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CB SERIES 28 VIN DC / DC CONVERTERS

ACCESSORY PRODUCT -- CBF (EMI FILTER)

Last Updated on Mar.05, 2009

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

Martek Power Abbott, Inc. 1111 Knox Street, Torrance, CA 90502 U.S.A. Tel: 310.202.8820 Fax: 310.836.4926
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CB5S

5 Watts Output Power

SINGLE OUTPUT

FEATURES

- **.38 Inch Profile**
- **Remote Turn On / Output Status (TTL)**
- **Output Overvoltage Protection**
- **Output Overcurrent Protection**
- **Fixed Frequency (500kHz) Conversion**
- **High Temperature Burn-In**
- **100% Environmental Screening (M Models)**

How to Order:

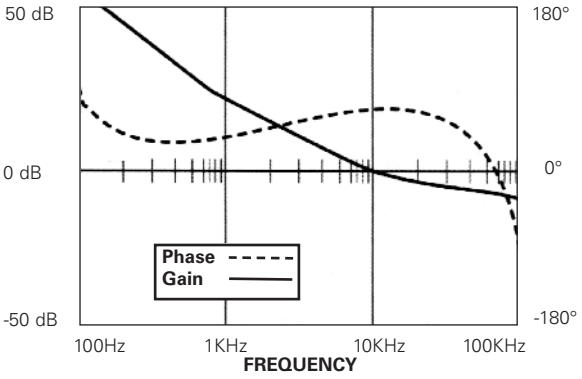
CB 5 S M / 5

- Series
- Total Output Power
- Single Output
- Unscreened (I) or Screened (M)
- Output Voltage: Maximum Current as stated in selection chart

INPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Input Voltage	14	28	40	Vdc
Brown Out (@75% Load)		12.2	12.6	Vdc
No Load Power Dissipation		450	600	mw
Inrush Charge			200	µc
Reflective Ripple Current		8		%
Logic Disable Current (Sink)		150	175	µA
Logic Disable Voltage (TTL)	0		0.8	Vdc
Logic Disable Power In		175	200	mw
Efficiency (FL)	75	78		%
3.3 Vdc Output (FL)	70	73		%
2 Vdc Output (FL)	60	63		%
EMI: Units conform to MIL-STD-461D (on the input leads) with companion filter				
Input Transient: Units can withstand 50V transients for up to 0.1 second				

STABILITY



SELECTION CHART

Nominal Output Voltage (Volts)	Output Current (Amps)	Model Number (Unscreened)	Model Number (Screened)
2	1.0	CB5SI/2	CB5SM/2
3.3	1.0	CB5SI/3.3	CB5SM/3.3
5	1.0	CB5SI/5	CB5SM/5
5.2	0.96	CB5SI/5.2	CB5SM/5.2
12	0.42	CB5SI/12	CB5SM/12
15	0.33	CB5SI/15	CB5SM/15

OUTPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Set Point Accuracy		25	50 [1]	mV
Load Regulation		0.05	0.2 [4]	% V_{out}
Line Regulation		0.05	0.2 [4]	% V_{out}
Ripple P-P (10 MHz)		40	100 [2]	mV
Overvoltage Protection		125		% V_{out}
Transient Response (V_{out} 1%) Time/Overshoot				
20-80% Load		150/125	500/250 [3]	µS/mV
Low Line - High Line		100/200	500/250 [3]	µS/mV
50-100% Load		100/80	500/250 [3]	µS/mV
Temperature Drift		0.01	0.05	%/°C
Long Term Drift		0.01	0.02	%/1KHrs
Current Limit	105	130	150	% I_{out}
Short Circuit Current		50	100	% I_{out}
Turn On Time		2.5	10	mS
Logic Turn On Time		1	5	mS

[1] 1% or 50mV, whichever is greater
[2] 1% or 100mV, whichever is greater
[3] 5% or 250mV, whichever is greater
[4] 0.2% or 10mV, whichever is greater

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

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TEMPERATURE CHARACTERISTICS

	Min.	Typ.	Max.	Units
Operating (Case)	-55		+100	°C
Operating (Max.still ambient FL)		+70		°C
Storage (Ambient)	-55		+125	°C
Thermal Resistance Case- Ambient		22.6		°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 5°C/ minute) similar to MIL-STD-883, M1010, Condition B
Burn in:	160 hours @ 85°C min. with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

ENVIRONMENTAL SCREENING - I MODEL

Burn in:	16 hours @ 85°C min. with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

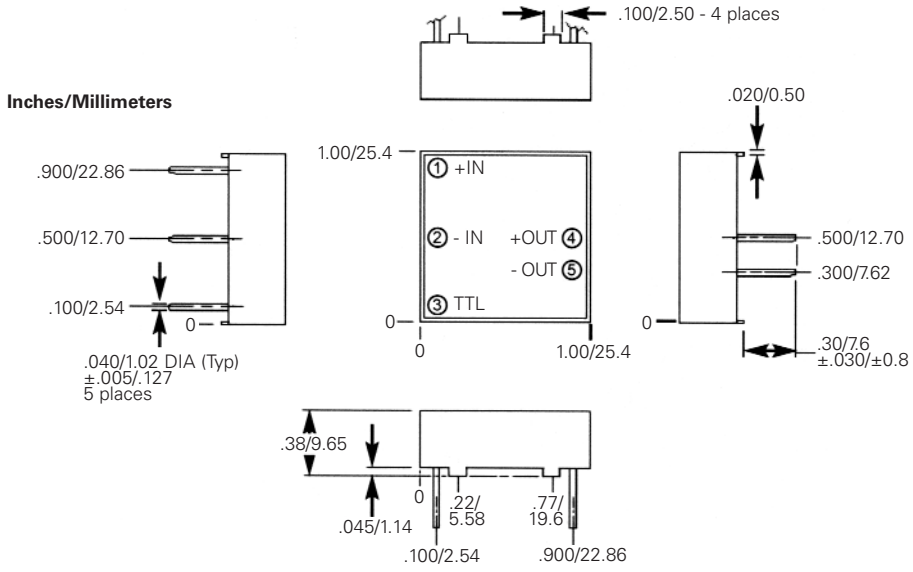
ISOLATION CHARACTERISTICS

	Min.	Units
Isolation:		
Input to Output	500	Vdc
Output to Case	250	Vdc
Input to Case	250	Vdc
Insulation Resistance (@50 Vdc)	50	MOhm

MECHANICAL CHARACTERISTICS

Weight	0.53 15	oz. grams
Size	1.0 x 1.0 x 0.38 25.4 x 25.4 x 9.7	inch mm
Volume	0.38 6.3	$inch^3$ cm^3
Material	Pin Case	Brass (Solder Plating) Aluminum 5052-H32

CASE DRAWINGS



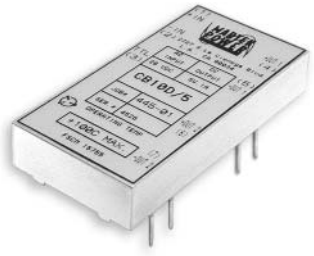
Tolerances: inches - x.xx = ±0.03, x.xxx = ±0.015 mm - x.x = ±0.8, x.xx = ±0.4

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

CB10D

10 Watts Output Power

DUAL OUTPUT



How to Order:

CB 10 D M / 5 / 12

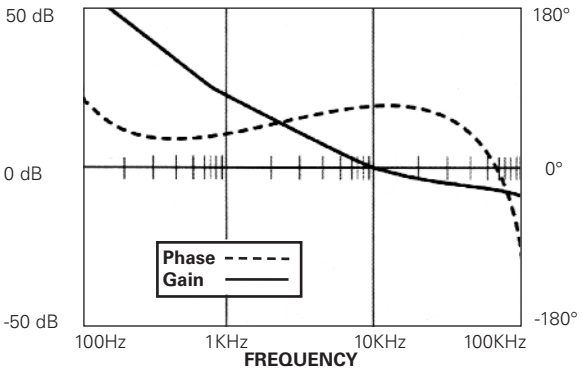
- Series: CB
- Total Output Power: 10
- Dual Output: D
- Unscreened (I) or Screened (M): M
- Output Voltage: Maximum Current as stated in selection chart: 5 / 12

Model Numbering Example:
An environmentally screened, 10 watts, dual output, 5 Vdc and 15 Vdc, the model number would be CB10DM/5/15. A non-environmentally screened dual output, 12 Vdc and 15 Vdc, would be model number CB10DI/12/15. The first output voltage in the model number is located on channel 1, and the second output voltage in the model number is located on channel 2 (see case drawing).

