VCCR300

DATASHEET

Single Output Conduction Cooled DC/DC

7.43" x 4.6" x 1"
Low profile

300W | 600W | 900W
Scalable

33.6-160V_{DC}
Wide input voltage range

Fan-less
Reliable

Ruggedised for long term reliability

The VCCR300 conduction cooled power series provide a rugged and highly reliable DC/DC power source that can deliver a silent 300 Watts of power in a 7.43 x 4.6 x 1-inch low profile package. The wide DC input voltage range covers the full requirements for standard 48V, 72V, 96V and 110V railway battery requirements detailed in EN50155 and suitable for a variety of Battery Electric Vehicle (BEV) and other demanding industrial applications. The high efficiency design minimises heating which results in a wide operating temperature range of -40°C to +70°C (+85°C 10 mins) with minimal cooling requirement. Standard output voltages available are 12V, 24V, 36V and 48V all of which have a wide adjustment range of 90% to 125%. Protections include over-voltage, over-current and over-temperature are provided while DC_OK and warning signals indicate the status of the PSU. An adjustable droop mode current share allows multiple units to be parallel connected to achieve higher power levels whilst sharing the load equally between each VCCR300 product. Internal fusing and 10ms full power holdup are included as standard. A remote shutdown signal can place the unit in a low power standby mode and the input undervoltage level can be programmed to meet specific application requirements. The series meets the requirements of the latest railway standards (EN50155), MIL-STD-810G (Shock & Vibration) and is approved to the latest industrial safety standards (IEC/UL62368-1 3RD Edition). EMC emissions and immunity exceed the requirements of EN50121-3-2, EN55035 and EN55032 class B.

MAIN FEATURES & BENEFITS

INDUSTRIAL · BEV · COMM · RAIL · 5G · RUGGED · 5 YEAR WARRANTY

- Powerful 300 Watts output
- Small 7.43" x 4.6" x 1" low profile, 8.77W/in^3
- Fan-less & conduction cooled
- Wide input voltage range (33.6V_{DC} – 160V_{DC})
- Standard output voltages of 12, 24, 36 & 48
- Adjustable output voltage (90% to 125%)
- High efficiency - up to 94%
- Scalable power architecture
- High reliability design
- Low no-load & standby power
- Wide operating temperature range (-40°C to +70°C, +85°C 10 mins)
- Programmable undervoltage protection
- Output current measurement signal
- Remote shutdown
- Extensive protections & system warnings
- Holdup as standard (10mS 300W)
- Low inrush current
- Operating altitude up to 4000m
- Protective conformal coating as standard
- Rugged chassis mount package
- 24 hrs samples from distribution
- Silent operation
- RoHS2 & REACH compliant
- CE compliant
- Low EMC emissions (EN55032:2020 Class B)
- MIL-STD-810G (Vibration & Shock)
- IEC62368-1:2018 (Industrial Safety)
- EN50155-1:2021 (Railway General)
- EN50121-3-2:2019 (Railway EMC)
- EN45545 (Fire & Smoke)
- Expert technical support
- 5 year warranty

SAFETY UL COMPLIANT · SAFETY CE COMPLIANT · ENVIRONMENTAL Conflict Minerals COMPLIANT · ENVIRONMENTAL Proposition 65 COMPLIANT · ENVIRONMENTAL REACH COMPLIANT · ENVIRONMENTAL RoHS Directive (EU) 2015/863 COMPLIANT · ENVIRONMENTAL SCIP COMPLIANT · ENVIRONMENTAL TSCA COMPLIANT · ENVIRONMENTAL GreenSoft Technology, Inc. VERIFIED

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MODEL SELECTION & ORDERING

Model	V_{NOM} (V)	V_{MIN} (V)	V_{MAX} (V)	I_{RATED} (A)	P_{RATED} (W)	V_{OVP} (%V_{SET})	V_{SCP} (%V_{SET})	I_{OCP} (%I_{RATED})	Efficiency[1] (%)
VCCR300-12	12	10.8	15	25	300	115	60	110	92
VCCR300-24	24	21.6	30	12.5	300	115	60	110	93
VCCR300-36	36	32.4	45	8.33	300	115	60	110	93
VCCR300-48	48	43.2	60	6.25	300	115	60	110	93

1. Vin = 110V, Vo = V_{NOM}, 100% load.

PART NUMBERING SYSTEM

SERIES	VCCR300	-	12	-	0	0	0	Factory use

Standard nominal output voltage
12/24/36/48

Contact your Distributor or Vox Power representative for information regarding non-standard requirements

