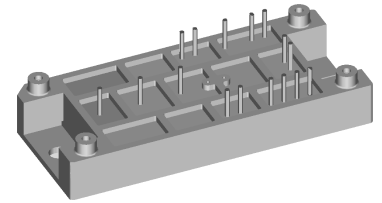
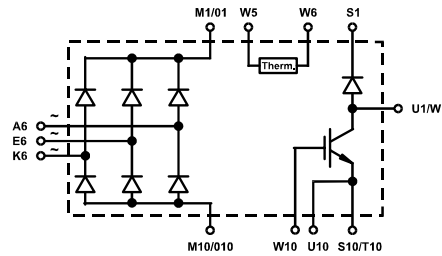


# Three Phase Rectifier Bridge with IGBT and Fast Recovery Diode for Braking System

**V<sub>RRM</sub> = 1200/1600 V**  
**I<sub>dAVM</sub> = 121/157 A**

**Preliminary Data**

V <sub>RRM</sub>	Type	V <sub>RRM</sub>	Type
V		V	
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	
<b>V<sub>RRM</sub></b>		1200/1600	1200/1600 V	
<b>I<sub>dAVM</sub></b>		121	157 A	
<b>I<sub>FSM</sub></b>	T <sub>C</sub> = 75°C, sinusoidal 120°			
	T <sub>VJ</sub> = 45°C, t = 10 ms, V <sub>R</sub> = 0 V	650	850 A	
		T <sub>VJ</sub> = 150°C, t = 10 ms, V <sub>R</sub> = 0 V	580	760 A
<b>I<sup>2</sup>t</b>	T <sub>VJ</sub> = 45°C, t = 10 ms, V <sub>R</sub> = 0 V	2110	3610 A	
		T <sub>VJ</sub> = 150°C, t = 10 ms, V <sub>R</sub> = 0V	1680	2880 A
	T <sub>C</sub> = 25°C per diode	130	160 W	
<b>V<sub>CES</sub></b>	T <sub>VJ</sub> = 25°C to 150°C	1200	1200 V	
		± 20	± 20 V	
<b>V<sub>GE</sub></b>	Continuous			
<b>I<sub>C25</sub></b>	T <sub>C</sub> = 25°C, DC	100	150 A	
		T <sub>C</sub> = 75°C, DC	71	106 A
		T <sub>C</sub> = 75°C, d = 0.5	56	85 A
<b>I<sub>CM</sub></b>	t <sub>p</sub> = Pulse width limited by T <sub>VJM</sub>	200	300 A	
<b>P<sub>tot</sub></b>	T <sub>C</sub> = 25°C	400	600 W	
<b>V<sub>RRM</sub></b>	T <sub>C</sub> = 75°C, rectangular d = 0.5	1200	V	
		25	A	
		39	A	
		tbid	A	
<b>I<sub>FAV</sub></b>	T <sub>C</sub> = 75°C, rectangular d = 0.5	200	A	
		180	A	
<b>I<sub>FRMS</sub></b>	T <sub>C</sub> = 75°C, t <sub>p</sub> = 10 μs, f = 5 kHz			
<b>I<sub>FRM</sub></b>	T <sub>VJ</sub> = 45°C, t = 10 ms	200	A	
		T <sub>VJ</sub> = 150°C, t = 10 ms	180	A
<b>P<sub>tot</sub></b>	T <sub>C</sub> = 25°C	100	W	
<b>T<sub>VJ</sub></b>		-40...+150	°C	
<b>T<sub>VJM</sub></b>		150	°C	
<b>T<sub>stg</sub></b>		-40...+125	°C	
<b>V<sub>ISOL</sub></b>	50/60 Hz	t = 1 min	3000 V~	
	I <sub>ISOL</sub> ≤ 1 mA	t = 1 s	3600 V~	
<b>M<sub>d</sub></b>	Mounting torque (M5) (10-32 unf)	2-2.5	Nm	
		18-22	lb.in.	
<b>d<sub>S</sub></b>	Creep distance on surface	12.7	mm	
<b>d<sub>A</sub></b>	Strike distance in air	9.4	mm	
<b>a</b>	Maximum allowable acceleration	50	m/s <sup>2</sup>	
<b>Weight</b>	typ.	80	g	

