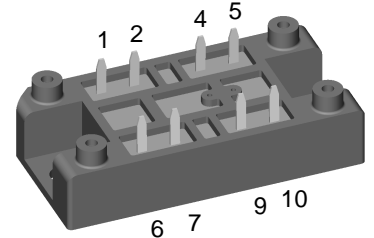
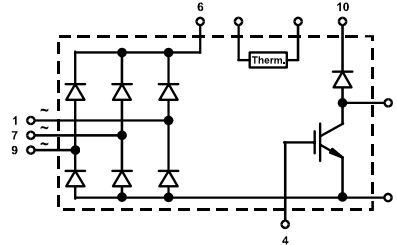


Three Phase Rectifier Bridge with IGBT and Fast Recovery Diode for Braking System

V_{RRM} = 1200-1600 V
I_{dAVM} = 70 A

V _{RRM} V	Type
1200	VUB 60-12 NO1
1600	VUB 60-16 NO1



Symbol	Test Conditions	Maximum Ratings	
V_{RRM} I_{dAV} I_{dAVM}	Rectifier Diodes $T_H = 110^\circ\text{C}$, sinusoidal 120° limited by leads	1200 / 1600	V
		59	A
		70	A
I_{FSM} I²t	Rectifier Diodes $T_{VJ} = 45^\circ\text{C}$, $t = 10\text{ ms}$, $V_R = 0\text{ V}$ $T_{VJ} = 150^\circ\text{C}$, $t = 10\text{ ms}$, $V_R = 0\text{ V}$	530	A
		475	A
		1400	A
		1130	A
P_{tot}	$T_H = 80^\circ\text{C}$ per diode	49	W
V_{CES} V_{GE}	IGBT $T_{VJ} = 25^\circ\text{C}$ to 150°C Continuous	1200	V
		± 20	V
I_{C25} I_{C70} I_{C80}	IGBT $T_H = 25^\circ\text{C}$, DC $T_H = 70^\circ\text{C}$, DC $T_H = 80^\circ\text{C}$, DC	31	A
		23	A
		21	A
I_{CM}	$t_p = \text{Pulse width limited by } T_{VJM}$	62	A
P_{tot}	$T_H = 80^\circ\text{C}$	70	W
V_{RRM} I_{FAV} I_{FRMS} I_{FRM}	Fast Recovery Diode $T_H = 80^\circ\text{C}$, rectangular $d = 0.5$ $T_H = 80^\circ\text{C}$, rectangular $d = 0.5$ $T_H = 80^\circ\text{C}$, $t_p = 10\ \mu\text{s}$, $f = 5\ \text{kHz}$	1200	V
		8	A
		12	A
		90	A
I_{FSM}	Fast Recovery Diode $T_{VJ} = 45^\circ\text{C}$, $t = 10\text{ ms}$ $T_{VJ} = 150^\circ\text{C}$, $t = 10\text{ ms}$	75	A
		60	A
P_{tot}	$T_H = 80^\circ\text{C}$	22	W
T_{VJ} T_{VJM} T_{stg}	Module	-40...+150	°C
		150	°C
		-40...+125	°C
V_{ISOL}	Module 50/60 Hz $I_{ISOL} \leq 1\ \text{mA}$	$t = 1\ \text{min}$ 3000	V~
		$t = 1\ \text{s}$ 3600	V~
M_d	Mounting torque (M5) (10-32 unf)	2-2.5 18-22	Nm lb.in.
Weight	typ.	35	g

Features

- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast freewheel diode
- Convenient package outline
- UL registered E 72873
- Thermistor

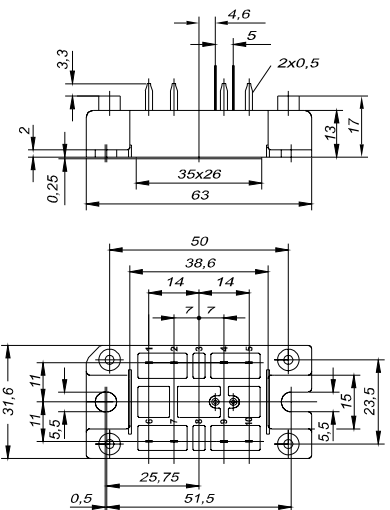
Applications

- Drive Inverters with brake system

Advantages

- 2 functions in one package
- No external isolation
- Easy to mount with two screws
- Suitable for wave soldering
- High temperature and power cycling capability

Dimensions in mm (1 mm = 0.0394")



Data according to IEC 60747
 IXYS reserves the right to change limits, test conditions and dimensions.

