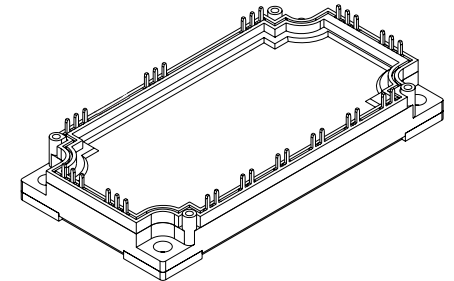
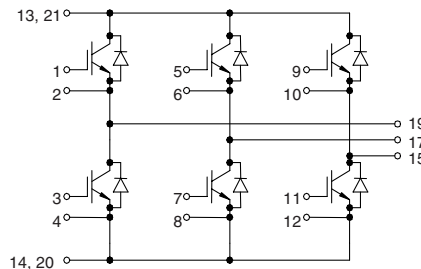


IGBT Modules

Sixpack

Short Circuit SOA Capability
Square RBSOA

Preliminary data



$$\begin{aligned} I_{C25} &= 170 \text{ A} \\ V_{CES} &= 600 \text{ V} \\ V_{CE(sat) \text{ typ.}} &= 2.0 \text{ V} \end{aligned}$$

IGBTs

Symbol	Conditions	Maximum Ratings	
V_{CES}	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$	600	V
V_{GES}		± 20	V
I_{C25}	$T_C = 25^{\circ}\text{C}$	170	A
I_{C80}	$T_C = 80^{\circ}\text{C}$	115	A
RBSOA	$V_{GE} = \pm 15 \text{ V}$; $R_G = 1.5 \Omega$; $T_{VJ} = 125^{\circ}\text{C}$ Clamped inductive load; $L = 100 \mu\text{H}$	$I_{CM} = 300$ $V_{CEK} \leq V_{CES}$	A
t_{SC} (SCSOA)	$V_{CE} = V_{CES}$; $V_{GE} = \pm 15 \text{ V}$; $R_G = 1.5 \Omega$; $T_{VJ} = 125^{\circ}\text{C}$ non-repetitive	10	μs
P_{tot}	$T_C = 25^{\circ}\text{C}$	515	W

Symbol	Conditions	Characteristic Values ($T_{VJ} = 25^{\circ}\text{C}$, unless otherwise specified)		
		min.	typ.	max.
$V_{CE(sat)}$	$I_C = 150 \text{ A}$; $V_{GE} = 15 \text{ V}$; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		2.0 2.3	2.5 V
$V_{GE(th)}$	$I_C = 3 \text{ mA}$; $V_{GE} = V_{CE}$	4.5		6.5 V
I_{CES}	$V_{CE} = V_{CES}$; $V_{GE} = 0 \text{ V}$; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		1.1	1.5 mA mA
I_{GES}	$V_{CE} = 0 \text{ V}$; $V_{GE} = \pm 20 \text{ V}$			400 nA
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 300 \text{ V}$; $I_C = 150 \text{ A}$ $V_{GE} = \pm 15 \text{ V}$; $R_G = 1.5 \Omega$		125 30 225 35 2.3 4.6	ns ns ns ns mJ mJ
C_{ies}			6.5	nF
Q_{Gon}			520	nC
R_{thJC}				0.24 K/W

Features

- NPT IGBT technology
- low saturation voltage
- low switching losses
- switching frequency up to 30 kHz
- square RBSOA, no latch up
- high short circuit capability
- positive temperature coefficient for easy paralleling
- MOS input, voltage controlled
- ultra fast free wheeling diodes
- solderable pins for PCB mounting
- package with copper base plate

Advantages

- space savings
- reduced protection circuits
- package designed for wave soldering

Typical Applications

- AC motor control
- AC servo and robot drives
- power supplies

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Diodes

Symbol	Conditions	Maximum Ratings	
I_{F25}	$T_C = 25^{\circ}C$	210	A
I_{F80}	$T_C = 80^{\circ}C$	130	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
V_F	$I_F = 150 \text{ A}; V_{GE} = 0 \text{ V}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		1.9 1.4	2.0 V
I_{RM} t_{rr}	$I_F = 150 \text{ A}; di_F/dt = -750 \text{ A}/\mu\text{s}; T_{VJ} = 125^\circ\text{C}$ $V_R = 300 \text{ V}; V_{GE} = 0 \text{ V}$		37 100	A ns
R_{thJC}	(per diode)			0.41 K/W

