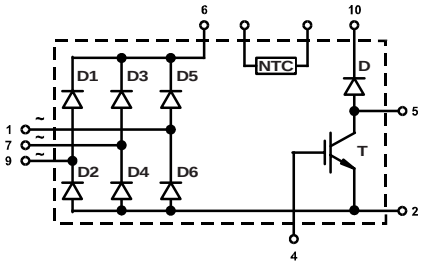
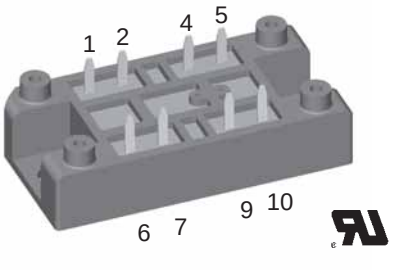
Three Phase Rectifier Bridge
with Brake Chopper

V_{RRM} = 1200/1600 V
I_{dAVM} = 110 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°C; sine 180°	40	A
I_{DAVM}	T_C = 80°C; rectangular; d = $^1/_3$; bridge	110	A
I_{FSM}	T_{VJ} = 25°C; t = 10 ms; sine 50 Hz	530	A
P_{tot}	T_C = 25°C	100	W

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

Chopper Diode D

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

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

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

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

340

Chopper Transistor T

Symbol	Conditions	Maximum Ratings	
V_{CES}	T_{VJ} = 25°C to 150°C	1200	V
V_{GES}		± 20	V
I_{C25}	DC; T_C = 25°C	50	A
I_{C80}	DC; T_C = 80°C	35	A
I_{CM}	V_{GE} = ±15 V; R_G = 39 Ω; T_{VJ} = 125°C	50	A
V_{CEK}	RBSOA; L = 100 µH	V_{CES}	
t_{SC} (SCSOA)	V_{GE} = ±15 V; V_{CE} = 900 V; T_{VJ} = 125°C; R_G = 39 Ω; non repetitive	10	µs

Symbol (T_{VJ} = 25°C, unless otherwise specified)	Conditions	Characteristic Values min.	typ.	max.	
$V_{CE(sat)}$	I_C = 25 A; V_{GE} = 15 V; T_{VJ} = 25°C		1.9	2.4	V
	T_{VJ} = 125°C		2.1		V
$V_{GE(th)}$	I_C = 1 mA; V_{GE} = V_{CE}	4.5		6.5	V
I_{CES}	V_{CE} = V_{CES}; V_{GE} = 0 V; T_{VJ} = 25°C			0.1	mA
	T_{VJ} = 125°C		0.1		mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ± 20 V			200	nA
$t_{d(on)}$	Inductive load, T_{VJ} = 125°C		80		ns
t_r	V_{CE} = 600 V; I_C = 25 A		50		ns
$t_{d(off)}$	V_{GE} = ±15 V; R_G = 39 Ω		440		ns
t_f			50		ns
E_{on}			3.8		mJ
E_{off}			2.0		mJ
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz		2.0		nF
Q_{Gon}	V_{CE}= 600 V; V_{GE} = 15 V; I_C = 35 A		150		nC
R_{thJC}				0.6	K/W
R_{thJH}	with heat transfer paste, see mounting instructions			1.2	K/W

Temperature Sensor NTC

Symbol	Conditions	Characteristic Values typ.	
R_{25}	T = 25°C	2.2	kΩ
$B_{25/100}$	$R(T) = R_{25} \cdot e^{B_{25/100}\left(\frac{1}{T} - \frac{1}{298K}\right)}$	100	K

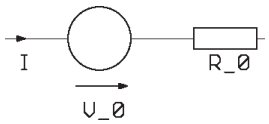
Module

Symbol	Conditions	Maximum Ratings	
I_{RMS}	per pin	100	A
T_{VJ}		-40...+150	°C
T_{stg}		-40...+125	°C
V_{ISOL}	I_{ISOL} ≤ 1 mA; 50/60 Hz; t = 1 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

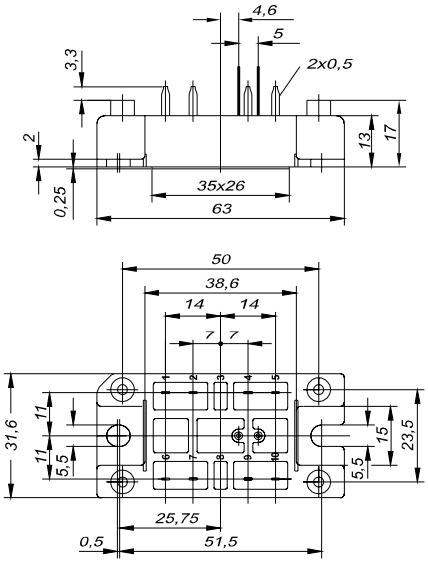
Diode (typ. at T_J = 125°C)
V_0 = 0.85 V; R_0 = 7 mΩ

T/D

IGBT (typ. at V_{GE} = 15 V; T_J = 125°C)
V_0 = 1.0 V; R_0 = 45 mΩ

Free Wheeling Diode (typ. at T_J = 125°C)
V_0 = 1.25 V; R_0 = 32 mΩ

Dimensions in mm (1 mm = 0.0394")



