VN-30W Series

30W 2:1 Regulated Single & Dual output

Features

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

PART NUMBER STRUCTURE

VN - 24 12 S 30 SK

(1) (2) (3) (4) (5) (6)

(1) Series

(2) Input Voltage Range

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

(3) Output Voltage

- **3R3** - 3.3 V
- **05** - 5.0 V
- **12** - 12 V
- **15** - 15 V

(4) Output Type

- **S** - Single Output
- **D** - Dual Output

(5) Watt

(6) Heat-sink (Optional)

- **Blank** - Without Heat-sink
- **SK** - With Heat-sink

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)		
VN-123R3S30	9-18	10	2213	3.3	0	7000	87	10000
VN-1205S30	9-18	10	2809	5	0	6000	89	7200
VN-1212S30	9-18	12	2778	12	0	2500	90	1200
VN-1215S30	9-18	12	2778	15	0	2000	90	1000
VN-243R3S30	18-36	10	1094	3.3	0	7000	88	10000
VN-2405S30	18-36	10	1404	5	0	6000	89	7200
VN-2412S30	18-36	10	1389	12	0	2500	90	1200
VN-2415S30	18-36	10	1374	15	0	2000	91	1000
VN-483R3S30	36-75	8	541	3.3	0	7000	89	10000
VN-4805S30	36-75	8	694	5	0	6000	90	7200
VN-4812S30	36-75	8	687	12	0	2500	91	1200
VN-4815S30	36-75	8	687	15	0	2000	91	1000
VN-1212D30	9-18	12	2841	±12	0	±1250	88	±750
VN-1215D30	9-18	14	2778	±15	0	±1000	90	±500
VN-2412D30	18-36	10	1389	±12	0	±1250	90	±750
VN-2415D30	18-36	10	1374	±15	0	±1000	91	±500
VN-4812D30	36-75	8	694	±12	0	±1250	90	±750
VN-4815D30	36-75	8	687	±15	0	±1000	91	±500

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	
Under Voltage Protection	12V Input	Module ON		8.6		VDC
		Module OFF		7.9		
	24V Input	Module ON		17.8		
		Module OFF		16.5		
	48V Input	Module ON		34		
		Module OFF		32.5		
Input Filter			Pi Type			
Input Reflected Ripple Current (1)				30		mApk-pk
Start up Time	Nominal Vin and constant resistive load			30		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			2.0		mA
Recommended input fuse (slow blow)	12V Input		6			A
	24V Input		3			
	48V Input		1.5			

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			-1.0		+1.0	%
Output Voltage Adjustability (Trim)	For Single output		-10		+10	%
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	Single Output			75	mVpk-pk
		Dual Output			60	
Over Voltage Protection (Zener diode clamp)	3.3V Output			3.9		VDC
	5V 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)	All models		250		µs
Transient Response Deviation		3.3V & 5V Output	-5		+5	%
		Other Output	-3		+3	

Note：
1. Measured with a 10µF MLCC.

ABSOLUTE MAXIMUM RATINGS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	12V Input			25	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		2000		pF
Switching Frequency	3.3V & 5V Output		270		kHz
	other Output		330		
MTBF	MIL-HDBK-217 F @ 25°C	370			k hours
Safety Approval	IEC / EN / UL 62368-1	DK-63588-UL, E252573			
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	Without Heat-sink	13			°C/W
	With Heat-sink	12			
Over Temperature Protection	Case Temperature		115		°C
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

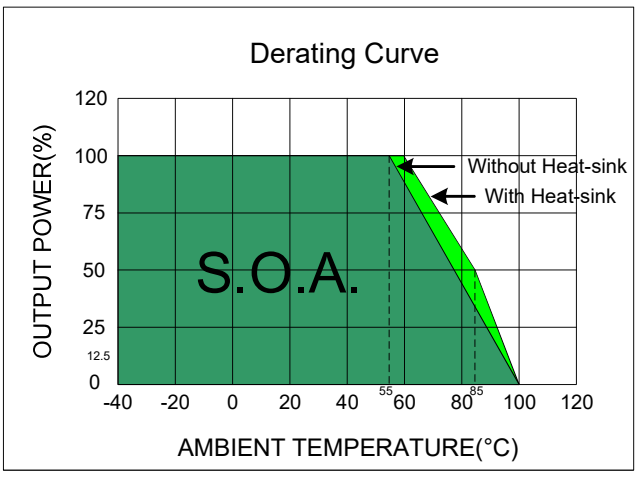
EMC SPECIFICATIONS

Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	A
Radiated Emissions	EN55032		A
ESD	IEC 61000-4-2	Air: ±8kV / Contact: ±6kV	A
RS	IEC 61000-4-3	20V/m	A
EFT	IEC 61000-4-4	±2kV with external components	A
Surge	IEC 61000-4-5	±2kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	100A/m	A

PHYSICAL SPECIFICATIONS

Parameter	Value
Case Material	Copper
Base Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Ø1.0mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	19.0 g, typ. (Without Heat-sink)
	21.9 g, typ. (With Heat-sink)
Dimensions	1.00" x 1.00" x 0.41" (Without Heat-sink)
	1.00" x 1.00" x 0.66" (With Heat-sink)

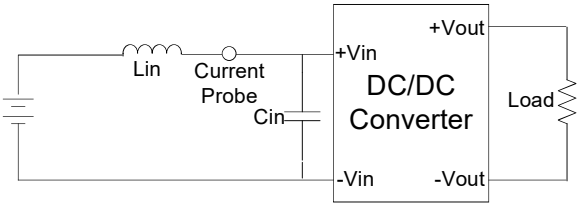
ELECTRICAL CHARACTERISTIC CURVES



TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor Lin (12μH) and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz) at nominal input and full load.



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.

