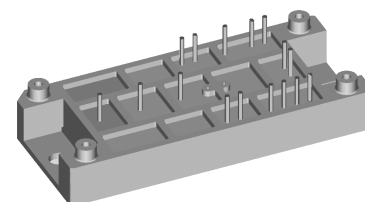
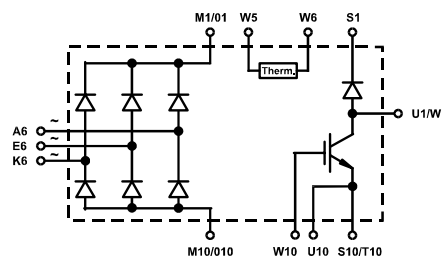


# Three Phase Rectifier Bridge with IGBT and Fast Recovery Diode for Braking System

$$\begin{aligned} V_{\text{RRM}} &= 1200/1600 \text{ V} \\ I_{\text{dAVM}} &= 121/157 \text{ A} \end{aligned}$$

## Preliminary Data

$V_{RRM}$	Type	$V_{RRM}$	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	
$V_{RRM}$	$T_C = 75^{\circ}\text{C}$ , sinusoidal 120°	1200/1600	1200/1600	
$I_{dAVM}$		121	157	
$I_{FSM}$		$T_{VJ} = 45^{\circ}\text{C}$ , $t = 10\text{ ms}$ , $V_R = 0\text{ V}$	650	850
		$T_{VJ} = 150^{\circ}\text{C}$ , $t = 10\text{ ms}$ , $V_R = 0\text{ V}$	580	760
$I^2t$		$T_{VJ} = 45^{\circ}\text{C}$ , $t = 10\text{ ms}$ , $V_R = 0\text{ V}$	2110	3610
	$T_{VJ} = 150^{\circ}\text{C}$ , $t = 10\text{ ms}$ , $V_R = 0\text{V}$	1680	2880	
$P_{tot}$	$T_C = 25^{\circ}\text{C}$ per diode	130	160	
$V_{CES}$	$T_{VJ} = 25^{\circ}\text{C}$ to $150^{\circ}\text{C}$ Continuous	1200	1200	
$V_{GE}$		$\pm 20$	$\pm 20$	
$I_{C25}$ $I_{C75}$		$T_C = 25^{\circ}\text{C}$ , DC	100	150
		$T_C = 75^{\circ}\text{C}$ , DC	71	106
		$T_C = 75^{\circ}\text{C}$ , $d = 0.5$	56	85
$I_{CM}$	$t_p = \text{Pulse width limited by } T_{VJM}$	200	300	
$P_{tot}$	$T_C = 25^{\circ}\text{C}$	400	600	
$V_{RRM}$	Fast Recovery Diode	1200		
$I_{FAV}$		$T_C = 75^{\circ}\text{C}$ , rectangular $d = 0.5$	25	
$I_{FRMS}$		$T_C = 75^{\circ}\text{C}$ , rectangular $d = 0.5$	39	
$I_{FRM}$		$T_C = 75^{\circ}\text{C}$ , $t_p = 10\text{ }\mu\text{s}$ , $f = 5\text{ kHz}$	tbd	
$I_{FSM}$		$T_{VJ} = 45^{\circ}\text{C}$ , $t = 10\text{ ms}$	200	
	$T_{VJ} = 150^{\circ}\text{C}$ , $t = 10\text{ ms}$	180		
$P_{tot}$	$T_C = 25^{\circ}\text{C}$	100		
$T_{VJ}$	Module	-40...+150	°C	
$T_{VJM}$		150	°C	
$T_{stg}$		-40...+125	°C	
$V_{ISOL}$		50/60 Hz $t = 1\text{ min}$	3000	V~
		$I_{ISOL} \leq 1\text{ mA}$ $t = 1\text{ s}$	3600	V~
$M_d$	Mounting torque (M5) (10-32 unf)	2-2.5 18-22	Nm 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/s²
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

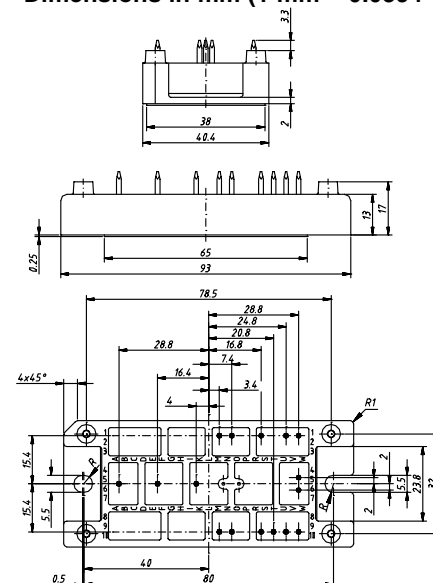
## Applications

- 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.

