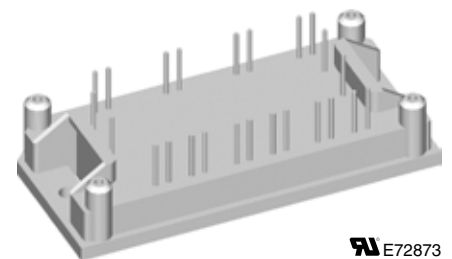
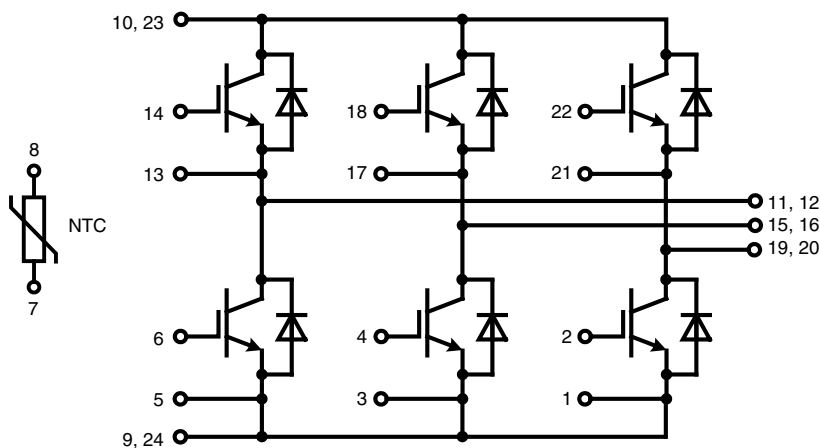


# Six-Pack XPT IGBT

$V_{CES} = 1200\text{ V}$   
 $I_{C25} = 17\text{ A}$   
 $V_{CE(sat)} = 1.8\text{ V}$

**Part name** (Marking on product)

MIXA10W1200TML



E72873

Pin configuration see outlines.

**Features:**

- High level of integration
- Rugged XPT design (Xtreme light Punch Through) results in:
  - short circuit rated for 10  $\mu\text{sec}$ .
  - very low gate charge
  - square RBSOA @ 3x  $I_C$
  - 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:**

- E1 package
- Assembly height is 17.1 mm
- Insulated base plate
- Pins suitable for wave soldering and PCB mounting
- UL registered E72873

**Output Inverter T1 - T6**

Symbol	Definitions	Conditions	Ratings			Unit	
			min.	typ.	max.		
$V_{CES}$	collector emitter voltage		$T_{VJ} = 25^{\circ}\text{C}$		1200	V	
$V_{GES}$	max. DC gate voltage	continuous			$\pm 20$	V	
$V_{GEM}$	max. transient collector gate voltage	transient			$\pm 30$	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		$T_C = 25^{\circ}\text{C}$		65	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	$I_C = 0.3\text{ mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	5.4	5.9	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 0.3	0.15	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 $V_{CE} = 600\text{ V}; I_C = 10\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 100\ \Omega$	$T_{VJ} = 125^{\circ}\text{C}$	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	
<b>RBSOA</b>	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 100\ \Omega; V_{CEK} = 1200\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$		30	A	
<b><math>I_{SC}</math> (SCSOA)</b>	short circuit safe operating area	$V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V};$ $R_G = 100\ \Omega; t_p = 10\ \mu\text{s};$ 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**

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
$V_{RRM}$	max. repetitive reverse voltage		$T_{VJ} = 25^{\circ}\text{C}$		1200	V
$I_{F25}$	forward current		$T_C = 25^{\circ}\text{C}$		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 1.95	2.2	V V
$Q_{rr}$	reverse recovery charge	$V_R = 600\text{ V}$ $di_F/dt = -250\text{ A}/\mu\text{s}$ $I_F = 10\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$	1.3		$\mu\text{C}$
$I_{RM}$	max. reverse recovery current			10.5		A
$t_{rr}$	reverse recovery time			350		ns
$E_{rec}$	reverse recovery energy			0.35		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

