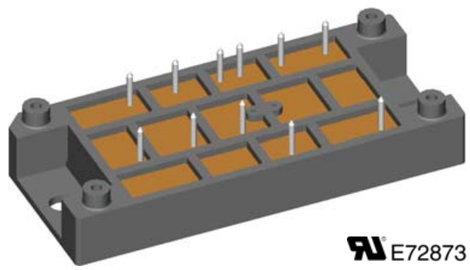
Thyristor Module

3 ~ Rectifier	Brake Chopper
V_{RRM} = 1600 V	V_{CES} = 1200 V
I_{DAVM} = 120 A	I_{C25} = 155 A
I_{FSM} = 700 A	$V_{CE(sat)}$ = 1.9 V

3~ Rectifier Bridge, half-controlled (high-side) + Brake Unit

Part name

VVZB120-16ioX



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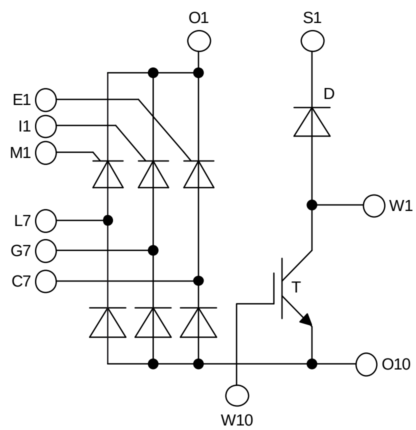


Features / Advantages:

- Soldering connections for PCB mounting
- Convenient package outline

Applications:

- 3~ Rectifier with brake unit for drive inverters

Package:

- Housing: V2-Pack
- DCB ceramic base plate
- Isolation voltage 3600 V~
- Easy to mount with two screws
- Space and weight savings
- RoHS compliant

Rectifier

Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage		T_{VJ} = 25°C			1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage		T_{VJ} = 25°C			1600	V
$I_{R/D}$	reverse current, drain current	$V_{R/D}$ = 1600 V	T_{VJ} = 25°C			300	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 125°C			10	mA
V_T	forward voltage drop	I_T = 40 A	T_{VJ} = 25°C			1.14	V
		I_T = 80 A				1.32	V
		I_T = 40 A	T_{VJ} = 125°C			1.06	V
		I_T = 80 A				1.29	V
$I_{D(AV)M}$	bridge output current	T_C = 80°C	T_{VJ} = 150°C			120	A
		rectangular d = ⅓					
V_{T0}	threshold voltage	for power loss calculation only	T_{VJ} = 150°C			0.86	V
r_T	slope resistance					5.4	mΩ
R_{thJC}	thermal resistance junction to case					1.00	K/W
R_{thCH}	thermal resistance case to heatsink				0.2		K/W
P_{tot}	total power dissipation		T_C = 25°C			120	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			700	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			755	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			595	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			645	A
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			2.45	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			2.37	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			1.77	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.73	kA²s
C_J	junction capacitance	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		54		pF
P_{GM}	max. gate power dissipation	t_P = 30 µs	T_C = 150°C			10	W
		t_P = 300 µs				5	W
P_{GAV}	average gate power dissipation					0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	T_{VJ} = 150°C; f = 50 Hz	repetitive, I_T = 120 A			150	A/µs
		t_P = 200 µs; di_G/dt = 0.45 A/µs					
		I_G = 0.45 A; V_D = ⅔ V_{DRM}	non-repet., I_T = 40 A			500	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V_D = ⅔ V_{DRM}	T_{VJ} = 150 °C			1000	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	V_D = 6 V	T_{VJ} = 25 °C			1.5	V
			T_{VJ} = -40 °C			1.6	V
I_{GT}	gate trigger current	V_D = 6 V	T_{VJ} = 25 °C			95	mA
			T_{VJ} = -40 °C			200	mA
V_{GD}	gate non-trigger voltage	V_D = ⅔ V_{DRM}	T_{VJ} = 150 °C			0.2	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	t_p = 30 µs	T_{VJ} = 25 °C			450	mA
		I_G = 0.45 A; di_G/dt = 0.45 A/µs					
I_H	holding current	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25 °C			200	mA
t_{gd}	gate controlled delay time	V_D = ½ V_{DRM}	T_{VJ} = 25 °C			2	µs
		I_G = 0.45 A; di_G/dt = 0.45 A/µs					
t_q	turn-off time	V_R = 100 V; I_T = 40 A; V_D = ⅔ V_{DRM}	T_{VJ} = 150 °C		150		µs
		di/dt = 10 A/µs; dv/dt = 20 V/µs; t_p = 200 µs					

