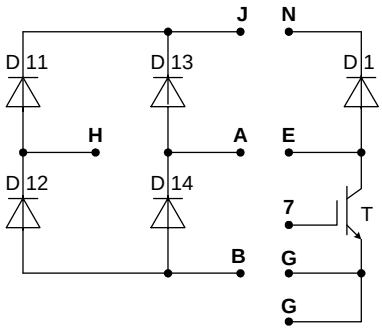
Rectifier Module for Power Factor Correction

Fast Single Phase Rectifier
Ultra Fast Boost Chopper

V_{RRM} = 1200 V
I_{FAV25} = 15 A

V_{CES} = 600 V
I_{C25} = 37 A



Typical Rectified Mains Power

P_n = 900 W at V_n = 110 V

P_n = 2100 W at V_n = 240 V

at V_{DC} = 400 V, f_T = 75 kHz, T_C = 80°C

Input Rectifier Bridge D11 - D14

Symbol	Conditions	Maximum Ratings	
V_{RRM}		1200	V
I_{FAV25}	T_C = 25°C; sine 180°	15	A
I_{FAV80}	T_C = 80°C; sine 180°	10	A
I_{FSM}	T_{VJ} = 25°C; t = 10 ms sine 50 Hz	75	A

Symbol	Conditions		Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = 10 A	T_{VJ} = 25°C		1.4	1.8	V
		T_{VJ} = 125°C		1.6		V
I_R	$V_R = V_{RRM}$	T_{VJ} = 25°C			0.05	mA
		T_{VJ} = 125°C		0.5		mA
t_{rr}	V_R = 100 V; I_F = 10 A; -di/dt = 5 A/µs			1		µs
R_{thJC}	(per diode)				2.5	K/W
R_{thJS}	with heat transfer paste			tbd		K/W

Application

- single phase rectification with power factor correction (PFC)
- low harmonic content of mains current
- mains current and voltage in phase
- wide input voltage range, controlled output voltage

Features

- high level of integration - only one power semiconductor module required for the whole PFC rectifier
- standard PFC control ICs useable
- fast rectifier diodes for enhanced EMC behaviour
- NPT IGBT with low saturation voltage, ultra fast switching capability, high RBSOA and short circuit ruggedness
- internally **series connected** HiPerFRED™ free wheeling diode for fast and soft reverse recovery at high switching frequency
- package with insulated DCB base and soldering pins for PCB mounting

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Chopper T

Symbol	Conditions	Maximum Ratings	
V_{CES}	T_{VJ} = 25°C to 150°C	600	V
V_{GES}	Continous	±20	V
I_{C25}	T_C = 25°C	37	A
I_{C80}	T_C = 80°C	25	A
RBSOA	V_{CE} = 600 V; R_G = 10 Ω; T_{VJ} = 125°C Clamped inductive load; L = 100 µH	I_{CM} = 100 $V_{CEK} \le V_{CES}$	A
t_{SC}	V_{CE} = 600 V; V_{GE} = ±15 V; R_G = 10 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 = 10 A; V_{GE} = 15 V ; T_{VJ} = 25°C		1.5	1.8	V
	T_{VJ} = 125°C		1.6		V
$V_{GE(th)}$	I_C = 1 mA; V_{GE} = V_{CE}	3		5	V
I_{CES}	V_{CE} = V_{CES}; V_{GE} = 0 V; T_{VJ} = 25°C			0.04	mA
	T_{VJ} = 125°C		1		mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ±20 V			100	nA
$t_{d(on)}$	Inductive load, T_{VJ} = 125°C V_{CE} = 400 V; I_C = 10 A V_{GE} = ±15 V; R_G = 10 Ω		30		ns
t_r			50		ns
$t_{d(off)}$			320		ns
t_f			70		ns
E_{on}			0.60		mJ
E_{off}			0.31		mJ
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz		1600		pF
Q_{Gon}	V_{CE} = 480 V; V_{GE} = 15 V; I_C = 10 A		140		nC
R_{thJC}				0.96	K/W
R_{thJS}	with heat transfer paste		tbd		K/W

Chopper D1

Symbol	Conditions	Maximum Ratings	
V_{RRM}	T_{VJ} = 25°C to 150°C	600	V
I_{F25}	T_C = 25°C	35	A
I_{F80}	T_C = 80°C	22	A

Symbol	Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = 10 A; T_{VJ} = 25°C		2.2	3.2	V
	T_{VJ} = 125°C			2.4	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 = 10 A; di_F/dt = -400 A/µs; T_{VJ} = 125°C		tbd		A
t_{rr}	V_R = 400 V		tbd		ns
R_{thJC}				1.15	K/W
R_{thJS}	with heat transfer paste		tbd		K/W

Module

Symbol	Conditions	Maximum Ratings	
T_{VJ}		-40...+150	°C
T_{stg}		-40...+125	°C
V_{ISOL}	$I_{ISOL} \leq 1$ mA; 50/60 Hz; t = 1 min	3000	V~
M_d	Mounting torque (M4)	1.5 - 2.0	Nm

Symbol	Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified)		
		min.	typ.	max.
d_S	Creepage distance on surface	tbd		mm
d_A	Strike distance through air	tbd		mm
Weight	typ.		18	g

Dimensions in mm (1 mm = 0.0394")