IXYS

IGBT Modules

Short Circuit SOA Capability
Square RBSOA

I_{C25} **= 270 A**
V_{CES} **= 1200 V**
$V_{CE(sat)\,typ.}$ **= 2.2 V**

MII   MID   MDI

$\boxed{UL}$ E 72873
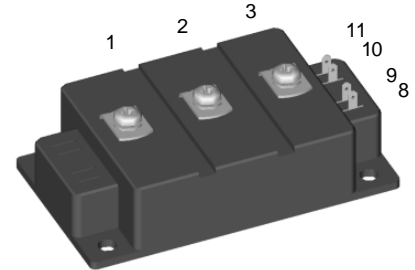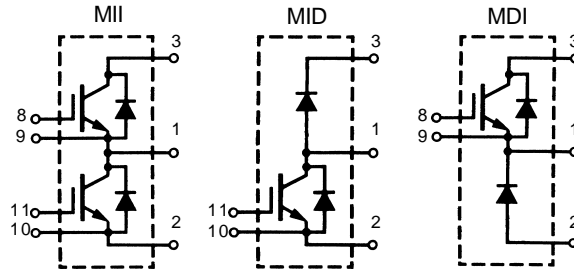
Symbol	Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 20 kΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	270	A
I_{C80}	T_C = 80°C	180	A
I_{CM}	T_C = 80°C, t_p = 1 ms	360	A
t_{SC} (SCSOA)	V_{GE} = ±15 V, V_{CE} = V_{CES}, T_J = 125°C R_G = 6.8 Ω, non repetitive	10	µs
RBSOA	V_{GE}= ±15 V, T_J = 125°C, R_G = 6.8 Ω Clamped inductive load, L = 100 µH	I_{CM} = 360 $V_{CEK} \leq V_{CES}$	A
P_{tot}	T_C = 25°C	1130	W
T_J		150	°C
T_{stg}		-40 ... +150	°C
V_{ISOL}	50/60 Hz, RMS t = 1 min $I_{ISOL} \leq 1$ mA t = 1 s Insulating material: Al_2O_3	4000 4800	V~ V~
M_d	Mounting torque (module) (teminals)	2.25-2.75 20-25 2.5-3.7 22-33	Nm lb.in. Nm lb.in.
d_S	Creepage distance on surface	10	mm
d_A	Strike distance through air	9.6	mm
a	Max. allowable acceleration	50	m/s²
Weight	Typical	250 8.8	g oz.

Data according to a single IGBT/FRED unless otherwise stated.

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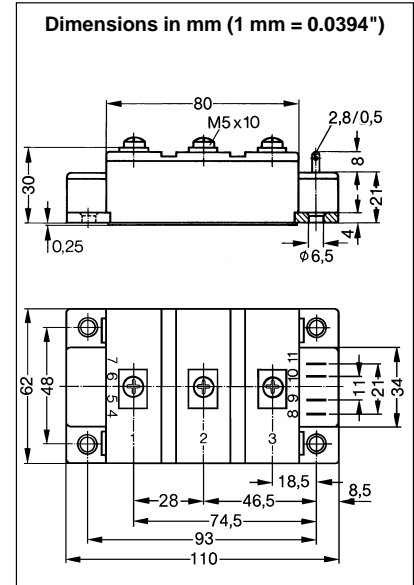- isolation voltage 4800 V
- UL registered E72873

Advantages
- space and weight savings
- reduced protection circuits

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

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Symbol	Conditions		Characteristic Values $(T_J = 25°C,$ unless otherwise specified)			
			min.	typ.	max.	
$V_{(BR)CES}$	$V_{GE} = 0$ V		1200			V
$V_{GE(th)}$	$I_C = 6$ mA, $V_{CE} = V_{GE}$		4.5		6.5	V
I_{CES}	$V_{CE} = V_{CES}$	$T_J = 25°C$			10	mA
		$T_J = 125°C$		15		mA
I_{GES}	$V_{CE} = 0$ V, $V_{GE} = ±20$ V				±700	nA
$V_{CE(sat)}$	$I_C = 150$ A, $V_{GE} = 15$ V			2.2	2.7	V
C_{ies}				11		nF
C_{oes}	$V_{CE} = 25$ V, $V_{GE} = 0$ V, f = 1 MHz			1.5		nF
C_{res}				0.65		nF
$t_{d(on)}$				100		ns
t_r	**Inductive load, $T_J = 125°C$**			50		ns
$t_{d(off)}$				650		ns
t_f	$I_C = 150$ A, $V_{GE} = ±15$ V			50		ns
E_{on}	$V_{CE} = 600$ V, $R_G = 6.8$ Ω			24.2		mJ
E_{off}				21		mJ
R_{thJC}					0.11	K/W
R_{thJS}	with heatsink compound			0.22		K/W

