

IGBT Module

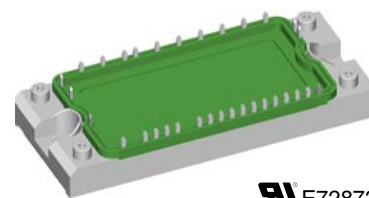
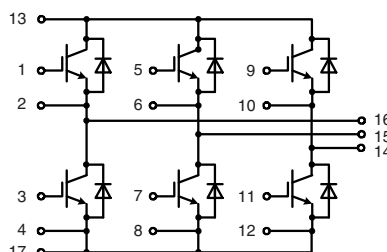
Sixpack

Short Circuit SOA Capability
Square RBSOA

$$I_{C25} = 52 \text{ A}$$

$$V_{CES} = 1200 \text{ V}$$

$$V_{CE(sat) \text{ typ.}} = 1.9 \text{ V}$$



E72873

See outline drawing for pin arrangement

IGBTs

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}	$T_C = 25^{\circ}\text{C}$	52 A
I_{C80}	$T_C = 80^{\circ}\text{C}$	36 A
I_{CM}	$V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega; T_{VJ} = 125^{\circ}\text{C}$	70 A
V_{CEK}	RBSOA; clamped inductive load; $L = 100 \mu\text{H}$	V_{CES}
t_{SC}	$V_{CE} = 900 \text{ V}; V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega; T_{VJ} = 125^{\circ}\text{C}$ SCSOA; non-repetitive	10 μs
P_{tot}	$T_C = 25^{\circ}\text{C}$	225 W

Features

- NPT³ IGBTs
 - low saturation voltage
 - positive temperature coefficient for easy paralleling
 - fast switching
 - short tail current for optimized performance also in resonant circuits
- HiPerFREDTM diode:
 - fast reverse recovery
 - low operating forward voltage
 - low leakage current
- Industry Standard Package
 - solderable pins for PCB mounting
 - isolated copper base plate

Typical Applications

- AC drives
- power supplies with power factor correction

Symbol	Conditions	Characteristic Values
	$(T_{VJ} = 25^{\circ}\text{C, unless otherwise specified})$	min. typ. max.
$V_{CE(sat)}$	$I_C = 25 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.9 2.4 V 2.1 V
$V_{GE(th)}$	$I_C = 1 \text{ mA}; V_{GE} = V_{CE}$	4.5 6.5 V
I_{CES}	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.4 0.4 mA mA
I_{GES}	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$	200 nA
$t_{d(on)}$	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 600 \text{ V}; I_C = 25 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega$	80 ns
t_r		50 ns
$t_{d(off)}$		440 ns
t_f		50 ns
E_{on}		3.8 mJ
E_{off}		2.0 mJ
C_{ies}	$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$	2 nF
Q_{Gon}	$V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 35 \text{ A}$	150 nC
R_{thJC}	(per IGBT)	0.55 K/W

IXYS reserves the right to change limits, test conditions and dimensions.

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Symbol	Conditions	Maximum Ratings
I_{F25}	$T_C = 25^\circ\text{C}$	50 A
I_{F80}	$T_C = 80^\circ\text{C}$	33 A

Symbol	Conditions	Characteristic Values
		min. typ. max.
V_F	$I_F = 25\text{ A}; V_{GE} = 0\text{ V}; T_{VJ} = 25^\circ\text{C}$	2.3 V
	$T_{VJ} = 125^\circ\text{C}$	1.7 V
I_{RM}	$I_F = 30\text{ A}; di_F/dt = -1100\text{ A}/\mu\text{s}; T_{VJ} = 125^\circ\text{C}$	51 A
t_{rr}		180 ns
$E_{rec(off)}$		1.8 mJ
R_{thJC}	(per diode)	1.19 K/W

