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%

ECONOLINE
DC/DC-Converter
with 3 year Warranty

RECOM

3.5 Watt DIP24 Reinforced Single & Dual Output

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 recognized 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.

RoHS 2011/65/EU 6/6

E-314885

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

REC3.5/R

Selection Guide

Part Number DIP24	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Efficiency (%)	Max Capacitive Load [1]
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

Derating-Graph
(Ambient Temperature)

Safe Operating Area

Output Power (%) vs Operating Temperature (°C)
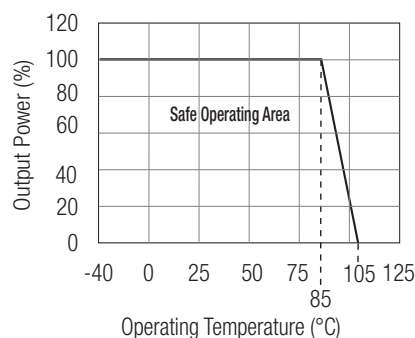
Refer to Application Notes

REC3.5/R

Specifications (measured at T_A = 25°C, nominal input voltage, full load and after warm-up)

Input Voltage Range			2:1
Output Voltage Accuracy			±2% max.
Line Regulation	(HL-LL)		±0.3% max.
Load Regulation	(for output load current change from 20% to 100%)		±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. (±20%)
		12V types	7V typ. (±20%)
		24V types	15V typ. (±10%)
		48V types	32V typ. (±10%)
Output Ripple and Noise	(0,1µF capacitor on output, 20MHz BW limited)		150mVp-p max.
Transient Response	(25% step change)		1ms 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)		20% Full Load
No Load Power Consumption			400mW max.
Isolation Voltage	R8-Suffix	(tested for 1 second)	8000VDC
		(rated for 1 minute**)	4000VAC / 60Hz
Isolation Voltage	R10-Suffix	(tested for 1 second)	10000VDC.
		(rated for 1 minute**)	5000VAC / 60Hz
Isolation Capacitance			20pF typ.
Isolation Resistance			10 GΩ 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)	*Detailed Information see Application Notes chapter "MTBF"*	using MIL-HDBK 217F	1206 x 10^3 hours
(+75°C)		using MIL-HDBK 217F	392x 10^3 hours
EMC	Conducted Emissions	EN55022	Class A
(with 470µF//0.1µF capacitors across input)	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	EN Medical Safety	Report: MDD1207051 + RM1207051	EN 60601-1 3rd Edition
		Medical Report + ISO14971 Risk Assessment	
	IEC Medical Safety	CB Report: CA-10168-A1-UL	IEC 60601-1 3rd Edition
	CSA Medical Safety	Report: 2202478	C22.2 601-1 2nd Ed.
	UL Medical Safety	E314885-A4	UL 60601-1 3rd Edition
	General Safety	Report: 2219431	C22.2 No. 60950-1-03
	UL 60950-1 1st Ed.	Recognised as Reinforced Isolation	Supplement to Report: 2219431

**Any data referred to in this datasheet are of indicative nature and based on our practical experience only. For further details, please refer to our Application Notes.
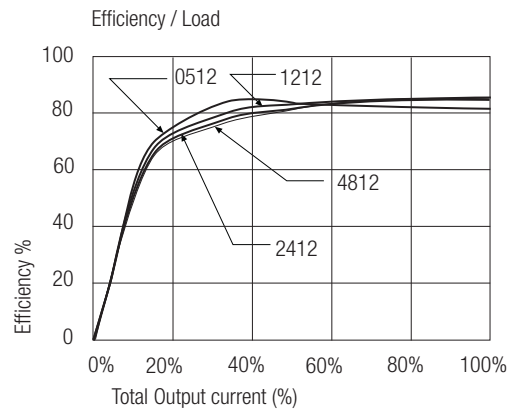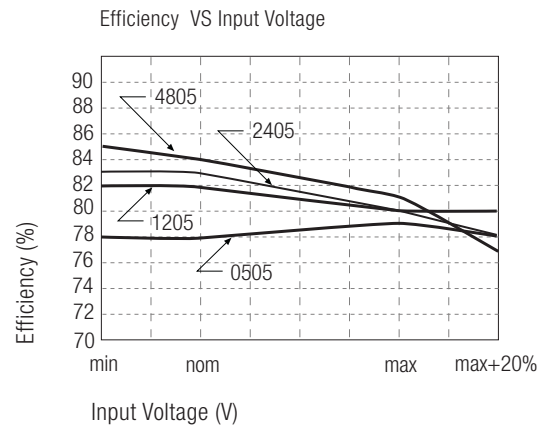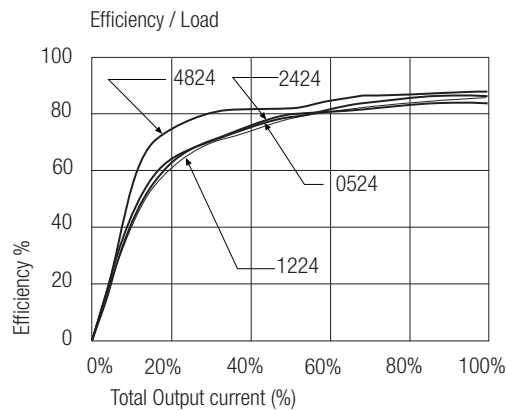
Efficiency vs Load
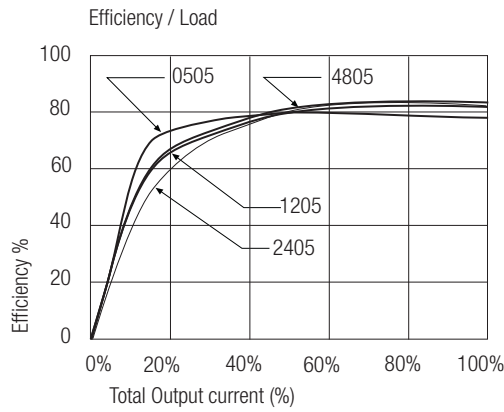
Efficiency vs Vin

