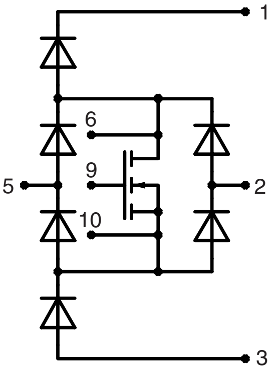
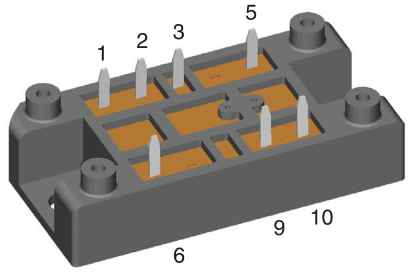
Rectifier Module
for Three Phase Power Factor Correction

Using fast recovery epitaxial diodes and MOSFET

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

$V_{RRM\,(Diode)}$	V_{DSS}	Type
V	V	
600	**500**	**VUM 25-05E**





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

① Pulse width limited by T_{VJ}

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

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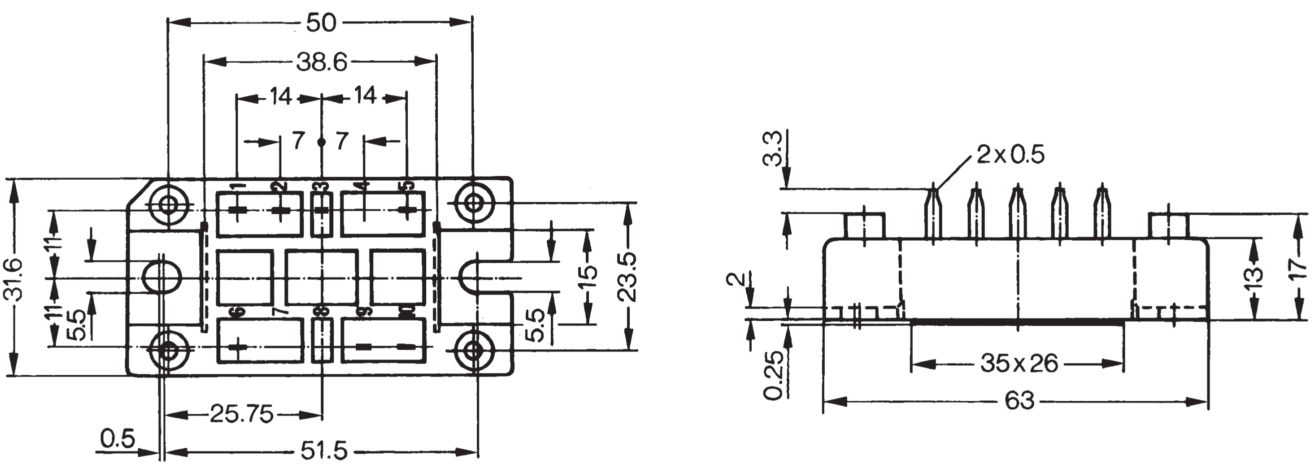
Symbol		Conditions	min.	typ.	max.	
		Characteristic Values (T_{VJ} = 25°C, unless otherwise specified)				
V_{DSS} $V_{GS(th)}$	MOSFET	V_{GS} = 0 V, I_D = 2 mA V_{DS} = 20 V, I_D = 20 mA	500 2		 5	V V
I_{GSS}	MOSFET	V_{GS} = ±20 V, V_{DS} = 0 V			±500	nA
I_{DSS}	MOSFET	V_{DS} = 500 V, V_{GS} = 0 V			2	mA
$R_{DS(on)}$ R_{Gint}	MOSFET	T_{VJ} = 25°C T_{VJ} = 25°C			0.12 1.5	Ω Ω
g_{fs} V_{DS}	MOSFET	V_{DS} = 15 V, I_{DS} = 12 A I_{DS} = 24 A, V_{GS} = 0 V		30	 1.5	S V
$t_{d(on)}$ $t_{d(off)}$	MOSFET	V_{DS} = 250 V, I_{DS} = 12 A, V_{GS} = 10 V Zgen. = 1 Ω, L-load			100 220	ns ns
C_{iss} C_{oss} C_{rss}	MOSFET	V_{DS} = 25 V, f = 1 MHz, V_{GS} = 0 V		8.5 0.9 0.3		nF nF nF
Q_g R_{thJH}	MOSFET	V_{DS} = 250 V, I_D = 12 A, V_{GS} = 10 V with heat transfer paste		350	 0.38	nC K/W
V_F	Diodes	I_F = 22 A, T_{VJ} = 25°C T_{VJ} = 150°C			1.65 1.4	V V
I_R	Diodes	V_R = 600 V, T_{VJ} = 25°C V_R = 480 V, T_{VJ} = 25°C T_{VJ} = 125°C			1.5 0.25 7	mA mA mA
V_{T0} r_T	Diodes	For power-loss calculations only T_{VJ} = 125°C			1.14 10	V mΩ
I_{RM}	Diodes	I_F = 30 A, $-di_F/dt$ = 240 A/µs V_R = 350 V, T_{VJ} = 100°C		10	11	A
R_{thJH}	Diodes	with heat transfer paste			1.8	K/W

