

# NB50S

50 Watts Output Power

SINGLE OUTPUT



## How to Order:

| NB     | 50 | S                  | M | /             | 5 | -                              | A | -                          | D |
|--------|----|--------------------|---|---------------|---|--------------------------------|---|----------------------------|---|
| Series |    | Total Output Power |   | Single Output |   | Industrial (I) or Military (M) |   | Options:                   |   |
|        |    |                    |   |               |   |                                |   | A- pins out side of unit   |   |
|        |    |                    |   |               |   |                                |   | B- pins out bottom of unit |   |
|        |    |                    |   |               |   |                                |   | C- pins out top of unit    |   |
|        |    |                    |   |               |   |                                |   | D- through hole inserts    |   |
|        |    |                    |   |               |   |                                |   | (STD threaded)             |   |
|        |    |                    |   |               |   |                                |   | I - M2.5 inserts           |   |

## INPUT CHARACTERISTICS

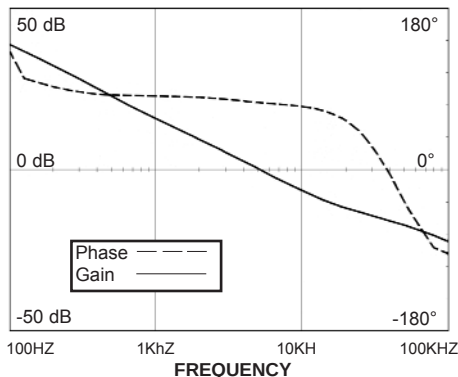
|                                        | PER CHANNEL |      |      |       |
|----------------------------------------|-------------|------|------|-------|
|                                        | Min.        | Typ. | Max. | Units |
| Input Voltage                          | 14          | 28   | 40   | Vdc   |
| Brown Out (75% of Full Load) [fig. I]* | 12          |      |      | Vdc   |
| No Load Power Dissipation              | 2           | 4    |      | Watt  |
| Inrush Charge [fig. VII]*              |             |      | 2    | mc    |
| Reflective Ripple Current [fig. VIII]* |             | 15   |      | %     |
| Logic Disable Current (Sink)           | 100         | 150  |      | μA    |
| Logic Disable Power In                 | 1.2         | 2.5  |      | W     |
| Input Ripple Rejection (120 Hz)        | 55          |      |      | dB    |
| Input Ripple Rejection (800 Hz)        | 45          |      |      | dB    |
| Efficiency up to                       | 83          |      |      | %     |

See Page 21 [fig. II, III]\*

EMI: Units conform to MIL-STD-461D (on the input leads) with companion filter

Input Transient: Units conform to MIL-STD-704D for transients up to 50V for 0.1 second

## STABILITY



All specifications are typical @+25°C with nominal input voltage under full output load conditions, unless otherwise noted. Specifications subject to change without notice.



## FEATURES

- .38 Inch Profile
- Synchronization
- N + 1 Redundancy
- Remote Turn On (TTL)
- Parallelable Operation
- Output Voltage Trim Pin
- Over Temperature Protection
- Output Overvoltage/Overcurrent
- Built-In Test (Output Power Good)
- 100% Environmental Screening (Military Version)

## SELECTION CHART

| Nominal Output Voltage | Output Current (Amps) | Model Number (Industrial) | Model Number (Military) |
|------------------------|-----------------------|---------------------------|-------------------------|
| 2                      | 10                    | NB50SI/2-A                | NB50SM/2-A              |
| 3.3                    | 10                    | NB50SI/3.3-A              | NB50SM/3.3-A            |
| 5                      | 10                    | NB50SI/5-A                | NB50SM/5-A              |
| 5.2                    | 9.6                   | NB50SI/5.2-A              | NB50SM/5.2-A            |
| 12                     | 4.2                   | NB50SI/12-A               | NB50SM/12-A             |
| 15                     | 3.3                   | NB50SI/15-A               | NB50SM/15-A             |
| 24                     | 2.1                   | NB50SI/24-A               | NB50SM/24-A             |
| 28                     | 1.8                   | NB50SI/28-A               | NB50SM/28-A             |

