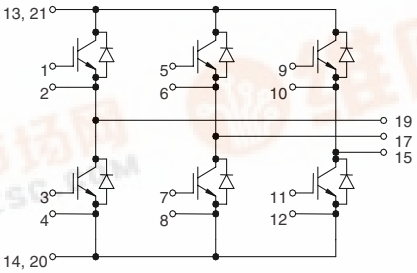
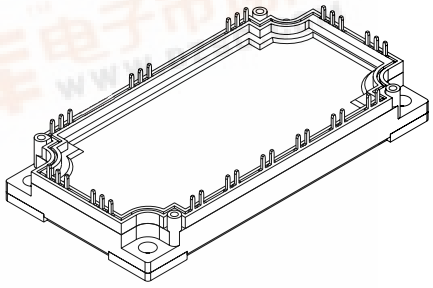
IGBT Modules
Sixpack

Short Circuit SOA Capability
Square RBSOA

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





IGBTs

Symbol	Conditions	Maximum Ratings	
V_{CES}	T_{VJ} = 25°C to 150°C	1200	V
V_{GES}		± 20	V
I_{C25}	T_C = 25°C	125	A
I_{C80}	T_C = 80°C	85	A
RBSOA	V_{GE} = ±15 V; R_G = 15 Ω; T_{VJ} = 125°C Clamped inductive load; L = 100 µH	I_{CM} = 150 $V_{CEK} \le V_{CES}$	A
t_{SC} (SCSOA)	$V_{CE} = V_{CES}$; V_{GE} = ±15 V; R_G = 15 Ω; T_{VJ} = 125°C non-repetitive	10	µs
P_{tot}	T_C = 25°C	500	W

Symbol	Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{CE(sat)}$	I_C = 75 A; V_{GE} = 15 V; T_{VJ} = 25°C		2.2	2.6	V
	T_{VJ} = 125°C		2.5		V
$V_{GE(th)}$	I_C = 3 mA; $V_{GE} = V_{CE}$	4.5		6.5	V
I_{CES}	$V_{CE} = V_{CES}$; V_{GE} = 0 V; T_{VJ} = 25°C			5	mA
	T_{VJ} = 125°C		3		mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ± 20 V			400	nA
$t_{d(on)}$	Inductive load, T_{VJ} = 125°C		100		ns
t_r	V_{CE} = 600 V; I_C = 75 A		50		ns
$t_{d(off)}$	V_{GE} = ±15 V; R_G = 15 Ω		650		ns
t_f			50		ns
E_{on}			12.1		mJ
E_{off}			10.5		mJ
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz		5.5		nF
Q_{Gon}	V_{CE} = 600V; V_{GE} = 15 V; I_C = 75 A		350		nC
R_{thJC}	(per IGBT)			0.25	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 parallelling
- 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

Diodes

Symbol	Conditions	Maximum Ratings	
I_{F25}	T_C = 25°C	150	A
I_{F80}	T_C = 80°C	100	A

Symbol	Conditions	Characteristic Values min.	typ.	max.	
V_F	I_F = 75 A; V_{GE} = 0 V; T_{VJ} = 25°C		2.2	2.6	V
	T_{VJ} = 125°C		1.6		V
I_{RM}	I_F = 75 A; di_F/dt = -750 A/µs; T_{VJ} = 125°C		79		A
t_{rr}	V_R = 600 V; V_{GE} = 0 V		220		ns
R_{thJC}	(per diode)			0.41	K/W

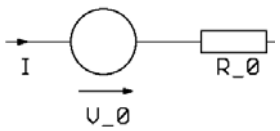
Module

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 mA; 50/60 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

