

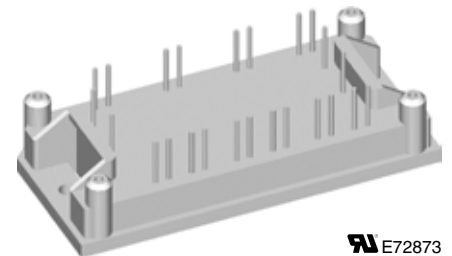
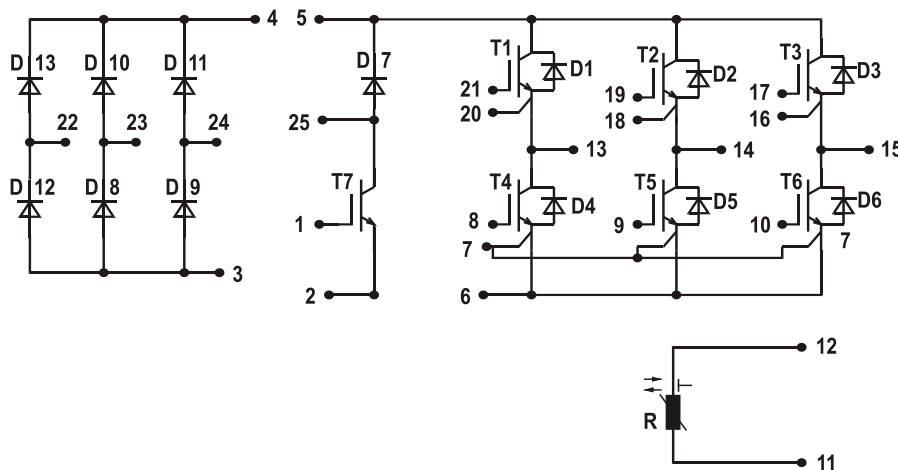
Converter - Brake - Inverter Module XPT IGBT

Preliminary data

Part name (Marking on product)

MIXA10WB1200TML

Three Phase Rectifier	Brake Chopper	Three Phase Inverter
$V_{RRM} = 1600 \text{ V}$	$V_{CES} = 1200 \text{ V}$	$V_{CES} = 1200 \text{ V}$
$I_{DAVM25} = 100 \text{ A}$	$I_{C25} = 17 \text{ A}$	$I_{C25} = 17 \text{ A}$
$I_{FSM} = 320 \text{ A}$	$V_{CE(sat)} = 1.8 \text{ V}$	$V_{CE(sat)} = 1.8 \text{ V}$



UL E72873

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:

- DCB based "E1-Pack"
- Assembly height is 17 mm
- Insulated base plate
- UL registered E72873

Output Inverter T1 - T6

				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	$T_C = 25^{\circ}\text{C}$			17	A	
I_{C80}		$T_C = 80^{\circ}\text{C}$			12	A	
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			63	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 9\text{ A}; V_{GE} = 15\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.8 2.1	2.1	V V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.3\text{ mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	5.5	6.0	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.02 0.2	0.1	mA mA	
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$			500	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 10\text{ A}$		27		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 10\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 100\text{ }\Omega$ $T_{VJ} = 125^{\circ}\text{C}$		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			1.1		mJ	
E_{off}	turn-off energy per pulse			1.1		mJ	
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 100\text{ }\Omega; V_{CEK} = 1200\text{ V}$ $T_{VJ} = 125^{\circ}\text{C}$			30	A	
I_{SC} (SCSOA)	short circuit safe operating area	$V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V};$ $R_G = 100\text{ }\Omega; t_p = 10\text{ }\mu\text{s};$ non-repetitive	$T_{VJ} = 125^{\circ}\text{C}$	40		A	
R_{thJC}	thermal resistance junction to case	(per IGBT)			2.0	K/W	
R_{thCH}	thermal resistance case to heatsink			0.7		K/W	

