |
| Continuous DC collector current | $I_{C\ nom}$ | $T_C=100^{\circ}C$, $T_{vj\ max}=175^{\circ}C$ | 300 | A |
| Repetitive peak collector current | I_{CRM} | $t_P=1ms$ | 600 | |
| Total power dissipation | P_{tot} | $T_C=25^{\circ}C$, $T_{vj\ max}=175^{\circ}C$ | 1250 | W |
| Gate-Emitter voltage | V_{GE} | | ± 20 | V |

Characteristics Values

| Parameter | Symbol | Test Condition | Value | | | Unit |
|--------------------------------------|--------------|--|--|----------------------|------|----------|
| | | | Min. | Typ. | Max. | |
| Collector-Emitter saturation voltage | V_{CEsat} | $V_{GE}=15V, I_C=300A$ $V_{GE}=15V, I_C=300A$ $V_{GE}=15V, I_C=300A$ | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | 1.67 1.92 1.98 | 2.10 | V |
| Gate-Emitter threshold voltage | $V_{GE(th)}$ | $I_C=12mA$, $V_{GE}=V_{CE}$ | $T_{vj}=25^{\circ}C$ | 5.30 | 5.90 | 6.40 |
| Gate charge | Q_G | $V_{GE}=-15V...+15V$ | | 3.02 | | μC |
| Internal gate resistor | R_{Gint} | $T_{vj}=25^{\circ}C$ | | 0.47 | | Ω |
| Input capacitance | C_{ies} | $f=100kHz, V_{CE}=25V$, $V_{GE}=0V$ | $T_{vj}=25^{\circ}C$ | 46.15 | | nF |
| Reverse transfer capacitance | C_{res} | | | 0.48 | | |
| Collector-Emitter cut-off current | I_{CES} | $V_{CE}=1200V, V_{GE}=0V$ | $T_{vj}=25^{\circ}C$ | | 2 | mA |
| Gate-Emitter leakage current | I_{GES} | $V_{CE}=0V, V_{GE}=20V$ | $T_{vj}=25^{\circ}C$ | | 200 | nA |
| Turn-on delay time | $t_{d\ on}$ | $I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2\Omega$ (inductive load) | $T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$ | 217 219 220 | | ns |

| | | | | | | | |
|--|--------------|---|---|-----|-------------------------|------|------------|
| Rise time | t_r | $I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2\Omega$ (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | 51 54 56 | | |
| Turn-off delay time | $t_{d\ off}$ | $I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2\Omega$ (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | 342 393 406 | | ns |
| Fall time | t_f | $I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2\Omega$ (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | 141 215 232 | | |
| Turn-on energy loss per pulse | E_{on} | $I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2\Omega$ $di/dt=4200A/\mu s(T_{vj}=150^\circ C)$ (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | 15.46 28.87 33.68 | | mJ |
| Turn-off energy loss per pulse | E_{off} | $I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2\Omega$ $dv/dt=4100V/\mu s(T_{vj}=150^\circ C)$ (inductive load) | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | | 23.55 30.09 32.01 | | |
| SC data | I_{SC} | $V_{GE}\leq 15V, V_{CE}=800V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt, t_p\leq 10\mu s,$ $T_{vj}=150^\circ C$ | | | 1250 | | A |
| Thermal resistance, junction to case | R_{thJC} | per IGBT | | | | 0.12 | K/W |
| Temperature under switching conditions | $T_{vj\ op}$ | | | -40 | | 150 | $^\circ C$ |

Diode, Inverter Maximum Ratings

| Parameter | Symbol | Test Condition | Value | Unit |
|---------------------------------|-----------|--|-------|--------|
| Repetitive peak reverse voltage | V_{RRM} | $T_{vj}=25^\circ C$ | 1200 | V |
| Continuous DC forward current | I_F | | 300 | A |
| Repetitive peak forward current | I_{FRM} | $t_p=1ms$ | 600 | |
| I^2t -value | I^2t | $t_p=10ms, \sin 180^\circ, T_{vj}=125^\circ C$ | 19000 | A^2s |

