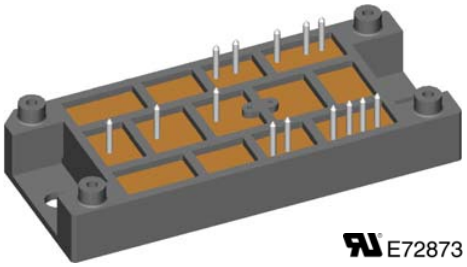
Standard Rectifier Module

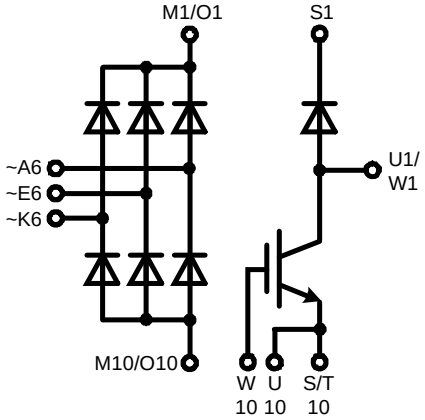
3 ~ Rectifier	Brake Chopper
V_{RRM} = 1600 V	V_{CES} = 1200 V
I_{DAVM} = 188 A	I_{C25} = 220 A
I_{FSM} = 1100 A	$V_{CE(sat)}$ = 1.95 V

3~ Rectifier Bridge + Brake Unit

Part name

VUB160-16NOX





Features / Advantages:

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

Applications:

- 3~ Rectifier with brake unit for drive inverters

Package:

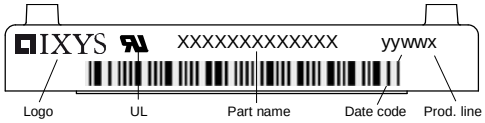
- Housing: V2-Pack
- DCB ceramic base plate
- Isolation voltage 3600 V~
- Easy to mount with two screws
- Space and weight savings
- RoHS compliant

Rectifier				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, drain current*	$V_{R/D}$ = 1600 V	T_{VJ} = 25°C			50	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 125°C			2	mA
V_F	*forward voltage drop*	I_T = 60 A	T_{VJ} = 25°C			1.16	V
		I_T = 120 A				1.36	V
		I_T = 60 A	T_{VJ} = 125°C			1.09	V
		I_T = 120 A				1.35	V
$I_{D(AV)M}$	*bridge output current*	T_C = 80°C	T_{VJ} = 150°C			188	A
		rectangular d = ⅓					
V_{F0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0.81	V
r_F	*slope resistance* }					4.4	mΩ
R_{thJC}	*thermal resistance junction to case*					0.60	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.2		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			200	W
I_{FSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.10	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.19	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			935	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.01	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			6.05	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			5.89	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			4.37	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			4.25	kA²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		37		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			220	A
I_{C80}			T_C = 80°C			150	A
P_{tot}	*total power dissipation*		T_C = 25°C			695	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 150 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.95	2.25	V
			T_{VJ} = 125°C		2.3		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 6 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 = 150 A			470		nC
$t_{d(on)}$	*turn-on delay time*	inductive load V_{CE} = 600 V; I_C = 150 A V_{GE} = ±15 V; R_G = 4.7 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*				14		mJ
E_{off}	*turn-off energy per pulse*				16		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = ±15 V; R_G = 4.7 Ω	T_{VJ} = 125°C				
I_{CM}		V_{CEK} = 1200 V				450	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 = 4.7 Ω; non-repetitive			600		A
R_{thJC}	*thermal resistance junction to case*					0.18	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.1		K/W

Brake Diode							
V_{RRM}	*max. repetitive reverse voltage*		T_{VJ} = 25°C			1200	V
I_{F25}	*forward current*		T_C = 25°C			62	A
I_{F80}			T_C = 80°C			40	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

