

Six-Pack Trench IGBT

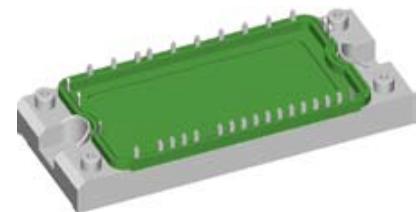
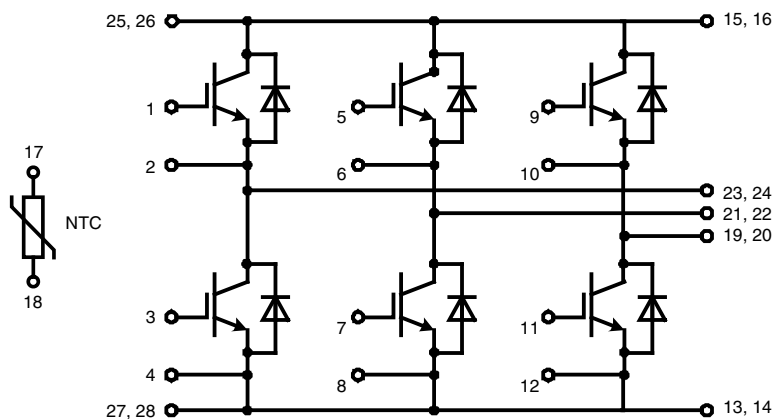
$$I_{C25} = 60 \text{ A}$$

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

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

Part name (Marking on product)

MWI 35-12T7T



E72873

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:

- "E2-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		$T_{VJ} = 25^{\circ}\text{C}$		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		$T_C = 25^{\circ}\text{C}$		200	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 35\text{ A}; V_{GE} = 15\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.7 1.9	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	5.8	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		0.2	0.2	mA mA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{ V}$			500	nA	
C_{ies}	input capacitance	$V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$		2530		pF	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 35\text{ A}$		170		nC	
$t_{d(on)}$	turn-on delay time	} inductive load $V_{CE} = 600\text{ V}; I_C = 35\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 27\ \Omega$ $L_S = 70\text{ nH}$	$T_{VJ} = 125^{\circ}\text{C}$	90		ns	
t_r	current rise time			30		ns	
$t_{d(off)}$	turn-off delay time			360		ns	
t_f	current fall time			340		ns	
E_{on}	turn-on energy per pulse			3.1		mJ	
E_{off}	turn-off energy per pulse			3.8		mJ	
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{ V}; R_G = 27\ \Omega$	$T_{VJ} = 125^{\circ}\text{C}$ $V_{CEK} = 1200\text{ V}$		70	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	$R_G = 27\ \Omega; \text{non-repetitive}$		140		A	
R_{thJC}	thermal resistance junction to case	(per IGBT)			0.62	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		$T_C = 25^{\circ}\text{C}$		44	A
I_{F80}			$T_C = 80^{\circ}\text{C}$		29	A
V_F	forward voltage	$I_F = 35\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	2.05 1.95	2.3	V V
Q_{rr}	reverse recovery charge	} $V_R = 600\text{ V}$ $di_F/dt = -1500\text{ A}/\mu\text{s}$ $I_F = 35\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$	3.1		μC
I_{RM}	max. reverse recovery current			47		A
t_{rr}	reverse recovery time			250		ns
E_{rec}	reverse recovery energy			0.97		mJ
R_{thJC}	thermal resistance junction to case	(per diode)			1.2	K/W

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

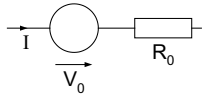
Temperature Sensor NTC

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		6			mm
d_A	strike distance through air		6			mm
$R_{pin-chip}$	resistance pin to chip			5		m Ω
R_{thCH}	thermal resistance case to heatsink	with heatsink compound		0.02		K/W
Weight				180		g

