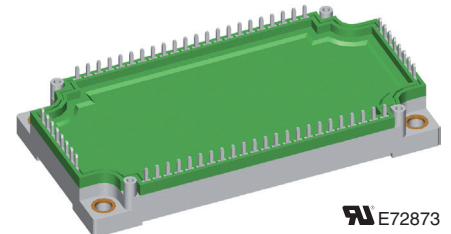


Converter - Brake - Inverter Module XPT IGBT

Three Phase Rectifier	Brake Chopper	Three Phase Inverter
$V_{RRM} = 1600\text{ V}$	$V_{CES} = 1200\text{ V}$	$V_{CES} = 1200\text{ V}$
$I_{DAVM} = 265\text{ A}$	$I_{C25} = 60\text{ A}$	$I_{C25} = 120\text{ A}$
$I_{FSM} = 1100\text{ A}$	$V_{CE(sat)} = 1.8\text{ V}$	$V_{CE(sat)} = 1.8\text{ V}$

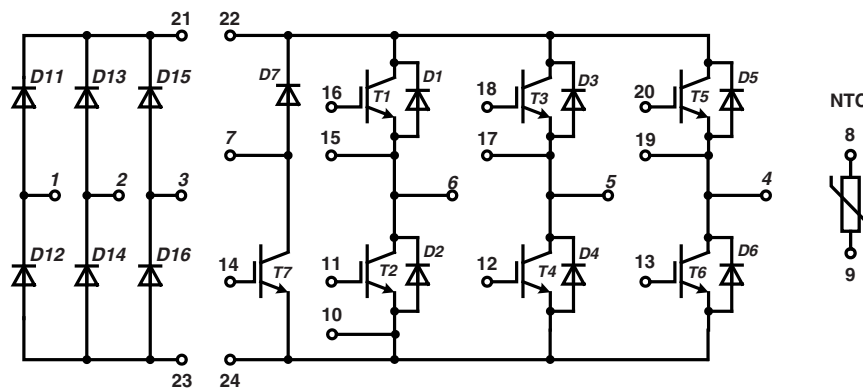
Part name (Marking on product)

MIXA80WB1200TEH



E72873

Pin configuration see outlines.



Features:

- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- Rugged XPT design (Xtreme light Punch Through) results in:
 - short circuit rated for 10 μsec .
 - very low gate charge
 - square RBSOA @ $3 \times I_C$
 - low EMI
- Thin wafer technology combined with the XPT design results in a competitive low $V_{CE(sat)}$
- SONIC™ diode
 - fast and soft reverse recovery
 - low operating forward voltage

Application:

- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies

Package:

- "E3-Pack" standard outline
- Insulated copper base plate
- Soldering pins for PCB mounting
- Temperature sense included

Terms & Conditions of usage

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact the sales office, which is responsible for you. Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend

- to perform joint risk and quality assessments;
- the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

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Output Inverter T1 - T6

Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
V_{CES}	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200		V
V_{GES}	max. DC gate voltage	continuous			± 20		V
V_{GEM}	max. transient collector gate voltage	transient			± 30		V
I_{C25}	collector current	$T_C = 25^{\circ}\text{C}$			120		A
I_{C80}		$T_C = 80^{\circ}\text{C}$			84		A
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			390		W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 77\text{ A}; V_{GE} = 15\text{ V}$		1.8 2.1	2.1		V V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 3\text{ mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	5.4	6.0	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.03 0.6	0.2		mA mA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$			500		nA
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 75\text{ A}$		230			nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 75\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 10\ \Omega$	$T_{VJ} = 125^{\circ}\text{C}$	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			6.8			mJ
E_{off}	turn-off energy per pulse			8.3			mJ
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 10\ \Omega;$	$T_{VJ} = 125^{\circ}\text{C}$ $V_{CEK} = 1200\text{ V}$		225		A
SCSOA	short circuit safe operating area						
t_{SC}	short circuit duration	$V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V};$	$T_{VJ} = 125^{\circ}\text{C}$		10		μs
I_{SC}	short circuit current	$R_G = 10\ \Omega;$ non-repetitive		300			A
R_{thJC}	thermal resistance junction to case	(per IGBT)			0.32		K/W

Output Inverter D1 - D6

Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200		V
I_{F25}	forward current	$T_C = 25^{\circ}\text{C}$			135		A
I_{F80}		$T_C = 80^{\circ}\text{C}$			90		A
V_F	forward voltage	$I_F = 100\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.95 1.95	2.2		V V
Q_{rr}	reverse recovery charge	$V_R = 600\text{ V}$ $di_F/dt = -1600\text{ A}/\mu\text{s}$ $I_F = 100\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$	12.5			μC
I_{RM}	max. reverse recovery current			100			A
t_{rr}	reverse recovery time			350			ns
E_{rec}	reverse recovery energy			4			mJ
R_{thJC}	thermal resistance junction to case	(per diode)			0.4		K/W

