

# Features

# Regulated Converters

- 6-Side Shielding
- External ON/OFF control
- 1.6kVDC Isolation
- UL/CSA/EN-60950-1 Certified
- 2:1 Input Voltage Range
- Continuous Short Circuit Protection
- Efficiency up to 90.5%
- Fixed Switching Frequency

## Description

The REC30-xxxxS\_D -series offer single and dual regulated outputs in a 2"x1.6" package with 1.6kVDC isolation and are suitable for higher power industrial applications. Remote on/off control is standard. The higher current outputs have raised output voltages to compensate for track losses as standard. The converter is fully certified to UL/EN/IEC safety standards.

## Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. [%]	max. Capacitive Load <sup>(1)</sup> [µF]
REC30-123.4S	9-18	3.4	6000	85	10000
REC30-125.1S	9-18	5.1	6000	87	6800
REC30-1212S	9-18	12	2500	89	1800
REC30-1215S	9-18	15	2000	88	1000
REC30-1212D	9-18	±12	±1250	87	±800
REC30-1215D	9-18	±15	±1000	88	±500
REC30-243.4S	18-36	3.4	6000	87	10000
REC30-245.1S	18-36	5.1	6000	89	6800
REC30-2412S	18-36	12	2500	90	1800
REC30-2415S	18-36	15	2000	89	1000
REC30-2412D	18-36	±12	±1250	88	±800
REC30-2415D	18-36	±15	±1000	89	±500
REC30-483.4S	36-75	3.4	6000	87.5	10000
REC30-485.1S	36-75	5.1	6000	89.5	6800
REC30-4812S	36-75	12	2500	90	1800
REC30-4815S	36-75	15	2000	90.5	1000
REC30-4812D	36-75	±12	±1250	89	±800
REC30-4815D	36-75	±15	±1000	90.5	±500

### Notes:

Note1: Max. capacitive load is tested at nominal input voltage and full load.

## Model Numbering



### Ordering Examples:

REC30-4812S, Single Output, 36-75Vin and 12Vout  
 REC30-2412D, Dual Output, 18-36Vin and ±12Vout

## REC30

30 Watt

2" x 1.6"

Single and Dual Output



IEC/EN60950-1 Certified  
 UL60950 Certified  
 CSA C22.2 NO. 60950 Certified  
 EN55022 Certified

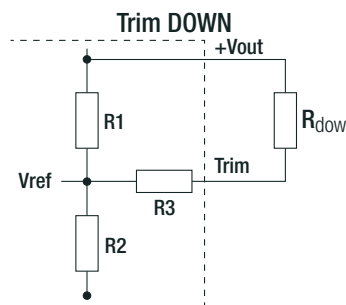
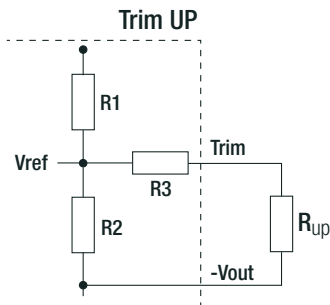
**Specifications** (measured at  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load and after warm up unless otherwise specified)

BASIC CHARACTERISTICS					
Parameter	Condition		Min.	Typ.	Max.
Input Voltage Range	nom. $V_{in} = 12\text{V}$ nom. $V_{in} = 24\text{V}$ nom. $V_{in} = 48\text{V}$		9VDC 18VDC 36VDC		18VDC 36VDC 75VDC
Start/up Time				10ms	
Under Voltage Lockout (UVLO)	nom. $V_{in} = 12\text{V}$	DC-DC ON DC-DC OFF		8.3VDC 7.9VDC	
	nom. $V_{in} = 24\text{V}$	DC-DC ON DC-DC OFF		17.4VDC 16.7VDC	
	nom. $V_{in} = 48\text{V}$	DC-DC ON DC-DC OFF		35.7VDC 34.3VDC	
Output Voltage Trimming	see calculation below				$\pm 10\%$
CTRL ON/OFF	DC-DC ON DC-DC OFF				Open or $3\text{V} < V_r < 12\text{V}$ Short or $0\text{V} < V_r < 1.2\text{V}$
Internal Operating Frequency				300kHz	
Minimum Load			0%		
Output Ripple and Noise <sup>(2)</sup>				100mVp-p	

**Notes:**

Note2: Ripple and Noise is measured with a 20MHz bandwidth and a 0.1µF ceramic capacitor.

