

62mm Half Bridge IGBT Module

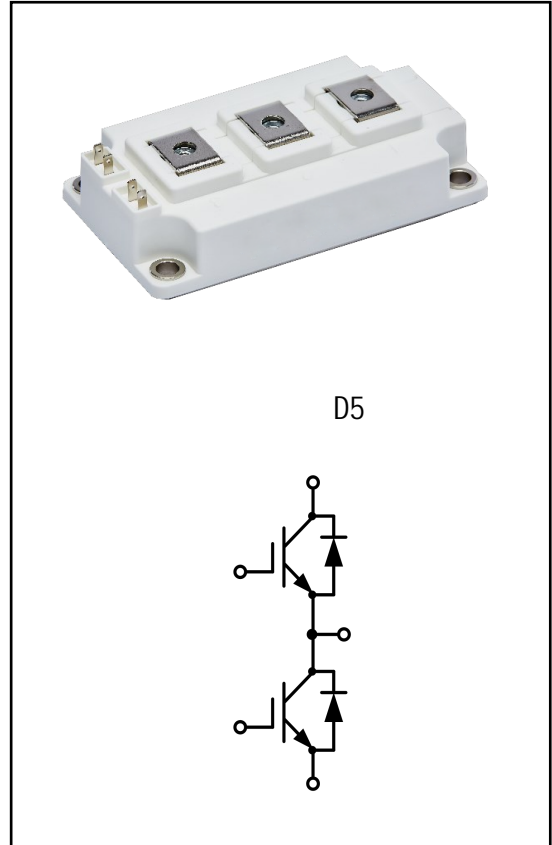
$V_{CES} = 1200V$, $I_{C\ nom} = 450A / I_{CRM} = 900A$

Electrical characteristics :

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

Applications:

- Variable Frequency Drive
- UPS
- Servo drive
- inverter



IGBT, Inverter

Maximum Ratings

| Parameter | Conditions | Symbol | Value | Unit |
|-----------------------------------|---|--------------|----------|------|
| Collector-Emitter voltage | $T_{vj} = 25^{\circ}C$ | V_{CES} | 1200 | V |
| Continuous DC collector current | $T_C = 100^{\circ}C$, $T_{vj\ max} = 175^{\circ}C$ | $I_{C\ nom}$ | 450 | A |
| Repetitive peak collector current | $t_p = 1\ ms$ | I_{CRM} | 900 | A |
| Total power dissipation | $T_C = 25^{\circ}C$, $T_{vj\ max} = 175^{\circ}C$ | P_{tot} | 2500 | W |
| Gate emitter voltage | | V_{GE} | ± 20 | V |

