

# Features

## Regulated Converters

- High 4kVDC & 6kVDC Isolation
- 5W DIP24 Industry Standard Package
- Feedback Regulated Output
- Continuous Short Circuit Protection
- Wide Inputs 2:1 & 4:1
- Approved for Medical Applications
- UL and EN Safety Approvals
- 2 Pinout Options, 3 Case Styles
- Efficiency to 86 %

### Description

This series offers standard isolation of 2kVDC with 4kVDC or 6kVDC options making it ideal for both industrial, medical and other sophisticated high end applications. Packaging can be either DIP-24 non-conductive plastic or 5-side-shielded DIP24 metal case (= option "/M") as well as DIP24-SMD case (= option "/SMD"). For all the above variants, 2 industry-standard pinouts (= option "/A" or "/C") are available. "B" pinning is also available with "/H" isolation of 1.6kVDC. 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>
REC5-xx3.3SRW/H*	9 - 18, 18 - 36, 36 - 72	3.3	1000	75-77	6800µF
REC5-xx05SRW/H*	9 - 18, 18 - 36, 36 - 72 4.5 - 9V	5	1000	79-81 72	6800µF
REC5-xx09SRW/H*	9 - 18, 18 - 36, 36 - 72 4.5 - 9V	9	556	82-83 73	6800µF
REC5-xx12SRW/H*	9 - 18, 18 - 36, 36 - 72 4.5 - 9V	12	420	84-85 74	6800µF
REC5-xx15SRW/H*	9 - 18, 18 - 36, 36 - 72 4.5 - 9V	15	340	85-86 75	6800µF
REC5-xx05DRW/H*	9 - 18, 18 - 36, 36 - 72 4.5 - 9V	±5	±500	79-81 72	±2200µF
REC5-xx09DRW/H*	9 - 18, 18 - 36, 36 - 72 4.5 - 9V	±9	±278	82-84 74	±2200µF
REC5-xx12DRW/H*	9 - 18, 18 - 36, 36 - 72 4.5 - 9V	±12	±210	84-85 75	±2200µF
REC5-xx15DRW/H*	9 - 18, 18 - 36, 36 - 72 4.5 - 9V	±15	±170	85-86 75	±2200µF
REC5-xx3.3SRWZ/H*	9 - 36**, 18 - 72	3.3	1000	75-76	6800µF
REC5-xx05SRWZ /H*	9 - 36**, 18 - 72	5	1000	81-82	6800µF
REC5-xx09SRWZ/H*	9 - 36, 18 - 72	9	556	82-83	6800µF
REC5-xx12SRWZ /H*	9 - 36, 18 - 72	12	420	83-84	6800µF
REC5-xx15SRWZ/H*	9 - 36, 18 - 72	15	340	84-85	6800µF
REC5-xx05DRWZ/H*	9 - 36**, 18 - 72	±5	±500	81-82	±2200µF
REC5-xx09DRWZ/H*	9 - 36, 18 - 72	±9	±278	82-84	±2200µF
REC5-xx12DRWZ /H*	9 - 36, 18 - 72	±12	±210	82-83	±2200µF
REC5-xx15DRWZ /H*	9 - 36, 18 - 72	±15	±170	84-85	±2200µF

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. \*\* Derate to 900mA (±450mA) max. at Vin=9V

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", "/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

#### 2:1 Input

(REC5-S/DRW)

xx = 4.5-9Vin = 05

xx = 9-18Vin = 12

xx = 18-36Vin = 24

xx = 36-72Vin = 48

#### 4:1 Input

(REC5-S/DRWZ)

xx = 9-36Vin = 24

xx = 18-72Vin = 48

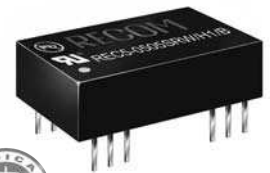
# ECONOLINE

DC/DC-Converter

with 3 year Warranty



## 5 Watt DIP24 & SMD Single & Dual Output



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

# REC 5

### 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.

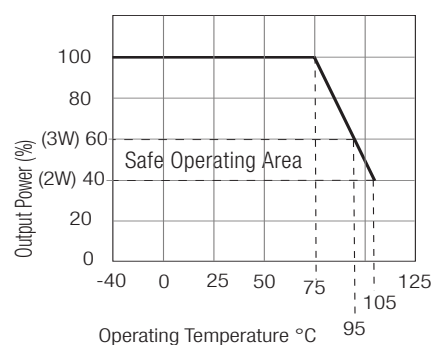
DIP-24 through-hole case and SMD-plastic case are not affected and offer the full isolation barriers of 2kV through to 6kVDC.

