

## 48 V Input DC-DC Converter Modules



Size:  
2.19 x 1.91 x 0.37 in  
55,7 x 48,6 x 9,5 mm

### Applications

- Communications
- Distributed power
- ATE
- Defense
- Aerospace
- Medical
- And other applications requiring high efficiency

### Features

- DC input range: 36 – 75 V
- Efficiency: Up to 93%
- DC output: 1 – 48 V
- Maximum operating temp: 100°C, full load
- Isolated output
- Low noise: Sine Amplitude Converter™ (SAC™) technology
- Highly efficient: ZCS/ZVS switching
- Fast dynamic response
- Low profile: 0.37 in. (9.5 mm)
- RoHS Compliant
- Power density up to 145 W/in<sup>3</sup>
- Agency approvals

### Product Overview

VI Brick DC-DC converters use advanced Sine Amplitude Converter™ (SAC™) technology, thermally enhanced packaging technologies, and advanced CIM processes to provide high power density and efficiency, superior transient response, and improved thermal management. The high speed 3.5 MHz, zero current switching–zero voltage switching (ZCS–ZVS) design enables efficient and low noise operation throughout the operating range.

### Product Selection: 36 – 75 V DC Input Range

| Output Voltage | Output Power (W) | Current (A) | Efficiency (%) | Part Numbering  |
|----------------|------------------|-------------|----------------|-----------------|
| 1.0 Vdc        | 100              | 100         | 85             | DC048B010T010FP |
| 1.5 Vdc        | 120              | 80          | 87             | DC048B015T012FP |
| 1.8 Vdc        | 144              | 80          | 89             | DC048B018T014FP |
| 2.5 Vdc        | 175              | 70          | 90             | DC048B025T017FP |
| 3.0 Vdc        | 180              | 60          | 91             | DC048B030T018FP |
| 3.3 Vdc        | 165              | 50          | 91             | DC048B033T016FP |
| 5 Vdc          | 180              | 36          | 91             | DC048B050T018FP |
| 10 Vdc         | 180              | 18          | 92             | DC048B100T018FP |
| 12 Vdc         | 220              | 18.33       | 92             | DC048B120T022FP |
| 15 vdc         | 200              | 13.33       | 92             | DC048B150T020FP |
| 24 Vdc         | 220              | 9.17        | 92             | DC048B240T022FP |
| 28 Vdc         | 190              | 6.79        | 92             | DC048B280T019FP |
| 48 Vdc         | 220              | 4.58        | 93             | DC048B480T022FP |

### Part Numbering

|                        |                          |              |                                                         |                                                           |                                                        |                                                       |                                                                            |                               |
|------------------------|--------------------------|--------------|---------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------|
| <b>D C</b>             | <b>0 4 8</b>             | <b>B</b>     | <b>0 5 0</b>                                            | <b>T</b>                                                  | <b>0 1 8</b>                                           | <b>F</b>                                              | <b>P</b>                                                                   |                               |
| DC-DC Converter Module | Input Voltage Designator | Package Size | Output Voltage Designator<br>(= V <sub>OUT</sub> X 10 ) | Product Grade Storage<br>T –40 to 125°C<br>M –65 to 125°C | Temperatures Operating<br>–40 to 100°C<br>–55 to 100°C | Output Power Designator<br>(= P <sub>OUT</sub> / 10 ) | Baseplate<br>F = Slotted flange<br>T = Transverse heat sink <sup>[a]</sup> | Pin Style<br>P = Through hole |

<sup>[a]</sup> Contact factory

## MODULE FAMILY ELECTRICAL CHARACTERISTICS

Electrical characteristics apply over the full operating range of input voltage, output load (resistive) and baseplate temperature, unless otherwise specified. All temperatures refer to the operating temperature at the center of the baseplate.

### Absolute Maximum Ratings

| Parameter                 | Rating       | Unit         | Notes               |
|---------------------------|--------------|--------------|---------------------|
| +In to -In voltage        | -1.0 to +85  | Vdc          |                     |
| PC to -In voltage         | -0.3 to +6.0 | Vdc          |                     |
| +Out to -Out              |              |              |                     |
| 1.0 V                     | -0.5 to 4.0  | Vdc          |                     |
| 1.5 V                     | -0.5 to 4.0  | Vdc          |                     |
| 1.8 V                     | -0.5 to 4.0  | Vdc          |                     |
| 2.5 V                     | -0.5 to 6.0  | Vdc          |                     |
| 3.0 V                     | -0.5 to 6.0  | Vdc          |                     |
| 3.3 V                     | -0.5 to 12.0 | Vdc          |                     |
| 5 V                       | -0.5 to 12.0 | Vdc          |                     |
| 10 V                      | -0.5 to 30.0 | Vdc          |                     |
| 12 V                      | -0.5 to 30.0 | Vdc          |                     |
| 15 V                      | -0.5 to 25   | Vdc          |                     |
| 24 V                      | -0.5 to 50.0 | Vdc          |                     |
| 28 V                      | -0.5 to 48.0 | Vdc          |                     |
| 48 V                      | -0.5 to 60.0 | Vdc          |                     |
| Isolation voltage         |              |              |                     |
| In to out                 | 2,250        | Vdc          | Test voltage        |
| In to base                | 2,250        | Vdc          | Test voltage        |
| Out to base               | 707          | Vdc          | Test voltage        |
| Operating Temperature     | -55 to +100  | °C           | M-Grade             |
| Storage Temperature       | -65 to +125  | °C           | M-Grade             |
| Pin soldering temperature | 500 (260)    | °F (°C)      | <5 sec; wave solder |
|                           | 750 (390)    | °F (°C)      | <7 sec; hand solder |
| Mounting torque           | 5 (0.57)     | in-lbs (N-m) | 6 each              |

**Note:** Stresses in excess of the maximum ratings can cause permanent damage to the device. Operation of the device is not implied at these or any other conditions in excess of those given in the specification. Exposure to absolute maximum ratings can adversely affect device reliability.

### Input Specifications

| Parameter                              | Min  | Typ  | Max  | Unit | Notes         |
|----------------------------------------|------|------|------|------|---------------|
| Operating input voltage                | 36   | 48   | 75   | Vdc  |               |
| Input surge withstand                  |      |      | 85   | Vdc  |               |
| Undervoltage turn-on                   |      | 33.8 | 35.3 | Vdc  |               |
| Undervoltage turn-off                  | 30.4 | 31.8 |      | Vdc  |               |
| Overvoltage turn-on                    | 75.7 | 77.3 |      | Vdc  |               |
| Overvoltage turn-off                   |      | 78.8 | 81.0 | Vdc  |               |
| Recommended external input capacitance |      | 100  |      | μF   | See Figure 19 |

## Output Specifications<sup>[a]</sup>

| Parameter               | Min | Typ   | Max | Unit                  | Notes                                                     |
|-------------------------|-----|-------|-----|-----------------------|-----------------------------------------------------------|
| Output voltage setpoint |     | 2%    |     | V <sub>out</sub> nom. | Nominal input; full load; 25°C                            |
| Line regulation         |     | ±0.5  | ±1  | %                     | Low line to high line; full load, deviation from setpoint |
| Temperature regulation  |     | ±0.03 | .05 | % / °C                | Over operating temperature range                          |

<sup>[a]</sup> For important information relative to applications where the converter modules are subject to continuous dynamic loading, contact Vicor applications engineering at 800-927-9474.

## Control Specifications

| Parameter              | Min | Typ  | Max  | Unit            | Notes             |
|------------------------|-----|------|------|-----------------|-------------------|
| Primary Control (PC)   |     |      |      |                 |                   |
| DC voltage             | 4.8 | 5.0  | 5.2  | V <sub>dc</sub> | Referenced to –In |
| Module disable voltage | 2.3 | 2.4  |      | V <sub>dc</sub> | Referenced to –In |
| Module enable voltage  |     | 2.5  | 2.6  | V <sub>dc</sub> | Referenced to –In |
| Disable hysteresis     |     | 100  |      | mV              |                   |
| Current limit          |     | 1.75 | 1.90 | mA              |                   |
| Disable delay time     |     | 1    |      | μs              |                   |

## Thermal Resistance and Capacity

| Parameter                                | Min | Typ  | Max | Unit        |
|------------------------------------------|-----|------|-----|-------------|
| Baseplate to sink; flat, greased surface |     | 0.20 |     | °C/Watt     |
| Baseplate to sink; thermal pad           |     | 0.18 |     | °C/Watt     |
| Baseplate to ambient                     |     | 6.5  |     | °C/Watt     |
| Baseplate to ambient; 1000 LFM           |     | 2.0  |     | °C/Watt     |
| Thermal capacity                         |     | 47.7 |     | Watt-sec/°C |

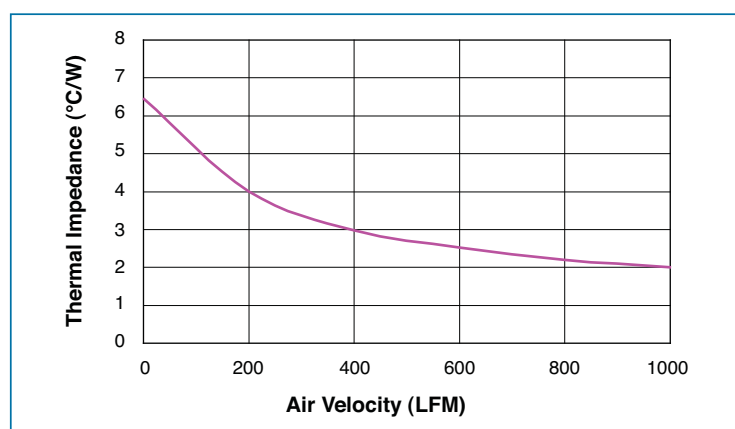


Figure 1 – Thermal impedance vs. airflow

### General Specifications

| Parameter                        | Min         | Typ        | Max   | Unit    | Notes                                                                                           |
|----------------------------------|-------------|------------|-------|---------|-------------------------------------------------------------------------------------------------|
| Isolation voltage                | In to out   | 2,250      |       | Vdc     | Test voltage, complies with basic insulation requirements                                       |
|                                  | In to base  | 2,250      |       | Vdc     | Test voltage, complies with basic insulation requirements                                       |
|                                  | Out to base | 707        |       | Vdc     | Test voltage, complies with operational insulation requirements                                 |
| Isolation resistance (in to out) |             | 10         |       | megohms |                                                                                                 |
| Weight                           |             | 2.19       |       | ounces  |                                                                                                 |
|                                  |             |            | 62.14 | grams   |                                                                                                 |
| Thermal protection               | 125         | 130        | 135   | °C      | Junction temperature, with automatic recovery                                                   |
| <a href="#">Agency approvals</a> |             | cTÜVus, CE |       |         | UL60950-1, CSA0950-1, EN60950-1, IEC60950-1.<br>With appropriate fuse in series with the +Input |

**Note:** Specifications are subject to change without notice.

## 1.0 Vout, 100 W OPERATING SPECIFICATIONS - (e.g. DC048B010T010FP)

| Parameter                   | Min  | Typ  | Max     | Unit  | Notes                                                        |
|-----------------------------|------|------|---------|-------|--------------------------------------------------------------|
| Efficiency                  | 82   | 85   |         | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |      | 100  | 138     | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 1.17 |      | 1.24    | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |      | 5.5  | 7.6     | Watts | No load                                                      |
| Load regulation             |      | ±0.6 | ±1.5    | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |      |      | 108,000 | µF    | External                                                     |
| Load current                | 0    |      | 100     | Amps  |                                                              |
| Current limit (peak)        | 108  | 115  | 130     | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0    | 1.0  | 50      | Amps  | Shut down, may require PC enable to initiate restart         |