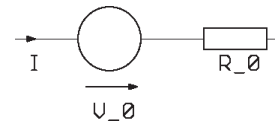
Module

Symbol	Conditions	Maximum Ratings
T_{VJ}		$-40...+150^\circ\text{C}$
T_{stg}		$-40...+125^\circ\text{C}$
V_{ISOL}	$I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$	2500 V~
M_d	Mounting torque (M5)	2.7 - 3.3 Nm

Symbol	Conditions	Characteristic Values
		min. typ. max.
$R_{pin-chip}$		5 mΩ
d_s	Creepage distance on surface	6 mm
d_A	Strike distance in air	6 mm
R_{thCH}	with heatsink compound	0.02 K/W
Weight		180 g

Equivalent Circuits for Simulation

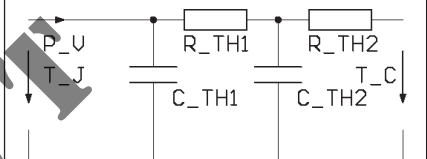
Conduction



IGBT (typ. at $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$)
 $V_0 = 0.95\text{ V}; R_0 = 48\text{ m}\Omega$

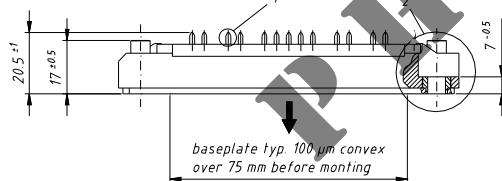
Free Wheeling Diode (typ. at $T_J = 125^\circ\text{C}$)
 $V_0 = 1.3\text{ V}; R_0 = 16.0\text{ m}\Omega$

Thermal Response

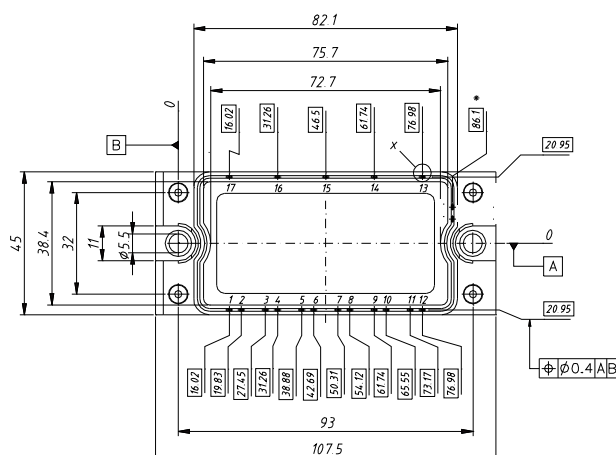


IGBT (typ.)
 $C_{th1} = 0.129\text{ J/K}; R_{th1} = 0.415\text{ K/W}$
 $C_{th2} = 1.279\text{ J/K}; R_{th2} = 0.135\text{ K/W}$

Free Wheeling Diode (typ.)
 $C_{th1} = 0.069\text{ J/K}; R_{th1} = 0.956\text{ K/W}$
 $C_{th2} = 0.847\text{ J/K}; R_{th2} = 0.234\text{ K/W}$



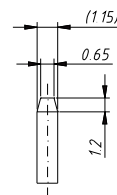
Dimensions in mm (1 mm = 0.0394")



