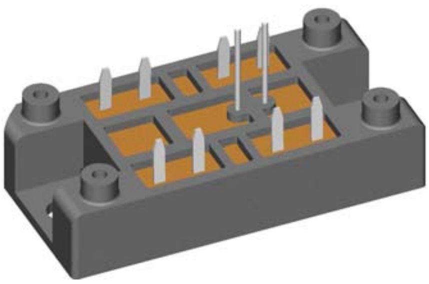
Standard Rectifier Module

3~ Rectifier	Brake Chopper
V_{RRM} = 1200 V	V_{CES} = 1200 V
I_{DAV} = 75 A	I_{C25} = 58 A
I_{FSM} = 600 A	$V_{CE(sat)}$ = 1.85 V

3~ Rectifier Bridge + Brake Unit + NTC

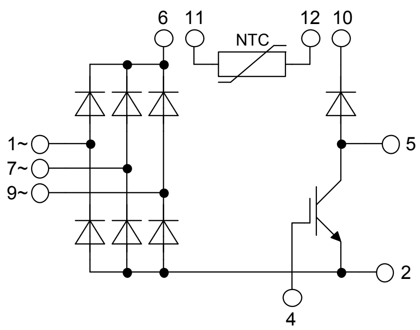
Part number

VUB72-12NOXT



Backside: isolated

E72873



Features / Advantages:

- Package with DCB ceramic base plate
- Improved temperature and power cycling
- Planar passivated chips
- Very low forward voltage drop
- Very low leakage current
- NTC

Applications:

- 3~ Rectifier with brake unit for drive inverters

Package: V1-A-Pack

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

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*	V_R = 1200 V	T_{VJ} = 25°C			40	µA
		V_R = 1200 V	T_{VJ} = 150°C			1.5	mA
V_F	*forward voltage drop*	I_F = 25 A	T_{VJ} = 25°C			1.10	V
		I_F = 75 A				1.38	V
		I_F = 25 A	T_{VJ} = 125 °C			1.01	V
		I_F = 75 A				1.37	V
I_{DAV}	*bridge output current*	T_C = 110°C rectangular d = ⅓	T_{VJ} = 150°C			75	A
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*					1.1	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.3		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			110	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			600	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			650	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			510	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			550	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.80	kA^2s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.76	kA^2s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			1.30	kA^2s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.26	kA^2s
C_J	*junction capacitance*	V_R = 400 V; f = 1 MHz	T_{VJ} = 25°C		19		pF

Brake IGBT

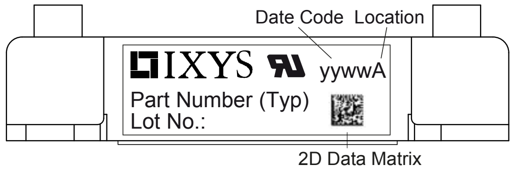
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	*collector emitter voltage*		T_{VJ} = 25°C			1200	V
V_{GES}	*max. DC gate voltage*					±20	V
V_{GEM}	*max. transient gate emitter voltage*					±30	V
I_{C25}	*collector current*		T_C = 25°C			58	A
I_{C80}			T_C = 80°C			40	A
P_{tot}	*total power 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 = 35 A			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

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			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

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
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*		*terminal to terminal*	6.0			mm
$d_{Spb/Apb}$			*terminal to backside*	12.0			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3600			V
		t = 1 minute		3000			V

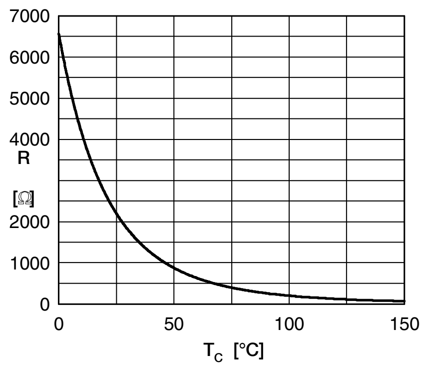


Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VUB72-12NOXT	VUB72-12NOXT	Box	10	510734