SPECIFICATIONS

All specifications are measured @ T_A=T_{BASE}= 25°C, rated input & rated load unless stated otherwise

ELECTRICAL SPECIFICATIONS

Parameter	Details	Min	Typical	Max	Units
DC Input Voltage	Continuous operation at 300W output power Under voltage transient < 100mS, output unaffected. Over voltage transient < 1S, output unaffected.	33.6 28.8 -	48/72/96/110	160 - 168	V_{DC}
Input under voltage lockout	User programmable. Default to minimum.	30		100	V_{DC}
Input Current	300Watts output. Typical at 48 V_{DC} input, max at 33.6V_{DC} input.		6.8	10	Amps
Input Power Limit	All Vin			400	Watts
Inrush Current	Holdup capacitor charging. 33.6V_{DC} input.			12	Amps
Input capacitance	EMI filter charge current is not limited by inrush controller		5		uF
Fusing	Positive line fused (5x20 Fast acting, 1500A breaking capacity).			15	Amps
Holdup	300Watts output, EN550155 Class S2 180Watts output, EN550155 Class S3	10 20	12 22		mS
No load power consumption	0% Load		1	1.5	Watts
Standby current consumption	Unit in standby mode.		3.5	5	mA
Output Power Rating				300	Watts
Output Voltage	All Models. Initial Setting, -40°C to 85°C	-1		1	%V_O
Load Regulation	All Models.	-50		50	mV
Line Regulation	All Models.	-0.1		0.1	%V_O
Ripple & Noise[3]	All Models. 20MHz BW, V_{PKPK}.			1	%V_O
Minimum Load	All Models.			0	Watts
Transient Response	25% to 75% I_{RATED}, 1A/uS. Recovery to within 10% of V_O.			5 1	%V_O mS
Turn on Rise Time	All Models. 10% to 90% of V_O.		35		mS
Turn on Delay	All Models, All Vin, All loads. Application of input voltage User Shutdown release		600 600		mS
Current Share	All Models. Droop mode, Vmax @0% load, Vmin @100% Load.	-2.5%		+2.5%	%V_O
Temperature Coefficient	All Models.	-0.02		0.02	%V_O/°C
Over Current Protection	All Models. Constant current mode.	105	110	115	%I_{RATED}
Short Circuit Protection	All Models. Hiccup mode. Activation Threshold.		60		%V_O
Over Voltage Protection	All Models. Auto Restart.		115		%V_O
Over Temperature Protection	All Models. Auto Restart.	115		125	°C
Reliability [1]	All Models.		0.5		FPMH[2]
Warranty	Standard terms and conditions apply.			5	Years
Size	188.6 [7.425] (L) x 116 [4.57] (W) x 25.4 [1.00] (H). See diagram for all other dimensions and tolerances.				mm [in]
Weight	800				Grams

Notes
1. 30˚C base & ambient, 100% load, SR332 Issue 3 Method I, Case 3, Ground, Fixed, Controlled
2. MTBF (Mean Time Between Failures) = 1/FPMH (Failures Per Million Hours)
3. Maximum 2% of Vo when in burst mode.

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COMPLIANCE TEST SUMMARY (EN50155:2021)					
Test	Category[1]	Subclause[2]	Standard	Test Details	Status
Visual inspection	R, T	13.4.1	Internal	dimensions, weight, markings	Not operating
Performance	R, T	13.4.2	Internal	Electrical specifications	Operating
DC power supply	T	13.4.3	EN50155:2021 IEC/EN61000-4-29	See EMC compliance tables	See EMC compliance tables
Low temperature start	T	13.4.4	IEC/EN60068-2-1:2007	Test Ad, Class OT4 -40C	Not operating. Criterion A
Dry heat	T	13.4.5	IEC/EN60068-2-2:2007	Test Bd, Cycle C – Class OT4 -ST2 +85C (10min), +70C (6h)	Operating. Criterion A
Insulation	R, T	13.4.7	EN50155:2021	See Safety & insulation specifications	Not operating
Cyclic damp heat	T	13.4.8	IEC/EN60068-2-30:2005	Test Db2, 25°C to 55°C, 2 cycles, 2x24h	Not operating. Criterion A
Electromagnetic compatibility	T	13.4.9	EN50121-3-2	See EMC compliance tables	See EMC compliance tables
Shock and vibration	T	13.4.10	EN61373:2010	See Environmental specifications	See Environmental specifications
Stress screening	R	13.4.11	Internal	24h at 45°C, 100% load[3]	Operating. Criterion A
Salt mist	T	13.4.13	IEC/EN60068-2-11	Test Ka, 35°C ±2°K, 48h	Not operating. Criterion A

