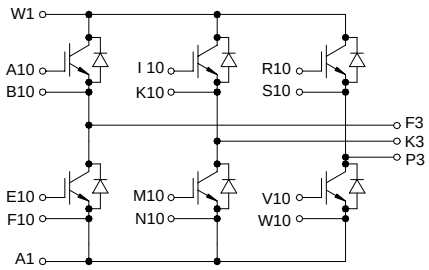
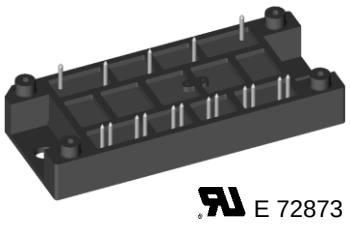
IGBT Modules
Sixpack

I_{C25} = 90 A
V_{CES} = 1200 V
$V_{CE(sat)\ typ.}$ = 2.2 V

Short Circuit SOA Capability
Square RBSOA





E 72873

Preliminary data

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	90	A
I_{C80}	T_C = 80°C	60	A
I_{CM}	T_C = 80°C, t_P = 1 ms	120	A
t_{SC} (SCSOA)	V_{GE} = ±15 V, V_{CE} = V_{CES}, T_J = 125°C R_G = 22 Ω, non repetitive	10	µs
RBSOA	V_{GE} = ±15 V, T_J = 125°C, R_G = 22 Ω Clamped inductive load, L = 100 µH	I_{CM} = 100 $V_{CEK} \le V_{CES}$	A
P_{tot}	T_C = 25°C	370	W
T_J		150	°C
T_{stg}		-40 ... +150	°C
V_{ISOL}	50/60 Hz, RMS t = 1 min $I_{ISOL} \le$ 1 mA t = 1 s Insulating material: Al_2O_3	4000 4800	V~ V~
M_d	Mounting torque (M5)	2.0 - 2.5 18 - 22	Nm lb.in.
d_S	Creepage distance on surface	9	mm
d_A	Strike distance through air	9	mm
a	Max. allowable acceleration	50	m/s^2
Weight	Typical	80 2.8	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
- solderable pins for PCB mounting
- package with DCB ceramic base plate
- isolation voltage 4800 V
- UL registered E72873

Advantages
- space and weight savings
- reduced protection circuits
- package designed for wave soldering

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

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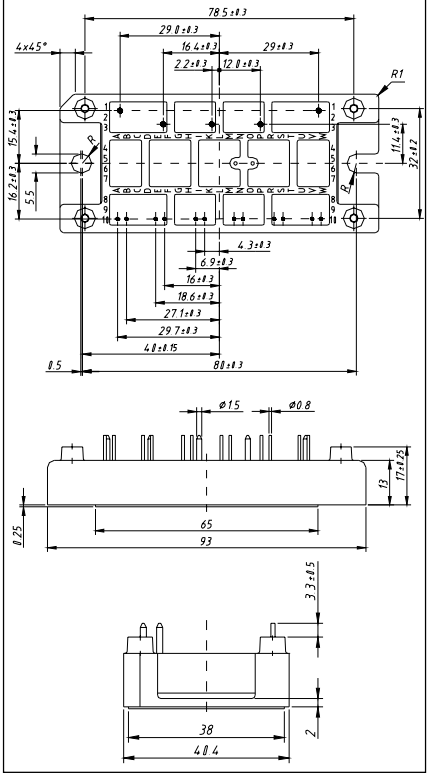
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Symbol	Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{(BR)CES}$	V_{GE} = 0 V		1200			V
$V_{GE(th)}$	I_C = 2 mA, V_{CE} = V_{GE}		4.5		6.5	V
I_{CES}	V_{CE} = V_{CES}	T_J = 25°C			4	mA
		T_J = 125°C		6		mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±200	nA
$V_{CE(sat)}$	I_C = 50 A, V_{GE} = 15 V			2.2	2.7	V
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz			3300		pF
C_{oes}				500		pF
C_{res}				220		pF
$t_{d(on)}$	**Inductive load, T_J = 125°C** I_C = 50 A, V_{GE} = ±15 V V_{CE} = 600 V, R_G = 22 Ω			100		ns
t_r				70		ns
$t_{d(off)}$				500		ns
t_f				70		ns
E_{on}				7.6		mJ
E_{off}				5.6		mJ
R_{thJC}					0.33	K/W
R_{thJS}	with heatsink compound			0.66		K/W