Output Inverter D1 - D6

				Ratings		
Symbol	Definitions	Conditions	min.	typ.	max.	Unit
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V
I_{F25}	forward current	$T_C = 25^{\circ}\text{C}$			19	A
I_{F80}		$T_C = 80^{\circ}\text{C}$			13	A
V_F	forward voltage	$I_F = 10\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.95 1.85	2.2	V V
Q_{rr}	reverse recovery charge	$V_R = 600\text{ V}$ $di_F/dt = -250\text{ A}/\mu\text{s}$ $I_F = 10\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$	tbd		μC
I_{RM}	max. reverse recovery current			tbd		A
t_{rr}	reverse recovery time			tbd		ns
E_{rec}	reverse recovery energy			tbd		mJ
R_{thJC}	thermal resistance junction to case	(per diode)			2.4	K/W
R_{thCH}	thermal resistance case to heatsink			0.8		K/W

Brake T7

				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.	Unit	
V _{CES}	collector emitter voltage	T _{VJ} = 25°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°C			17	A	
I _{C80}		T _C = 80°C			12	A	
P _{tot}	total power dissipation	T _C = 25°C			63	W	
V _{CE(sat)}	collector emitter saturation voltage	I _C = 9 A; V _{GE} = 15 V	T _{VJ} = 25°C T _{VJ} = 125°C	1.8 2.1	2.1	V V	
V _{GE(th)}	gate emitter threshold voltage	I _C = 0.3 mA; V _{GE} = V _{CE}	T _{VJ} = 25°C	5.5	6.0	6.5	V
I _{CES}	collector emitter leakage current	V _{CE} = V _{CES} ; V _{GE} = 0 V	T _{VJ} = 25°C T _{VJ} = 125°C	0.01 0.1	0.1	mA 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 = 10 A		27		nC	
t _{d(on)}	turn-on delay time	inductive load V _{CE} = 600 V; I _C = 10 A V _{GE} = ±15 V; R _G = 100 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			1.1		mJ	
E _{off}	turn-off energy per pulse			1.1		mJ	
RBSOA	reverse bias safe operating area	V _{GE} = ±15 V; R _G = 100 Ω; V _{CEK} = 1200 V T _{VJ} = 125°C			30	A	
I _{SC} (SCSOA)	short circuit safe operating area	V _{CE} = 900 V; V _{GE} = ±15 V; R _G = 100 Ω; t _p = 10 μs; non-repetitive	T _{VJ} = 125°C	40		A	
R _{thJC}	thermal resistance junction to case	(per IGBT)			2.0	K/W	
R _{thCH}	thermal resistance case to heatsink			0.7		K/W	

Brake Chopper D7

				Ratings		
Symbol	Definitions	Conditions	min.	typ.	max.	Unit
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 150^{\circ}\text{C}$			1200	V
I_{F25}	forward current	$T_C = 25^{\circ}\text{C}$			19	A
I_{F80}		$T_C = 80^{\circ}\text{C}$			13	A
V_F	forward voltage	$I_F = 10\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.95 1.85	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	$V_R = 600\text{ V}$ $di_F/dt = \text{tbd A}/\mu\text{s}$ $I_F = 10\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$	tbd		μC
I_{RM}	max. reverse recovery current			tbd		A
t_{rr}	reverse recovery time			tbd		ns
E_{rec}	reverse recovery energy			tbd		mJ
R_{thJC}	thermal resistance junction to case	(per diode)			2.4	K/W
R_{thCH}	thermal resistance case to heatsink			0.8		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		$T_C = 25^{\circ}\text{C}$		70		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	1.7		V V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.2	0.02		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

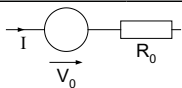
Temperature Sensor NTC

Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
R_{25}	resistance	$T_C = 25^{\circ}\text{C}$	4.45	4.7	5.0		k Ω
$B_{25/50}$				3510			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				-		
M_d	mounting torque	(M4)	2.0		2.2		Nm
d_S	creep distance on surface		12.7				mm
d_A	strike distance through air		7.6				mm
Weight				40			g

