

The R series is a dc dc converter designed for the railway industry. The converter is sealed to IP66 and is designed and tested in accordance with RIA12, EN50155 and EN50121.

The input to the converter has an extremely rugged input filter with full reverse polarity and inrush current limitation protection built in as standard. Outputs are galvanically isolated from the input supply and 100% open and short circuit proof.

- Convection cooled, high efficiency**
- Wide input voltage ranges**
- Designed to meet RIA12, EN50155 and EN50121**
- High input to output isolation**
- Input undervoltage lockout**
- Short circuit protected with automatic recovery**
- Wide operating temperature range**
- Die-cast case with integral mounting flanges**
- Robust, keyed, latching, Deutsch connectors**
- IP66 rated**



MODEL SELECTION

OUTPUT		INPUT		
Vdc	A	14.4 to 33Vdc	28.8 to 72Vdc	43 to 137 Vdc
5	4	RA-2405-20W-B	RA-4805-20W-B	RA-11005-20W-B
12	1.67	RA-2412-20W-B	RA-4812-20W-B	RA-11012-20W-B
15	1.12	RA-2415-20W-B	RA-4815-20W-B	RA-11015-20W-B
24	0.83	RA-2424-20W-B	RA-4824-20W-B	RA-11024-20W-B

6W, 10W and 15W versions also available on request.

GENERAL SPECIFICATIONS

CHARACTERISTICS	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Switching frequency	Vi nom, Io nom		300		kHz
Isolation voltage	Input/Output	1.5			kVdc
Isolation resistance	Input/Output @ 500Vdc	1G			Ω
Ambient temperature	Operating at Vi nom, Io nom	-40		70	°C
Case temperature	Operating at Vi nom, Io nom			+85	°C
Storage temperature	Non operational	-40		+100	°C
Relative humidity	Operating at Vi nom, Io nom	20		95	%RH
MTBF	Operating at Vi nom, Io nom	1000			k hours
Cooling	Free air convection				
Reverse polarity protection	Continuous				
Output short circuit protection	Continuous				
Over voltage protection	115 to 140% (20W)				
Current limit	110 to 160% (20W)				
Shock and vibration	Operating at Vi nom, Io nom				EN61373: 2010 cat 1
Dimensions					139.7 x 63.7 x 55.4 mm
Weight					400g

All specifications typical at nominal line, full load, 25 °C unless stated otherwise.

INPUT SPECIFICATIONS						
CHARACTERISTICS	CONDITIONS		MIN.	TYP.	MAX.	UNIT
Input voltage range	Ta min ... Ta max, Io nom	24V models	14.4	24	33	Vdc
		48V models	28.8	48	72	Vdc
		110V models	43	72/110	137	Vdc
No load input current	Vi = nom, Io = 0	24V models		20		mA
		48V models		10		mA
		110V models		8		mA
Input voltage w/o damage (Continuous)	Io nom	24V models			40	Vdc
		48V models			80	Vdc
		110V models			176	Vdc

OUTPUT SPECIFICATIONS						
CHARACTERISTICS	CONDITIONS		MIN.	TYP.	MAX.	UNIT
Output voltage accuracy	Vi nom, Io nom				±3	%
Minimum load	Vi nom		0			%
Line regulation	Io nom, Vi min ... Vi max				±1	%
Load regulation	Vi nom, Io min .. Io nom				±2	%
Temperature coefficient	Vi nom, Io nom				±0.02	% /°C
Ripple & noise	Vi nom, Io nom, BW = 20MHz				100	mV
Output over voltage protection	5V output			6.2V		Vdc
	12V output			15V		
	15V output			18V		
	24V output			28.8V		
Over current protection	Vi min - max		110	130	170	%
Output short circuit protection			Continuous, automatic recovery			
Hold up time (supply interruption)	Vi nom to 0%, Io nom		>10			mS
Efficiency	Vi nom, Io nom, Po/Pi			82		%

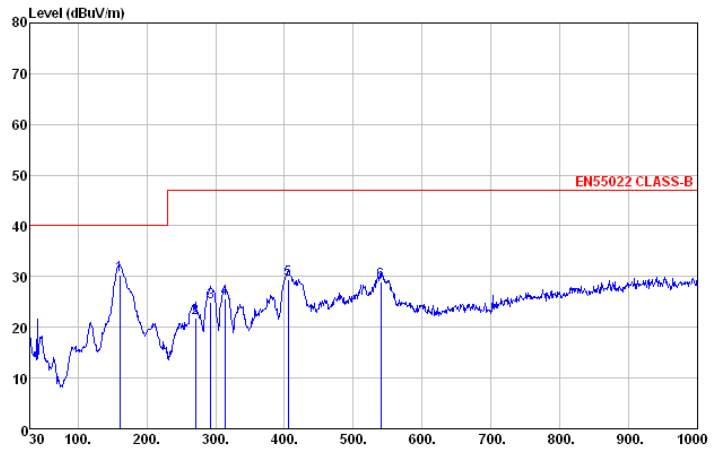
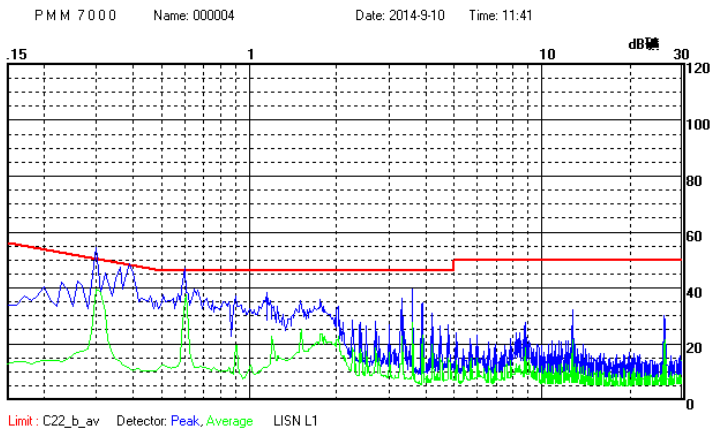
CONNECTORS (DEUTSCH)	
Input Connector	2 Pin DT13-2P
Output Connector	4 Pin DT13-4P

