

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

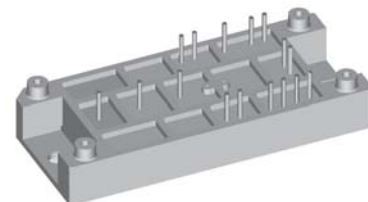
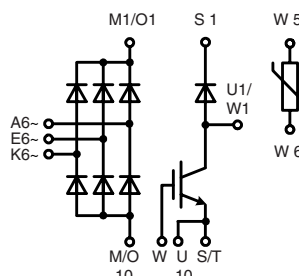
$$V_{RRM} = 1200/1600 \text{ V}$$

$$I_{dAVM} = 188 \text{ A}$$

Preliminary Data

V_{RRM} V	Type	V_{RRM} V	Type
1200	VUB 120-12 NO2(T)	1600	VUB 120-16 NO2(T)
1200	VUB 160-12 NO2(T)	1600	VUB 160-16 NO2(T)

(T) = NTC optional



Symbol	Conditions	Maximum Ratings	
V_{RRM}		1200/1600	V
I_{dAVM}	$T_C = 80^\circ\text{C}$, rect., $d = 1/3$	188	A
I_{FSM}	Rectifier Diodes	$T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$	1100 A
		$T_{VJ} = 150^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$	960 A
		$T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$	6050 A
		$T_{VJ} = 150^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$	4610 A
I^2t			
P_{tot}	$T_C = 25^\circ\text{C}$ per diode	160	W
V_{CES}	$T_{VJ} = 25^\circ\text{C}$ to 150°C Continuous	VUB 120 1200	V
V_{GE}		± 20	V
I_{C25}	IGBT	$T_C = 25^\circ\text{C}$, DC	140 A
I_{C80}		$T_C = 80^\circ\text{C}$, DC	100 A
		$T_C = 80^\circ\text{C}$, $d = 0.5$	95 A
I_{CM}	$t_p = \text{Pulse width limited by } T_{VJM}$	280	A
P_{tot}	$T_C = 25^\circ\text{C}$	570	W
V_{RRM}	Fast Recovery Diode	1200	V
I_{FAV}		34	A
I_{FRMS}		48	A
I_{FSM}		200	A
P_{tot}	$T_C = 25^\circ\text{C}$	140	W
T_{VJ}	Module	-40...+150	$^\circ\text{C}$
T_{VJM}		150	$^\circ\text{C}$
T_{stg}		-40...+125	$^\circ\text{C}$
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 Nm 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

Data according to IEC 60747

IXYS reserves the right to change limits, test conditions and dimensions.

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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
- optional NTC

