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Rectifier Bridges Circuit configuration	I_{dAV} A	V_{RRM}/V_{DRM} (V) 1200 12	1400 14	1600 16	Type	Page
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2	59	●		●	VUB 60-..NO1	F3 - 4
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3	137	●		●	VUB 160-..NO1	F3 -10
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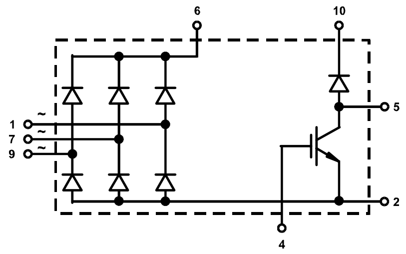
1



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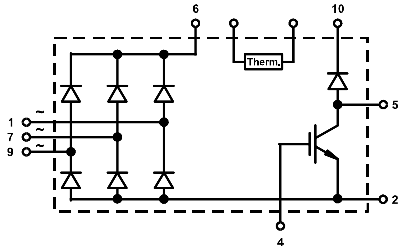

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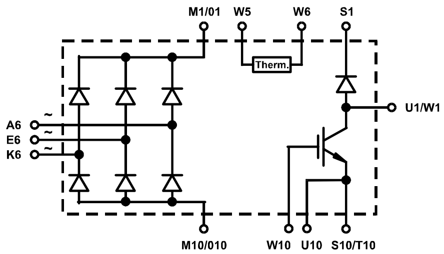

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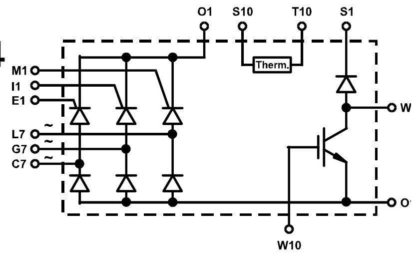

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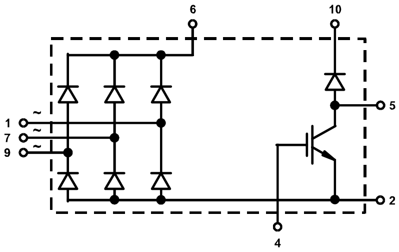
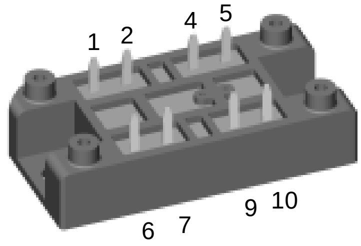
Three Phase Rectifier Bridge
with IGBT and Fast Recovery Diode
for Braking System

V_{RRM} = 1200-1600 V
I_{dAV} = 51 A

Preliminary data

V_{RRM} V	Type
1200	VUB 51-12 NO1
1600	VUB 51-16 NO1





Symbol		Test Conditions	Maximum Ratings	
V_{RRM}	Rectifier Diodes		1200 / 1600	V
I_{dAV}		T_H = 110°C, sinusoidal 120°	51	A
I_{dAVM}		limited by leads	70	A
I_{FSM}		T_{VJ} = 45°C, t = 10 ms, V_R = 0 V	300	A
		T_{VJ} = 150°C, t = 10 ms, V_R = 0 V	260	A
I^2t		T_{VJ} = 45°C, t = 10 ms, V_R = 0 V	450	A
		T_{VJ} = 150°C, t = 10 ms, V_R = 0V	340	A
P_{tot}		T_H = 25°C per diode	80	W
V_{CES}	IGBT	T_{VJ} = 25°C to 150°C	1200	V
V_{GE}		Continuous	± 20	V
I_{C25}		T_H = 25°C, DC	31	A
I_{C80}		T_H = 80°C, DC	21	A
I_{CM}		t_p = Pulse width limited by T_{VJM}	62	A
P_{tot}		T_H = 25°C	130	W
V_{RRM}	Fast Recovery Diode		1200	V
I_{FAV}		T_H = 80°C, rectangular d = 0.5	9	A
I_{FRMS}		T_H = 80°C, rectangular d = 0.5	14	A
I_{FRM}		T_H = 80°C, t_P = 10 µs, f = 5 kHz	90	A
I_{FSM}		T_{VJ} = 45°C, t = 10 ms	75	A
		T_{VJ} = 150°C, t = 10 ms	60	A
P_{tot}		T_H = 25°C	40	W
T_{VJ}	Module		-40...+150	°C
T_{VJM}			150	°C
T_{stg}			-40...+125	°C
V_{ISOL}		50/60 Hz t = 1 min	3000	V~
		I_{ISOL} ≤ 1 mA t = 1 s	3600	V~
M_d		Mounting torque (M5)	2-2.5	Nm
		(10-32 unf)	18-22	lb.in.
Weight		typ.	35	g

Data according to IEC 60747
IXYS reserves the right to change limits, test conditions and dimensions.

Features

- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast freewheel diode
- Convenient package outline
- UL registered E 72873

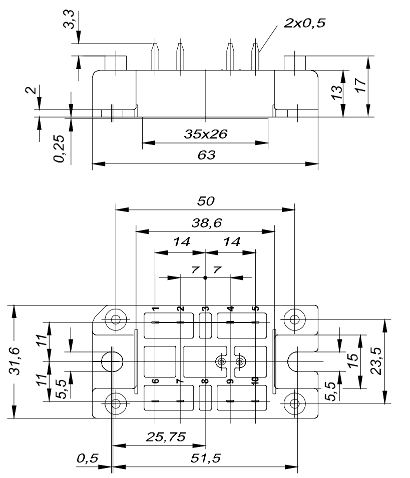
Applications

- 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

Dimensions in mm (1 mm = 0.0394")



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Symbol		Test 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 $V_R = V_{RRM}$, T_{VJ} = 150°C			0.1 3	mA mA
V_F		I_F = 25 A, T_{VJ} = 25°C			1.16	V
V_{T0} r_T		For power-loss calculations only T_{VJ} = 150°C			0.8 12.5	V mΩ
R_{thJH}		per diode			1.5	K/W
$V_{BR(CES)}$ $V_{GE(th)}$	IGBT	V_{GS} = 0 V, I_C = 3 mA I_C = 10 mA	1200 5		 7.5	V V
I_{GES}		V_{GE} = ± 20 V			500	nA
I_{CES}		T_{VJ} = 25°C, V_{CE} = 0.8 V_{CES} T_{VJ} = 125°C, V_{CE} = 0.8 V_{CES}			250 1	µA mA
V_{CEsat}		V_{GE} = 15 V, I_C = 25 A			3.5	V
t_{SC} (SCSOA)		V_{GE} = 15 V, V_{CE} = 0.6 V_{CES}, T_{VJ} = 125°C, R_G = 4.7 Ω, non repetitive			10	µs
I_C (RBSOA)		V_{GE} = 15 V, V_{CE} = 0.8 V_{CES}, T_{VJ} = 125°C, R_G = 4.7 Ω, Clamped Inductive load, L = 100 µH			50	A
C_{ies}		V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0 V		2.9		nF
$t_{d(on)}$ $t_{d(off)}$ t_{fi} E_{on} E_{off}		V_{CE} = 600 V, I_C = 25 A V_{GE} = 15 V, R_G = 4.7 Ω Inductive load; L = 100 µH T_{VJ} = 125°C		100 220 1600 3.5 12		ns ns ns mJ mJ
R_{thJH}					1	K/W
I_R	Fast Recovery Diode	V_R = V_{RRM}, T_{VJ} = 25°C V_R = 800 V, T_{VJ} =150°C			0.2 6	mA mA
V_F		I_F = 12 A, T_{VJ} = 25°C			2.7	V
V_{T0} r_T		For power-loss calculations only T_{VJ} = 150°C			1.65 46	V mΩ
I_{RM}		I_F = 25 A, $-di_F/dt$ = 100 A/µs V_R = 100 V T_J = 100°C		6.5	7	A
t_{rr}		I_F = 1 A, $-di_F/dt$ = 100 A/µs V_R = 30 V T_J = 100°C		50	70	ns
R_{thJH}					3.12	K/W
d_S d_A a	Module	Creep distance on surface Strike distance in air Maximum allowable acceleration			12.7 9.4 50	mm mm m/s^2

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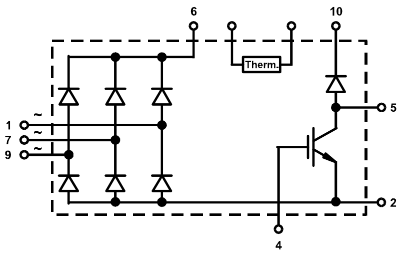
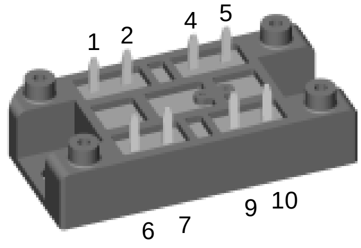
Three Phase Rectifier Bridge
with IGBT and Fast Recovery Diode for Braking System

V_{RRM} = 1200-1600 V
I_{dAVM} = 70 A

V_{RRM} V	Type
1200	VUB 60-12 NO1
1600	VUB 60-16 NO1





	Symbol	Test Conditions		Maximum Ratings	
Rectifier Diodes	V_{RRM}			1200 / 1600	V
	I_{dAV}	T_H = 110°C, sinusoidal 120°		59	A
	I_{dAVM}	limited by leads		70	A
	I_{FSM}	T_{VJ} = 45°C, t = 10 ms, V_R = 0 V		530	A
		T_{VJ} = 150°C, t = 10 ms, V_R = 0 V		475	A
	I^2t	T_{VJ} = 45°C, t = 10 ms, V_R = 0 V		1400	A
		T_{VJ} = 150°C, t = 10 ms, V_R = 0V		1130	A
	P_{tot}	T_H = 80°C per diode		49	W
IGBT	V_{CES}	T_{VJ} = 25°C to 150°C		1200	V
	V_{GE}	Continuous		± 20	V
	I_{C25}	T_H = 25°C, DC		31	A
	I_{C70}	T_H = 70°C, DC		23	A
	I_{C80}	T_H = 80°C, DC		21	A
	I_{CM}	t_p = Pulse width limited by T_{VJM}		62	A
	P_{tot}	T_H = 80°C		70	W
Fast Recovery Diode	V_{RRM}			1200	V
	I_{FAV}	T_H = 80°C, rectangular d = 0.5		8	A
	I_{FRMS}	T_H = 80°C, rectangular d = 0.5		12	A
	I_{FRM}	T_H = 80°C, t_P = 10 µs, f = 5 kHz		90	A
	I_{FSM}	T_{VJ} = 45°C, t = 10 ms		75	A
		T_{VJ} = 150°C, t = 10 ms		60	A
	P_{tot}	T_H = 80°C		22	W
Module	T_{VJ}			-40...+150	°C
	T_{VJM}			150	°C
	T_{stg}			-40...+125	°C
	V_{ISOL}	50/60 Hz	t = 1 min	3000	V~
		I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
	M_d	Mounting torque	(M5)	2-2.5	Nm
			(10-32 unf)	18-22	lb.in.
	Weight	typ.		35	g

Data according to IEC 60747
IXYS reserves the right to change limits, test conditions and dimensions.

