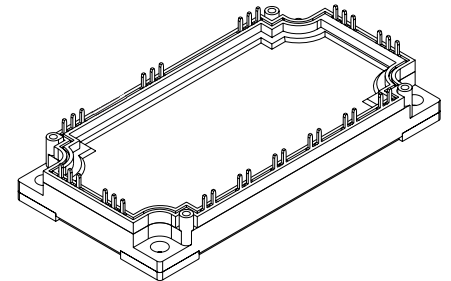
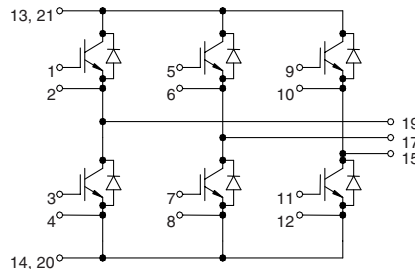


IGBT Modules

Sixpack

Short Circuit SOA Capability
Square RBSOA

$$\begin{aligned} I_{C25} &= 125 \text{ A} \\ V_{CES} &= 1200 \text{ V} \\ V_{CE(sat) \text{ typ.}} &= 2.2 \text{ V} \end{aligned}$$



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}	$T_C = 25^{\circ}\text{C}$	125	A
I_{C80}	$T_C = 80^{\circ}\text{C}$	85	A
RBSOA	$V_{GE} = \pm 15 \text{ V}$; $R_G = 15 \Omega$; $T_{VJ} = 125^{\circ}\text{C}$ Clamped inductive load; $L = 100 \mu\text{H}$	$I_{CM} = 150$ $V_{CEK} \leq V_{CES}$	A
t_{SC} (SCSOA)	$V_{CE} = V_{CES}$; $V_{GE} = \pm 15 \text{ V}$; $R_G = 15 \Omega$; $T_{VJ} = 125^{\circ}\text{C}$ non-repetitive	10	μs
P_{tot}	$T_C = 25^{\circ}\text{C}$	500	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

Symbol	Conditions	Characteristic Values ($T_{VJ} = 25^{\circ}\text{C}$, unless otherwise specified)		
		min.	typ.	max.
$V_{CE(sat)}$	$I_C = 75 \text{ A}$; $V_{GE} = 15 \text{ V}$; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		2.2 2.5	2.6 V
$V_{GE(th)}$	$I_C = 3 \text{ mA}$; $V_{GE} = V_{CE}$	4.5		6.5 V
I_{CES}	$V_{CE} = V_{CES}$; $V_{GE} = 0 \text{ V}$; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		3	5 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, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 600 \text{ V}$; $I_C = 75 \text{ A}$ $V_{GE} = \pm 15 \text{ V}$; $R_G = 15 \Omega$		100 50 650 50 12.1 10.5	ns ns ns ns mJ mJ
C_{ies}			5.5	nF
Q_{Gon}			350	nC
R_{thJC}				0.25 K/W

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Diodes

Symbol	Conditions	Maximum Ratings
I_{F25}	$T_C = 25^\circ\text{C}$	150 A
I_{F80}	$T_C = 80^\circ\text{C}$	100 A

Symbol	Conditions	Characteristic Values
		min. typ. max.
V_F	$I_F = 75\text{ A}; V_{GE} = 0\text{ V}; T_{VJ} = 25^\circ\text{C}$	2.2 V
	$T_{VJ} = 125^\circ\text{C}$	1.6 V
I_{RM} t_{rr}	$I_F = 75\text{ A}; di_F/dt = -750\text{ A}/\mu\text{s}; T_{VJ} = 125^\circ\text{C}$ $V_R = 600\text{ V}; V_{GE} = 0\text{ V}$	79 A 220 ns
R_{thJC}	(per diode)	0.41 K/W

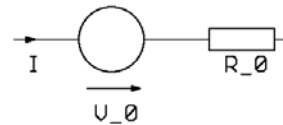
Module

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.
$R_{pin-chip}$		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