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

Temperature Sensor NTC

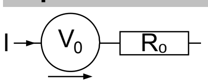
Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	*resistance*	T_{VJ} = 25°	2.13	2.2	2.27	kΩ
$B_{25/50}$	*temperature coefficient*			3560		K



Typ. NTC resistance vs. temperature

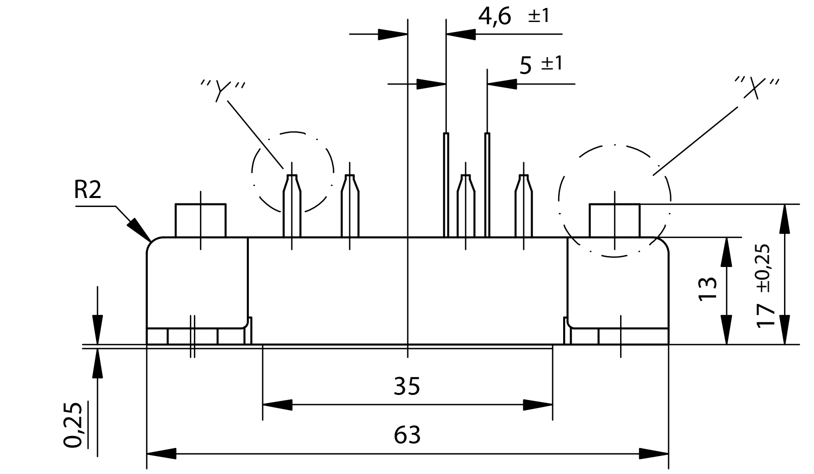
Equivalent Circuits for Simulation

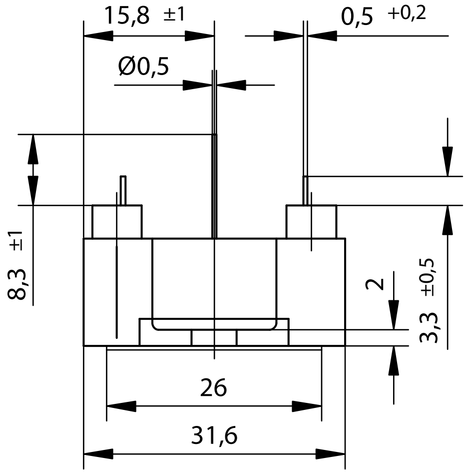
** on die level* T_{VJ} = 150 °C

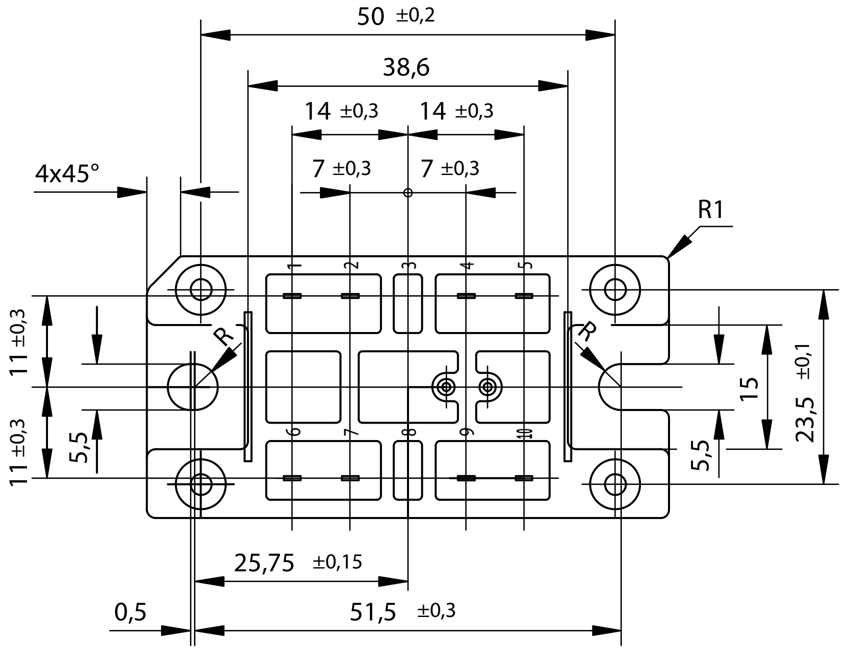


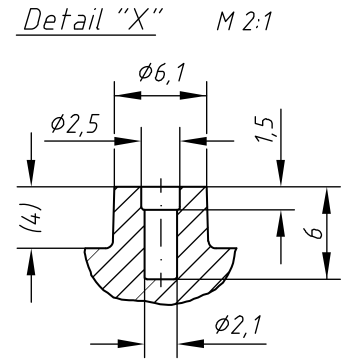
		Rectifier	Brake IGBT	Brake Diode	
$V_{0\,max}$	*threshold voltage*	0.79	1.1	1.16	V
$R_{0\,max}$	*slope resistance **	6.5	40	43	mΩ

