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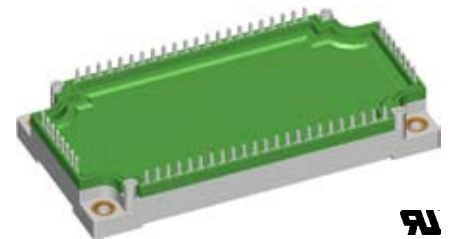
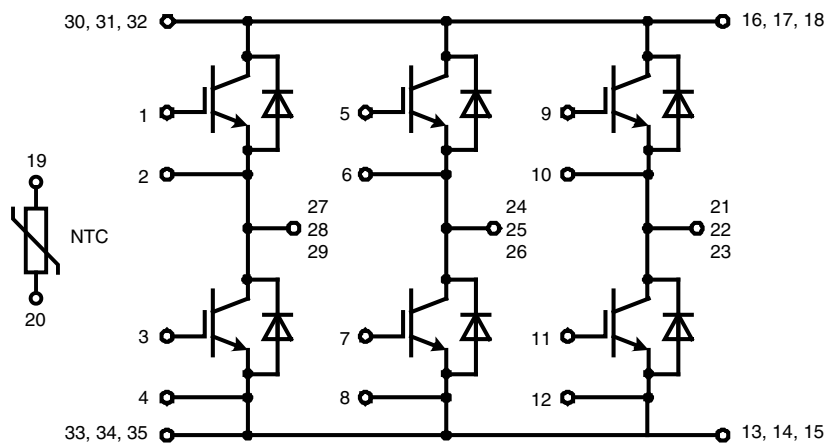


# Six-Pack Trench IGBT

 $V_{CES} = 1200\text{ V}$ 
 $I_{C25} = 215\text{ A}$ 
 $V_{CE(sat)} = 1.7\text{ V}$ 

**Part name** (Marking on product)

MWI150-12T8T



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		$T_{VJ} = 25^{\circ}\text{C}$		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		$T_C = 25^{\circ}\text{C}$		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	
$V_{GE(th)}$	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 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	
<b>RBSOA</b>	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	
<b>SCSOA</b>	short circuit safe operating area		$T_{VJ} = 125^{\circ}\text{C}$		10	$\mu\text{s}$	
$t_{SC}$	short circuit duration	$V_{CE} = 900\text{ V}; V_{GE} = \pm 15\text{ V};$		600		$\mu\text{s}$	
$I_{SC}$	short circuit current	$R_G = 2.4\ \Omega; \text{non-repetitive}$				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 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		$\mu\text{C}$
$I_{RM}$	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

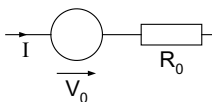
 $T_C = 25^{\circ}\text{C}$  unless otherwise stated

**Temperature Sensor NTC**

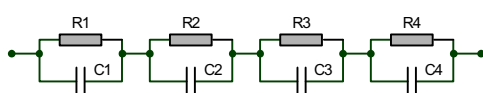
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
$R_{25}$	resistance	$T_C = 25^\circ\text{C}$	4.75	5.0	5.25	k $\Omega$
$B_{25/50}$				3375		K

**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~
<b>CTI</b>	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 $\Omega$
$R_{thCH}$	thermal resistance case to heatsink	with heatsink compound		0.02		K/W
<b>Weight</b>				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 $\Omega$
$V_0$ $R_0$	Diode	D1 - D6 $T_{VJ} = 125^\circ\text{C}$		1.15 4.7		V m $\Omega$