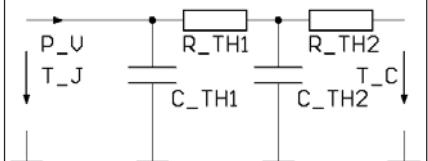
Conduction



IGBT (typ. at $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$)
 $V_0 = 1.5\text{ V}; R_0 = 13.5\text{ m}\Omega$

Free Wheeling Diode (typ. at $T_J = 125^\circ\text{C}$)
 $V_0 = 1.3\text{ V}; R_0 = 4\text{ m}\Omega$

Thermal Response



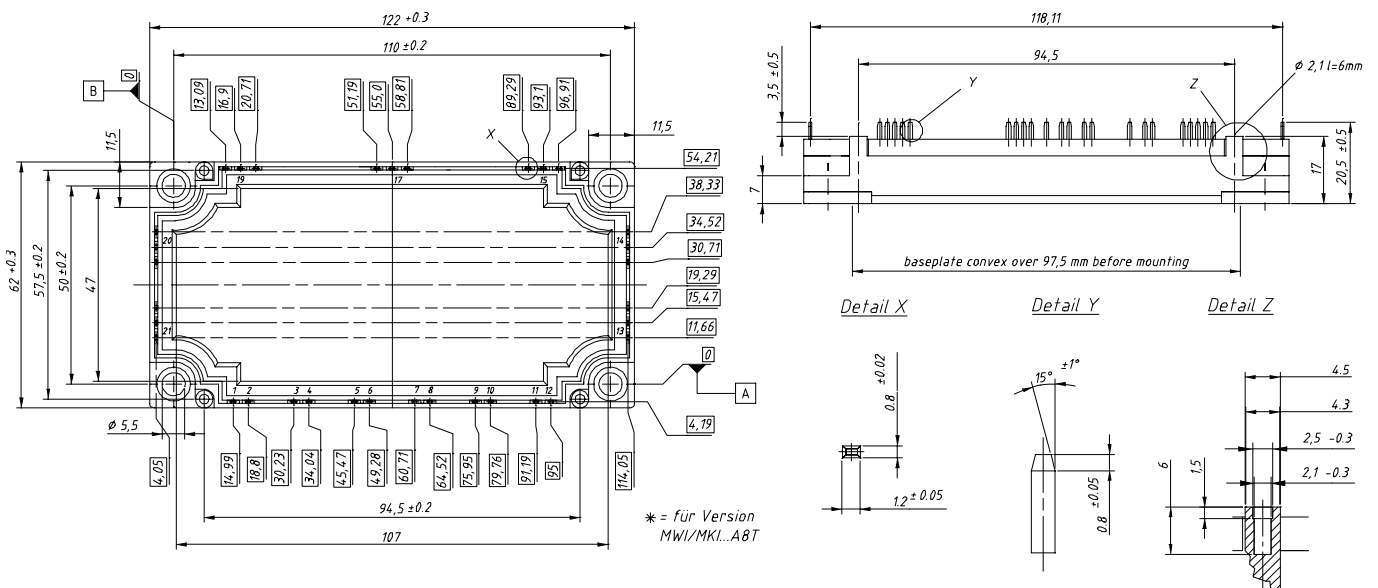
IGBT (typ.)

$C_{th1} = 0.295\text{ J/K}; R_{th1} = 0.186\text{ K/W}$
 $C_{th2} = 1.750\text{ J/K}; R_{th2} = 0.064\text{ K/W}$

Free Wheeling Diode (typ.)