Characteristic Values

| Parameter | Conditions | Symbol | Value | | | Unit |
|--|---|--------------|-------|-------------------------|------|-------------|
| | | | Min. | Typ. | Max. | |
| Collector-Emitter saturation voltage | $V_{GE}=15V, I_C=450A$ $T_{vj}=25^{\circ}C$ $V_{GE}=15V, I_C=450A$ $T_{vj}=125^{\circ}C$ $V_{GE}=15V, I_C=450A$ $T_{vj}=150^{\circ}C$ | V_{CEsat} | | 1.85 2.13 2.19 | 2.20 | V |
| Gate-Emitter threshold voltage | $I_C=17mA, V_{GE}=V_{CE}$ $T_{vj}=25^{\circ}C$ | $V_{GE(th)}$ | 5.3 | 5.9 | 6.5 | |
| Gate charge | $V_{GE}=-15V...+15V$ | Q_G | | 3.10 | | μC |
| Internal gate resistor | $T_{vj}=25^{\circ}C$ | R_{Gint} | | 1.84 | | Ω |
| Input capacitance | $f=1MHz, V_{CE}=25V, V_{GE}=0V$ $T_{vj}=25^{\circ}C$ | C_{ies} | | 34.62 | | nF |
| Reverse transfer capacitance | | C_{res} | | 1.37 | | nF |
| Collector-emitter cut-off current | $V_{CE}=1200V, V_{GE}=0V$ $T_{vj}=25^{\circ}C$ | I_{CES} | | | 1 | mA |
| Gate-emitter leakage current | $V_{CE}=0V, V_{GE}=20V$ $T_{vj}=25^{\circ}C$ | I_{GES} | | | 200 | nA |
| Turn-on delay time | $I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$ | t_{don} | | 217 228 230 | | ns |
| Rise time | $I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$ | t_r | | 83 89 92 | | |
| Turn-off delay time | $I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$ | t_{doff} | | 380 425 439 | | |
| Fall time | $I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$ | t_f | | 102 109 109 | | |
| Turn-on energy loss per pulse | $I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ $di/dt = 4000 A/\mu s (T_{vj} = 150^{\circ}C)$ $T_{vj}=150^{\circ}C$ (inductive load) | E_{on} | | 26.38 36.60 41.24 | | |
| Turn-off energy loss per pulse | $I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ $dv/dt = 4900V/\mu s (T_{vj} = 150^{\circ}C)$ $T_{vj}=150^{\circ}C$ (inductive load) | E_{off} | | 35.87 40.24 41.81 | | mJ |
| SC data | $V_{GE}\leq 15V, V_{ce}=800V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$ $t_p\leq 10\mu s, T_{vj}=150^{\circ}C$ | I_{sc} | | 3074 | | A |
| Thermal resistance, junction to case | per IGBT | R_{thJC} | | | 0.06 | K/W |
| Temperature under switching conditions | | $T_{vj op}$ | -40 | | 150 | $^{\circ}C$ |

Diode, Inverter

Maximum Ratings

| Parameter | Conditions | Symbol | Value | Unit |
|---------------------------------|--|-----------|-------|----------------------|
| Repetitive peak reverse voltage | $T_{vj}=25^{\circ}\text{C}$ | V_{RRM} | 1200 | V |
| Continuous DC forward current | | I_F | 450 | A |
| Repetitive peak forward current | $t_p=1\text{ms}$ | I_{FRM} | 900 | A |
| I^2t -value | $t_p=10\text{ms}$, $\sin 180^{\circ}$, $T_j=125^{\circ}\text{C}$ | I^2t | 40271 | A^2S |

Characteristic Values

| Parameter | Conditions | Symbol | Value | | | Unit |
|--|---|---|-----------|-------------------------|------|--------------------|
| | | | Min. | Typ. | Max. | |
| Forward voltage | $I_F=450\text{A}$, $V_{GE}=0\text{V}$ $I_F=450\text{A}$, $V_{GE}=0\text{V}$ $I_F=450\text{A}$, $V_{GE}=0\text{V}$ | $T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$ | V_F | 2.30 2.46 2.38 | 2.80 | V |
| Peak reverse recovery current | $I_F=450\text{A}$, $-di_F/dt=4000\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $V_R=600\text{V}$, $V_{GE}=-15\text{V}$ | $T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$ | I_{RM} | 250 288 307 | | A |
| Recovered charge | $I_F=450\text{A}$, $-di_F/dt=4000\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $V_R=600\text{V}$, $V_{GE}=-15\text{V}$ | $T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$ | Q_r | 34 51 61 | | μC |
| Reverse recovered energy | $I_F=450\text{A}$, $-di_F/dt=4000\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $V_R=600\text{V}$, $V_{GE}=-15\text{V}$ | $T_{vj}=25^{\circ}\text{C}$ $T_{vj}=125^{\circ}\text{C}$ $T_{vj}=150^{\circ}\text{C}$ | E_{rec} | 14.53 21.06 25.04 | | mJ |
| Thermal resistance, junction to case | per diode | R_{thJC} | | | 0.16 | K/W |
| Temperature under switching conditions | | $T_{vj\text{op}}$ | -40 | | 150 | $^{\circ}\text{C}$ |