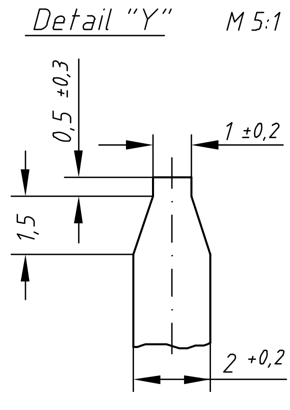
Outlines V1-A-Pack

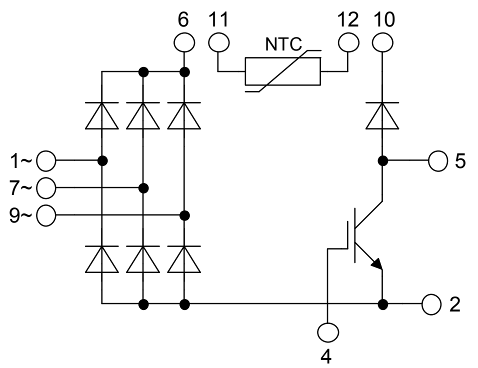












Rectifier

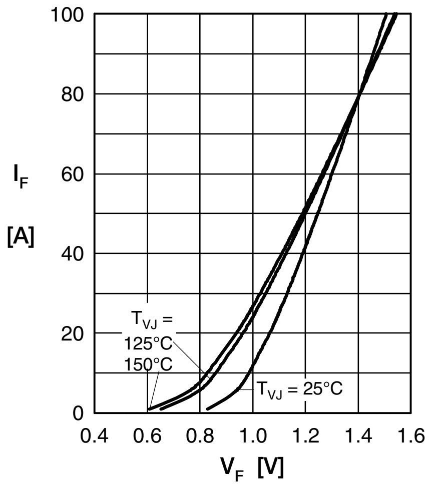


Fig. 1 Forward current vs. voltage drop per diode

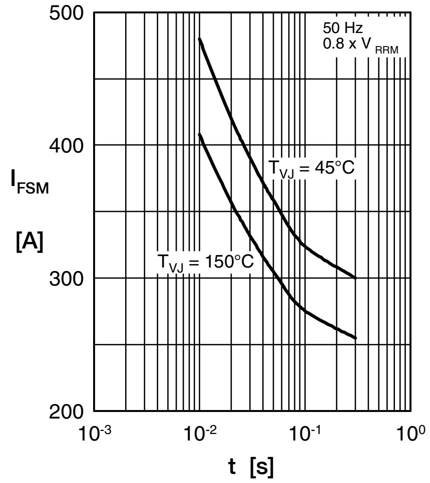


Fig. 2 Surge overload current vs. time per diode

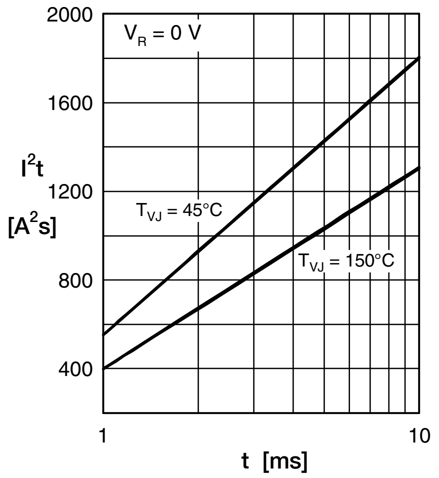


Fig. 3 I^2t vs. time per diode