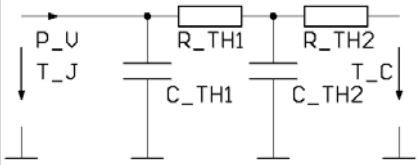
Conduction



IGBT (typ. at V_{GE} = 15 V; T_J = 125°C)
V_0 = 1.5 V; R_0 = 13.5 mΩ

Free Wheeling Diode (typ. at T_J = 125°C)
V_0 = 1.3 V; R_0 = 4 mΩ

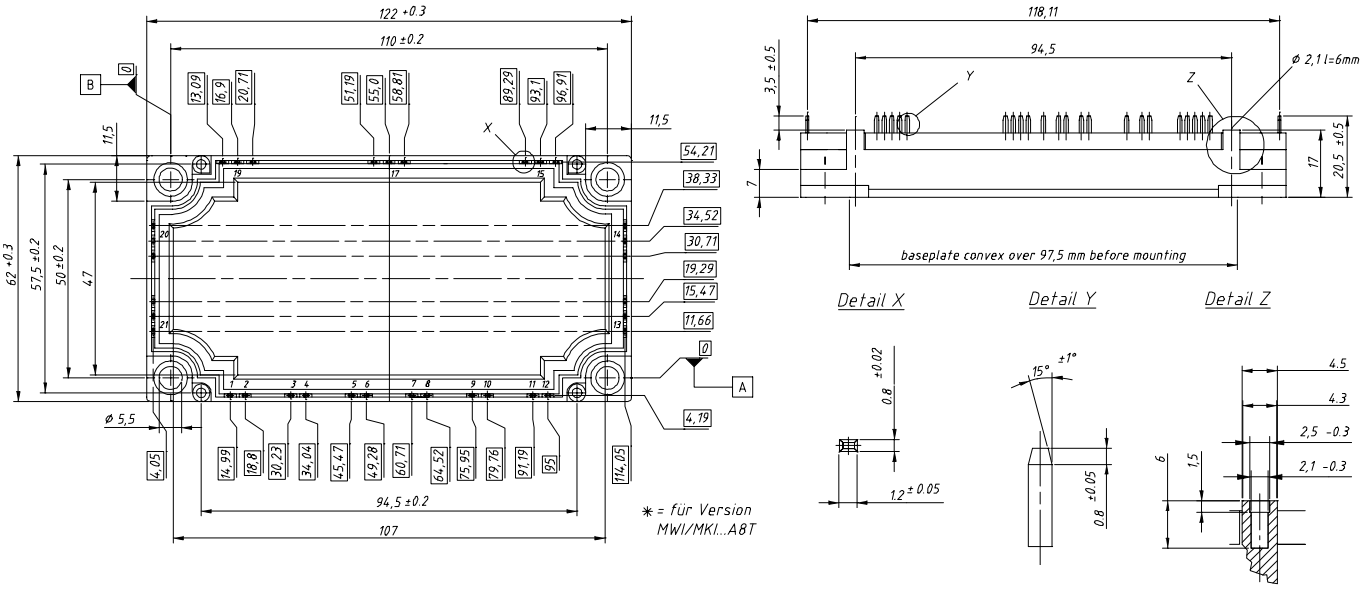
Thermal Response



IGBT (typ.)
C_{th1} = 0.295 J/K; R_{th1} = 0.186 K/W
C_{th2} = 1.750 J/K; R_{th2} = 0.064 K/W

Free Wheeling Diode (typ.)
C_{th1} = 0.227 J/K; R_{th1} = 0.321 K/W
C_{th2} = 1.328 J/K; R_{th2} = 0.089 K/W

Dimensions in mm (1 mm = 0.0394")