**Output Voltage Trimming**



Vout	3.4V	5.1V	12V	15V
R1	2.1 kΩ	2.55 kΩ	9.53 kΩ	9.09 kΩ
R2	1.198 kΩ	2.449 kΩ	2.498 kΩ	1.810 kΩ
R3	6.8 kΩ	9.76 kΩ	16.9 kΩ	13 kΩ
Vref	1.24 V / 2.5 V			

**Trim Calculation**

$V_{out}$  = nom. output voltage

$\Delta V_{out}$  = output voltage trim

$R_{up}$  = trim up resistor

$R_{down}$  = trim down resistor

$a$  = trim up factor

$b$  = trim down factor

$$\Delta V_{out} = V_{out} - V_{out_{trimmed}}$$

$$R_{up} = \frac{a \cdot R2}{R2 - a} \cdot r - R3 = \text{k}\Omega$$

$$R_{down} = \frac{b \cdot R1}{R1 - b} \cdot r - R3 = \text{k}\Omega$$

$$a = \frac{V_{ref}}{(V_{out} + \Delta V_{out}) - V_{ref}} \cdot r \cdot R1 = \text{k}\Omega$$

$$b = \frac{(V_{out} + \Delta V_{out}) - V_{ref}}{V_{ref}} \cdot r \cdot R2 = \text{k}\Omega$$

**Trim Up:**

$V_{out} = 5.1\text{V}$ ,  $\Delta V_{out} = 0.51\text{V}$  (10%),  $V_{ref} = 2.5\text{V}$

$$a = \frac{2.5\text{V}}{(5.1\text{V} + 0.51\text{V}) - 2.5\text{V}} \cdot r \cdot 2.55\text{k}\Omega = \mathbf{2.043\text{k}\Omega}$$

$$R_{up} = \frac{2.043\text{k}\Omega \cdot 2.449\text{k}\Omega}{2.449\text{k}\Omega - 2.043\text{k}\Omega} \cdot r - 9.76 = \mathbf{2.573\text{k}\Omega}$$

**Trim down:**

$V_{out} = 5.1\text{V}$ ,  $\Delta V_{out} = -0.51\text{V}$  (-10%),  $V_{ref} = 2.5\text{V}$

$$b = \frac{[5.1\text{V} + (-0.51\text{V})] - 2.5\text{V}}{2.5\text{V}} \cdot r \cdot 2.449\text{k}\Omega = \mathbf{2.047\text{k}\Omega}$$

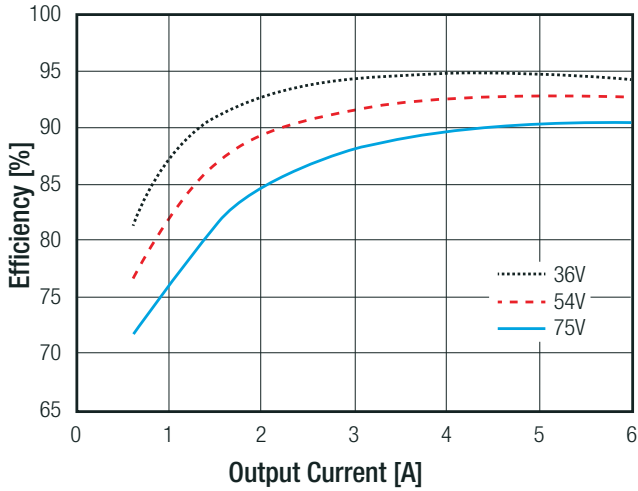
$$R_{down} = \frac{2.047\text{k}\Omega \cdot 2.55\text{k}\Omega}{2.55\text{k}\Omega - 2.047\Omega} \cdot r - 9.76\text{k}\Omega = \mathbf{0.627\text{k}\Omega}$$