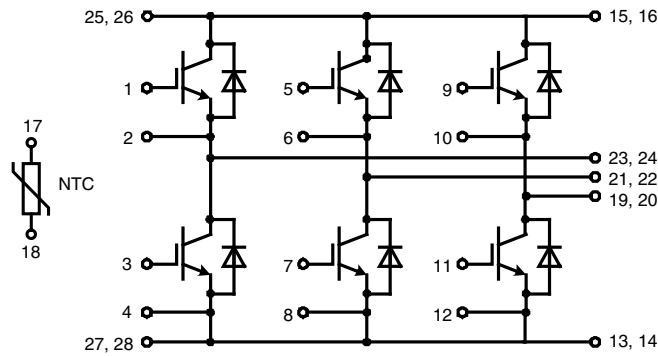
Equivalent Circuits for Simulation



Ratings

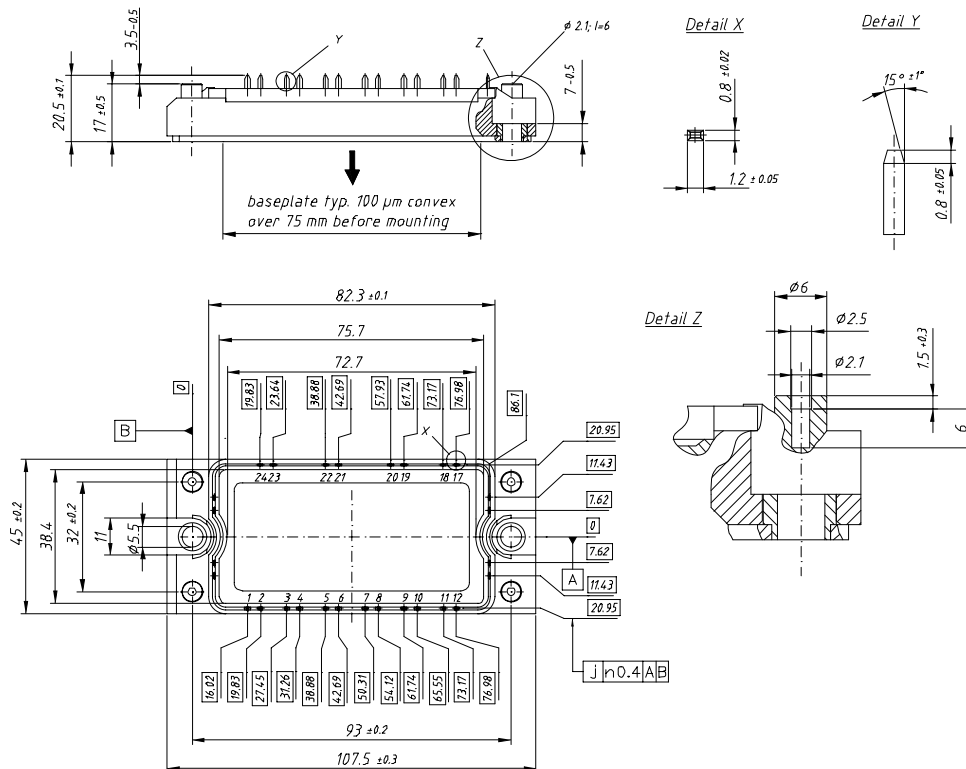
Symbol	Definitions	Conditions	min.	typ.	max.	Unit
V_0	IGBT	T1 - T6		1.0		V
R_0				25.7		m Ω
V_0	Diode	D1 - D6		1.15		V
R_0				23		m Ω
$Z_{th}(t) = \sum_{i=1}^n \left[R_i \cdot \left(1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$ $\tau_i = R_i \cdot C_i$						
R_1				0.132	0.3413	
R_2				0.0724	0.2171	
R_3				0.3078	0.3475	
R_4				0.1078	0.2941	
τ_1				0.0025	0.0025	
τ_2				0.03	0.03	
τ_3				0.03	0.03	
τ_4				0.08	0.08	

Circuit Diagram

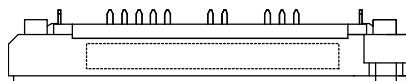


Outline Drawing

Dimensions in mm (1 mm = 0.0394")



Product Marking



Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MWI 35-12T7T	MWI35-12T7T	Box	6	506994

