

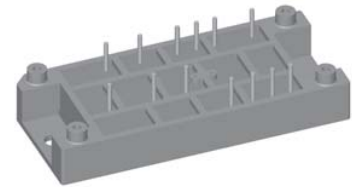
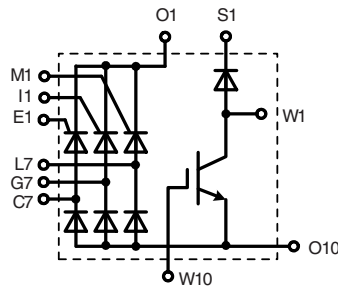
# Three Phase Half Controlled Rectifier Bridge

## with IGBT and Fast Recovery Diode for Braking System

$V_{RRM} = 1200/1600 \text{ V}$   
 $I_{dAV} = 120 \text{ A}$

### Preliminary data

$V_{RRM}$ V	Type
1200	VVZB 120-12 io2
1600	VVZB 120-16 io2



Symbol	Conditions	Maximum Ratings		
$I_{dAV}$	$T_{case} = 80^\circ\text{C}$ , sinusoidal 120°	120	A	
$I_{FRMS}/I_{TRMS}$	$T_{case} = 80^\circ\text{C}$ , per leg	77	A	
$I_{FSM}/I_{TSM}$	$T_{VJ} = 25^\circ\text{C}$ , $t = 10 \text{ ms}$ , $V_R = 0 \text{ V}$	750	A	
	$T_{VJ} = 150^\circ\text{C}$ , $t = 10 \text{ ms}$ , $V_R = 0 \text{ V}$	670	A	
$I^2t$	$T_{VJ} = 25^\circ\text{C}$ , $t = 10 \text{ ms}$ , $V_R = 0 \text{ V}$	2810	A	
	$T_{VJ} = 150^\circ\text{C}$ , $t = 10 \text{ ms}$ , $V_R = 0 \text{ V}$	2240	A	
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ , $f = 50 \text{ Hz}$ , $t_p = 200 \mu\text{s}$ repetitive, $I_T = 150 \text{ A}$	150	A/ $\mu\text{s}$	
	$V_D = \frac{2}{3} V_{DRM}$ $I_G = 0.45 \text{ A}$ , non repetitive, $I_T = I_{d(AV)}/3$ $di_G/dt = 0.45 \text{ A}/\mu\text{s}$	500	A/ $\mu\text{s}$	
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$ ; $V_{DR} = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$ ; method 1 (linear voltage rise)	1000	V/ $\mu\text{s}$	
$P_{GM}$	$T_{VJ} = T_{VJM}$ , $t_p = 30 \mu\text{s}$	10	W	
	$I_T = I_{d(AV)}/3$ , $t_p = 300 \mu\text{s}$	5	W	
	$t_p = 10 \text{ ms}$	1	W	
$P_{GAVM}$		0.5	W	
$V_{CES}$ $V_{GE}$	$T_{VJ} = 25^\circ\text{C}$ to $150^\circ\text{C}$	1200	V	
	Continuous	$\pm 20$	V	
$I_{C25}$ $I_{C80}$ $I_{CM}$	IGBT $T_{case} = 25^\circ\text{C}$ , DC	140	A	
		$T_{case} = 80^\circ\text{C}$ , DC	100	A
		$t_p = \text{Pulse width limited by } T_{VJM}$	280	A
$P_{tot}$	$T_{case} = 80^\circ\text{C}$	570	W	
$V_{RRM}$		1200	V	
$I_{F(AV)}$ $I_{F(RMS)}$ $I_{FRM}$	Fast Recovery Diode $T_{case} = 80^\circ\text{C}$ , rectangular $d = 0.5$	27	A	
		$T_{case} = 80^\circ\text{C}$ , rectangular $d = 0.5$	38	A
		$T_{case} = 80^\circ\text{C}$ , $t_p = 10 \mu\text{s}$ , $f = 5 \text{ kHz}$	tbd	A
$I_{FSM}$	$T_{VJ} = 45^\circ\text{C}$ , $t = 10 \text{ ms}$ $T_{VJ} = 150^\circ\text{C}$ , $t = 10 \text{ ms}$	200	A	
		180	A	
$P_{tot}$	$T_{case} = 80^\circ\text{C}$	64	W	

