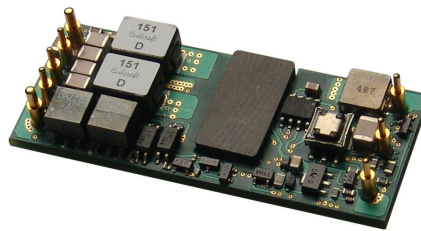


NES50-48 Series: Isolated DC/DC Converters
36 – 75V Input, Maximum Power : 66WData Sheet
Dec. 09, 2010**NES50-48 : High efficient DC/DC converters****Features**

- Industry standard Eighth-Brick pin map
- High efficiency
- Low no-load power dissipation
- Wide operating temperature range with thermal derating (-40°C to + 85°C)
- Precision thermal protection(Accuracy $\pm 3^{\circ}\text{C}$)
- Over current and short-circuit protection
- Under voltage lockout (UVLO)
- Input over voltage protection
- Output over voltage protection
- Over temperature protection
- Remote on/off control
(Option : positive or negative logic)
- Output voltage adjustment (TRM)
- Positive/Negative remote sense
- RoHS directive

**Applications •**

- Distributed power architectures
- Telecommunication
- Network equipment
- High current microprocessors and ICs(DSP, FPGA, ASIC)
- Instrumentation / Equipments

Description

The NES50 series DC-DC converters are designed to provide up to 30A output current in an industry standard eighth brick package. These DC-DC converters operate over an input voltage range of 36 to 75 Vdc and provide a single, precisely-regulated output, precision thermal protection and low no-load power dissipation.

Features include high isolation, UVLO, Input over-voltage protection, output over-voltage protection, over current limiting, short-circuit protection, thermal shutdown, remote on/off control, output voltage adjustment and (\pm)output sense functions.

NES50-48 Series: Isolated DC/DC Converters
 36 – 75V Input, Maximum Power : 66W

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Absolute Maximum Ratings

Parameter	Min.	Typ.	Max.	Unit	Notes
Input voltage continuous	0	-	80	Vdc	
Input voltage Transients(100ms)	0	-	100	Vdc	
Operating ambient temperature	-40	-	85	°C	
Storage temperature	-40	-	125	°C	
I/O isolation voltage	-	1500	-	VDC	

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device.

Electrical Specifications

Ta=25°C, Vin=48Vdc unless otherwise noted.

Input Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating voltage range	Vin	36	48	75	Vdc
Input under voltage lockout					
Turn-on threshold		-	35	-	Vdc
Turn-off threshold		-	31	-	Vdc
Input over-voltage protection					
Turn-on threshold		-	76	-	Vdc
Turn-off threshold		-	80	-	Vdc
Disabled input current (Remote on/off control, module disabled)		-	2	-	mA
No load input current (Io = 0, Module enabled)		25	30	35	mA
Maximum Input current (Vin = Vin,min, Io = Io,max)					
NES50-48-1R5	Iin	-	1.464	-	A
NES50-48-1R8		-	1.730	-	A
NES50-48-2R5		-	1.613	-	A
NES50-48-3R3		-	2.114	-	A
Input reflected ripple current (Io = Io,max)		-	150	-	mA

