

Features

Regulated Converters

- 1.6kVDC, 2kVDC, 4kVDC or 6kVDC isolation
- Industry standard 5W DIP24 or SMD package
- Feedback regulated output
- Continuous short circuit protection
- Wide 2:1 or 4:1 input
- 3 case styles
- CTRL pin option (A pinning only)

RECOM
DC/DC Converter

REC5-S(D)RW(Z)

5 Watt
DIP24 or
SMD Case
Single and Dual



CAL®
US
E358085

IEC60950-1 certified
UL60950-1 certified
CAN/CSA-C22.2 No. 60950-1-03 certified
EN55032 compliant

PREFERRED ALTERNATIVES

For new medical applications:

REM5E



Description

This series offers standard isolation of 2kVDC/1s with 4kVDC/1s (= „/H4“) or 6kVDC/1s (= „/H6“) options making it ideal for both industrial, medical and other sophisticated high end applications. Packaging can be either DIP24 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	Input Voltage Range ⁽¹⁾ [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. ⁽²⁾ [%]	max. Capacitive Load ⁽³⁾ [μF]
REC5-xx3.3SRW	4.5-9, 9-18, 18-36, 36-72	3.3	1000	75-77	6800
REC5-xx05SRW	9-18, 18-36, 36-72 4.5-9	5	1000	79-81 75	6800
REC5-xx09SRW	9-18, 18-36, 36-72 4.5-9	9	556	82-83 73	6800
REC5-xx12SRW	9-18, 18-36, 36-72 4.5-9	12	420	84-85 74	6800
REC5-xx15SRW	9-18, 18-36, 36-72 4.5-9	15	340	85-86 75	6800
REC5-xx05DRW	9-18, 18-36, 36-72 4.5-9	±5	±500	79-81 72	±2200
REC5-xx09DRW	9-18, 18-36, 36-72 4.5-9	±9	±278	82-84 74	±2200
REC5-xx12DRW	9-18, 18-36, 36-72 4.5-9	±12	±210	84-85 75	±2200
REC5-xx15DRW	9-18, 18-36, 36-72 4.5-9	±15	±170	85-86 75	±2200
REC5-xx3.3SRWZ	9-36, 18-72	3.3	1000	75-76	6800
REC5-xx05SRWZ	9-36, 18-72	5	1000	81-82	6800
REC5-xx09SRWZ	9-36, 18-72	9	556	82-83	6800
REC5-xx12SRWZ	9-36, 18-72	12	420	83-84	6800
REC5-xx15SRWZ	9-36, 18-72	15	340	84-85	6800
REC5-xx05DRWZ	9-36, 18-72	±5	±500	81-82	±2200
REC5-xx09DRWZ	9-36, 18-72	±9	±278	82-84	±2200
REC5-xx12DRWZ	9-36, 18-72	±12	±210	82-83	±2200
REC5-xx15DRWZ	9-36, 18-72	±15	±170	84-85	±2200

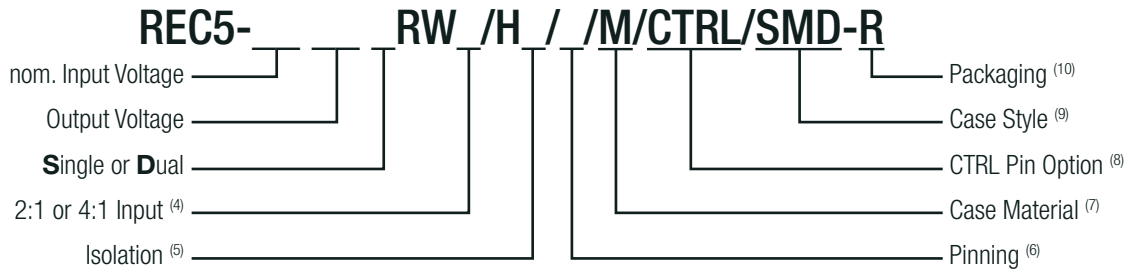
Notes:

Note1: Refer to “Input Voltage Range”

Note2: Efficiency is tested at nominal input and full load at +25°C ambient

Note3: Max Cap Load is tested at nominal input and full resistive load

Model Numbering



Notes:

