

IGBT Modules

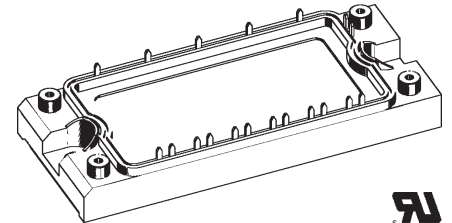
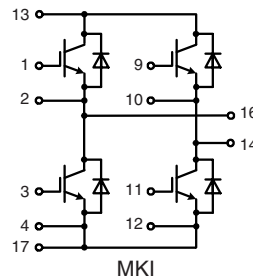
H Bridge

Short Circuit SOA Capability
Square RBSOA

$$I_{C25} = 65 \text{ A}$$

$$V_{CES} = 1200 \text{ V}$$

$$V_{CE(sat) \text{ typ.}} = 3.2 \text{ V}$$



IGBTs		
Symbol	Conditions	Maximum Ratings
V_{CES}	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$	1200 V
V_{GES}		± 20 V
I_{C25}	$T_C = 25^{\circ}\text{C}$	65 A
I_{C80}	$T_C = 80^{\circ}\text{C}$	45 A
I_{CM}	$V_{GE} = \pm 15 \text{ V}; R_G = 13 \Omega; T_{VJ} = 125^{\circ}\text{C}$	100 A
V_{CEK}	RBSOA; clamped inductive load; $L = 100 \mu\text{H}$	V_{CES}
t_{SC}	$V_{CE} = 900 \text{ V}; V_{GE} = \pm 15 \text{ V}; R_G = 13 \Omega; T_{VJ} = 125^{\circ}\text{C}$ SCSOA; non-repetitive	10 μs
P_{tot}	$T_C = 25^{\circ}\text{C}$	350 W

Features

- Fast NPT IGBTs
 - low saturation voltage
 - positive temperature coefficient for easy paralleling
 - fast switching
 - short tail current for optimized performance also in resonant circuits
- HiPerFRED™ diode:
 - fast reverse recovery
 - low operating forward voltage
 - low leakage current
- Industry Standard Package
 - solderable pins for PCB mounting
 - isolated copper base plate
 - UL registered, E 72873

Symbol	Conditions	Characteristic Values ($T_{VJ} = 25^{\circ}\text{C}$, unless otherwise specified)			
		min.	typ.	max.	
$V_{CE(sat)}$	$I_C = 50 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		3.2 3.8	V V	
$V_{GE(th)}$	$I_C = 2 \text{ mA}; V_{GE} = V_{CE}$	4.5		6.5 V	
I_{CES}	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		2.5	0.7 mA mA	
I_{GES}	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$			500 nA	
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 600 \text{ V}; I_C = 50 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 13 \Omega$		130 60 360 30 6.0 2.5	ns ns ns ns mJ mJ	
C_{ies}		$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$		3.3	nF
Q_{Gon}		$V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 50 \text{ A}$		600	nC
R_{thJC}		(per IGBT)			0.35 KW

Typical Applications

- motor control
 - . DC motor amature winding
 - . DC motor excitation winding
 - . synchronous motor excitation winding
- supply of transformer primary winding
 - . power supplies
 - . welding
 - . X-ray
 - . battery charger

Diodes

Symbol	Conditions	Maximum Ratings	
I_{F25}	$T_C = 25^\circ\text{C}$	110	A
I_{F80}	$T_C = 80^\circ\text{C}$	70	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
V_F	$I_F = 50\text{ A}; V_{GE} = 0\text{ V}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	2.2	2.6	V
I_{RM} t_{rr}	$I_F = 50\text{ A}; di_F/dt = -500\text{ A}/\mu\text{s}; T_{VJ} = 125^\circ\text{C}$ $V_R = 600\text{ V}; V_{GE} = 0\text{ V}$	40		A
		200		ns
R_{thJC}	(per diode)			0.61 K/W

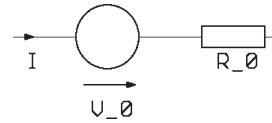
Module

Symbol	Conditions	Maximum Ratings	
T_{VJ}	operating	-40...+125	$^\circ\text{C}$
T_{VJM}		-40...+150	$^\circ\text{C}$
T_{stg}		-40...+125	$^\circ\text{C}$
V_{ISOL}	$I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$	2500	V~
M_d	Mounting torque (M5)	2.7 - 3.3	Nm

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
$R_{pin-chip}$			5	m Ω
d_S	Creepage distance on surface	6		mm
d_A	Strike distance in air	6		mm
R_{thCH}	with heatsink compound		0.02	K/W
Weight			180	g

Equivalent Circuits for Simulation

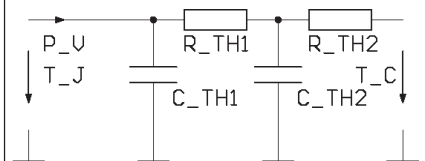
Conduction



IGBT (typ. at $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$)
 $V_0 = 2.05\text{ V}; R_0 = 35\text{ m}\Omega$

Free Wheeling Diode (typ. at $T_J = 125^\circ\text{C}$)
 $V_0 = 1.3\text{ V}; R_0 = 6\text{ m}\Omega$

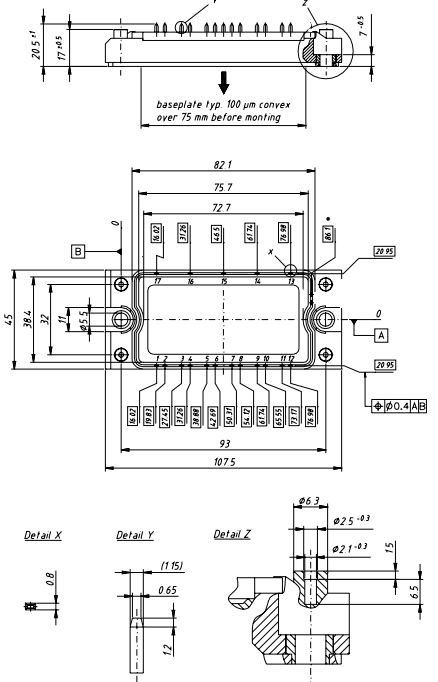
Thermal Response



IGBT (typ.)
 $C_{th1} = 0.22\text{ J/K}; R_{th1} = 0.26\text{ K/W}$
 $C_{th2} = 1.74\text{ J/K}; R_{th2} = 0.09\text{ K/W}$

Free Wheeling Diode (typ.)
 $C_{th1} = 0.151\text{ J/K}; R_{th1} = 0.483\text{ K/W}$
 $C_{th2} = 1.003\text{ J/K}; R_{th2} = 0.127\text{ K/W}$

Dimensions in mm (1 mm = 0.0394")



pins 5, 6, 7, 8 and 15 for MWI only