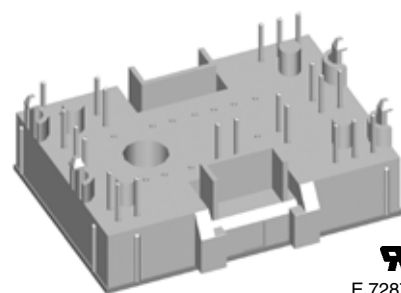
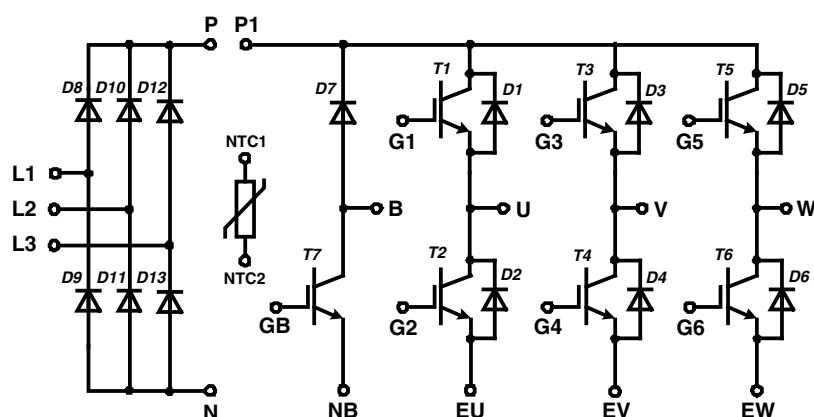


Converter - Brake - Inverter Module XPT IGBT

Three Phase Rectifier	Brake Chopper	Three Phase Inverter
$V_{RRM} = 1600 \text{ V}$	$V_{CES} = 1200 \text{ V}$	$V_{CES} = 1200 \text{ V}$
$I_{DAVM25} = 100 \text{ A}$	$I_{C25} = 28 \text{ A}$	$I_{C25} = 28 \text{ A}$
$I_{FSM} = 270 \text{ A}$	$V_{CE(sat)} = 1.8 \text{ V}$	$V_{CE(sat)} = 1.8 \text{ V}$

Part name (Marking on product)

MIXA20WB1200TMH




E 72873

Pin configuration see outlines.

Features:

- High level of integration - only one power semiconductor module required for the whole drive
- 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 $V_{CE(sat)}$
- Temperature sense included
- SONIC™ diode
 - fast and soft reverse recovery
 - low operating forward voltage

Application:

- AC motor drives
- Pumps, Fans
- Washing machines
- Air-conditioning system
- Inverter and power supplies

Package:

- "Mini" package
- Assembly height is 17 mm
- Insulated base plate
- Pins suitable for wave soldering and PCB mounting
- Assembly clips available
 - IXKU 5-505 screw clamp
 - IXRB 5-506 click clamp
- UL registered E72873

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	$T_C = 25^{\circ}\text{C}$			28		A
I_{C80}		$T_C = 80^{\circ}\text{C}$			20		A
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			100		W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 16\text{ A}; V_{GE} = 15\text{ V}$		1.8 2.1	2.1		V V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.6\text{ mA}; V_{GE} = V_{CE}$	5	5.5	6.5		V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$		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	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 15\text{ A}$		48			nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 15\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 56\ \Omega$	$T_{VJ} = 125^{\circ}\text{C}$	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			1.55			mJ
E_{off}	turn-off energy per pulse			1.7			mJ
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 56\ \Omega; V_{CEK} = 1200\text{ V}$ $T_{VJ} = 125^{\circ}\text{C}$			45		A
I_{SC} (SCSOA)	short circuit safe operating area	$V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V};$ $R_G = 56\ \Omega; t_p = 10\ \mu\text{s};$ non-repetitive $T_{VJ} = 125^{\circ}\text{C}$		60			A
R_{thJC}	thermal resistance junction to case	(per IGBT)		0.42	1.26		K/W K/W
R_{thCH}	thermal resistance case to heatsink						