Dimensions in mm (1 mm = 0.0394")

Reverse Diode (FRED)		Characteristic Values $(T_J = 25°C,$ unless otherwise specified)			
		min.	typ.	max.	
V_F	$I_F = 150$ A, $V_{GE} = 0$ V,		2.2	2.5	V
	$I_F = 150$ A, $V_{GE} = 0$ V, $T_J = 125°C$		1.8	1.9	V
I_F	$T_C = 25°C$			300	A
	$T_C = 80°C$			200	A
I_{RM}	$I_F = 150$ A, $V_{GE} = 0$ V, $-di_F/dt = 1200$ A/µs		125		A
t_{rr}	$T_J = 125°C, V_R = 600$ V		200		ns
R_{thJC}				0.23	K/W
R_{thJS}	with heatsink compound		0.45		K/W

Equivalent Circuits for Simulation

Conduction
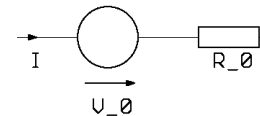
IGBT (typ. at $V_{GE} = 15$ V; $T_J = 125°C$)
   $V_0 = 1.5$ V; $R_0 = 7.0$ mΩ

Free Wheeling Diode (typ. at $T_J = 125°C$)
   $V_0 = 1.3$ V; $R_0 = 3.4$ mΩ

Thermal Response
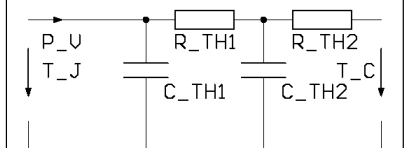
IGBT (typ.)
   $C_{th1} = 0.40$ J/K; $R_{th1} = 0.110$ K/W
   $C_{th2} = 0.93$ J/K; $R_{th2} = 0.003$ K/W

Free Wheeling Diode (typ.)
   $C_{th1} = 0.28$ J/K; $R_{th1} = 0.226$ K/W
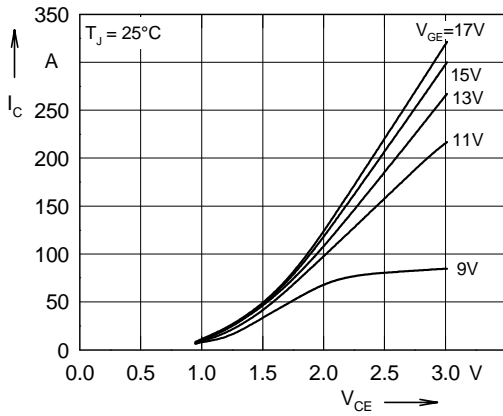   *$C_{th2} = 0.51$ J/K; $R_{th2} = 0.005$ K/W*
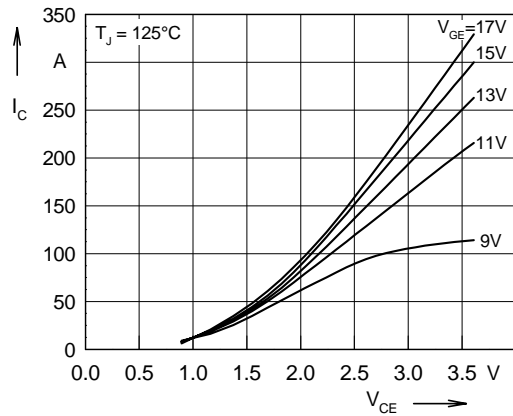
Fig. 1   Typ. output characteristics

