Features

Regulated Converters

- 150W DC/DC converter in Half Brick format
- 9-75VDC ultra wide input voltage range
- 2.5kVDC/1 minute insulation
- Efficiency up to 89.5%
- -40°C to +110°C baseplate temperature range
- Fully protected with UVLO, SCP, OVP, and OLP

RECOM
DC/DC Converter

REC150H-UW

150 Watt Half Brick Single Output

Description

The REC150H-UW is a half-brick encapsulated DC/DC converter which delivers up to 150W. Its wide input voltage range makes it flexible to install on 12, 24, and 48V rails, and it is especially suitable for 12V, 24V or 48V battery supplies. The tightly-regulated, fully-protected output voltage options are 12V, 24V, 28V, 48V, or 54V - all trimmable over a +/-10% range. Aside from the common 12, 24, and 48V output voltages, additional 28V for avionic systems and 54V for PoE applications are standard.

Selection Guide

Part Number	Input Voltage Range [VDC]	nom. Output Voltage [VDC]	Output Current max. [A]	Efficiency typ. (1) [%]	Max. Capacitive Load (2) [µF]
REC150H-4812SUW	9 - 75	12	12.5	89.5	5000
REC150H-4824SUW	9 - 75	24	6.25	88.5	2000
REC150H-4828SUW	9 - 75	28	5.357	89	1500
REC150H-4848SUW	9 - 75	48	3.125	88.5	1000
REC150H-4854SUW	9 - 75	54	2.778	89	1000

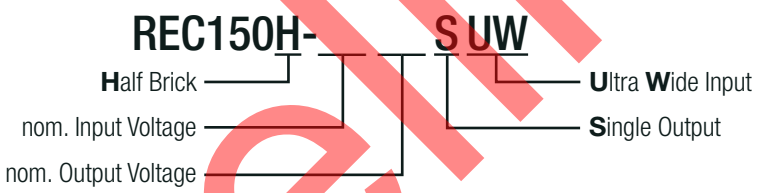
Notes:

Note1: Efficiency is tested at nominal input and full load at +25°C ambient

Note2: Maximum capacitive load is tested at V_{IN}=9VDC and constant resistive load

IEC/EN62368-1 pending
UL62368-1 pending
CAN/CSA-C22.2 No. 62368-1-19 pending

Model Numbering



Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS				
Parameter	**Condition**	**Min.**	**Typ.**	**Max.**
Internal Input Filter				Pi type
Input Voltage Range	nom. V_{IN}= 48VDC	9VDC	48VDC	75VDC
Input Surge Voltage	100ms max.			100VDC
Under Voltage Lockout (UVLO)	0% to 100%		8VDC	
Quiescent Current	nom. V_{OUT}= 12, 24, 28VDC			35mA
	nom. V_{OUT}= 48, 54VDC			75mA
Minimum Load		0%		
Output Voltage Trimming				±10%
ON/OFF CTRL	DC-DC ON	Open or 3VDC < V_{CTRL} < 12VDC		
	DC-DC OFF	Short or 0VDC < V_{CTRL} < 1.2VDC		

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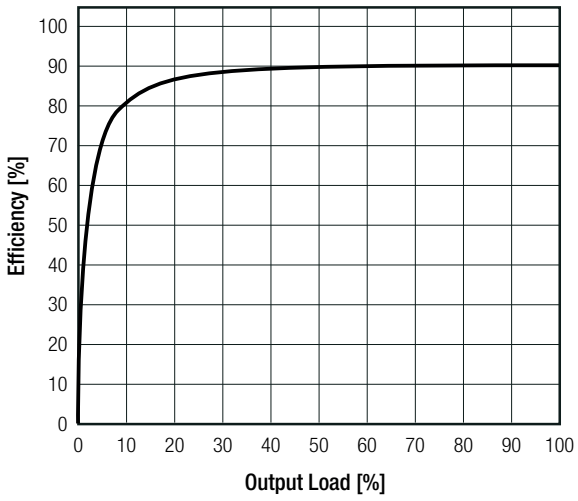
REC150H-UW Series

