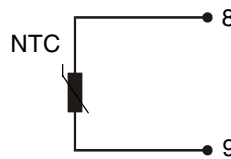
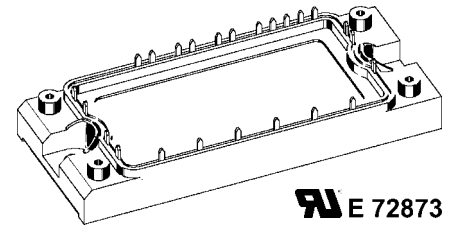
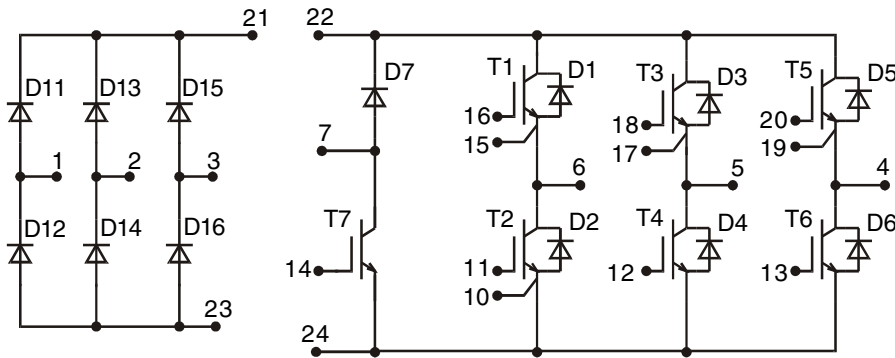


## Converter - Brake - Inverter Module (CBI2)



Three Phase Rectifier	Brake Chopper	Three Phase Inverter
$V_{RRM} = 1600V$	$V_{CES} = 600 V$	$V_{CES} = 600 V$
$I_{DAVM} = 36 A$	$I_{C25} = 25 A$	$I_{C25} = 35 A$
$I_{FSM} = 300 A$	$V_{CE(sat)} = 1.9 V$	$V_{CE(sat)} = 1.9 V$

### Input Rectifier Bridge D11 - D16

Symbol	Conditions	Maximum Ratings	
$V_{RRM}$		1600	V
$I_{FAV}$	$T_C = 80^\circ C$ ; sine 180°	25	A
$I_{DAVM}$	$T_C = 80^\circ C$ ; rectangular; $d = 1/3$	24	A
$I_{FSM}$	$T_{VJ} = 25^\circ C$ ; $t = 10 ms$ ; sine 50 Hz	300	A
$P_{tot}$	$T_C = 25^\circ C$	100	W

Symbol	Conditions	Characteristic Values		
		$(T_{VJ} = 25^\circ C, \text{ unless otherwise specified})$		
		min.	typ.	max.
$V_F$	$I_F = 20 A$ ; $T_{VJ} = 25^\circ C$ $T_{VJ} = 125^\circ C$		1.4 1.3	1.6 V V
$I_R$	$V_R = V_{RRM}$ ; $T_{VJ} = 25^\circ C$ $T_{VJ} = 125^\circ C$		1.2	0.15 mA mA
$t_{rr}$	$V_R = 100 V$ ; $I_F = 15 A$ ; $di/dt = -15 A/\mu s$		1	$\mu s$
$R_{thJC}$	(per diode)			1.3 K/W

### Application: AC motor drives with

- Input from single or three phase grid
- Three phase synchronous or asynchronous motor
- electric braking operation

### Features

- High level of integration - only one power semiconductor module required for the whole drive
- Fast rectifier diodes for enhanced EMC behaviour
- NPT IGBT technology with low saturation voltage, low switching losses, high RBSOA and short circuit ruggedness
- Epitaxial free wheeling diodes with Hiperfast and soft reverse recovery
- Industry standard package with insulated copper base plate and soldering pins for PCB mounting
- Temperature sense included

**Output Inverter T1 - T6**

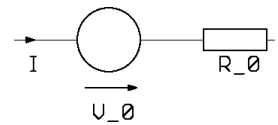
Symbol	Conditions	Maximum Ratings	
$V_{CES}$	$T_{VJ} = 25^{\circ}\text{C}$ to $150^{\circ}\text{C}$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^{\circ}\text{C}$	35	A
$I_{C80}$	$T_C = 80^{\circ}\text{C}$	25	A
<b>RBSOA</b>	$V_{GE} = \pm 15\text{ V}$ ; $R_G = 47\ \Omega$ ; $T_{VJ} = 125^{\circ}\text{C}$ Clamped inductive load; $L = 100\ \mu\text{H}$	$I_{CM} = 40$ $V_{CEK} \leq V_{CES}$	A
$t_{SC}$ <b>(SCSOA)</b>	$V_{CE} = V_{CES}$ ; $V_{GE} = \pm 15\text{ V}$ ; $R_G = 47\ \Omega$ ; $T_{VJ} = 125^{\circ}\text{C}$ non-repetitive	10	$\mu\text{s}$
$P_{tot}$	$T_C = 25^{\circ}\text{C}$	125	W

