

# Features

- 300W DC/DC converter in Half Brick format
- 9-36VDC wide input voltage range
- 3kVDC/1 minute insulation
- Fully protected with UVLO, SCP, OVP, and OLP

# Regulated Converters



## REC300H-W

**300 Watt  
Half Brick  
Single Output**



### Description

The REC300H-W is a half-brick encapsulated DC/DC converter which delivers up to 300W. The input range is 9-36VDC, and the tightly regulated, fully protected output voltage options are 12V, 15V, 24V, or 48V - all trimmable over a +/-10% range. Applications include demanding industrial power supplies, telecom, and PoE circuits.

### Selection Guide

Part Number	Input Voltage Range [VDC]	nom. Output Voltage [VDC]	Output Current max. [A]	Efficiency typ. <sup>(1)</sup> [%]	Max. Capacitive Load <sup>(2)</sup> [μF]
REC300H-2412SW	9 - 36	12	25	86.5	8800
REC300H-2415SW	9 - 36	15	20	87	8800
REC300H-2424SW	9 - 36	24	12.5	86	4300
REC300H-2448SW	9 - 36	48	6.25	87	1500

#### Notes:

- Note1: Efficiency is tested at nominal input and full load at +25°C ambient  
 Note2: Maximum capacitive load is tested by nominal input and constant resistive load

### Model Numbering



IEC/EN62368-1 pending

### 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			LC type		
Input Voltage Range	nom. V <sub>IN</sub> = 24VDC		9VDC	24VDC	36VDC
Input Surge Voltage	1000ms max.				50VDC
Under Voltage Lockout (UVLO)	0% to 100%		7VDC		
Quiescent Current	nom. V <sub>OUT</sub> = 12, 15, 24VDC			50mA	
	nom. V <sub>OUT</sub> = 48VDC			70mA	
Minimum Load			0%		
Output Voltage Trimming	V <sub>IN</sub> = 9-36VDC	nom. V <sub>OUT</sub> = 24VDC	-10%		+10%
	V <sub>IN</sub> = 12-36VDC	nom. V <sub>OUT</sub> = 12, 15VDC	-10%		+10%
		nom. V <sub>OUT</sub> = 48VDC	-10%		+15%
ON/OFF CTRL	DC-DC ON		Open or 3VDC < V <sub>CTRL</sub> < 12VDC		
	DC-DC OFF		Short or 0VDC < V <sub>CTRL</sub> < 1.2VDC		

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**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$ , full load and after warm-up unless otherwise stated)

Parameter	Condition	Min.	Typ.	Max.
Start-up Time	nom. $V_{in} = 48\text{VDC}$			200ms
Internal Operating Frequency			250kHz	
Output Ripple and Noise <sup>(3)</sup>	20MHz BW	nom. $V_{OUT} = 12\text{VDC}$	120mVp-p	
		nom. $V_{OUT} = 15\text{VDC}$	150mVp-p	
		nom. $V_{OUT} = 24\text{VDC}$	300mVp-p	
		nom. $V_{OUT} = 48\text{VDC}$	480mVp-p	

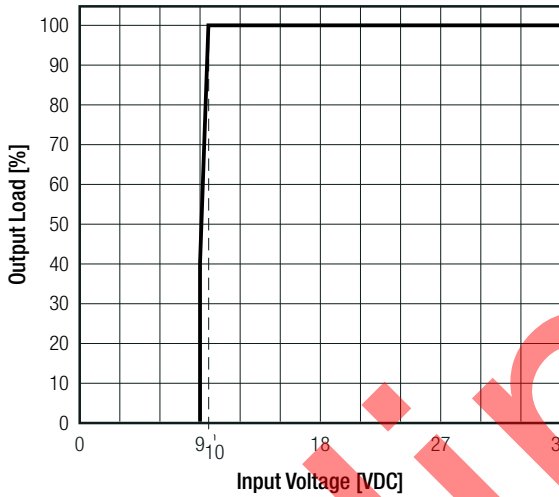
**Notes:**

Note3: Measured at 20MHz bandwidth and E-Cap,  $47\mu\text{F}/100\text{V} + \text{X7R MLCC } 0.47\mu\text{F}/100\text{V}$

