intronics®
1400 PROVIDENCE HIGHWAY • BUILDING 2
NORWOOD, MASSACHUSETTS 02062-5015
WWW.INTRONICS.COM


# W30 Series DC/DC MODULES

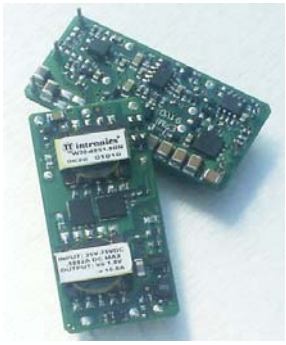
## Applications

- Servers, Switches and Data Storage
- Networking Gear
- Wireless Communications
- Data Communications
- Distributed Power Architecture
- Telecommunications
- Semiconductor Test Equipment
- Industrial / Medical

The W30 Family of high efficiency DC/DC converters offer power levels of up to 30 Watts, exceeding that of other products with the same Industry-Standard Pinouts, while providing much smaller footprints. With a wide input voltage range and single outputs, ranging from 1.5 to 15 Volts, these converters provide versatility without sacrificing the board space. All models feature an input filter and microcontroller-based protection features. The open frame construction allows very efficient heat transfer with no hot spots. All converters combine creative design practices with highly derated power devices to achieve superior efficiencies (up to 94%), reliability, high performance and low cost solution to systems designers.

## Specifications & Features Summary

- No minimum load required
- On/Off pin control
- -40°C to +85°C ambient operation
- Output adjustment +/-10% range
- 1500V, 10MΩ input-to-output isolation
- Output overcurrent protection
- Input Under voltage protection
- Input Over voltage protection
- Synchronous rectification topology
- MTBF of up to 1,000,000 hours @ 50°C (Bellcore)
- Over Voltage protection
- Over Temperature protection
- Please add suffix "A" or "B", depending on Pinout
- Please add suffix "N" for Negative Logic
- Delivers up to 30W in 1" x 2" package with Industry-Standard Pinouts
- UL 60950 pending, TUV EN60950 and CSA C22.2 No. (Pending)



| Model | Input Voltage Range (Vin) | Iin No Load | I in Full Load (A) | Output Voltage (Vo) | Output Current (Io) A | Eff (Typ) % | Regulation Line/Load (%) | Ripple / Noise (MV) pk-pk |
|---|---|---|---|---|---|---|---|---|
| W30-12S1.5 | 9-18 | 0.030 | 2.0 | 1.5 | 10.0 | 83 | ±0.2 / ±0.2 | 15 |
| W30-12S1.8 | 9-18 | 0.035 | 2.38 | 1.8 | 10.0 | 84 | ±0.3 / ±0.2 | 15 |
| W30-12S2.5 | 9-18 | 0.040 | 3.26 | 2.5 | 10.0 | 85 | ±0.2 / ±0.2 | 15 |
| W30-12S3.3 | 9-18 | 0.040 | 3.26 | 3.3 | 8.0 | 90 | ±0.2 / ±0.2 | 20 |
| W30-12S5 | 9-18 | 0.050 | 3.66 | 5.0 | 6.0 | 91 | ±0.2 / ±0.2 | 20 |
| W30-12S12 | 9-18 | 0.050 | 3.58 | 12.0 | 2.5 | 93 | ±0.2 / ±0.2 | 50 |
| W30-12S15 | 9-18 | 0.050 | 3.54 | 15.0 | 2.0 | 94 | ±0.2 / ±0.2 | 50 |
| U30-12S1.5 | 9-36 | 0.030 | 2.05 | 1.5 | 10.0 | 81 | ±0.2 / ±0.2 | 15 |
| U30-12S1.8 | 9-36 | 0.035 | 2.44 | 1.8 | 10.0 | 82 | ±0.3 / ±0.2 | 15 |
| U30-12S2.5 | 9-36 | 0.040 | 3.30 | 2.5 | 10.0 | 84 | ±0.2 / ±0.2 | 15 |
| U30-12S3.3 | 9-36 | 0.040 | 3.35 | 3.3 | 8.0 | 88 | ±0.2 / ±0.2 | 20 |
| U30-12S5 | 9-36 | 0.050 | 3.75 | 5.0 | 6.0 | 89 | ±0.2 / ±0.2 | 20 |
| U30-12S12 | 9-36 | 0.050 | 3.70 | 12.0 | 2.5 | 90 | ±0.2 / ±0.2 | 50 |
| U30-12S15 | 9-36 | 0.050 | 3.66 | 15.0 | 2.0 | 91 | ±0.2 / ±0.2 | 50 |
| W30-24S1.5 | 18-36 | 0.025 | 1.00 | 1.5 | 10.0 | 83 | ±0.2 / ±0.2 | 15 |
| W30-24S1.8 | 18-36 | 0.028 | 1.19 | 1.8 | 10.0 | 84 | ±0.3 / ±0.2 | 15 |
| W30-24S2.5 | 18-36 | 0.032 | 1.63 | 2.5 | 10.0 | 85 | ±0.2 / ±0.2 | 15 |
| W30-24S3.3 | 18-36 | 0.035 | 1.63 | 3.3 | 8.0 | 90 | ±0.2 / ±0.2 | 20 |
| W30-24S5 | 18-36 | 0.040 | 1.83 | 5.0 | 6.0 | 91 | ±0.2 / ±0.2 | 20 |
| W30-24S12 | 18-36 | 0.050 | 1.81 | 12.0 | 2.5 | 92 | ±0.2 / ±0.2 | 50 |
| W30-24S15 | 18-36 | 0.050 | 1.79 | 15.0 | 2.0 | 93 | ±0.2 / ±0.2 | 50 |
| W30-48S1.5 | 36 - 75 | 0.025 | .490 | 1.5 | 10.0 | 85 | ±0.2 / ±0.2 | 15 |
| W30-48S1.8 | 36 - 75 | 0.028 | .581 | 1.8 | 10.0 | 86 | ±0.3 / ±0.2 | 15 |
| W30-48S2.5 | 36 - 75 | 0.032 | .789 | 2.5 | 10.0 | 88 | ±0.2 / ±0.2 | 15 |
| W30-48S3.3 | 36 - 75 | 0.035 | .808 | 3.3 | 8.0 | 91 | ±0.2 / ±0.2 | 20 |
| W30-48S5 | 36 - 75 | 0.040 | .905 | 5.0 | 6.0 | 92 | ±0.2 / ±0.2 | 20 |
| W30-48S12 | 36 - 75 | 0.050 | .896 | 12.0 | 2.5 | 93 | ±0.2 / ±0.2 | 50 |
| W30-48S15 | 36 - 75 | 0.050 | .886 | 15.0 | 2.0 | 94 | ±0.2 / ±0.2 | 50 |

FOR POTTED UNITS AND OTHER AVAILABLE VOLTAGES AND FEATURES PLEASE CONSULT THE FACTORY

| PARAMETER | NOTES | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|
| Absolute maximum rating | | | | | |
| Input voltage | | 0 | | 75 | V |
| Operating ambient temperature | (see thermal charts) | -40 | | 85 | °C |
| Storage temperature | | -55 | | 125 | °C |
| Humidity | | | | 95 | % |
| **Input characteristics** | | | | | |
| Operating input voltage range | 9-18V,9-36V,18-36V, 36-75V | xx | xx | xx | V |
| Turn on voltage threshold | | 17/35 | | | V |
| Turn off voltage threshold | | | | 16/34 | V |
| Transient withstand | Transient duration: 100ms | | | 100 | V |
| Maximum input current | 100% load , 18Vin | | | 1.830 | A |
| Off converter input current | | | | 10 | mA |
| **Output characteristics** | | | | | |
| Output voltage setpoint accuracy | | | | 1.0 | %Vo |
| Output voltage line regulation | Vin =9-18,9-36,18-36,36-75V | | | ±0.2 | % |
| Output voltage load regulation | 0%-100%Load | | | ±0.2 | % |
| Output voltage trim range | | | | ±10 | % |
| Output voltage ripple / noise (See notes & charts) | 20Mz bandwidth, 100% Load, 12/24/48 Vin See pinout A notes on charts | | | 35 | mV (pk-pk) |
| Output over power protection | | 110 | 120 | 140 | % |
| Over-voltage protection | | 120 | | 135 | %Vo |
| Temperature coefficient | | | | ±0.02 | %/°C |
| Capacitive Load | | | | 10000 | µF |
| **Output characteristics** | | | | | |
| Startup time | 5% to 95% of the Vo | | | 1 | ms |
| Transient recovery time | 50% load change | | | 250 | µs |
| Transient peak deviation | 50% load change | | | 4 | %Vo |
| **Isolation characteristics** | | | | | |
| Isolation (primary to secondary) | 1minute | | 1500 | | VDC |
| Isolation resistance | 1500VDC, Primary to secondary | 10 | | | MΩ |
| Isolation capacitance | Primary to secondary | | | 1000 | pF |
| **Feature Characteristics** | | | | | |
| Switching frequency | (≤2.5V = 300) (≥3.3V=400) | 300 | | 400 | KHz |
| ON/OFF control (Positive logic) | All Models | | | | |
| Converter On | | 3.5 | | | V |
| Converter Off | | | | 0.8 | V |
| ON/OFF control (Negative logic) | All Models | | | | |
| Converter On | | | | 0.8 | V |
| Converter Off | | 3.5 | | | V |
| Over Temperature Protection | Maximum component level | | | 130 | °C |
| Calculated MTBF | Bellcore @ 50°C > 1,000,000 hrs | | | | Hrs |

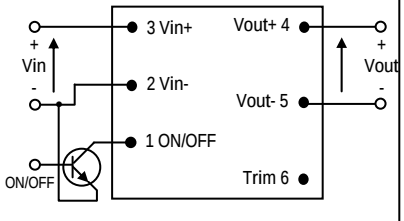



Fig 1. Recommended ON/OFF circuit configuration

### Remote Sense

The unit does NOT have remote sense pins.

### Output Trim (Pin 6)

Permits the user to adjust the output voltage up or down to achieve the custom voltage or to make the output voltage margining.

The unit's output voltage can be adjusted up 10% or down 10% relative to the rated output voltage by adding an external resistor between pin 6 and one of the output pins (pin 4 and 5).

To increase the output voltage, a trim resistor should be connected between pin 6(Trim) and pin 5 (Vout-).

To decrease the output voltage, a trim resistor should be connected between pin 6 (Trim) and pin 4 (Vout+).

### Basic Operations and Functions

W30 Family is a high efficiency, isolated DC/DC converter. Neither heat sink nor airflow is required when the unit operates at ambient temperature of 25C. The unit has basic control, output adjustment and protection functions.

### Input (Pin 2, Pin 3)

Input power Vin(+) must be connected to Positive input pin 3; Input power Vin(-) must be connected to Negative input pin2.

### Output (Pin 4, Pin 5)

Output power Vout(+) must be connected to Positive output pin 4; Output power Vout(-) must be connected to Negative output pin6.

