

VKA50xS

50 Watt Single Output Half Brick DC/DC Converter







- 18-36 V & 33 75V Input Range
- High Efficiency: 87% Typical at 5V
- 100µS Transient Response 50-100% Load Step
- 420 kHz Fixed-Frequency Operation
- Remote Sense

- Operation to +100°C Baseplate Temperature
- Primary Remote On/Off, Choice of Pos/Neg Logic
- Adjustable Output Voltage
- Continuout Short-Circuit Protection
- Thermal Shutdown
- Case Ground Pin

The VKA50xS Series DC/DC converters present an economical and practical solution for distributed power system architectures which require high power density and efficiency while maintaining system modularity and upgradeability. With the ability to operate over a wide input voltage range of 18 to 36 and 33 to 75 volts, these modules are

ideal for use in battery backup applications common in todays' telecommunication and electronic data processing applications. The output is fully isolated from the input, allowing for a variety of polarity and grounding configura-

The VKA50xS's proprietary control circuitry responds to 50-100% load steps in 100µSeconds to within 1% nominal Vout.

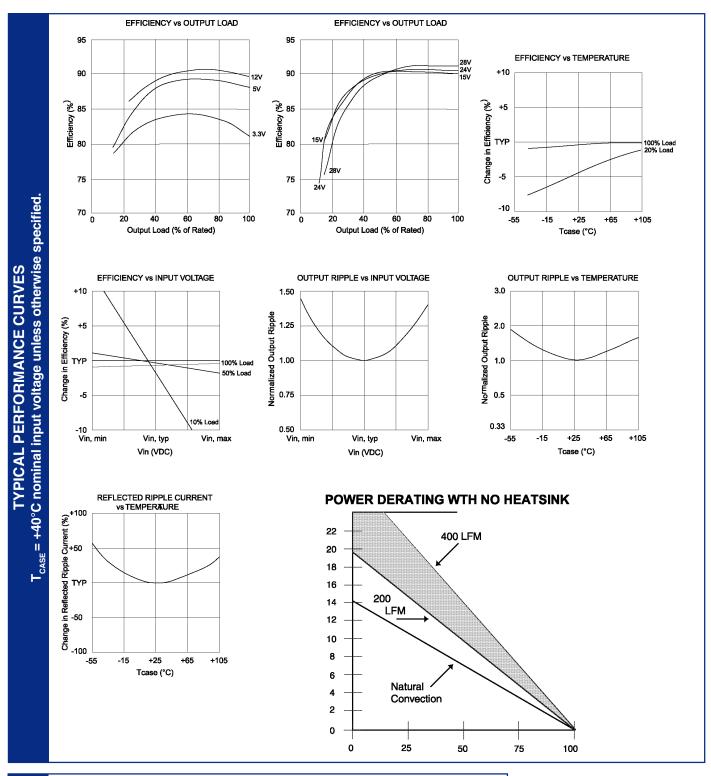
The patented fixed frequency architecture combined with surface mount technology results in a compact, efficient and reliable solution to DC/DC conversion requirements. Safety per UL1950, EN 60950 and CSA 22.2 #234

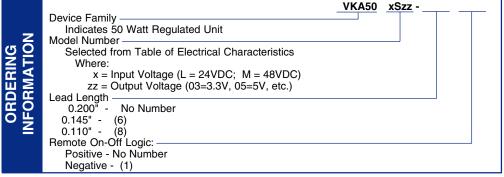
| PRODUCT SELECTION CHART | | | | | | | | | | |
|-------------------------|------------------|---------------|-------------|-----------------|-----------------------|--|--|--|--|--|
| MODEL | INPUT VOLTAGE | VOUT (VDC) | IOUT (A) | EFFICIEI MIN | EFFICIENCY MIN TYP | | | | | |
| VKA50LS03 | | 3.3V | 10.0 | 80 | 81 | | | | | |
| VKA50LS05 | 24VDC | 5.0V | 10.0 | 85 | 86 | | | | | |
| VKA50LS12 | | 12.0V | 4.2 | 87 | 88 | | | | | |
| VKA50LS15 | (18-36) | 15.0V | 3.3 | 88 | 89 | | | | | |
| VKA50LS24 | | 24.0V | 2.1 | 89 | 90 | | | | | |
| VKA50MS03 | | 3.3V | 10.0 | 81 | 82 | | | | | |
| VKA50MS05 | 48VDC | 5.0V | 10.0 | 86 | 87 | | | | | |
| VKA50MS12 | | 12.0V | 4.2 | 88 | 89 | | | | | |
| VKA50MS15 | (33-75) | 15.0V | 3.3 | 89 | 90 | | | | | |
| VKA50MS24 | | 24.0V | 2.1 | 89 | 90 | | | | | |