Module

| Parameter | Conditions | Symbol | Value | | | Unit |
|------------------------------------|---------------------|-------------------|--------------------------------|-----|-----|------|
| Isolation test voltage | RMS, f=50Hz, t=1min | V _{ISOL} | 4000 | | | V |
| Internal isolation | | | Al ₂ O ₃ | | | |
| Storage temperature | | T _{stg} | -40 | | 125 | °C |
| Mounting torque for modul mounting | | M | 3.0 | | 6.0 | Nm |
| Terminal Connection Torque | | M | 2.5 | | 5.0 | Nm |
| Weight | | W | | 324 | | g |

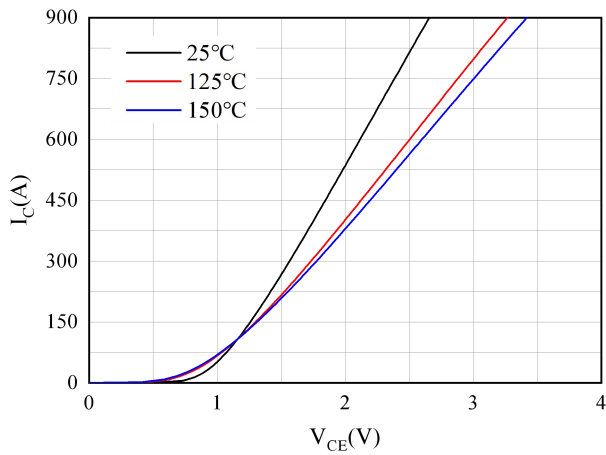


Fig 1. Typical output characteristics ($V_{GE}=15V$)

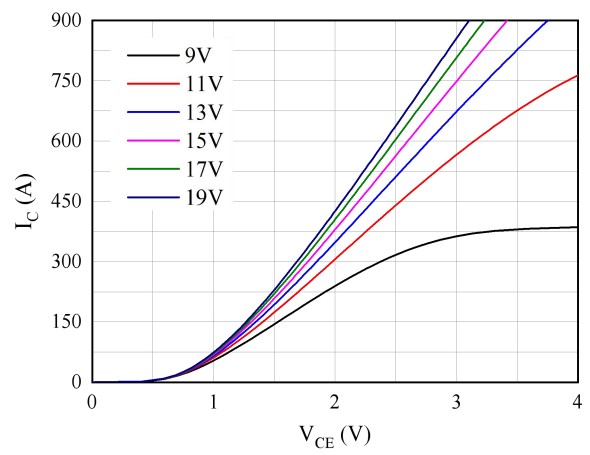


Fig 2. Typical output characteristics ($T_{vj}=150^{\circ}C$)

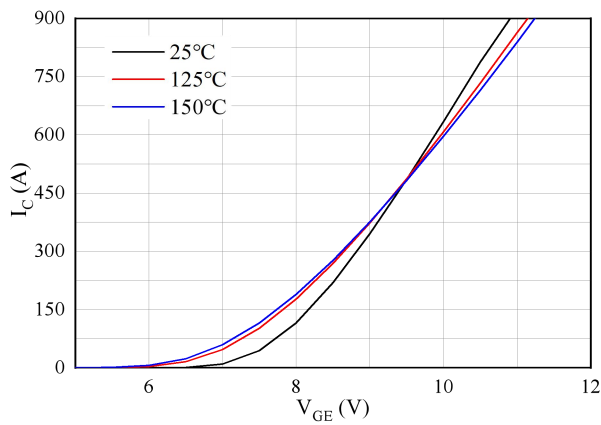


Fig 3. Typical transfer characteristic($V_{CE}=20V$)

