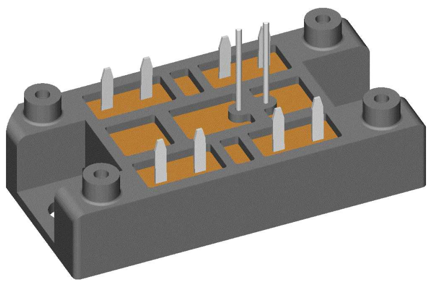
Standard Rectifier Module

3~ Rectifier	Brake Chopper
V_{RRM} = 1600	V_{CES} = 1200
I_{DAV} = 75	I_{C25} = 58
I_{FSM} = 600	$V_{CE(sat)}$ = 1,85

3~ Rectifier Bridge + Brake Unit + NTC

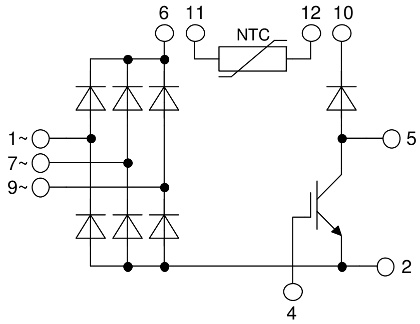
Part number

VUB72-16NOXT



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			1700	V
V_{RRM}	max. repetitive reverse blocking voltage		T_{VJ} = 25°C			1600	V
I_R	reverse current	V_R = 1600 V	T_{VJ} = 25°C			40	µA
		V_R = 1600 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	for power loss calculation only				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	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1,76	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			1,30	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1,26	kA²s
C_J	junction capacitance	V_R = 400 V; f = 1 MHz	T_{VJ} = 25°C		19		pF

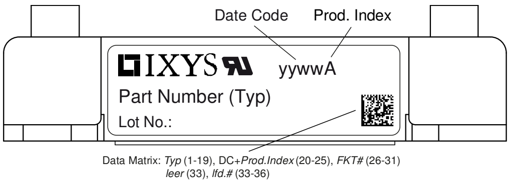
Brake IGBT

Symbol	Definition	Conditions		Ratings 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 = 2 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*	inductive load V_{CE} = 600 V; I_C = 35 A V_{GE} = ±15 V; R_G = 27 Ω	T_{VJ} = 125°C		70		ns
t_r	*current rise time*				40		ns
$t_{d(off)}$	*turn-off delay time*				250		ns
t_f	*current fall time*				100		ns
E_{on}	*turn-on energy per pulse*				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*	V_{CEK} = 1200 V					
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 $-di_F/dt$ = 400 A/µs I_F = 25 A	T_{VJ} = 125°C		1,2		µC
I_{RM}	*max. reverse recovery current*				18		A
t_{rr}	*reverse recovery time*				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_{VJ}	*virtual junction temperature*		-40		150	°C
T_{op}	*operation temperature*		-40		125	°C
T_{stg}	*storage temperature*		-40		125	°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

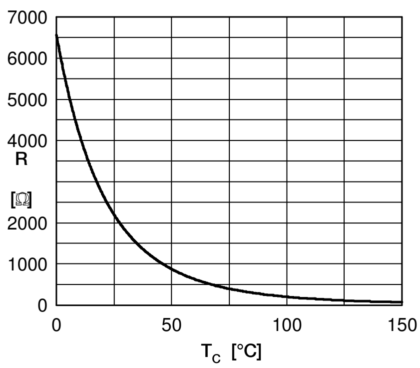


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VUB72-16NOXT	VUB72-16NOXT	Blister	24	510741

Similar Part	Package	Voltage class
VUB72-12NOXT	V1-A-Pack	1200

Temperature Sensor NTC

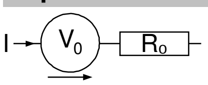
Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	*resistance*	T_{VJ} = 25°	2,13	2,2	2,27	kΩ
$B_{25/50}$	*temperature coefficient*			3560		K