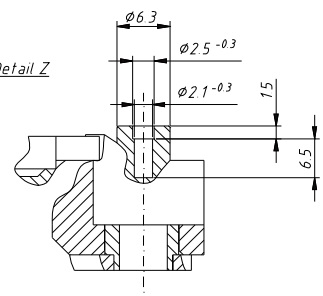
Detail X



Detail Y



Detail Z



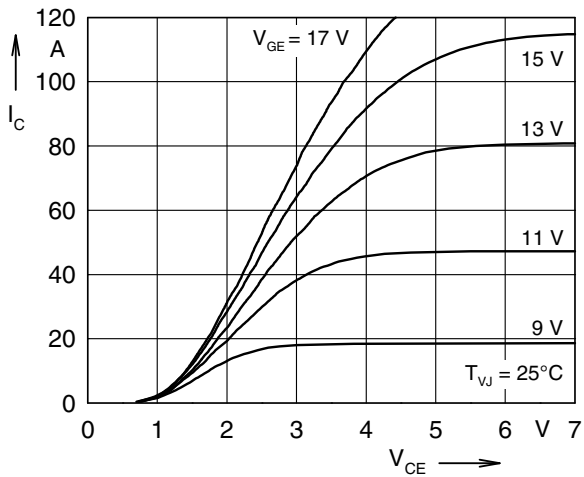


Fig. 1 Typ. output characteristics

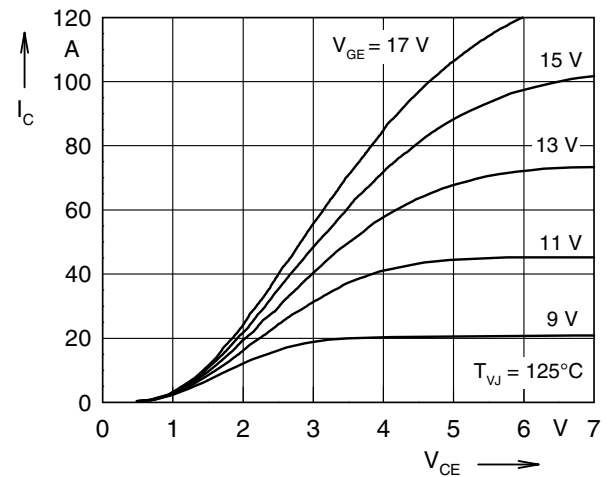


Fig. 2 Typ. output characteristics

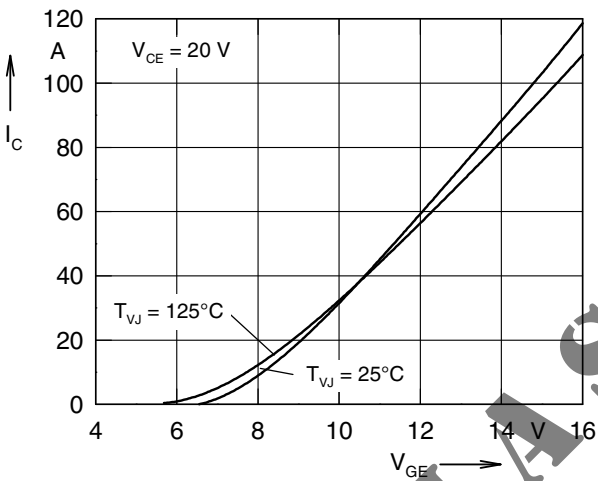


Fig. 3 Typ. transfer characteristics

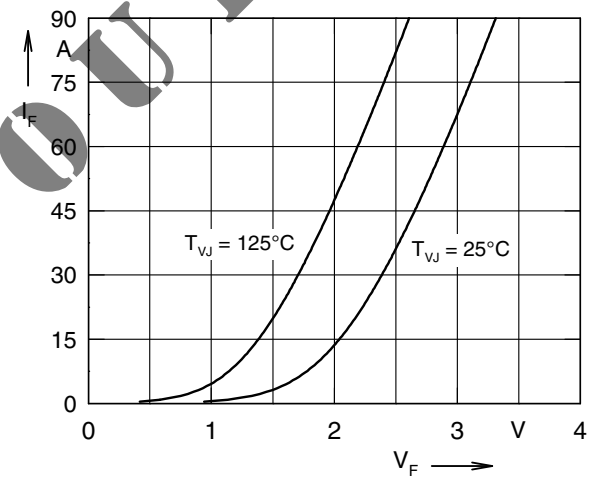


Fig. 4 Typ. forward characteristics of free wheeling diode