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	±2% max.		
Line Regulation (HL-LL)	±0.3% max.		
Load Regulation (for output load current change from 20% to 100%)	±0.6% max.		
Minimum Load	0%		
Output Ripple and Noise (0,1µF capacitor on output, 20MHz BW)	50mVp-p max.		
Operating Frequency at Full Load (at nominal input voltage)	2:1 input	120kHz typ.	
	4:1 input	200kHz typ.	
Input Filter	Pi Network		
Efficiency at Full Load	see above		
No Load Power Consumption	300mW max.		
Isolation Voltage	H2 types	(tested for 1 second)	2000VDC
		(rated for 1 minute)	1000VAC / 60Hz
Isolation Voltage	H4 types	(tested for 1 second)	4000VDC
		(rated for 1 minute)	2000VAC / 60Hz
Isolation Voltage	H6 types	(tested for 1 second)	6000VDC
		(rated for 1 minute)	3000VAC / 60Hz
Isolation Capacitance	60pF typ.		
Isolation Resistance	1 GΩ min.		
Short Circuit Protection (Max temp. = 50°C during short circuit conditions)	Continuous, Auto Restart		
Operating Temperature (free air convection)	-40°C to +75°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	using MIL-HDBK 217F	850 x 10 <sup>3</sup> hours
		using MIL-HDBK 217F	206 x 10 <sup>3</sup> hours
(+75°C)	Application Notes chapter "MTBF"		
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
	EN Medical Safety Report: ETS-060065		EN60601-1:1988 + A1: 1991 + A2: 1995

## Derating-Graph (Ambient Temperature)



### Ordering Examples:

REC5-0512DRW/H2/A/CTRL= 2:1 input, 5V Vin, ±12V Vout, 2kVDC, pinout "A", plastic case, control pin

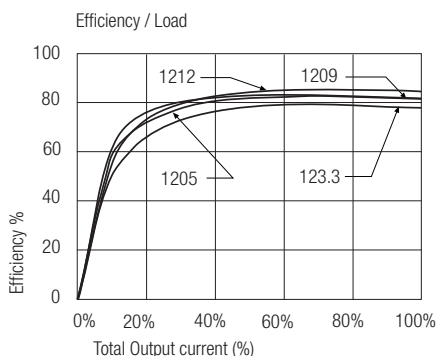
REC5-4812SRWZ/H4/A/M = 4:1 input, 48V Vin, 12V Vout, 4kVDC, pinout "A", metal case, no control pin

REC5-1212DRWZ/H/B = 4:1 input, 12V Vin, ±12V Vout, 1.6kVDC, pinout "B", plastic case, no control pin

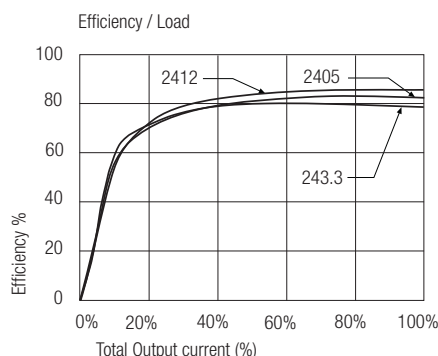
REC5-0505SRW/H6/C/SMD = 2:1 input, 5V Vin, 5V Vout, 6kVDC, SMD pinout "C", plastic case, no control pin