Symbol	Conditions	Characteristic Values ( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{CE(sat)}$	$I_C = 20\text{ A}$ ; $V_{GE} = 15\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.9 2.2	2.3	V V
$V_{GE(th)}$	$I_C = 0.5\text{ mA}$ ; $V_{GE} = V_{CE}$	4.5	6.5	V
$I_{CES}$	$V_{CE} = V_{CES}$ ; $V_{GE} = 0\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.4	0.6	mA mA
$I_{GES}$	$V_{CE} = 0\text{ V}$ ; $V_{GE} = \pm 20\text{ V}$		200	nA
$t_{d(on)}$ $t_r$ $t_{d(off)}$ $t_f$ $E_{on}$ $E_{off}$	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 300\text{ V}$ ; $I_C = 20\text{ A}$ $V_{GE} = \pm 15\text{ V}$ ; $R_G = 47\ \Omega$		50 55 300 30	ns ns ns ns
			0.92	mJ
			0.68	mJ
$C_{ies}$		$V_{CE} = 25\text{ V}$ ; $V_{GE} = 0\text{ V}$ ; $f = 1\text{ MHz}$	1100	pF
$Q_{Gon}$		$V_{CE} = 300\text{ V}$ ; $V_{GE} = 15\text{ V}$ ; $I_C = 20\text{ A}$	65	nC
$R_{thJC}$		(per IGBT)		1

**Output Inverter D1 - D6**

Symbol	Conditions	Maximum Ratings	
$I_{F25}$	$T_C = 25^{\circ}\text{C}$	35	A
$I_{F80}$	$T_C = 80^{\circ}\text{C}$	24	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
$V_F$	$I_F = 20\text{ A}$ ; $V_{GE} = 0\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.4	2.1	V V
$I_{RM}$ $t_{rr}$	$I_F = 15\text{ A}$ ; $di_F/dt = -400\text{ A}/\mu\text{s}$ ; $T_{VJ} = 125^{\circ}\text{C}$ $V_R = 300\text{ V}$ ; $V_{GE} = 0\text{ V}$	13	90	A ns
$R_{thJC}$		(per diode)		2.1

**Equivalent Circuits for Simulation**
**Conduction**

**D11 - D16**

Rectifier Diode (typ. at  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 1.12\text{ V}$ ;  $R_0 = 0.11\text{ m}\Omega$

**T1 - T6 / D1 - D6**

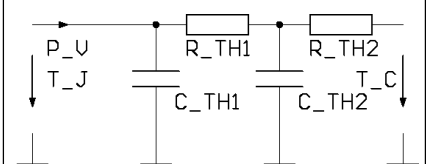
IGBT (typ. at  $V_{GE} = 15\text{ V}$ ;  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 0.9\text{ V}$ ;  $R_0 = 65\text{ m}\Omega$

Free Wheeling Diode (typ. at  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 1.09\text{ V}$ ;  $R_0 = 12\text{ m}\Omega$

**T7 / D7**

IGBT (typ. at  $V_{GE} = 15\text{ V}$ ;  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 0.99\text{ V}$ ;  $R_0 = 81\text{ m}\Omega$

Free Wheeling Diode (typ. at  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 1.07\text{ V}$ ;  $R_0 = 23\text{ m}\Omega$

**Thermal Response**

**D11 - D16**

Rectifier Diode (typ.)  
 $C_{th1} = 0.106\text{ J/K}$ ;  $R_{th1} = 1.06\text{ K/W}$   
 $C_{th2} = 0.79\text{ J/K}$ ;  $R_{th2} = 0.239\text{ K/W}$

**T1 - T6 / D1 - D6**

IGBT (typ.)  
 $C_{th1} = 0.108\text{ J/K}$ ;  $R_{th1} = 0.79\text{ K/W}$   
 $C_{th2} = 0.921\text{ J/K}$ ;  $R_{th2} = 0.209\text{ K/W}$

Free Wheeling Diode (typ.)