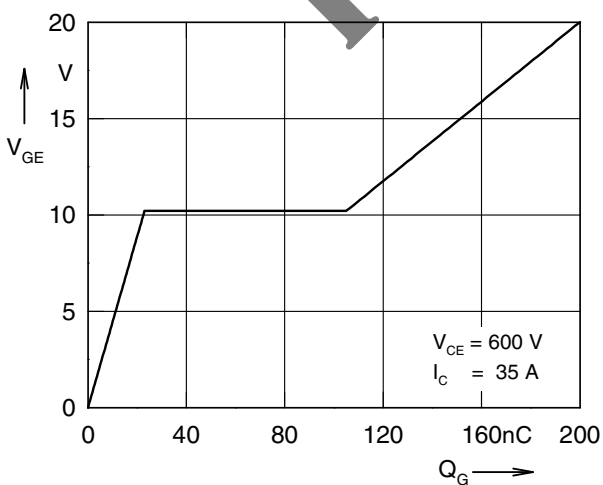


Fig. 5 Typ. turn on gate charge

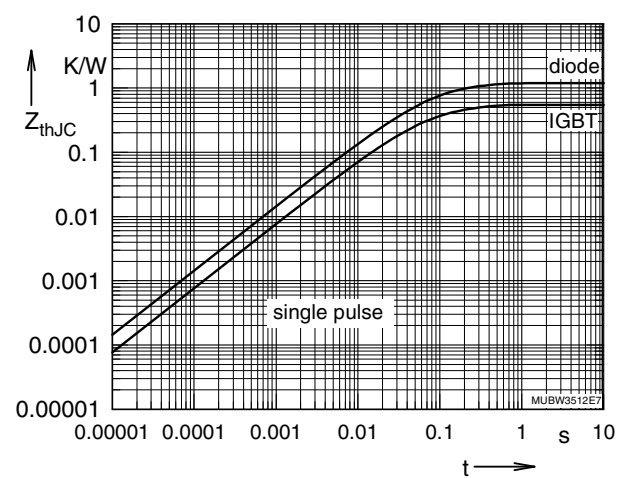


Fig. 6 Typ. transient thermal impedance

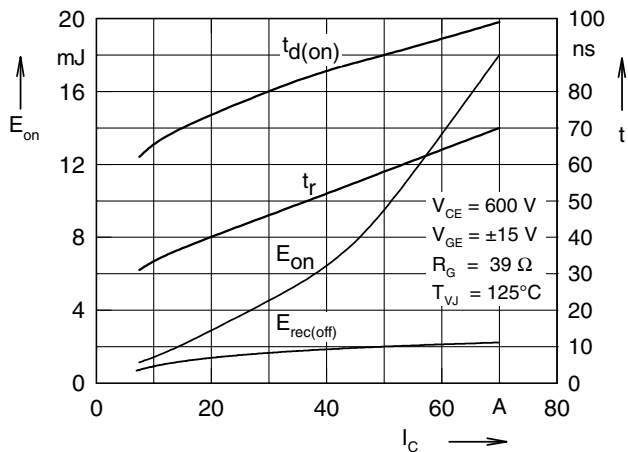


Fig. 7 Typ. turn on energy and switching times versus collector current

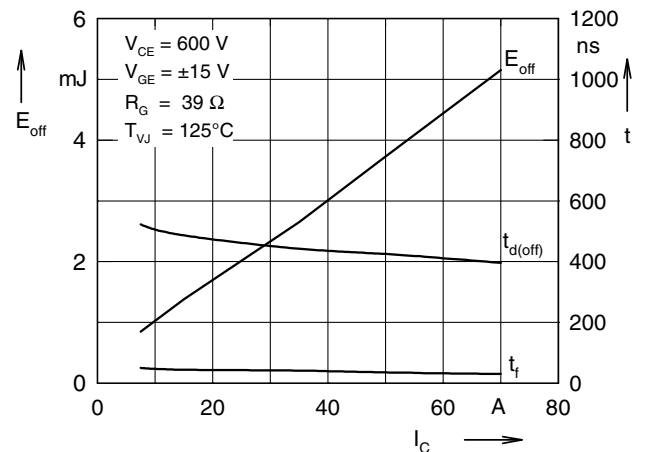


Fig. 8 Typ. turn off energy and switching times versus collector current

