Features

Regulated Converter

- 4:1 wide input voltage range
- 1.6kVDC Isolation
- UL, IEC/EN60950 and EN50155 certified
- Efficiency up to 88%
- OVP, OCP & OTP
- +105°C max. case temperature

RECOM
DC/DC Converter

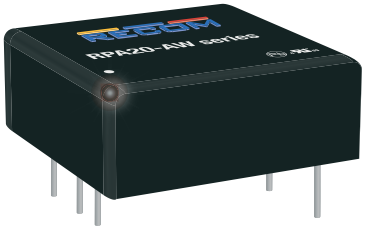
RPA20-AW

20 Watt 1“ x 1“ Single and Dual Output

YEAR 3 warranty

Description

The RPA20-AW series are high power density, wide input voltage range 20W DC/DC converters in an industry standard 1”x1” case size. Despite their small size, the RPA20-AW converters are fully specified devices with output currents up to 6Amps, up to 88% efficiency, no minimum load, 1600VDC isolation, tight regulation and low ripple/noise figures. The outputs are also fully protected against over-temperature, short circuits, overcurrent and overvoltage and the single output version offers a ±10% trim range. A heatsink option is available to extend the operating temperature range. The converters are UL and EN50155 certified and will find many uses in railway and industrial applications where board space is at a premium.



Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input [1] Current [mA]	Efficiency [1] typ. [%]	Max. Capacitive Load [µF]
RPA20-243.3SAW [2,3]	9-36	3.3	6000	948	87	10000
RPA20-2405SAW [2,3]	9-36	5	4000	947	88	10000
RPA20-2412SAW [2,3]	9-36	12	1670	949	88	1000
RPA20-2415SAW [2,3]	9-36	15	1330	945	88	1000
RPA20-2412DAW [2,3]	9-36	±12	±830	949	88	±1000
RPA20-2415DAW [2,3]	9-36	±15	±670	945	88	±680

Notes:

Note1: tested at nominal Vin, full load and at +25°C ambient

c UL us E224736

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

Model Numbering

RPA20-____AW/__

- nom. Input Voltage
- nom. Output Voltage
- Single or Dual
- *“Package [3]”*
- *“CTRL Logic [2]”*

Notes:

Note2: no suffix for standard part without CTRL pin, trim pin fitted
add suffix “P” for positive CTRL function (1=ON, 0=OFF), trim pin fitted
add suffix “N” for negative CTRL function (0=ON, 1=OFF), trim pin fitted
trim pin is only available for single outputs

Note3: add suffix “-HC” for glued Heat-sink (compatible with all other suffixes)

