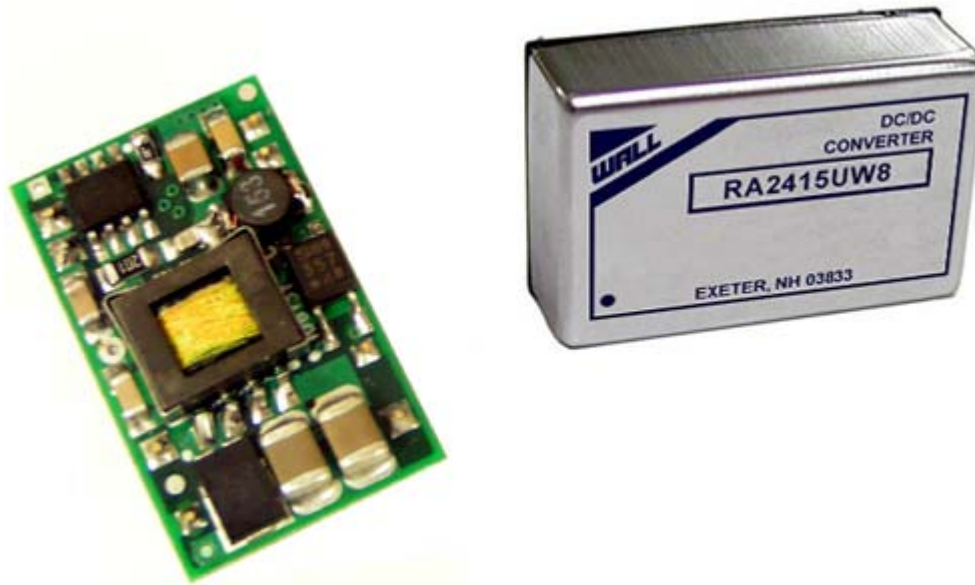


Wall Industries, Inc.

RA4805UW5

5W DC-DC Converter
18-75 Vdc Input
5 Vdc Output at 1.0 A
DIP Package

High Reliability COTS Converter

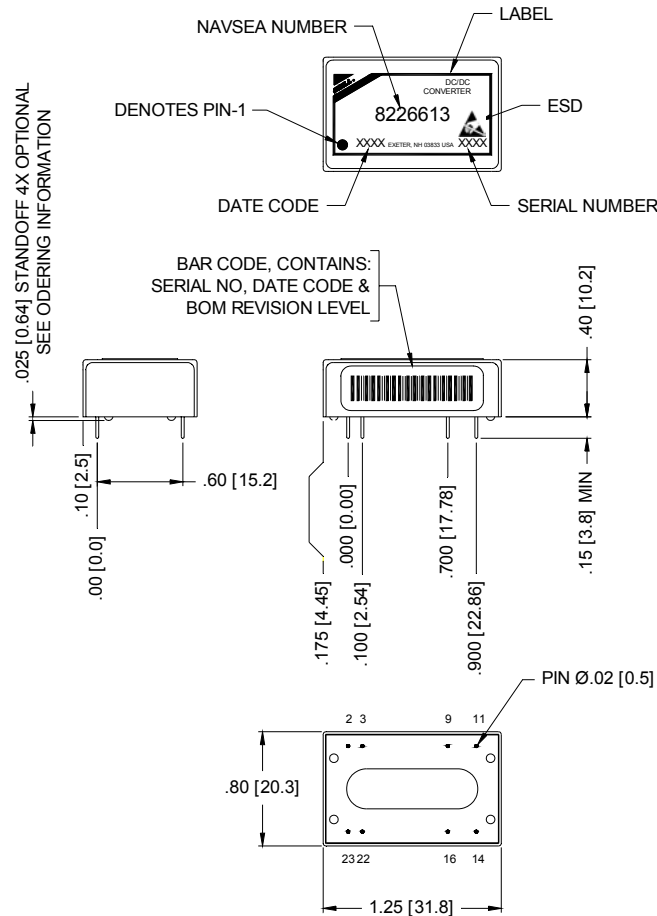


Features:

- **Over 80% Efficient at Full Load**
- **Wide Input Range**
- **Fast Transient Response**
- **Low Output Ripple**
- **Fixed Switching Frequency**
- **Output Over Current Protection**
- **Output Short Circuit Protection**
- **1000 Vdc Isolation**
- **ISO9001 Compliant**
- **IPC-A-610 Compliant**
- **J-STD-001 Compliant**
- **Conformal Coat IAW IPC-CC-830, Type UR**
- **GEIA-STD-0005-2, Level 2B Tin Whisker Compliant**
- **100% Burn In**
- **Manufactured in the United States**