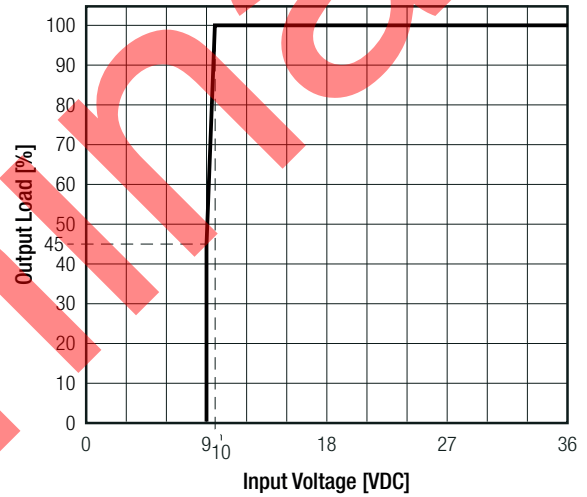
**Output Load vs. Input Voltage**

(@ nom.  $V_{in} = 24\text{VDC}$ )

REC300H-2412SW



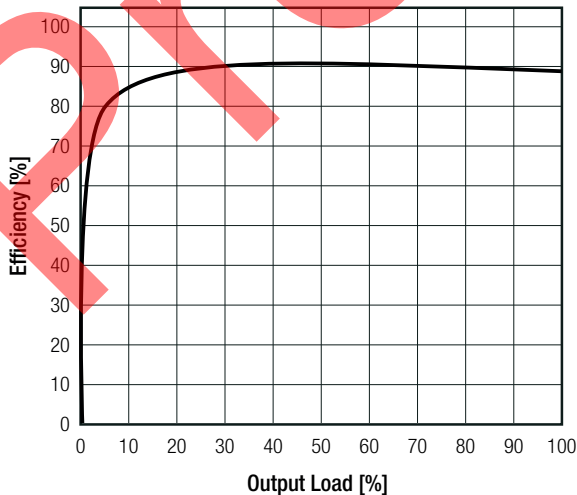
REC300H-2415SW



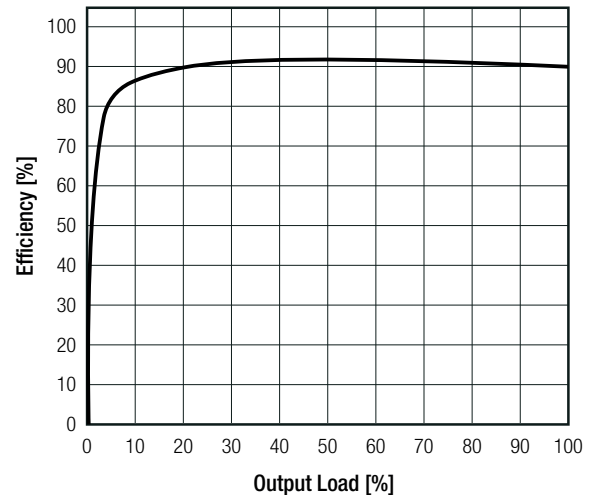
**Efficiency vs. Load**

(@ nom.  $V_{in} = 24\text{VDC}$ )