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	$T_C = 25^{\circ}\text{C}$			33		A
I_{F80}		$T_C = 80^{\circ}\text{C}$			22		A
V_F	forward voltage	$I_F = 20\text{ A}; V_{GE} = 0\text{ V}$		1.95 1.95	2.2		V V
Q_{rr}	reverse recovery charge	$V_R = 600\text{ V}$ $di_F/dt = -400\text{ A}/\mu\text{s}$ $I_F = 20\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$	3			μC
I_{RM}	max. reverse recovery current			20			A
t_{rr}	reverse recovery time			350			ns
E_{rec}	reverse recovery energy			0.7			mJ
R_{thJC}	thermal resistance junction to case	(per diode)		0.5	1.5		K/W K/W
R_{thCH}	thermal resistance case to heatsink						

Brake T7

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	$T_C = 25^{\circ}\text{C}$			28		A
I_{C80}		$T_C = 80^{\circ}\text{C}$			20		A
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			100		W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 16\text{ A}; V_{GE} = 15\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.8 2.1	2.1		V V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.6\text{ mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	5	5.5	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	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 15\text{ A}$		48			nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 15\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 56\ \Omega$	$T_{VJ} = 125^{\circ}\text{C}$	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			1.55			mJ
E_{off}	turn-off energy per pulse			1.7			mJ
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 56\ \Omega; V_{CEK} = 1200\text{ V}$ $T_{VJ} = 125^{\circ}\text{C}$			45		A
I_{SC} (SCSOA)	short circuit safe operating area	$V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V};$ $R_G = 56\ \Omega; t_p = 10\ \mu\text{s};$ non-repetitive	$T_{VJ} = 125^{\circ}\text{C}$	60			A
R_{thJC}	thermal resistance junction to case	(per IGBT)			1.26		K/W
R_{thCH}	thermal resistance case to heatsink			0.42			K/W

Brake Chopper D7

Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 150^{\circ}\text{C}$			1200		V
I_{F25}	forward current	$T_C = 25^{\circ}\text{C}$			12		A
I_{F80}		$T_C = 80^{\circ}\text{C}$			8		A
V_F	forward voltage	$I_F = 5\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.95 1.95	2.2		V V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.01 0.1	0.1		mA mA
Q_{rr}	reverse recovery charge	$V_R = 600\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $I_F = 5\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$	0.6			μC
I_{RM}	max. reverse recovery current			6			A
t_{rr}	reverse recovery time			350			ns
E_{rec}	reverse recovery energy			0.15			mJ
R_{thJC}	thermal resistance junction to case	(per diode)			3.4		K/W
R_{thCH}	thermal resistance case to heatsink			1.1			K/W

Input Rectifier Bridge D8 - D11

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°	$T_C = 80^{\circ}\text{C}$		24		A
I_{DAVM}	max. average DC output current	rect.; $d = 1/3$	$T_C = 80^{\circ}\text{C}$		69		A
I_{FSM}	max. forward surge current	$t = 10 \text{ ms}$; sine 50 Hz	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		270 240		A A
I^2t	I^2t value for fusing	$t = 10 \text{ ms}$; sine 50 Hz	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		360 290		A^2s A^2s
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$		69		W
V_F	forward voltage	$I_F = 30 \text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.27 1.24	1.6		V V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.3	0.01		mA mA
R_{thJC}	thermal resistance junction to case	(per diode)		0.6	1.8		K/W
R_{thCH}	thermal resistance case to heatsink	(per diode)					K/W

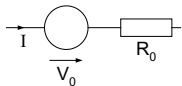
Temperature Sensor NTC

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			2500		V~
CTI	comparative tracking index				-		
F_C	mounting force		40		80		N
d_S	creep distance on surface		12.7				mm
d_A	strike distance through air		12				mm
Weight				35			g

