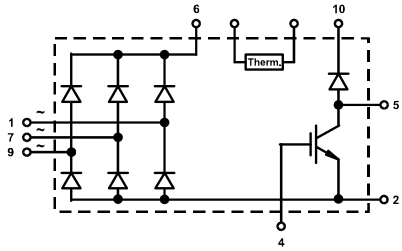
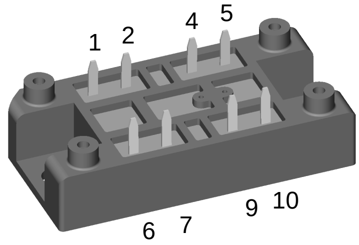
Three Phase Rectifier Bridge
with IGBT and Fast Recovery Diode for Braking System

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	
Rectifier Diodes	V_{RRM}			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
IGBT	V_{CES}	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
Fast Recovery Diode	V_{RRM}			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
Module	T_{VJ}			-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

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

Features

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

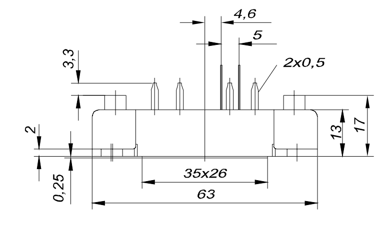
Applications

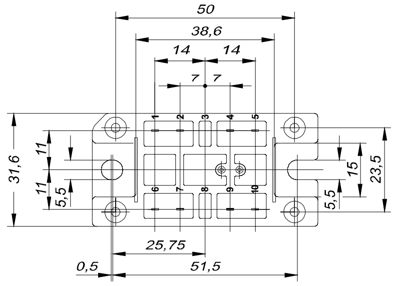
- Drive Inverters with brake system

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")





Symbol		Test Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
I_R	Rectifier Diodes	$V_R = V_{RRM}$, T_{VJ} = 25°C $V_R = V_{RRM}$, T_{VJ} = 150°C			0.1 3	mA mA
V_F	Rectifier Diodes	I_F = 25 A, T_{VJ} = 25°C			1.3	V
V_{T0} r_T	Rectifier Diodes	For power-loss calculations only T_{VJ} = 150°C			0.85 8.5	V mΩ
R_{thJH}	Rectifier Diodes	per diode			1.42	K/W
$V_{BR(CES)}$ $V_{GE(th)}$	IGBT	V_{GS} = 0 V, I_C = 3 mA I_C = 10 mA	1200 5		 7.5	V V
I_{GES}	IGBT	V_{GE} = ± 20 V			500	nA
I_{CES}	IGBT	T_{VJ} = 25°C, V_{CE} = 800 V T_{VJ} = 125°C, V_{CE} = 800 V			250 1	µA mA
V_{CEsat}	IGBT	V_{GE} = 15 V, I_C = 25 A			3.5	V
t_{SC} (SCSOA)	IGBT	V_{GE} = 15 V, V_{CE} = 600 V, T_{VJ} = 125°C, R_G = 4.7 Ω, non repetitive			10	µs
RBSOA	IGBT	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}	IGBT	V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0 V		2.85		nF
$t_{d(on)}$ $t_{d(off)}$ t_{fi} E_{on} E_{off}	IGBT	V_{CE} = 600 V, I_C = 25 A V_{GE} = 15 V, R_G = 4.7 Ω Inductive load; L = 100 µH T_{VJ} = 125°C		100 220 1600 3.5 12		ns ns ns mJ mJ
R_{thJH}	IGBT				1	K/W
I_R	Fast Recovery Diode	$V_R = V_{RRM}$, T_{VJ} = 25°C V_R = 800 V, T_{VJ} = 150°C			0.2 6	mA mA
V_F	Fast Recovery Diode	I_F = 12 A, T_{VJ} = 25°C			2.7	V
V_{T0} r_T	Fast Recovery Diode	For power-loss calculations only T_{VJ} = 150°C			1.65 46	V mΩ
I_{RM}	Fast Recovery Diode	I_F = 25 A, $-di_F/dt$ = 100 A/µs V_R = 100 V		6.5	7	A
t_{rr}	Fast Recovery Diode	I_F = 1 A, $-di_F/dt$ = 100 A/µs V_R = 30 V		50	70	ns
R_{thJH}	Fast Recovery Diode				3.12	K/W
R_{25}	NTC	Siemens Typ S 891/2,2k/+9			2.2	kΩ
d_S d_A a	Module	Creep distance on surface Strike distance in air Maximum allowable acceleration			12.7 9.4 50	mm mm m/s^2