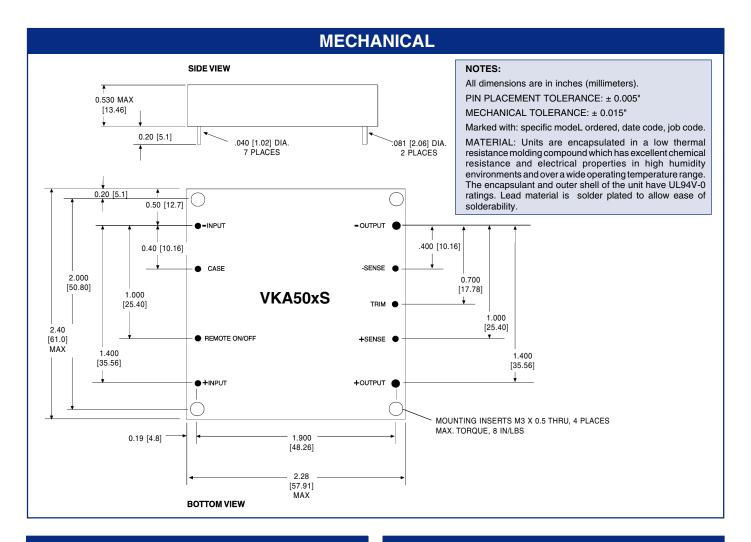
SPECIFICATIONS, ALL MODELS Specifications are at T_{CASE} = +40°C nominal input voltage unless otherwise specified.