$C_{th1} = 0.065\text{ J/K}$ ;  $R_{th1} = 1.766\text{ K/W}$   
 $C_{th2} = 0.636\text{ J/K}$ ;  $R_{th2} = 0.344\text{ K/W}$

**T7 / D7**

IGBT (typ.)  
 $C_{th1} = 0.077\text{ J/K}$ ;  $R_{th1} = 1.111\text{ K/W}$   
 $C_{th2} = 0.732\text{ J/K}$ ;  $R_{th2} = 0.279\text{ K/W}$

Free Wheeling Diode (typ.)

$C_{th1} = 0.043\text{ J/K}$ ;  $R_{th1} = 2.738\text{ K/W}$   
 $C_{th2} = 0.54\text{ J/K}$ ;  $R_{th2} = 0.462\text{ K/W}$

**Brake Chopper T7**

Symbol	Conditions	Maximum Ratings	
$V_{CES}$	$T_{VJ} = 25^{\circ}\text{C}$ to $150^{\circ}\text{C}$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^{\circ}\text{C}$	25	A
$I_{C80}$	$T_C = 80^{\circ}\text{C}$	18	A
<b>RBSOA</b>	$V_{GE} = \pm 15\text{ V}$ ; $R_G = 68\ \Omega$ ; $T_{VJ} = 125^{\circ}\text{C}$ Clamped inductive load; $L = 100\ \mu\text{H}$	$I_{CM} = 30$ $V_{CEK} \leq V_{CES}$	A
$t_{SC}$ <b>(SCSOA)</b>	$V_{CE} = V_{CES}$ ; $V_{GE} = \pm 15\text{ V}$ ; $R_G = 68\ \Omega$ ; $T_{VJ} = 125^{\circ}\text{C}$ non-repetitive	10	$\mu\text{s}$
$P_{tot}$	$T_C = 25^{\circ}\text{C}$	90	W

Symbol	Conditions	Characteristic Values ( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{CE(sat)}$	$I_C = 15\text{ A}$ ; $V_{GE} = 15\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.9	2.3	V
		2.1		V
$V_{GE(th)}$	$I_C = 0.4\text{ mA}$ ; $V_{GE} = V_{CE}$	4.5	6.5	V
$I_{CES}$	$V_{CE} = V_{CES}$ ; $V_{GE} = 0\text{ V}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.3	0.5	mA mA
$I_{GES}$	$V_{CE} = 0\text{ V}$ ; $V_{GE} = \pm 20\text{ V}$		200	nA
$t_{d(on)}$	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 300\text{ V}$ ; $I_C = 15\text{ A}$ $V_{GE} = \pm 15\text{ V}$ ; $R_G = 68\ \Omega$	30		ns
$t_r$		50		ns
$t_{d(off)}$		270		ns
$t_f$		40		ns
$E_{on}$		0.7		mJ
$E_{off}$		0.5		mJ
$C_{ies}$	$V_{CE} = 25\text{ V}$ ; $V_{GE} = 0\text{ V}$ ; $f = 1\text{ MHz}$	800		pF
$Q_{Gon}$	$V_{CE} = 300\text{ V}$ ; $V_{GE} = 15\text{ V}$ ; $I_C = 15\text{ A}$	57		nC
$R_{thJC}$			1.39	K/W

**Brake Chopper D7**

Symbol	Conditions	Maximum Ratings	
$V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$ to $150^{\circ}\text{C}$	600	V
$I_{F25}$	$T_C = 25^{\circ}\text{C}$	22	A
$I_{F80}$	$T_C = 80^{\circ}\text{C}$	15	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
$V_F$	$I_F = 15\text{ A}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$		1.5	2.2 V V
$I_R$	$V_R = V_{RRM}$ ; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.07	0.06	mA mA
$I_{RM}$	$I_F = 10\text{ A}$ ; $di_F/dt = -400\text{ A}/\mu\text{s}$ ; $T_{VJ} = 125^{\circ}\text{C}$ $V_R = 300\text{ V}$		11	A
$t_{rr}$			80	ns
$R_{thJC}$			3.2	K/W