Technical Specifications		Model No. RA4805UW5			
Unless otherwise noted, all specifications are based over the entire rated ambient temperature as described in Graph 2.					
SPECIFICATION	Related condition	Min	Nom	Max	Unit
Switching Frequency		273	307	338	kHz
INPUT (V_{in})					
Operating Voltage Range		18	36	75	Vdc
UVLO Turn On at		16.5	17.4	18.3	Vdc
UVLO Turn Off at		15.4	16.1	16.7	Vdc
UVLO Hysteresis		1.1	1.3	1.6	Vdc
Maximum Input Current (Graph 3)	Low Line	-	341	360	mA
No Load Input Current (Graph 5)	No Load	-	6.5	13	mA
Reflected Ripple Current (Photo 1)	With a 1 μF ceramic	-	5	15	mA
Input Surge Voltage	100 mS	-	-	100	Vdc
EFFICIENCY (Graph 1)	Nominal Line	78	80	-	%
OUTPUT (V_o)					
Voltage Set Point	at 25 °C – see Temperature Drift for Set Point at other Temperatures	4.925 -1.5	5.000	5.075 +1.5	Vdc %
Load Regulation (Graph 6)	$= \frac{V_o(\text{Min. Load}) - V_o(\text{Full Load})}{V_o(\text{Min. Load})} V_{in} = \text{Nominal Line}$	-	0.1	0.5	%
Line Regulation (Graph 7)	$= \frac{V_o(\text{Low Line}) - V_o(\text{High Line})}{V_o(\text{Low Line})} I_o = 100\% \text{ Load}$	-	0.05	0.2	%
Temperature Drift (Graph 8)	$= \frac{V_o(25^\circ\text{C}) - V_o(-40^\circ\text{C or } +85^\circ\text{C})}{V_o(25^\circ\text{C})} I_o = 50\% \text{ Load}$	-	0.006	0.02	% / °C
Ripple (Photo 5)	With 1 μF ceramic & 20 MHz BW	-	30	100	mV _{pk-pk}
Spikes (Photo 5)	With 1 μF ceramic & 20 MHz BW	-	30	100	mV _{pk-pk}
Current		0	-	1.0	A
Current Limit	Power Limited	1.3	1.9	2.5	A
Over Voltage Limit		6.8	7.4	8.0	Vdc
DYNAMIC RESPONSE					
Load step ΔV (Photo 6)	25% to 75% I _o , di/dt=0.15A/μS, C _{out} =1μF	-	64	100	mV
Recovery Time (Photo 6)	Recovery to within 1% V _{out} (nom), C _{out} =1μF	-	200	300	μs
Turn On Delay (Photos 2 & 3)	From V _{in} (min) to V _{out} (90%), no external capacitance	-	13	20	ms
Turn On Overshoot (Photos 2 & 3)	Full Load Resistive	-	0	0	%
Hold Up Time (Photo 4)	From V _{in} (min) to V _{ULVO_Turn_Off}	0	-	-	mS
ISOLATION					
Input-Output	1 minute	1000	-	-	Vdc
Input/Output-Chassis	1 minute	1000	-	-	Vdc
Isolation Resistance		20	-	-	GΩ
Isolation Capacitance		-	2350	3000	pF
THERMAL					
Ambient Operating Temperature (Graph 2)	Max. Ambient limited by Derating Curves (Graph 2)	-40	25	Graph 2	°C
Storage Temperature		-55	-	125	°C
MTBF	MIL-HDBK-217F Notice 2; T _{amb} =75°C		369,0000		hours
MECHANICAL					
Weight		17	19	21	g

Figure 1: Mechanical Dimensions



NOTES:

1. Pin to Pin Tolerance: ± 0.01 (± 0.3)
2. Pin Diameter Tolerance: ± 0.005 (± 0.13)
3. Unless otherwise specified all dimensions are in inches [XX] are in millimeters.
4. Applied Tolerances: Angles $\pm 1^\circ$, .XX = ± 0.02 [0.5] .XXX = ± 0.010 [0.25]
5. Do not scale drawing. Interpret dimension and tolerance per ASME Y14.5M – 1994
6. Third Angle Projection
7. Pin Material: Brass alloy "360, 1/2 Hard" per ASTM B16-85, chemical composition; 61.5%Cu, 35.4%Zn, 3.1%Pb.
8. Pin Finish: 10u Gold over Nickel. Meets the solder ability requirements of MIL-STD-202, Method 208.
9. PCB Cleaning: Devices shall be capable of exposure to the following PCB assembly cleaning processes: Aquanox XJN+ an aqueous cleaner chemistry made by Kyzen Corp. This solution operates at a concentration of 25% XJN and 75% deionized water sprayed onto the device at 25-40 PSI. This cleaning process includes the following steps:
 - a. Pre-wash and wash at 150°F. Dwell time 3-4 minutes.
 - b. Isolation water rinse at 140°F
 - c. Deionized water rinse at 140°F
 - d. Final deionized water rinse
 - e. Blower dry
 - f. 1 hour CCA bake at 125 Deg F prior to CCA conformal coat.
10. Unit is not hermetically sealed
11. Pin Table:

Pin #	Description	Pin Ø
2	-V _{in}	0.020 (0.51)
3	-V _{in}	0.020 (0.51)
9	NC	0.020 (0.51)
11	NC	0.020 (0.51)
14	+V _{out}	0.020 (0.51)
16	-V _{out}	0.020 (0.51)
22	+V _{in}	0.020 (0.51)
23	+V _{in}	0.020 (0.51)

DESIGN CONSIDERATIONS

Under Voltage Lock Out (UVLO)

The converter output is disabled until the input voltage exceeds the UVLO turn-on limit. The converter will remain ON until the input voltage falls below the UVLO turn-off limit.