Notes:
1. R = Routine test, T = Type test
2. Subclauses refer to EN50155:2021
3. Test time reduction plan according to IPC9592B appendix E. (E.2.1.2 tables E-2 and E-1)

ELECTROMAGNETIC COMPLIANCE – EMISSIONS			
Phenomenon	Port	Reference Standards	Test Details
Radiated emissions, electric field	Enclosure	EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.7 EN61000-6-4 tbl.1 EN55032/CISPR16-1-1	30MHz to 1GHz. EN50032 Class B compliant. Exceeds the requirements of EN50121-3-2:2016
Conducted emissions	Battery power supply	EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.7 tbl.2.1 EN55032/EN55016-2-1	150kHz to 30MHz EN50032 Class B compliant. Exceeds the requirements of EN50121-3-2:2016

ELECTROMAGNETIC COMPLIANCE – IMMUNITY				
Phenomenon	Port	Reference Standards	Test Details	Performance[1]
Electrostatic discharge	Enclosure	EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.8 tbl.5.3 IEC61000-4-2	Test level 3: ±8kV air, ±6kV contact	Criteria A
Radiated RF EM field, AM	Enclosure	EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.8 tbl.5.1 IEC61000-4-3	20V/m, 80MHz-800MHz, sine wave, AM 80%, 1kHz	Criteria A
Radiated RF EM field	Enclosure	EN55035:2017 cl.5 tbl.1.3 EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.8 tbl.5.2 IEC61000-4-3	Test levels as per EN50121-3-2 table 5, item 5.2 & EN55035:2017 Table 1, item 1.3	Criteria A
Electrical Fast Transients/burst	Battery power supply	EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.8 tbl.3.2 IEC61000-4-4	Test Level 3: ±2kV, 5/50nS, 5kHz, Direct coupling	Criteria A
Electrical Fast Transients/burst	Control	EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.8 tbl.4.2 IEC61000-4-4	Test Level 4: ±2kV, 5/50nS, 5kHz, Capacitive clamp coupling	Criteria A
Surge	Battery power supply	EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.8 tbl.3.3 IEC61000-4-5	1.2/50uS, 42Ω, 0.5uF, ±1kV L-L & ±2kV L-E 1.2/50uS, 12Ω, 9uF, ±1kV L-L & ±2kV L-E	Criteria A
Conducted disturbances induced by RF field	Battery power supply	EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.8 tbl.3.1 IEC61000-4-6	Test Level 3: 10V, 0.15 to 80MHz, sine wave, AM 80%, 1kHz	Criteria A
Conducted disturbances induced by RF field	Control	EN50155:2021 cl.13.4.9 EN50121-3-2:2016 cl.8 tbl.4.1 IEC61000-4-6	Test Level 3: 10V, 0.15 to 80MHz, sine wave, AM 80%, 1kHz	Criteria A
Temporary supply overvoltage	Battery power supply	EN50155:2021 cl.13.4.3.3 IEC61000-4-29	110V to 168V for 100ms & 1s	Criteria A
Temporary supply undervoltage	Battery power supply	EN50155:2021 cl.13.4.3.4 IEC61000-4-29	48V to 28.8V for 100ms	Criteria A
Interruptions of supply voltage	Battery power supply	EN50155:2021 cl.13.4.3.5 IEC61000-4-29[2]	Interruption for 10ms at 300W load. EN50155:2021 Class S2 Interruption for >10ms at 300W load Interruption for 20ms at 180W load. EN50155:2021 Class S3 Interruption for >20ms at 180W load	Criteria A Criteria C Criteria A Criteria C
Supply change-over	Battery power supply	EN50155:2021 cl.13.4.3.6 IEC61000-4-29	48V to 28.8V for 100ms. Class C1 48V to open circuit for 30ms. Class C2	Criteria A Criteria B

Notes:
1. Performance criteria are defined in EN50155:2021 cl.4.3
2. Tested at minimum nominal input voltage. (48V)