Features

- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast freewheel diode
- Convenient package outline
- UL registered E 72873
- Thermistor

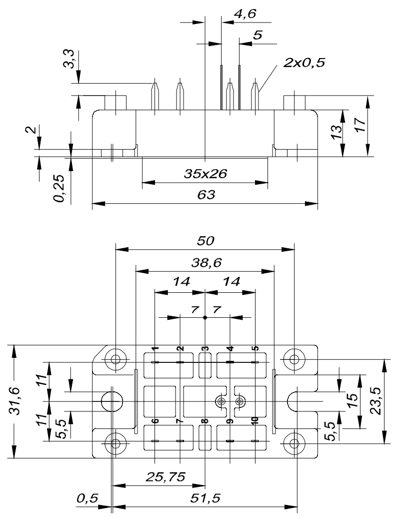
Applications

- 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

Dimensions in mm (1 mm = 0.0394")



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Symbol		Test 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 $V_R = V_{RRM}$, T_{VJ} = 150°C			0.1 3	mA mA
V_F	Rectifier Diodes	I_F = 25 A, T_{VJ} = 25°C			1.3	V
V_{T0} r_T	Rectifier Diodes	For power-loss calculations only T_{VJ} = 150°C			0.85 8.5	V mΩ
R_{thJH}	Rectifier Diodes	per diode			1.42	K/W
$V_{BR(CES)}$ $V_{GE(th)}$	IGBT	V_{GS} = 0 V, I_C = 3 mA I_C = 10 mA	1200 5		 7.5	V V
I_{GES}	IGBT	V_{GE} = ± 20 V			500	nA
I_{CES}	IGBT	T_{VJ} = 25°C, V_{CE} = 800 V T_{VJ} = 125°C, V_{CE} = 800 V			250 1	µA mA
V_{CEsat}	IGBT	V_{GE} = 15 V, I_C = 25 A			3.5	V
t_{SC} (SCSOA)	IGBT	V_{GE} = 15 V, V_{CE} = 600 V, T_{VJ} = 125°C, R_G = 4.7 Ω, non repetitive			10	µs
RBSOA	IGBT	V_{GE} = 15 V, V_{CE} = 800 V, T_{VJ} = 125°C, R_G = 4.7 Ω, Clamped Inductive load, L = 100 µH			50	A
C_{ies}	IGBT	V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0 V		2.85		nF
$t_{d(on)}$ $t_{d(off)}$ t_{fi} E_{on} E_{off}	IGBT	V_{CE} = 600 V, I_C = 25 A V_{GE} = 15 V, R_G = 4.7 Ω Inductive load; L = 100 µH T_{VJ} = 125°C		100 220 1600 3.5 12		ns ns ns mJ mJ
R_{thJH}	IGBT				1	K/W
I_R	Fast Recovery Diode	$V_R = V_{RRM}$, T_{VJ} = 25°C V_R = 800 V, T_{VJ} = 150°C			0.2 6	mA mA
V_F	Fast Recovery Diode	I_F = 12 A, T_{VJ} = 25°C			2.7	V
V_{T0} r_T	Fast Recovery Diode	For power-loss calculations only T_{VJ} = 150°C			1.65 46	V mΩ
I_{RM}	Fast Recovery Diode	I_F = 25 A, $-di_F/dt$ = 100 A/µs V_R = 100 V		6.5	7	A
t_{rr}	Fast Recovery Diode	I_F = 1 A, $-di_F/dt$ = 100 A/µs V_R = 30 V		50	70	ns
R_{thJH}	Fast Recovery Diode				3.12	K/W
R_{25}	NTC	Siemens Typ S 891/2,2k/+9			2.2	kΩ
d_S d_A a	Module	Creep distance on surface Strike distance in air Maximum allowable acceleration			12.7 9.4 50	mm mm m/s^2

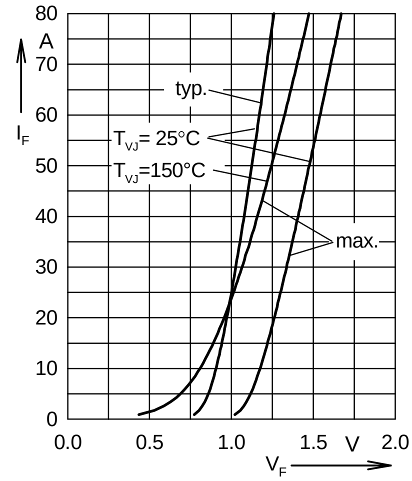

Fig. 1 Forward current versus voltage drop per rectifier diode

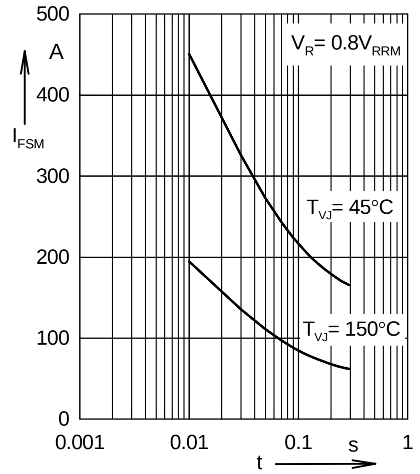

Fig. 2 Surge overload current per rectifier diode

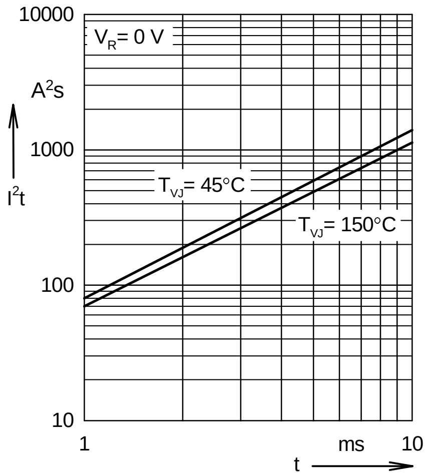

Fig. 3 I^2t versus time per rectifier diode

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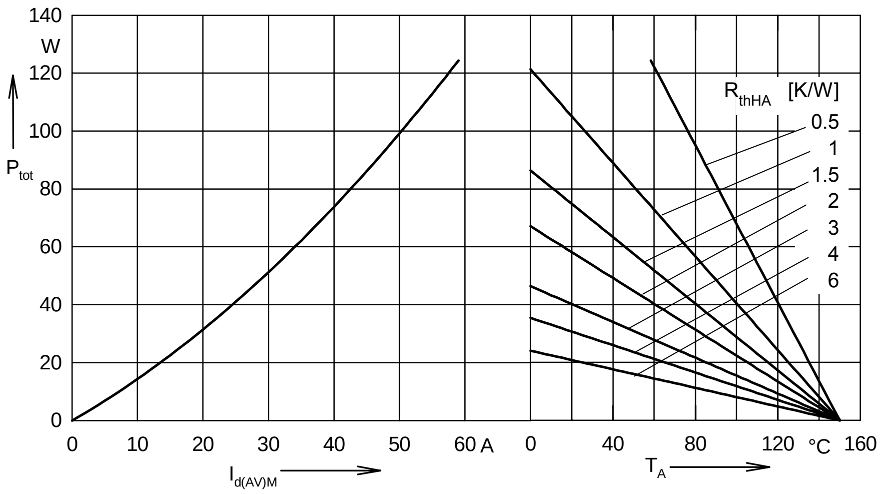

Fig. 4 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

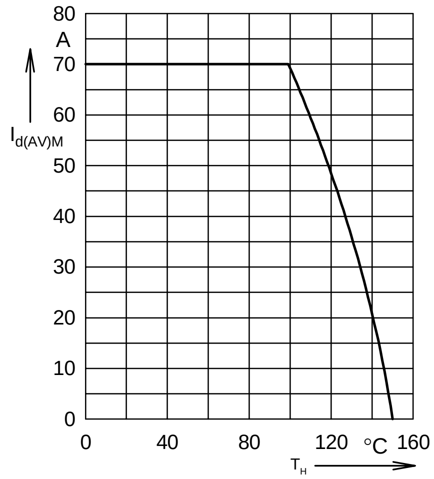

Fig. 5 Maximum forward current versus heatsink temperature (Rectifier bridge)

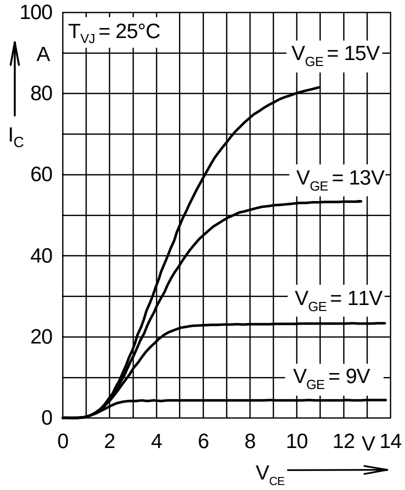

Fig. 6 Output characteristics for braking (IGBT)