Input Rectifier D1-D6

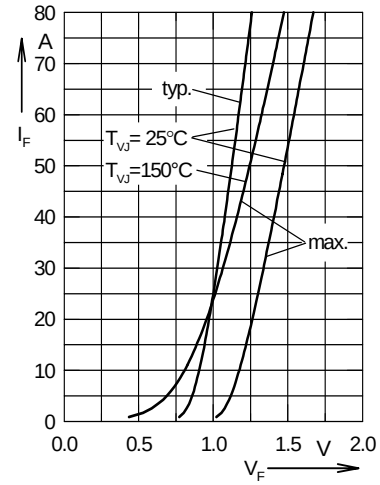


Fig. 1 Forward current versus voltage drop per rectifier diode

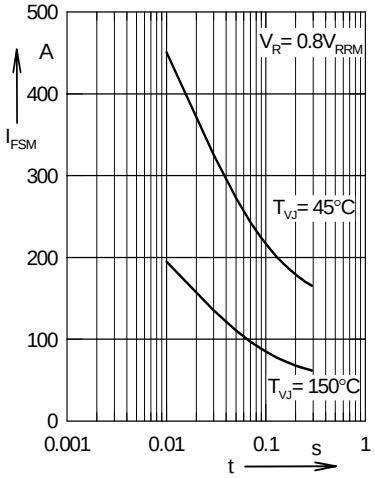


Fig. 2 Surge overload current per rectifier diode

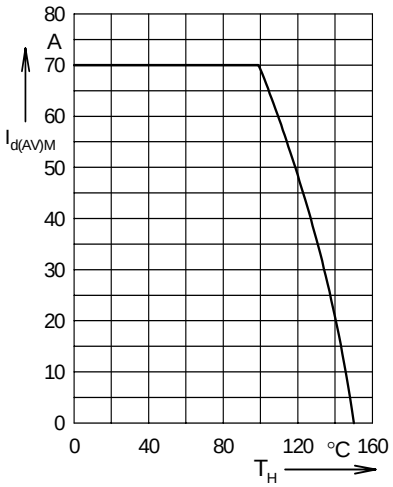


Fig. 3 Maximum forward current versus heatsink temperature (Rectifier bridge)