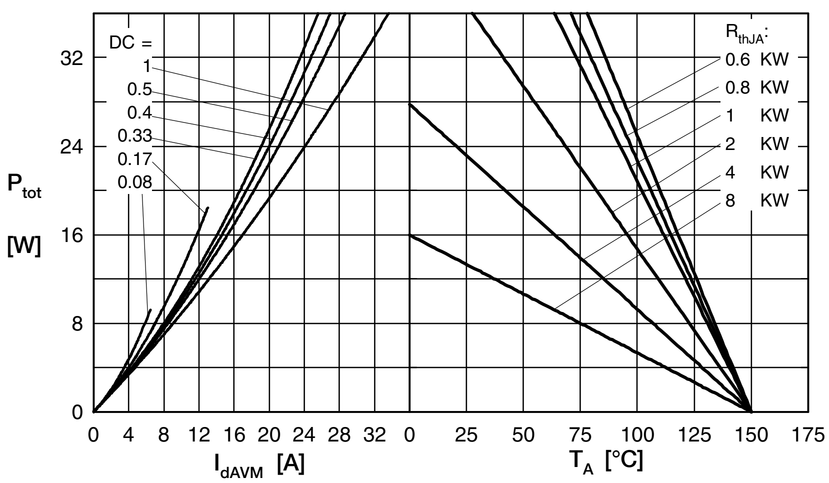


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

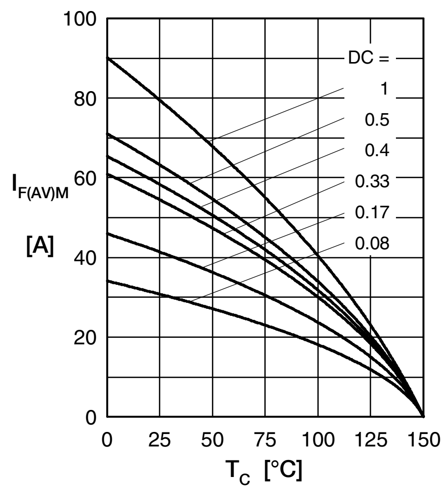


Fig. 5 Max. forward current vs. case temperature per diode

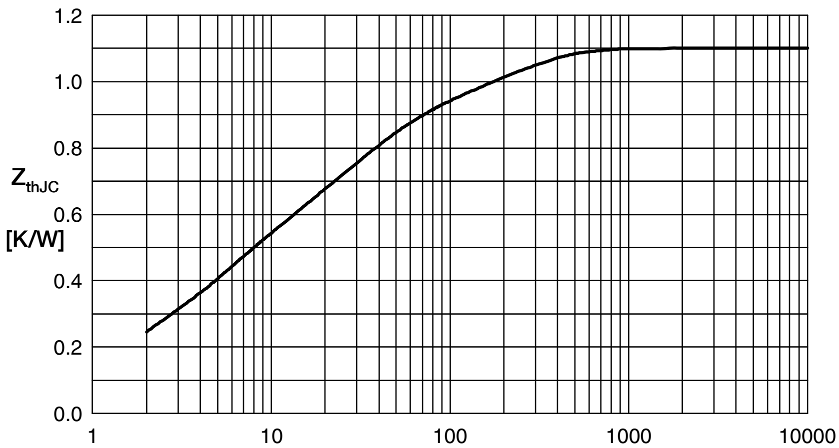


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for Z_{thJC} calculation:

i	R_{th} (K/W)	t_i (s)
1	0.0607	0.0004
2	0.1230	0.00256
3	0.2305	0.0045
4	0.4230	0.0242
5	0.2628	0.1800