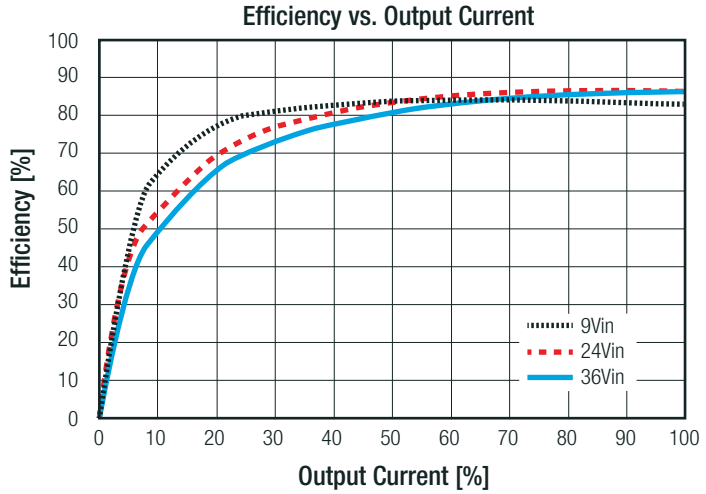
Ordering Examples

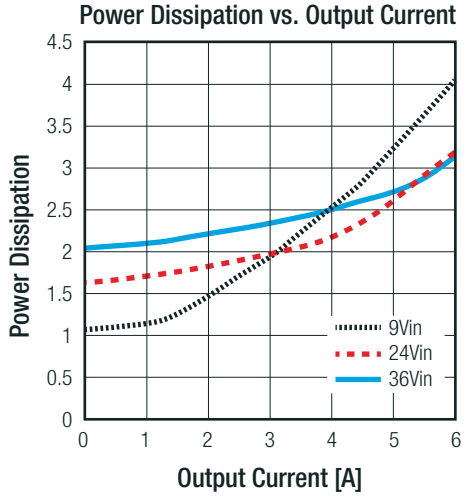
RPA20-243.3SAW = 24V input, 3.3V output, single, no CTRL pin
RPA20-2405DAW/P = 24V input, 5V output, dual, positive CTRL function
RPA20-2415SAW-HC = 24V input, 15V output, single, no CTRL pin, glued Heat-sink
RPA20-2415DAW/N-HC = 24V input, 15V output, dual, negative CTRL function, glued Heat-sink

Specifications (measured @Ta = 25°C, resistive load, nom. Vin and rated Iout unless otherwise noted)

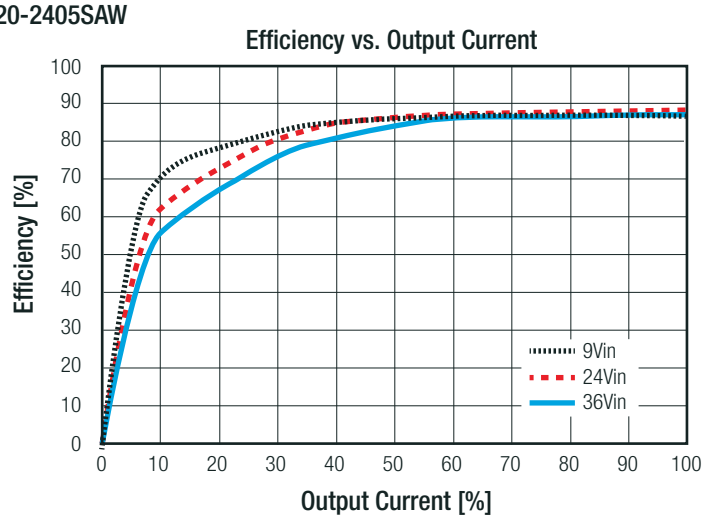
BASIC CHARACTERISTICS					
Parameter	**Condition**		**Min.**	**Typ.**	**Max.**
Internal Input Filter					Pi-Type
Input Voltage Range	nom. Vin= 24VDC		9VDC	24VDC	36VDC
Input Surge Voltage	100ms max.				50VDC
Under Voltage Lockout (UVLO)	DC-DC ON DC-DC OFF		8VDC 7VDC	8.5VDC 7.5VDC	9VDC 8VDC
Quiescent Current			20mA		55mA
Output Voltage Trimming	refer to ***"OUTPUT VOLTAGE TRIMMING"***		-10%		+10%
Minimum Load			0%		
Start-up time	Power up ON/OFF CTRL			8ms	16ms
ON/OFF CTRL	Positive Logic	DC-DC ON DC-DC OFF	Open or 2.4VDC < V_{CTRL} < 10VDC Short or 0VDC < V_{CTRL}< 0.8VDC		
	Negative Logic	DC-DC ON DC-DC OFF	Short or 0VDC < V_{CTRL} < 0.8VDC Open or 2.4VDC < V_{CTRL} < 10VDC		
Input Current of CTRL Pin				6mA	
Internal Operating Frequency				550kHz	
Output Ripple and Noise	20MHz BW, 10µF tantalum capacitor and 1µF ceramic capacitor			50mVp-p	