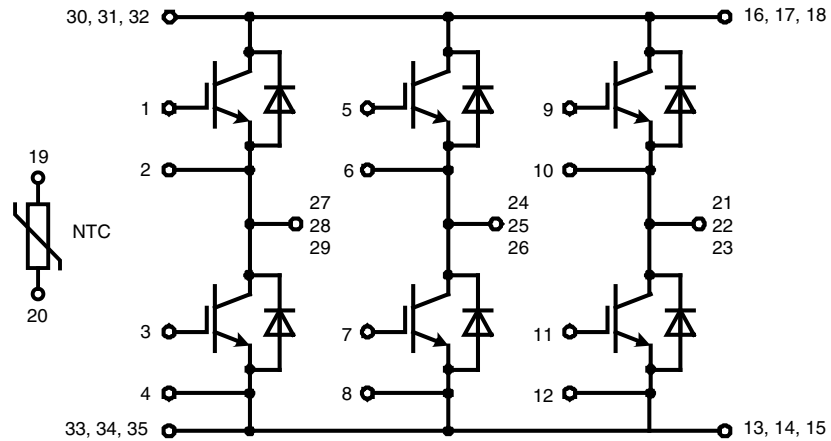
$$Z_{th}(t) = \sum_{i=1}^n \left[ R_i \cdot \left( 1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

	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
$\tau_1$	0.0025	0.0025
$\tau_2$	0.076	0.076
$\tau_3$	0.036	0.036
$\tau_4$	0.076	0.076

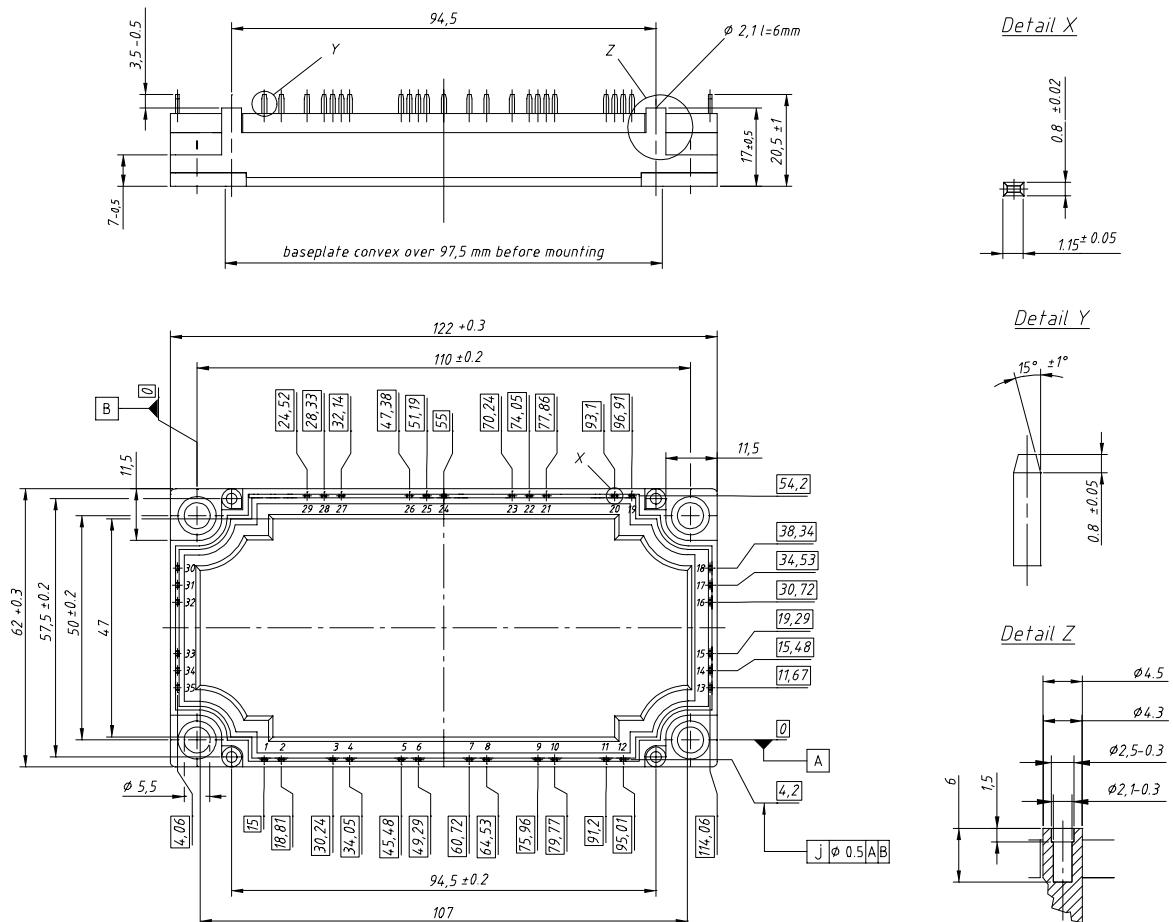
 $T_C = 25^\circ\text{C}$  unless otherwise stated

