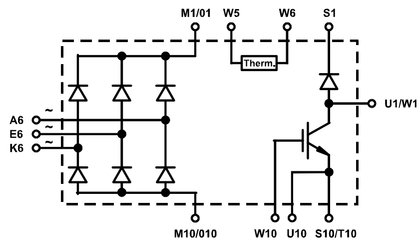
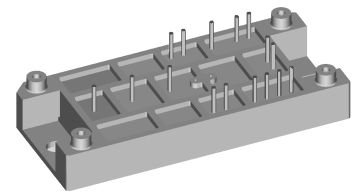
Three Phase Rectifier Bridge
with IGBT and Fast Recovery Diode for Braking System

V_{RRM} = 1200/1600 V
I_{dAVM} = 121/157 A





Preliminary Data

V_{RRM} V	Type	V_{RRM} V	Type
1200	**VUB 120-12 NO1**	**1600**	**VUB 120-16 NO1**
1200	**VUB 160-12 NO1**	**1600**	**VUB 160-16 NO1**

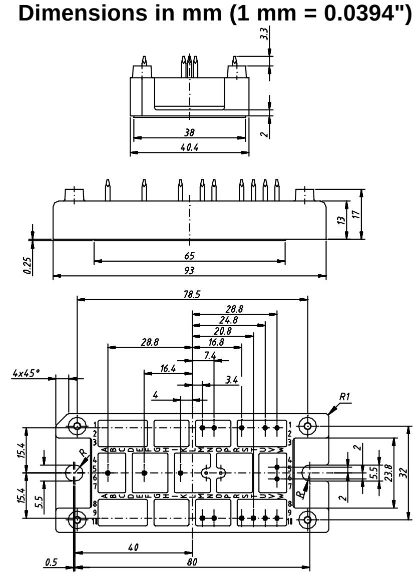
Symbol		Test Conditions		Maximum Ratings VUB 120	VUB160	
V_{RRM}	Rectifier Diodes			1200/1600	1200/1600	V
I_{dAVM}		T_C = 75°C, sinusoidal 120°		121	157	A
I_{FSM}		T_{VJ} = 45°C,	t = 10 ms, V_R = 0 V	650	850	A
		T_{VJ} = 150°C,	t = 10 ms, V_R = 0 V	580	760	A
I^2t		T_{VJ} = 45°C,	t = 10 ms, V_R = 0 V	2110	3610	A
		T_{VJ} = 150°C,	t = 10 ms, V_R = 0V	1680	2880	A
P_{tot}		T_C = 25°C per diode		130	160	W
V_{CES}	IGBT	T_{VJ} = 25°C to 150°C		1200	1200	V
V_{GE}		Continuous		± 20	± 20	V
I_{C25}		T_C = 25°C, DC		100	150	A
I_{C75}		T_C = 75°C, DC		71	106	A
		T_C = 75°C, d = 0.5		56	85	A
I_{CM}		t_p = Pulse width limited by T_{VJM}		200	300	A
P_{tot}		T_C = 25°C		400	600	W
V_{RRM}	Fast Recovery Diode			1200		V
I_{FAV}		T_C = 75°C, rectangular d = 0.5		25		A
I_{FRMS}		T_C = 75°C, rectangular d = 0.5		39		A
I_{FRM}		T_C = 75°C, t_P = 10 µs, f = 5 kHz		tbd		A
I_{FSM}		T_{VJ} = 45°C,	t = 10 ms	200		A
		T_{VJ} = 150°C,	t = 10 ms	180		A
P_{tot}		T_C = 25°C		100		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.
d_S		Creep distance on surface		12.7		mm
d_A		Strike distance in air		9.4		mm
a		Maximum allowable acceleration		50		m/s^2
Weight		typ.		80		g

Features
- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast diode
- Convenient package outline
- UL registered E 72873
- Case and potting UL94 V-0
- Thermistor

Applications
- Drive Inverters with brake system

Advantages
- 2 functions in one package
- 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.