Brake IGBT

Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			1200	V
V_{GES}	*max. DC gate voltage*					±20	V
V_{GEM}	*max. transient collector gate voltage*					±30	V
I_{C25}	*collector current*		T_C = 25°C			155	A
I_{C80}			T_C = 80°C			107	A
P_{tot}	*total power dissipation*		T_C = 25°C			500	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 100 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.9	2.2	V
			T_{VJ} = 125°C		2.5		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 4 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5.4	5.9	6.5	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			0.1	mA
			T_{VJ} = 125°C		0.1		mA
I_{GES}	*gate emitter leakage current*	V_{GE} = ±20 V				500	nA
$Q_{G(on)}$	*total gate charge*	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 100 A			295		nC
$t_{d(on)}$	*turn-on delay time*	inductive load	T_{VJ} = 125°C		70		ns
t_r	*current rise time*	V_{CE} = 600 V; I_C = 100 A			40		ns
$t_{d(off)}$	*turn-off delay time*	V_{GE} = ±15 V; R_G = 6.8 Ω			250		ns
t_f	*current fall time*				100		ns
E_{on}	*turn-on energy per pulse*				8.5		mJ
E_{off}	*turn-off energy per pulse*				11.5		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 6.8 Ω	T_{VJ} = 125°C				
I_{CM}		V_{CEK} = 1200 V				300	A
SCSOA	*short circuit safe operating area*						
t_{SC}	*short circuit duration*	V_{CE} = 720 V; V_{GE} = ±15 V	T_{VJ} = 125°C			10	µs
I_{SC}	*short circuit current*	R_G = 6.8 Ω; non-repetitive			400		A
R_{thJC}	*thermal resistance junction to case*					0.25	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.1		K/W

Brake Diode

Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			1200	V
I_{F25}	*forward current*		T_C = 25°C			48	A
I_{F80}			T_C = 80°C			34	A
V_F	*forward voltage*	I_F = 30 A	T_{VJ} = 25°C			2.71	V
			T_{VJ} = 125°C			1.94	V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			0.25	mA
			T_{VJ} = 125°C			1	mA
Q_{rr}	*reverse recovery charge*	V_R = 600 V			1.8		µC
I_{RM}	*max. reverse recovery current*	$-di_F/dt$ = 400 A/µs	T_{VJ} = 125°C		23		A
t_{rr}	*reverse recovery time*	I_F = 30 A			150		ns
R_{thJC}	*thermal resistance junction to case*					0.9	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.3		K/W

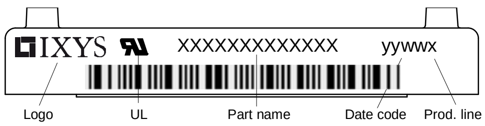
IXYS reserves the right to change limits, conditions and dimensions.