## Circuit Diagram



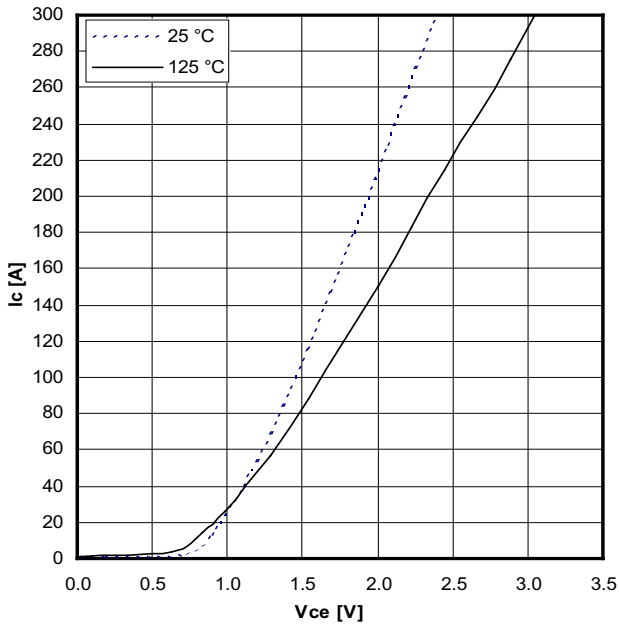
## Outline Drawing

Dimensions in mm (1 mm = 0.0394")

