Features

Regulated Converter

- 4:1 wide input range
- 3kVAC reinforced insulation for 110Vin
 2.25kVDC basic insulation for 24Vin & 48Vin
- Efficiency up to 91%
- No minimum load required
- UL60950-1. EN50155 & IEC/EN60950-1 certified



RP75H-RW

75 Watt Half Brick Single Output







EN50155 certified IEC/EN60950-1 certified UL60950-1 certified

Description

The half-brick RP75H series DC/DC converters are designed for railway rolling stock and high voltage battery applications. Each series has three 4:1 input voltage range options to cover all input voltages from 9VDC up to 160VDC with isolated and regulated 5V to 48VDC outputs. The converters have high efficiencies and metal baseplates to permit a wide operating temperature range from -40°C to +85°C (when mounted on a suitable heatsink). The case is fitted with threaded inserts to allow secure mounting to the PCB or bulkhead for use in high shock and vibration environments. The converters are EN50155, UL60950 and IEC/EN60950 certified. The RP75H-RW series have a three year warranty.

Selection Gu	ide						
Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input ⁽¹⁾ Current [mA]	Output Power [W]	Efficiency ⁽¹⁾ typ. [%]	Max. Capacitive Load [µF]
RP75H-2405SRW	9-36	5	15000	3551	75	88	30000
RP75H-2412SRW	9-36	12	6300	3579	75	88	5250
RP75H-2415SRW	9-36	15	5000	3551	75	88	3330
RP75H-2424SRW	9-36	24	3200	3678	76	87	1330
RP75H-2448SRW	9-36	48	1600	3678	77	87	330
RP75H-4805SRW	18-75	5	15000	1736	75	90	30000
RP75H-4812SRW	18-75	12	6300	1750	75	90	5250
RP75H-4815SRW	18-75	15	5000	1755	75	89	3330
RP75H-4824SRW	18-75	24	3200	1818	76	88	1330
RP75H-4848SRW	18-75	48	1600	1839	77	87	330
RP75H-11005SRW	/ 43-160	5	15000	749	75	91	30000
RP75H-11012SRW	/ 43-160	12	6300	755	75	91	5250
RP75H-11015SRW	/ 43-160	15	5000	749	75	91	3330
RP75H-11024SRW	/ 43-160	24	3200	775	76	90	1330
RP75H-11048SRW	/ 43-160	48	1600	775	77	90	330

Notes

Note1: Efficiency is tested by nominal Vin, full load and at 25°C

Model Numbering



Notes:

Note2: standard part is with suffix "P" for positive logic (1=0N, 0=0FF) or add suffix "N" instead for negative logic (0=0N, 1=0FF)

for more details refer to "ON/OFF CTRL (4)"

Note3: add suffix "-HC" for premounted Heat-sink (refer to "Dimension Drawing Heat-sink (mm)") (compatible with all other suffixes)

Ordering Examples

RP75H-2405SRW/N = 24V Input, 5V Output, Single, Neg. CTRL function
RP75H-11012SRW/P = 110V Input, 12V Output, Single, Pos. CTRL function
RP75H-11012SRW/P-HC = 110V Input, 12V Output, Single, Pos. CTRL function, with premounted Heat-sink



https://recom-power.com/rec-s-R-REF04-RIA12.html



https://recom-power.com/rec-s-RSPxxx-168.html



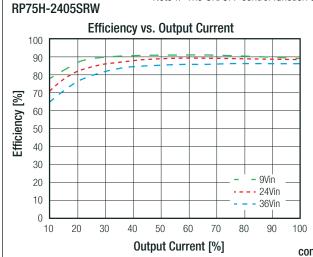
Series

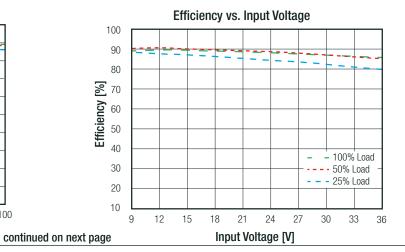
Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)