Over Current Protection

The converter is protected from short circuit and over current conditions. Upon sensing an over current, the output will begin to drop (or 'foldback') limiting the output power. Further increasing the output current will cause the converter to shut off and then restart (or 'hiccup') until the over current condition is removed. Shorting the output will cause the converter to immediately enter the 'hiccup' mode.

Over Temperature Protection

The converter is NOT protected from over temperature conditions. Exceeding the rated case temperature of 100°C may cause permanent damage to the unit.

Input Filter

No additional input capacitor is needed for the power supply to operate. However, to reduce input ripple and high frequency noise, it is highly recommended that a minimum 1 μ F/100 V ceramic capacitor be added across the input pins.

Output Filter

No additional output capacitor is needed for the power supply to operate. However, to reduce high frequency noise, a 1 μ F/10V ceramic capacitor is recommended.

Fusing

For applications that are required to meet UL and/or CSA safety regulations, the input to the converter shall be current limited or supplied through a 2 A fuse. This unit is designed to meet these regulations, but is not certified.

Final Electrical Test

See Appendix I for description of Final Electrical Test. All units tested 100% at 25°C.

Qualification Testing

40 samples, No Failures Allowed, 40/0 (Devices shall be exposed to PCB cleaning process prior to testing)

Subgroup 1 - 1000 hour life test per MIL-STD-883, Method 1015:

1. 10 samples, No Failures Allowed, 10/0
2. Final Electrical Test performed at maximum ambient and full load per Graph 2 with no external air
3. Final Electrical Test performed at 168, 250, 500 and 1000 hours

Subgroup 2 - Accelerated Non-Operating Humidity and Thermal/Mechanical Fatigue:

1. 10 samples, No Failures Allowed, 10/0
2. 500 hrs at 85°C at 85% Relative Humidity, Unbiased
3. 200 temperature cycles (T/C), -46°C to +85°C @ 5°C/minute minimum, 45 minute dwell
4. Final Electrical Test at 25°C
5. 500 hrs at 85°C at 85% Relative Humidity, Unbiased
6. 200 temperature cycles (T/C), -46°C to +85°C @ 5°C/minute minimum, 45 minute dwell
7. Final Electrical Test at 25°C

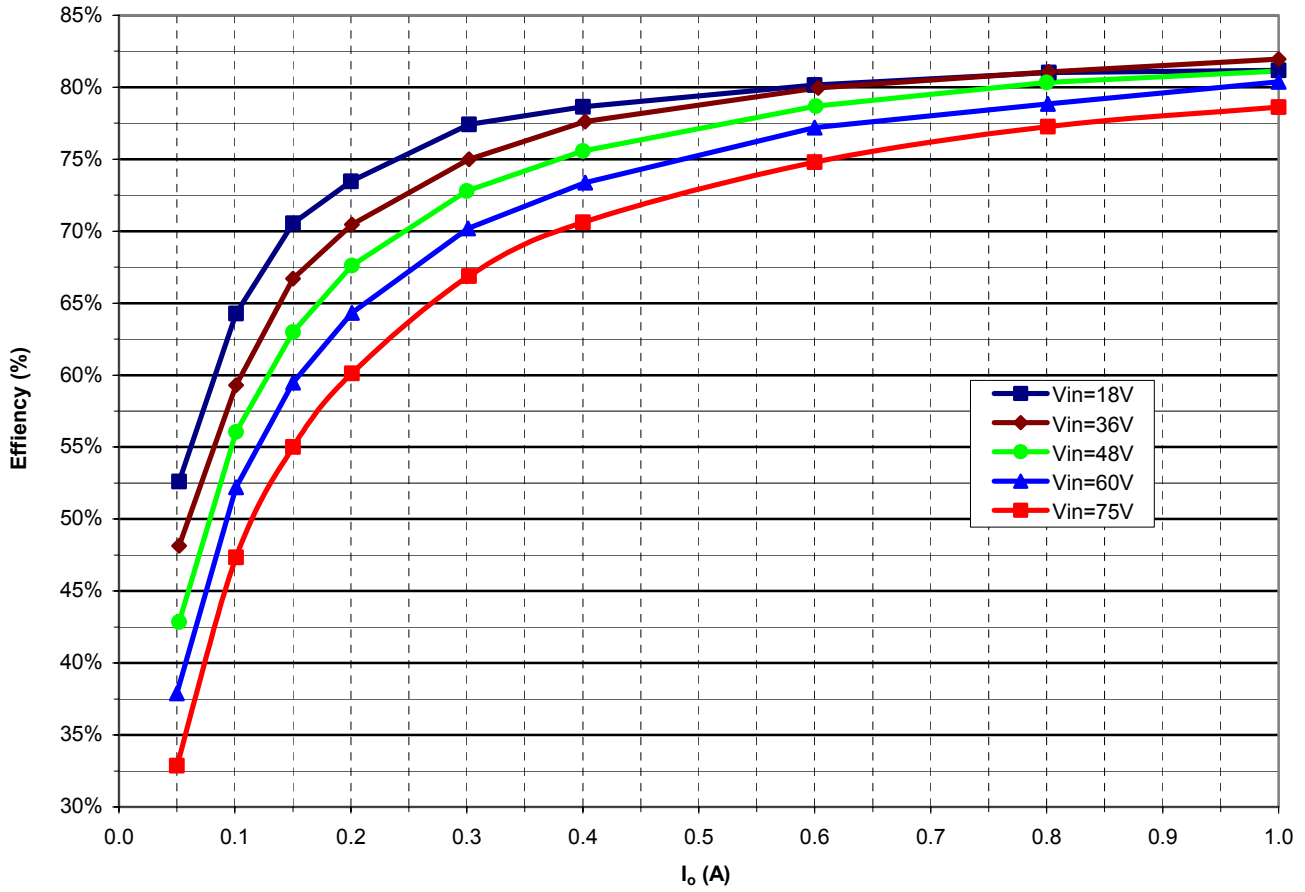
Subgroup 3 - Snap Start from Low Operating Temp:

1. 10 samples, No Failures Allowed, 10/0
2. Cold soak at -40°C until device reaches thermal equilibrium
3. Power up under full load with worst case input transient waveform applied (as specified on datasheet)
4. Total cycles: 500 (definition of 1 cycle: -40°C soak, power up, re-soak -40°C)
5. Final Electrical Test at 25°C

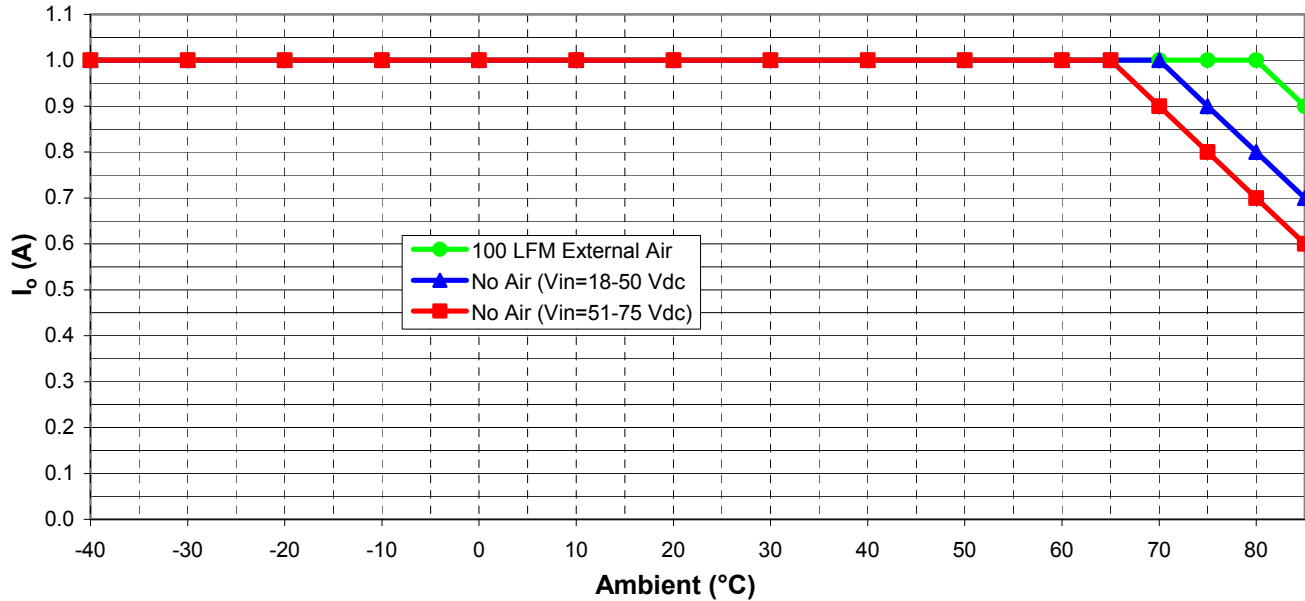
Subgroup 4 - Non-Operating Vibration and Shock:

1. 10 samples, No Failures Allowed, 10/0
2. Non-operating Mechanical Shock: Method 2002, MIL-STD-883, Condition B, 1500g, 0.5 ms pulse
3. Non-operating Random Vibration: Method 2026, MIL-STD-883, Condition K, 44.8 grms
4. Final Electrical Test at 25°C

