

# VU-12W Series



12W 2:1 Regulated Single & Dual output

## Features

- Wide 2:1 Input Range
- 1600VDC Isolation
- Efficiency up to 91%
- Operating Temperature Range -40 ~ 100°C max.
- Continuous Short Circuit Protection
- Over Voltage Protection
- DIP24 Package
- Soft Start
- Remote ON/OFF Control ( CTRL )



## PART NUMBER STRUCTURE

**VU** - **24** **12** **S** **12**  
(1) (2) (3) (4) (5)

### (1) Series

### (2) Input Voltage Range

12 - 9-18 V  
24 - 18-36 V  
48 - 36-75 V

### (4) Output Type

S - Single Output  
D - Dual Output

### (3) Output Voltage

2R5 - 2.5 V  
3R3 - 3.3 V  
05 - 5.0 V  
5R1 - 5.1 V  
12 - 12 V  
15 - 15 V

### (5) Watt

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current		Efficiency @FL (% , typ.)	Capacitive Load @FL (µF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
VU-122R5S12	9-18	15	848	2.5	0	3500	86	2000
VU-123R3S12	9-18	15	1109	3.3	0	3500	86	2000
VU-1205S12	9-18	15	1136	5	0	2400	88	2000
VU-125R1S12	9-18	15	1159	5.1	0	2400	88	2000
VU-1212S12	9-18	15	1111	12	0	1000	90	430
VU-1215S12	9-18	15	1111	15	0	800	90	300
VU-1212D12	9-18	15	1111	±12	0	±500	90	±200
VU-1215D12	9-18	15	1111	±15	0	±400	90	±120
VU-242R5S12	18-36	15	429	2.5	0	3500	85	2000
VU-243R3S12	18-36	15	553	3.3	0	3500	87	2000
VU-2405S12	18-36	15	562	5	0	2400	89	2000
VU-245R1S12	18-36	15	567	5.1	0	2400	90	2000
VU-2412S12	18-36	15	562	12	0	1000	89	430
VU-2415S12	18-36	15	556	15	0	800	90	300
VU-2412D12	18-36	15	562	±12	0	±500	89	±200
VU-2415D12	18-36	15	549	±15	0	±400	91	±120
VU-482R5S12	36-75	15	217	2.5	0	3500	84	2000
VU-483R3S12	36-75	15	280	3.3	0	3500	86	2000
VU-4805S12	36-75	15	278	5	0	2400	90	2000
VU-485R1S12	36-75	15	287	5.1	0	2400	89	2000
VU-4812S12	36-75	15	287	12	0	1000	87	430
VU-4815S12	36-75	15	281	15	0	800	89	300
VU-4812D12	36-75	15	287	±12	0	±500	87	±200
VU-4815D12	36-75	15	287	±15	0	±400	87	±120

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INPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	12V Input	9	12	18	VDC
	24V Input	18	24	36	
	48V Input	36	48	75	
Input Filter		Pi Type			
Input Reflected Ripple Current (1)			20		mApk-pk
Start up Time	Nominal Vin and constant resistive load		20		ms
Remote ON/OFF Control (2)	Module ON ( Open Circuit )	3.0		12	VDC
	Module OFF ( Short circuit pin 2 and pin 3 )	0		1.2	
	OFF idle current		5.0		mA
Recommended input fuse ( slow blow )	12V Input	2.5			A
	24V Input	1.25			
	48V Input	0.8			
Note :					
1. Measured with a simulated source inductance of 12μH and a source capacitor Cin ( 47μF, ESR<1.0Ω at 100kHz ).					
2. The remote ON/OFF control pin is referenced to -Vin ( pin2 ).					

OUTPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		-1.2		+1.2	%
Line Regulation		-0.5		+0.5	%
Load Regulation	From 0% to 100% Load	Single Output	-0.5	+0.5	%
		Dual Output	-1.0	+1.0	
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output	-5		+5	%
Ripple & Noise (1)	20MHz bandwidth			85	mVpk-pk
Over Voltage Protection ( Zener diode clamp )	2.5V Output		3.9		VDC
	3.3V Output		3.9		
	5V Output		6.2		
	5.1V Output		6.2		
	12V Output		15		
	15V Output		18		
Over Current Protection			150		% of FL
Short Circuit Protection		Indefinite ( hiccup ) ( Automatic Recovery )			
Temperature Coefficient		-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load	See Table			
Transient Recovery Time	Nominal Vin and 25% load step change ( 75%-50%-25% of Io )		250		μs
Transient Response Deviation		2.5V ∙ 3.3V Output	-5		+5
	Other Output	-3		+3	
Note :					
1. Measured with a 1.0μF MLCC.					