**Input Rectifier Bridge D11 - D16**

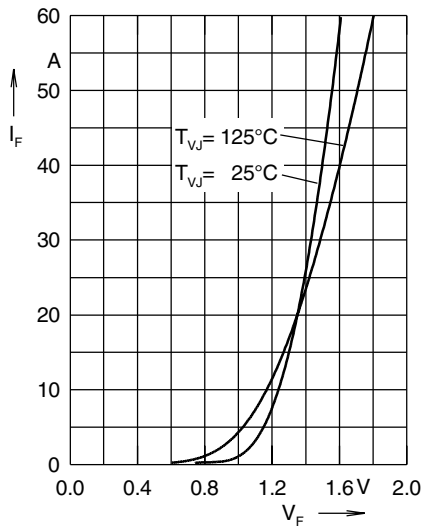


Fig. 1 Forward current versus voltage drop per diode

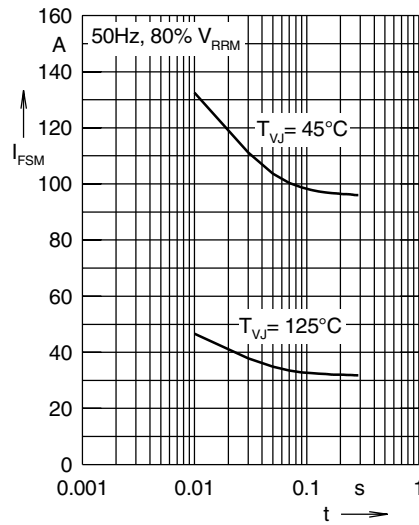


Fig. 2 Surge overload current

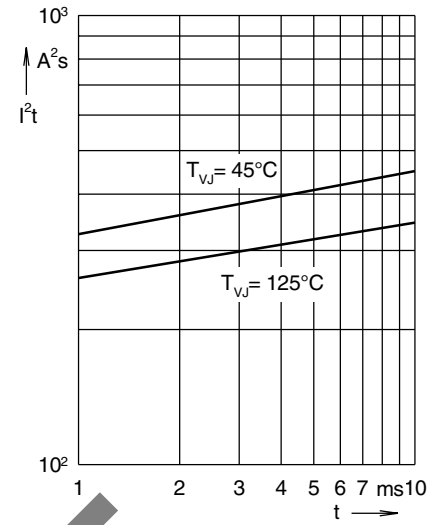


Fig. 3  $I^2t$  versus time per diode

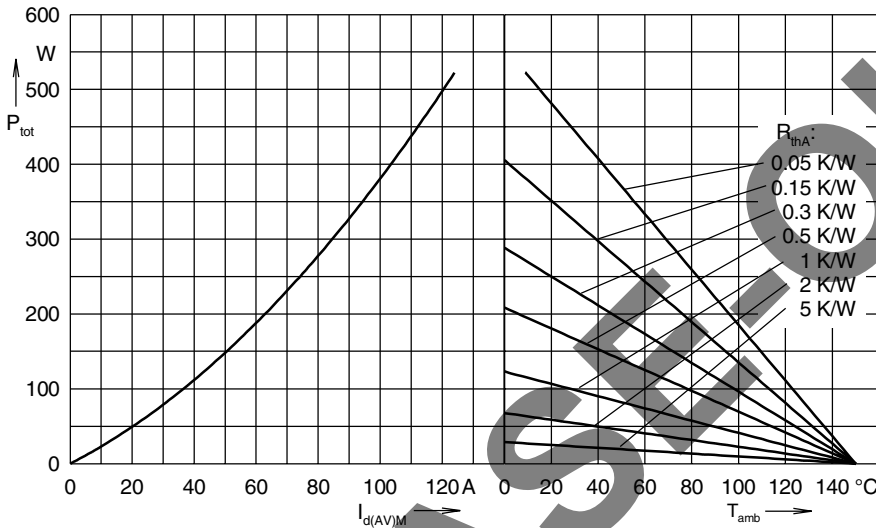


Fig. 4 Power dissipation versus direct output current and ambient temperature, sin 1