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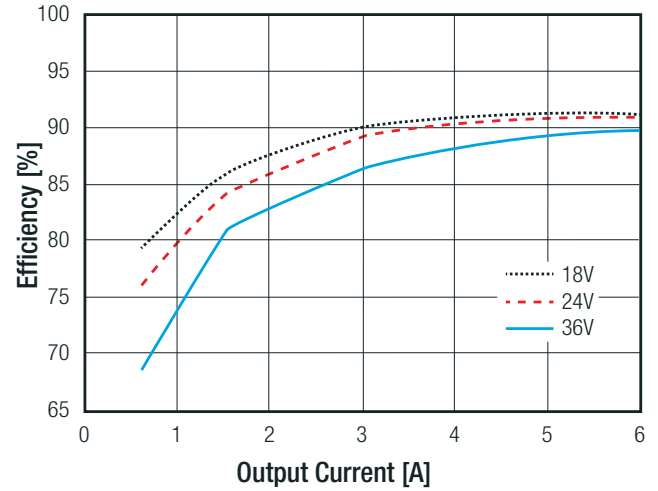
**Specifications** (measured at  $T_a=25^\circ\text{C}$ , nominal input voltage, full load and after warm up unless otherwise specified)

Efficiency vs. Load

REC30-485.1S



REC30-2415D

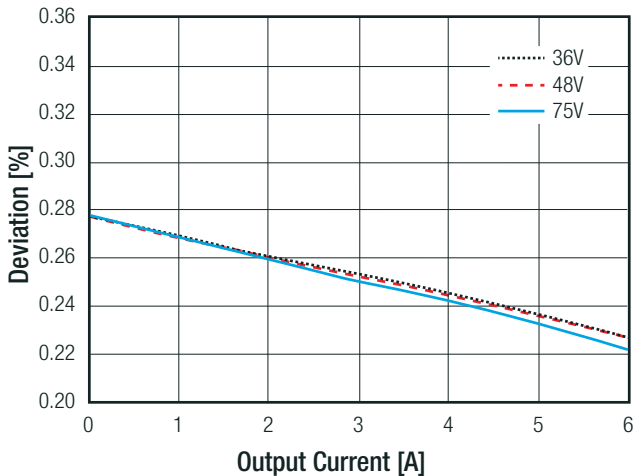


**REGULATIONS**

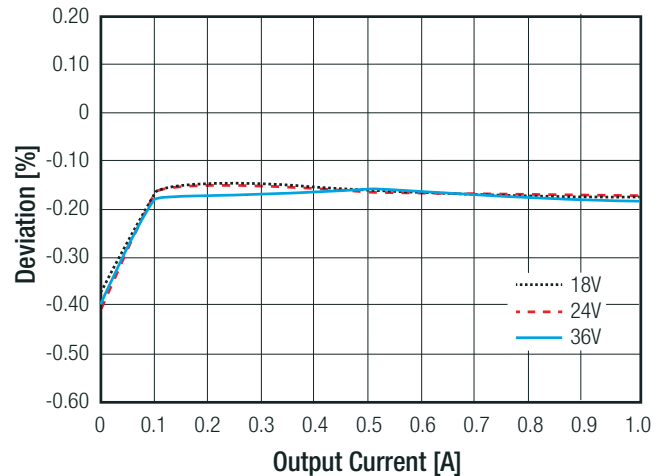
Parameter	Condition	Type	Values
Output Accuracy			$\pm 1.0\%$ max.
Line Regulation	low line to high line, full load		$\pm 0.2\%$ max.
Load Regulation	10% to 100% load	single output	$\pm 0.5\%$ max.
		dual output	$\pm 1.0\%$ max.
Cross Regulation	25% to 100% load	dual output	$\pm 5.0\%$ max.
Transient Response Recovery Time	25% load step change		250 $\mu\text{s}$ typ.