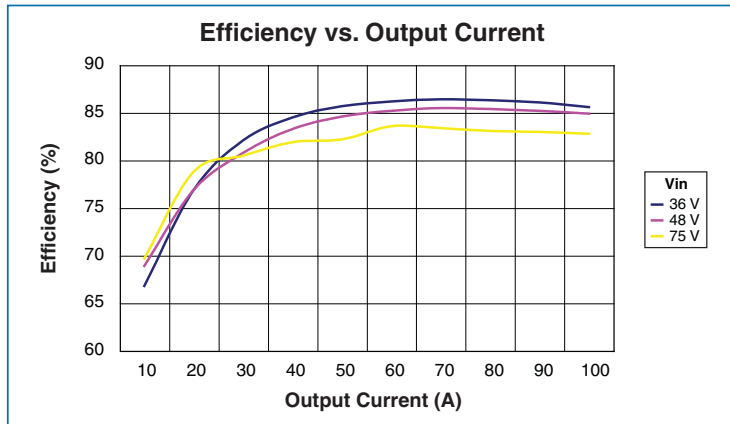


Figure 2-1 – Efficiency vs. load

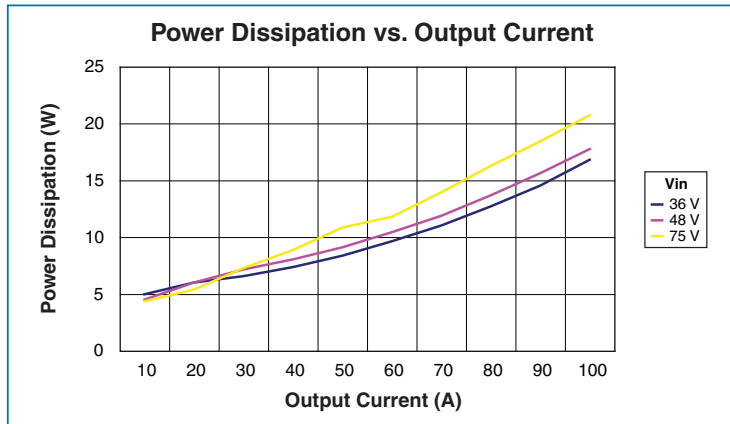


Figure 2-2 – Power dissipation vs. load

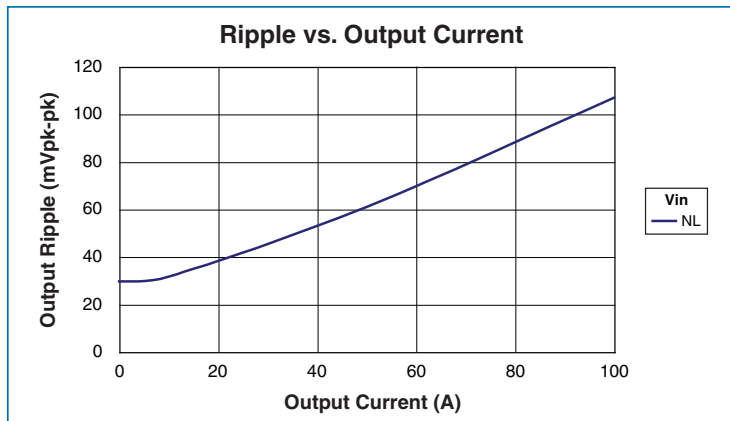


Figure 2-3 – Output ripple vs. load with no external bypass capacitance

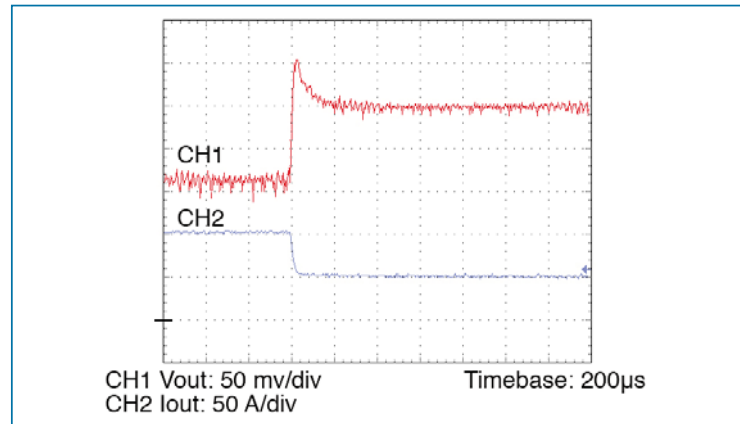


Figure 2-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

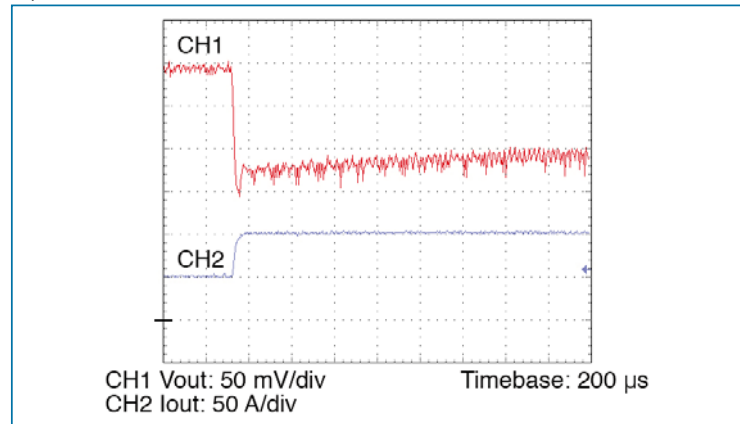


Figure 2-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

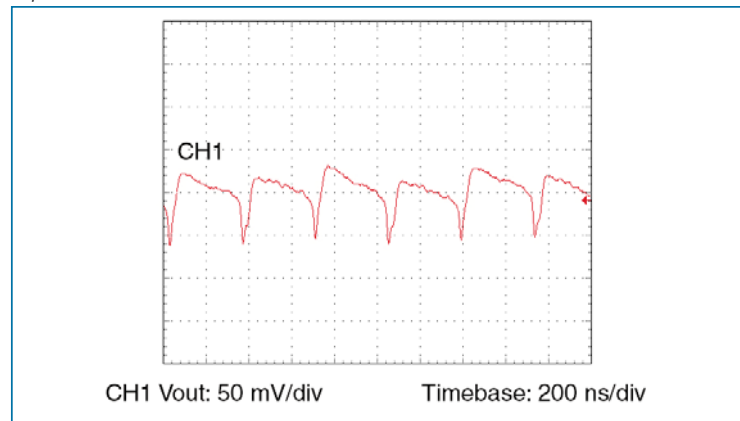


Figure 2-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

## 1.5 Vout, 120 W OPERATING SPECIFICATIONS - (e.g. DC048B015T012FP)

| Parameter                   | Min  | Typ  | Max    | Unit  | Notes                                                        |
|-----------------------------|------|------|--------|-------|--------------------------------------------------------------|
| Efficiency                  | 83   | 87   |        | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |      | 100  | 125    | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 1.75 |      | 1.86   | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |      | 5.5  | 7.6    | Watts | No load                                                      |
| Load regulation             |      | ±0.6 | ±1.5   | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |      |      | 48,000 | µF    | External                                                     |
| Load current                | 0    |      | 80     | Amps  |                                                              |
| Current limit (peak)        | 86.4 | 92   | 104    | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0    | 1.0  | 40     | Amps  | Shut down, may require PC enable to initiate restart         |

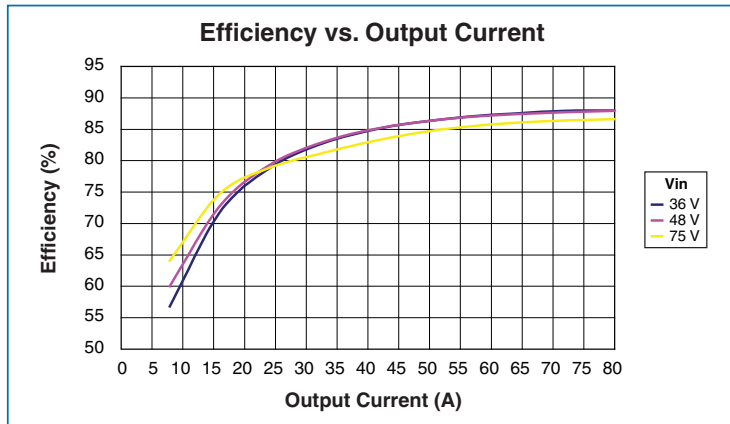


Figure 3-1 – Efficiency vs. load

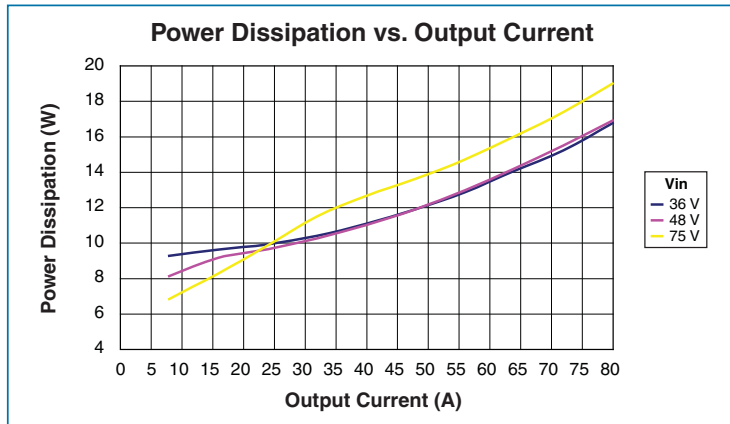


Figure 3-2 – Power dissipation vs. load

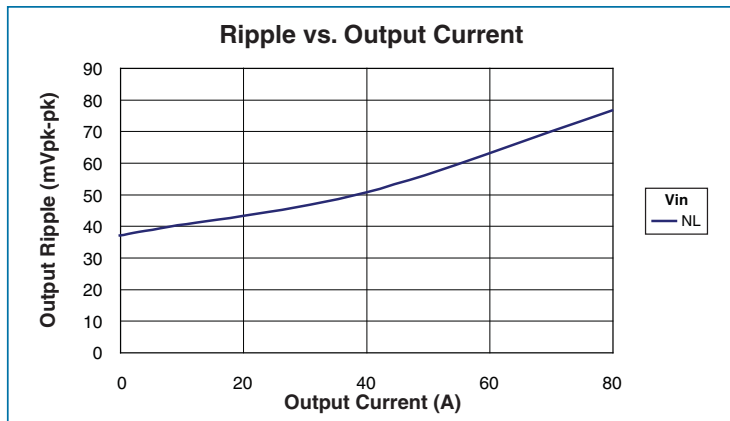


Figure 3-3 – Output ripple vs. load with no external bypass capacitance

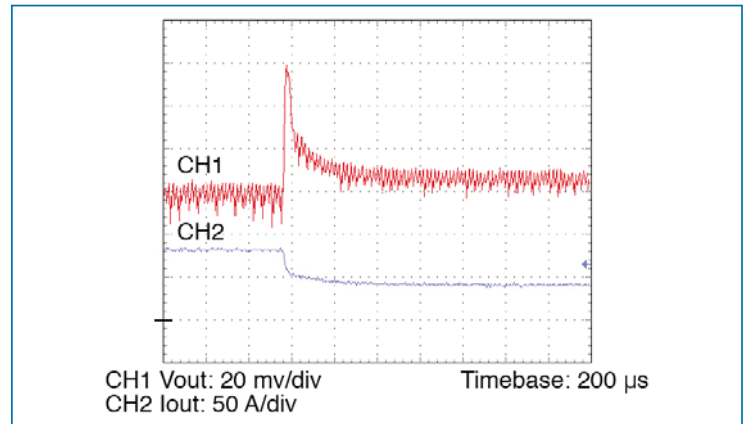


Figure 3-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

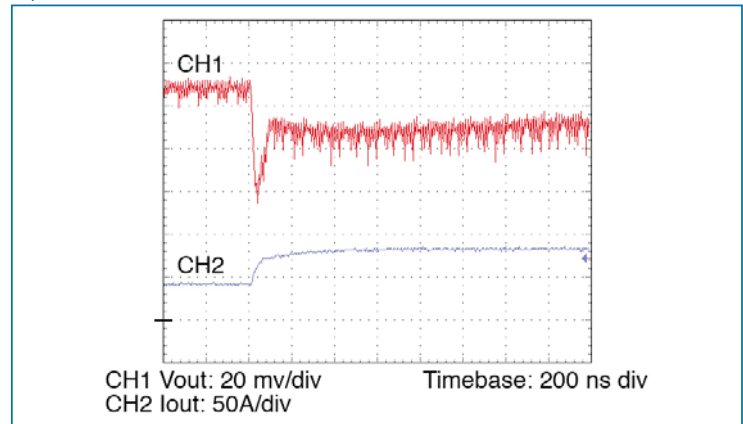


Figure 3-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

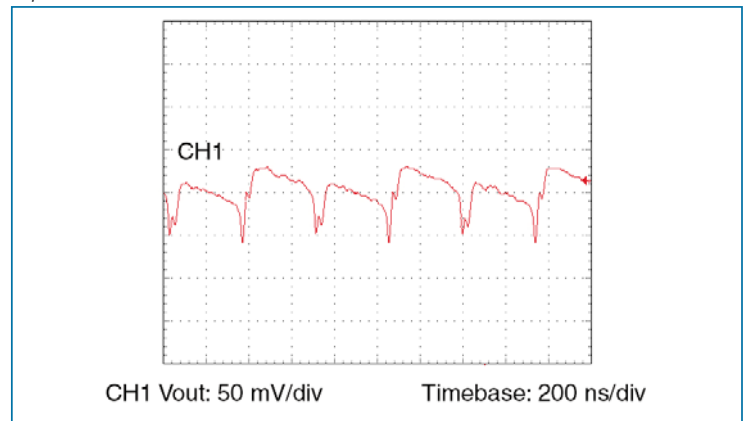


Figure 3-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

## 1.8 Vout, 144 W OPERATING SPECIFICATIONS - (e.g. DC048B018T014FP)

| Parameter                   | Min  | Typ  | Max    | Unit  | Notes                                                        |
|-----------------------------|------|------|--------|-------|--------------------------------------------------------------|
| Efficiency                  | 86   | 89   |        | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |      | 87   | 109    | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 2.33 |      | 2.48   | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |      | 5.5  | 7.6    | Watts | No load                                                      |
| Load regulation             |      | ±0.6 | ±1.5   | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |      |      | 27,000 | µF    | External                                                     |
| Load current                | 0    |      | 80     | Amps  |                                                              |
| Current limit (peak)        | 86.4 | 92   | 104    | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0    | 1.0  | 40     | Amps  | Shut down, may require PC enable to initiate restart         |

