

Six-Pack Trench IGBT

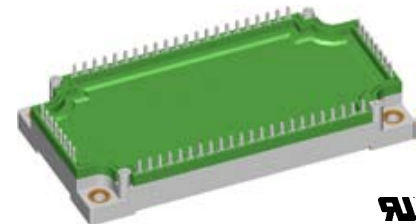
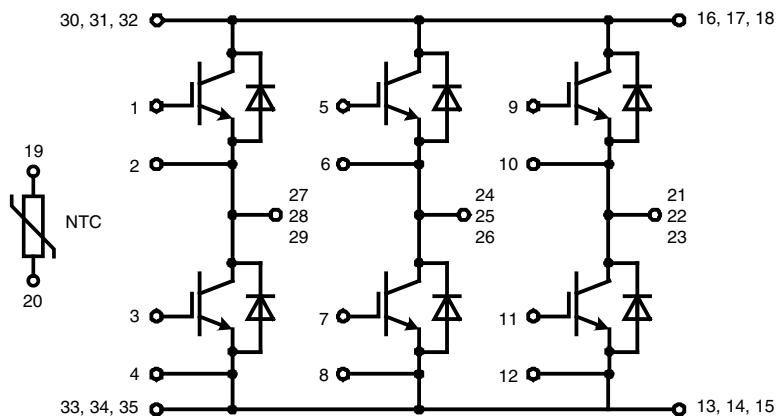
$$V_{CES} = 1200 \text{ V}$$

$$I_{C25} = 215 \text{ A}$$

$$V_{CE(sat)} = 1.7 \text{ V}$$

Part name (Marking on product)

MWI150-12T8T



IXYS
E 72873

Pin configuration see outlines.

Features:

- Trench IGBT technology
- low saturation voltage
- low switching losses
- square RBSOA, no latch up
- high short circuit capability
- positive temperature coefficient for easy paralleling
- MOS input, voltage controlled
- ultra fast free wheeling diodes
- solderable pins for PCB mounting
- package with copper base plate

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

Output Inverter T1 - T6

Symbol	Definitions	Conditions	Ratings			Unit	
			min.	typ.	max.		
V_{CES}	collector emitter voltage				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		$T_C = 25^\circ\text{C}$		215	A	
I_{C80}			$T_C = 80^\circ\text{C}$		150	A	
P_{tot}	total power dissipation		$T_C = 25^\circ\text{C}$		690	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 150\text{ A}; V_{GE} = 15\text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	1.7 2.0	2.1	V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 6\text{ mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^\circ\text{C}$	5.0	5.8	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		6	mA	
				2		mA	
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$			500	nA	
C_{ies}	input capacitance	$V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$		10770		pF	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 150\text{ A}$		860		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 150\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 2.4\ \Omega$ $L_S = 70\text{ nH}$	$T_{VJ} = 125^\circ\text{C}$	270		ns	
t_r	current rise time			50		ns	
$t_{d(off)}$	turn-off delay time			500		ns	
t_f	current fall time			340		ns	
E_{on}	turn-on energy per pulse			15.5		mJ	
E_{off}	turn-off energy per pulse			20		mJ	
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 2.4\ \Omega;$	$T_{VJ} = 125^\circ\text{C}$ $V_{CEK} = 1200\text{ V}$		300	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	$R_G = 2.4\ \Omega; \text{non-repetitive}$		600		A	
R_{thJC}	thermal resistance junction to case	(per IGBT)			0.18	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		$T_C = 25^\circ\text{C}$		196	A
I_{F80}			$T_C = 80^\circ\text{C}$		132	A
V_F	forward voltage	$I_F = 150\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	1.95 1.85	2.2	V
Q_{rr}	reverse recovery charge	$V_R = 600\text{ V}$ $di_F/dt = -2900\text{ A}/\mu\text{s}$ $I_F = 150\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^\circ\text{C}$	20		μC
I_{RM}	max. reverse recovery current			160		A
t_{rr}	reverse recovery time			320		ns
E_{rec}	reverse recovery energy			7		mJ
R_{thJC}	thermal resistance junction to case	(per diode)			0.28	K/W