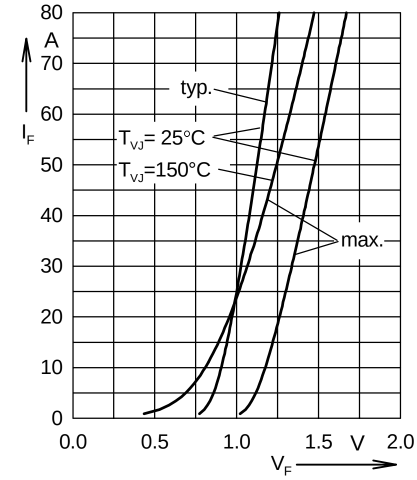


Fig. 1 Forward current versus voltage drop per rectifier diode

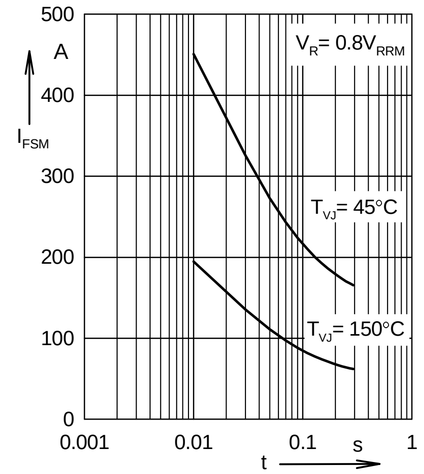


Fig. 2 Surge overload current per rectifier diode

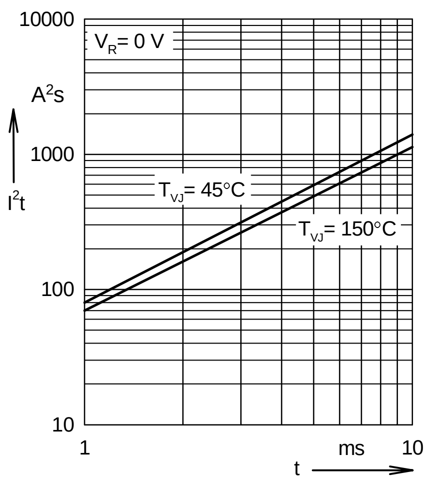


Fig. 3 I^2t versus time per rectifier diode

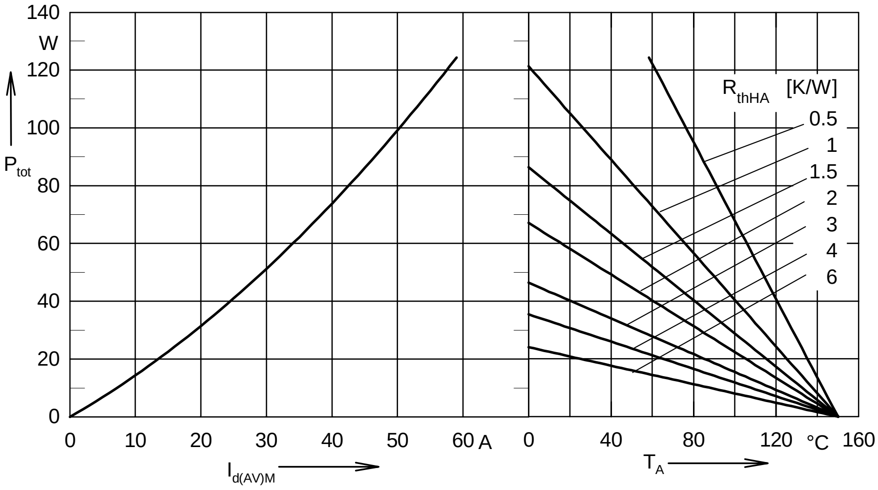


Fig. 4 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

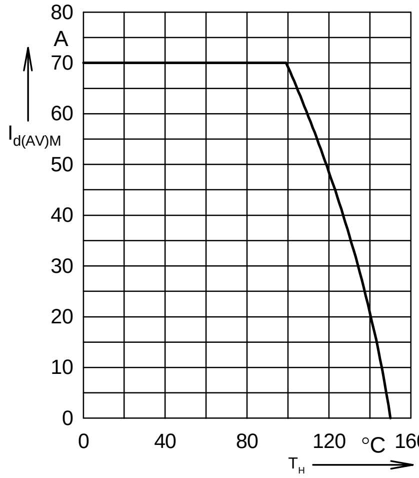


Fig. 5 Maximum forward current versus heatsink temperature (Rectifier bridge)