Equivalent Circuits for Simulation



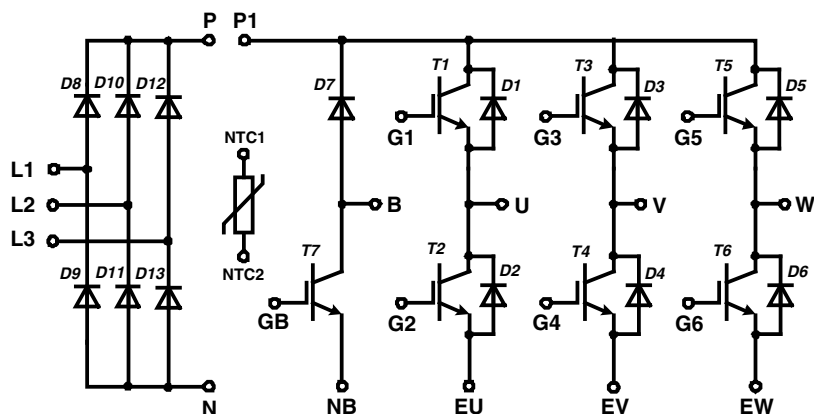
Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
V_0 R_0	rectifier diode	D8 - D13	$T_{VJ} = 150^{\circ}\text{C}$		0.86 12.3		V $\text{m}\Omega$
V_0 R_0	IGBT	T1 - T6	$T_{VJ} = 150^{\circ}\text{C}$		1.1 86.3		V $\text{m}\Omega$
V_0 R_0	free wheeling diode	D1 - D6	$T_{VJ} = 150^{\circ}\text{C}$		1.19 40.0		V $\text{m}\Omega$
V_0 R_0	IGBT	T7	$T_{VJ} = 150^{\circ}\text{C}$		1.1 86.3		V $\text{m}\Omega$
V_0 R_0	free wheeling diode	D7	$T_{VJ} = 150^{\circ}\text{C}$		1.15 171		V $\text{m}\Omega$

IXYS reserves the right to change limits, test conditions and dimensions.