Typ. NTC resistance vs. temperature

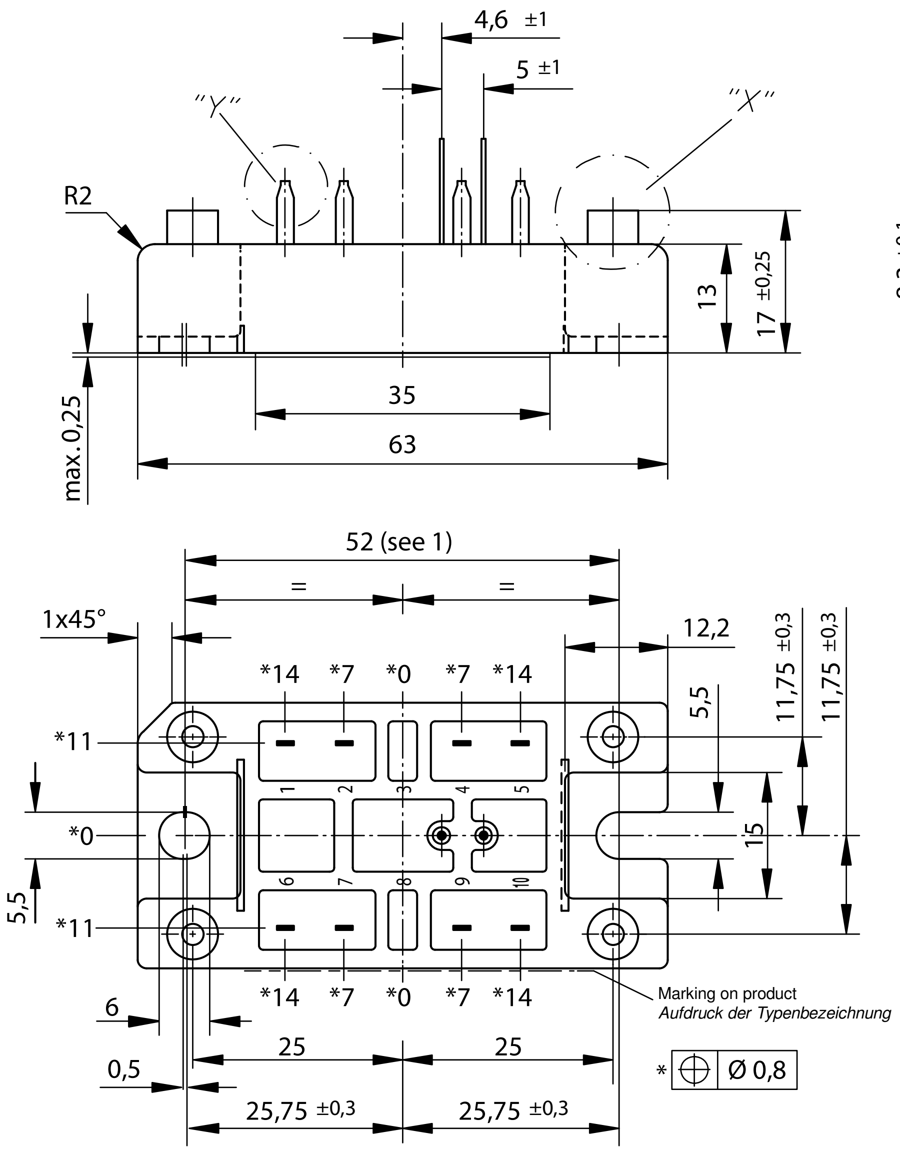
Equivalent Circuits for Simulation

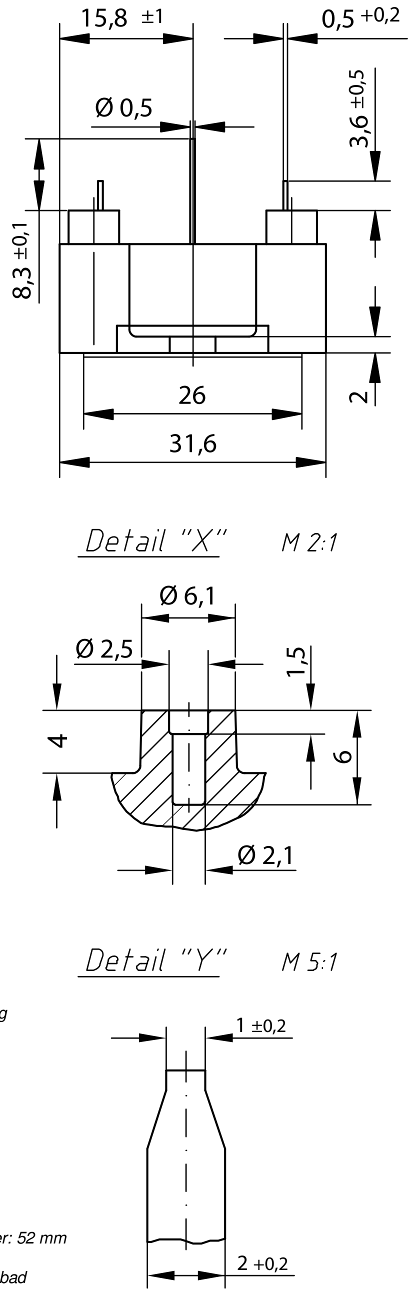
** on die level* T_{VJ} = 150 °C



		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

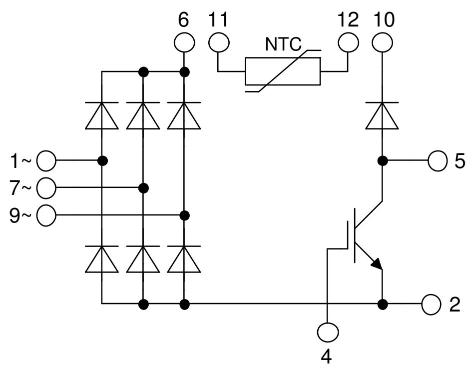
Outlines V1-A-Pack





Remarks / ***Bemerkungen:***

1. Nominal distance mounting screws on heat sink: 52 mm / *Nennabstand Befestigungsschrauben auf Kühlkörper: 52 mm*
2. General tolerance / *Allgemeintoleranz* : DIN ISO 2768 -T1-c
3. Surface treatment of pins: tin plated (Sn) in hot dip / *Oberflächenbehandlung der Pins: verzinnt (Sn) im Tauchbad*