Brake IGBT

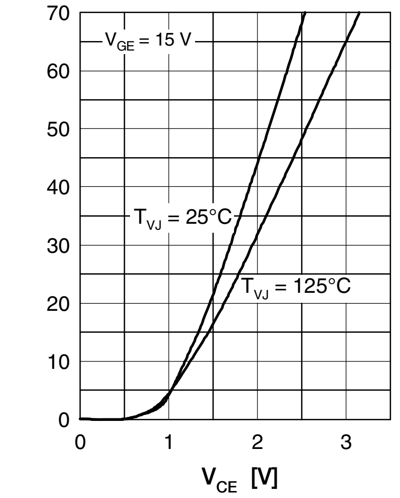


Fig. 1 Typ. output characteristics

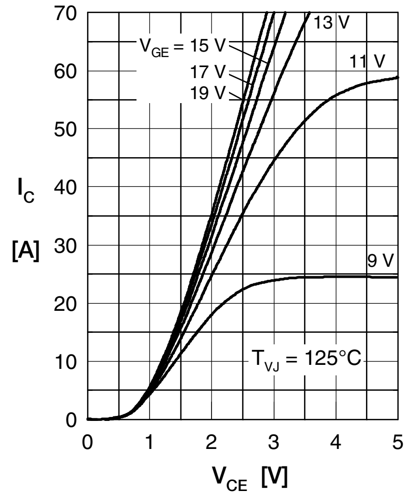


Fig. 2 Typ. output characteristics

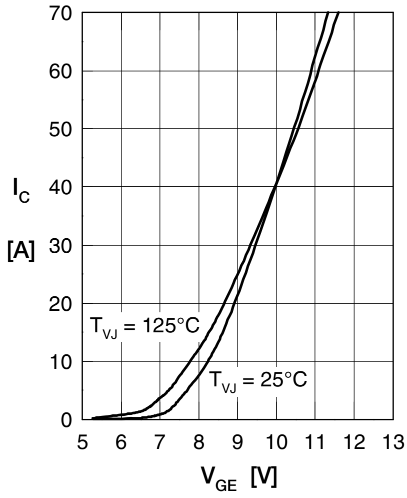


Fig. 3 Typ. tranfer characteristics

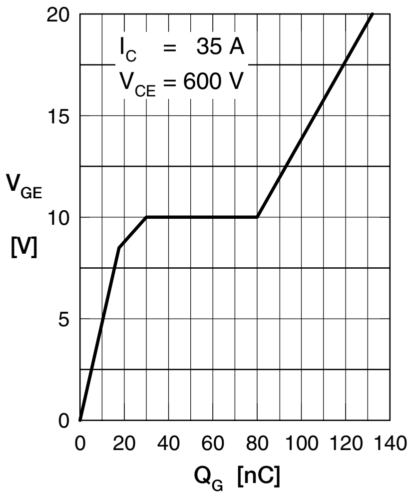


Fig. 4 Typ. turn-on gate charge

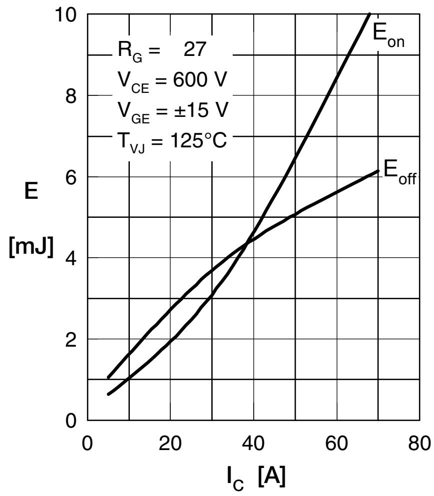


Fig. 5 Typ. switching energy versus collector current