Equivalent Circuits for Simulation



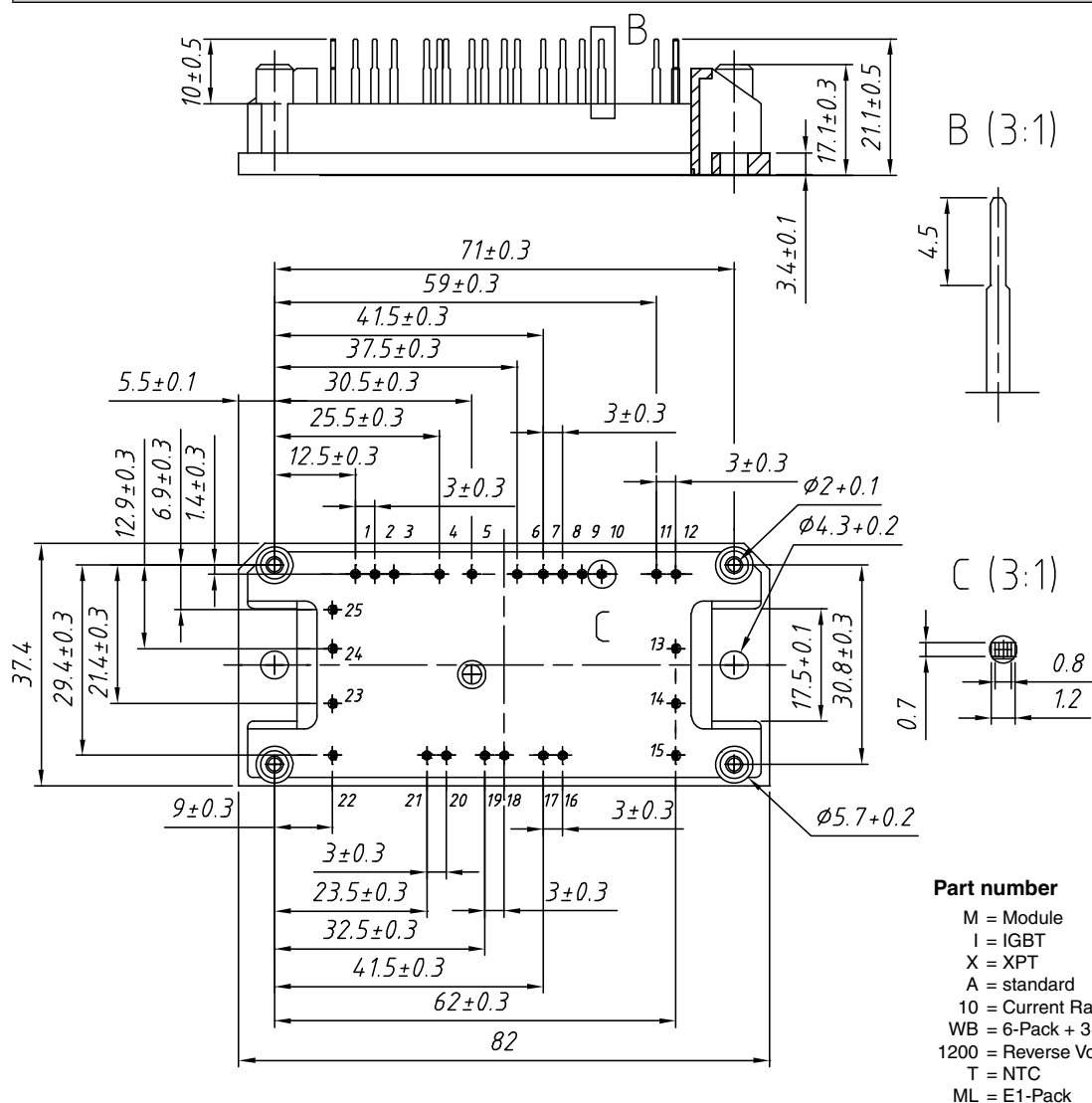
Symbol	Definitions	Conditions	min.	Ratings			Unit
				typ.	max.		
V_0	rectifier diode	D8 - D13	$T_{VJ} = 150^{\circ}\text{C}$		0.86		V
R_0					12.3		m Ω
V_0	IGBT	T1 - T6	$T_{VJ} = 150^{\circ}\text{C}$		1.1		V
R_0					153		m Ω
V_0	free wheeling diode	D1 - D6	$T_{VJ} = 150^{\circ}\text{C}$		1.09		V
R_0					91		m Ω
V_0	IGBT	T7	$T_{VJ} = 150^{\circ}\text{C}$		1.1		V
R_0					153		m Ω
V_0	free wheeling diode	D7	$T_{VJ} = 150^{\circ}\text{C}$		1.09		V
R_0					91		m Ω

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

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

20110916c

Dimensions in mm (1 mm = 0.0394")



Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXA 10 WB 1200 TML	MIXA10WB1200TML	Box	10	509367

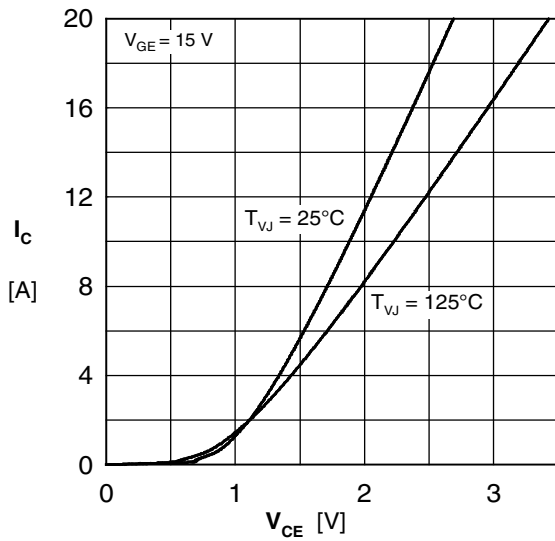


Fig. 1 Typ. output characteristics

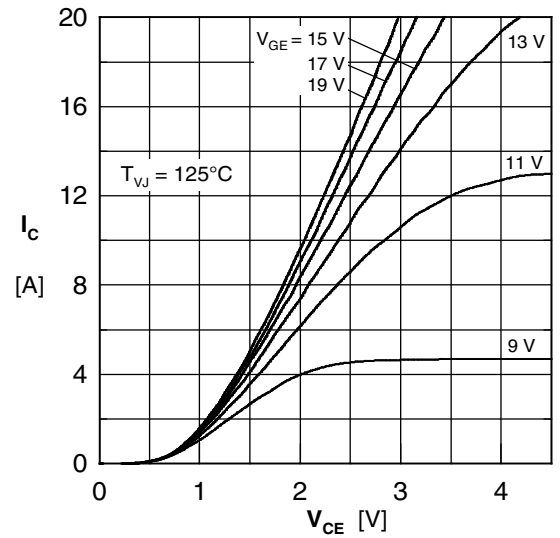


Fig. 2 Typ. output characteristics

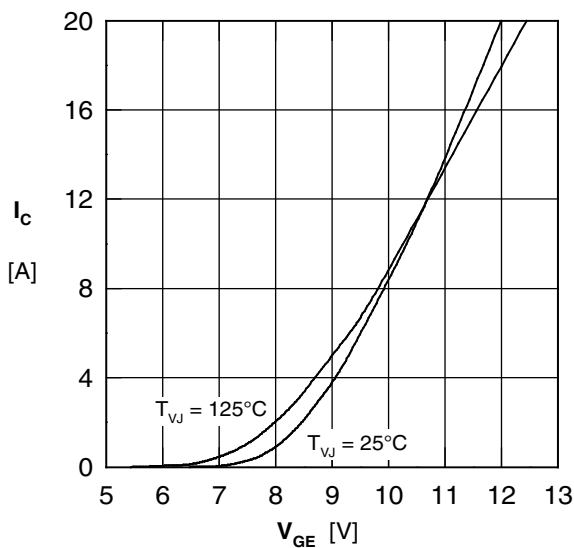


Fig. 3 Typ. transfer characteristics

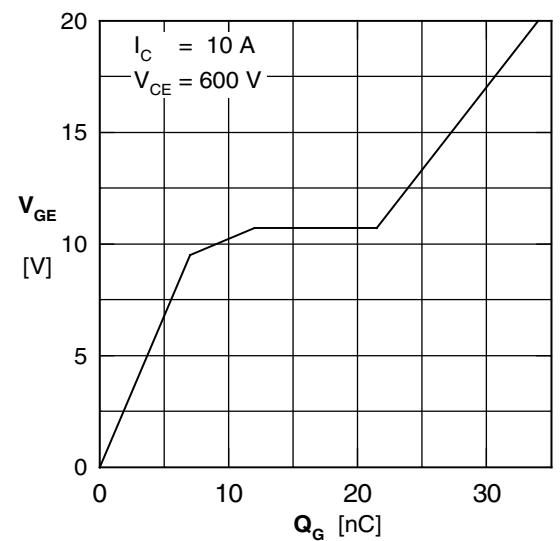