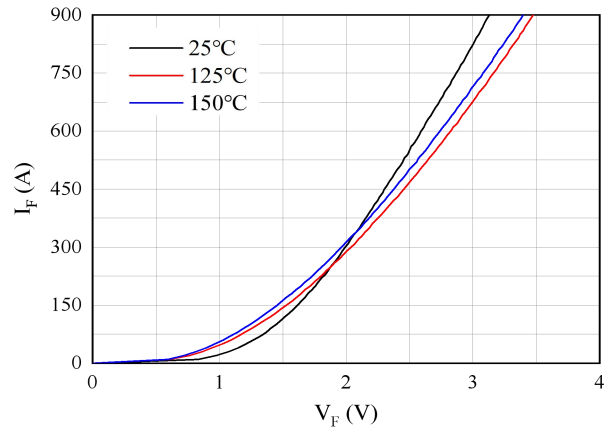


Fig 4. Forward characteristic of Diode

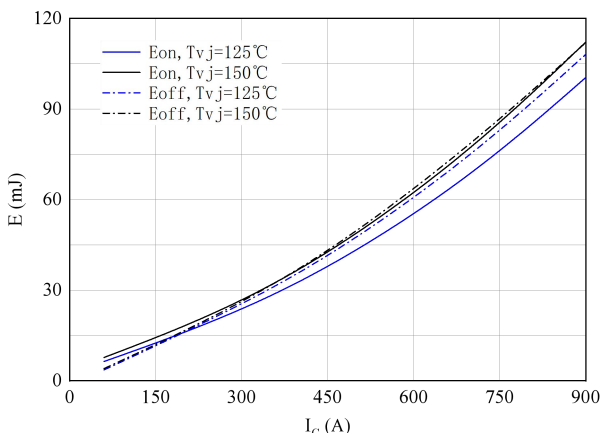


Fig5. Switching losses of IGBT
 $V_{GE}=\pm 15V, R_{Gon}=1\Omega, R_{Goff}=1\Omega, V_{CE}=600V$