ENVIRONMENTAL SPECIFICATIONS				
Parameter	Details	Min	Max	Units
Operating temperature	Continuous, Full output power, EN 50155:2021 Class OT4	-40	+70	°C
Switch on temperature	10 minutes maximum, Full output power, EN 50155:2021 Class ST1 & ST 2		+85	°C
Case temperature	Measured at location shown in mechanical drawing		+90	°C
Storage Temperature	Not operational	-55	+85	°C
Humidity	Relative, non-condensing	5	95	%
Altitude class		-200	4000(1)	m
Pollution degree	PD2			
Protective coating	Class PC2. Internal assemblies dip coated			
Ingress protection	IP30			
Fire behaviour	EN45545-1:2013 & EN45545-2:2020 & EN45545-5:2013+A1:2015, HL1 to HL3			
Simulated long life	EN50155:2021 cl. 13.4.10.2, EN61373:2010 cl.9 Not Operating	5.72 5 15(3)	150	m/s^2 Hz h
Mechanical Shock	EN50155:2021 cl. 13.4.10.3, EN61373:2010 cl.10, IEC60068-2-27 Operating. Performance criteria A	50 30 18(2)		m/s^2 ms Bumps
Functional random vibration	EN50155:2021 cl. 13.4.10.4, EN61373:2010 cl.8 Category 1, Class B, Body mounted Operating. Performance criteria A	1.01 5 30	150	m/s^2 Hz min
Mechanical Shock	IEC60068-2-27: Half sine, 3 axes, 3 positive & 3 negative. Non-Operational IEC60068-2-27: Half sine, 3 axes, 3 positive & 3 negative. Operational MIL-STD-810G: Method 516.6, Procedure IV, Transit drop		50,11 30,18	g,mS g,mS
Vibration	IEC60068-2-6: Sine,10 – 500 Hz, 3 axes, 1 oct/min., 10 cycles each axis. Operational IEC60068-2-64: Random, 5 – 500 Hz, 3 axes, 30 min. Operational IEC60068-2-64: Random, 5 – 500 Hz, 3 axes, 30 min. Non-Operational MIL-STD-810G: Method 514.6, Procedure I (General Vibration) Category 4 (Trucks & Trailers, Composite wheeled vehicle), Figure 514.6C-3 Category 7 (Aircraft, Jet cargo), Figure 514.6C-5 General exposure Category 24, (All, Minimum integrity) Figure 514.6E-1		2 0.0122,3.15 0.02,2.56	g $g^2/Hz, g_{RMS}$ $g^2/Hz, g_{RMS}$
Thermal Shock	MIL-STD-810G: Method 503.5 Procedure I-C. Multi-cycle. 3 shocks. Non-operational.	-51	85	°C
Notes	1. Additional power derating may be necessary at high altitudes to ensure component temperatures remain within specification. 2. 3 positive and 3 negative bumps in each axis 3. 5 hours each axis			

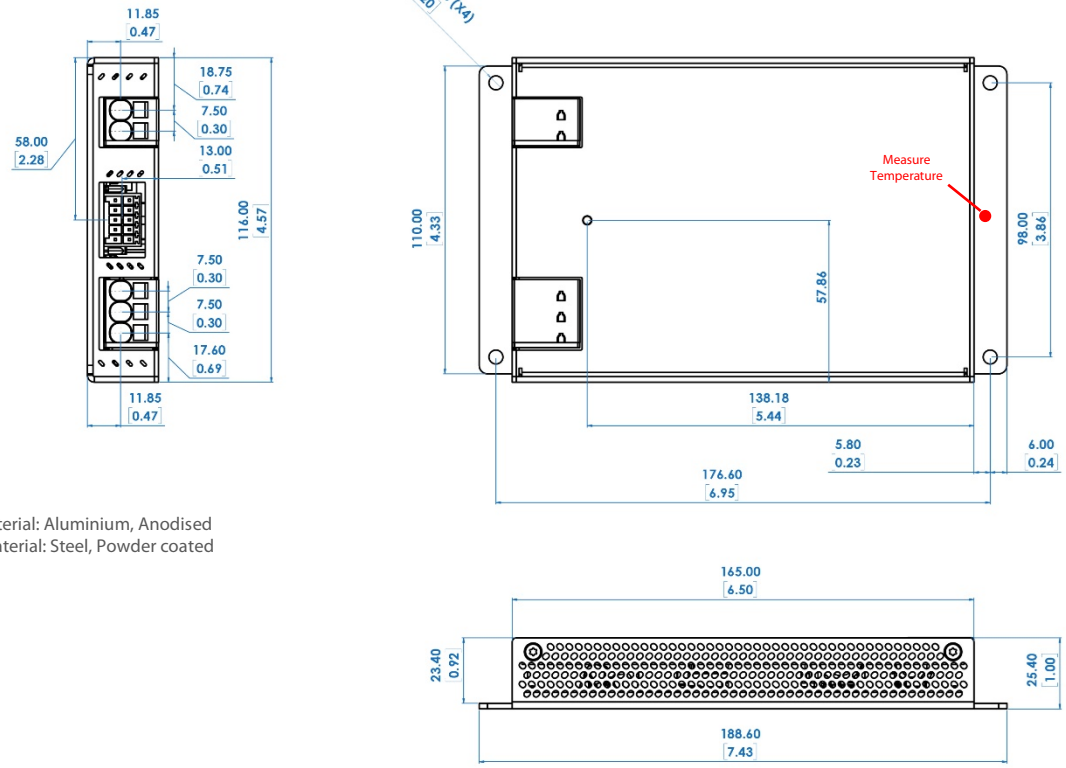
SAFETY & INSULATION SPECIFICATIONS				
Barrier	Rating	Voltage withstand(3) (V_{DC})	Creepage distance(2) (mm)	Insulation resistance (1) (MΩ)
Input to Output	Reinforced	5400	5	>300
Input to Chassis	Basic	3400	3.5	>300
Output to Chassis	Basic	2000	3.5	>300

