

Rectifier Module for Three Phase Power Factor Correction

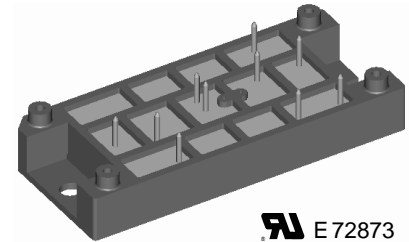
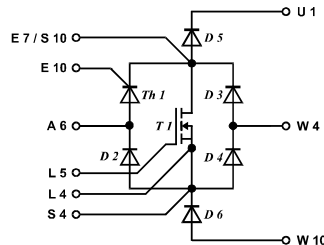
$$V_{DSS} = 500 \text{ V}$$

$$I_{D25} = 130 \text{ A}$$

$$R_{DS(on)} = 36 \text{ m}\Omega$$

Preliminary data

V_{RRM} (FAST Diode) V	$V_{RRM, DRM}$ (Diode, Thyr.) V	V_{DSS} (MOSFET) V	Type
600	500	500	VUM 85-05A



Symbol	Conditions	Maximum Ratings	
MOSFET T 1			
V_{DSS}	$T_{VJ} = 25^\circ\text{C}$ to 150°C	500	V
V_{DGR}	$T_{VJ} = 25^\circ\text{C}$ to 150°C ; $R_G = 1 \text{ M}\Omega$	500	V
V_{GSM}	Transient	± 30	V
V_{GS}	Continuous	± 20	V
I_D	$T_C = 100^\circ\text{C}$, $T_{VJ} = 125^\circ\text{C}$	60	A
I_{D25}	$T_C = 25^\circ\text{C}$, $T_{VJ} = 150^\circ\text{C}$	130	A
I_{DM}	$T_C = 25^\circ\text{C}$, $T_{VJ} = 150^\circ\text{C}$	520	A
E_{AR}	$T_C = 25^\circ\text{C}$	60	mJ
P_{tot}	$T_C = 25^\circ\text{C}$	1380	W
Single Phase Bridge Th1, D2, D3, D4			
V_{RRM}, V_{DRM}		500	V
I_{DAV}	$T_{VJ} = 150^\circ\text{C}$, $T_C = 100^\circ\text{C}$	47	A
I_{FSM}, I_{TSM}	$T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$ (50 Hz)	320	A
	$t = 8.3 \text{ ms}$ (60 Hz)	340	A
	$T_{VJ} = 150^\circ\text{C}$, $t = 10 \text{ ms}$ (50 Hz)	280	A
	$t = 8.3 \text{ ms}$ (60 Hz)	300	A
P_{tot}	$T_C = 25^\circ\text{C}$; per diode	90	W
Fast Diodes D5, D6			
V_{RRM}		600	V
I_{FAV}	$T_{VJ} = 150^\circ\text{C}$, $T_C = 100^\circ\text{C}$, rectangular $\delta = 0.5$	31	A
I_{FSM}	$T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$ (50 Hz)	250	A
P_{tot}	$T_C = 25^\circ\text{C}$	95	W
Module			
T_{VJ}		-40...+150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-40...+125	$^\circ\text{C}$
V_{ISOL}	$I_{ISOL} \leq 1 \text{ mA}$	50/60 Hz	3600 V~
M_d	Mounting torque (M5)		2-2.5/18-22 Nm/lb.in.
Weight		80	g

Features

- Package with DCB ceramic base plate
- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Low $R_{DS(on)}$ HDMOS™ process
- Low package inductance for high speed switching
- Ultrafast diodes
- Kelvin source for easy drive
- UL recognized

Applications

- Three phase PFC by Kolar circuit
- Three phase input rectifier with power factor correction consisting of three modules VUM 85-05
- For power supplies, UPS, SMPS, drives, welding etc.