$C_{th1} = 0.227\text{ J/K}; R_{th1} = 0.321\text{ K/W}$
 $C_{th2} = 1.328\text{ J/K}; R_{th2} = 0.089\text{ K/W}$

Dimensions in mm (1 mm = 0.0394")



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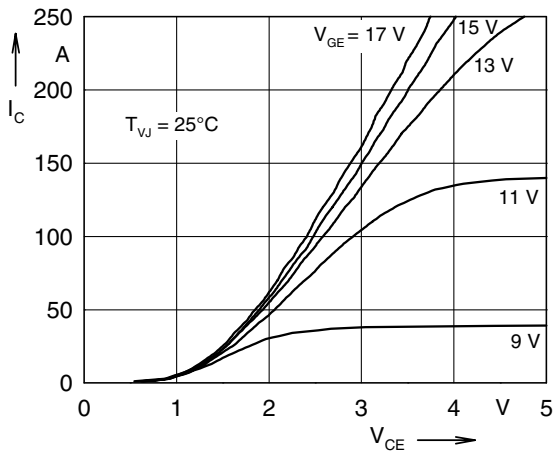


Fig. 1 Typ. output characteristics

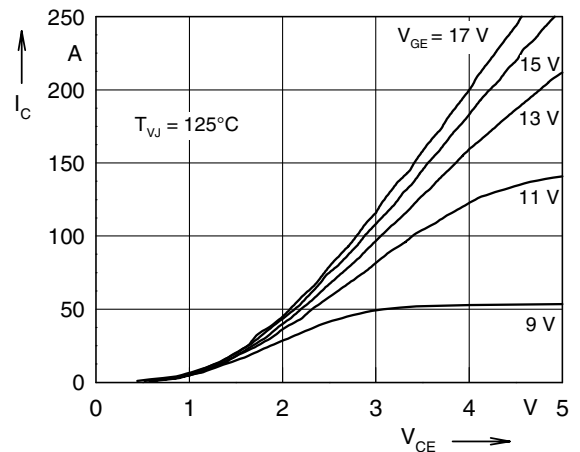


Fig. 2 Typ. output characteristics

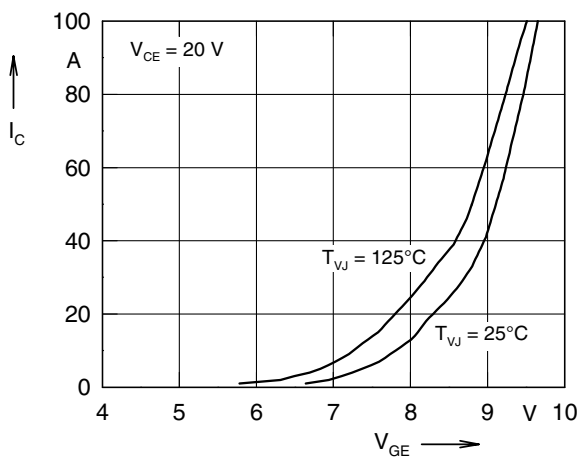


Fig. 3 Typ. transfer characteristics