 $T_C = 25^{\circ}\text{C}$ unless otherwise stated

Brake T7

				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.	Unit	
V_{CES}	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
V_{GES}	max. DC gate voltage	continuous			± 20	V	
V_{GEM}	max. transient collector gate voltage	transient			± 30	V	
I_{C25}	collector current	$T_C = 25^{\circ}\text{C}$			60	A	
I_{C80}		$T_C = 80^{\circ}\text{C}$			40	A	
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			195	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 35\text{ A}; V_{GE} = 15\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.8 2.1	2.1	V V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 1.5\text{ mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	5.4	6.0	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.01 0.1	0.1	mA mA	
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$			500	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 35\text{ A}$		107		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 35\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 27\text{ }\Omega$	$T_{VJ} = 125^{\circ}\text{C}$	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	$V_{GE} = \pm 15\text{ V}; R_G = 27\text{ }\Omega;$	$T_{VJ} = 125^{\circ}\text{C}$ $V_{CEK} = 1200\text{ V}$		105	A	
SCSOA	short circuit safe operating area						
t_{sc}	short circuit duration	$V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V};$	$T_{VJ} = 125^{\circ}\text{C}$		10	μs	
I_{sc}	short circuit current	$R_G = 27\text{ }\Omega;$ non-repetitive		140		A	
R_{thJC}	thermal resistance junction to case				0.64	K/W	

Brake Chopper D7

				Ratings		
Symbol	Definitions	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			44	A
I _{F80}		T _C = 80°C			29	A
V _F	forward voltage	I _F = 30 A; V _{GE} = 0 V	T _{VJ} = 25°C T _{VJ} = 125°C	1.95 1.95	2.2	V V
I _R	reverse current	V _R = V _{RRM}	T _{VJ} = 25°C T _{VJ} = 125°C	0.01 0.15	0.1	mA mA
Q _{rr}	reverse recovery charge	V _R = 600 V di _F /dt = 600 A/μs I _F = 30 A; V _{GE} = 0 V	T _{VJ} = 125°C	3.5		μC
I _{RM}	max. reverse recovery current			30		A
t _{rr}	reverse recovery time			350		ns
E _{rec}	reverse recovery energy			0.9		mJ
R _{thJC}	thermal resistance junction to case				1.2	K/W

 $T_C = 25^{\circ}\text{C}$ unless otherwise stated

Input Rectifier Bridge D11 - D16

Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$			1600		V
I_{FAV}	average forward current	sine 180°			94		A
I_{DAVM}	max. average DC output current	rect.; $d = 1/3$			265		A
I_{FSM}	max. forward surge current	$t = 10 \text{ ms}$; sine 50 Hz			1100		A
					970		A
I^2t	I^2t value for fusing	$t = 10 \text{ ms}$; sine 50 Hz			6000		A^2s
					4700		A^2s
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			250		W
V_F	forward voltage	$I_F = 150 \text{ A}$					V
				1.3	1.6		V
I_R	reverse current	$V_R = V_{RRM}$					mA
				0.05	0.1		mA
R_{thJC}	thermal resistance junction to case	(per diode)			0.5		K/W

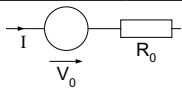
Temperature Sensor NTC

Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
R_{25}	resistance	$T_C = 25^{\circ}\text{C}$	4.75	5.0	5.25		$\text{k}\Omega$
$B_{25/50}$				3375			K

Module

Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
T_{VJ}	operating temperature		-40		125		$^{\circ}\text{C}$
T_{VJM}	max. virtual junction temperature				150		$^{\circ}\text{C}$
T_{stg}	storage temperature		-40		125		$^{\circ}\text{C}$
V_{ISOL}	isolation voltage	$I_{ISOL} \leq 1 \text{ mA}$; 50/60 Hz			3000		V~
CTI	comparative tracking index				200		
M_d	mounting torque (M5)		3		6		Nm
d_S	creep distance on surface		6				mm
d_A	strike distance through air		6				mm
$R_{pin-chip}$	resistance pin to chip			5			$\text{m}\Omega$
R_{thCH}	thermal resistance case to heatsink	with heatsink compound		0.01			K/W
Weight				300			g

Equivalent Circuits for Simulation



Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
V_0	rectifier diode	D8 - D13			0.87		V
R_0					2.7		$\text{m}\Omega$
V_0	IGBT	T1 - T6			1.1		V
R_0					17.9		$\text{m}\Omega$
V_0	free wheeling diode	D1 - D6			1.09		V
R_0					9.1		$\text{m}\Omega$
V_0	IGBT	T7			1.1		V
R_0					40		$\text{m}\Omega$
V_0	free wheeling diode	D7			1.2		V
R_0					27.0		$\text{m}\Omega$