Symbol	Test Conditions	Characteristic Values ($T_{VJ} = 25^{\circ}\text{C}$, unless otherwise specified)		
		min.	typ.	max.
Rectifier Diodes	I_R	$V_R = V_{RRM1}$ $V_R = V_{RRM1}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 150^{\circ}\text{C}$	0.1 mA 3 mA
	V_F	$I_F = 25 \text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$	1.3 V
	V_{T0}	For power-loss calculations only		0.85 V
	r_T	$T_{VJ} = 150^{\circ}\text{C}$		8.5 m Ω
	R_{thJH}	per diode		1.42 K/W
IGBT	$V_{BR(CES)}$	$V_{GS} = 0 \text{ V}$, $I_C = 3 \text{ mA}$	1200	V
	$V_{GE(th)}$	$I_C = 10 \text{ mA}$	5	V
	I_{GES}	$V_{GE} = \pm 20 \text{ V}$		500 nA
	I_{CES}	$T_{VJ} = 25^{\circ}\text{C}$, $V_{CE} = 800 \text{ V}$ $T_{VJ} = 125^{\circ}\text{C}$, $V_{CE} = 800 \text{ V}$		250 μA 1 mA
	V_{CEsat}	$V_{GE} = 15 \text{ V}$, $I_C = 25 \text{ A}$		3.5 V
	$t_{SC} \text{ (SCSOA)}$	$V_{GE} = 15 \text{ V}$, $V_{CE} = 600 \text{ V}$, $T_{VJ} = 125^{\circ}\text{C}$, $R_G = 4.7 \Omega$, non repetitive		10 μs
	RBSOA	$V_{GE} = 15 \text{ V}$, $V_{CE} = 800 \text{ V}$, $T_{VJ} = 125^{\circ}\text{C}$, $R_G = 4.7 \Omega$, Clamped Inductive load, $L = 100 \mu\text{H}$		50 A
	C_{ies}	$V_{CE} = 25 \text{ V}$, $f = 1 \text{ MHz}$, $V_{GE} = 0 \text{ V}$	2.85	nF
	$t_{d(on)}$	$V_{CE} = 600 \text{ V}$, $I_C = 25 \text{ A}$ $V_{GE} = 15 \text{ V}$, $R_G = 4.7 \Omega$ Inductive load; $L = 100 \mu\text{H}$ $T_{VJ} = 125^{\circ}\text{C}$	100	ns
	$t_{d(off)}$		220	ns
t_{fi}	1600		ns	
E_{on}	3.5		mJ	
E_{off}	12		mJ	
R_{thJH}			1 K/W	
Fast Recovery Diode	I_R	$V_R = V_{RRM1}$ $V_R = 800 \text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 150^{\circ}\text{C}$	0.2 mA 6 mA
	V_F	$I_F = 12 \text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$	2.7 V
	V_{T0}	For power-loss calculations only		1.65 V
	r_T	$T_{VJ} = 150^{\circ}\text{C}$		46 m Ω
	I_{RM}	$I_F = 25 \text{ A}$, $-di_F/dt = 100 \text{ A}/\mu\text{s}$ $V_R = 100 \text{ V}$	6.5	7 A
t_{rr}	$I_F = 1 \text{ A}$, $-di_F/dt = 100 \text{ A}/\mu\text{s}$ $V_R = 30 \text{ V}$	50	70 ns	
R_{thJH}			3.12 K/W	
R_{25}	NTC	Siemens Typ S 891/2,2k/+9		2.2 k Ω
d_s	Module	Creep distance on surface		12.7 mm
d_A		Strike distance in air		9.4 mm
a		Maximum allowable acceleration		50 m/s ²