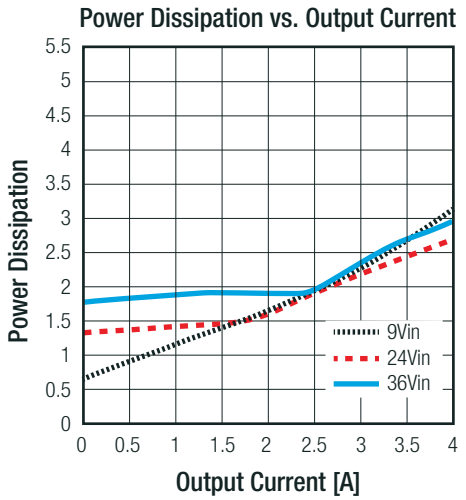
RPA20-243.3SAW





RPA20-2405SAW





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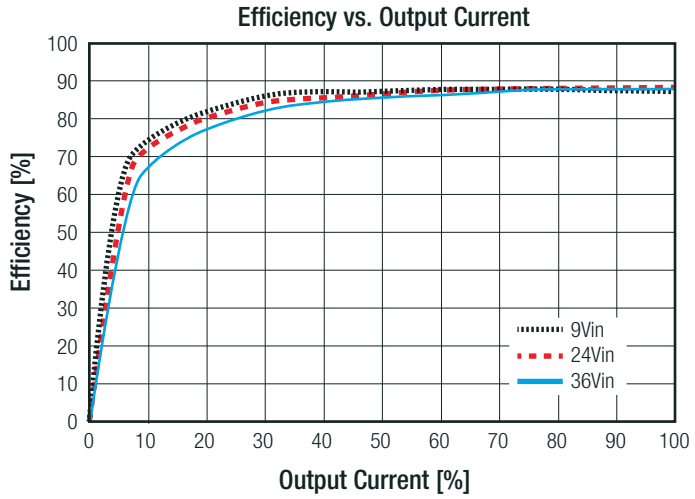
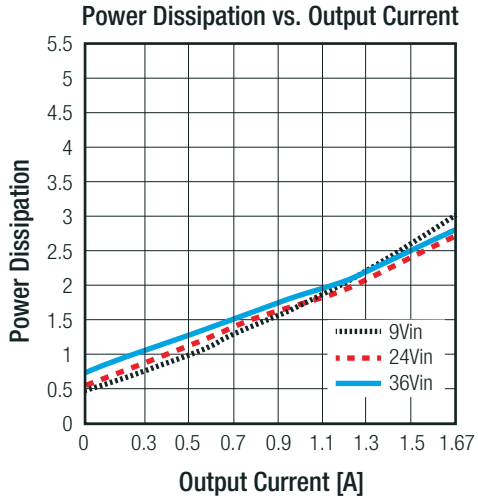
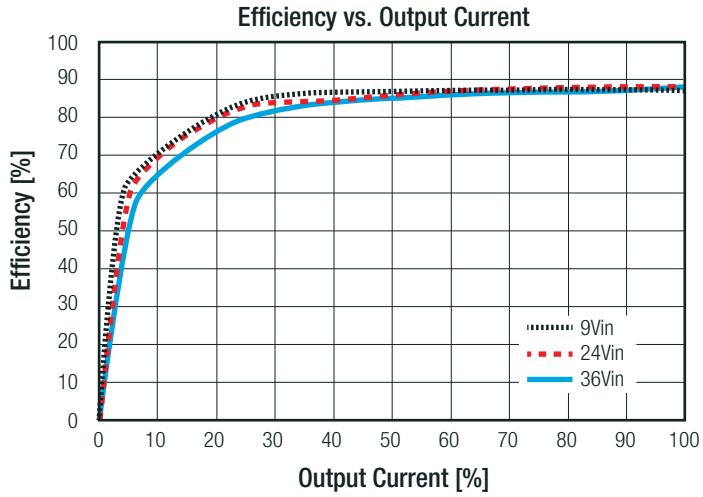
Specifications (measured @Ta = 25°C, resistive load, nom. Vin and rated Iout unless otherwise noted)