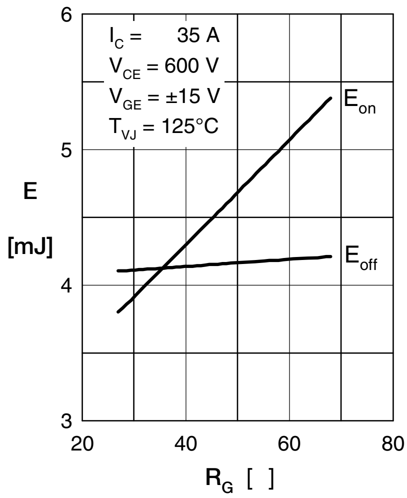


Fig. 6 Typ. switching energy versus gate resistance

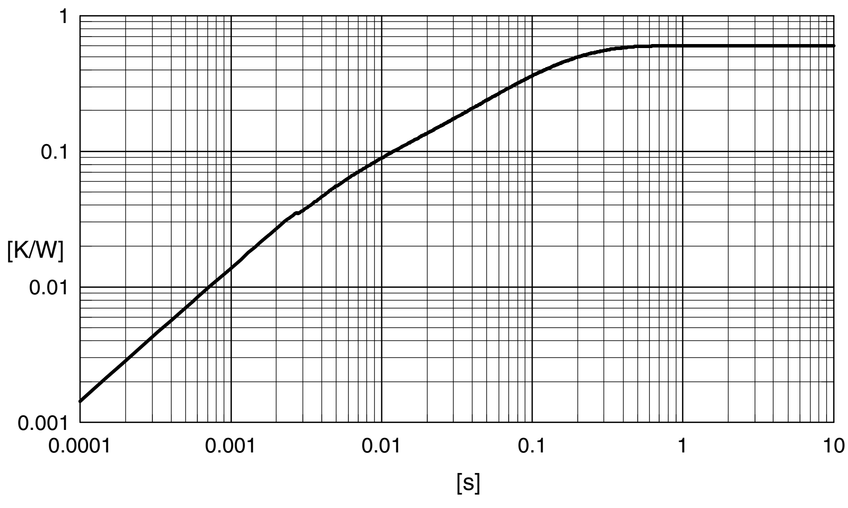


Fig. 7 Typ. transient thermal impedance

Brake Diode

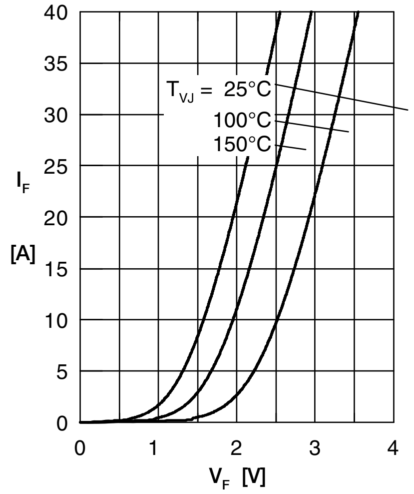


Fig. 1 Forward current
I_F versus V_F

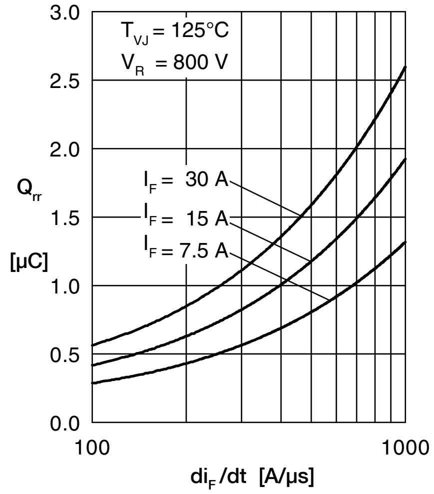


Fig. 2 Typ. reverse recov. charge
Q_r versus di_F/dt

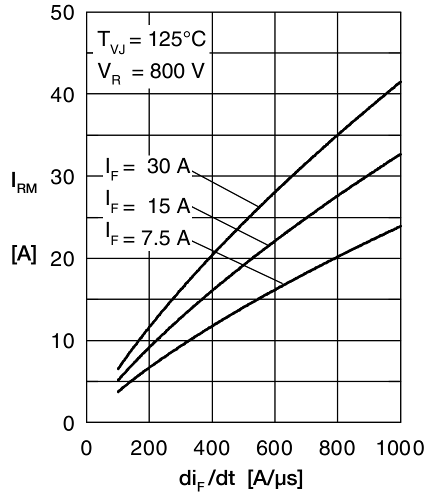


Fig. 3 Typ. peak reverse current
