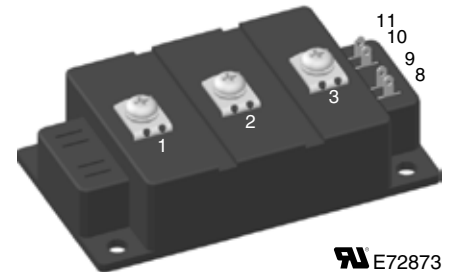
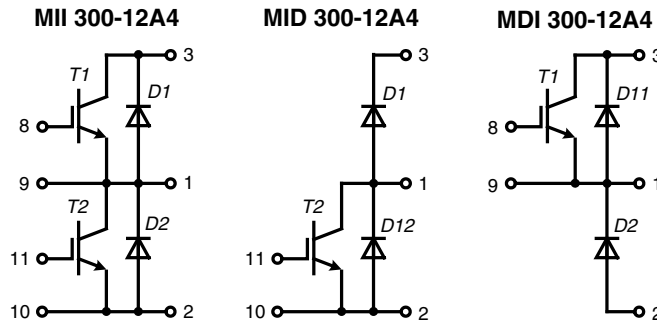


# IGBT Modules

Short Circuit SOA Capability  
 Square RBSOA

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



IGBTs T1 - T2		Maximum Ratings	
Symbol	Conditions		
$V_{CES}$	$T_{VJ} = 25^\circ\text{C to } 150^\circ\text{C}$	1200	V
$V_{GES}$		$\pm 20$	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
$V_{CEK}$	<b>RBSOA</b> 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	$\mu\text{s}$
$P_{tot}$	$T_C = 25^\circ\text{C}$	1380	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

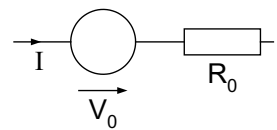
Symbol	Conditions	Characteristic Values				
		$(T_{VJ} = 25^\circ\text{C}, \text{ unless otherwise specified})$				
		min.	typ.	max.		
$V_{CE(sat)}$	$I_C = 200 \text{ A}; V_{GE} = 15 \text{ V}$		2.2	2.7	V	
$V_{GE(th)}$	$I_C = 8 \text{ mA}; V_{GE} = V_{CE}$	4.5		6.5	V	
$I_{CES}$	$V_{CE} = V_{CES}; V_{GE}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

**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

**Equivalent Circuits for Simulation**
**Conduction**


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

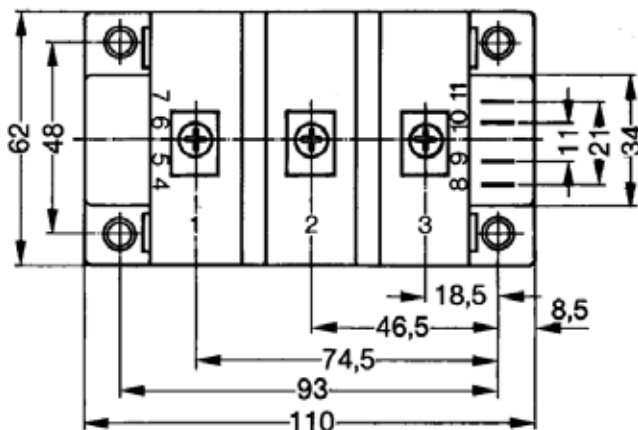
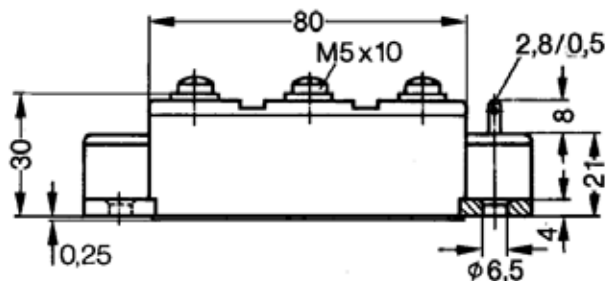
Free wheeling diode (typ. at  $T_J = 125^\circ\text{C}$ )  
 $V_0 = 1.3\text{ V}; R_0 = 2.4\text{ m}\Omega$