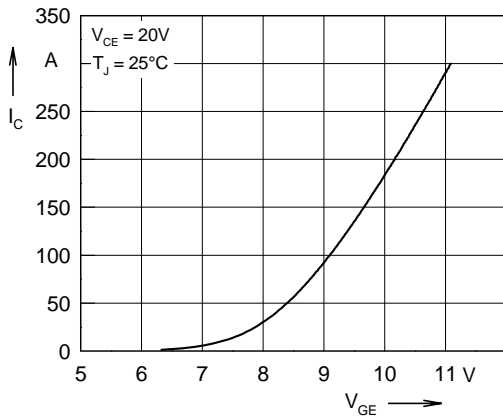Fig. 2   Typ. output characteristics

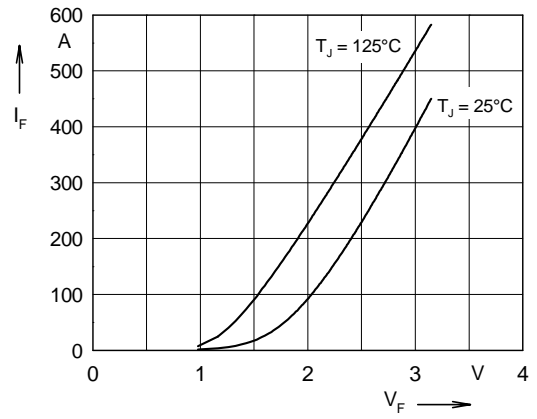Fig. 3   Typ. transfer characteristics

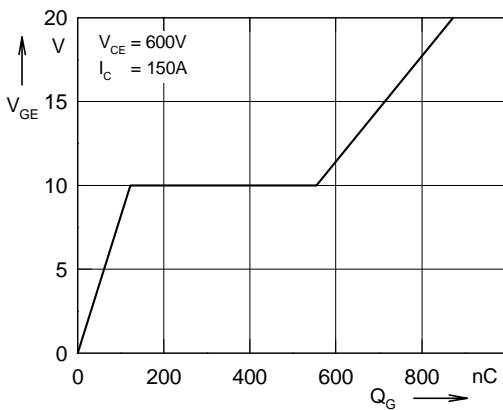Fig. 4   Typ. forward characteristics of free wheeling diode
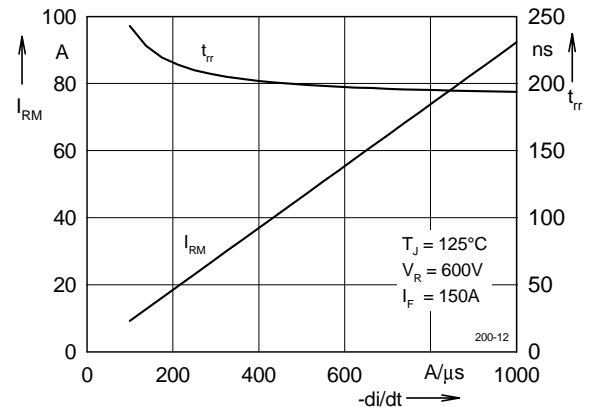
Fig. 5   Typ. turn on gate charge

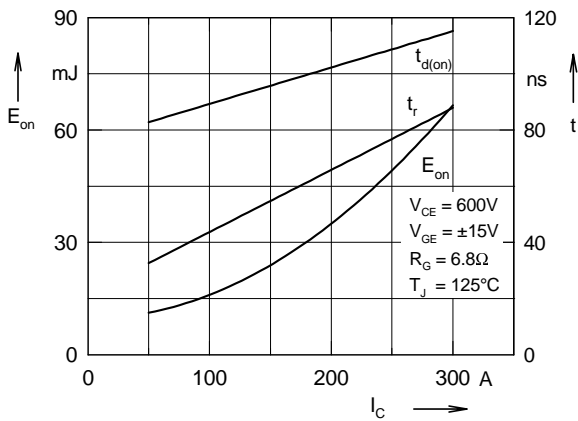Fig. 6   Typ. turn off characteristics of free wheeling diode