Dimensions in mm (1 mm = 0.0394")

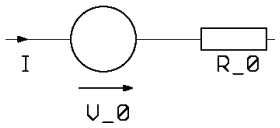


Reverse Diode (FRED)

		Characteristic Values min.	typ.	max.	
V_F	I_F = 50 A, V_{GE} = 0 V		2.3	2.5	V
	I_F = 50 A, V_{GE} = 0 V, T_J = 125°C		1.8	2.1	V
I_F	T_C = 25°C			100	A
	T_C = 80°C			60	A
I_{RM}	I_F = 50 A, V_{GE} = 0 V, -di_F/dt = 400 A/µs		40		A
t_{rr}	T_J = 125°C, V_R = 600 V		200		ns
R_{thJC}				0.66	K/W
R_{thJS}	with heatsink compound		1.32		K/W

Equivalent Circuits for Simulation

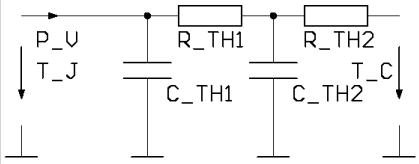
Conduction



IGBT (typ. at V_{GE} = 15 V; T_J = 125°C)
V_0 = 1.5 V; R_0 = 20.7 mΩ

Free Wheeling Diode (typ. at T_J = 125°C)
V_0 = 1.3 V; R_0 = 11.3 mΩ

Thermal Response



IGBT (typ.)
C_{th1} = 0.13 J/K; R_{th1} = 0.323 K/W
C_{th2} = 0.32 J/K; R_{th2} = 0.008 K/W

Free Wheeling Diode (typ.)
C_{th1} = 0.10 J/K; R_{th1} = 0.645 K/W
C_{th2} = 0.18 J/K; R_{th2} = 0.013 K/W

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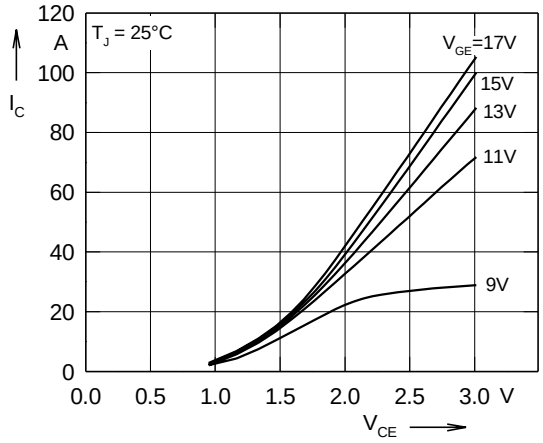