Parameter		Con	dition		Min.	Тур.	Max.
Internal Input Filter					'	,	Pi-Type
		nom V	in = 24V		9VDC	24VDC	36VDC
Input Voltage Range		nom V	in = 48V		18VDC	48VDC	75VDC
		nom Vii	n = 110V		43VDC	110VDC	160VDC
			V, 1s max.				50VDC
Input Surge Voltage			SV, 1s max.				100VDC
		Vin = 11	DV, 1s max.				185VDC
	Vin =	24\/		DC ON			9VDC
	VIII —			DC OFF		7.5VDC	
Under Voltage Lockout (UVLO)	Vin = 48V			DC ON			18VDC
onder voilage Lockout (ovlo)			DC-I	DC OFF		16VDC	
	Vin = 110V			DC-DC ON			43VDC
	VIII —			DC OFF		36VDC	
		Vin = 24V					185mA
Quiescent Current			= 48V		50mA		90mA
		Vin = 110V				10mA	
Output Voltage Trimming	ref	er to <i>"OUTPUT V</i>	OLTAGE TRIMMING	,,,	-20%		+10%
Minimum Load					0%		
	Power up		Vin =	Vin = 110V		60ms	
Start-up time			Vin = 24V	Vin = 48V		25ms	
Start-up time	Remote ON/OFF		Vin = 110V			60ms	
	hemote or	W/UFF	Vin = 24V	Vin = 48V		25ms	
	Positive	Logic	DC-	DC-DC ON		Open or 3.0VDC < V _{CRTL} < 1	
ON/OFF CTRL (4)	LOSITIVE	Logic	DC-I	DC-DC OFF		Short or OVDC < V	
refer to "ON/OFF CTRL"	Negative	A Logic	DC-	DC ON	Short or OVDC < V _{CRTL} ·		CRTL < 1.2VDC
	Negative	Logic	DC-I	DC OFF	Ope	n or 3.0VDC < \	$I_{\text{CRTL}} < 12 \text{VDC}$
Input Current of CTRL pin	drive cu	ırrent	I	CTRL	-0.5mA		1mA
Standby Current	DC-DC	OFF		I _{In}		3mA	
Internal Operating Frequency		**		270kHz	300kHz	330kHz	
		with a 4.7uF	5/50V X7R MLCC	5 Vout		75mVp-p	100mVp-p
0	measured by		5/50V X7R MLCC	12, 15Vout		100mVp-p	125mVp-p
Output Ripple and Noise	20MHz BW		5/50V X7R MLCC	24Vout		200mVp-p	250mVp-p
			100V X7R MLCC	48Vout		300mVp-p	350mVp-p
Remote Sense	% (of set Vout (refer t	o "REMOTE SENSE	")			10%

Notes:

