

NB50S single and triple-output DC/DC converters

14 – 40Vin, 2 – 28Vout, 50 watts



How to Order:

NB	50	S	M	/	5	-	A	-	D
Series									
Total Output Power									
Single Output									
Industrial (I) or Military (M)									

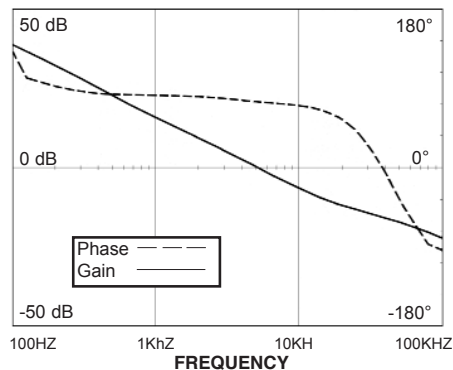
Output Voltage: Maximum current as stated in chart

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

	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

	Min.	Typ.	Max.	Units
Set Point Accuracy			1 †	% V _{out}
Load Regulation		5	0.2% [†]	mV
Line Regulation		5	0.2% [†]	mV
Ripple P-P (10 MHz) (2V-24V) [fig. IV]*		45	150	mV
Ripple P-P (10 MHz) (28V)		0.2%	1%	% V _{out}
Trim Range	100		110	% V _{out}
Remote Sense Compensation			0.5	Vdc
Overvoltage Protection (2V, 3.3V)		140		% V _{out}
Overvoltage Protection (5V-28V)		125		% V _{out}
Current Sharing		±10		% I _{out}
Transient Response (V _{out} 1%) Time/Overhoot [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 _{out}
Short Circuit Current	25		75	% I _{out}
Turn On Time [fig. XI]*		1.5		mS
Logic Turn On Time [fig. IX]*		1.5		mS

† 1% or 50mV, whichever is greater

[†] .2% or 25 mV, whichever is greater

* figures on page 21



Powering Business Worldwide

For additional information, call 310.542.8561
or e-mail: Orders-EP@eaton.com

www.eaton.com/powerconversion

Industrial & military grade 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.

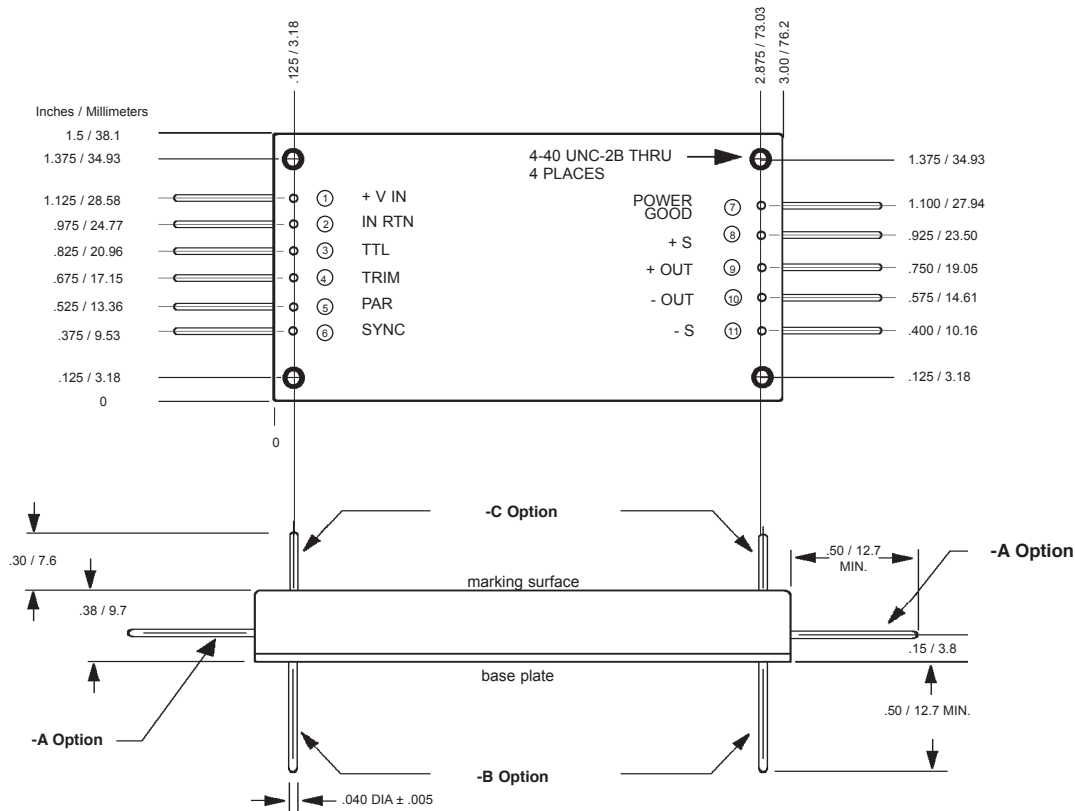
CASE DRAWINGS

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)



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.

