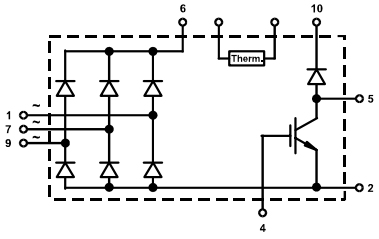
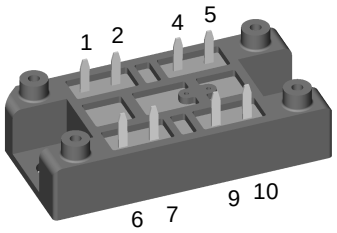
Three Phase Rectifier Bridge
with IGBT and Fast Recovery Diode for Braking System

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

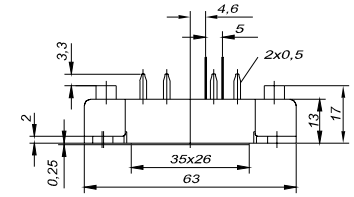
Applications

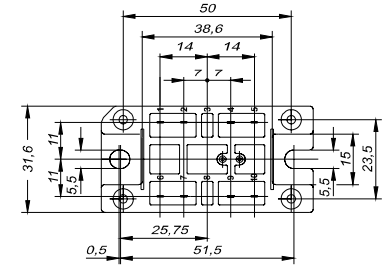
- Drive Inverters with brake system

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 (T_{VJ} = 25°C, unless otherwise specified)	Characteristic Values min.	typ.	max.	
I_R	Rectifier Diodes	$V_R = V_{RRM}$, T_{VJ} = 25°C			0.1	mA
		$V_R = V_{RRM}$, T_{VJ} = 150°C			3	mA
V_F		I_F = 25 A, T_{VJ} = 25°C			1.3	V
V_{T0}		For power-loss calculations only			0.85	V
r_T		T_{VJ} = 150°C			8.5	mΩ
R_{thJH}		per diode			1.42	K/W
$V_{BR(CES)}$	IGBT	V_{GS} = 0 V, I_C = 3 mA	1200			V
$V_{GE(th)}$		I_C = 10 mA	5		7.5	V
I_{GES}		V_{GE} = ± 20 V			500	nA
I_{CES}		T_{VJ} = 25°C, V_{CE} = 800 V			250	µA
		T_{VJ} = 125°C, V_{CE} = 800 V			1	mA
V_{CEsat}		V_{GE} = 15 V, I_C = 25 A			3.5	V
t_{SC} (SCSOA)		V_{GE} = 15 V, V_{CE} = 600 V, T_{VJ} = 125°C, R_G = 4.7 Ω, non repetitive			10	µs
RBSOA		V_{GE} = 15 V, V_{CE} = 800 V, T_{VJ} = 125°C, R_G = 4.7 Ω, Clamped Inductive load, L = 100 µH			50	A
C_{ies}		V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0 V		2.85		nF
$t_{d(on)}$		V_{CE} = 600 V, I_C = 25 A		100		ns
$t_{d(off)}$		V_{GE} = 15 V, R_G = 4.7 Ω		220		ns
t_{fi}		Inductive load; L = 100 µH		1600		ns
E_{on}		T_{VJ} = 125°C		3.5		mJ
E_{off}				12		mJ
R_{thJH}					1	K/W
I_R	Fast Recovery Diode	$V_R = V_{RRM}$, T_{VJ} = 25°C			0.2	mA
		V_R = 800 V, T_{VJ} = 150°C			6	mA
V_F		I_F = 12 A, T_{VJ} = 25°C			2.7	V
V_{T0}		For power-loss calculations only			1.65	V
r_T		T_{VJ} = 150°C			46	mΩ
I_{RM}		I_F = 25 A, $-di_F/dt$ = 100 A/µs		6.5	7	A
		V_R = 100 V				
t_{rr}		I_F = 1 A, $-di_F/dt$ = 100 A/µs		50	70	ns
		V_R = 30 V				
R_{thJH}					3.12	K/W
R_{25}	NTC	Siemens Typ S 891/2,2k/+9			2.2	kΩ
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