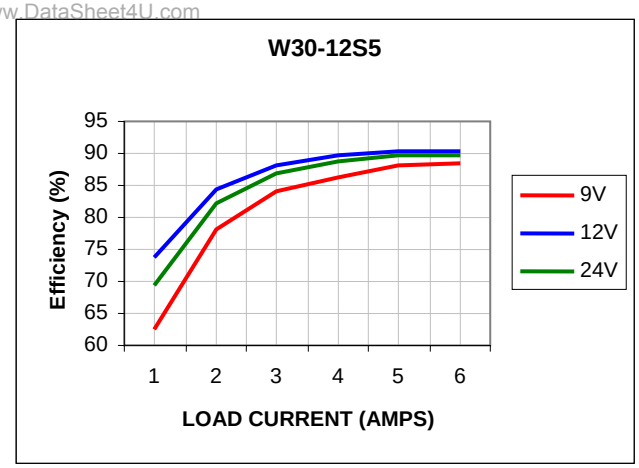
### ON/OFF (Pin 1)

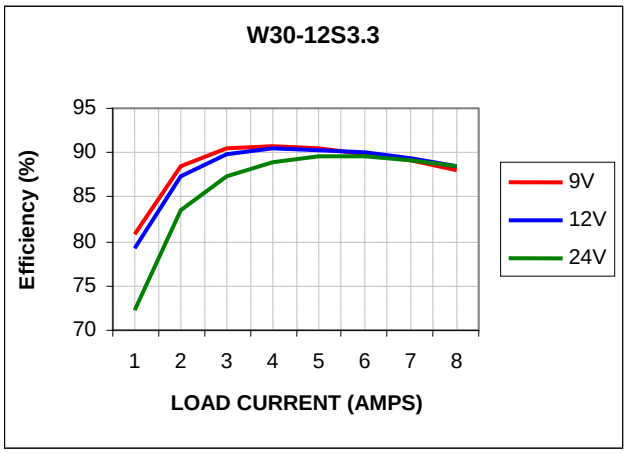
Permits the user to maintain unit On/Off, in order to properly sequence different power supplies and reduce power consumption during the standby condition. There are two ON/OFF control options: positive logic (W30-SX) and negative logic (W30-SXN). Both are referenced to Vin-.

Pin 1 is the "Enable" pin, connecting a TTL compatible pin. A TTL control signal to this pin, according to the specification, turns the unit on or off.

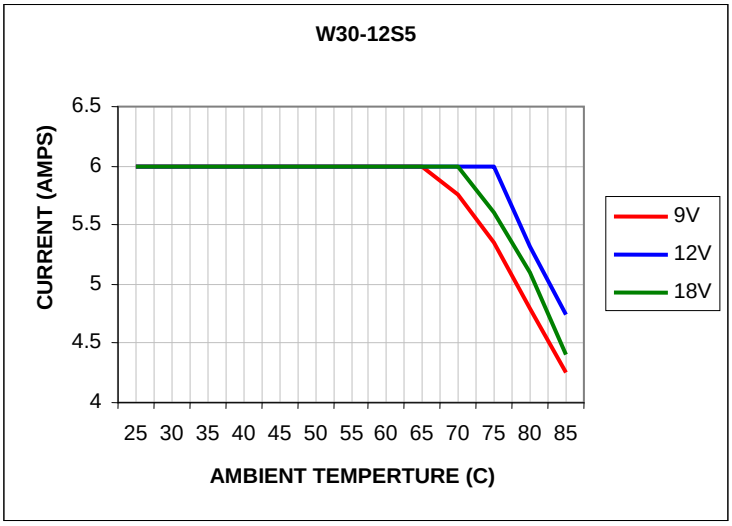
The positive logic unit turns on when the pin is at logic high or open, and turns off at logic low. The negative logic unit turns on when the pin is at logic low, and turns off at logic high state. Typical ON/OFF connection is shown in Fig 1.