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

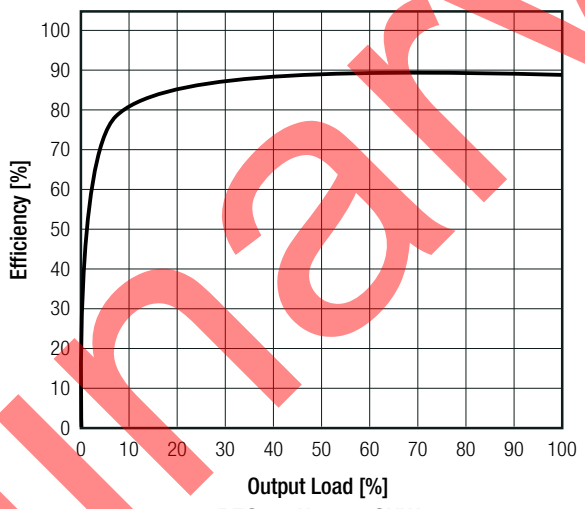
Parameter	Condition		Min.	Typ.	Max.
Start-up Time			200ms		400ms
Internal Operating Frequency				200kHz	
Output Ripple and Noise	20MHz BW	nom. V_{OUT}= 12VDC			100mVp-p
		others			240mVp-p

Efficiency vs. Load
(@ nom. V_{IN}=48VDC)