Over Temperature Protection Test

The over temperature protection consists of circuitry that provides protection from thermal damage. If the temperature exceeds the over temperature threshold the module will shut down. The module will try to restart after shut down, if the over temperature condition still exists during restart, the module will shut down again. This restart trial will continue until the temperature is within specification.

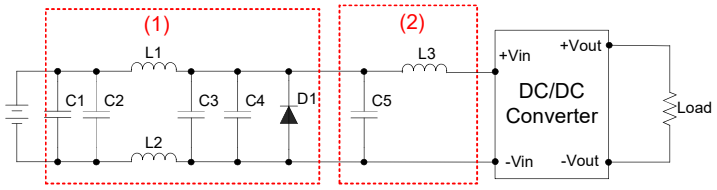
Remote Module ON / OFF

Positive logic turns on the module during high logic and off during low logic. Remote module ON/OFF can be controlled by an external switch between the CTRL terminal and -Vin terminal. For positive logic if the remote feature is not used, please leave the CTRL pin floating.

DESIGN & FEATURE CONFIGURATIONS

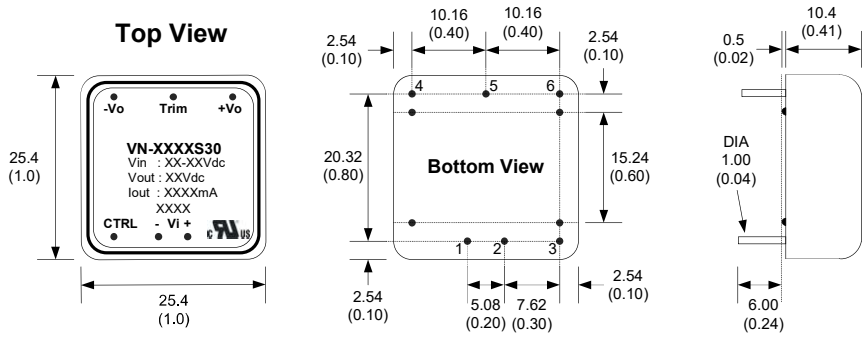
EMC Filter

The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



	C1	C2, C4	L1, L2	C3	D1	C5	L3
VN-12XXX30	NIPPON Chemi-con KY series 330μF, 100V	NIPPON Chemi-con KY series 470μF, 100V	1.0μH	NIPPON Chemi-con KY series 330μF, 100V		MLCC 3.3μF, 50V	0.82μH
VN-24XXX30					SMDJ58A		
VN-48XXX30					SMDJ120A		

MECHANICAL SPECIFICATIONS

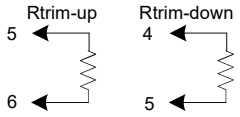


PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	Trim	COM
6	-Vout	-Vout

Notes：All dimensions are typical in millimeters (inches).
1. Pin diameter: 1.0±0.05 (0.04±0.002)
2. Pin pitch and length tolerance: ±0.35 (±0.014)
3. Case tolerance: ±0.5 (±0.02)
4. Stand-off tolerance: ±0.1 (±0.004)

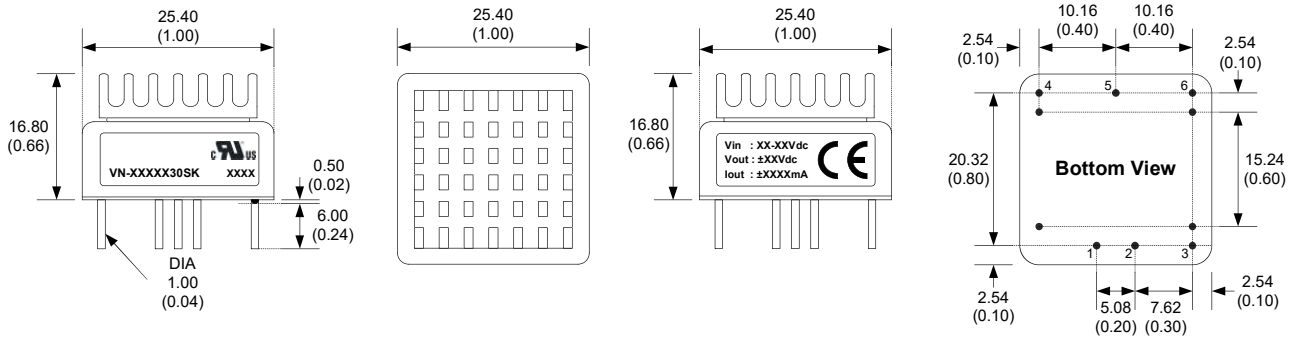
EXTERMAL OUTPUT TRIMMING

Output can be externally trimmed by using the method as below. (single output models only)

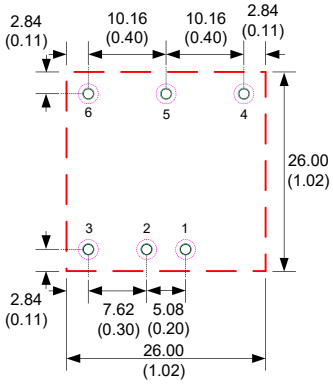


With Heat-sink

Order code: VN-XXXXX30SK (contain: heat-sink, thermal pad)
Material: Aluminum
Finish: Anodic treatment (black)
Weight: 2.9 g (0.10 oz) (without converter)
Note:
1. Converters will be supplied with heat-sinks already mounted. Please contact factory for quotation.



RECOMMENDED FOOTPRINT DETAILS



Notes：1. All dimensions are typical in millimeters (inches).
Through hole (black) 1~6: Ø1.3 (0.051)
Top view pad (green) 1~6: Ø1.5 (0.059)
Bottom view pad (pink) 1~6: Ø2.6 (0.098)

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