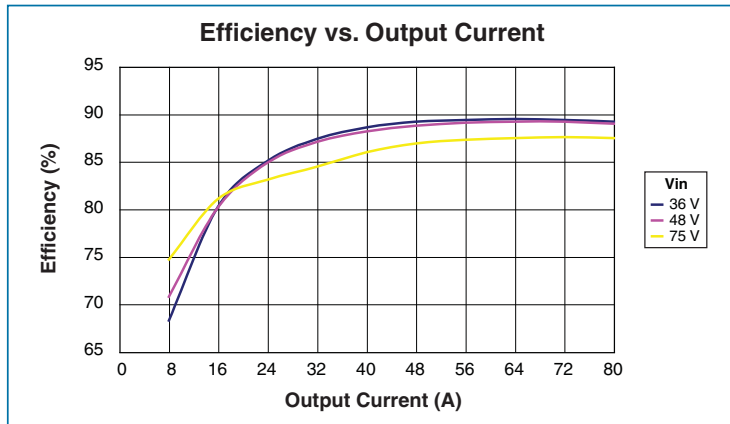


Figure 4-1 – Efficiency vs. load

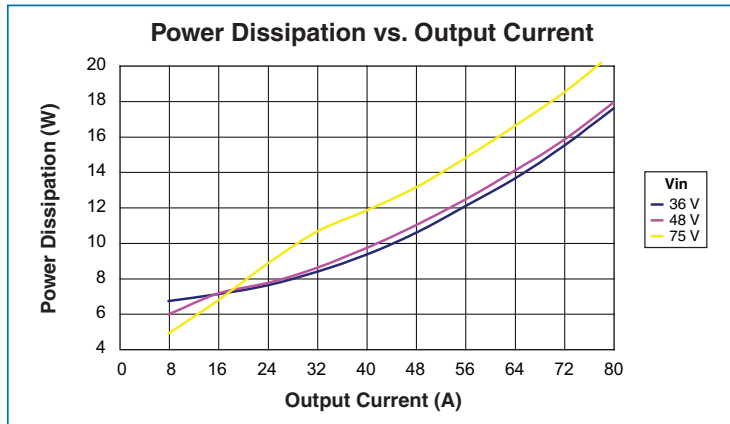


Figure 4-2 – Power dissipation vs. load

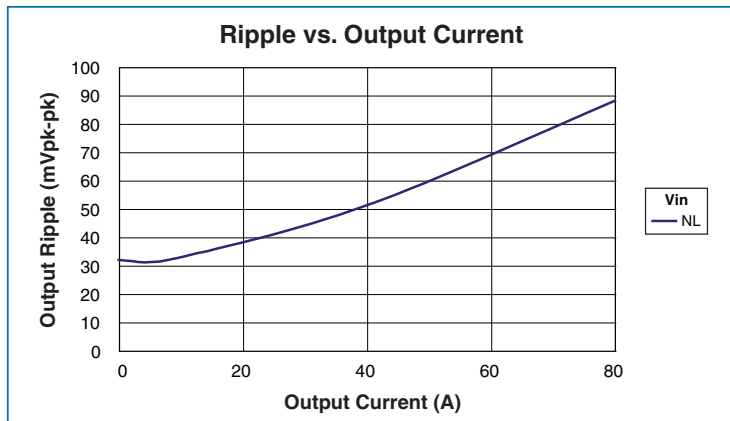


Figure 4-3 – Output ripple vs. load with no external bypass capacitance

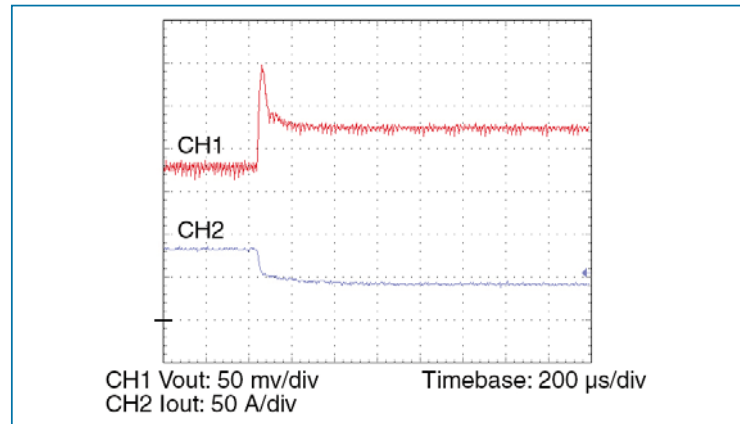


Figure 4-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

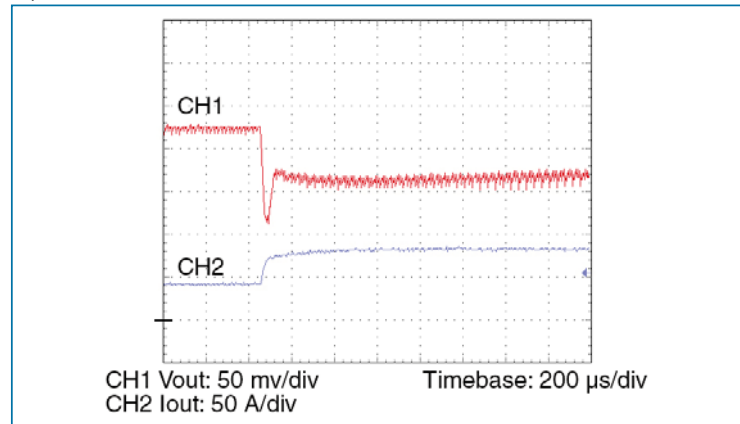


Figure 4-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

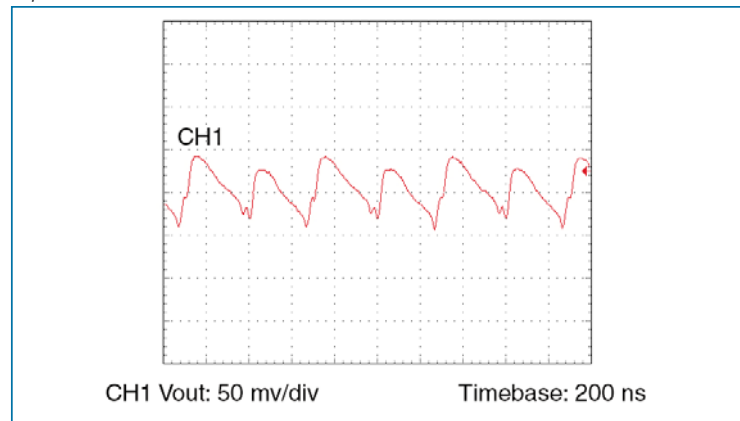


Figure 4-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

## 2.5 Vout, 175 W OPERATING SPECIFICATIONS - (e.g. DC048B025T017FP)

| Parameter                   | Min  | Typ  | Max    | Unit  | Notes                                                        |
|-----------------------------|------|------|--------|-------|--------------------------------------------------------------|
| Efficiency                  | 87   | 90   |        | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |      | 65   | 95     | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 3.5  |      | 3.71   | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |      | 5.5  | 7.6    | Watts | No load                                                      |
| Load regulation             |      | ±0.6 | ±1.5   | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |      |      | 12,000 | µF    | External                                                     |
| Load current                | 0    |      | 70     | Amps  |                                                              |
| Current limit (peak)        | 75.6 | 80.5 | 91     | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0    | 1.0  | 35     | Amps  | Shut down, may require PC enable to initiate restart         |

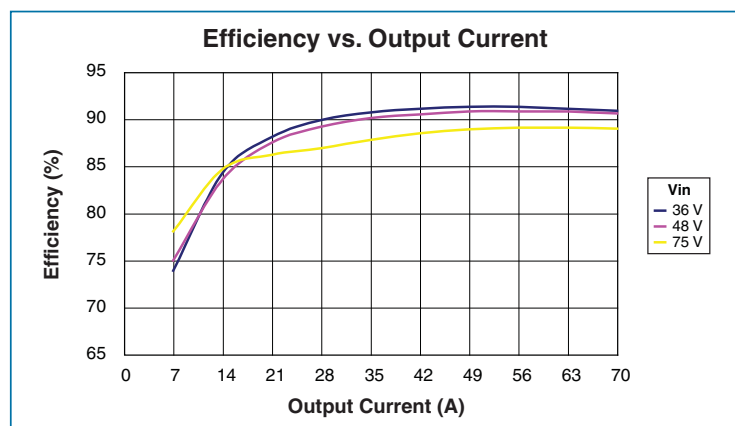


Figure 5-1 – Efficiency vs. load

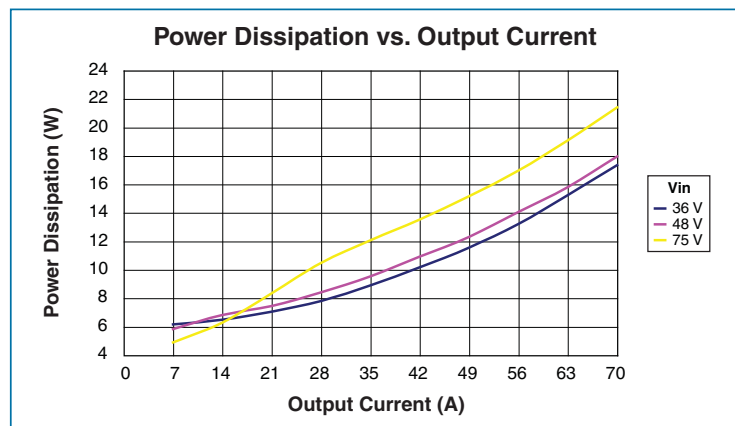


Figure 5-2 – Power dissipation vs. load

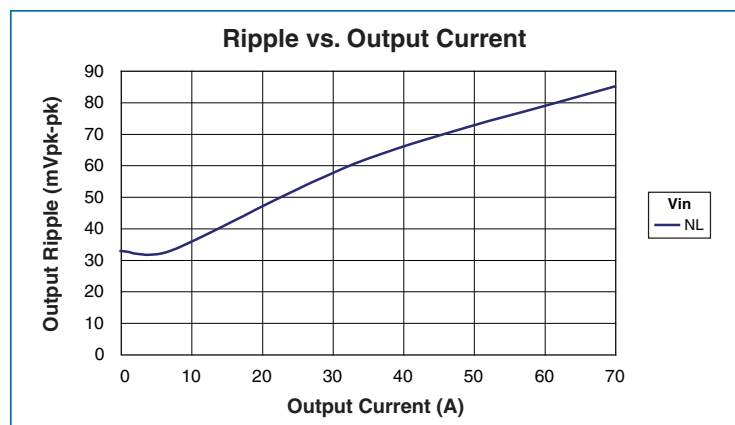


Figure 5-3 – Output ripple vs. load with no external bypass capacitance

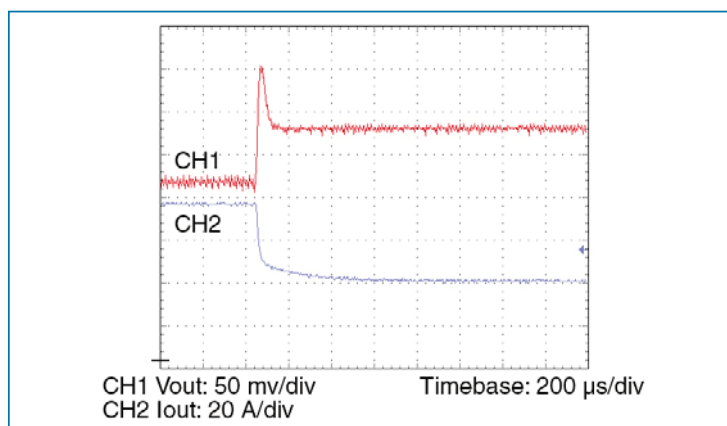


Figure 5-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

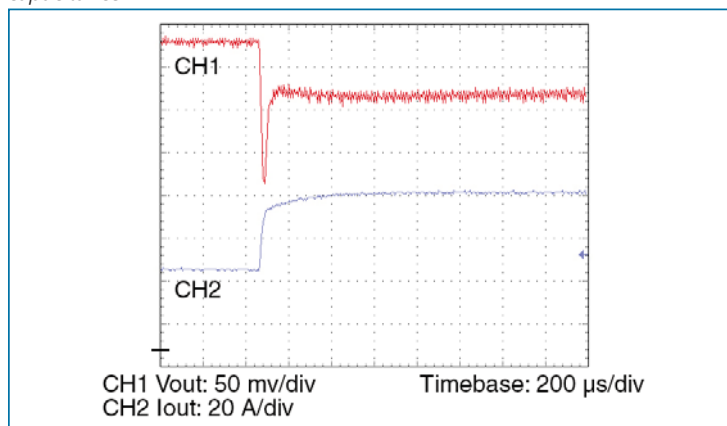


Figure 5-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

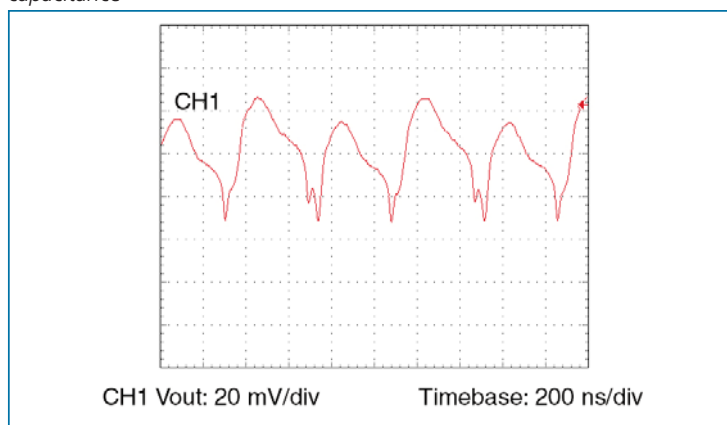


Figure 5-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.



### 3.0 Vout, 180 W OPERATING SPECIFICATIONS - (e.g. DC048B030T018FP)

| Parameter                   | Min  | Typ  | Max    | Unit  | Notes                                                        |
|-----------------------------|------|------|--------|-------|--------------------------------------------------------------|
| Efficiency                  | 88   | 91   |        | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |      | 56   | 90     | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 3.5  |      | 3.71   | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |      | 5.5  | 7.6    | Watts | No load                                                      |
| Load regulation             |      | ±0.6 | ±1.5   | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |      |      | 12,000 | µF    | External                                                     |
| Load current                | 0    |      | 60     | Amps  |                                                              |
| Current limit (peak)        | 64.8 | 69.0 | 78.0   | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0    | 1.0  | 30     | Amps  | Shut down, may require PC enable to initiate restart         |

