

# Features

## Regulated Converters

- 2kV, 4kVDC & 6kVDC Isolation
- Industry Standard 3W DIP24 Package
- Feedback Regulated Output
- Continuous Short Circuit Protection
- Wide Input 2:1 & 4:1
- Medical Approvals (4kV/6kV Versions)
- EN and UL Certificates
- 3 Pinout Options, 3 Case Styles
- Control Pin Option
- Efficiency to 86%

### Description

Besides the standard isolation of 2kVDC, this series offers options of 4kVDC (= "/H4") or 6kVDC (= "/H6") making it suitable for medical applications and other sophisticated industrial applications. Packaging can be either DIP-24 plastic or 5-side-shielded DIP24 metal case (= option "/M") as well as SMD pinning (= option "/SMD"). For all the above variants, 2 industry-standard pinouts (= option "/A" or "/C") are available, and B pinning is available with 1.6kVDC isolation. Remote on/off control is possible with the /CTRL option (A pinning only). 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 (SMD)	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Efficiency (%)	Max Capacitive Load <sup>(1)</sup>
REC3-xx3.3SRW/H*	4.5 - 9, 9 - 18, 18 - 36, 36 - 72	3.3	900	66-76	4700µF
REC3-xx05SRW/H*	4.5 - 9, 9 - 18, 18 - 36, 36 - 72	5	600	71-79	4700µF
REC3-xx09SRW/H*	4.5 - 9, 9 - 18, 18 - 36, 36 - 72	9	330	74-83	3300µF
REC3-xx12SRW/H*	4.5 - 9, 9 - 18, 18 - 36, 36 - 72	12	250	75-85	2200µF
REC3-xx15SRW/H*	4.5 - 9, 9 - 18, 18 - 36, 36 - 72	15	200	75-86	2200µF
REC3-xx05DRW/H*	4.5 - 9, 9 - 18, 18 - 36, 36 - 72	±5	±300	74-83	±2200µF
REC3-xx12DRW/H*	4.5 - 9, 9 - 18, 18 - 36, 36 - 72	±12	±125	75-85	±1000µF
REC3-xx15DRW/H*	4.5 - 9, 9 - 18, 18 - 36, 36 - 72	±15	±100	75-86	±1000µF
REC3-xx3.3SRWZ/H*	9 - 36, 18 - 72	3.3	900	77-79	4700µF
REC3-xx05SRWZ/H*	9 - 36, 18 - 72	5	600	78-80	4700µF
REC3-xx09SRWZ/H*	9 - 36, 18 - 72	9	330	80-83	3300µF
REC3-xx12SRWZ/H*	9 - 36, 18 - 72	12	250	83-85	2200µF
REC3-xx15SRWZ/H*	9 - 36, 18 - 72	15	200	83-85	2200µF
REC3-xx05DRWZ/H*	9 - 36, 18 - 72	±5	±300	77-80	±2200µF
REC3-xx12DRWZ/H*	9 - 36, 18 - 72	±12	±125	83-85	±1000µF
REC3-xx15DRWZ/H*	9 - 36, 18 - 72	±15	±100	83-85	±1000µF

H\* = H2, H4 or H6 for A or C pinning options with 2kVDC, 4kVDC or 6kVDC isolation.

H\* = H for B pinning option with 1.6kVDC isolation only.

**2:1 Input**  
(REC3-S/DRWH4/H6)  
xx = 4.5-9Vin = 05  
xx = 9-18Vin = 12  
xx = 18-36Vin = 24  
xx = 36-72Vin = 48

**4:1 Input**  
(REC3-S/DRWZ(H4/H6))  
xx = 9-36Vin = 24  
xx = 18-72Vin = 48

- \* add suffix "/A", "/B" or "/C" for pinning options, see next page and Isolation Restrictions.
- \* add suffix "/M" for metal case.
- \* add suffix "/SMD" for SMD package.
- \* add suffix "/CTRL" for control pin option (A Pinning only)
- \* add suffix -R for Tape and Reel packaging

### Ordering Examples:

REC3-0512DRW/H2/A/CTRL= 2:1 input, 5V Vin, ±12V Vout, 2kVDC, pinout "A", plastic case, control pin  
 REC3-4812SRWZ/H4/A/M = 4:1 input, 48V Vin, 12V Vout, 4kVDC, pinout "A", metal case, no control pin  
 REC3-2412DRWZ/H/B = 4:1 input, 24V Vin, ±12V Vout, 1.6kVDC, pinout "B", plastic case, no control pin  
 REC3-0505SRW/H6/C/SMD-R = 2:1 input, 5V Vin, 5V Vout, 6kVDC, SMD pinout "C", plastic case, no control pin, Tape and Reel packaging.