- Note4: add "Z" for 4:1 Input Voltage (24= 9-36VDC or 48= 18-72VDC), without suffix= standard 2:1 input voltage range
- Note5: "H" = 1.6kVDC/1s isolation (B pinning only)
 "H2" = 2kVDC/1s isolation (A, A/X2 or C pinning available only)
 "H4" = 4kVDC/1s isolation (A, A/X2 or C pinning available only)
 "H6" = 6kVDC/1s isolation (A, A/X2 or C pinning available only)
- Note6: "A" = A pinning; "B" = B pinning or "C" for C pinning. For more details please refer to "DIMENSION AND PHYSICAL CHARACTERISTICS"
 "B" Pinning is restricted to 1.6kV isolation due to the closeness of the input and output pins.
- Note7: add suffix "M" for 5-side-shielded metal case, without suffix = 5-side-shielded non-conductive plastic case.
- Note8: add "CTRL" for control function. If CTRL is not used, pin 1 is omitted for THT version. (option for "A"-pinning only)
- Note9: add suffix "SMD" for SMD package, without suffix = standard DIP24 THT package. (If the options "M" and "SMD" are combined, the maximum allowed isolation voltage is 2kVDC/1s because of the shorter distance between pins and the metal case; DIP24 THT case and SMD plastic case are not affected and offer the full isolation barriers of 2kVDC/1s through to 6kVDC)
- Note10: add suffix "R" for tape and reel packaging, without suffix standard tube packaging. (tape and reel option only available for SMD case style)

Ordering Examples:

REC5-0505SRW/H4/A/M/CTRL	4.5-9Vin	5Vout	Single output	2:1 input	4kVDC isolation	A pinning	metal case	with CTRL Pin	THT	tube packaging
REC5-2412DRWZ/H2/C/SMD-R	9-36Vin	±12Vout	Dual output	4:1 input	2kVDC isolation	C pinning	plastic case	no CTRL function	SMD	tape and reel packaging
REC5-1212SRWZ/H/B/M	9-36Vin	12Vout	Single Output	4:1 input	6kVDC isolation	B pinning	metal case	no CTRL Pin	THT	tube packaging
REC5-1215DRW/H/B/M/SMD-R	9-18Vin	±15Vout	Dual Output	2:1 input	1.6kVDC isolation	B pinning	metal case	no CTRL function	SMD	tape and reel packaging