Data according to IEC 60747and per diode unless otherwise specified

20111115b

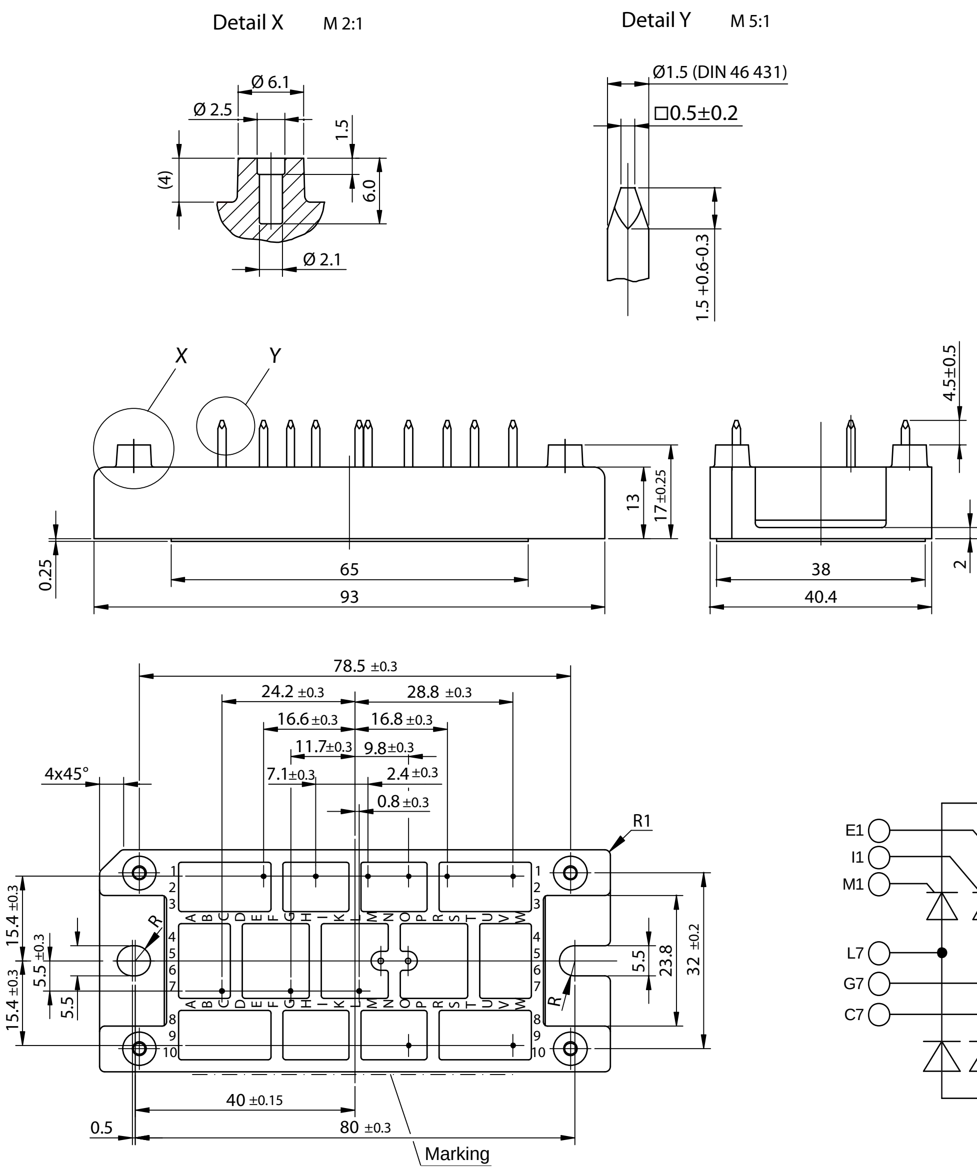
Package V2-Pack

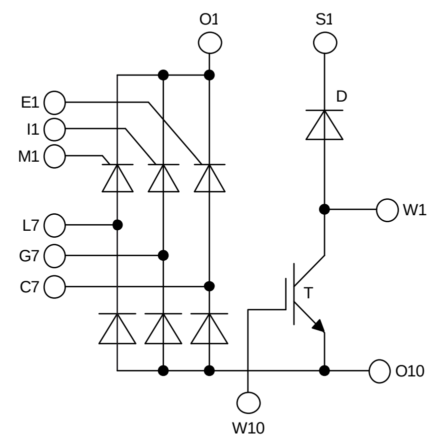
Symbol	Definition	Conditions		min.	typ.	max.	Unit
				Ratings			
I_{RMS}	*I_{RM} current*	per terminal				100	A
T_{stg}	*storage temperature*			-40		125	°C
T_{VJ}	*virtual junction temperature*			-40		150	°C
Weight					76		g
M_D	*mounting torque*			2		2.5	Nm
V_{ISOL}	*isolation voltage*	t = 1 second		3600			V
		t = 1 minute		3000			V
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*		*terminal to terminal*	6.0			mm
$d_{Spb/Apb}$			*terminal to backside*	12.0			mm



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VVZB120-16ioX	VVZB120-16ioX	Box	6	511152