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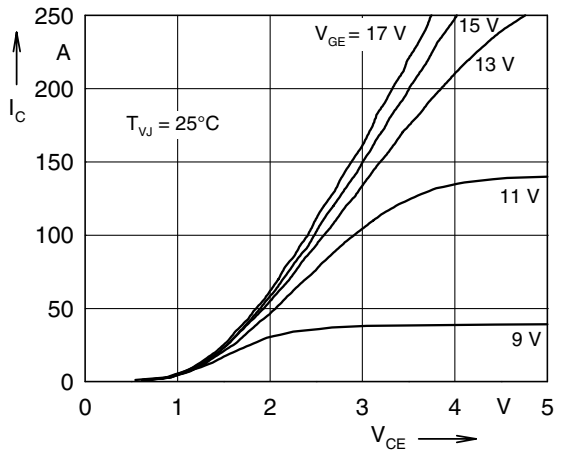

Fig. 1 Typ. output characteristics

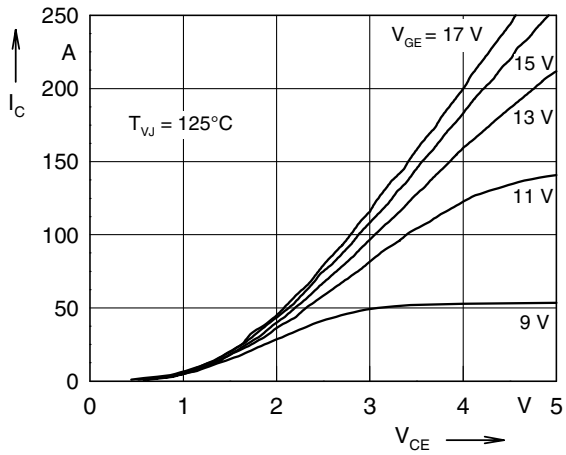

Fig. 2 Typ. output characteristics

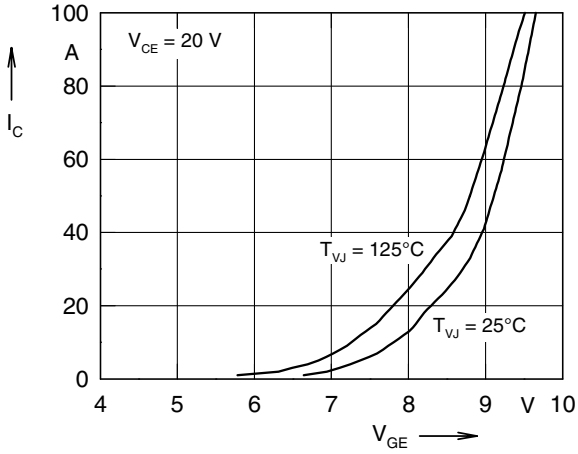

Fig. 3 Typ. transfer characteristics

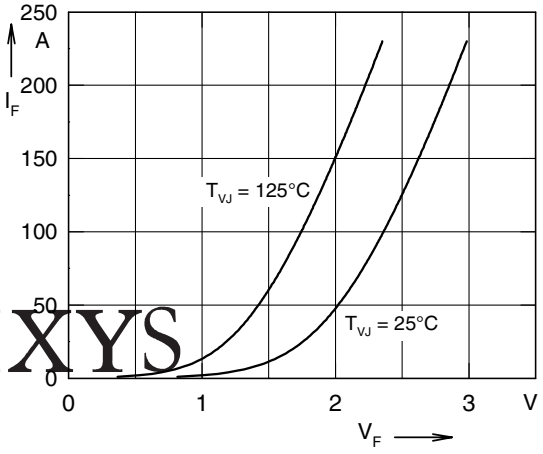

Fig. 4 Typ. forward characteristics of free wheeling diode