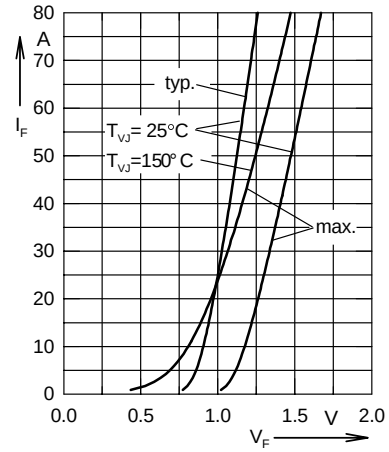


Fig. 1 Forward current versus voltage drop per rectifier diode

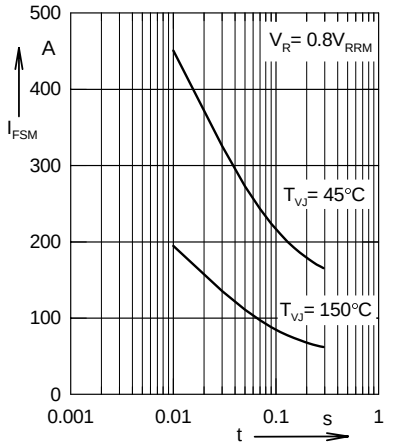


Fig. 2 Surge overload current per rectifier diode

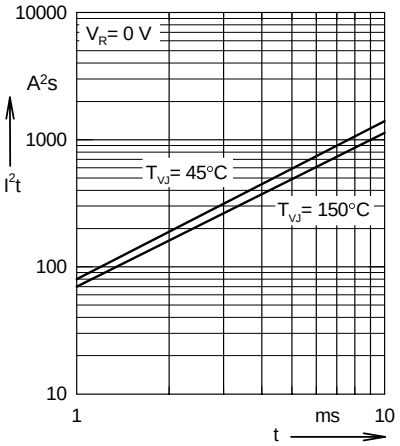


Fig. 3 I^2t versus time per rectifier diode

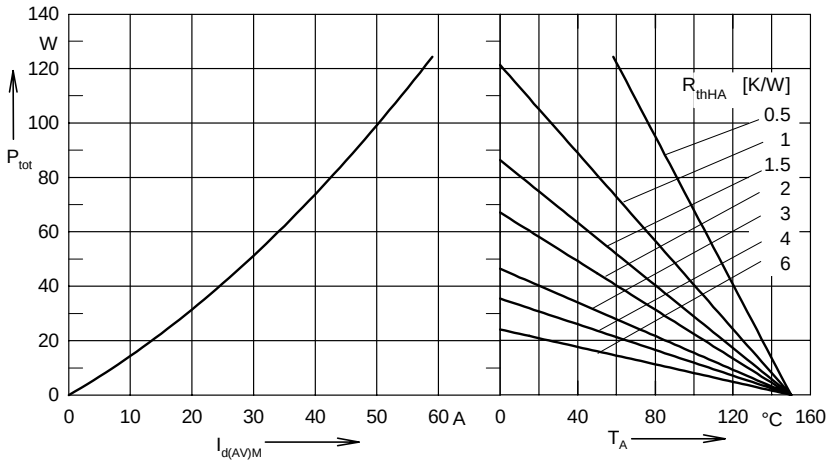


Fig. 4 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

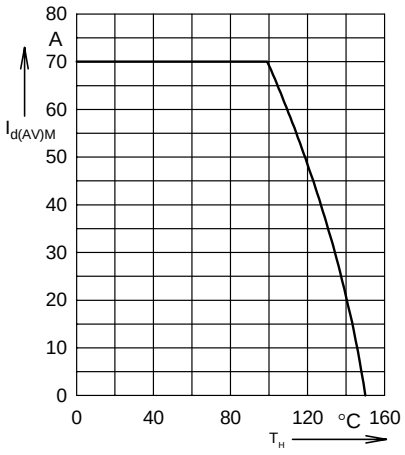


Fig. 5 Maximum forward current versus heatsink temperature (Rectifier bridge)

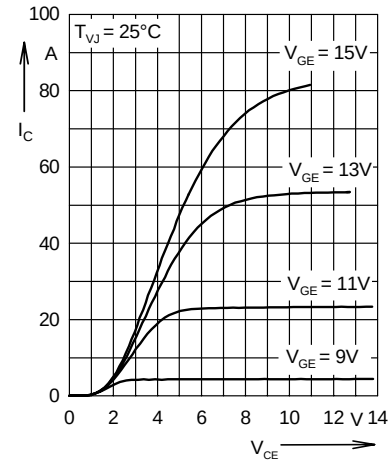


Fig. 6 Output characteristics for braking (IGBT)

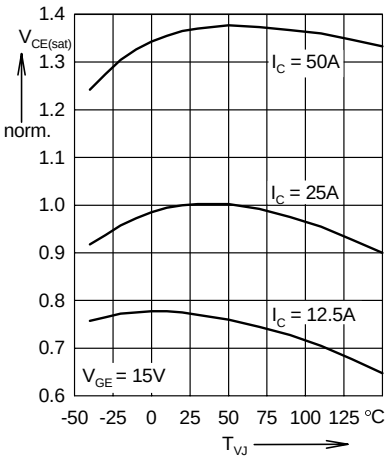


Fig. 7 Saturation voltage versus junction temperature normalized (IGBT)