Symbol	Test Conditions	Characteristic Values ( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$I_R$	$V_R = V_{RRM}, T_{VJ} = 25^{\circ}\text{C}$ $V_R = V_{RRM}, T_{VJ} = 150^{\circ}\text{C}$			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 m $\Omega$ 4.6 m $\Omega$
$R_{thJC}$	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
$V_{BR(CES)}$	$V_{GS} = 0\text{ V}, I_C = 3\text{ mA}$	1200		V
$V_{GE(th)}$	$I_C = 20\text{ mA}$	VUB 120 VUB 160	5 5	8 V 8 V
$I_{CES}$	$T_{VJ} = 25^{\circ}\text{C}, V_{CE} = 1200\text{ V}$ $T_{VJ} = 125^{\circ}\text{C}, V_{CE} = 0,8 \cdot V_{CES}$	VUB 120 VUB 160 VUB 120 VUB 160		0.8 mA 1.2 mA 3 mA 4.5 mA
$V_{CEsat}$	$V_{GE} = 15\text{ V}, I_C = 50\text{ A}$ $V_{GE} = 15\text{ V}, I_C = 75\text{ A}$	VUB 120 VUB 160		2.9 V 2.9 V
$t_{sc}$ (SCSOA)	$V_{GE} = 15\text{ V}, V_{CE} = 720\text{ V}, T_{VJ} = 125^{\circ}\text{C},$ $R_G = 11\text{ }\Omega$ , non repetitive $R_G = 7\text{ }\Omega$ , non repetitive	VUB 120 VUB 160		10 $\mu\text{s}$ 10 $\mu\text{s}$
RBSOA	$V_{GE} = 15\text{ V}, V_{CE} = 960\text{ V}, T_{VJ} = 125^{\circ}\text{C},$ Clamped Inductive load, $L = 100\text{ }\mu\text{H}$ $R_G = 11\text{ }\Omega$ $R_G = 7\text{ }\Omega$	VUB 120 VUB 160		100 A 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
$t_{d(on)}$ $t_{d(off)}$ $E_{on}$ $E_{off}$	$V_{CE} = 720\text{ V}, I_C = 50/75\text{ A}$ $V_{GE} = 15\text{ V}, R_G = 11/7\text{ }\Omega$ Inductive load; $L = 100\text{ }\mu\text{H}$ $T_{VJ} = 125^{\circ}\text{C}$	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 m $\Omega$
$I_{RM}$	$I_F = 30\text{ A}, -di_F/dt = 240\text{ A}/\mu\text{s}, V_R = 540\text{ V}$		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 k $\Omega$