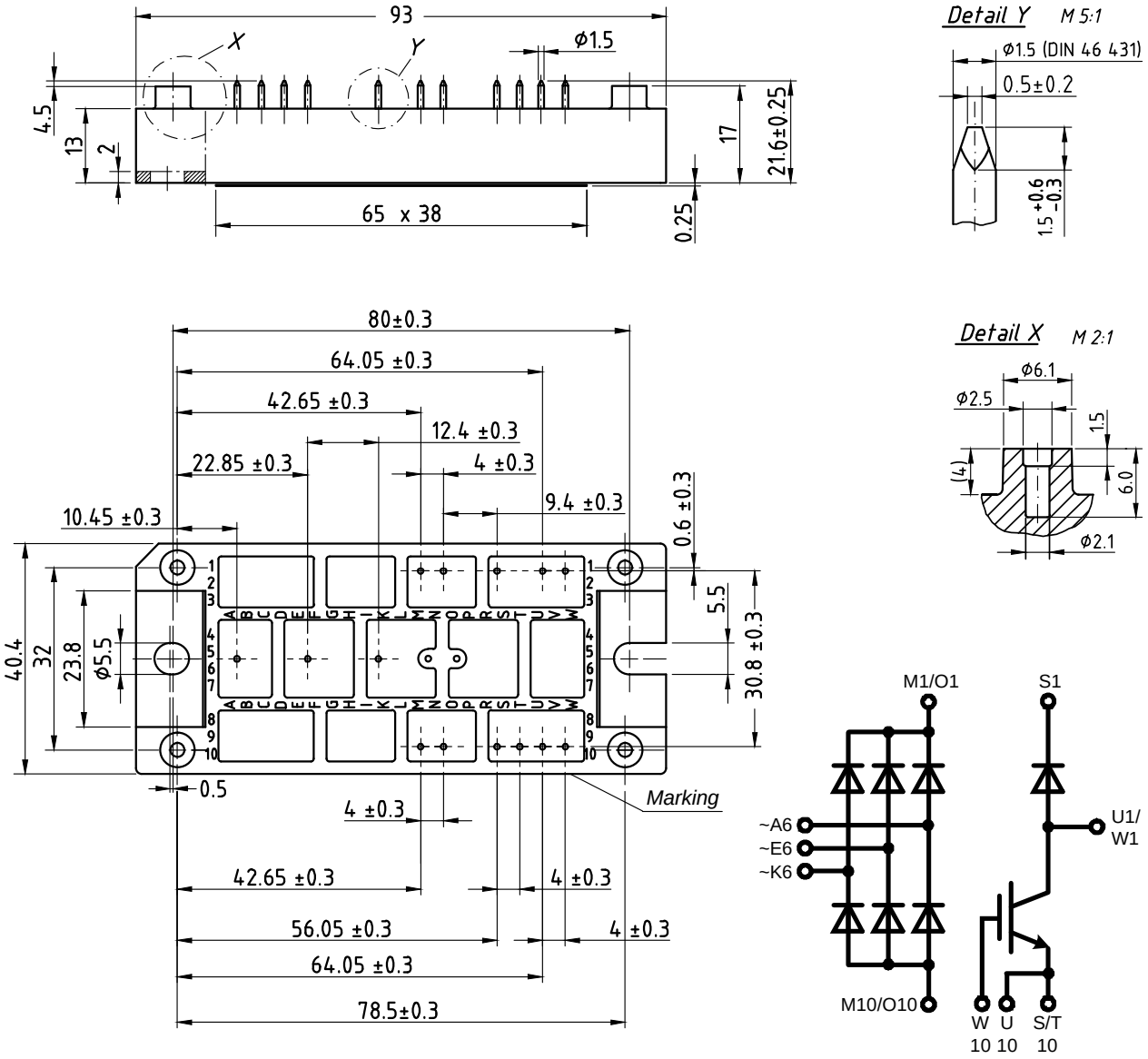
Package V2-Pack			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	I_{RM} current	per terminal			100	A
T_{stg}	storage temperature		-40		125	°C
T_{VJ}	virtual junction temperature		-40		150	°C
Weight				76		g
M_D	mounting torque		2		2.5	Nm
V_{ISOL}	isolation voltage	t = 1 second	3600			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	VUB160-16NOX	VUB160-16NOX	Box	6	510141