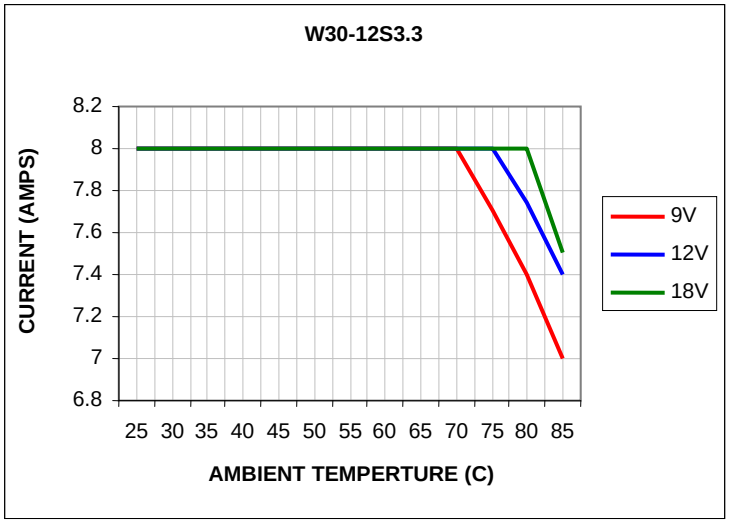
## W30-12 EFFICIENCY CHARTS



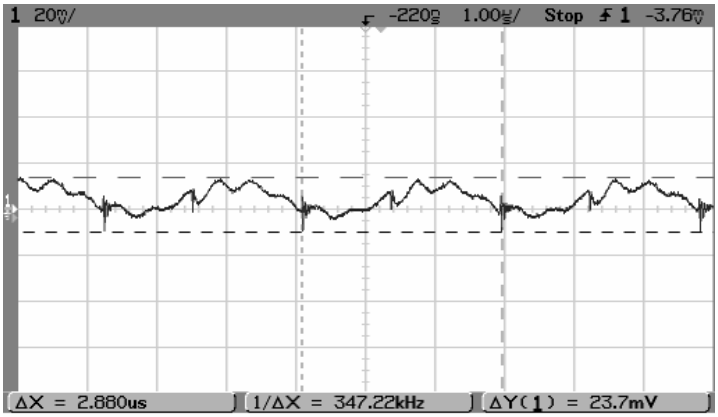




## W30-12 DERATING CHARTS (STILL AIR)

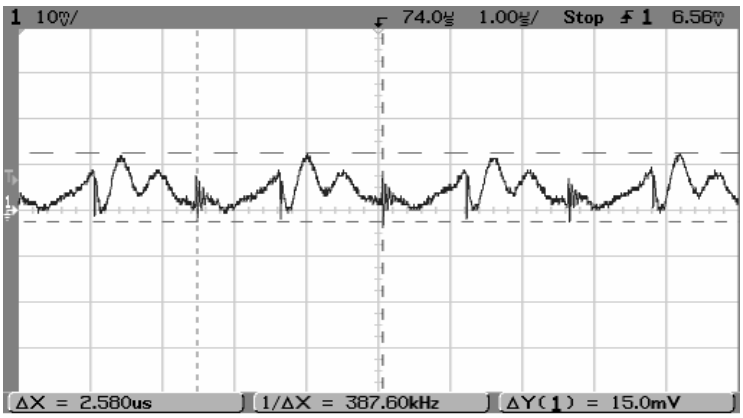



## W30-12 OUTPUT NOISE

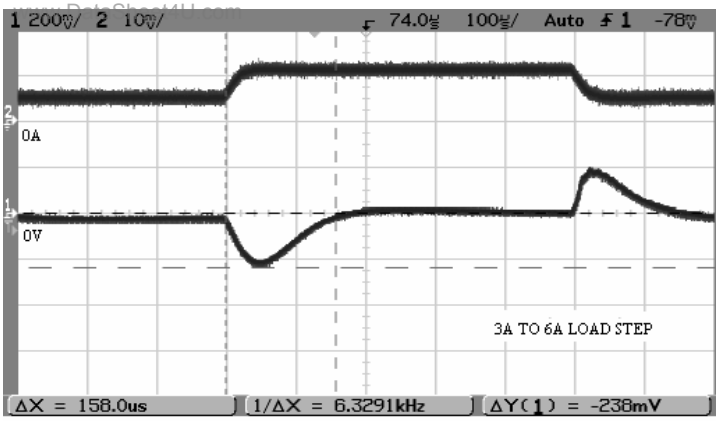



2.2uF CERAMIC CAP ACROSS OUTPUT
Vin=12V@FL 20MHz BANDWIDTH
OUTPUT NOISE
W30-12S5



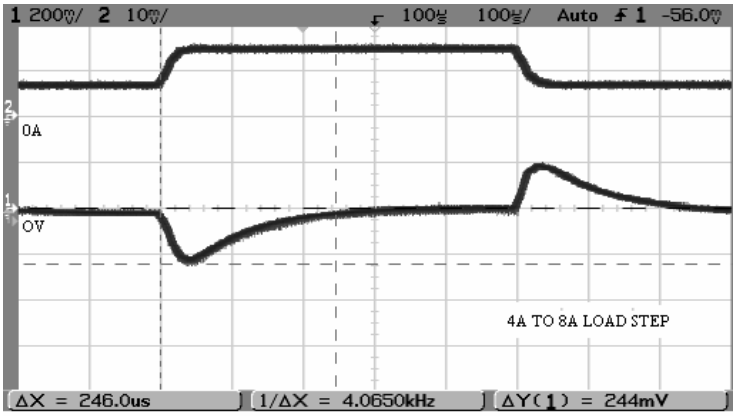

2.2uF CERAMIC CAP ACROSS OUTPUT
Vin=12V@FL 20MHz BANDWIDTH
OUTPUT NOISE
W30-12S3.3

## W30-12 TRANSIENT RESPONSE




Ch 1 = 200mV/Div
Ch 2 = 5A/Div

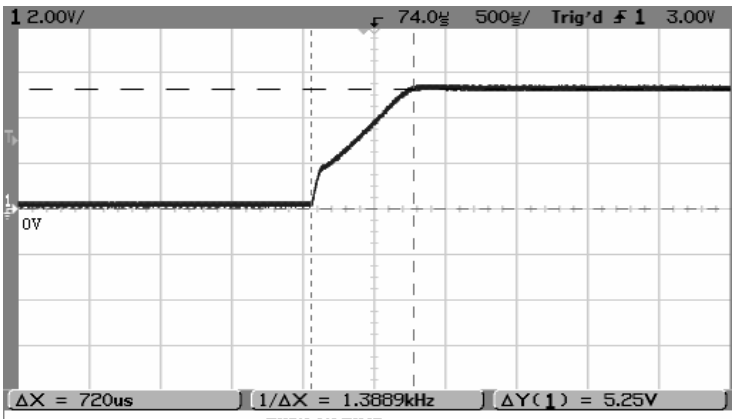
TRANSIENT RESPONSE
W30-12S5




Ch 1 = 200mV/Div
Ch 2 = 5A/Div

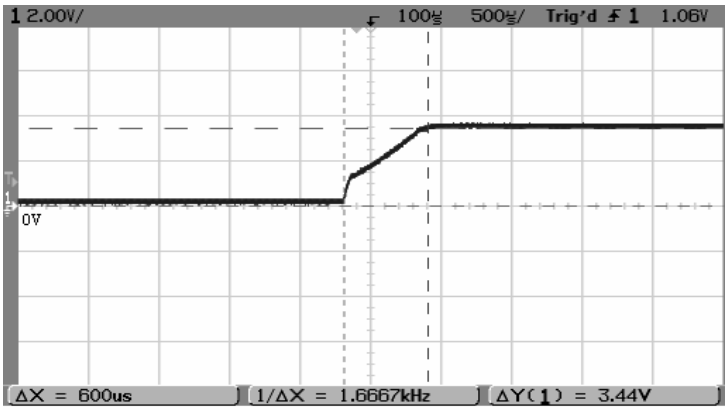
TRANSIENT RESPONSE
W30-12S3.3

## W30-12 TURN ON TIME




Vin = 12V @ FL

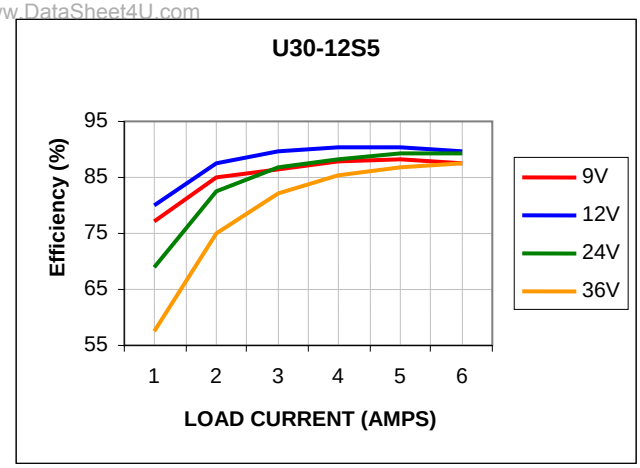
TURN ON TIME
W30-12S5

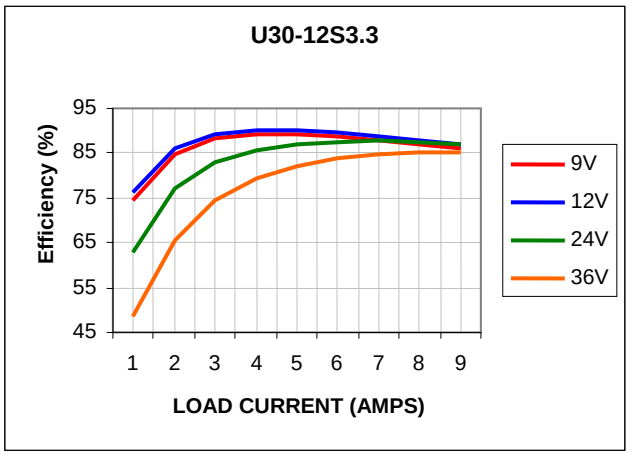



Vin = 12V @ FL

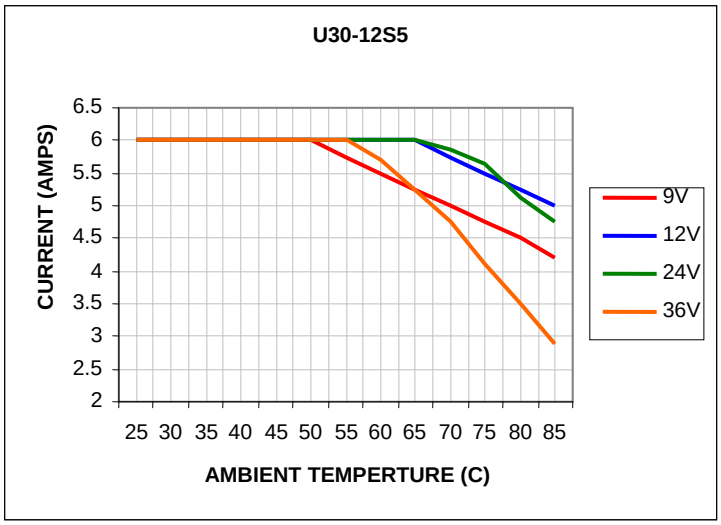
TURN ON TIME
W30-12S3.3

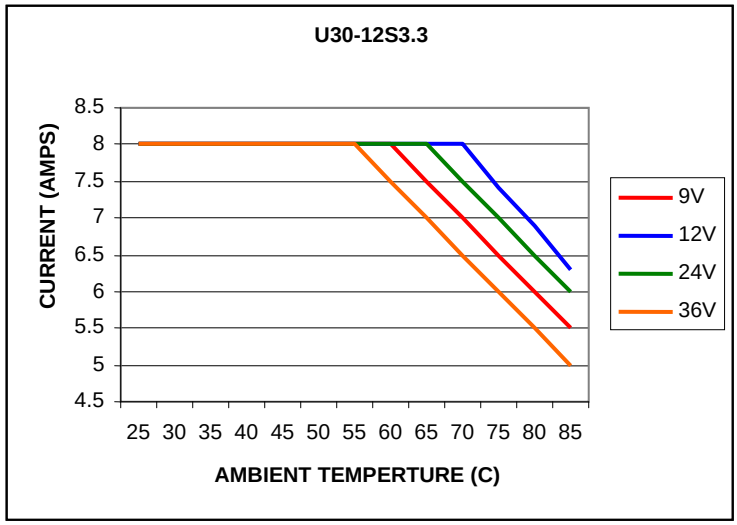