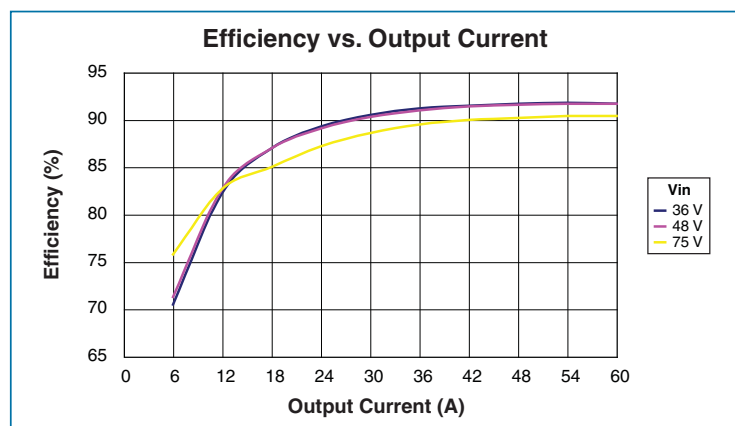


Figure 6-1 – Efficiency vs. load

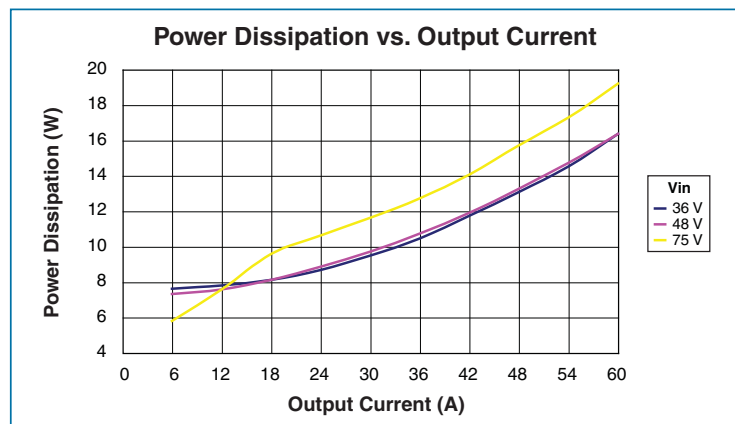


Figure 6-2 – Power dissipation vs. load

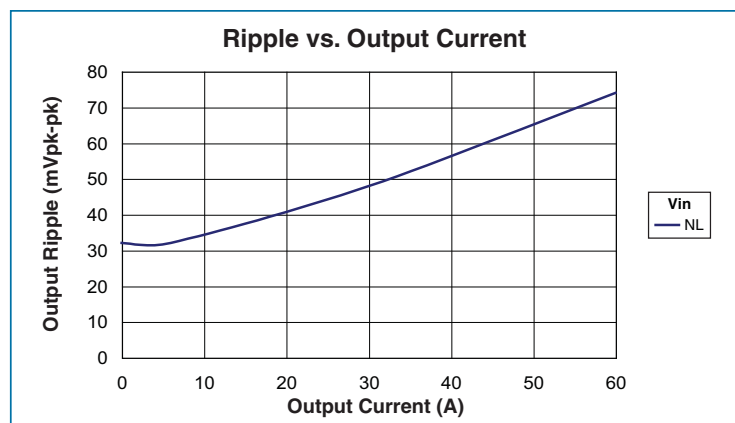


Figure 6-3 – Output ripple vs. load with no external bypass capacitance

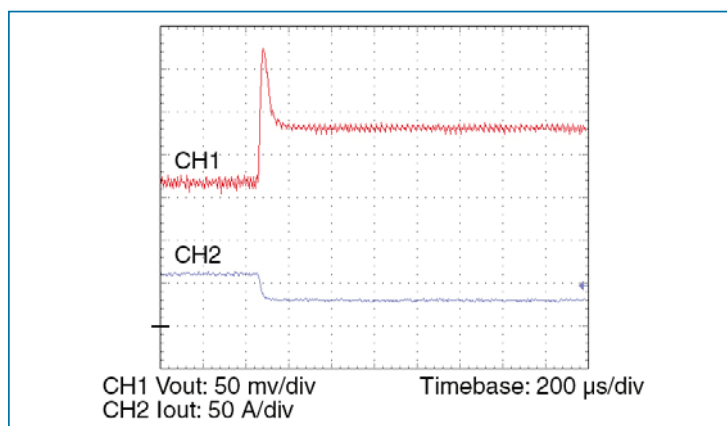


Figure 6-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

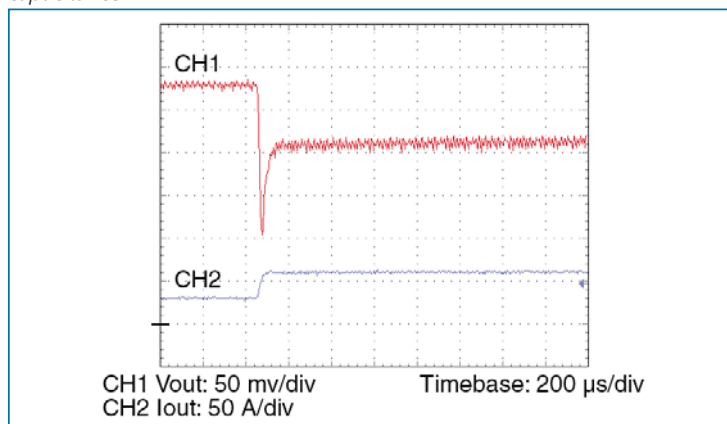


Figure 6-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

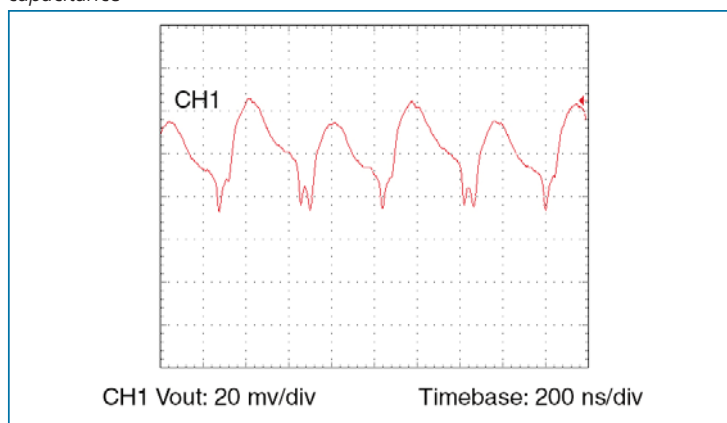


Figure 6-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

### 3.3 Vout, 165 W OPERATING SPECIFICATIONS - (e.g. DC048B033T016FP)

| Parameter                   | Min  | Typ  | Max   | Unit  | Notes                                                        |
|-----------------------------|------|------|-------|-------|--------------------------------------------------------------|
| Efficiency                  | 87   | 91   |       | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |      | 130  | 163   | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 4.67 |      | 4.95  | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |      | 5.5  | 7.6   | Watts | No load                                                      |
| Load regulation             |      | ±0.6 | ±1.5  | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |      |      | 6,700 | µF    | External                                                     |
| Load current                | 0    |      | 50    | Amps  |                                                              |
| Current limit (peak)        | 54.0 | 57.5 | 65    | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0    | 1.0  | 25    | Amps  | Shut down, may require PC enable to initiate restart         |

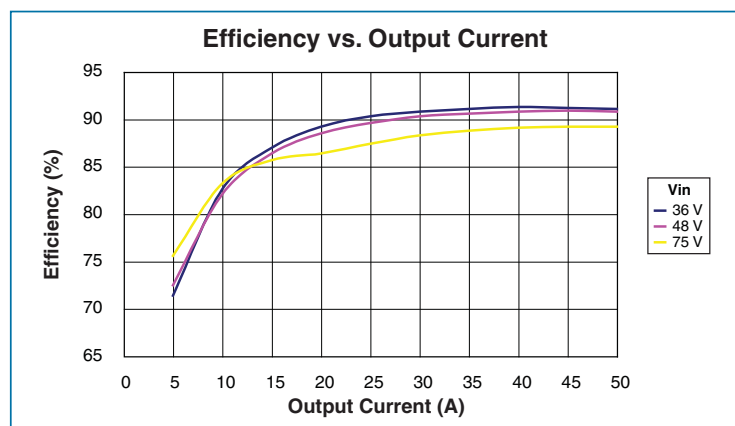


Figure 7-1 – Efficiency vs. load

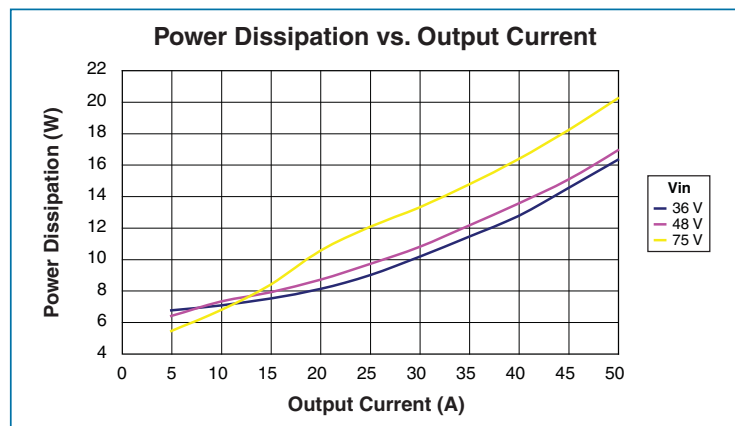


Figure 7-2 – Power dissipation vs. load

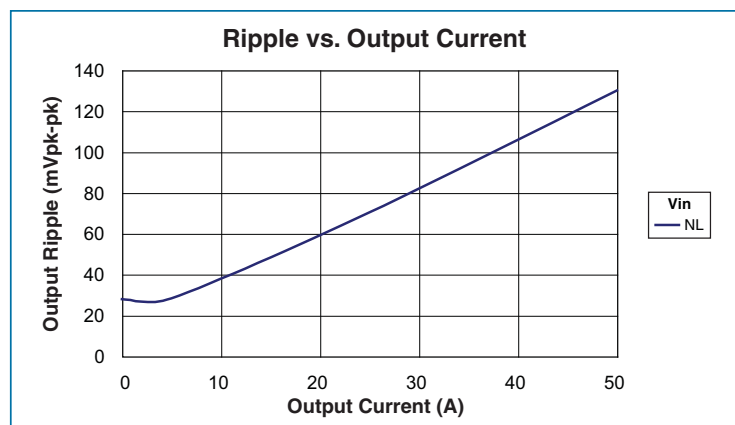


Figure 7-3 – Output ripple vs. load with no external bypass capacitance

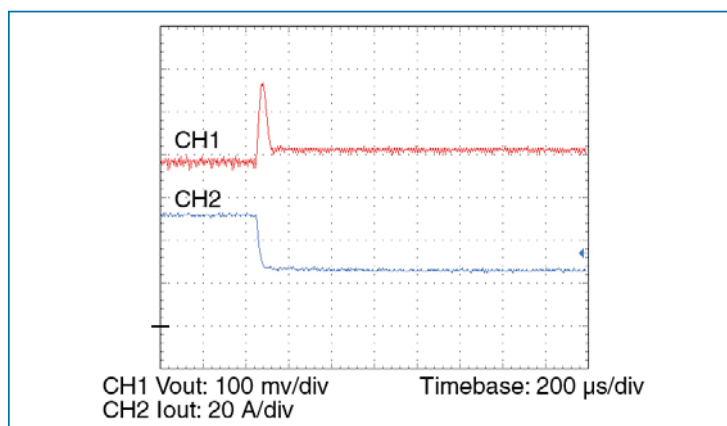


Figure 7-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

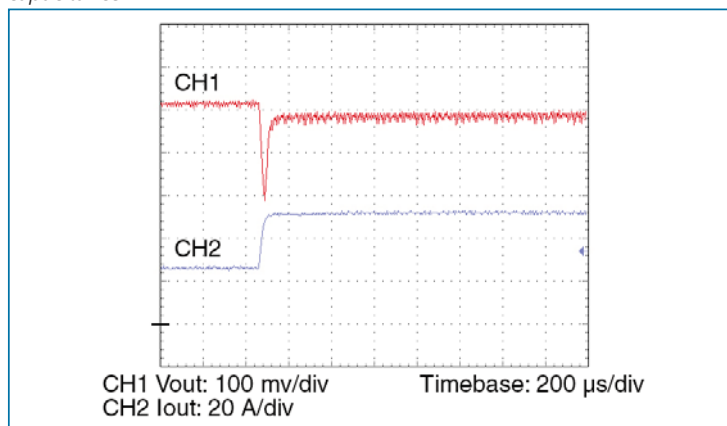


Figure 7-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

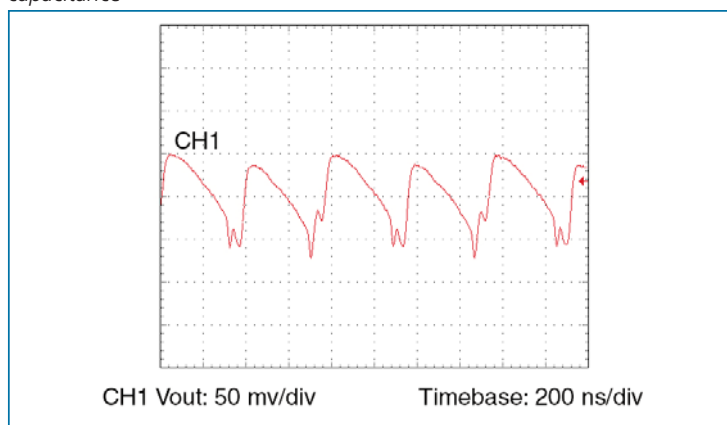


Figure 7-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

## 5.0 Vout, 180 W OPERATING SPECIFICATIONS - (e.g. DC048B050T018FP)

| Parameter                   | Min   | Typ  | Max   | Unit  | Notes                                                        |
|-----------------------------|-------|------|-------|-------|--------------------------------------------------------------|
| Efficiency                  | 88    | 91   |       | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |       | 130  | 165   | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 7.0   |      | 7.43  | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |       | 5.5  | 7.6   | Watts | No load                                                      |
| Load regulation             |       | ±0.6 | ±1.5  | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |       |      | 3,000 | µF    | External                                                     |
| Load current                | 0     |      | 36    | Amps  |                                                              |
| Current limit (peak)        | 38.88 | 41.4 | 46.8  | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0     | 1.0  | 18.0  | Amps  | Shut down, may require PC enable to initiate restart         |

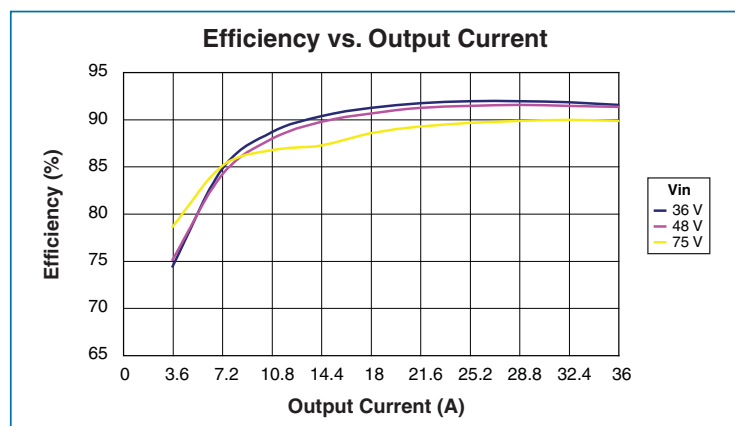


Figure 8-1 – Efficiency vs. load

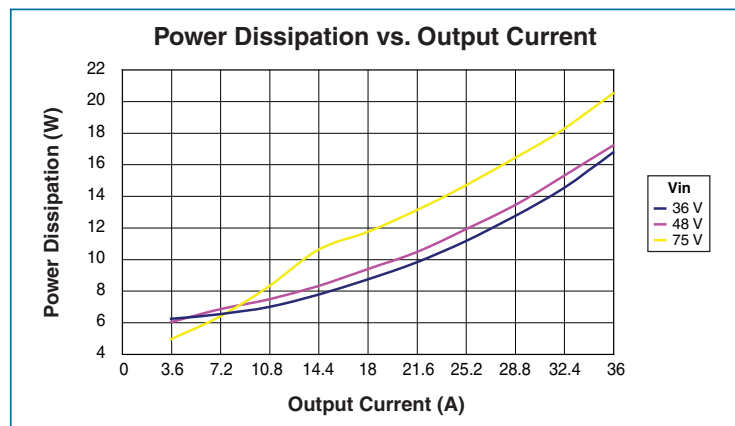


Figure 8-2 – Power dissipation vs. load

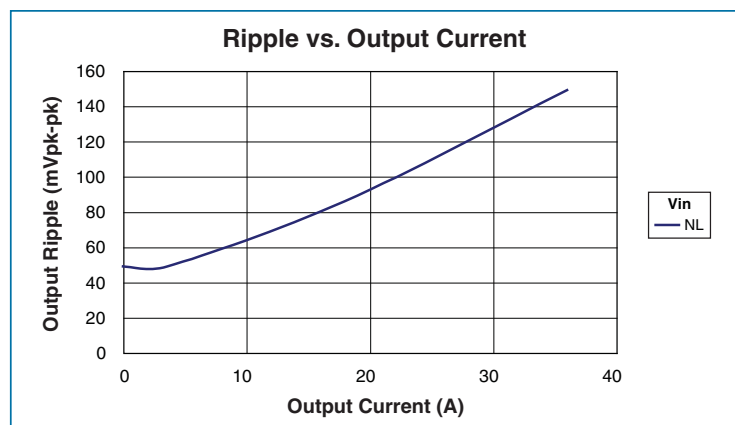


Figure 8-3 – Output ripple vs. load with no external bypass capacitance

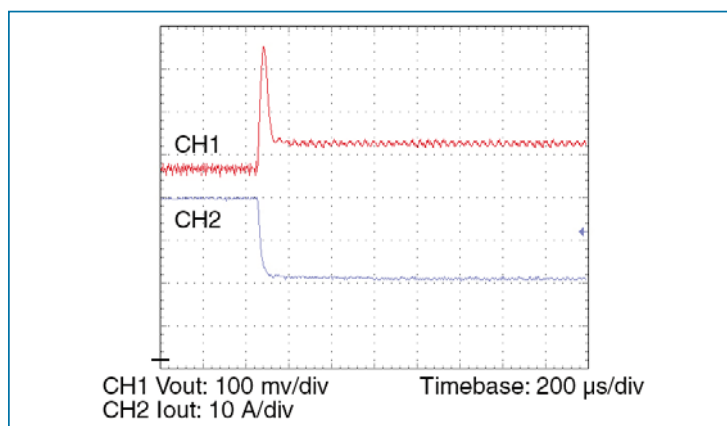


Figure 8-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

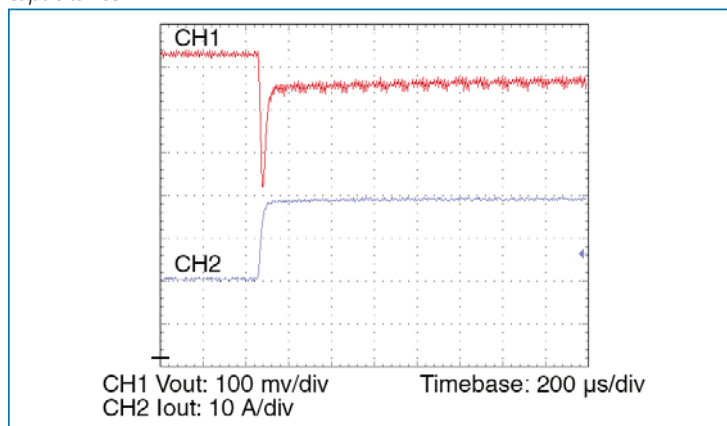


Figure 8-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

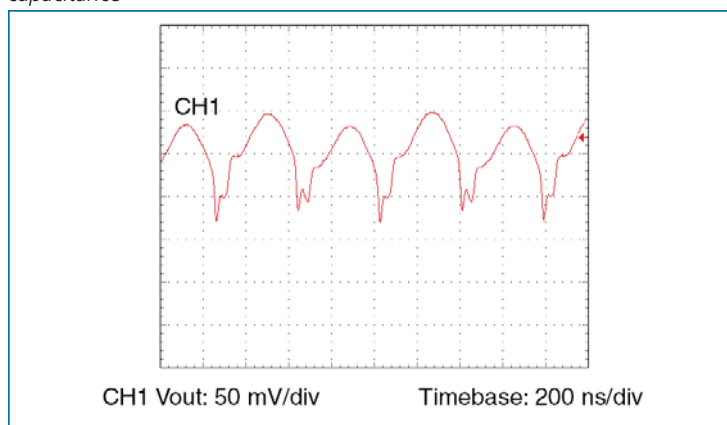


Figure 8-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

## 10 Vout, 180 W OPERATING SPECIFICATIONS - (e.g. DC048B100T018FP)

| Parameter                   | Min   | Typ  | Max   | Unit  | Notes                                                        |
|-----------------------------|-------|------|-------|-------|--------------------------------------------------------------|
| Efficiency                  | 89    | 92   |       | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |       | 80   | 125   | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 14.0  |      | 14.85 | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |       | 5.5  | 7.6   | Watts | No load                                                      |
| Load regulation             |       | ±0.6 | ±1.5  | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |       |      | 750   | µF    | External                                                     |
| Load current                | 0     |      | 18    | Amps  |                                                              |
| Current limit (peak)        | 19.44 | 20.7 | 23.4  | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0     | 1.0  | 9.0   | Amps  | Shut down, may require PC enable to initiate restart         |

