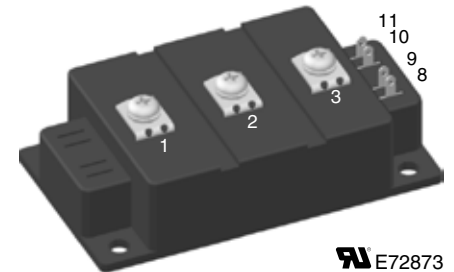
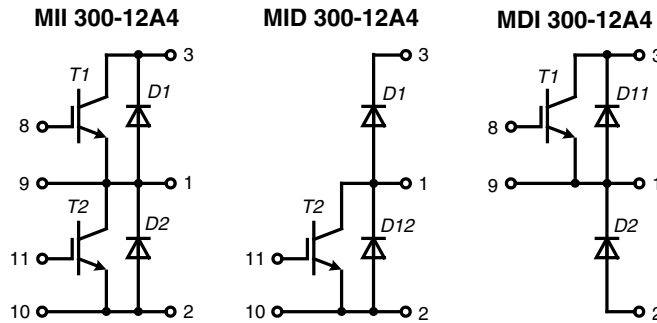


IGBT Modules

Short Circuit SOA Capability
Square RBSOA

$$\begin{aligned} I_{C25} &= 330 \text{ A} \\ V_{CES} &= 1200 \text{ V} \\ V_{CE(sat) \text{ typ.}} &= 2.2 \text{ V} \end{aligned}$$



IGBTs T1 - T2			
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}	$T_C = 25^{\circ}\text{C}$	330	A
I_{C80}	$T_C = 80^{\circ}\text{C}$	220	A
I_{CM}	$V_{GE} = \pm 15 \text{ V}; R_G = 3.3 \Omega; T_{VJ} = 125^{\circ}\text{C}$	400	A
V_{CEK}	RBSOA Clamped inductive load; $L = 100 \mu\text{H}$	V_{CES}	
t_{SC} (SCSOA)	$V_{CE} = V_{CES}; V_{GE} = \pm 15 \text{ V}; R_G = 3.3 \Omega$ $T_{VJ} = 125^{\circ}\text{C}; \text{non-repetitive}$	10	μs
P_{tot}	$T_C = 25^{\circ}\text{C}$	1380	W

Symbol	Conditions	Characteristic Values			
		(T _{VJ} = 25°C, unless otherwise specified)			
		min.	typ.	max.	
$V_{CE(sat)}$	$I_C = 200 \text{ A}; V_{GE} = 15 \text{ V}$		2.2	2.7	V
$V_{GE(th)}$	$I_C = 8 \text{ mA}; V_{GE} = V_{CE}$	4.5		6.5	V
I_{CES}	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}$ $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$			13	mA mA
I_{GES}	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$			± 800	nA
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	Inductive load $V_{CE} = 600 \text{ V}; I_C = 200 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 3.3 \Omega$ $T_{VJ} = 125^{\circ}\text{C}$		100 60 600 90 32 29		ns ns ns ns mJ mJ
C_{ies} C_{oes} C_{res}	$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$		13 2 1		nF nF nF
R_{thJC} R_{thJH}	(per IGBT) with heatsink compound		0.18	0.09	K/W K/W

Features

- NPT IGBT technology
- 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
- package with DCB ceramic base plate
- isolation voltage 4800 V
- UL registered E72873

Advantages

- space and weight savings
- reduced protection circuits

Applications

- AC and DC motor control
- AC servo and robot drives
- power supplies
- welding inverters

Free wheeling diodes D1 - D2 / D11 - D12

Symbol	Conditions	Maximum Ratings	
I_{F25}	$T_C = 25^\circ\text{C}$	450	A
I_{F80}	$T_C = 80^\circ\text{C}$	280	A

Symbol	Conditions	Characteristic Values			
		min.	typ.	max.	
V_F	$I_F = 300\text{ A}; V_{GE} = 0\text{ V};$ $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		2.2 1.7	2.5	V V
I_{RM} t_{rr}	$I_F = 200\text{ A}; di_F/dt = -1800\text{ A}/\mu\text{s};$ $V_R = 600\text{ V}; V_{GE} = 0\text{ V};$ $T_{VJ} = 125^\circ\text{C}$		180 200		A ns
R_{thJC} R_{thJH}	(per IGBT) with heatsink compound		0.3	0.15	K/W K/W

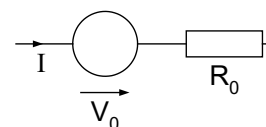
Module

Symbol	Conditions	Maximum Ratings	
T_{VJ}	operating	-40...+150	$^\circ\text{C}$
T_{stg}		-40...+150	$^\circ\text{C}$
V_{ISO}	$I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$	4000	V~
M_d	Mounting torque (module, M6) (terminal, M5)	2.25 - 2.75 2.5 - 3.7	Nm Nm