## U30-12 EFFICIENCY CHARTS



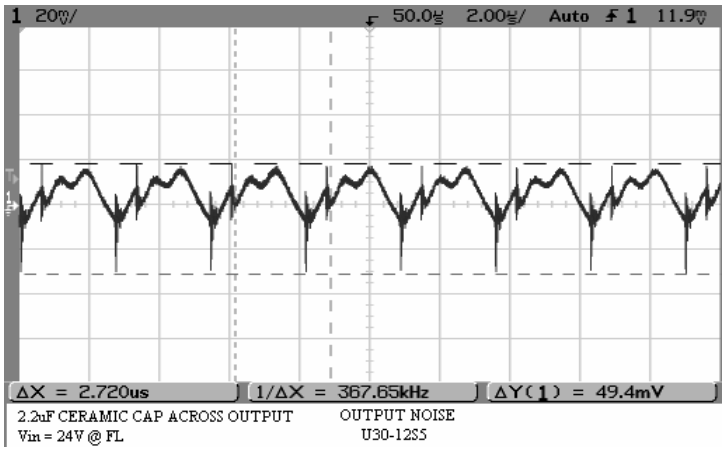



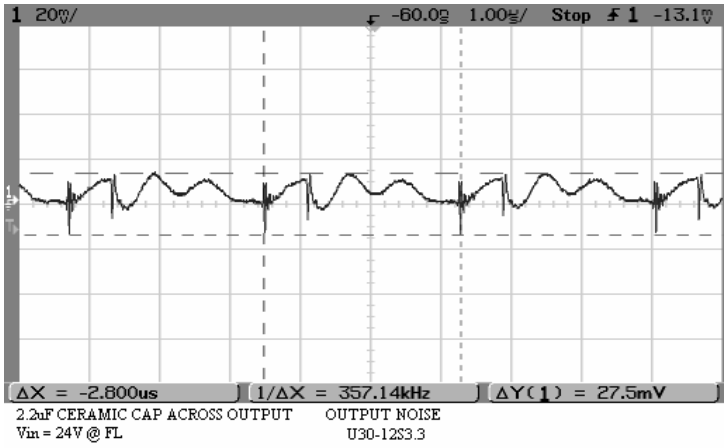

## U30-12 DERATING CHARTS (STILL AIR)



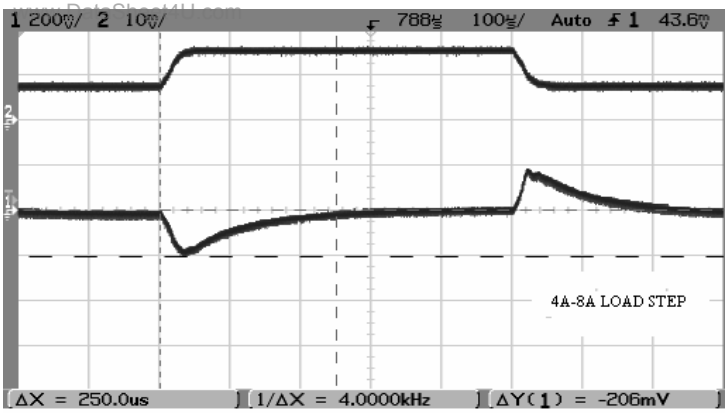




## U30-12 OUTPUT NOISE



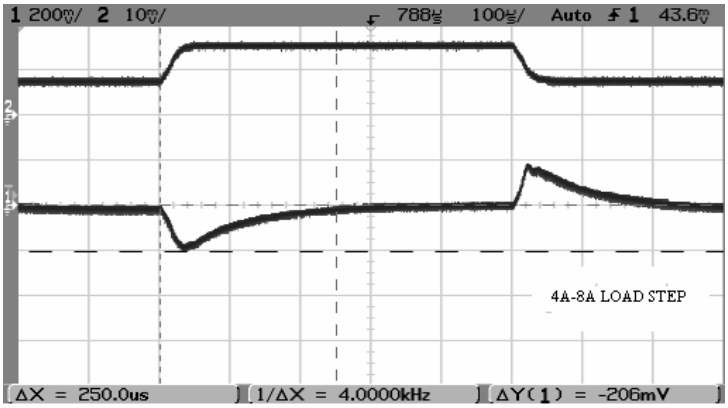



## U30-12 TRANSIENT RESPONSE




Ch1 = 200mV/Div
Ch1 = 5A/Div

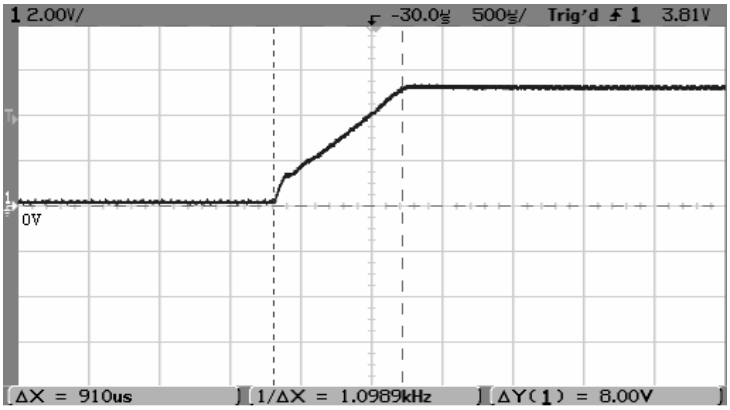
TRANSIENT RESPONSE
U30-12S3.3




Ch1 = 200mV/Div
Ch1 = 5A/Div

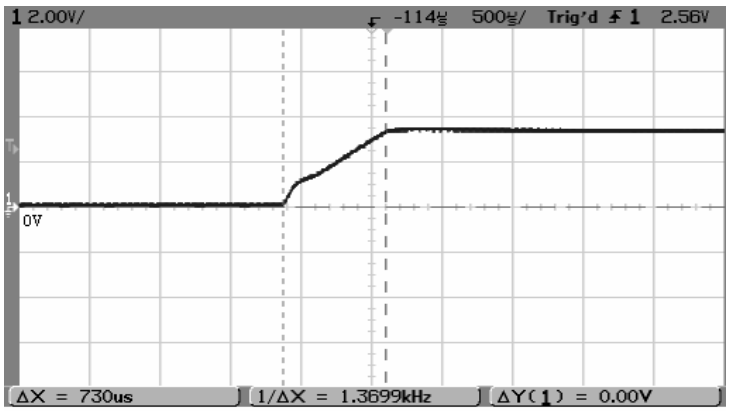
TRANSIENT RESPONSE
U30-12S3.3

## U30-12 TURN ON TIME




Vin = 24V @ FL

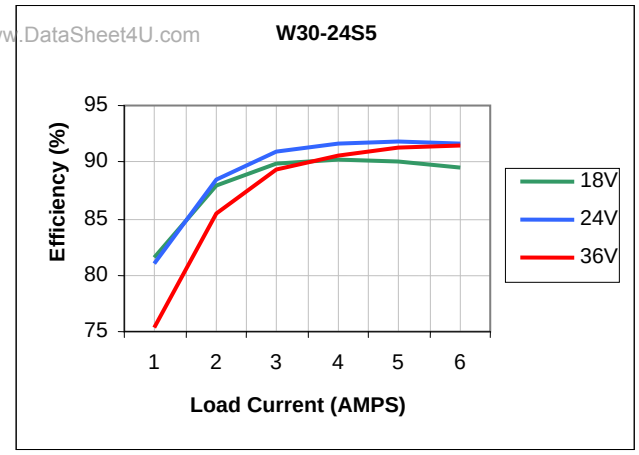
TURN ON TIME
U30-12S5

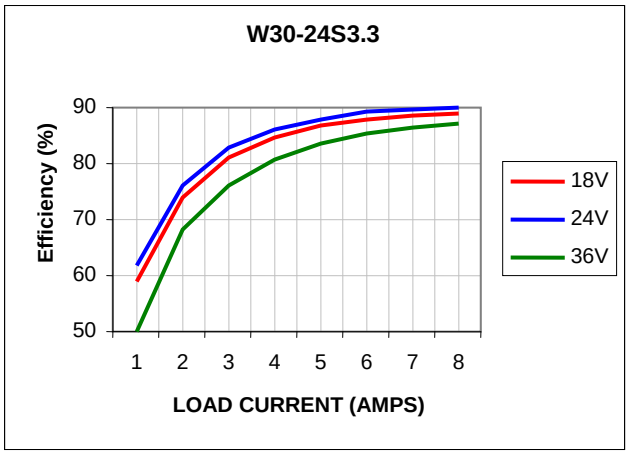



Vin = 24V @ FL

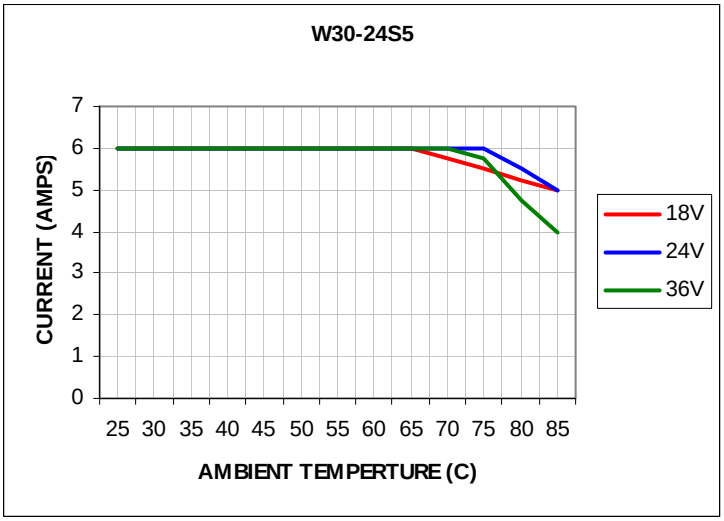
TURN ON TIME
U30-12S3.3

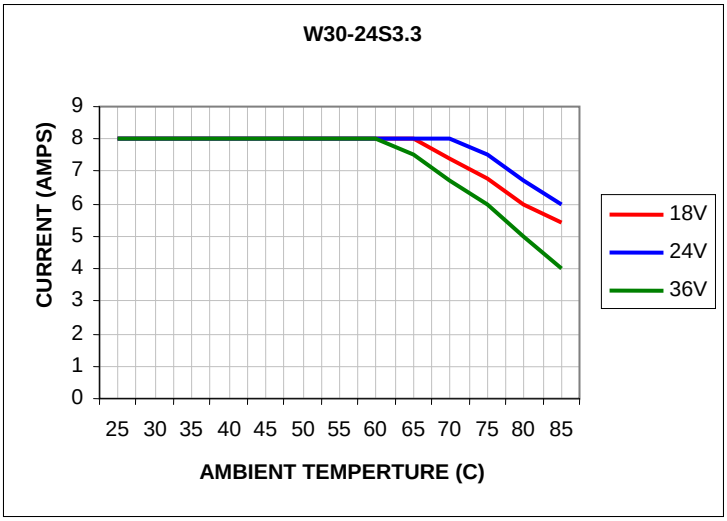
## W30-24 EFFICIENCY CHARTS



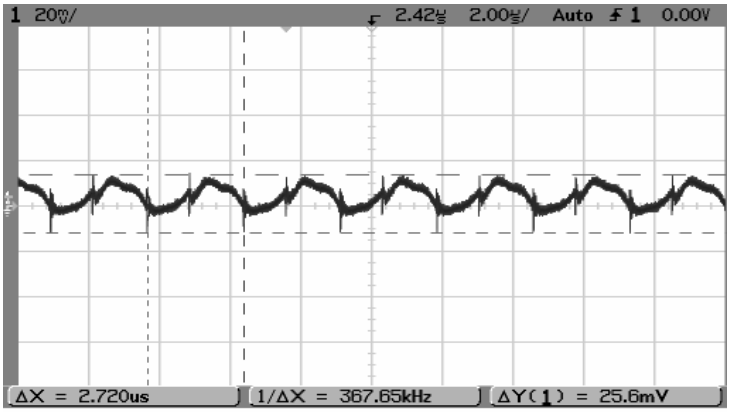




## W30-24 DERATING CHARTS (STILL AIR)



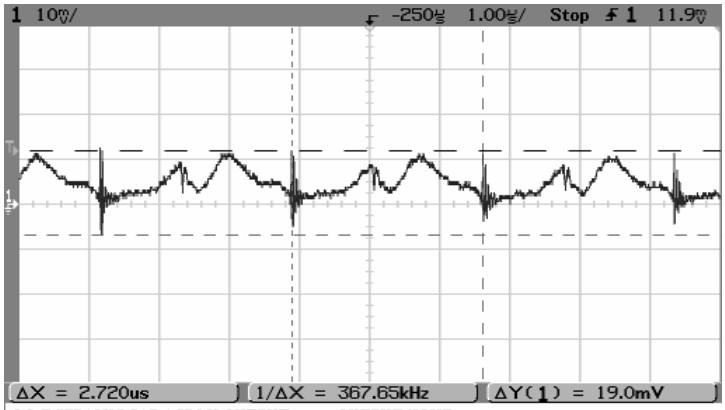




## W30-24 OUTPUT NOISE




2.2uF CERAMIC CAP ACROSS OUTPUT
Vin=24V@6.0A 20MHz BANDWIDTH