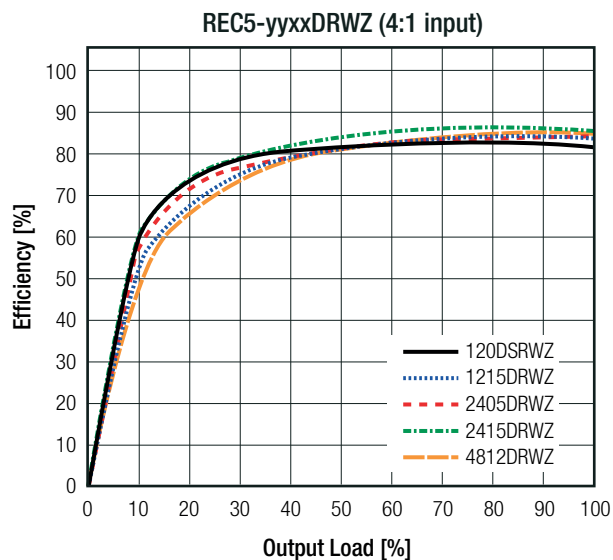
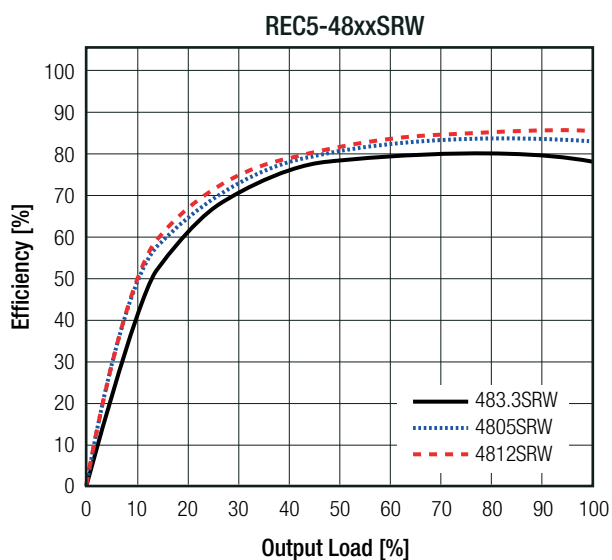
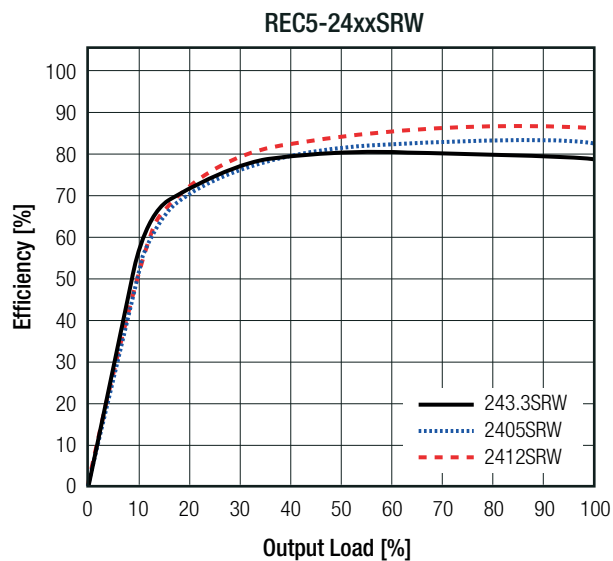
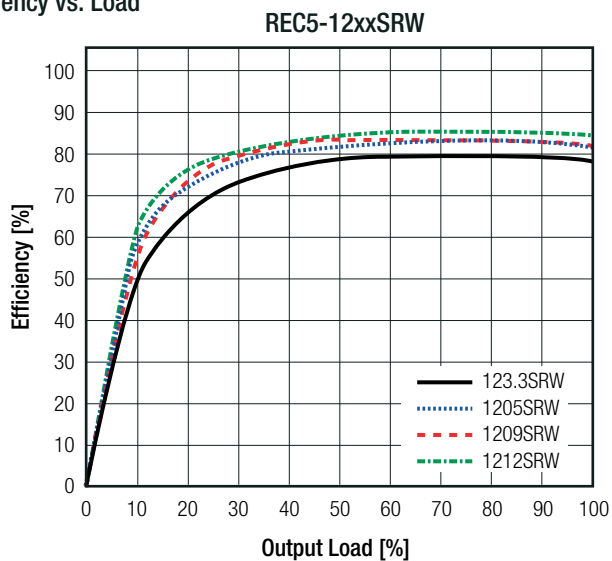
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

BASIC CHARACTERISTICS						
Parameter	Condition			Min.	Typ.	Max.
Internal Input Filter				Pi Network		
Input Voltage Range	2:1 Input	nom. Vin=	5VDC	4.5VDC		9VDC
			12VDC	9VDC		18VDC
			24VDC	18VDC		36VDC
			48VDC	36VDC		72VDC
	4:1 Input („Z“)	nom. Vin=	24VDC	9VDC		36VDC
			48VDC	18VDC		72VDC
Input Surge Voltage	100ms max.	nom. Vin=	5VDC			16VDC
			12VDC			25VDC
			24VDC			50VDC
			48VDC			100VDC
Minimum Load ⁽¹¹⁾				10%		
No Load Power Consumption						300mW
ON/OFF CTRL ⁽¹²⁾	DC-DC ON			Open or 0V<V _{CTRL} <1.2V		
	DC-DC OFF			2.2V<V _{CTRL} <12VDC		
Internal Operating Frequency	2:1 Input			120kHz		
	4:1 Input			200kHz		
Output Ripple and Noise ⁽¹³⁾	20MHz BW					50mVp-p
Notes: Note11: Operation below 10% load won't harm the converter, but specifications may not be met Note12: “/A”-pinning only. Please refer to “ON/OFF CTRL (“/A” pinning only)” for CTRL pin circuit. Note13: Measurements are made with a 0.1µF MLCC across output. (low ESR)						
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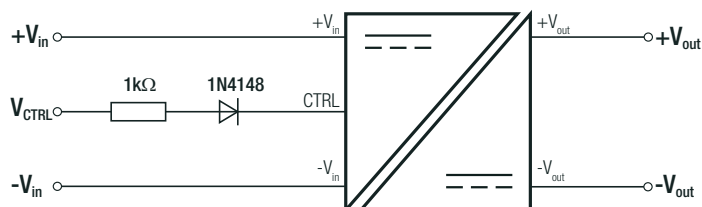
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Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. V_{in} , full load and after warm-up unless otherwise stated)