Similar Part	Package	Voltage class
VUB160-16NOXT	V2-Pack	1600

Outlines



Rectifier

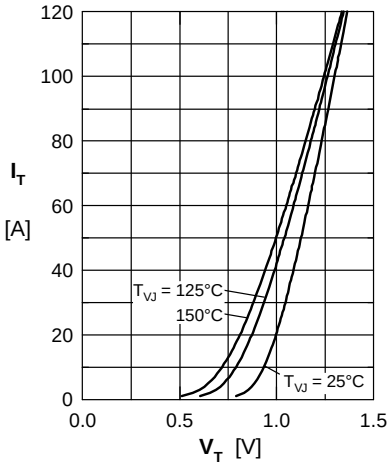


Fig.1 Forward current versus voltage drop per diode

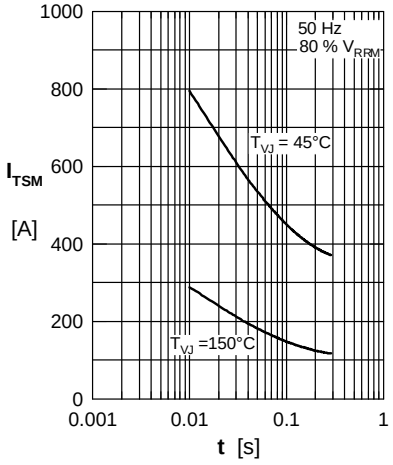


Fig.2 Surge overload current

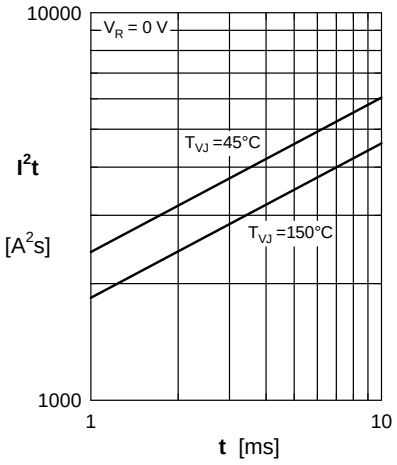


Fig.3 I^2t versus time per diode

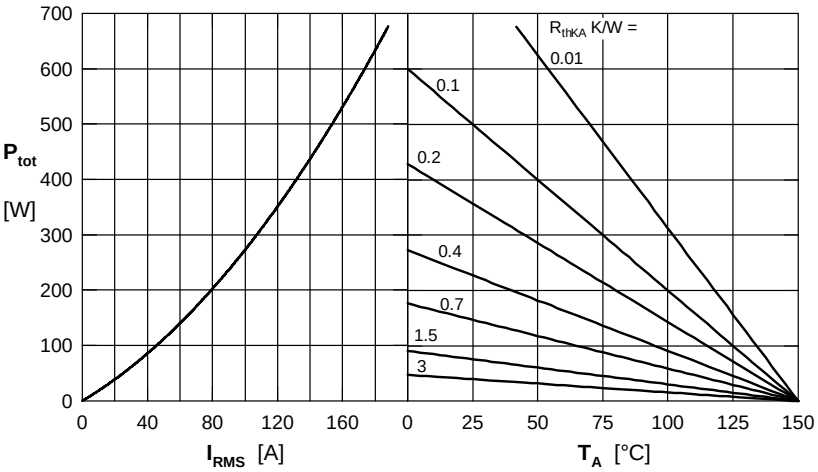


Fig.4 Power dissipation versus direct output current and ambient temperature, sine 180°

