Rectifier Module
for Three Phase
Power Factor Correction

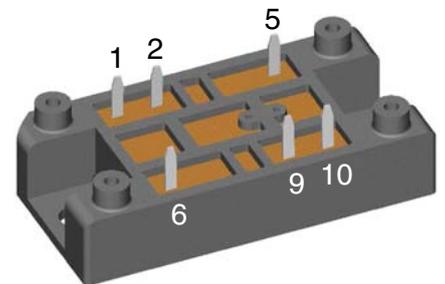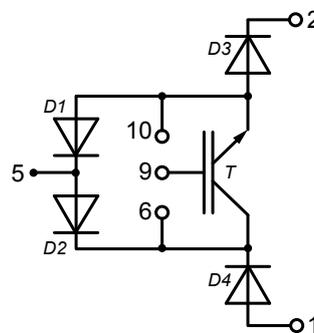**Typ. Rectified Mains Power**

P_n = 15 kW at

V_n = 400 V 3~
f_T = 15 kHz
T_C = 80°C

Preliminary data

Part name (Marking on product)

VUI30-12N1

Features:

• NPT IGBT with low saturation voltage
• Fast recovery epitaxial diodes (FRED)

Application:

Three phase rectifier with power factor correction, set up as follows:
• input from three phase mains
  - wide range of input voltage
  - mains currents approx. sinusoidal in phase with mains voltage
  - topology permits to control overcurrent such as in case of input voltage peaks
• output
  - direct current link
  - buck type converter - reduced output voltage
  - possibility to supply boost converter, inverter etc.
• required components
  - one power semiconductor module per phase
  - one inductor and one capacitor per phase on mains side
  - output inductor, depending on supplied circuit

Package:

• High level of integration
• Solder terminals for PCB mounting
• Isolated DCB ceramic base plate
• Large creepage and strike distances

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VUI 30-12 N1

Transistor T

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
V_{CES}	collector emitter voltage	T_{VJ} = 25°C to 150°C				1200	V
V_{GES}	DC gate voltage	continuous		-20		+20	V
I_{C25}	collector current	DC	T_C = 25°C			95	A
I_{C80}		DC	T_C = 80°C			65	A
$V_{CE(sat)}$	collector emitter saturation voltage	I_C = 20 A; V_{GE} = 15 V	T_{VJ} = 25°C		1.7	2.0	V
			T_{VJ} = 125°C		1.9		
$V_{GE(th)}$	gate emitter threshold voltage	I_C = 2 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	4.5		6.5	V
I_{CES}	collector emitter leakage current	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			1.6	mA
			T_{VJ} = 125°C		1.8		mA
I_{GES}	gate emitter leakage current	V_{CE} = 0 V; V_{GE} = ±20 V				400	nA
$t_{d(on)}$	turn-on delay time				100		ns
t_r	current rise time	inductive load T_{VJ} = 125°C			70		ns
$t_{d(off)}$	turn-off delay time	V_{CE} = 600 V; I_C = 20 A			500		ns
t_f	current fall time	V_{GE} = ±15 V; R_G = 22 Ω; L = 100 µH			70		ns
E_{on}	turn-on energy per pulse				3.0		mJ
E_{off}	turn-off energy per pulse				2.2		mJ
C_{ies}	input capacitance	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz			3.3		nF
Q_{Gon}	total gate charge	V_{CE} = 600 V; V_{GE} = 15 V; I_C = 50 A			240		nC
I_{CM}	reverse bias safe operating area	RBSOA; V_{GE} = ±15 V; R_G = 22 Ω; L = 100 µH			100		A
V_{CEK}		clamped inductive load; T_{VJ} = 125°C		$\leq$ V_{CES}-L_S·d_I/dt			V
t_{SC} **(SCSOA)**	short circuit safe operating area	V_{CE} = V_{CES}; V_{GE} = ±15 V; R_G = 22 Ω; non-repetitive	T_{VJ} = 125°C			10	µs
R_{thJC}	thermal resistance junction to case					0.3	K/W
R_{thJH}	thermal resistance case to heatsink	with heat transfer paste, see mounting instructions			0.6		K/W

Diodes D1 - D4

Symbol	Conditions			min.	typ.	max.	
V_{RRM}	repetitive reverse voltage	T_{VJ} = 25°C				1200	V
I_{F25}	collector current	T_C = 25°C				40	A
I_{F80}		T_C = 80°C				25	A
I_R	reverse current	V_R = V_{RRM}	T_{VJ} = 25°C			0.75	mA
		V_R = 0.8·V_{RRM}	T_{VJ} = 125°C		2		mA
V_F	forward voltage	I_F = 20 A	T_{VJ} = 25°C		2.2	2.4	V
			T_{VJ} = 125°C		1.9		V
I_{RM}	reverse recovery current	I_F = 30 A; di_F/dt = -250 A/µs			16		A
t_{rr}	reverse recovery time	V_R = 540 V	T_{VJ} = 125°C		400		ns
R_{thJC}	thermal resistance junction to case	per diode	T_{VJ} = 25°C			1.3	K/W
R_{thJH}	thermal resistance case to heatsink	with heat transfer paste	T_{VJ} = 25°C		2.6		K/W

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Module

Symbol	Definitions	Conditions	min.	typ.	max.	Unit
T_{VJ}	operating temperature		-40		150	°C
T_{stg}	storage temperature		-40		125	°C
V_{ISOL}	isolation voltage	$I_{ISOL} \leq 1$ mA; 50/60 Hz; $\quad$ t = 1 min			3600	V~
M_d	mounting torque	(M5)	2		2.5	Nm
d_S; d_A	creep distance on surface / through air		5			mm
Weight				35		g

Outline Drawing

Dimensions in mm (1 mm = 0.0394")

Product Marking

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	VUI30-12N1	VUI30-12N1	Box	10	487554

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