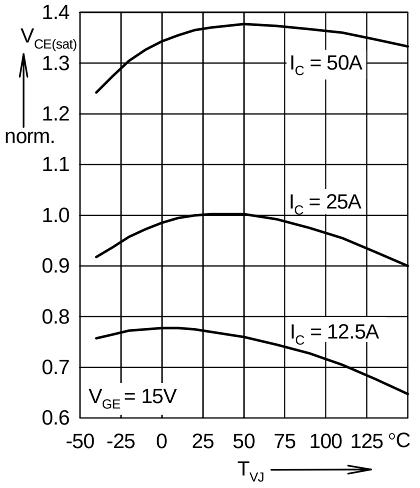

Fig. 7 Saturation voltage versus junction temperature normalized (IGBT)

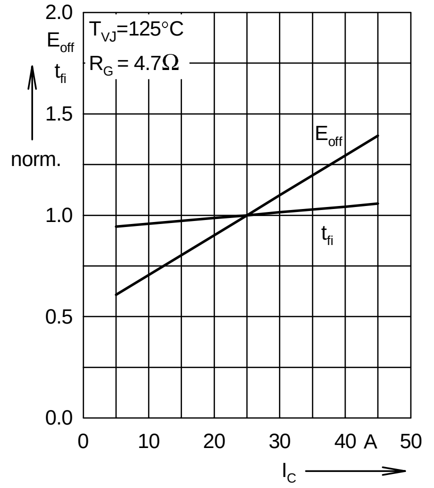

Fig. 8 Turn-off energy per pulse and fall time versus collector current, normalized (IGBT)

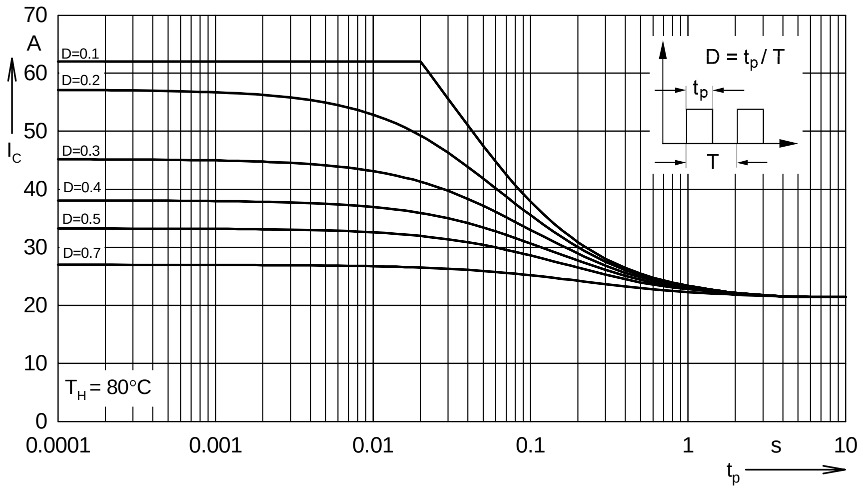

Fig. 9 Collector current versus pulse width and duty cycle (IGBT)

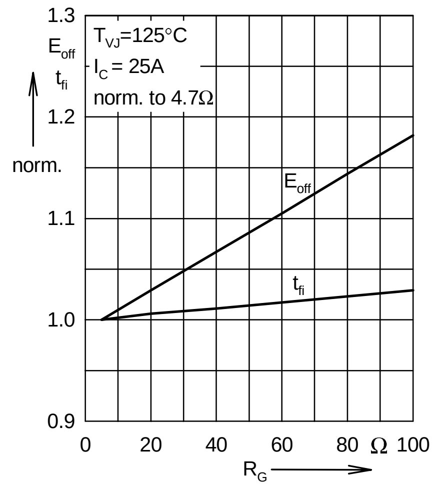

Fig.10 Turn-off energy per pulse and fall time versus R_G (IGBT)

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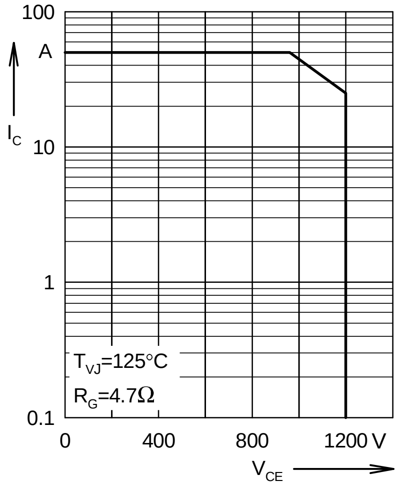

Fig.11 Reverse biased safe operation area (IGBT)

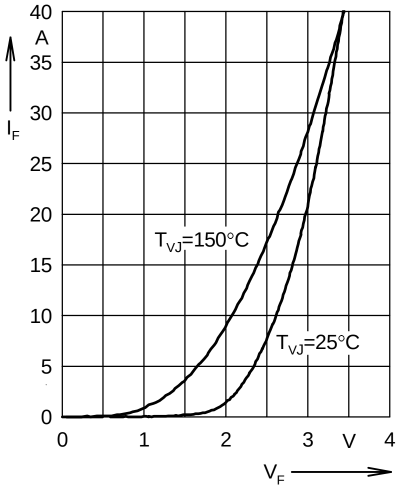

Fig. 12 Forward current versus voltage drop (Fast Diode)

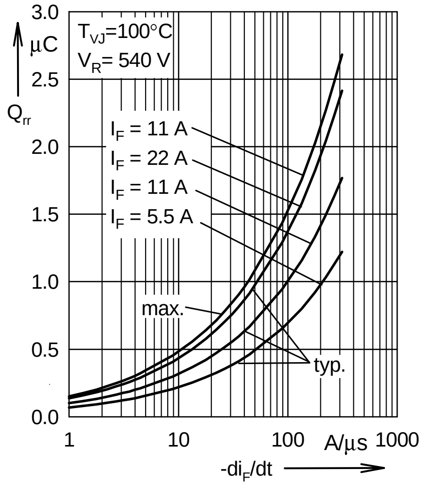

Fig. 13 Recovery charge versus $-di_F/dt$ (Fast Diode)

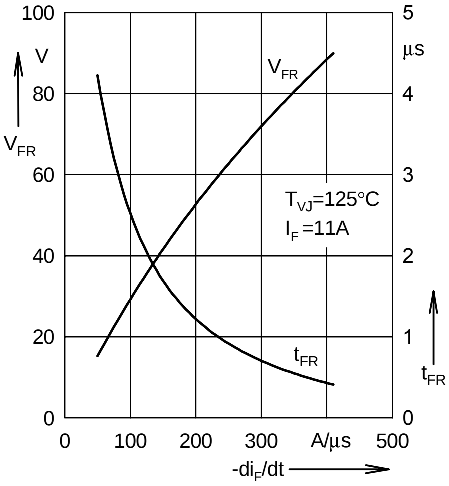

Fig.14 Peak forward voltage and recovery time versus $-di_F/dt$ (Fast Diode)

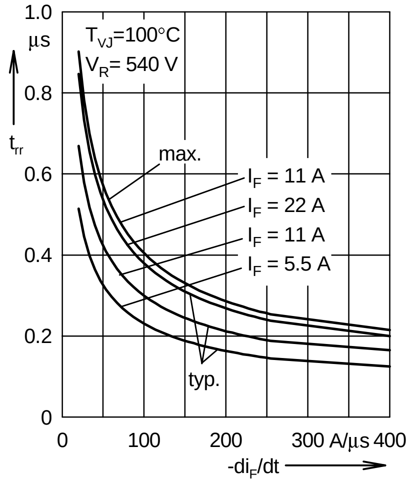

Fig.15 Recovery time versus $-di_F/dt$ (Fast Diode)

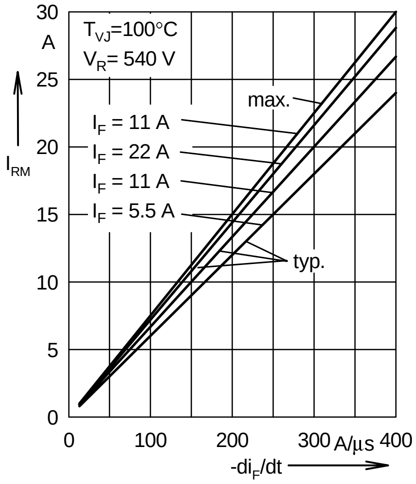

Fig.16 Peak reverse current versus $-di_F/dt$ (Fast Diode)

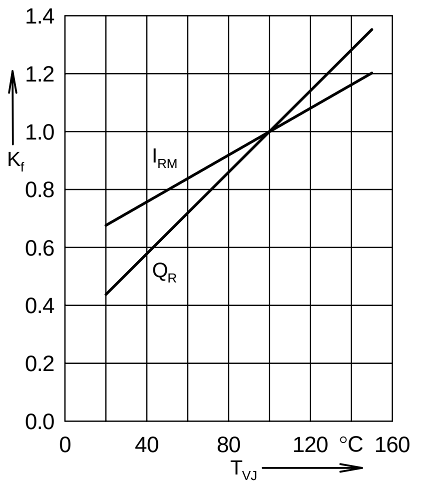

Fig.17 Dynamic parameters versus junction temperature (Fast Diode)