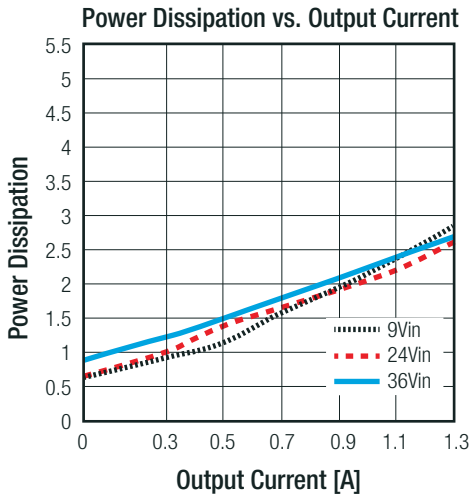
RPA20-2412SAW



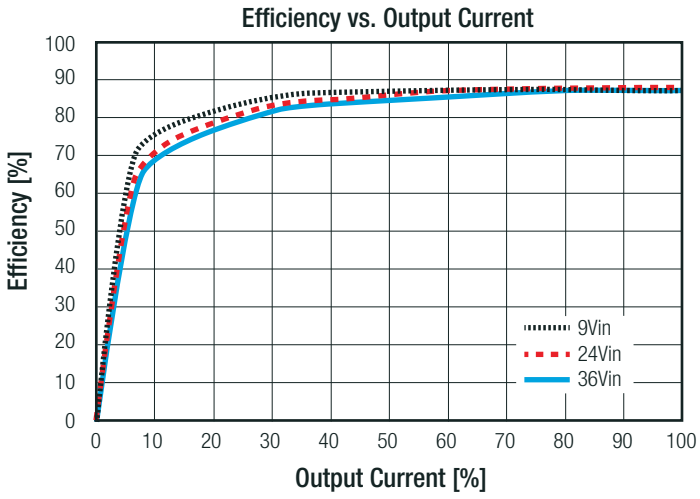


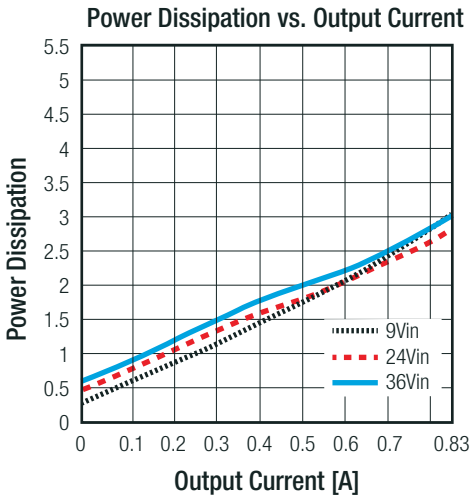
RPA20-2415SAW





RPA20-2412DAW





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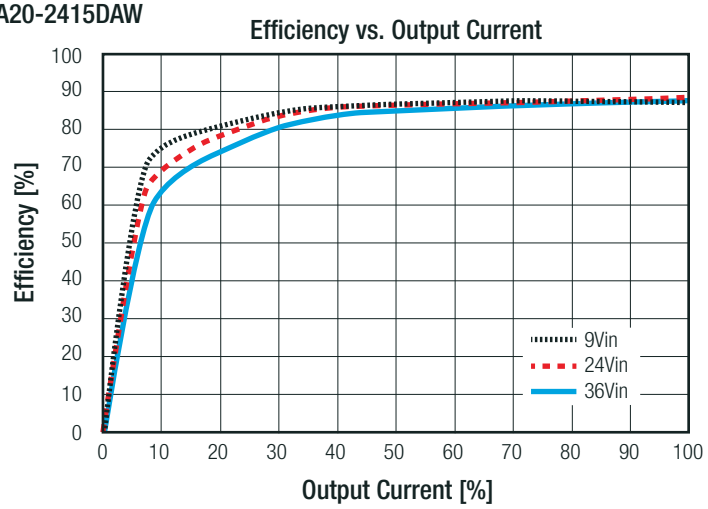
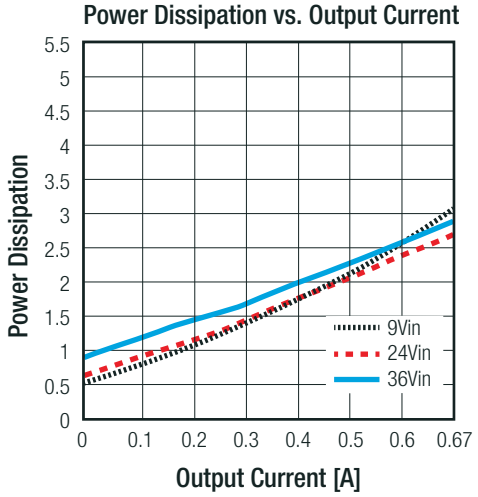
Specifications (measured @Ta = 25°C, resistive load, nom. Vin and rated Iout unless otherwise noted)