Note4: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin

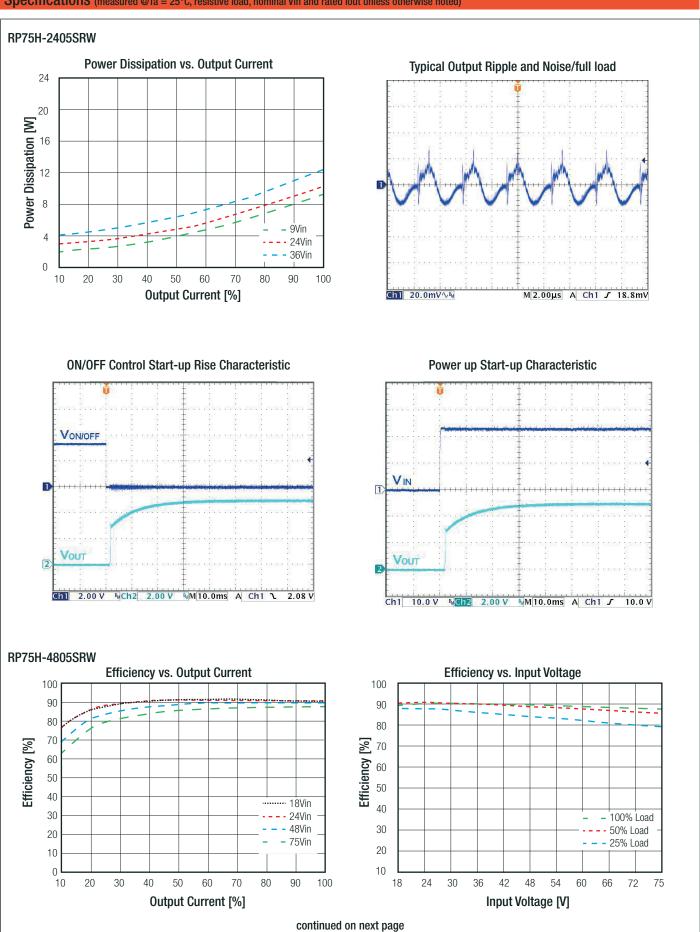






Series

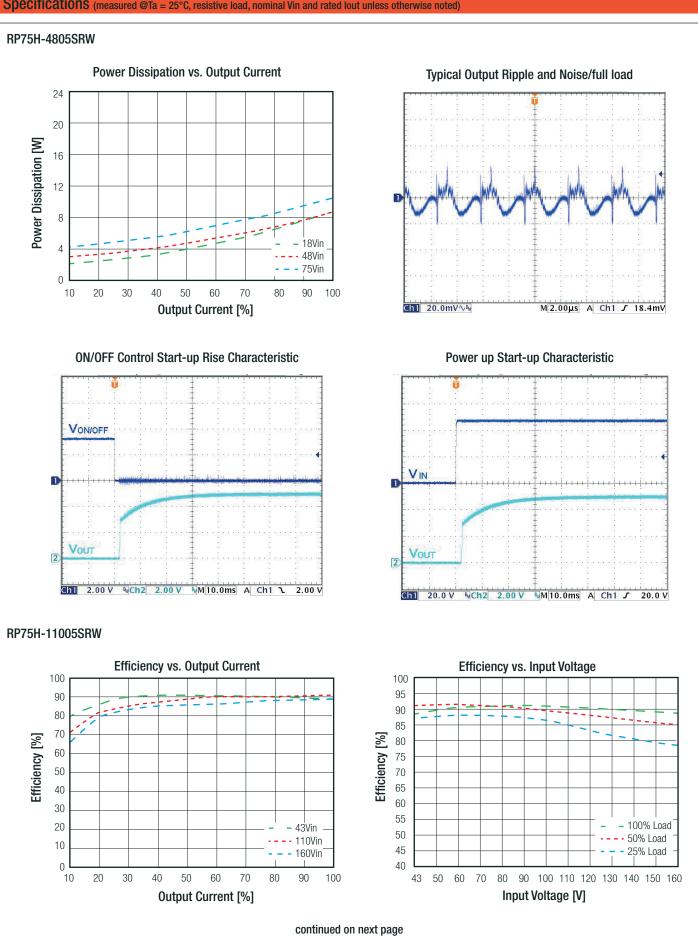
Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)





Series

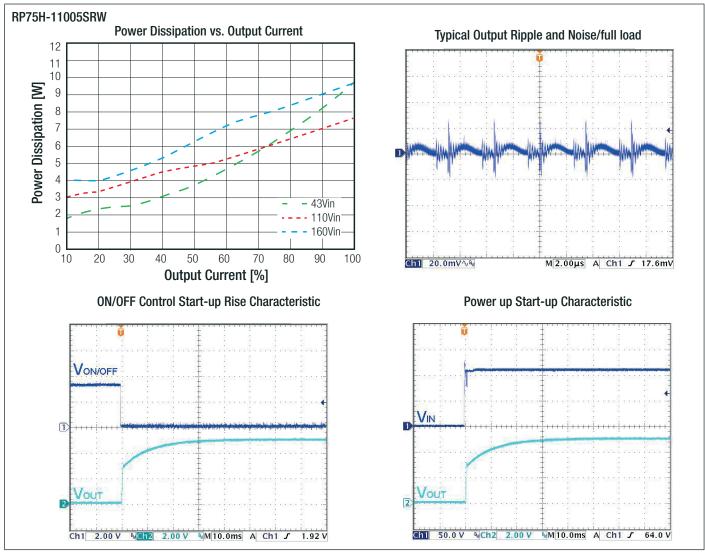
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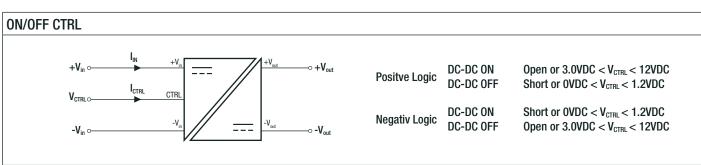


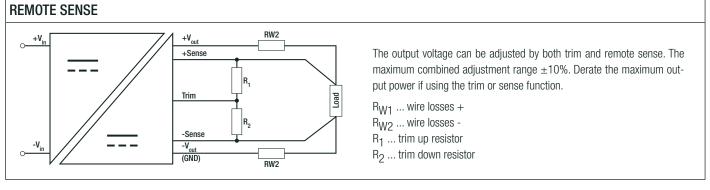


Series

Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)









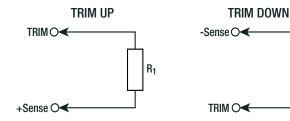
Series

Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)

OUTPUT VOLTAGE TRIMMING

Output Voltage Trimming

RP75H-RW converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. The values for trim resistors shown in trim tables below are according to standard E96 values; therefore, the specified voltage may slightly vary; they also can be calculated with below shown equation.



Trim Calculation

$$R_{_{1}} = \left[\frac{100*Vout + \Delta Vout * Vout)}{1.225*\Delta Vout} - \frac{(100 + 2\Delta Vout)}{\Delta Vout} \right] k\Omega$$

Vout = Output Voltage

 Δ Vout = Output Voltage Trim in %

 R_2

R1 = trim up resistor R2 = trim down resistor

$$R_{2} = \left[\frac{100}{\Delta Vout} - 2 \right] k\Omega$$
 R2 =

Practical Example:

Trim Up:

Vout = 5V, Δ Vout = 10% (5.5V)

$$R_{1} = \left[\frac{100^{*}Vout + \Delta Vout * Vout}{1.225^{*}\Delta Vout} - \frac{(100 + 2\Delta Vout)}{\Delta Vout} \right] k\Omega = \left[\frac{100^{*}5 + 10^{*}5}{1.225^{*}10} - \frac{100 + 2^{*}10}{10} \right] = 44.89 - 12 = 32.9k\Omega$$

Trim down:

Vout = 5V, Δ Vout = -10% (4.5V)

$$R_2 = \left[\frac{100}{\Delta Vout} - 2 \right] k\Omega = \left[\frac{100}{10} - 2 \right] = 8.06 k\Omega$$

RP75H-xx05SRW

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.4	5.45	5.50	Volts
$R_1 =$	309	158	105	78.7	63.4	53.6	46.4	40.2	36.5	33.2	KOhms
RP75H-xx	12SRW										
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20	Volts
R ₁ =	887	453	301	226	182	154	133	118	105	95.3	KOhms



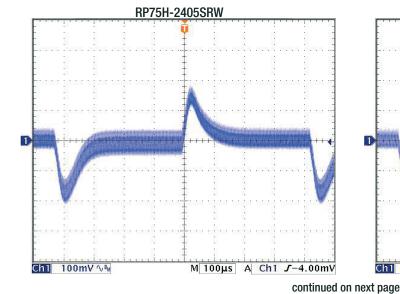
Series

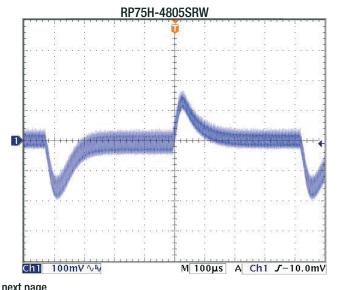
Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)

RP75H-xx	15SRW										
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50	Volts
R ₁ =	1130	576	383	294	237	196	169	150	137	124	KOhms
RP75H-xx	24SRW										
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	24.24	24.48	24.72	24.96	25.20	25.44	25.68	25.92	26.16	26.40	Volts
$R_1 =$	1870	953	634	487	392	324	280	249	226	205	KOhms
RP75H-xx	48SRW										
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	48.48	48.96	49.44	49.92	50.40	50.88	51.36	51.84	52.32	52.80	Volts
$R_1 =$	3830	1960	1300	1000	806	681	576	511	464	422	KOhms
Trim Down	n all Vout's										
Trim down	1	2	3	4	5	6	7	8	9	10	%
$R_2 =$	97.6	47.5	31.6	23.2	17.8	14.7	12.1	10.5	9.09	8.06	KOhms
Trim down	11	12	13	14	15	16	17	18	19	20	%
$R_2 =$	7.15	6.34	5.76	5.11	4.64	4.22	3.92	3.57	3.24	3.01	KOhms

REGULATIONS		
Parameter	Condition	Value
Output Accuracy		±1.0%
Line Regulation	low line to high line at full load	±0.1%
Load Regulation	0% to 100% load	0.1%
Transient Response	25% load step change	200µs typ.; 250µs max.

Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load at nom.Vin

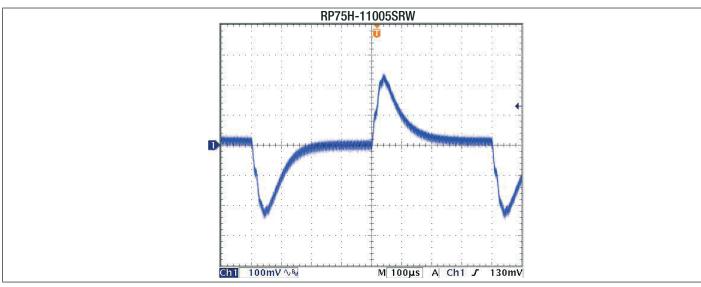






Series

Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)



PROTECTIONS			
Parameter	Co	ndition	Value
Short Circuit Protection (SCP)	belov	v 100mΩ	continuous, automatic recovery
Over Voltage Protection (OVP)	% of	nom. Vout	115%-130%, Hiccup Mode
Over Load Protection (OLP)	otection (OLP) % lout rated		120%-150%, Hiccup Mode 150% typ., Hiccup Mode
Over Temperature Protection (OTP)			+115°C
1.10.10	110Vin	I/P to O/P I/P or O/P to Baseplate	3kVAC/1minute 1.5kVAC/1minute
Isolation Voltage	24Vin, 48Vin	I/P to O/P I/P or O/P to Baseplate	2.25kVDC/1minute 1.6kVDC/1minute
Isolation Resistance	50	OO VDC	1GΩ min.
Isolation Capacitance			2500pF max.
Isolation Grade		in, 48 Vin 10Vin	basic Insulation reinforced Insulation
Notes:	•		

	otes:
14	uico.