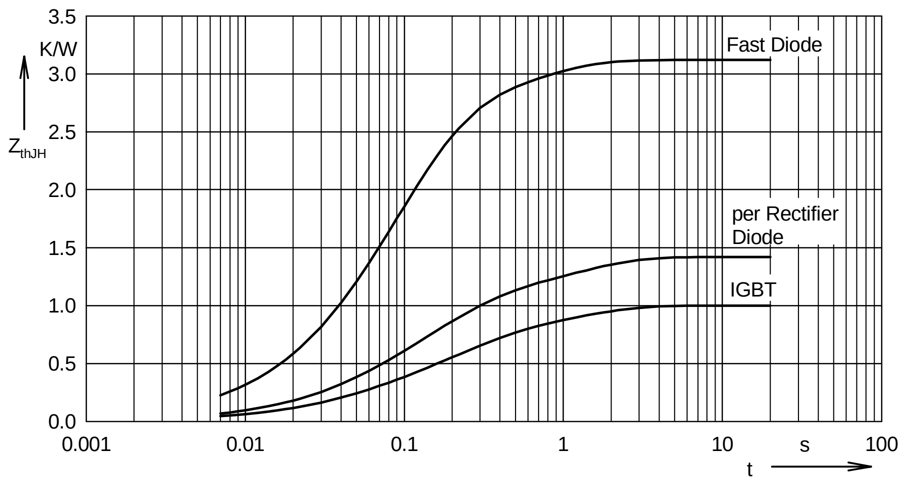

Fig.18 Transient thermal impedance junction to heatsink Z_{thJH}

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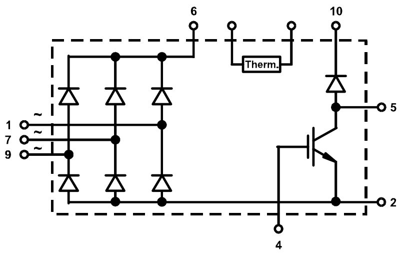
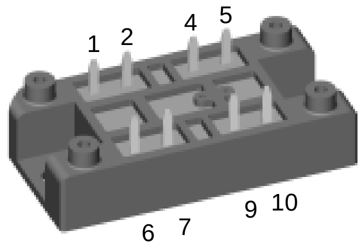
Three Phase Rectifier Bridge
with IGBT and Fast Recovery Diode for Braking System

V_{RRM} = 1200-1600 V
I_{dAVM} = 70 A

V_{RRM} V	Type
1200	**VUB 71-12 NO1**
1600	**VUB 71-16 NO1**





Symbol		Test Conditions		Maximum Ratings	
V_{RRM}	Rectifier Diodes			1200 / 1600	V
I_{dAV}		T_H = 110°C, sinusoidal 120°		59	A
I_{dAVM}		limited by leads		70	A
I_{FSM}		T_{VJ} = 45°C, t = 10 ms, V_R = 0 V		530	A
		T_{VJ} = 150°C, t = 10 ms, V_R = 0 V		475	A
I^2t		T_{VJ} = 45°C, t = 10 ms, V_R = 0 V		1400	A
		T_{VJ} = 150°C, t = 10 ms, V_R = 0V		1130	A
P_{tot}		T_H = 25°C per diode		90	W
V_{CES}	IGBT	T_{VJ} = 25°C to 150°C		1200	V
V_{GE}		Continuous		± 20	V
I_{C25}		T_H = 25°C, DC		43	A
I_{C80}		T_H = 80°C, DC		29	A
I_{CM}		t_p = Pulse width limited by T_{VJM}		90	A
P_{tot}		T_H = 80°C		160	W
V_{RRM}	Fast Recovery Diode			1200	V
I_{FAV}		T_H = 80°C, rectangular d = 0.5		9	A
I_{FRMS}		T_H = 80°C, rectangular d = 0.5		14	A
I_{FRM}		T_H = 80°C, t_P = 10 µs, f = 5 kHz		90	A
I_{FSM}		T_{VJ} = 45°C, t = 10 ms		75	A
		T_{VJ} = 150°C, t = 10 ms		60	A
P_{tot}		T_H = 25°C		40	W
T_{VJ}	Module			-40...+150	°C
T_{VJM}				150	°C
T_{stg}				-40...+125	°C
V_{ISOL}		50/60 Hz	t = 1 min	3000	V~
		I_{ISOL} ≤ 1 mA	t = 1 s	3600	V~
M_d		Mounting torque	(M5)	2-2.5	Nm
			(10-32 unf)	18-22	lb.in.
Weight		typ.		35	g

Data according to IEC 60747
IXYS reserves the right to change limits, test conditions and dimensions.

Features

- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast freewheeling diode
- Convenient package outline
- UL registered E 72873
- Thermistor

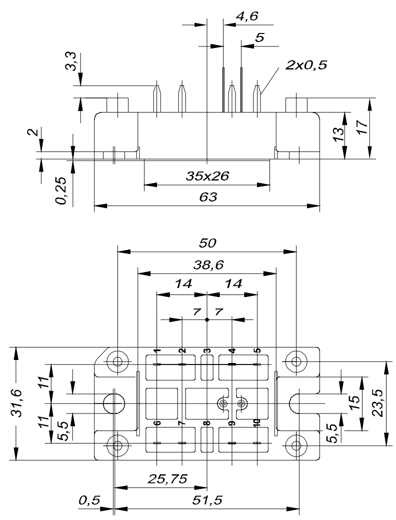
Applications

- Drive Inverters with brake system

Advantages

- 2 functions in one package
- No external isolation neccessary
- Easy to mount with two screws
- Suitable for wave soldering
- High temperature and power cycling capability

Dimensions in mm (1 mm = 0.0394")



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Symbol		Test 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 $V_R = V_{RRM}$, T_{VJ} = 150°C			0.1 3	mA mA
V_F	Rectifier Diodes	I_F = 25 A, T_{VJ} = 25°C			1.3	V
V_{T0} r_T	Rectifier Diodes	For power-loss calculations only T_{VJ} = 150°C			0.85 8.5	V mΩ
R_{thJH}	Rectifier Diodes	per diode			1.42	K/W
$V_{BR(CES)}$ $V_{GE(th)}$	IGBT	V_{GS} = 0 V, I_C = 3 mA I_C = 10 mA	1200 5		 8	V V
I_{GES}	IGBT	V_{GE} = ± 20 V			500	nA
I_{CES}	IGBT	T_{VJ} = 25°C, $V_{CE} = V_{CES}$ T_{VJ} = 125°C, $V_{CE} = 0.8\ V_{CES}$			700 1.5	µA mA
V_{CEsat}	IGBT	V_{GE} = 15 V, I_C = 25 A			2.9	V
t_{SC} (SCSOA)	IGBT	V_{GE} = 15 V, V_{CE} = 600 V, T_{VJ} = 125°C, R_G = 22 Ω, non repetitive			10	µs
RBSOA	IGBT	V_{GE} = 15 V, V_{CE} = 800 V, T_{VJ} = 125°C, R_G = 22 Ω, Clamped Inductive load, L = 100 µH			50	A
C_{ies}	IGBT	V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0 V		4.5		nF
$t_{d(on)}$ $t_{d(off)}$ t_{fi} E_{on} E_{off}	IGBT	V_{CE} = 600 V, I_C = 25 A V_{GE} = 15 V, R_G = 22 Ω Inductive load; L = 100 µH T_{VJ} = 125°C		300 350 1600 6 8		ns ns ns mJ mJ
R_{thJH}	IGBT				0.8	K/W
I_R	Fast Recovery Diode	$V_R = V_{RRM}$, T_{VJ} = 25°C V_R = 800 V, T_{VJ} =150°C		 4	0.2 6	mA mA
V_F	Fast Recovery Diode	I_F = 12 A, T_{VJ} = 25°C			2.7	V
V_{T0} r_T	Fast Recovery Diode	For power-loss calculations only T_{VJ} = 150°C			1.65 46	V mΩ
I_{RM}	Fast Recovery Diode	I_F = 25 A, $-di_F/dt$ = 100 A/µs V_R = 100 V		6.5	7	A
t_{rr}	Fast Recovery Diode	I_F = 1 A, $-di_F/dt$ = 100 A/µs V_R = 30 V		50	70	ns
R_{thJH}	Fast Recovery Diode				3.12	K/W
R_{25}	NTC	Siemens Typ S 891/2,2k/+9			2,2	kΩ
d_S d_A a	Module	Creep distance on surface Strike distance in air Maximum allowable acceleration			12.7 9.4 50	mm mm m/s^2

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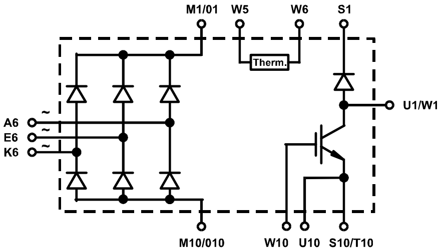
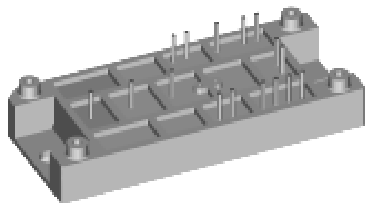
Three Phase Rectifier Bridge
with IGBT and Fast Recovery Diode for Braking System

V_{RRM} = 1200/1600 V
I_{dAVM} = 121/157 A

Preliminary Data

V_{RRM} V	Type	V_{RRM} V	Type
1200	**VUB 120-12 NO1**	**1600**	**VUB 120-16 NO1**
1200	**VUB 160-12 NO1**	**1600**	**VUB 160-16 NO1**