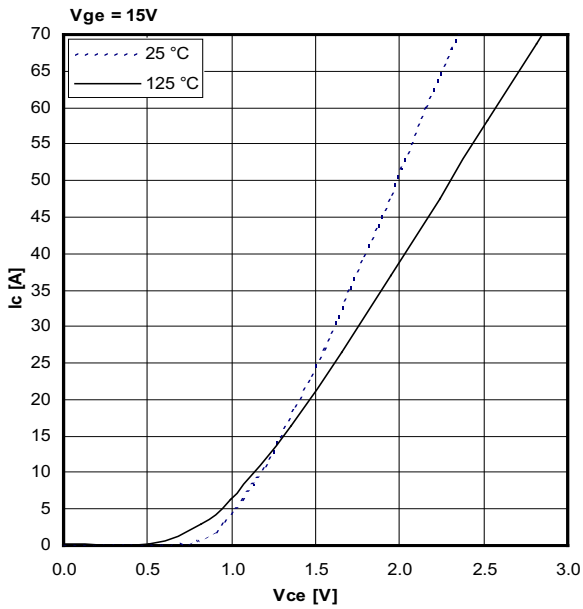
IXYS reserves the right to change limits, test conditions and dimensions.

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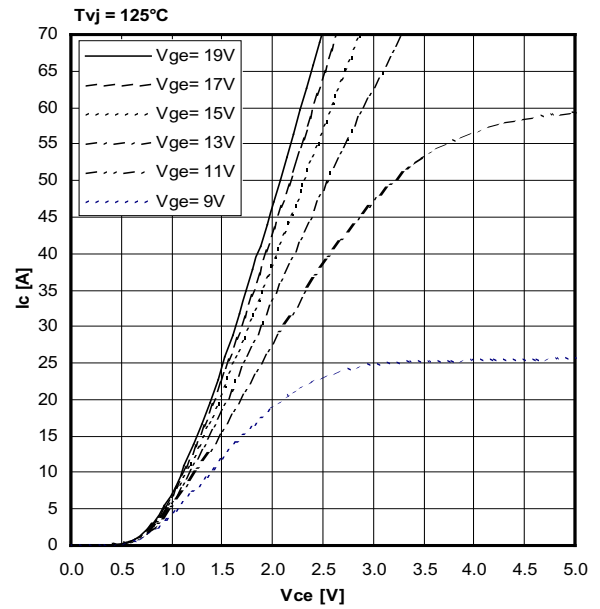
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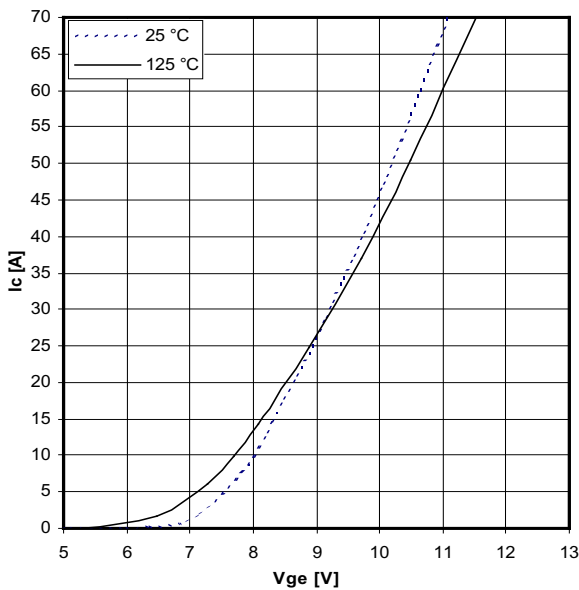
Inverter T1 - T6