Dimensions in mm (1 mm = 0.0394")



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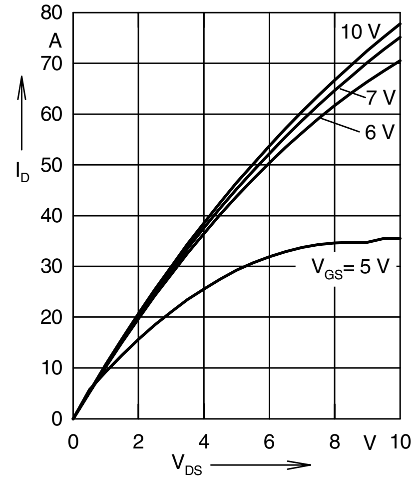

Fig. 1 Typ. output characteristic
$I_D = f (V_{DS})$ (MOSFET)

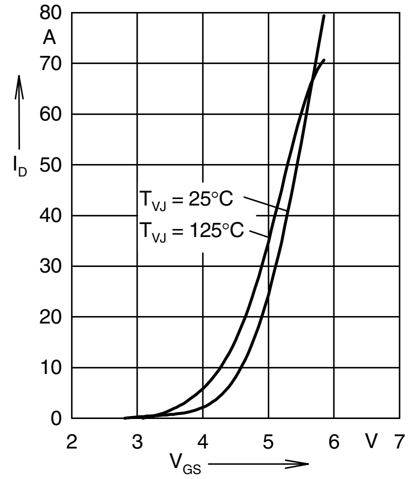

Fig. 2 Typ. transfer characteristics
$I_D = f (V_{GS})$ (MOSFET)

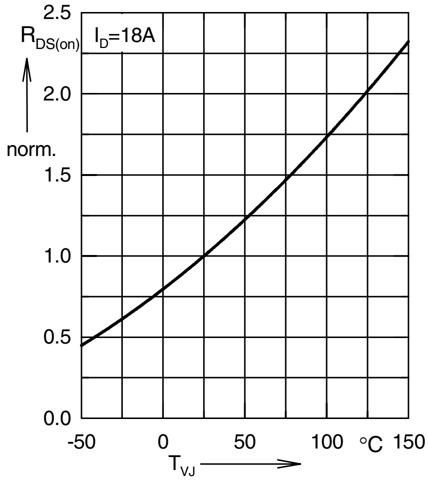

Fig. 3 Typ. normalized
$R_{DS(on)} = f (T_{VJ})$ (MOSFET)

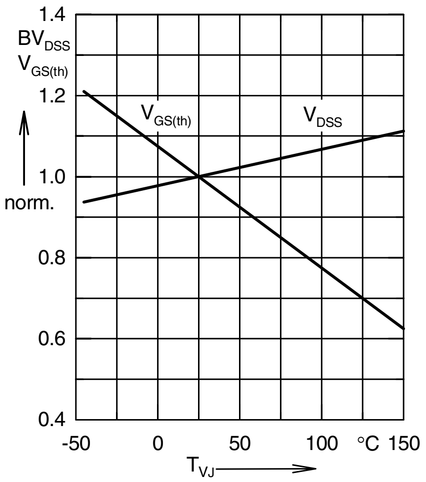

Fig. 4 Typ. normalized $BV_{DSS} = f (T_{VJ})$
$V_{GS(th)} = f (T_{VJ})$ (MOSFET)