Deviation vs. Load

REC30-485.1S



REC30-2415D



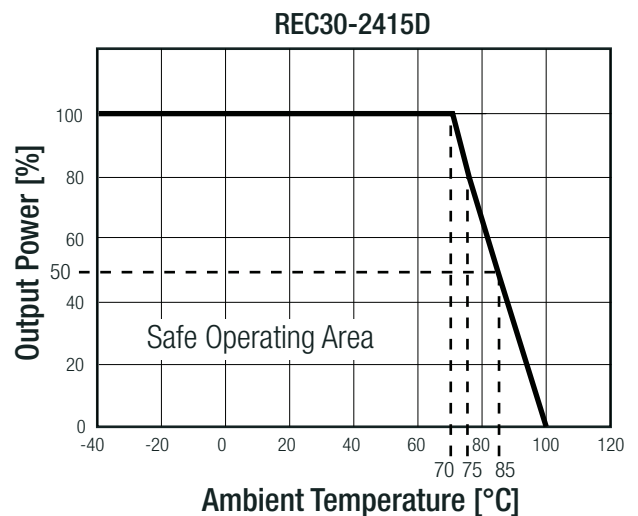
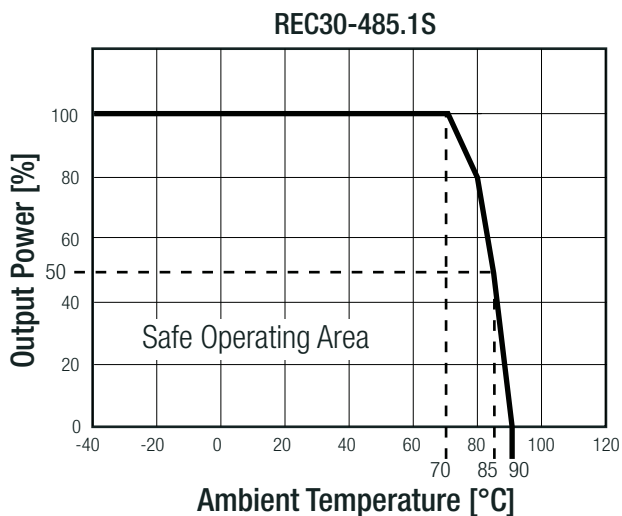
**Specifications** (measured at  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load and after warm up unless otherwise specified)

PROTECTIONS			
Parameter	Condition		Value
Short Circuit Protection (SCP)	below 100mΩ		continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode Clamp	3.4Vout	4VDC typ.
		5.1Vout	6.2VDC typ.
		12Vout	15VDC typ.
		15Vout	18VDC typ.
Over Load Protection (OLP)			180% typ.
Isolation Voltage	I/P to O/P	tested for 1 minute	1.6kVDC
Isolation Capacitance			3300pF typ.
Isolation Resistance			1GΩ min.

ENVIRONMENTAL			
Parameter	Condition		Value
Operating Temperature Range	with derating (see graph)		-40°C to +85°C
Maximum Case Temperature			+105°C
Temperature Coefficient			±0.05%/°C
Thermal Impedance	natural convection (0.1m/s)		8°C/W
Operating Altitude			5000m
Operating Humidity	non-condensing		5% - 95% RH max.
Vibration			MIL-STD-202G
MTBF	according to MIL-HDBK-217F G.B., +25°C		529 x 10 <sup>3</sup> hours

**Derating Graph**

@ nominal input voltage, full load and natural convection (0.1 m/s)



**Notes:**

Note3: For more details, please contact our technical support service at [TechsupportAT@recom-power.com](mailto:TechsupportAT@recom-power.com)

**Specifications** (measured at  $T_a=25^{\circ}\text{C}$ , nominal input voltage, full load and after warm up unless otherwise specified)

### SAFETY AND CERTIFICATIONS

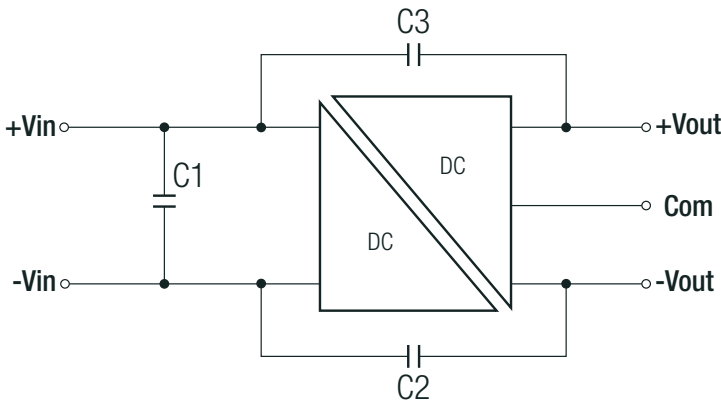
Certificate Type	Report / File Number	Standard
CB General Safety	E224736	IEC60950-1, 2nd Edition, 2013
UL General Safety		UL60950-1, 2nd Edition, 2014
EN General Safety		EN60950-1, 2nd Edition, 2013
CAN/CSA General Safety		C22.2 No. 60950-1-07, 2014

