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VR20 Series

DC-DC Converter

XP Power

2 Amp

- Non Isolated 2A Switching Regulator
- Regulated Single Outputs from 2.5 to 15VDC
- Wide Input Range to 36V
- SIP3 Package
- High Efficiency to 96%
- Class B Conducted & Radiated Emissions
- Short Circuit Protection
- Low 0.1mA Standby Input Current
- -40°C to +85°C Operation
- MTBF >2MHrs
- 3 Year Warranty



Dimensions:

VR20:
0.453 x 0.689 x 0.354" (11.5 x 17.5 x 9.0mm)

The VR20 provides a cost effective compact efficient switching regulator solution operating from a wide range DC input. Output voltages start from 2.5V and the VR20 consumes as little as 0.1mA when idle.

Models & Ratings

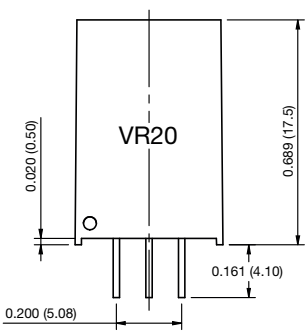
Input Voltage	Output Voltage	Output Current	Input Current(1)		Max. Capacitive Load	Efficiency(2)		Model Number
			No Load	Full Load		Vin, Min.	Vin, Max.	
4.5-36V	2.5V	2.0A	0.2mA	1300mA	2000µF	89%	83%	VR20S2V5
6.0-36V	3.3V	2.0A	0.1mA	1260mA	1800µF	89%	85%	VR20S3V3
8.0-36V	5.0V	2.0A	0.1mA	1380mA	1000µF	92%	89%	VR20S05
13-36V	9.0V	2.0A	0.1mA	1490mA	680µF	95%	92%	VR20S09
16-36V	12V	2.0A	0.1mA	1590mA	470µF	96%	94%	VR20S12
18-36V	15V	2.0A	0.1mA	1760mA	470µF	96%	94%	VR20S15

Notes

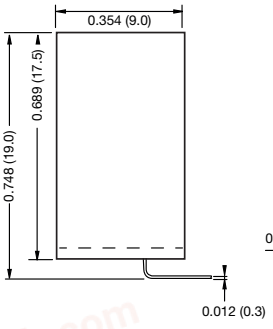
1. Full load input current measured at minimum input voltage.
2. Efficiency measured at full load.
3. Standard tube quantity 44 pcs.
4. Right angle pin option, add suffix -RA.

Mechanical Details

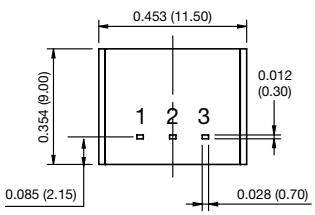
FRONT VIEW



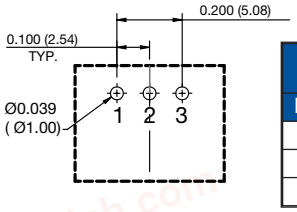
RIGHT ANGLE PIN OPTION (-RA)



UNDERSIDE VIEW



FOOTPRINT (TOP VIEW)



Pin Connections	
Pin	Single
1	+Vin
2	Ground
3	+Vout

Notes

1. All dimensions are in inches (mm)
2. Weight: 0.0083lbs (3.8g) approx.
3. Pin diameter: 0.02±0.004 (0.7±0.1)
4. Case & pin tolerance: ±0.02 (±0.5)

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Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage Range	4.5		36	VDC	See Models and Ratings table.
Input Filter	Internal capacitor				
Input Reflected Ripple			20	mA pk-pk	
Input Surge			45	VDC	For max. 100ms.

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage	2.5		15	VDC	See Models and Ratings table.
Initial Set Accuracy		±2.0	±4.0/±3.0	%	2.5V and 3.3V/others (At full load)
Minimum Load	0			mA	No minimum load required.
Line Regulation		±0.4	±0.8	%	Full load over input voltage range.
Load Regulation		±0.5	±1.5	%	Maximum variation applies to 2.5V output models.
Transient Response			±5	%	For 50% load change. Recovery in 200µs.
Ripple & Noise			75	mV pk-pk	20 MHz bandwidth.
Short Circuit Protection	Continuous, with auto recovery. Hiccup mode.				
Maximum Capacitive Load	See Models and Ratings table.				
Temperature Coefficient			0.03	%/°C	
Overload Protection		3.5		A	
Start-up Time		20		ms	

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency			96	%	See models and ratings table.
Isolation: Input to Output	0			VDC	Non isolated.
Switching Frequency		400		kHz	At full load.
Mean Time Between Failure	2			MHrs	MIL-HDBK-217F.
Weight		0.0083 (3.8)		lb (g)	
Case Material	Non-conductive black plastic UL94V-0.				
Pin Material	Solder coated phosphor bronze C5191R-1/2H.				
Potting Material	Polyurethane type L780 UL94V-0 rated.				
Water Wash	Use de-ionised water only, dry thoroughly.				
Soldering Temperature			260	°C	Wave solder peak, 1.5mm from case 10s max. Not suitable for vapour phase soldering. For further details contact XP Power applications team.

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+85	°C	See derating curves.
Storage Temperature	-55		+125	°C	
Case Temperature			+120	°C	
Humidity			95	%RH	Non-condensing.
Cooling	Natural convection.				

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EMC: Emissions

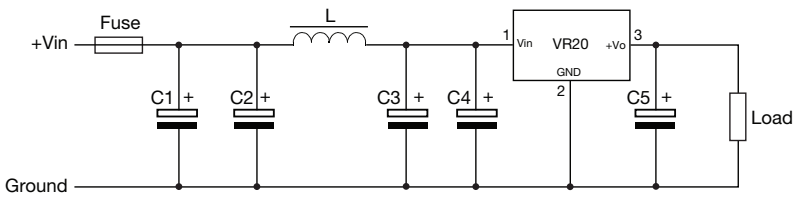
Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN55032	Class B	See Application Notes
Radiated	EN55032	Class B	

EMC: Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
ESD Immunity	EN61000-4-2	±6kV	B	Contact discharge.
Radiated Immunity	EN61000-4-3	10V/m	A	
EFT/Burst	EN61000-4-4	±1.0kV	B	See Application Notes
Surges	EN61000-4-5	±1.0kV	B	
Conducted Immunity	EN61000-4-6	3Vrms	A	

Application Notes

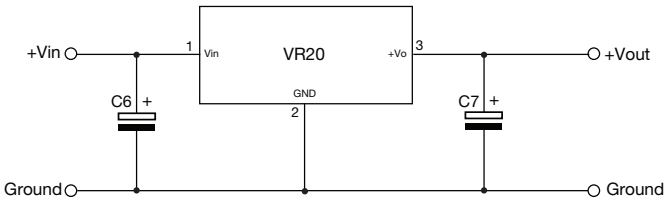
Input Filter to meet Class B Conducted Emissions



L	C1	C2/C3	C4	C5
22µH	100µF/100V	10µF/50V	680µF/50V	22µF/25V

Select fuse rating based on application input current.

Typical Application



Part Number	C6	C7
VR20S2V5	22µF/50V	22µF/10V
VR20S3V3		22µF/10V
VR20S05		22µF/10V
VR20S09		22µF/16V
VR20S12		22µF/25V
VR20S15		22µF/25V

Derating Curves