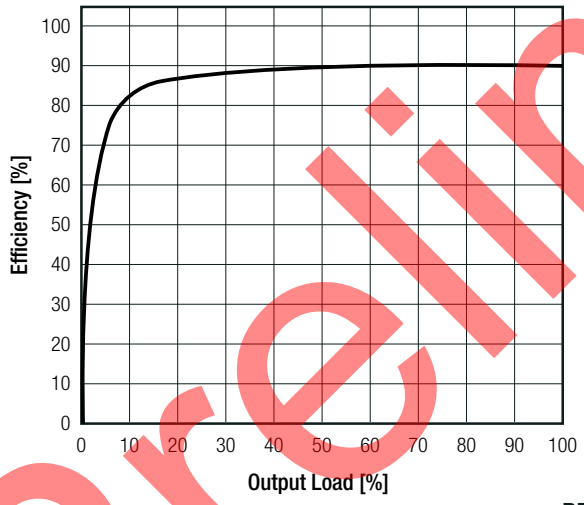
REC150H-4812SUW



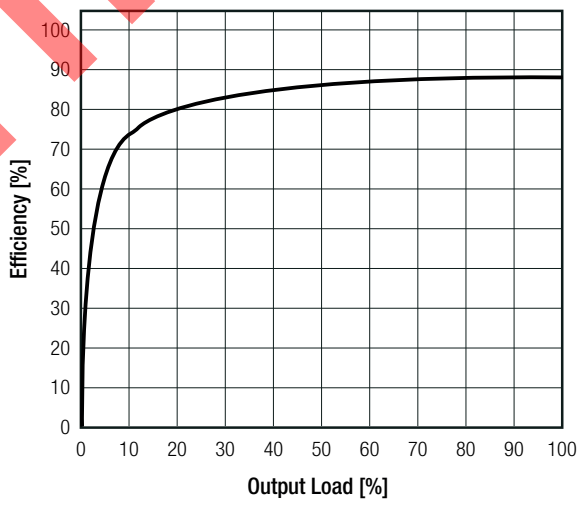
REC150H-4824SUW



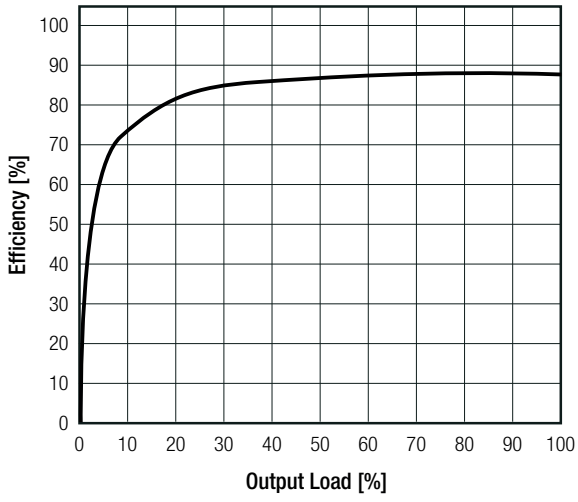
REC150H-4828SUW



REC150H-4848SUW



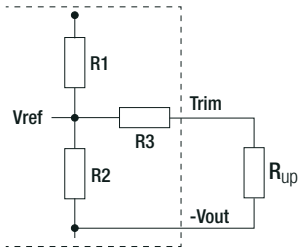
REC150H-4854SUW



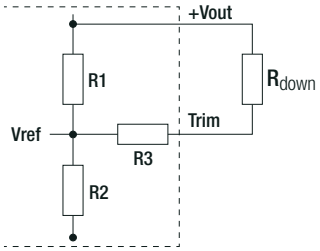
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

OUTPUT VOLTAGE TRIMMING

Trim UP



Trim DOWN



$Vout_{nom}$	R_1 [Ω]	R_2 [Ω]	R_3 [Ω]	V_{ref} [VDC]
12VDC	38k	10k	68k	2.5
24VDC	86k		76k8	
28VDC	102k		76k8	
48VDC	182k		80k6	
54VDC	206k1		82k	

Trim Calculation

$Vout_{nom}$ = nominal output voltage [VDC]
$Vout_{set}$ = trimmed output voltage [VDC]
V_{ref} = reference voltage [VDC]
R_{up} = trim up resistor [Ω]
R_{down} = trim down resistor [Ω]
R_1, R_2, R_3 = internal resistors [Ω]
k_u = trim up factor (a) [ ]
k_d = trim down factor (b) [ ]

$$k_u = \left[\frac{Vref}{Vout_{set} - Vref}\right] \times R1 \qquad R_{up} = \left[\frac{k_u * R2}{R2 - k_u}\right] - R3$$

$$k_d = \left[\frac{Vout_{set} - Vref}{Vref}\right] \times R2 \qquad R_{down} = \left[\frac{k_d * R1}{R1 - k_d}\right] - R3$$

Trim Up: $Vout_{set}$= 26.4VDC

$Vout_{nom}$ = 24V

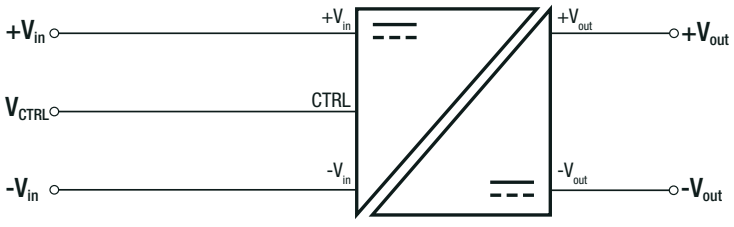
$$k_u = \left[\frac{2.5V}{26.4V - 2.5V}\right] \times 86k\Omega = \mathbf{8k995\Omega} \qquad R_{up} = \left[\frac{8.995k\Omega \times 10k\Omega}{10k\Omega - 8.995k\Omega}\right] - 76.8k\Omega = \mathbf{12k7\Omega}$$

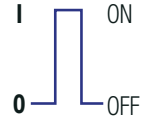
Trim down: $Vout_{set}$= 21.6VDC

$Vout_{nom}$ = 24V

$$k_d = \left[\frac{21.6 - 2.5V}{2.5V}\right] \times 10k\Omega = \mathbf{76k4\Omega} \qquad R_{down} = \left[\frac{76.4k\Omega \times 86k\Omega}{86k\Omega - 76.4k\Omega}\right] - 76.8k\Omega = \mathbf{684k4\Omega}$$

