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R SERIES

dc-dc converter

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	67 to 137 Vdc
5	**4**	864-7751	864-7767	864-7773
12	**1.67**	864-7755	864-7761	864-7777
24	0.7	864-7764	864-7770	864-7786
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 speciications typical at nominal line, full load, 25 °C unless stated otherwise.					

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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	67	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	Io nom	24V models			40	Vdc
(Continuous)		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

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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 ield	IEC/EN 61000-4-3	x3	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	35	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	36	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 ield	IEC/EN 61000-4-8	38	—	100 A/m			60 s in all 3 axis	yes	A
Supply related surges	RIA 12	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		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	100 Ω			
		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				
		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.

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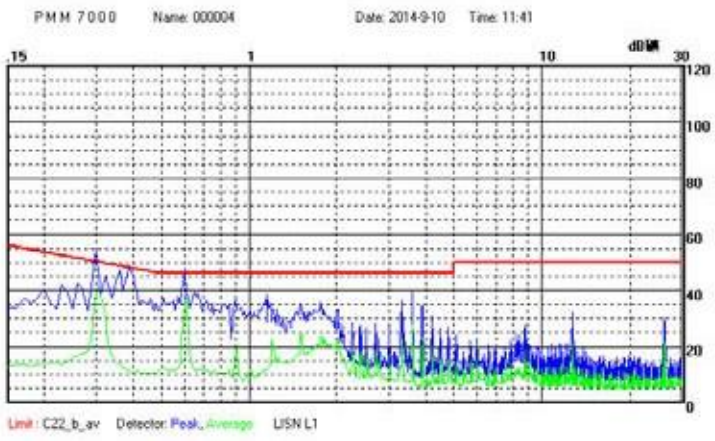
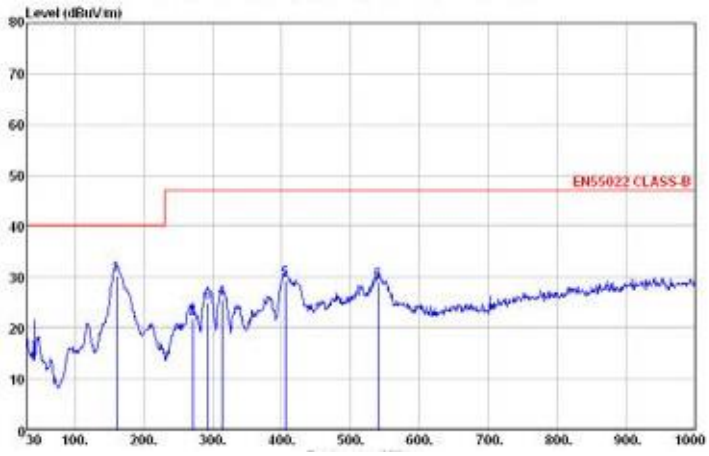
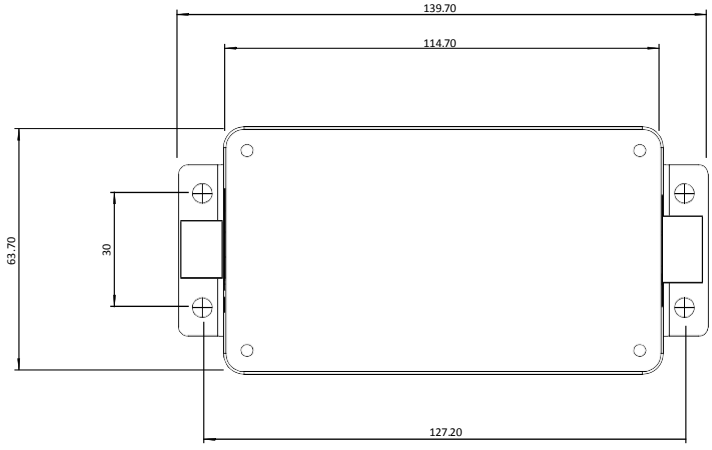
ELECTROMAGNETIC EMISSIONS



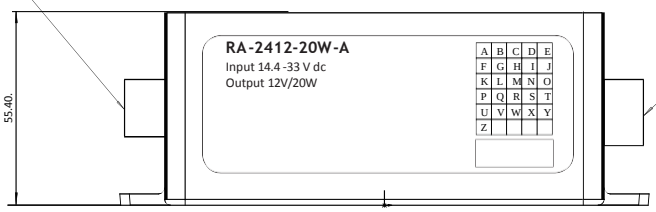
Typical conducted disturbances at the input (quasi-peak and average) of RA-11012-20W-B according to EN55022, measured at Vi = 110 Vdc and Io nom.



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



SK1 INPUT
Pin 1 +VE
Pin 2 0V



SK2 OUTPUT
Pin 1 +VE
Pin 2 +VE
Pin 3 0V
Pin 4 0V