Performance characteristics



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		%

EML: 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 _{out}
Load Regulation		0.1	0.5		0.3	1	% V _{out}
Line Regulation		0.1	0.5		0.2	1	% V _{out}
Ripple P-P (10 MHz) [fig. IV]*		50	125		50	150	mV
Trim Range	100		110				% V _{out}
Remote Sense Compensation			0.5				Vdc
Overvoltage Protection		125					% V _{out}
Transient Response (V _{out} 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 _{out}
Short Circuit Current	25		75	25		75	% I _{out}
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

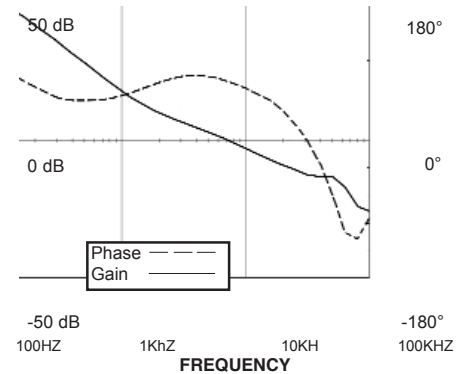
- .38 Inch Profile
- Synchronization
- Remote Turn On (TTL)
- Output Voltage Trim Pin
- Over Temperature Protection
- Built-In Test (Output Power Good; Main Output)
- Output Overvoltage/Overcurrent Protection
- 100% Environmental Screening (Military Version)

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



Industrial & military grade 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		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.

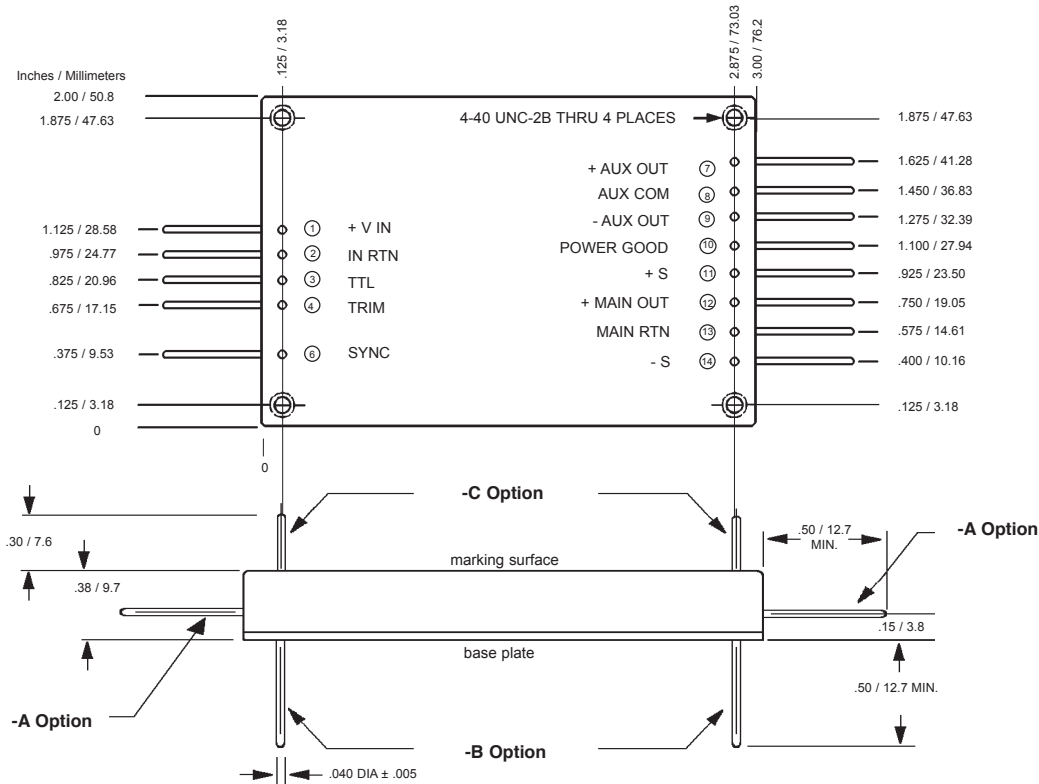
ISOLATION CHARACTERISTICS

	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

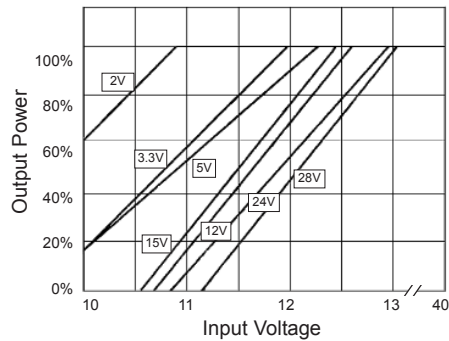
Weight	4.2	oz.
	120	grams
Size	3.0 x 2.0 x 0.38	inch
	76.2 x 50.8 x 9.7	mm
Volume	2.28	inch³
	37.5	cm³
Material	Pin	Brass (Solder Plating)
	Baseplate	Aluminum 5052-H32
	Case	28 Gauge Steel (cold rolled)
Finish		Nickel Plating
Mounting	Standard	4-40 inserts provided in baseplate
	I Option	M2.5 metric inserts (4 places)
	D Option	0.115 DIA thru holes (4 places)