RPA20-2415DAW

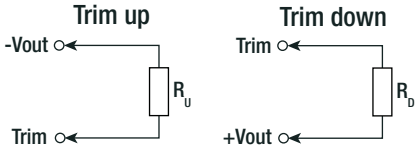




OUTPUT VOLTAGE TRIMMING

Output Voltage Trimming

RPA20-AW 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.



RPA20-243.3SAW

Trim up	1	2	3	4	5	6	7	8	9	10	[%]
Vout =	3.33	3.36	3.39	3.43	3.46	3.49	3.53	3.56	3.59	3.63	[VDC]
R_U =	402	169	100	75	47.5	34.8	26.1	17.8	12.1	8.06	[kΩ]
Trim down	1	2	3	4	5	6	7	8	9	10	[%]
Vout =	3.27	3.23	3.20	3.17	3.14	3.10	3.07	3.04	3.0	2.97	[VDC]
R_D =	402	191	113	75	52.3	39.2	26.7	20	12.1	8.06	[kΩ]

RPA20-2405SAW

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	5.40	5.45	5.50	[VDC]
R_U =	604	243	147	95.3	68.1	39.2	34.8	22.1	15	8.06	[kΩ]
Trim down	1	2	3	4	5	6	7	8	9	10	[%]
Vout =	4.95	4.90	4.85	4.80	4.75	4.70	4.65	4.60	4.55	4.50	[VDC]
R_D =	604	287	169	124	105	78.7	54.9	39.2	15	0.5	[kΩ]

RPA20-2412SAW

Trim up	1	2	3	4	5	6	7	8	9	10	[%]
Vout =	12.12	12.24	12.36	12.48	12.6	12.72	12.84	12.96	13.08	13.20	[VDC]
R_U =	604	267	162	105	75	499	40.2	24.9	18.2	10	[kΩ]
Trim down	1	2	3	4	5	6	7	8	9	10	[%]
Vout =	11.88	11.76	11.64	11.52	11.40	11.28	11.16	11.04	10.92	10.80	[VDC]
R_D =	750	309	200	124	90.9	64.9	45.3	32.4	20	12.1	[kΩ]

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Specifications (measured @Ta = 25°C, resistive load, nom. Vin and rated Iout unless otherwise noted)

RPA20-2415SAW											
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	[VDC]
R_U =	1000	243	200	130	90.9	61.9	40.2	30.1	24.9	10	[kΩ]
Trim down	1	2	3	4	5	6	7	8	9	10	[%]
Vout =	14.85	14.70	14.55	14.40	14.25	14.10	13.95	13.80	13.65	13.50	[VDC]
R_D =	1000	348	210	140	95.3	68.1	45.3	30.1	18.2	8.06	[kΩ]

REGULATION

Parameter	Condition		Value
Output Accuracy			±1.0% typ., ±2.0% max.
Line Regulation	low line to high line, full load	single dual	±0.1% typ., ±0.2% max. ±0.1% typ., ±0.5% max.
Load Regulation	3.3Vout 5Vout 12Vout, 15Vout ±12Vout, ±15Vout		±0.3% ±0.2% ±0.1% ±1.0%
Cross Regulation	asymmetrical 25%<>100% load		±2.0% typ., ±3.0% max.
Transient Response	50-75%, full load, 0.1A/µs		±3.0% typ.
	25% load step change		250µs typ.