### Features

- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast freewheel diode
- Convenient package outline

### 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

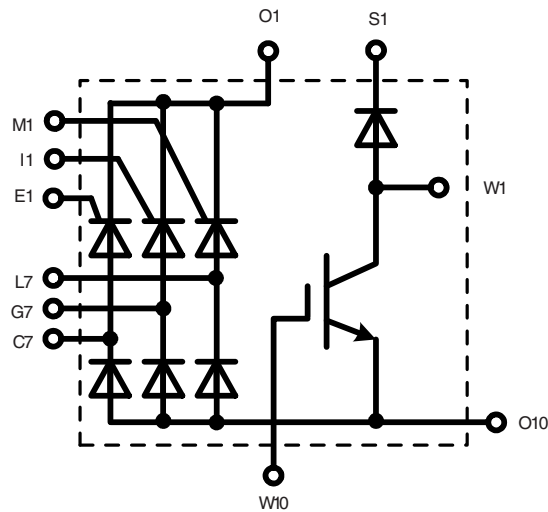
Data according to IEC 60747

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

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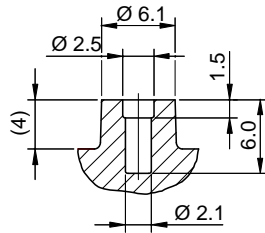
Symbol	Conditions	Characteristic Values		
		(T <sub>VJ</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
I <sub>R</sub> , I <sub>D</sub>	V <sub>R</sub> = V <sub>RRM</sub> /V <sub>DRM</sub> V <sub>R</sub> = V <sub>RRM</sub> /V <sub>DRM</sub> ; T <sub>VJ</sub> = 150°C	0.3		mA 5 mA
V <sub>F</sub> , V <sub>T</sub>	I <sub>F</sub> = 100 A			1.47 V
V <sub>TO</sub>	For power-loss calculations only			0.85 V
r <sub>T</sub>	T <sub>VJ</sub> = 150°C			5 mΩ
V <sub>GT</sub>	V <sub>D</sub> = 6 V; T <sub>VJ</sub> = 25°C			1.5 V
I <sub>GT</sub>	V <sub>D</sub> = 6 V; T <sub>VJ</sub> = 25°C			100 mA
	T <sub>VJ</sub> = -40°C			200 mA
V <sub>GD</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> ; V <sub>D</sub> = 2/3 V <sub>DRM</sub>			0.2 V
I <sub>GD</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> ; V <sub>D</sub> = 2/3 V <sub>DRM</sub>			10 mA
I <sub>L</sub>	V <sub>D</sub> = 6 V; t <sub>G</sub> = 30 μs di <sub>G</sub> /dt = 0.45 A/μs; I <sub>G</sub> = 0.45 A			450 mA
I <sub>H</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> ; V <sub>D</sub> = 6 V; R <sub>GK</sub> = ∞			200 mA
t <sub>gd</sub>	V <sub>D</sub> = 1/2 V <sub>DRM</sub> di <sub>G</sub> /dt = 0.45 A/μs; I <sub>G</sub> = 0.45 A			2 μs
t <sub>q</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> ; V <sub>R</sub> = 100 V; V <sub>D</sub> = 2/3 V <sub>DRM</sub> ; t <sub>p</sub> = 200 μs dv/dt = 10 V/μs; I <sub>T</sub> = 120 A; -di/dt = 10 A/μs			150 μs
Q <sub>S</sub>	} T <sub>VJ</sub> = T <sub>VJM</sub> -di/dt = 0.64 A/μs; I <sub>T</sub> /I <sub>F</sub> = 50 A			90 μC
I <sub>RM</sub>		11 A		
R <sub>thJC</sub>	per thyristor/diode; sine 120° el.			1 K/W
R <sub>thJH</sub>	per thyristor/diode; sine 120° el.			1.3 K/W
V <sub>BR(CES)</sub>	V <sub>GS</sub> = 0 V; I <sub>C</sub> = 1 mA	1200		V
V <sub>GE(th)</sub>	I <sub>C</sub> = 4 mA	4.5		6.5 V
I <sub>GES</sub>	V <sub>GE</sub> = ± 20 V			500 nA
I <sub>CES</sub>	V <sub>CE</sub> = V <sub>CES</sub> V <sub>CE</sub> = V <sub>CES</sub> ; T <sub>VJ</sub> = 125°C			0.2 mA 1 mA
V <sub>CEsat</sub>	V <sub>GE</sub> = 15 V; I <sub>C</sub> = 50 A			2.1 V
t <sub>SC</sub> (SCSOA)	V <sub>GE</sub> = 15 V; V <sub>CE</sub> = 900 V; T <sub>VJ</sub> = 125°C R <sub>G</sub> = 15 Ω; non repetitive			10 μs
RBSOA	V <sub>GE</sub> = 15 V; V <sub>CE</sub> = 1200 V; T <sub>VJ</sub> = 125°C R <sub>G</sub> = 15 Ω; Clamped Inductive load; L = 100 μH			150 A
C <sub>ies</sub>	V <sub>CE</sub> = 25 V; f = 1 MHz; V <sub>GE</sub> = 0 V	5.7		nF
t <sub>d(on)</sub>	} V <sub>CE</sub> = 600 V; I <sub>C</sub> = 50 A V <sub>GE</sub> = 15 V; R <sub>G</sub> = 15 Ω Inductive load; L = 100 μH T <sub>VJ</sub> = 125°C	170		ns
t <sub>d(off)</sub>		680		ns
E <sub>on</sub>		11		mJ
E <sub>off</sub>		8		mJ
R <sub>thJC</sub>				0.22 K/W
R <sub>thCH</sub>		0.1		K/W

