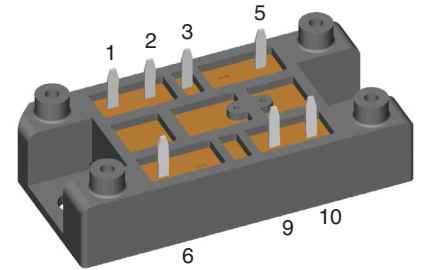
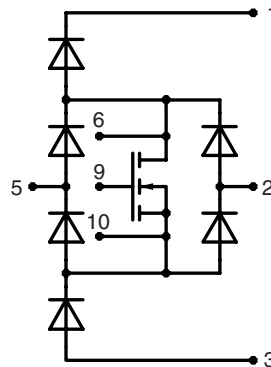


# Rectifier Module for Three Phase Power Factor Correction

Using fast recovery epitaxial diodes and MOSFET

$V_{DSS} = 500\text{ V}$   
 $I_{D25} = 35\text{ A}$   
 $R_{DS(on)} = 0.12\ \Omega$

$V_{RRM}$ (Diode)	$V_{DSS}$	Type
V	V	
<b>600</b>	<b>500</b>	<b>VUM 25-05E</b>



Symbol	Conditions	Maximum Ratings		
$V_{DSS}$	$T_{VJ} = 25^\circ\text{C to } 150^\circ\text{C}$	500	V	
$V_{DGR}$	$T_{VJ} = 25^\circ\text{C to } 150^\circ\text{C}; R_{GS} = 10\text{ k}\Omega$	500	V	
$V_{GS}$	Continuous	$\pm 20$	V	
$I_D$	<b>MOSFET</b> $T_S = 85^\circ\text{C}$	24	A	
$I_D$		$T_S = 25^\circ\text{C}$	35	A
$I_{DM}$		$T_S = 25^\circ\text{C}, t_p = \textcircled{1}$	95	A
$P_D$	$T_S = 85^\circ\text{C}$	170	W	
$I_S$	$V_{GS} = 0\text{ V}, T_S = 25^\circ\text{C}$	24	A	
$I_{SM}$	$V_{GS} = 0\text{ V}, T_S = 25^\circ\text{C}, t_p = \textcircled{1}$	95	A	
$V_{RRM}$	<b>Diodes</b> $T_S = 85^\circ\text{C}, \text{rectangular } \delta = 0.5$	600	V	
$I_{dAV}$		40	A	
$I_{FSM}$	$T_{VJ} = 45^\circ\text{C}, t = 10\text{ ms (50 Hz)}$ $t = 8.3\text{ ms (60 Hz)}$	300	A	
		320	A	
	$T_{VJ} = 150^\circ\text{C}, t = 10\text{ ms (50 Hz)}$ $t = 8.3\text{ ms (60 Hz)}$	260	A	
		280	A	
$P$	$T_S = 85^\circ\text{C}$	36	W	
$T_{VJ}$	<b>Module</b>	-40...+150	$^\circ\text{C}$	
$T_{JM}$		150	$^\circ\text{C}$	
$T_{stg}$		-40...+150	$^\circ\text{C}$	
$V_{ISOL}$	50/60 Hz	$t = 1\text{ min}$	3000	V~
	$I_{ISOL} \leq 1\text{ mA}$	$t = 1\text{ s}$	3600	V~
$M_d$ Weight	Mounting torque (M5)	2-2.5/18-22	Nm/lb.in.	
		35	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

### Applications

- Three phase input rectifier with power factor correction consisting of three modules VUM 25-05
- For power supplies, UPS, SMPS, drives, welding etc.