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Section	Symbol	Test Conditions	Type	min.	typ.	max.	Unit
		(T_{VJ} = 25°C, unless otherwise specified)					
Rectifier Diodes	I_R	$V_R = V_{RRM}$, T_{VJ} = 25°C				0.3	mA
		$V_R = V_{RRM}$, T_{VJ} = 150°C				5	mA
	V_F	I_F = 150 A, T_{VJ} = 25°C	VUB 120			1.59	V
			VUB 160			1.49	V
	V_{T0}	For power-loss calculations only	VUB 120			0.80	V
			VUB 160			0.75	V
	r_T	T_{VJ} = 150°C	VUB 120			6.1	mΩ
			VUB 160			4.6	mΩ
	R_{thJC}	per diode	VUB 120			1.0	K/W
			VUB 160			0.8	K/W
	R_{thJH}		VUB 120			1.3	K/W
			VUB 160			1.1	K/W
IGBT	$V_{BR(CES)}$	V_{GS} = 0 V, I_C = 3 mA		1200			V
	$V_{GE(th)}$	I_C = 20 mA	VUB 120	5		8	V
		I_C = 30 mA	VUB 160	5		8	V
	I_{CES}	T_{VJ} = 25°C, V_{CE} = 1200 V	VUB 120			0.8	mA
			VUB 160			1.2	mA
		T_{VJ} = 125°C, $V_{CE} = 0{,}8 \cdot V_{CES}$	VUB 120			3	mA
			VUB 160			4.5	mA
	V_{CEsat}	V_{GE} = 15 V, I_C = 50 A	VUB 120			2.9	V
		V_{GE} = 15 V, I_C = 75 A	VUB 160			2.9	V
	t_{SC} (SCSOA)	V_{GE} = 15 V, V_{CE} = 720 V, T_{VJ} = 125°C,					
		R_G = 11 Ω, non repetitive	VUB 120			10	µs
		R_G = 7 Ω, non repetitive	VUB 160			10	µs
	RBSOA	V_{GE} = 15 V, V_{CE} = 960 V, T_{VJ} = 125°C, Clamped Inductive load, L = 100 µH					
		R_G = 11 Ω	VUB 120			100	A
		R_G = 7 Ω	VUB 160			150	A
	C_{ies}	V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0 V	VUB 120		9		nF
			VUB 160		13.5		nF
	$t_{d(on)}$	V_{CE} = 720 V, I_C = 50/75 A; V_{GE} = 15 V, R_G = 11/7 Ω; Inductive load; L = 100 µH; T_{VJ} = 125°C			300		ns
	$t_{d(off)}$				350		ns
	E_{on}		VUB 120		12		mJ
			VUB 160		18		mJ
	E_{off}		VUB 120		16		mJ
			VUB 160		24		mJ
	R_{thJC}		VUB 120			0.32	K/W
			VUB 160			0.21	K/W
	R_{thJH}		VUB 120			0.45	K/W
			VUB 160			0.30	K/W
Fast Recovery Diode	I_R	$V_R = V_{RRM}$, T_{VJ} = 25°C				0.75	mA
		$V_R = 0{,}8 \cdot V_{CES}$, T_{VJ} = 125°C			4	7	mA
	V_F	I_F = 30 A, T_{VJ} = 25°C				2.55	V
	V_{T0}	For power-loss calculations only				1.65	V
	r_T	T_{VJ} = 150°C				18.2	mΩ
	I_{RM}	I_F = 30 A, $-di_F/dt$ = 240 A/µs, V_R = 540 V			16	18	A
	t_{rr}	I_F = 1 A, $-di_F/dt$ = 100 A/µs, V_R = 30 V			40	60	ns
	R_{thJC}					1.2	K/W
	R_{thJH}					1.6	K/W
NTC	R_{25}	Siemens S 891/2,2/+9				2.2	kΩ