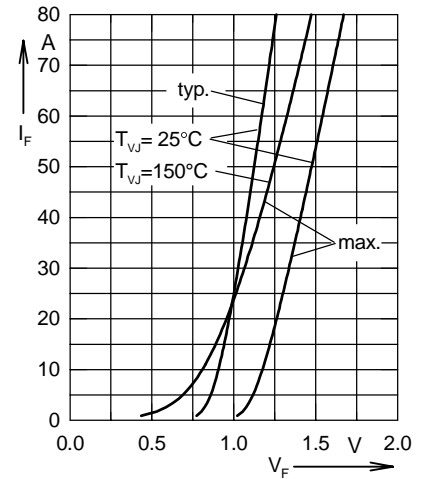


Fig. 1 Forward current versus voltage drop per rectifier diode

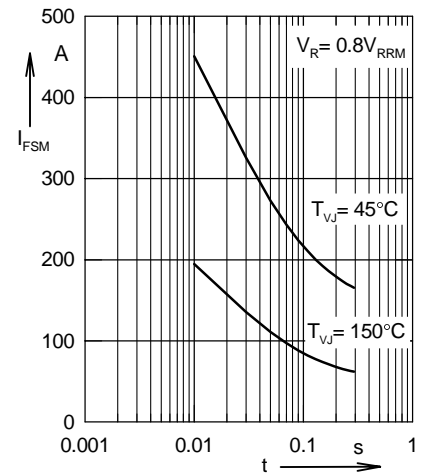


Fig. 2 Surge overload current per rectifier diode

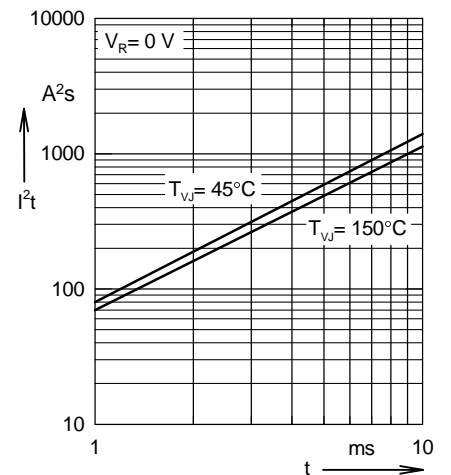


Fig. 3 I^2t versus time per rectifier diode

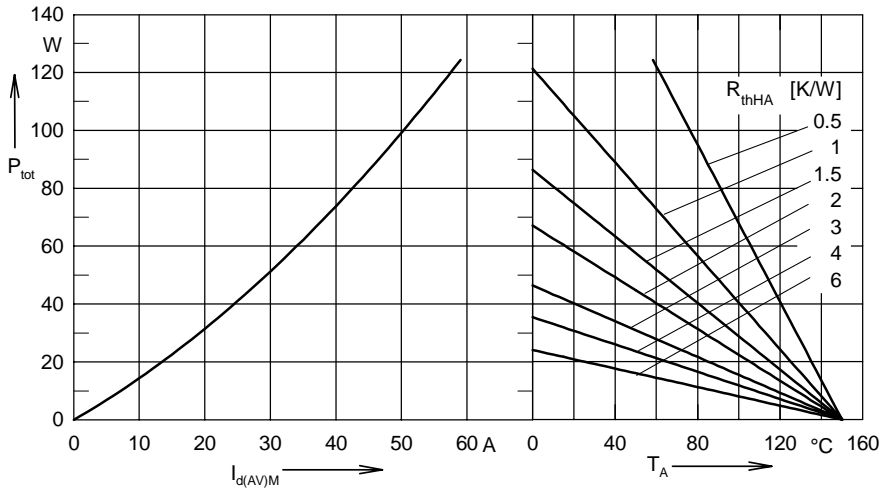


Fig. 4 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

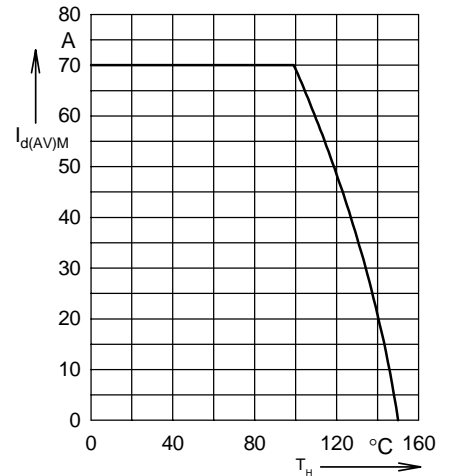


Fig. 5 Maximum forward current versus heatsink temperature (Rectifier bridge)