 $T_C = 25^{\circ}\text{C}$ unless otherwise stated

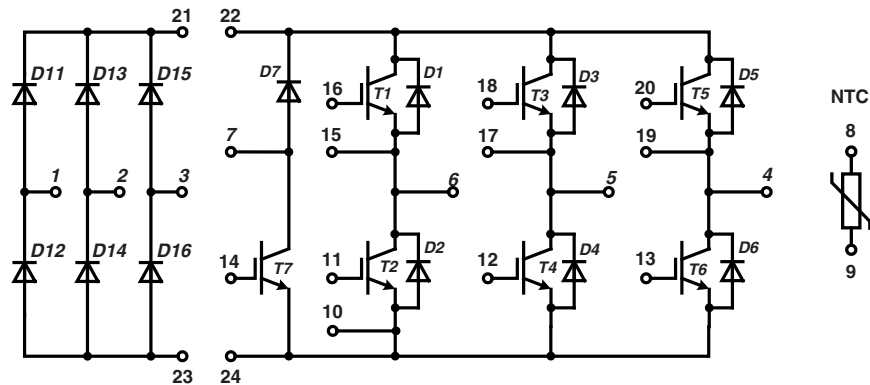
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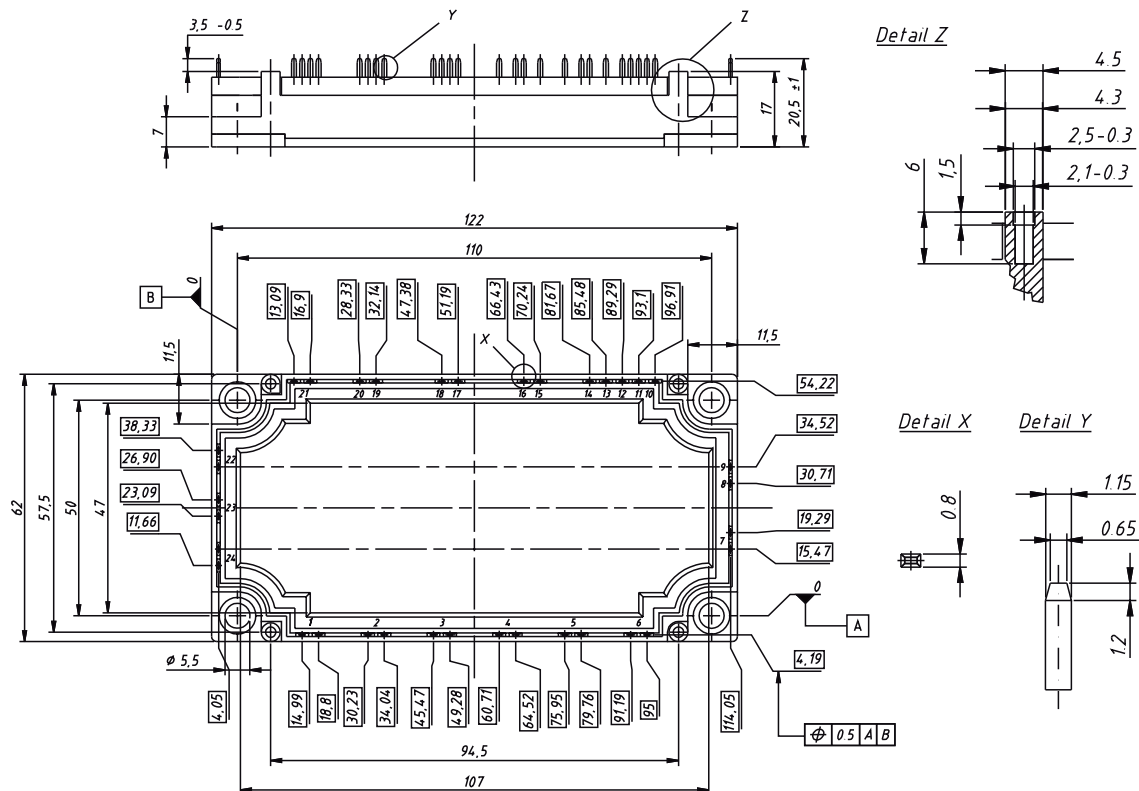
4 - 9

Circuit Diagram

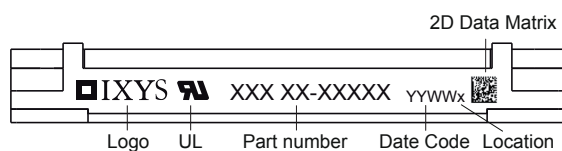


Outline Drawing

Dimensions in mm (1 mm = 0.0394")