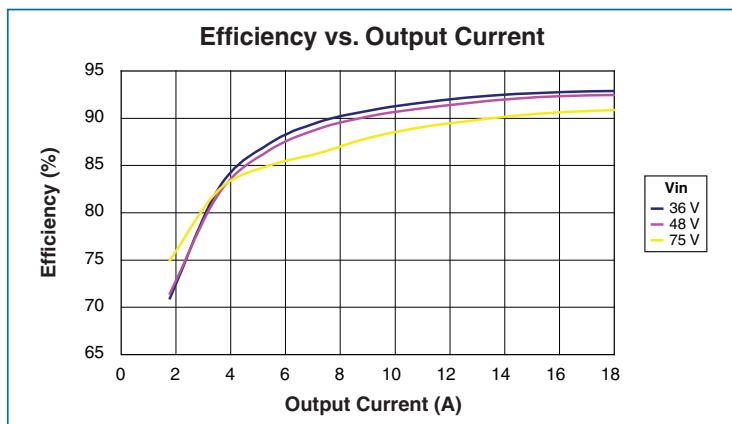


Figure 9-1 – Efficiency vs. load

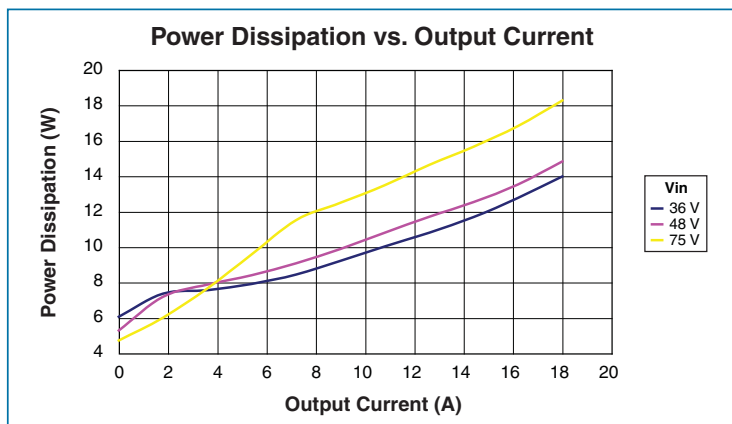


Figure 9-2 – Power dissipation vs. load

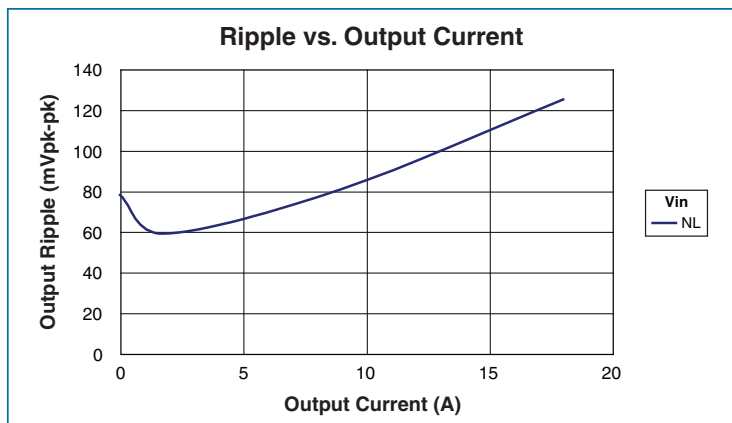


Figure 9-3 – Output ripple vs. load with no external bypass capacitance

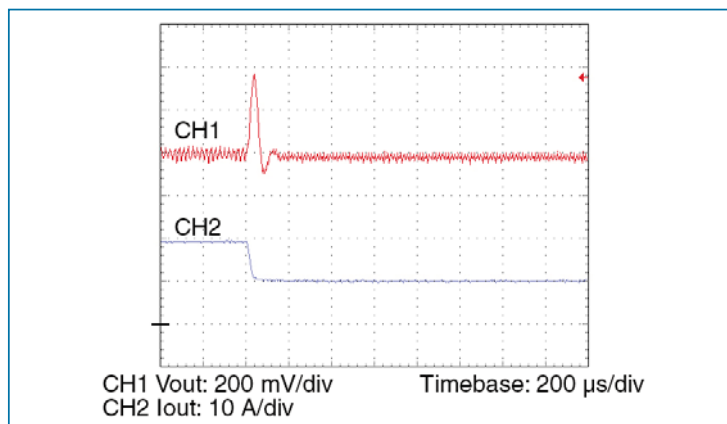


Figure 9-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

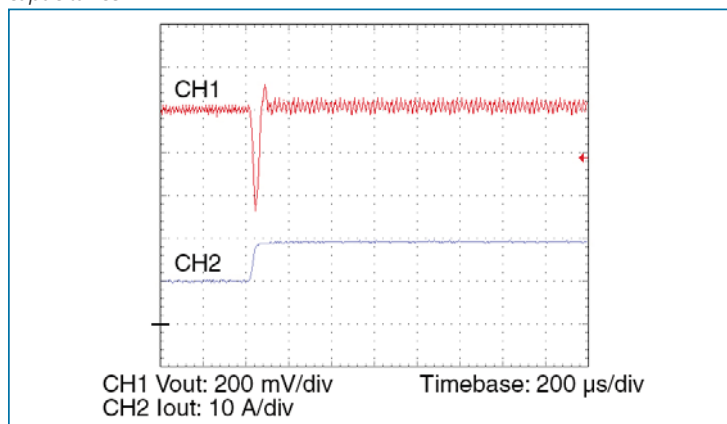


Figure 9-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

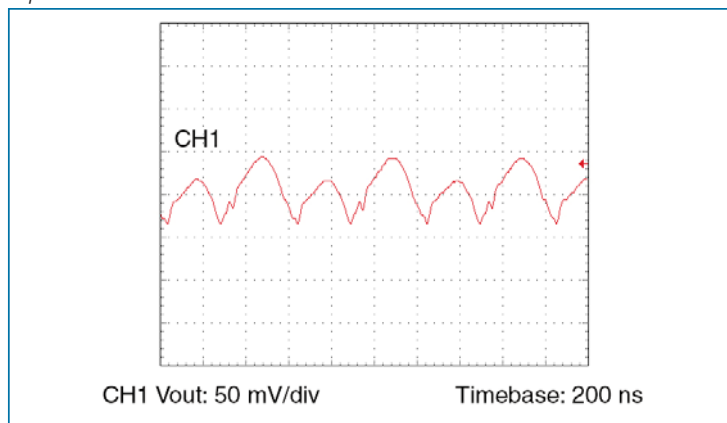


Figure 9-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

## 12 Vout, 220 W OPERATING SPECIFICATIONS - (e.g. DC048B120T022FP)

| Parameter                   | Min   | Typ   | Max   | Unit  | Notes                                                        |
|-----------------------------|-------|-------|-------|-------|--------------------------------------------------------------|
| Efficiency                  | 87    | 92    |       | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |       | 160   | 200   | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 14.0  |       | 14.85 | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |       | 5.5   | 7.6   | Watts | No load                                                      |
| Load regulation             |       | ±0.6  | ±1.5  | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |       |       | 750   | µF    | External                                                     |
| Load current                | 0     |       | 18.33 | Amps  |                                                              |
| Current limit (peak)        | 19.80 | 21.08 | 23.83 | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0     | 1.0   | 9.17  | Amps  | Shut down, may require PC enable to initiate restart         |

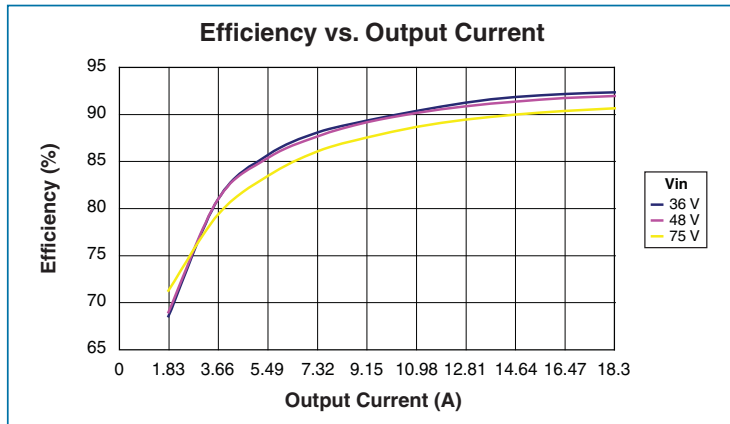


Figure 10-1 – Efficiency vs. load

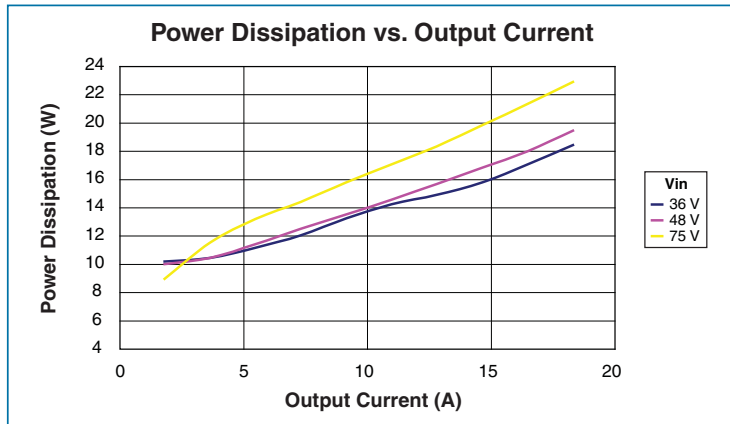


Figure 10-2 – Power dissipation vs. load

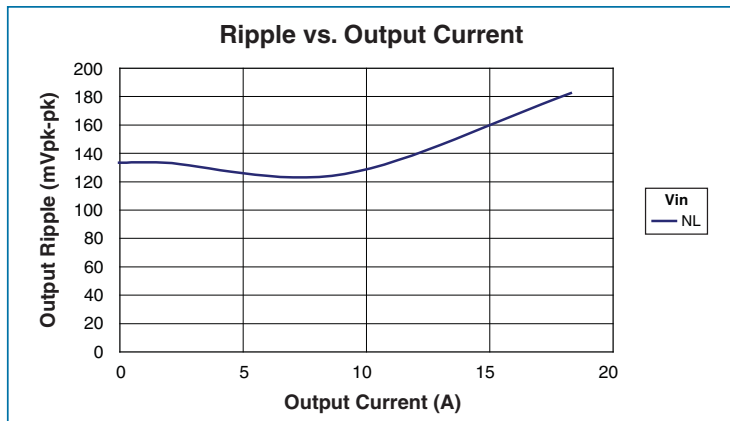


Figure 10-3 – Output ripple vs. load with no external bypass capacitance

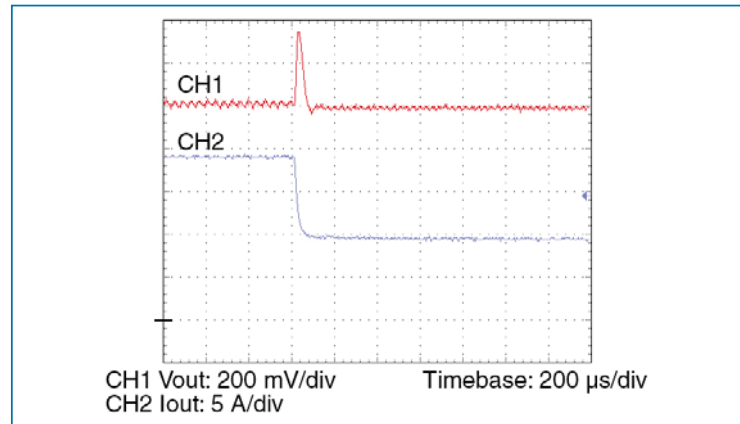


Figure 10-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

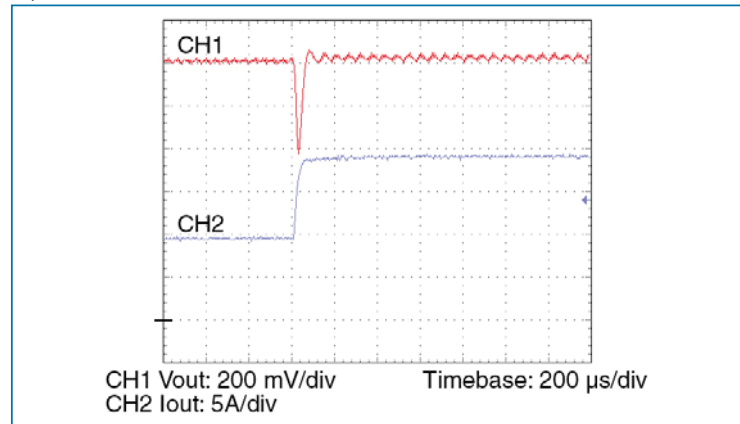


Figure 10-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

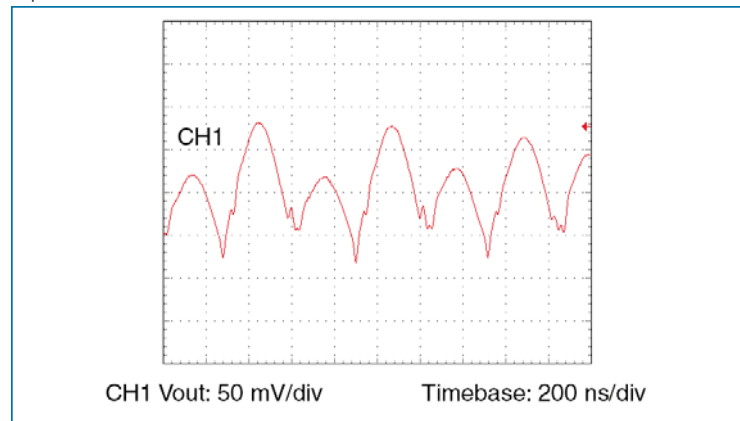


Figure 10-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

## 15 Vout, 200 W OPERATING SPECIFICATIONS - (e.g. DC048B150T020FP)

| Parameter                   | Min   | Typ   | Max   | Unit  | Notes                                                        |
|-----------------------------|-------|-------|-------|-------|--------------------------------------------------------------|
| Efficiency                  | 89    | 92    |       | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |       | 115   | 144   | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 18.67 |       | 19.8  | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |       | 5.5   | 7.6   | Watts | No load                                                      |
| Load regulation             |       | ±0.6  | ±1.5  | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |       |       | 423   | µF    | External                                                     |
| Load current                | 0     |       | 13.33 | Amps  |                                                              |
| Current limit (peak)        | 14.40 | 15.33 | 17.33 | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0     | 1.0   | 6.67  | Amps  | Shut down, may require PC enable to initiate restart         |