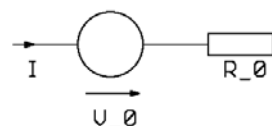
Module

Symbol	Conditions	Maximum Ratings	
T_{VJ}	operating	-40...+125	°C
T_{JM}		+150	°C
T_{stg}		-40...+125	°C
V_{ISOL}	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$	2500	V~
M_d	Mounting torque (M5)	3 - 6	Nm

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
$R_{\text{pin-chip}}$			1.8	mΩ
d_s	Creepage distance on surface	10		mm
d_A	Strike distance in air	10		mm
R_{thCH}	with heatsink compound		0.01	K/W
Weight			300	g

Equivalent Circuits for Simulation

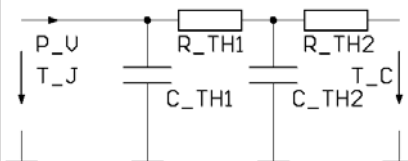
Conduction



IGBT (typ. at $V_{GE} = 15\text{ V}$; $T_J = 125^\circ\text{C}$)
 $V_\theta = 1.1\text{ V}$; $R_\theta = 8\text{ m}\Omega$

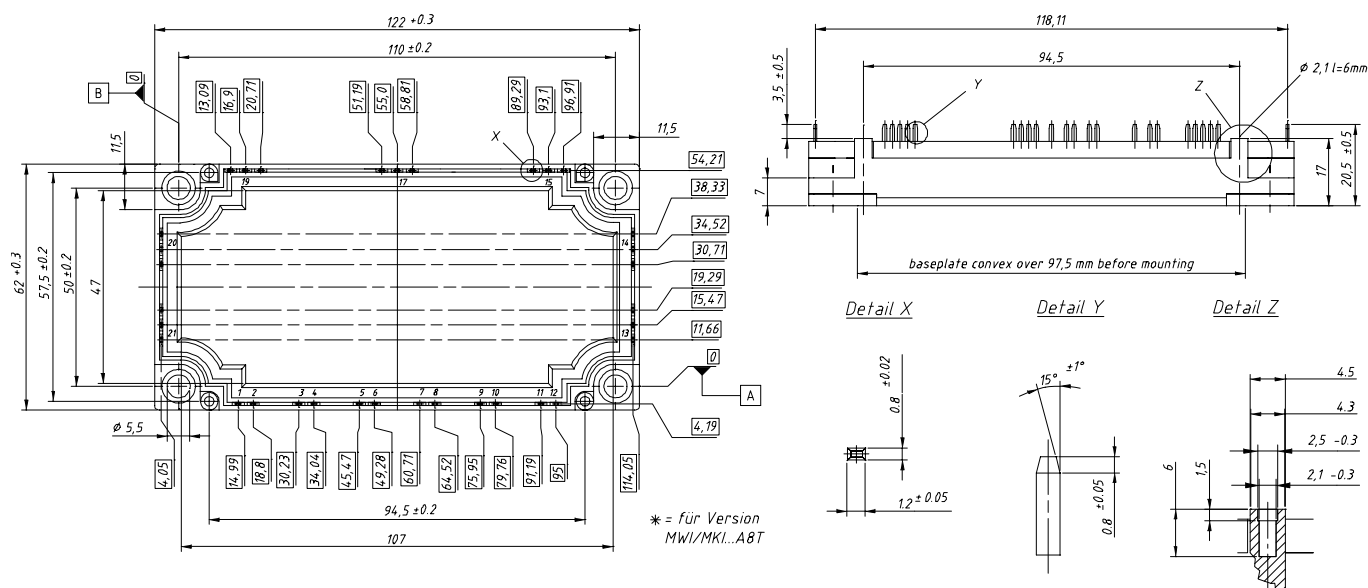
Free Wheeling Diode (typ. at $T_J = 125^\circ\text{C}$)
 $V_0 = 1.1\text{ V}; R_0 = 2.25\text{ m}\Omega$

Thermal Response



IGBT (typ.)
 $C_{th1} = 0.295 \text{ J/K}; R_{th1} = 0.176 \text{ K/W}$
 $C_{th2} = 1.750 \text{ J/K}; R_{th2} = 0.064 \text{ K/W}$

Free Wheeling Diode (typ.)
 $C_{th1} = 0.21 \text{ J/K}; R_{th1} = 0.317 \text{ K/W}$
 $C_{th2} = 1.28 \text{ J/K}; R_{th2} = 0.093 \text{ K/W}$



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