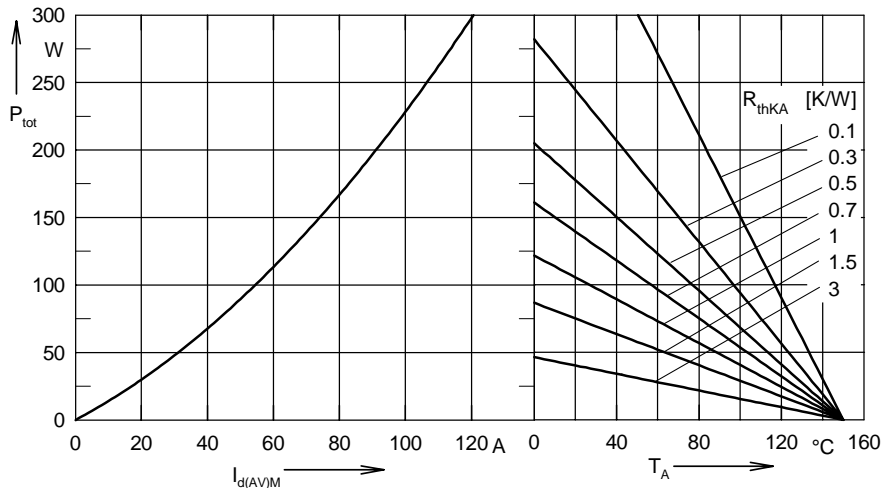


Fig. 1 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

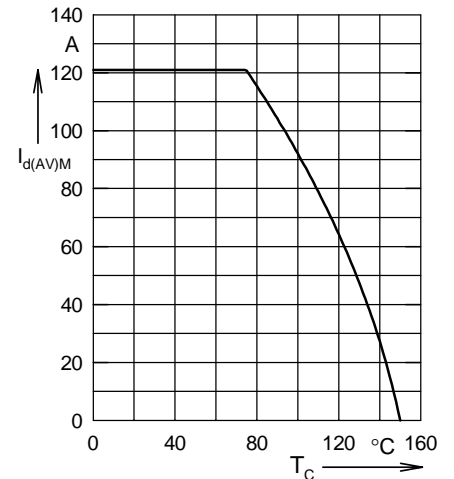


Fig. 2 Maximum forward current versus case temperature (Rectifier bridge)

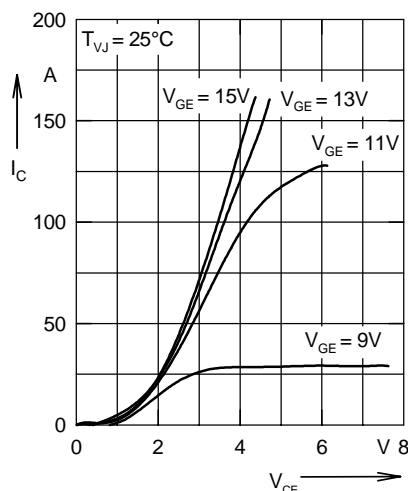


Fig. 3 Output characteristics for braking (IGBT)

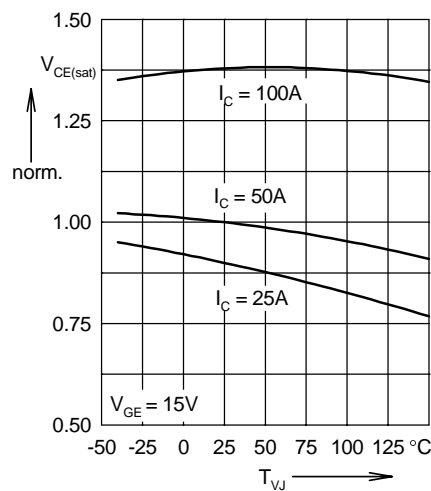


Fig. 4 Temperature dependence of output saturation voltage, normalized (IGBT)

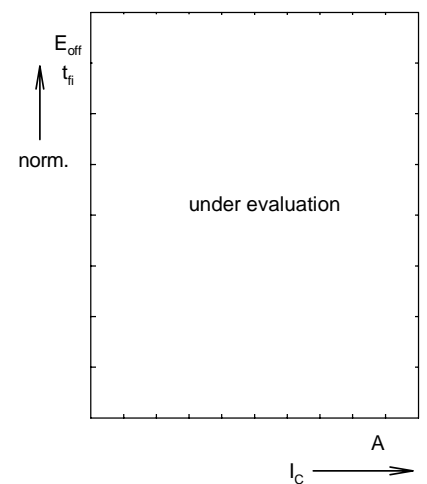


Fig. 5 Turn-off energy per pulse and fall time in collector current, normalized (IGBT)