CASE DRAWINGS

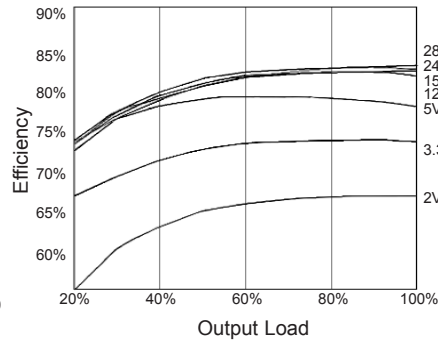


Performance characteristics

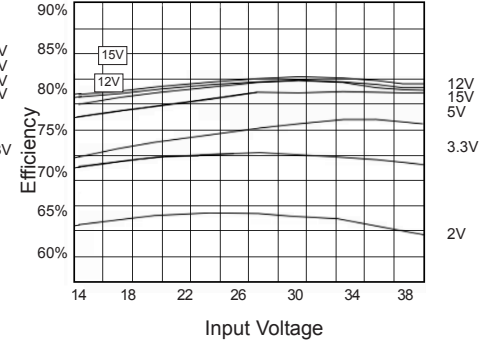
I. Input Voltage vs. Output Power



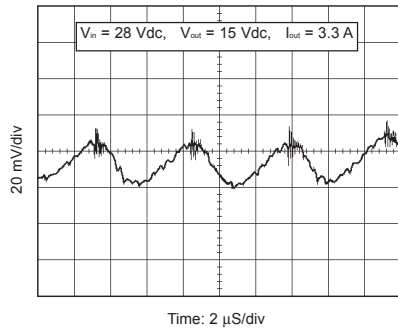
II. Efficiency vs. Output Power



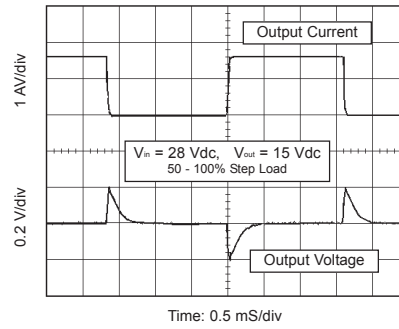
III. Efficiency vs. Input Voltage



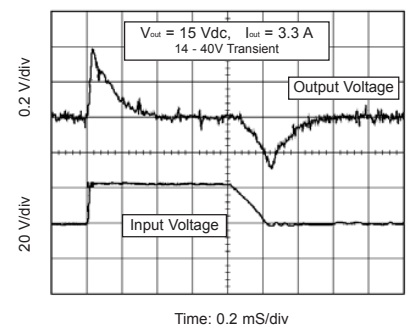
IV. Output Voltage Ripple



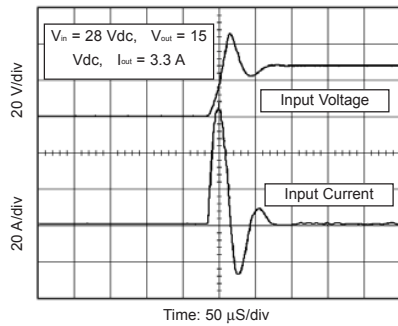
V. Load Transient Response



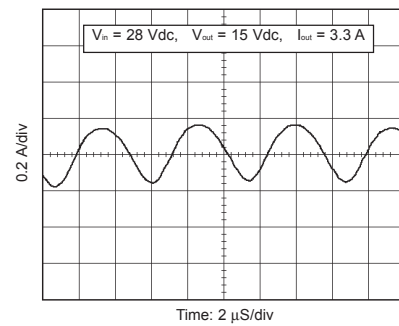
VI. Input Transient Response



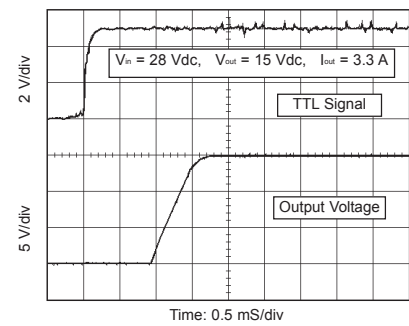
VII. Input Inrush Current



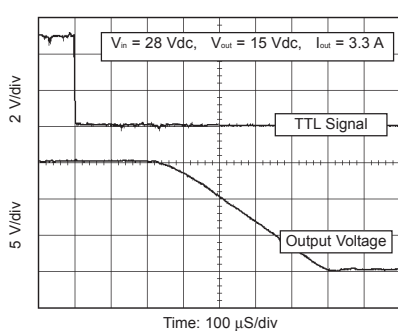
VIII. Input Current Ripple



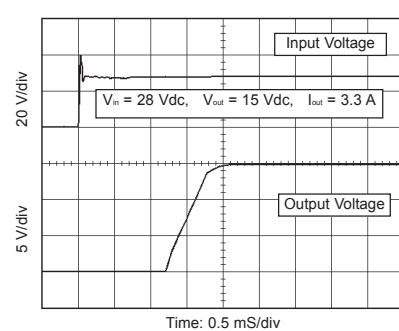
IX. TTL Turn On