PROTECTIONS

Parameter	Condition		Value
Short Circuit Protection (SCP)	below 100mΩ		continuous, auto recovery
Over Voltage Protection (OVP)			115%-150% Output Voltage, Hiccup, auto recovery
Over Current Protection (OCP)			110%-160% Output Current, Hiccup
Over Temperature Protection (OTP)			115°C ±5°C
Isolation Voltage (4)	I/P to O/P	tested for 1 minute	1.6kVDC
Isolation Resistance			10MΩ min.
Isolation Capacitance			1100pF typ.
Insulation Grade			basic

Notes:

Note4: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note5: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: 3A slow blow type

ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range (6)			refer to ***"Thermal Calculation"***
Maximum Case Temperature			+105°C
Temperature Coefficient			0.02%/K
Thermal Impedance			refer to ***"Table 1: Thermal Impedance"***
Operating Altitude			2000m
Operating Humidity	non-condensing		95% RH
Shock			30G, 11ms, 3 times along X,Y and Z axis
Vibration			10-500Hz, 2.4G, 30mins along X,Y and Z axis
MTBF	according to Telcordia SR332 3	+25°C	5800 x 10^3 hours

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Specifications (measured @Ta = 25°C, resistive load, nom. Vin and rated Iout unless otherwise noted)

Table 1: Thermal Impedance

	without Heatsink		with Heatsink	
airflow [m/s]	Rth without PCB [K/W]	Rth with PCB (6) [K/W]	Rth without PCB [K/W]	Rth with PCB (6) [K/W]
0.1	17.8	12.5	16.0	11.3
0.2	16.0	11.2	14.4	10.1
0.5	14.0	9.7	12.6	8.7
1.0	10.0	7.1	9.0	6.4
1.5	8.3	5.8	7.5	5.2
2.0	6.3	4.4	5.7	4.0

Notes:

Note6:Test PCB: 160x100mm 105µm (Eurocard), double layer

Thermal Calculation

choose your model:

RPA20-2405SAW (with PCB (6))

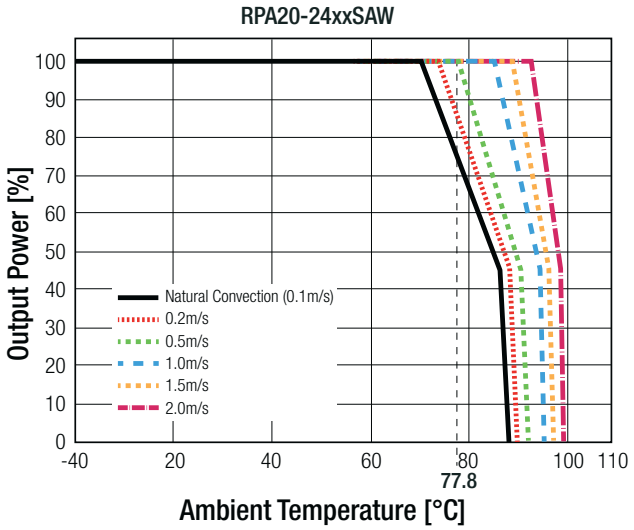
- Load conditions in application (e.g. 100%)
- Airflow conditions in application (e.g. 0.5m/s)
- use Rth from Table1 (9.7K/W)

Calculation:

Iout = 100%
R_{th} = 9.7K/W
P_{DISS} = 2.8W
$T_{CASEmax}$ = 105°C

$T_{OVER} = R_{th} \times P_{Dis} = 9.7K/W \times 2.8W = \mathbf{27.2°C}$

$T_{AMBmax} = T_{CASEmax} - T_{OVER} = 105°C - 27.2°C = \underline{\mathbf{77.8°C}}$



choose your model:

RPA20-2405SAW-HC (with PCB (6))