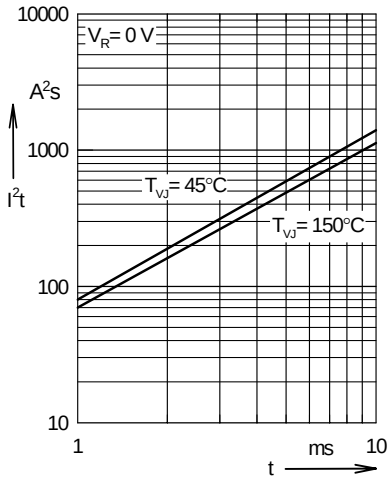


Fig. 4 I2t versus time per rectifier diode

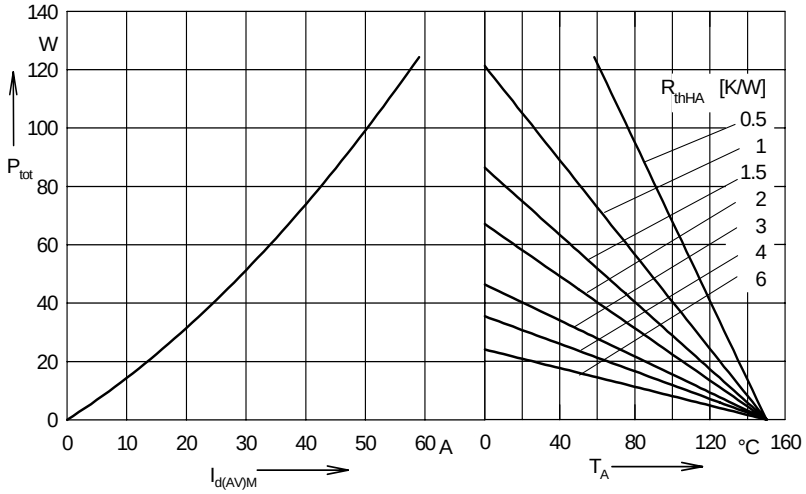


Fig. 5 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

Note:
transient thermal impedance
see next page

340

Chopper T - D

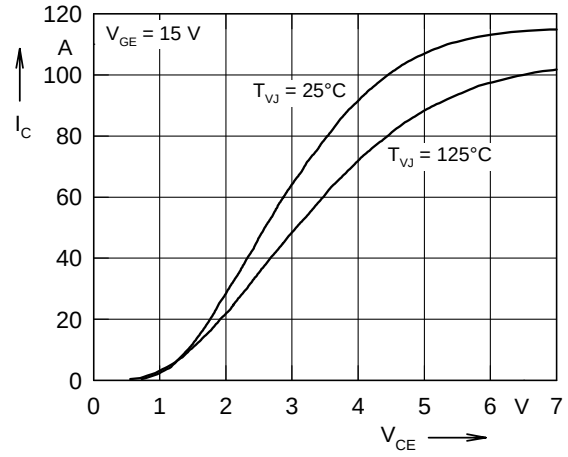


Fig. 6 Typ. IGBT output characteristics

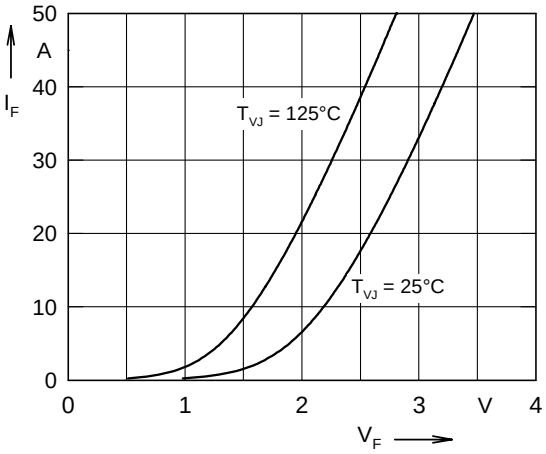


Fig. 7 Typ. forward characteristics of free wheeling diode

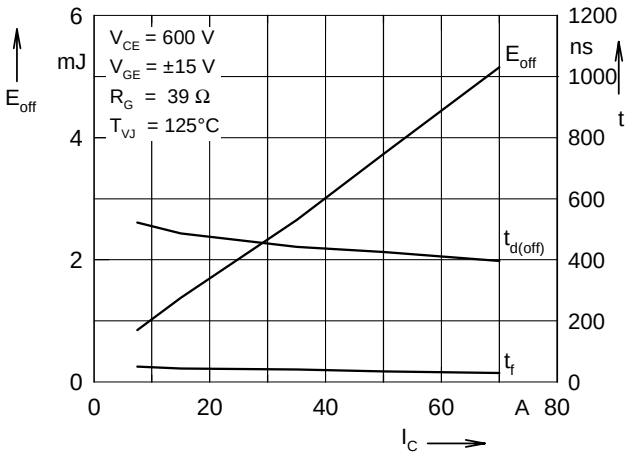


Fig. 8 Typ. IGBT turn off energy and switching times versus collector current

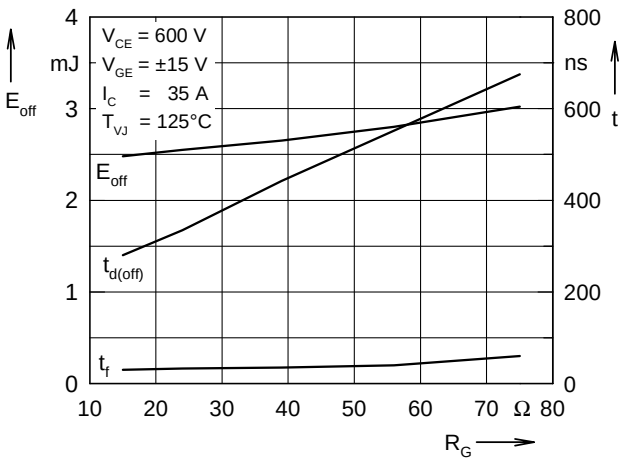


Fig. 9 Typ. IGBT turn off energy and switching times versus gate resistor

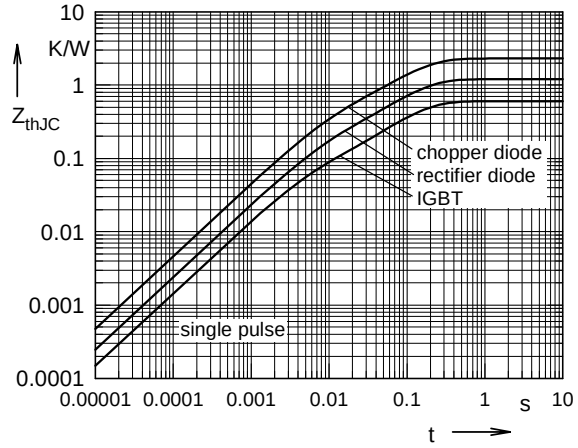


Fig. 10 Typ. transient thermal impedance

Temperature Sensor NTC

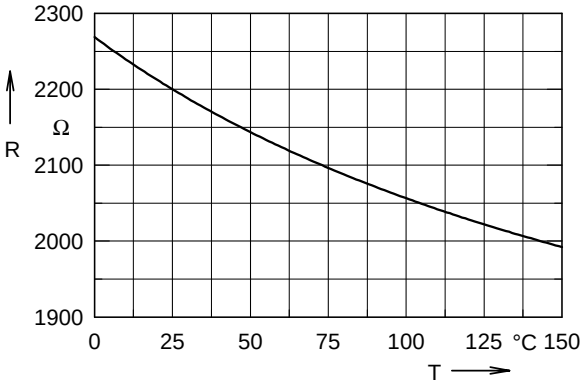


Fig. 11 Typ. thermistorresistance versus temperature

340