

# Features

## Regulated Converters

- 8kVDC & 10kVDC Reinforced Isolation
- Industry Standard DIP24 Package
- 3.5W Regulated Output
- Continuous Short Circuit Protection
- Wide Input 2:1
- Medical Approved
- EN, CSA and CB Certificates
- 2 Pinout Options
- Control Pin Option
- Efficiency to 86%

### Description

The REC3.5 series uses a reinforced isolation transformer to offer exceptionally high isolation of 8kVDC (4kVAC/1 minute) or 10kVDC (5kVAC/1minute) making it suitable for HT monitoring circuits, mains power meters, IGBT isolated power supplies and other sophisticated industrial and medical applications. The isolation capacitance of only 20pF makes them also suitable for low leakage applications. The isolation transformer is recognised by CSA as reinforced isolated with a minimum internal clearance of 2.4mm and a minimum internal creepage clearance of 4.6mm. The REC3.5 is available in two industry-standard pinouts (= "/A" or "/C"). Remote on/off control is possible with the /CTRL option (A pinning only) and an optional undervoltage lockout function is also available (= "/X1"). The converters can deliver 140% rated power for short periods of time to cope with applications with large capacitive loads or high start up currents.

### Selection Guide

Part Number DIP24	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Efficiency (%)	Max Capacitive Load <sup>(1)</sup>
REC3.5-xx05SRW/R*	9 - 18, 18 - 36, 36 - 75 4.5 - 9	5	700	80, 81, 82 77	4700µF
REC3.5-xx09SRW/R*	9 - 18, 18 - 36, 36 - 75 4.5 - 9	9	388	81, 82, 83 80	3300µF
REC3.5-xx12SRW/R*	9 - 18, 18 - 36, 36 - 75 4.5 - 9	12	290	82, 83, 84 82	2200µF
REC3.5-xx15SRW/R*	9 - 18, 18 - 36, 36 - 75 4.5 - 9	15	233	84, 85, 86 83	2200µF
REC3.5-xx24SRW/R*	9 - 18, 18 - 36, 36 - 75 4.5 - 9	24	145	83, 84, 85 82	1000µF
REC3.5-xx05DRW/R*	9 - 18, 18 - 36, 36 - 75 4.5 - 9	±5	±350	80, 81, 82 77	±2200µF
REC3.5-xx09DRW/R*	9 - 18, 18 - 36, 36 - 75 4.5 - 9	±9	±194	81, 82, 83 80	±1600µF
REC3.5-xx12DRW/R*	9 - 18, 18 - 36, 36 - 75 4.5 - 9	±12	±145	81, 82, 83 82	±1000µF
REC3.5-xx15DRW/R*	9 - 18, 18 - 36, 36 - 75 4.5 - 9	±15	±117	82, 83, 84 80	±1000µF

R\* = R8 or R10 for 8kVDC or 10kVDC isolation.

Note 1: Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter.

\* add suffix "/A" or "/C" for pinning options, see next page for details.

\* add suffix "/CTRL" for control pin option (A Pinning only)

\* add suffix "/X1" for Undervoltage Lockout

#### 2:1 Input

(REC3.5-S\_DRW/R8(R10))

xx = 4.5-9Vin = 05

xx = 9-18Vin = 12

xx = 18-36Vin = 24

xx = 36-75Vin = 48

#### Ordering Examples:

REC3.5-0512DRW/R8/A/CTRL= 5V Vin, ±12V Vout, 8kVDC isolation, pinout "A", control pin

REC3.5-4805SRW/R10/A = 48V Vin, 5V Vout, 10kVDC isolation, pinout "A"

REC3.5-1212DRW/R8/C/X1 = 12V Vin, ±12V Vout, 8kVDC isolation, pinout "C", UVL

REC3.5-0505SRW/R10/A/CTRL/X1 = 5V Vin, 5V Vout, 10kVDC isolation, pinout "A", control pin, UVL