I_{RM} versus di_F/dt

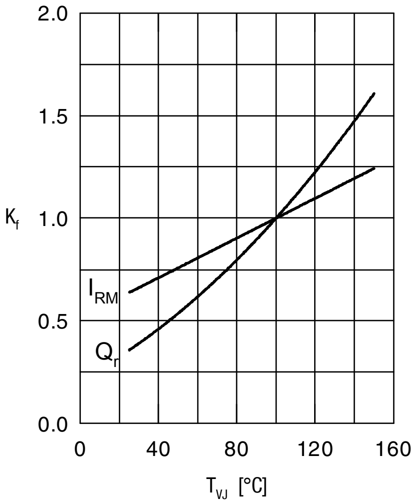


Fig. 4 Dynamic parameters
Q_r, I_{RM} versus T_{VJ}

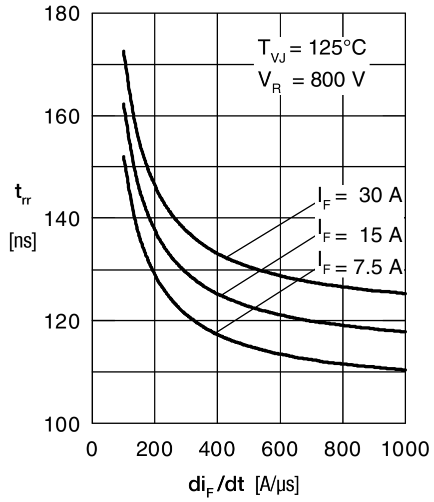


Fig. 5 Typ. recovery time
t_{rr} versus di_F/dt

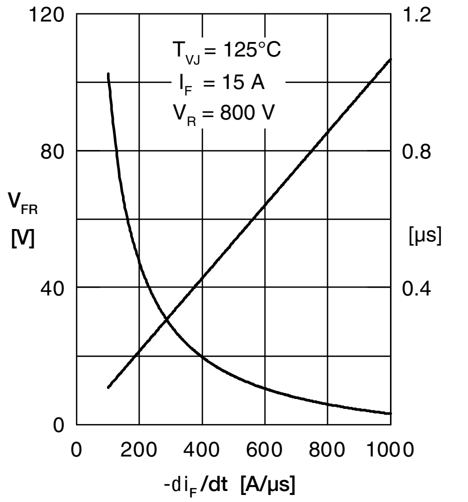


Fig. 6 Typ. peak forward voltage
V_{FR} and t_{fr} versus di_F/dt

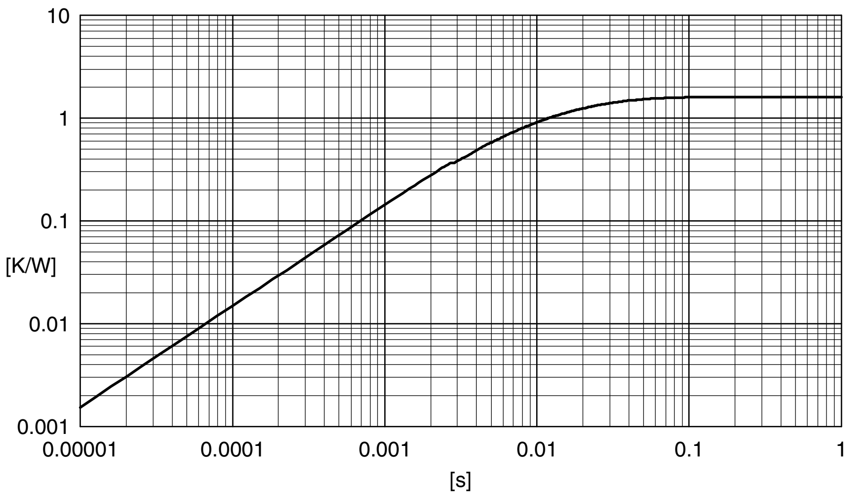


Fig. 7 Transient thermal impedance junction to case