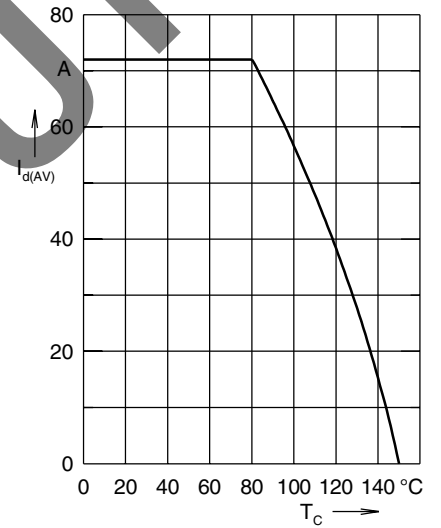


Fig. 5 Max. forward current versus case temperature

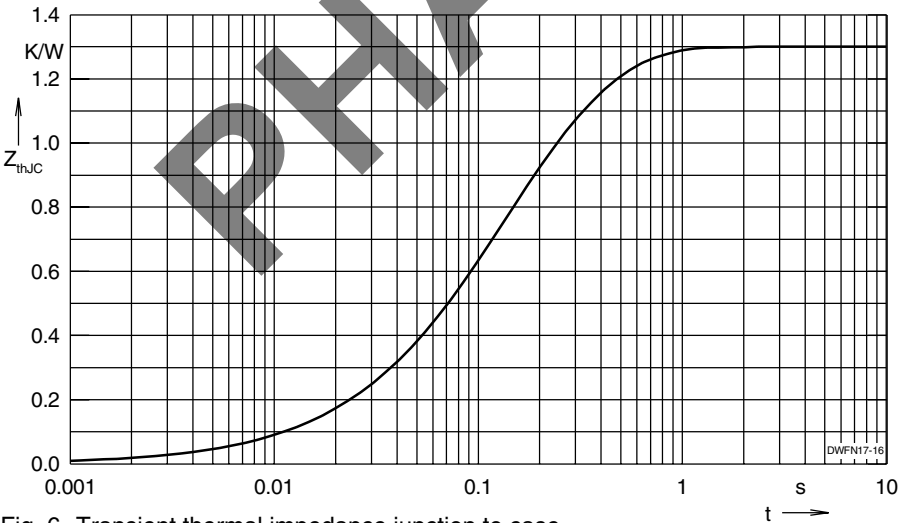


Fig. 6 Transient thermal impedance junction to case

**Output Inverter T1 - T6 / D1 - D6**

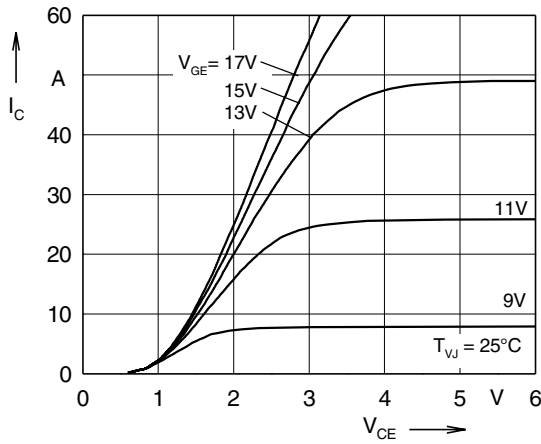


Fig. 7 Typ. output characteristics

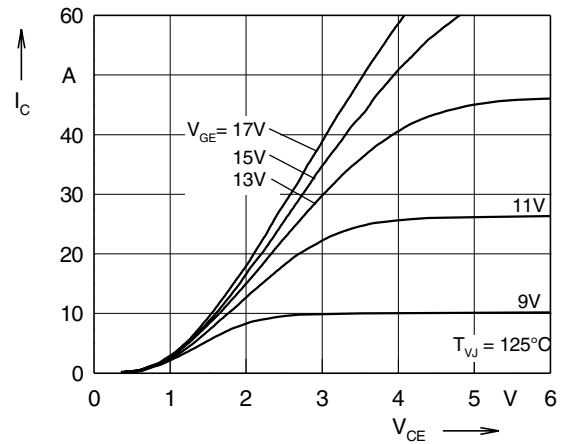


Fig. 8 Typ. output characteristics

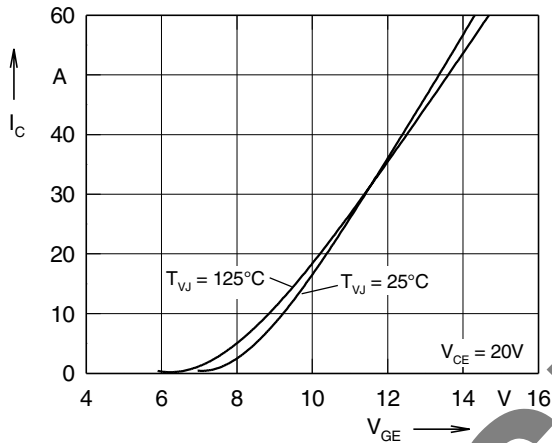


Fig. 9 Typ. transfer characteristics

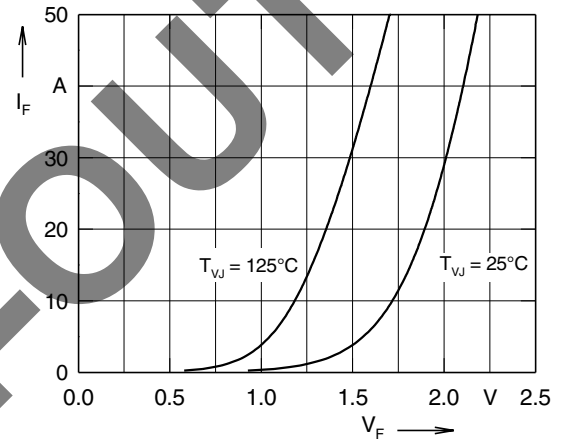


Fig. 10 Typ. forward characteristics of free wheeling diode