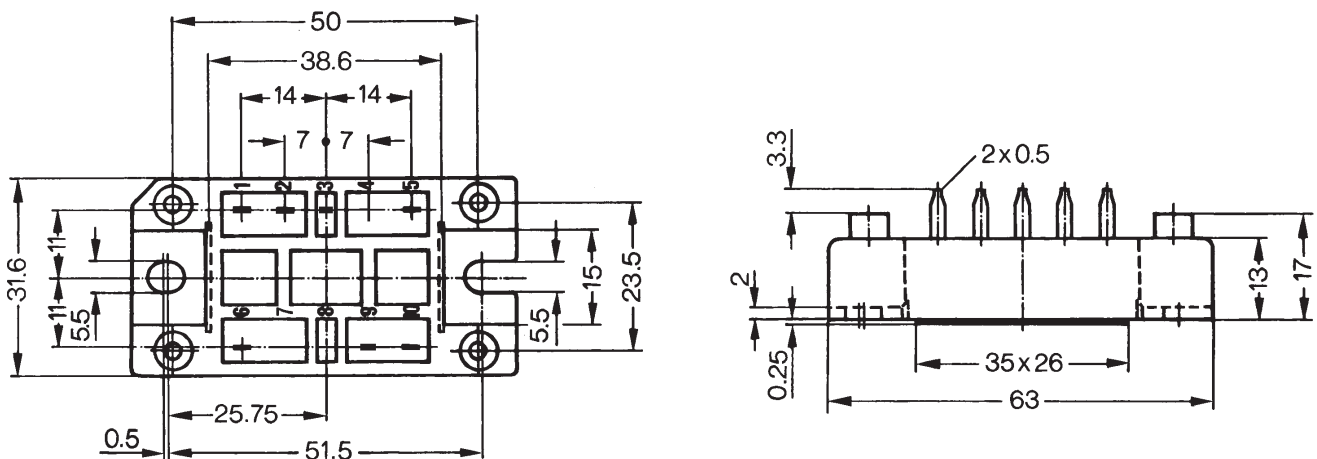
### Advantages

- 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

$\textcircled{1}$  Pulse width limited by  $T_{VJ}$

Symbol	Conditions	Characteristic Values ( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 2\text{ mA}$	500		V
$V_{GS(th)}$	$V_{DS} = 20\text{ V}, I_D = 20\text{ mA}$	2		V
$I_{GSS}$	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			$\pm 500\text{ nA}$
$I_{DSS}$	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$			2 mA
$R_{DS(on)}$	$T_{VJ} = 25^{\circ}\text{C}$			0.12 $\Omega$
$R_{Gint}$	$T_{VJ} = 25^{\circ}\text{C}$			1.5 $\Omega$
$g_{fs}$	$V_{DS} = 15\text{ V}, I_{DS} = 12\text{ A}$		30	S
$V_{DS}$	$I_{DS} = 24\text{ A}, V_{GS} = 0\text{ V}$			1.5 V
$t_{d(on)}$	$V_{DS} = 250\text{ V}, I_{DS} = 12\text{ A}, V_{GS} = 10\text{ V}$ $Z_{gen.} = 1\ \Omega, \text{ L-load}$			100 ns
$t_{d(off)}$				220 ns
$C_{iss}$	$V_{DS} = 25\text{ V}, f = 1\text{ MHz}, V_{GS} = 0\text{ V}$		8.5	nF
$C_{oss}$			0.9	nF
$C_{rss}$			0.3	nF
$Q_g$	$V_{DS} = 250\text{ V}, I_D = 12\text{ A}, V_{GS} = 10\text{ V}$		350	nC
$R_{thJH}$	with heat transfer paste			0.38 K/W
$V_F$	$I_F = 22\text{ A}, T_{VJ} = 25^{\circ}\text{C}$			1.65 V
	$T_{VJ} = 150^{\circ}\text{C}$			1.4 V
$I_R$	$V_R = 600\text{ V}, T_{VJ} = 25^{\circ}\text{C}$			1.5 mA
	$V_R = 480\text{ V}, T_{VJ} = 25^{\circ}\text{C}$			0.25 mA
	$T_{VJ} = 125^{\circ}\text{C}$			7 mA
$V_{T0}$	For power-loss calculations only			1.14 V
$r_T$	$T_{VJ} = 125^{\circ}\text{C}$			10 m $\Omega$
$I_{RM}$	$I_F = 30\text{ A}, -di_F/dt = 240\text{ A}/\mu\text{s}$		10	11 A
	$V_R = 350\text{ V}, T_{VJ} = 100^{\circ}\text{C}$			
$R_{thJH}$	with heat transfer paste			1.8 K/W