Rectifier

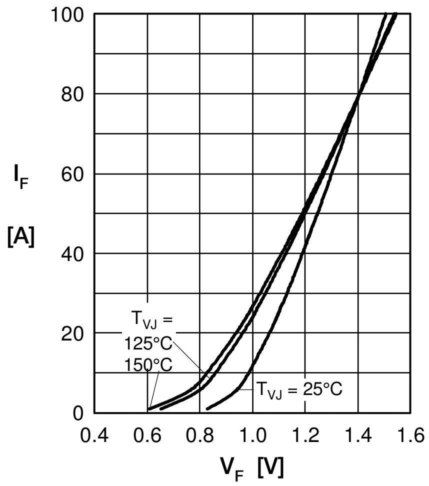


Fig. 1 Forward current vs. voltage drop per diode

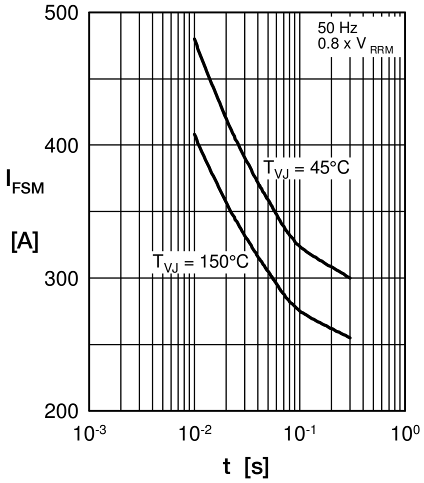


Fig. 2 Surge overload current vs. time per diode

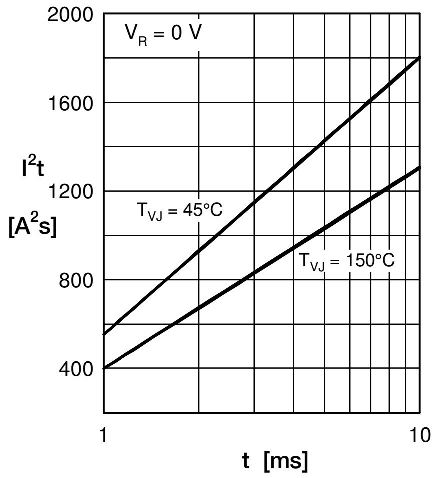


Fig. 3 I^2t vs. time per diode

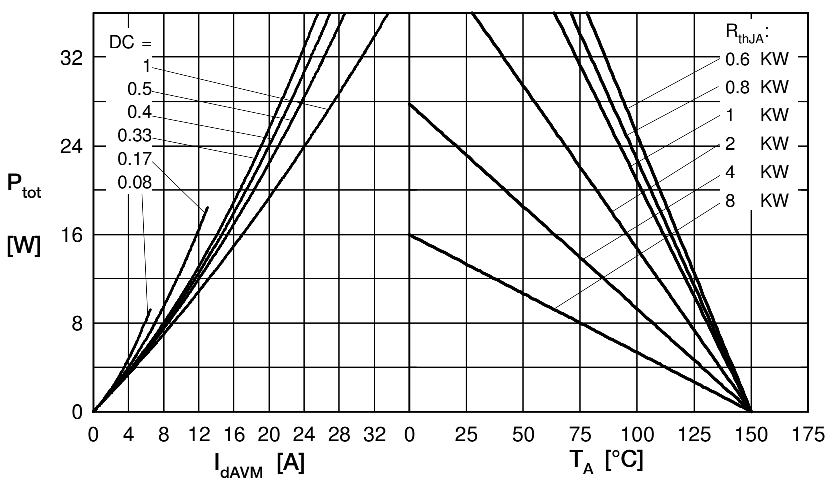


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

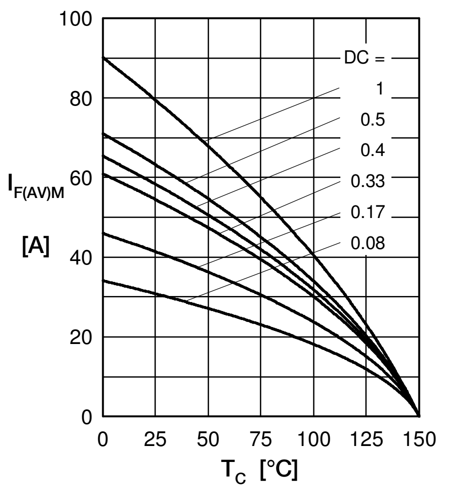


Fig. 5 Max. forward current vs. case temperature per diode

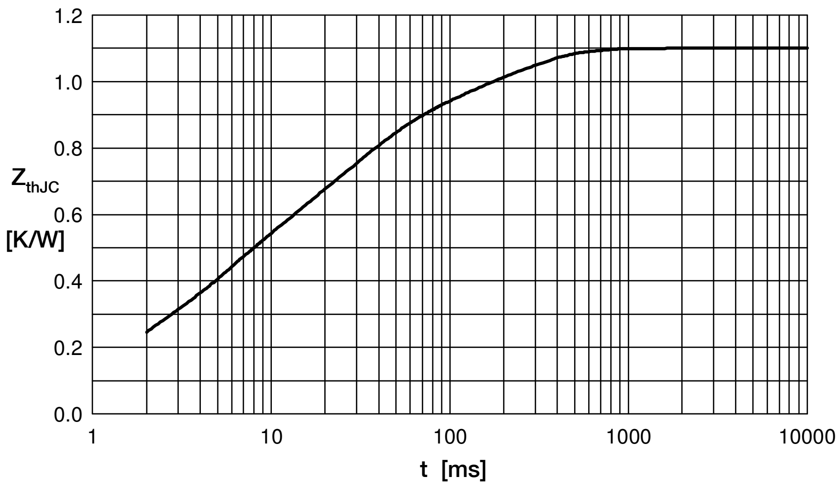


Fig. 6 Transient thermal impedance junction to case vs. time per diode

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

 Data according to IEC 60747and per semiconductor unless otherwise specified 20151102d