Product Marking



Part number

M = Module
I = IGBT
XA = XPT standard
80 = Current Rating [A]
WB = 6-Pack + 3~ Rectifier Bridge & Brake Unit
1200 = Reverse Voltage [V]
T = NTC
EH = E3-Pack

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXA80WB1200 TEH	MIXA80WB1200TEH	Box	5	509112

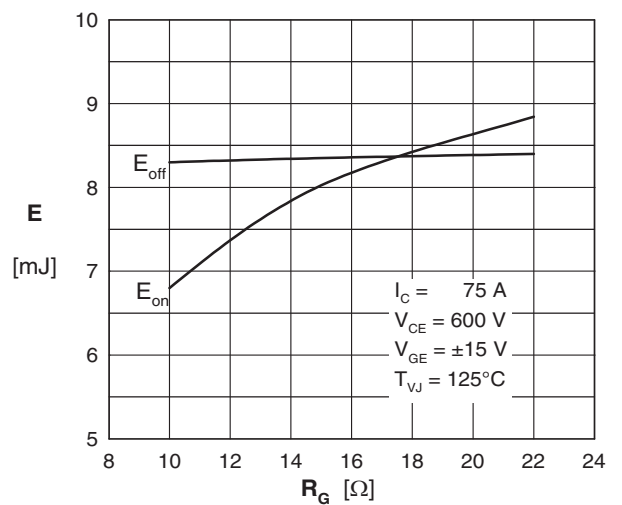
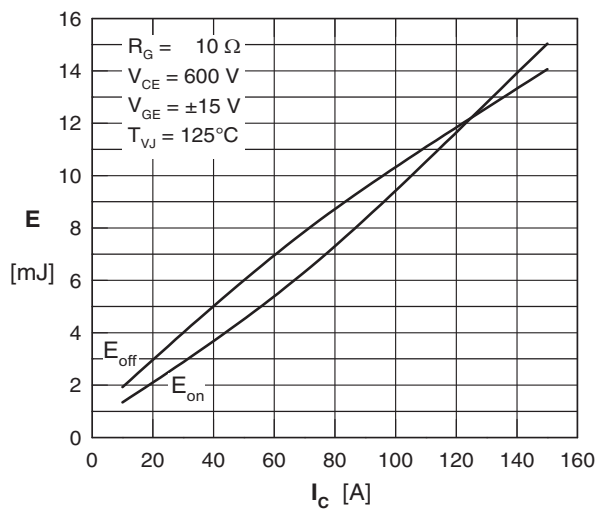
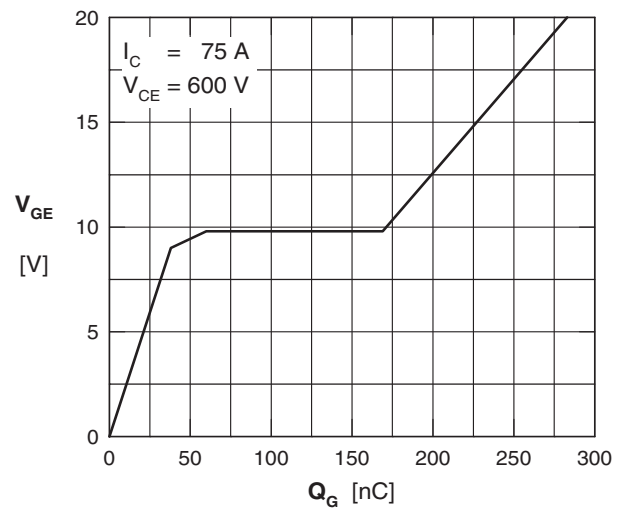
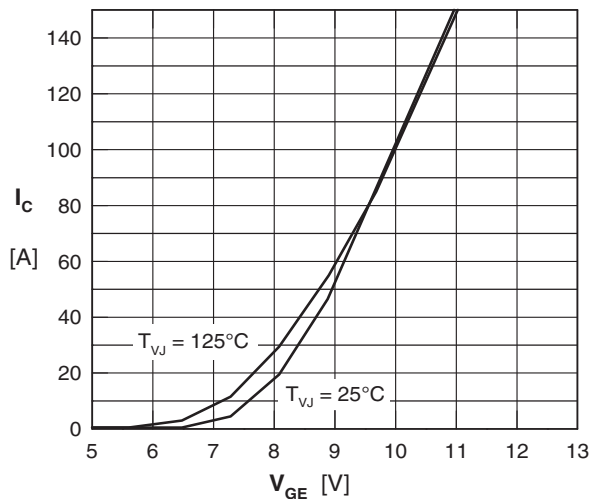
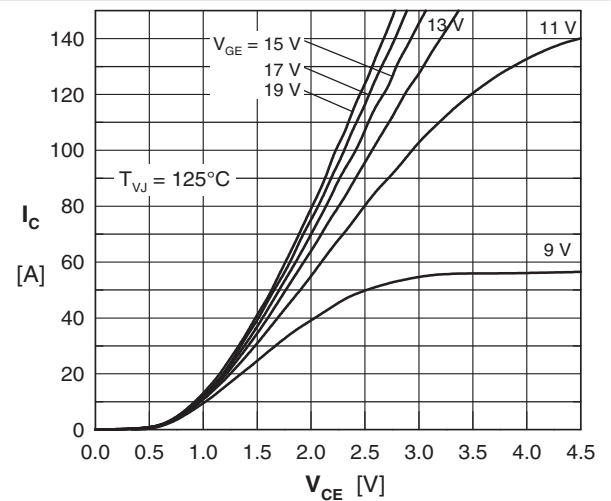
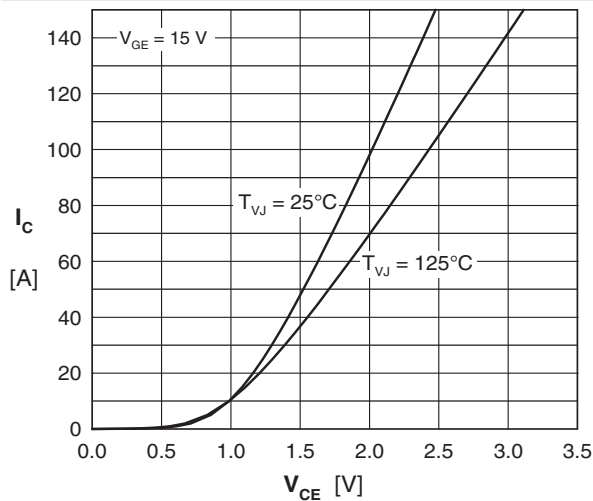
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Inverter T1 - T6