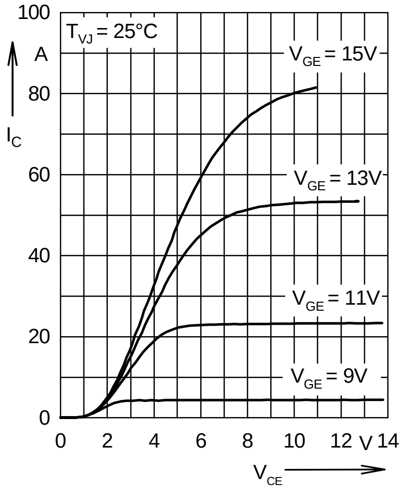


Fig. 6 Output characteristics for braking (IGBT)

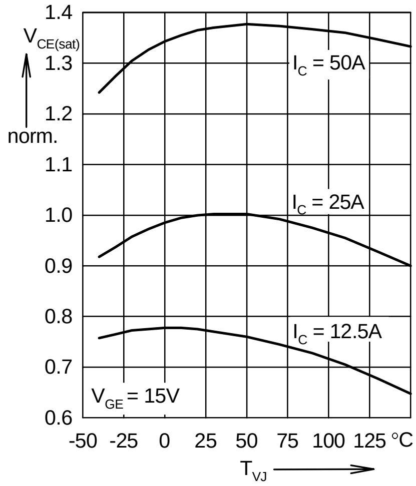


Fig. 7 Saturation voltage versus junction temperature normalized (IGBT)

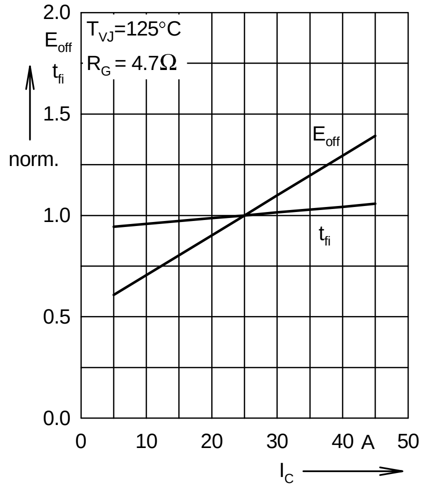


Fig. 8 Turn-off energy per pulse and fall time versus collector current, normalized (IGBT)

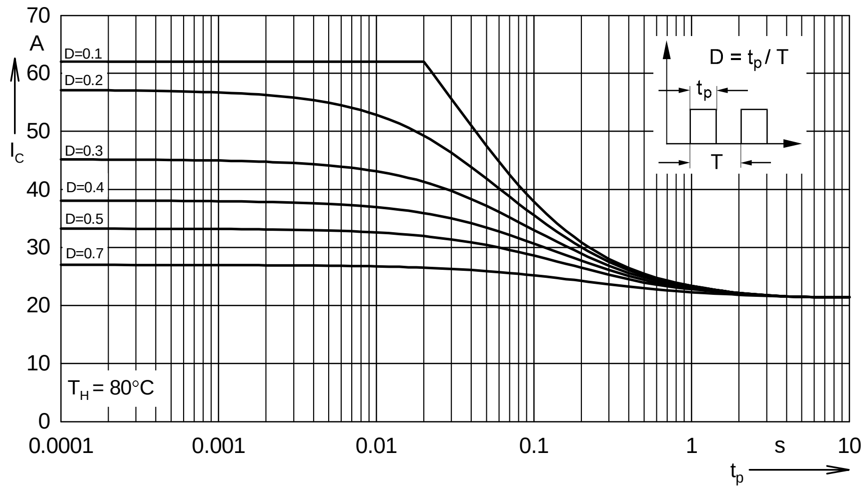


Fig. 9 Collector current versus pulse width and duty cycle (IGBT)