Outlines





Rectifier

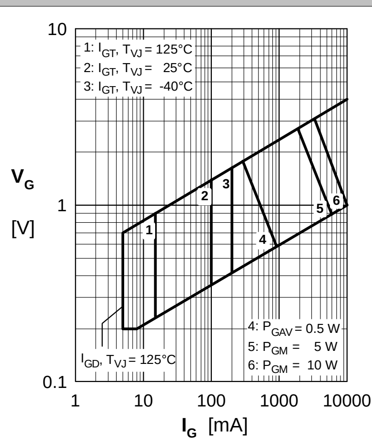


Fig. 1 Gate trigger characteristics

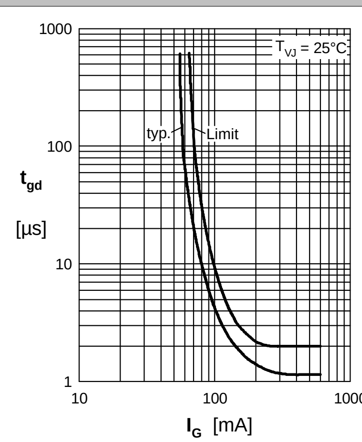


Fig. 2 Gate trigger delay time

Rectifier

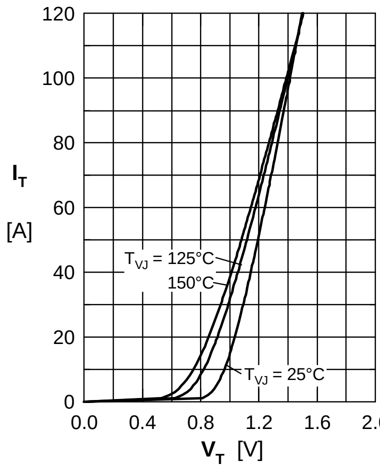


Fig.3 Forward current versus voltage drop per diode

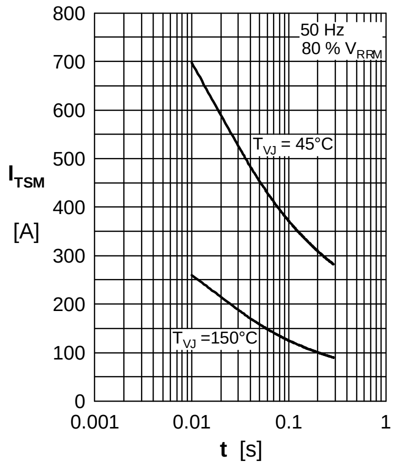


Fig.4 Surge overload current

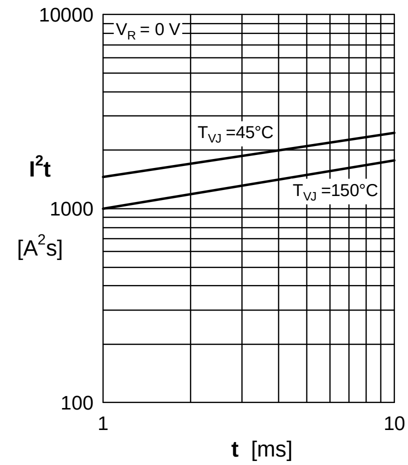


Fig.5 I^2t versus time per diode

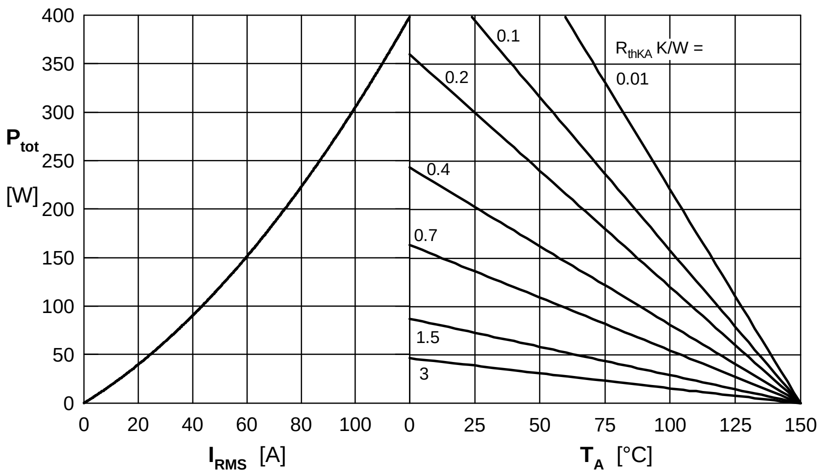


Fig.6 Power dissipation versus direct output current and ambient temperature, sine 180°