Note5: Refer to local wiring regulations if input over-current protection is also required. Recommended fuse: T30A slow blow

ENVIRONMENTAL					
Parameter	Condition		Value		
Operating Case Temperature Range	Baseplate		refer to derating graph		
Maximum Case Temperature			105°C		
Temperature Coefficient			±0.02%/°C max.		
Thormal Impedance	vertical direction by natural convection (0.1m/s) witho	ut Heat-sink	6.7°C/W		
Thermal Impedance	vertical direction by natural convection (0.1m/s) with	n Heat-sink	4.7°C/W		
Operating Humidity					
Pollution Dograd	24Vin, 48Vin	24Vin, 48Vin			
Pollution Degree	110Vin		PD2		
Shock			according to EN61373 standard		
Thermal Shock			according to MIL-STD-810F standard		
Vibration			according to EN61373 standard		
Fire protection on railway vehicles			according to EN45545-2, 2013 standard		
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	336.2 x 10 ³ hours		
	continued on next page				



Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)

Thermal Calculation

 $R_{\text{thcase-ambient}} = 6.7^{\circ}\text{C/W} \text{ (vertical)}$ $R_{\text{thcase-ambientHC}} = 4.7^{\circ}\text{C/W} \text{ (vertical)}$

 $R_{\text{thcase-ambient}} = \frac{T_{\text{case}} - T_{\text{ambient}}}{P_{\text{dissipation}}}$

 $\mathsf{P}_{\text{dissipation}} = \; \mathsf{P}_{\mathsf{IN}} - \mathsf{P}_{\mathsf{OUT}} \; = \frac{\mathsf{P}_{\mathsf{OUTapp}}}{\eta} - \mathsf{P}_{\mathsf{OUTapp}}$

 T_{case} = Case Temperature $T_{ambient}$ = Environment Temperature

 $P_{\text{dissipation}} = \text{Internal losses}$ $P_{\text{IN}} = \text{Input Power}$ $P_{\text{OUT}} = \text{Output Power}$

 η = Efficiency under given Operating Conditions

 $R_{those ambient} = Thermal Impedance$

Practical Example:

Take the RP75H-2405SRW with 9V input Voltage and 50% load. What is the maximum ambient operating temperature? Use converter vertical in application without airflow.

$$Eff_{min} = 90\% @ V_{nom}$$

 $P_{OUT} = 75W$

 $P_{OUTapp} = 75 \times 0.5 = 37.5W$

 $\eta=92\%$ (Efficiency vs. Load Graph)

$$P_{\text{dissipation}} = \frac{37.5}{0.92} - 37.5 = 3.26W$$

without Heat-sink

$$R_{th} = \frac{T_{casemax} - T_{amb}}{P_{dissipation}} --> 6.7^{\circ}\text{C/W} = \frac{105 - T_{amb}}{3.26\text{W}}$$

$$T_{amb} = 83^{\circ}C$$

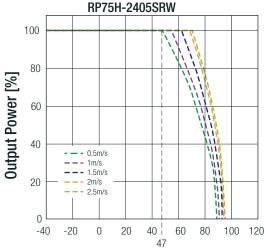
with Heat-sink

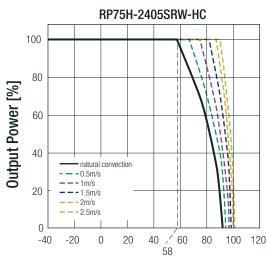
$$R_{thHC} = \frac{T_{casemax} - T_{amb}}{P_{dissipation}} --> 4.7^{\circ}\text{C/W} = \frac{105 - T_{amb}}{3.26\text{W}}$$

$$T_{ambHC} = 89^{\circ}C$$

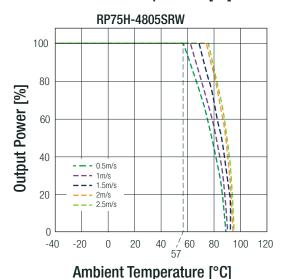
Derating Graph⁽⁶⁾

(@ Chamber and natural convection 0.1m/s)

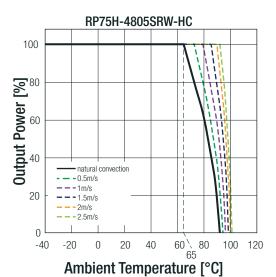




Ambient Temperature [°C]



Ambient Temperature [°C]

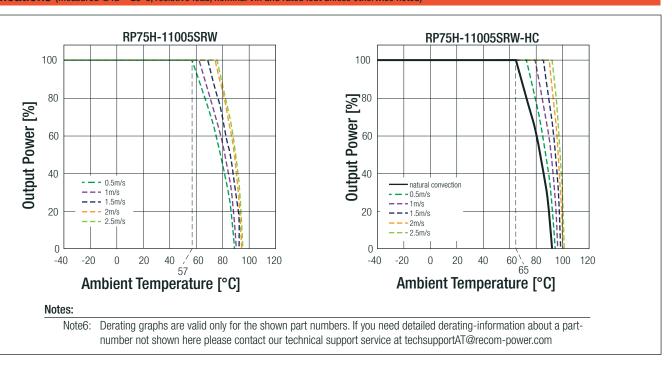


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Series

Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)



SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E196683	UL60950-1, 2nd Edition, 2014 CSA C22.2 No. 60950-1-07, 2nd Edition, 2014
Information Technology Equipment - General Requirements for Safety	TW1608034-001, TW1608035-001	IEC60950-1, 2nd Edition, 2005 EN60950-1, 2006
Railway Applications - Electrical Equipment used on rolling stock	16A081501E-C	EN50155, 2007
EAC	RU-AT.49.09571	TP TC 004/2011
RoHS 2+		RoHS 2011/65/EU
EMI Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	110Vin	EN55022, Class A and Class B
Industrial, scientific and medical equipment - Radio frequency disturbance characteristics - Limits and methods of measurement	with external components	EN55011, Class A and Class B
Low-voltage power supplies DC output - Part 3: Electromagnetic compatibility (EMC)	24Vin, 48Vin with external components	EN61204-3, Class B
ESD Electrostatic discharge immunity test	Air ±8kV and Contact ±6kV	EN61000-4-2, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	20V/m (110Vin), 10V/m (24Vin,48Vin)	EN61000-4-3, Criteria A
Fast Transient and Burst Immunity ⁽⁷⁾	±2kV	EN61000-4-4, Criteria A
Surge Immunity ⁽⁷⁾	EN55024 & EN50155 ±2kV (±1kV, 24Vin, 48Vin)	EN61000-4-5, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	10 Vr.m.s	EN61000-4-6, Criteria A

Notes:

Note7: An external input filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5.

The **24Vin** and **48Vin** version recommend 2pcs of aluminium elecrolytic capacitor to connect in parallel.

Recom suggest: $220\mu F/100V$.

The 110Vin version recommend 2pcs of aluminium electrolytic capacitor to connect in parallel.

Recom suggest: 150µF/200V

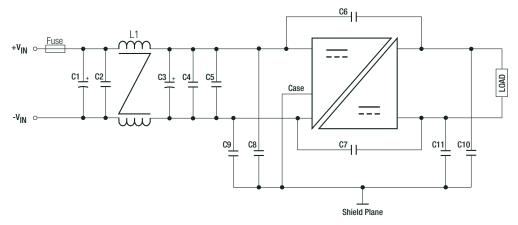
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Series

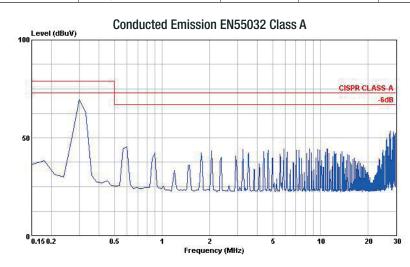
Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)

EMI Filtering according to EN61204-3 Class A and EN50121-1 (24Vin and 48Vin)

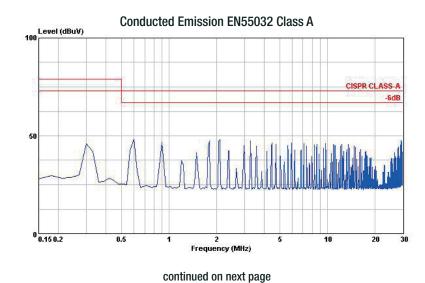


MODEL C1, C3		C2, C4, C5	C6 to C11	L1
RP75H-24xxSRW	100μF, 50V	4.7μF, 50V	1000pF, 3kV	156µH
NF / JI I-24XXJNW	Al Cap. Chemi-con KY Series	1812 MLCC	1808 MLCC	CMC
DD7ELL 40va/CDW	100μF, 100V	2.2µF, 100V	1000pF, 3kV	620µH
RP75H-48xxSRW	Al Cap. Chemi-con KY Series	1812 MLCC	1808 MLCC	CMC

RP75H-2405SRW



RP75H-4805SRW

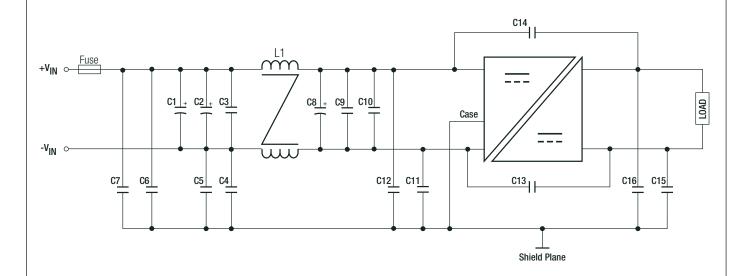




Series

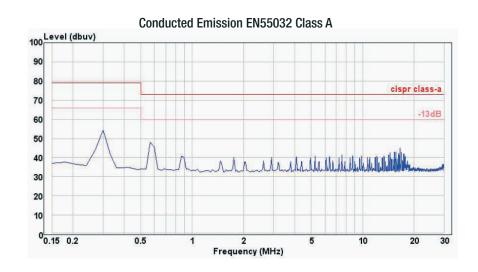
Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)

EMI Filtering according to EN55032/11 Class A and EN50121-1 (110Vin)