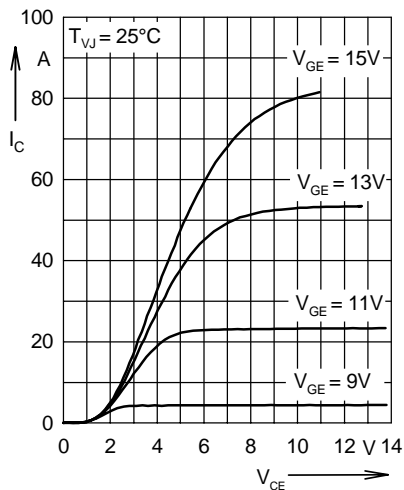


Fig. 6 Output characteristics for braking (IGBT)

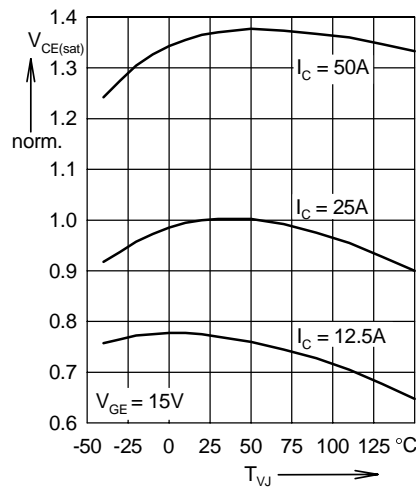


Fig. 7 Saturation voltage versus junction temperature normalized (IGBT)

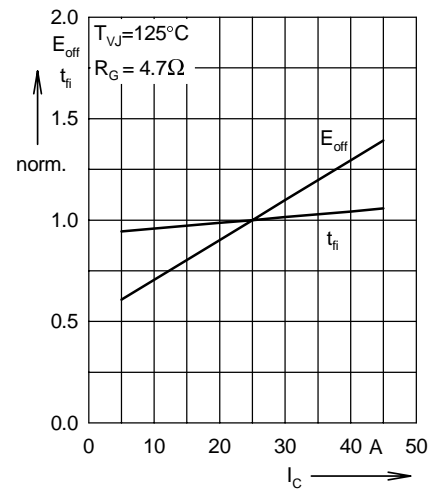


Fig. 8 Turn-off energy per pulse and fall time versus collector current, normalized (IGBT)

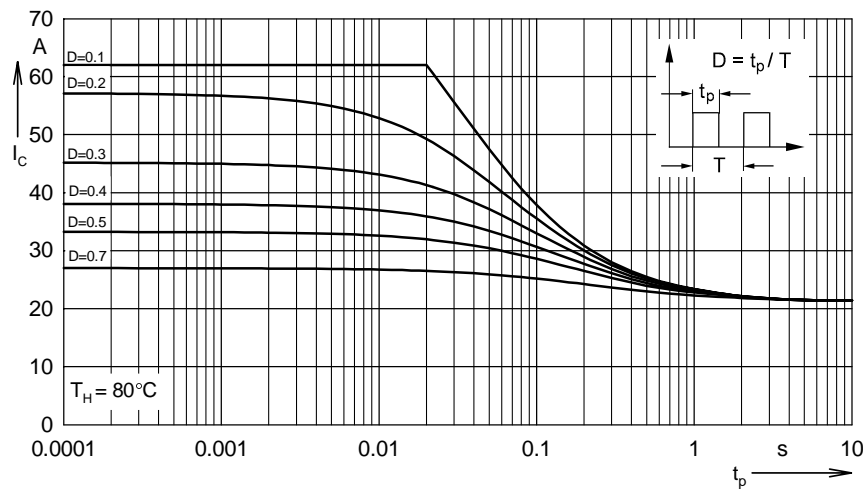


Fig. 9 Collector current versus pulse width and duty cycle (IGBT)