INPUT CHARACTERISTICS

	PER CHANNEL			
	Min.	Typ.	Max.	Units
Input Voltage	14	28	40	Vdc
Brown Out (@75% Load)		12.2	12.6	Vdc
No Load Power Dissipation		1200	1400	mw
Inrush Charge			200	µc
Reflective Ripple Current		8		%
Logic Disable Current (Sink)		150	175	µA
Logic Disable Voltage (TTL)	0		0.8	Vdc
Logic Disable Power In		175	200	mw
Efficiency (FL)	75	78		%
3.3 Vdc Output (FL)	70	73		%
2 Vdc Output (FL)	60	63		%
EMI: Units conform to MIL-STD-461D (on the input leads) with companion filter				
Input Transient: Units can withstand 50V transients for up to 0.1 second				

STABILITY



FEATURES

- **.38 Inch Profile**
- **Remote Turn On / Output Status (TTL)**
- **Output Overvoltage Protection**
- **Output Overcurrent Protection**
- **Outputs Isolated Allowing Any Combination of Output Voltages and Polarity**
- **Fixed Frequency (500kHz) Conversion**
- **High Temperature Burn-In**
- **100% Environmental Screening (M Models)**

SELECTION CHART

Nominal Output Voltage (Volts)	Dual Output; Per Channel Output Current (Amps)
2	1.0
3.3	1.0
5	1.0
5.2	0.96
12	0.42
15	0.33

OUTPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Set Point Accuracy		25	50 [1]	mV
Load Regulation		0.05	0.2 [4]	% V_{out}
Line Regulation		0.05	0.2 [4]	% V_{out}
Ripple P-P (10 MHz)		40	100 [2]	mV
Overvoltage Protection		125		% V_{out}
Transient Response (V_{out} 1%) Time/Overshoot				
20-80% Load		150/125	500/250 [3]	µS/mV
Low Line - High Line		100/200	500/250 [3]	µS/mV
50-100% Load		100/80	500/250 [3]	µS/mV
Temperature Drift		0.01	0.05	%/°C
Long Term Drift		0.01	0.02	%/1KHrs
Current Limit	105	130	160	% I_{out}
Short Circuit Current		80	120	% I_{out}
Turn On Time		2.5	10	mS
Logic Turn On Time		1	5	mS
Remote Turn On	4.5			V
Remote Turn Off			0.8	V

[1] 1% or 50mV, whichever is greater
[2] 1% or 100mV, whichever is greater
[3] 5% or 250mV, whichever is greater
[4] 0.2% or 10mV, whichever is greater

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

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TEMPERATURE CHARACTERISTICS

	Min.	Typ.	Max.	Units
Operating (Case)	-55		+100	°C
Operating (Max.still ambient FL)		+70		°C
Storage (Ambient)	-55		+125	°C
Thermal Resistance Case- Ambient		22.6		°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 5°C/ minute) similar to MIL-STD-883, M1010, Condition B
Burn in:	160 hours @ 85°C min. with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

ENVIRONMENTAL SCREENING - I MODEL

Burn in:	16 hours @ 85°C min. with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

ISOLATION CHARACTERISTICS

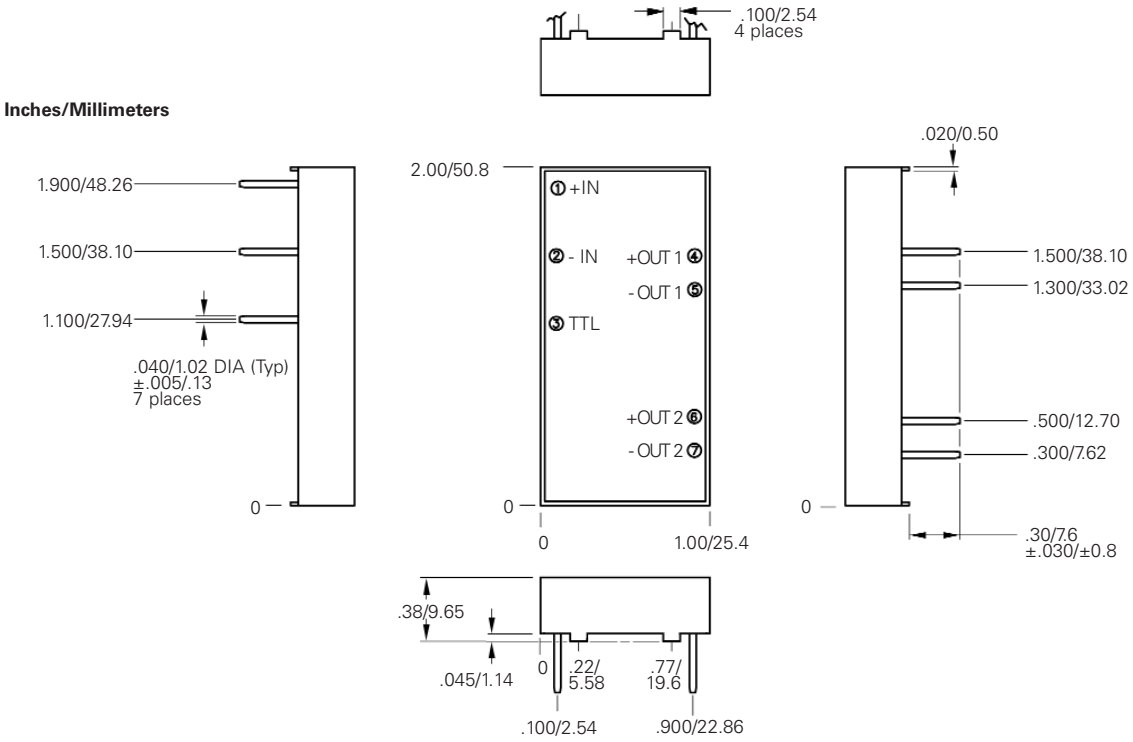
	Min.	Units
Isolation:		
Input to Output	500	Vdc
Output to Case	250	Vdc
Input to Case	250	Vdc
Insulation Resistance (@50 Vdc)	50	MOhm

MECHANICAL CHARACTERISTICS

Weight	1.06 30	oz. grams
Size	2.0 x 1.0 x 0.38 50.8 x 25.4 x 9.7	inch mm
Volume	0.76 12.6	$inch^3$ cm^3
Material	Pin Case	Brass (Solder Plating) Aluminum 5052-H32

CASE DRAWINGS

Inches/Millimeters



Tolerances: inches - x.xx = ±0.03, x.xxx = ±0.015 mm - x.x = ±0.8, x.xx = ±0.4

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

CB30S

30 Watts Output Power

SINGLE OUTPUT

How to Order

CB 30 S M / 5 - C - D

- Series
- Total Output Power
- Single Output
- Unscreened (I) or Screened (M)
- Output Voltage: Maximum current as stated in selection chart
- Options

Options:
- **B** - pins out bottom of unit
- **C** - pins out top of unit
- **D** - through hole inserts (.115 DIA)
- **I** - M2.5 inserts (STD 4 - 40 Inserts)

FEATURES

- **.38 Inch Profile**
- **Remote Turn On (TTL)**
- **Output Overvoltage Protection**
- **Output Overcurrent Protection**
- **Over Temperature Protection**
- **Output Voltage Trim**
- **100% Environmental Screening (M Models)**

