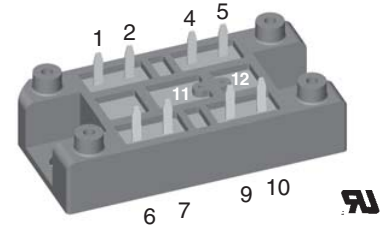
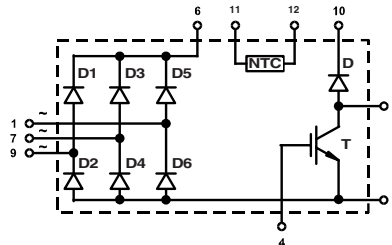


## Three Phase Rectifier Bridge with Brake Chopper

$$V_{RRM} = 1200/1600 \text{ V}$$

$$I_{dAVM} = 110 \text{ A}$$



### Input Rectifier D1 - D6

Symbol	Conditions	Maximum Ratings	
$V_{RRM}$	VUB 72 -12 NO1	1200	V
	VUB 72 -16 NO1	1600	V
$I_{FAV}$	$T_C = 80^\circ\text{C}$ ; sine 180°	40	A
$I_{dAVM}$	$T_C = 80^\circ\text{C}$ ; rectangular; $d = 1/3$ ; bridge	110	A
$I_{FSM}$	$T_{VJ} = 25^\circ\text{C}$ ; $t = 10 \text{ ms}$ ; sine 50 Hz	530	A
$P_{tot}$	$T_C = 25^\circ\text{C}$	100	W

Symbol	Conditions	Characteristic Values ( $T_{VJ} = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_F$	$I_F = 25 \text{ A}$ ; $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	1.0	1.1	V
		0.9		V
$I_R$	$V_R = V_{RRM}$ ; $T_{VJ} = 25^\circ\text{C}$ $V_R = 0.8 \cdot V_{RRM}$ ; $T_{VJ} = 125^\circ\text{C}$		0.02	mA
		0.4		mA
$R_{thJC}$	per diode			1.2
$R_{thJH}$	with heat transfer paste			1.42

### Chopper Diode D

Symbol	Conditions	Maximum Ratings	
$V_{RRM}$	$T_{VJ} = 25^\circ\text{C}$ to $150^\circ\text{C}$	1200	V
$I_{F25}$	DC; $T_C = 25^\circ\text{C}$	25	A
$I_{F80}$	DC; $T_C = 80^\circ\text{C}$	15	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
$V_F$	$I_F = 25 \text{ A}$ ; $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	2.7	3.1	V
		2.0		V
$I_R$	$V_R = V_{RRM}$ ; $T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		0.1	mA
		0.1		mA
$I_{RM}$ $t_{tr}$	$I_F = 15 \text{ A}$ ; $di_F/dt = -400 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}$ ; $T_{VJ} = 125^\circ\text{C}$	16		A
		130		ns
$R_{thJC}$	with heat transfer paste			2.3
$R_{thJH}$				3.12

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

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### Features

- three phase mains rectifier
- brake chopper:
  - IGBT with low saturation voltage
  - HiPerFRED™ free wheeling diode
- module package:
  - high level of integration
  - solder terminals for PCB mounting
  - UL registered E72873
  - isolated DCB ceramic base plate
  - large creepage and strike distances
  - high reliability

### Applications

- drives with
- mains input
  - DC link
  - inverter or chopper feeding the machine
  - motor and generator/brake operation

## Chopper Transistor T

Symbol	Conditions	Maximum Ratings	
$V_{CES}$	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$	1200	V
$V_{GES}$		$\pm 20$	V
$I_{C25}$	DC; $T_C = 25^{\circ}\text{C}$	50	A
$I_{C80}$	DC; $T_C = 80^{\circ}\text{C}$	35	A
$I_{CM}$	$V_{GE} = \pm 15\text{ V}; R_G = 39\ \Omega; T_{VJ} = 125^{\circ}\text{C}$	50	A
$V_{CEK}$	RBSOA; $L = 100\ \mu\text{H}$	$V_{CES}$	
$t_{SC}$ (SCSOA)	$V_{GE} = \pm 15\text{ V}; V_{CE} = 900\text{ V}; T_{VJ} = 125^{\circ}\text{C}$ $R_G = 39\ \Omega; \text{non repetitive}$	10	$\mu\text{s}$