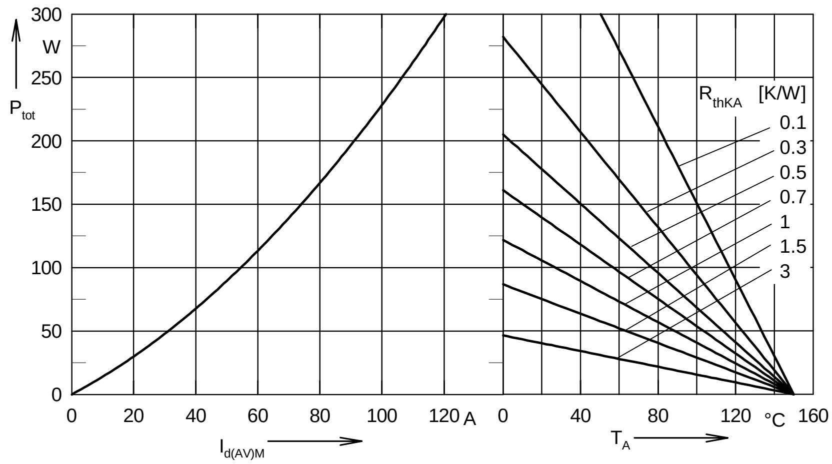

Fig. 1 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

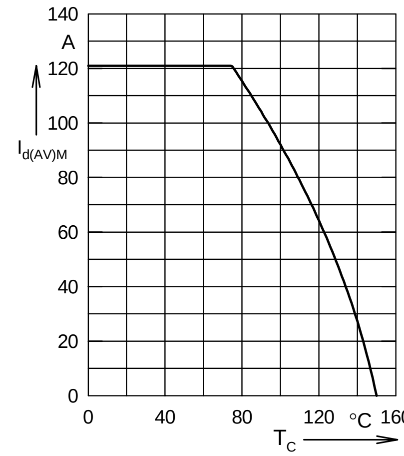

Fig. 2 Maximum forward current versus case temperature (Rectifier bridge)

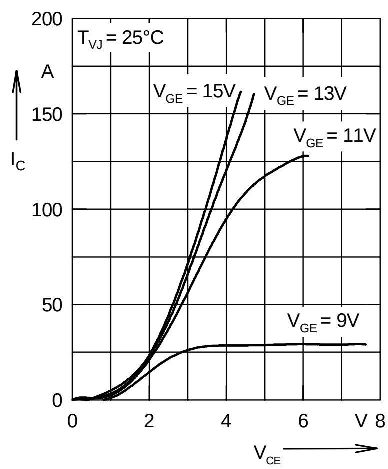

Fig. 3 Output characteristics for braking (IGBT)

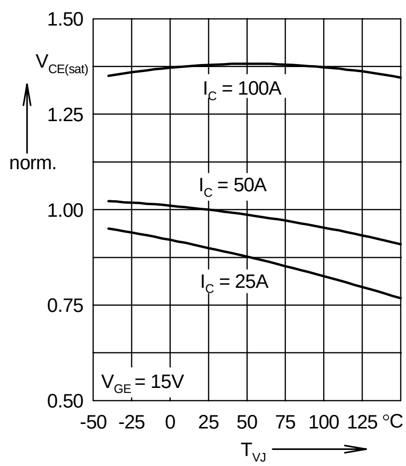

Fig. 4 Temperature dependence of output saturation voltage, normalized (IGBT)

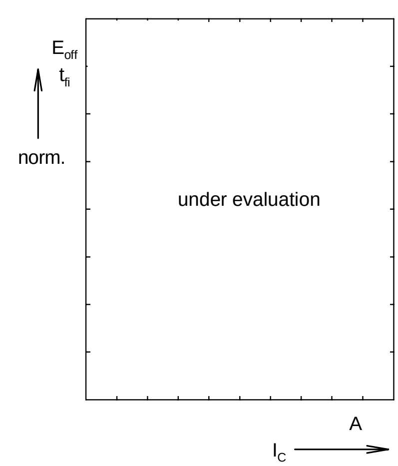

Fig. 5 Turn-off energy per pulse and fall time in collector current, normalized (IGBT)