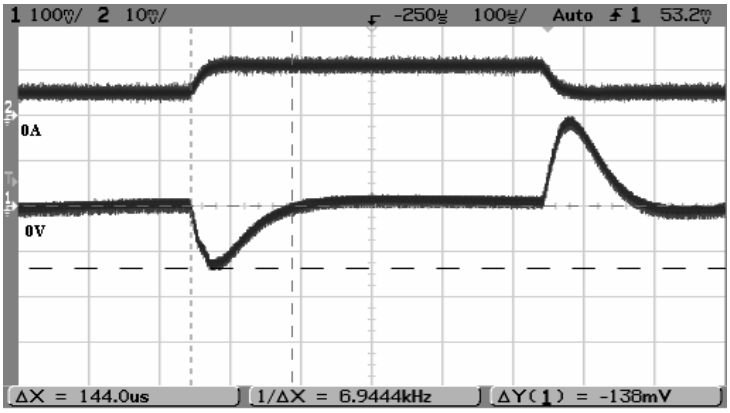
OUTPUT NOISE
W30-24S5




2.2uF CERAMIC CAP ACROSS OUTPUT
Vin = 24V @ 8A 20MHz BANDWIDTH

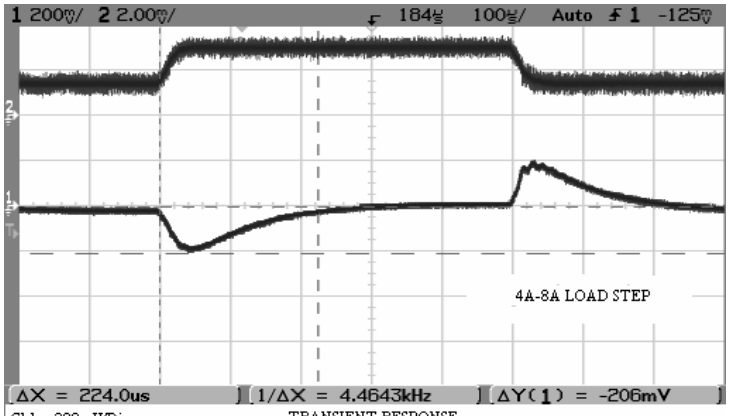
OUTPUT NOISE
W30-24S3.3

## W30-24 TRANSIENT RESPONSE




Vin=24V@3A-6A LOAD STEP
Ch1=Vo Ch2=Io

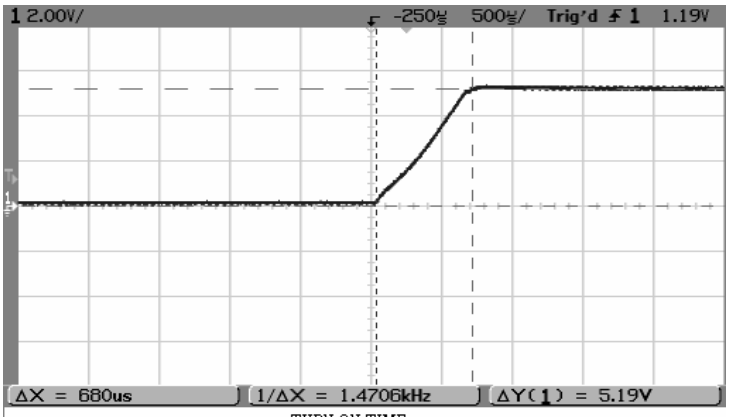
TRANSIENT RESPONSE
W30-24S5




Ch1 = 200mV/Div
Ch2 = 5A/Div

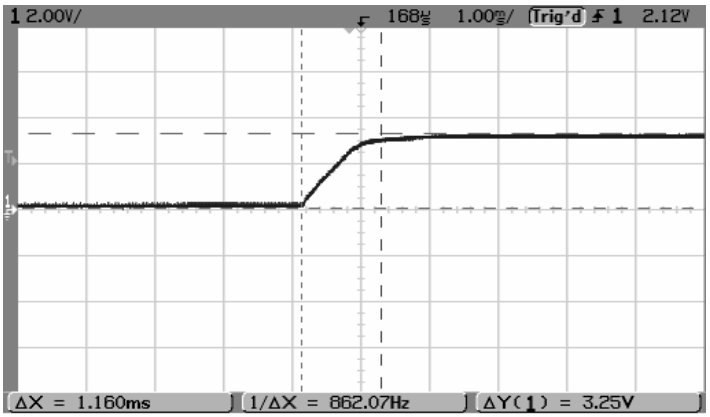
TRANSIENT RESPONSE
W30-24S3.3

## W30-24 TURN ON TIME




Vin = 0-24V @ 6A

TURN ON TIME
W30-24S5

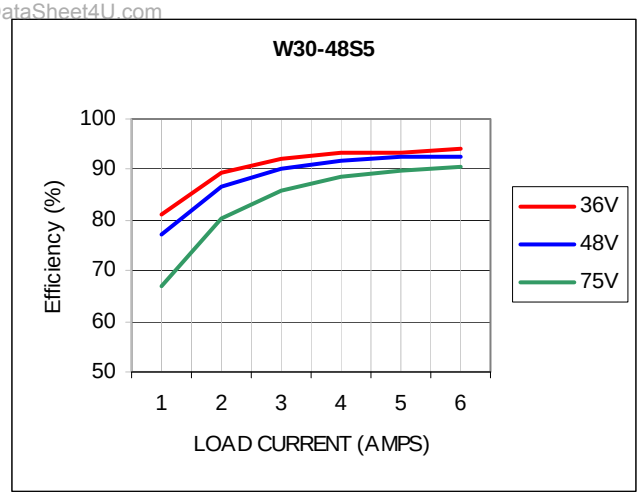


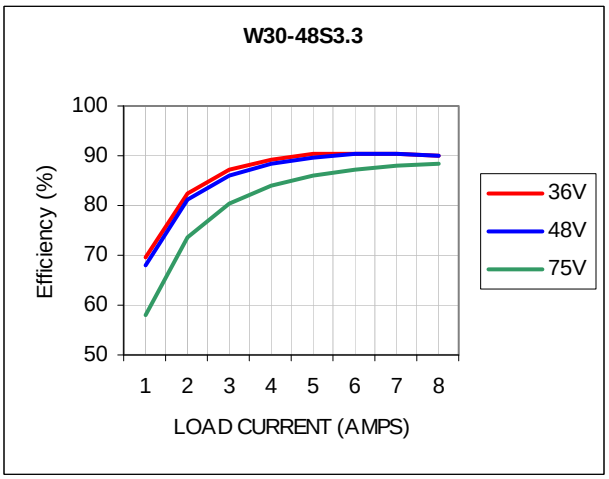

Vin = 24V @ 8A

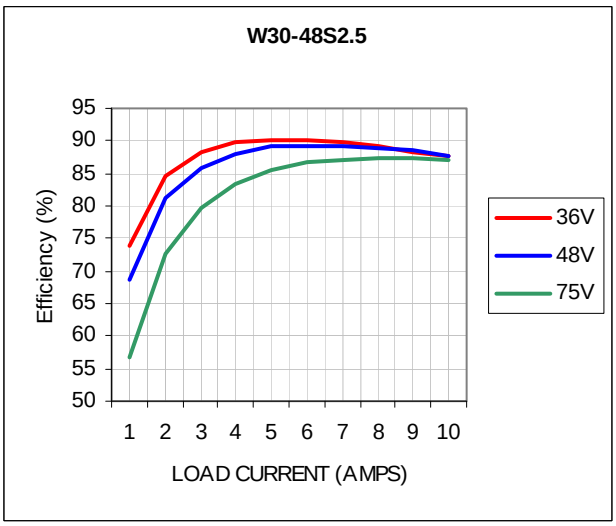
TURN ON TIME
W30-24S3.3

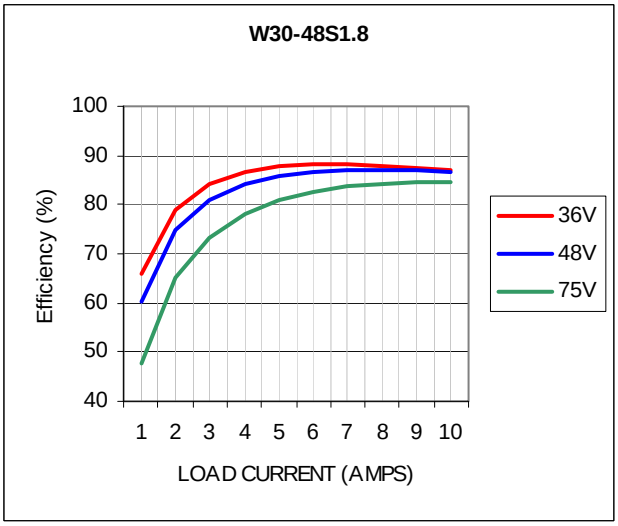
# W30-48 EFFICIENCY CHARTS

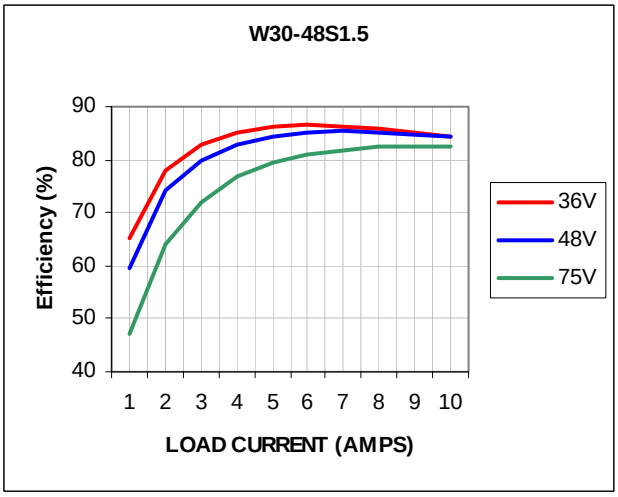




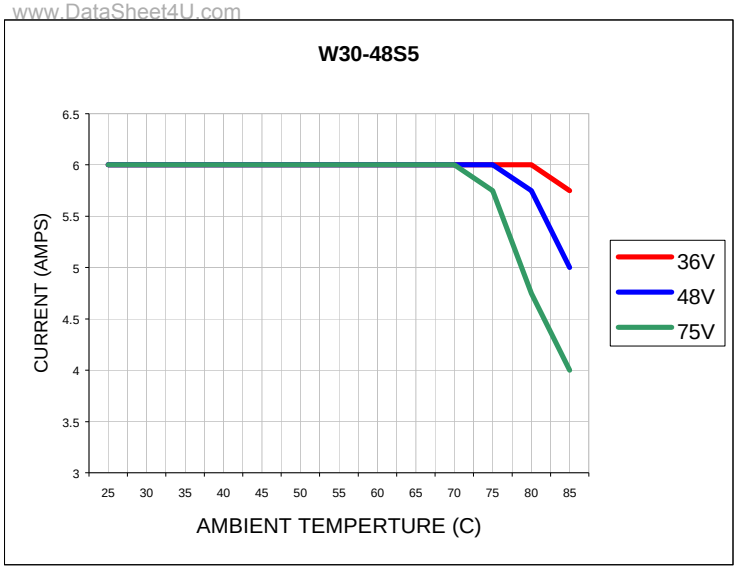



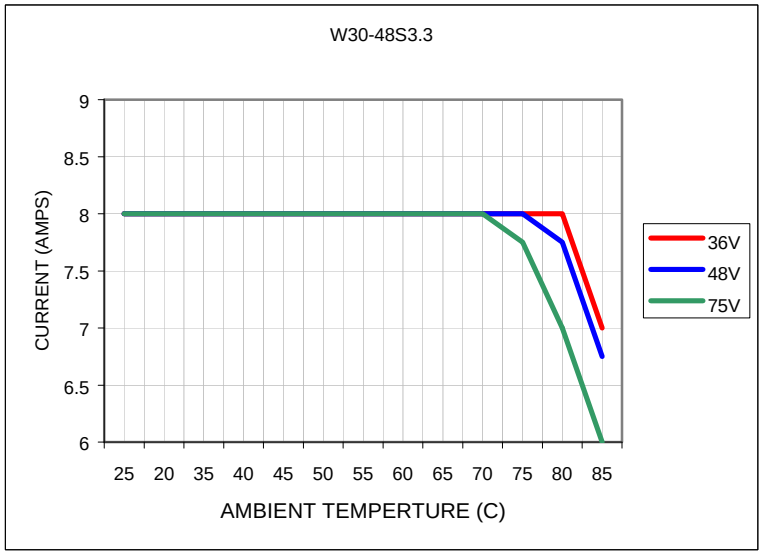



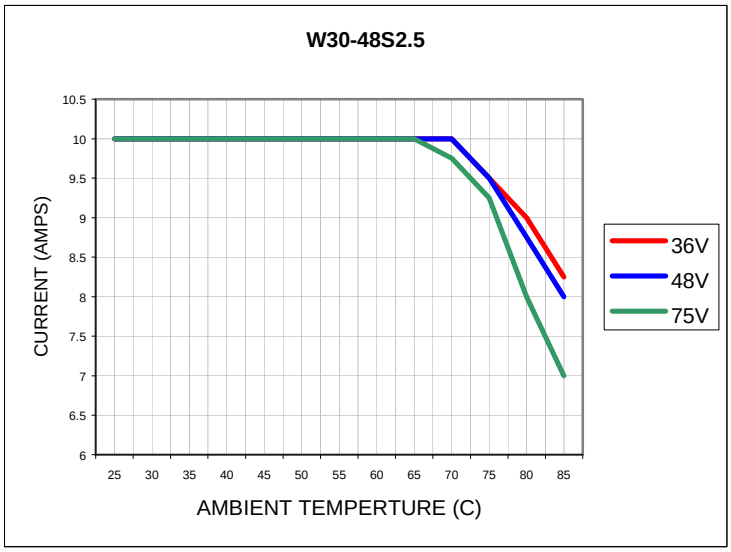



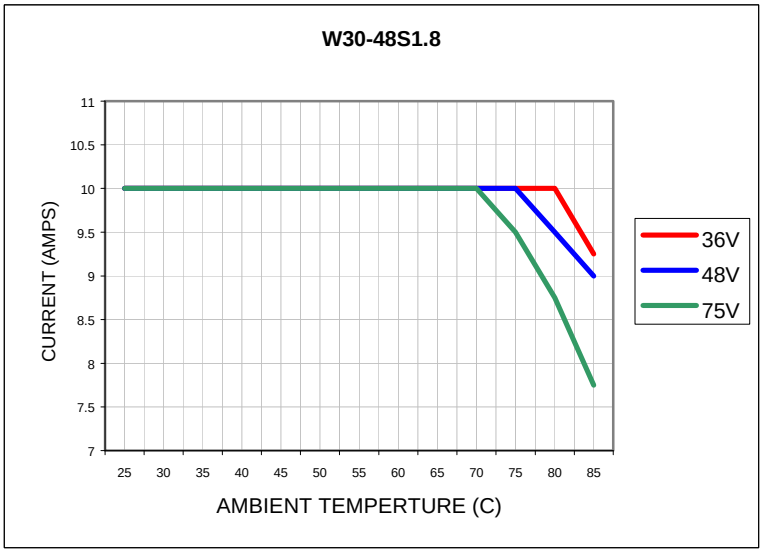
# W30-48 DERATING CHARTS (STILL AIR)