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ABSOLUTE MAXIMUM RATINGS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage ( 1000 ms )	12V Input			36	VDC
	24V Input			50	
	48V Input			100	
Soldering Temperature	1.5mm from case 10sec max.			260	°C

Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

GENERAL SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, and rated for 60sec	1600			VDC
	Case-I/O, and rated for 60sec	1600			
Isolation Resistance	Input-output	1000			MΩ
Isolation Capacitance	Input-output			1200	pF
Switching Frequency			330		kHz
MTBF	MIL-HDBK-217 F @ 25°C	1			M hours
Safety Approval	IEC / EN / UL 62368-1	Designed to meet			
Environmental compliance		RoHS			

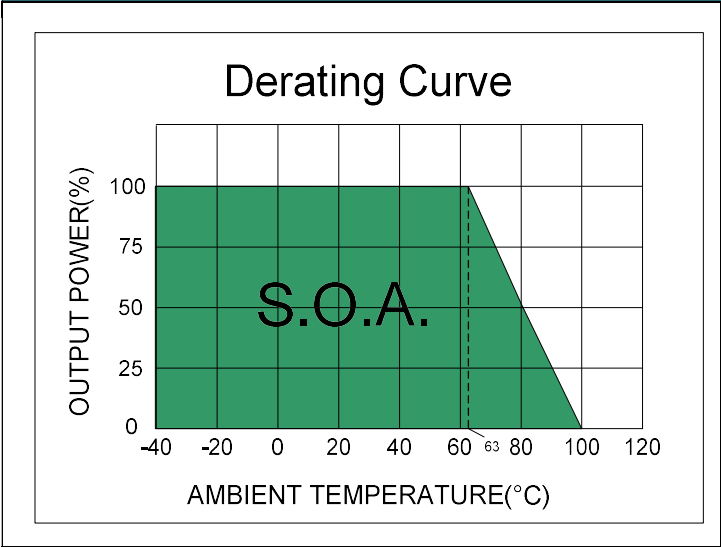
ENVIRONMENT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		100	°C
Maximum Case Temperature				105	°C
Thermal Impedance		21.2			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

EMC SPECIFICATIONS			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	A
Radiated Emissions	EN55032		A
ESD	IEC 61000-4-2	Air: ± 8kV / Contact: ± 6kV	B
RS	IEC 61000-4-3	20V/m	A
EFT	IEC 61000-4-4	±2kV	A
Surge	IEC 61000-4-5	±1kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	1A/m	A

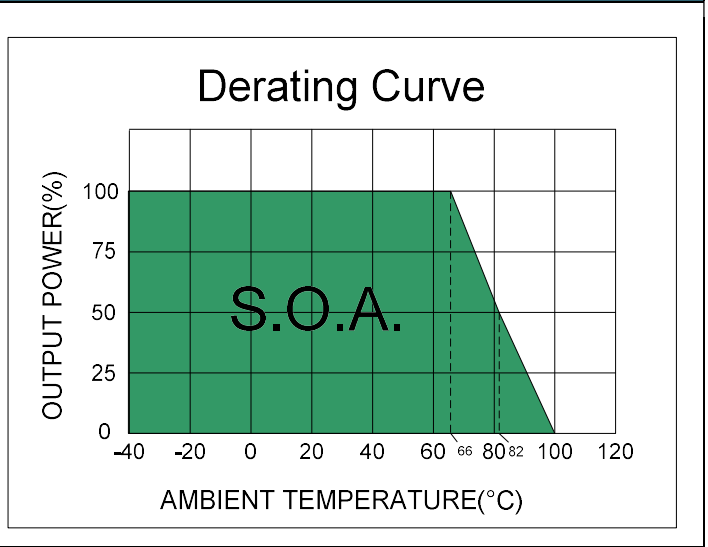
PHYSICAL SPECIFICATIONS	
Parameter	Value
Case Material	Aluminum
Base Material	Nonconductive Black Plastic ( UL94V-0 rated )
Pin Material	Ø0.5mm Brass Solder-coated
Potting Material	Epoxy ( UL94V-0 rated )
Weight	14.0 g, typ.
Dimensions	1.25" x 0.8" x 0.4"

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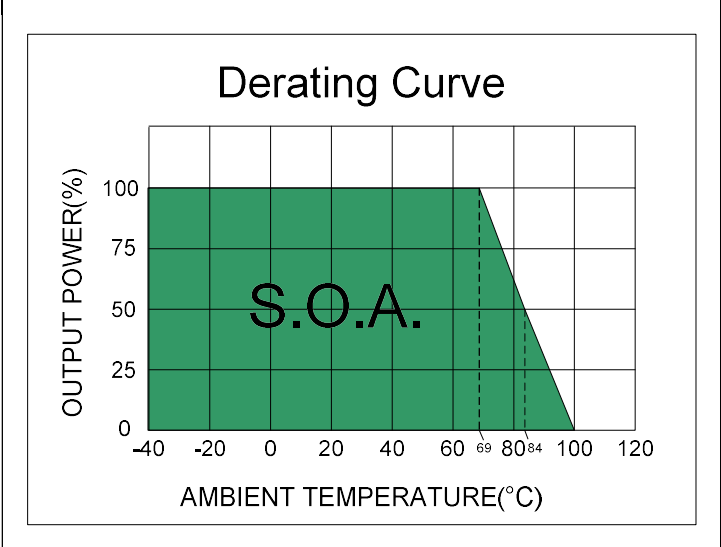
**ELECTRICAL CHARACTERISTIC CURVES**