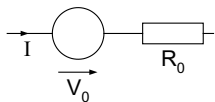
## Module

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
$T_{VJ}$	operating temperature		-40		125	°C
$T_{VJM}$	max. virtual junction temperature				150	°C
$T_{stg}$	storage temperature		-40		125	°C
$V_{ISOL}$	isolation voltage	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$			2500	V~
<b>CTI</b>	comparative tracking index				-	
<b>F<sub>C</sub></b>	mounting force		40		80	N
<b>d<sub>S</sub></b>	creep distance on surface		12.7			mm
<b>d<sub>A</sub></b>	strike distance through air		12.7			mm
<b>Weight</b>				40		g

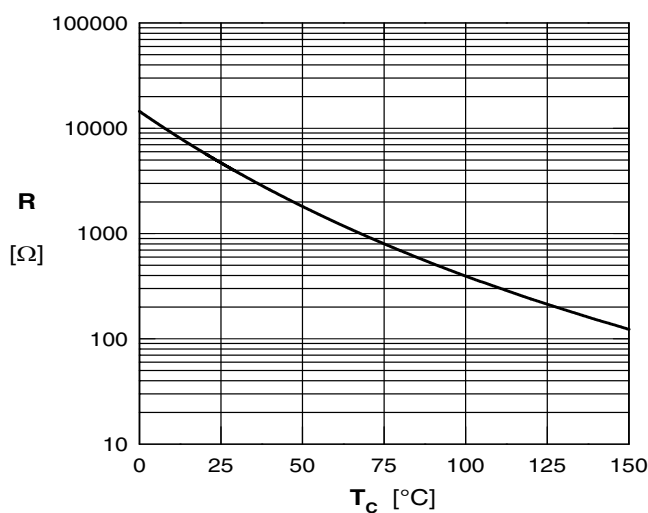
## Temperature Sensor NTC

Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
<b>R<sub>25</sub></b>	resistance	$T_C = 25^\circ\text{C}$	4.75	5.0	5.25	kΩ
<b>B<sub>25/50</sub></b>				3375		K

## Equivalent Circuits for Simulation

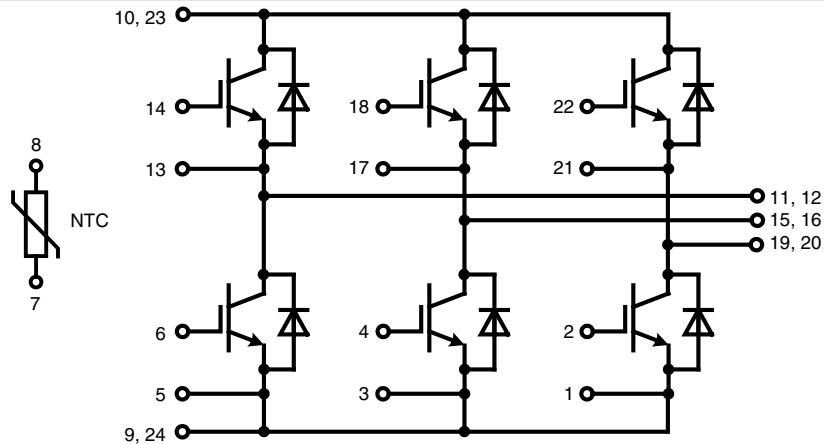


Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
<b>V<sub>0</sub></b>	IGBT	$T_{VJ} = 150^\circ\text{C}$		1.1		V
<b>R<sub>0</sub></b>				153		mΩ
<b>V<sub>0</sub></b>	Diode	$T_{VJ} = 150^\circ\text{C}$		1.25		V
<b>R<sub>0</sub></b>				85		mΩ