REC300H-2412SW

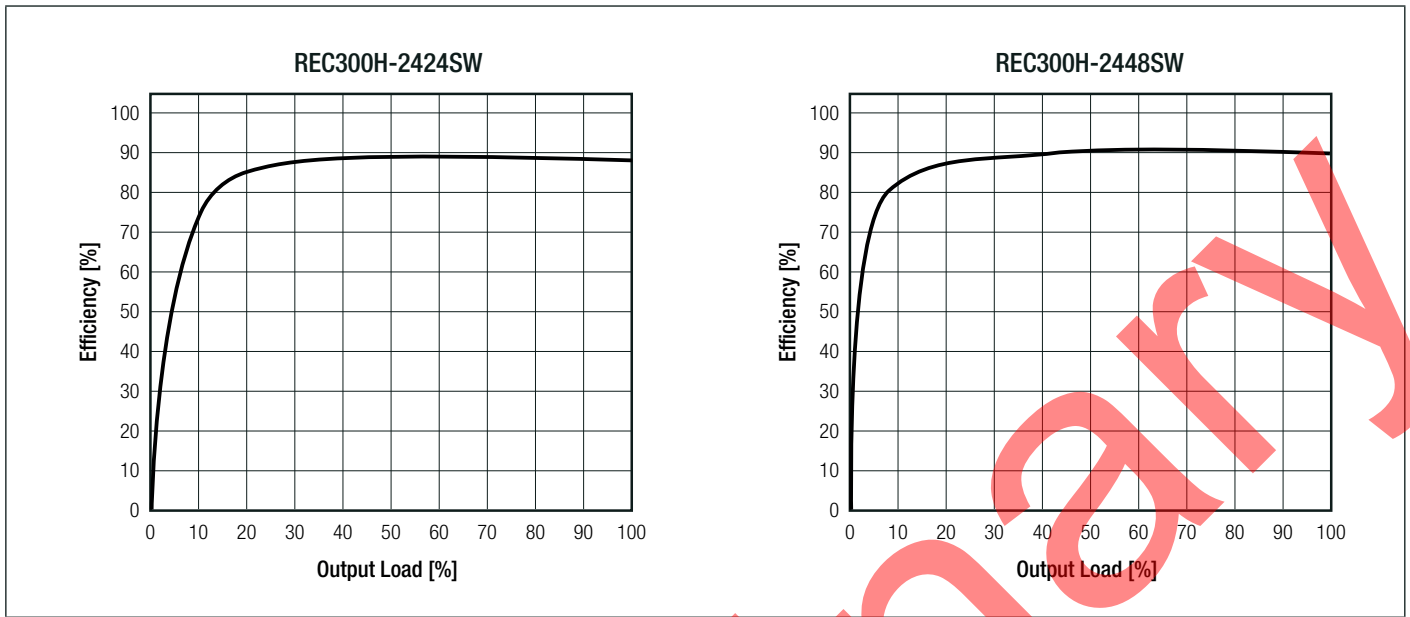


REC300H-2415SW

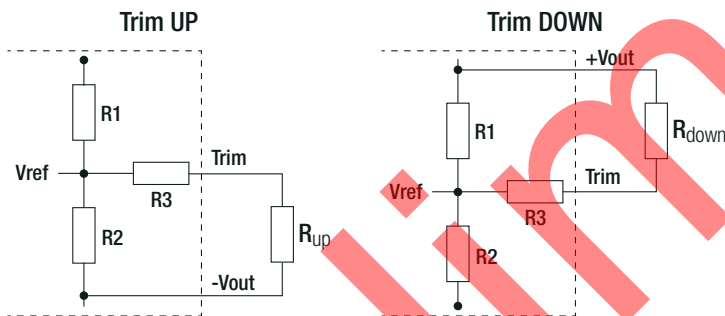


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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)



**OUTPUT VOLTAGE TRIMMING**



Vout <sub>nom</sub>	R <sub>1</sub> [Ω]	R <sub>2</sub> [Ω]	R <sub>3</sub> [Ω]	V <sub>ref</sub> [VDC]
12VDC	38k	10k	68k	2.5
15VDC	50k	10k	68k	2.5
24VDC	103k	5k6	51k	1.24
48VDC	36k4	2k	12k4	2.5