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

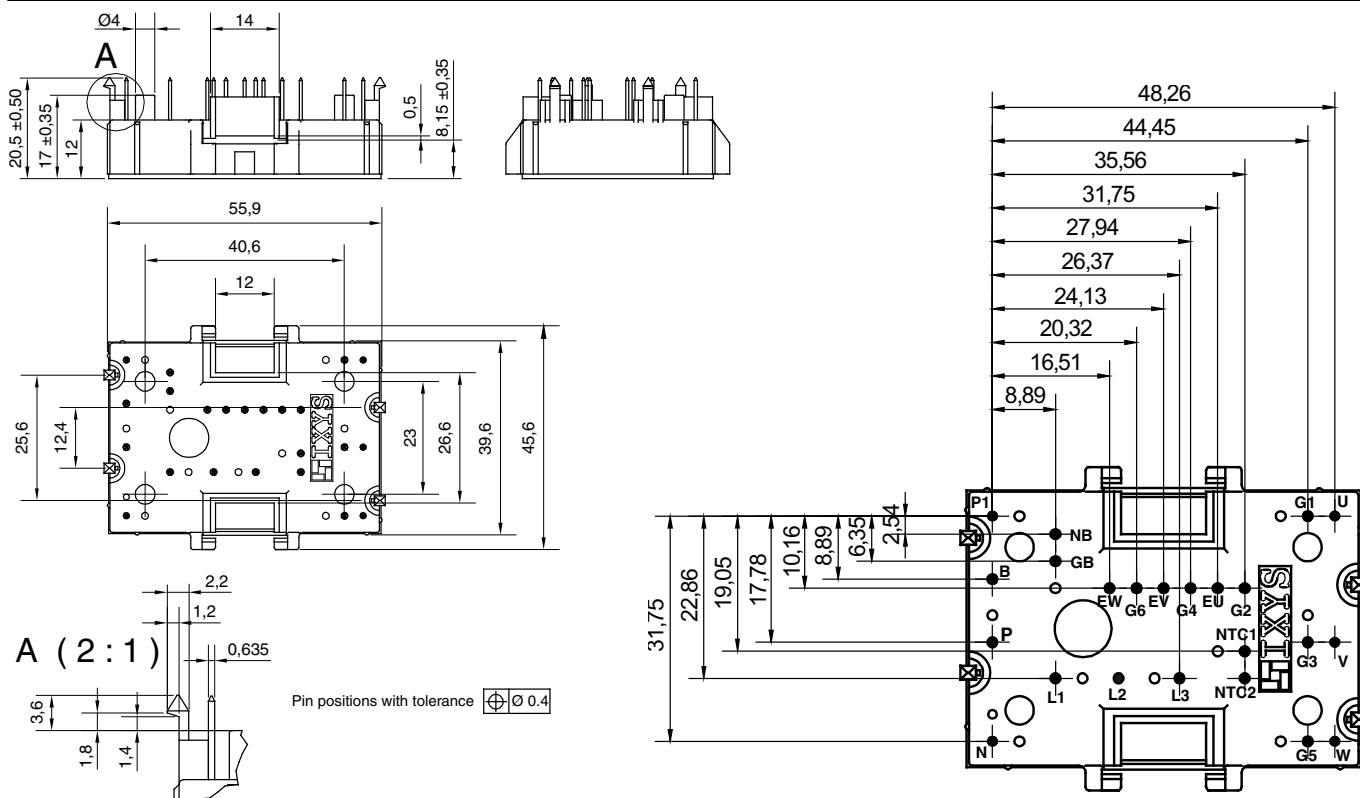
20101103b

Circuit Diagram

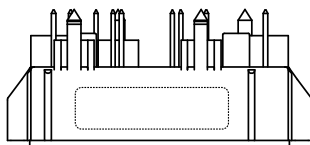


Outline Drawing

Dimensions in mm (1 mm = 0.0394")



Product Marking



Part number

M = Module
I = IGBT
X = XPT
A = standard
20 = Current Rating [A]
WB = 6-Pack + 3~ Rectifier Bridge & Brake Unit
1200 = Reverse Voltage [V]
T = NTC
MH = MiniPack2

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXA 20 WB 1200 TMH	MIXA20WB1200TMH	Box	20	508616