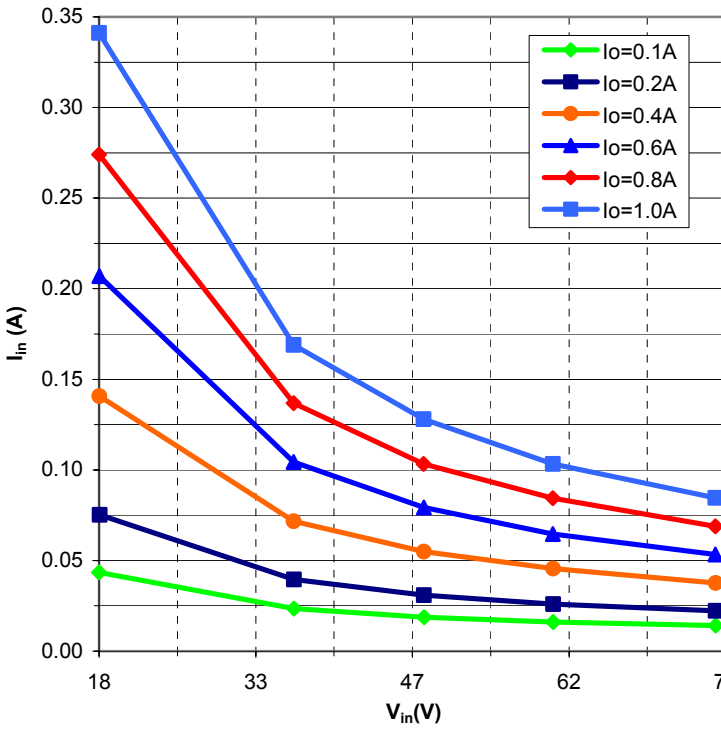
Graph 1: Efficiency vs. Output Current



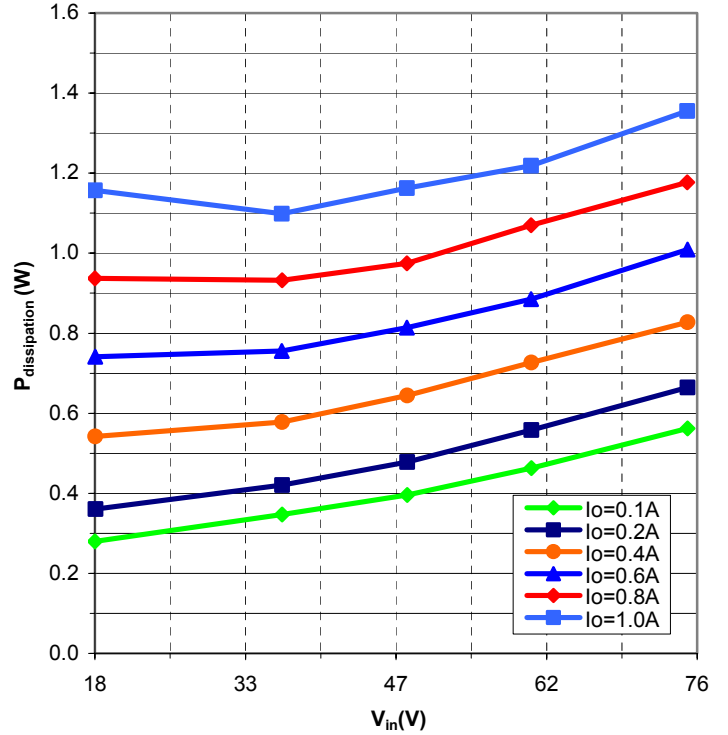
Graph 2: Max. Ambient vs. Output Current



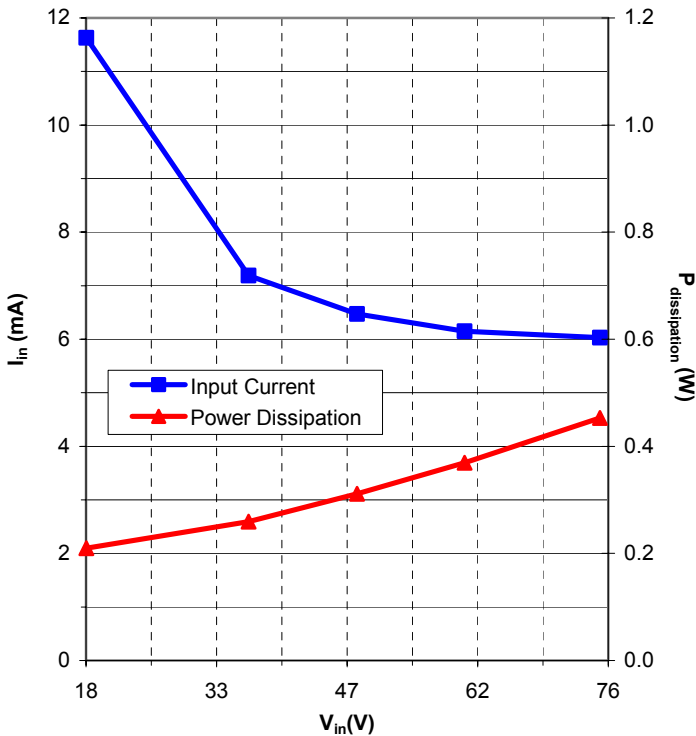
Graph 3: Input Current vs. Input Voltage