**Trim Calculation**

- Vout<sub>nom</sub> = nominal output voltage [VDC]
- Vout<sub>set</sub> = trimmed output voltage [VDC]
- V<sub>ref</sub> = reference voltage [VDC]
- R<sub>up</sub> = trim up resistor [Ω]
- R<sub>down</sub> = trim down resistor [Ω]
- R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> = internal resistors [Ω]
- k<sub>u</sub> = trim up factor (a) [ ]
- k<sub>d</sub> = trim down factor (b) [ ]

$$k_u = \left[ \frac{V_{ref}}{V_{out_{set}} - V_{ref}} \right] \times R_1$$

$$k_d = \left[ \frac{V_{out_{set}} - V_{ref}}{V_{ref}} \right] \times R_2$$

$$R_{up} = \left[ \frac{k_u \times R_2}{R_2 - k_u} \right] - R_3$$

$$R_{down} = \left[ \frac{k_d \times R_1}{R_1 - k_d} \right] - R_3$$

**Trim Up: Vout<sub>set</sub> = 26.4VDC**

Vout<sub>nom</sub> = 24V

$$k_u = \left[ \frac{1.24V}{26.4 - 1.24V} \right] \times 103k\Omega = 4k989\Omega$$

$$R_{up} = \left[ \frac{4.989k\Omega \times 5k6\Omega}{5k6\Omega - 4.989k\Omega} \right] - 51k\Omega = 3k28\Omega$$

**Trim down: Vout<sub>set</sub> = 21.6VDC**

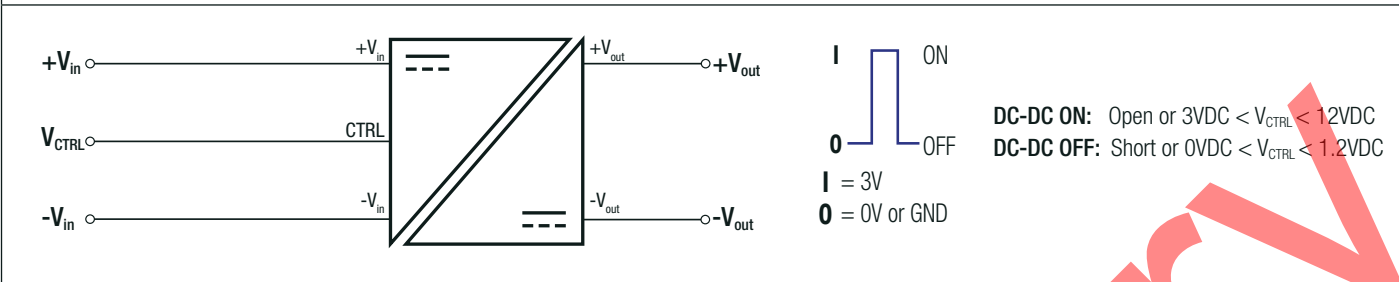
Vout<sub>nom</sub> = 24V

$$k_d = \left[ \frac{21.6 - 1.24V}{1.24V} \right] \times 5k6\Omega = 91k94\Omega$$

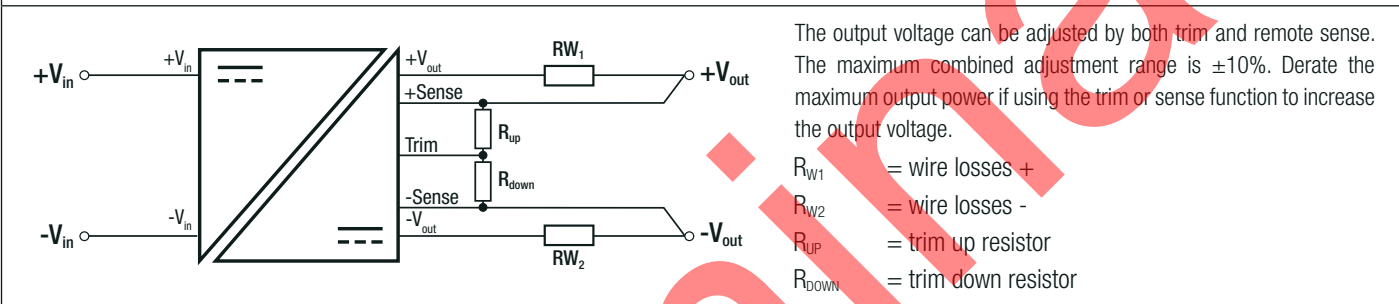
$$R_{down} = \left[ \frac{91.94k\Omega \times 103k\Omega}{103k\Omega - 91.94k\Omega} \right] - 51k\Omega = 805k95\Omega$$