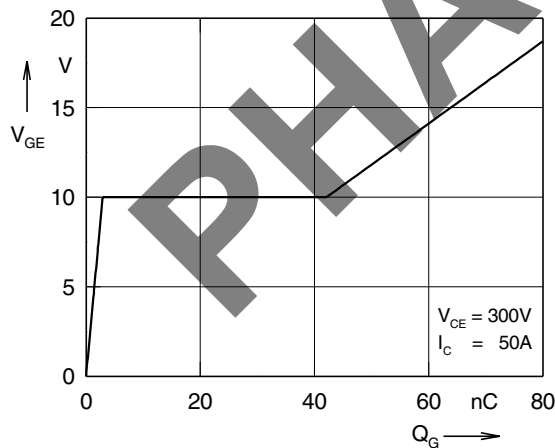


Fig. 11 Typ. turn on gate charge

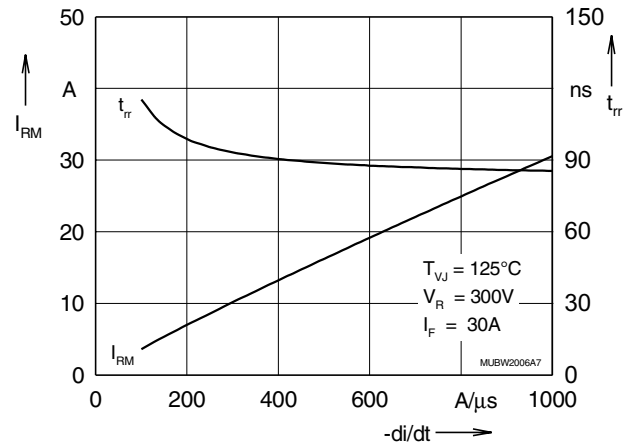


Fig. 12 Typ. turn off characteristics of free wheeling diode

Output Inverter T1 - T6 / D1 - D6

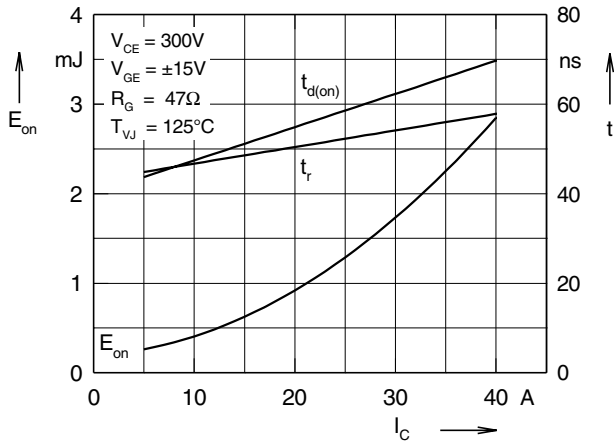


Fig. 13 Typ. turn on energy and switching times versus collector current

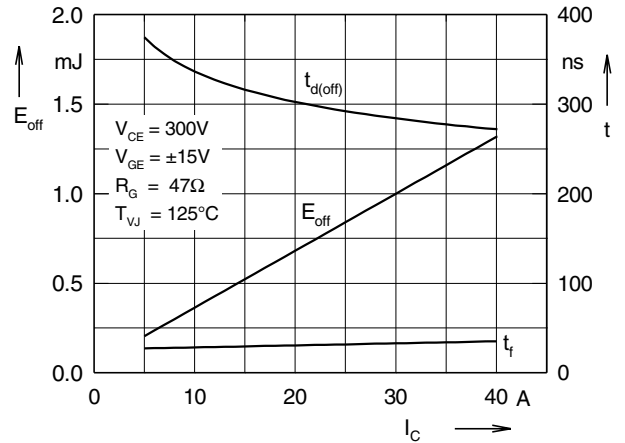


Fig. 14 Typ. turn off energy and switching times versus collector current

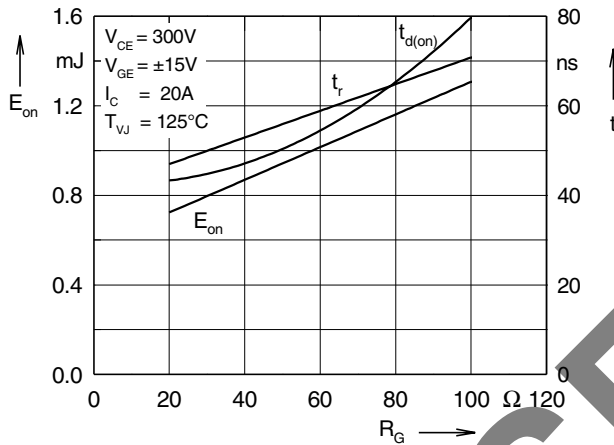


Fig. 15 Typ. turn on energy and switching times versus gate resistor