ON/OFF CTRL



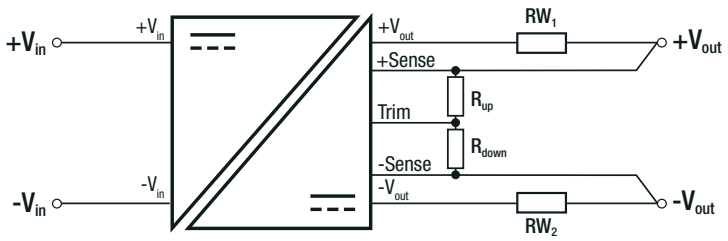


I = 3V
0 = 0V or GND

DC-DC ON: Open or 3VDC < V_{CTRL} < 12VDC
DC-DC OFF: Short or 0VDC < V_{CTRL} < 1.2VDC

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

REMOTE SENSE



The output voltage can be adjusted by both trim and remote sense. The maximum combined adjustment range is ±10%. Derate the maximum output power if using the trim or sense function to increase the output voltage.

R_{W1} = wire losses +
R_{W2} = wire losses -
R_{UP} = trim up resistor
R_{DOWN} = trim down resistor

REGULATIONS

Parameter	Condition	Value
Output Accuracy		±1.0% typ. / ±1.5% max.
Line Regulation	low line to high line, full load	±0.2% max.
Load Regulation	0% to 100% load	0.5% max.
Transient Response Recovery Time	25% load step change (75% - 100%)	500µs

PROTECTIONS

Parameter	Type		Value
Short Circuit Protection (SCP)			continuous, auto recovery
Over Voltage Protection (OVP)	shut down	nom. V_{OUT}= 12VDC	13.4 - 18VDC
		nom. V_{OUT}= 24VDC	26.9 - 36VDC
		nom. V_{OUT}= 28VDC	31.4 - 42VDC
		nom. V_{OUT}= 48VDC	53.8 - 72VDC
		nom. V_{OUT}= 54VDC	60.5 - 81VDC
Over Load Protection (OLP)			150% of rated I_{OUT}, hiccup
Isolation Voltage (3)	1 minute	I/P to O/P	2.5kVDC
Isolation Resistance	V_{ISO}= 500VDC		1GΩ min.
Isolation Capacitance			3500pF max.

Notes:

Note3: For repeat Hi-Pot testing, reduce the time and/or the test voltage

ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range (4)	with derating (refer to below calculations)		-40°C to +105°C
Max. Baseplate Temperature			+105°C
Temperature Coefficient			0.05%/K max.
Thermal Impedance			refer to ***"Thermal Calculation Example"***
Operating Altitude			5000m
Operating Humidity	non-condensing		5% - 95% RH max.
Pollution Degree			PD2
Vibration	according to MIL-STD-833G-Methode-2026-Letter-D		
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	300 x 10^3 hours

Notes:

Note4: Following calculations are made with REC150H-4812SUW. Test PCB: Eurocard 160x100mm 105µm copper, double layer

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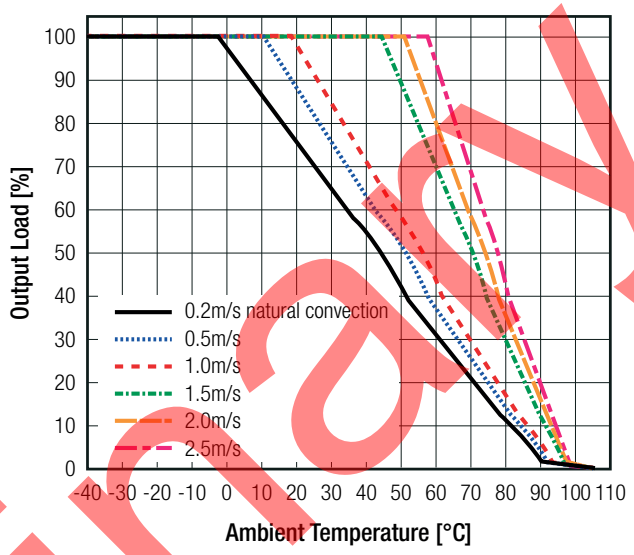
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Thermal Derating with Fan Cooling and Double Layer PCB without Heatsink