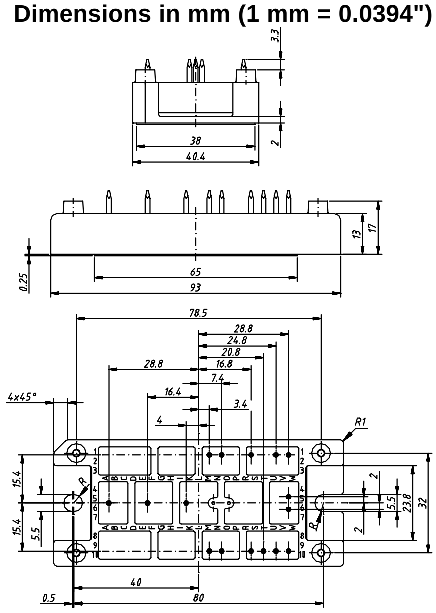
Symbol		Test Conditions		Maximum Ratings VUB 120	VUB160	
V_{RRM}	Rectifier Diodes			1200/1600	1200/1600	V
I_{dAVM}		T_C = 75°C, sinusoidal 120°		121	157	A
I_{FSM}		T_{VJ} = 45°C,	t = 10 ms, V_R = 0 V	650	850	A
		T_{VJ} = 150°C,	t = 10 ms, V_R = 0 V	580	760	A
I^2t		T_{VJ} = 45°C,	t = 10 ms, V_R = 0 V	2110	3610	A
		T_{VJ} = 150°C,	t = 10 ms, V_R = 0V	1680	2880	A
P_{tot}		T_C = 25°C per diode		130	160	W
V_{CES}	IGBT	T_{VJ} = 25°C to 150°C		1200	1200	V
V_{GE}		Continuous		± 20	± 20	V
I_{C25}		T_C = 25°C, DC		100	150	A
I_{C75}		T_C = 75°C, DC		71	106	A
		T_C = 75°C, d = 0.5		56	85	A
I_{CM}		t_p = Pulse width limited by T_{VJM}		200	300	A
P_{tot}		T_C = 25°C		400	600	W
V_{RRM}	Fast Recovery Diode			1200		V
I_{FAV}		T_C = 75°C, rectangular d = 0.5		25		A
I_{FRMS}		T_C = 75°C, rectangular d = 0.5		39		A
I_{FRM}		T_C = 75°C, t_P = 10 µs, f = 5 kHz		tbd		A
I_{FSM}		T_{VJ} = 45°C,	t = 10 ms	200		A
		T_{VJ} = 150°C,	t = 10 ms	180		A
P_{tot}		T_C = 25°C		100		W
T_{VJ}	Module			-40...+150		°C
T_{VJM}				150		°C
T_{stg}				-40...+125		°C
V_{ISOL}		50/60 Hz	t = 1 min	3000		V~
		I_{ISOL} ≤ 1 mA	t = 1 s	3600		V~
M_d		Mounting torque	(M5)	2-2.5		Nm
			(10-32 unf)	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

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.

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

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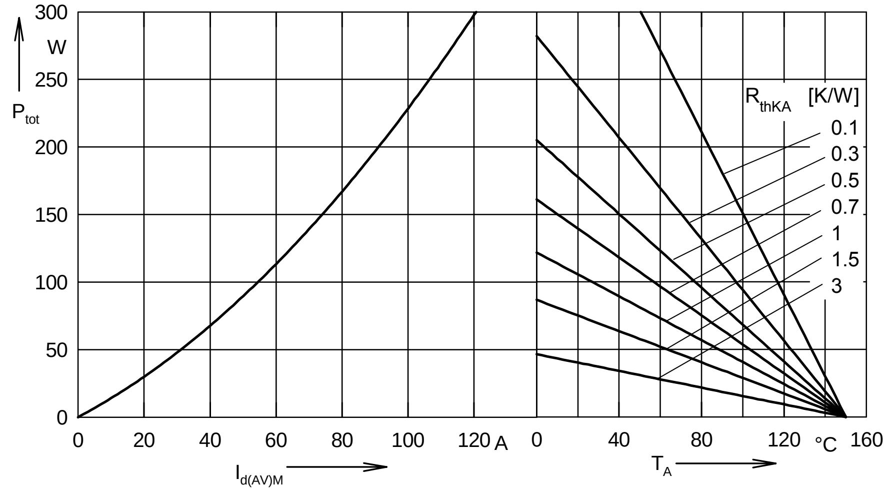


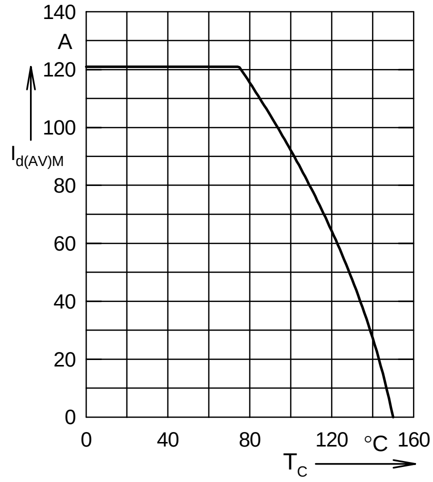
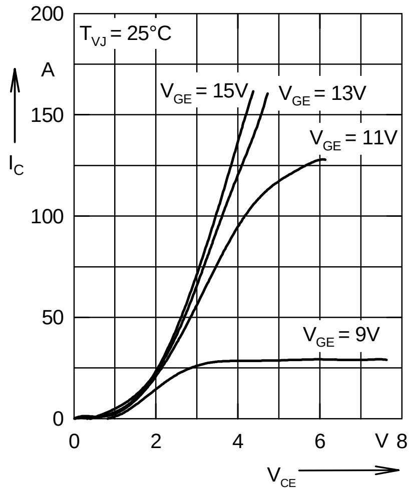
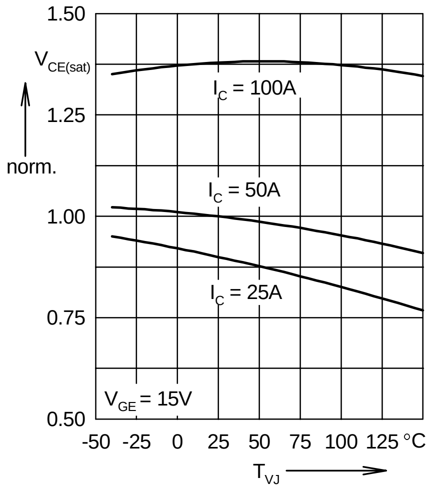


Fig. 1 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

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





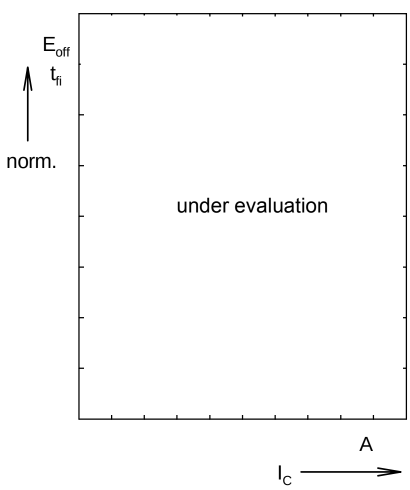
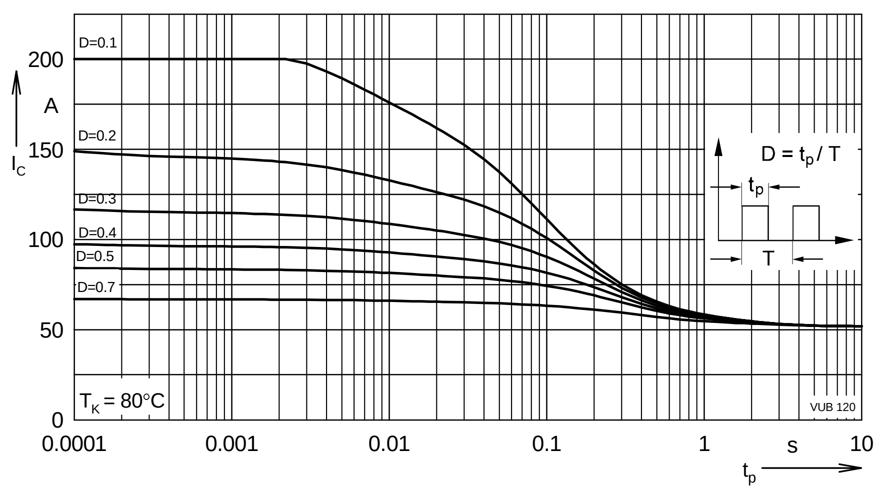


Fig. 3 Output characteristics for braking (IGBT)

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)



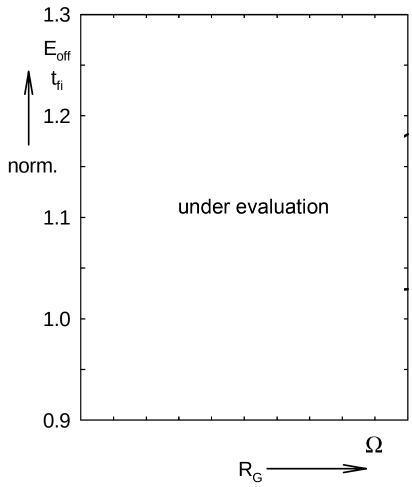


Fig. 6 Collector current dependence on pulse width and duty cycle (IGBT)

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

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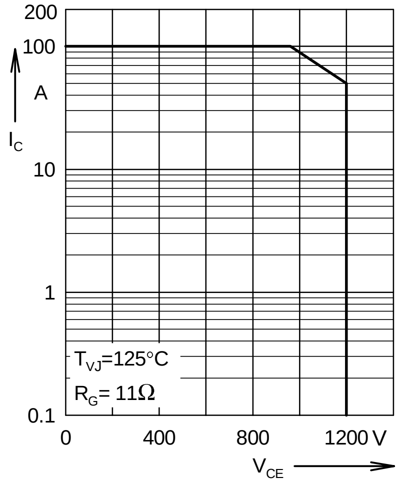

Fig. 8 Reverse baised safe operation area (IGBT)

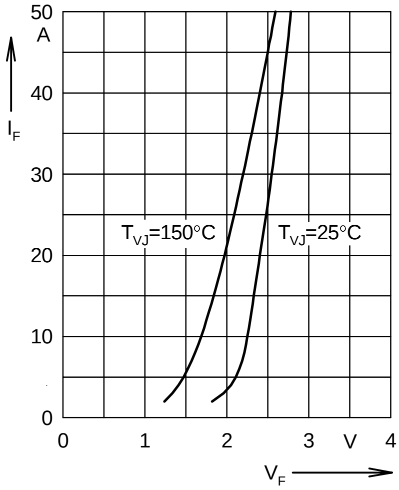

Fig. 9 Forward current versus voltage drop (Fast Diode)