Inverter D1 - D6

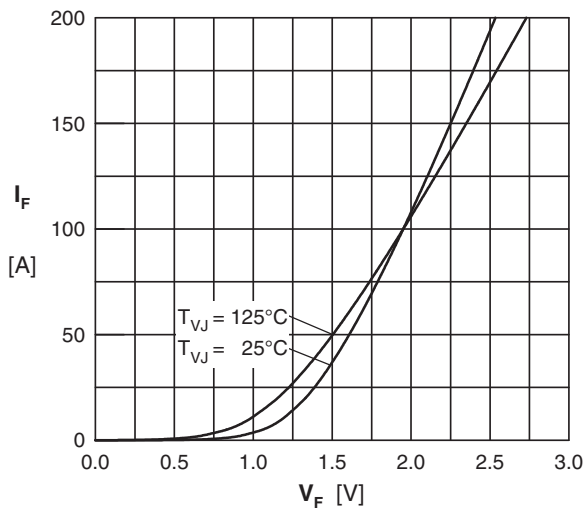


Fig. 7 Typ. Forward current versus V_F

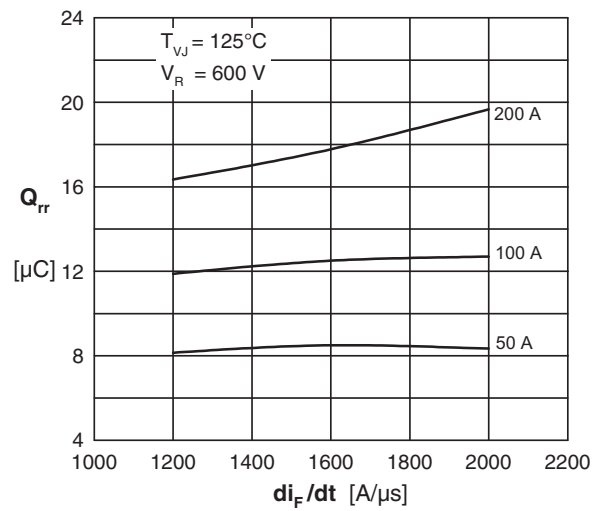


Fig. 8 Typ. reverse recov.charge Q_{rr} vs. di/dt

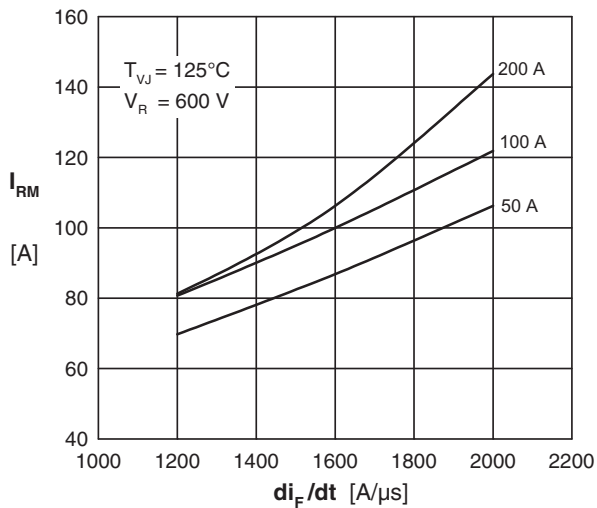


Fig. 9 Typ. peak reverse current I_{RM} vs. di/dt

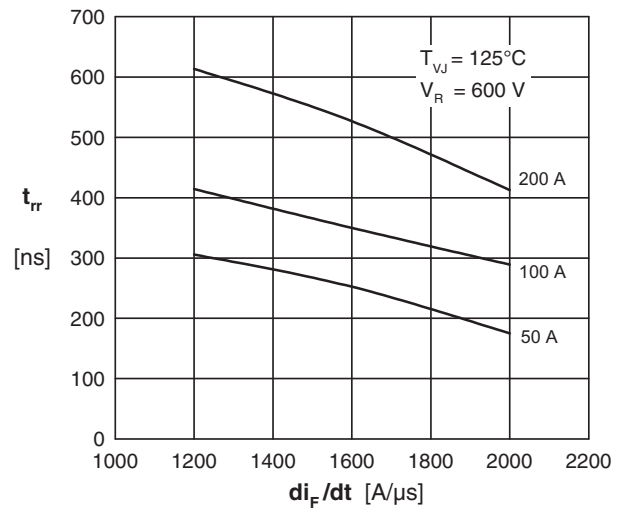


Fig. 10 Typ. recovery time t_{rr} versus di/dt

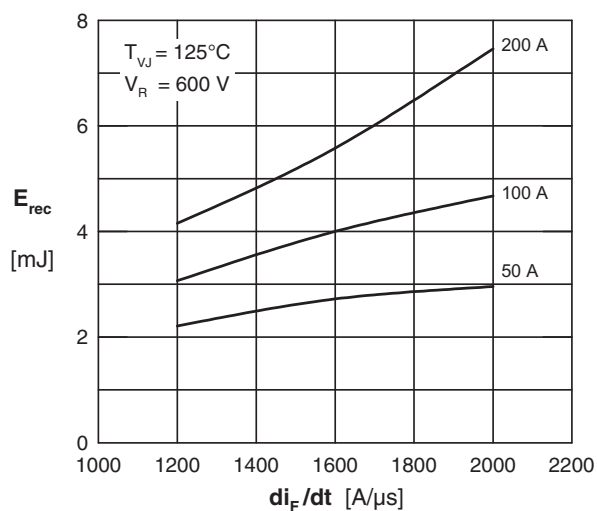