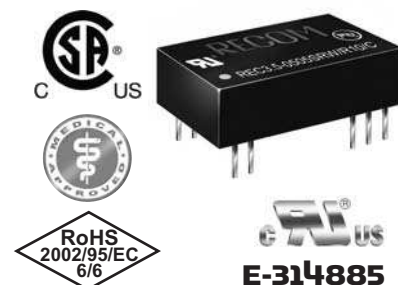
## ECONOLINE

DC/DC-Converter

with 3 year Warranty



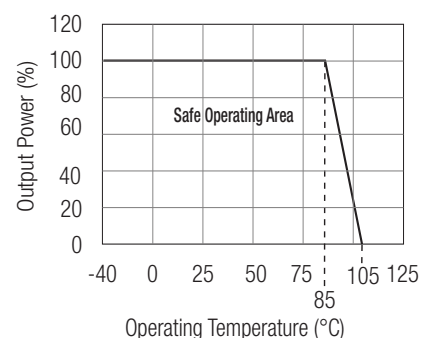
## 3.5 Watt DIP24 Reinforced Single & Dual Output



**C22.2-No. 60950 Certified**  
**C22.2-601.1 Certified**  
**UL-60601.1 Certified**

## REC3.5/R

## Derating-Graph (Ambient Temperature)



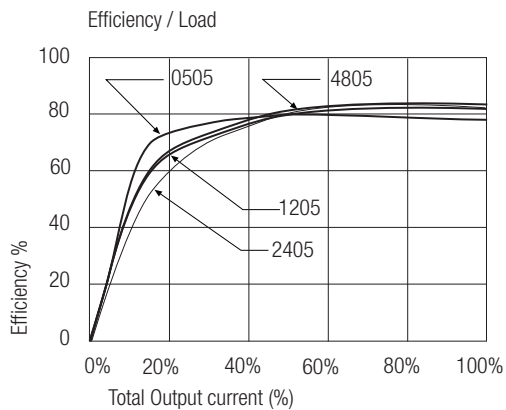
Refer to Application Notes

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

Input Voltage Range			2:1
Output Voltage Accuracy			$\pm 2\%$ max.
Line Regulation	(HL-LL)		$\pm 0.3\%$ max.
Load Regulation	(for output load current change from 20% to 100%)		$\pm 0.6\%$ max.
Input Surge	(1 minute)	5V types	16V max.
		12V types	25V max.
		24V types	50V max.
		48V types	100V max.
Undervoltage Lockout	(/X1 Versions)	5V types	3.5V typ. ( $\pm 20\%$ )
		12V types	7V typ. ( $\pm 20\%$ )
		24V types	15V typ. ( $\pm 10\%$ )
		48V types	32V typ. ( $\pm 10\%$ )
Output Ripple and Noise	(0,1 $\mu\text{F}$ capacitor on output, 20MHz BW limited)		150mVp-p max.
Transient Response	(25% step change)		1 ms typ.
Switching Frequency	(Full load and nominal input voltage)		150kHz min. / 500kHz max.
Input Filter			Pi Network
Capacitors	All types		MLCC capacitors only
Minimum Load	(Operation under no load will not damage the converter, but it may not meet all specifications)		10% Full Load
No Load Power Consumption			400mW max.
Isolation Voltage	R8 types	(tested for 1 second)	8000VDC
		(rated for 1 minute)	4000VAC / 60Hz
Isolation Voltage	R10 types	(tested for 1 second)	10000VDC.
		(rated for 1 minute)	5000VAC / 60Hz
Isolation Capacitance			20pF typ.
Isolation Resistance			10 G $\Omega$ min.
Short Circuit Protection	(Max operating temp. = 60°C during short circuit conditions)		Continuous, Auto Restart
Operating Temperature Range	(free air convection)		-40°C to +85°C (see Graph)
Case Temperature			105°C max.
Storage Temperature Range			-55°C to +125°C
Relative Humidity			95% RH
Case Material			Non-Conductive Plastic
Potting Material			Silicone
Thermal Impedance	Natural convection		20°C/W
Package Weight			14g
Packing Quantity			15 pcs per Tube
MTBF (+25°C) (+75°C)	} Detailed Information see Application Notes chapter "MTBF"	using MIL-HDBK 217F	1206 x 10 <sup>3</sup> hours
		using MIL-HDBK 217F	392x 10 <sup>3</sup> hours
EMC (with 470 $\mu\text{F}$ /0.1 $\mu\text{F}$ capacitors across input)	Conducted Emissions	EN55022	Class A
	Radiated Emissions	EN55022	Class A
Reinforced Isolation	Transformer Creepage	/R8 and /R10 Types	4.6 mm min.
	Transformer Clearance	/R8 and /R10 Types	2.4 mm min.
	PCB Creepage & Clearance	/R8 and /R10 Types	6.0 mm min.
	Optocoupler Creepage	/R8 and /R10 Types	6.0 mm min.
External Creepage and Clearance	Plastic Case	Input <-> Output pins	14.2 mm min.
Certifications	CB Report	Medical Safety	Ref: CA/11158/CSA IEC60601-1:1988 + A1: 1991 + A2:1995
	CSA	Medical Safety	Report: 2202478 C22.2 601-1 2nd Ed.
	UL	Medical Safety	E314885 UL 60601-1
	UL 60950-1 1st Ed.	General Safety	Report: 2219431 C22.2 No. 60950-1-03 Recognised as Reinforced Isolation Supplement to Report: 2219431