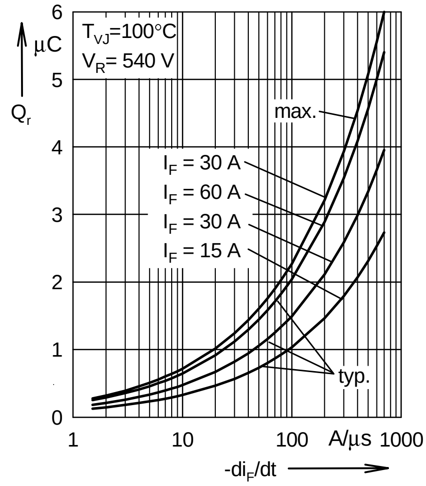

Fig. 10 Recovery charge versus $-di_F/dt$ (Fast Diode)

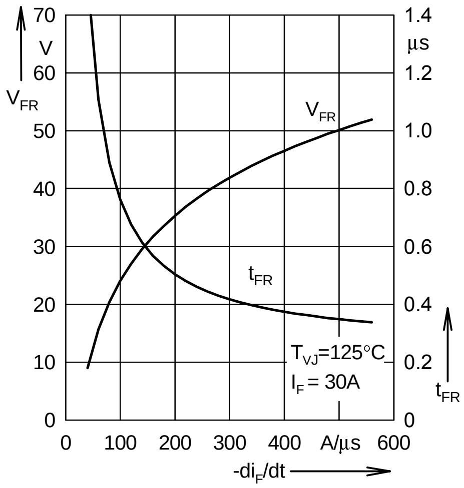

Fig.11 Peak forward voltage and recovery time versus $-di_F/dt$ (Fast Diode)

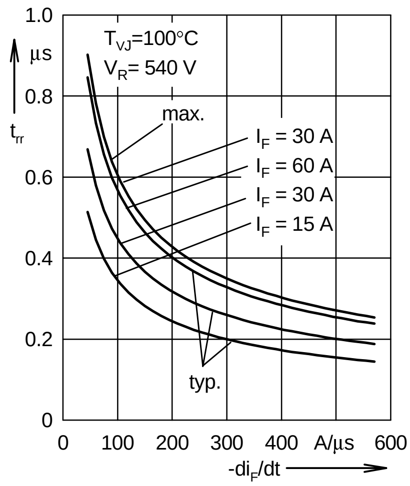

Fig.12 Recovery time versus $-di_F/dt$ (Fast Diode)

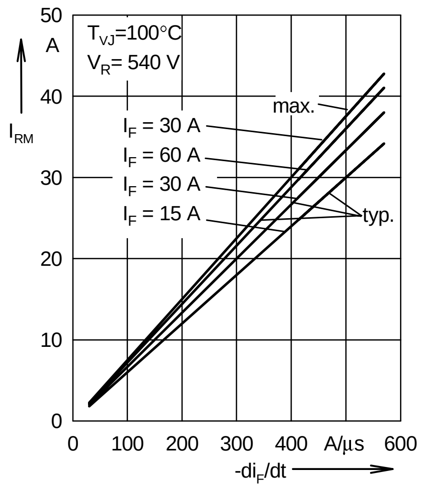

Fig.13 Peak reverse current versus $-di_F/dt$ (Fast Diode)

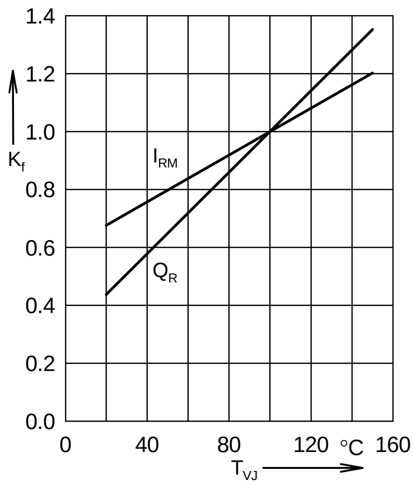

Fig.14 Dynamic parameters versus junction temperature (Fast Diode)

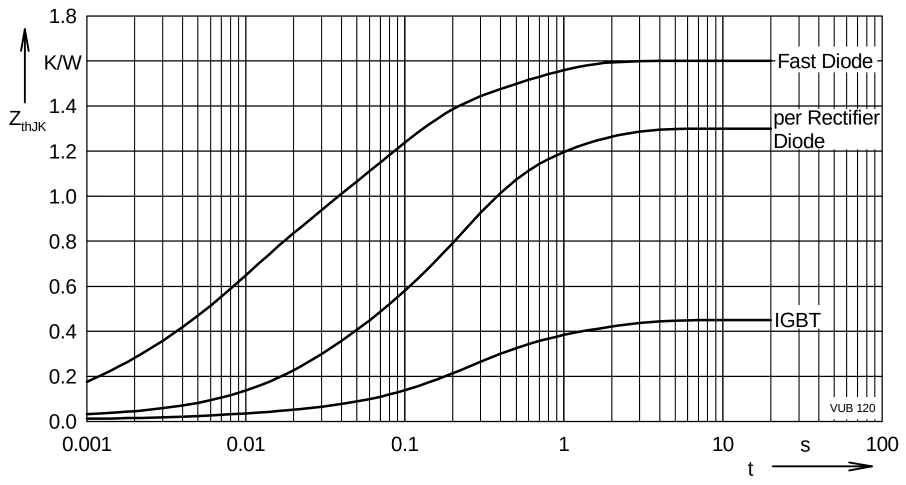

Fig.15 Transient thermal impedance junction to heatsink Z_{thJK}

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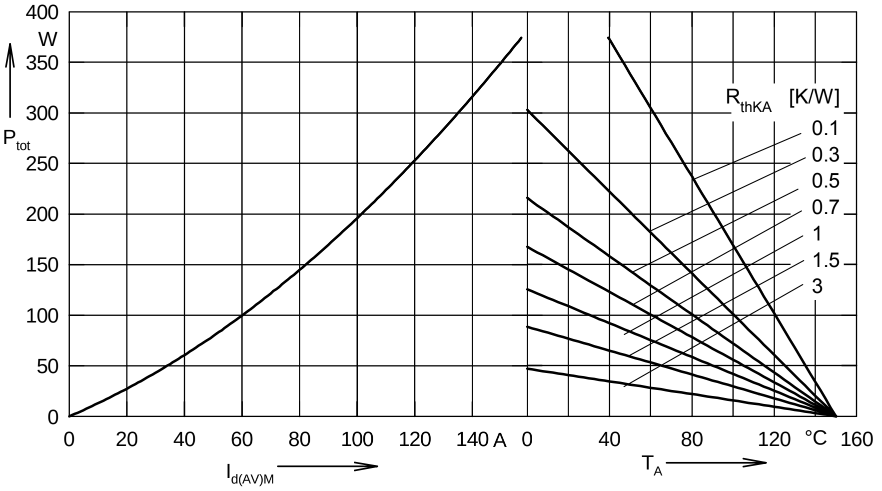

Fig. 1 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

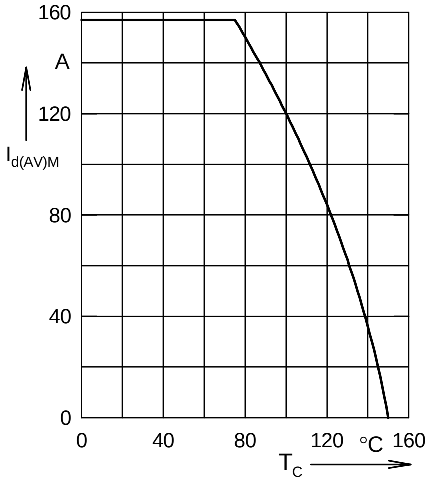

Fig. 2 Maximum forward current versus case temperature (Rectifier bridge)

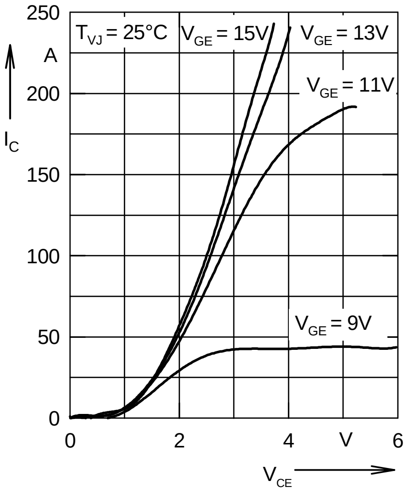

Fig. 3 Output characteristics for braking (IGBT)

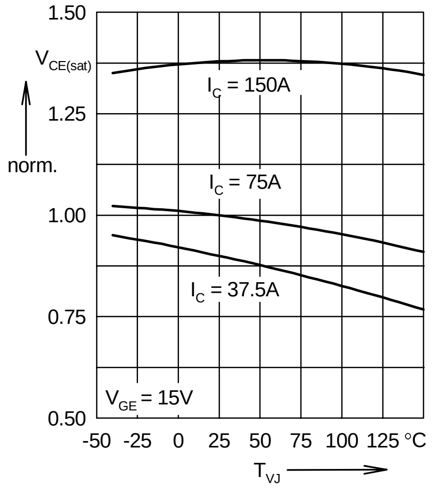

Fig. 4 Temperature dependence of output saturation voltage, normalized (IGBT)

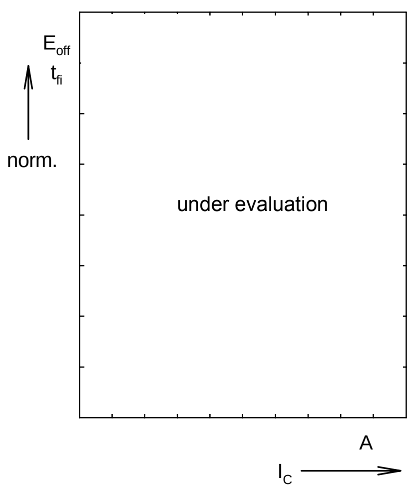

Fig. 5 Turn-off energy per pulse and fall time in collector current, normalized (IGBT)