Vout : 3.3V & 5.0V & 5.1V



Vout : 2.5V & 12V

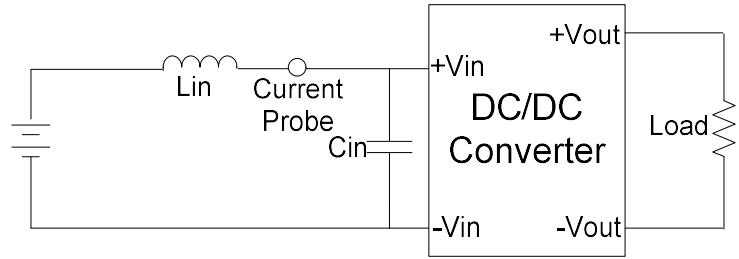


Vout : 15V

**TEST CONFIGURATIONS**

**Input Reflected Ripple Current Test Step**

Input reflected ripple current is measured with a source inductor  $L_{in}$  ( $12\mu H$ ) and a source capacitor  $C_{in}$  ( $47\mu F$ ,  $ESR < 1.0\Omega$  at  $100kHz$ ) at nominal input and full load.



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## DESIGN & FEATURE CONFIGURATIONS

### Over Current Protection

The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup). The module will try to restart after shut down. If the over load condition still exists, the module will shut down again.

### Over Voltage Protection

The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

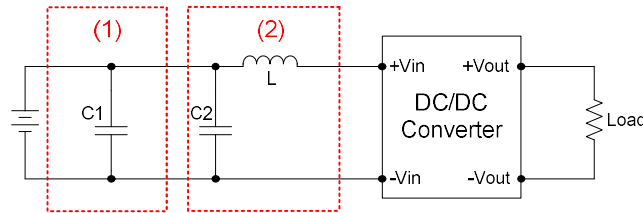
#### Note

1. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

**DESIGN & FEATURE CONFIGURATIONS**

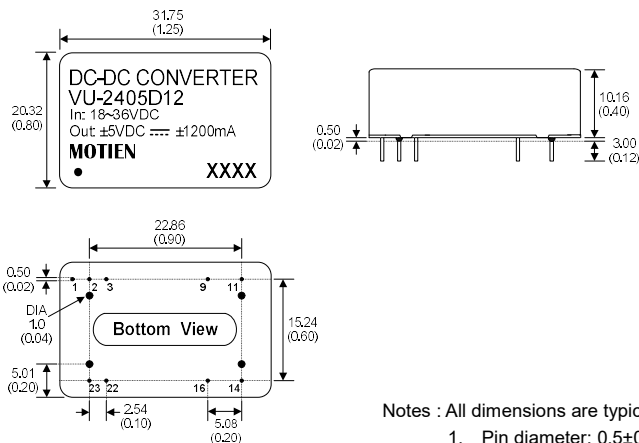
**EMC Filter**

The part (1) Circuit is used to meet Surge test. (2) Circuit is used to meet EMI test.



	C1	C2	L
VU-12XXX12	NIPPON	NIPPON	12 $\mu$ H
VU-24XXX12	Chemi-con KY series	Chemi-con KY series	
VU-48XXX12	330 $\mu$ F, 100V	100 $\mu$ F, 100V	

**MECHANICAL SPECIFICATIONS**

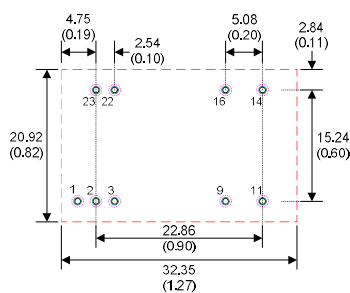


PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	CTRL	CTRL
2	-Vin	-Vin
3	-Vin	-Vin
9	N.P.	COM
11	N.C.	-Vout
14	+Vout	+Vout
16	-Vout	COM
22	+Vin	+Vin
23	+Vin	+Vin

- Notes : All dimensions are typical in millimeters ( inches ).
1. Pin diameter: 0.5 $\pm$ 0.05 ( 0.02 $\pm$ 0.002 )
  2. Pin pitch and length tolerance:  $\pm$ 0.35 (  $\pm$ 0.014 )
  3. Case Tolerance:  $\pm$ 0.5 (  $\pm$ 0.02 )
  4. Stand-off tolerance:  $\pm$ 0.1 (  $\pm$ 0.004 )

\*N.P. : No PIN  
\*N.C. : No Connection

**RECOMMENDED FOOTPRINT DETAILS**



- Notes : 1. All dimensions are typical in millimeters ( inches ).
- Through hole ( black ) 1 ~ 23: Ø0.80 ( 0.031 )
  - Top view pad ( green ) 1 ~ 23: Ø1.00 ( 0.039 )
  - Bottom view pad ( pink ) 1 ~ 23: Ø1.60 ( 0.063 )