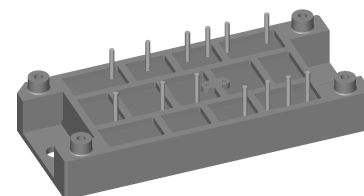
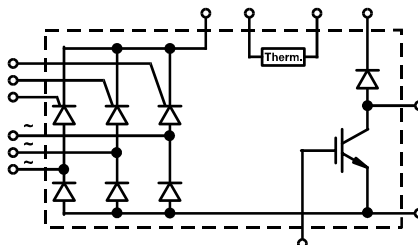


# Three Phase Half Controlled Rectifier Bridge

## with IGBT and Fast Recovery Diode for Braking System

**V<sub>RRM</sub> = 1200-1600 V**  
**I<sub>dAV</sub> = 120 A**

V <sub>RRM</sub> V	Type
1200	VVZB 120-12 io1
1400	VVZB 120-14 io1
1600	VVZB 120-16 io1



Symbol	Conditions	Maximum Ratings	
I <sub>dAV</sub>	T <sub>case</sub> = 80°C, sinusoidal 120°	120	A
I <sub>FRMS</sub> /I <sub>TRMS</sub>	T <sub>case</sub> = 80°C, per leg	77	A
I <sub>FSM</sub> /I <sub>TSM</sub>	T <sub>VJ</sub> = 25°C, t = 10 ms, V <sub>R</sub> = 0 V	750	A
	T <sub>VJ</sub> = 150°C, t = 10 ms, V <sub>R</sub> = 0 V	670	A
I <sup>2</sup> t	T <sub>VJ</sub> = 25°C, t = 10 ms, V <sub>R</sub> = 0 V	2810	A
	T <sub>VJ</sub> = 150°C, t = 10 ms, V <sub>R</sub> = 0V	2240	A
(di/dt) <sub>cr</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> repetitive, I <sub>T</sub> = 150 A f = 50 Hz, t <sub>p</sub> = 200 μs	150	A/μs
	V <sub>D</sub> = 2/3 V <sub>DRM</sub> I <sub>G</sub> = 0.45 A,      non repetitive, I <sub>T</sub> = I <sub>d(AV)</sub> /3 di <sub>G</sub> /dt = 0.45 A/μs	500	A/μs
(dv/dt) <sub>cr</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> ; V <sub>DR</sub> = 2/3 V <sub>DRM</sub> R <sub>GK</sub> = ∞; method 1 (linear voltage rise)	1000	V/μs
P <sub>GM</sub>	T <sub>VJ</sub> = T <sub>VJM</sub> t <sub>p</sub> = 30 μs	10	W
	I <sub>T</sub> = I <sub>d(AV)</sub> /3      t <sub>p</sub> = 300 μs	5	W
	t <sub>p</sub> = 10 ms	1	W
P <sub>GAVM</sub>		0.5	W
V <sub>CES</sub>	T <sub>VJ</sub> = 25°C to 150°C	1200	V
V <sub>GE</sub>	Continuous	± 20	V
I <sub>C25</sub>	T <sub>case</sub> = 25°C, DC	78	A
I <sub>C80</sub>	T <sub>case</sub> = 80°C, DC	52	A
I <sub>CM</sub>	t <sub>p</sub> = Pulse width limited by T <sub>VJM</sub>	140	A
P <sub>tot</sub>	T <sub>case</sub> = 80°C	222	W
V <sub>RRM</sub>		1200	V
I <sub>F(AV)</sub>	T <sub>case</sub> = 80°C, rectangular d = 0.5	27	A
	T <sub>case</sub> = 80°C, rectangular d = 0.5	38	A
	T <sub>case</sub> = 80°C, t <sub>p</sub> = 10 μs, f = 5 kHz	tbd	A
I <sub>FSM</sub>	T <sub>VJ</sub> = 45°C, t = 10 ms	200	A
	T <sub>VJ</sub> = 150°C, t = 10 ms	180	A
P <sub>tot</sub>	T <sub>case</sub> = 80°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.