NES50-48 Series: Isolated DC/DC Converters
36 – 75V Input, Maximum Power : 66W

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Output Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Output voltage tolerance	V_o	-2	-	2	%
Output regulation;					
- Line regulation($V_{in}=V_{in,min}$ to $V_{in,max}$)		-	± 0.2	± 0.5	%
- Load regulation($I_o=I_{o,min}$ to $I_{o,max}$)		-	± 0.2	± 0.5	%
Output current					
NES50-48-1R5		0	-	30	A
NES50-48-1R8	I_o	0	-	30	A
NES50-48-2R5		0	-	20	A
NES50-48-3R3		0	-	20	A
Output current limit(Automatic recovery)		105	-	-	%
Output ripple and noise, ($I_o = I_{o,max}$, 1 μ F ceramic + 15 μ F tantalum, Bandwidth : 20MHz)					
NES50-48-1R5		-	-	50	mV
NES50-48-1R8		-	-	50	mV
NES50-48-2R5		-	-	50	mV
NES50-48-3R3		-	-	50	mV
Efficiency ($V_{in} = 48V$, 50% Load)					
NES50-48-1R5		-	89.52	-	%
NES50-48-1R8		-	90.52	-	%
NES50-48-2R5		-	89.38	-	%
NES50-48-3R3		-	90.75	-	%
Efficiency ($V_{in} = 48V$, 100% Load)					
NES50-48-1R5		-	86.79	-	%
NES50-48-1R8		-	87.31	-	%
NES50-48-2R5		-	86.18	-	%
NES50-48-3R3		-	88.12	-	%
Dynamic load response (Load change from $I_o = 50\%$ to 75% , 75% to 50% of $I_{o,max}$, Slew rate = 0.1A/ μ s)					
NES50-48-1R5		-	± 70	-	mV
NES50-48-1R8		-	± 90	-	mV

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NES50-48-2R5		-	±65	-	mV
NES50-48-3R3		-	±60	-	mV
Recovery time(within 1% of Vo,nom) (Load change from Io = 50% to 75 % , 75% to 50% of Io,max, Slew rate = 0.1A/μs)					
NES50-48-1R5		-	-	100	μs
NES50-48-1R8		-	-	150	μs
NES50-48-2R5		-	-	150	μs
NES50-48-3R3		-	-	200	μs
Output Over-voltage Protection (% of Vo,nom)		-	125	-	%
Start-up time (Io=Io,max, On/off control)		-	2	-	ms
Turn-on overshoot		-	0	2	%

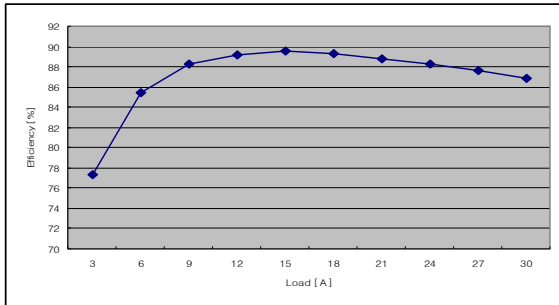
General Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Switching Frequency		-	200	-	KHz
Remote ON/OFF (Positive Logic)					
On = open		2.5	-	6	Vdc
Off = short to Vin-		0	-	0.8	Vdc
Output voltage trim range		-	-	±10	%
Output voltage remote sense range		-	-	10	%
Over-temperature protection		-	125	-	°C
Over-temperature accuracy		-	±3	-	°C
Dimensions(W.H.L.)		58.1 x 23.1 x 11.7 (2.29 x 0.91 x 0.46)			mm (inches)
Weight		-	25	-	g

Characteristic Curves

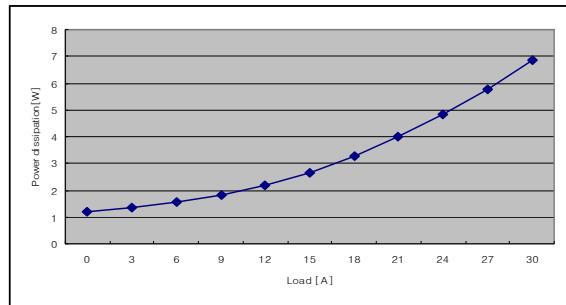
The following [fig.1~6] provide typical characteristics for NES50-48-1R5 (1.5V/30A).

Efficiency



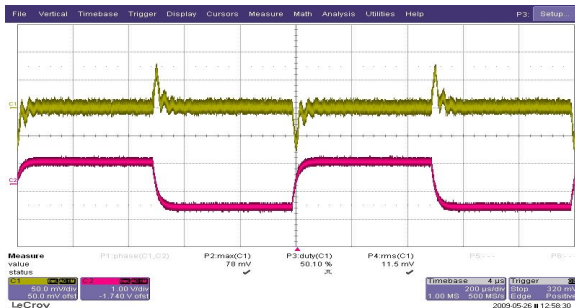
[Fig.1] Efficiency for 48V input Voltage at 25°C