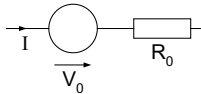
 $T_C = 25^\circ\text{C}$ unless otherwise stated

Temperature Sensor NTC

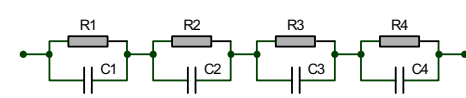
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
R_{25}	resistance	$T_C = 25^\circ\text{C}$	4.75	5.0	5.25	k Ω
$B_{25/50}$				3375		K

Module

Symbol	Definitions	Conditions	Ratings			Unit
			min.	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	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$			2500	V~
CTI	comparative tracking index				-	
M_d	mounting torque (M5)		2.7		3.3	Nm
d_s	creep distance on surface		10			mm
d_A	strike distance through air		7.5			mm
$R_{pin-chip}$	resistance pin to chip			2.5		m Ω
R_{thCH}	thermal resistance case to heatsink	with heatsink compound		0.02		K/W
Weight				300		g

0.0 Equivalent Circuits for Simulation

Ratings

Symbol	Definitions	Conditions	min.	typ.	max.	Unit
V_0 R_0	IGBT	T1 - T6 $T_{VJ} = 125^\circ\text{C}$		1.0 6.7		V m Ω
V_0 R_0	Diode	D1 - D6 $T_{VJ} = 125^\circ\text{C}$		1.15 4.7		V m Ω



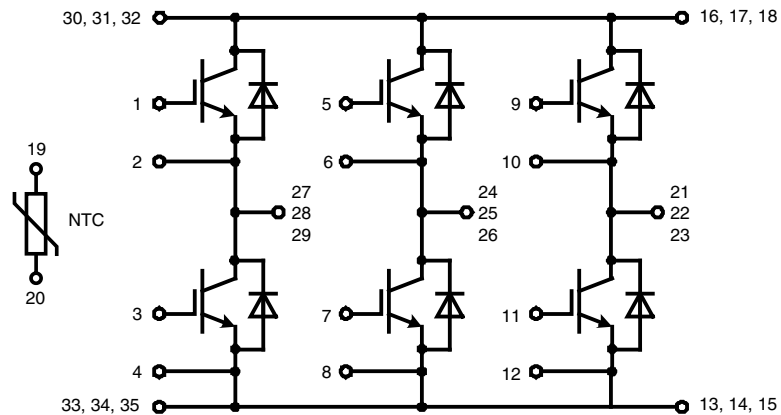
$$Z_{th}(t) = \sum_{i=1}^n \left[R_i \cdot \left(1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

	IGBT	Diode
R_1	0.0267	0.054
R_2	0.0309	0.05
R_3	0.061	0.096
R_4	0.0614	0.08
τ_1	0.0025	0.0025
τ_2	0.076	0.076
τ_3	0.036	0.036
τ_4	0.076	0.076