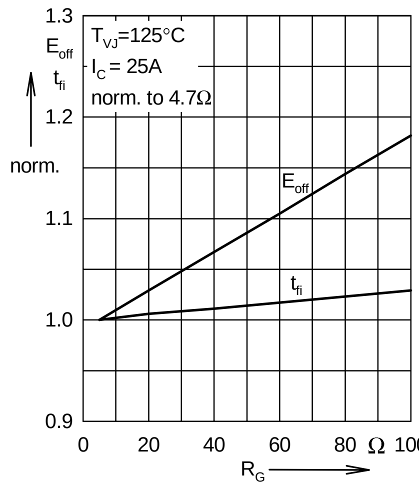


Fig.10 Turn-off energy per pulse and fall time versus R_G (IGBT)

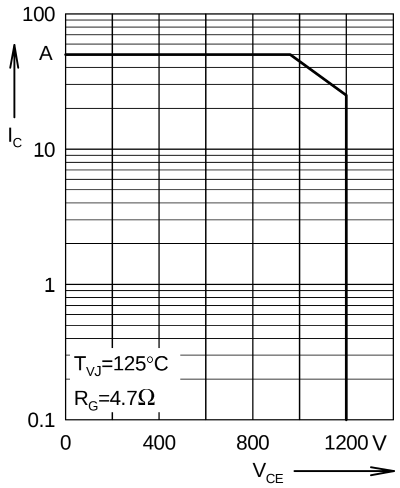


Fig.11 Reverse biased safe operation area (IGBT)

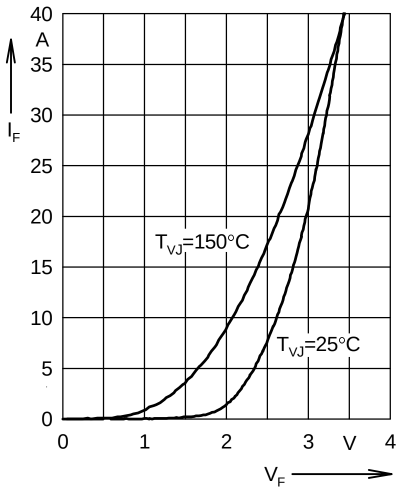


Fig. 12 Forward current versus voltage drop (Fast Diode)

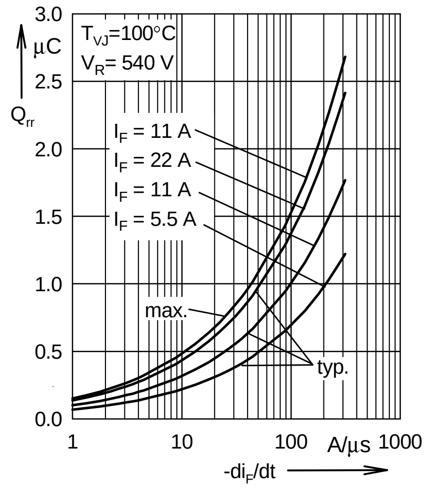


Fig. 13 Recovery charge versus $-di_F/dt$ (Fast Diode)

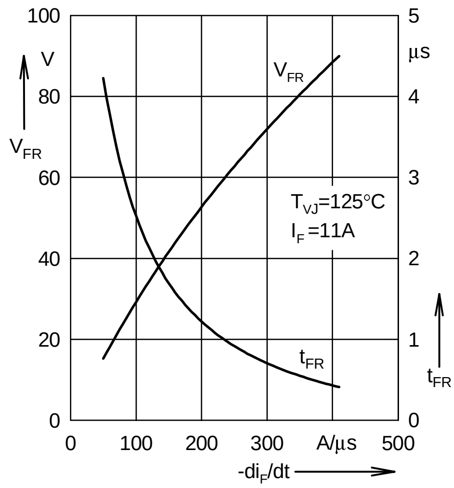


Fig.14 Peak forward voltage and recovery time versus $-di_F/dt$ (Fast Diode)