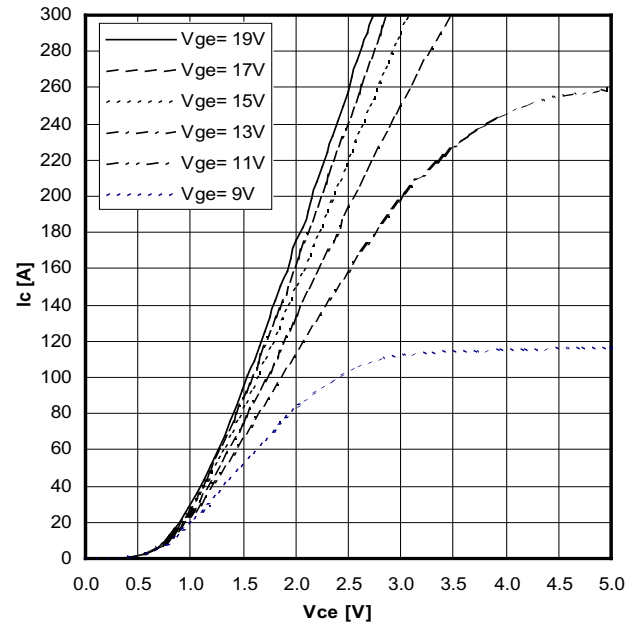


## Product Marking

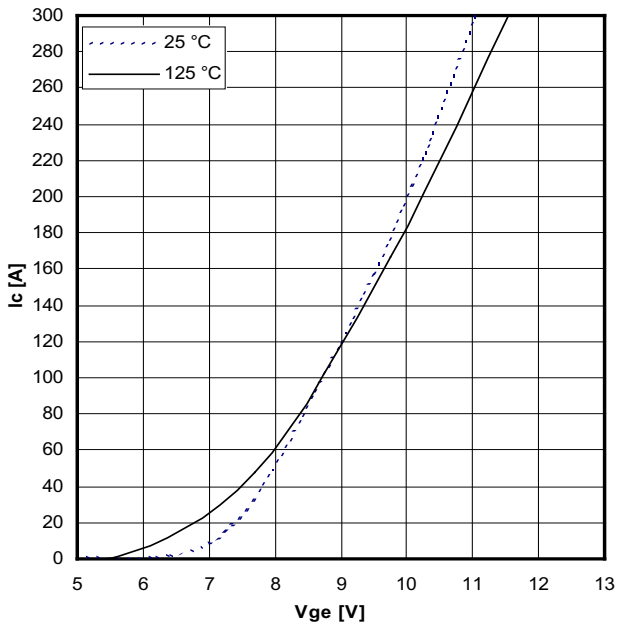
Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MWI150-12T8T	MWI150-12T8T	Box	5	502301