Brake IGBT

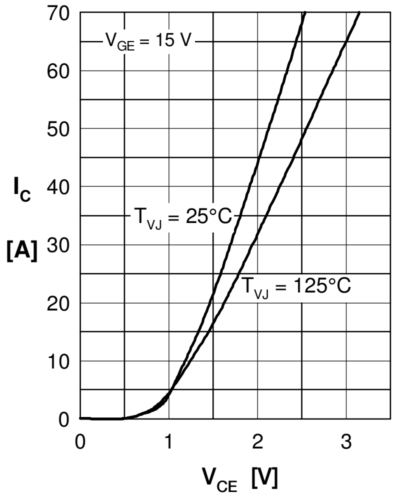


Fig. 1 Typ. output characteristics

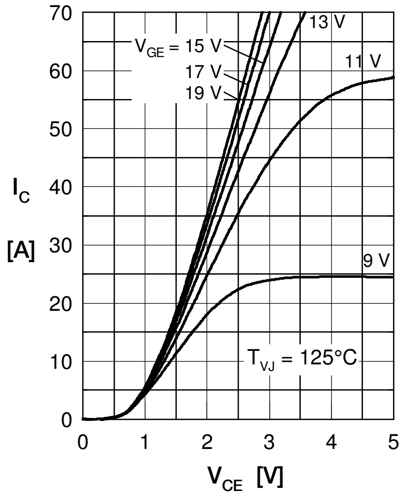


Fig. 2 Typ. output characteristics

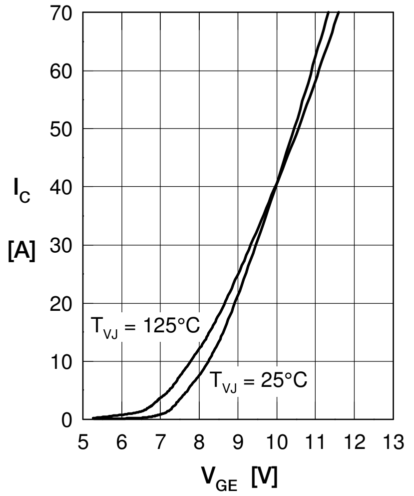


Fig. 3 Typ. tranfer characteristics

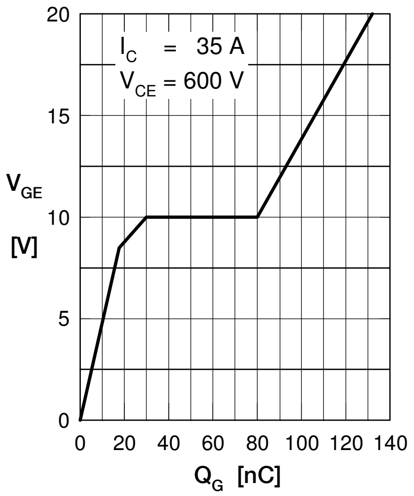


Fig. 4 Typ. turn-on gate charge

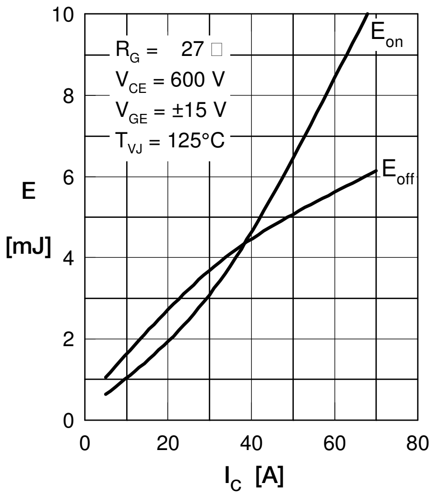


Fig. 5 Typ. switching energy versus collector current