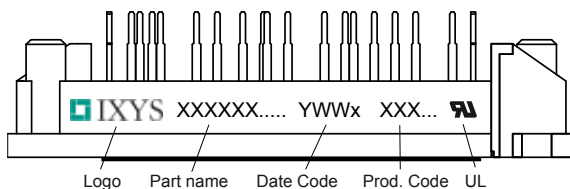
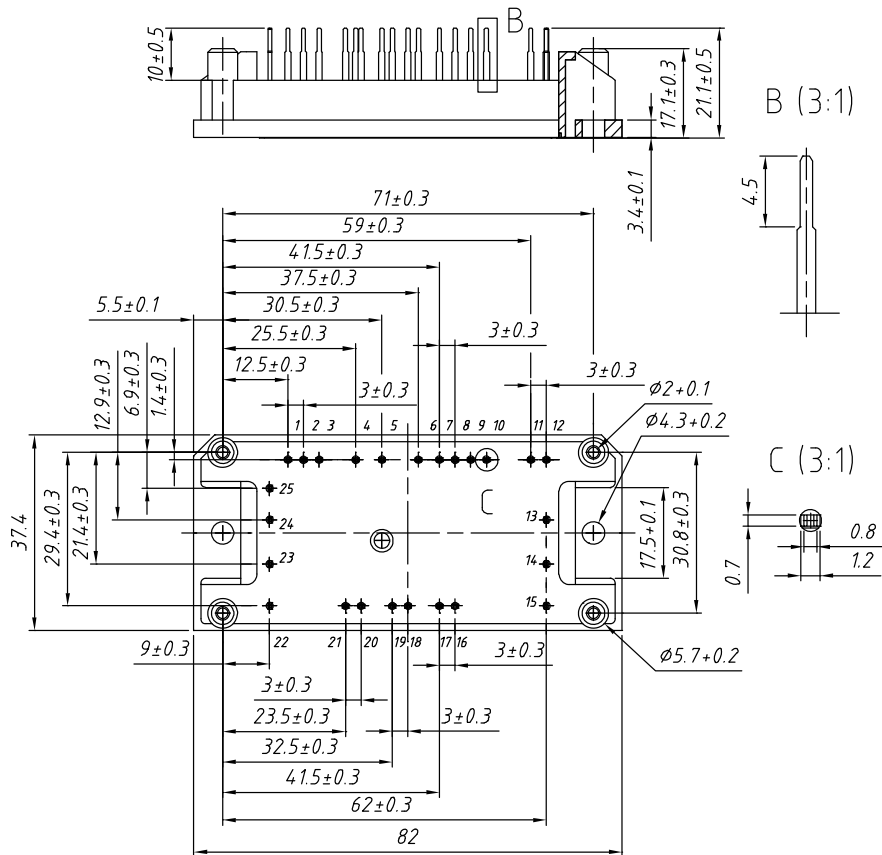
Typ. NTC resistance versus temperature

### Circuit Diagram



### Outline Drawing

Dimensions in mm (1 mm = 0.0394")



#### Part number

- M = Module
- I = IGBT
- X = XPT
- A = standard
- 10 = Current Rating [A]
- W = 6-Pack
- 1200 = Reverse Voltage [V]
- T = NTC
- ML = E1-Pack

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MIXA 10 W 1200 TML	MIXA10W1200TML	Box	10	510155