IGBT T1 - T6

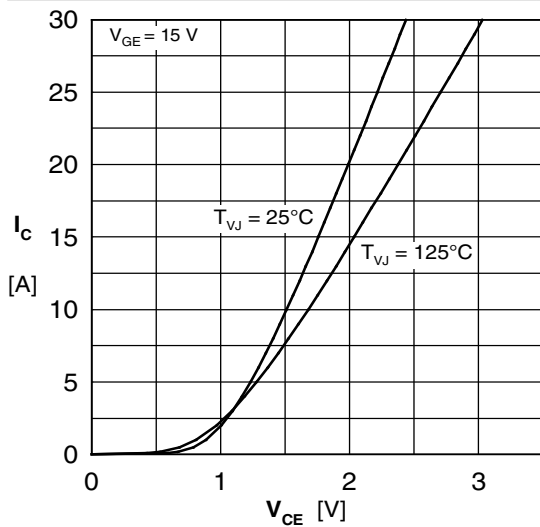


Fig. 1 Typ. output characteristics

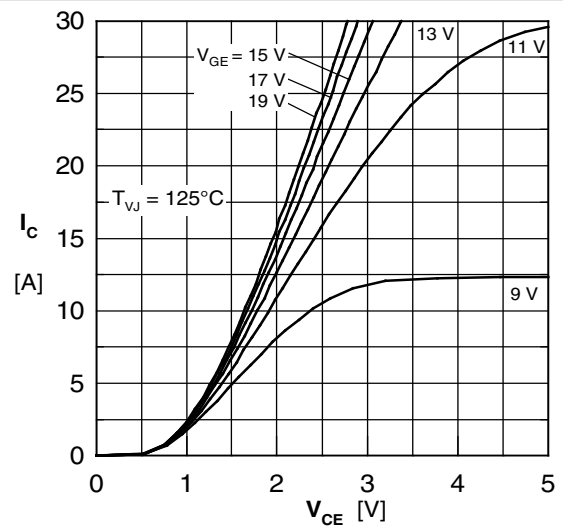


Fig. 2 Typ. output characteristics

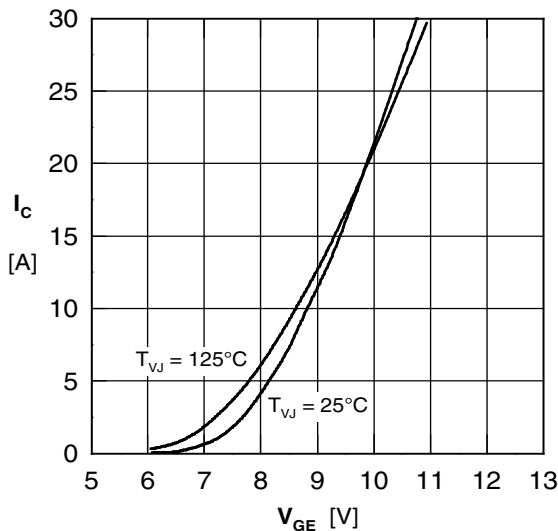


Fig. 3 Typ. transfer characteristics

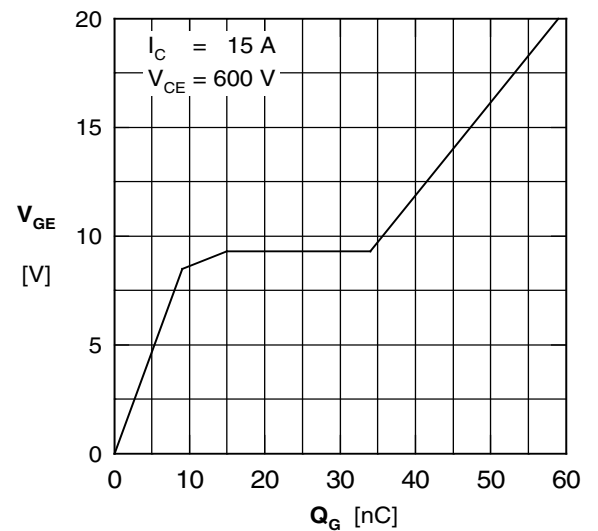


Fig. 4 Typ. turn-on gate charge

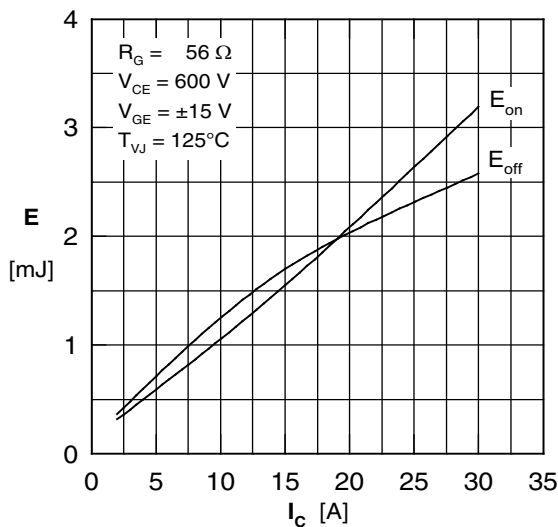