## OUTPUT CHARACTERISTICS

|                                                            | PER CHANNEL |         |                   |                    |
|------------------------------------------------------------|-------------|---------|-------------------|--------------------|
|                                                            | Min.        | Typ.    | Max.              | Units              |
| Set Point Accuracy                                         |             |         | 1 <sup>†</sup>    | % V <sub>out</sub> |
| Load Regulation                                            |             | 5       | 0.2% <sup>1</sup> | mV                 |
| Line Regulation                                            |             | 5       | 0.2% <sup>1</sup> | mV                 |
| Ripple P-P (10 MHz) (2V-24V) [fig. IV]*                    |             | 45      | 150               | mV                 |
| Ripple P-P (10 MHz) (28V)                                  |             | 0.2%    | 1%                | % V <sub>out</sub> |
| Trim Range                                                 | 100         |         | 110               | % V <sub>out</sub> |
| Remote Sense Compensation                                  |             |         | 0.5               | Vdc                |
| Overvoltage Protection (2V, 3.3V)                          |             | 140     |                   | % V <sub>out</sub> |
| Overvoltage Protection (5V-28V)                            |             | 125     |                   | % V <sub>out</sub> |
| Current Sharing                                            |             | ±10     |                   | % I <sub>out</sub> |
| Transient Response (Vout 1%) Time/Overshoot [fig. V & VI]* |             |         |                   |                    |
| 20-80% Load                                                |             | 350/300 |                   | μS/mV              |
| Low Line - High Line                                       |             | 300/350 |                   | μS/mV              |
| 50-100% Load                                               |             | 250/300 |                   | μS/mV              |
| Temperature Drift                                          |             | 0.01    | 0.05              | %/°C               |
| Long Term Drift                                            |             | 0.01    | 0.02              | %/1KHrs            |
| Current Limit                                              | 105         | 125     | 150               | % I <sub>out</sub> |
| Short Circuit Current                                      | 25          |         | 75                | % I <sub>out</sub> |
| Turn On Time [fig. XI]*                                    |             | 1.5     |                   | mS                 |
| Logic Turn On Time [fig. IX]*                              |             | 1.5     |                   | mS                 |

<sup>†</sup> 1% or 50mV, whichever is greater

<sup>1</sup> .2% or 25 mV, whichever is greater

\* figures on page 21



## HIGH DENSITY DC TO DC CONVERTERS

### TEMPERATURE CHARACTERISTICS

|                                   | Min. | Typ. | Max. | Units |
|-----------------------------------|------|------|------|-------|
| Operating                         | -55  |      | +100 | °C    |
| Storage (Ambient)                 | -55  |      | +125 | °C    |
| Over Temperature Shutdown         |      | +105 |      | °C    |
| Thermal Resistance Case - Ambient |      | 12   |      | °C/W  |

### ENVIRONMENTAL SCREENING - M MODEL

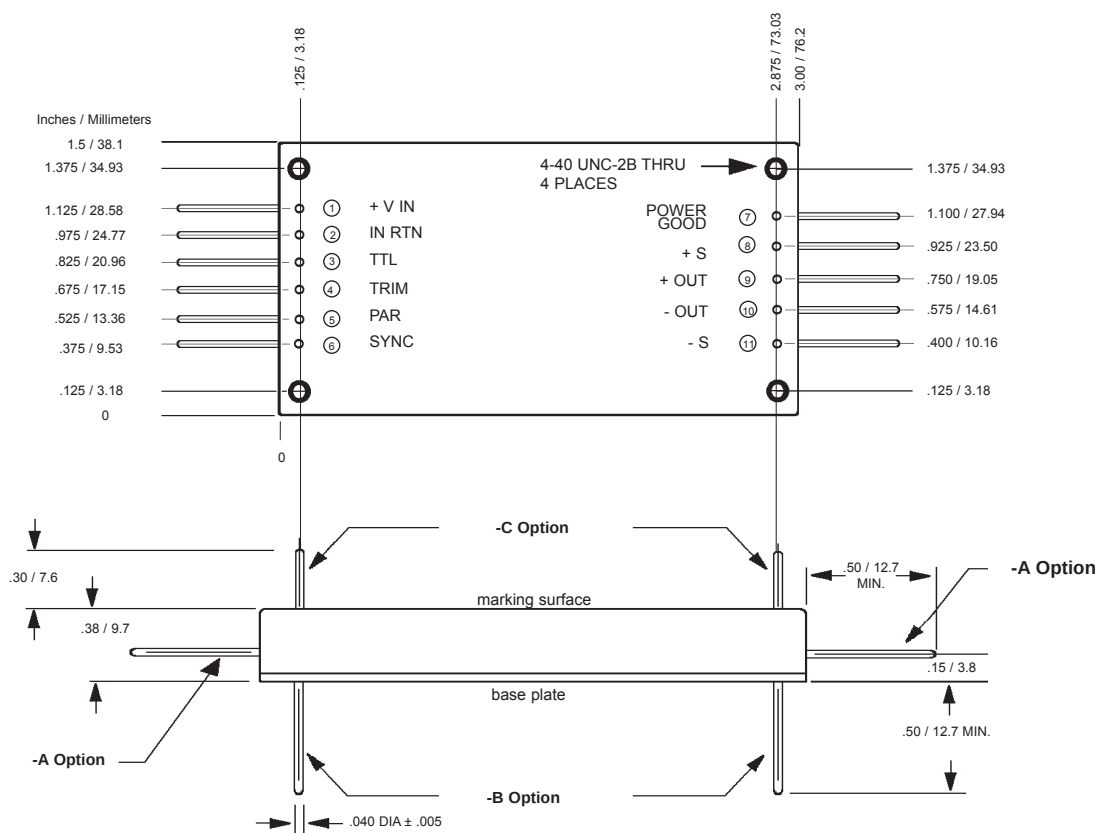
|                      |                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------|
| Stabilization Bake:  | +125°C for 24 hours similar to Mil-Std-883, M1008.2, Condition B                                       |
| Temperature Cycling: | 10 cycles at -55°C to +125°C (transition period 36 minutes) similar to Mil-Std-883, M1010, Condition B |
| Burn-in:             | 160 hours at +85°C min.                                                                                |
| Final Testing        |                                                                                                        |