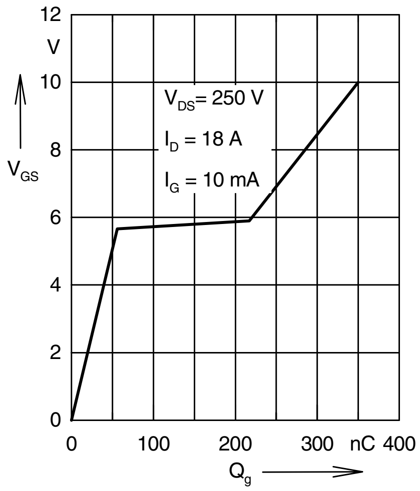

Fig. 5 Typ. turn-on gate charge
characteristics, $V_{GS} = f (Q_g)$ (MOSFET)

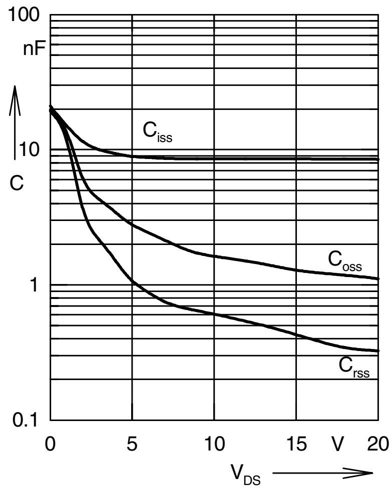

Fig. 6 Typ. capacitances $C = f (V_{DS})$,
f = 1 MHz (MOSFET)

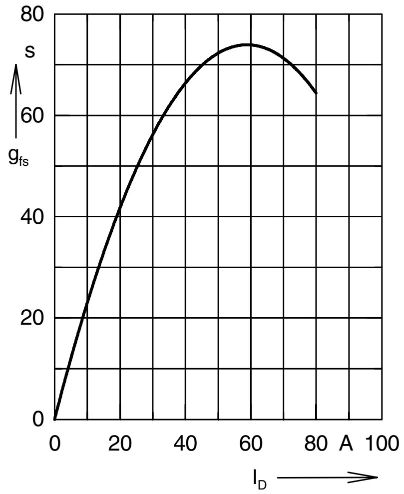

Fig. 7 Typ. transconductance,
$g_{fs} = f (I_D)$ (MOSFET)

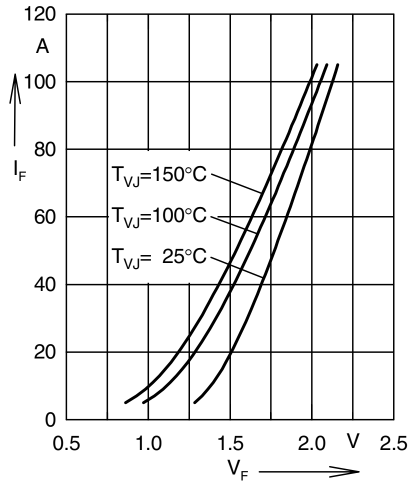

Fig. 8 Forward current versus
voltage drop (Diodes)

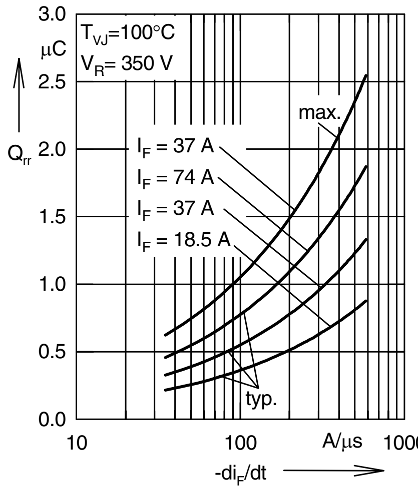

Fig. 9 Recovery charge versus $-di_F/dt$
(Diodes)

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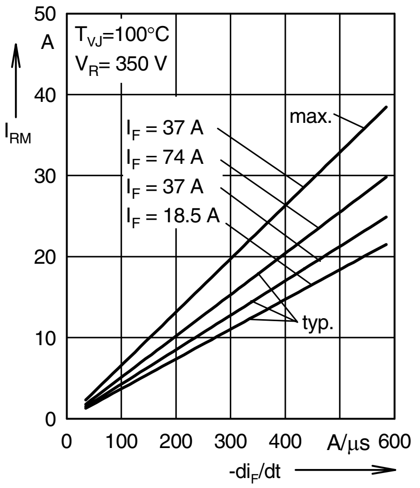

