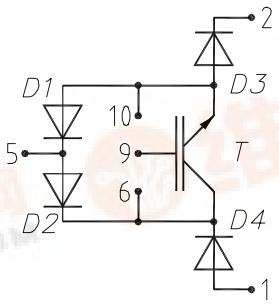
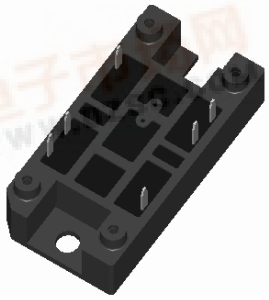
Rectifier Module for Three Phase Power Factor Correction





Typical Rectified Mains Power

P_n = 15 kW

at V_n = 400 V 3~; f_T = 15 kHz; T_C = 80°C

Transistor T

Symbol	Conditions	Maximum Ratings	
V_{CES}	T_{VJ} = 25°C to 150°C	1200	V
V_{GES}		± 20	V
I_{C25} I_{C80}	T_C = 25°C T_C = 80°C	95 65	A A
I_{CM} V_{CEK}	V_{GE} = ±15 V; R_G = 22 Ω; T_{VJ} = 125°C RBSOA; L = 100 µH	100 V_{CES}	A
t_{SC} (SCSOA)	V_{CE} = V_{CES}; V_{GE} = ±15 V; R_G = 22 Ω; T_{VJ} = 125°C non-repetitive	10	µs

Symbol	Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{CE(sat)}$	I_C = 20 A; V_{GE} = 15 V; T_{VJ} = 25°C T_{VJ} = 125°C		1.7 1.9	2.0	V V
$V_{GE(th)}$	I_C = 2 mA; V_{GE} = V_{CE}	4.5		6.5	V
I_{CES}	V_{CE} = V_{CES}; V_{GE} = 0 V; T_{VJ} = 25°C T_{VJ} = 125°C		 1.8	1.6	mA mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ± 20 V			400	nA
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	Inductive load, T_{VJ} = 125°C V_{CE} = 600 V; I_C = 20 A V_{GE} = ±15 V; R_G = 22 Ω		100 70 500 70 3.0 2.2		ns ns ns ns mJ mJ
C_{ies} Q_{Gon}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz V_{CE} = 600 V; V_{GE} = 15 V; I_C = 50 A		3.3 240		nF nC
R_{thJC} R_{thJH}	with heatsink transfer paste		 0.6	0.3	K/W K/W

Features

- NPT IGBT with low saturation voltage
- fast recovery epitaxial diodes (FRED)
- module package:
  - high level of integration
  - solder terminals for PCB mounting
  - isolated DCB ceramic base plate
  - large creepage and strike distances

Applications

Three phase rectifier with power factor correction, set up as follows:

- input from three phase mains
  - wide range of input voltage
  - mains currents approximately sinusoidal in phase with mains voltage
  - topology permits to control overcurrent such as in case of input voltage peaks
- output
  - direct current link
  - buck type converter - reduced output voltage
  - possibility to supply boost converter, inverter etc.
- required components
  - one power semiconductor module per phase
  - one inductor and one capacitor per phase on mains side
  - output inductor, depending on supplied circuit

IXYS Semiconductor GmbH
Edisonstr. 15 D-68623 Lampertheim
IXYS Corporation
3540 Bassett Street, Santa Clara, CA 95054

Diodes D1 - D4

Symbol	Conditions	Maximum Ratings	
V_{RRM}	T_{VJ} = 25°C to 150°C	1200	V
I_{F25}	T_C = 25°C	40	A
I_{F80}	T_C = 80°C	25	A

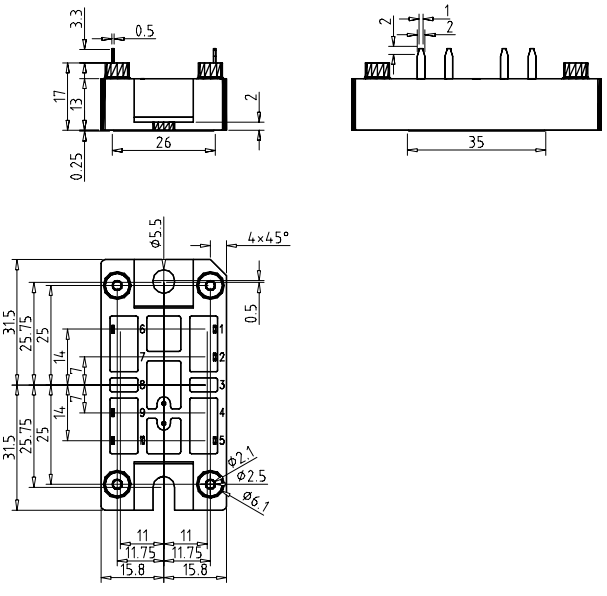
Symbol	Conditions	Characteristic Values min.	typ.	max.	
V_F	I_F = 20 A; T_{VJ} = 25°C		2.2	2.4	V
	T_{VJ} = 125°C		1.9		V
I_R	$V_R = V_{RRM}$; T_{VJ} = 25°C			0.75	mA
	$V_R = 0.8V_{RRM}$; T_{VJ} = 125°C		2		mA
I_{RM}	I_F = 30A; di_F/dt = -250 A/µs; T_{VJ} = 125°C		16		A
t_{rr}	V_R = 540 V		400		ns
R_{thJC}				1.3	K/W
R_{thJH}	with heat transfer paste		2.6		K/W

Module

Symbol	Conditions	Maximum Ratings	
T_{VJ}		-40...+150	°C
T_{stg}		-40...+125	°C
V_{ISOL}	$I_{ISOL} \le$ 1 mA; 50/60 Hz; t = 1 min	3600	V~
M_d	Mounting torque (M5)	2 - 2.5	Nm

Symbol	Conditions (T_{VJ} = 25°C, unless otherwise specified)	Characteristic Values min.	typ.	max.	
d_A, d_S		5			mm
Weight			35		g

Dimensions in mm (1 mm = 0.0394")



106

IXYS Semiconductor GmbH
Edisonstr. 15 D-68623 Lampertheim

IXYS Corporation
3540 Bassett Street, Santa Clara, CA 95054