Power Dissipation



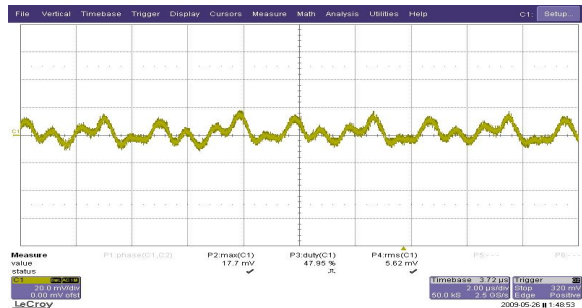
[Fig.2] Power dissipation for 48V input voltage at 25°C

Output Load Transient Response



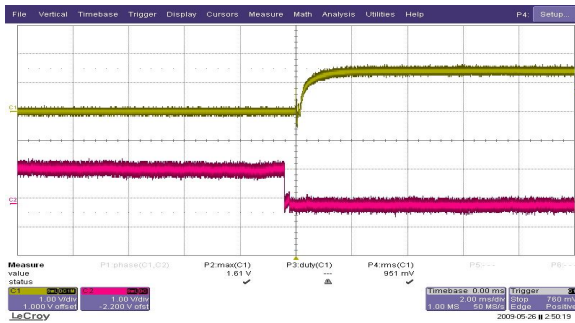
[Fig.3] Load step: 50%-75-50% of Io, di/dt= 0.1A/us (CH1: 50mV, CH2: 5A/div, 200us/div)

Output Ripple/Noise



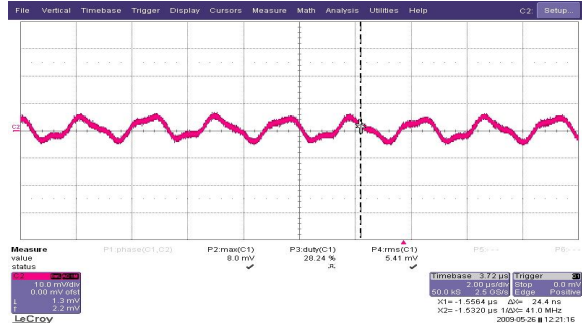
[Fig.4] Output ripple & noise (20mV/div)

Start-up from On/off input



[Fig.5] Ch1: Vo, Ch2: On/off input (2ms/div)

Input Reflected Ripple Current

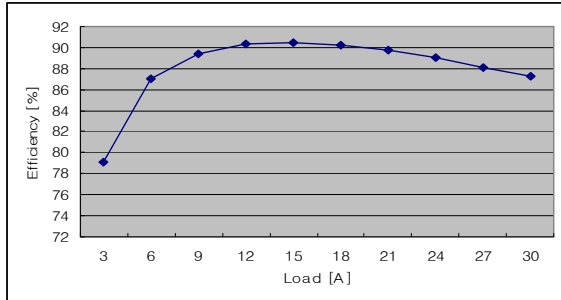


[Fig.6] Input reflect ripple current (100mA/div)

Characteristic Curves

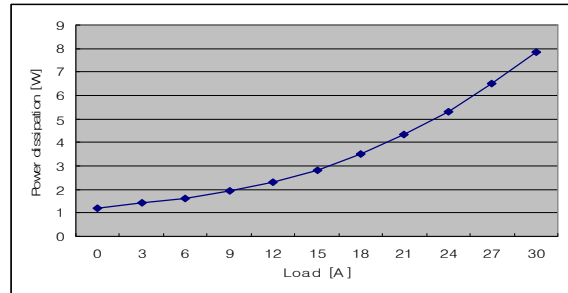
The following [fig.7~12] provide typical characteristics for NES50-48-1R8 (1.8V/30A).