Thermal Impedance	
airflow [m/s]	Rth [K/W]
0	5.5
0.25	5.0
0.5	4.4
1.0	4.0
1.5	2.8
2.0	2.5
2.5	2.2
3.0	1.9
3.5	1.6
4.0	1.3
4.5	1.2
5.0	1.1

Thermal Calculation Example

Iout = 100%
R_{th} = 2.2K/W
P_{DISS} = 21.395W
$T_{BASEmax}$ = 105°C



T_{OVER} = R_{th} x P_{Diss} = 2.2K/W x 21.395W = **+47°C**

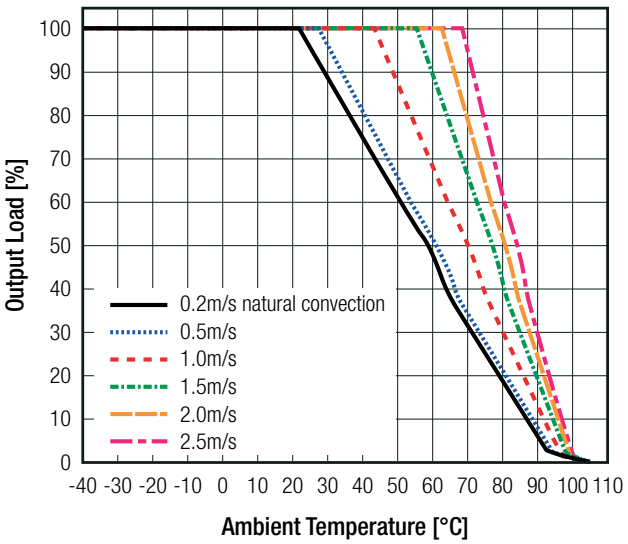
T_{AMBmax} = $T_{BASEmax}$ - T_{OVER} = 105°C - 47°C = **+58°C**

Thermal Derating with Fan Cooling, Double Layer PCB and Heat-sink

Thermal Impedance	
airflow [m/s]	Rth [K/W]
0.2	3.83
0.5	3.58
0.7	3.16
1.0	2.85
1.2	2.67
1.5	2.28
2.0	1.96
2.5	1.70
3.0	1.44
3.5	1.18
4.0	0.92
4.5	0.75
5.0	0.65