## Typical Characteristics

### 12V Single 2:1

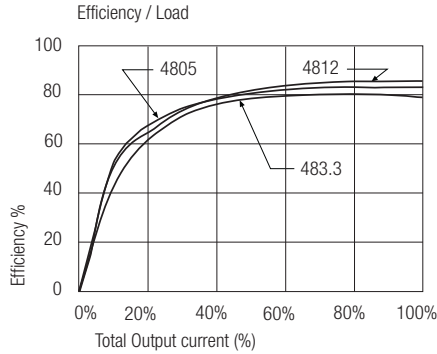


### 24V Single 2:1

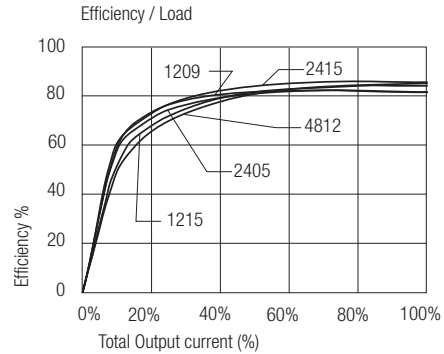


### Typical Characteristics

#### 48V Single 2:1



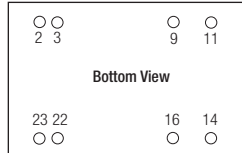
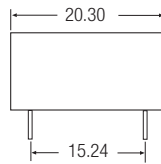
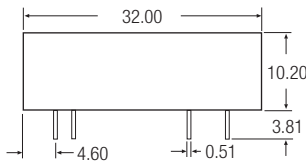
#### Dual 4:1



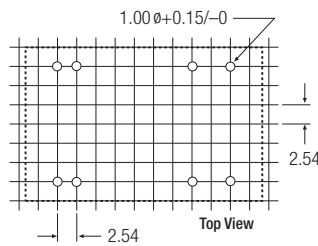
### Package Style and Pinning (mm) DIP 24 , Wide Input 2:1 & 4:1

#### "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

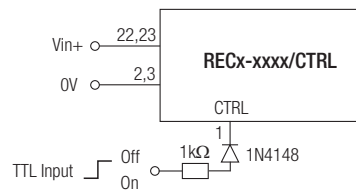
NC = No Connection

XX.X ± 0.5 mm

XX.XX ± 0.25 mm

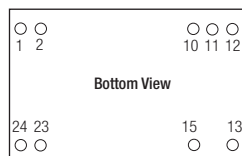
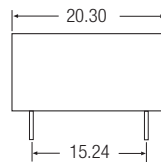
#### CTRL Option

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

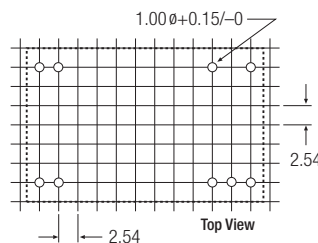


#### "C" Pinning

/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

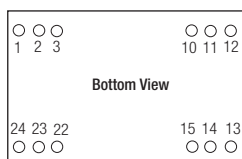
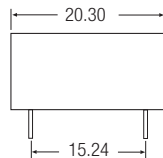
XX.X ± 0.5 mm

XX.XX ± 0.25 mm

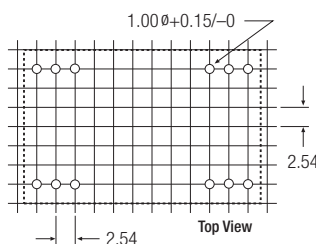
Package Style and Pinning (mm) DIP 24 , Wide Input 2:1 & 4:1



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



**Recommended Footprint Details**



**Pin Connections**

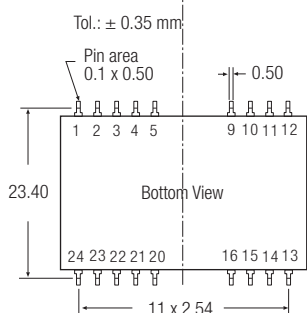
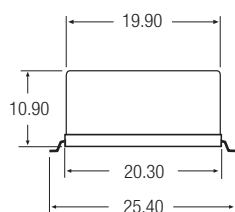
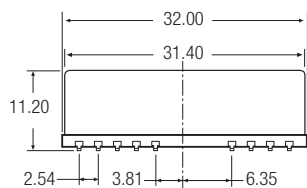
Pin #	Single	Dual
1	+Vin	+Vin
2	No Pin	-Vout
3	No Pin	Com
10	-Vout	Com
11	+Vout	+Vout
12	-Vin	-Vin
13	-Vin	-Vin
14	+Vout	+Vout
15	-Vout	Com
22	No Pin	Com
23	No Pin	-Vout
24	+Vin	+Vin

NC = No Connection

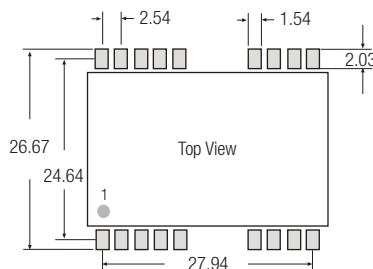
XX.X ± 0.5 mm

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

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**

**/B/SMD Pinning**

**/C/SMD Pinning**

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