Advantages

- Reduced harmonic content of input currents corresponding to standards
- Rectifier generates maximum DC power with a given AC fuse
- Wide input voltage range
- No external isolation
- Easy to mount with two screws
- Suitable for wave soldering
- High temperature and power cycling capability

Symbol	Conditions	Characteristic Values			
		(T _{VJ} = 25°C, unless otherwise specified)			
		min.	typ.	max.	
MOSFET T 1					
V _{GS(th)}	V _{DS} = ±20 V, I _D = 30 mA	2	3	4 V	
I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±1.5 μA	
I _{DSS}	V _{DS} = V _{DSS} , V _{GS} = 0 V V _{DS} = 0,8•V _{DSS} , V _{GS} = 0 V, T _{VJ} = 125°C		0.5 1	1.4 7 mA	
R _{DS(on)}	I _D = ½ I _{D25} , V _{GS} = 10 V, pulse test t ≤ 300 μs, d ≤ 2%			36 mΩ	
g _{fs}	V _{DS} = 10 V, I _D = ½ I _{D25} , t = < 300 μs	75	145	S	
t _{d(on)} t _r t _{d(off)} t _f	V _{DS} = ½ V _{DSS} , I _D = ½ I _{D25} , V _{GS} = 15 V R _G = 1 Ω, L = 100 μH, T _{VJ} = 125°C		16 33 65 30	25 45 80 40 ns	
C _{iss} C _{oss} C _{rss}		V _{DS} = 25 V, f = 1 MHz, V _{GS} = 0 V	30 3 1	nF nF nF	
Q _g Q _{gs} Q _g			V _{DS} = ½ V _{DSS} , I _D = ½ I _{D25} , V _{GS} = 15 V	945 195 435	1120 280 595 nC
R _{thJC} R _{thCH}				0.05	0.09 K/W
Single Phase Bridge Th1, D2, D3, D4					
V _F , V _T	I _F , I _T = 45 A, T _{VJ} = 25°C T _{VJ} = 125°C			1.50 V 1.55 V	
I _{RRM} , I _{DRM}	V _D , V _R = V _{DRM} , V _{RRM} , T _{VJ} = 25°C V _D , V _R = 0,8•V _{DRM} , V _{RRM} , T _{VJ} = 125°C		0.5 1	1.4 7 mA	
V _{T0} r _T	For power-loss calculations only T _{VJ} = 150°C			0.85 V 14 mΩ	
V _{GT} I _{GT}	V _D = 6 V			1.5 V 100 mA	
V _{GD} I _{GD}	V _D = 2/3 V _{DRM} , T _{VJ} = 150°C			0.2 V 5 mA	
V _{RGM}				10 V	
I _H	V _D = 6 V, R _{GK} = ∞			200 mA	
I _L	I _G = 0.45 A, di _G /dt = 0.45 A/μs, t _p = 10 μs			450 mA	
(di/dt) _{cr}	I _G = 0.45 A, di _G /dt = 0.45 A/μs, t _p = 200 μs, f = 50 Hz V _D = 2/3 V _{DRM} , T _{VJ} = 150°C, I _T = 45 A, repetitive			150 A/μs	
	I _G = 0.45 A, di _G /dt = 0.45 A/μs, t _p = 200 μs, f = 50 Hz V _D = 2/3 V _{DRM} , T _{VJ} = 150°C, I _T = I _{d(AV)} , non-repetitive			500 A/μs	
t _{gd}	I _G = 0.45 A, di _G /dt = 0.45 A/μs, V _D = ½ V _{DRM}			2 μs	
t _q	I _T = 20 A, di/dt = -10 A/μs, V _R = 100 V, V _D = 2/3 V _{DRM} t _p = 200 μs, dv/dt = 15 V/μs, T _{VJ} = 150°C	150		μs	
P _{GM}	I _T = I _{d(AV)} , T _{VJ} = 150°C	t _p = 30 μs		10 W	
		t _p = 300 μs		5 W	
P _{GAVM}				0,5 W	
R _{thJC} R _{thCH}	DC per diode / thyristor			1.3 K/W	
	DC per diode / thyristor	0.4		K/W	

Symbol	Conditions	Characteristic Values		
		(T _{VJ} = 25°C, unless otherwise specified)		
		min.	typ.	max.
Fast Diodes D 5, D 6				
V _F	I _F = 30 A; T _{VJ} = 25°C T _{VJ} = 125°C			2.70 V 1.85 V
I _R	V _R = 600 V, T _{VJ} = 25°C T _{VJ} = 125°C			0.5 mA 1 mA
V _{T0}	For power-loss calculations only			1.23 V
r _T	T _{VJ} = 150°C			9.8 mΩ
I _{RM}	I _F = 50 A; di/dt = 100 A/μs V _R = 100 V, T _{VJ} = 100°C		3	3.5 A
t _{rr}	I _F = 1 A, V _R = 30 V, di/dt = 200 A/μs		25	30 ns
R _{thJC}	DC per diode			1.3 K/W
R _{thCH}	DC per diode	0.4		K/W

Dimensions in mm (1 mm = 0.0394")