| | CASE - 1 IO | COMPUTIONS | | | | |
|-----------|-----------------------------------|---|------|-------------|----------------|------------------------|
| | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
| | INPUT | | | | | |
| | Voltage Range | | | | | |
| | VKA50LS | | 18 | 24 | 36 | VDC |
| | VKA50MS | | 33 | 48 | 75 | VDC |
| | Maximum Input Current | | | 70 | 7.5 | VDO |
| | VKA50LS | V _{IN} = 16VDC | | | 3.7 | Α |
| | VKA50MS | $V_{IN} = 10VDC$ $V_{IN} = 27VDC$ | | | 2.2 | A A |
| | Reflected Ripple Current | Peak - Peak | | 20 | 2.2 | mA |
| NPUT | Input Ripple Rejection | DC to 1KHz | 50 | 60 | | dB |
| 7 | No Load Input Current LS/MS | DC to TKHZ | 50 | 50/100 | | mA |
| 7 | Power Dissipation LS/MS | | | 50/100 | | IIIA |
| | No Load | | | 3.6/4.8 | | w |
| | Standby, Primary On/Off Disable | d L C/MC | | 0.18/0.4 | | W |
| | Inrush Charge | $V_{IN} = V_{IN} max.$ | | 0.16/0.4 | | |
| | VKA50LS | $\mathbf{v}_{IN} = \mathbf{v}_{IN}max.$ | | | 0.520 | mC |
| | VKA50LS VKA50MS | | | | | mC mC |
| | Quiescent Operating Current | | | | 0.360 | mC |
| | , , | | | 0 | 40 | ^ |
| | Primary On/Off Disabled | | | 8 | 12 | mA |
| | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
| | OUTPUT | | | | | |
| | Rated Power | | 0 | | 50 | W |
| | Set point Accuracy | | | | 1 | % |
| | Line Regulation | High Line to Low Line | | 0.02 | 0.05 | % |
| ᆫ | Load Regulation | No Load to Rated Load | | 0.02 | 0.05 | % |
| | Output Temperature Drift | | | ±.02 | | %/°C |
| Ė | Output Ripple, p-p | DC to 20MHz BW | | 1% | | V_{OUT} , Nom |
| OUTPUT | Output Current Limit Inception | | | | 130% | I _{оит} , Nom |
| Ō | Output Short-Circuit Current (2) | test | | | 110% | I _{OUT} , Nom |
| | Output Overvoltage Limit | | | 125% | 130% | V |
| | Transient Response | 50 to 100% Load Step | | | | |
| | Peak Deviation | di/dt = 1.0A/μSec | | 2% | | V _{out} , Nom |
| | Settling Time | V _{OUT} , 1% of Nominal Output | | 100 | | μSec |
| | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
| | ISOLATION | | | | | |
| | Input to Output | Peak Test for 2 Seconds | 1500 | | | VDC |
| | Input to Baseplate | | 1500 | | | VDC |
| | Output to Baseplate | | 500 | | | VDC |
| | Resistance | | 10 | | | MΩ |
| - | Capacitance | | | 2000 | | pF |
| | Leakage Current | V _{ISO} = 240VAC, 60Hz | | 180 | | μA, rms |
| | GENERAL | V _{ISO} = 2 10 V/10, 001 i2 | | 100 | | μο τ, 11110 |
| | Efficiency, Line, Load, Temp. (3) | | | | | |
| _ | Switching Frequency | | 400 | 420 | 440 | KHz |
| \exists | Remote Sense Compensation | | 100 | 120 | 0.5 | V |
| 2 | Output Voltage Adjust Range | 12V & higher(4) | | -50% / +25% | 0.0 | V _{OUT} , Nom |
| ** | Remote On/Off Control Inputs | 12 V & Higher(1) | | 00707 12070 | | OUT, I COIII |
| ۳ | Primary | Open Collector/Drain | | | | |
| GENERAL | Sink Current-Logic Low | Open Comoden/Brain | | | 1.0 | mA |
| G | Vlow | | | | 0.4 | V |
| | Vhigh | | | | Open Collector | · |
| | Turn-on Time | Within 1% of Rated Output | | 10.0 | 12.5 | mSec |
| | Weight | Thim. 170 of Fiction Output | | 10.0 | 85 (3.0) | g (oz.) |
| | TEMPERATURE | + | | | 33 (0.0) | 9 (02.) |
| - | Operation/Specification | Case Temperature | -40 | +25 | +100 | °C |
| | Storage | Case Temperature Case Temperature | -55 | +25 | +125 | °C |
| | Shutdown Temperature | Case Temperature | +100 | 120 | +115 | °C |
| | Thermal Impedance, case-ambient | - Case Temperature | FIOU | 7.1 | FIIO | °C/W |
| | Lead Solder Temperature | 10 Seconds max | | 7.1 | +300 | °C |
| | | | | 1 | 1000 | _ |

NOTES: (1) See Typical Performance Curves, page 3
(2) Continuous Mode
(3) See graphs for Efficiency vs. Output Load, V_{IN}, T_{CASE}
(4) 3.3V Models Limited in Trim Down Range
(5) Consult Factory for Details







OUTPUT ADJUST VOLTAGE

This feature allows the user to accurately adjust the module's output voltage set point to a specified level. This is achieved by connecting a resistor or potentiometer from the TRIM terminal to either the +Vout terminal (for increased Vout) or the -Vout terminal (for decreased Vout). The formulae below describe the trim resistor value to obtain a Vout change of $\Delta\%$. Vo is output voltage prior to adjustment (3.3V, 5V, 12V, 15V, or 24V).

Radj - up =
$$\left(\frac{\text{Vo}(100 + \Delta\%)}{1.225\Delta\%} - \frac{(100 + 2\Delta\%)}{\Delta\%}\right) k\Omega$$

Radj - down =
$$\left(\frac{100}{\Delta\%} - 2\right) k\Omega$$

OVP NOTE

Special attention should be given to the peak voltage deviation during a dynamic load step when trimming the output above the original set point to avoid tripping the overvoltage protection circuit. Should an OVP condition occur, the converter will go into a latch condition and must be externally reset before it will return to normal operation.

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