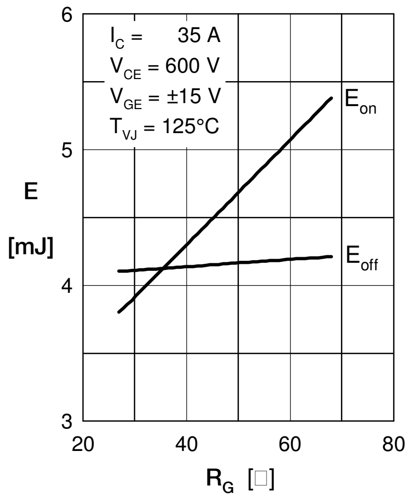


Fig. 6 Typ. switching energy versus gate resistance

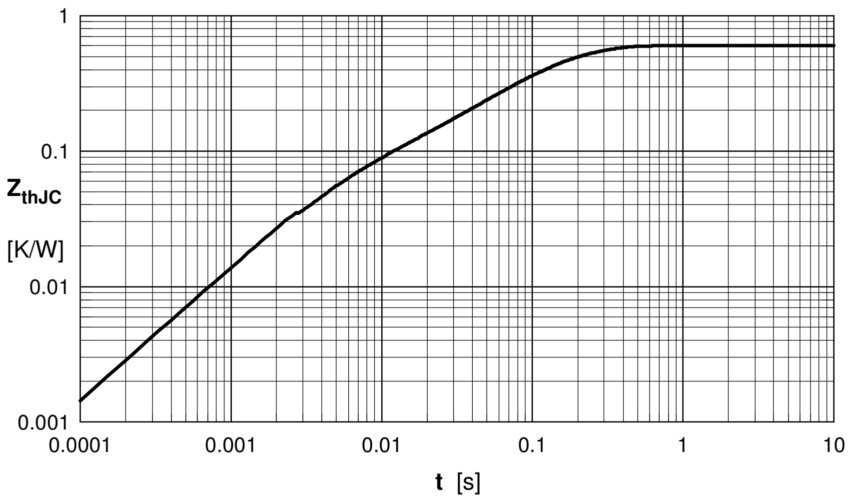


Fig. 7 Typ. transient thermal impedance

Brake Diode

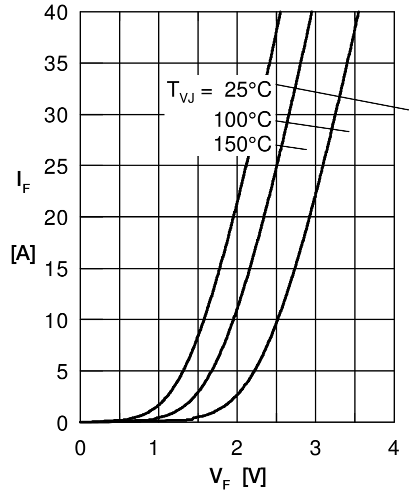


Fig. 1 Forward current
I_F versus V_F

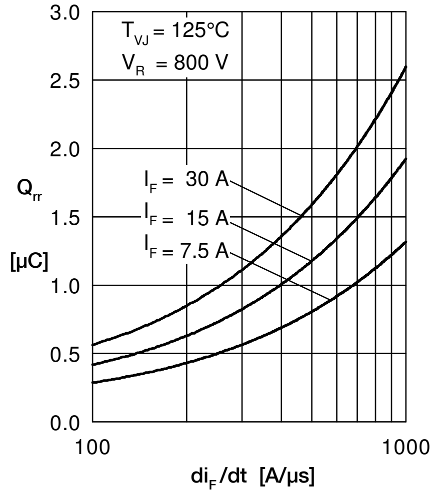


Fig. 2 Typ. reverse recov. charge
Q_r versus di_F /dt

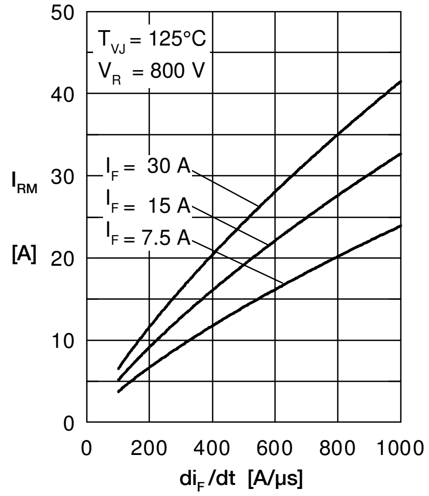


Fig. 3 Typ. peak reverse current