**Features**

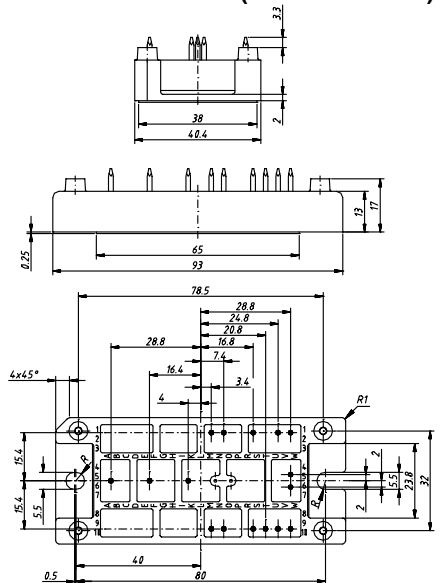
- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast diode
- Convenient package outline
- UL registered E 72873
- Case and potting UL94 V-0
- Thermistor

**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.

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

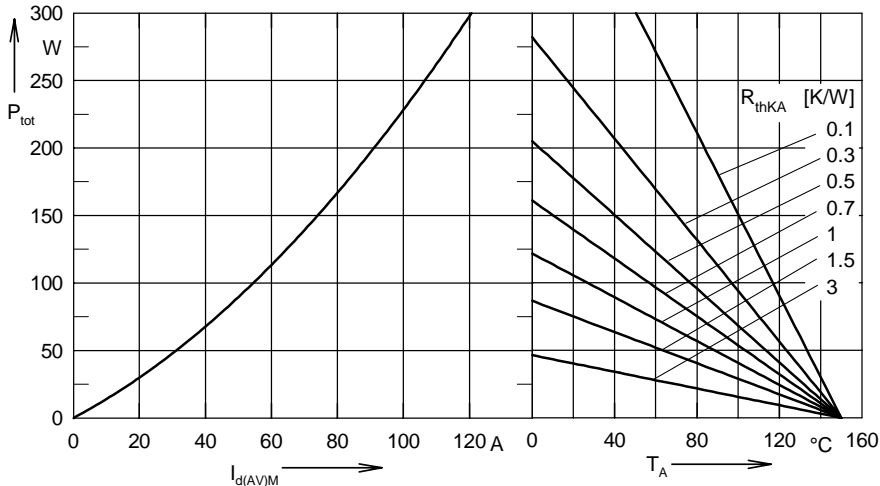


Fig. 1 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

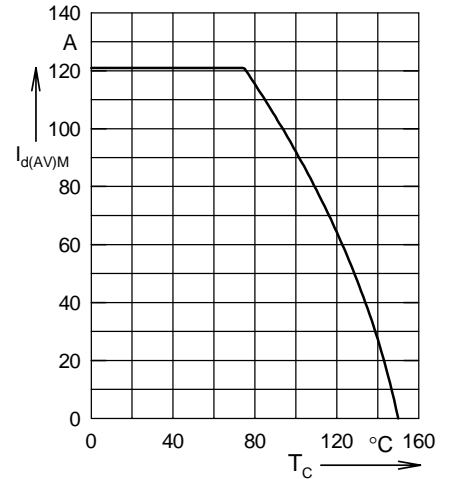


Fig. 2 Maximum forward current versus case temperature (Rectifier bridge)