### ENVIRONMENTAL SCREENING - I MODEL

|               |                        |
|---------------|------------------------|
| Burn-in:      | 16 hours at +85°C min. |
| Final Testing |                        |

See "Guide to Operation" for full details.

### CASE DRAWINGS



**Tolerances:** inches - x.xx = ±0.03 mm - x.x = ±0.8  
x.xxx = ±0.015 x.xx = ±0.40

All specifications are typical @+25°C with nominal input voltage under full output load conditions, unless otherwise noted. Specifications subject to change without notice.

## Industrial & Military Grades

### ISOLATION CHARACTERISTICS

|                                 | Min. | Typ.  | Units |
|---------------------------------|------|-------|-------|
| Isolation:                      |      |       |       |
| Input to Output                 | 500  |       | Vdc   |
| Output to Base                  | 250  |       | Vdc   |
| Input to Base                   | 250  |       | Vdc   |
| Input to Output Capacitance     |      | 0.022 | µf    |
| Insulation Resistance (@50 Vdc) | 50   |       | MOhm  |

### MECHANICAL CHARACTERISTICS

|          |                   |                                    |
|----------|-------------------|------------------------------------|
| Weight   | 3.2               | oz.                                |
|          | 90                | grams                              |
| Size     | 3.0 x 1.5 x 0.38  | inch                               |
|          | 76.2 x 38.1 x 9.7 | mm                                 |
| Volume   | 1.71              | inch³                              |
|          | 28                | cm³                                |
| Material | Pin               | Brass (Solder Plating)             |
|          | Baseplate         | Aluminum 5052-H32                  |
|          | Case              | 28 Gauge Steel (cold rolled)       |
| Finish   |                   | Nickel Plating                     |
| Mounting | Standard          | 4-40 inserts provided in baseplate |
|          | I Option          | M2.5 metric inserts (4 places)     |
|          | D Option          | 0.115 DIA thru holes (4 places)    |

# NB50T

50 Watts Output Power

TRIPLE OUTPUT



## How to Order:

**NB 50 T M / 5 / 15 - A - D**

|                                |                                        |
|--------------------------------|----------------------------------------|
| Series                         | Options:                               |
| Total Output Power             | A- pins out side of unit               |
| Triple Output                  | B- pins out bottom of unit             |
| Industrial (I) or Military (M) | C- pins out top of unit                |
| Main Output Voltage            | D- through hole inserts (STD threaded) |
| Auxiliary Output Voltages      | I - M2.5 inserts                       |

## INPUT CHARACTERISTICS

|                                        | Min. | Typ. | Max. | Units |
|----------------------------------------|------|------|------|-------|
| Input Voltage                          | 14   | 28   | 40   | Vdc   |
| Brown Out (75% of Full Load) [fig. I]* |      | 12   |      | Vdc   |
| No Load Power Dissipation              |      | 3    | 5    | Watt  |
| Inrush Charge [fig. VII]*              |      |      | 2    | mc    |
| Reflective Ripple Current [fig. VIII]* |      | 10   |      | %     |
| Logic Disable Current (Sink)           |      | 150  | 250  | μA    |
| Logic Disable Power In                 |      | 1.2  | 2.5  | W     |
| Input Ripple Rejection (120 Hz)        |      | 50   |      | dB    |
| Input Ripple Rejection (800 Hz)        |      | 40   |      | dB    |
| Efficiency up to [fig. II & III]*      |      | 85   |      | %     |