Fig. 1 Typ. output characteristics

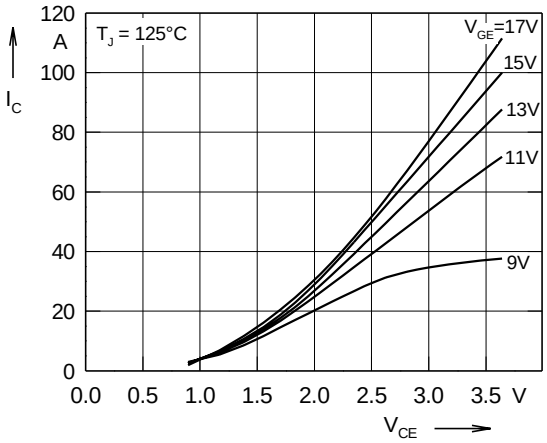


Fig. 2 Typ. output characteristics

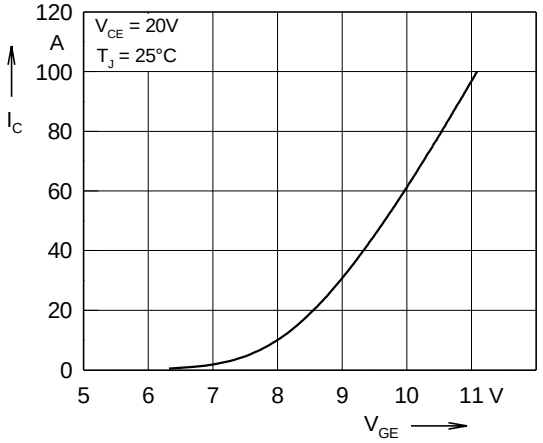


Fig. 3 Typ. transfer characteristics

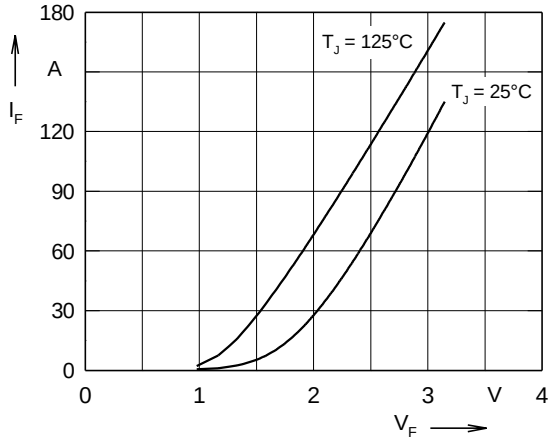


Fig. 4 Typ. forward characteristics of free wheeling diode

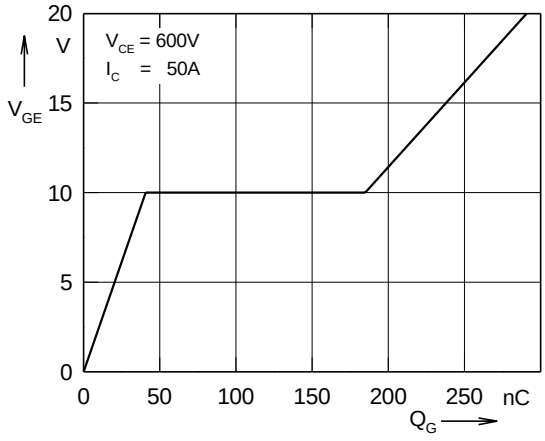


Fig. 5 Typ. turn on gate charge

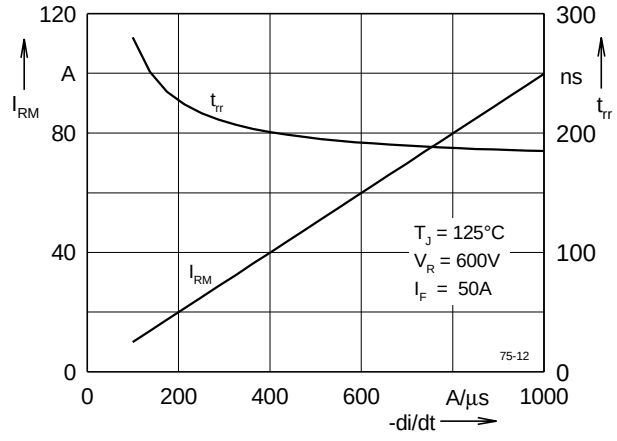


Fig. 6 Typ. turn off characteristics of free wheeling diode

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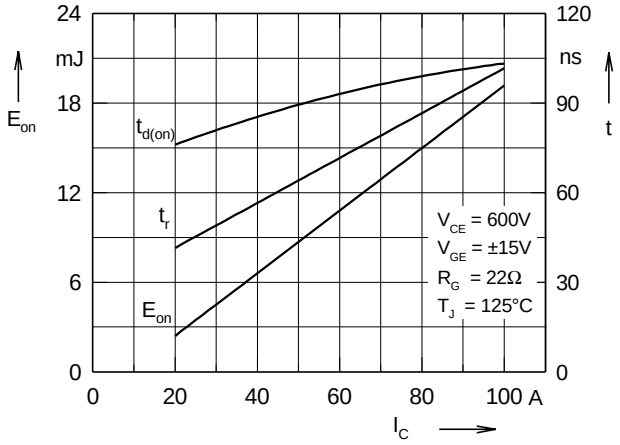