Efficiency vs. Load



ON/OFF CTRL ("A" pinning only)



DC-DC ON: $0V < V_{CTRL} < 1.2V_{DC}$
DC-DC OFF: $2.2V < V_{CTRL} < 12V_{DC}$

REGULATIONS

Parameter	Condition	Value
Output Accuracy		$\pm 2.0\%$ max.
Line Regulation	low line to high line	$\pm 0.3\%$ max.
Load Regulation	20% to 100% load	$\pm 0.6\%$ max.

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

PROTECTIONS

Parameter	Type		Value
Short Circuit Protection (SCP) ⁽¹⁴⁾	below 100mΩ		continuous, auto recovery
Isolation Voltage ⁽¹⁵⁾	with suffix "/H"	tested for 1 second	1.6kVDC
		rated for 1 minute	500VAC/60Hz
	with suffix "/H2"	tested for 1 second	2kVDC
		rated for 1 minute	1kVAC/60Hz
	with suffix "/H4"	tested for 1 second	4kVDC
		rated for 1 minute	2kVAC/60Hz
	with suffix "/H6"	tested for 1 second	6kVDC
		rated for 1 minute	3kVAC/60Hz
Isolation Resistance			1GΩ min.
Isolation Capacitance			60pF typ.
Insulation Grade			functional

Notes:

Note14: Max. Temperature = +50°C during the short circuit conditions.

Note15: For repeat Hi-Pot testing, reduce the time and/or the test voltage

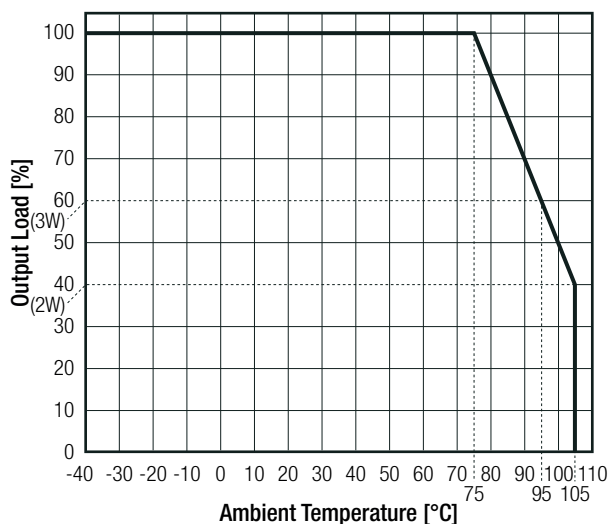
Note16: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type

ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range	with derating @ free air convection (refer to "Derating Graph")		-40°C to +105°C
Thermal Impedance	plastic case		20K/W
	metal case		12K/W
Operating Altitude			2000m
Operating Humidity	non-condensing		95% RH max.
Pollution Degree			PD2
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	850 x 10 ³ hours
		+75°C	206 x 10 ³ hours

Derating Graph

(@ Chamber and free air convection 0.1m/s)



Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

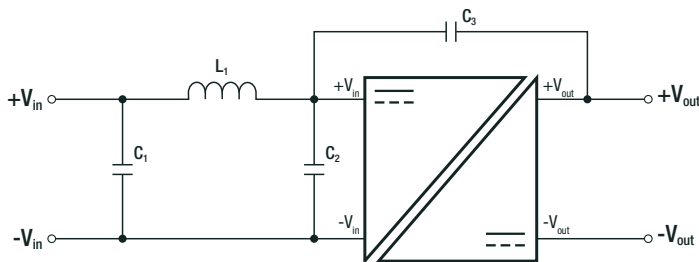
SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E358085	UL60950-1, 1st Edition, 2007 CAN/CSA-C22.2 No. 60950-1-03, 1st Edition, 2006
Information Technology Equipment, General Requirements for Safety	LVD1605077-10	IEC60950-1:2005, 2nd Edition + A2:2013
Medical Electric Equipment, General Requirements for Safety and Essential Performance	SPC1006048	IEC60601-1:1988 + A2:1995 EN60601-1:1990 + A13 :1996
RoHS2	TWNC00677039	RoHS, 2011/65/EU + AM-2015/863