Symbol	Conditions	Characteristic Values ( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$I_R, I_D$	$V_R = V_{RRM}/V_{DRM}$ $V_R = V_{RRM}/V_{DRM}, T_{VJ} = 150^{\circ}\text{C}$			0.3 mA 5 mA
$V_F, V_T$	$I_F = 100 \text{ A}$ ,			1.47 V
$V_{T0}$	For power-loss calculations only			0.85 V
$r_T$	$T_{VJ} = 150^{\circ}\text{C}$			5 m $\Omega$
$V_{GT}$	$V_D = 6 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = -40^{\circ}\text{C}$			1.5 V 1.6 V
$I_{GT}$	$V_D = 6 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = -40^{\circ}\text{C}$			100 mA 200 mA
$V_{GD}$	$T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}$			0.2 V
$I_{GD}$		$T_{VJ} = T_{VJM}; V_D = 2/3 V_{DRM}$		
$I_L$	$V_D = 6 \text{ V}; t_G = 30 \mu\text{s}$ $di_G/dt = 0.45 \text{ A}/\mu\text{s}; I_G = 0.45 \text{ A}$			450 mA
$I_H$		$T_{VJ} = T_{VJM}; V_D = 6 \text{ V}; R_{GK} = \infty$		
$t_{gd}$	$V_D = 1/2 V_{DRM}$ $di_G/dt = 0.45 \text{ A}/\mu\text{s}; I_G = 0.45 \text{ A}$			2 $\mu\text{s}$
$t_q$	$T_{VJ} = T_{VJM}; V_R = 100 \text{ V}; V_D = 2/3 V_{DRM}; t_p = 200 \mu\text{s}$ $dv/dt = 10 \text{ V}/\mu\text{s}; I_T = 120 \text{ A}; -di/dt = 10 \text{ A}/\mu\text{s}$			150 $\mu\text{s}$
$Q_S$	$T_{VJ} = T_{VJM}$ $-di/dt = 0.64 \text{ A}/\mu\text{s}; I_T/I_F = 50 \text{ A}$			90 $\mu\text{C}$
$I_{RM}$				11 A
$R_{thJC}$	per thyristor / diode; sine $120^{\circ}$ el.			1 KW
$R_{thJH}$	per thyristor / diode; sine $120^{\circ}$ el.			1.3 KW
$V_{BR(CES)}$	$V_{GS} = 0 \text{ V}, I_C = 1 \text{ mA}$	1200		V
$V_{GE(th)}$	$I_C = 10 \text{ mA}$	5		8 V
$I_{GES}$	$V_{GE} = \pm 20 \text{ V}$			500 nA
$I_{CES}$	$V_{CE} = 0.8 V_{CES}$ $V_{CE} = 0.8 V_{CES}, T_{VJ} = 150^{\circ}\text{C}$			0.5 mA 3 mA
$V_{CESat}$	$V_{GE} = 15 \text{ V}, I_C = 50 \text{ A}$			3.35 V
$t_{sc}$ (SCSOA)	$V_{GE} = 15 \text{ V}, V_{CE} = 0.6 V_{CES}, T_{VJ} = 125^{\circ}\text{C}$ , $R_G = 11 \Omega$ , non repetitive			10 $\mu\text{s}$
RBSOA	$V_{GE} = 15 \text{ V}, V_{CE} = 0.8 V_{CES}, T_{VJ} = 125^{\circ}\text{C}$ , $R_G = 11 \Omega$ , Clamped Inductive load, $L = 100 \mu\text{H}$			100 A
$C_{ies}$	$V_{CE} = 25 \text{ V}, f = 1 \text{ MHz}, V_{GE} = 0 \text{ V}$		9	nF
$t_{d(on)}$	$V_{CE} = 0.6 V_{CES}, I_C = 25 \text{ A}$ $V_{GE} = 15 \text{ V}, R_G = 11 \Omega$ Inductive load; $L = 100 \mu\text{H}$ $T_{VJ} = 125^{\circ}\text{C}$		65	ns
$t_{d(off)}$			200	ns
$t_{ri}$			tbd	ns
$t_{fi}$			tbd	ns
$E_{on}$			4.1	mJ
$E_{off}$			5.7	mJ
$R_{thJC}$				0.32 KW
$R_{thJH}$				0.45 KW

Symbol	Conditions	Characteristic Values		
		(T <sub>VJ</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
I <sub>R</sub>	V <sub>R</sub> = V <sub>RRM</sub> , T <sub>VJ</sub> = 25°C		3	0.75 mA
	V <sub>R</sub> = 0.8 V <sub>RRM</sub> , T <sub>VJ</sub> = 150°C			7 mA
V <sub>F</sub>	I <sub>F</sub> = 30 A, T <sub>VJ</sub> = 25°C			2.55 V
V <sub>T0</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>				1.1 KW
R <sub>thJH</sub>				1.5 KW
<b>Fast Recovery Diode</b>				
<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 18-22	Nm 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>
R <sub>25</sub>	Thermistor		2.1	kΩ
B <sub>25/100</sub>			3560	K
<b>Module</b>				