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

**ON/OFF CTRL**



**REMOTE SENSE**



**REGULATIONS**

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

**PROTECTIONS**

Parameter	Type		Value
Short Circuit Protection (SCP)			continuous, auto recovery
Over Voltage Protection (OVP)	shut down	nom. $V_{OUT} = 12VDC$	13.4 - 19.2VDC
		nom. $V_{OUT} = 15VDC$	16.8 - 24VDC
		nom. $V_{OUT} = 24VDC$	26.9 - 38.4VDC
		nom. $V_{OUT} = 48VDC$	56.2 - 67.2VDC
Over Load Protection (OLP)			150% of rated $I_{OUT}$ , hiccup 3kVDC
Isolation Voltage <sup>(4)</sup>	1 minute	I/P o O/P	2kVAC (not safety certified)
	1 minute	I/P (O/P) to case	1.6kVDC 1kVAC (not safety certified)
Isolation Resistance	$V_{ISO} = 500VDC$		1G $\Omega$ min.
Isolation Capacitance			4700pF max.

**Notes:**

Note4: For repeat Hi-Pot testing, reduce the time and/or the test voltage

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

**ENVIRONMENTAL**

Parameter	Condition	Value
Operating Temperature Range <sup>(6)</sup>	with derating (refer to below calculations)	-40°C to +100°C
Max. Baseplate Temperature		+105°C
Temperature Coefficient		0.05%/K max.
Thermal Impedance		refer to "Thermal Calculation Example"
Operating Altitude		2000m
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 150 x 10 <sup>3</sup> hours

**Notes:**

Note5: Following calculations are made with REC300H-2424SW. Test PCB: Eurocard 160x100mm 105µm copper, double layer

**Thermal Derating with Fan Cooling and Double Layer PCB without Heatsink**

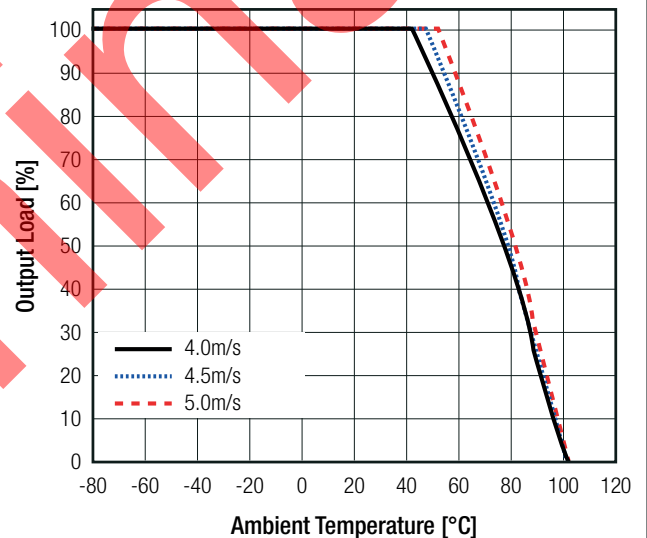
Thermal Impedance	
airflow [m/s]	R <sub>th</sub> [K/W]
0	5.5
0.25	5.0
0.5	4.4
1.0	4.0
1.5	2.8
2.0	2.5
2.5	2.2
3.0	1.9
3.5	1.6
4.0	1.3
4.5	1.2
5.0	1.1