Fig. 4 Typ. turn-on gate charge

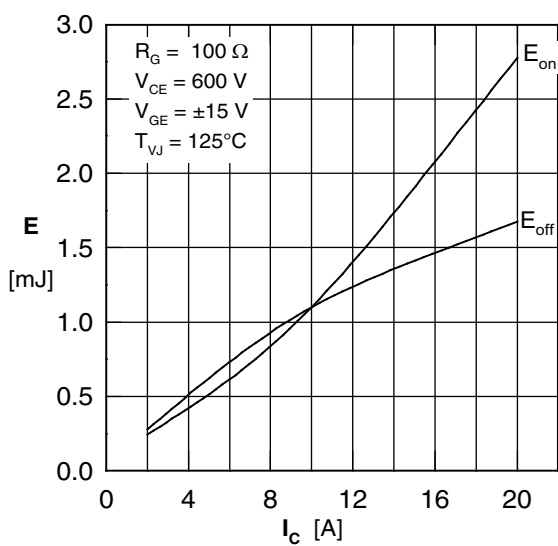


Fig. 5 Typ. switching energy vs. collector current

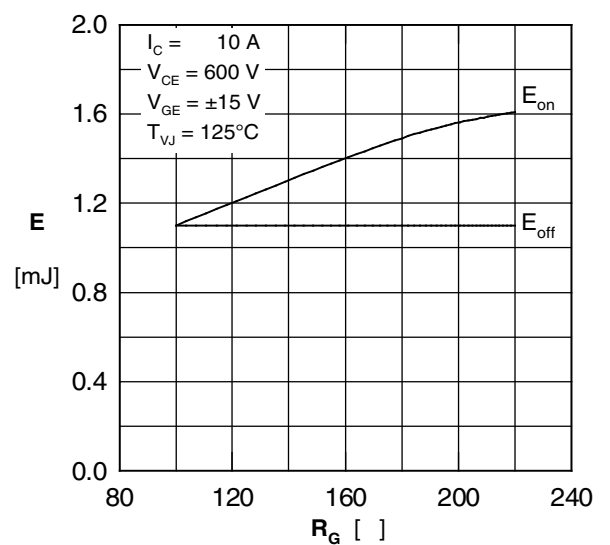


Fig. 6 Typ. switching energy vs. gate resistance

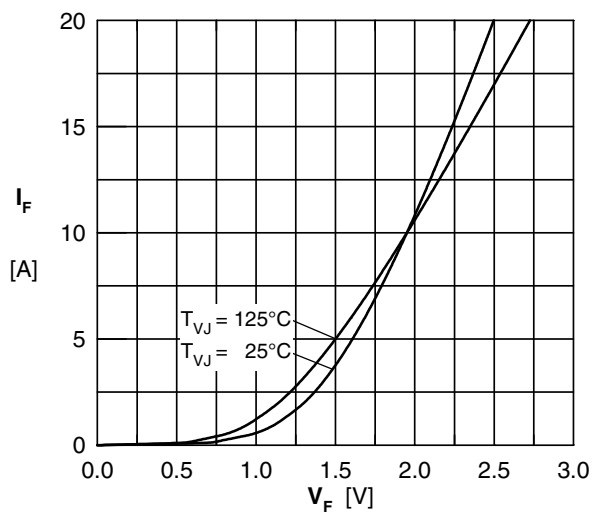


Fig. 7 Typ. forward characteristics

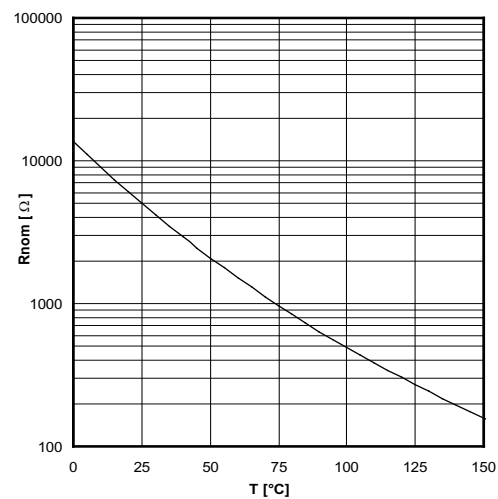


Fig. 8 Typ. thermistor resistance vs. temperature