Characteristics Values

| Parameter | Symbol | Test Condition | Value | | | Unit |
|--|--------------|---|---|-------------------------|------|------------|
| | | | Min. | Typ. | Max. | |
| Forward voltage | V_F | $I_F=300A, V_{GE}=0V$ $I_F=300A, V_{GE}=0V$ $I_F=300A, V_{GE}=0V$ | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | 2.24 2.17 2.10 | 2.80 | V |
| Peak reverse recovery current | I_{RM} | $I_F=300A$ $-di_F/dt=4200A/\mu s(T_{vj}=150^\circ C)$ $V_R=600V, V_{GE}=-15V$ | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | 179 211 224 | | A |
| Recovered charge | Q_r | $I_F=300A$ $-di_F/dt=4200A/\mu s(T_{vj}=150^\circ C)$ $V_R=600V, V_{GE}=-15V$ | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | 15.38 38.01 48.01 | | $^\circ C$ |
| Reverse recovered energy | E_{rec} | $I_F=300A$ $-di_F/dt=4200A/\mu s(T_{vj}=150^\circ C)$ $V_R=600V, V_{GE}=-15V$ | $T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$ | 5.43 13.34 17.19 | | mJ |
| Thermal resistance, junction to case | R_{thJC} | per diode | | | 0.23 | K/W |
| Temperature under switching conditions | $T_{vj\ op}$ | | | -40 | 150 | $^\circ C$ |

Characteristics Values(Module)

| Parameter | Symbol | Test Condition | Value | Unit | |
|-------------------------------------|------------|---------------------|-----------|------|----|
| Isolation test voltage | V_{ISOL} | RMS, f=50Hz, t=1min | 4000 | V | |
| Internal isolation | | | Al_2O_3 | | |
| Storage temperature | T_{stg} | | -40 | 125 | °C |
| Mounting torque for module mounting | M | | 3.0 | 6.0 | Nm |
| Terminal Connection Torque | M | | 2.5 | 5.0 | |
| Weight | W | | 315 | | g |

Typical Characteristics

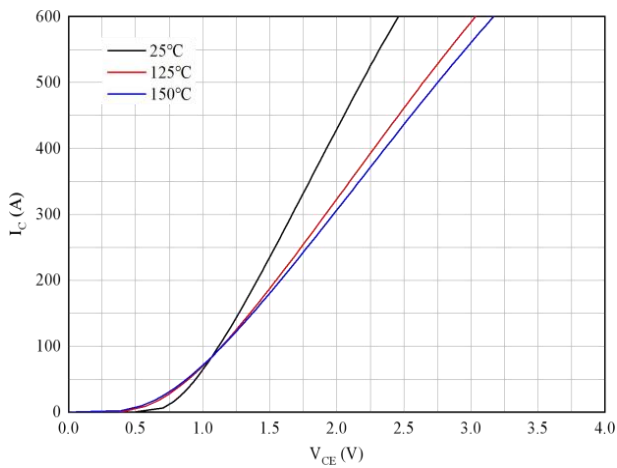


Fig 1. Typical output characteristics ($V_{GE}=15V$)

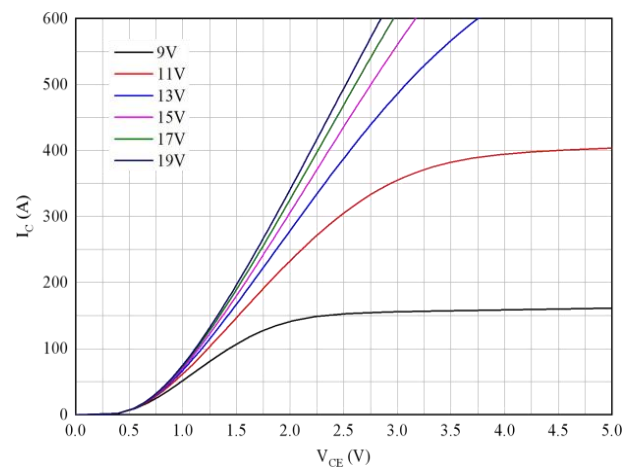


Fig 2. Typical output characteristics ($T_{vj}=150^{\circ}C$)