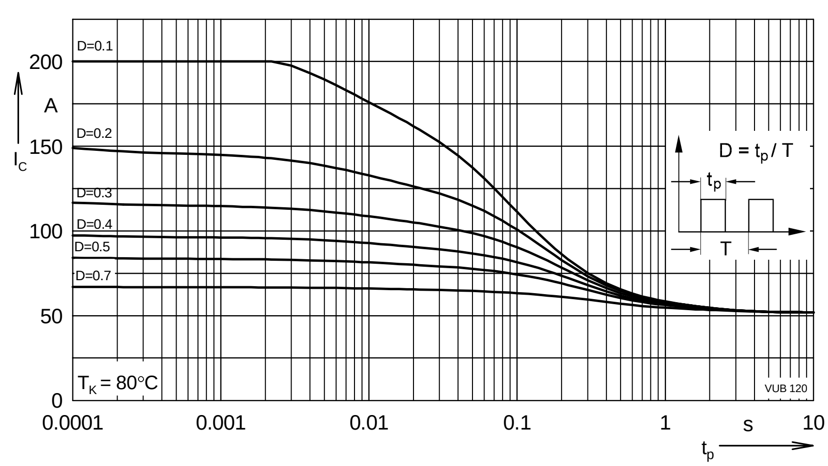

Fig. 6 Collector current dependence on pulse width and duty cycle (IGBT)

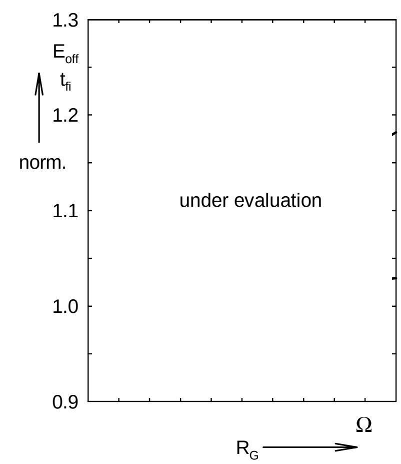

Fig.7 Turn-off energy per pulse and fall time on R_G (IGBT)

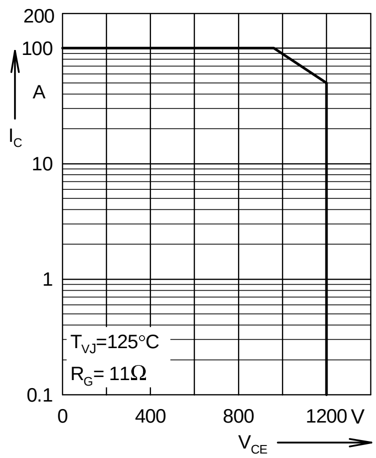

Fig. 8 Reverse baised safe operation area (IGBT)

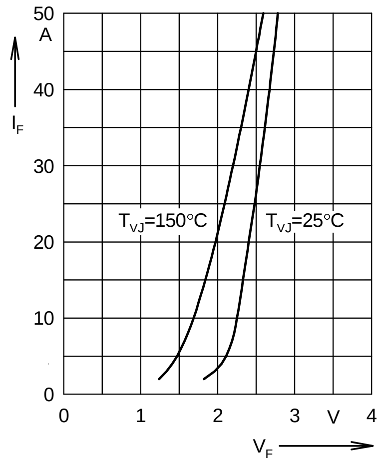

Fig. 9 Forward current versus voltage drop (Fast Diode)

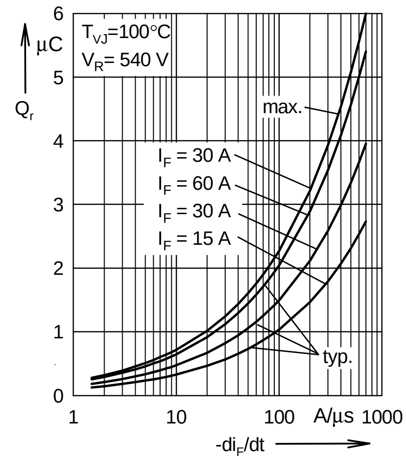

Fig. 10 Recovery charge versus $-di_F/dt$ (Fast Diode)

