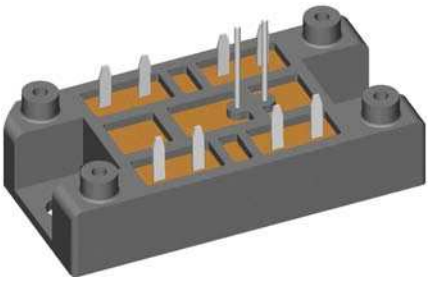
Standard Rectifier Module

3~ Rectifier			Brake Chopper		
V_{RRM}	=	1200 V	V_{CES}	=	1200 V
I_{DAV}	=	74 A	I_{C25}	=	58 A
I_{FSM}	=	550 A	$V_{CE(sat)}$	=	1.85 V

3~ Rectifier Bridge + Brake Unit

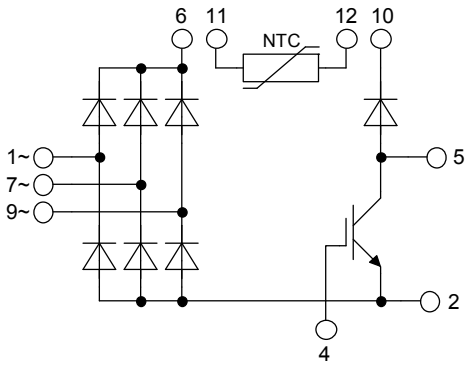
Part number

VUB72-12NOXT



Backside: isolated

E72873



Features / Advantages:

- Soldering connections for PCB mounting
- Convenient package outline
- NTC

Applications:

- 3~ Rectifier with brake unit for drive inverters

Package:

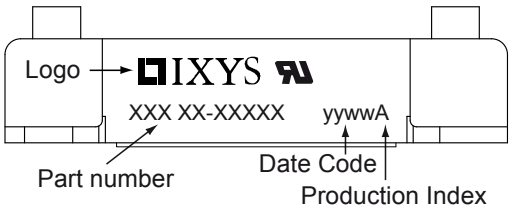
- Housing: V1-A-Pack
- DCB ceramic base plate
- Isolation voltage 4800 V~
- Easy to mount with two screws
- Space and weight savings
- RoHS compliant

Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	*max. non-repetitive reverse blocking voltage*		T_{VJ} = 25°C			1300	V
V_{RRM}	*max. repetitive reverse blocking voltage*		T_{VJ} = 25°C			1200	V
I_R	*reverse current, drain current*	V_R = 1200 V	T_{VJ} = 25°C			20	µA
		V_R = 1200 V	T_{VJ} = 125°C			3	mA
V_F	*forward voltage drop*	I_F = 25 A	T_{VJ} = 25°C			1.10	V
		I_F = 50 A				1.25	V
		I_F = 25 A	T_{VJ} = 125°C			1.01	V
		I_F = 50 A				1.20	V
I_{DAV}	*bridge output current*	T_C = 80°C	T_{VJ} = 150°C			74	A
		sine 120° d = ⅓					
V_{F0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0.79	V
r_F	*slope resistance* }					7.7	mΩ
R_{thJC}	*thermal resistance junction to case*					0.90	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.30		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			130	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			550	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			595	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			470	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			505	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.52	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.48	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			1.11	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.06	kA²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		19		pF

Brake IGBT				Ratings			
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			58	A
I_{C80}			T_C = 80°C			40	A
P_{tot}	*total power dissipation*		T_C = 25°C			195	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 35 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.85	2.15	V
			T_{VJ} = 125°C		2.15		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 1.5 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 = 35 A			110		nC
$t_{d(on)}$	*turn-on delay time*				70		ns
t_r	*current rise time*				40		ns
$t_{d(off)}$	*turn-off delay time*	inductive load	T_{VJ} = 125°C		250		ns
t_f	*current fall time*	V_{CE} = 600 V; I_C = 35A			100		ns
E_{on}	*turn-on energy per pulse*	V_{GE} = ±15 V; R_G = 27 Ω			3.8		mJ
E_{off}	*turn-off energy per pulse*				4.1		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 27 Ω	T_{VJ} = 125°C				
I_{CM}		V_{CEK} = 1200 V				105	A
SCSOA	*short circuit safe operating area*						
t_{SC}	*short circuit duration*	V_{CE} = 900 V; V_{GE} = ±15 V	T_{VJ} = 125°C			10	µs
I_{SC}	*short circuit current*	R_G = 27 Ω; non-repetitive			140		A
R_{thJC}	*thermal resistance junction to case*					0.65	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.25		K/W

