

IGBT Module

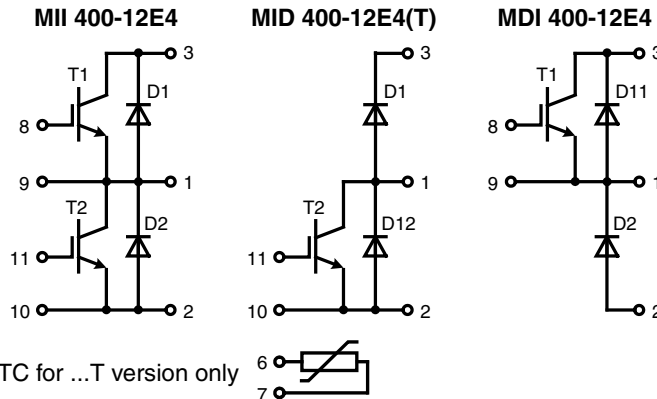
phaseleg and chopper topologies
with optional temperature sensor

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			
$(T_{VJ} = 25^{\circ}\text{C}, \text{ unless otherwise specified})$							
		min.	typ.	max.			
$V_{CE(sat)}$	$I_C = 300 \text{ A}; V_{GE} = 15 \text{ V};$		2.2	2.8	V		
	$T_{VJ} = 25^{\circ}\text{C}$		2.6		V		
	$T_{VJ} = 125^{\circ}\text{C}$				V		
$V_{GE(th)}$	$I_C = 10 \text{ mA}; V_{GE} = V_{CE}$	4.5		6.5	V		
I_{CES}	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V};$		0.8	3.3	mA		
	$T_{VJ} = 25^{\circ}\text{C}$		3.5		mA		
	$T_{VJ} = 125^{\circ}\text{C}$				mA		
I_{GES}	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$			600	nA		
$t_{d(on)}$	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		ns		
t_r			60		ns		
$t_{d(off)}$			680		ns		
t_f			50		ns		
E_{on}			44		mJ		
E_{off}		30		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)

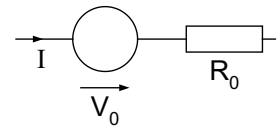
Symbol	Conditions	Characteristic Values			
		min.	typ.	max.	
R_{25} $B_{25/100}$	$T = 25^\circ\text{C}$ $\left\{ R(T) = R_{25} \cdot e^{B_{25/100} \left(\frac{1}{T} - \frac{1}{298\text{K}} \right)} \right\}$		2200 3560		k Ω K

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		Nm Nm	
		4.5 - 5.5			
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

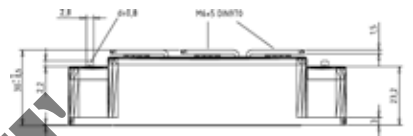
Equivalent Circuits for Simulation

Conduction

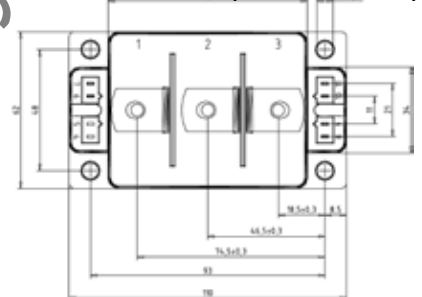


IGBT (typ. at $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$)
 $V_0 = 1.0\text{ V}; R_0 = 5.3\text{ m}\Omega$

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)