Fig. 11 Typ. recovery energy E_{rec} versus di/dt

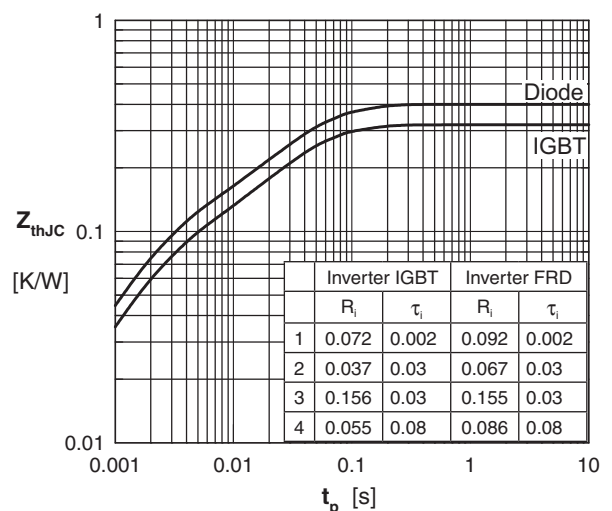


Fig. 12 Typ. transient thermal impedance

Brake T7 & D7

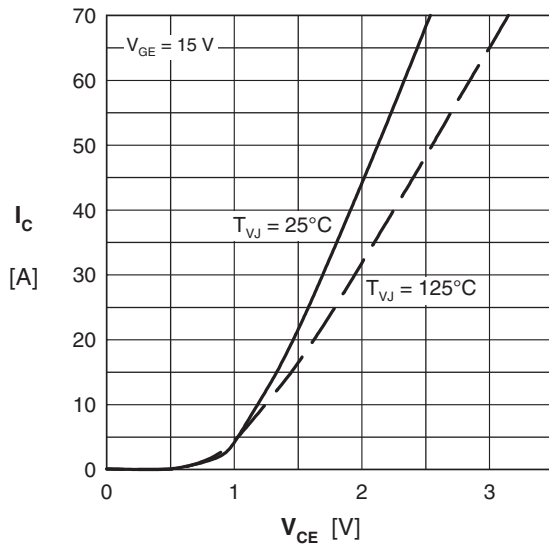


Fig. 13 Typ. output characteristics

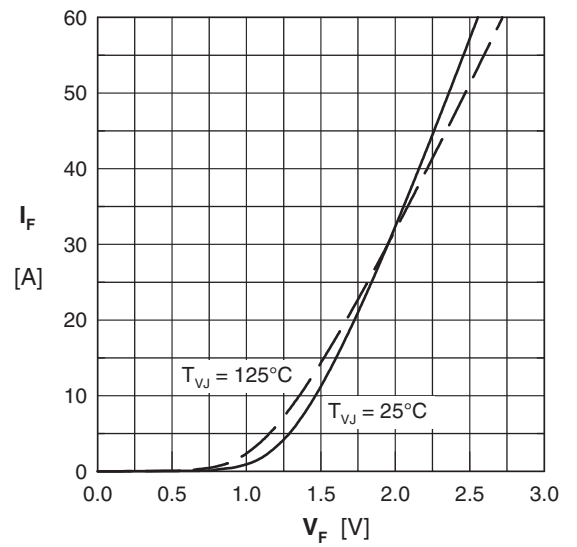


Fig. 14 Typ. forward characteristics

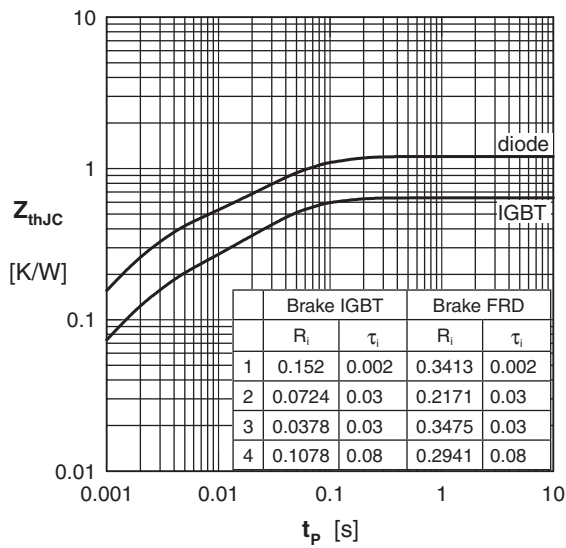


Fig. 15 Typ. transient thermal impedance

