

VR05 Series

DC-DC Converter

0.5 Amp

FEATURES

- Non Isolated 0.5A Switching Regulator
- Regulated Single Outputs from 3.3 to 15VDC
- Wide Input Range to 36V
- SIP3 Package
- High Efficiency to 95%
- 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: VR05: 0.457 x 0.401 x 0.297" (11.6 x 10.16 x 7.55mm)

The VR05 provides a cost effective compact efficient switching regulator solution operating from a wide range DC input. Output voltages start from 3.3V and the VR05 consumes as little as 0.2mA when idle.

MODELS & RATINGS

Model Number	Input Voltage (VDC)	Output Voltage (VDC)	Output Current (mA)	Input Current - No Load (mA)	Input Current - Full Load (mA)	Max. Capacitive Load	Efficiency - Max (%)	Efficiency - Min (%)
VR05S3V3	4.75-36	3.3	500	1.5	416	680μF	89%	80%
VR05S05	6.5-36	5.0	500	0.2	446	680μF	90%	84%
VR05S09	12-36	9.0	500	0.2	412	680μF	93%	90%
VR05S12	15-36	12	500	0.2	436	680μF	94%	91%
VR05S15	19-36	15	500	0.2	422	680μF	95%	93%

1. Full load input current measured at minimum input voltage.
2. Efficiency measured at full load.
3. Standard tube quantity 43 pcs.

SPECIFICATIONS

INPUT

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage Range	4.75		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	3.3		15	VDC	See Models and Ratings table.
Initial Set Accuracy	±2.0		±4.0/±3.0	%	3.3V/others (At full load)
Minimum Load	0			mA	No minimum load required.
Line Regulation	±0.2		±0.4	%	Full load over input voltage range.
Load Regulation	±0.3		±0.6	%	Maximum variation applies to 3.3V output models.
Transient Response	±2			%	For 50% load change. Recovery in 100μs.
Ripple & Noise		75		mV pk-pk	20 MHz bandwidth.
Short Circuit Protection					Continuous, with auto recovery.
Maximum Capacitive Load					See Models and Ratings table.
Temperature Coefficient	0.03			%/° C	
Overload Protection	1.0			A	

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Start-up Time	20			ms	

GENERAL

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		92		%	See models and ratings table.
Isolation: Input to Output	0			VDC	Non isolated.
Switching Frequency	550		850	kHz	At full load, nominal input.
Mean Time Between Failure	2			MHrs	MIL-HDBK-217F.
Weight	0.0039 (1.8)			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.

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.

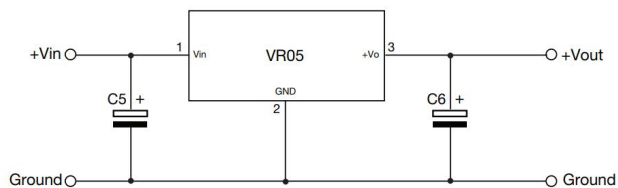
EMC: IMMUNITY

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	

EMC: EMISSIONS

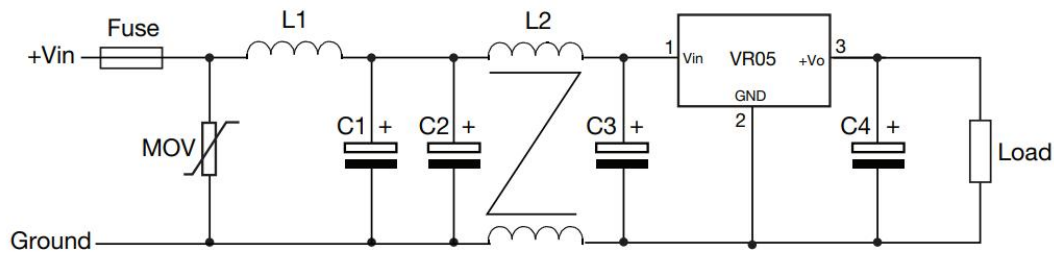
Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN55032	Class B	See Application Notes
Radiated	EN55032	Class B	

APPLICATION NOTES



Part Number	C5	C6
VR05S3V3	10μF/50V	22μF/10V
VR05S05		22μF/10V
VR05S09		22μF/16V
VR05S12		22μF/25V
VR05S15		22μF/25V

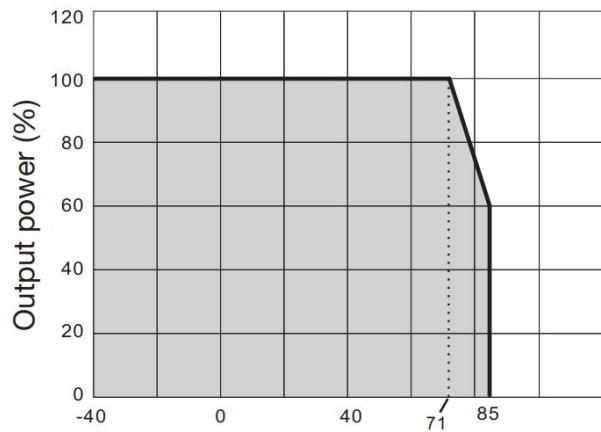
Input Filter to meet Class B Conducted Emissions



Components: MOV S20K30; L1 82μH; L2 12μH; C1 680μF/50V; C2 4.7μF/50V; C3 See C5; C4 See C6
Select fuse rating based on application input current.

DERATING CURVE

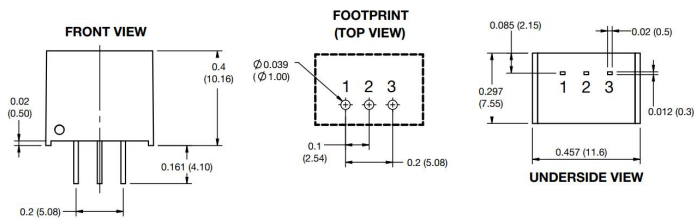
Ambient temperature (°C): -40 to 85; Output power (%): 0-120. Output power derates from 71°C ambient, reaching approximately 60% at 85°C.



MECHANICAL DETAILS

FRONT VIEW / FOOTPRINT (TOP VIEW) / UNDERSIDE VIEW - pins 1 2 3

PIN CONNECTIONS



Pin	Positive	Negative
1	Vin	Vin
2	Ground	-Vout
3	+Vout	Ground

NOTES

1. All dimensions are in inches (mm)
2. Weight: 0.0039lbs (1.8g) approx.
3. Pin diameter: 0.02±0.004 (0.7±0.1)
4. Case & pin tolerance: ±0.02 (±0.5)