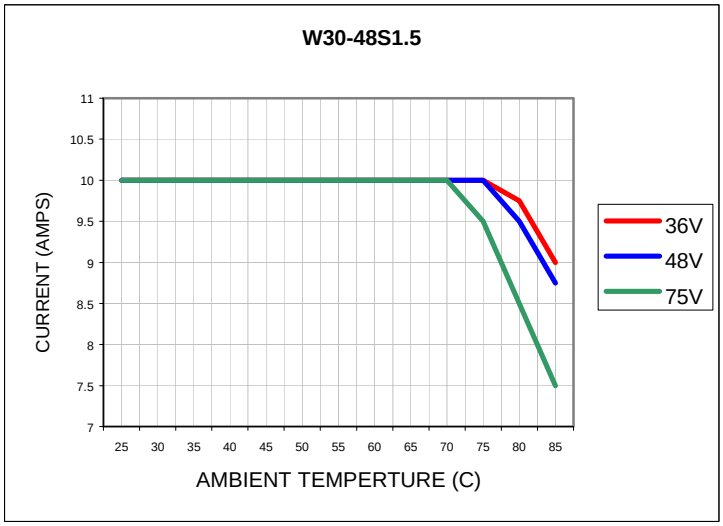




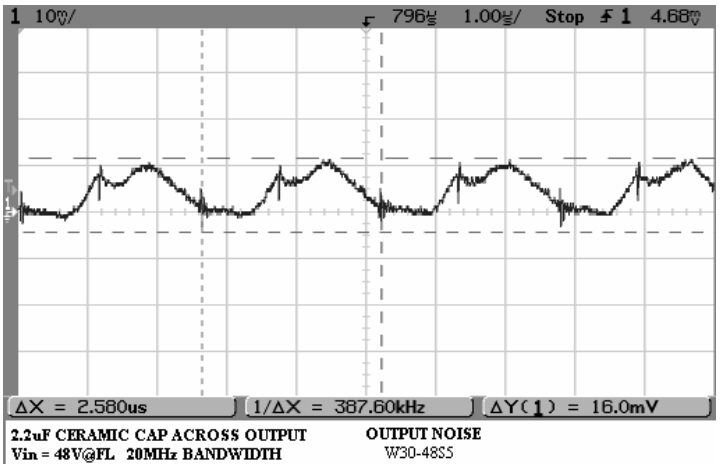

Note 1)

Units tested horizontally in a sealed enclosure (6”x6”X3”), within an environmental chamber.

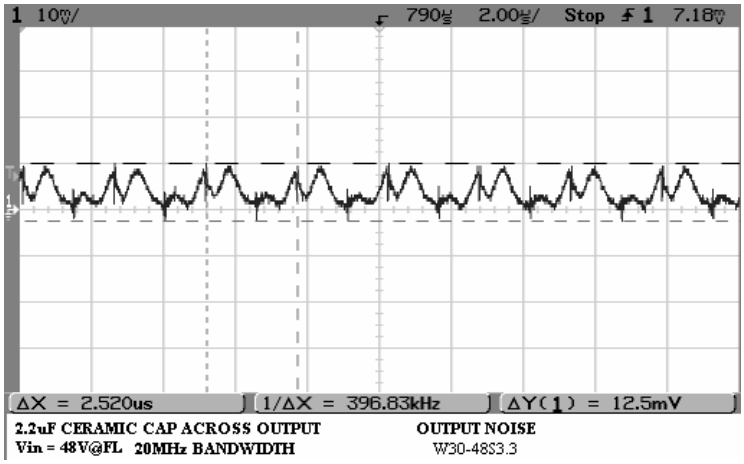
Note 2)
Ambient temperature measured within sealed enclosure.

Note 3)
Derating occurs when a maximum temperature of 120°C is measured at the thermal switch.

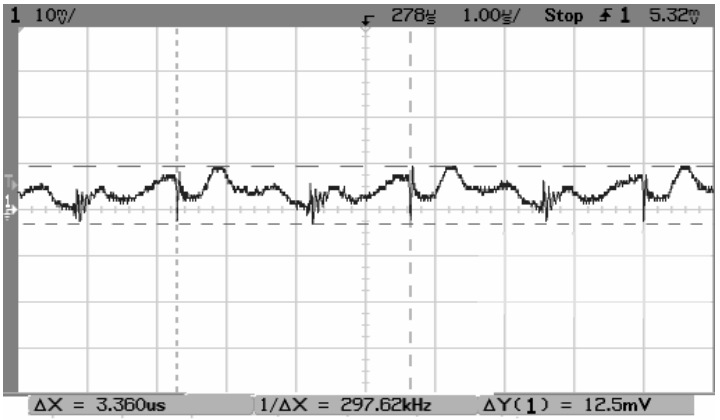
# W30-48 OUTPUT NOISE (PINOUT B)



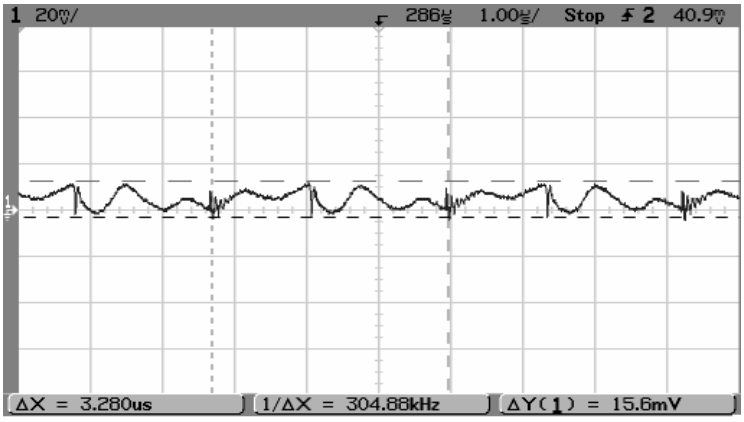

2.2uF CERAMIC CAP ACROSS OUTPUT OUTPUT NOISE
Vin = 48V@FL 20MHz BANDWIDTH W30-48S5



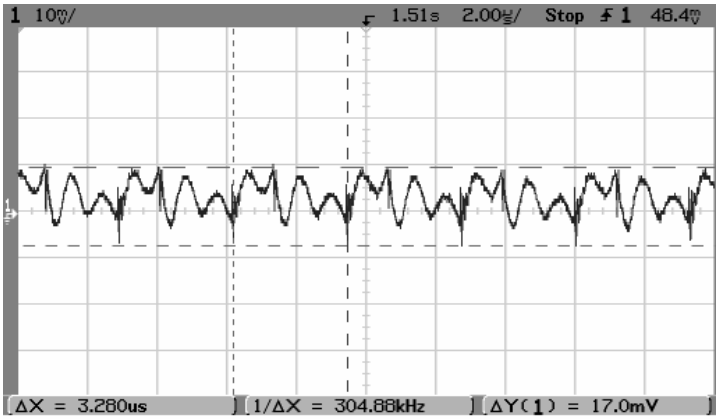

2.2uF CERAMIC CAP ACROSS OUTPUT OUTPUT NOISE
Vin = 48V@FL 20MHz BANDWIDTH W30-48S3.3




2.2uF 10V CERAMIC CAP ACROSS OUTPUT OUTPUT NOISE
Vin = 48V@FL 20MHz BANDWIDTH W30 2.5V




2.2uF CERAMIC CAP ACROSS OUTPUT OUTPUT NOISE
Vin = 48V@FL 20MHz BANDWIDTH W30 1.8V



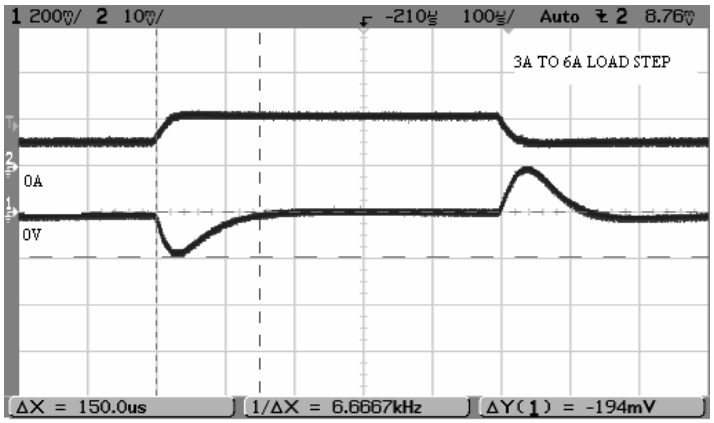

2.2uF 10V CERAMIC CAP ACROSS OUTPUT OUTPUT NOISE
Vin = 48V@FL 20MHz BANDWIDTH W30 1.5V

Note 1)