Symbol	Conditions ( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified)	Characteristic Values			
		min.	typ.	max.	
$V_{CE(sat)}$	$I_C = 25\text{ A}; V_{GE} = 15\text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.9 2.1	2.4	V V	
$V_{GE(th)}$	$I_C = 1\text{ mA}; V_{GE} = V_{CE}$	4.5	6.5	V	
$I_{CES}$	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.1	0.1	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, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 600\text{ V}; I_C = 25\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 39\ \Omega$	80	50	ns ns	
		440	50	ns	
		3.8	2.0	mJ mJ	
$C_{ies}$		$V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$	2.0		nF
$Q_{Gon}$		$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 35\text{ A}$	150		nC
$R_{thJC}$ $R_{thJH}$		with heat transfer paste, see mounting instructions		0.6 1.2	KW KW

## Temperature Sensor NTC

Symbol	Conditions	Characteristic Values typ.	
$R_{25}$	$T = 25^{\circ}\text{C}$	2.2	k $\Omega$
$B_{25/100}$		3560	K

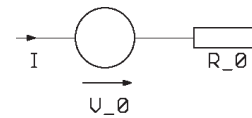
## Module

Symbol	Conditions	Maximum Ratings	
$I_{RMS}$	per pin	100	A
$T_{VJ}$		-40...+150	$^{\circ}\text{C}$
$T_{stg}$		-40...+125	$^{\circ}\text{C}$
$V_{ISOL}$	$I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}; t = 1\text{ min}$	3600	V~
$M_d$	Mounting torque (M5)	2 - 2.5	Nm

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
$d_A, d_S$		5		mm
Weight		35		g

## Equivalent Circuits for Simulation

### Conduction



### D1 - D6

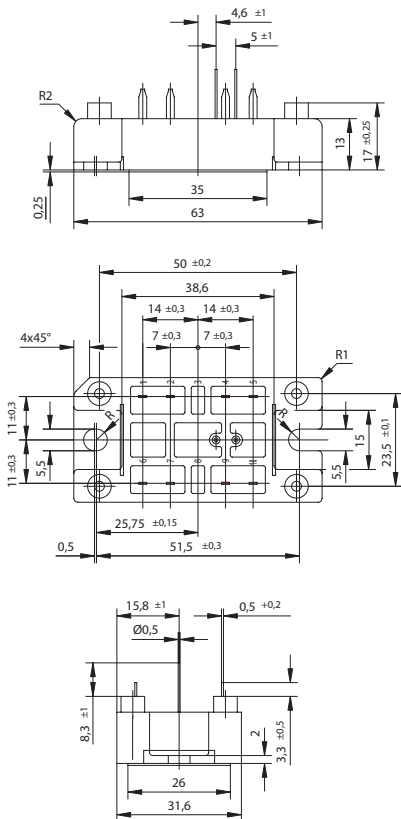
Diode (typ. at  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 0.85\text{ V}; R_0 = 7\text{ m}\Omega$

### T/D

IGBT (typ. at  $V_{GE} = 15\text{ V}; T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 1.0\text{ V}; R_0 = 45\text{ m}\Omega$

Free Wheeling Diode (typ. at  $T_J = 125^{\circ}\text{C}$ )  
 $V_0 = 1.25\text{ V}; R_0 = 32\text{ m}\Omega$