SELECTION CHART

Nominal Output Voltage (Volts)	Output Current (Amps)	Model Number (Unscreened)	Model Number (Screened)
2	6.0	CB30SI/2-C	CB30SM/2-C
3.3	6.0	CB30SI/3.3-C	CB30SM/3.3-C
5	6.0	CB30SI/5-C	CB30SM/5-C
5.2	5.8	CB30SI/5.2-C	CB30SM/5.2-C
12	2.5	CB30SI/12-C	CB30SM/12-C
15	2.0	CB30SI/15-C	CB30SM/15-C
24	1.3	CB30SI/24-C	CB30SM/24-C
28	1.1	CB30SI/28-C	CB30SM/28-C

INPUT CHARACTERISTICS

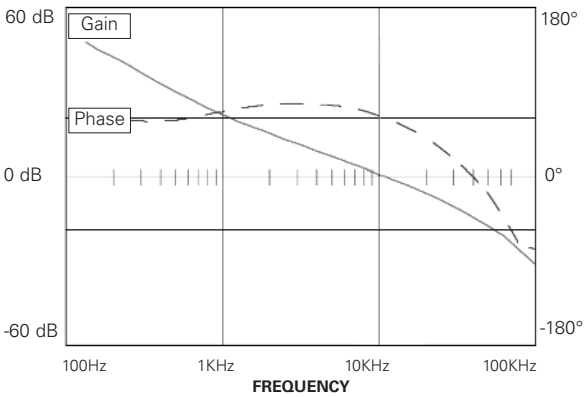
	Min.	Typ.	Max.	Units
Input Voltage	16	28	40	Vdc
Brown Out (75% of Full Load) [fig. I]*			13.5	Vdc
No Load Power Dissipation		1.0		W
Logic Disable Current (Sink)			150	µA
Logic Disable Voltage (TTL)	0		0.8	Vdc
Logic Disable Power In		300		mw
Efficiency (FL) [fig. II, III]*				
>=5 Vdc Output (FL)	80			%
<5 Vdc Output (FL)	65			%
EMI: Units conform to MIL-STD-461D with companion filter module (CBF30)				
Input Transient: Units can withstand 50V transients for up to 100 ms per MIL-STD-704E				

OUTPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Set Point Accuracy		25	50 [1]	mV
Load Regulation		10	20 [2]	mV
Line Regulation		10	20 [3]	mV
Ripple P - P (10 MHz) [fig. IV]*		50	100 [4]	mV
Overvoltage Protection		125		% V_{out}
Transient Response (V_{out} 1%) Time/Overshoot [fig. V & VI]*				
20 - 80% Load (@ Nom. Line)		250/250	500/500	µS/mV
Low Line - High Line		250/250	500/500	µS/mV
50 - 100% Load (@ Nom. Line)		250/250	500/500	µS/mV
Temperature Drift		0.01	0.05	%/°C
Current Limit	105		150	% I_{out}
Short Circuit Current	25	50	75	% I_{out}
Trim Range	90		110	% V_{out}
Turn On Time [fig. XI]*		5		mS
Logic Turn On Time [fig. IX]*		2.5		mS

[1] 1% or 50mV, whichever is greater
[2] or 0.2% maximum, whichever is greater from no load to full load
[3] or 0.2% maximum, whichever is greater from low line to high line
[4] or 1% maximum, whichever is greater
* see figures on page 13

STABILITY



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TEMPERATURE CHARACTERISTICS

	Min.	Typ.	Max.	Units
Operating (Case)	-55		+100	°C
Storage (Ambient)	-55		+125	°C
Thermal Resistance Case (Ambient)		13		°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 5°C/ min.)similar to MIL-STD-883, M1010, Condition B
Burn in:	160 hours @ 85°C minimum with V_{in}=28Vdc and output at full load
Final Testing	

ENVIRONMENTAL SCREENING - I MODEL

Burn in:	16 hours @ 85°C minimum with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

ISOLATION CHARACTERISTICS

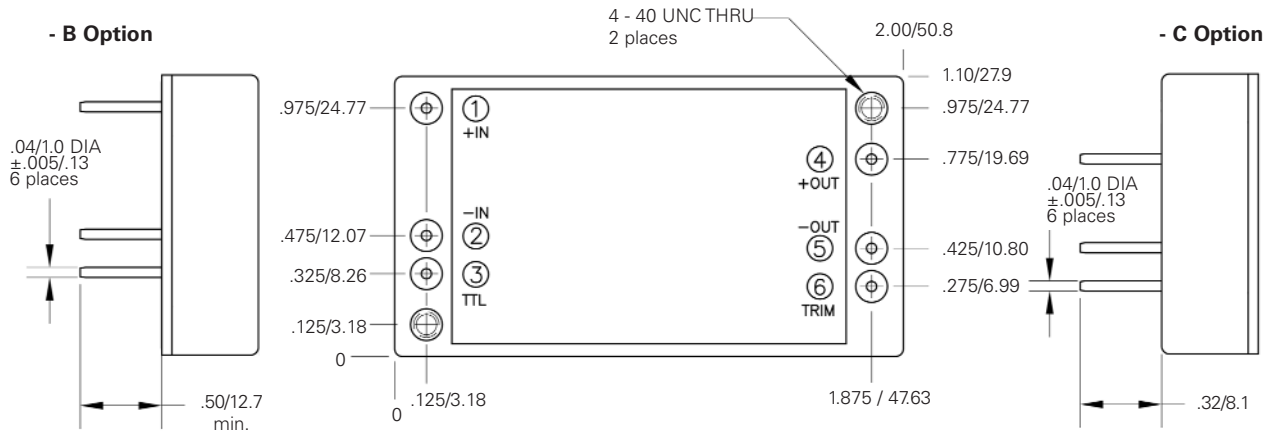
	Min.	Units
Isolation:		
Input to Output	500	Vdc
Output to Base	250	Vdc
Input to Base	250	Vdc
Insulation Resistance (@50 Vdc)	50	MOhm

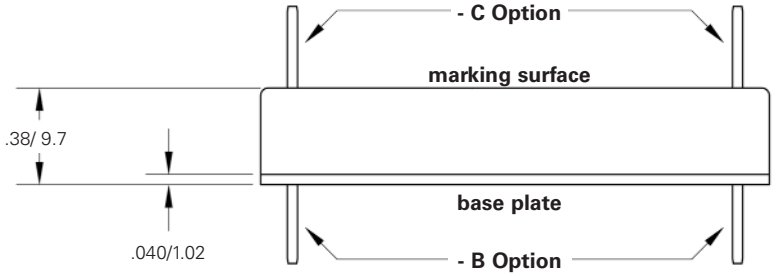
MECHANICAL CHARACTERISTICS

Weight	1.59 45	oz. maximum grams maximum
Size	1.1 x 2.0 x 0.38 27.9 x 50.8 x 9.7	inch mm
Volume	0.84 13.75	$inch^3$ cm^3
Material	Pin Base Case	Brass (Solder Plating) Aluminum 5052-H32 28 GA CRS (Nickel Plating)
Mounting	Standard I Option D Option	4-40 inserts in baseplate M2.5 metric inserts in baseplate 0.115 DIA thru holes in baseplate

CASE DRAWINGS

Inches/Millimeters





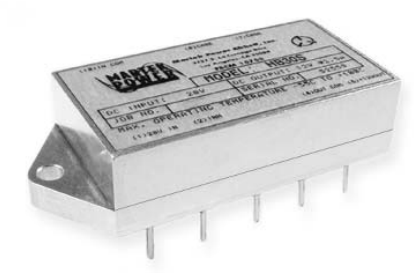
Tolerances: inches - x.xx = ±0.03 mm - x.x = ±0.8
x.xxx = ±0.015 x.xx = ±0.4

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

HB30S

30 Watts Output Power

SINGLE OUTPUT



How to Order

HB 30 S M / 5 - F

- Series
- Total Output Power
- Single Output
- Unscreened (I) or Screened (M)
- Output Voltage: Maximum current as stated in selection chart
- Options
- Options: F - Flange, S - Stud