With Pinout A 10uf tantalum caps across each output is recommended

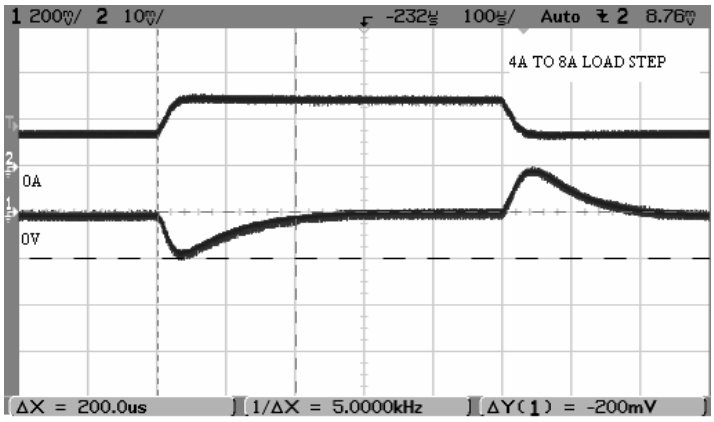
# W30-48 TRANSIENT RESPONSE





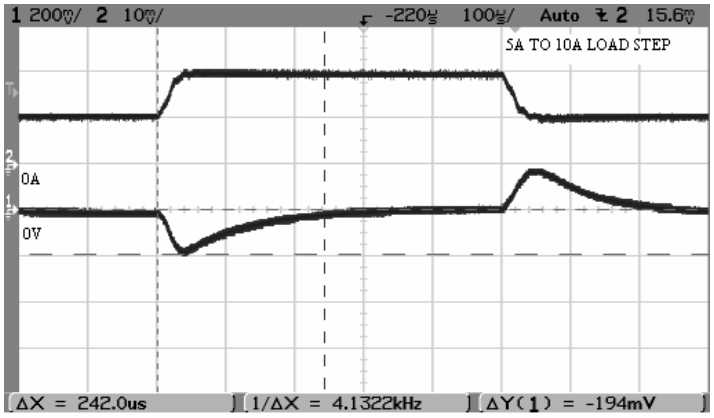

Ch 1 = 200mV/Div
Ch 2 = 5A/Div

TRANSIENT RESPONSE
W30 5V



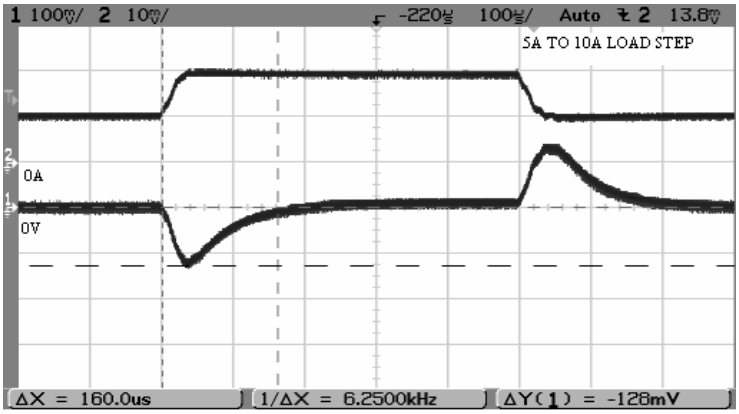

Ch 1 = 200mV/Div
Ch 2 = 5A/Div

TRANSIENT RESPONSE
W30 3.3V



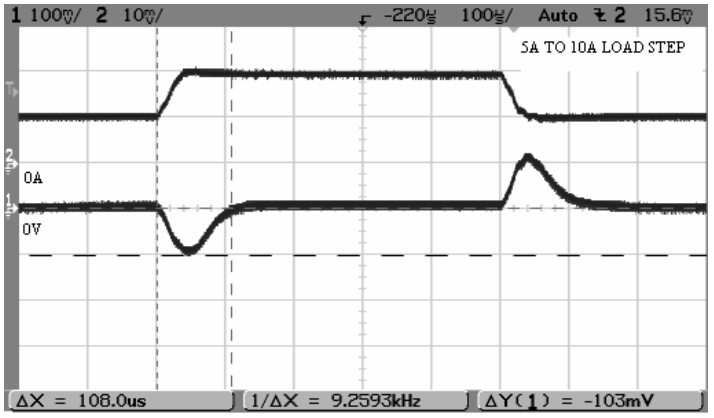

Ch 1 = 200mV/Div
Ch 2 = 5A/Div

TRANSIENT RESPONSE
W30 2.5V




Ch 1 = 200mV/Div
Ch 2 = 5A/Div

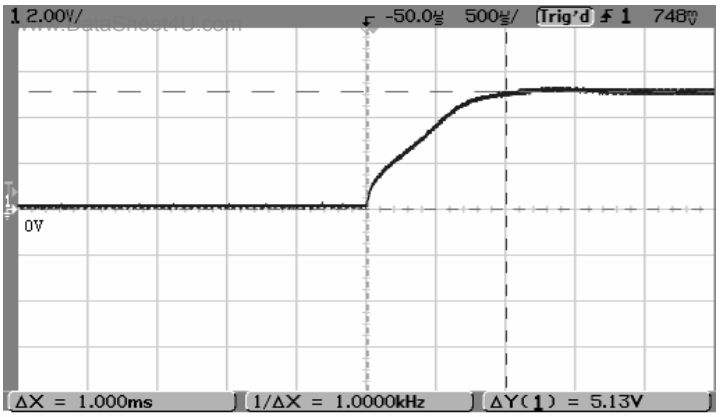
TRANSIENT RESPONSE
W30 1.8V




Ch 1 = 200mV/Div
Ch 2 = 5A/Div

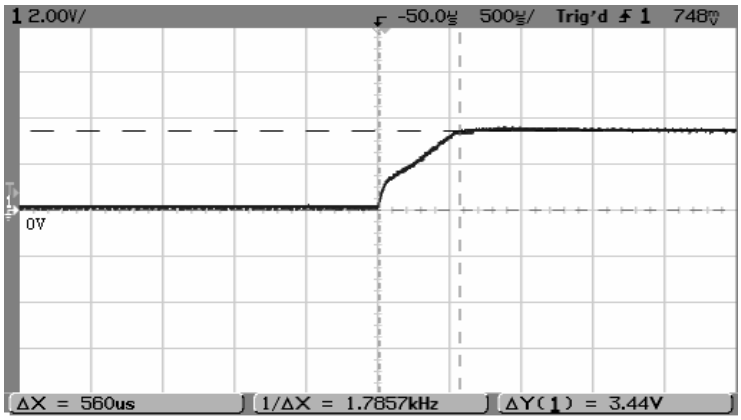
TRANSIENT RESPONSE