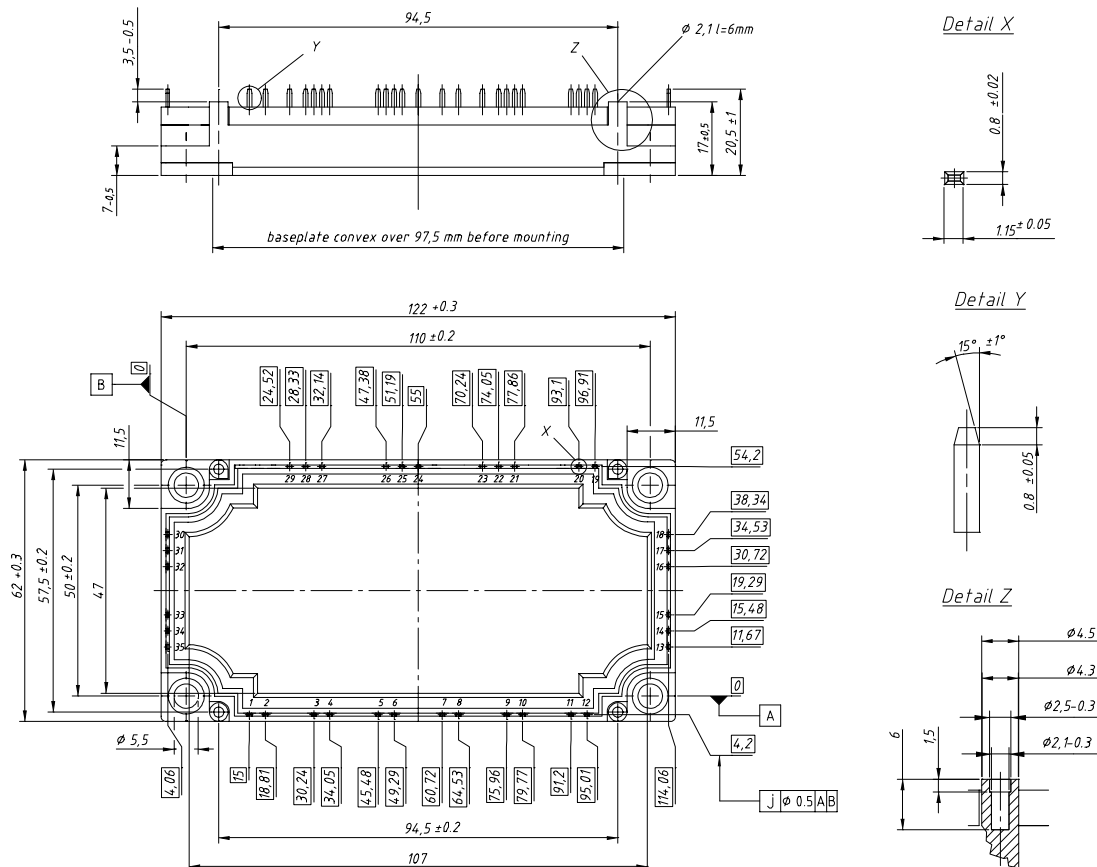
 $T_C = 25^\circ\text{C}$ unless otherwise stated

Circuit Diagram



Outline Drawing

Dimensions in mm (1 mm = 0.0394")



Product Marking

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MWI150-12T8T	MWI150-12T8T	Box	5	502301

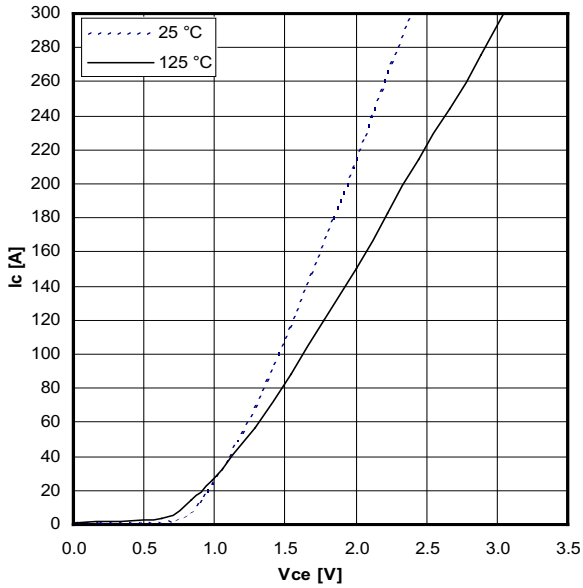
IXYS reserves the right to change limits, test conditions and dimensions.