Fig. 5 Typ. switching energy vs. collector current

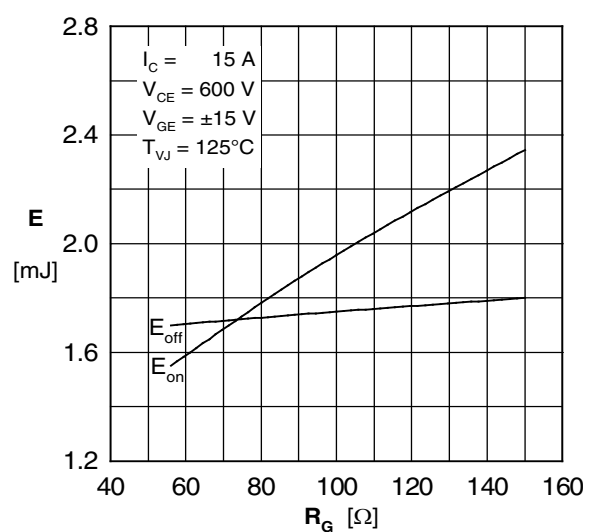


Fig. 6 Typ. switching energy vs. gate resistance

Diode D1 - D6

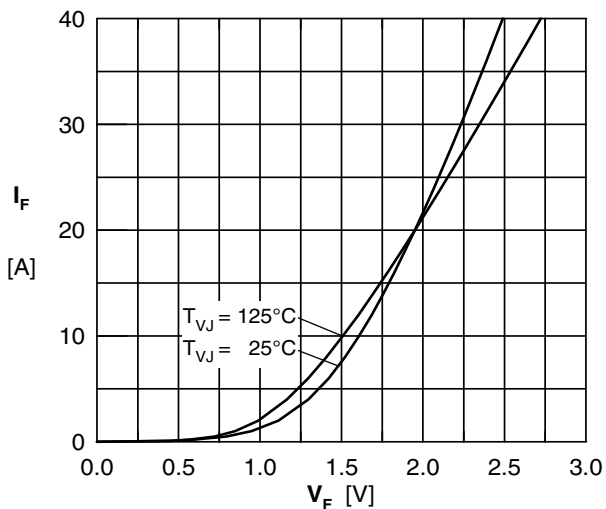


Fig. 7 Typ. Forward current versus V_F

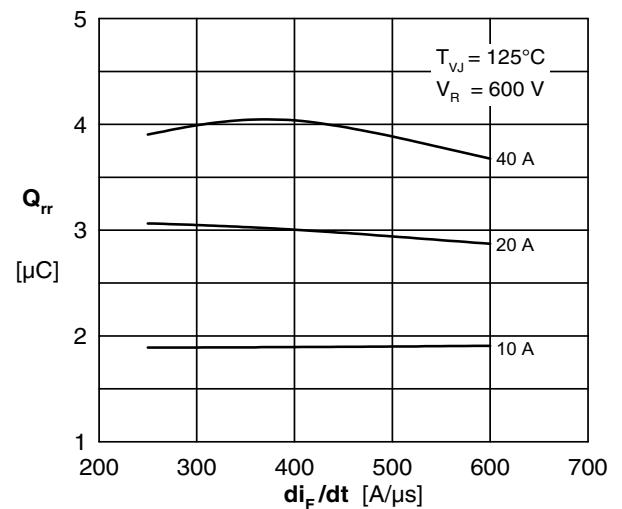


Fig. 8 Typ. reverse recov.charge Q_{rr} vs. di/dt

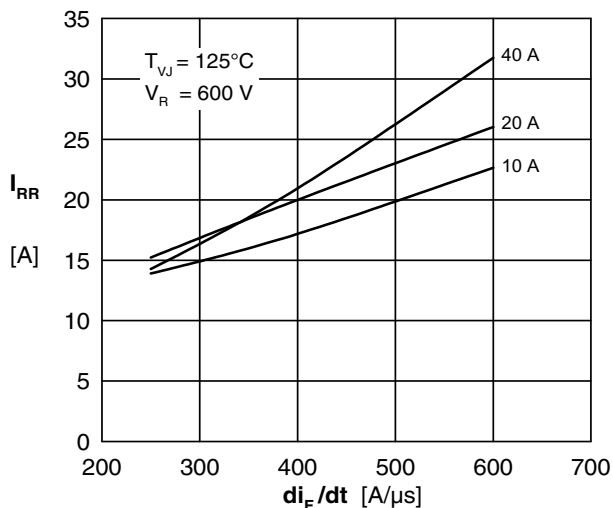


Fig. 9 Typ. peak reverse current I_{RM} vs. di/dt