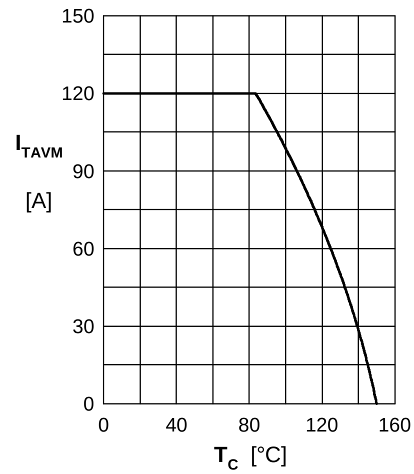


Fig. 7 Max. forward current vs. case temperature

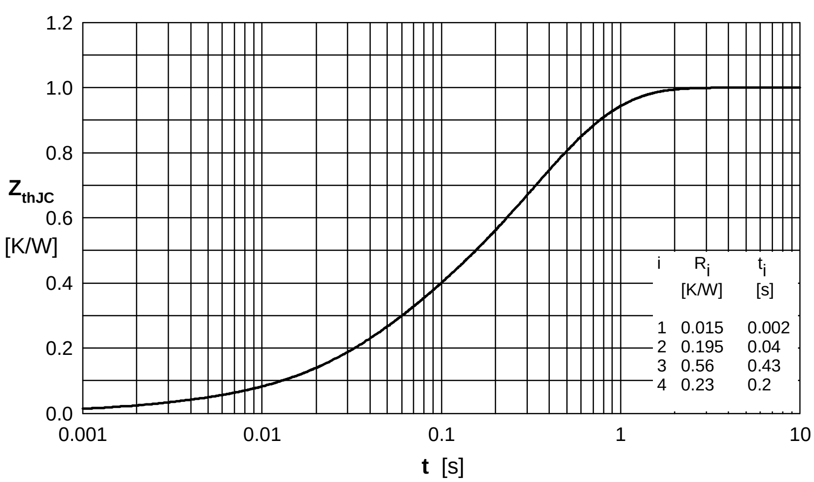


Fig. 8 Transient thermal impedance junction to case

Brake IGBT

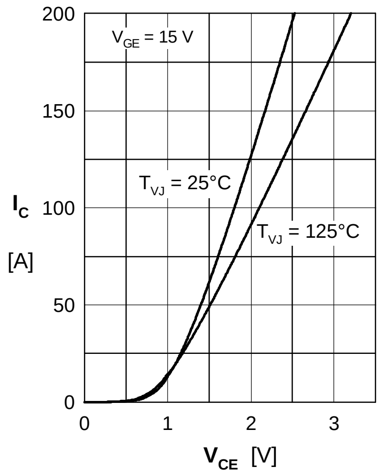


Fig. 1 Typ. output characteristics

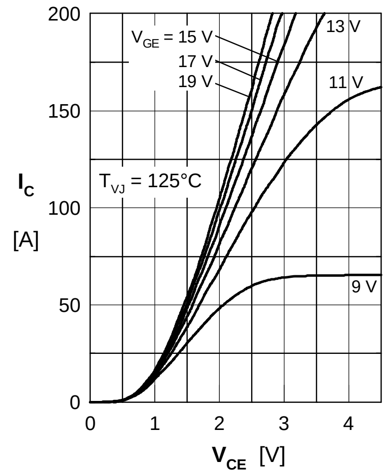


Fig. 2 Typ. output characteristics

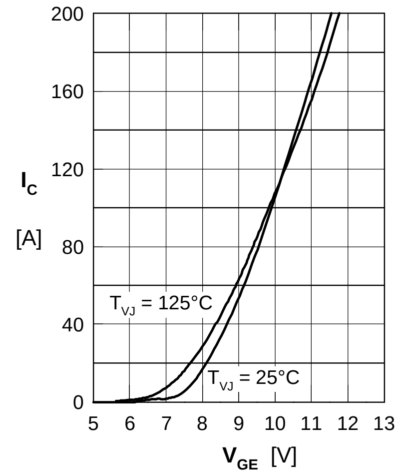


Fig. 3 Typ. transfer characteristics

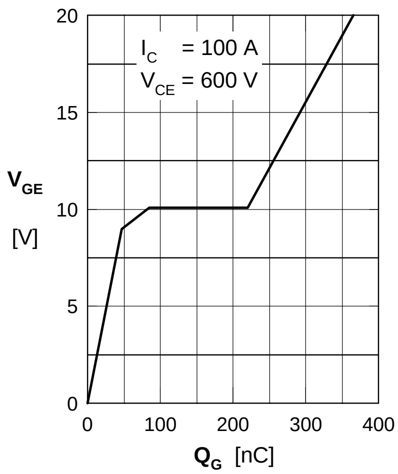


Fig. 4 Typ. turn-on gate charge