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

Symbol	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		0.3 mA
		V _R = V _{RRM} , T _{VJ} = 150°C		5 mA
V_F	Rectifier Diodes	I _F = 150 A, T _{VJ} = 25°C		1.46 V
V_{T0}		For power-loss calculations only		0.87 V
r_T	Rectifier Diodes	T _{VJ} = 150°C		4.0 mΩ
R_{thJC}		per diode		0.6 K/W
R_{thCH}	Rectifier Diodes		0.2	K/W
V_{BR(CES)}		V _{GS} = 0 V, I _C = 1 mA	1200	V
V_{GE(th)}	IGBT	I _C = 4 mA	4.5	6.5 V
I_{CES}		V _{CE} = 1200 V, T _{VJ} = 25°C T _{VJ} = 125°C		0.2 mA 1 mA
V_{CEsat}	IGBT	V _{GE} = 15 V, I _C = 50 A VUB 120 I _C = 75 A VUB 160		2.1 V 2.2 V
t_{SC} (SCSOA)		V _{GE} = 15 V, V _{CE} = 900 V, T _{VJ} = 125°C, R _G = 15/10 Ω, non repetitive		10 μs
RBSOA	IGBT	V _{GE} = 15 V, V _{CE} = 1200 V, T _{VJ} = 125°C, Clamped Inductive load, L = 100 μH R _G = 15 Ω VUB 120 R _G = 10 Ω VUB 160		150 A 200 A
C_{ies}		V _{CE} = 25 V, f = 1 MHz, V _{GE} = 0 V VUB 120 VUB 160	5.7 7.4	nF nF
t_{d(on)}	IGBT	V _{CE} = 600 V, I _C = 50/75 A V _{GE} = 15 V, R _G = 15/10 Ω Inductive load; L = 100 μH T _{VJ} = 125°C	VUB 120 VUB 160	170 ns 330 ns
t_{d(off)}			VUB 120 VUB 160	680 ns 750 ns
E_{on}	IGBT	V _{CE} = 600 V, I _C = 50/75 A V _{GE} = 15 V, R _G = 15/10 Ω Inductive load; L = 100 μH T _{VJ} = 125°C	VUB 120 VUB 160	11 mJ 12 mJ
E_{off}			VUB 120 VUB 160	8 mJ 10 mJ
R_{thJC}	IGBT	VUB 120 VUB 160		0.22 K/W 0.18 K/W
R_{thCH}		VUB 120 VUB 160	0.1 0.1	K/W K/W
I_R	Fast Recovery Diode	V _R = V _{RRM} , T _{VJ} = 25°C T _{VJ} = 125°C	0.75	0.5 mA 1 mA
V_F		I _F = 30 A, T _{VJ} = 25°C		2.7 V
V_{T0}	Fast Recovery Diode	For power-loss calculations only		1.3 V
r_T		T _{VJ} = 150°C		15 mΩ
I_{RM}	Fast Recovery Diode	I _F = 50 A, -di _F /dt = 100 A/μs, V _R = 100 V	8	12 A
t_{rr}		I _F = 1 A, -di _F /dt = 100 A/μs, V _R = 30 V	40	60 ns
R_{thJC}	Fast Recovery Diode			0.9 K/W
R_{thCH}			0.3	K/W
R₂₅	NTC	T _{VJ} = 25°C	4.75	5.0 kΩ
R_{25/50}			3375	K

Technical drawing of a 10x10 matrix keypad assembly, showing dimensions in mm (tolerance: 0.0394").

Top View:

- Overall dimensions: 93 mm (width) x 21.6 ± 0.25 mm (height).
- Internal dimensions: 65 x 38 mm.
- Pin spacing: 1.5 mm (indicated by $\phi 1.5$).
- Pin locations are marked with 'X' and 'Y'.
- Mounting holes: 4.5 mm diameter, 13 mm spacing.
- Bottom flange: 0.25 mm thick.

Side View:

- Overall height: 40.4 mm.
- Internal height: 32 mm.
- Pin height: 23.8 mm.
- Pin diameter: $\phi 5.5$.
- Mounting holes: 10 mm diameter, 11.2 ± 0.3 mm spacing.
- Bottom flange: 0.5 mm thick.

Detail Y (M 5:1):

- Pin diameter: $\phi 1.5$ (DIN 46 431).
- Pin height: 1.5 + 0.6 / - 0.3 mm.

Detail X (M 2:1):

- Pin diameter: $\phi 2.5$.
- Pin height: 1.4 mm.
- Pin diameter: $\phi 6.1$.

Matrix Layout:

- Matrix dimensions: 80 ± 0.3 mm (width) x 30.8 ± 0.3 mm (height).
- Internal dimensions: 64.8 ± 0.3 mm, 43.4 ± 0.3 mm, 23.6 ± 0.3 mm, 12.4 ± 0.3 mm, 4 ± 0.3 mm, 9.4 ± 0.3 mm, 0.75 ± 0.3 mm, 4 ± 0.3 mm, 5.5 mm.
- Matrix grid: 10 rows (1-10) x 10 columns (A-J).
- Matrix type: M1/01 W5 W6 S1.
- Label: 4 ± 0.3 mm.