MATING CONNECTORS (DEUTSCH)	
Input	DT062S-CE06 (RS 425-692)
Output	DT064S-CE06 (RS 425-686)
Crimps	0462-201-16141 (RS 425-800) Pack 10

ELECTROMAGNETIC IMMUNITY									
PHENOMENON	STANDARD	LEVEL	COUPLING MODE ¹	VALUE APPLIED	WAVEFORM	SOURCE IMPED.	TEST PROCEDURE	IN OPER.	PERF. CRIT ²
Electrostatic discharge (to case)	IEC/EN 61000-4-2	4	contact discharge	6000 Vp	1/50ns	330 Ω	10 positive and 10 negative discharges	yes	A
			air discharge	8000 Vp					
Electromagnetic field	IEC/EN 61000-4-3	x ³	antenna	20 V/m	AM 80% /1 kHz	n.a.	80 – 1000 MHz	yes	A
		4	antenna	20 V/m	AM 80% /1 kHz	n.a.	8000 – 1000 MHz		
				10 V/m			1400 – 2100 MHz		
				5 V/m			2100 – 2500 MHz		
3	antenna	10 V/m	50% duty cycle, 200 Hz rep. rate	n.a.	900 ±5 MHz				
Electrical fast transients/burst	IEC/EN 61000-4-4	3 ⁵	capacitive, o/c	±2000 Vp	bursts of 5/50 ns 2.5/5 kHz over 15 ms; burst period: 300 ms	50 Ω	60 s positive 60 s negative transients per coupling mode	yes	A
		4	i/c, +i/-i direct	±4000 Vp					
Surges	IEC/EN 61000-4-5	3 ⁶	i/c	±2000 Vp	1.2/50 μs	12 Ω	5 pos. and 5 neg. surges per coupling mode	yes	A
			+i/-i	±2000 Vp		2 Ω			
Conducted disturbances	IEC/EN 61000-4-6	3 ⁷	i, o, signal wires	10 VAC (140 dBμV)	AM 80% 1 kHz	150 Ω	0.15 – 80 MHz	yes	A
Power frequency magnetic field	IEC/EN 61000-4-8	3 ⁸	---	100 A/m			60 s in all 3 axis	yes	A
Supply related surges		A	+i/-i	3.5 · V _{batt}	2/20/2ms	0.2 Ω	1 positive surge	yes	A
		B		1.5 · V _{batt}	0.1/1/0.1s				
Direct transients	RIA 12	C	i/c, +i/-i	960 Vp	10/100 μs	5 Ω	5 positive and 5 negative impulses	yes	A
		D		1800 Vp	5/50 μs				
		E		3600 Vp	0.5/5 μs				
		F		4800 Vp	0.1/1 μs				
		G		8400 Vp	0.5/50 μs				
Indirect coupled transients		H	-o/c, + o/c, -o/-l	1800 Vp	5/50 μs	100 Ω	5 positive and 5 negative impulses	yes	A
		J		3600 Vp	0.5/5 μs				
		K		4800 Vp	0.1/1 μs				
		L		8400 Vp	0.05/01. μs				

1 i = input, o = output, c = case
2 A = normal operation, no deviation from specs; B = normal operation, temporary loss of function or deviation from specs possible
3 Corresponds to EN 50121-3-2:2006 table 9.1 and exceeds EN 50121-4:2006 table 1.1.
4 Corresponds to EN 50121-3-2:2006 table 9.2 and EN 50121-4:2006 table 1.2 (compliance with digital mobile phones).
5 Corresponds to EN 50121-3-2:2006 table 7.2 and EN 50121-4:2006 table 2.2.
6 Covers or exceeds EN 50121-3-2:2006 table 7.3 and EN 50121-4:2006 table 2.3.
7 Corresponds to EN 50121-3-2:2006 table 7.1 and EN 50121-4:2006 table 3.1 (radio frequency common mode).
8 Corresponds to EN 50121-4:2006 table 1.3.

ELECTROMAGNETIC EMISSIONS



Typical conducted disturbances at the input (quasi-peak and average) of RA-11012-20W-B according to EN55022, measured at $V_i = 110$ Vdc and I_o nom.

Typical radiated emissions of RA-11012-B according to EN 55022, normalized to a distance of 3m, measured at $V_i = 110$ Vdc and I_o nom.