Efficiency



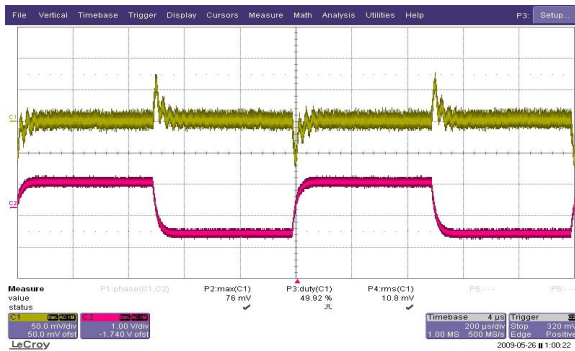
[Fig.7] Efficiency for 48V input Voltage at 25°C

Power Dissipation



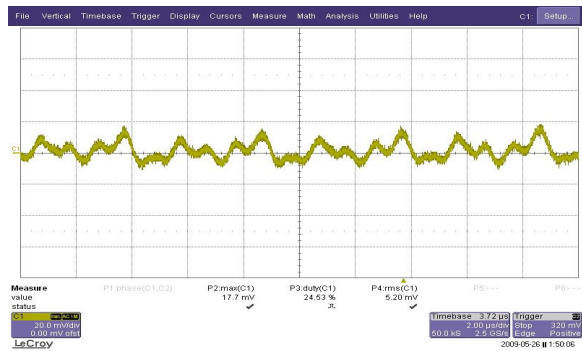
[Fig.8] Power dissipation 48V input voltage at 25°C

Output Load Transient Response



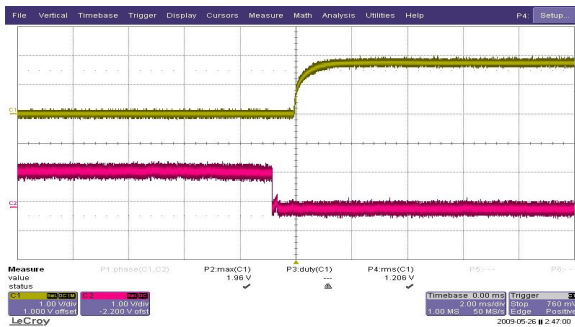
[Fig. 9] Load step: 50%-75-50% of Io, di/dt= 0.1A/us (CH1: 50mV, CH2: 5A/div, 200us/div)

Output Ripple & Noise



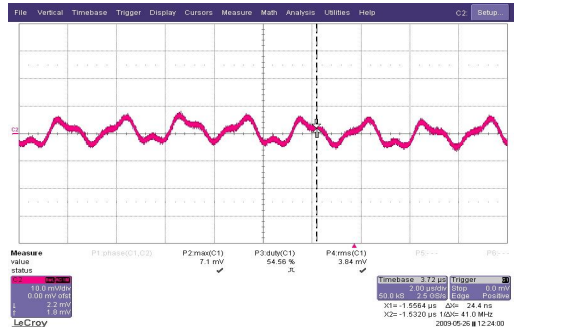
[Fig.10] Output ripple & noise (20mV/div)

Start-up from On/off input



[Fig.11] Ch1: Vo, Ch2: On/off input(2ms/div)

Input Reflected Ripple Current



[Fig.12] Input reflect ripple current (100mA/div)

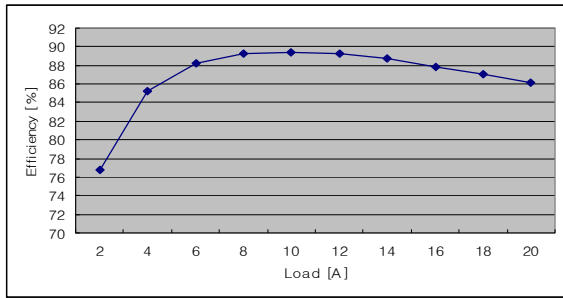
NES50-48 Series: Isolated DC/DC Converters
 36 – 75V Input, Maximum Power : 66W

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Characteristic Curves

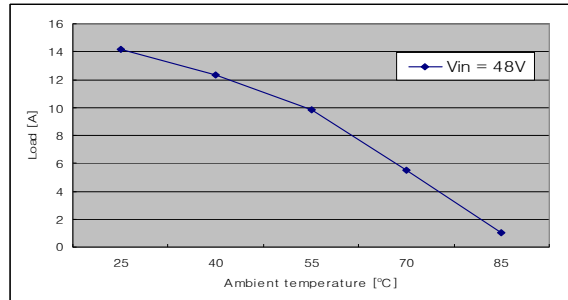
The following fig.13~18 provide typical characteristics for NES50-48-2R5 (2.5V/20A)