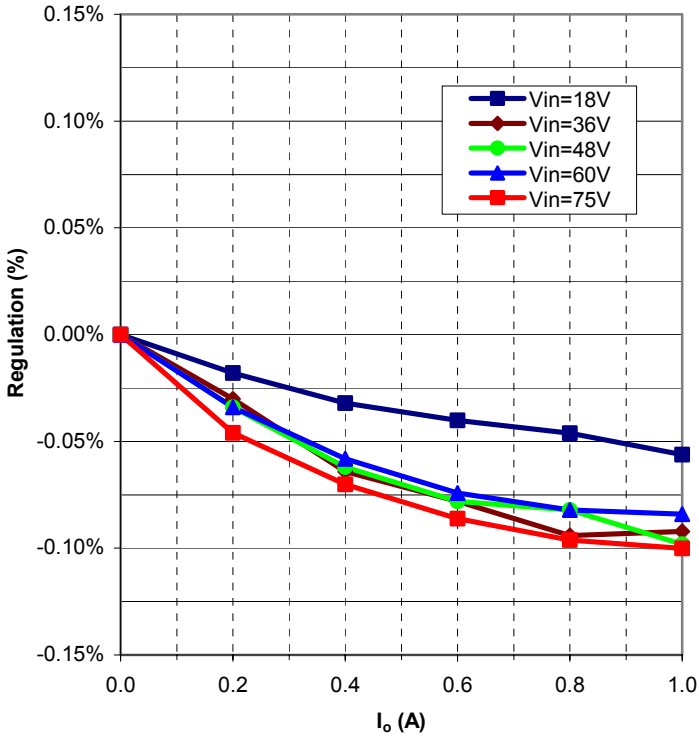
Graph 4: Power Dissipation vs. Input Voltage



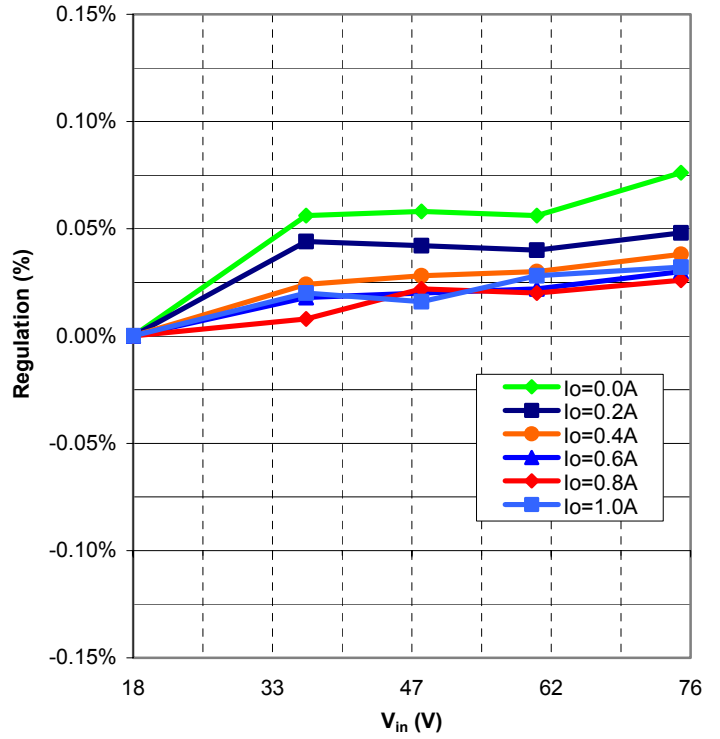
Graph 5: No Load Input Current and Power Dissipation vs. Input Voltage



Graph 6: Load Regulation



Graph 7: Line Regulation



Graph 8: Output Temperature Drift

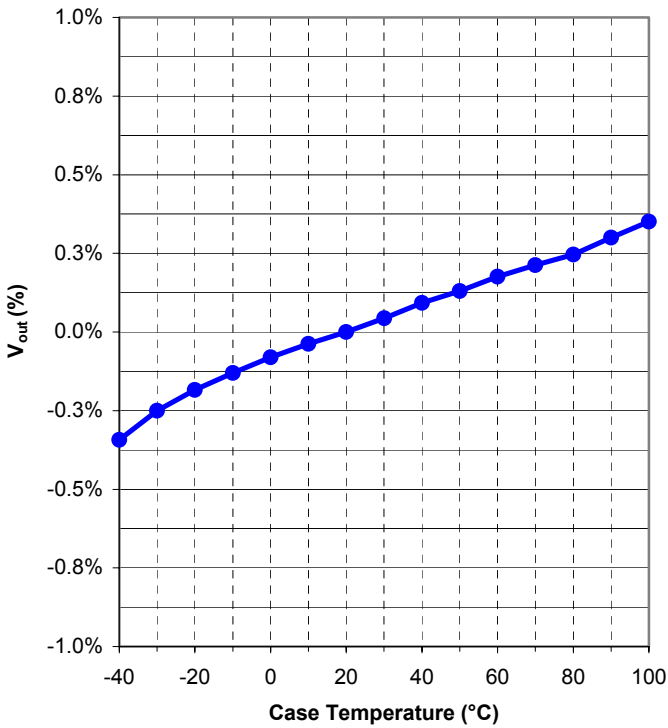


Photo 1: Input Ripple Voltage and Current
 $V_{in}=36\text{ V}$, $I_{out} = 1.0\text{ A}$
 With a $1\text{ }\mu\text{F}$ Ceramic across the Input