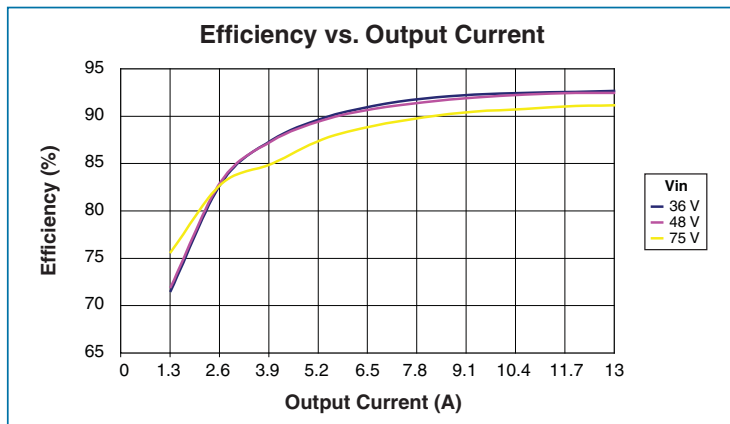


Figure 11-1 – Efficiency vs. load

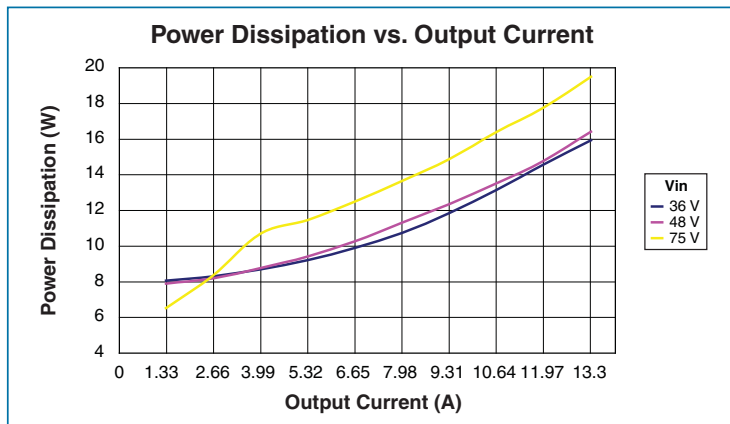


Figure 11-2 – Power dissipation vs. load

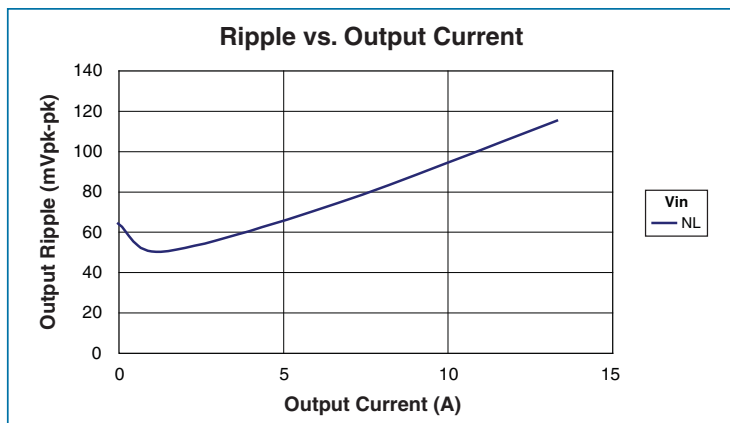


Figure 11-3 – Output ripple vs. load with no external bypass capacitance

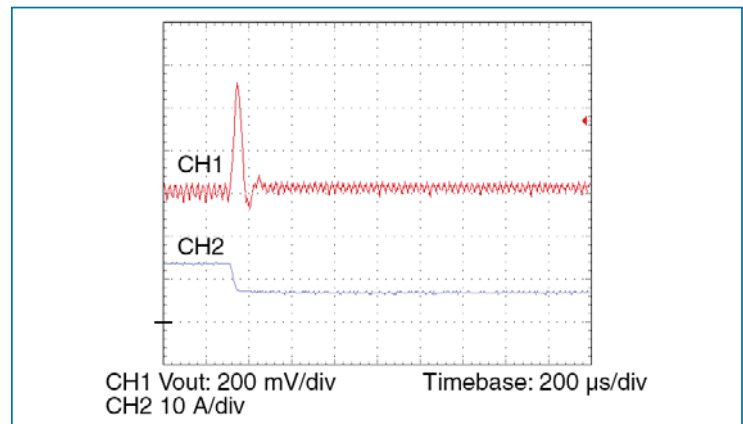


Figure 11-4 – Transient response 100 – 50%, 3 x 4.7 µF ceramic bypass capacitance

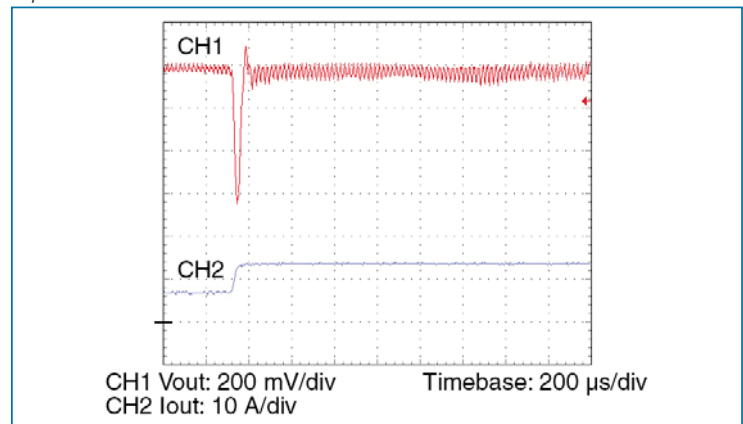


Figure 11-5 – Transient response 50 – 100%, 3 x 4.7 µF ceramic bypass capacitance

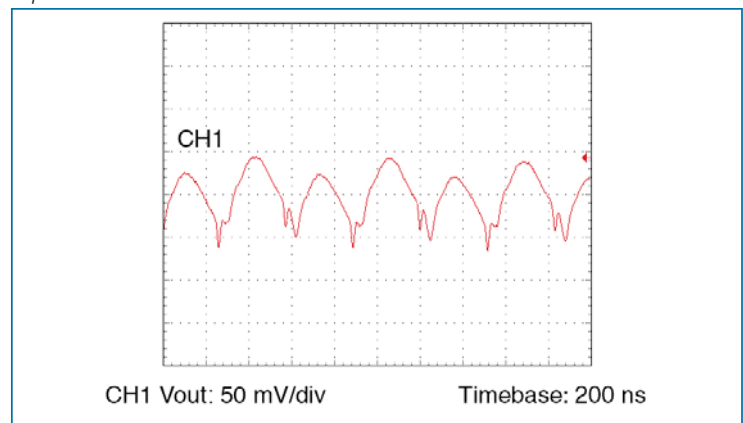


Figure 11-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.



## 24 Vout, 220 W OPERATING SPECIFICATIONS - (e.g. DC048B240T022FP)

| Parameter                   | Min  | Typ   | Max   | Unit  | Notes                                                        |
|-----------------------------|------|-------|-------|-------|--------------------------------------------------------------|
| Efficiency                  | 87   | 92    |       | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |      | 108   | 135   | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 28.0 |       | 29.7  | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |      | 5.5   | 7.6   | Watts | No load                                                      |
| Load regulation             |      | ±0.6  | ±1.5  | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |      |       | 188   | μF    | External                                                     |
| Load current                | 0    |       | 9.17  | Amps  |                                                              |
| Current limit (peak)        | 9.90 | 10.55 | 11.92 | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0    | 1.0   | 4.59  | Amps  | Shut down, may require PC enable to initiate restart         |

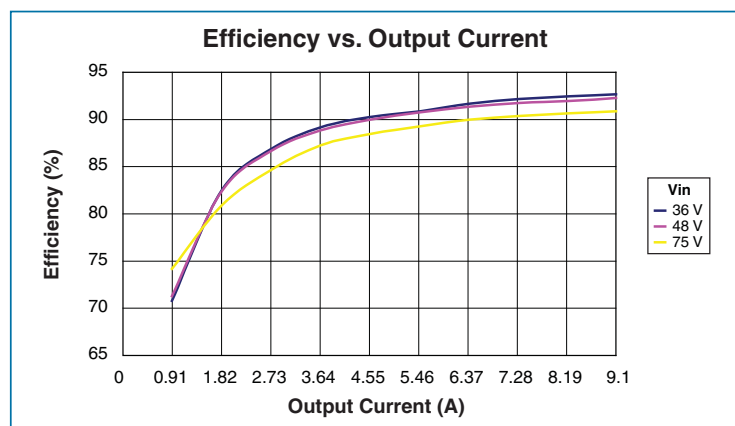


Figure 12-1 – Efficiency vs. load

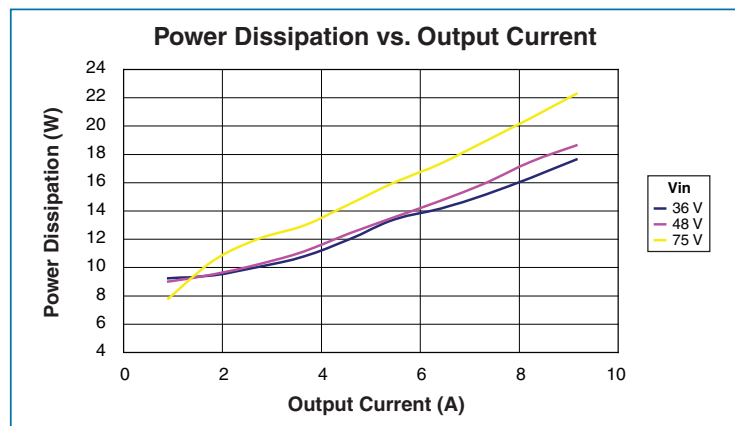


Figure 12-2 – Power dissipation vs. load

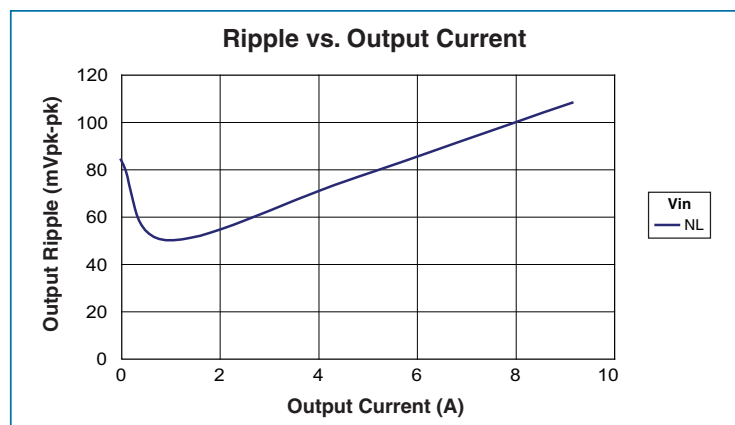


Figure 12-3 – Output ripple vs. load with no external bypass capacitance

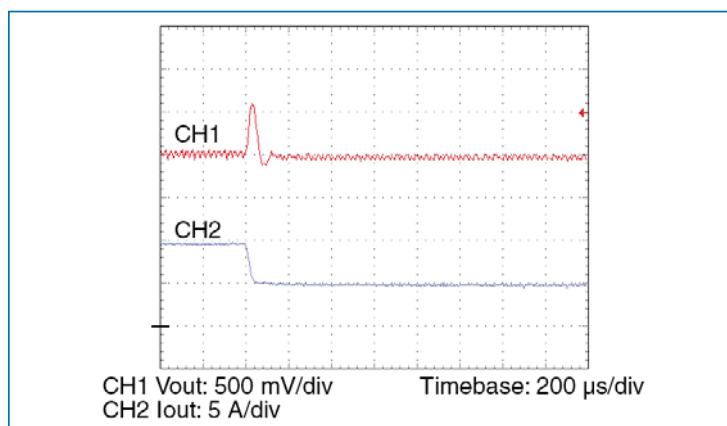


Figure 12-4 – Transient response 100 – 50%, 3 x 4.7 μF ceramic bypass capacitance

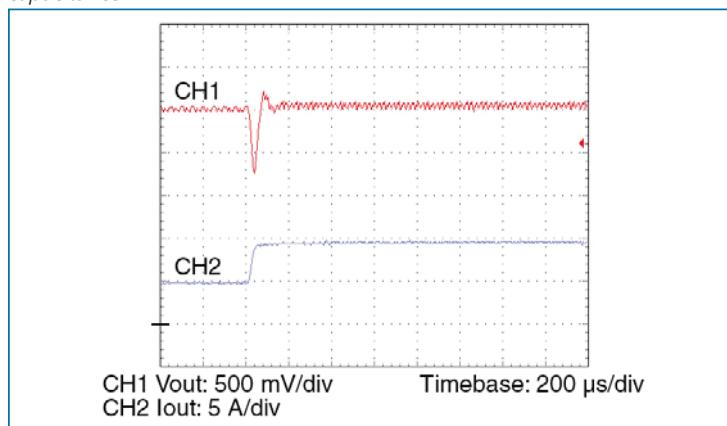


Figure 12-5 – Transient response 50 – 100%, 3 x 4.7 μF ceramic bypass capacitance