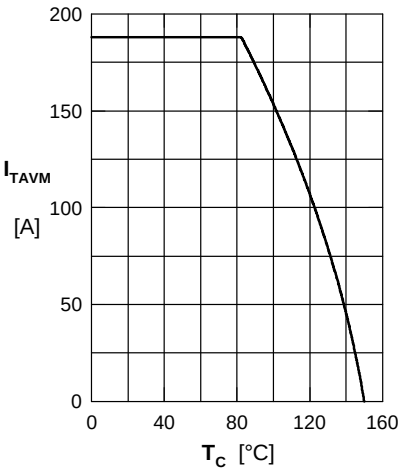


Fig. 5 Max. forward current vs. case temperature

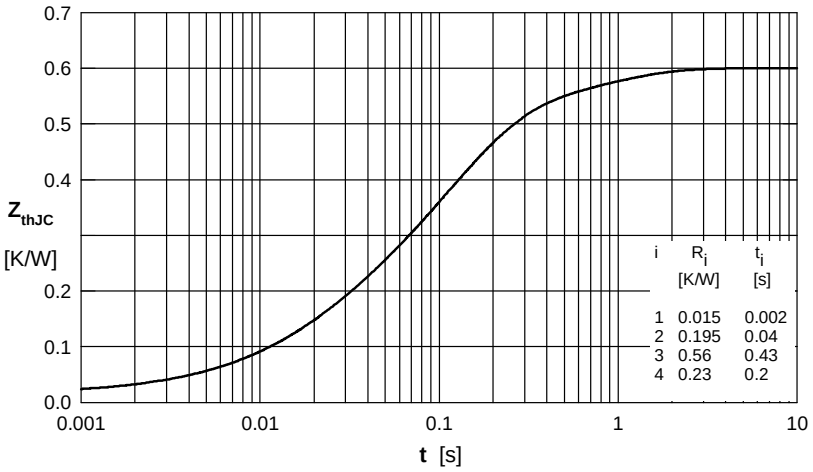


Fig. 6 Transient thermal impedance junction to case

Brake IGBT

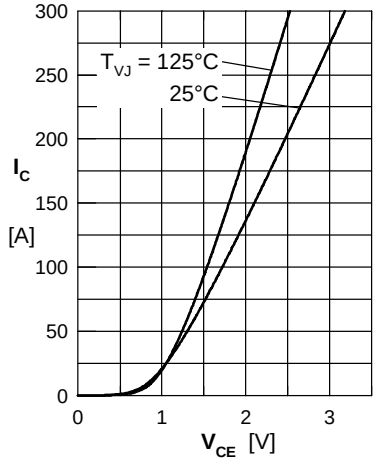


Fig. 1 Typ. output characteristics

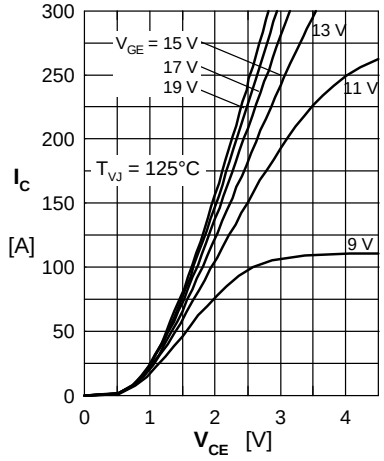


Fig. 2 Typ. output characteristics

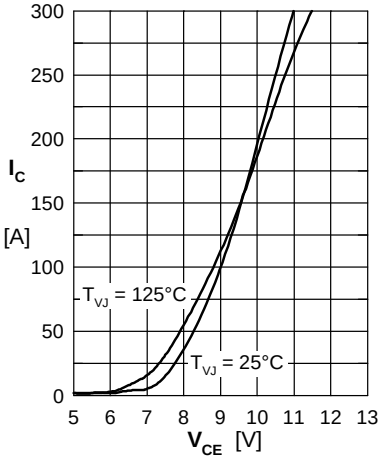


Fig. 3 Typ. transfer characteristics

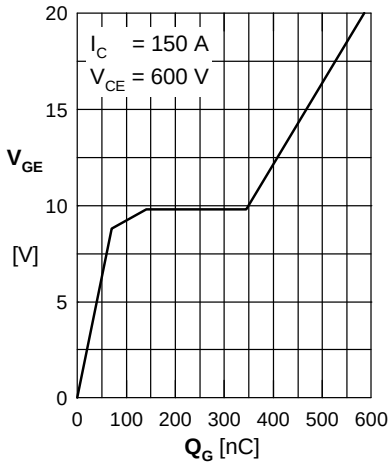


Fig. 4 Dynamic parameters Q_r, I_{RM} versus T_{VJ}