W30 1.5V

# W30-48 TURN ON TIME



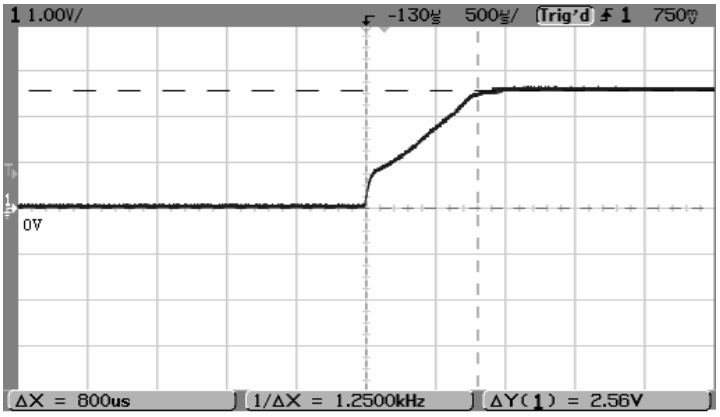

Vin = 48V @ FL

TURN ON TIME
W30 5V



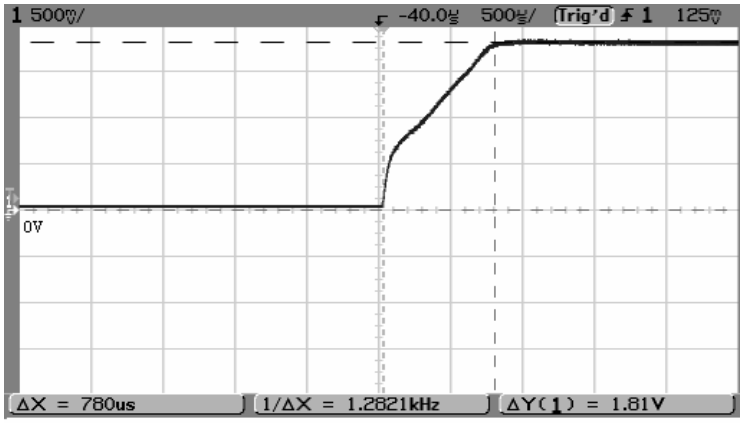

Vin = 48V @ FL

TURN ON TIME
W30 3.3V



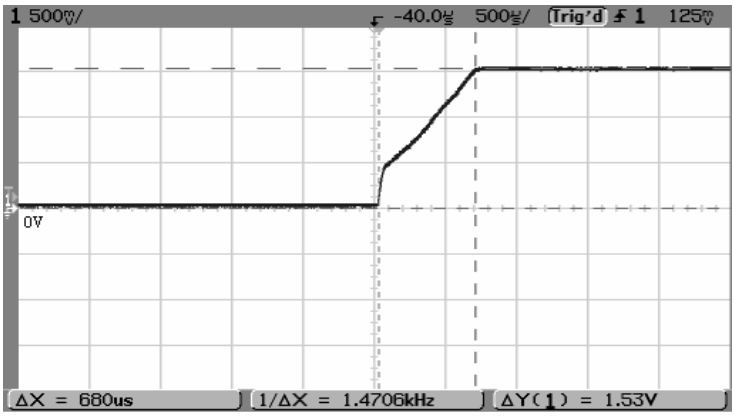

Vin = 48V @ FL

TURN ON TIME
W30 2.5V




Vin = 48V @ FL

TURN ON TIME
W30 1.8V

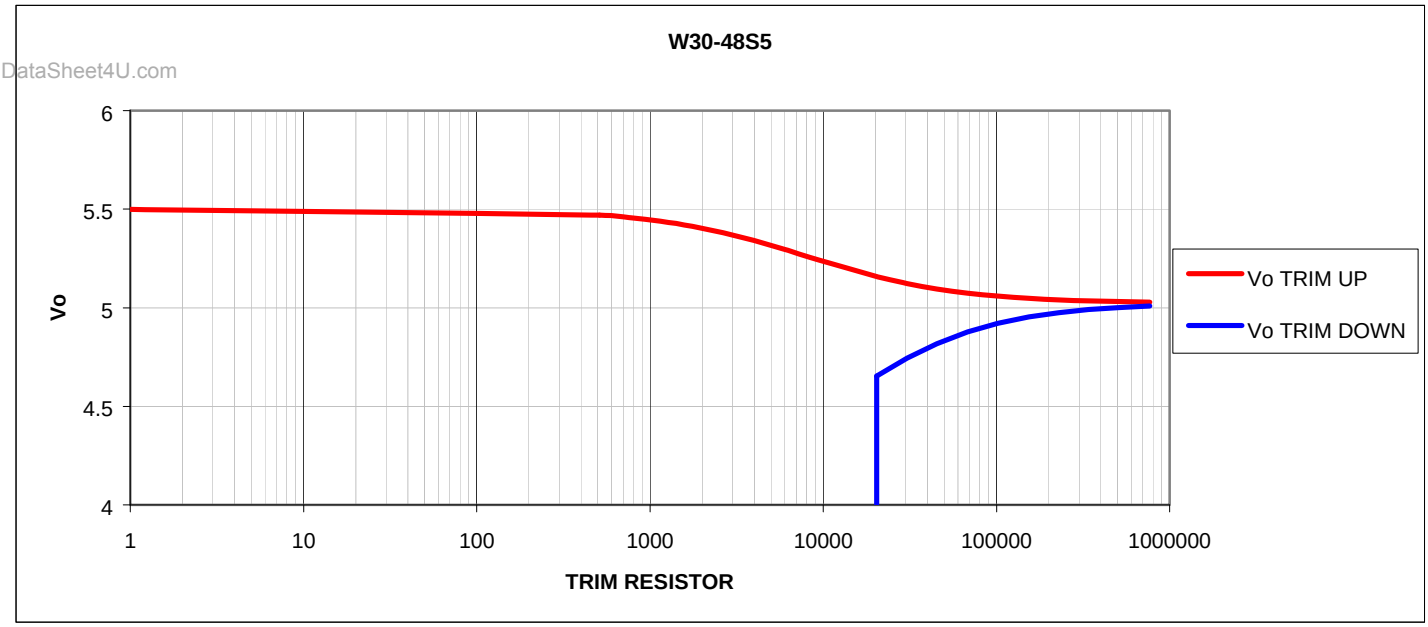


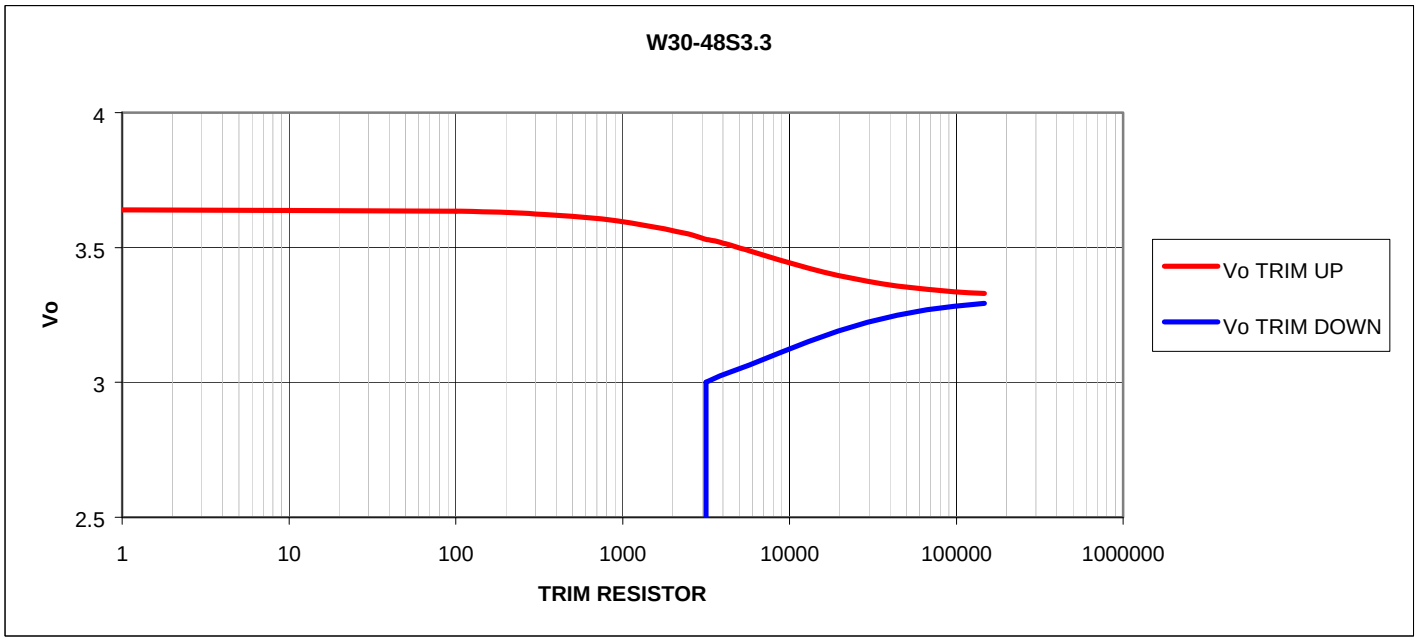

Vin = 48V @ FL

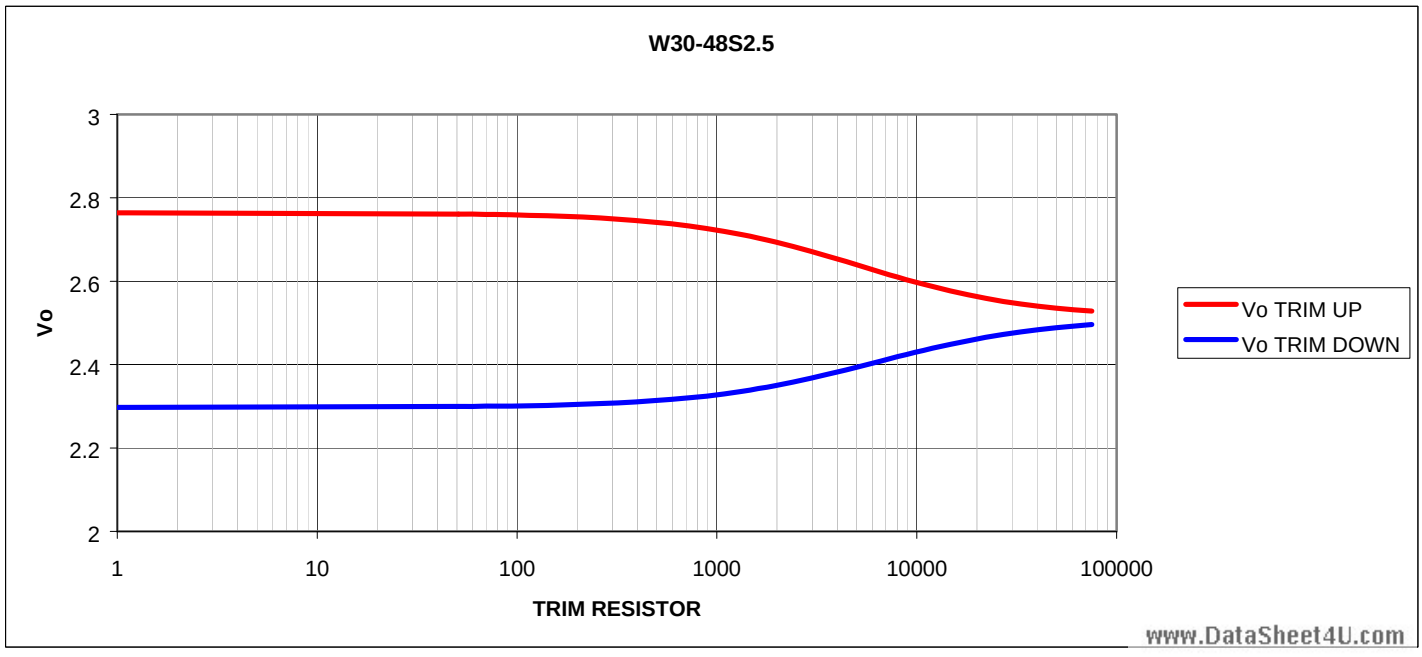
TURN ON TIME
W30 1.5V

# W30-48 TRIM CHARTS



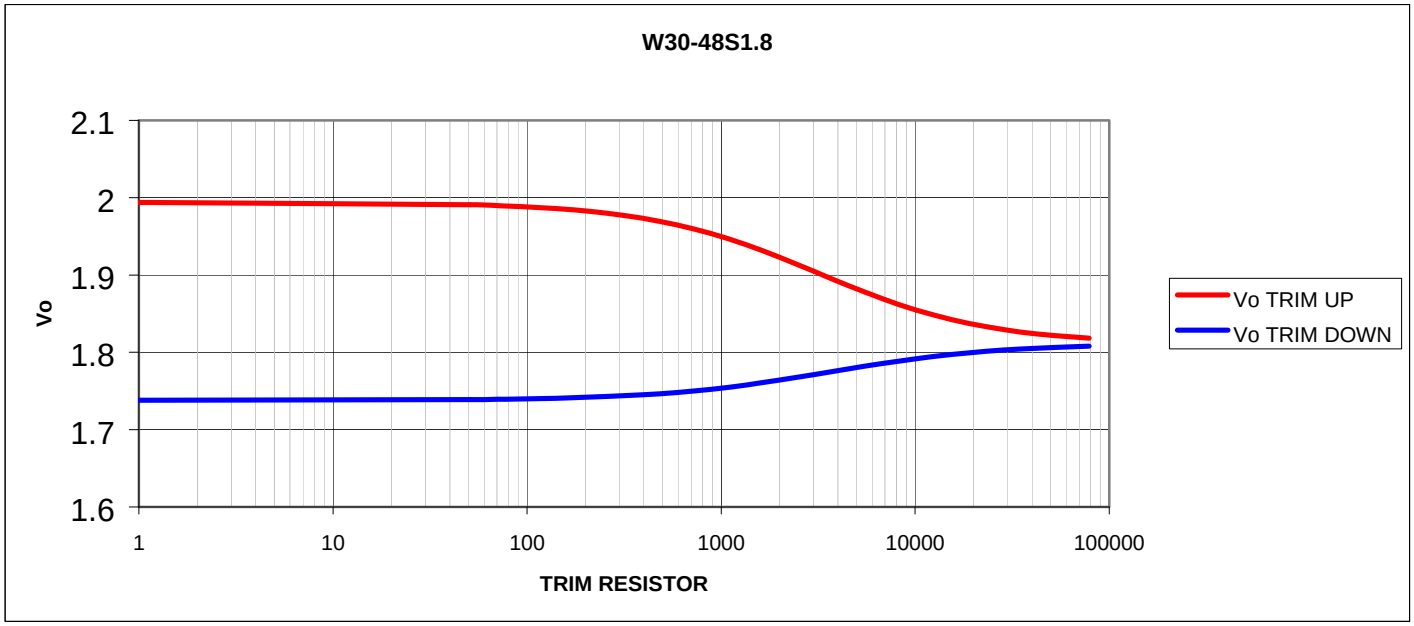


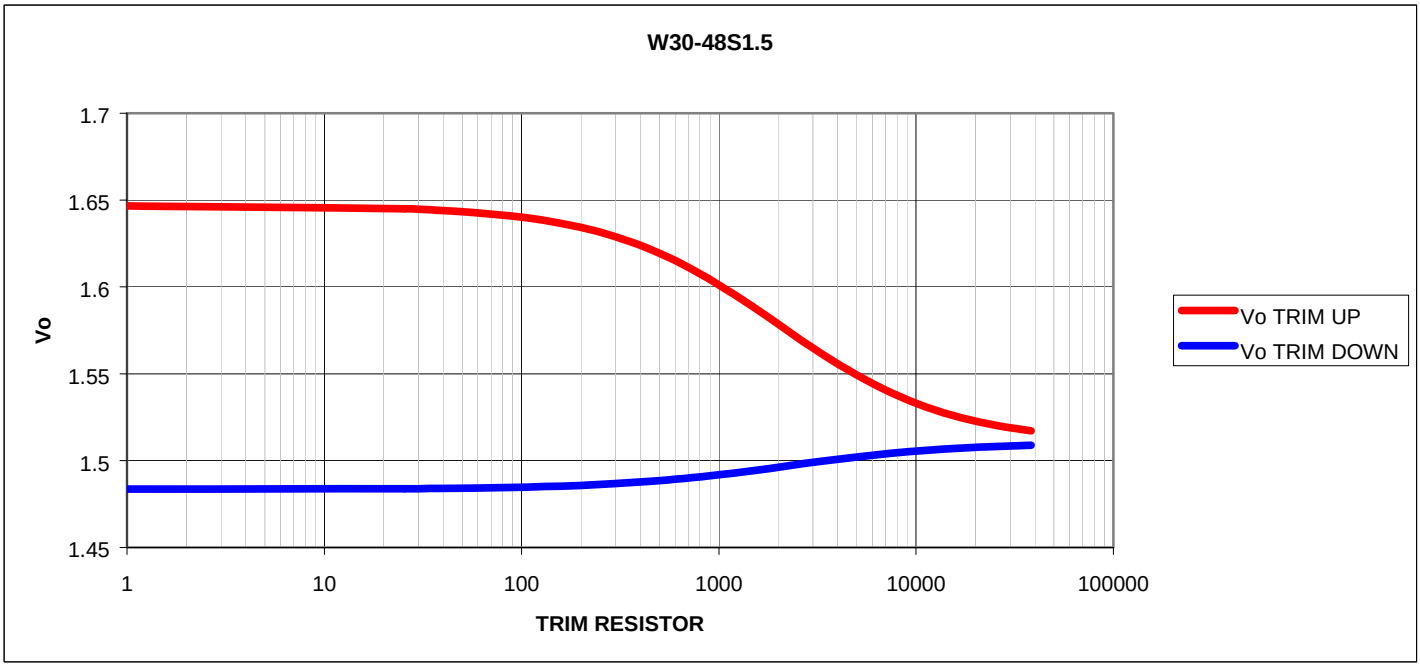



# W30-48 TRIM CHARTS CONTINUED





# W30 PINOUTS