EMC Compliance	Condition	Standard / Criterion
EMI	with external filter (see filter suggestions)	EN55022, Class A,B
ESD	Air: $\pm 8\text{kV}$ ; Contact: $\pm 4\text{kV}$	EN61000-4-2, Criteria B
Radiated Immunity	10V/m	EN61000-4-3, Criteria A
Fast Transient	$\pm 1\text{kV}$	EN61000-4-4, Criteria B
Surge <sup>(4)</sup>	$\pm 1\text{kV}$	EN61000-4-5, Criteria A
Conducted Immunity	10Vr.m.s	EN61000-4-6, Criteria A
Power Magnetic Field	50Hz 1A/m (r.m.s)	EN61000-4-8, Criteria A

**Notes:**

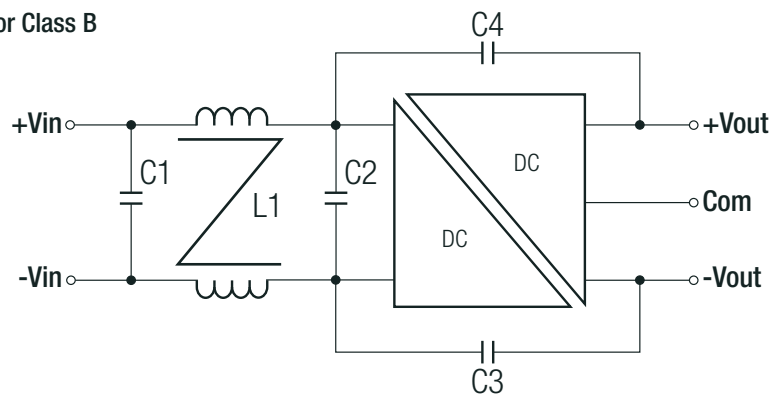
Note4: An external MOV is required if the module has to meet EN61000-4-5. The MOV suggest: NichTek SVI32-380

#### EMC Filtering - Suggestions for Class A



MODEL	C1	C2	C3
REC30-12xxS	330 $\mu\text{F}$ /50V	2200pF/3kV	NA
REC30-24xxS	330 $\mu\text{F}$ /50V	2200pF/3kV	NA
REC30-48xxS	330 $\mu\text{F}$ /100V	2200pF/3kV	NA
REC30-12xxD	330 $\mu\text{F}$ /50V	2200pF/3kV	2200pF/3kV
REC30-24xxD	330 $\mu\text{F}$ /50V	2200pF/3kV	2200pF/3kV
REC30-48xxD	330 $\mu\text{F}$ /100V	2200pF/3kV	2200pF/3kV