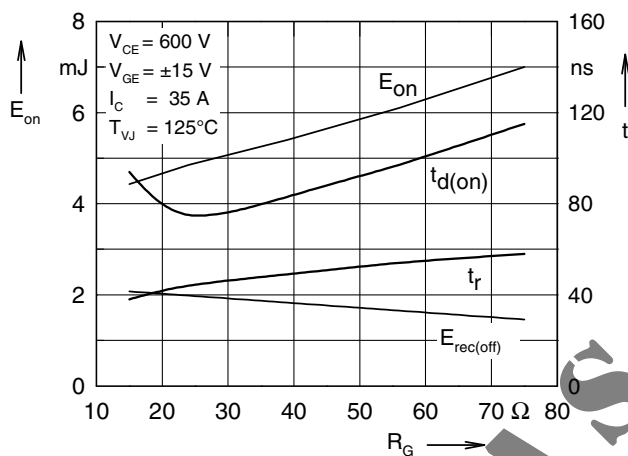


Fig. 9 Typ. turn on energy and switching times versus gate resistor

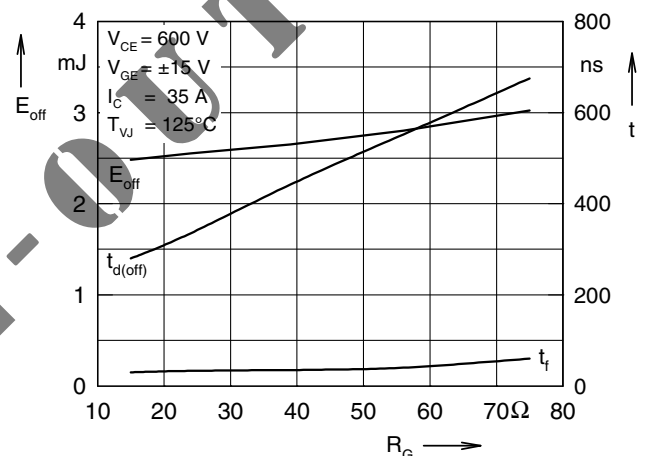


Fig. 10 Typ. turn off energy and switching times versus gate resistor

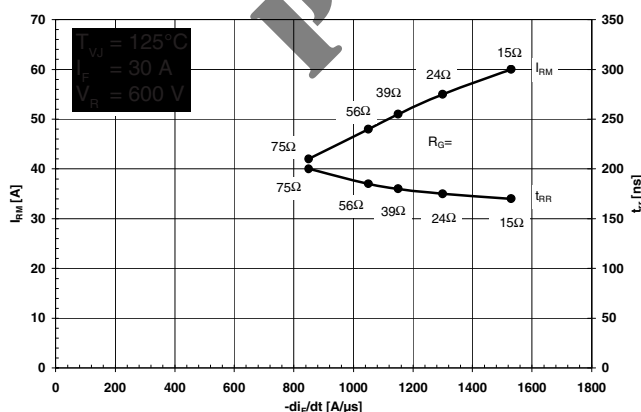


Fig. 11 Typ. turn off characteristics of free wheeling diode

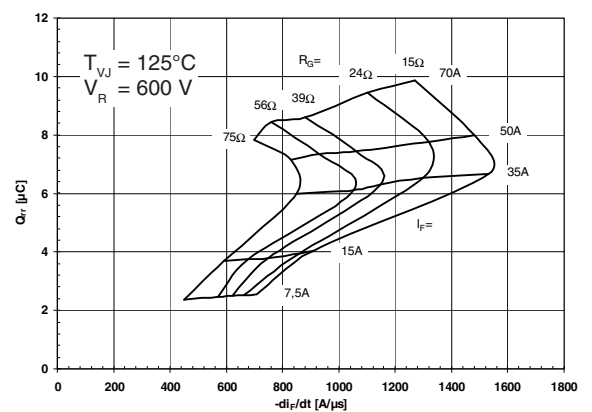


Fig. 12 Typ. turn off characteristics of free wheeling diode