MODEL	MODEL C1, C8		C13, C14	C5, C15, C16	L1
DD7ELL 110vvCDW	150μF, 200V	1μF, 250V	1000pF, 400VAC	1000pF, 5kV	521µH
RP75H-110xxSRW	Al Capacitor (lie down) Chemi-con KXJ	1812 MLCC	TDK CD Series	1808 MLCC	CMC
C2, C3, C4, C6, C7, C	C9, C11, C12 : N/A				

RP75H-11005SRW

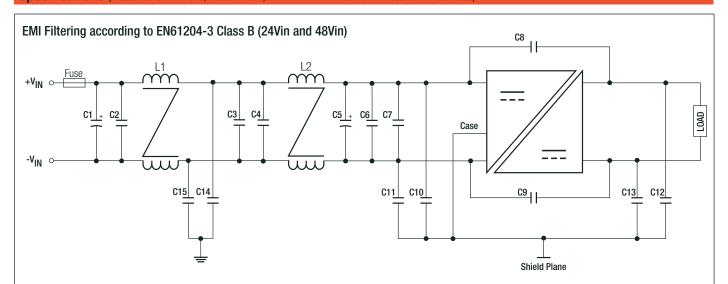


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Series

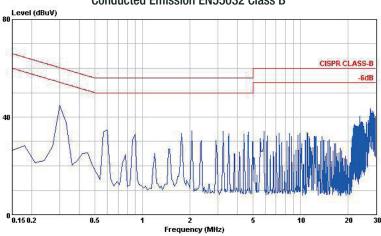
Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)



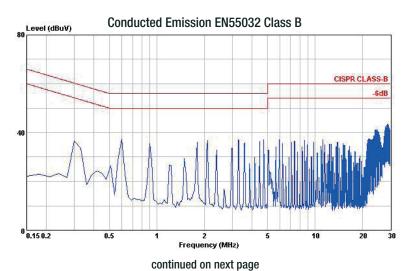
MODEL	C1, C5	C2, C3, C4, C6, C7	C8, C14, C15	С9	C10 to C13	L1	L2
RP75H-24xxSRW	100μF, 50V	4.7μF, 50V	1000pF, 3kV	1000pF, 3kV	10nF, 2kV	305μH	305µH
	Al Cap. (lie down) Chemi-con KY	1812 MLCC	1808 MLCC	1808 MLCC	1812 MLCC	CMC	CMC
RP75H-48xxSRW	100μF, 100V	2.2µF, 100V	1000pF, 3kV	4700pF, 3kV	10nF, 2kV	1186µH	156µH
	Al Cap. (lie down) Chemi-con KY	1812 MLCC	1808 MLCC	1812 MLCC	1812 MLCC	CMC	CMC

RP75H-2405SRW





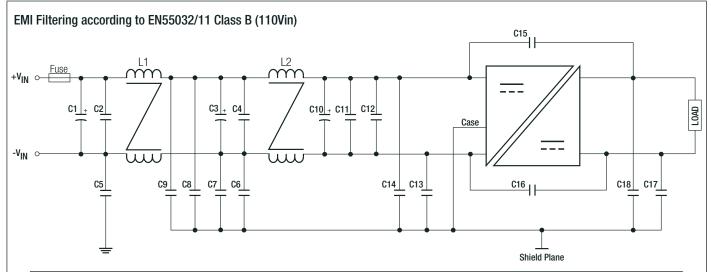






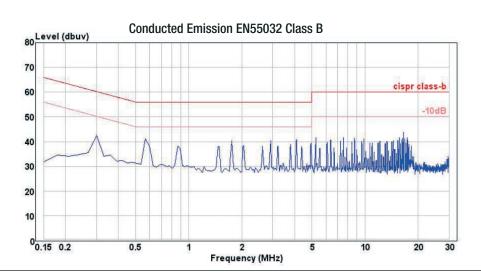
Series

Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)



MODEL	C1, C3, C10	C11, C12	C13	C15, C16	C6, C7, C8, C9, C17, C18	L1	L2
RP75H-110xxSRW	150µF, 200V Al Cap. (lie down) Chemi-con KXJ	1μF, 250V 1812 MLCC	330pF, 5kV 1808 MLCC	1000pF, 400VAC TDK CD Series	1000pF, 5kV 1808MLCC	305µН СМС	806µН СМС
C2. C4. C5. C14: N/A	7						