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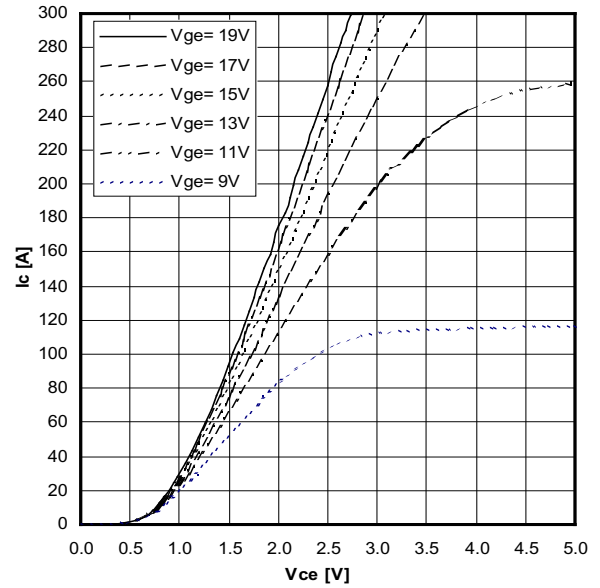
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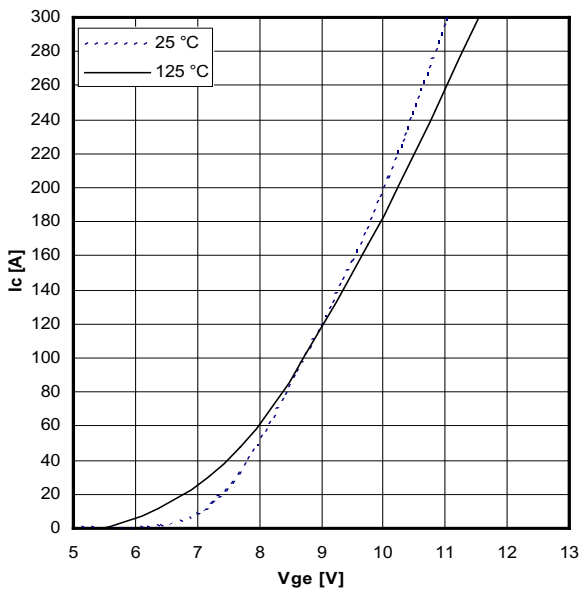
Inverter T1 - T6