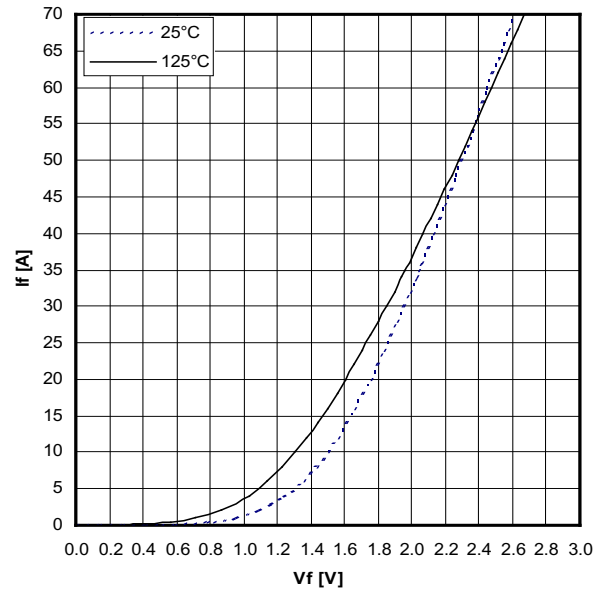
Typ. output characteristics



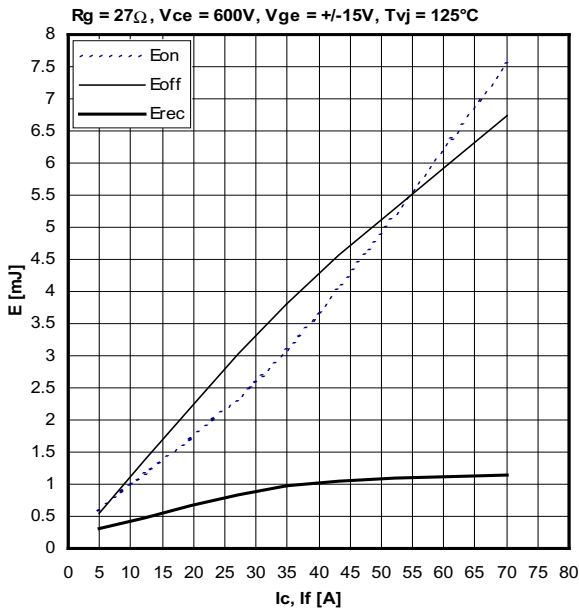
Typ. output characteristics



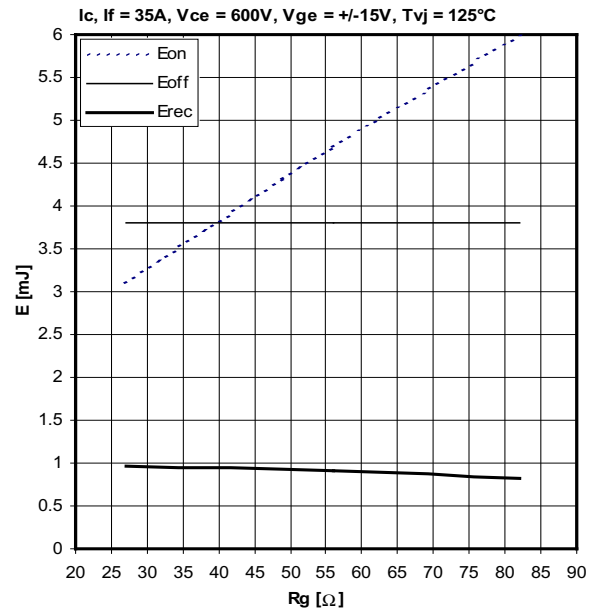
Typ. transfer characteristics



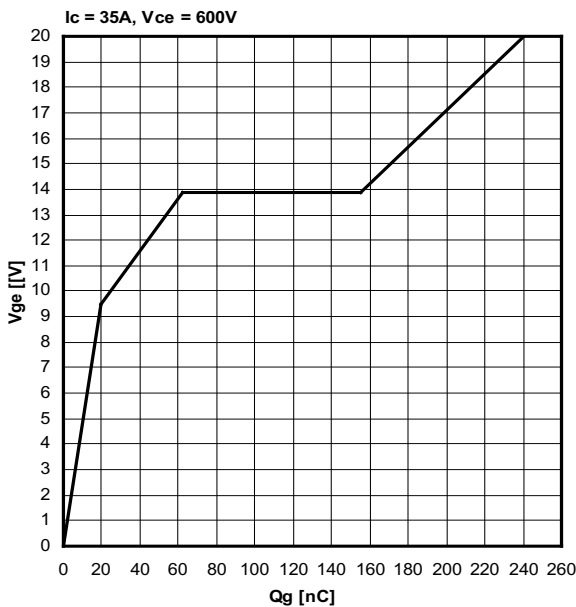
Typ. forward characteristics



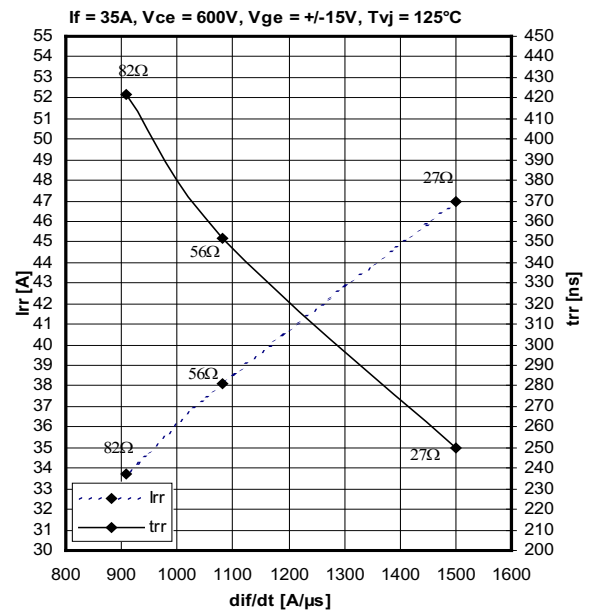
Typ. switching energy vs. collector current