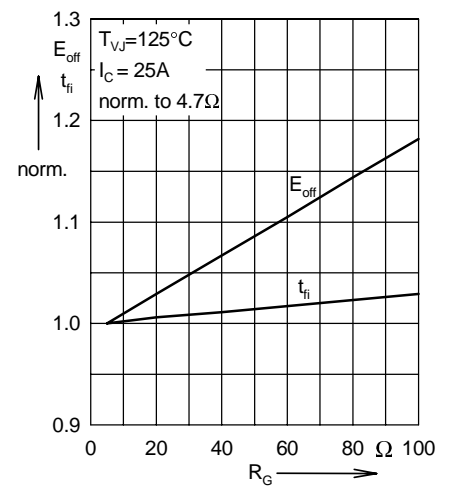


Fig. 10 Turn-off energy per pulse and fall time versus R_G (IGBT)

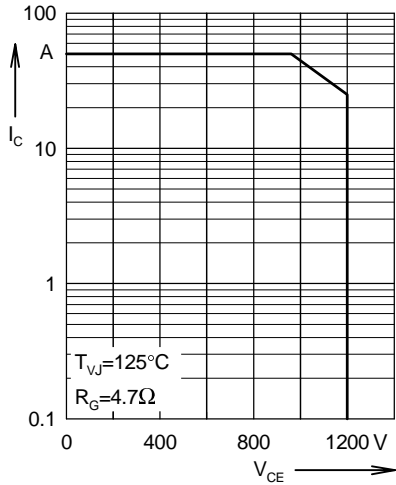


Fig. 11 Reverse biased safe operation area (IGBT)

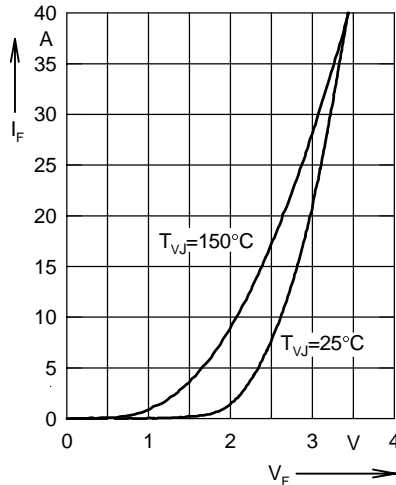


Fig. 12 Forward current versus voltage drop (Fast Diode)

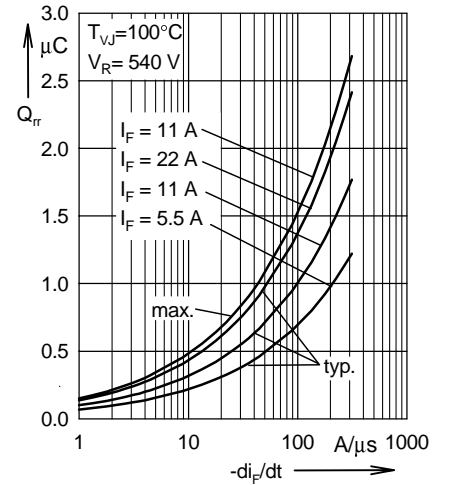


Fig. 13 Recovery charge versus $-di_F/dt$ (Fast Diode)

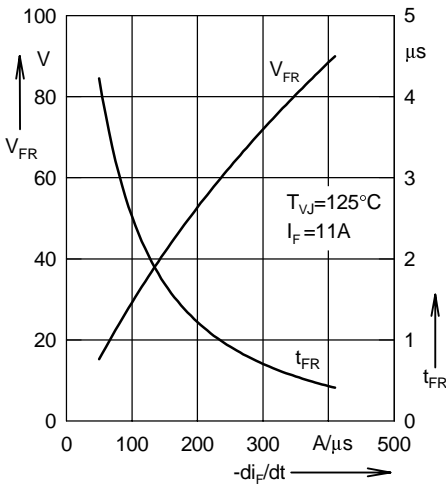


Fig. 14 Peak forward voltage and recovery time versus $-di_F/dt$ (Fast Diode)