## Dimensions in mm (1 mm = 0.0394")



Input Rectifier D1-D6

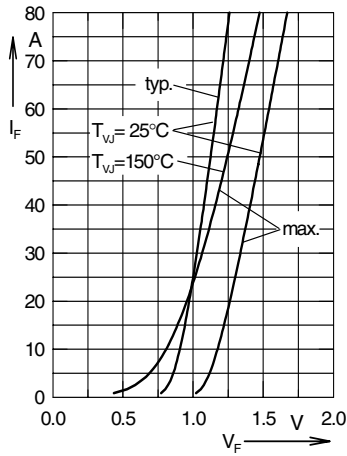


Fig. 1 Forward current vs. voltage drop per rectifier diode

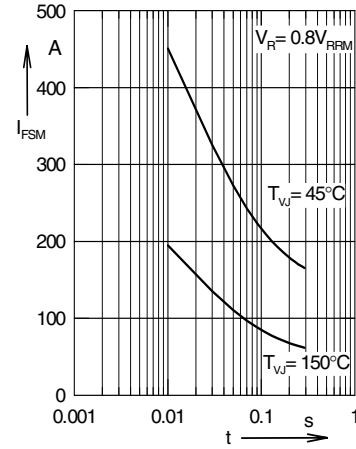


Fig. 2 Surge overload current per rectifier diode

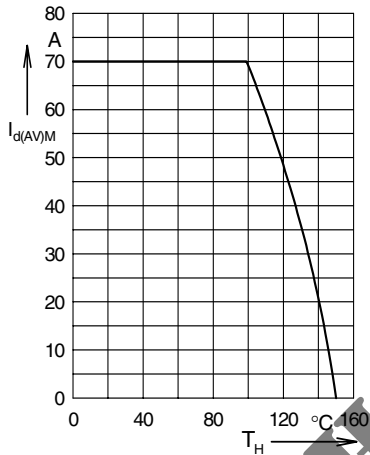


Fig. 3 Maximum forward current vs. heatsink temperature (Rectifier bridge)

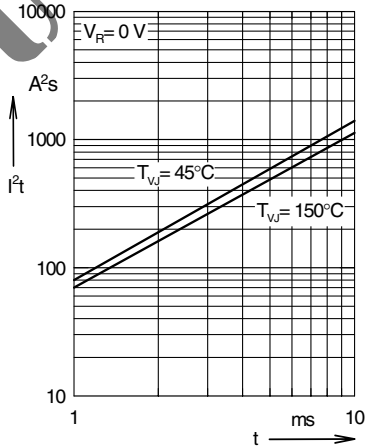


Fig. 4 I<sup>2</sup>t versus time per rectifier diode

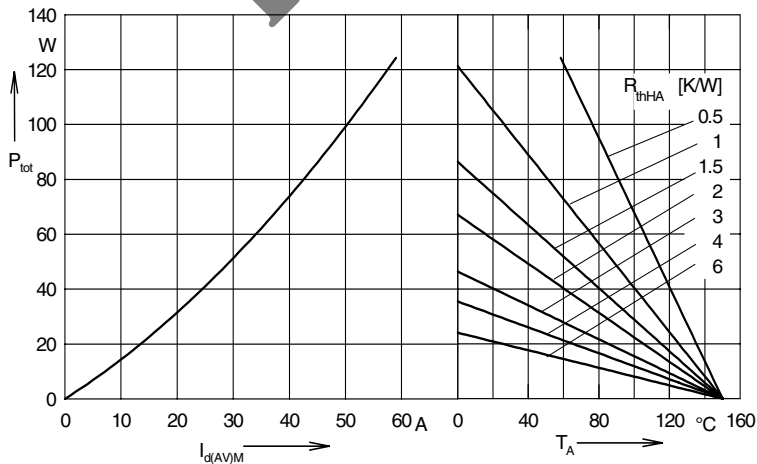


Fig. 5 Power dissipation vs. direct output current and ambient temperature (Rectifier bridge)