FEATURES

- **Internal EMI Filter**
- **SMD footprint**
- **Remote Turn On**
- **Remote Sense**
- **Output Overvoltage Protection**
- **Output Overcurrent Protection**
- **Over Temperature Protection**
- **100% Environmental Screening (M Models)**

SELECTION CHART

Nominal Output Voltage (Volts)	Output Current (Amps)	Model Number (Unscreened)	Model Number (Screened)
2	6.0	HB30SI/2	HB30SM/2
3.3	6.0	HB30SI/3.3	HB30SM/3.3
5	6.0	HB30SI/5	HB30SM/5
5.2	5.8	HB30SI/5.2	HB30SM/5.2
9	3.3	HB30SI/9	HB30SM/9
12	2.5	HB30SI/12	HB30SM/12
15	2.0	HB30SI/15	HB30SM/15
24	1.3	HB30SI/24	HB30SM/24
28	1.1	HB30SI/28	HB30SM/28

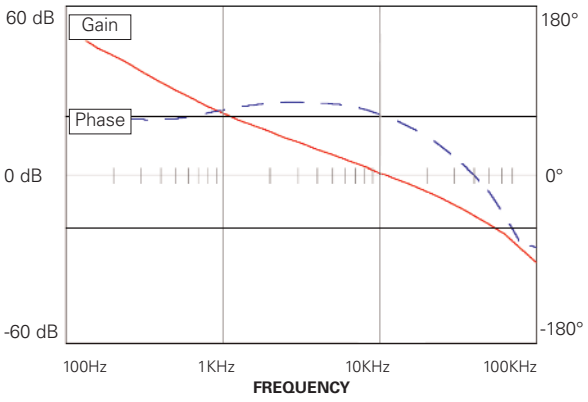
INPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Input Voltage	16	28	40	Vdc
Brown Out (75% of Full Load) [fig. I]*		12	14	Vdc
Logic Disable Current (Sink)			150	µA
Logic Disable Voltage (TTL)	0		0.8	Vdc
Logic Disable Power In		300	500	mw
Efficiency (FL) [fig. II, III]*				
>=5 Vdc Output (FL)	80	84		%
3.3 Vdc Output (FL)	74	78		%
2Vdc Output (FL)	68	72		%
EMI: Units conform to MIL-STD-461E				
Input Transient: Units can withstand 50V transients for up to 100 ms per MIL-STD-704E				

OUTPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Set Point Accuracy			50 [1]	mV
Load Regulation			25 [2]	mV
Line Regulation			25 [3]	mV
Ripple P - P (10 MHz) [fig. IV]*			100 [4]	mV
Overvoltage Protection		125		% V_{out}
Transient Response Time/Overshoot [fig. V & VI]*				
20 -80% Load (@Nom.Line)		100/100	500/250 [5]	µS/mV
Low Line - High Line (@FL)		100/100	500/250 [5]	µS/mV
50 -100% Load (@Nom.Line)		100/100	500/250 [5]	µS/mV
Temperature Drift			0.05	%/°C
Current Limit	105		150	% I_{out}
Short Circuit Current	25	50	75	% I_{out}
Turn On Time [fig. XI]*		5		mS
Logic Turn On Time [fig. IX]*		2.5		mS

STABILITY



[1] or 1 % maximum, whichever is greater
[2] or 0.2% maximum, whichever is greater from no load to full load
[3] or 0.2% maximum, whichever is greater from low line to high line
[4] or 1 % maximum, whichever is greater
[5] or 5 % maximum, whichever is greater
* see figures on page 19

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

TEMPERATURE CHARACTERISTICS

	Min.	Typ.	Max.	Units
Operating (Case)	-55		+100	°C
Storage (Ambient)	-55		+125	°C
Thermal Resistance Case (Ambient)		13		°C/W

ENVIRONMENTAL SCREENING - M MODEL

Stabilization Bake:	+125°C for 24 hours per MIL-STD-883, M1008.2, Condition B
Temperature Cycling:	10 cycles at -55°C to +125°C (transition 5°C/ minute) per MIL-STD-883, M1010, Condition B
Burn in:	160 hours @ 85°C mininum with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

ENVIRONMENTAL SCREENING - I MODEL

Burn in:	16 hours @ 85°C mininum with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

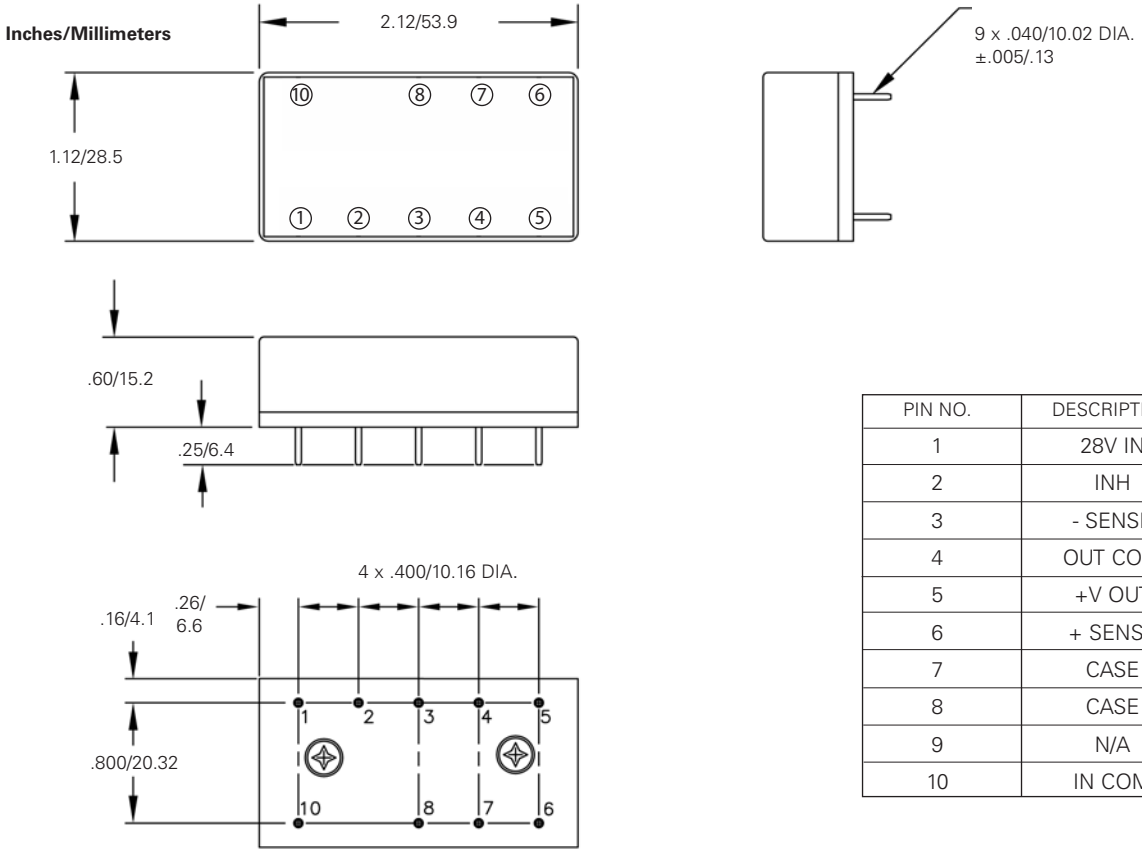
ISOLATION CHARACTERISTICS

	Min.	Units
Isolation:		
Input to Output	500	Vdc
Output to Base	250	Vdc
Input to Base	250	Vdc
Insulation Resistance (@50 Vdc)	50	MOhm