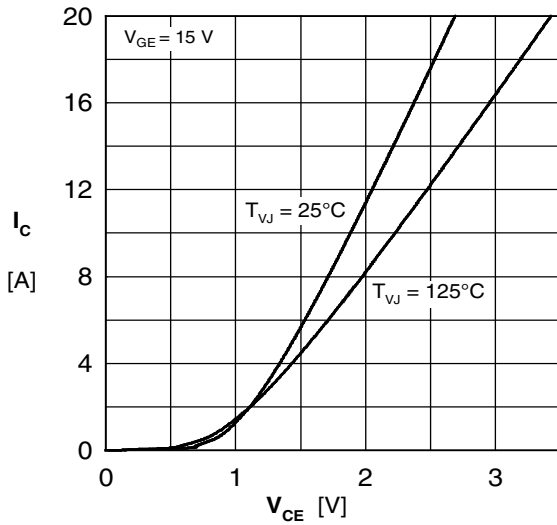
**IGBT T1 - T6**


Fig. 1 Typ. output characteristics

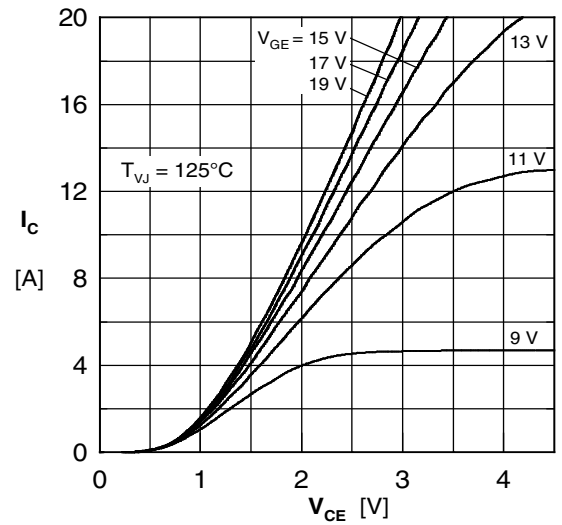


Fig. 2 Typ. output characteristics

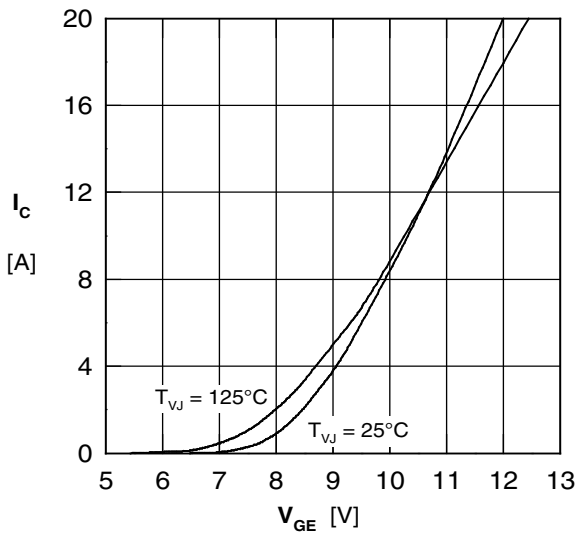


Fig. 3 Typ. transfer characteristics

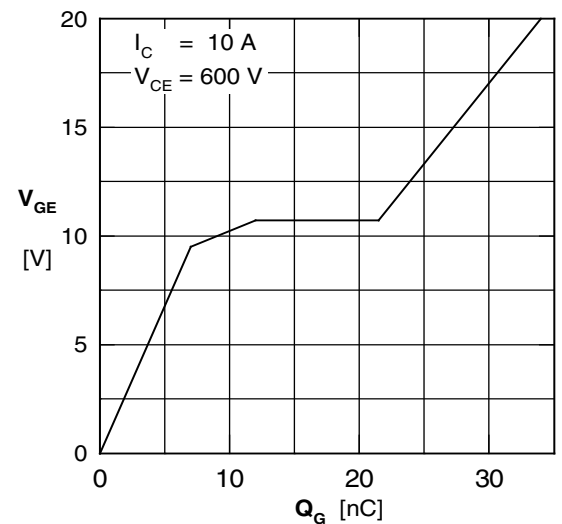


Fig. 4 Typ. turn-on gate charge

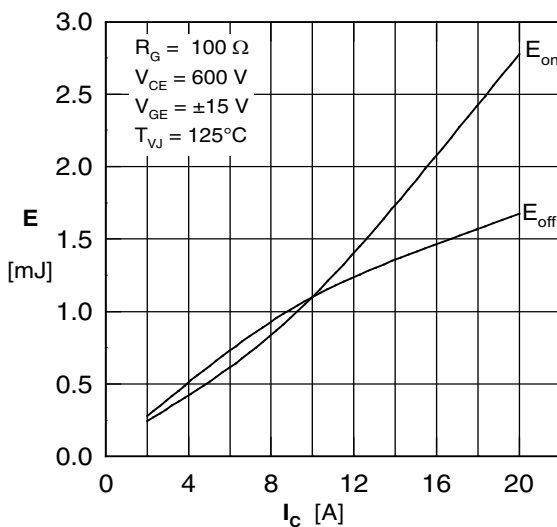