Symbol	Conditions	Characteristic Values			
		min.	typ.	max.	
d_s	Creepage distance on surface	10			mm
d_A	Strike distance in air	9.6			mm
Weight			250		g

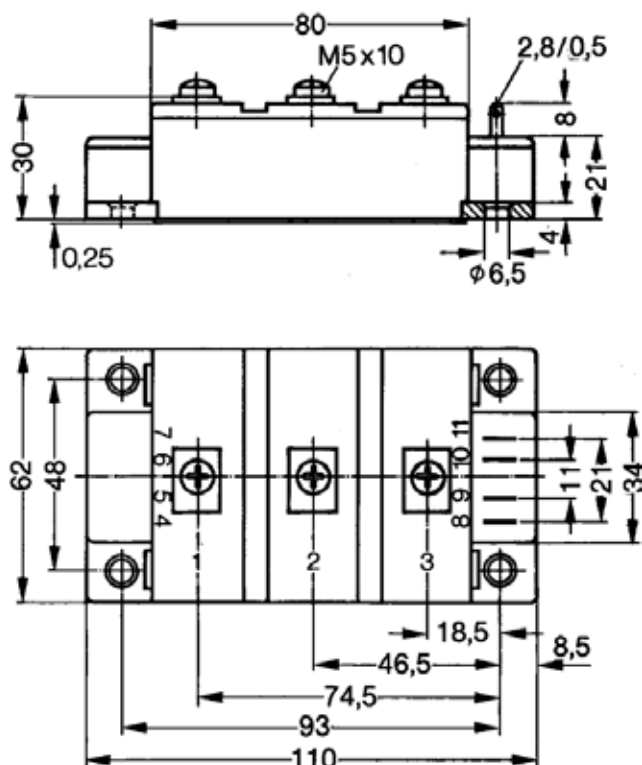
Equivalent Circuits for Simulation

Conduction



IGBT (typ. at $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$)
 $V_0 = 1.3\text{ V}; R_0 = 6.2\text{ m}\Omega$

Free wheeling diode (typ. at $T_J = 125^\circ\text{C}$)
 $V_0 = 1.3\text{ V}; R_0 = 2.4\text{ m}\Omega$



Dimensions in mm (1 mm = 0.0394")