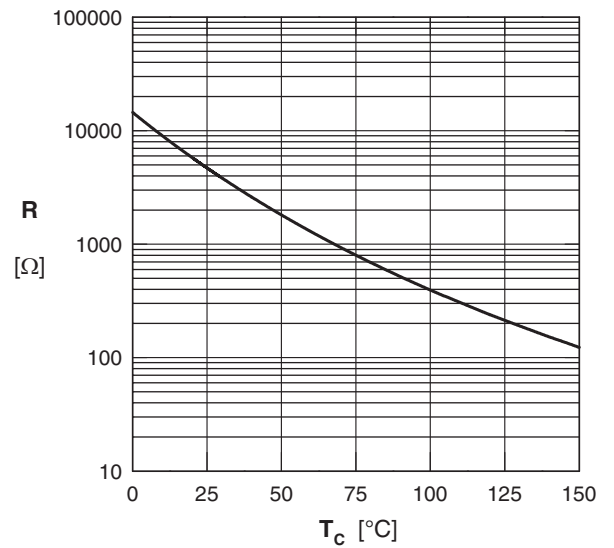


Fig. 16 Typ. NTC resistance vs. temperature

Rectifier D11 - D16

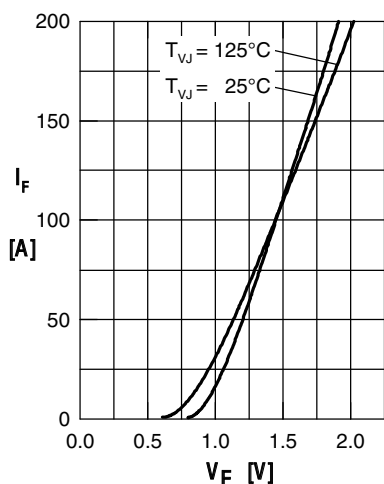


Fig. 1 Forward current vs. voltage drop per diode

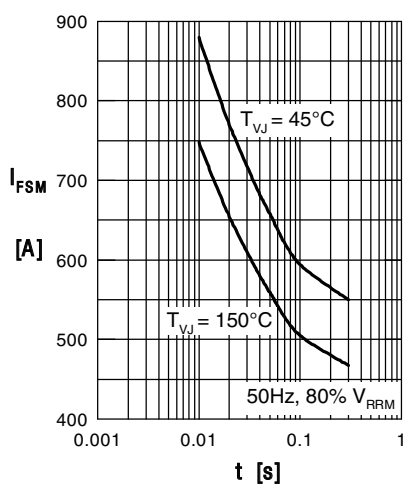


Fig. 2 Surge overload current vs. time per diode

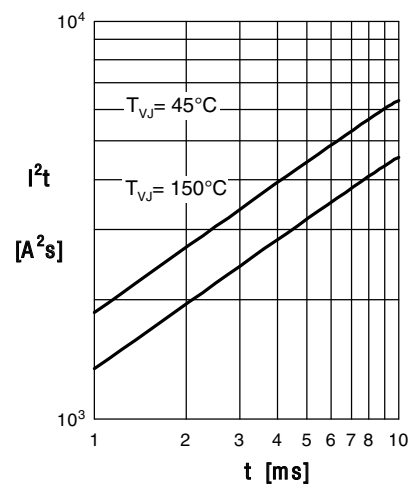


Fig. 3 I^2t vs. time per diode

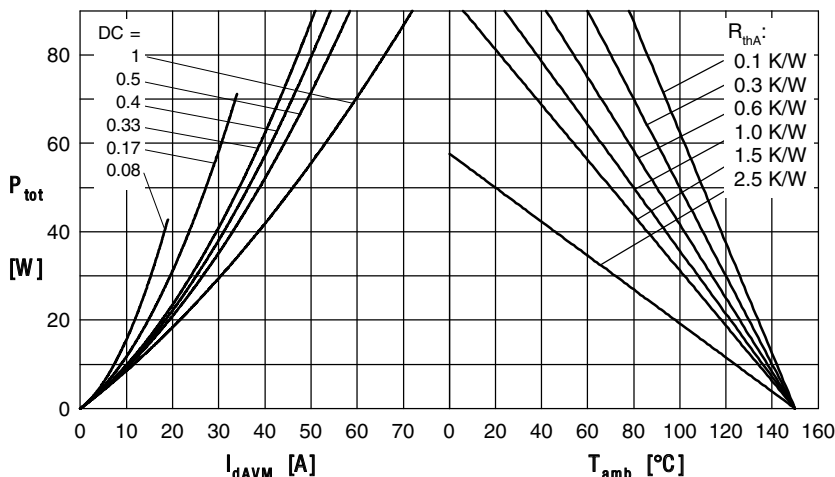