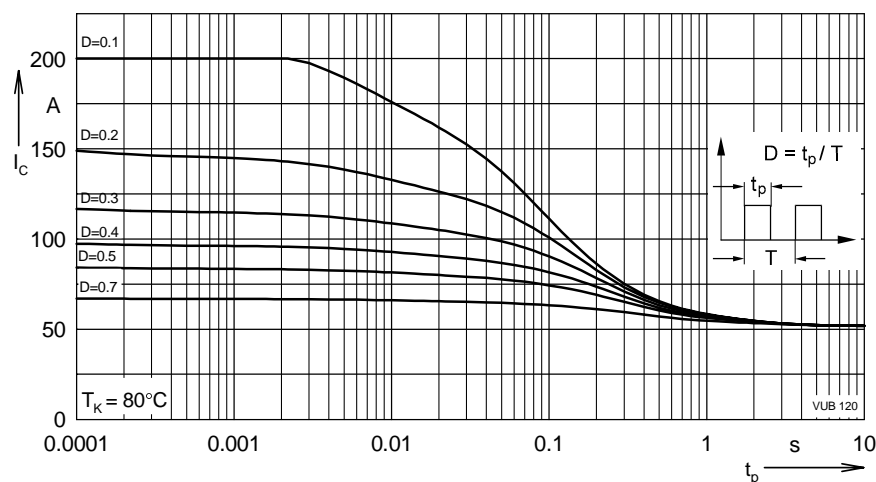


Fig. 6 Collector current dependence on pulse width and duty cycle (IGBT)

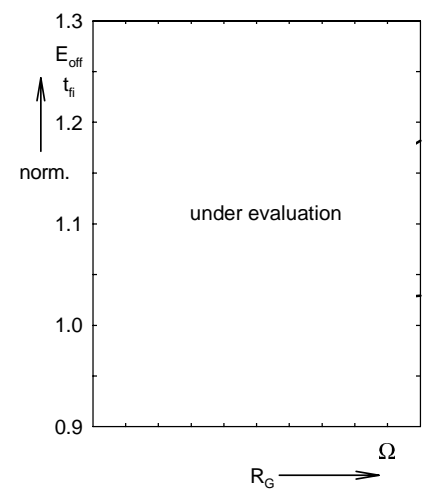


Fig. 7 Turn-off energy per pulse and fall time on  $R_G$  (IGBT)

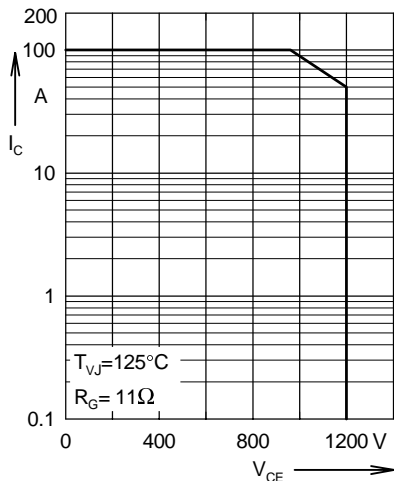


Fig. 8 Reverse biased safe operation area (IGBT)

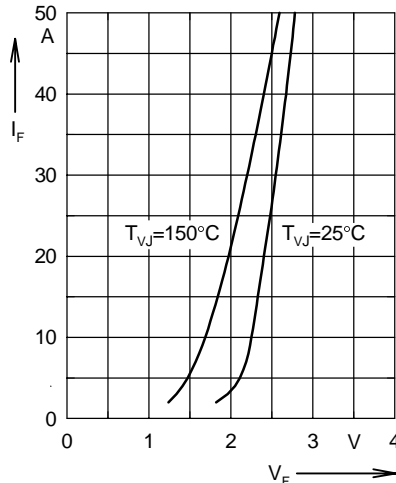


Fig. 9 Forward current versus voltage drop (Fast Diode)

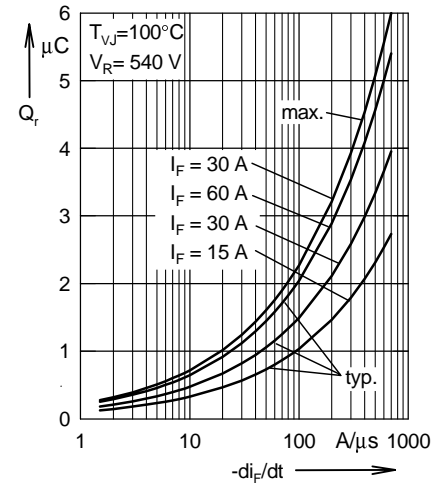


Fig. 10 Recovery charge versus  $-di_F/dt$  (Fast Diode)

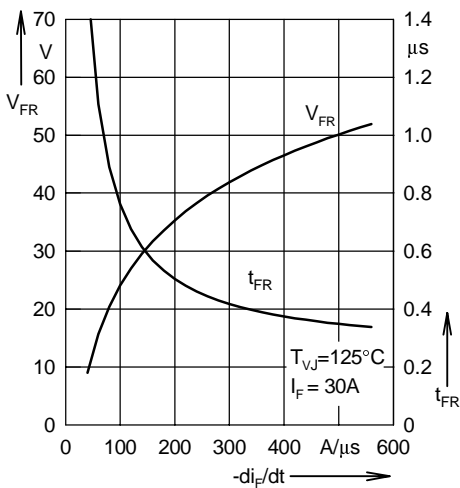


Fig. 11 Peak forward voltage and recovery time versus  $-di_F/dt$  (Fast Diode)