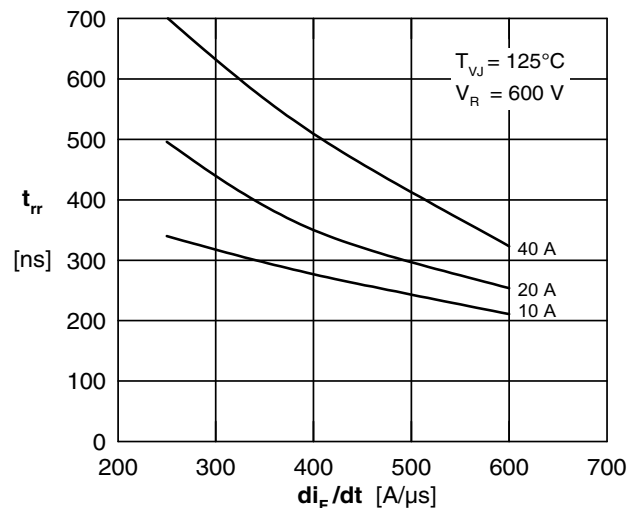


Fig. 10 Typ. recovery time t_{rr} versus di/dt

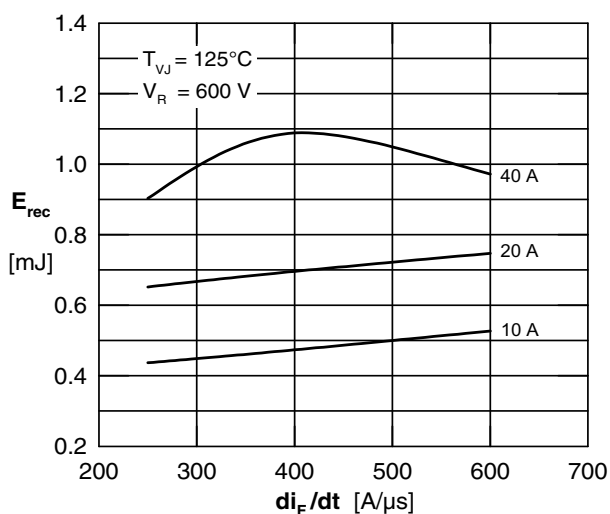


Fig. 11 Typ. recovery energy E_{rec} versus di/dt

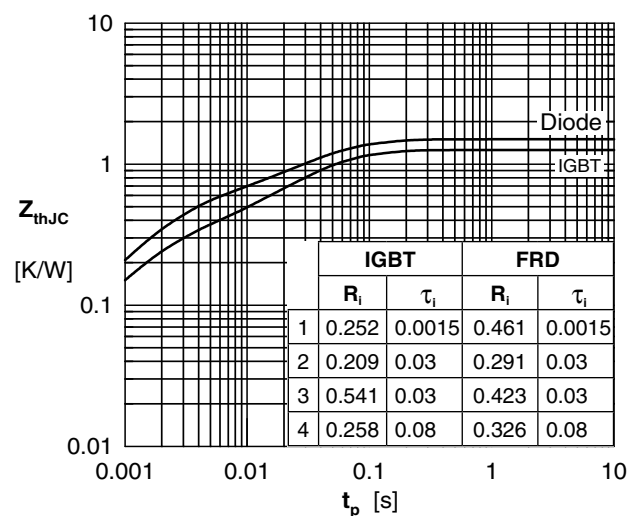


Fig. 12 Typ. transient thermal impedance

NTC

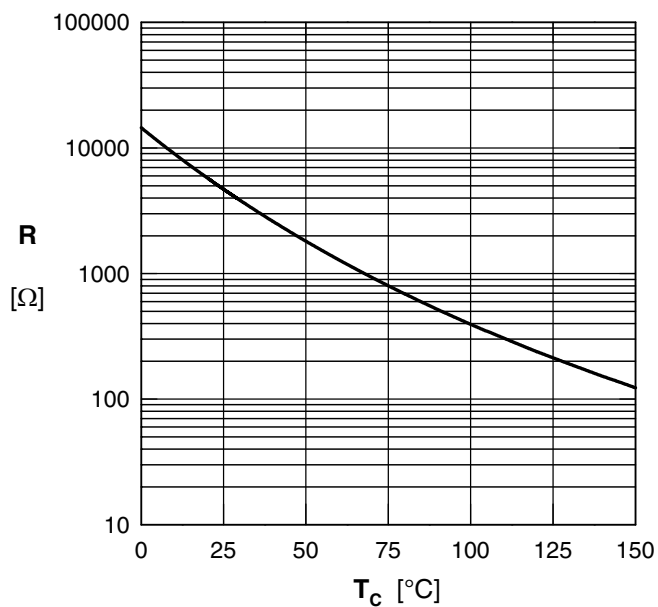


Fig. 13 Typ. thermistor resistance vs. temperature