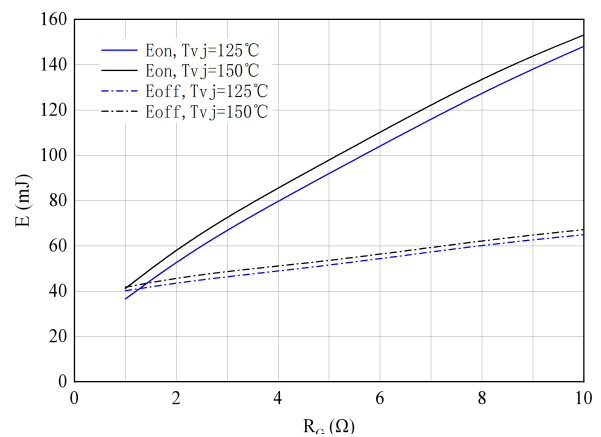


Fig 6. Switching losses of IGBT
 $V_{GE}=\pm 15V, I_C=450A, V_{CE}=600V$

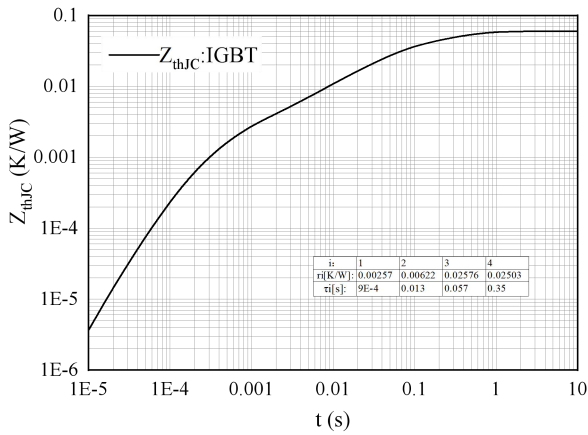


Fig 7. Transient thermal impedance IGBT,Inverter

$Z_{thJC}=f(t)$

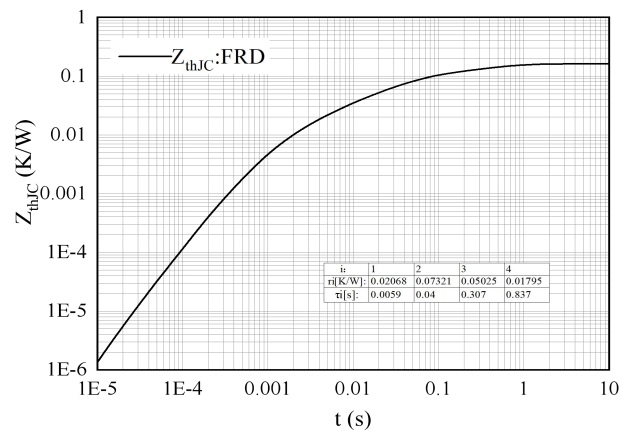


Fig 8. Transient thermal impedance FRD,Inverter

$Z_{thJC}=f(t)$

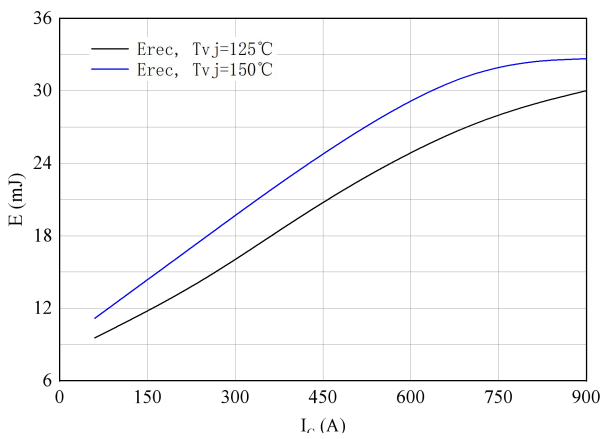


Fig 9. Switching losses of Diode

$R_{Gon}=1\Omega, V_{CE}=600V$

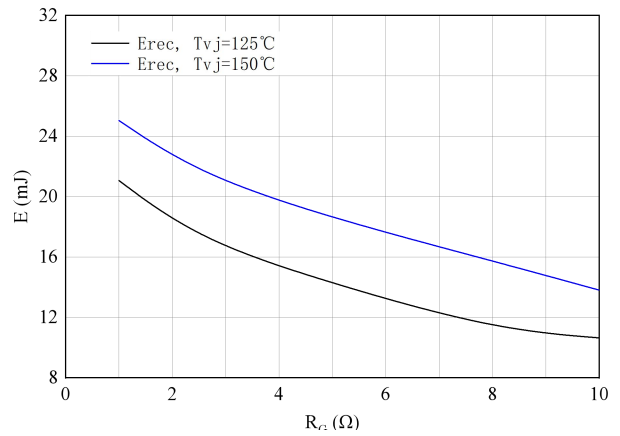


Fig 10. Switching losses of Diode

$I_F=450A, V_{CE}=600V$

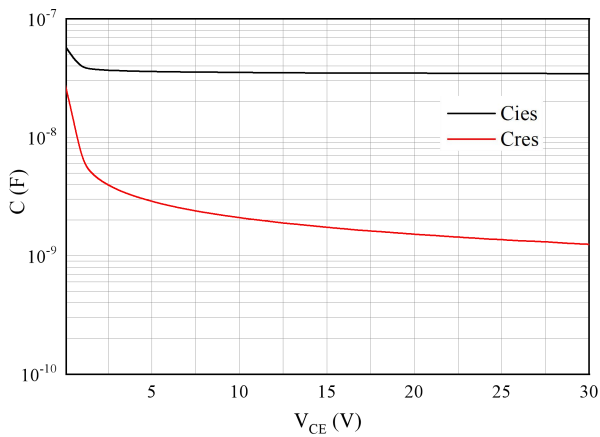
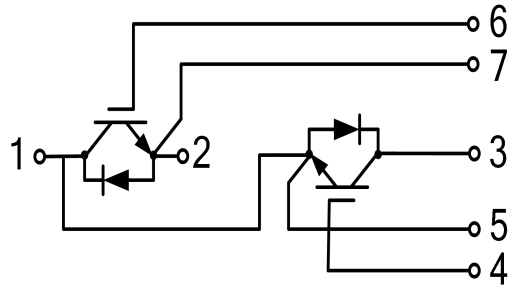


Fig 11. Capacitance characteristic

Circuit diagram



Package outlines