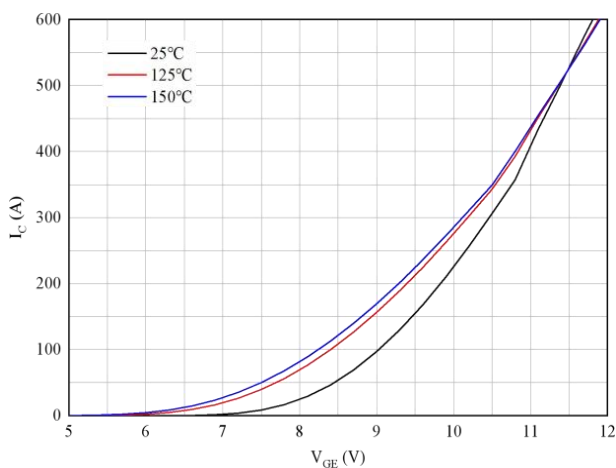


Fig 3. Typical transfer characteristic ($V_{CE}=20V$)

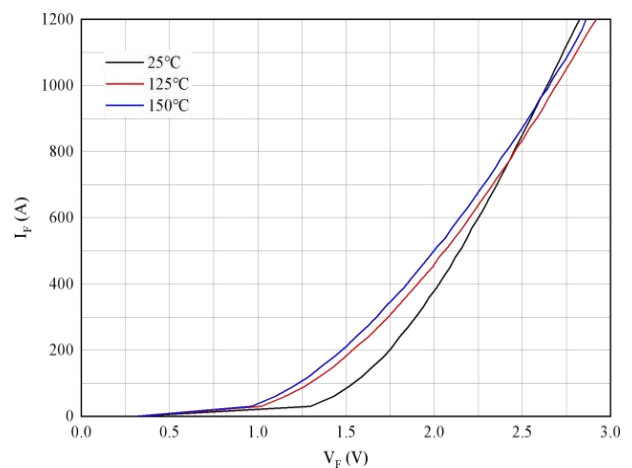


Fig 4. Forward characteristic of Diode

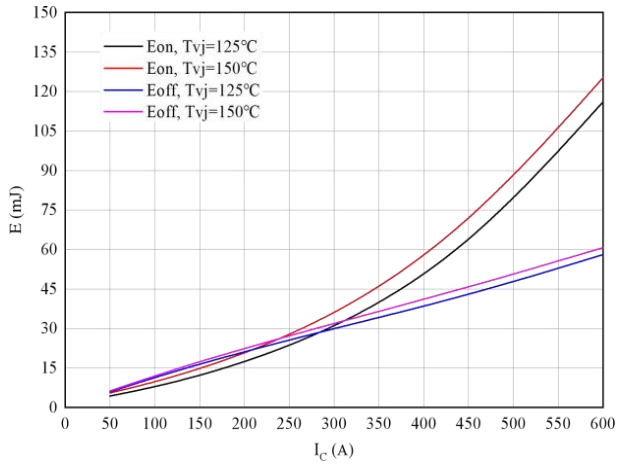


Fig 5. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $R_{Gon}=2\Omega$, $R_{Goff}=2\Omega$, $V_{CE}=600V$

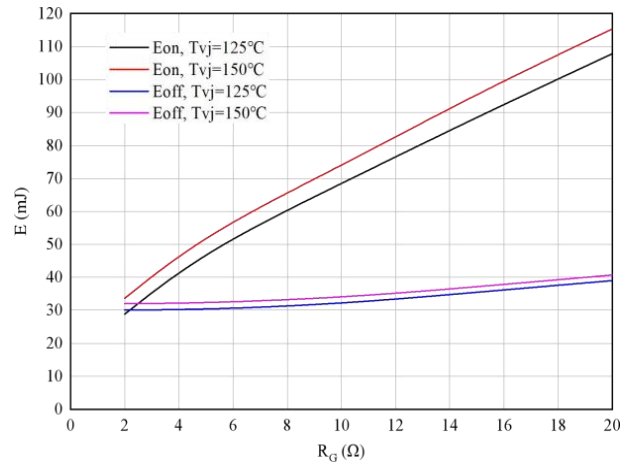


Fig 6. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $I_c=300A$, $V_{CE}=600V$