Fig. 5 Typ. switching energy vs. collector current

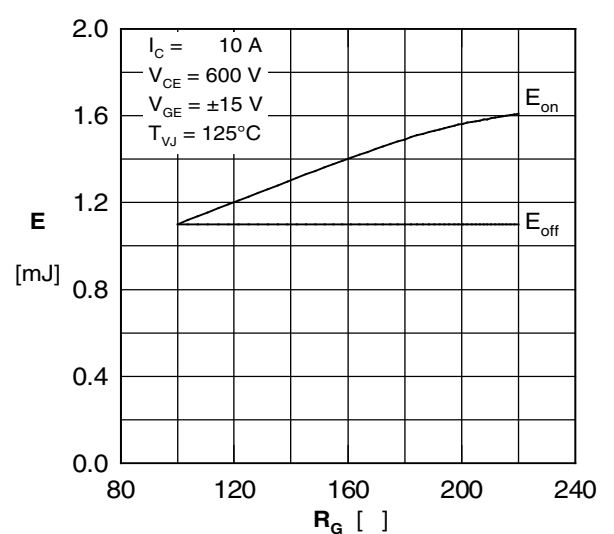


Fig. 6 Typ. switching energy vs. gate resistance

## Diode D1 - D6

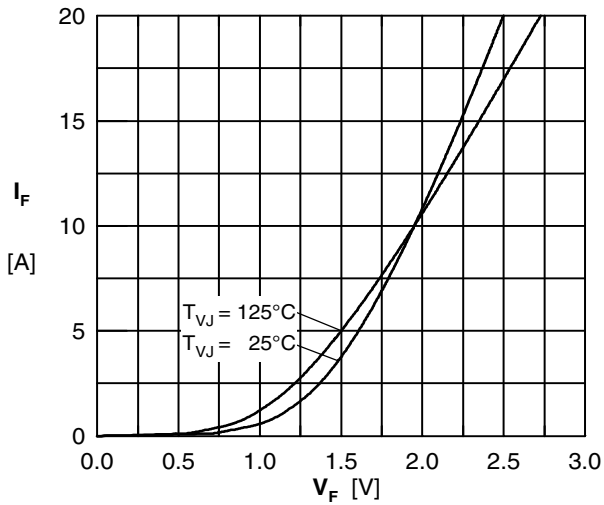


Fig. 7 Typ. forward characteristics

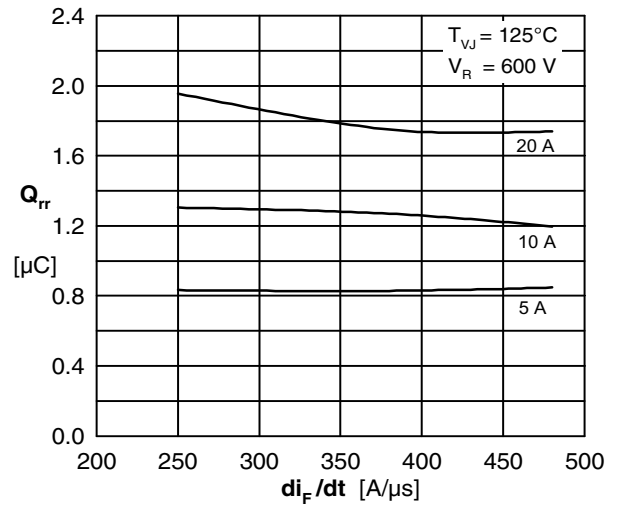


Fig. 8 Typical reverse recovery charge  $Q_{rr}$  versus  $di_F/dt$  (125°C)