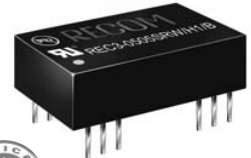
# ECONOLINE

DC/DC-Converter

with 3 year Warranty



## 3 Watt DIP24 & SMD Single & Dual Output



**EN-60950-1 Certified**  
**UL-60950-1 Certified**  
**EN-60601-1 Certified**

# REC3-S\_DRW

### Isolation Restrictions

"B" Pinning is restricted to 1.6kV isolation due to the closeness of the input and output pins.

If the options "/M" for metal case and "/SMD" for SMD pinout are combined, the maximum allowed isolation voltage is 2kVDC because of the shorter distances between pins and the metal case.

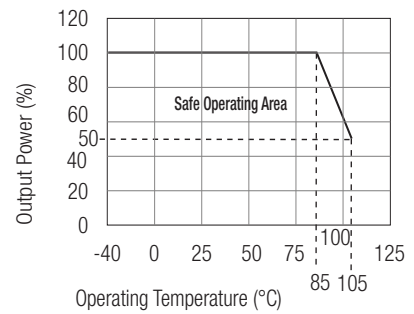
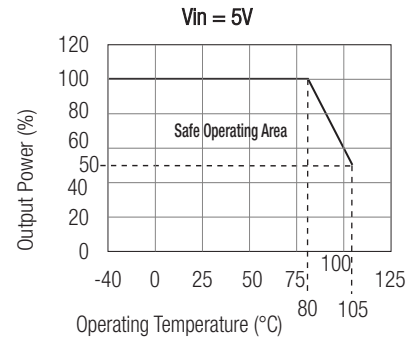
DIP-24 through-hole case and SMD-plastic case are not affected and offer the full isolation barriers of 2kV through to 6kVDC.

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 & 4:1		
Output Voltage Accuracy	$\pm 2\%$ max.		
Line Regulation (HL-LL)	$\pm 0.4\%$ max.		
Load Regulation (for output load current change from 20% to 100%)	$\pm 0.6\%$ max.		
Minimum Load	0%		
Output Ripple and Noise (0,1 $\mu\text{F}$ capacitor on output, 20MHz BW)	50mVp-p max.		
Switching Frequency at Full Load and nominal Input Voltage	2:1 Input types	90kHz min. / 150kHz max.	
	4:1 Input types	120kHz min. / 180kHz max.	
Input Filter	Pi Network		
Efficiency at Full Load	see above		
No Load Power Consumption	300mW max.		
Isolation Voltage	H2 types	(tested for 1 second) (rated for 1 minute) 2000VDC 1000VAC / 60Hz	
	H4 types	(tested for 1 second) (rated for 1 minute) 4000VDC 2000VAC / 60Hz	
Isolation Voltage	H6 types	(tested for 1 second) (rated for 1 minute) 6000VDC 3000VAC / 60Hz	
Isolation Capacitance	2:1 Input types	20pF min. / 60pF max.	
	4:1 Input types	40pF min. / 80pF max.	
Isolation Resistance	1 G $\Omega$ min.		
Short Circuit Protection (Max temp. = 60°C during short circuit conditions)	Continuous, Auto Restart		
Operating Temperature Range (free air convection)	5V input types	-40°C to +80°C (see Graph)	
	others	-40°C to +85°C (see Graph)	
Storage Temperature Range	-55°C to +125°C		
Relative Humidity	95% RH		
Case Material	Non-Conductive Plastic or Metal		
Thermal Impedance	Natural convection	20°C/W for plastic case	
		12°C/W for metal case	
Package Weight	13g		
Packing Quantity	15 pcs per Tube		
	100 pcs per Reel		
MTBF (+25°C)	} Detailed Information see Application Notes chapter "MTBF"	using MIL-HDBK 217F	1043 x 10 <sup>3</sup> hours
		using MIL-HDBK 217F	186 x 10 <sup>3</sup> hours
Certifications	UL General Safety Report: E248550	UL 60950-1 1st Ed.	C22.2 No. 60950-1-03
	EN General Safety Report: LVD-2K05230	EN60950-1:2001	EN60601-1:1988 + A1: 1991 + A2: 1995
	EN Medical Safety Report: ETS-060065		