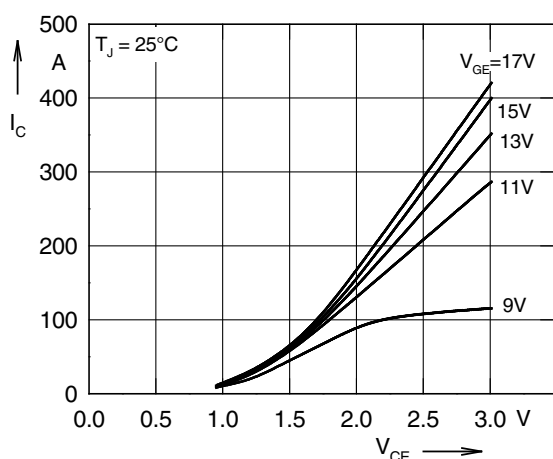


Fig. 1 Typ. output characteristics

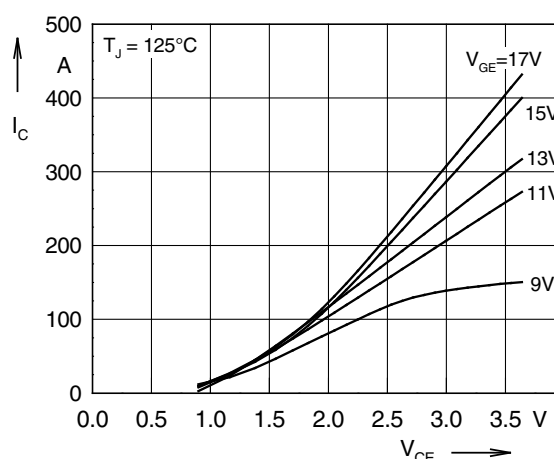


Fig. 2 Typ. output characteristics

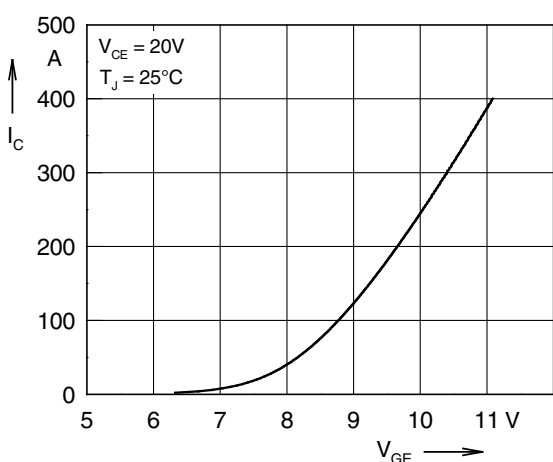


Fig. 3 Typ. transfer characteristics

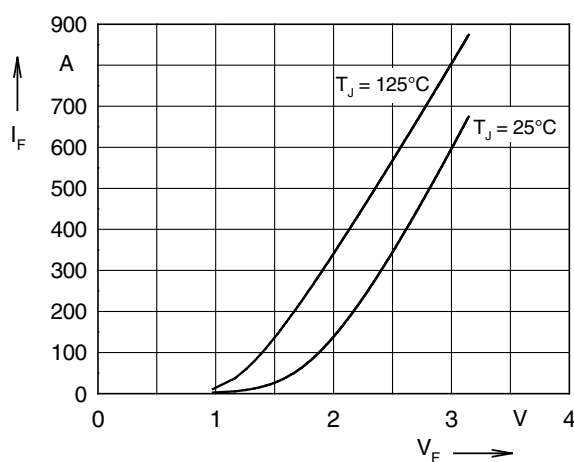


Fig. 4 Typ. forward characteristics of free wheeling diode

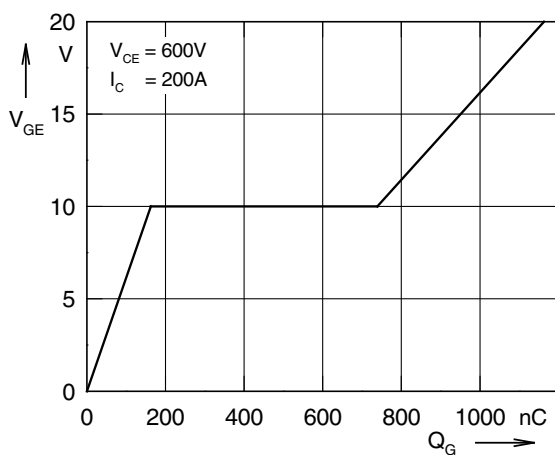


Fig. 5 Typ. turn on gate charge

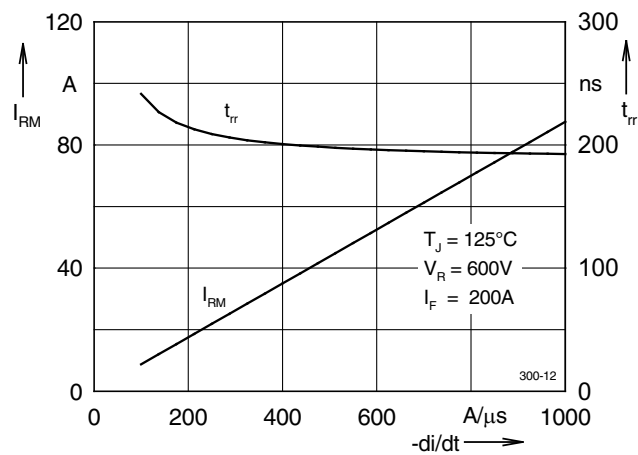


Fig. 6 Typ. turn off characteristics of free wheeling diode

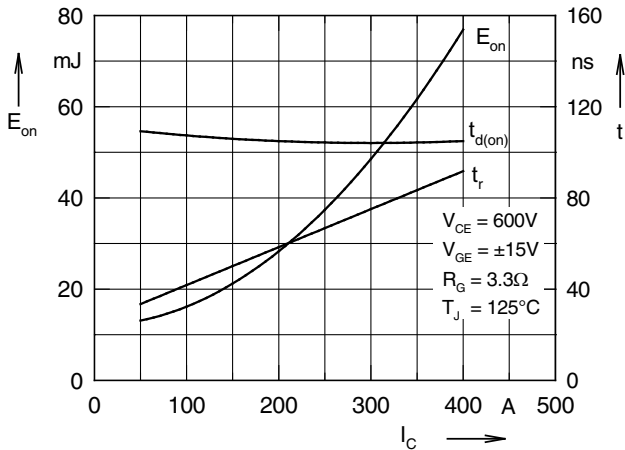


Fig. 7 Typ. turn on energy and switching