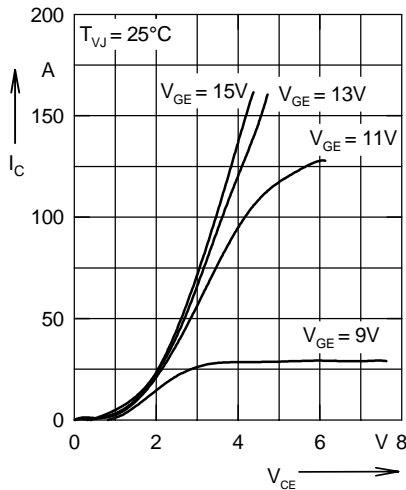


Fig. 3 Output characteristics for braking (IGBT)

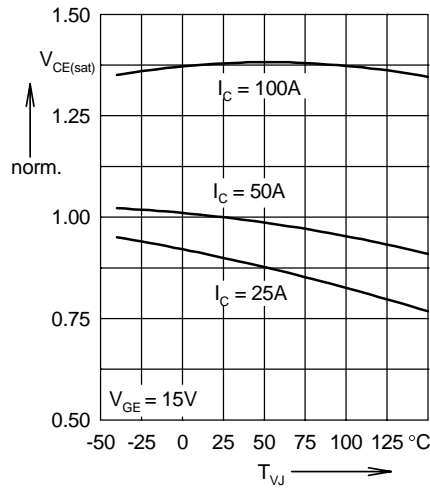


Fig. 4 Temperature dependence of output saturation voltage, normalized (IGBT)

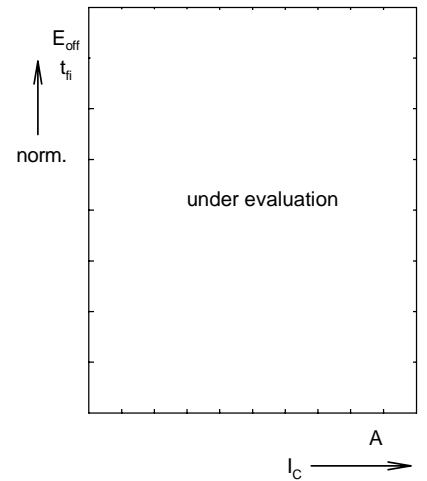


Fig. 5 Turn-off energy per pulse and fall time in collector current, normalized (IGBT)

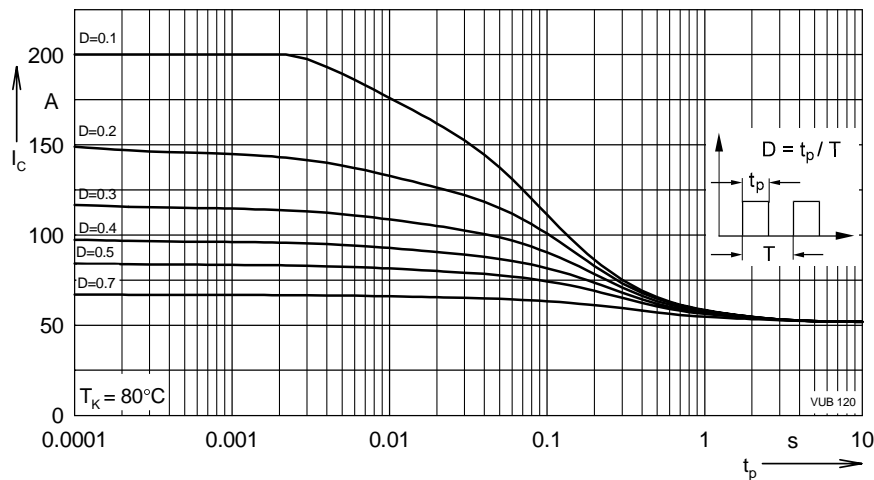


Fig. 6 Collector current dependence on pulse width and duty cycle (IGBT)