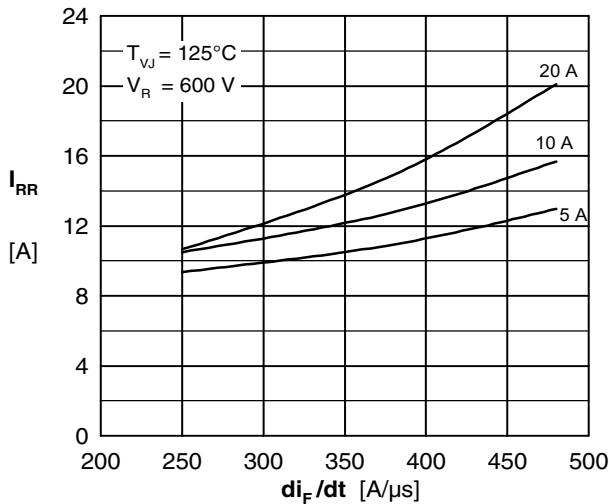


Fig. 9 Typical peak reverse current  $I_{RR}$  versus  $di_F/dt$  (125°C)

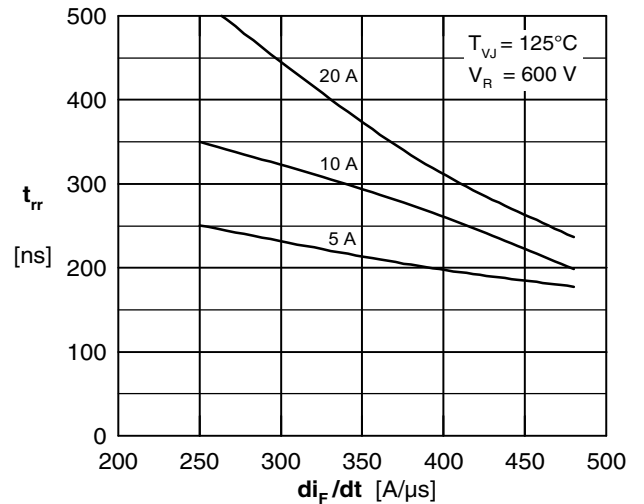


Fig. 10 Typ. recovery time  $t_{rr}$  vs.  $di/dt$  (125°C)

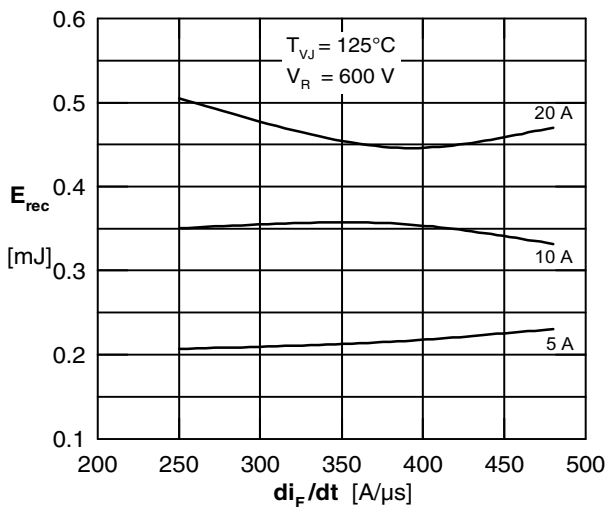


Fig. 11 Typ. recovery energy  $E_{rec}$  vs.  $di_F/dt$  (125°C)

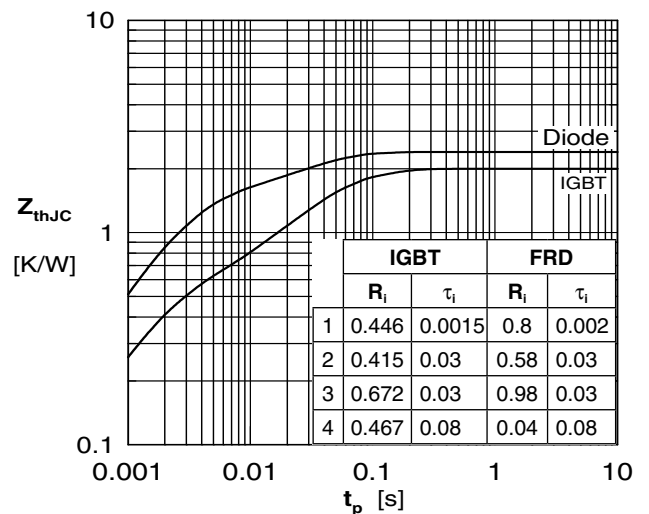


Fig. 12 Transient thermal impedance