

# 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<br>DIP24 (SMD) | Input Voltage<br>(VDC)            | Output Voltage<br>(VDC) | Output Current<br>(mA) | Efficiency<br>(%) | 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<br>(REC3-S/DRWH4/H6) | 4:1 Input<br>(REC3-S/DRWZ(H4/H6)) |
|--------------------------------|-----------------------------------|
| xx = 4.5-9Vin = 05             | xx = 9-36Vin = 24                 |
| xx = 9-18Vin = 12              | xx = 18-72Vin = 48                |
| xx = 18-36Vin = 24             |                                   |
| xx = 36-72Vin = 48             |                                   |

- \* add suffix "/A", "/A/X2", "/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.

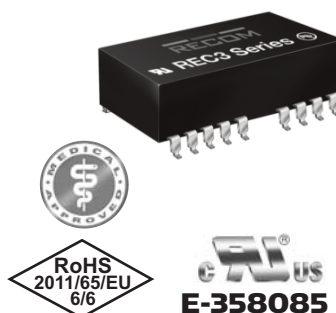
# ECONOLINE

## DC/DC-Converter

with 3 year Warranty

RECOM

## 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.

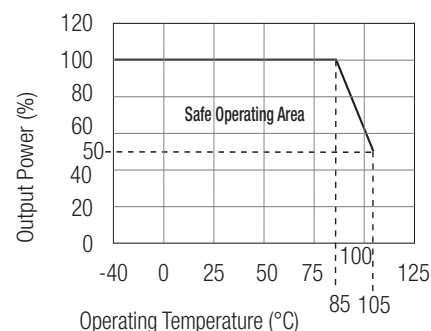
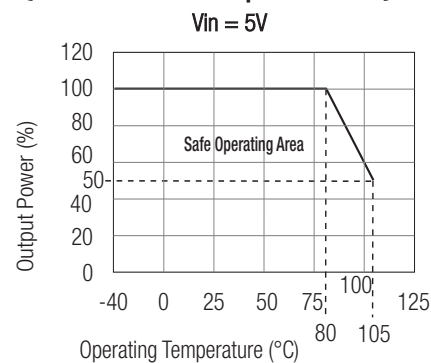
DIP-24 through-hole case and SMD-plastic case are not affected and offer the full isolation barriers of 2kV through to 6kVDC.

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                                                     |                                                                |                                                 | ±2% max.                                                               |
| Line Regulation (HL-LL)                                                     |                                                                |                                                 | ±0.4% max.                                                             |
| Load Regulation (for output load current change from 20% to 100%)           |                                                                |                                                 | ±0.6% max.                                                             |
| Minimum Load                                                                |                                                                |                                                 | 10% <sup>(2)</sup>                                                     |
| Output Ripple and Noise (0,1µF capacitor on output, 20MHz BW)               |                                                                |                                                 | 50mVp-p max.                                                           |
| Switching Frequency at Full Load<br>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-Suffix                                                      | (tested for 1 second)<br>(rated for 1 minute**) | 2000VDC<br>1000VAC / 60Hz                                              |
| Isolation Voltage                                                           | H4-Suffix                                                      | (tested for 1 second)<br>(rated for 1 minute**) | 4000VDC<br>2000VAC / 60Hz                                              |
| Isolation Voltage                                                           | H6-Suffix                                                      | (tested for 1 second)<br>(rated for 1 minute**) | 6000VDC<br>3000VAC / 60Hz                                              |
| Isolation Capacitance                                                       | 2:1 Input types                                                | 20pF min. / 60pF max.                           |                                                                        |
|                                                                             | 4:1 Input types                                                | 40pF min. / 80pF max.                           |                                                                        |
| Isolation Resistance                                                        |                                                                |                                                 | 1 GΩ min.                                                              |
| Short Circuit Protection (Max temp. = 60°C during short circuit conditions) |                                                                |                                                 | Continuous, Auto Restart                                               |
| Operating Temperature Range<br>(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<br>20°C/W for plastic case<br>12°C/W for metal case |
| Package Weight                                                              |                                                                |                                                 | 13g                                                                    |
| Packing Quantity                                                            |                                                                |                                                 | 15 pcs per Tube<br>100 pcs per Reel                                    |
| MTBF (+25°C)<br><br>(+85°C)                                                 | } Detailed Information see<br>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: E358085                            |                                                                |                                                 | UL 60950-1 1st Ed.<br>C22.2 No. 60950-1-03                             |
| EN General Safety Report: SPCLVD1212007                                     |                                                                |                                                 | EN60950-1:2006 + A1:2010+A12:2011                                      |
| EN Medical Safety Report: MDD1205098-3 + RM1205098-3                        |                                                                |                                                 | IEC/EN 60601-1 3rd Ed.                                                 |
| Medical Report + ISO14971 Risk Assessment                                   |                                                                |                                                 |                                                                        |