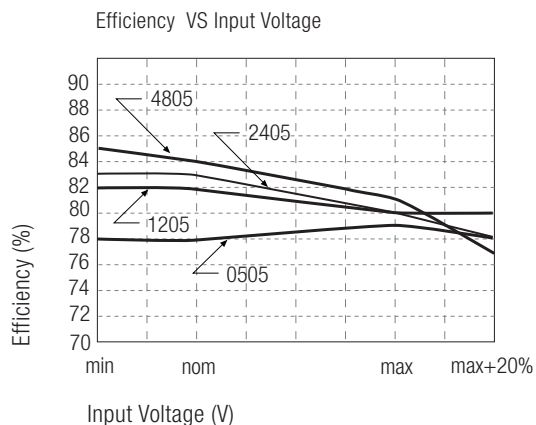
### Typical Characteristics - Continued

#### Efficiency vs Load

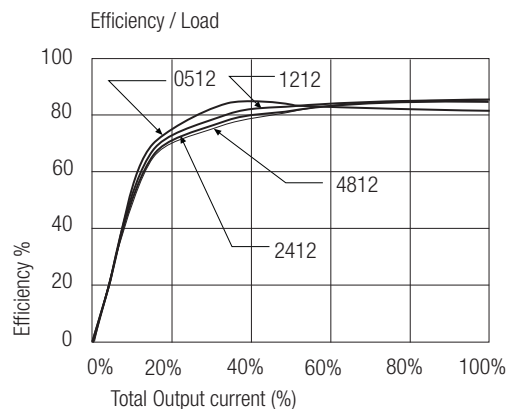


REC3.5-xx05SRW/R\*  
REC3.5-xx05DRW/R\*

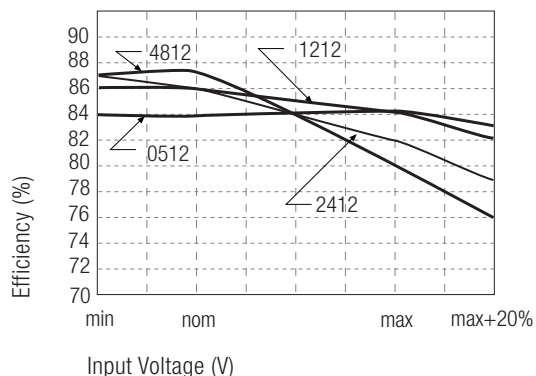
#### Efficiency vs Vin



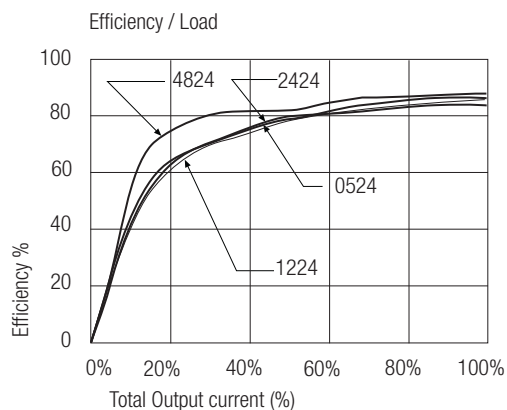
REC3.5-xx12SRW/R\*



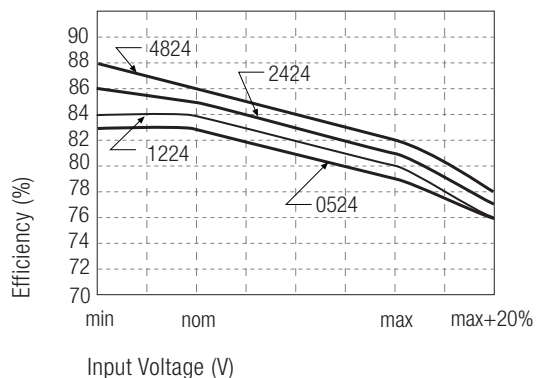
#### Efficiency VS Input Voltage



REC3.5-xx24SRW/R\*  
REC3.5-xx12DRW/R\*



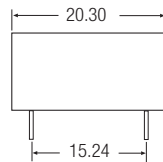
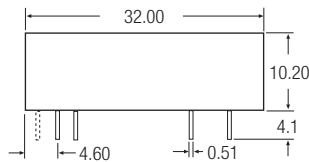
#### Efficiency VS Input Voltage



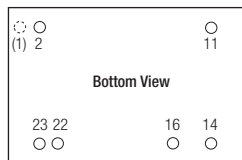
REC3.5/R



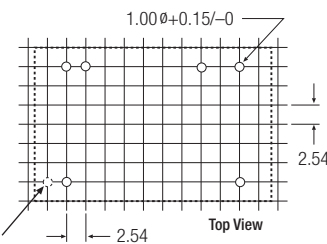
### "A" Pinning /R8 & /R10



#### Recommended Footprint Details



CRTL Version only