EMI: Units conform to MIL-STD-461D (on the input leads) with companion filter

## OUTPUT CHARACTERISTICS

| +5V Output                                                             |      |         |      | Auxiliary Outputs |        |      |                    |
|------------------------------------------------------------------------|------|---------|------|-------------------|--------|------|--------------------|
|                                                                        | Min. | Typ.    | Max. | Min.              | Typ.   | Max. | Units              |
| Set Point Accuracy                                                     |      | 1 †     | 2    |                   |        | 1    | % V <sub>out</sub> |
| Load Regulation                                                        |      | 0.1     | 0.5  |                   | 0.3    | 1    | % V <sub>out</sub> |
| Line Regulation                                                        |      | 0.1     | 0.5  |                   | 0.2    | 1    | % V <sub>out</sub> |
| Ripple P-P (10 MHz) [fig. IV]*                                         |      | 50      | 125  |                   | 50     | 150  | mV                 |
| Trim Range                                                             | 100  |         | 110  |                   |        |      | % V <sub>out</sub> |
| Remote Sense Compensation                                              |      |         | 0.5  |                   |        |      | Vdc                |
| Overvoltage Protection                                                 |      | 125     |      |                   |        |      | % V <sub>out</sub> |
| Transient Response (V <sub>out</sub> 1%) Time/Overshoot [fig. V & VI]* |      |         |      |                   |        |      |                    |
| 20-80% Load                                                            |      | 350/200 |      |                   | 200/30 |      | μS/mV              |
| Low Line - High Line                                                   |      | 500/350 |      |                   | 500/50 |      | μS/mV              |
| 50-100% Load                                                           |      | 300/150 |      |                   | 200/30 |      | μS/mV              |
| Temperature Drift                                                      |      | 0.01    | 0.05 |                   | 0.02   | 0.05 | %/°C               |
| Long Term Drift                                                        |      | 0.01    | 0.02 |                   | 0.01   | 0.02 | %/1KHrs            |
| Current Limit                                                          | 105  | 125     | 150  | 105               | 125    | 150  | % I <sub>out</sub> |
| Short Circuit Current                                                  | 25   |         | 75   | 25                |        | 75   | % I <sub>out</sub> |
| Turn On Time [fig. X, XI, XII]*                                        |      | 1.0     |      |                   | 1.0    |      | mS                 |
| Logic Turn On Time [fig. IX]*                                          |      | 1.0     |      |                   | 1.0    |      | mS                 |

† 1% or 50mV, whichever is greater  
\* figures on page 22

All specifications are typical @+25°C with nominal input voltage under full output load conditions, unless otherwise noted. Specifications subject to change without notice.



## FEATURES

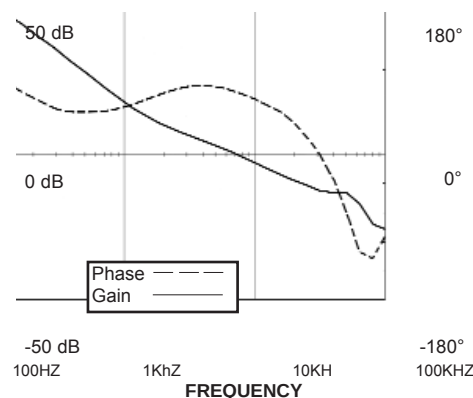
- .38 Inch Profile
- Synchronization
- Remote Turn On (TTL)
- Output Voltage Trim Pin
- Over Temperature Protection
- Built-In Test (Output Power Good; Main Output)
- Output Overvoltage/Overcurrent Protection
- 100% Environmental Screening (Military Version)

## SELECTION CHART

| Main Output |         | Auxiliary Output |         | Model Number  |
|-------------|---------|------------------|---------|---------------|
| Voltage     | Current | Voltage          | Current |               |
| 5           | 5.0A    | ±12              | 1.04A   | NB50TI/5/12-A |
| 5           | 5.0A    | ±15              | 0.83A   | NB50TI/5/15-A |

The above model number is for the Industrial grade power supply. For the Military grade power supply replace the 'I' with 'M'.