**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
<b>Weight</b>			250		g



Dimensions in mm (1 mm = 0.0394")

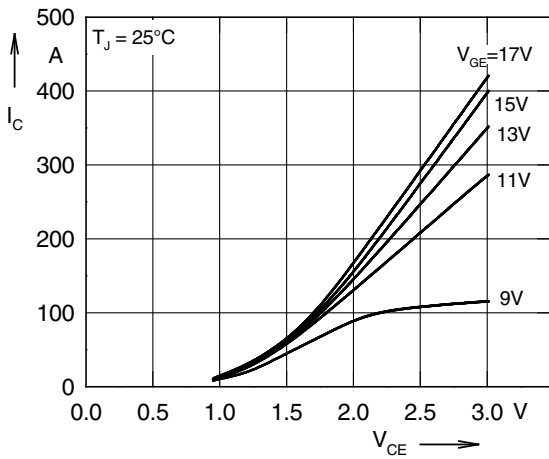


Fig. 1 Typ. output characteristics

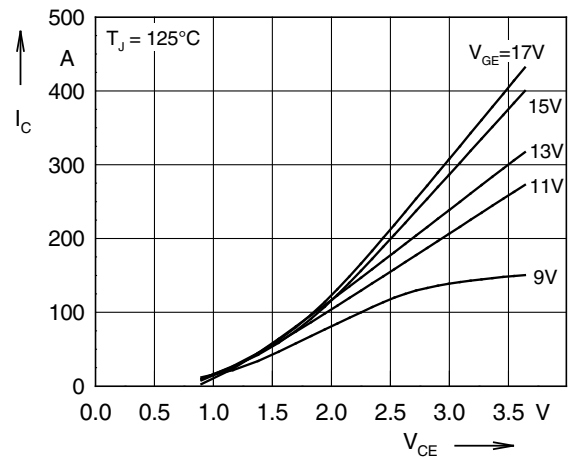


Fig. 2 Typ. output characteristics

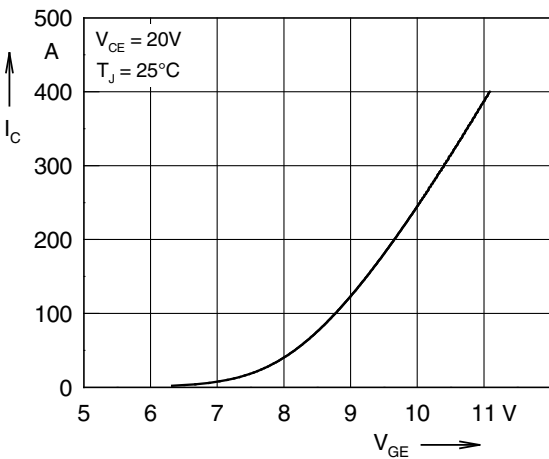


Fig. 3 Typ. transfer characteristics

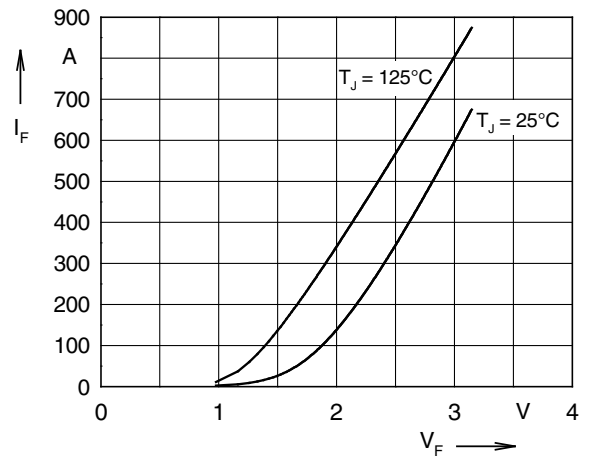