Thermal Calculation Example

Iout = 100%
R_{th} = 2.67K/W
P_{DISS} = 21.395W
$T_{BASEmax}$ = 105°C



T_{OVER} = R_{th} x P_{Diss} = 2.67K/W x 21.395W = **+57°C**

T_{AMBmax} = $T_{BASEmax}$ - T_{OVER} = 105°C - 57°C = **+48°C**

REC150H-UW Series

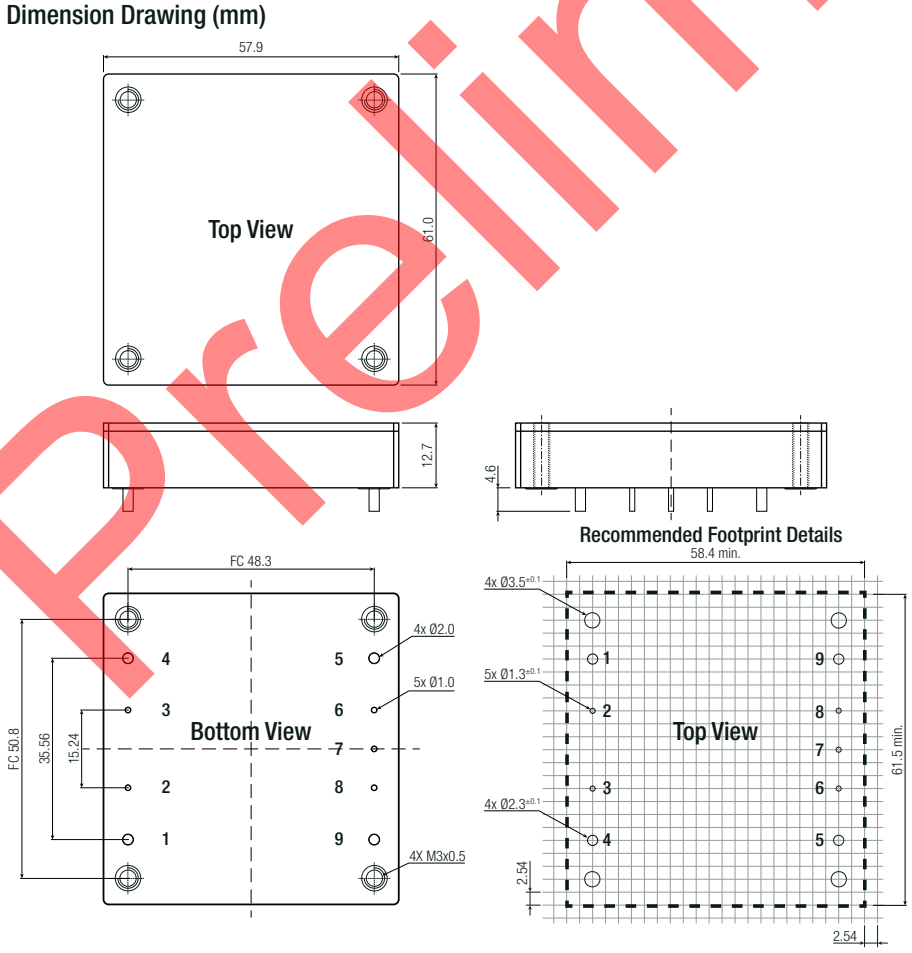
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

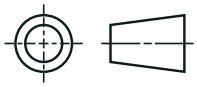
SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	**Report / File Number**	**Standard**
Audio/Video, information and communication technology equipment - Part1: Safety requirements (CB)	pending	IEC62368-1:2018 3rd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements		EN IEC 62368-1:2020+A11:2020
Audio/Video, information and communication technology equipment - Part1: Safety requirements (CB)	pending	UL62368-1:2019 3rd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements		CAN/CSA-C22.2 No. 62368-1-19 3rd Edition
RoHS		RoHS-2011/65/EU + AM-2015/863

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	with external components	EN55032:2015+A11:2020, Class A, B

DIMENSION AND PHYSICAL CHARACTERISTICS		
Parameter	**Type**	**Value**
Material	case	non-conductive black plastic, (UL94 V-0)
	baseplate	aluminum
	potting	silicone, (UL94 V-2)
	PCB	FR4, (UL94 V-1)
Dimension (LxWxH)		57.9 x 61.0 x 12.7mm
Weight		109g typ.

Dimension Drawing (mm)





Pinning Information

Pin #	Function
1	+Vin
2	CTRL
3	Case
4	-Vin
5	-Vout
6	-Sense
7	Trim
8	+Sense
9	+Vout

FC= Fixing Centers for Heat-sink
Pin Dimension Tolerance ±0.1mm

Tolerance:
xx.x= ±0.5mm
xx.xx= ±0.25mm

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

PACKAGING INFORMATION		
Parameter	**Type**	**Value**
Packaging Dimension (LxWxH)	tube	520.0 x 60.9 x 26.9mm
Packaging Quantity		7pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity	non-condensing	95% RH max.