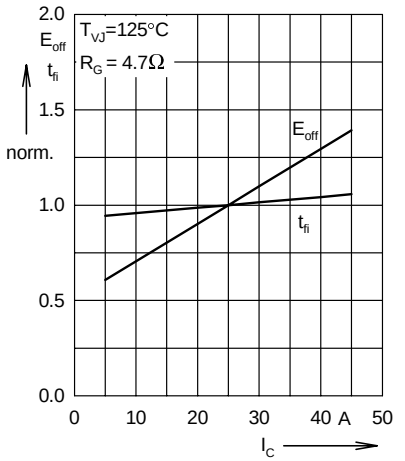


Fig. 8 Turn-off energy per pulse and fall time versus collector current, normalized (IGBT)

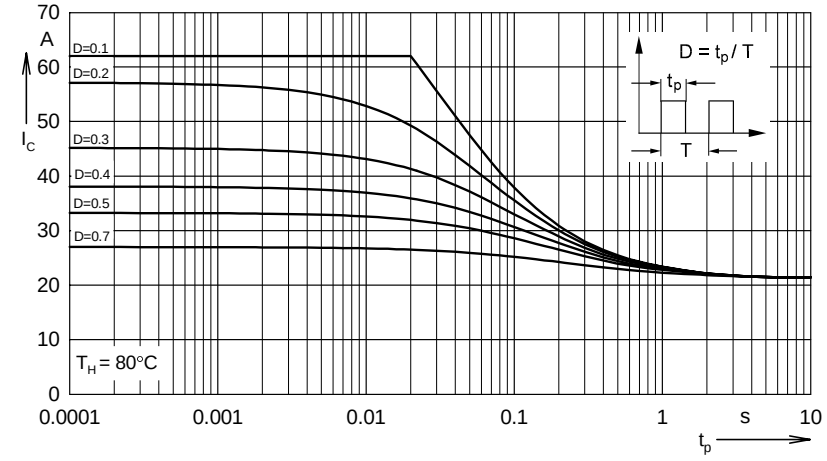


Fig. 9 Collector current versus pulse width and duty cycle (IGBT)

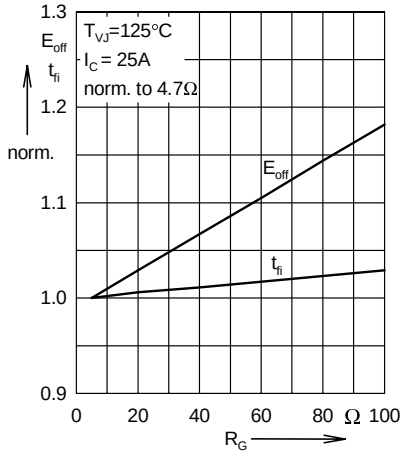


Fig.10 Turn-off energy per pulse and fall time versus R_G (IGBT)

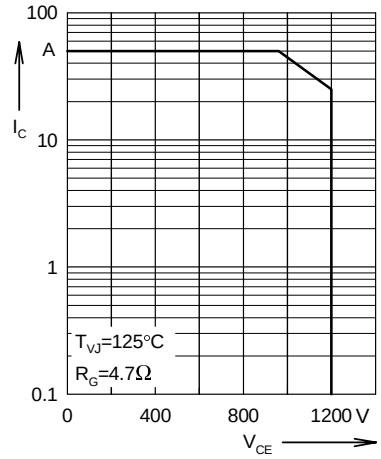


Fig.11 Reverse biased safe operation area (IGBT)

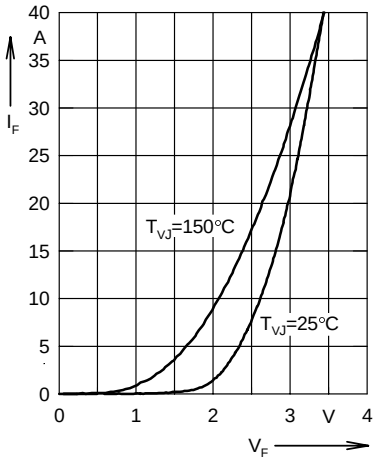


Fig. 12 Forward current versus voltage drop (Fast Diode)

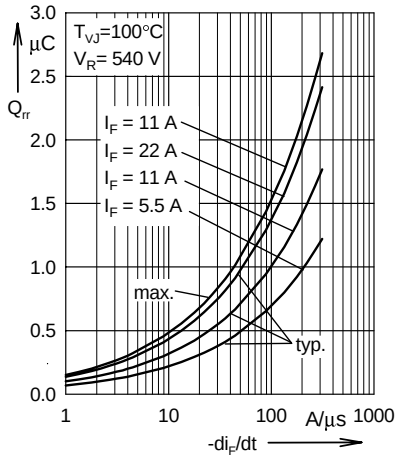


Fig. 13 Recovery charge versus $-di_F/dt$ (Fast Diode)