**Thermal Calculation Example**

$$\begin{aligned}
 I_{out} &= 50\% \\
 R_{th} &= 2.5\text{K/W} \\
 P_{DISS} &= 21.395\text{W} \\
 T_{BASEmax} &= 105^\circ\text{C}
 \end{aligned}$$

$$T_{OVER} = R_{th} \times P_{DISS} = 2.5\text{K/W} \times 21.395\text{W} = +53^\circ\text{C}$$

$$T_{AMBmax} = T_{BASEmax} - T_{OVER} = 105^\circ\text{C} - 53^\circ\text{C} = +52^\circ\text{C}$$



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

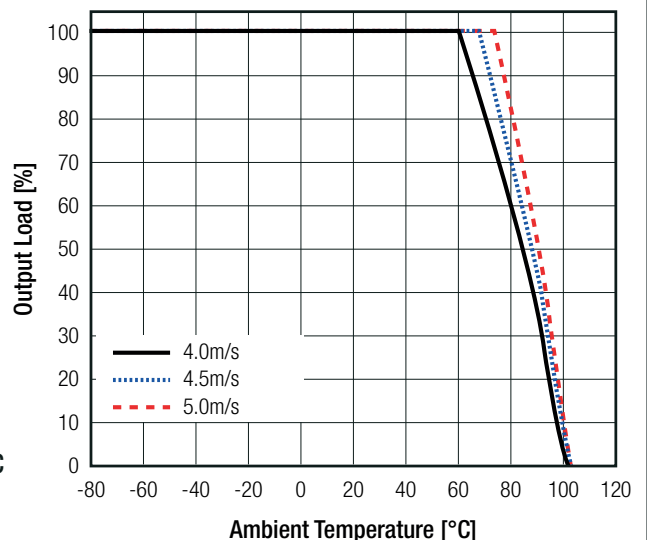
Thermal Impedance	
airflow [m/s]	R <sub>th</sub> [K/W]
0.2	3.83
0.5	3.58
0.7	3.16
1.0	2.85
1.2	2.67
1.5	2.28
2.0	1.96
2.5	1.70
3.0	1.44
3.5	1.18
4.0	0.92
4.5	0.75
5.0	0.65

**Thermal Calculation Example**

$$\begin{aligned}
 I_{out} &= 50\% \\
 R_{th} &= 2.67\text{K/W} \\
 P_{DISS} &= 21.395\text{W} \\
 T_{BASEmax} &= 105^\circ\text{C}
 \end{aligned}$$

$$T_{OVER} = R_{th} \times P_{DISS} = 2.67\text{K/W} \times 21.395\text{W} = +57^\circ\text{C}$$

$$T_{AMBmax} = T_{BASEmax} - T_{OVER} = 105^\circ\text{C} - 57^\circ\text{C} = +48^\circ\text{C}$$