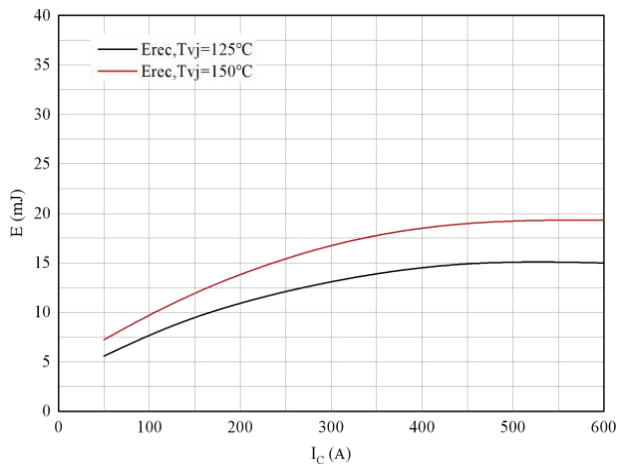


Fig 7. Switching losses of Diode
 $R_{Gon}=2\Omega$, $V_{CE}=600V$

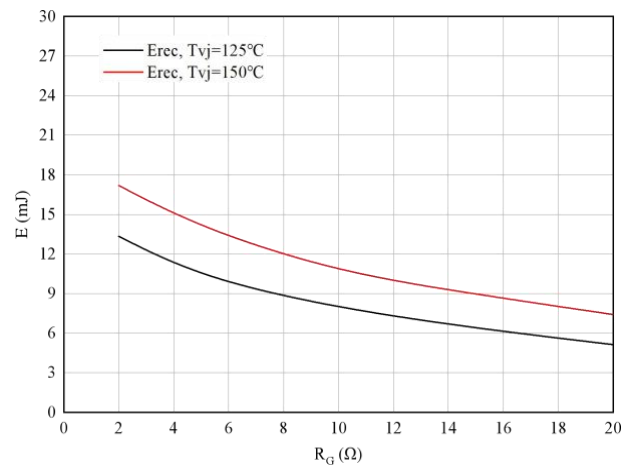


Fig 8. Switching losses of Diode
 $I_F=300A$, $V_{CE}=600V$

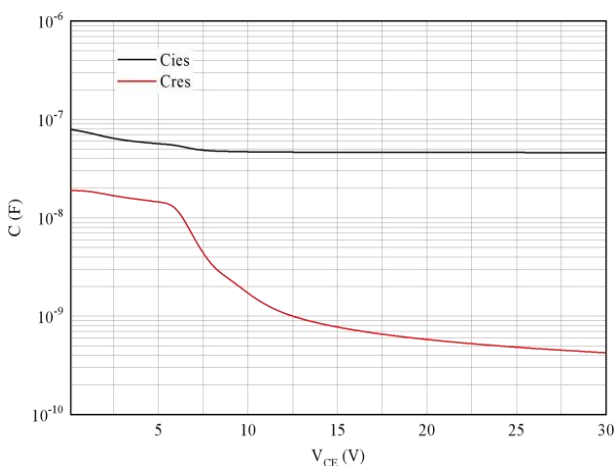


Fig 9. Capacitance characteristic

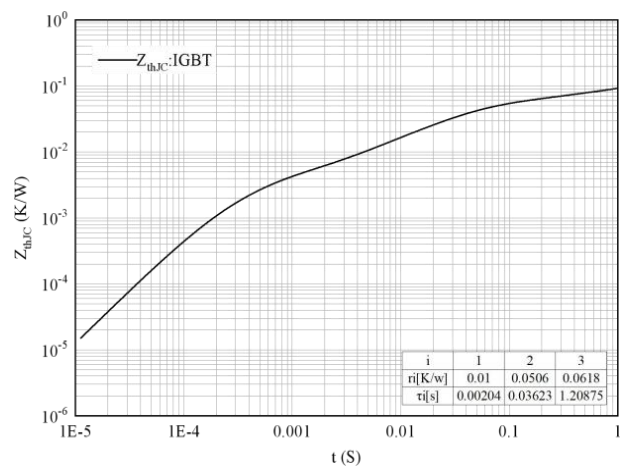


Fig 10. Transient thermal impedance IGBT, Inverter