Brake Diode							
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			1200	V
I_{F25}	*forward current*		T_C = 25°C			31	A
I_{F80}			T_C = 80°C			21	A
V_F	*forward voltage*	I_F = 25 A	T_{VJ} = 25°C			2.97	V
			T_{VJ} = 125°C			2.43	V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			0.1	mA
			T_{VJ} = 125°C			0.5	mA
Q_{rr}	*reverse recovery charge*	V_R = 600 V			1.2		µC
I_{RM}	*max. reverse recovery current*	$-di_F/dt$ = 400 A/µs	T_{VJ} = 125°C		18		A
t_{rr}	*reverse recovery time*	I_F = 25 A			130		ns
R_{thJC}	*thermal resistance junction to case*					1.6	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.55		K/W

Package V1-A-Pack				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal				100	A
T_{stg}	*storage temperature*			-40		125	°C
T_{VJ}	*virtual junction temperature*			-40		150	°C
Weight					37		g
M_D	*mounting torque*			2		2.5	Nm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	4800			V
		t = 1 minute		4000			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	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VUB72-12NOXT	VUB72-12NOXT	Box	10	510734

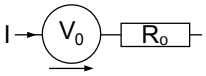
Similar Part	Package	Voltage class
VUB72-16NOXT	V1-A-Pack	1600

Temperature Sensor NTC

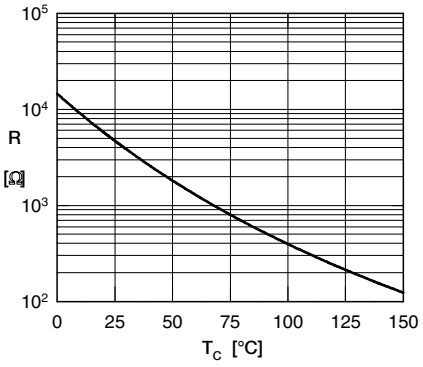
Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	*resistance*	T_{VJ} = 25°	2.13	2.2	2.27	kΩ
$B_{25/50}$	*temperature coefficient*			3560		K

Equivalent Circuits for Simulation

** on die level* T_{VJ} = 150°C

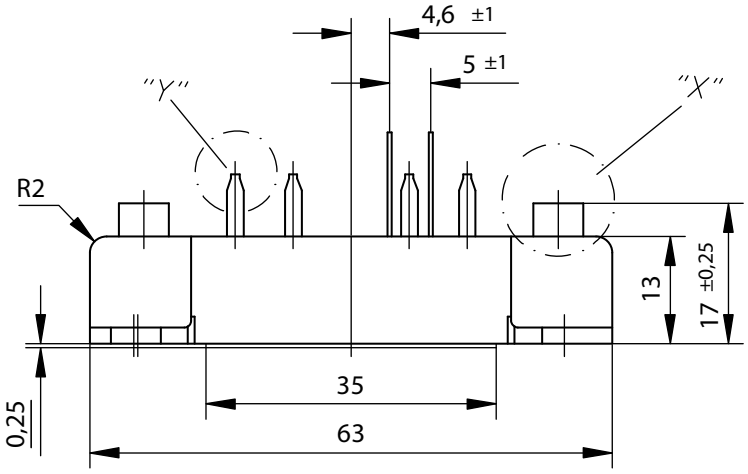


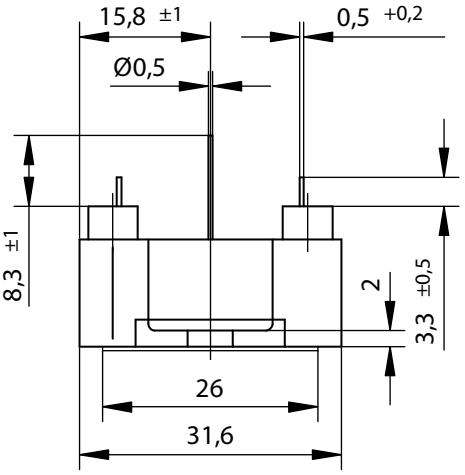
		Rectifier	Brake IGBT	Brake Diode	
$V_{0\,max}$	*threshold voltage*	0.79	1.1	1.16	V
$R_{0\,max}$	*slope resistance **	6.5	40	43	mΩ

