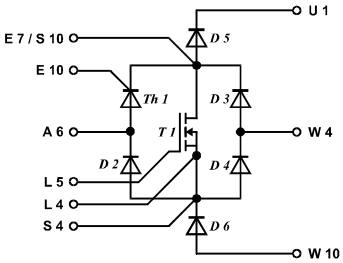
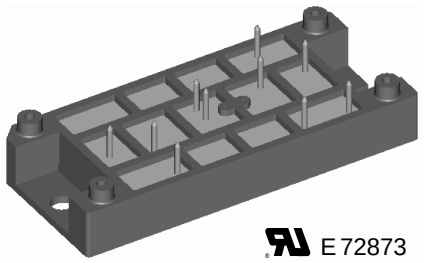
# Rectifier Module
## for Three Phase Power Factor Correction

$V_{DSS}$ = 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 |




| 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 | 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 | | 0.5 | 1.4 | mA |
| | $V_{DS}$ = 0,8•$V_{DSS}$, $V_{GS}$ = 0 V, $T_{VJ}$ = 125°C | | 1 | 7 | mA |
| $R_{DS(on)}$ | $I_D$ = ½ $I_{D25}$, $V_{GS}$ = 10 V, pulse test<br>t ≤ 300 µs, d ≤ 2% | | | 36 | mΩ |
| $g_{fs}$ | $V_{DS}$ = 10 V, $I_D$ = ½ $I_{D25}$, t = < 300 µs | 75 | 145 | | S |
| $t_{d(on)}$ | $V_{DS}$ = ½ $V_{DSS}$, $I_D$ = ½ $I_{D25}$, $V_{GS}$ = 15 V<br>$R_G$ = 1 Ω, L = 100 µH, $T_{VJ}$ = 125°C | | 16 | 25 | ns |
| $t_r$ | | | 33 | 45 | ns |
| $t_{d(off)}$ | | | 65 | 80 | ns |
| $t_f$ | | | 30 | 40 | ns |
| $C_{iss}$ | $V_{DS}$ = 25 V, f = 1 MHz, $V_{GS}$ = 0 V | | 30 | | nF |
| $C_{oss}$ | | | 3 | | nF |
| $C_{rss}$ | | | 1 | | nF |
| $Q_g$ | $V_{DS}$ = ½ $V_{DSS}$, $I_D$ = ½ $I_{D25}$, $V_{GS}$ = 15 V | | 945 | 1120 | nC |
| $Q_{gs}$ | | | 195 | 280 | nC |
| $Q_g$ | | | 435 | 595 | nC |
| $R_{thJC}$ | | | | 0.09 | K/W |
| $R_{thCH}$ | | | 0.05 | | K/W |
| | **Single Phase Bridge Th1, D2, D3, D4** | | | | |
| $V_F$, $V_T$ | $I_F$, $I_T$ = 45 A, $T_{VJ}$ = 25°C | | | 1.50 | V |
| | $T_{VJ}$ = 125°C | | | 1.55 | V |
| $I_{RRM}$, $I_{DRM}$ | $V_D$, $V_R$ = $V_{DRM}$, $V_{RRM}$, $T_{VJ}$ = 25°C | | 0.5 | 1.4 | mA |
| | $V_D$, $V_R$ = 0,8•$V_{DRM}$, $V_{RRM}$, $T_{VJ}$ = 125°C | | 1 | 7 | mA |
| $V_{T0}$ | For power-loss calculations only | | | 0.85 | V |
| $r_T$ | $T_{VJ}$ = 150°C | | | 14 | mΩ |
| $V_{GT}$ | $V_D$ = 6 V | | | 1.5 | V |
| $I_{GT}$ | | | | 100 | mA |
| $V_{GD}$ | $V_D$ = $^2/_3$ $V_{DRM}$, $T_{VJ}$ = 150°C | | | 0.2 | V |
| $I_{GD}$ | | | | 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 |
| $(di/dt)_{cr}$ | $I_G$ = 0.45A, $di_G/dt$ = 0.45A/µs, $t_p$ = 200µs, f = 50Hz<br>$V_D$ = $^2/_3V_{DRM}$, $T_{VJ}$ = 150°C, $I_T$ = 45 A, repetitive | | | 150 | A/µs |
| | $I_G$ = 0.45A, $di_G/dt$ = 0.45A/µs, $t_p$ = 200µs, f = 50Hz<br>$V_D$ = $^2/_3V_{DRM}$, $T_{VJ}$ = 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, $V_D$ = ½ $V_{DRM}$ | | | 2 | µs |
| $t_q$ | $I_T$ = 20 A, di/dt = -10 A/µs, $V_R$ = 100 V, $V_D$ = $^2/_3V_{DRM}$<br>$t_p$ = 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 |
| $R_{thJC}$ | DC per diode / thyristor | | | 1.3 | K/W |
| $R_{thCH}$ | 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 | | | 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")**