Symbol	Conditions	Characteristic Values			
		(T <sub>VJ</sub> = 25°C, unless otherwise specified)			
		min.	typ.	max.	
Fast Recovery Diode	I <sub>R</sub>	V <sub>R</sub> = V <sub>RRM</sub> ; T <sub>VJ</sub> = 25°C V <sub>R</sub> = 0.8 V <sub>RRM</sub> ; T <sub>VJ</sub> = 150°C		0.75 mA 7 mA	
	V <sub>F</sub>	I <sub>F</sub> = 30 A; T <sub>VJ</sub> = 25°C		2.55 V	
	V <sub>TO</sub>	For power-loss calculations only		1.65 V	
	r <sub>T</sub>	T <sub>VJ</sub> = 150°C		18.2 mΩ	
	I <sub>RM</sub>	I <sub>F</sub> = 30 A; -di <sub>F</sub> /dt = 240 A/μs V <sub>R</sub> = 100 V	16	18	A
	t <sub>rr</sub>	I <sub>F</sub> = 1 A; -di <sub>F</sub> /dt = 100 A/μs V <sub>R</sub> = 30 V	40	60	ns
	R <sub>thJC</sub> R <sub>thJH</sub>				1.1 K/W 1.5 K/W
<b>Common Specification</b>		<b>Maximum Ratings</b>			
T <sub>VJ</sub>		-40...+150 °C			
T <sub>VJM</sub>		150 °C			
T <sub>stg</sub>		-40...+125 °C			
V <sub>ISOL</sub>	50/60 Hz	t = 1 min	3000 V~		
	I <sub>ISOL</sub> ≤ 1 mA	t = 1 s	3600 V~		
M <sub>d</sub>	Mounting torque (M5) (10-32 UNF)	2-2.5 Nm 18-22 lb.in.			
Weight	typ.	80 g			
d <sub>s</sub>	Creep distance on surface	12.7 mm			
d <sub>A</sub>	Strike distance in air	11 mm			
a	Maximum allowable acceleration	50 m/s <sup>2</sup>			



Dimensions in mm (1 mm = 0.0394")

Detail X M 2:1



Detail Y M 5:1