## Derating-Graph (Ambient Temperature)



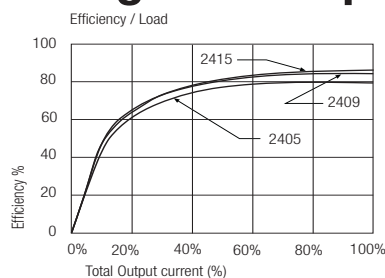
\*\*Any data referred to in this datasheet are of indicative nature and based on our practical experience only. For further details, please refer to our Application Notes.

### Notes

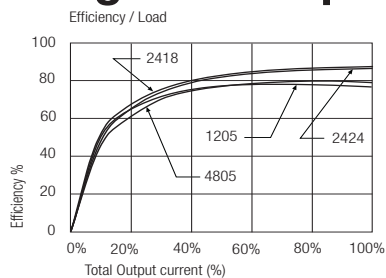
- Note 1: Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter
- Note 2: The REC3-RW series requires a minimum of 10% load on the output to maintain specified regulation. Operating under no-load conditions will not damage these devices; however, they may not meet all listed specifications.

### Typical Characteristics

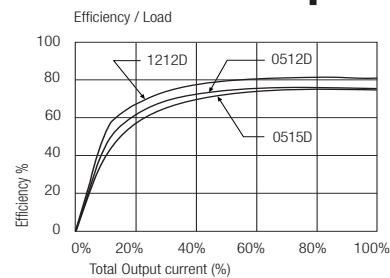
#### Single 2:1 Input



#### Single 2:1 Input

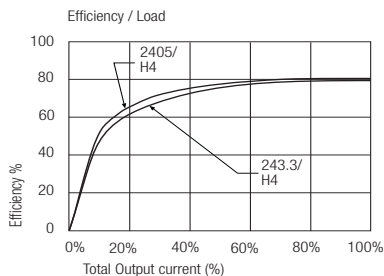


#### Dual 2:1 Input

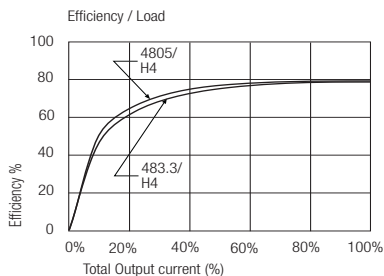


### Typical Characteristics - Continued

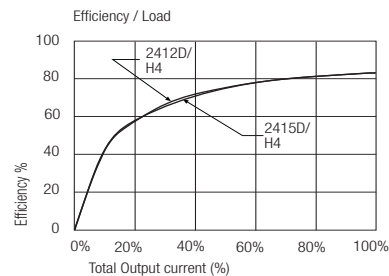
## Single 4:1 Input



## Single 4:1 Input



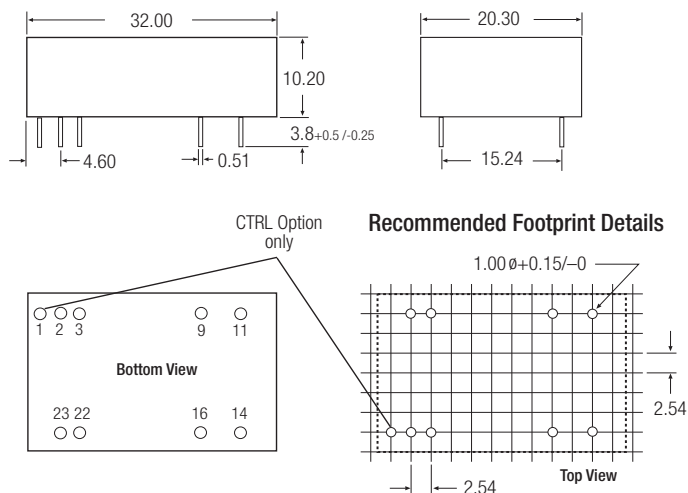
## Dual 4:1 Input



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

#### "A" Pinning

/H2, /H4 & /H6



#### Pin Connections

| Pin #      | Single | Single/X2 | Dual  |
|------------|--------|-----------|-------|
| 1 (option) | CTRL   | CTRL      | CTRL  |
| 2          | -Vin   | -Vin      | -Vin  |
| 3          | -Vin   | -Vin      | -Vin  |
| 9          | NC     | No Pin    | Com   |
| 11         | NC     | NC        | -Vout |
| 14         | +Vout  | +Vout     | +Vout |
| 16         | -Vout  | -Vout     | Com   |
| 22         | +Vin   | +Vin      | +Vin  |
| 23         | +Vin   | +Vin      | +Vin  |