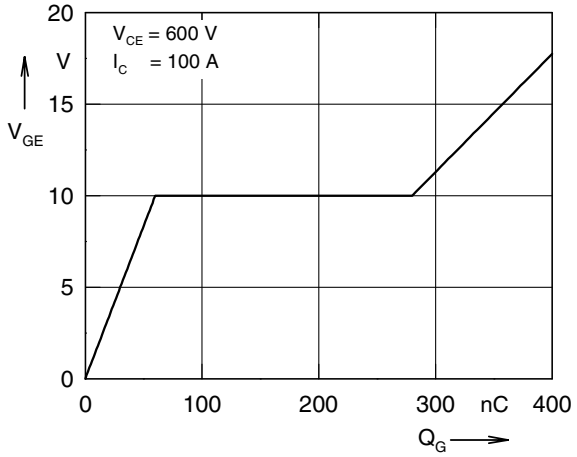

Fig. 5 Typ. turn on gate charge

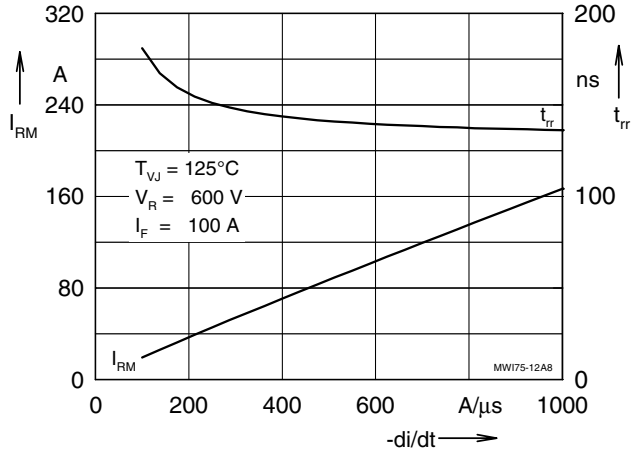

Fig. 6 Typ. turn off characteristics of free wheeling diode

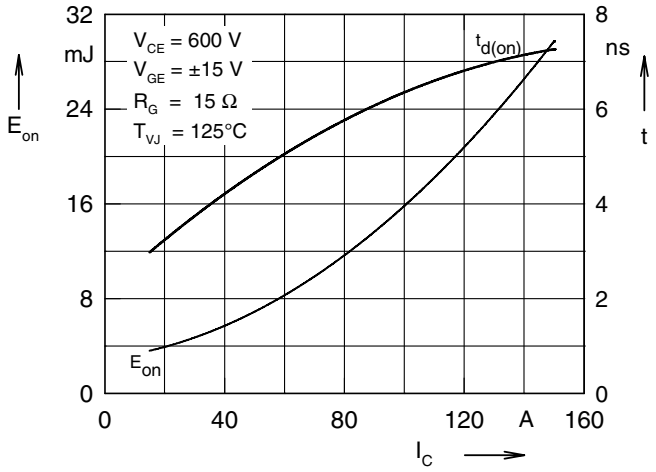

Fig. 7 Typ. turn on energy and switching times versus collector current

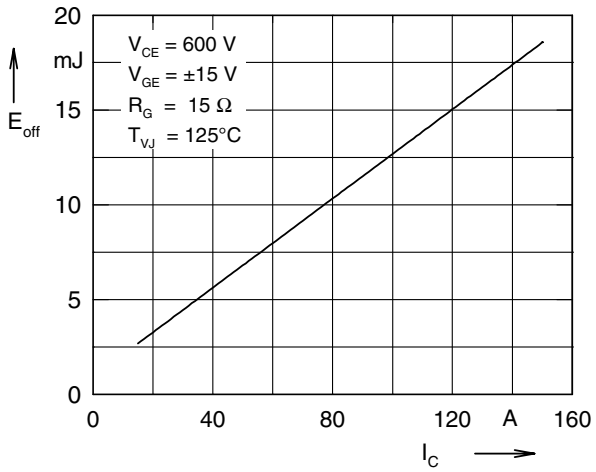

Fig. 8 Typ. turn off energy and switching times versus collector current