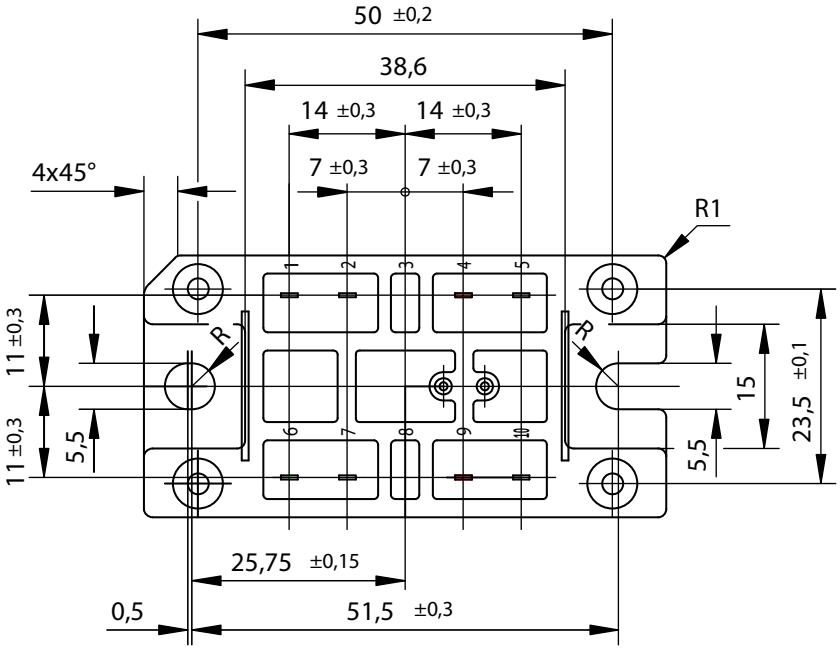


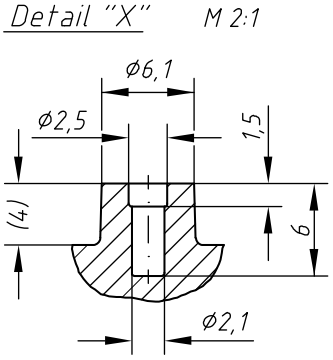
Typ. NTC resistance vs. temperature

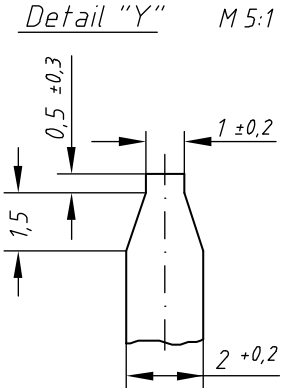
Outlines V1-A-Pack

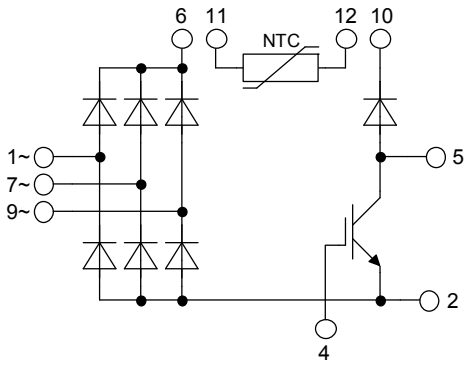












Rectifier

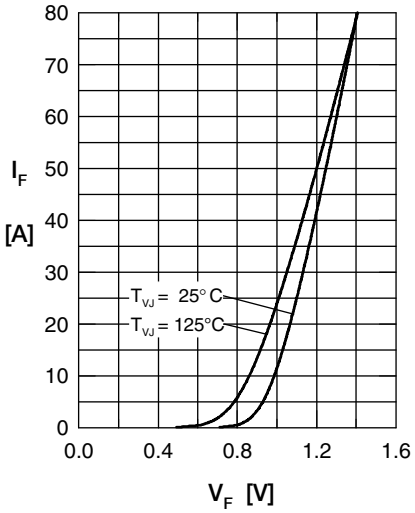