MECHANICAL CHARACTERISTICS

Weight	2.4 68	oz. maximum grams maximum
Size	1.12 x 2.85 x .60 28.5 x 72.4 x 15.2	inch mm
Volume	1.92 31.37	$inch^3$ cm^3
Material	Pin Base Case	Brass (Solder Plating) Alumimum 5052-H32 Alumimum 6061-T6
Mounting	Standard - F - S	 Flange with 2X .162 DIA 2X 4-40 UNC-2A Studs

CASE DRAWINGS: HB30S STANDARD

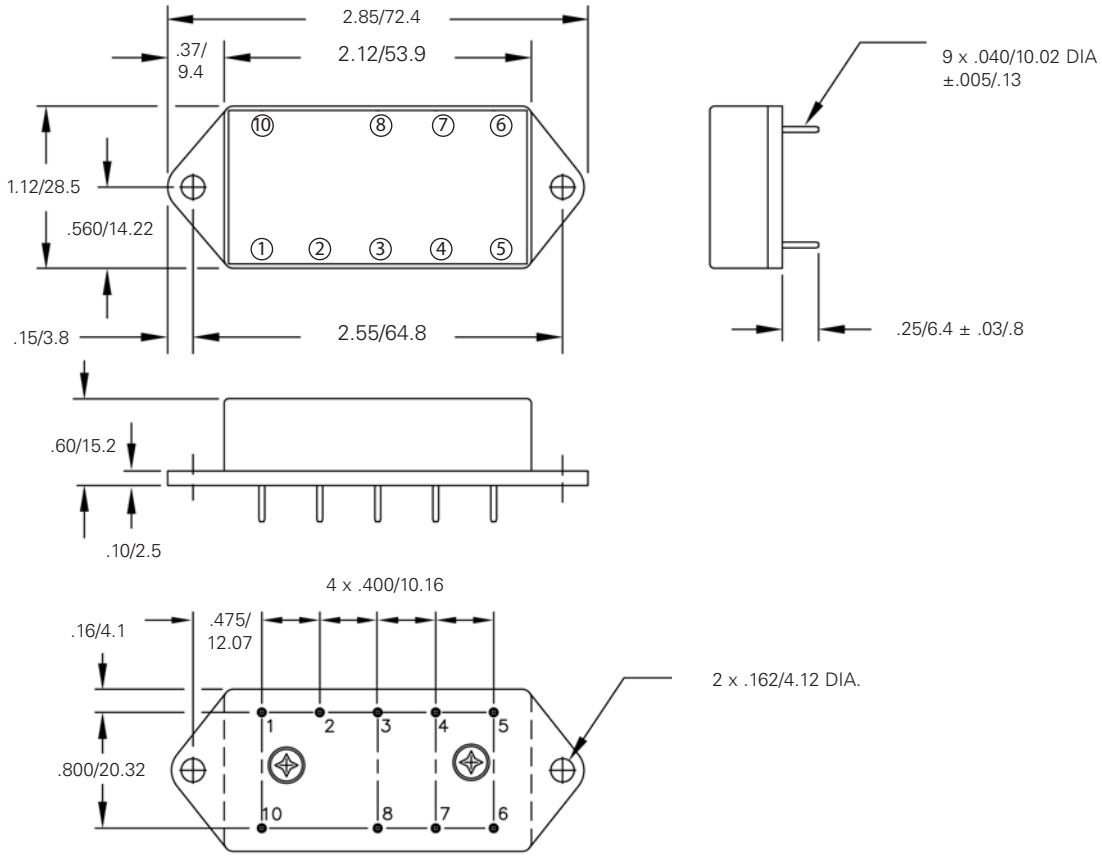


PIN NO.	DESCRIPTION
1	28V IN
2	INH
3	- SENSE
4	OUT COM
5	+V OUT
6	+ SENSE
7	CASE
8	CASE
9	N/A
10	IN COM

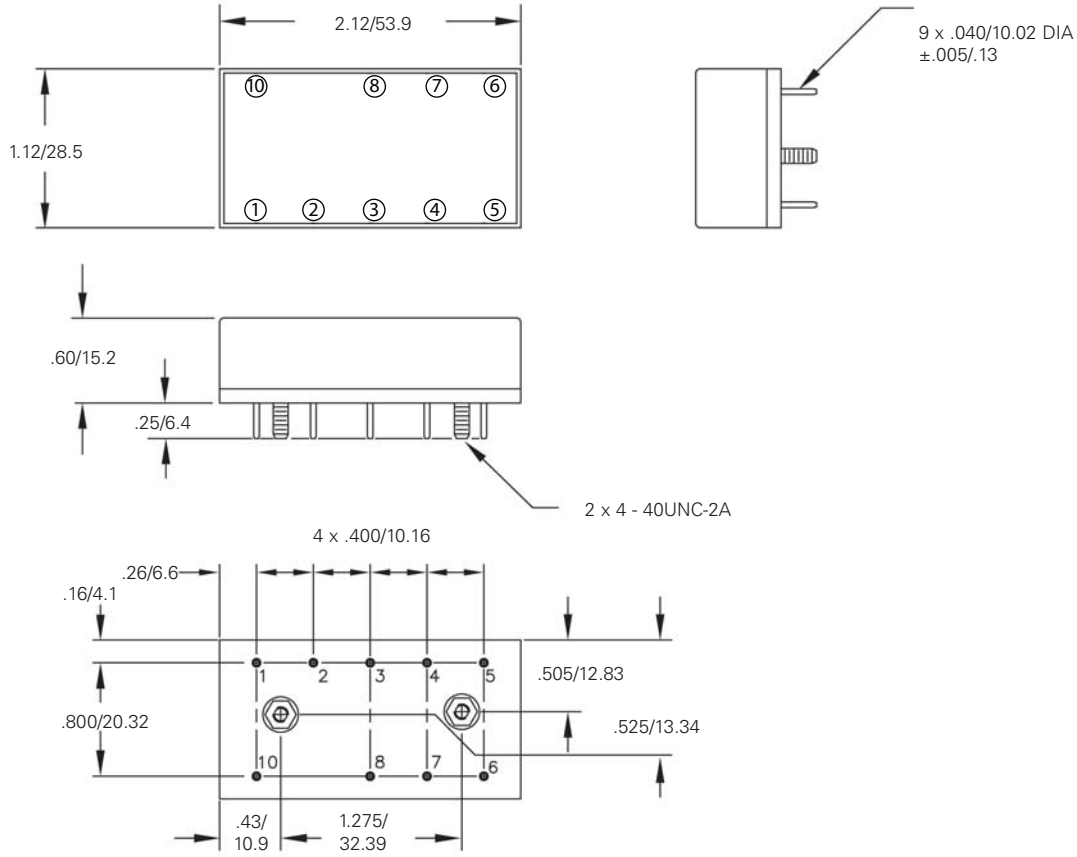
Tolerances: inches - x.xx = ±0.03 mm - x.x = ±0.8
x.xxx = ±0.015 x.xx = ±0.4

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

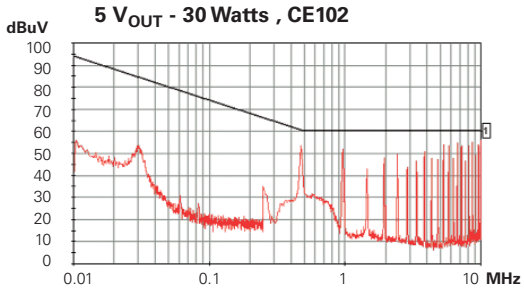
CASE DRAWINGS: HB30S WITH OPTION -F



CASE DRAWINGS: HB30S WITH OPTION -S



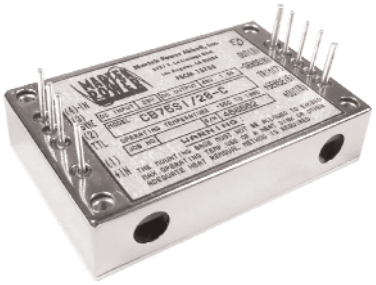
EMI GRAPH - HB30S



CB75S

75 Watts Output Power

SINGLE OUTPUT



How to Order:

CB 75 S M / 5 - C - D

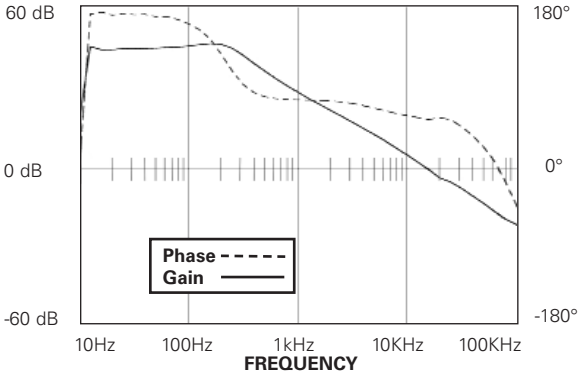
- Series
- Total Output Power
- Single Output
- Unscreened (I) or Screened (M)
- Output Voltage: Maximum current as stated in selection chart
- Options

Options:
B - pins out bottom of unit
C - pins out top of unit
D - through hole inserts (.115 DIA)
I - M2.5 inserts (STD 4 - 40 inserts)

INPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Input Voltage	16	28	40	Vdc
Brown Out (75% of FL)		13.5	14.4	Vdc
No Load Power Dissipation		1.3		W
Input Inrush Charge			2.0	mc
Reflective Ripple Current		3		%
Input Ripple Rejection(120Hz, 5Vout)		70		dB
Input Ripple Rejection(800Hz, 5Vout)		50		dB
Logic Disable Current (Sink)			150	µA
Logic Disable Voltage (TTL)	0		.8	Vdc
Logic Disable Power In		175		mw
Sync Input Voltage	3.0	5.0	5.25	Vc
Sync Input Frequency	480	500	550	KHz
Sync Input Duty Cycle	30	35	55	%
Efficiency (Full Load)>= 5 Vdc output	80	84		%
3.3 Vdc output	75	80		%
2 Vdc output	68	72		%
EMI: Units conform to MIL-STD-461D with companion filter (CBF75)				
Input Transient: Units can withstand 50Vdc transients for up to 100ms per MIL-STD-704E				

STABILITY



FEATURES

- **.50 Inch Profile**
- **Standard Quarter Brick Pin-out and Footprint**
- **Remote Turn On / Output Status (TTL)**
- **Output Voltage Trim**
- **Output Overvoltage Protection**
- **Output Overcurrent Protection**
- **Over Temperature Protection**
- **Fixed Frequency (500kHz) Conversion**
- **Synchronization Input**
- **High Temperature Burn-In**
- **100% Environmental Screening (M Models)**

SELECTION CHART

Nominal Output Voltage (Volts)	Output Current (Amps)	Model Number (Unscreened)	Model Number (Screened)
2	15	CB75SI/2	CB75SM/2
3.3	15	CB75SI/3.3	CB75SM/3.3
5	15	CB75SI/5	CB75SM/5
5.2	14.5	CB75SI/5.2	CB75SM/5.2
12	6.3	CB75SI/12	CB75SM/12
15	5	CB75SI/15	CB75SM/15
24	3.2	CB75SI/24	CB75SM/24
28	2.7	CB75SI/28	CB75SM/28

OUTPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Set Point Accuracy		25	50 [1]	mV
Load Regulation		5	10 [2]	mV
Line Regulation		5	10 [3]	mV
Ripple P-P (10 MHz)		60	100 [4]	mV
Overvoltage Protection		125		% V_{out}
Transient Response Time - Overshoot				
20-80% Load (@ Nom. Line)		100/100	500/250 [5]	µS /mV
Low Line - High Line (@ FL)		200/150	500/250 [5]	µS /mV
50-100% Load (@ Nom.Line)		100/100	500/250 [5]	µS /mV
Temperature Drift		0.02	0.05	%/°C
Long Term Drift		0.02	0.05	%/1KHrs
Current Limit	105	130	150	%
Short Circuit Current	20	25	75	%
Load Capacitance			30 [6]	µF
Remote Sense Compensation			0.5	Vdc
Status "OK" (TTL)	2.4		5	Vdc
Status "Bad" (TTL)	0		0.8	Vdc
Trim Range	90		110	%
Turn On Time		6	10	mS
Logic Turn On Time		5	10	mS

[1] or 1 % Vout, whichever is greater
[2] or 0.2 % Vout, whichever is greater from No Load to Full Load with line constant
[3] or 0.2 % Vout, whichever is greater from Low Line to High Line at Full Load
[4] whichever is greater measured at 10 MHz Bandwidth
[5] or 5 % Vout, whichever is greater
[6] or 3 x Co, whichever is greater

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

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TEMPERATURE CHARACTERISTICS

	Min.	Typ.	Max.	Units
Operating (Baseplate)	-55		+100	°C
Storage (Ambient)	-55		+125	°C
Thermal Resistance (Baseplate to Ambient)		8		°C/W
OverTemperature Shutdown		105		°C

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 5°C/ minute) similar to MIL-STD-883, M1010, Condition B
Burn in:	160 hours @ 85°C minimum with V_{in}= 28Vdc and output at full load
Final Testing	

ENVIRONMENTAL SCREENING - I MODEL

Burn in:	16 hours @ 85°C minimum with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

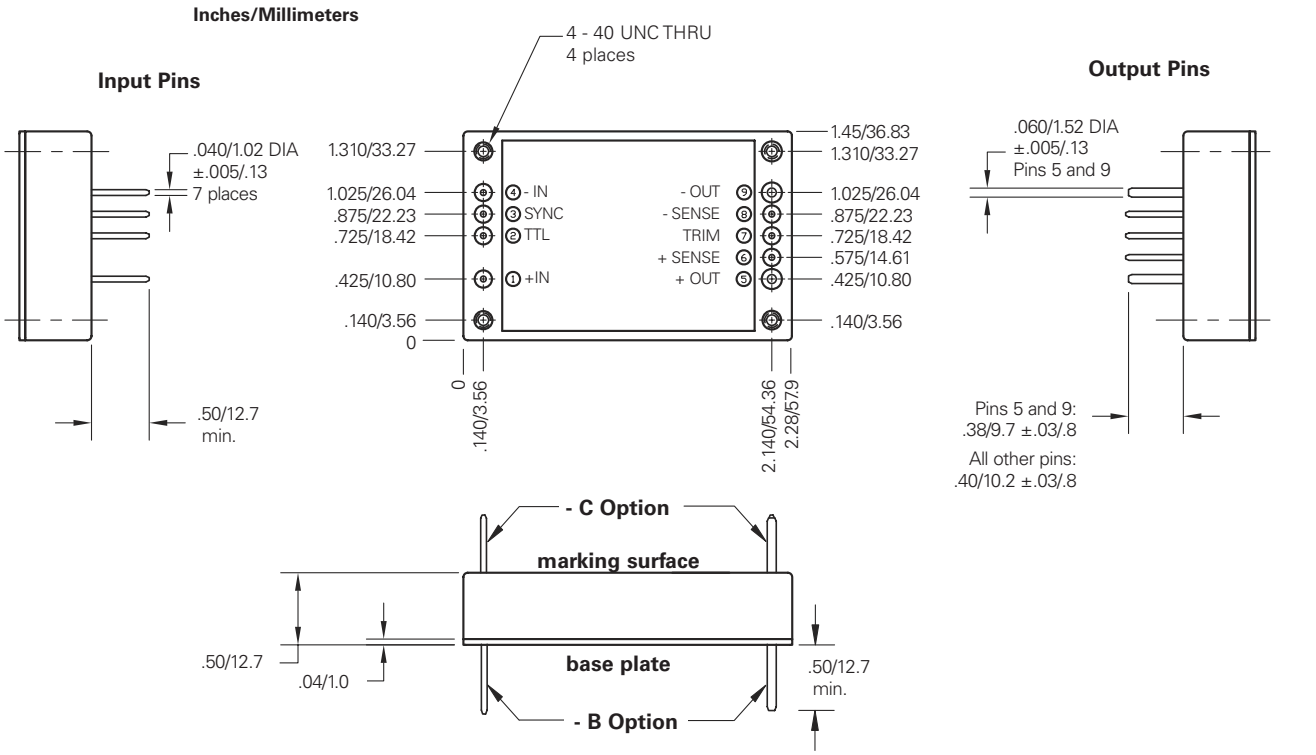
ISOLATION CHARACTERISTICS

	Min.	Units
Isolation:		
Input to Output	500	Vdc
Output to Base	250	Vdc
Input to Base	250	Vdc
Insulation Resistance (@50 Vdc)	50	MOhm