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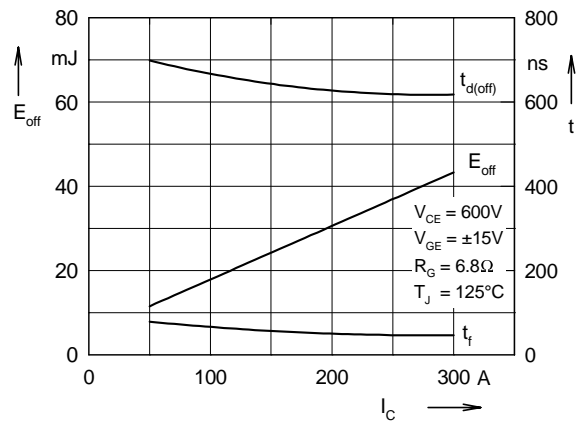times versus collector current

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

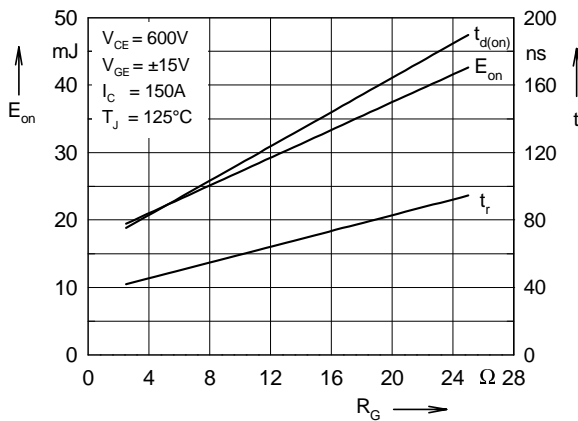Fig. 9   Typ. turn on energy and switching
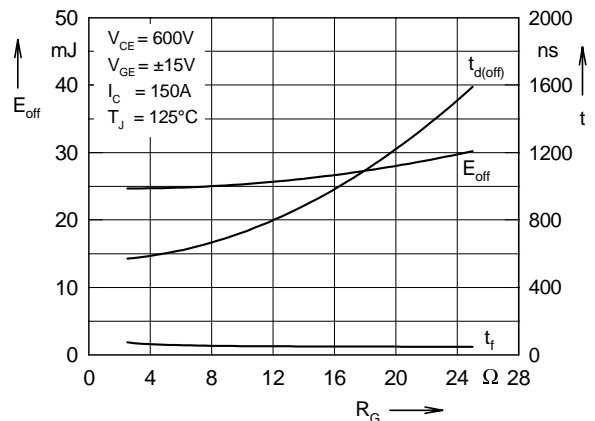times versus gate resistor

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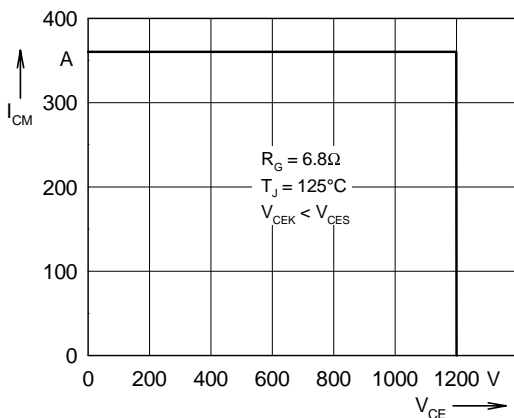times versus gate resistor
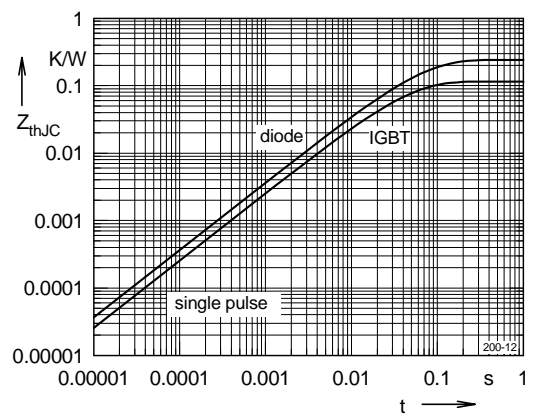

Fig. 11   Reverse biased safe operating area
RBSOA

Fig. 12   Typ. transient thermal impedance