Dimensions in mm (1 mm = 0.0394")



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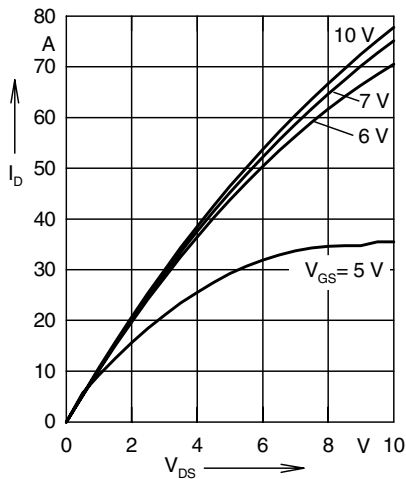


Fig. 1 Typ. output characteristic  $I_D = f(V_{DS})$  (MOSFET)

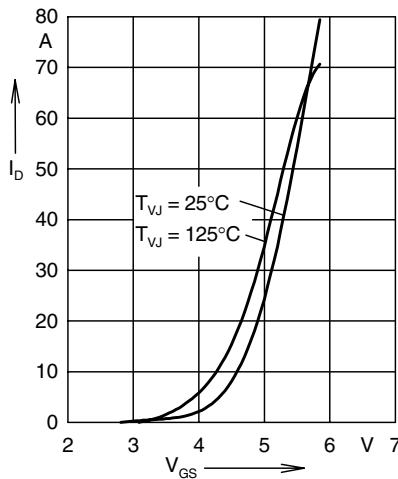


Fig. 2 Typ. transfer characteristics  $I_D = f(V_{GS})$  (MOSFET)

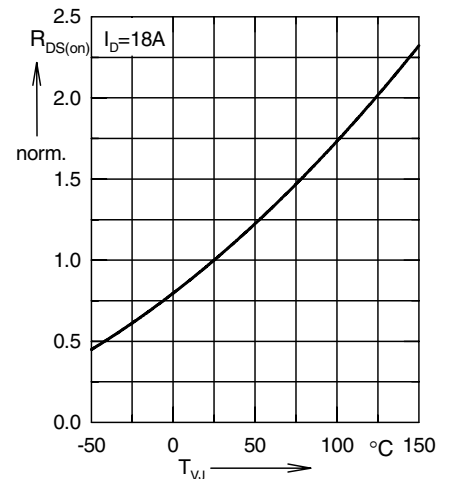


Fig. 3 Typ. normalized  $R_{DS(on)} = f(T_{VJ})$  (MOSFET)

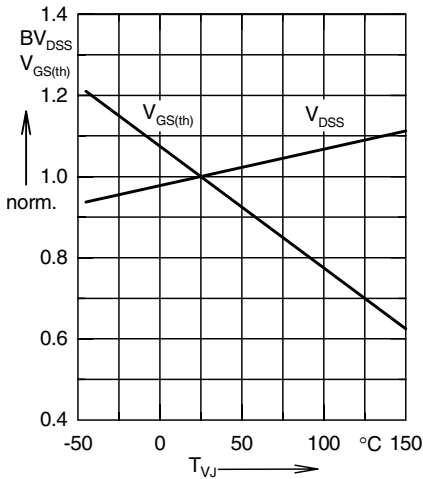


Fig. 4 Typ. normalized  $BV_{DS(sat)} = f(T_{VJ})$   
 $V_{GS(th)} = f(T_{VJ})$  (MOSFET)

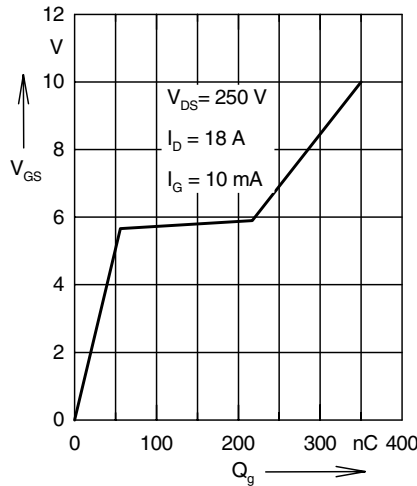


Fig. 5 Typ. turn-on gate charge characteristics,  $V_{GS} = f(Q_g)$  (MOSFET)