## Derating-Graph (Ambient Temperature)



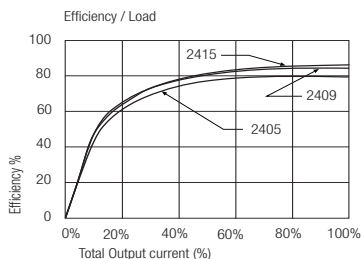
### Notes

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

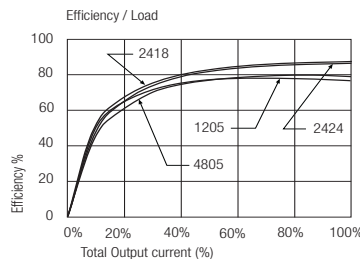
REC3-RW

## Typical Characteristics

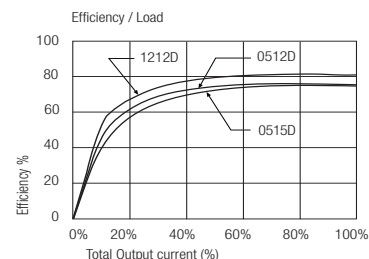
### Single 2:1 Input



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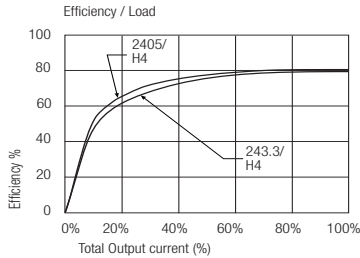


### Dual 2:1 Input

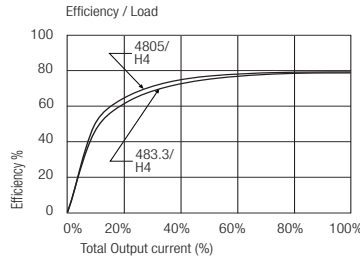


Typical Characteristics - Continued

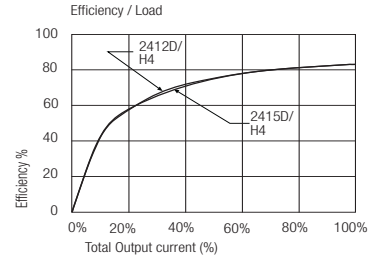
## Single 4:1 Input



## Single 4:1 Input

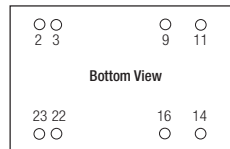
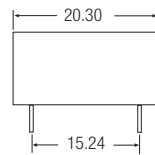
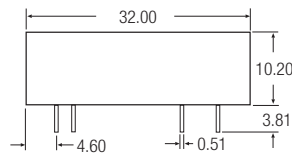


## Dual 4:1 Input

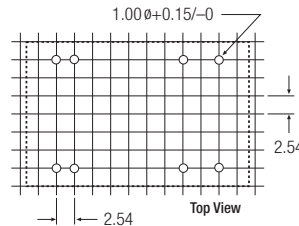


Package Style and Pinning (mm) DIP 24 , Wide Input 2:1 & 4:1

**"A" Pinning**  
/H2, /H4 & /H6



Recommended Footprint Details



Pin Connections

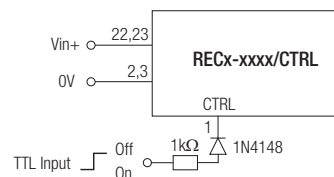
Pin #	Single	Dual
1 (option)	CTRL	CTRL
2	-Vin	-Vin
3	-Vin	-Vin
9	NC	Com
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Com
22	+Vin	+Vin
23	+Vin	+Vin

NC = No Connection

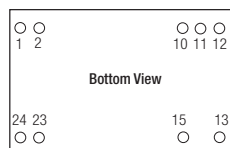
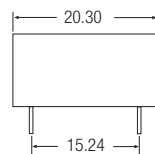
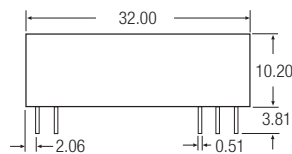
XX.X ± 0.5 mm  
XX.XX ± 0.25 mm

**CTRL Option**

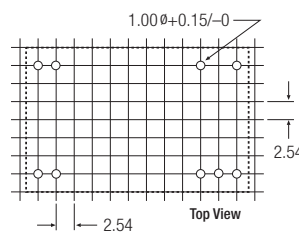
ON = Open or  $0V < V_{ctrl} < 1.2V$   
OFF =  $2.2V < V_{ctrl} < 12V$