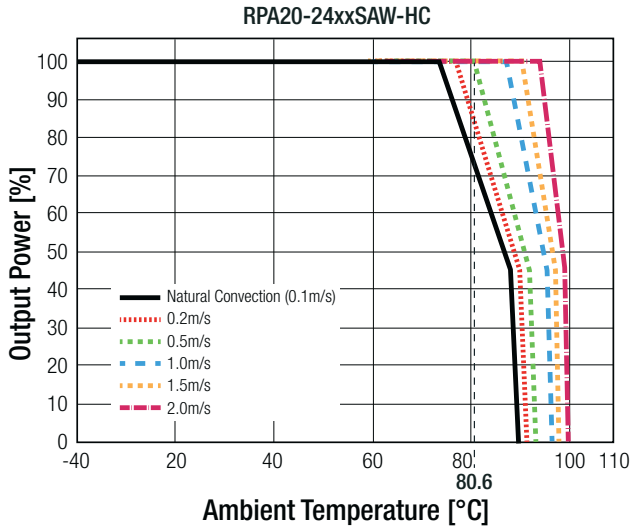
- Load conditions in application (e.g. 100%)
- Airflow conditions in application (e.g. 0.5m/s)
- use Rth from Table1 (8.7K/W)

Calculation:

Iout = 100%
R_{th} = 8.7K/W
P_{DISS} = 2.8W
$T_{CASEmax}$ = 105°C

$T_{OVER} = R_{th} \times P_{Dis} = 8.7K/W \times 2.8W = \mathbf{24.4°C}$

$T_{AMBmax} = T_{CASEmax} - T_{OVER} = 105°C - 21.3°C = \underline{\mathbf{80.6°C}}$



SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment - General Requirements for Safety	E224736-A39 + A40	UL60950-1, 2nd Edition, 2014 CSA C22.2 No. 60950-1-07, 2nd Edition, 2014
Information Technology Equipment - General Requirements for Safety (CB Scheme)	E224736-A39-CB + A40-CB	IEC60950-1:2005, 2nd Edition + A2:2013
Information Technology Equipment - General Requirements for Safety		EN60950-1:2006 + A2:2013
Railway applications – Electronic equipment used on rolling stock	15100175 001, 15100176 001	EN50155:2007, Clause 5.4 and 5.5
EAC	RU-AT.49.09571	TP TC 004/2011
RoHS2		RoHS 10/10, 2011/65/EU + AM-2015/863

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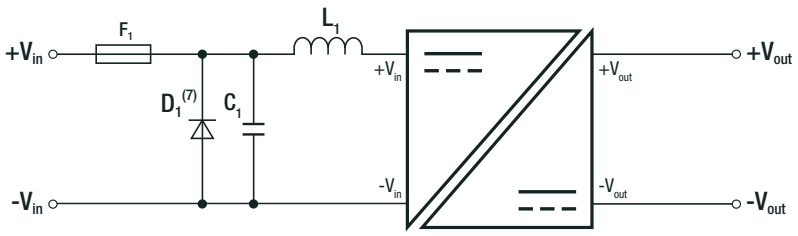
Specifications (measured @Ta = 25°C, resistive load, nom. Vin and rated Iout unless otherwise noted)

EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	with external filter (see filter suggestion below)	EN55032, Class A
Railway applications - Electromagnetic compatibility Part 3-2: Rolling stock - Apparatus		EN50121-3-2:2015
Specification for radio disturbance and immunity measuring apparatus and methods Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements		EN55016-2-1:2009
Specification for radio disturbance and immunity measuring apparatus and methods Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements		EN55016-2-3:2010
ESD Electrostatic discharge immunity test	Air ±8kV, Contact ±6kV	EN61000-4-2:2009, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	20V/m, 80-1000MHz 10V/m, 1.4-2.0GHz 5V/m, 2.0-2.7GHz 3V/m, 5.1-6.0GHz	EN61000-4-3:2006, Criteria A
Fast Transient and Burst Immunity	DC Power Port ±2kV	IEC61000-4-4:2004, Criteria A
Surge Immunity	DC Power Port ±1kV	EN61000-4-5:2006, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	DC Power Port 10V	EN61000-4-6:2009, Criteria A