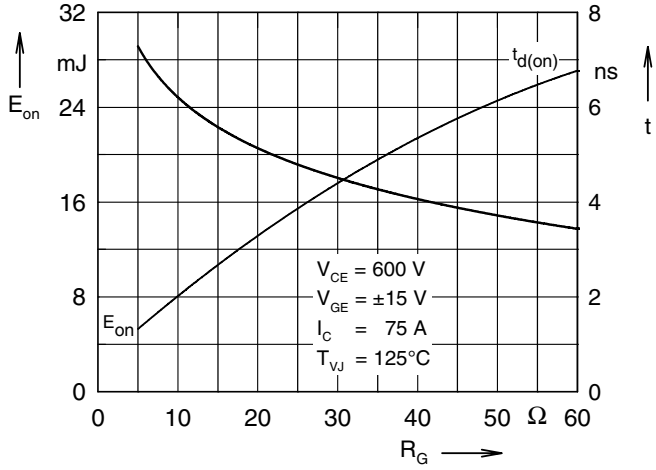

Fig. 9 Typ. turn on energy and switching times versus gate resistor

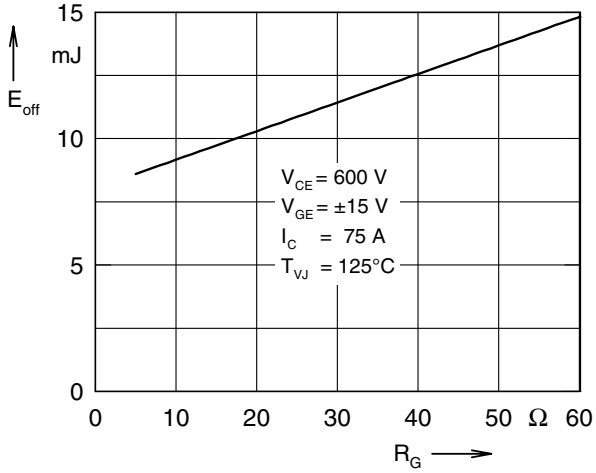

Fig.10 Typ. turn off energy and switching times versus gate resistor

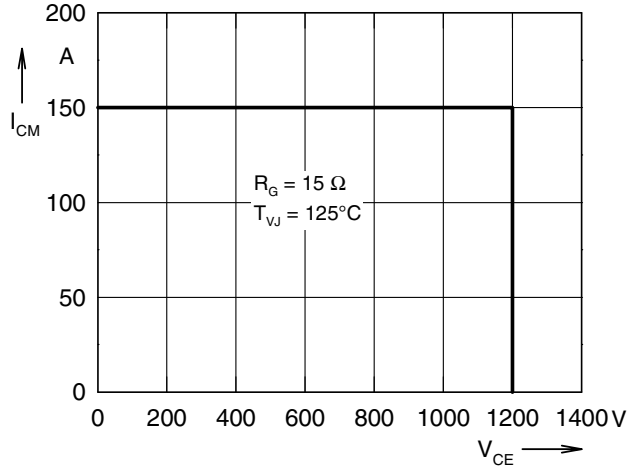

Fig. 11 Reverse biased safe operating area RBSOA

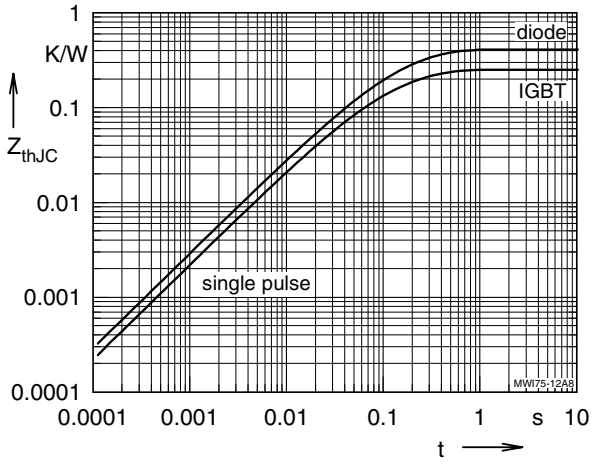

Fig. 12 Typ. transient thermal impedance