**Inverter T1 - T6**


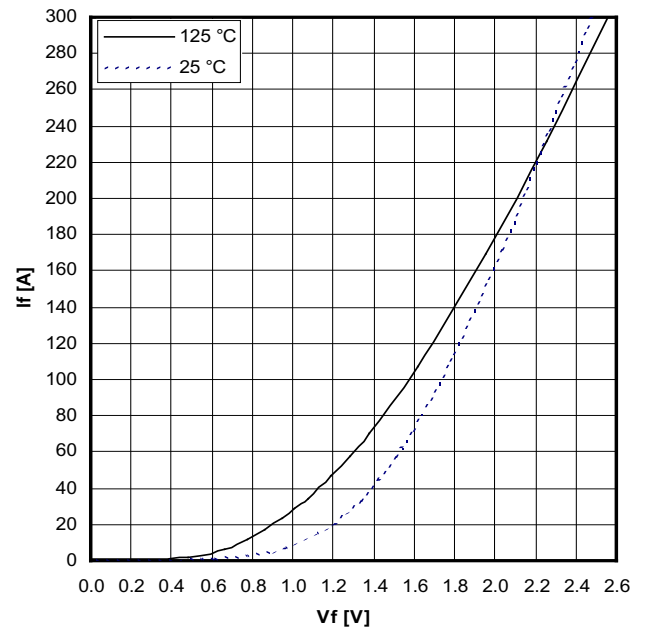
Typ. output characteristics



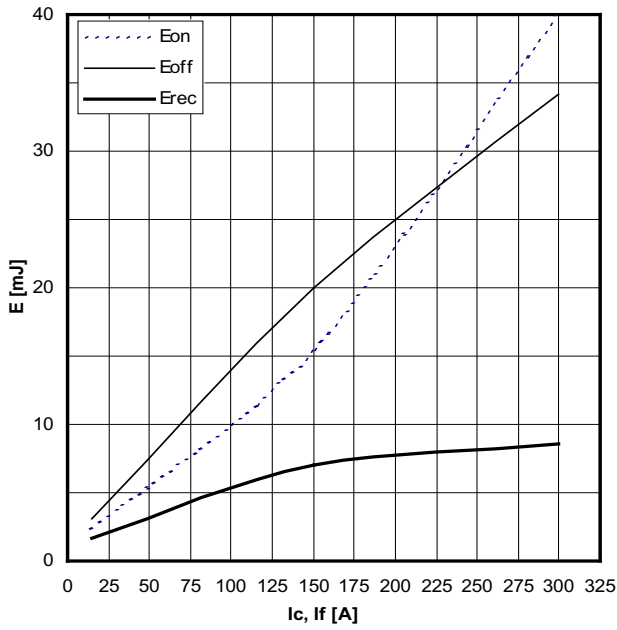
Typ. output characteristics



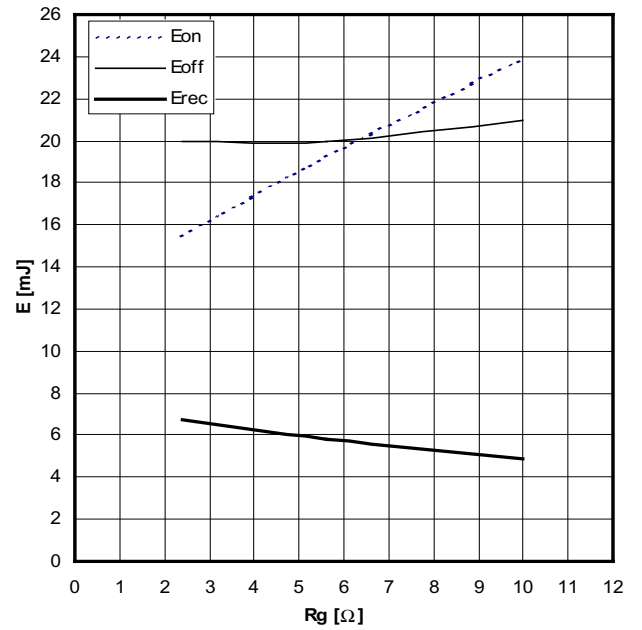
Typ. tranfer characteristics



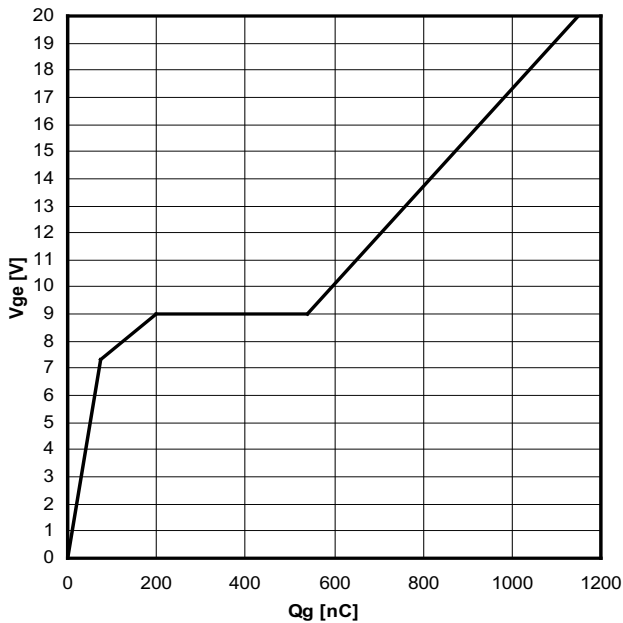
Typ. tranfer characteristics



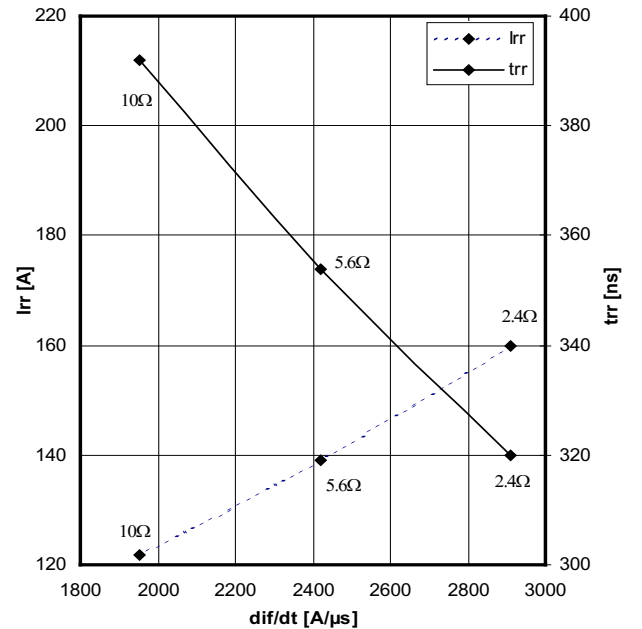
Typ. switching energy vs. collector current