NC = No Connection

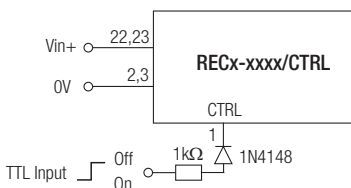
XX.X ± 0.5 mm

XX.XX ± 0.25 mm

#### CTRL Option

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

OFF =  $2.2V < V_{ctrl} < 12V$



#### 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  |

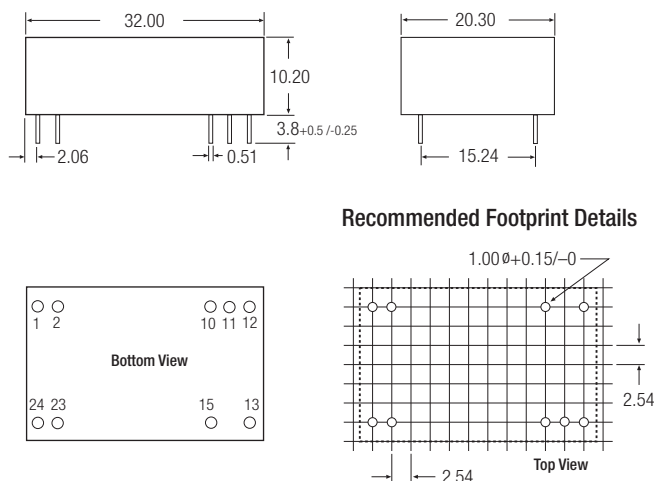
NC = No Connection

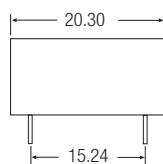
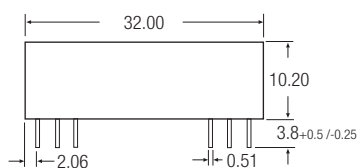
XX.X ± 0.5 mm

XX.XX ± 0.25 mm

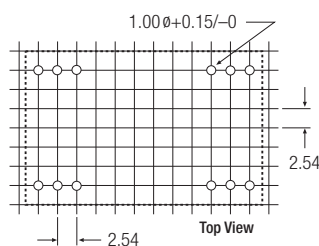
#### "C" Pinning

/H2, /H4 & /H6





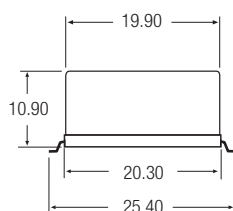
Bottom View



| 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  |

XX.XX  $\pm$  0.25 mm

Technical drawing of a rectangular plate. The overall width is 32.00 mm, and the overall height is 11.20 mm. The inner width is 31.40 mm. The plate has a central vertical dashed line. The bottom edge features a series of small rectangular features (possibly holes or notches) with dimensions 2.54, 3.81, and 6.35 mm. The tolerance is specified as Tol.:  $\pm 0.35$  mm.



Bottom View

Pin area  $0.1 \times 0.50$

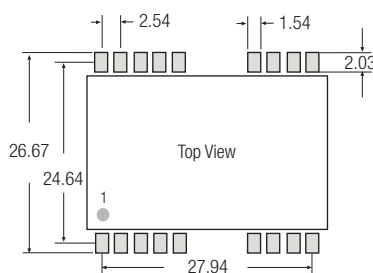
0.50

23.40

1 2 3 4 5 9 10 11 12

24 23 22 21 20 16 15 14 13

11 x 2.54



**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

## /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  |

# Mouser Electronics

Authorized Distributor

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## RECOM:

[REC3-2412DRW/H/B/SMD](#) [REC3-2412DRW/H/B/SMD-R](#) [REC3-2412DRW/H2/A](#) [REC3-2412DRW/H2/A/CTRL](#)  
[REC3-2412DRW/H2/A/M](#) [REC3-2412DRW/H2/A/M/CTRL](#) [REC3-2412DRW/H2/A/M/SMD](#) [REC3-](#)  
[2412DRW/H2/A/M/SMD/CTRL](#) [REC3-2412DRW/H2/A/M/SMD/CTRL-R](#) [REC3-2412DRW/H2/A/M/SMD-R](#) [REC3-](#)  
[2412DRW/H2/A/SMD](#) [REC3-2412DRW/H2/A/SMD/CTRL](#) [REC3-2412DRW/H2/A/SMD/CTRL-R](#) [REC3-](#)  
[2412DRW/H2/A/SMD-R](#) [REC3-2412DRW/H2/C](#) [REC3-2412DRW/H2/C/M](#) [REC3-2412DRW/H2/C/M/SMD](#) [REC3-](#)  
[2412DRW/H2/C/M/SMD-R](#) [REC3-2412DRW/H2/C/SMD](#) [REC3-2412DRW/H2/C/SMD-R](#) [REC3-2412DRW/H4/A](#)  
[REC3-2412DRW/H4/A/CTRL](#) [REC3-2412DRW/H4/A/M](#) [REC3-2412DRW/H4/A/M/CTRL](#) [REC3-2412DRW/H4/A/SMD](#)  
[REC3-2412DRW/H4/A/SMD/CTRL](#) [REC3-2412DRW/H4/A/SMD/CTRL-R](#) [REC3-2412DRW/H4/A/SMD-R](#) [REC3-](#)  
[2412DRW/H4/C](#) [REC3-2412DRW/H4/C/M](#) [REC3-2412DRW/H4/C/SMD](#) [REC3-2412DRW/H4/C/SMD-R](#) [REC3-](#)  
[2412DRW/H6/A](#) [REC3-2412DRW/H6/A/CTRL](#) [REC3-2412DRW/H6/A/M](#) [REC3-2412DRW/H6/A/M/CTRL](#) [REC3-](#)  
[2412DRW/H6/A/SMD](#) [REC3-2412DRW/H6/A/SMD/CTRL](#) [REC3-2412DRW/H6/A/SMD/CTRL-R](#) [REC3-](#)  
[2412DRW/H6/A/SMD-R](#) [REC3-2412DRW/H6/C](#) [REC3-2412DRW/H6/C/M](#) [REC3-2412DRW/H6/C/SMD](#) [REC3-](#)  
[2412DRW/H6/C/SMD-R](#) [REC3-2412DRWZ/H/B](#) [REC3-2412DRWZ/H/B/M](#) [REC3-2412DRWZ/H/B/M/SMD](#) [REC3-](#)  
[2412DRWZ/H/B/M/SMD-R](#) [REC3-2412DRWZ/H/B/SMD](#) [REC3-2412DRWZ/H/B/SMD-R](#) [REC3-2412DRWZ/H2/A](#)  
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[2412DRWZ/H2/A/M/SMD-R](#) [REC3-2412DRWZ/H2/A/SMD](#) [REC3-2412DRWZ/H2/A/SMD/CTRL](#) [REC3-](#)  
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[2412DRWZ/H4/A/SMD/CTRL-R](#) [REC3-2412DRWZ/H4/A/SMD-R](#) [REC3-2412DRWZ/H4/C](#) [REC3-2412DRWZ/H4/C/M](#)  
[REC3-2412DRWZ/H4/C/SMD](#) [REC3-2412DRWZ/H4/C/SMD-R](#) [REC3-2412DRWZ/H6/A](#) [REC3-2412DRWZ/H6/A/CTRL](#)  
[REC3-2412DRWZ/H6/A/M](#) [REC3-2412DRWZ/H6/A/M/CTRL](#) [REC3-2412DRWZ/H6/A/SMD](#) [REC3-](#)  
[2412DRWZ/H6/A/SMD/CTRL](#) [REC3-2412DRWZ/H6/A/SMD/CTRL-R](#) [REC3-2412DRWZ/H6/A/SMD-R](#) [REC3-](#)  
[2412DRWZ/H6/C](#) [REC3-2412DRWZ/H6/C/M](#) [REC3-2412DRWZ/H6/C/SMD](#) [REC3-2412DRWZ/H6/C/SMD-R](#) [REC3-](#)  
[2412SRW/H/B](#) [REC3-2412SRW/H/B/M](#) [REC3-2412SRW/H/B/M/SMD](#) [REC3-2412SRW/H/B/M/SMD-R](#) [REC3-](#)  
[2412SRW/H/B/SMD](#) [REC3-2412SRW/H/B/SMD-R](#) [REC3-2412SRW/H2/A](#) [REC3-2412SRW/H2/A/CTRL](#)