Fig. 10 Peak reverse current versus -di_F/dt (Diodes)

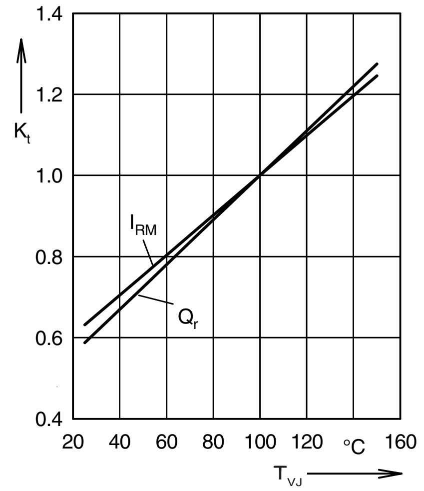

Fig. 11 Dynamic parameters versus junction temperature (Diodes)

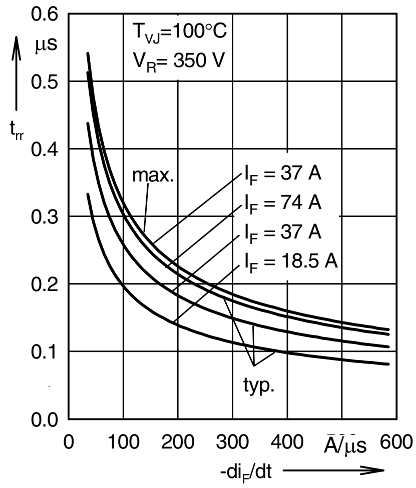

Fig. 12 Recovery time versus -di_F/dt (Diodes)

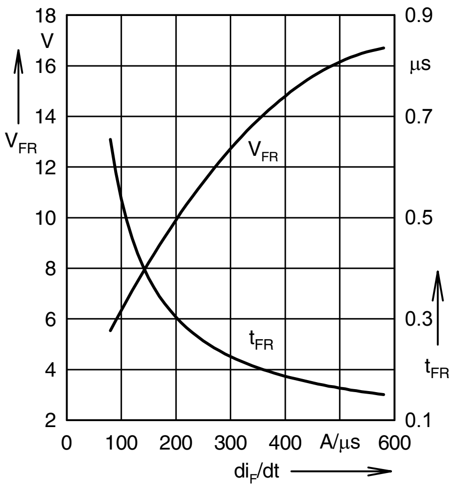

Fig. 13 Peak forward voltage versus -di_F/dt (Diodes)

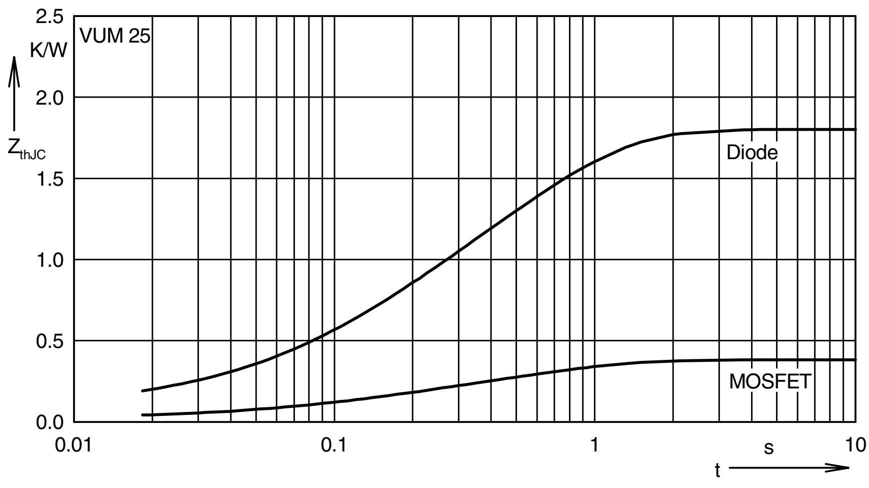

Fig. 14 Transient thermal impedance junction to case for all devices

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