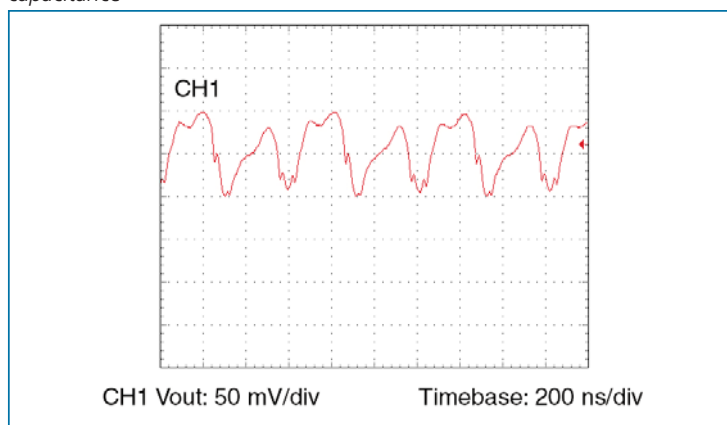


Figure 12-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

## 28 Vout, 190 W OPERATING SPECIFICATIONS - (e.g. DC048B280T019FP)

| Parameter                   | Min   | Typ  | Max  | Unit  | Notes                                                        |
|-----------------------------|-------|------|------|-------|--------------------------------------------------------------|
| Efficiency                  | 89    | 92   |      | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |       | 130  | 163  | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 37.33 |      | 39.6 | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |       | 5.5  | 7.6  | Watts | No load                                                      |
| Load regulation             |       | ±0.6 | ±1.5 | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |       |      | 106  | μF    | External                                                     |
| Load current                | 0     |      | 6.79 | Amps  |                                                              |
| Current limit (peak)        | 7.33  | 7.81 | 8.83 | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0     | 10   | 3.40 | Amps  | Shut down, may require PC enable to initiate restart         |

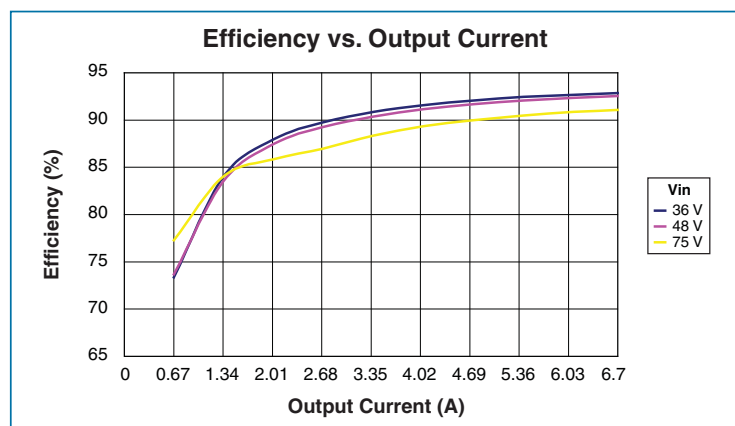


Figure 13-1 – Efficiency vs. load

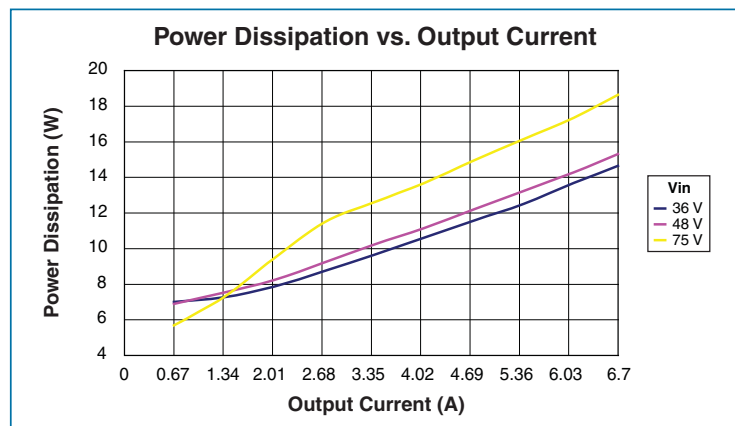


Figure 13-2 – Power dissipation vs. load

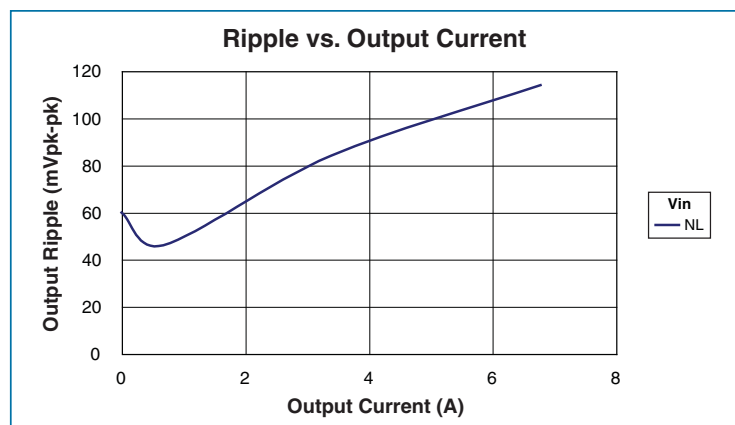


Figure 13-3 – Output ripple vs. load with no external bypass capacitance

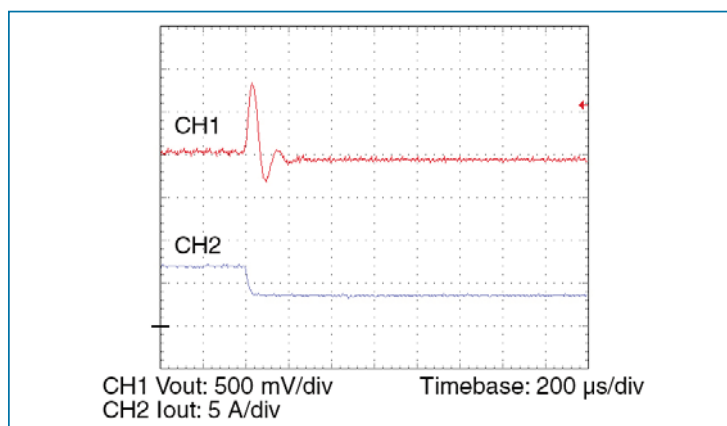


Figure 13-4 – Transient response 100 – 50%, 3 x 4.7 μF ceramic bypass capacitance

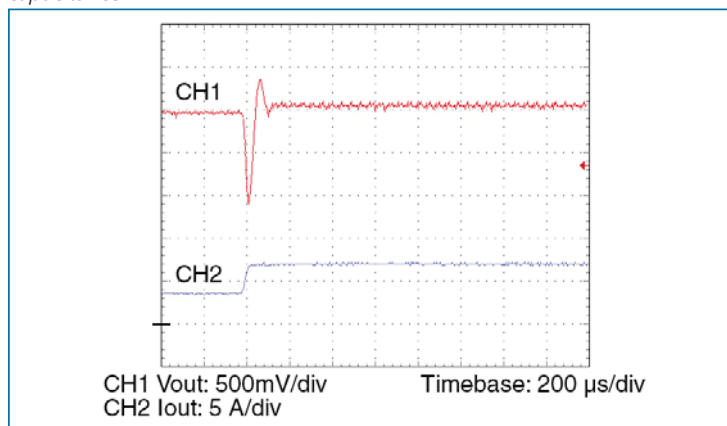


Figure 13-5 – Transient response 50 – 100%, 3 x 4.7 μF ceramic bypass capacitance

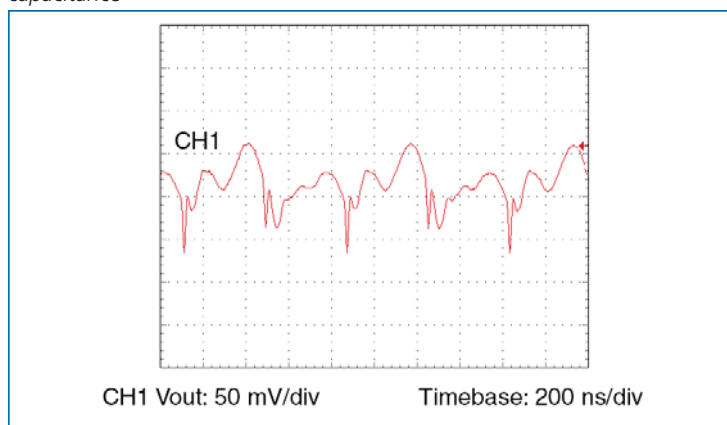


Figure 13-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.



## 48 Vout, 220 W OPERATING SPECIFICATIONS - (e.g. DC048B480T022FP)

| Parameter                   | Min  | Typ  | Max  | Unit  | Notes                                                        |
|-----------------------------|------|------|------|-------|--------------------------------------------------------------|
| Efficiency                  | 90   | 93   |      | %     | Nominal input; full load; 25°C                               |
| Ripple and noise            |      | 160  | 200  | mV    | p-p; Nominal input; full load; 20 MHz bandwidth              |
| Output OVP setpoint         | 56.0 |      | 59.4 | Volts | 25°C; recycle input voltage to restart (1 minute off)        |
| Dissipation, standby        |      | 5.5  | 7.6  | Watts | No load                                                      |
| Load regulation             |      | ±0.6 | ±1.5 | %     | No load to full load; nominal input, deviation from setpoint |
| Output capacitance          |      |      | 47   | μF    | External                                                     |
| Load current                | 0    |      | 4.58 | Amps  |                                                              |
| Current limit (peak)        | 4.95 | 5.27 | 5.95 | Amps  | Shut down, may require PC enable to initiate restart         |
| Short circuit current (avg) | 0    | 1.0  | 2.29 | Amps  | Shut down, may require PC enable to initiate restart         |

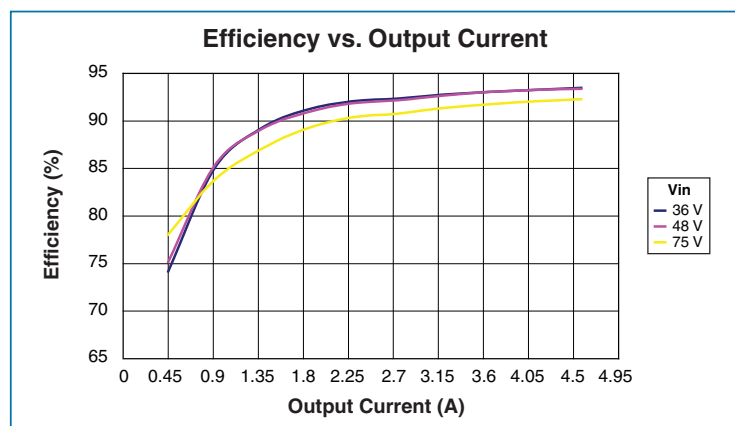


Figure 14-1 – Efficiency vs. load

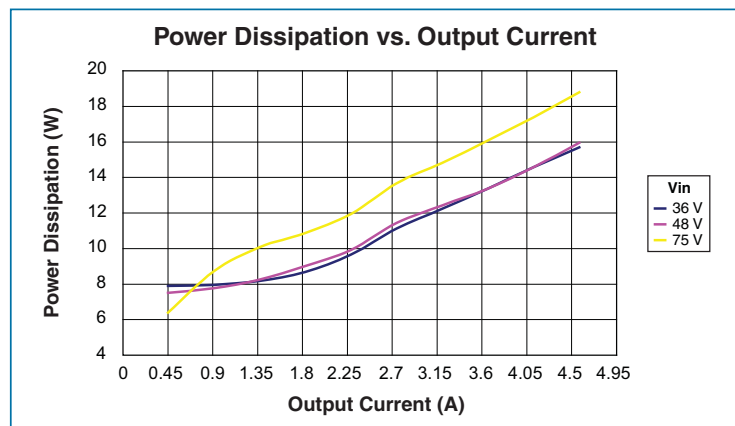


Figure 14-2 – Power dissipation vs. load

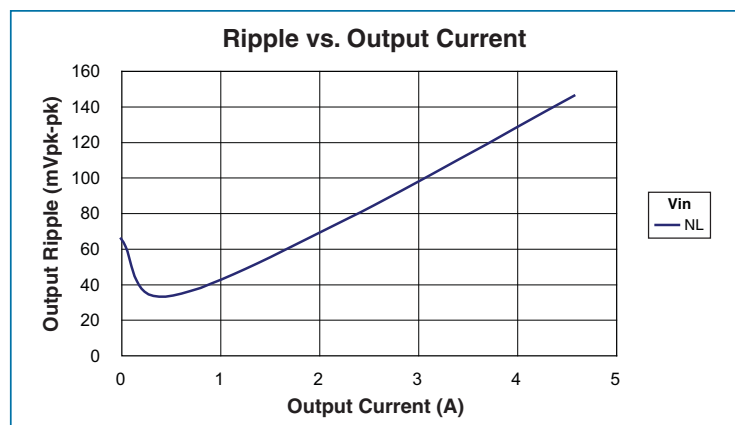


Figure 14-3 – Output ripple vs. load with no external bypass capacitance

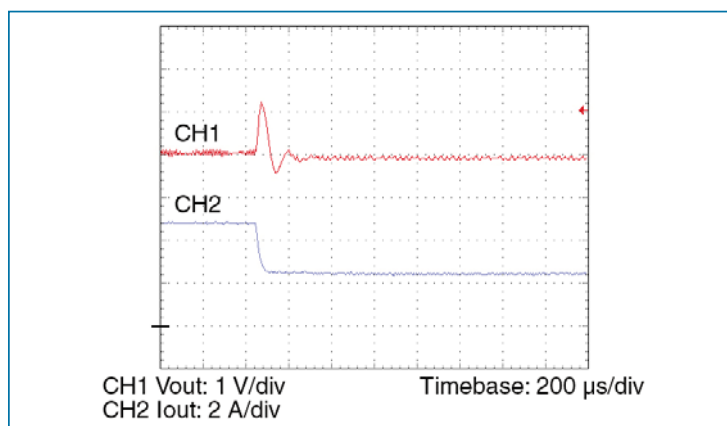


Figure 14-4 – Transient response 100 – 50%, 3 x 4.7 μF ceramic bypass capacitance

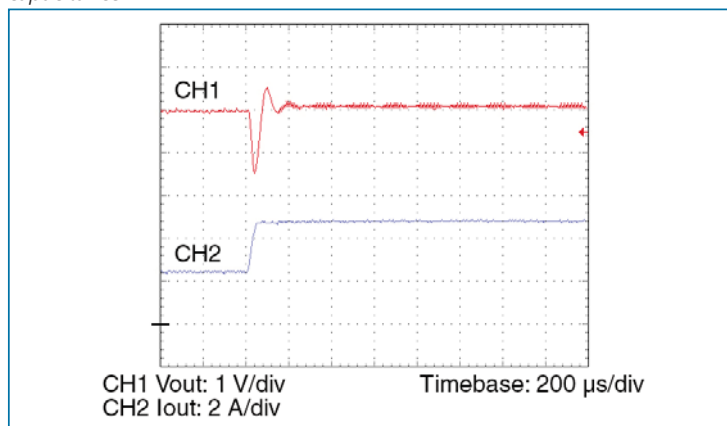


Figure 14-5 – Transient response 50 – 100%, 3 x 4.7 μF ceramic bypass capacitance

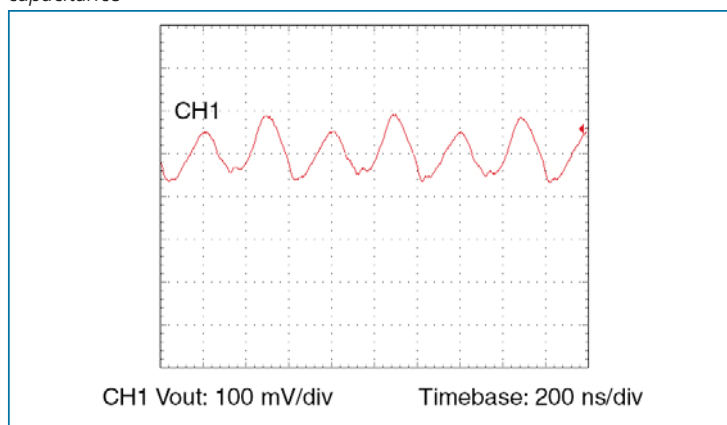


Figure 14-6 – Output voltage ripple at nominal line and full load with no external bypass capacitance.

