

### 0.5 Amp

- 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.

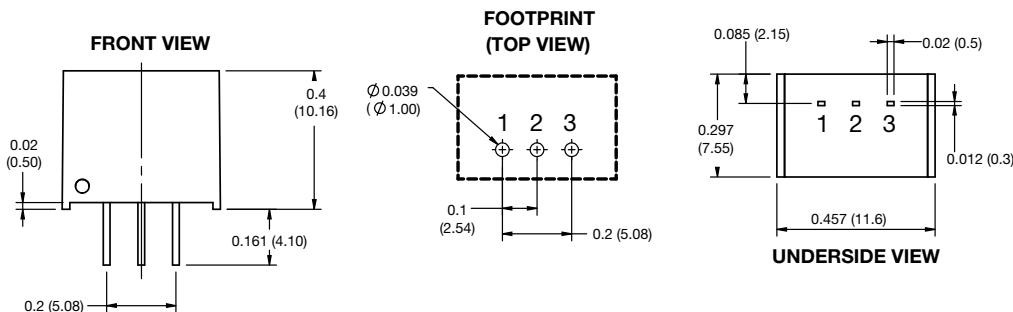
### Models & Ratings

Input Voltage	Output Voltage	Output Current	Input Current <sup>(1)</sup>		Max. Capacitive Load	Efficiency <sup>(2)</sup>		Model Number
			No Load	Full Load		Vin, Min.	Vin, Max.	
4.75-36V	3.3V	500mA	1.5mA	416mA	680µF	89%	80%	VR05S3V3
6.5-36V	5.0V	500mA	0.2mA	446mA	680µF	90%	84%	VR05S05
12-36V	9.0V	500mA	0.2mA	412mA	680µF	93%	90%	VR05S09
15-36V	12V	500mA	0.2mA	436mA	680µF	94%	91%	VR05S12
19-36V	15V	500mA	0.2mA	422mA	680µF	95%	93%	VR05S15

### Notes

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

### Mechanical Details



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)

### 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	
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. For further details contact 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.				

### EMC: Emissions

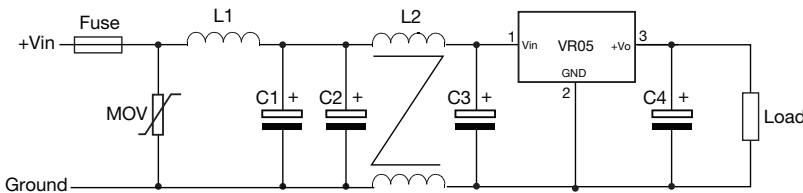
Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN55032	Class B	See Application Notes
Radiated	EN55032	Class B	

### EMC: Immunity

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

### Application Notes

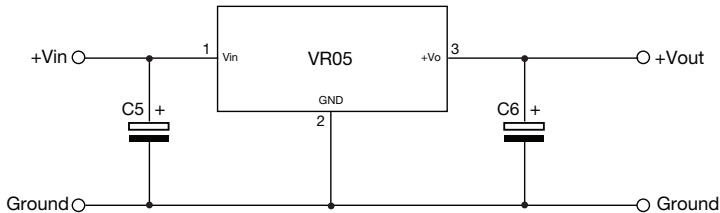
#### Input Filter to meet Class B Conducted Emissions



MOV	L1	L2	C1	C2	C3	C4
S20K30	82 $\mu\text{H}$	12 $\mu\text{H}$	680 $\mu\text{F}/50\text{V}$	4.7 $\mu\text{F}/50\text{V}$	See C5	See C6

Select fuse rating based on application input current.

#### Typical Application



Part Number	C5	C6
VR05S3V3	10 $\mu\text{F}/50\text{V}$	22 $\mu\text{F}/10\text{V}$
VR05S05		22 $\mu\text{F}/10\text{V}$
VR05S09		22 $\mu\text{F}/16\text{V}$
VR05S12		22 $\mu\text{F}/25\text{V}$
VR05S15		22 $\mu\text{F}/25\text{V}$

#### Derating Curve