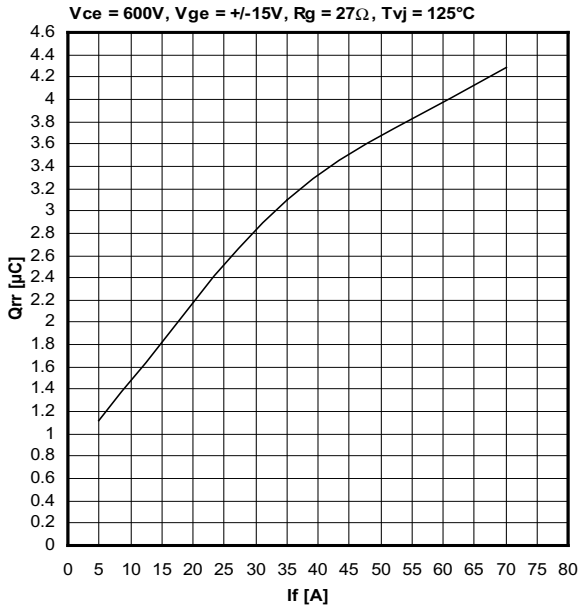
Typ. switching energy vs. gate resistance



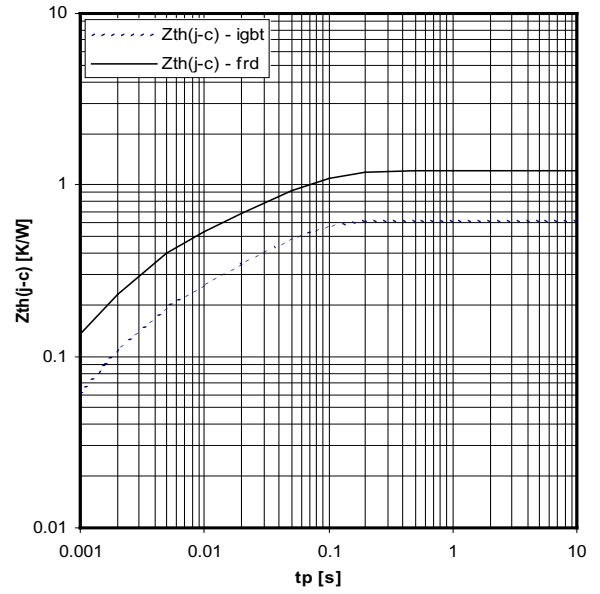
Typ. turn-on gate charge



Reverse recovery characteristics

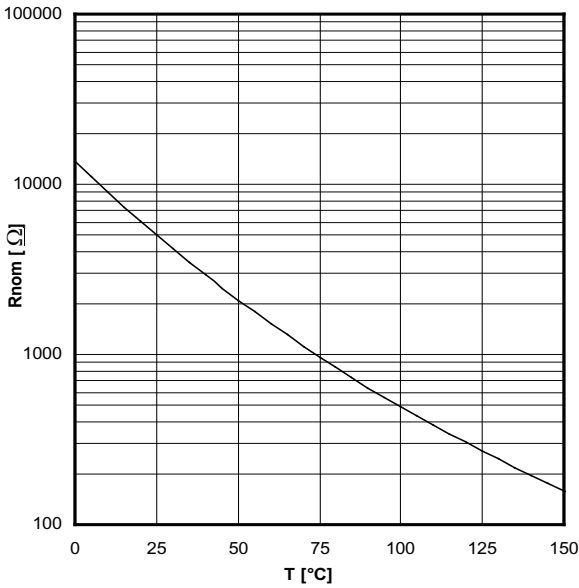


Reverse recovery characteristics



Typ. transient thermal impedance

NTC



Typ. NTC resistance versus temperature