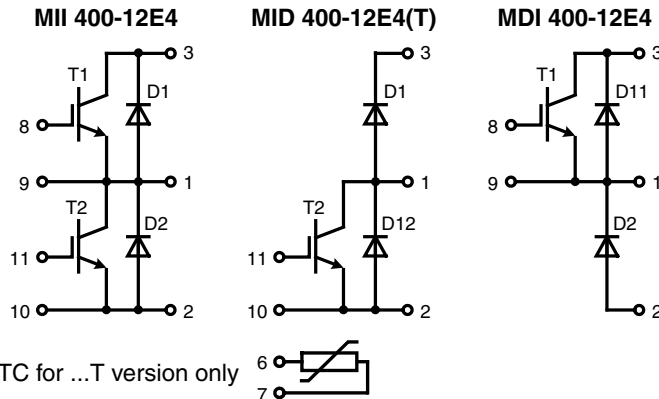


IGBT Module

phaseleg and chopper topologies
with optional temperature sensor

Preliminary Data

$I_{C25} = 420 \text{ A}$
 $V_{CES} = 1200 \text{ V}$
 $V_{CE(sat) \text{ typ.}} = 2.2 \text{ V}$



| IGBTs T1 - T2 | | Maximum Ratings | |
|---------------------|--|-----------------|---------------|
| Symbol | Conditions | | |
| V_{CES} | $T_{VJ} = 25^\circ\text{C to } 125^\circ\text{C}$ | 1200 | V |
| V_{GES} | | ± 20 | V |
| I_{C25} | $T_C = 25^\circ\text{C}$ | 420 | A |
| I_{C80} | $T_C = 80^\circ\text{C}$ | 300 | A |
| I_{CM} | $V_{GE} = \pm 15 \text{ V}; R_G = 4.7 \ \Omega; T_{VJ} = 125^\circ\text{C}$ | 450 | A |
| V_{CEK} | RBSOA Clamped inductive load; $L = 100 \ \mu\text{H}$ | V_{CES} | |
| t_{SC} (SCSOA) | $V_{CE} = 900 \text{ V}; V_{GE} = \pm 15 \text{ V}; R_G = 4.7 \ \Omega$ $T_{VJ} = 125^\circ\text{C}; \text{non-repetitive}$ | 10 | μs |
| P_{tot} | $T_C = 25^\circ\text{C}$ | 1700 | W |

| Symbol | Conditions | Characteristic Values | | | | |
|--|--|--|------------------------------------|------|----------------------------------|---------------|
| | | min. | typ. | max. | | |
| $(T_{VJ} = 25^\circ\text{C}, \text{ unless otherwise specified})$ | | | | | | |
| $V_{CE(sat)}$ | $I_C = 300 \text{ A}; V_{GE} = 15 \text{ V};$ $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$ | | 2.2 2.6 | 2.8 | V V | |
| $V_{GE(th)}$ | $I_C = 10 \text{ mA}; V_{GE} = V_{CE}$ | 4.5 | | 6.5 | V | |
| I_{CES} | $V_{CE} = V_{CES}; V_{GE} = 0 \text{ V};$ $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$ | | 0.8 3.5 | 3.3 | mA mA | |
| I_{GES} | $V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$ | | | 600 | nA | |
| $t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off} | Inductive load, $T_{VJ} = 125^\circ\text{C}$ $V_{CE} = 600 \text{ V}; I_C = 300 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 4.7 \ \Omega$ | | 170 60 680 50 44 30 | | ns ns ns ns mJ mJ | |
| C_{ies} | | $V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$ | | 17 | | nF |
| Q_{Gon} | | $V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 300 \text{ A}$ | | 1.74 | | μC |
| R_{thJC} | | (per IGBT) | | | 0.08 | K/W |
| R_{thJH} | | with heatsink compound | | 0.15 | | K/W |

Features

- NPT³ IGBT
 - low saturation voltage
 - positive temperature coefficient
 - fast switching
 - short tail current for optimized performance in resonant circuits
- HiPerFRED™ diodes
 - fast and soft reverse recovery
 - low operating forward voltage
 - low leakage current
- NTC sensor for measurement of case temperature
- Package
 - low inductive current path
 - screw connection to high current main terminals
 - use of non interchangeable connectors for auxiliary terminals possible
 - Kelvin emitter terminal for easy drive
 - isolated ceramic base plate

Applications

- drives
 - AC
 - DC
- power supplies
 - rectifiers with power factor correction and recuperation capability
 - UPS