MECHANICAL CHARACTERISTICS

Weight	3.19 90	oz. grams
Size	1.45 x 2.28 x .50 36.8 x 57.9 x 12.7	inch mm
Volume	1.65 27.1	$inch^3$ cm^3
Material	Pin Baseplate Case	Brass (Solder Plating) Aluminum 5052-H32 28 GA Steel (Nickel Plating)
Mounting	Standard D Option I Option	4 - 40 inserts in baseplate 0.115 DIA thru hole inserts M2.5 inserts in baseplate

CASE DRAWINGS



Tolerances: inches - x.xx = ±0.03 mm - x.x = ±0.8
x.xxx = ±0.015 x.xx = ±0.4

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

CB75T

75 Watts Output Power

TRIPLE OUTPUT

How to Order:

CB 75 T M / 5 / 12 - C - D

- Series
- Total Output Power
- Triple Output
- Unscreened (I) or Screened (M)
- Main Output Voltage
- Auxiliary Output Voltage

Options:
- **B** - pins out bottom of unit
- **C** - pins out top of unit
- **D** - through hole inserts (.115 DIA) (Standard threaded)
- **I** - M2.5 inserts

FEATURES

- **.50 Inch Profile**
- **Remote Turn On / Status (TTL)**
- **Sync Input**
- **Fixed Frequency (500KHz) Conversion**
- **Output Overvoltage Protection**
- **Output Overcurrent Protection**
- **Over Temperature Protection**
- **Output Voltage Trim Pin**
- **High Temperature Burn-In**
- **No Minimum Load Requirement**
- **100% Environmental Screening (M Models)**

SELECTION CHART

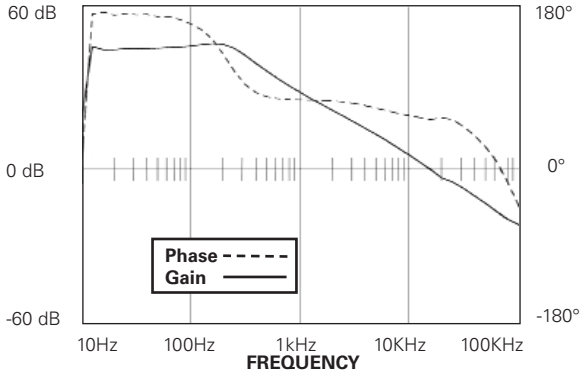
Main Output Voltage	Main Output Current	Auxiliary Output Voltage	Auxiliary Output Current	Model Number
3.3	7.5	±12	1.6	CB75TI/3.3/12-C
3.3	7.5	±15	1.25	CB75TI/3.3/15-C
5	7.5	±12	1.6	CB75TI/5/12-C
5	7.5	±15	1.25	CB75TI/5/15-C

The above model numbers are for the Industrial grade power supplies. For the Military grade power supplies replace the 'I' with 'M'.

INPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Input Voltage	16	28	40	Vdc
Brown Out (75% of FL)		13.5	14.4	Vdc
No Load Power Dissipation		3.0	4.0	W
Input Inrush Charge			2.0	mc
Reflective Ripple Current		1	3	%
Input Ripple Rejection(120Hz)	50	55		dB
Input Ripple Rejection(800Hz)	38	45		dB
Logic Disable Current (Sink)		270	300	µA
Logic Disable Voltage (TTL)	0		0.8	Vdc
Logic Disable Power In		620	700	mw
Sync Input Voltage	2.4		5.25	Vp-p
Sync Input Frequency	475		525	kHz
Sync Input Duty Cycle	10		55	%
Efficiency (FL)	82	85		%
EMI: Units conform to Mil-Std-461D (on the input leads) with companion filter (CBF75)				
Input Transient: Units conform to Mil-Std-704E for transients up to 50Vdc for 0.1 second				

STABILITY



OUTPUT CHARACTERISTICS

	Main Output			Auxiliary Outputs			
	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Set Point Accuracy (FL)			1[1]			1	%Vout
Load Regulation		0.05	0.2[2]		2.5[5]/0.3[6]	3.0[5]/0.5[6]	%Vout
Line Regulation		0.05	0.2[2]		0.05	0.2	%Vout
Ripple P-P (10 MHz)			1[3]			1	%Vout
Trim Range	90		110		N/A		%Vout
Remote Sense Compensation			0.5		N/A		Vdc
Overvoltage Protection	120	125	135		N/A		%Vout
Transient Response (Vout 1%) Time/Overshoot							
20-80% Load		200/3	500/5[4]		200/1	500/5	µS/%Vout
Low Line - High Line		350/5	500/5[4]		350/4	500/5	µS/%Vout
50-100% Load		200/3	500/5[4]		200/1	500/5	µS/%Vout
Temperature Drift		0.01	0.02		0.02	0.04	%/°C
Long Term Drift		0.01	0.02		0.01	0.02	%/1KHrs
Current Limit	110	125	140	110	125	140	%Iout
Short Circuit Current	20		50	25		75	%Iout
Load Capacitance			30[7]			30[7]	µF
Turn On Time		5	10		10	15	mS
Logic Turn On Time		5	10		10	15	mS
Status "OK" (TTL)	4.0		5.05	4.0		5.0	Vdc
Status "FAIL" (TTL)	0		2.0	0		3.0	Vdc

[1] 1% or 50mV, whichever is greater. [2] 0.2% or 10mV , whichever is greater. [3] 1% or 100mV, whichever is greater. [4] 5% or 250mV, whichever is greater.
[5] Unbalanced loads, 5% to 100% load. [6] Balanced loads, 0% to 100% load. [7] See Application Notes.

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

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TEMPERATURE CHARACTERISTICS

	Min.	Typ.	Max.	Units
Operating (Baseplate)	-55		+100	°C
Storage (Ambient)	-55		+125	°C
Thermal Resistance (Case - Ambient)		7.6		°C/W
Overtemperature Shutdown		107		°C

ISOLATION CHARACTERISTICS

	Min.	Units
Isolation:		
Input to Output	500	Vdc
Output to Case	250	Vdc
Input to Case	250	Vdc
Insulation Resistance (@50 Vdc)	50	MOhm

ENVIRONMENTAL SCREENING - M MODEL

Stabilization Bake:	+125°C for 24 hours similiar to Mil-Std-883, M1008.2, Condition B
Temperature Cycling:	10 cycles at -55°C to +125°C (transition 5°C/ minute) similiar to Mil-Std-883, M1010, Condition B
Burn in:	160 hours @ 85°C min. with V_{in}=28Vdc and output at full load
Final Testing	

ENVIRONMENTAL SCREENING - I MODEL

Burn in:	16 hours @ 85°C min. with V_{in}=28Vdc and output at full load
Final Testing	