RP75H-11005SRW

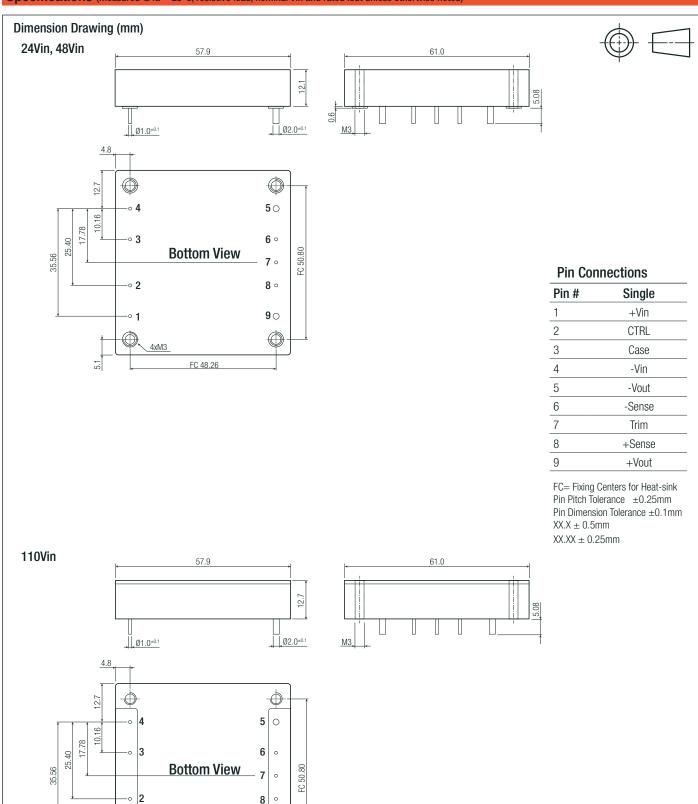


Parameter	T	/pe	Value	
	case	24Vin, 48Vin 110Vin	Meta Plastic	
Material	baseplate	24Vin, 48Vin 110Vin	FR4 PCE Aluminium	
	po	tting	Silicone (UL94 V-0)	
Dimensions (LxWxH)		Heat-sink eat-sink	61.0 x 57.9 x 12.7mm 61.0 x 57.9 x 24.13mm	
Weight		Heat-sink eat-sink	105g 157g	



Series

Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)



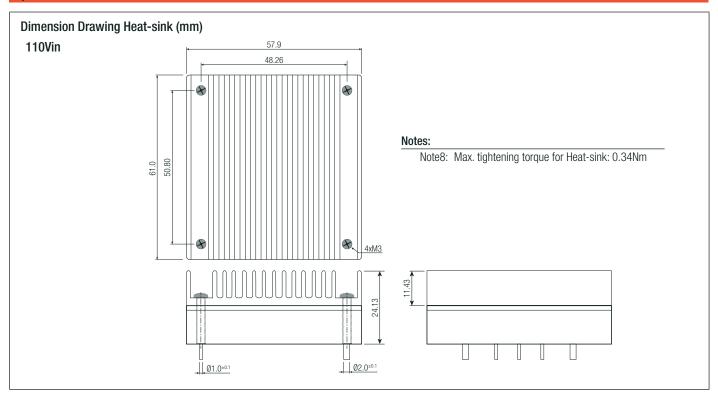
9 0

FC 48.26



Series

Specifications (measured @Ta = 25°C, resistive load, nominal Vin and rated lout unless otherwise noted)



PACKAGING INFORMATION						
Parameter		Value				
Packaging Dimension	Tray	without Heat-sink with Heat-sink	157.0 x 88.0 x 23.0mm 157.0 x 88.0 x 35.0mm			
Packaging Quantity			2pcs.			
Storage Temperature Range			-55°C to +125°C			
Storage Humidity			5% - 95% RH			

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.

Mouser Electronics

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RP75H-2405SRW/N RP75H-2424SRW/N RP75H-2412SRW/N-HC RP75H-2405SRW/P RP75H-2412SRW/N RP75H-11024SRW/P RP75H-11048SRW/P RP75H-11012SRW/N-HC RP75H-11012SRW/N-HC RP75H-11012SRW/P-HC RP75H-11012SRW/P-HC RP75H-4815SRW/P RP75H-2424SRW/P RP75H-4824SRW/P-HC RP75H-4848SRW/N-HC RP75H-11005SRW/P-HC RP75H-4848SRW/N-HC RP75H-11005SRW/N-HC RP75H-4812SRW/N-HC RP75H-4805SRW/N-HC RP75H-4824SRW/N-HC RP75H-4824SRW/N-HC RP75H-4805SRW/N-HC RP75H-4848SRW/N-HC RP75H-4815SRW/N-HC RP75H-2412SRW/P-HC RP75H-4824SRW/N-HC RP75H-4815SRW/N-HC RP75H-2412SRW/P-HC RP75H-2405SRW/N-HC RP75H-2415SRW/N-HC RP75H-2415SRW/P-HC RP75H-4805SRW/N-HC RP75H-11005SRW/N RP75H-2448SRW/P-HC RP75H-4805SRW/P-HC RP75H-11005SRW/N RP75H-2448SRW/P-HC RP75H-4805SRW/N RP75H-11005SRW/N RP75H-2448SRW/P-HC RP75H-4848SRW/P-RP75H-2424SRW/N-HC RP75H-11005SRW/N RP75H-2424SRW/P-HC RP75H-2424SRW/N-HC RP75H