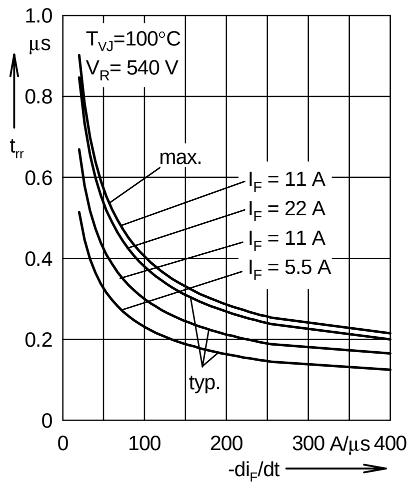


Fig.15 Recovery time versus $-di_F/dt$ (Fast Diode)

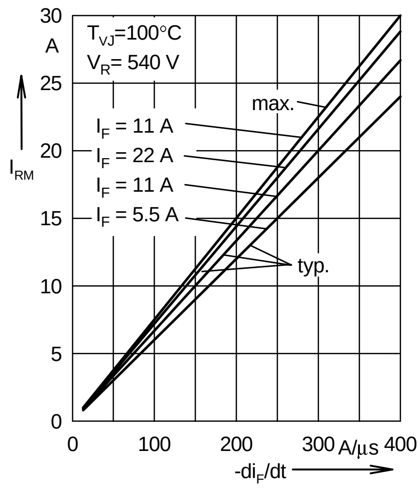


Fig.16 Peak reverse current versus $-di_F/dt$ (Fast Diode)

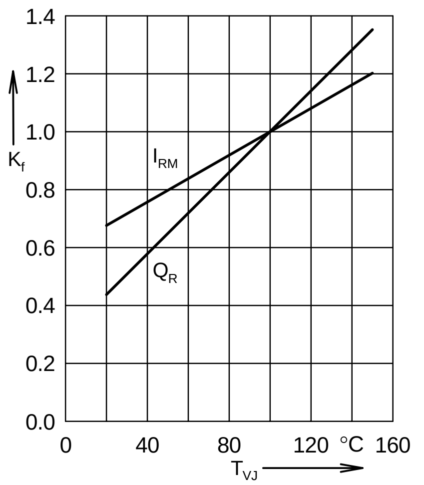


Fig.17 Dynamic parameters versus junction temperature (Fast Diode)

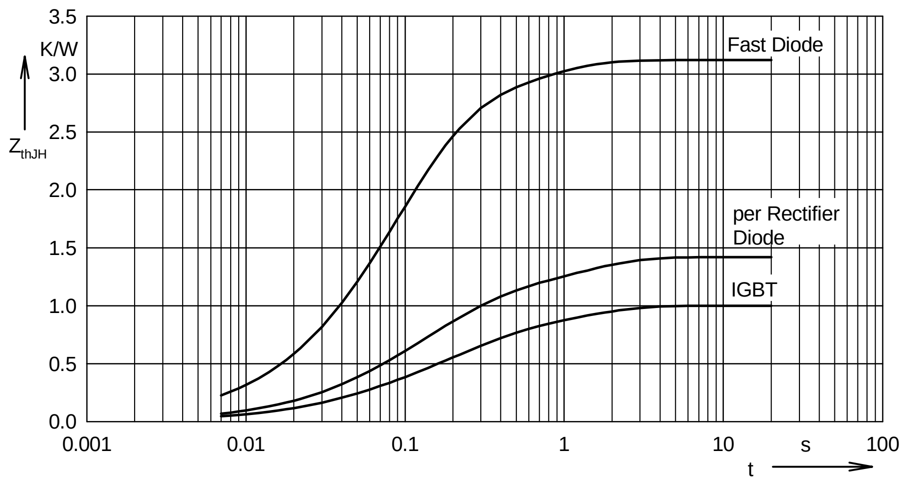


Fig.18 Transient thermal impedance junction to heatsink Z_{thJH}