Fig. 1 Typ. forward current vs. voltage drop per diode

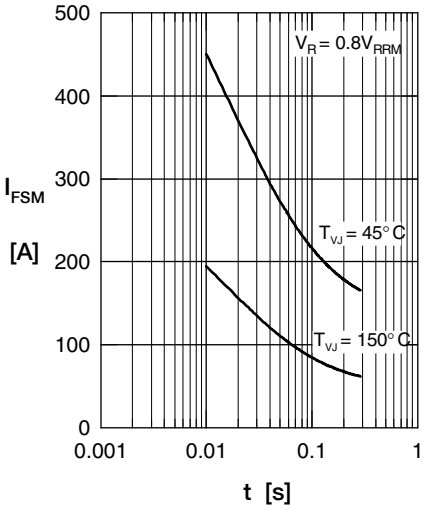


Fig. 2 Surge overload current

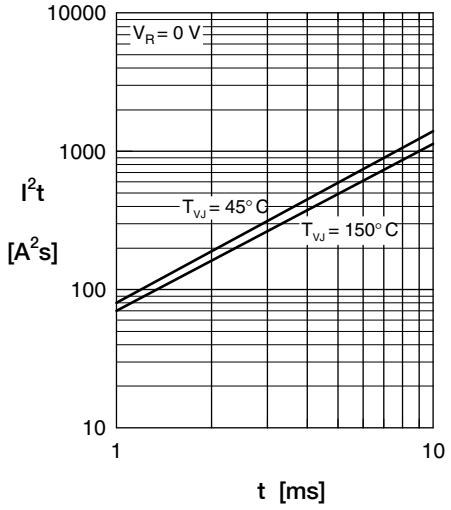


Fig. 3 I^2t versus time per diode

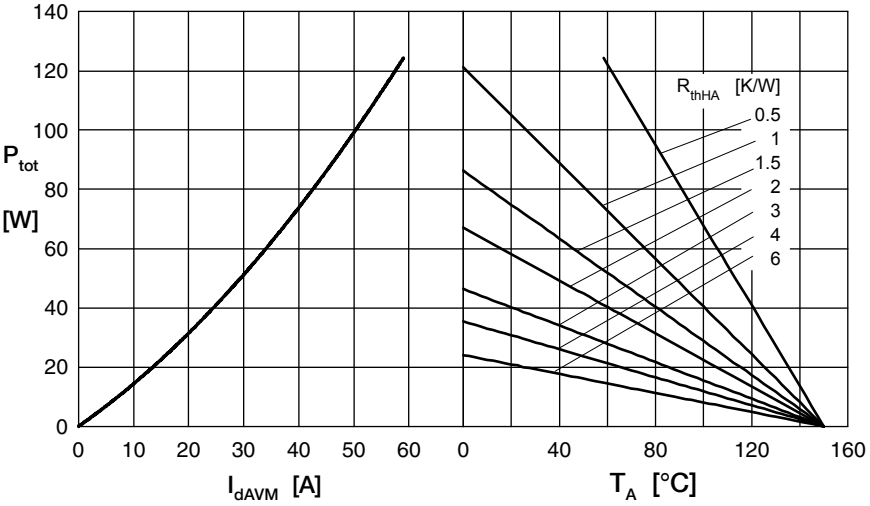


Fig. 4 Power dissipation versusdirect output current and ambient temperature, sine 180°