#### EMC Filtering - Suggestions for Class B



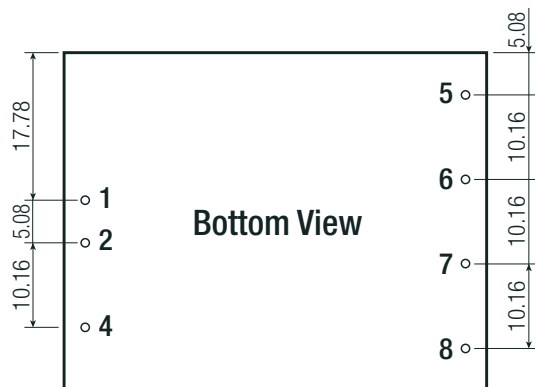
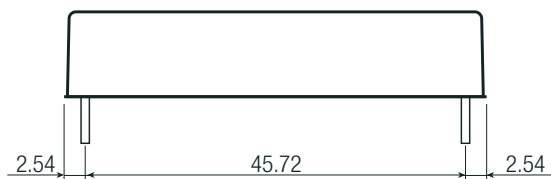
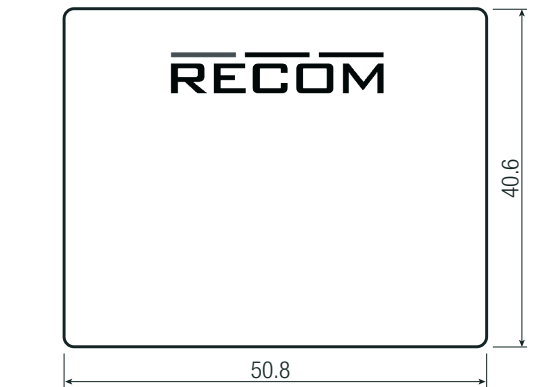
MODEL	C1	C2	L1	C3	C4
REC30-12xxS	330 $\mu\text{F}$ /50V	10 $\mu\text{F}$ /50V	1.3mH CMC	2200pF/3kV	NA
REC30-24xxS	330 $\mu\text{F}$ /50V	10 $\mu\text{F}$ /50V	1.3mH CMC	2200pF/3kV	NA
REC30-48xxS	330 $\mu\text{F}$ /100V	10 $\mu\text{F}$ /100V	1.3mH CMC	2200pF/3kV	NA
REC30-12xxD	330 $\mu\text{F}$ /50V	10 $\mu\text{F}$ /50V	1.3mH CMC	2200pF/3kV	2200pF/3kV
REC30-24xxD	330 $\mu\text{F}$ /50V	10 $\mu\text{F}$ /50V	1.3mH CMC	2200pF/3kV	2200pF/3kV
REC30-48xxD	330 $\mu\text{F}$ /100V	10 $\mu\text{F}$ /100V	1.3mH CMC	2200pF/3kV	2200pF/3kV

**Specifications** (measured at  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load and after warm up unless otherwise specified)

### DIMENSION and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case	nickel plated copper
	Base	non conductive black plastic
	PCB	FR4
	Potting	epoxy (UL94 V-0)
Package Dimension (LxWxH)		50.8 x 40.6 x 10.2mm
Package Weight		48g typ.

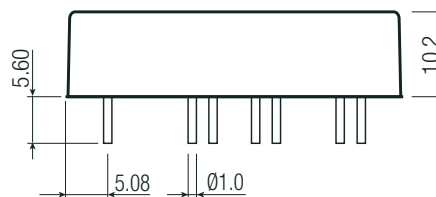
### Dimension Drawing (mm)



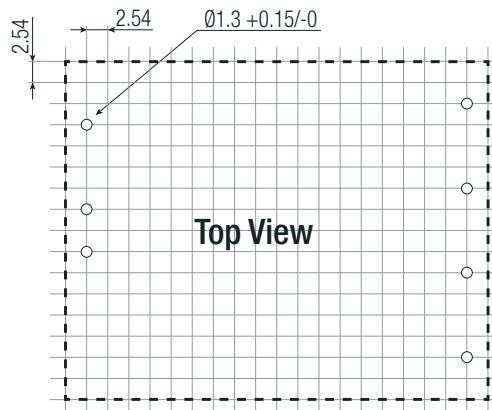
### Pin Connections

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
4	CTRL ON/OFF	
5	No Pin	+Vout
6	+Vout	Com
7	-Vout	-Vout
8	Trim	Trim

Tolerance: xx.x= ±0.5mm  
 xx.xx= ±0.35mm  
 Pin dimension: ±0.05mm



### Recommended Footprint Details



### PACKAGING INFORMATION

Packaging Dimension (LxWxH)	tube	520.0 x 54.5 x 21.0mm
Packaging Quantity		11pcs
Storage Temperature Range		-55°C to +125°C

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[REC30-125.1S](#) [REC30-1212D](#) [REC30-1215D](#) [REC30-485.1S](#) [REC30-2415S](#) [REC30-4812S](#) [REC30-483.4S](#)  
[REC30-2412D](#) [REC30-4815D](#) [REC30-4812D](#) [REC30-4815S](#)