I_{RM} versus di_F /dt

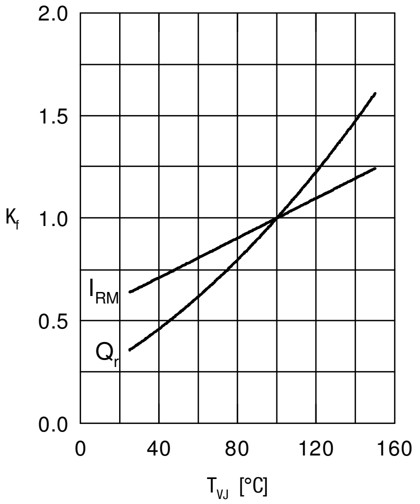


Fig. 4 Dynamic parameters
Q_r, I_{RM} versus T_{VJ}

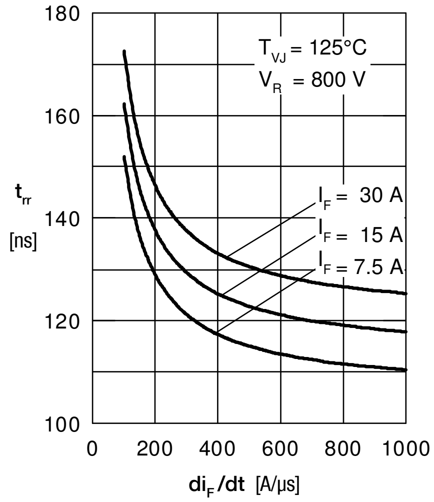


Fig. 5 Typ. recovery time
t_{rr} versus di_F/dt

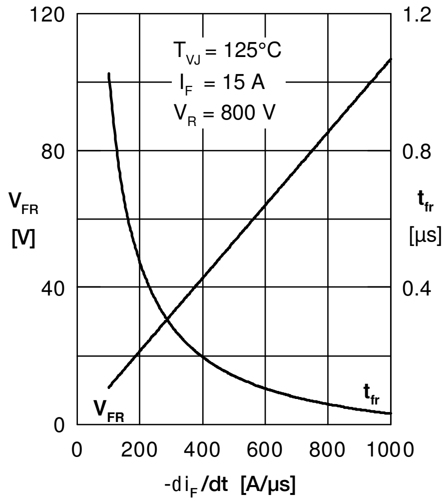


Fig. 6 Typ. peak forward voltage
V_{FR} and t_{fr} versus di_F/dt

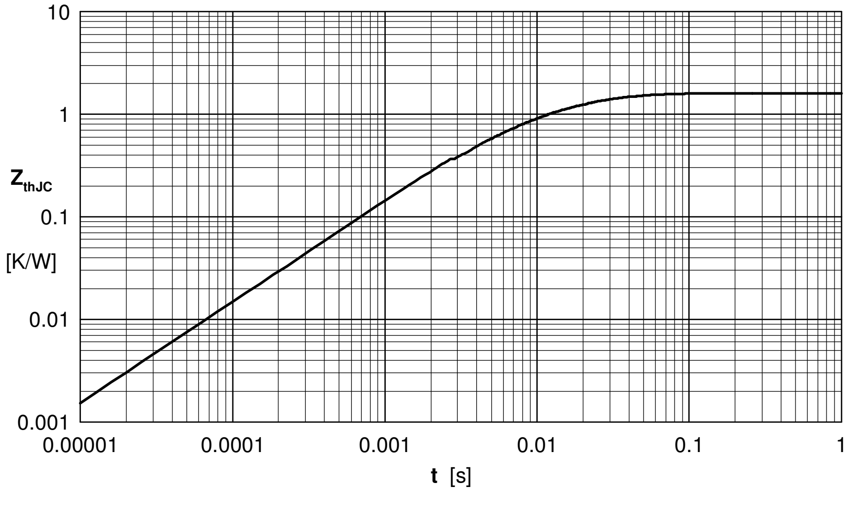


Fig. 7 Transient thermal impedance junction to case