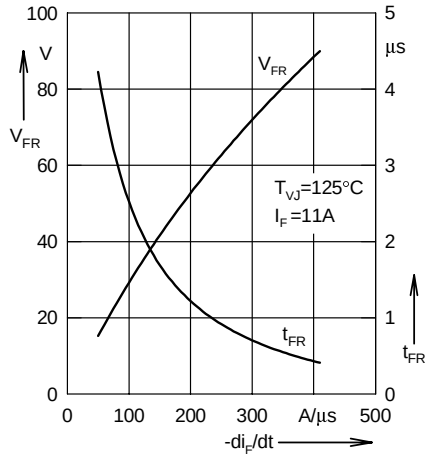


Fig.14 Peak forward voltage and recovery time versus $-di_F/dt$ (Fast Diode)

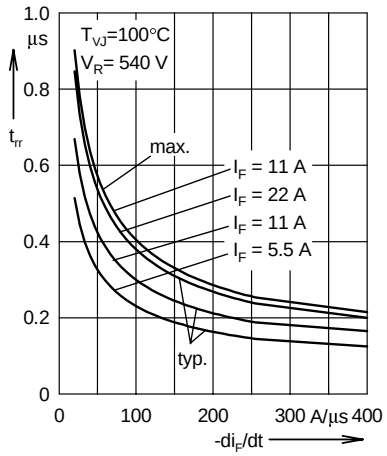


Fig.15 Recovery time versus $-di_F/dt$ (Fast Diode)

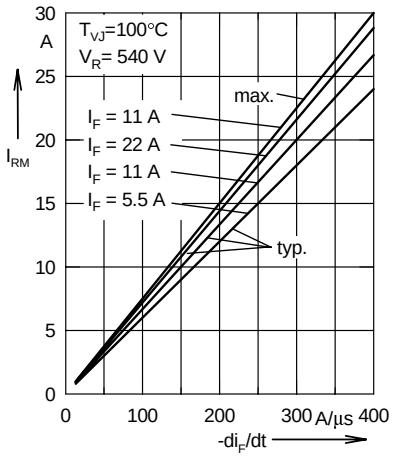


Fig.16 Peak reverse current versus $-di_F/dt$ (Fast Diode)

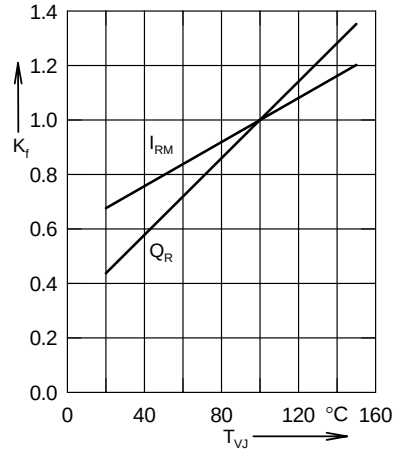


Fig.17 Dynamic parameters versus junction temperature (Fast Diode)

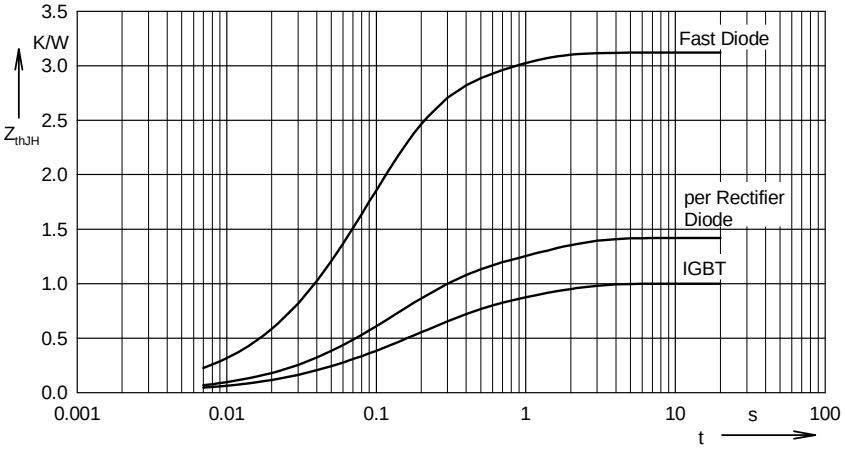


Fig.18 Transient thermal impedance junction to heatsink Z_{thJH}