Fig. 4 Typ. forward characteristics of free wheeling diode

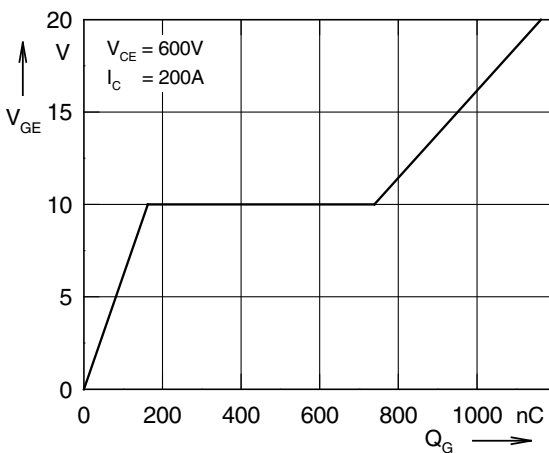


Fig. 5 Typ. turn on gate charge

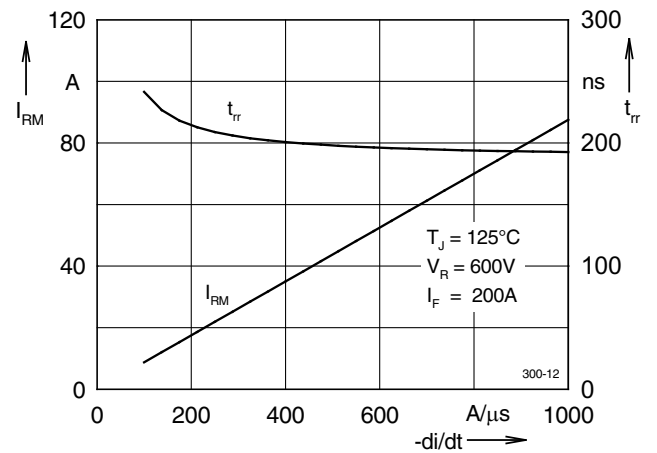


Fig. 6 Typ. turn off characteristics of free wheeling diode

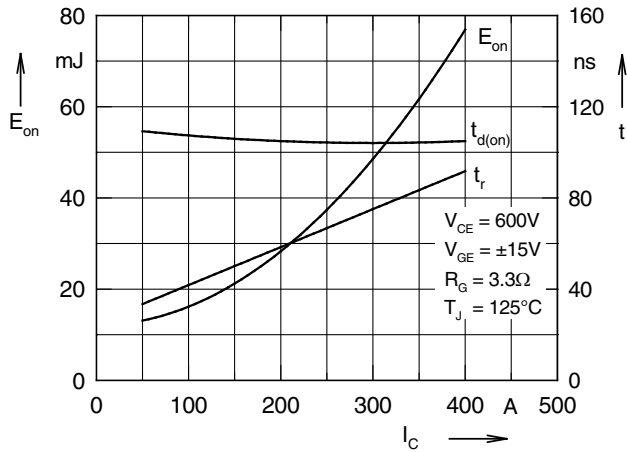


Fig. 7 Typ. turn on energy and switching

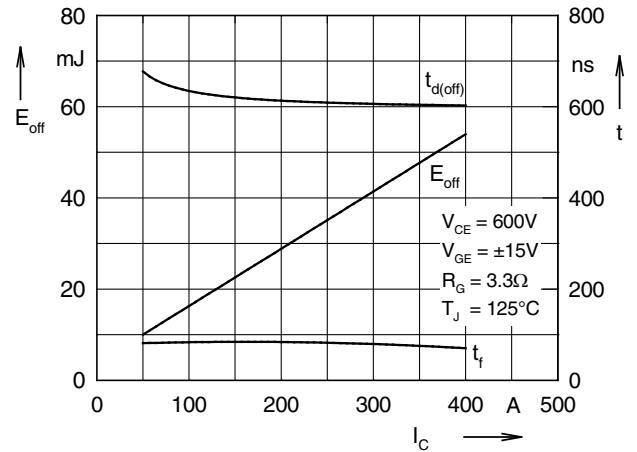


Fig. 8 Typ. turn off energy and switching times versus collector current