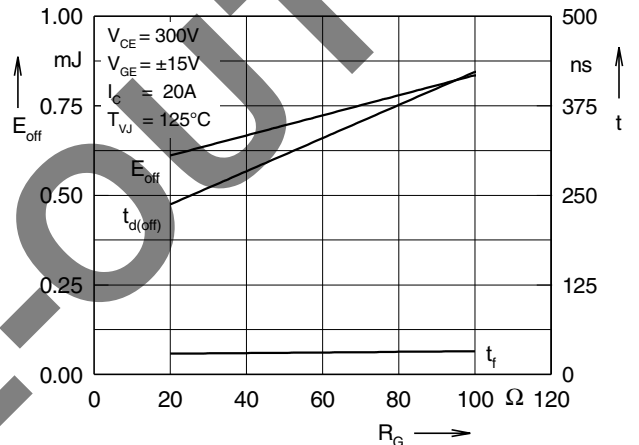


Fig. 16 Typ. turn off energy and switching times versus gate resistor

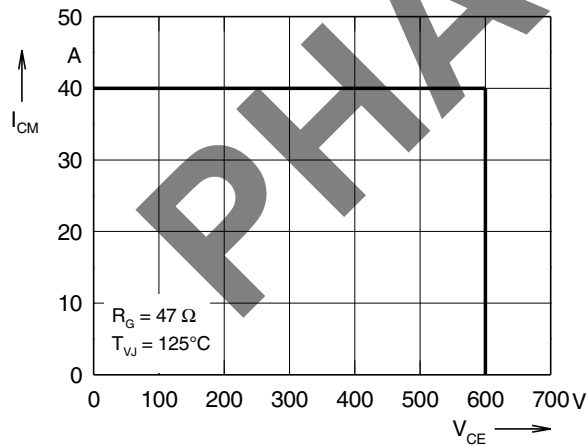


Fig. 17 Reverse biased safe operating area RBSOA

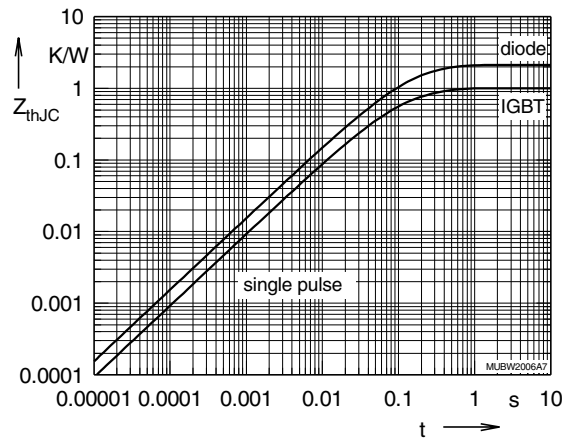


Fig. 18 Typ. transient thermal impedance

**Brake Chopper T7 / D7**

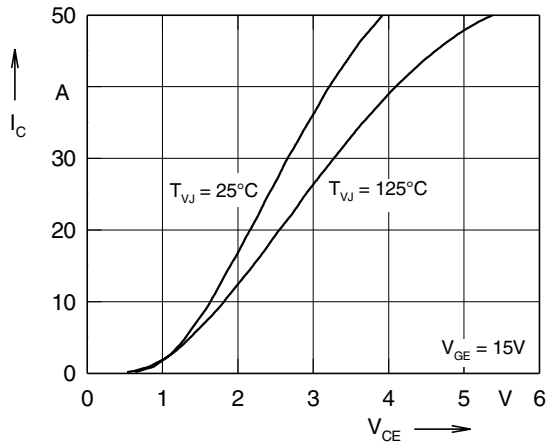


Fig. 19 Typ. output characteristics

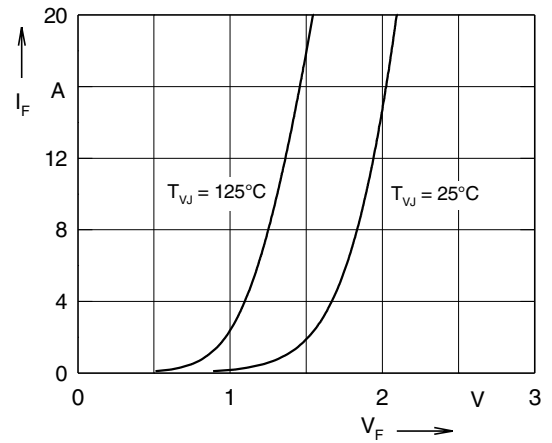


Fig. 20 Typ. forward characteristics of free wheeling diode

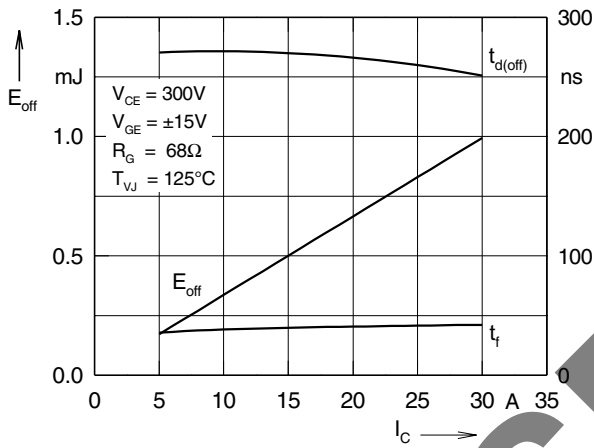