EMC Compliance

Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements ⁽¹⁷⁾	with external filter (see filter suggestion below)
	EN55032, Class A/B

EMC Filtering Suggestions according to EN55032



Component List Class A

MODEL	C1	C2	C3	L1
REC5-0505SRW/H4/A	N/A	10μF MLCC	150pF	N/A
REC5-1205SRW/H4/A				12μH RLS-126
REC5-2405SRW/H4/A			330pF	22μH RLS-226
REC5-4805SRW/H2/A				

Component List Class B

MODEL	C1	C2	C3	L1
REC5-0505SRW/H4/A	10µF MLCC	10µF MLCC	150pF	18µH RLS-186
REC5-1205SRW/H4/A				12µH RLS-126
REC5-2405SRW/H4/A			1nF	22µH RLS-226
REC5-4805SRW/H2/A				100µH RLS-105

Notes:

Note17: Filter suggestions are valid for indicated part numbers only. For other part numbers, please contact Recom tech support advice

DIMENSION AND PHYSICAL CHARACTERISTICS

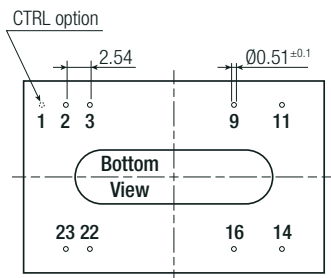
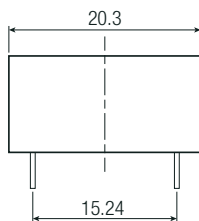
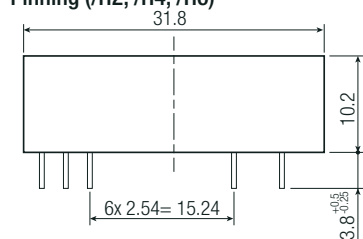
Parameter	Type		Value
Material	plastic case		non-conductive black plastic, (UL94 V-0)
	metal case ("M" option)		nickel plated copper
	PCB		FR4, (UL94 V-0)
	potting		epoxy, (UL94 V-0)
Dimension (LxWxH)	DIP24	plastic case	31.8 x 20.3 x 10.2mm
		metal case ("M" option)	32.0 x 20.3 x 10.5mm
	SMD	plastic case	31.8 x 20.3 x 10.9mm
		metal case ("M" option)	32.0 x 20.3 x 10.9mm
Weight			13g typ.

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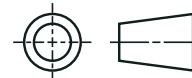
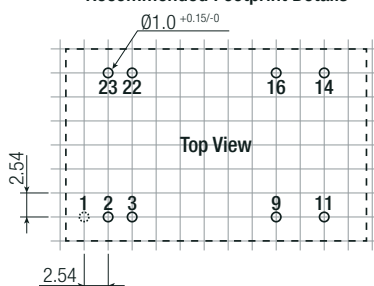
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing DIP24 plastic case (mm)

„A“ Pinning (/H2, /H4, /H6)



Recommended Footprint Details

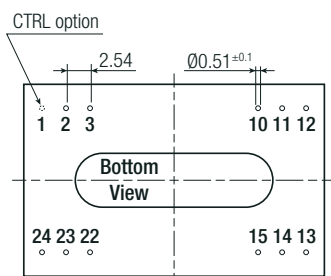
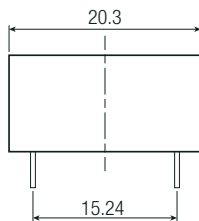
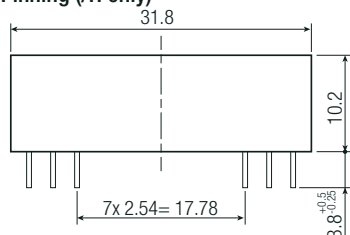


„A“ Pinning (/H2,/H4,/H6)