Efficiency



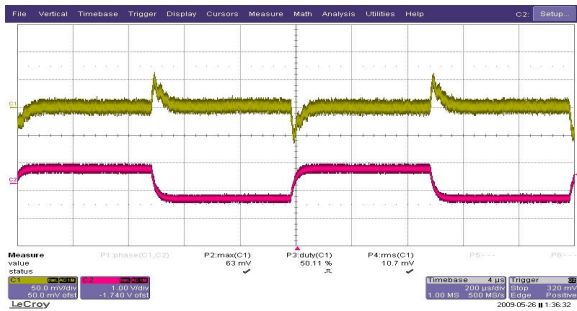
[Fig.13] Efficiency for 48V input Voltage at 25°C

Thermal Derating



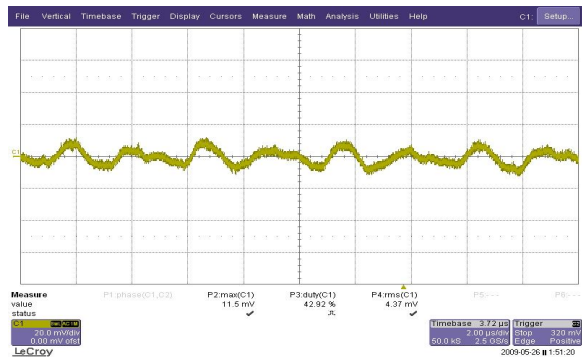
[Fig.14] Thermal derating for 48V input voltage at 25°C

Output Load Transient Response



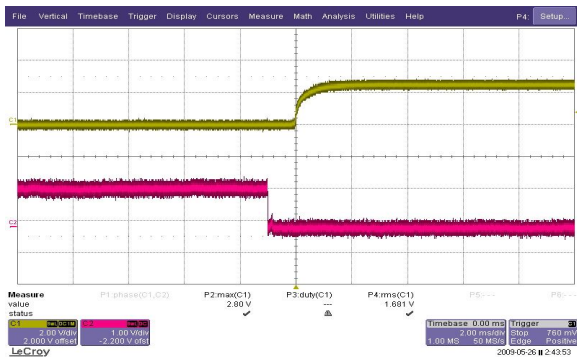
[Fig.15] Load step: 50%-75-50% of Io, di/dt= 0.1A/us (CH1: 50mV, CH2: 5A/div, 200us/div)

Output Ripple/Noise



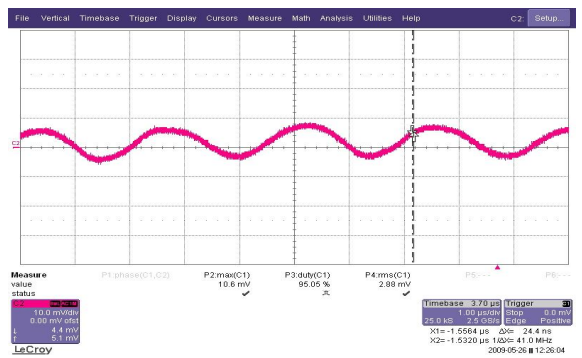
[Fig.16] Output ripple & noise (20mV/div)

Start-up on/off input



[Fig.17] Ch1: Vo, Ch2: On/off input(2ms/div)

Input Reflected Ripple Current

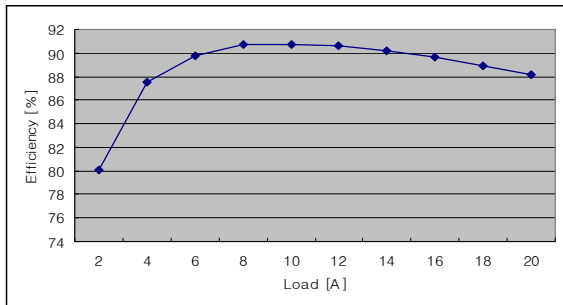


[Fig.18] Input reflect ripple current (100mA/div)

