

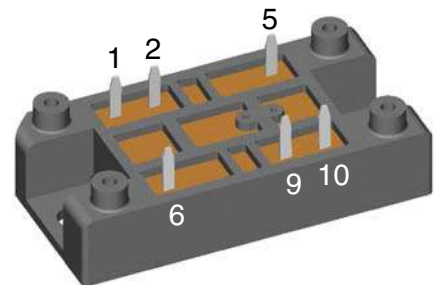
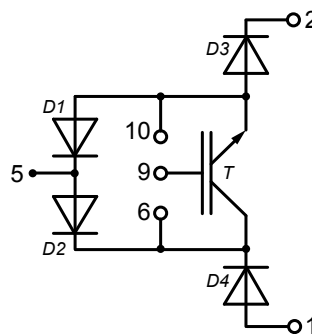
# Rectifier Module for Three Phase Power Factor Correction

**Typ. Rectified Mains Power**  
 $P_n = 15 \text{ kW}$  at  
 $V_n = 400 \text{ V } 3\sim$   
 $f_T = 15 \text{ kHz}$   
 $T_C = 80^\circ\text{C}$

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

Transistor T						
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
$V_{CES}$	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$			1200	V
$V_{GES}$	DC gate voltage	continuous	-20		+20	V
$I_{C25}$	collector current	DC			95	A
$I_{C80}$		DC			65	A
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 20\text{ A}; V_{GE} = 15\text{ V}$		1.7 1.9	2.0	V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 2\text{ mA}; V_{GE} = V_{CE}$	4.5		6.5	V
$I_{CES}$	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$		1.8	1.6	mA mA
$I_{GES}$	gate emitter leakage current	$V_{CE} = 0\text{ V}; V_{GE} = \pm 20\text{ V}$			400	nA
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{ V}; I_C = 20\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 22\ \Omega; L = 100\ \mu\text{H}$		100		ns
$t_r$	current rise time			70		ns
$t_{d(off)}$	turn-off delay time			500		ns
$t_f$	current fall time			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	$V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$		3.3		nF
$Q_{Gon}$	total gate charge	$V_{CE} = 600\text{ V}; V_{GE} = 15\text{ V}; I_C = 50\text{ A}$		240		nC
$I_{CM}$	reverse bias safe operating area	RBSOA; $V_{GE} = \pm 15\text{ V}; R_G = 22\ \Omega; L = 100\ \mu\text{H}$		100		A
$V_{CEK}$		clamped inductive load; $T_{VJ} = 125^{\circ}\text{C}$		$\leq V_{CES} - L_S \cdot di/dt$		V
$t_{SC}$ (SCSOA)	short circuit safe operating area	$V_{CE} = V_{CES}; V_{GE} = \pm 15\text{ V}; R_G = 22\ \Omega; \text{non-repetitive}$			10	$\mu\text{s}$
$R_{thJC}$	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	Ratings			Unit	
		min.	typ.	max.		
$V_{RRM}$	repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$		1200	V	
$I_{F25}$	collector current	$T_C = 25^{\circ}\text{C}$		40	A	
$I_{F80}$		$T_C = 80^{\circ}\text{C}$		25	A	
$I_R$	reverse current	$V_R = V_{RRM}$ $V_R = 0.8 \cdot V_{RRM}$		0.75	mA mA	
$V_F$	forward voltage	$I_F = 20\text{ A}$		2.2 1.9	V V	
$I_{RM}$	reverse recovery current	$I_F = 30\text{ A}; di_F/dt = -250\text{ A}/\mu\text{s}$ $V_R = 540\text{ V}$		16	A	
$t_{rr}$	reverse recovery time		$T_{VJ} = 125^{\circ}\text{C}$		400	ns
$R_{thJC}$	thermal resistance junction to case	per diode			1.3	K/W
$R_{thJH}$	thermal resistance case to heatsink	with heat transfer paste		2.6		K/W