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

Efficiency / Load

Efficiency VS Input Voltage

REC3.5-xx12SRW/R*

Efficiency / Load

Efficiency VS Input Voltage
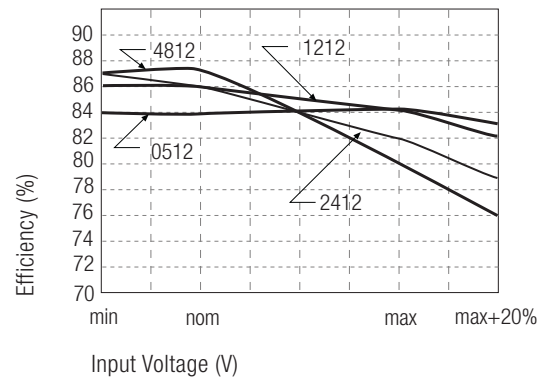
REC3.5-xx24SRW/R*
REC3.5-xx12DRW/R*

Efficiency / Load

Efficiency VS Input Voltage

REC3.5/R

Package Style and Pinning (mm) DIP 24 , Wide Input 2:1

"A" Pinning

/R8 & /R10

32.00
10.20
4.1 +0.25 /-0.5
4.60
0.51
20.30
15.24

Recommended Footprint Details

(1) 2
11

Bottom View

23 22
16 14

CRTL Version only

1.00 ⌀ +0.15/–0
2.54
2.54
Top View
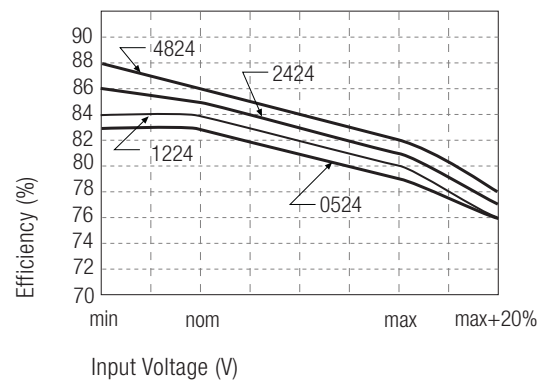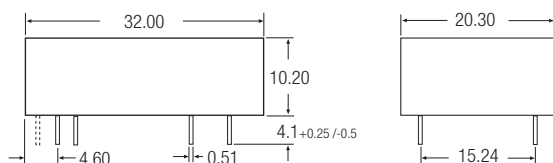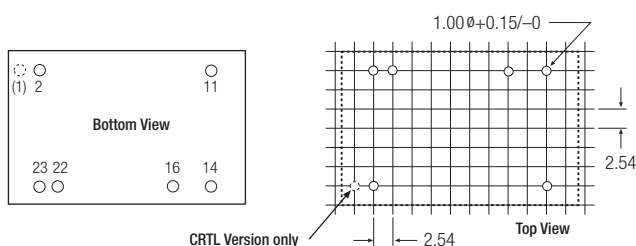
Pin Connections

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

Vin+ 22,23
0V 2
REC3.5-xxxx/CTRL
CTRL
1
1kΩ 1N4148
TTL Input Off On

"C" Pinning

/R8 & /R10

32.00
10.20
4.1 +0.25 /-0.5
2.03
0.51
20.30
15.24

Recommended Footprint Details

1 2
10 11 12

Bottom View

24 23
15 13

1.00 ⌀ +0.15/–0
2.54
2.54
Top View
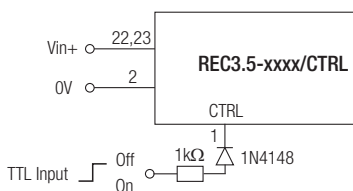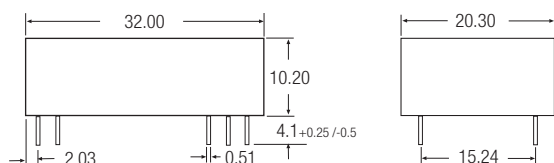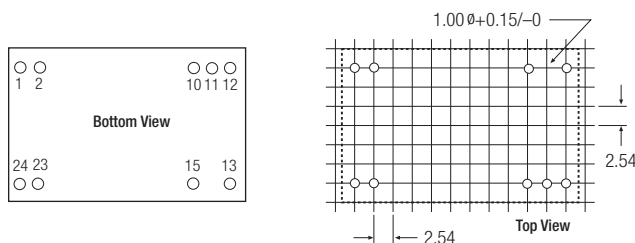
Pin Connections

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

REC3.5/R