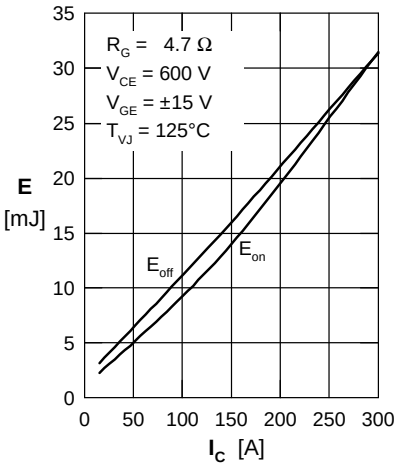


Fig. 5 Typ. recovery time t_{rr} vs. $-di_F/dt$

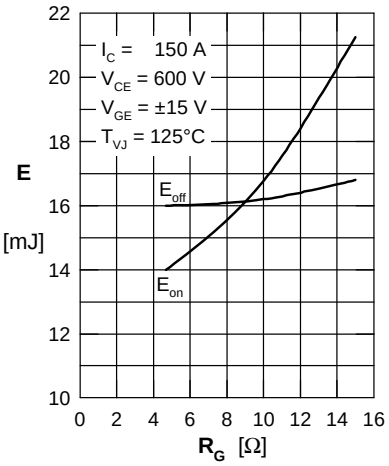


Fig. 6 Typ. peak forward voltage V_{FR} and t_{fr} versus di_F/dt

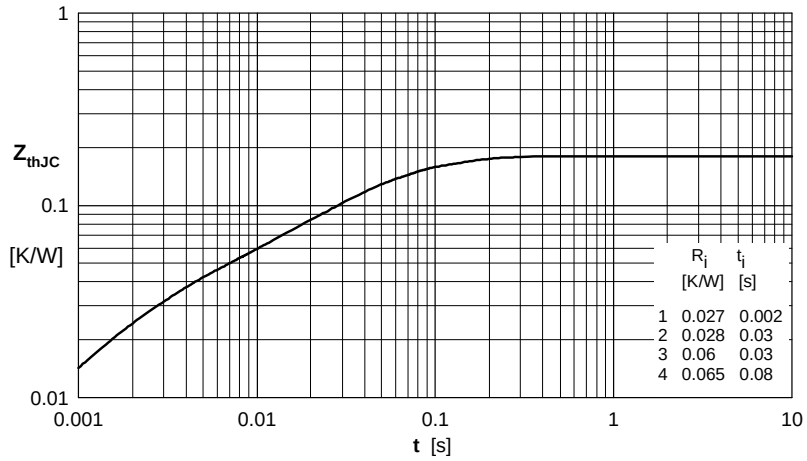


Fig. 7 Transient thermal impedance junction to case

Brake Diode

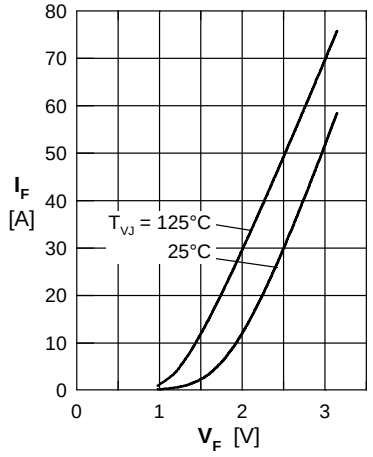


Fig. 1 Typ. forward current I_F vs. V_F

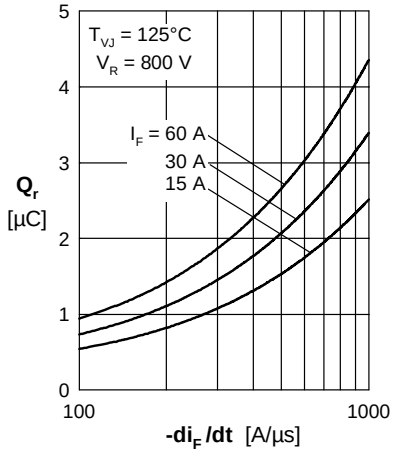


Fig. 2 Typ. reverse recovery charge Q_r versus -di$_F$/dt