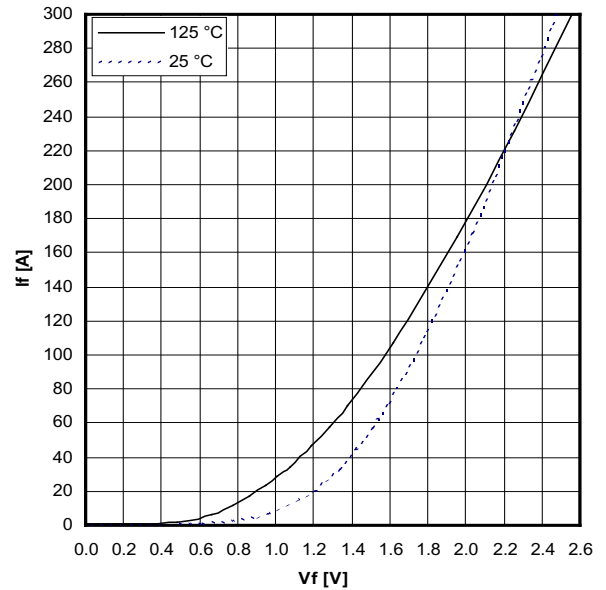
Typ. output characteristics



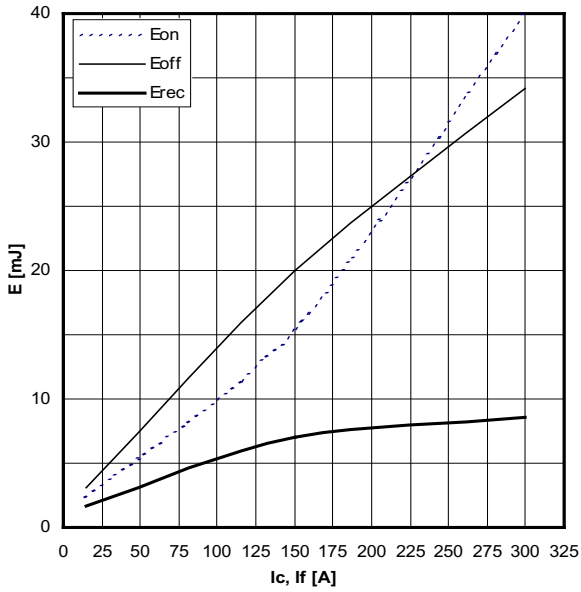
Typ. output characteristics



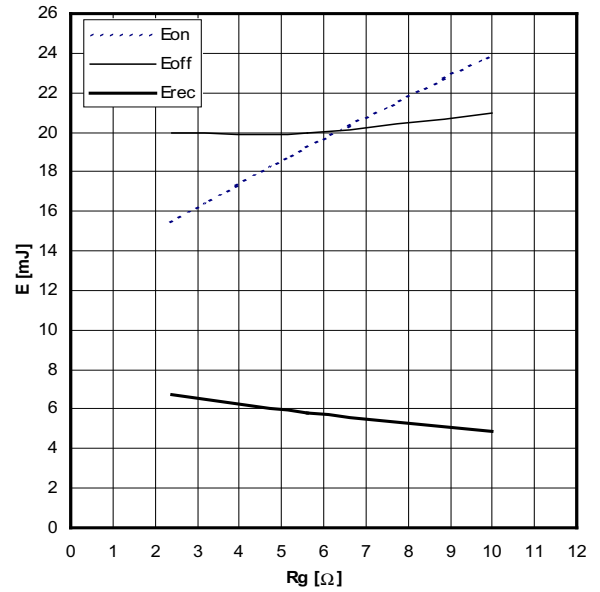
Typ. transfer characteristics



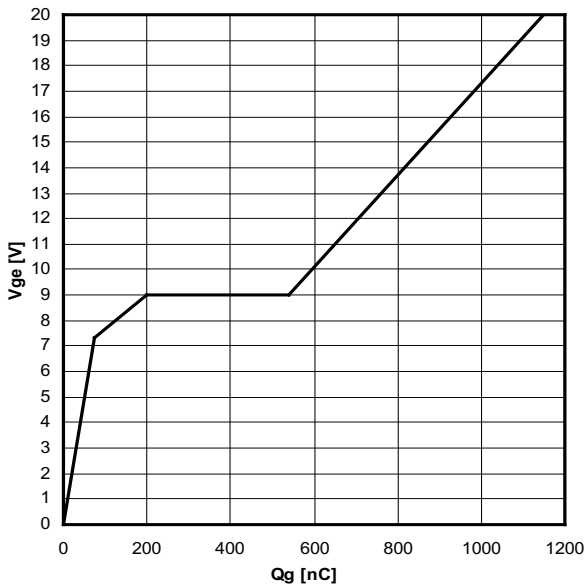
Typ. transfer characteristics



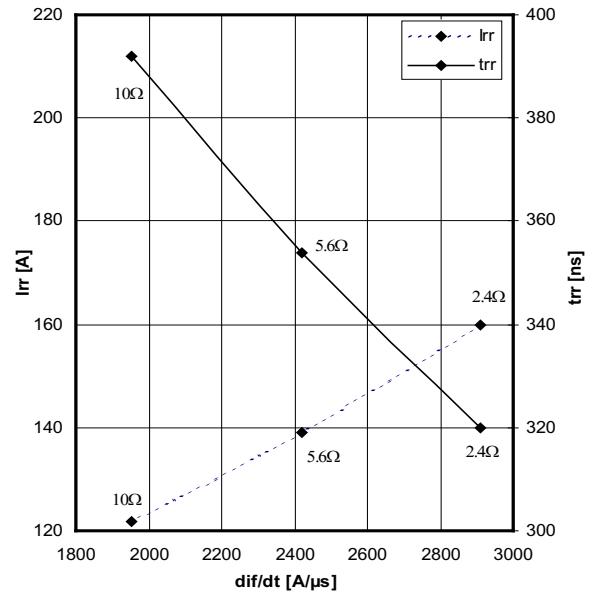
Typ. switching energy vs. collector current