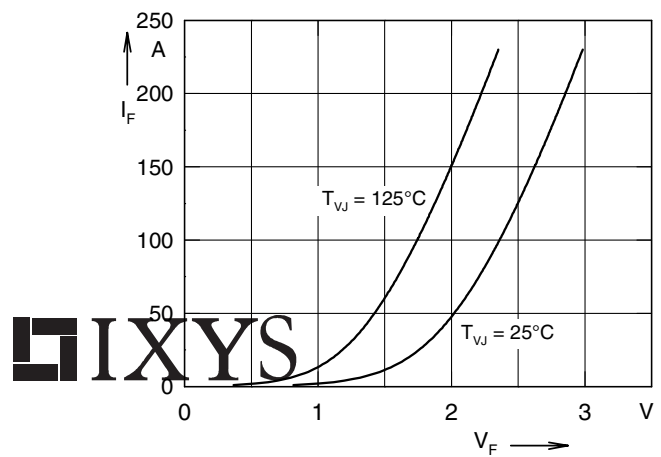


Fig. 4 Typ. forward characteristics of free wheeling diode

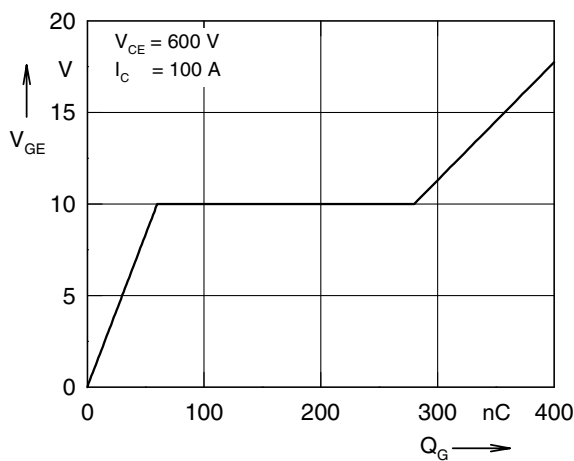


Fig. 5 Typ. turn on gate charge

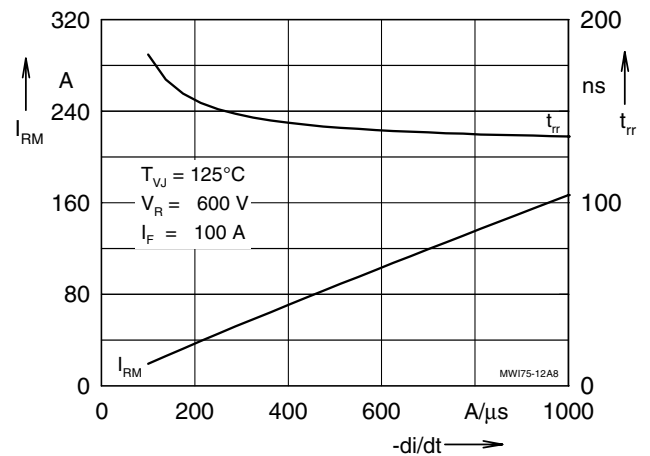


Fig. 6 Typ. turn off characteristics of free wheeling diode

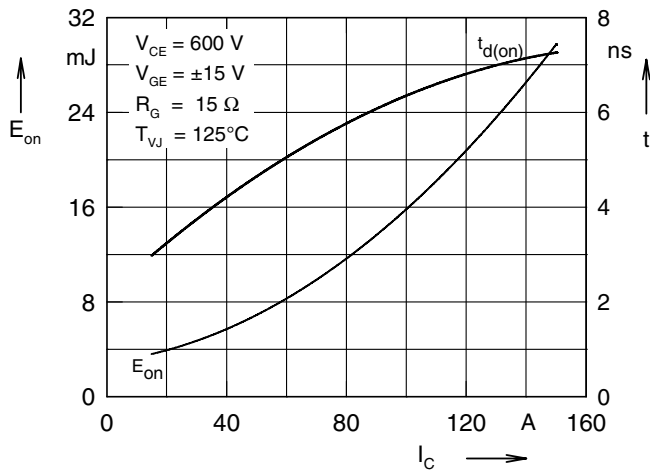


Fig. 7 Typ. turn on energy and switching times versus collector current

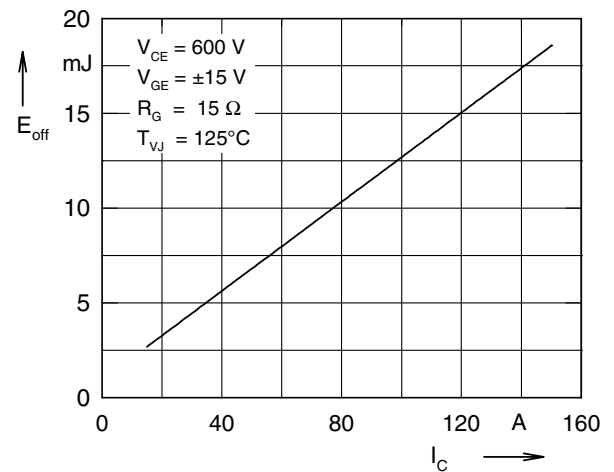