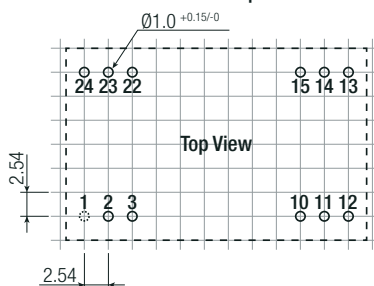
Pin #	Single	Single/X2	Dual
1 „Note8“	CTRL	CTRL	CTRL
2,3	-Vin	-Vin	-Vin
9	NC	no pin	Com
11	NC	NC	-Vout
14	+Vout	+Vout	+Vout
16	-Vout	-Vout	Com
22,23	+Vin	+Vin	+Vin

NC= No Connection

„B“ Pinning (/H only)



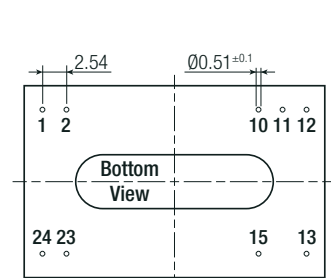
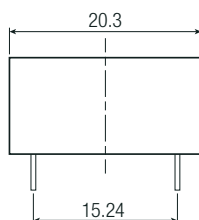
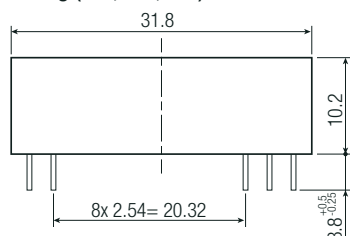
Recommended Footprint Details



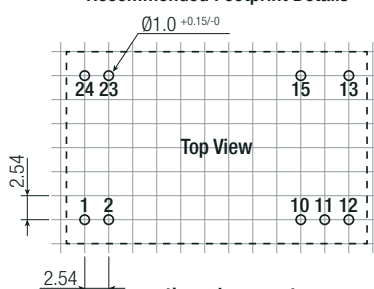
„B“ Pinning (/H only)

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

„C“ Pinning (/H2, /H4, /H6)



Recommended Footprint Details



„C“ Pinning (/H2,/H4,/H6)

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

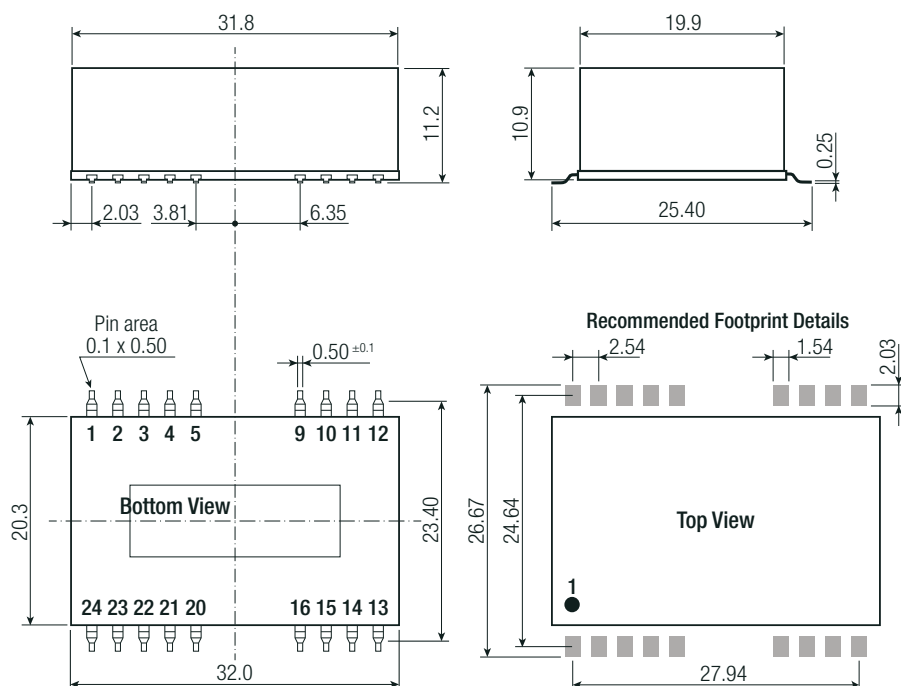
NC= No Connection

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tolerance $\pm 0.25\text{mm}$

