IXYS

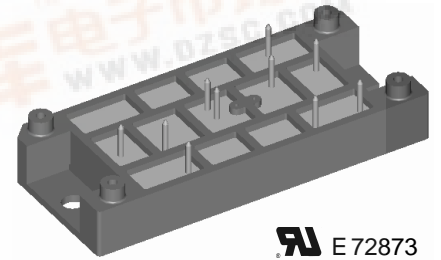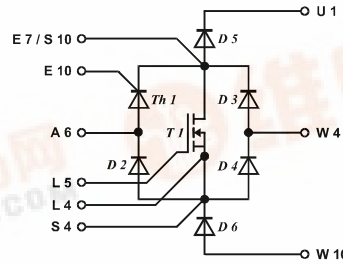**VUM 85-05A**

Rectifier Module
for Three Phase Power Factor Correction

V_{DSS} = 500 V
I_{D25} = 130 A
$R_{DS(on)}$ = 36 mΩ

Preliminary data

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

U 1
E 7 / S 10
E 10
Th 1   D 5   D 3
A 6   T 1   W 4
D 2   D 4
L 5
L 4
S 4   D 6
W 10

UL E 72873

Symbol	Conditions	Maximum Ratings	
MOSFET T 1			
V_{DSS}	T_{VJ} = 25°C to 150°C	500	V
V_{DGR}	T_{VJ} = 25°C to 150°C; R_G = 1 MΩ	500	V
V_{GSM}	Transient	±30	V
V_{GS}	Continuous	±20	V
I_D	T_C = 100°C, T_{VJ} = 125°C	60	A
I_{D25}	T_C = 25°C, T_{VJ} = 150°C	130	A
I_{DM}	T_C = 25°C, T_{VJ} = 150°C	520	A
E_{AR}	T_C = 25°C	60	mJ
P_{tot}	T_C = 25°C	1380	W
Single Phase Bridge Th1, D2, D3, D4			
V_{RRM},V_{DRM}		500	V
I_{DAV}	T_{VJ} = 150°C, T_C = 100°C	47	A
I_{FSM}, I_{TSM}	T_{VJ} = 45°C, t = 10 ms (50 Hz)	320	A
	t = 8.3 ms (60 Hz)	340	A
	T_{VJ} = 150°C, t = 10 ms (50 Hz)	280	A
	t = 8.3 ms (60 Hz)	300	A
P_{tot}	T_C = 25°C; per diode	90	W
Fast Diodes D5, D6			
V_{RRM}		600	V
I_{FAV}	T_{VJ} = 150°C, T_C = 100°C, rectangular δ = 0.5	31	A
I_{FSM}	T_{VJ} = 45°C, t = 10 ms (50 Hz)	250	A
P_{tot}	T_C = 25°C	95	W
Module			
T_{VJ}		-40...+150	°C
T_{JM}		150	°C
T_{stg}		-40...+125	°C
V_{ISOL}	I_{ISOL} ≤ 1 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	min.	typ.	max.	
		Characteristic Values (T_{VJ} = 25°C, unless otherwise specified)			
MOSFET T 1					
$V_{GS(th)}$	$V_{DS} = \pm 20$ V, $I_D = 30$ mA	2	3	4	V
I_{GSS}	$V_{GS} = \pm 20$ V, $V_{DS} = 0$ V			±1.5	µA
I_{DSS}	$V_{DS} = V_{DSS}$, $V_{GS} = 0$ V $V_{DS} = 0{,}8 \cdot V_{DSS}$, $V_{GS} = 0$ V, $T_{VJ} = 125$°C		0.5 1	1.4 7	mA mA
$R_{DS(on)}$	$I_D = \frac{1}{2} I_{D25}$, $V_{GS} = 10$ V, pulse test t ≤ 300 µs, d ≤ 2%			36	mΩ
g_{fs}	$V_{DS} = 10$ V, $I_D = \frac{1}{2} I_{D25}$, t = < 300 µs	75	145		S
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	$V_{DS} = \frac{1}{2} V_{DSS}$, $I_D = \frac{1}{2} I_{D25}$, $V_{GS} = 15$ V $R_G = 1$ Ω, L = 100 µH, $T_{VJ} = 125$°C		16 33 65 30	25 45 80 40	ns ns ns 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	$V_{DS} = \frac{1}{2} V_{DSS}$, $I_D = \frac{1}{2} I_{D25}$, $V_{GS} = 15$ V		945 195 435	1120 280 595	nC nC nC
R_{thJC} R_{thCH}			 0.05	0.09	K/W 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 1.55	V V
I_{RRM}, I_{DRM}	V_D, $V_R = V_{DRM}$, V_{RRM}, $T_{VJ} = 25$°C V_D, $V_R = 0{,}8 \cdot V_{DRM}$, V_{RRM}, $T_{VJ} = 125$°C		0.5 1	1.4 7	mA mA
V_{T0} r_T	For power-loss calculations only $T_{VJ} = 150$°C			0.85 14	V mΩ
V_{GT} I_{GT}	$V_D = 6$ V			1.5 100	V mA
V_{GD} I_{GD}	$V_D = \frac{2}{3} V_{DRM}$, $T_{VJ} = 150$°C			0.2 5	V mA
V_{RGM}				10	V
I_H	$V_D = 6$ V, $R_{GK} = \infty$			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 = 50Hz $V_D = \frac{2}{3} V_{DRM}$, $T_{VJ} = 150$°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 = 50Hz $V_D = \frac{2}{3} V_{DRM}$, $T_{VJ} = 150$°C, $I_T = I_{DAV}$, non-repetitive			500	A/µs
t_{gd}	$I_G = 0.45$ A, $di_G/dt = 0.45$ A/µs, $V_D = \frac{1}{2} V_{DRM}$			2	µs
t_q	$I_T = 20$ A, di/dt = -10 A/µs, $V_R = 100$ V, $V_D = \frac{2}{3} V_{DRM}$ $t_p = 200$ 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 $t_p = 300$ µs			10 5	W W
P_{GAVM}				0,5	W
R_{thJC} R_{thCH}	DC per diode / thyristor DC per diode / thyristor		 0.4	1.3	K/W K/W

Symbol **Conditions** **Characteristic Values**
(T_{VJ} = 25°C, unless otherwise specified)

Symbol	Conditions	min.	typ.	max.	
Fast Diodes D 5, D 6					
V_F	I_F = 30 A; T_{VJ} = 25°C			2.70	V
	T_{VJ} = 125°C			1.85	V
I_R	V_R = 600 V, T_{VJ} = 25°C			0.5	mA
	T_{VJ} = 125°C			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")