## STABILITY





## HIGH DENSITY DC TO DC CONVERTERS

## Industrial & Military Grades

### TEMPERATURE CHARACTERISTICS

|                                   | Min. | Typ. | Max. | Units |
|-----------------------------------|------|------|------|-------|
| Operating                         | -55  |      | +100 | °C    |
| Storage (Ambient)                 | -55  |      | +125 | °C    |
| Over Temperature Shutdown         |      | +105 |      | °C    |
| Thermal Resistance Case - Ambient |      | 11   |      | °C/W  |

### ENVIRONMENTAL SCREENING - M MODEL

Stabilization Bake: +125°C for 24 hours similar to Mil-Std-883, M1008.2, Condition B

Temperature Cycling: 10 cycles at -55°C to +125°C (transition period 36 minutes) similar to Mil-Std-883, M1010, Condition B

Burn-in: 160 hours at +85°C min.

Final Testing

### ENVIRONMENTAL SCREENING - I MODEL

Burn-in: 16 hours at +85°C min.

Final Testing

See "Guide to Operation" for full details.

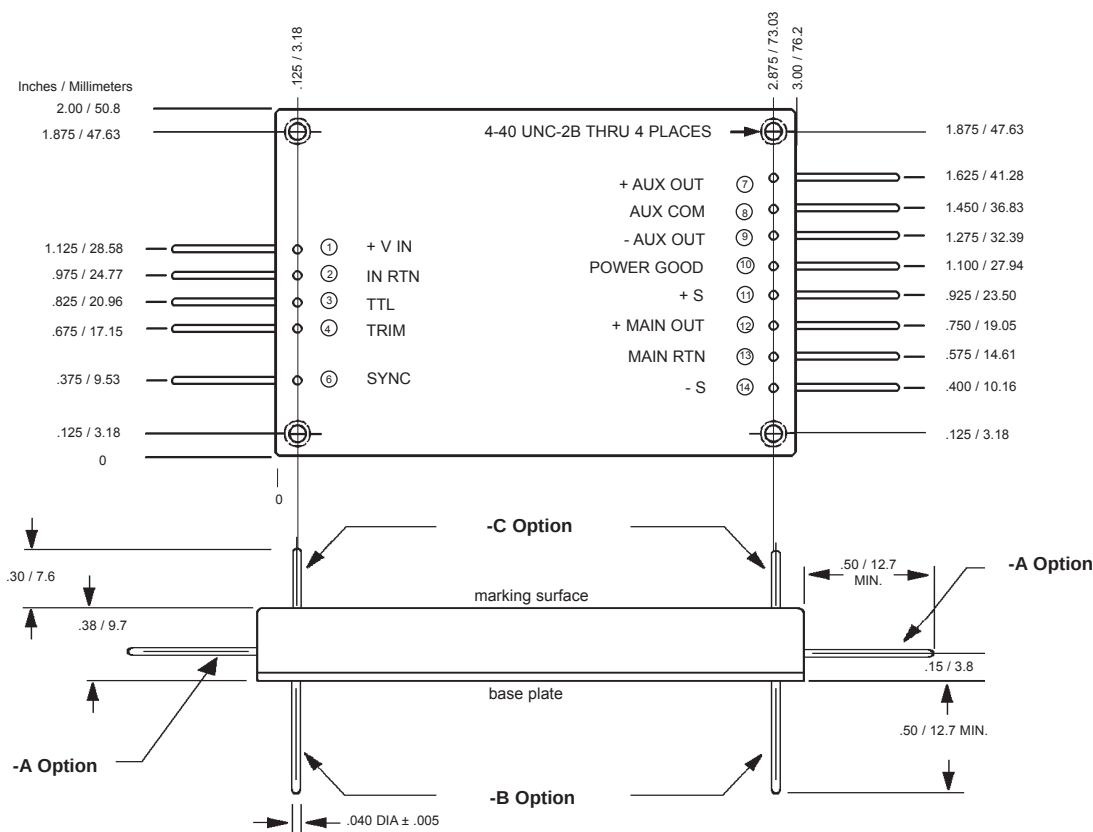
### ISOLATION CHARACTERISTICS

|                                 | Min. | Typ.  | Units |
|---------------------------------|------|-------|-------|
| Isolation:                      |      |       |       |
| Input to Output                 | 500  |       | Vdc   |
| Output to Base                  | 250  |       | Vdc   |
| Input to Base                   | 250  |       | Vdc   |
| Input to Output Capacitance     |      | 0.022 | µf    |
| Insulation Resistance (@50 Vdc) | 50   |       | MOhm  |