Characteristic Curves

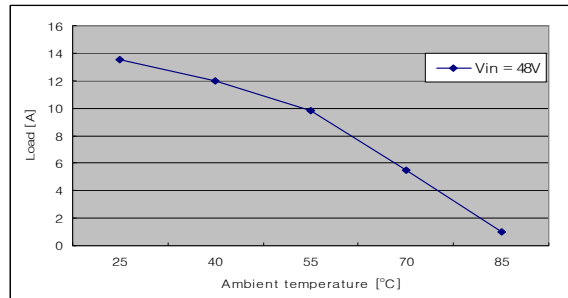
The following fig.19~24 provide typical characteristics for NES50-48-3R3 (3.3V/20A)

Efficiency



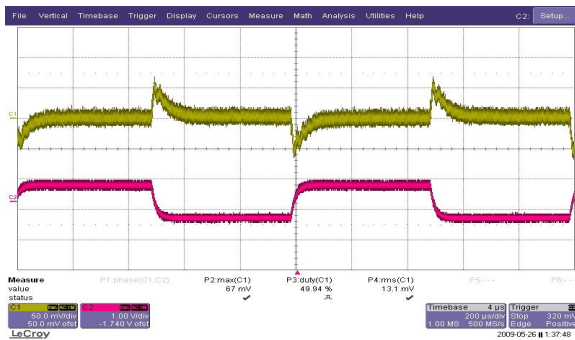
[Fig.19] Efficiency for 48V input Voltage at 25°C

Thermal Derating



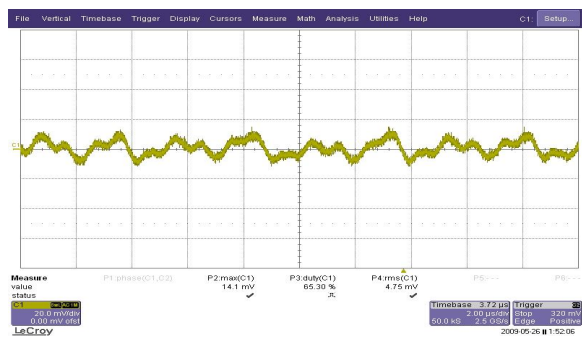
[Fig.20] Thermal derating for 48V input voltage

Output Load Transient Response



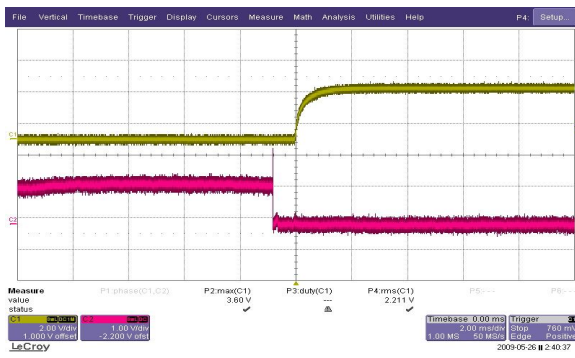
[Fig.21] Load step: 50%-75%-50% of I_o , $di/dt=0.1A/us$ (CH1: 50mV, CH2: 5A/div, 200us/div)

Output Ripple/Noise



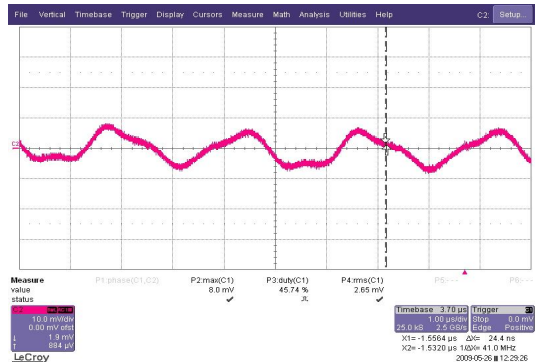
[Fig.22] Output ripple & noise (20mV/div)

Start-up on/off input



[Fig.23] Ch1: V_o , Ch2: On/off input(2ms/div)

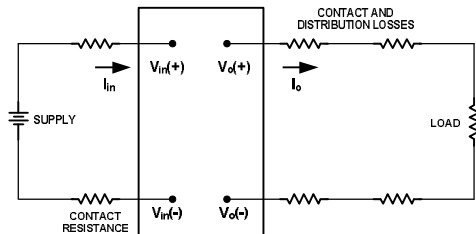
Input Reflected Ripple Current



[Fig.24] Input reflect ripple current (100mA/div)

TEST Configurations

Output Voltage and Efficiency



*All measurements are taken at the module terminals when socketing, place Kelvin connections at module terminals to avoid measurement errors due to socket contact resistance.