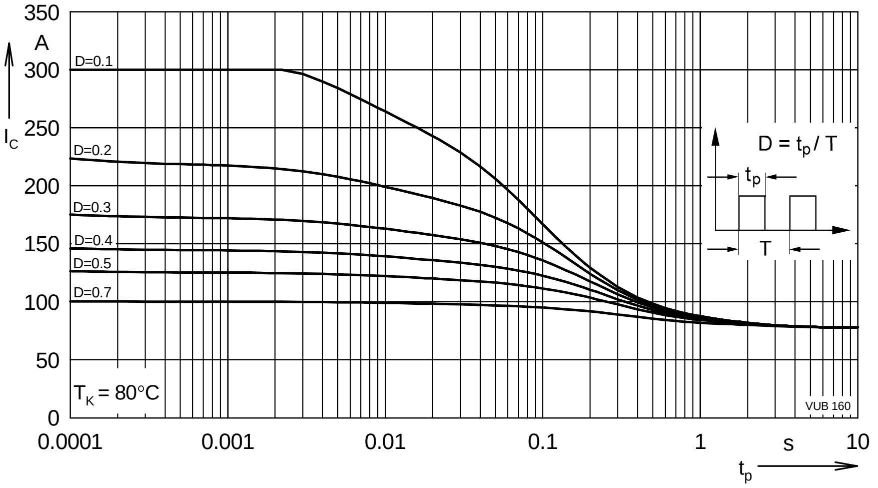

Fig. 6 Collector current dependence on pulse width and duty cycle (IGBT)

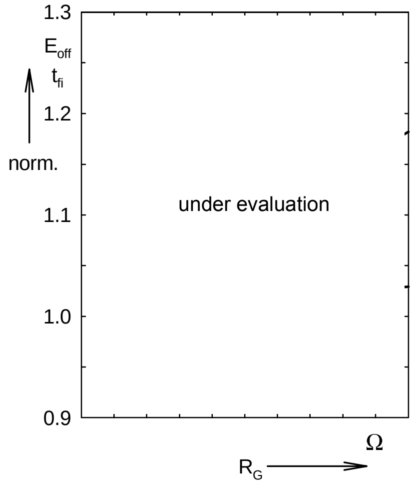

Fig.7 Turn-off energy per pulse and fall time on R_G (IGBT)

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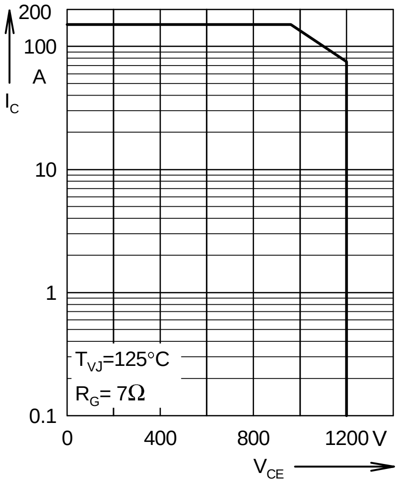

Fig. 8 Reverse baised safe operation area (IGBT)

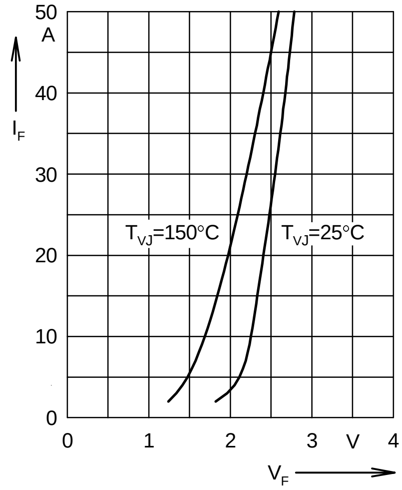

Fig. 9 Forward current versus voltage drop (Fast Diode)

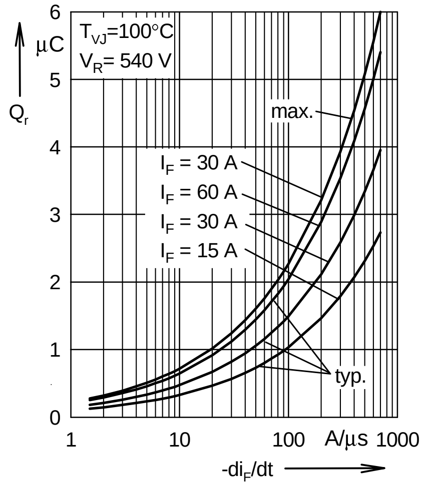

Fig. 10 Recovery charge versus $-di_F/dt$ (Fast Diode)

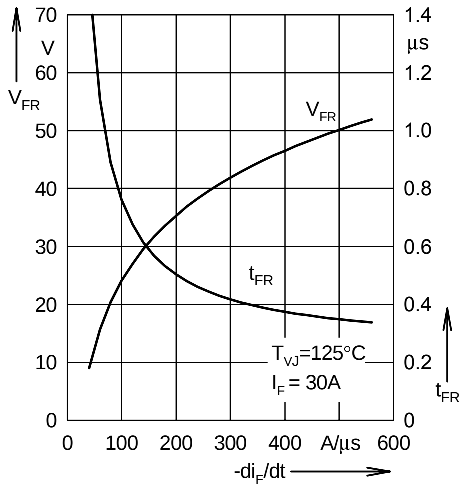

Fig.11 Peak forward voltage and recovery time versus $-di_F/dt$ (Fast Diode)

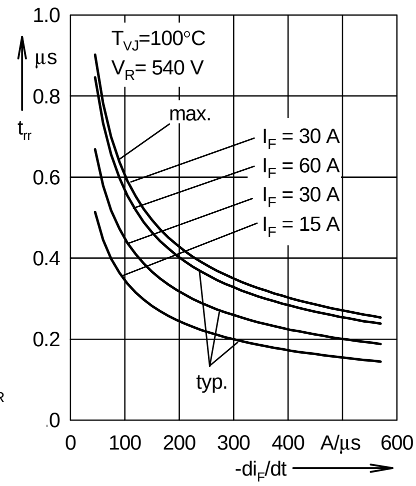

Fig.12 Recovery time versus $-di_F/dt$ (Fast Diode)

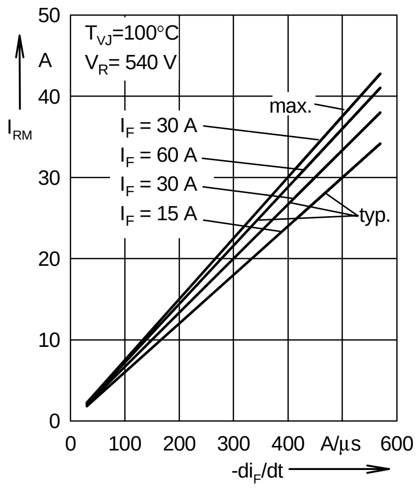

Fig.13 Peak reverse current versus $-di_F/dt$ (Fast Diode)

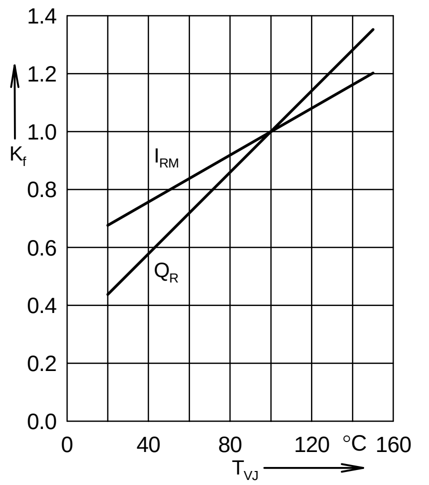

Fig.14 Dynamic parameters versus junction temperature (Fast Diode)

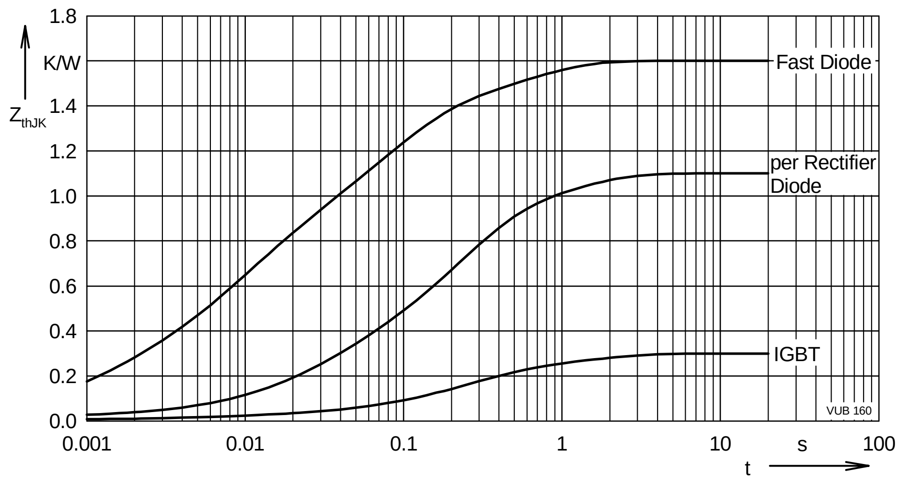

Fig.15 Transient thermal impedance junction to heatsink Z_{thJK}

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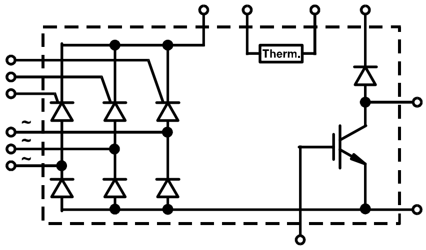
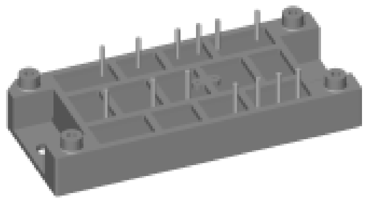
Three Phase Half Controlled Rectifier Bridge

with IGBT and Fast Recovery Diode for Braking System

V_{RRM} = 1200-1600 V
I_{dAV} = 120 A

V_{RRM} V	Type
1200	**VVZB 120-12 io1**
1400	**VVZB 120-14 io1**
1600	**VVZB 120-16 io1**