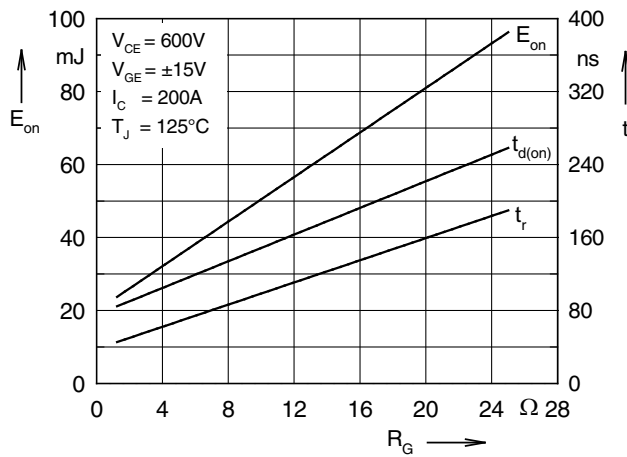


Fig. 9 Typ. turn on energy and switching times versus gate resistor

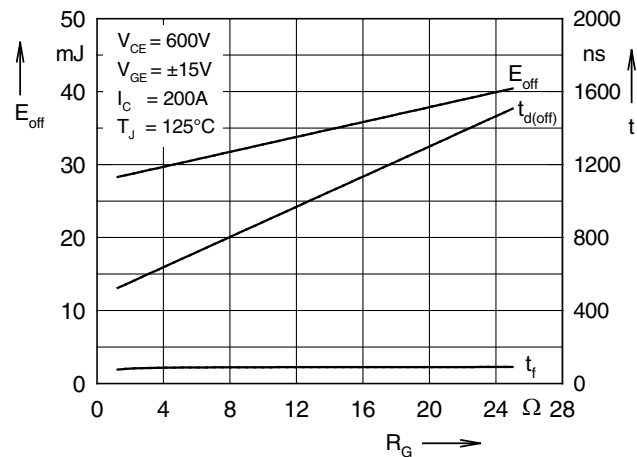


Fig. 10 Typ. turn off energy and switching times versus gate resistor

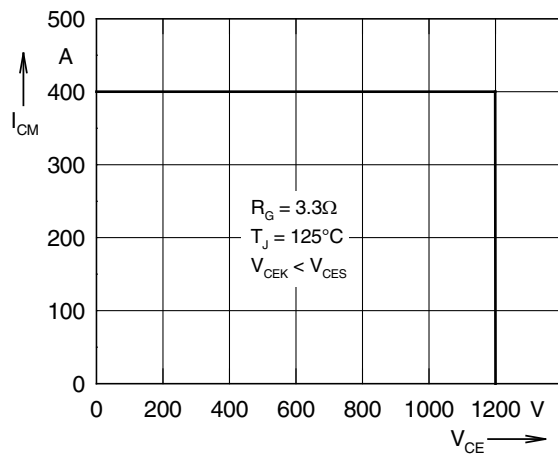


Fig. 11 Reverse biased safe operating area RBSOA

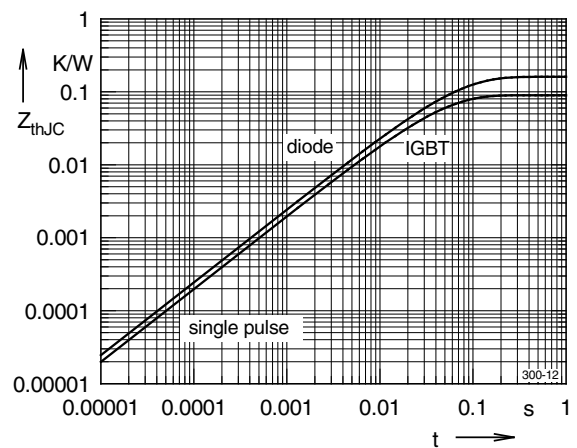


Fig. 12 Typ. transient thermal impedance