1. Insulation resistance tested at $500V_{DC}$
2. Material group IIIb, Pollution degree PD2 & Overvoltage category OV3 as defined in EN50124-1:2017
3. Tested in production
4. Insulation coordination complies with EN50124-1:2017 & EN62368-1:2018

INSTALLATION SPECIFICATIONS			
Parameter	Details	Parameter	Details
Equipment class (EN62368-1:2018)	I	Flammability Rating (EN62368-1:2018)	94V-2
Overvoltage category (EN50124-1:2017)	OV3	Material Group	IIIb
Pollution degree	PD2	Ingress protection rating	IP30

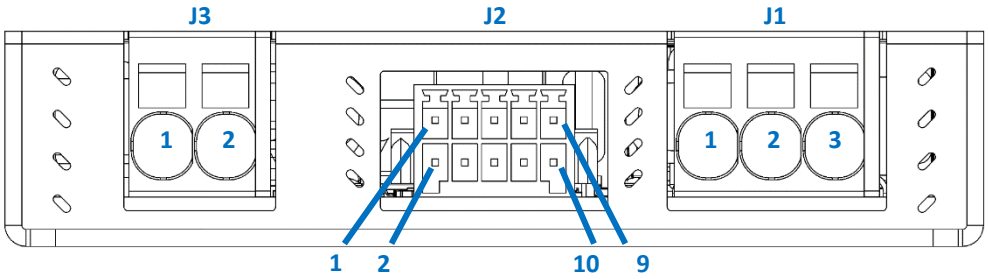
AGENCY APPROVALS		
Standard	Details	File
IEC 62368-1:2018	3RD Edition. Audio/video, information and communication technology equipment - Part 1: Safety requirements	
UL 62368-1:2019	3RD Edition. Audio/video, information and communication technology equipment - Part 1: Safety requirements	UL: E316486
CSA-C22.2 No. 62368-1-2019	3RD Edition. Audio/video, information and communication technology equipment - Part 1: Safety requirements	
CE	LVD 2014/35/EU, EMC 2014/30/EU, RoHS 2 2011/65/EU	
Approval certificates available at www.vox-power.com		

MECHANICAL DIMENSIONS AND MOUNTING



Chassis base material: Aluminium, Anodised
Chassis cover material: Steel, Powder coated

CONNECTORS AND PINOUT



J3 - DC output voltage	
WAGO 2626-1102/020-004	
Pin	**Function**
1	Positive
2	Negative

J2 - User Controls	
WAGO 713-1425/037-000, Mating: WAGO 713-1105/037-047	
Pin	**Function**
1	Output voltage adjust (VOUT_ADJ)- Connect to SCOM through a resistor
2	Secondary common (SCOM) – Internally connect to J3 Pin 2
3	Droop input (DROOP) – Connect to IOUT through a resistor
4	Output current measurement (IOUT)
5	WARN - Open drain output. Active Low.
6	DC_OK – Open drain output. Active Low.
7	BLANK
8	BLANK
9	Shut Down & Under voltage adjust (SD_UV) Connect to VIN_NEG through resistor for under voltage adjust. Close switch VIN_NEG to SD_UV for shutdown.
10	Primary negative (V_{IN_NEG}) – Internally connect to J1 Pin 1

J1 - DC input voltage	
WAGO 2626-1103/020-004	
Pin	**Function**
1	Negative
2	Positive
3	Protective Earth

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