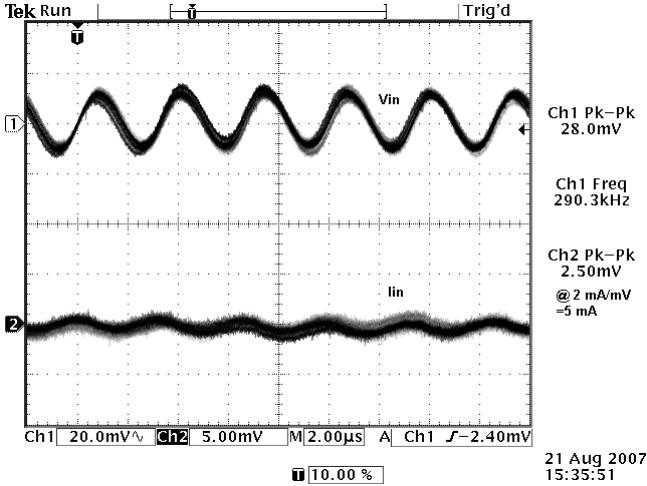


Photo 2: Turn On at 1 A Load, $V_{in} = 36\text{ Vdc}$
 $C_{out} = 2200\text{ }\mu\text{F}$ Aluminum Electrolytic

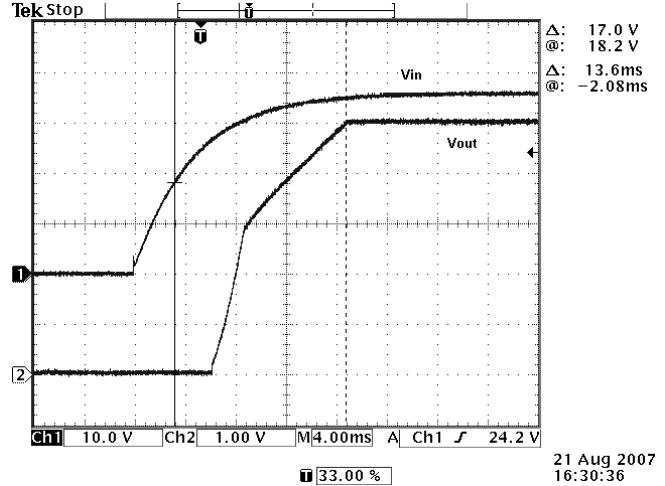


Photo 3: Normal Turn On at No Load, $V_{in} = 36\text{ Vdc}$

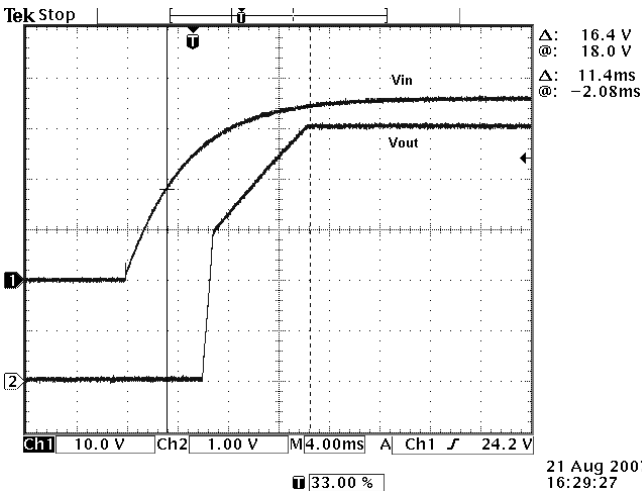


Photo 4: Turn Off at 36 V

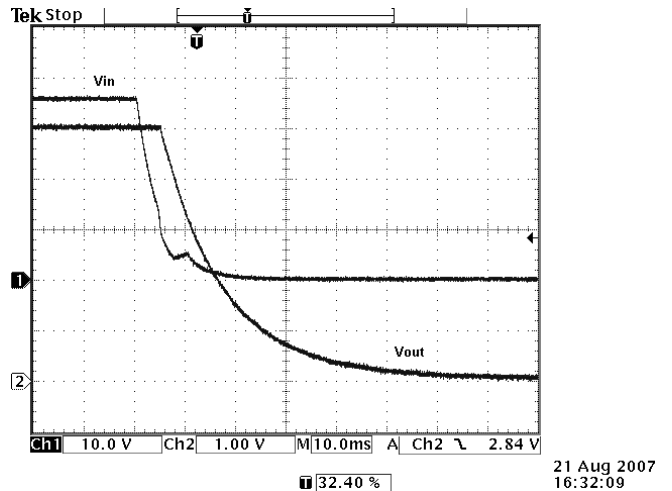


Photo 5: Output Ripple and Noise (20 MHz BW)
 $V_{in}=36\text{ V}$, $I_{out} = 1.0\text{ A}$
 With a $1\text{ }\mu\text{F}$ Ceramic across the Output