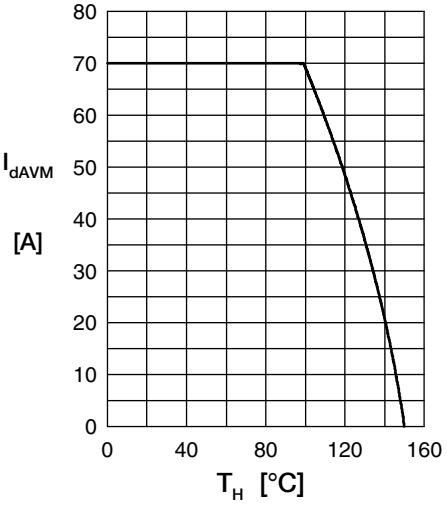


Fig. 5 Max. forward current versus case temperature

Brake IGBT

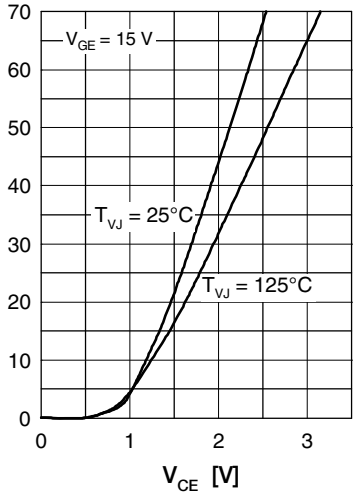


Fig. 1 Typ. output characteristics

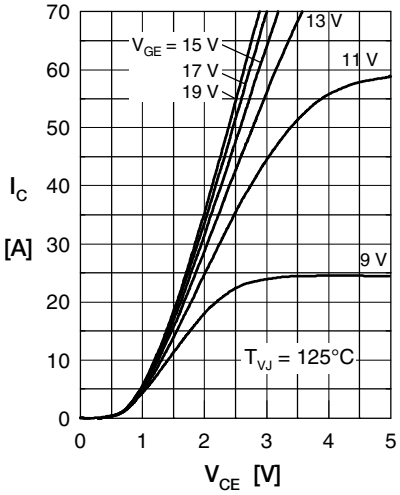


Fig. 2 Typ. output characteristics

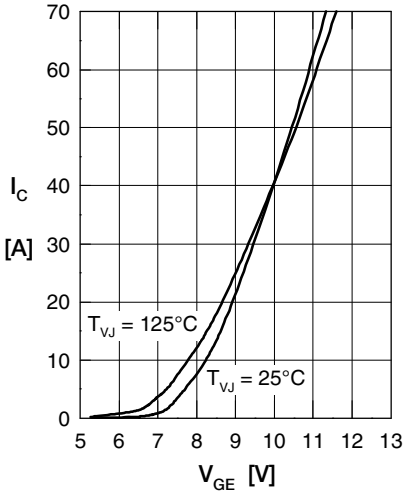


Fig. 3 Typ. tranfer characteristics

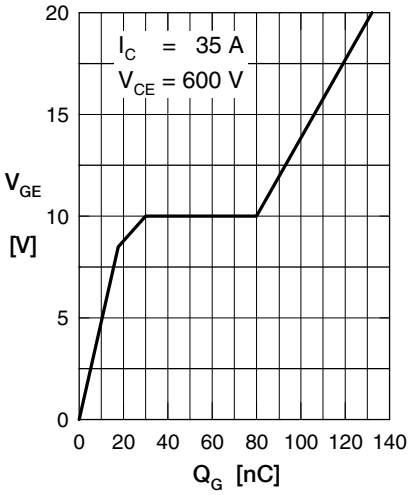


Fig. 4 Typ. turn-on gate charge

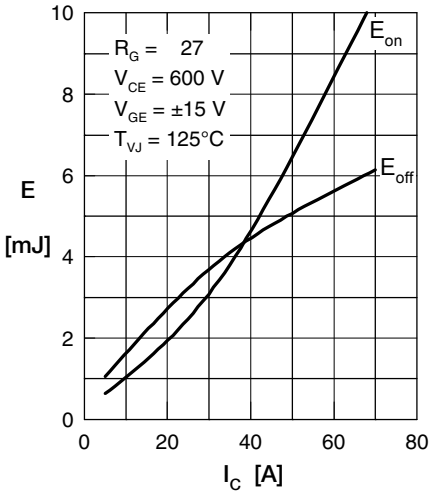