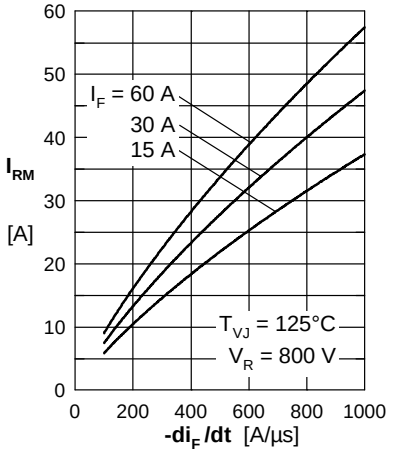


Fig. 3 Typ. peak reverse current I_{RM} versus -di$_F$/dt

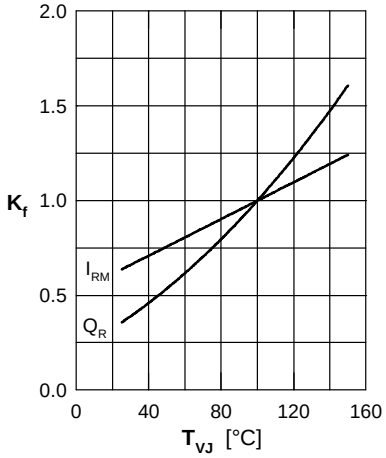


Fig. 4 Typ. dynamic parameters Q_r, I_{RM}, versus T_{VJ}

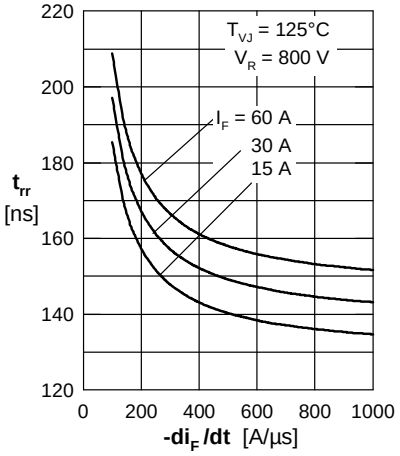


Fig. 5 Typ. recovery time t_{rr} vs. -di$_F$/dt

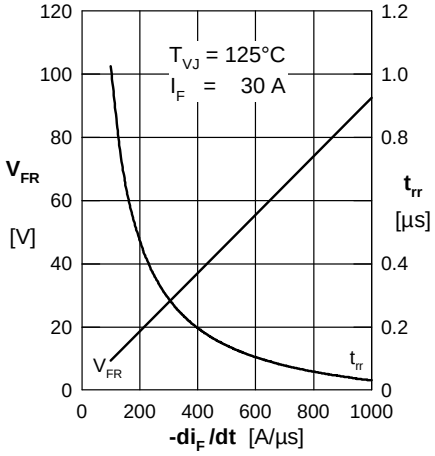


Fig. 6 Typ. peak forward voltage V_{FR} and t_{fr} versus di$_F$/dt

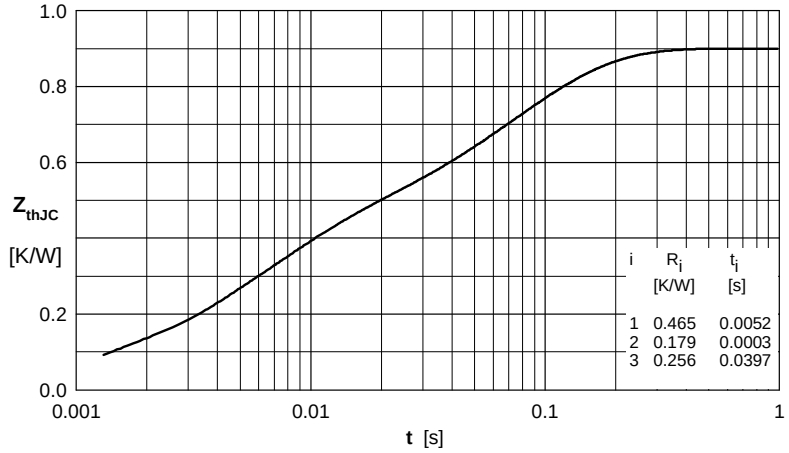


Fig. 7 Typ. transient thermal impedance junction to case