	Symbol	Conditions		Maximum Ratings	
Rectifier Bridge	I_{dAV}	T_{case}= 80°C, sinusoidal 120°		120	A
	I_{FRMS}/I_{TRMS}	T_{case}= 80°C, per leg		77	A
	I_{FSM}/I_{TSM}	T_{VJ} = 25°C, t = 10 ms, V_R = 0 V		750	A
		T_{VJ} = 150°C, t = 10 ms, V_R = 0 V		670	A
	I^2t	T_{VJ} = 25°C, t = 10 ms, V_R = 0 V		2810	A
		T_{VJ} = 150°C, t = 10 ms, V_R = 0V		2240	A
	$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50 Hz, t_P = 200 µs	repetitive, I_T = 150 A	150	A/µs
		$V_D = {}^2/_3\ V_{DRM}$ I_G = 0.45 A, di_G/dt = 0.45 A/µs	non repetitive, $I_T = I_{d(AV)}/3$	500	A/µs
	$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$; $V_{DR} = {}^2/_3\ V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise)		1000	V/µs
	P_{GM}	$T_{VJ} = T_{VJM}$	t_P = 30 µs	10	W
		$I_T = I_{d(AV)}/3$	t_P = 300 µs	5	W
			t_P = 10 ms	1	W
	P_{GAVM}			0.5	W
IGBT	V_{CES}	T_{VJ} = 25°C to 150°C		1200	V
	V_{GE}	Continuous		± 20	V
	I_{C25}	T_{case} = 25°C, DC		78	A
	I_{C80}	T_{case} = 80°C, DC		52	A
	I_{CM}	t_p = Pulse width limited by T_{VJM}		140	A
	P_{tot}	T_{case} = 80°C		222	W
Fast Recovery Diode	V_{RRM}			1200	V
	$I_{F(AV)}$	T_{case} = 80°C, rectangular d = 0.5		27	A
	$I_{F(RMS)}$	T_{case} = 80°C, rectangular d = 0.5		38	A
	I_{FRM}	T_{case} = 80°C, t_P = 10 µs, f = 5 kHz		tbd	A
	I_{FSM}	T_{VJ} = 45°C, t = 10 ms		200	A
		T_{VJ} = 150°C, t = 10 ms		180	A
	P_{tot}	T_{case} = 80°C		64	W

Data according to IEC 60747
IXYS reserves the right to change limits, test conditions and dimensions.

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

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Symbol		Conditions	Characteristic Values (min.)	(typ.)	(max.)	
		(T_{VJ} = 25°C, unless otherwise specified)	min.	typ.	max.	
I_R, I_D	Rectifier Bridge	$V_R = V_{RRM}/V_{DRM}$, $V_R = V_{RRM}/V_{DRM}$, T_{VJ} = 150°C			0.3 5	mA mA
V_F, V_T		I_F = 100 A,			1.47	V
V_{T0} r_T		For power-loss calculations only T_{VJ} = 150°C			0.85 5	V mΩ
V_{GT} I_{GT}		V_D = 6 V; T_{VJ} = 25°C T_{VJ} = -40°C V_D = 6 V; T_{VJ} = 25°C T_{VJ} = -40°C			1.5 1.6 100 200	V V mA mA
V_{GD} I_{GD}		$T_{VJ} = T_{VJM}$; $V_D = {}^2/_3\, V_{DRM}$ $T_{VJ} = T_{VJM}$; $V_D = {}^2/_3\, V_{DRM}$			0.2 10	V mA
I_L		V_D = 6 V; t_G = 30 µs di_G/dt = 0.45 A/µs; I_G = 0.45 A			450	mA
I_H		$T_{VJ} = T_{VJM}$; V_D = 6 V; $R_{GK} = \infty$			200	mA
t_{gd}		$V_D = ½\, V_{DRM}$ di_G/dt = 0.45 A/µs; I_G = 0.45 A			2	µs
t_q		$T_{VJ} = T_{VJM}$; V_R = 100 V; $V_D = {}^2/_3\, V_{DRM}$; t_P = 200 µs dv/dt = 10 V/µs; I_T = 120 A; -di/dt = 10 A/µs			150	µs
Q_S I_{RM}		$T_{VJ} = T_{VJM}$ -di/dt = 0.64 A/µs; I_T/I_F = 50 A			90 11	µC A
R_{thJC} R_{thJH}		per thyristor / diode; sine 120° el. per thyristor / diode; sine 120° el.			1 1.3	K/W K/W
$V_{BR(CES)}$ $V_{GE(th)}$	IGBT	V_{GS} = 0 V, I_C = 1 mA I_C = 10 mA	1200 5		 8	V V
I_{GES}		V_{GE} = ± 20 V			500	nA
I_{CES}		$V_{CE} = 0.8\, V_{CES}$ $V_{CE} = 0.8\, V_{CES}$, T_{VJ} = 150°C			0.5 3	mA mA
V_{CEsat}		V_{GE} = 15 V, I_C = 50 A			3.35	V
t_{SC} (SCSOA)		V_{GE} = 15 V, $V_{CE} = 0.6\, V_{CES}$, T_{VJ} = 125°C, R_G = 11 Ω, non repetitive			10	µs
RBSOA		V_{GE} = 15 V, $V_{CE} = 0.8\, V_{CES}$, T_{VJ} = 125°C, R_G = 11 Ω, Clamped Inductive load, L = 100 µH			100	A
C_{ies}		V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0 V		9		nF
$t_{d(on)}$ $t_{d(off)}$ t_{ri} t_{fi} E_{on} E_{off}		$V_{CE} = 0.6\, V_{CES}$, I_C = 25 A V_{GE} = 15 V, R_G = 11 Ω Inductive load; L = 100 µH T_{VJ} = 125°C		65 200 tbd tbd 4.1 5.7		ns ns ns ns mJ mJ
R_{thJC} R_{thJH}					0.32 0.45	K/W K/W

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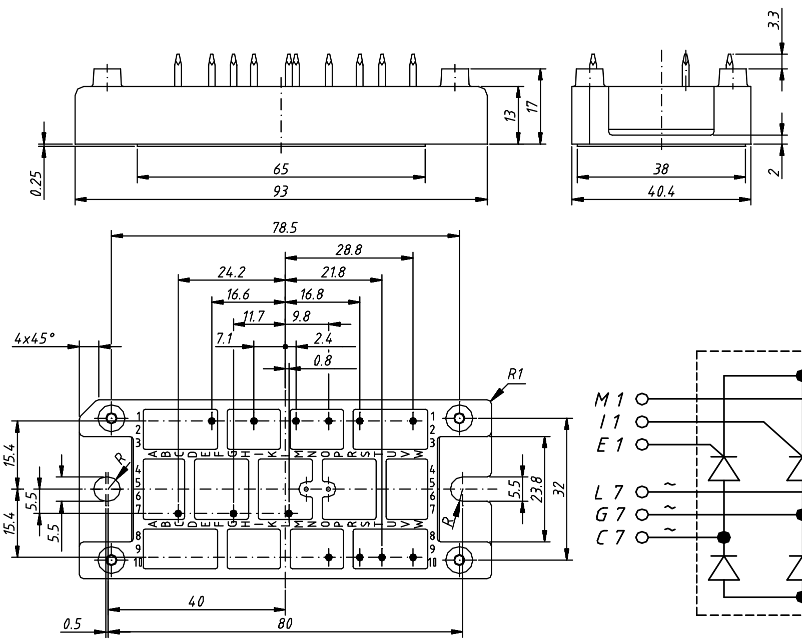
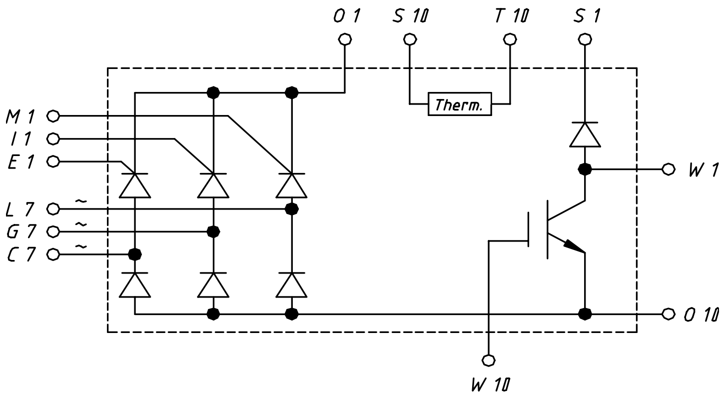
Symbol		Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
I_R	Fast Recovery Diode	V_R = V_{RRM}, T_{VJ} = 25°C V_R = 0.8 V_{RRM}, T_{VJ} = 150°C		 3	0.75 7	mA mA
V_F		I_F = 30 A, T_{VJ} = 25°C			2.55	V
V_{T0} r_T		For power-loss calculations only T_{VJ} = 150°C			1.65 18.2	V mΩ
I_{RM}		I_F = 30 A, $-di_F/dt$ = 240 A/µs V_R = 100 V		16	18	A
t_{rr}		I_F = 1 A, $-di_F/dt$ = 100 A/µs V_R = 30 V		40	60	ns
R_{thJC} R_{thJH}					1.1 1.5	K/W K/W

		Common Specification		Maximum Ratings	
T_{VJ} T_{VJM} T_{stg}	Module			-40...+150 150 -40...+125	°C °C °C
V_{ISOL}		50/60 Hz I_{ISOL} ≤ 1 mA	t = 1 min t = 1 s	3000 3600	V~ V~
M_d		Mounting torque	(M5) (10-32 unf)	2-2.5 18-22	Nm lb.in.
Weight		typ.		80	g
d_S d_A a		Creep distance on surface Strike distance in air Maximum allowable acceleration		12.7 11 50	mm mm m/s^2
R_{25} $B_{25/100}$		Thermistor		2.1 3560	kΩ K

Dimensions in mm (1 mm = 0.0394")





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