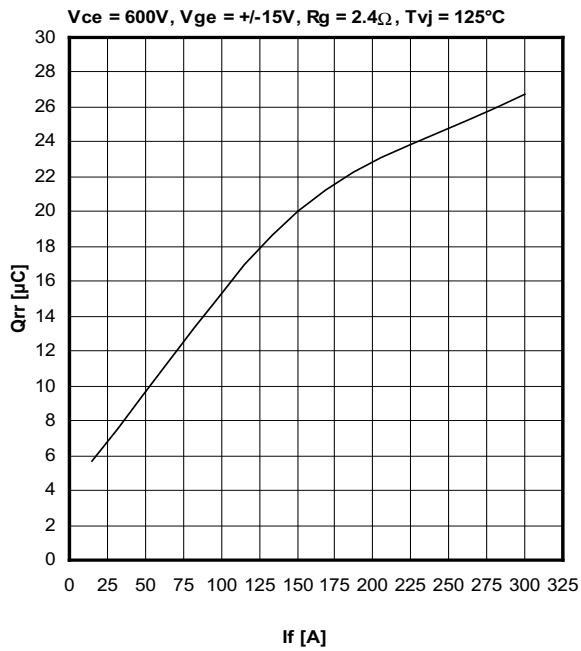
Typ. switching energy vs. gate resistance



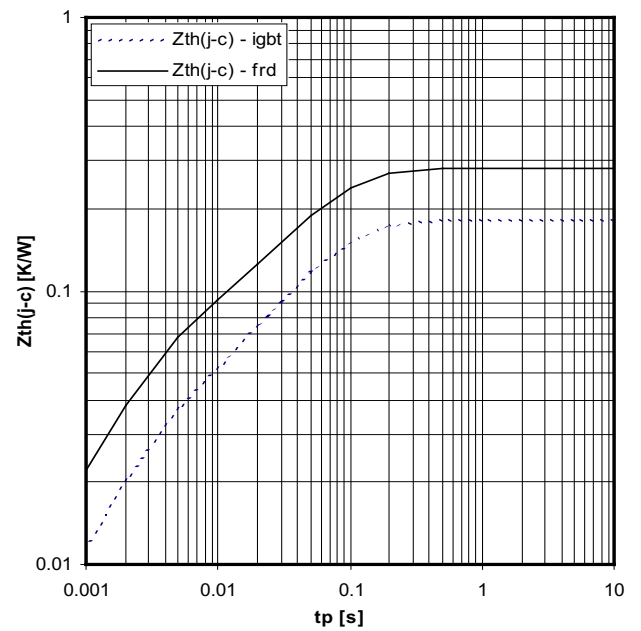
Typ. turn-on gate charge



Reverse recovery characteristics

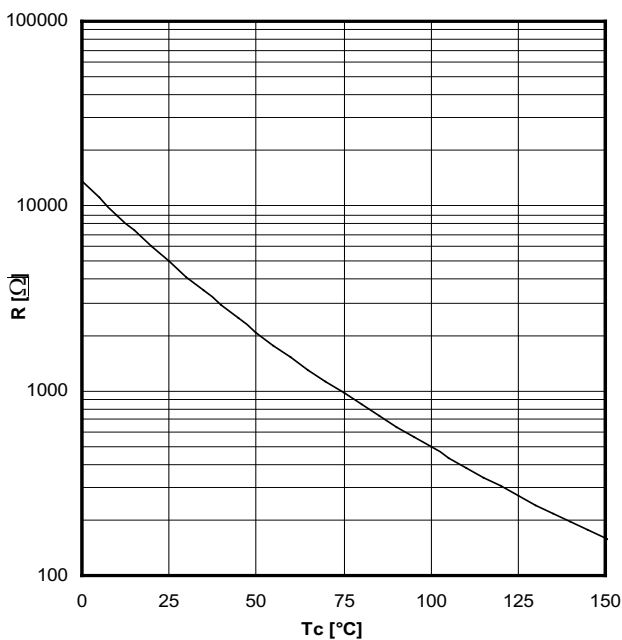


Reverse recovery characteristics



Typ. transient thermal impedance

**NTC**



Typ. NTC resistance versus temperature