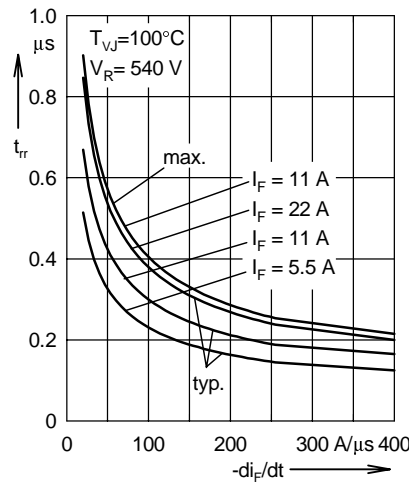


Fig. 15 Recovery time versus $-di_F/dt$ (Fast Diode)

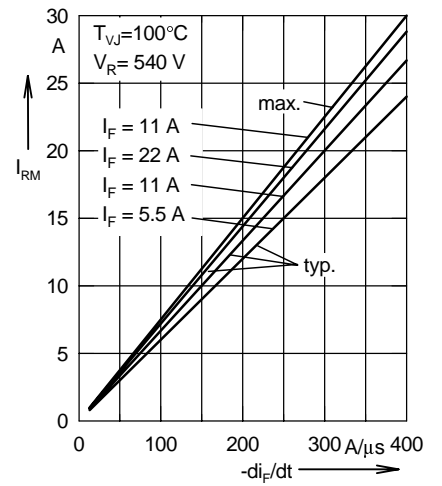


Fig. 16 Peak reverse current versus $-di_F/dt$ (Fast Diode)

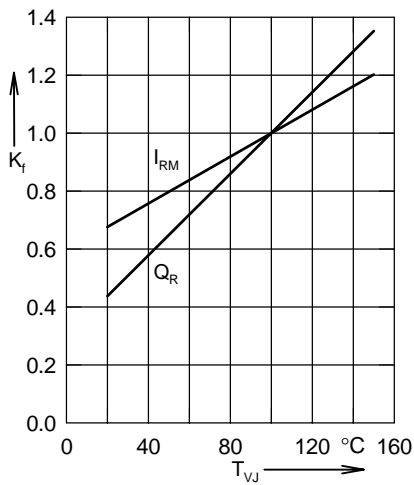


Fig. 17 Dynamic parameters versus junction temperature (Fast Diode)

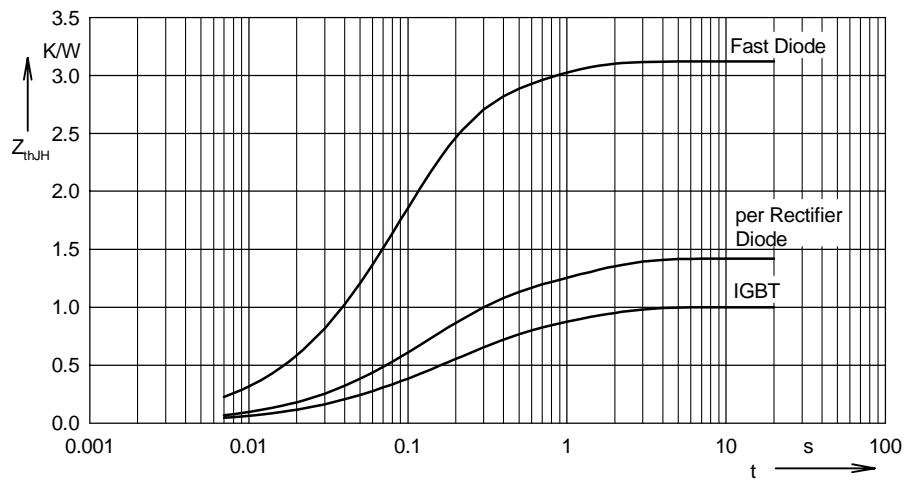


Fig. 18 Transient thermal impedance junction to heatsink Z_{thjH}