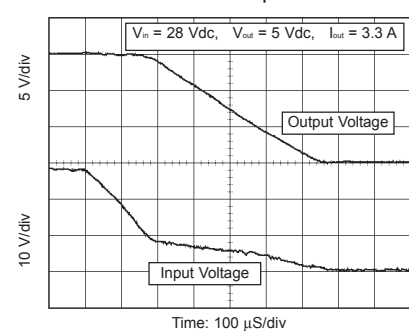
X. TTL Turn-off



XI. Turn-on



XII. Turn-off / Hold-up Time



NBF50 EMI filters



How to Order:

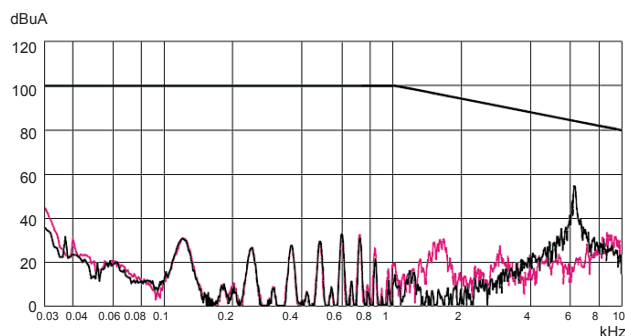
NBF 50 - A - D

Series
Total Output Power

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

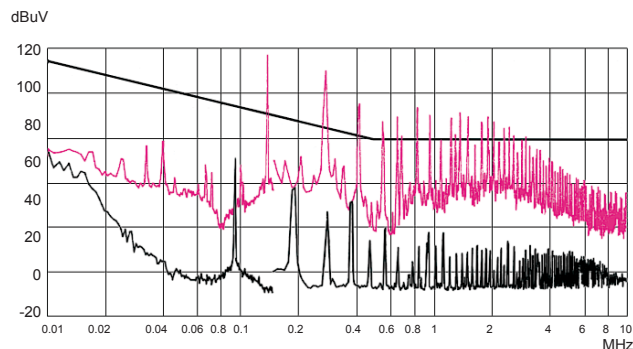
EMI COMPARISON GRAPHS

28V_{in} - 50 watts
MIL-STD-461D, CE101-4



28V_{in} - 50 watts
MIL-STD-461D, CE102

■ With NBF50
■ Without NBF50



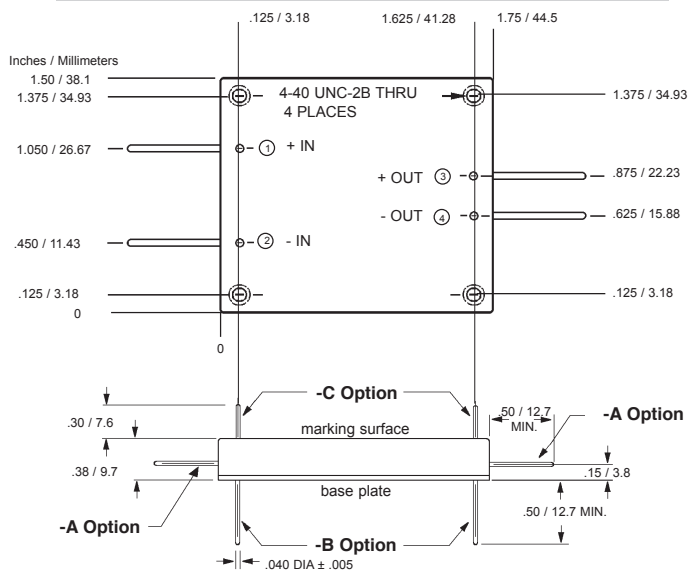
FEATURES

- 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 ³
	16.5	cm ³
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

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

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