EMC Filtering according to EN50121-3-2 and EN55032 Class A



Notes:

Note7: Diode is only needed for EN50155

C1	L1
47µF/50V electrolyte capacitor	1µH choke

DIMENSIONS and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case baseplate potting	al alloy, anodize black non-conductive FR4 silicone (UL94 V-0)
Dimensions (LxWxH)	without Heat-sink with Heat-sink	25.4 x 25.4 x 10.2mm 25.4 x 25.4 x 16.8mm
Weight	without Heat-sink with Heat-sink	17g typ. 21g typ.

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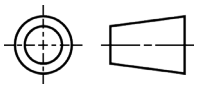
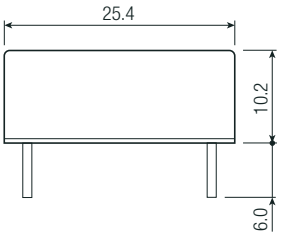
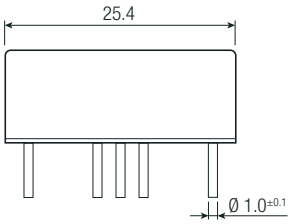
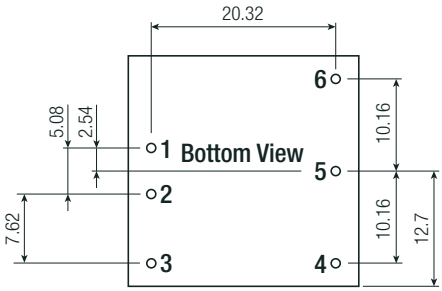
Specifications (measured @Ta = 25°C, resistive load, nom. Vin and rated Iout unless otherwise noted)

Dimension Drawing (mm)

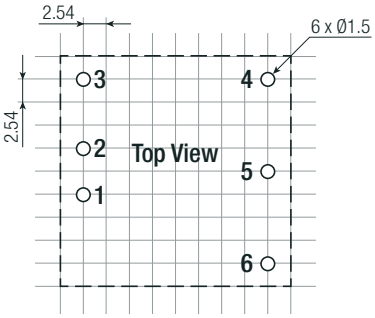








Recommended Footprint Details

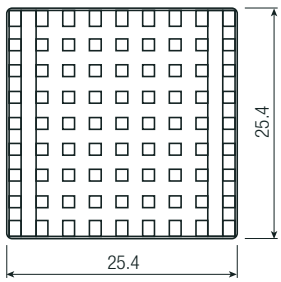


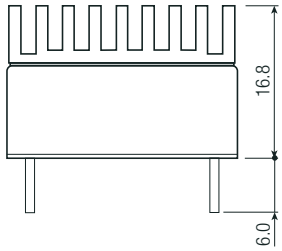
Pin Connections

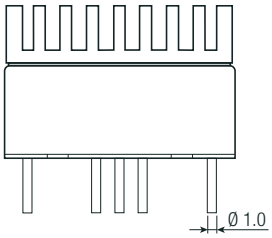
Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL (2)	CTRL (2)
4	-Vout	-Vout
5	Trim	Com
6	+Vout	+Vout

Pin Pitch Tolerance ±0.25mm
xx.x= ±0.5mm
xx.xx= ±0.25mm

Heat-sink Dimension Drawing (mm)







Specifications (measured @Ta = 25°C, resistive load, nom. Vin and rated Iout unless otherwise noted)

PACKAGING INFORMATION			
Parameter	**Type**		**Value**
Packaging Dimensions (LxWxH)	tube	without Heat-sink with Heat-sink	285.0 x 27.6 x 19.0mm 285.0 x 27.6 x 25.8mm
Packaging Quantity			10pcs
Storage Temperature Range			-55°C to +125°C
Storage Humidity	non-condensing		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.

Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

Как с нами связаться

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