### MECHANICAL CHARACTERISTICS

|          |                   |                                    |
|----------|-------------------|------------------------------------|
| Weight   | 4.2               | oz.                                |
|          | 120               | grams                              |
| Size     | 3.0 x 2.0 x 0.38  | inch                               |
|          | 76.2 x 50.8 x 9.7 | mm                                 |
| Volume   | 2.28              | inch <sup>3</sup>                  |
|          | 37.5              | cm <sup>3</sup>                    |
| Material | Pin               | Brass (Solder Plating)             |
|          | Baseplate         | Aluminum 5052-H32                  |
|          | Case              | 28 Gauge Steel (cold rolled)       |
| Finish   |                   | Nickel Plating                     |
| Mounting | Standard          | 4-40 inserts provided in baseplate |
|          | I Option          | M2.5 metric inserts (4 places)     |
|          | D Option          | 0.115 DIA thru holes (4 places)    |

### CASE DRAWINGS



Tolerances: inches - x.xx = ±0.03 mm - x.x = ±0.8  
x.xxx = ±0.015 x.xx = ±0.40

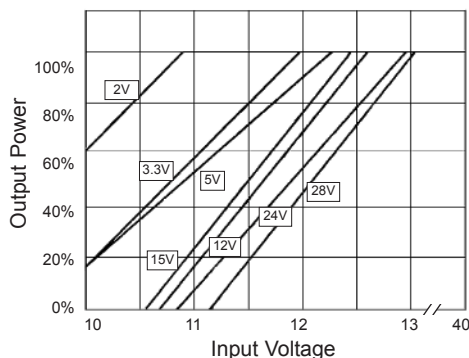
All specifications are typical @+25°C with nominal input voltage under full output load conditions, unless otherwise noted. Specifications subject to change without notice.