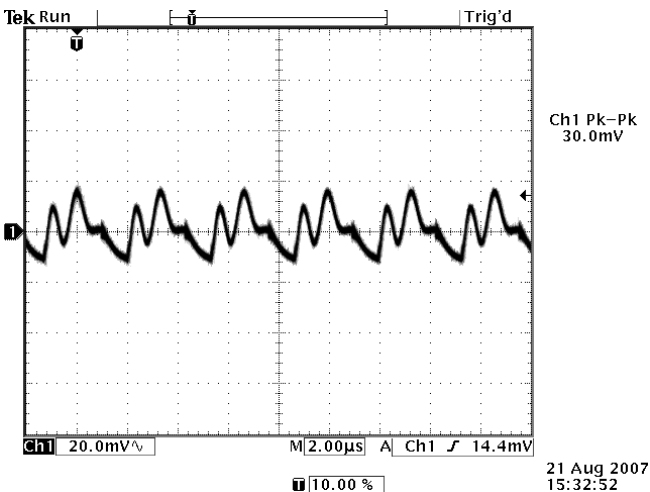
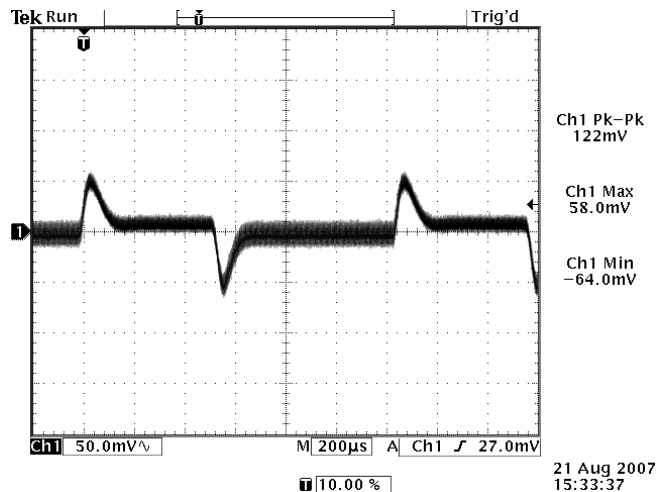


Photo 6: Transient Response – $0.15\text{ A}/\mu\text{s}$
 $V_{in} = 36\text{ Vdc}$, $I_{out} = 0.25\text{ to }0.75\text{ A}$ (25% to 75%)
 With a $1\text{ }\mu\text{F}$ Ceramic across the Output



PART ORDERING:

- RA4805UW5
- RA4805UW5/ES (with Electrical Screening)
- RA4805UW5/SO (with Standoffs)
- RA4805UW5/ES/SO (with Electrical Screening and Standoffs)

Electrical Screening Option:

1. Internal Visual: IPC-A-610
2. Temperature cycling: MIL-STD-883, Method 1010, Condition B, -55 to +125°C, 10 cycles
3. Burn-In: MIL-STD-883, Method 1015, 96 hours, $I_{out}=1.0$ A, Ambient as specified in Graph 2 for specified input voltage range and no external air
4. Final Electrical: 100% at 25°C. See appendix I
5. External Inspection: MIL-STD-883, Method 2009

Company Information:

Wall Industries, Inc. has created custom and modified units for over 40 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001-2000 certification is just one example of our commitment to producing a high quality, well documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

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Web: www.wallindustries.com
Address: 5 Watson Brook Rd.
Exeter, NH 03833

RA4805UW5 ATE FINAL ELECTRICAL TEST DESCRIPTION

Rev. – A 2/14/08

Sequence #1 - Set State

- Set Vin = 48 Vdc
- Set Iout = 1.0 A

Sequence #2 - Output voltage accuracy

- Under the previously set conditions, measure the output voltage.
- V min = 4.925 Vdc
- V max = 5.075 Vdc

Sequence #3 - Efficiency

- Under the previously set conditions, measure the efficiency.
- Min E = 78%
- Max E = 99%

Sequence #4 - Set State

- Set Vin = 20 Vdc
- Set Iout = 125 mA

Sequence #5 - Input Current

- Under the previously set conditions, measure the Input Current
- Max Iin = 60 mA

Sequence #6 – Line Regulation

- Set number of points to take measurements = 5
- Set low line voltage for Vin = 18 Vdc
- Set high line voltage for Vin = 75 Vdc
- Set I out = 1.0 A
- Min acceptable value = 0% delta
- Max acceptable value = 0.2% delta

Sequence #7 – Load Regulation

- Set number of points to take measurements = 6
- Set Vin = 48 Vdc
- Set high current = 1.0 A
- Set low current = 0 A
- Min acceptable value = 0%
- Max acceptable value = 0.5%

\Sequence #6 – Current Limit Threshold

- Set Vin = 48 Vdc
- Set threshold = 98% Vout
- Increase Iout in increments of 0.1 A
- I out start at 1.0 A
- Min acceptable value = 1.3 A
- Max acceptable value = 2.5 A

Sequence #7 – Ripple Amplitude

- Set Vin = 48 Vdc
- Set Iout = 1.0 A
- Min acceptable measurement = 0
- Max acceptable measurement = 100 mVp-p