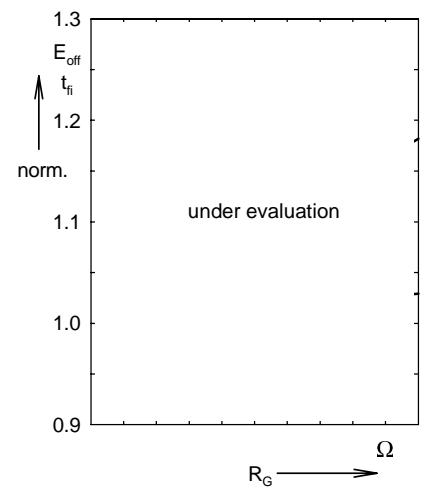


Fig. 7 Turn-off energy per pulse and fall time on  $R_G$  (IGBT)

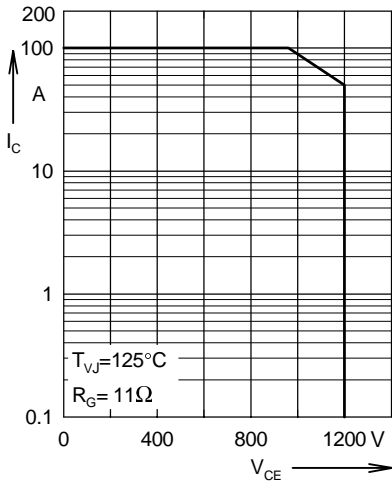


Fig. 8 Reverse biased safe operation area (IGBT)

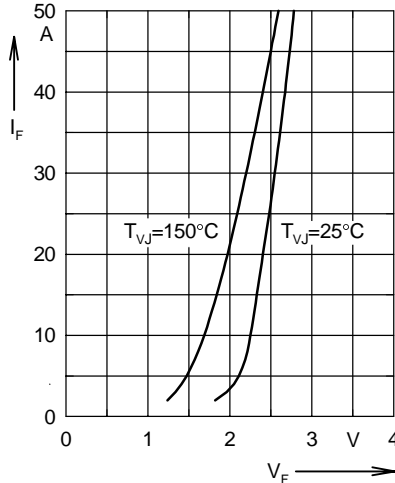


Fig. 9 Forward current versus voltage drop (Fast Diode)

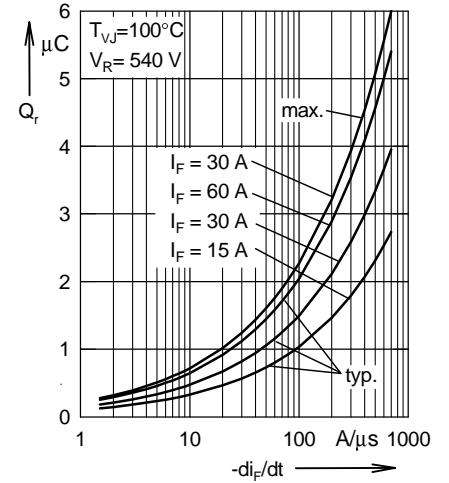


Fig. 10 Recovery charge versus  $-di_F/dt$  (Fast Diode)

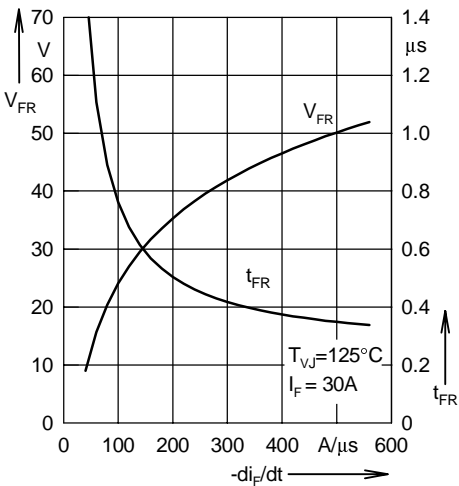


Fig. 11 Peak forward voltage and recovery time versus  $-di_F/dt$  (Fast Diode)