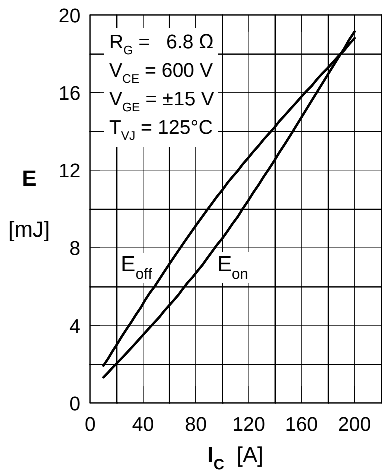


Fig. 5 Typ. switching energy versus collector current

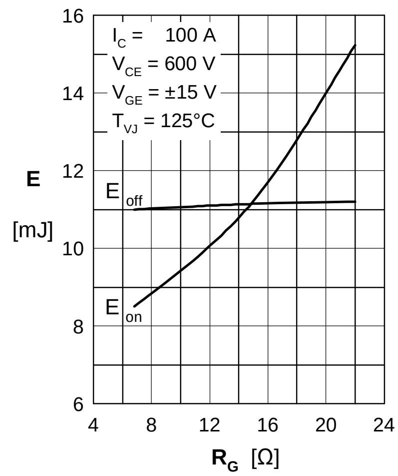


Fig. 6 Typ. switching energy versus gate resistance

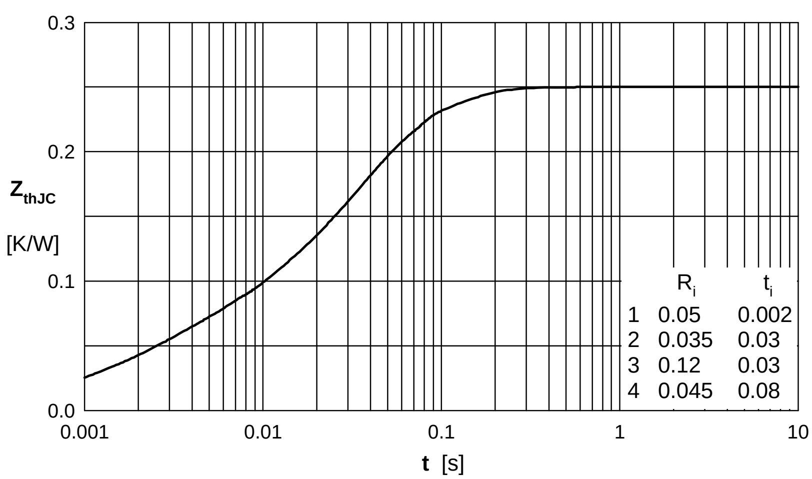


Fig. 7 Transient thermal impedance junction to case

Brake Diode

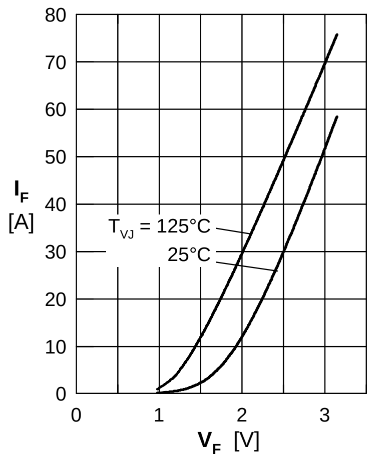


Fig. 1 Typ. forward current I_F vs. V_F

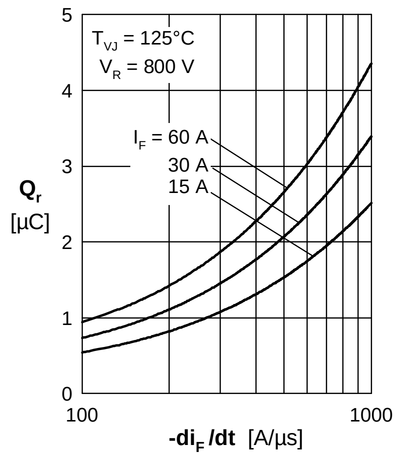


Fig. 2 Typ. reverse recovery charge Q_r versus $-di_F/dt$