#### Pin Connections

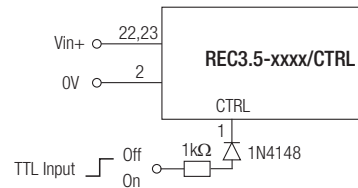
Pin #	Single	Dual
1 (option)	CTRL	CTRL
2	-Vin	-Vin
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Com
22	+Vin	+Vin
23	+Vin	+Vin

NC = No Connection

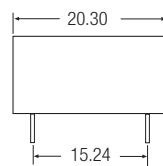
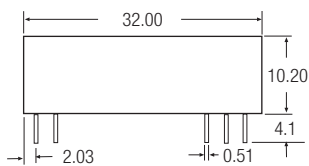
XX.X ± 0.5 mm  
XX.XX ± 0.25 mm

### CTRL Option

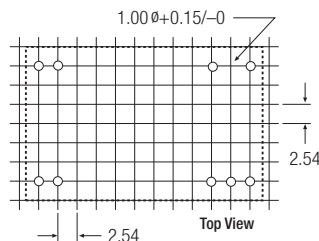
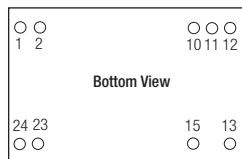
ON = Open or  $0V < V_{ctrl} < 1.2V$   
OFF =  $2.2V < V_{ctrl} < 12V$



### "C" Pinning /R8 & /R10



#### Recommended Footprint Details



#### Pin Connections

Pin #	Single	Dual
1	+Vin	+Vin
2	+Vin	+Vin
10	NC	Com
11	NC	Com
12	-Vout	NC
13	+Vout	-Vout
15	NC	+Vout
23	-Vin	-Vin
24	-Vin	-Vin

NC = No Connection

XX.X ± 0.5 mm  
XX.XX ± 0.25 mm