Efficiency

$$\eta = \left(\frac{[V_o(+)-V_o(-)] \times I_o}{[V_{in}(+)-V_{in}(-)] \times I_{in}} \right) \times 100\%$$

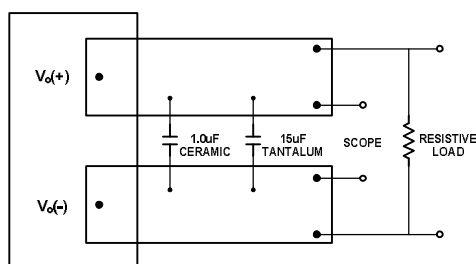
Thermal Considerations

This products has wide operating temperature range from -40°C to +85°C.

However, it should be required a enough air flow for more reliable operation. Output derating curve provide designers with a quantity of a current under the desired ambient temperature and velocity of airflow.

Output load transient response / ripple & noise Test

Output load transient response and ripple&noise are measured in figure 13. And the probe ground should be less than 1/2 inch and oscilloscope is set up 20MHz bandwidth to measure exact data.



Protection Functions

Input under-voltage Lockout (UVLO)

At input voltages below the input under-voltage lockout limit, the module operation is disabled. The module will begin to operate once the input voltage is raised above the under-voltage lockout turn-on threshold.

Input Over-Voltage Protection

At input voltages over the input over-voltage lockout limit, the module operation is disabled. The module will begin to operate once the input voltage is downed under the over-voltage lockout turn-on threshold.

Over Voltage Protection (OVP)

This protection feature latches in the event of over voltage across the output. Cycling the input voltage resets the latching protection feature.

Over current Protection (OCP)

To provide protection in output overload condition, the unit is equipped with internal current-limiting circuitry. At the point of current-limit inception, the unit enters hiccup mode. Also the module automatically recovers when over current condition is removed.

Over Temperature Shut down (OTP)

The converters are equipped with precision thermal-shutdown circuitry. If the internal temperature of the converter rises up to the designed operating temperature, a precision temperature sensor will power down the unit. When the internal temperature decreases below the threshold of the temperature sensor, the unit will self start.

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Pin Functions

Remote On/Off Control (CNT)

Two remote on/off options are available. Positive logic turns module on during a logic high voltage on the ON/Off pin, and off during a logic low.

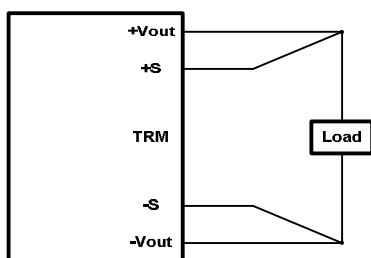
Our module is set up negative logic with default.

If you want positive logic, contact our company.

Remote Sense(±sense)

Remote sense minimizes the effects of distribution losses by regulating the voltage at the remote sense connections. The voltage between the remote-sense pins and the output terminals must not exceed the output voltage sense range given in the specifications.

The amount of power delivered by the module is defined as the voltage at the output terminals multiplied by the output current. When using remote sense and trim, the output voltage of the module can be increased, which at the same output current would increase the power output of the module. Care should be taken to ensure that the maximum output power of the module remains at or below the maximum rated power.



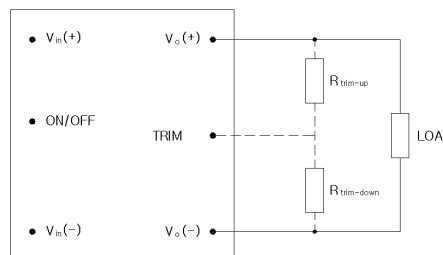
Output voltage adjustment (Trim)

Trimming allows the output voltage set point to be increased or decreased, this is accomplished by connecting an external resistor between the TRIM pin and either the Vo(+) pin or the Vo(-)

pin.