**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
RoHS		RoHS-2011/65/EU + AM-2015/863

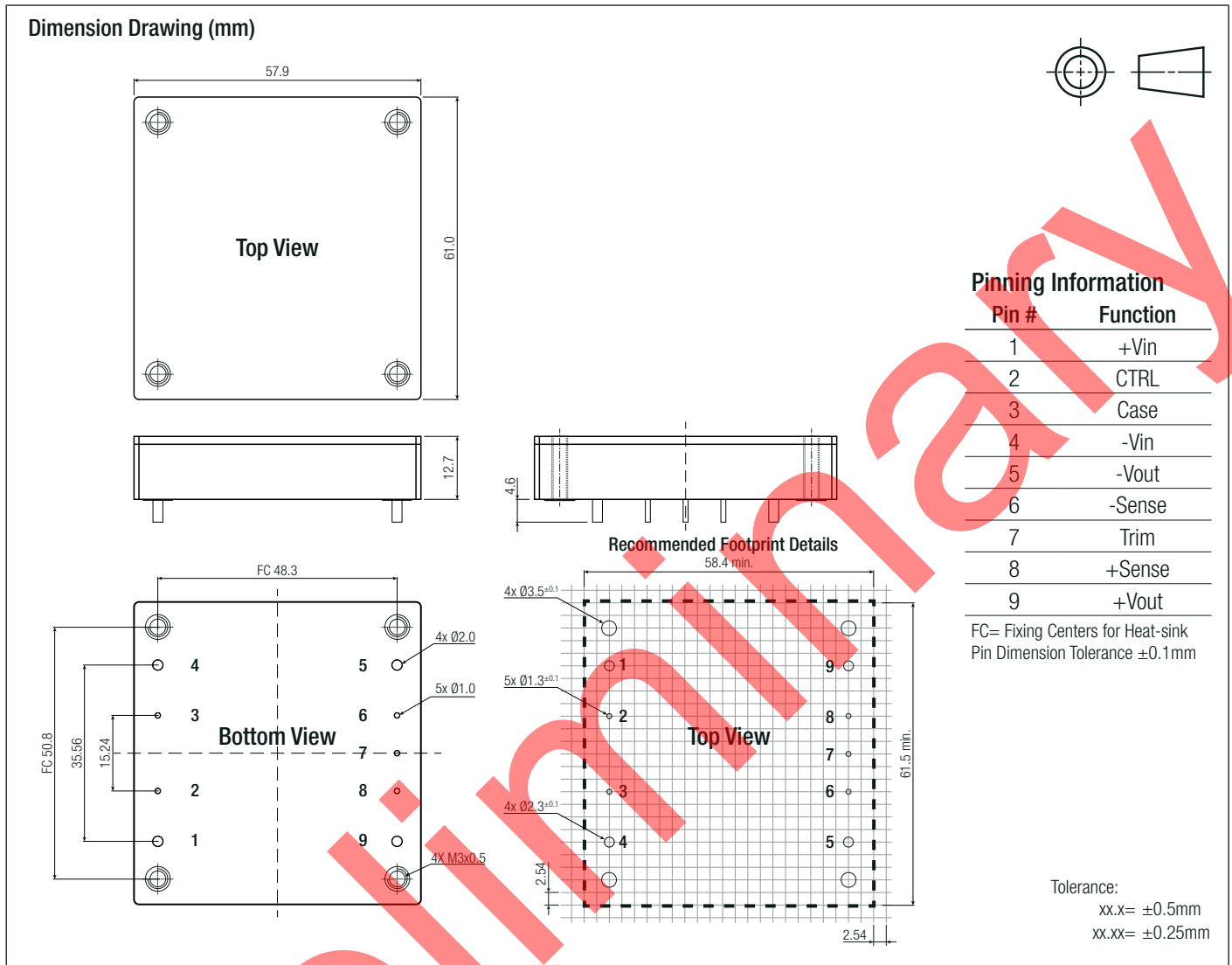
EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	with external components	EN55032:2015+A11:2020, Class A, B
ESD Electrostatic discharge immunity test	Air ±2, 4, 8kV Contact ±2, 4, 6kV	IEC61000-4-2, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m	IEC61000-4-3, Criteria A
Fast Transient and Burst Immunity	±2kV	IEC61000-4-4, Criteria A
Surge Immunity	±2kV	IEC61000-4-5, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	10Vr.m.s	IEC61000-4-6, Criteria A
Power Magnetic Field Immunity	10A/m 50Hz	IEC61000-4-8, Criteria A

### DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case	non-conductive black plastic, (UL94 V-0)
	baseplate	aluminum
	potting	silicone, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		57.9 x 61.0 x 12.7mm
Weight		120g typ.

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**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.

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