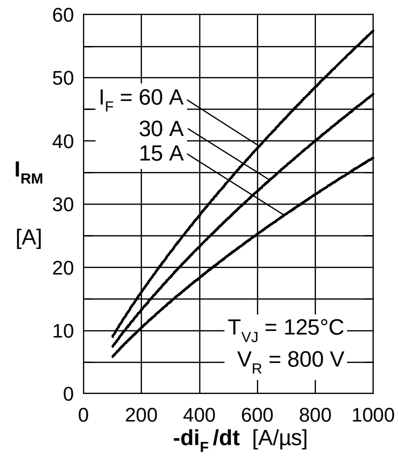


Fig. 3 Typ. peak reverse current I_{RM} versus $-di_F/dt$

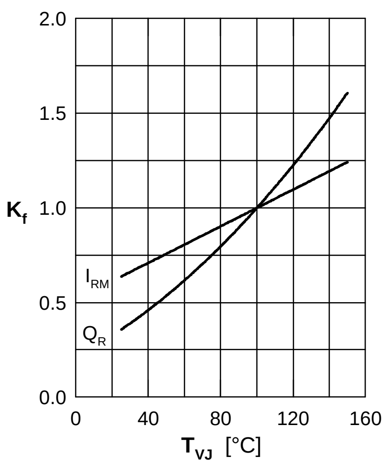


Fig. 4 Typ. dynamic parameters Q_r, I_{RM}, versus T_{VJ}

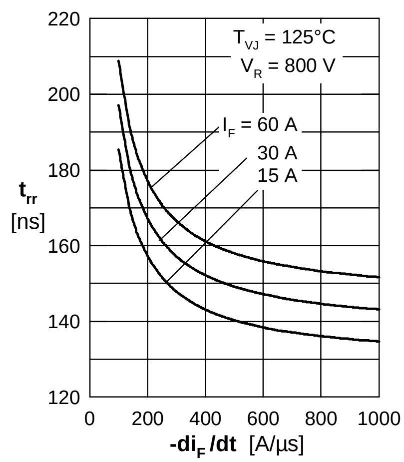


Fig. 5 Typ. recovery time t_{rr} vs. $-di_F/dt$

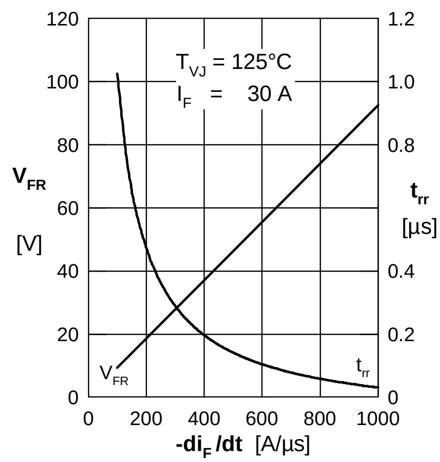


Fig. 6 Typ. peak forward voltage V_{FR} and t_{fr} versus di_F/dt

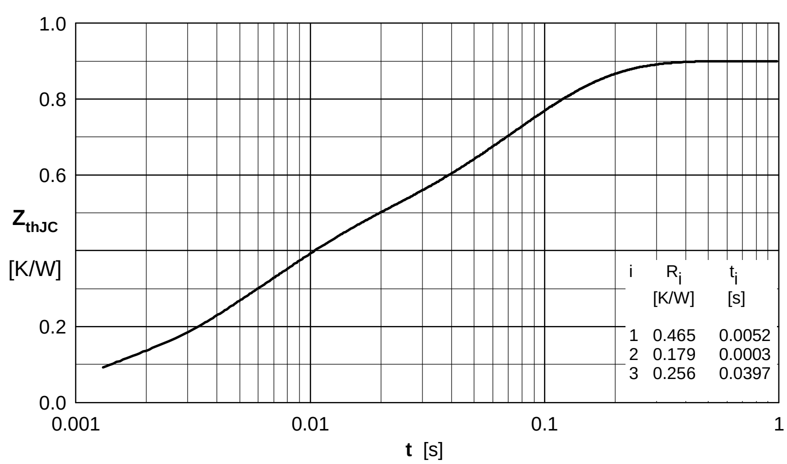


Fig. 7 Typ. transient thermal impedance junction to case