Fig. 8 Typ. turn off energy and switching times versus collector current

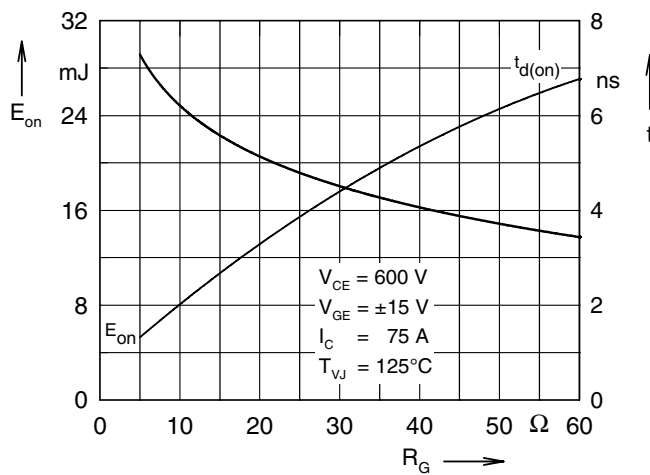


Fig. 9 Typ. turn on energy and switching times versus gate resistor

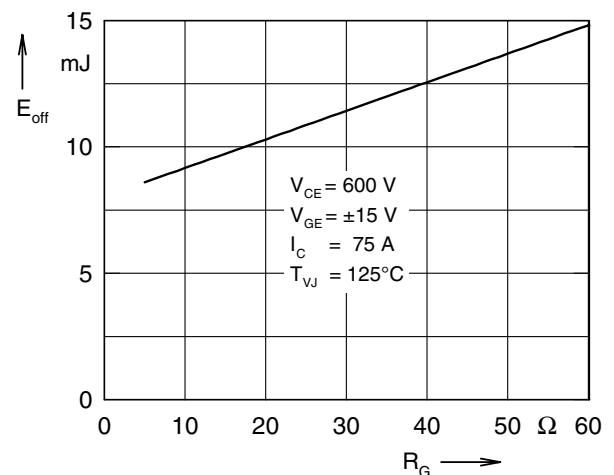


Fig. 10 Typ. turn off energy and switching times versus gate resistor

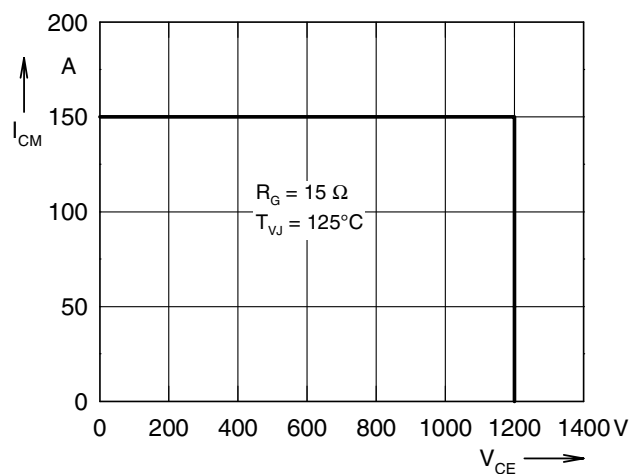


Fig. 11 Reverse biased safe operating area RBSOA

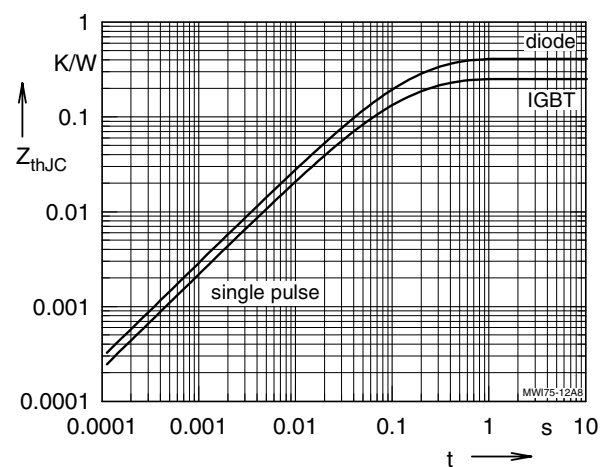


Fig. 12 Typ. transient thermal impedance