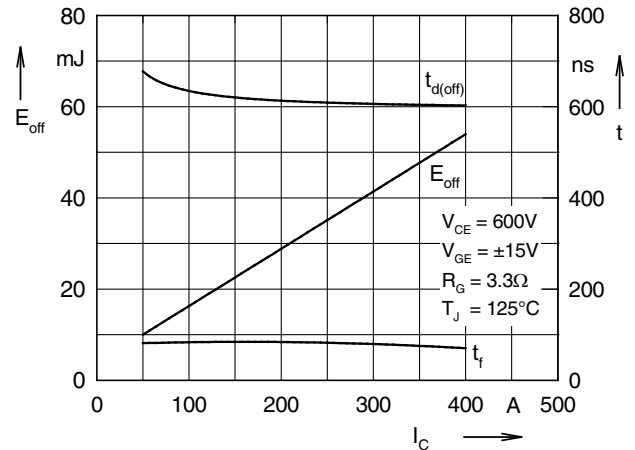


Fig. 8 Typ. turn off energy and switching times versus collector current

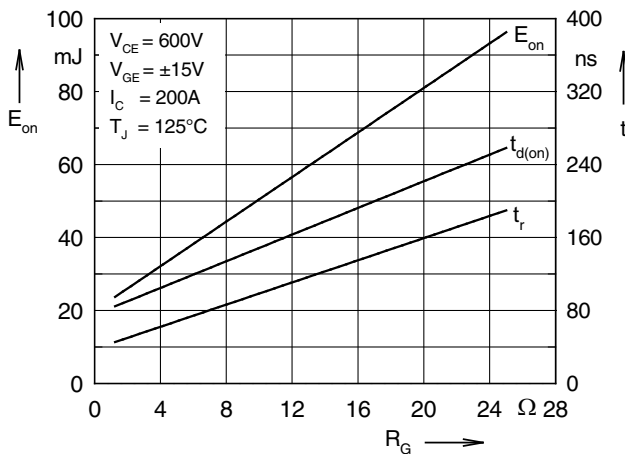


Fig. 9 Typ. turn on energy and switching times versus gate resistor

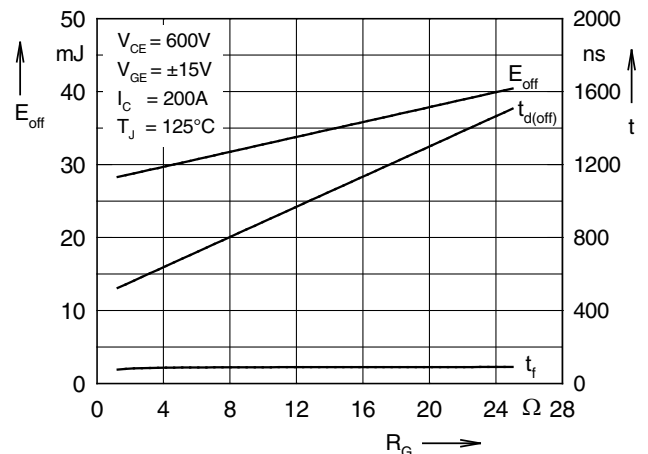


Fig. 10 Typ. turn off energy and switching times versus gate resistor

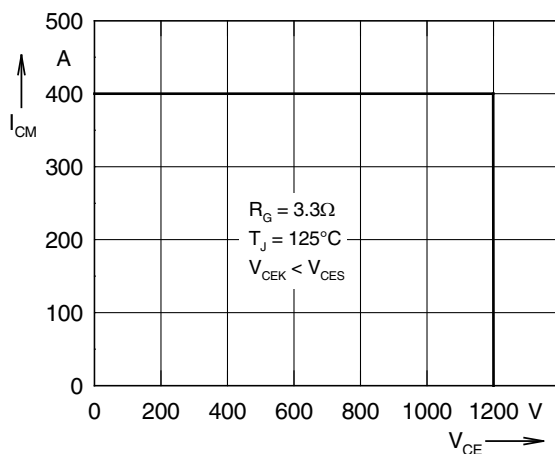


Fig. 11 Reverse biased safe operating area RBSOA

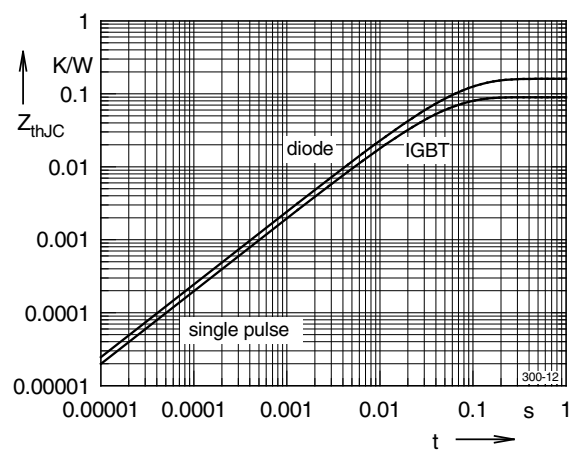


Fig. 12 Typ. transient thermal impedance

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