Free wheeling diodes D1 - D2

| Symbol | Conditions | Maximum Ratings | | | |
|--------------------------|---|-----------------------|------------|------|------------|
| I_{F25} | $T_C = 25^\circ\text{C}$ | 450 | A | | |
| I_{F80} | $T_C = 80^\circ\text{C}$ | 290 | A | | |
| Symbol | Conditions | Characteristic Values | | | |
| | | min. | typ. | max. | |
| V_F | $I_F = 300\text{ A}; V_{GE} = 0\text{ V};$ $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$ | | 2.3 1.7 | 2.7 | V V |
| I_{RM} t_{rr} | $I_F = 225\text{ A}; di_F/dt = -2000\text{ A}/\mu\text{s};$ $V_R = 600\text{ V}; V_{GE} = 0\text{ V};$ $T_{VJ} = 125^\circ\text{C}$ | | 200 220 | | A ns |
| R_{thJC} R_{thJH} | (per IGBT) with heatsink compound | | 0.3 | 0.15 | K/W K/W |

Chopper anti parallel diodes D11 - D12

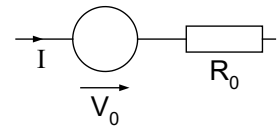
| Symbol | Conditions | Maximum Ratings | | | |
|--------------------------|---|-----------------------|------------|------|------------|
| I_{F25} | $T_C = 25^\circ\text{C}$ | 150 | A | | |
| I_{F80} | $T_C = 80^\circ\text{C}$ | 95 | A | | |
| Symbol | Conditions | Characteristic Values | | | |
| | | min. | typ. | max. | |
| V_F | $I_F = 100\text{ A}; V_{GE} = 0\text{ V};$ $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$ | | 2.3 1.7 | 2.7 | V V |
| I_{RM} t_{rr} | $I_F = 75\text{ A}; di_F/dt = -750\text{ A}/\mu\text{s};$ $V_R = 600\text{ V}; V_{GE} = 0\text{ V};$ $T_{VJ} = 125^\circ\text{C}$ | | 80 220 | | A ns |
| R_{thJC} R_{thJH} | (per IGBT) with heatsink compound | | 0.9 | 0.45 | K/W K/W |

Temperature Sensor NTC (...T version only)

| Symbol | Conditions | Characteristic Values | | | |
|--------------------------|---|-----------------------|--------------|------|-----------------|
| | | min. | typ. | max. | |
| R_{25} $B_{25/100}$ | $T = 25^\circ\text{C}$ $\left\{ R(T) = R_{25} \cdot e^{B_{25/100} \left(\frac{1}{T} - \frac{1}{298\text{K}} \right)} \right\}$ | | 2200 3560 | | k Ω K |

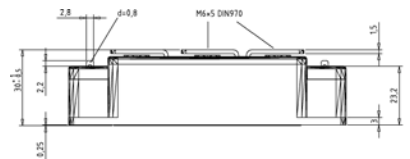
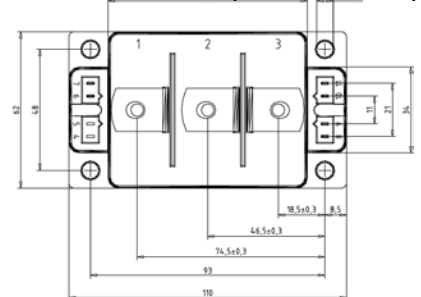
Module

| Symbol | Conditions | Maximum Ratings | | | |
|-----------------------|--|--------------------------|------|------------------|----------|
| T_{VJ} T_{stg} | operating | -40...+150 | | $^\circ\text{C}$ | |
| | | -40...+125 | | $^\circ\text{C}$ | |
| V_{ISO} | $I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$ | 4000 | | V~ | |
| M_d | Mounting torque (module, M6) (terminal, M6) | 2.25 - 2.75 4.5 - 5.5 | | Nm Nm | |
| Symbol | Conditions | Characteristic Values | | | |
| | | min. | typ. | max. | |
| d_s d_A | Creepage distance on surface Strike distance in air | 2 | | | mm mm |
| Weight | | | 250 | | g |

Equivalent Circuits for Simulation
Conduction


IGBT (typ. at $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$)
 $V_0 = 1.0\text{ V}; R_0 = 5.3\text{ m}\Omega$

Free Wheeling Diode D1-D2 (typ. at $T_J = 125^\circ\text{C}$)
 $V_0 = 1.3\text{ V}; R_0 = 1.3\text{ m}\Omega$


Dimensions in mm (1 mm = 0.0394")

Optional accessories for modules

keyed twin plugs
 (UL758, style 1385, CSA class 5851,
 guide 460-1-1)

- Type ZY180L with wire length 350mm
 – for pins 11 (yellow wire) and 10 (red wire)
- Type ZY180R with wire length 350mm
 – for pins 8 (yellow wire) and 9 (red wire)