Fig. 21 Typ. turn off energy and switching times versus collector current

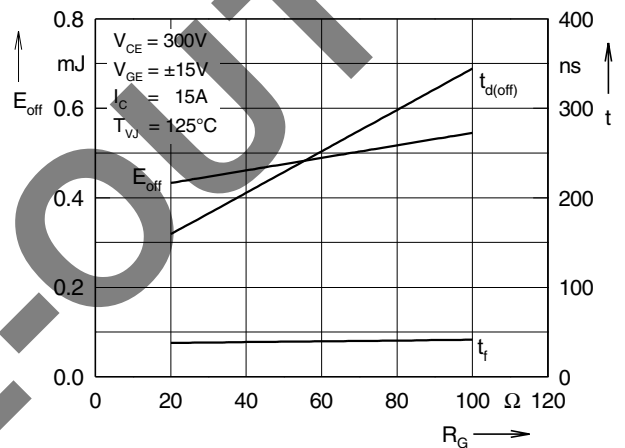


Fig. 22 Typ. turn off energy and switching times versus gate resistor

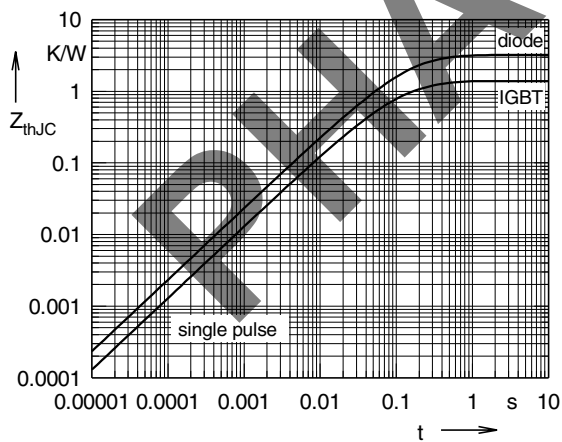


Fig. 23 Typ. transient thermal impedance

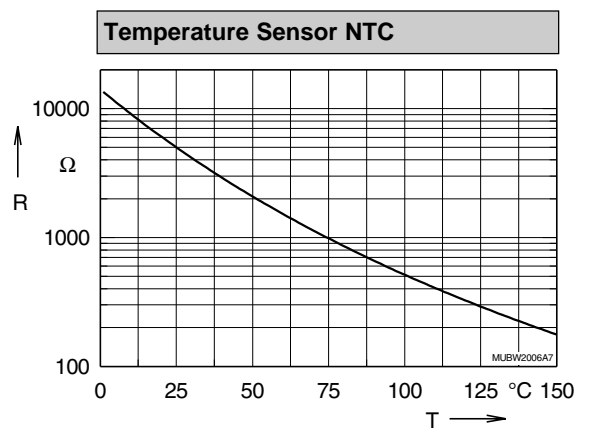


Fig. 24 Typ. thermistorresistance versus temperature





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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**Факс:** 8 (812) 320-02-42

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