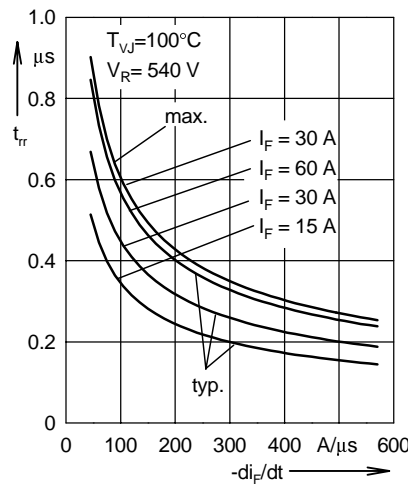


Fig. 12 Recovery time versus  $-di_F/dt$  (Fast Diode)

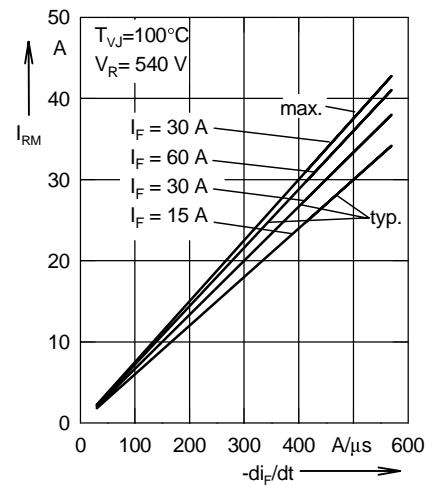


Fig. 13 Peak reverse current versus  $-di_F/dt$  (Fast Diode)

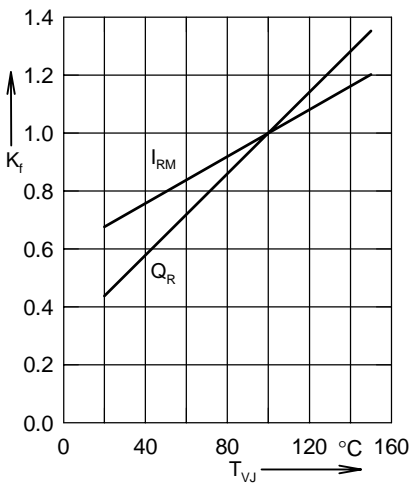


Fig. 14 Dynamic parameters versus junction temperature (Fast Diode)

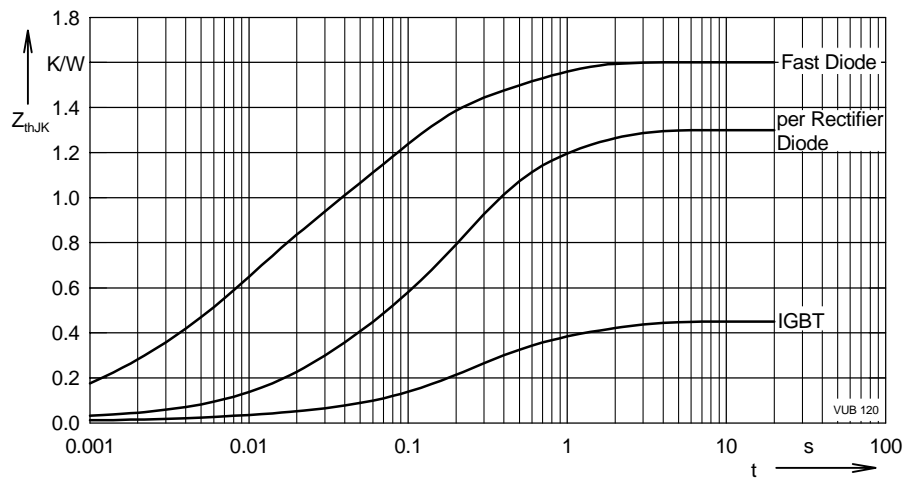


Fig. 15 Transient thermal impedance junction to heatsink  $Z_{thjK}$