Fig. 5 Typ. switching energy versus collector current

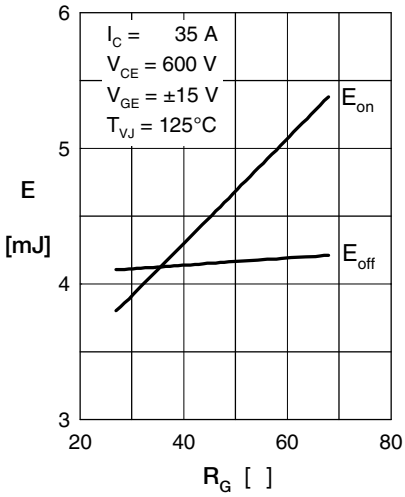


Fig. 6 Typ. switching energy versus gate resistance

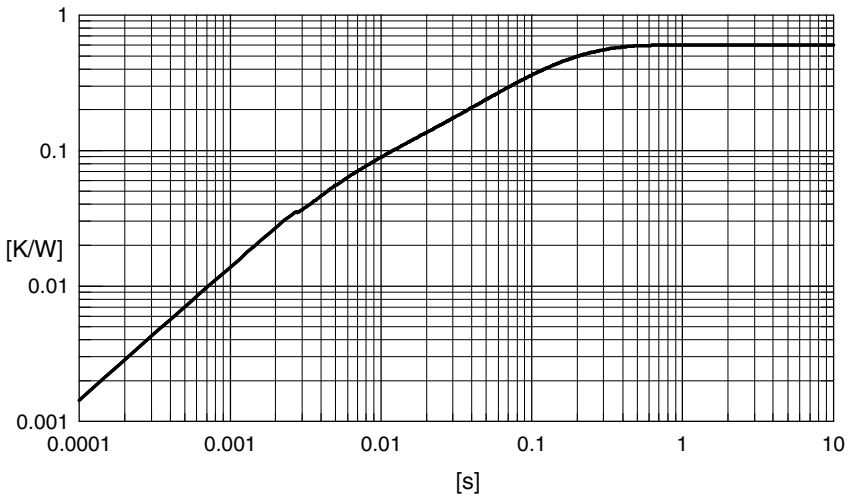


Fig. 7 Typ. transient thermal impedance

Brake Diode

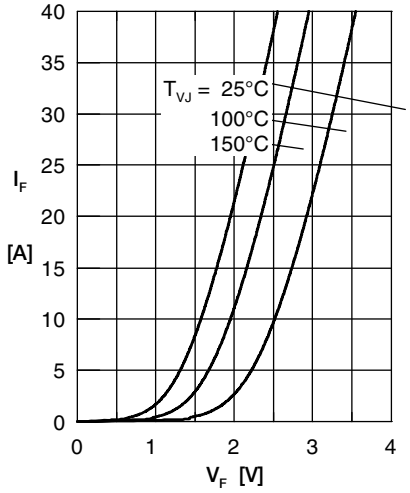


Fig. 1 Forward current I_F versus V_F

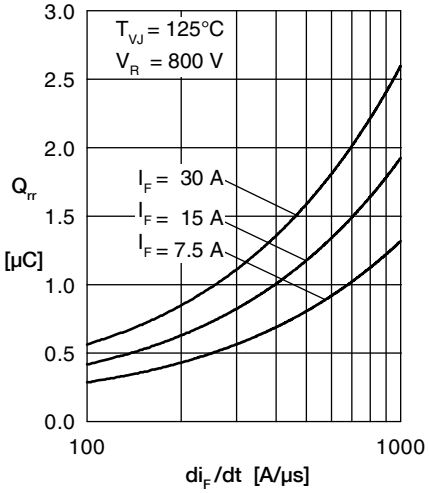


Fig. 2 Typ. reverse recov. charge Q_r versus di_F/dt

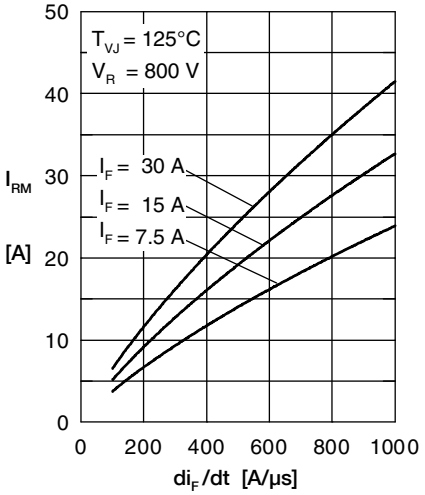