Fig. 7 Typ. turn on energy and switching times versus collector current

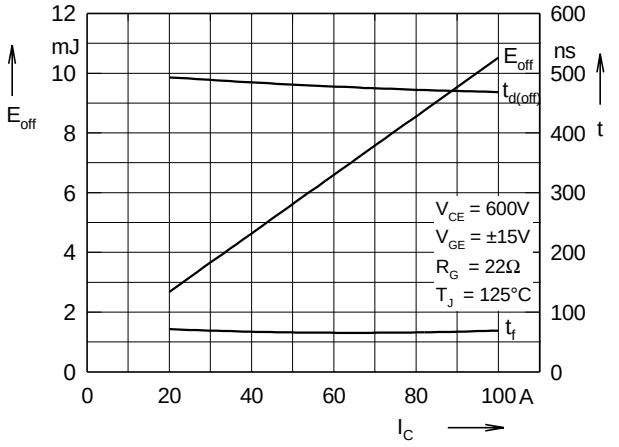


Fig. 8 Typ. turn off energy and switching times versus collector current

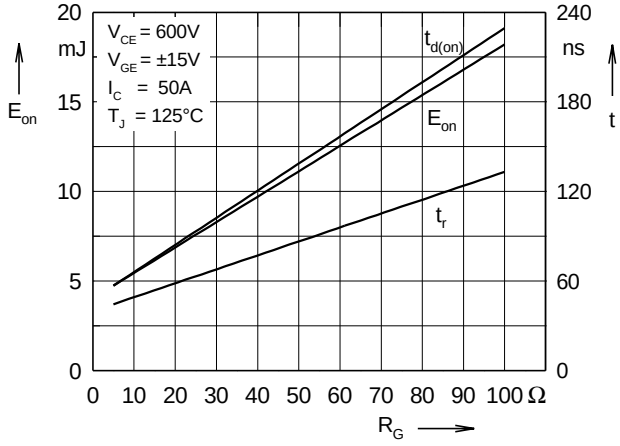


Fig. 9 Typ. turn on energy and switching times versus gate resistor

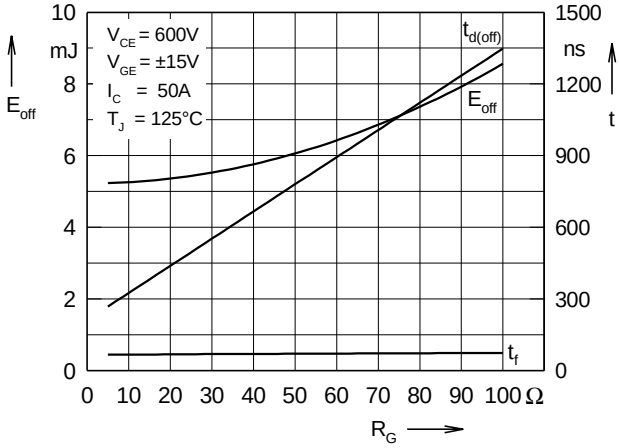


Fig.10 Typ. turn off energy and switching times versus gate resistor

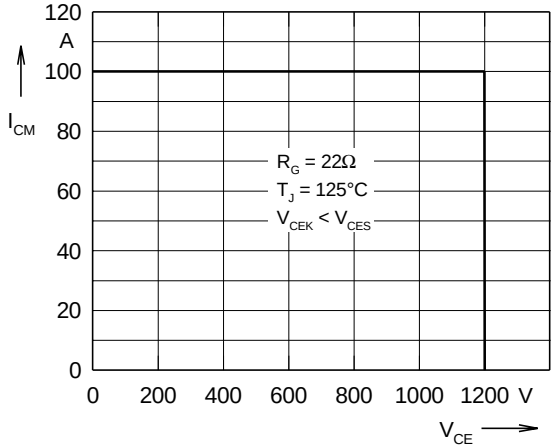


Fig. 11 Reverse biased safe operating area RBSOA

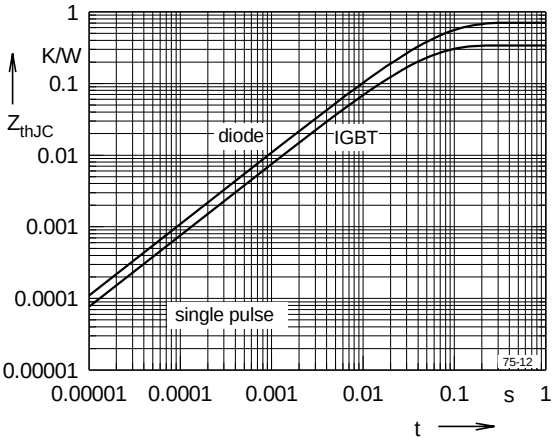


Fig. 12 Typ. transient thermal impedance

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