Fig. 4 Power dissipation vs. forward current and ambient temperature per diode

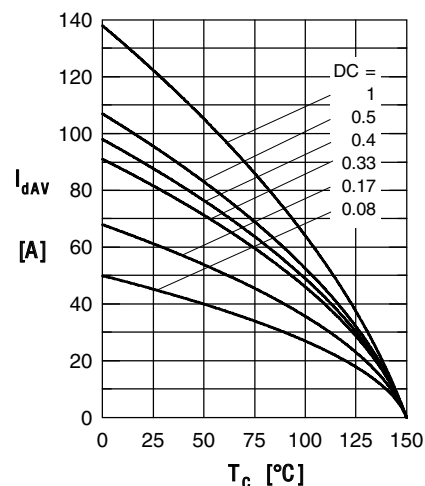


Fig. 5 Max. forward current vs. case temperature per diode

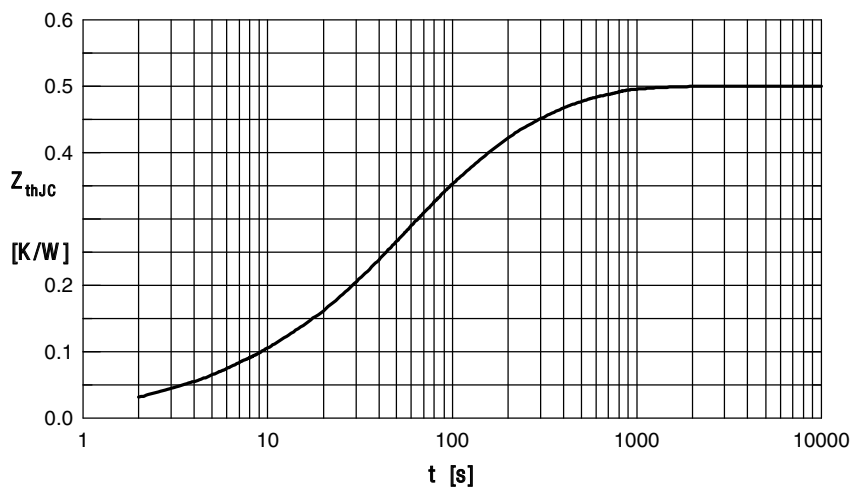


Fig. 6 Transient thermal impedance junction to case vs. time per diode

Constants for Z_{thJC} calculation:

i	R_{th} (K/W)	t_i (s)
1	0.040	0.004
2	0.003	0.010
3	0.140	0.030
4	0.120	0.300
5	0.197	0.080