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing SMD plastic case (mm)



„A“ Pinning		
Pin #	Single	Dual
1 „Note8“	CTRL	CTRL
2,3	-Vin	-Vin
4,5	NC	NC
9	NC	Com
10,12,13,15	NC	NC
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Com
20,21,24	NC	NC
22,23	+Vin	+Vin

NC= No Connection

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

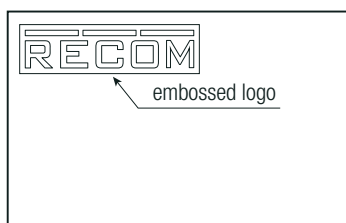
NC= No Connection

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

NC= No Connection

Notes:

Note18: All models with plastic housings have an embossed RECOM logo. See below top view:



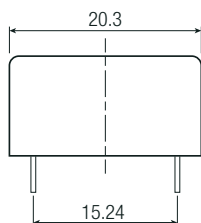
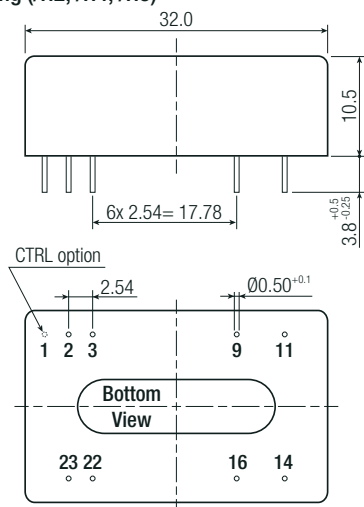
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tolerance $\pm 0.35\text{mm}$

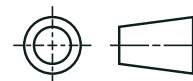
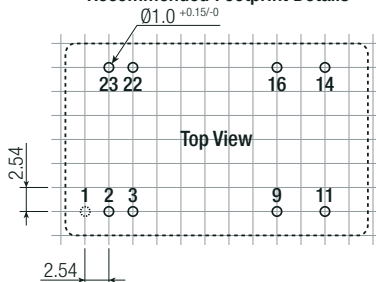
Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing DIP24 metal case (mm)

„A“ Pinning (/H2, /H4, /H6)



Recommended Footprint Details

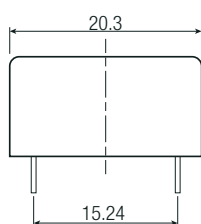
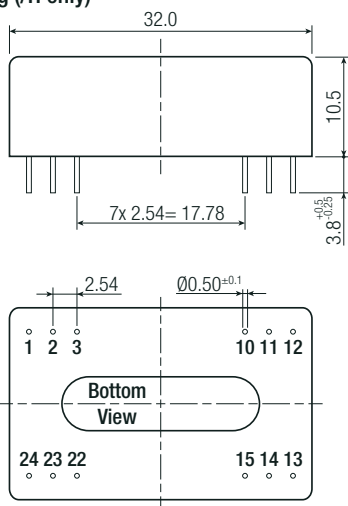


„A“ Pinning (/H2,/H4,/H6)

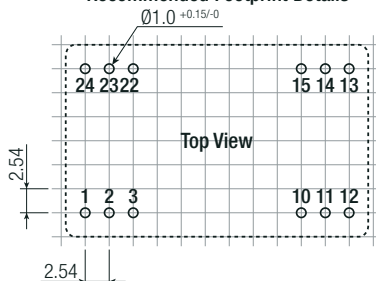
Pin #	Single	Single/X2	Dual
1 „Note8“	CTRL	CTRL	CTRL
2,3	-Vin	-Vin	-Vin
9	NC	no pin	Com
11	NC	NC	-Vout
14	+Vout	+Vout	+Vout
16	-Vout	-Vout	Com
22,23	+Vin	+Vin	+Vin

NC: No Connection

„B“ Pinning (/H only)