 $Z_{thJC}=f(t)$

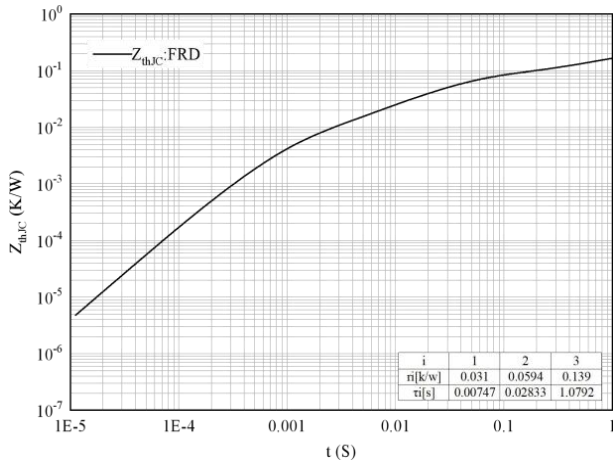
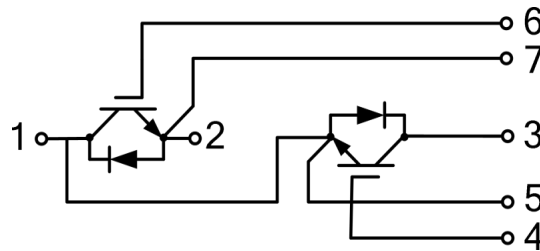
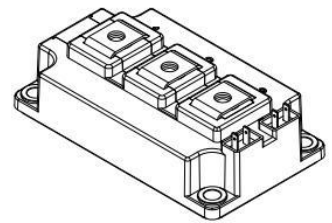
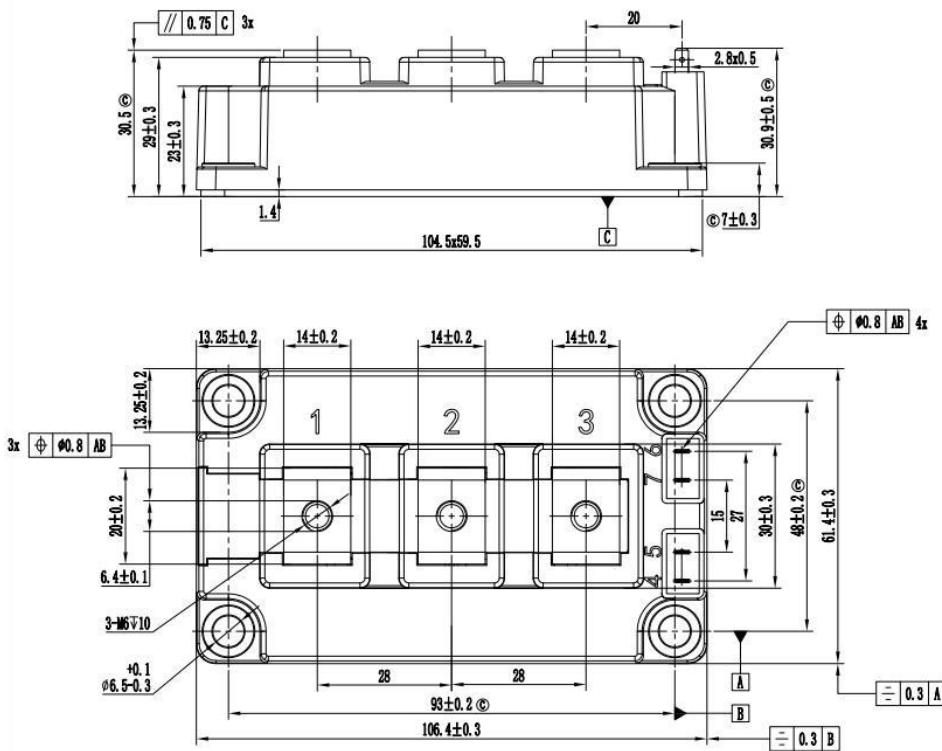


Fig11. Transient thermal impedance FRD, Inverter
 $Z_{thJC}=f(t)$

Circuit Diagram



Package Outlines(Unit: mm)



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