Fig. 3 Typ. peak reverse current I_{RM} versus di_F/dt

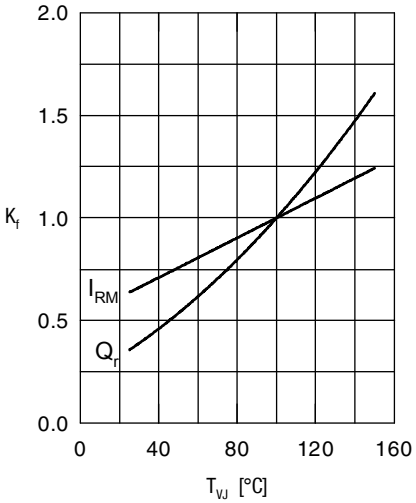


Fig. 4 Dynamic parameters Q_r, I_{RM} versus T_{VJ}

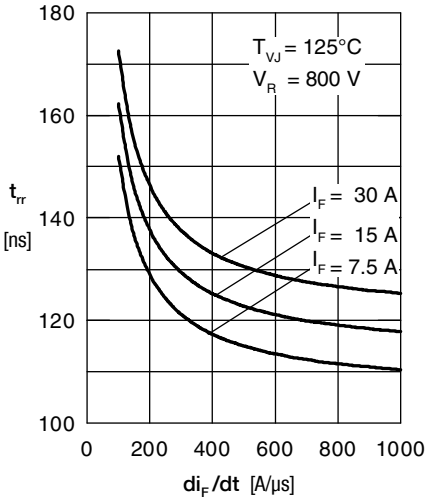


Fig. 5 Typ. recovery time t_{rr} versus di_F/dt

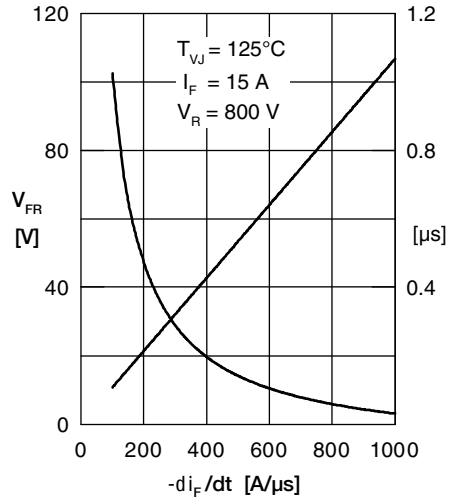


Fig. 6 Typ. peak forward voltage V_{FR} and t_{fr} versus di_F/dt

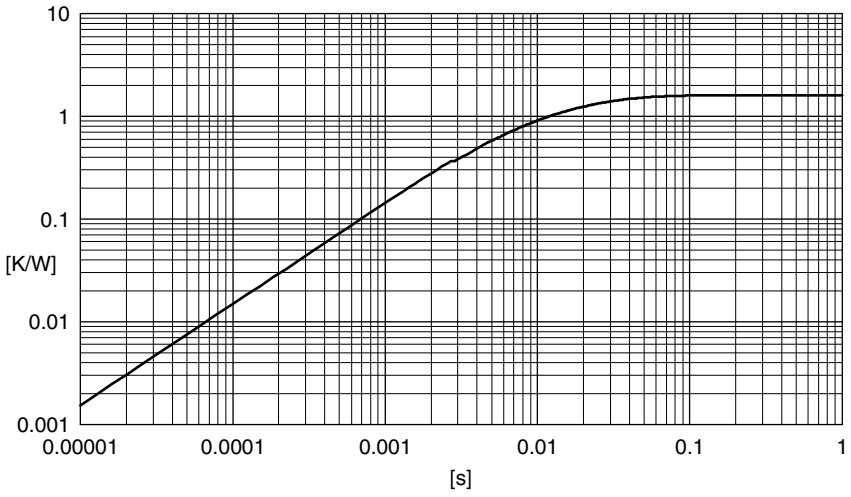


Fig. 7 Transient thermal impedance junction to case