Recommended Footprint Details

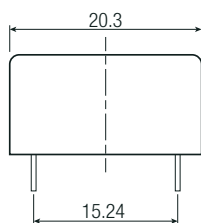
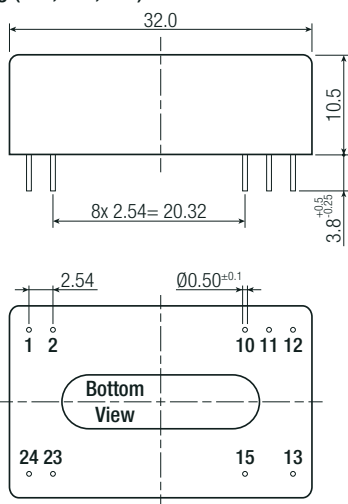


„B“ Pinning (/H only)

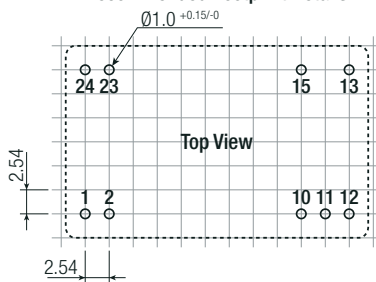
Pin #	Single	Dual
1	+Vin	+Vin
2	no pin	-Vout
3	no pin	Com
10	-Vout	Com
11,14	+Vout	+Vout
12,13	-Vin	-Vin
15	-Vout	Com
22	no pin	Com
23	no pin	-Vout
24	+Vin	+Vin

NC= No Connection

„C“ Pinning (/H2, /H4, /H6)



Recommended Footprint Details



„C“ Pinning (/H2,/H4,/H6)

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

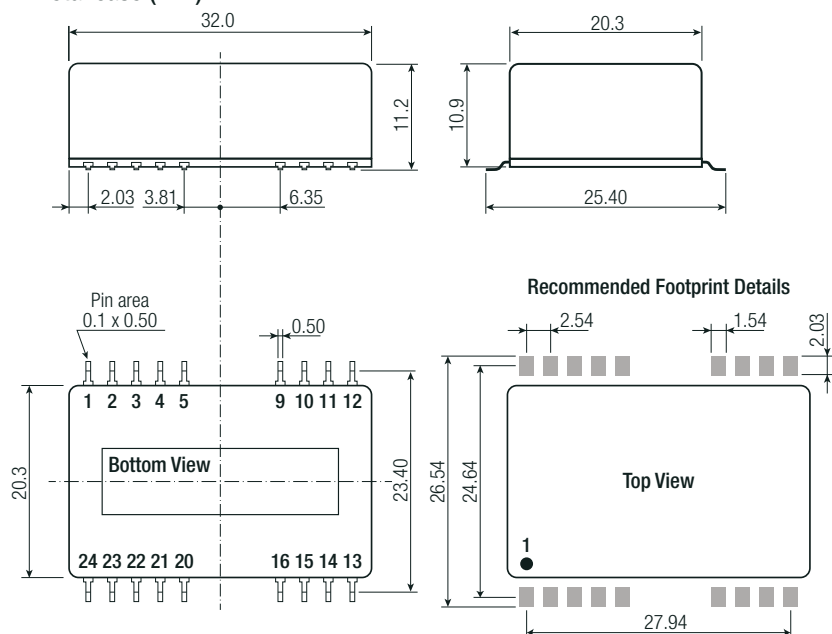
NC= No Connection

tolerance ±0.25mm

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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Dimension Drawing SMD metal case (mm)



„A“ Pinning

Pin #	Single	Dual
1 „Note8“	CTRL	CTRL
2,3	-Vin	-Vin
4,5	NC	NC
9	NC	Com
10,12,13,15	NC	NC
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Com
20,21,24	NC	NC
22,23	+Vin	+Vin

NC= No Connection

„B“ Pinning

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

NC= No Connection

„C“ Pinning

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

NC= No Connection

tolerance ±0.35mm

PACKAGING INFORMATION

Parameter	Type		Value
Packaging Dimension (LxWxH)	tube	THT	530.0 x 23.0 x 19.0mm
		SMD	530.0 x 32.0 x 19.0mm
	tape and reel (“-R” only)		355.0 x 342.0 x 70.0mm
Tape Width			44mm
Packaging Quantity	tube		15pcs
	tape and reel		100pcs
Storage Temperature Range			-55°C to +125°C
Storage Humidity	non-condensing		95% RH max.

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