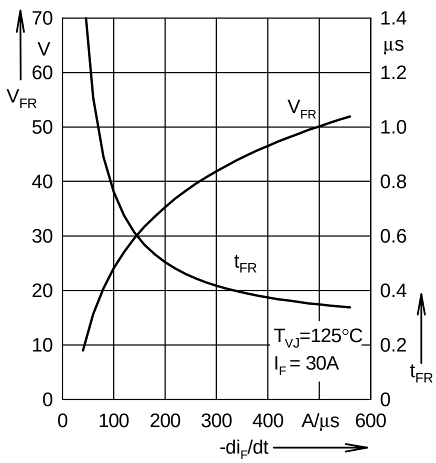

Fig.11 Peak forward voltage and recovery time versus $-di_F/dt$ (Fast Diode)

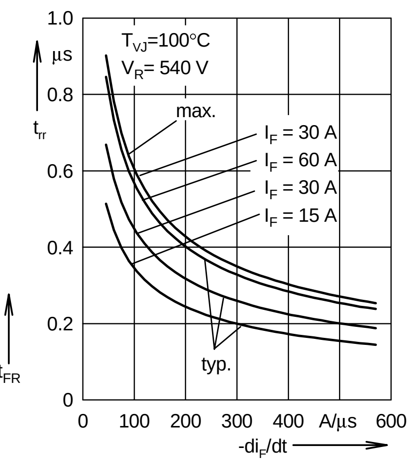

Fig.12 Recovery time versus $-di_F/dt$ (Fast Diode)

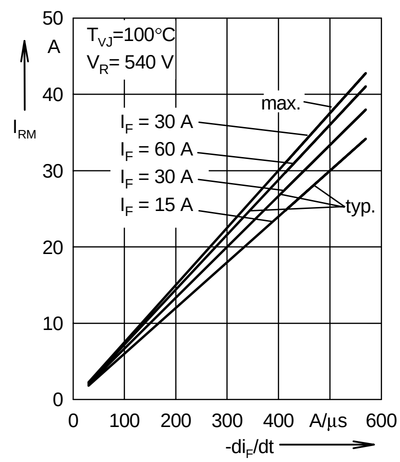

Fig.13 Peak reverse current versus $-di_F/dt$ (Fast Diode)

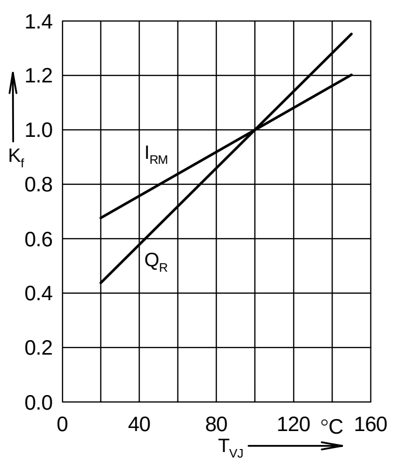

Fig.14 Dynamic parameters versus junction temperature (Fast Diode)

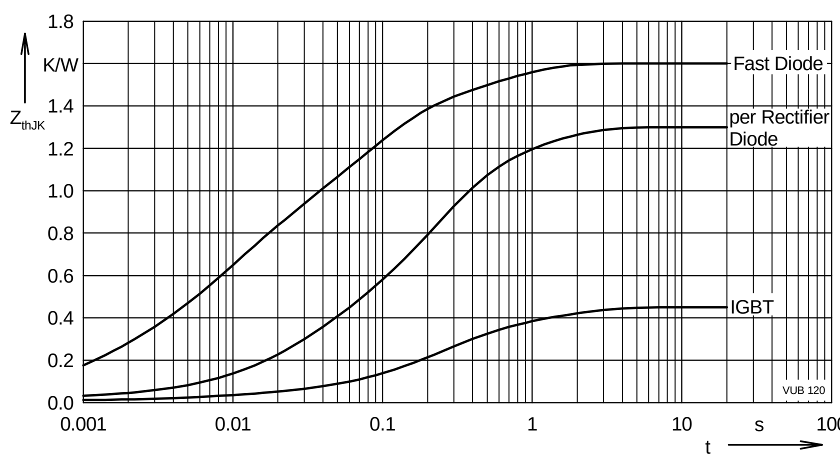

Fig.15 Transient thermal impedance junction to heatsink Z_{thJK}