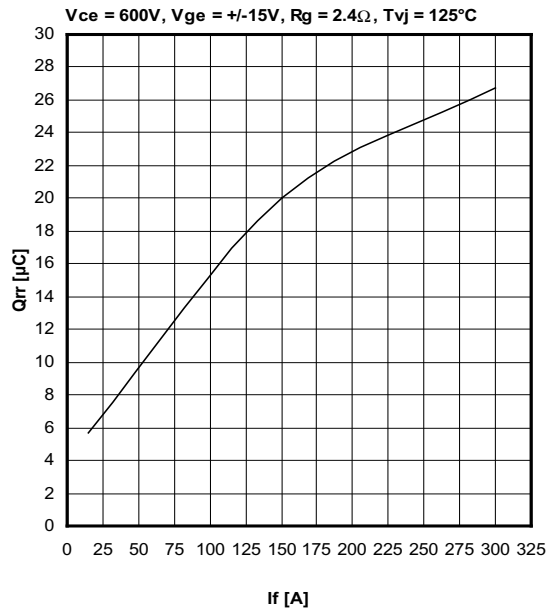
Typ. switching energy vs. gate resistance



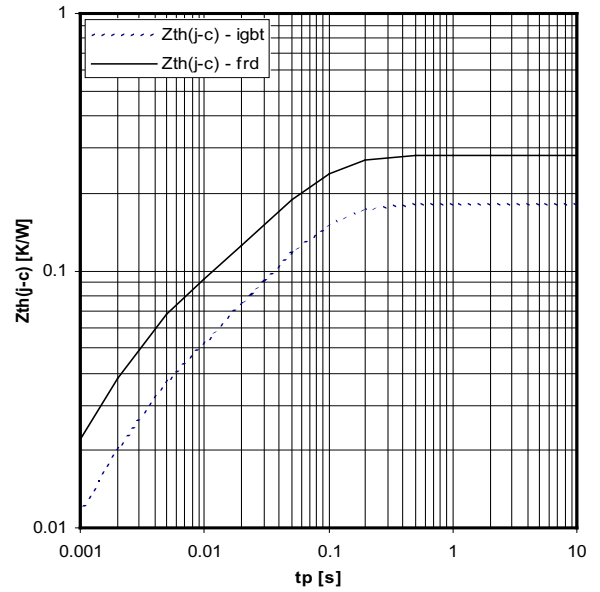
Typ. turn-on gate charge



Reverse recovery characteristics

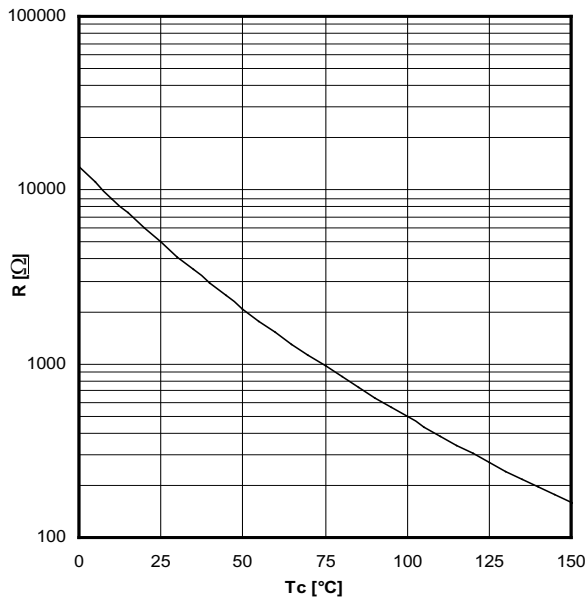


Reverse recovery characteristics



Typ. transient thermal impedance

NTC



Typ. NTC resistance versus temperature