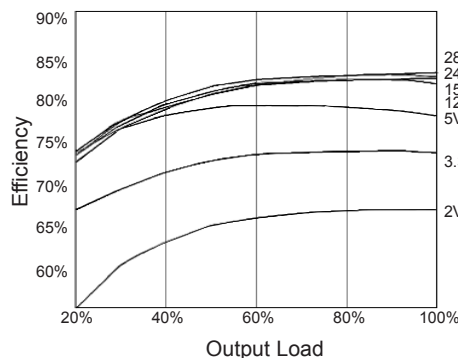
# NB50S NB100 NB150

## Performance Characteristics

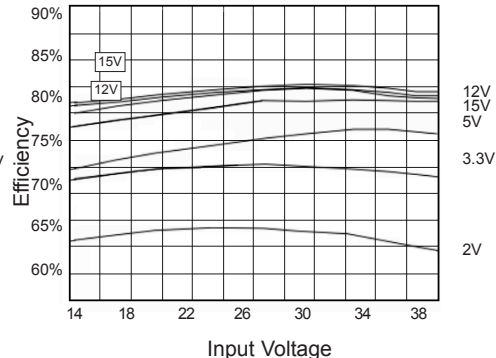
I. Input Voltage vs. Output Power



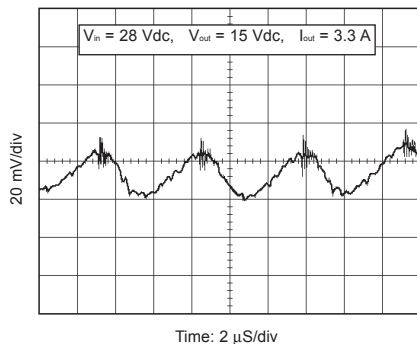
II. Efficiency vs. Output Power



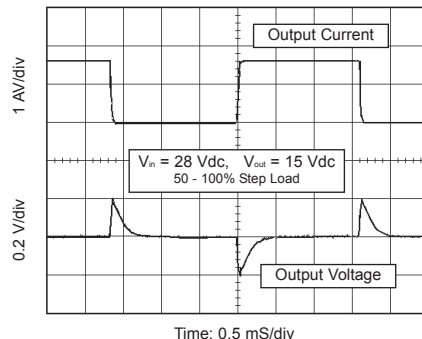
III. Efficiency vs. Input Voltage



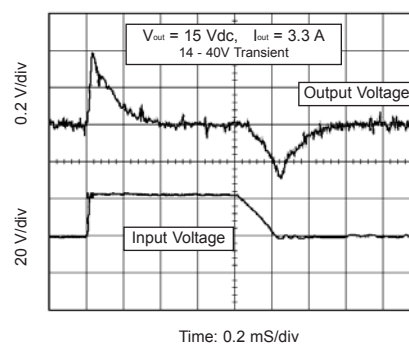
IV. Output Voltage Ripple



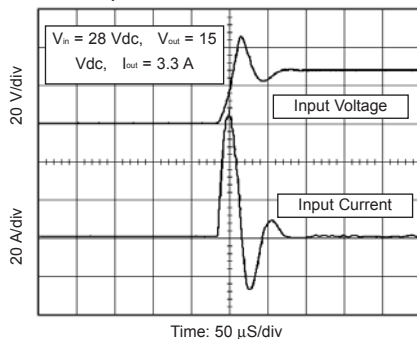
V. Load Transient Response



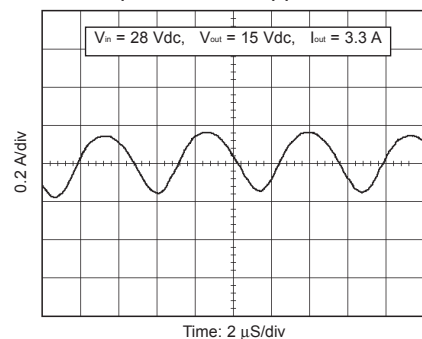
VI. Input Transient Response



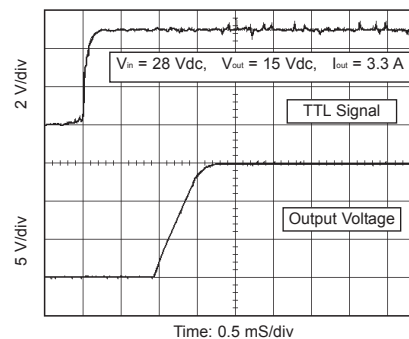
VII. Input Inrush Current



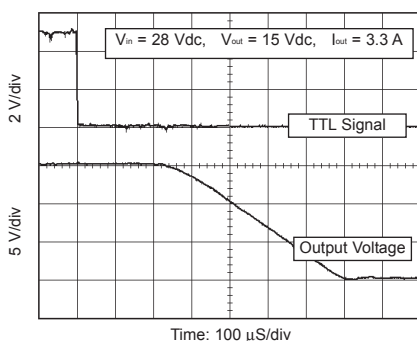
VIII. Input Current Ripple



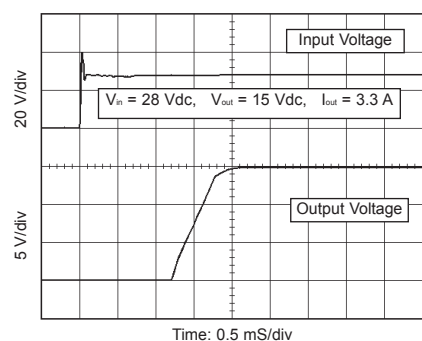
IX. TTL Turn On



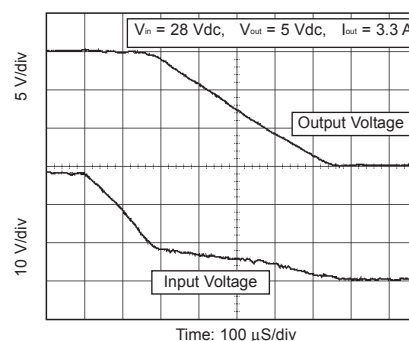
X. TTL Turn-off



XI. Turn-on



XII. Turn-off / Hold-up Time



# NBF50

## EMI Filter



### How to Order:

**NBF 50 - A - D**

Series

Total Output Power

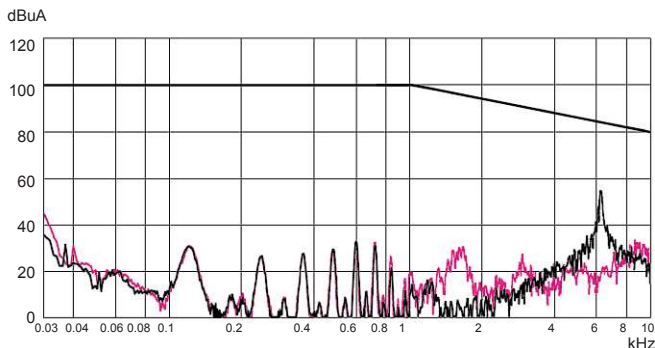
Options:

A- pins out side of unit  
B- pins out bottom of unit  
C- pins out top of unit  
D- through hole inserts (STD threaded)  
I - M2.5 inserts