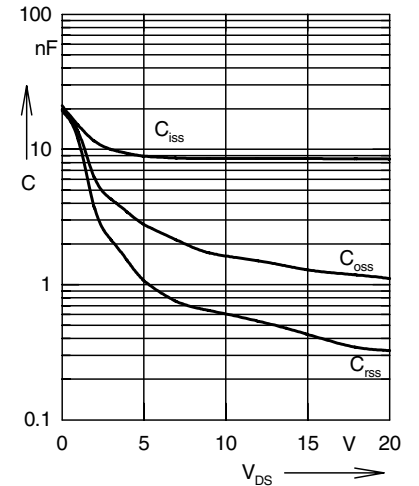


Fig. 6 Typ. capacitances  $C = f(V_{DS})$ ,  $f = 1$  MHz (MOSFET)

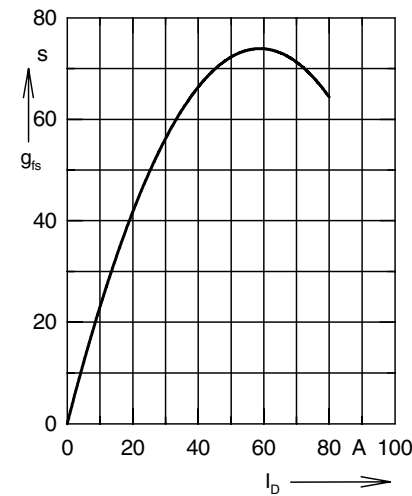


Fig. 7 Typ. transconductance,  $g_{fs} = f(I_D)$  (MOSFET)

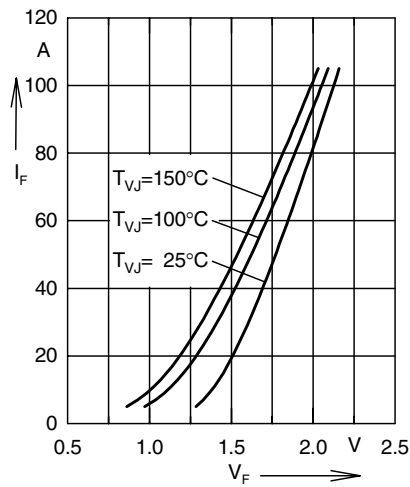


Fig. 8 Forward current versus voltage drop (Diodes)

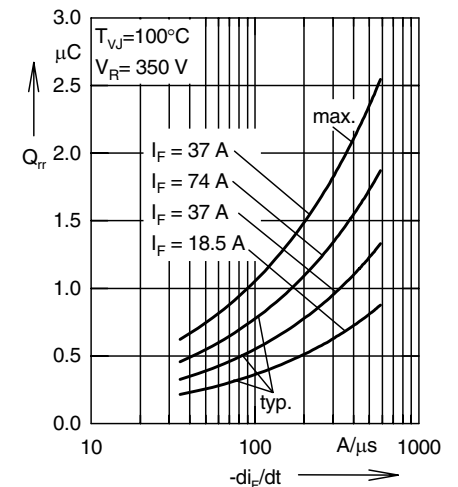


Fig. 9 Recovery charge versus  $-di_F/dt$  (Diodes)

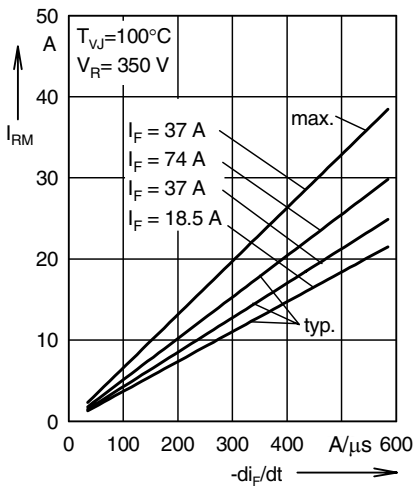


Fig. 10 Peak reverse current versus  $-di_F/dt$  (Diodes)