+In / -In DC Voltage Ports

The maximum input voltage should not be exceeded. The modules have internal over / undervoltage lockout functions that prevent operation outside of the specified input range. They will turn on when the input voltage rises above its undervoltage lockout. If the input voltage exceeds the overvoltage lockout, the module will shut down until the overvoltage fault clears. PC will toggle indicating an out of bounds condition.

PC – Primary Control

The output voltage is enabled when the PC pin is open circuit (floating). To disable the module's output voltage, the PC pin is pulled low (referenced to -IN). Open collector optocouplers, transistors, or relays can be used to control the PC pin. During an abnormal condition the PC pin will pulse (Figure 17) as the module initiates a restart cycle. This will continue until the abnormal condition is rectified. The PC pin should not be used as an auxiliary voltage supply, nor should it be switched at a rate greater than 1 Hz.

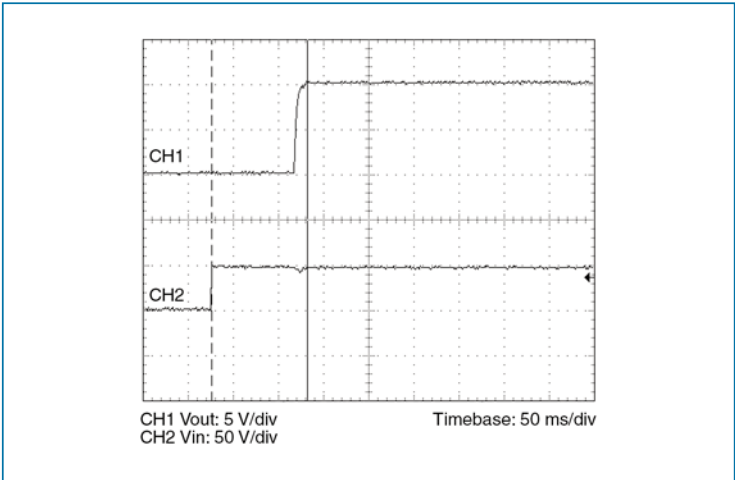


Figure 15 — Nominal line full load, turn on delay, Vin vs. Vout

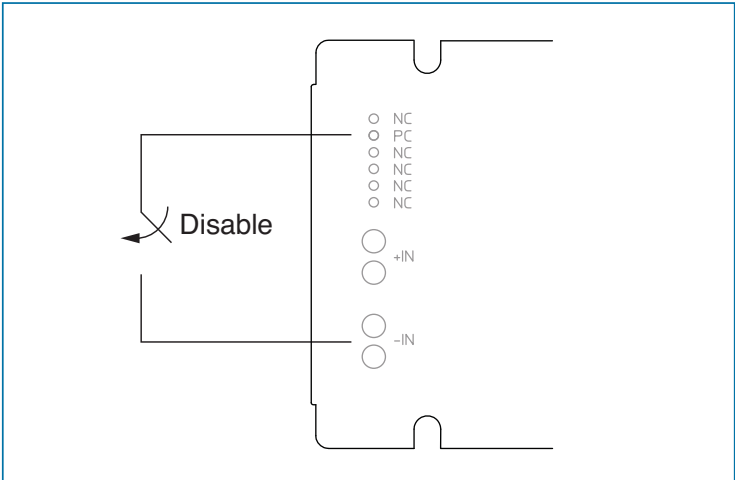


Figure 16 — Module enable/disable.

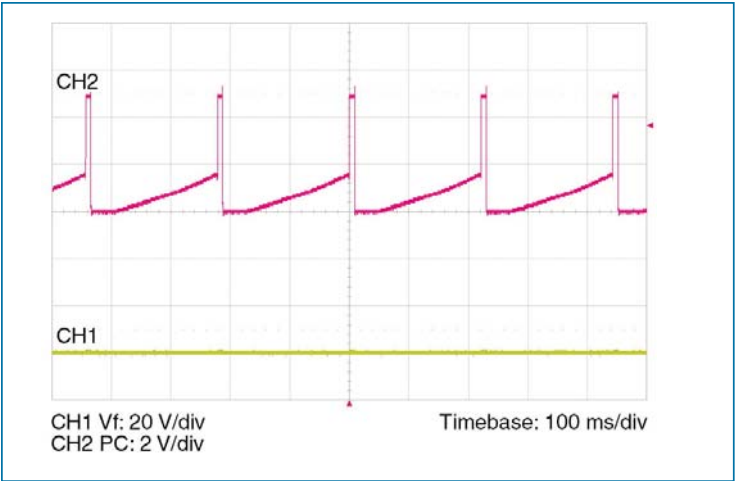


Figure 17 — PC module alarm logic

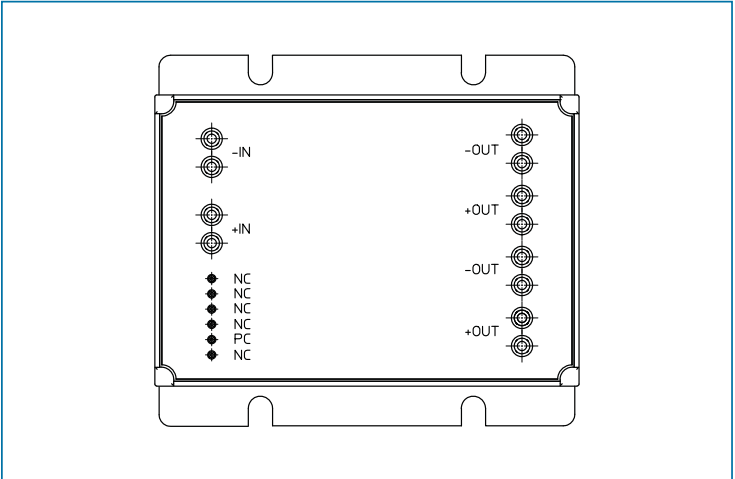
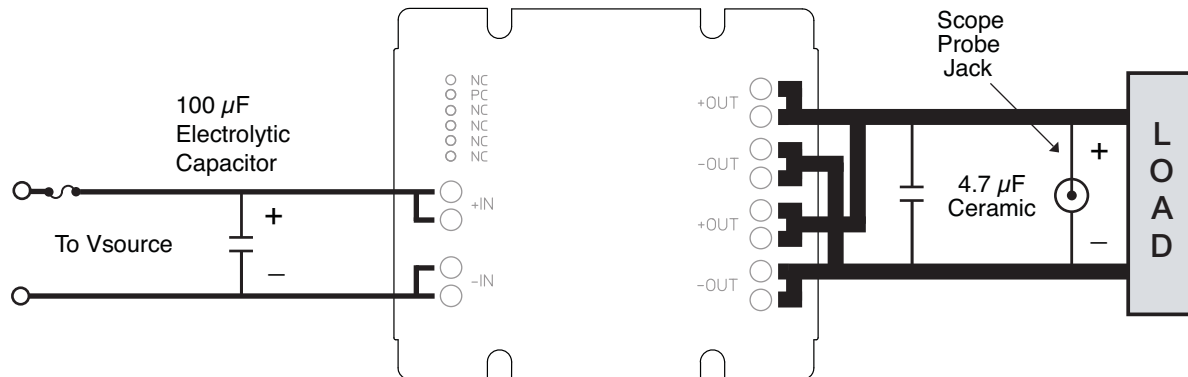


Figure 18 — Pin configuration (as viewed from pin side)



For agency approvals and fusing conditions, click on the link below:

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Figure 19 — Test set-up diagram for input and output ripple.

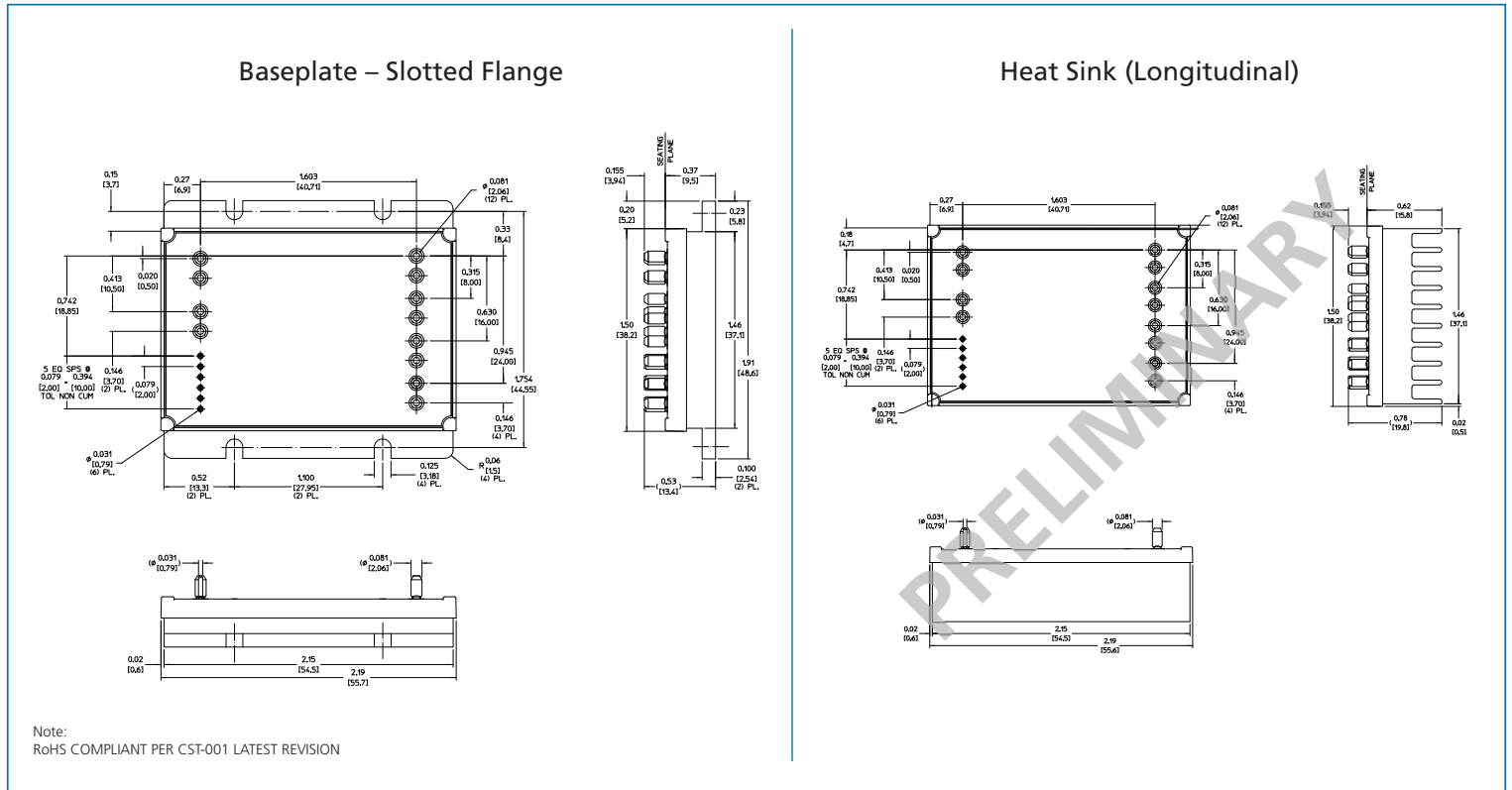


Figure 20 — Module outline

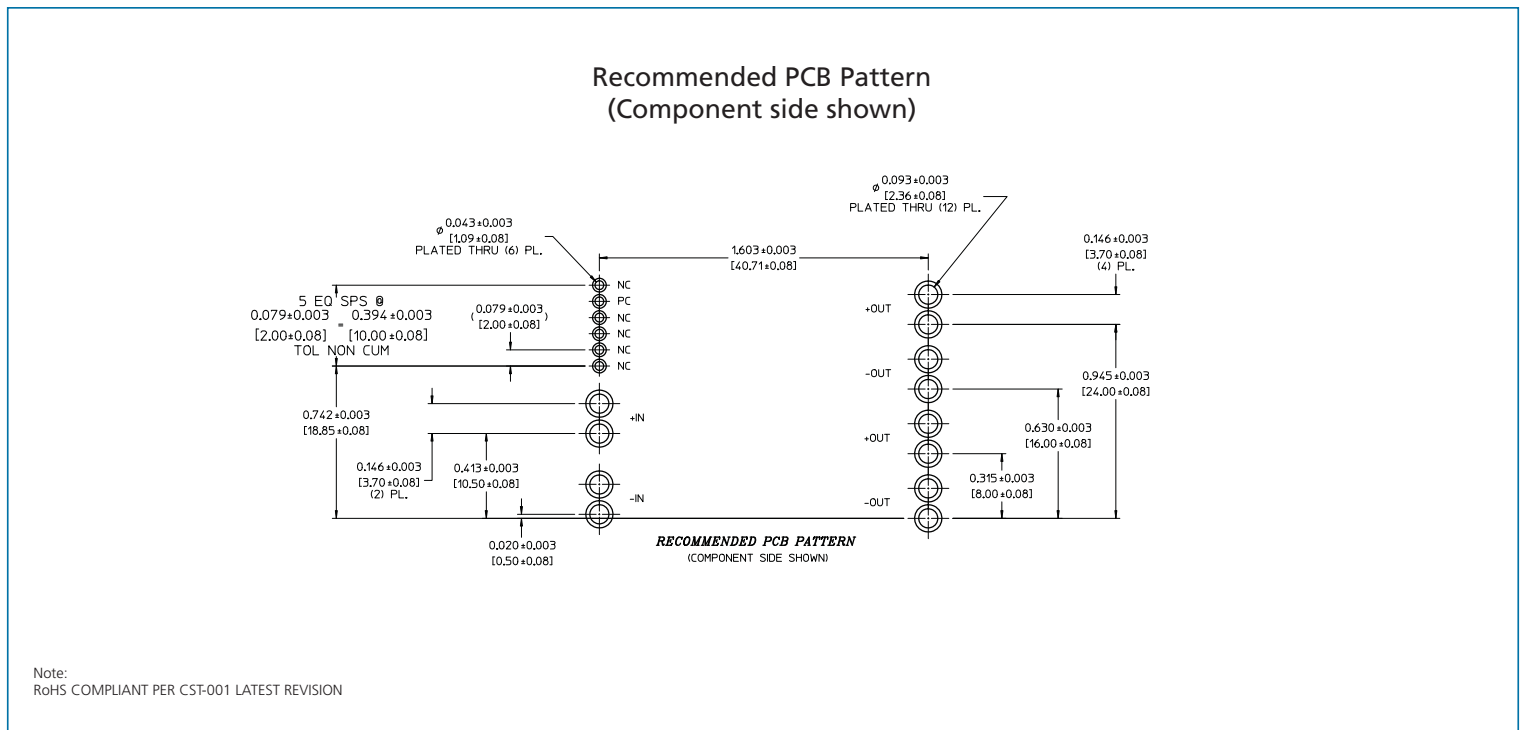


Figure 21 — PCB mounting specifications

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