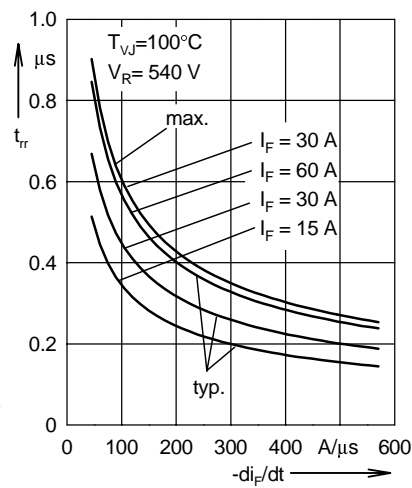


Fig. 12 Recovery time versus  $-di_F/dt$  (Fast Diode)

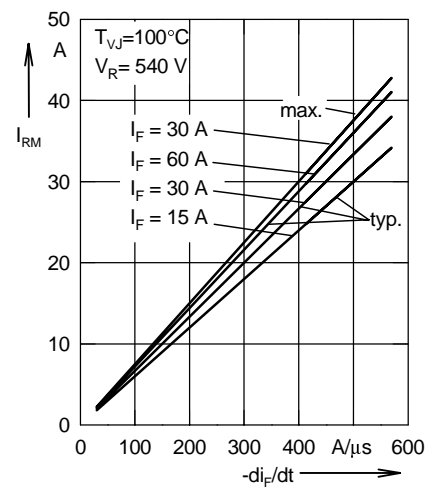


Fig. 13 Peak reverse current versus  $-di_F/dt$  (Fast Diode)

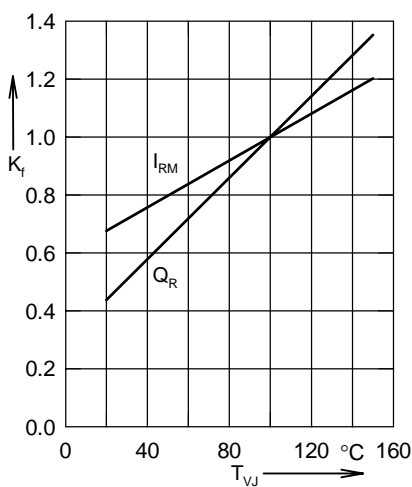


Fig. 14 Dynamic parameters versus junction temperature (Fast Diode)

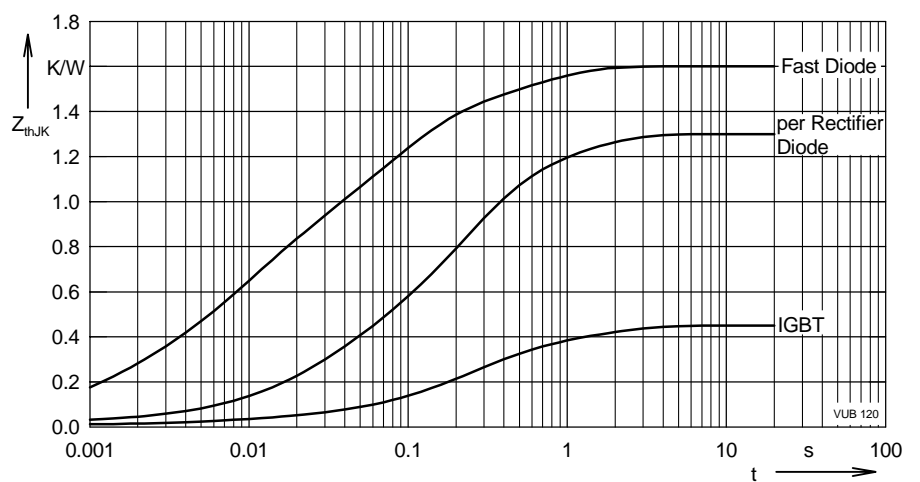


Fig. 15 Transient thermal impedance junction to heatsink  $Z_{thJK}$