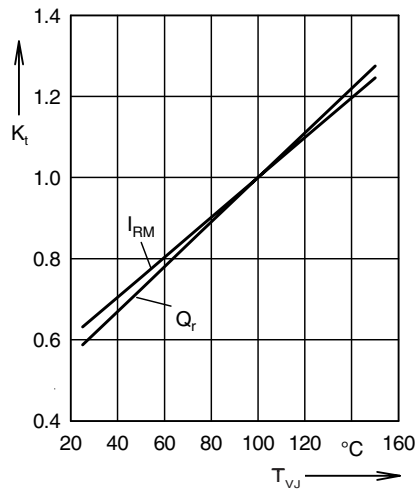


Fig. 11 Dynamic parameters versus junction temperature (Diodes)

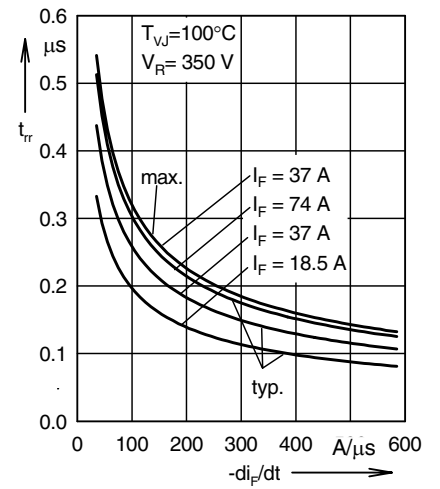


Fig. 12 Recovery time versus  $-di_F/dt$  (Diodes)

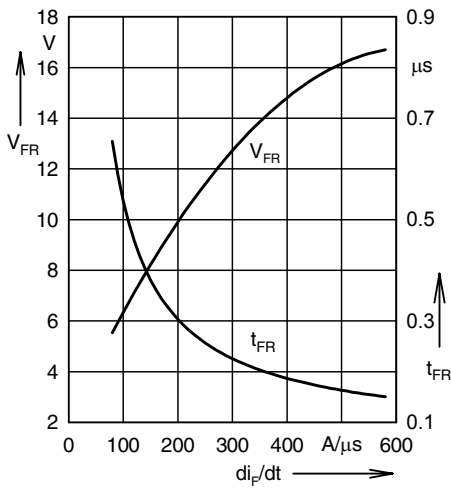


Fig. 13 Peak forward voltage versus  $-di_F/dt$  (Diodes)

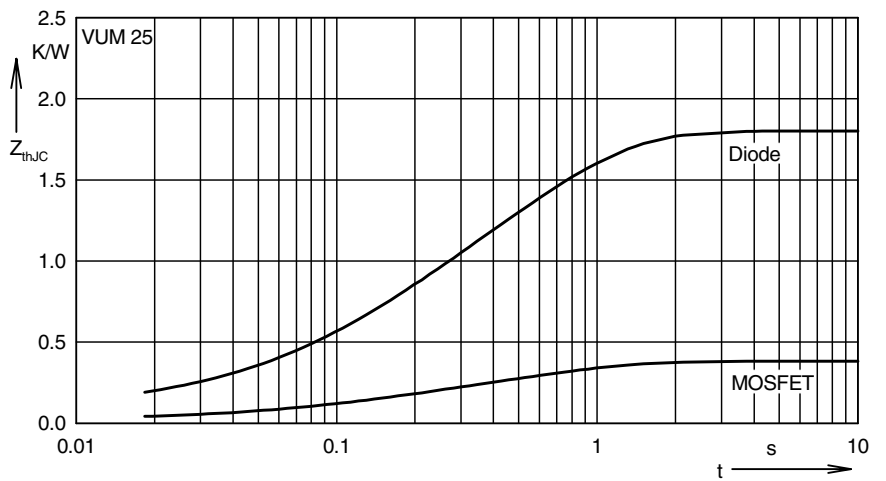


Fig. 14 Transient thermal impedance junction to case for all devices