### EMI COMPARISON GRAPHS

28V<sub>in</sub> - 50 watts

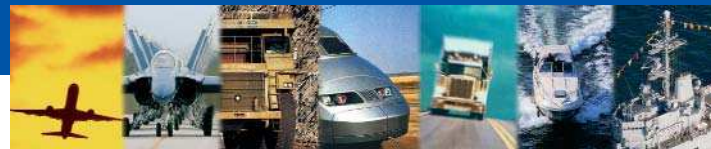
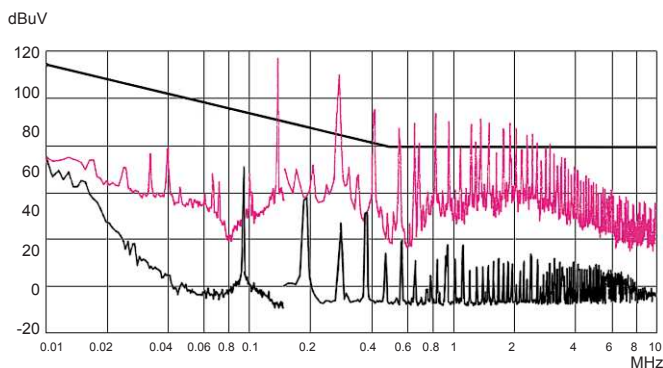
MIL-STD-461D, CE101-4



28V<sub>in</sub> - 50 watts

MIL-STD-461D, CE102

■ With NBF50  
■ Without NBF50



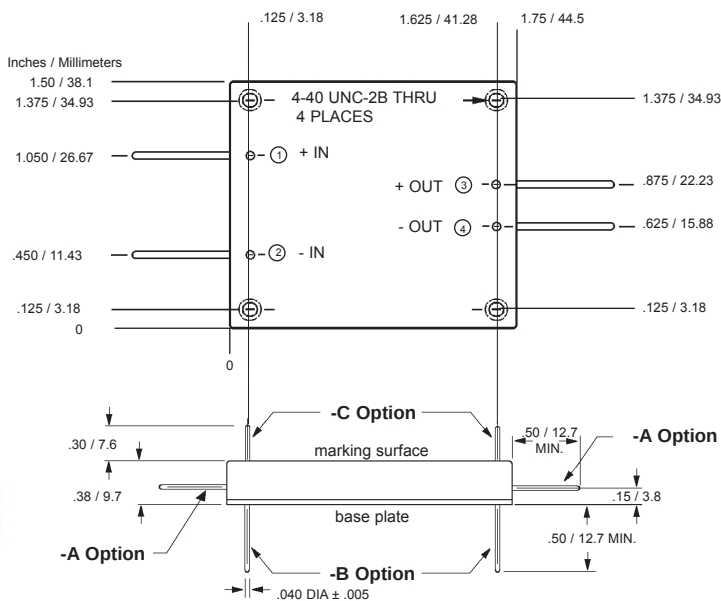
### FEATURES

- MIL-STD-461D Compliance CE101 and CE102
- Thermally Non-dissipative device
- Less than 1.0 volt drop across the NBF50
- Does Not Require External Components
- Meets Environmental Requirements of MIL-STD-810E and MIL-STD-901C
- For Use With NB15, NB30, NB45 and NB50 Series DC/DC Converters

### SPECIFICATIONS

|                                           |                   |                                    |
|-------------------------------------------|-------------------|------------------------------------|
| Input Voltage (maximum)                   | 50                | Vdc                                |
| Rated Output Current                      | 5                 | A                                  |
| Isolation (Input/Output to Case)          | 500               | Vdc                                |
| Operating Temperature                     | -55 to + 100      | °C                                 |
| Storage Temperature                       | -55 to + 125      | °C                                 |
| Insulation Resistance (measured at 50Vdc) | 50                | M Ohm                              |
| Weight                                    | 1.98              | oz.                                |
|                                           | 56.0              | grams                              |
| Size                                      | 1.75 x 1.5 x 0.38 | inch                               |
|                                           | 44.5 x 38.1 x 9.7 | mm                                 |
| Volume                                    | 1.00              | inch <sup>3</sup>                  |
|                                           | 16.5              | cm <sup>3</sup>                    |
| Material                                  | Pin               | Brass (Solder Plating)             |
|                                           | Baseplate         | Aluminum 5052-H32                  |
|                                           | Case              | 28 Gauge Steel (cold rolled)       |
| Finish                                    |                   | Nickel Plating                     |
| Mounting                                  | Standard          | 4-40 inserts provided in baseplate |
|                                           | I Option          | M2.5 metric inserts (4 places)     |
|                                           | D Option          | 0.115 DIA thru holes (4 places)    |

### CASE DRAWING



|             |        |   |       |          |
|-------------|--------|---|-------|----------|
| Tolerances: | inches | - | x.xx  | = ±0.03  |
|             |        |   | x.xxx | = ±0.015 |
|             | mm     | - | x.x   | = ±0.8   |
|             |        |   | x.xx  | = ±0.40  |