Note:  
Transient thermal impedance  
see next page

PHASE-OUT

Chopper T - D

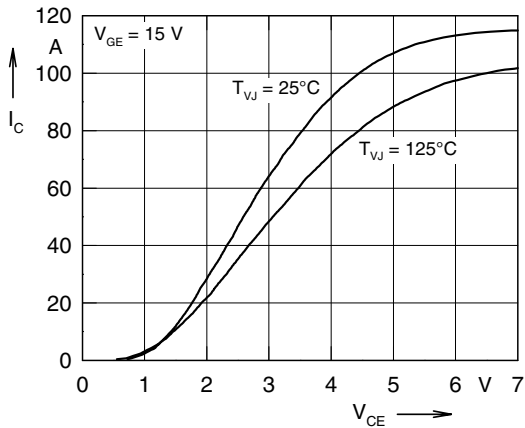


Fig. 6 Typ. IGBT output characteristics

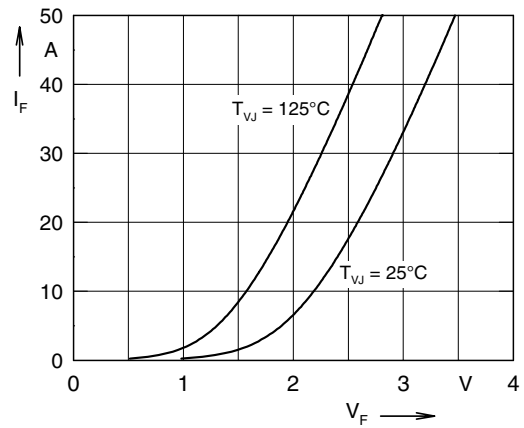


Fig. 7 Typ. forward characteristics of free wheeling diode

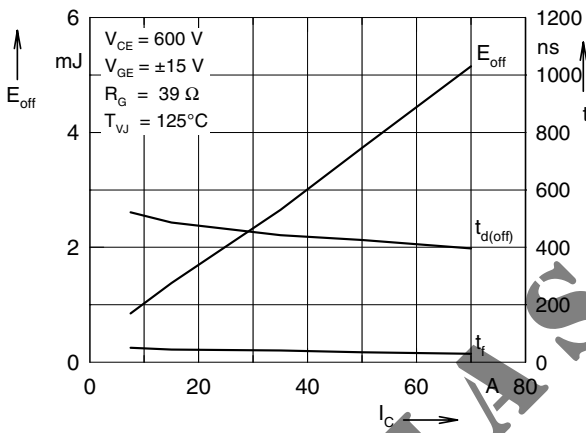


Fig. 8 Typ. IGBT turn off energy and switching times versus collector current

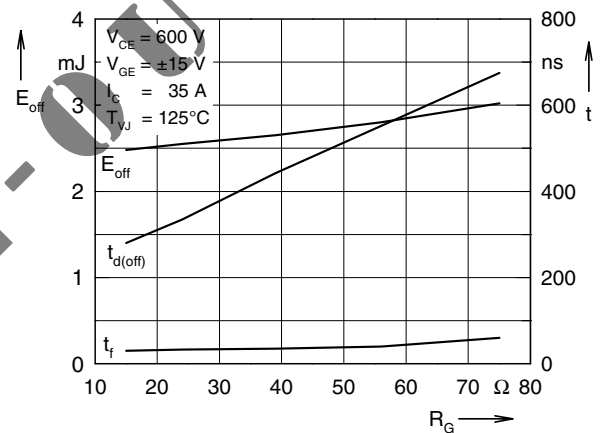


Fig. 9 Typ. IGBT turn off energy and switching times versus gate resistor

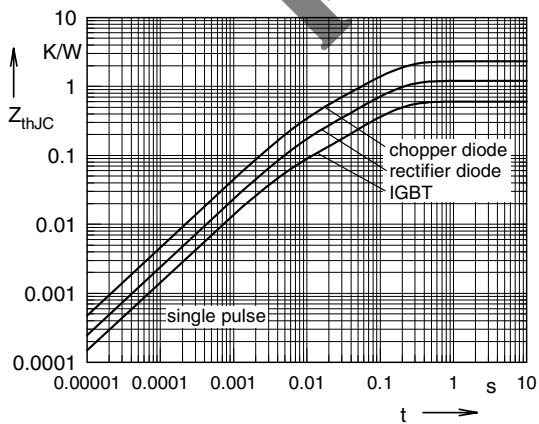


Fig. 10 Typ. transient thermal impedance

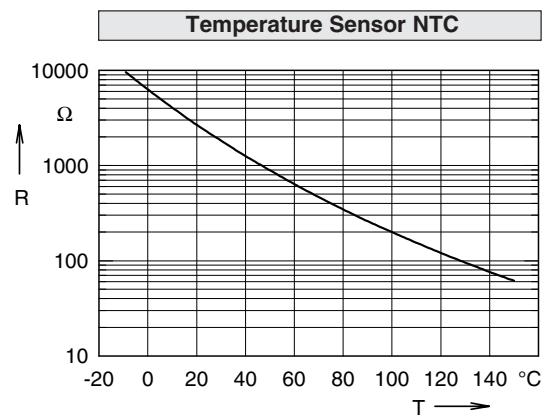


Fig. 11 Typ. thermistorresistance versus temperature