**"C" Pinning**  
/H2, /H4 & /H6



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

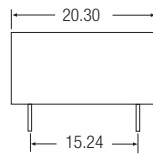
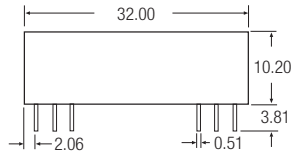
NC = No Connection

XX.X ± 0.5 mm  
XX.XX ± 0.25 mm

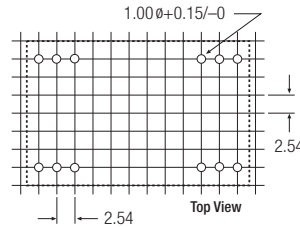
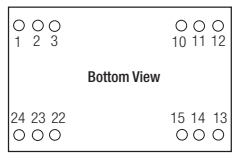
REC3-RW

Package Style and Pinning (mm) DIP 24 , Wide Input 2:1 & 4:1

**"B" Pinning**  
**/H (1.6kV Only)**



**Recommended Footprint Details**



**Pin Connections**

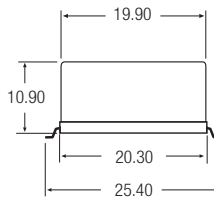
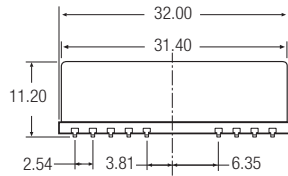
Pin #	Single	Dual
1	+Vin	+Vin
2	No Pin	-Vout
3	No Pin	Com
10	-Vout	Com
11	+Vout	+Vout
12	-Vin	-Vin
13	-Vin	-Vin
14	+Vout	+Vout
15	-Vout	Com
22	No Pin	Com
23	No Pin	-Vout
24	+Vin	+Vin

NC = No Connection

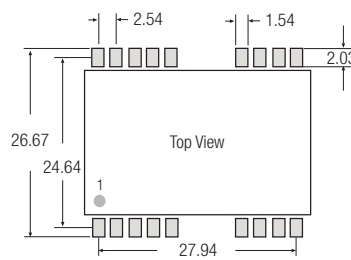
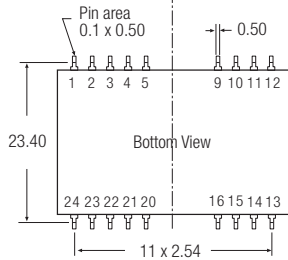
XX.X ± 0.5 mm

XX.XX ± 0.25 mm

**SMD Pinning**



**Recommended Footprint Details**



SMD pin connections follow standard package A (/A/SMD), B (/B/SMD) or C (/C/SMD) pinning.

All unused pins are NC (No Connection). See Below for detailed pinout lists

REC3-RW

for all packages incl.SMD case the length of plastic case is 31,8 mm, length of metal case 32.0 mm

**/A/SMD Pinning**

Pin Connections			Pin Connections		
Pin #	Single	Dual	Pin #	Single	Dual
1 (Option)	CTRL	CTRL	13	NC	NC
2	-Vin	-Vin	14	+Vout	+Vout
3	-Vin	-Vin	15	NC	NC
4	NC	NC	16	-Vout	Com
5	NC	NC	20	NC	NC
9	NC	Com	21	NC	NC
10	NC	NC	22	+Vin	+Vin
11	NC	-Vout	23	+Vin	+Vin
12	NC	NC	24	NC	NC

**/B/SMD Pinning**

Pin Connections			Pin Connections		
Pin #	Single	Dual	Pin #	Single	Dual
1	+Vin	+Vin	13	-Vin	-Vin
2	NC	-Vout	14	+Vout	+Vout
3	NC	Com	15	-Vout	Com
4	NC	NC	16	NC	NC
5	NC	NC	20	NC	NC
9	NC	NC	21	NC	NC
10	-Vout	Com	22	NC	Com
11	+Vout	+Vout	23	NC	-Vout
12	-Vin	-Vin	24	+Vin	+Vin

**/C/SMD Pinning**

Pin Connections			Pin Connections		
Pin #	Single	Dual	Pin #	Single	Dual
1	+Vin	+Vin	13	+Vout	-Vout
2	+Vin	+Vin	14	NC	NC
3	NC	NC	15	NC	+Vout
4	NC	NC	16	NC	NC
5	NC	NC	20	NC	NC
9	NC	NC	21	NC	NC
10	NC	Com	22	NC	NC
11	NC	Com	23	-Vin	-Vin
12	-Vout	NC	24	-Vin	-Vin