Connecting an external resistor (Rtrim-down) between the TRIM pin and the Vo(-) pin decreases the output voltage set point.

Connecting an external resistor (Rtrim-up) between the TRIM pin and the Vo(+) pin increases the output voltage set point.

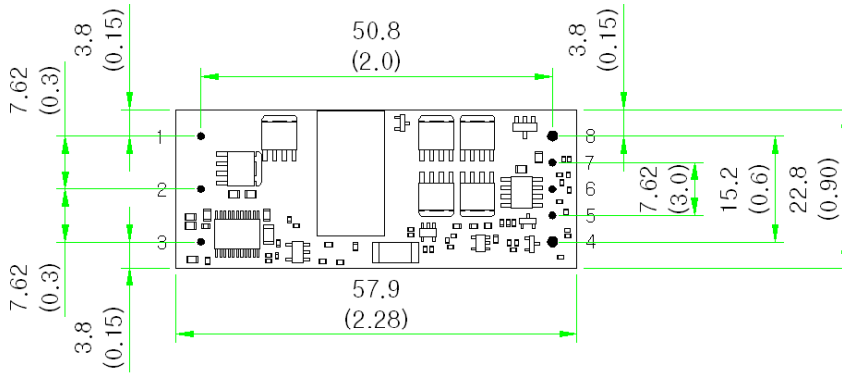


NES50-48 Series: Isolated DC/DC Converters
 36 – 75V Input, Maximum Power : 66W

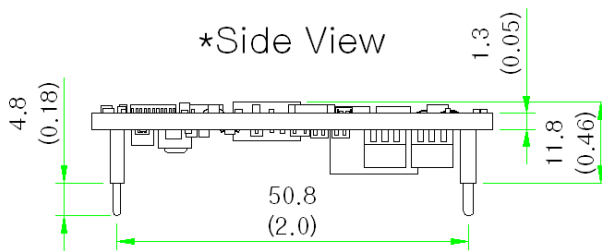
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Mechanical Specification

*Top View



*Side View



NOTES

1. All dimension are in mm (inch)

Pin Assignments

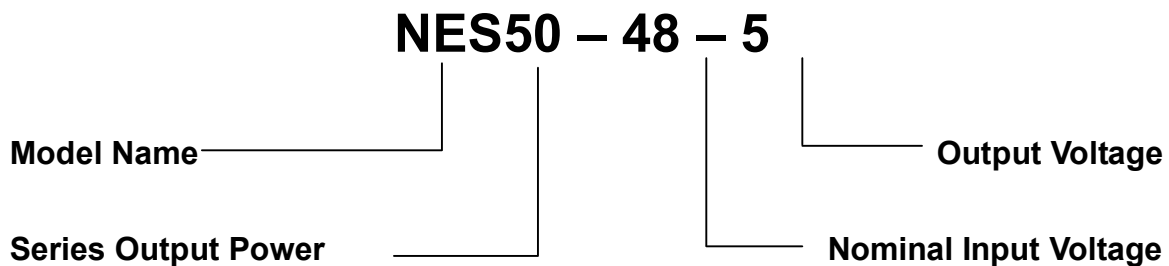
PIN NO	NAME	FUNCTION
1	+Vin	Positive Input voltage
2	CNT	Remote ON/OFF
3	-Vin	Negative input voltage
4	-Vout	Negative output voltage
5	-Sense	Negative remote sense
6	Trim	Output voltage variation
7	+Sense	Positive remote sense
8	+Vout	Positive output voltage

Ordering Information

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Input	Output	Maximum Power	Ripple & Noise Max.	Efficiency Typ.	Model Number
36~75V	1.5V@30A	45W	50mVp-p	86.79%	NES50-48-1R5
36~75V	1.8V@30A	54W	50mVp-p	87.31%	NES50-48-1R8
36~75V	2.5V@20A	50W	50mVp-p	86.18%	NES50-48-2R5
36~75V	3.3V@20A	66W	50mVp-p	88.12%	NES50-48-3R3

- Remote on/off control (Option : positive or negative logic)

Part Number Structure

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