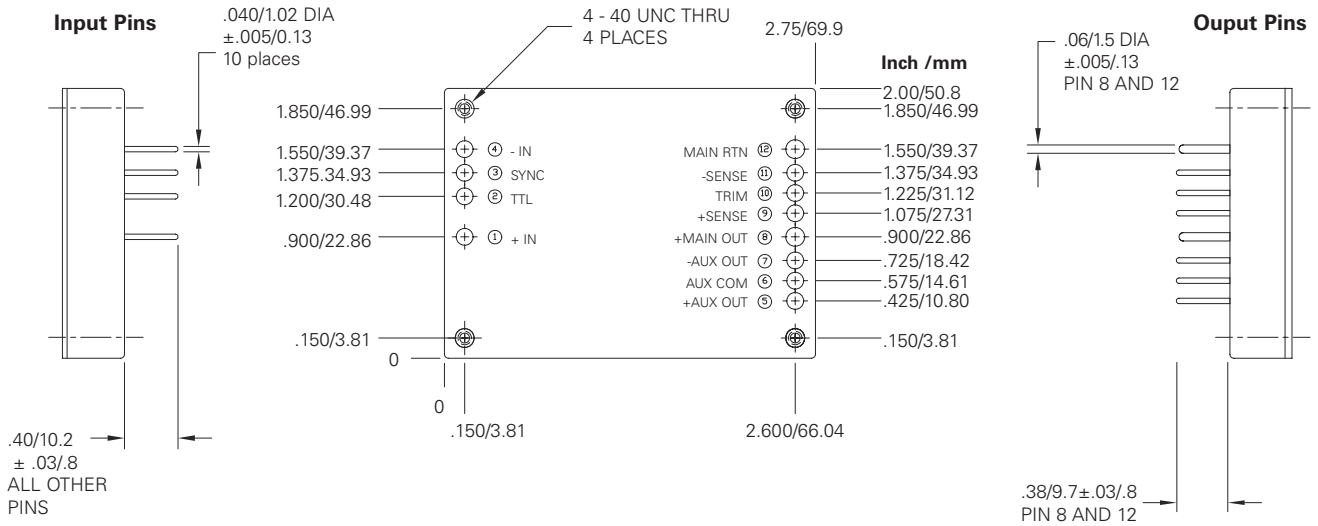
See "Guide to Operation" for full details

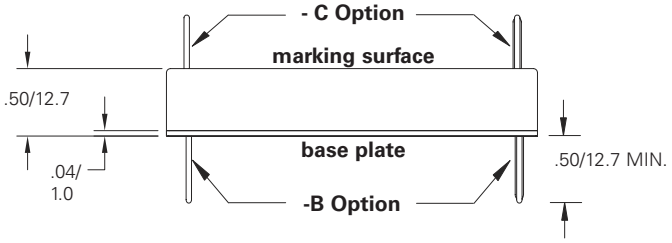
MECHANICAL CHARACTERISTICS

Weight	6.43 150	oz. grams
Size	2.0 x 2.75 x 0.50 50.8 x 69.85 x 12.7	inch mm
Volume	2.75 45.06	$inch^3$ cm^3
Material	Pin Baseplate Case Finish (Case)	Brass (Solder Plating) Aluminum 5052-H32 28 GA Steel (Cold Rolled) Nickel Plating
Mounting	Standard I Option D Option	4-40 inserts provided in baseplate M2.5 metric inserts 0.115 DIA thru holes

CASE DRAWINGS

- C Option





Tolerances: inches - x.xx = ±0.03 mm - x.x = ±0.8
x.xxx = ±0.015 x.xx = ±0.4

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

CB150S

150 Watts Output Power

SINGLE OUTPUT

Preliminary Data Sheet Sept 24, 08

FEATURES

- **.50 Inch Profile**
- **Remote Turn On (TTL)**
- **Sync Input**
- **Output Overvoltage Protection**
- **Output Overcurrent Protection**
- **Over Temperature Protection**
- **Output Voltage Trim Pin**
- **High Temperature Burn-In**
- **100% Environmental Screening (M Models)**

How to Order:

CB 150 S M / 5 - C - D

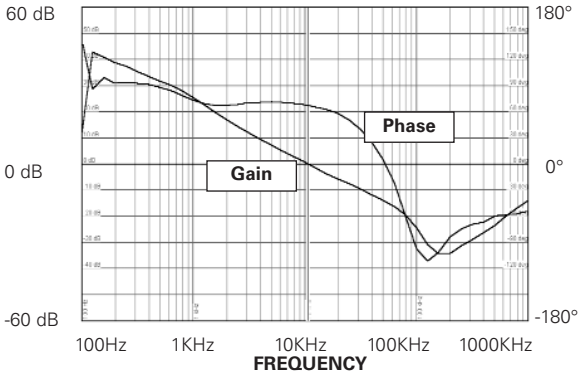
- Series
- Total Output Power
- Single Output
- Unscreened (I) or Screened (M)
- Output Voltage: Maximum Current as stated in selection chart
- Options

Options:
B - pins out bottom of unit
C - pins out top of unit
D - through hole inserts (.115 DIA) (Standard threaded)
I - M2.5 inserts

INPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Input Voltage	16		40	Vdc
Brown Out (FL)		14.4		Vdc
No Load Power Dissipation		3	4	W
Input Inrush Charge		5.3		mc
Reflective Ripple Current		100	200	mA
Input Ripple Rejection(120Hz)		50		dB
Input Ripple Rejection(800Hz)		40		dB
Logic Disable Current (Sink)			200	µA
Logic Disable Power In		500	800	mw
Efficiency (FL) >=5 Vdc Output	80			%
<5 Vdc Output	70			%
EMI: Units conform to Mil-Std-461E (on the input leads) with companion filter (CBF150)				
Input Transient: Units conform to Mil-Std-704E for transients up to 50Vdc for 0.1 second				

STABILITY



SELECTION CHART

Nominal Output Voltage (Volts)	Output Current (Amps)	Model Number (Unscreened)	Model Number (Screened)
2	30	CB150SI/2	CB150SM/2
3.3	30	CB150SI/3.3	CB150SM/3.3
5	30	CB150SI/5	CB150SM/5
5.2	28.8	CB150SI/5.2	CB150SM/5.2
12	12.5	CB150SI/12	CB150SM/12
15	10	CB150SI/15	CB150SM/15
24	6.25	CB150SI/24	CB150SM/24
28	5.35	CB150SI/28	CB150SM/28

OUTPUT CHARACTERISTICS

	Min.	Typ.	Max.	Units
Set Point Accuracy		25	50[1]	mV
Load Regulation		5/0.1	20/0.2 [2]	mV/%
Line Regulation		5/0.1	20/0.2 [3]	mV/%
Ripple P-P (10 MHz)		60	100/1 [4]	mV/%
Overvoltage Protection		125		% V_{out}
Transient Response Time - Overshoot				
20-80% Load (@Nom. Line)		100/100	500/250 [5]	µS/mV
Low Line - High Line (@FL)		200/150	500/250 [5]	µS/mV
50-100% Load (@Nom. Line)		100/100	500/250 [5]	µS/mV
Temperature Drift		.02	0.05	%/°C
Long Term Drift		.02	0.05	%/1KHrs
Current Limit	105	130	150	% I_{out}
Short Circuit Current	25	50	75	% I_{out}
Remote Sense Compenstation			0.5	Vdc
Trim Range	90		110	% V_{out}
Turn On Time		5	20	mS
Logic Turn On Time		5	10	mS

[1] or 1 % Vout, whichever is greater
[2] whichever is greater from No Load to Full Load with line constant
[3] whichever is greater from Low Line to High Line at Full Load
[4] whichever is greater measured at 10 MHz Bandwidth
[5] or 5 % Vout, whichever is greater

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

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TEMPERATURE CHARACTERISTICS

	Min.	Typ.	Max.	Units
Operating (Baseplate)	-55		+100	°C
Storage (Ambient)	-55		+125	°C
Thermal Resistance Case (Ambient)		3		°C/W

ENVIRONMENTAL SCREENING - M MODEL

Stabilization Bake:	+125°C for 24 hours similiar to Mil-Std-883, M1008.2, Condition B
Temperature Cycling:	10 cycles at -55°C to +125°C (transition 5°C/ minute) similiar to Mil-Std-883, M1010, Condition B
Burn in:	160 hours @ 85°C min. with V_{in}=28Vdc and output at full load
Final Testing	

ENVIRONMENTAL SCREENING - I MODEL

Burn in:	16 hours @ 85°C min. with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

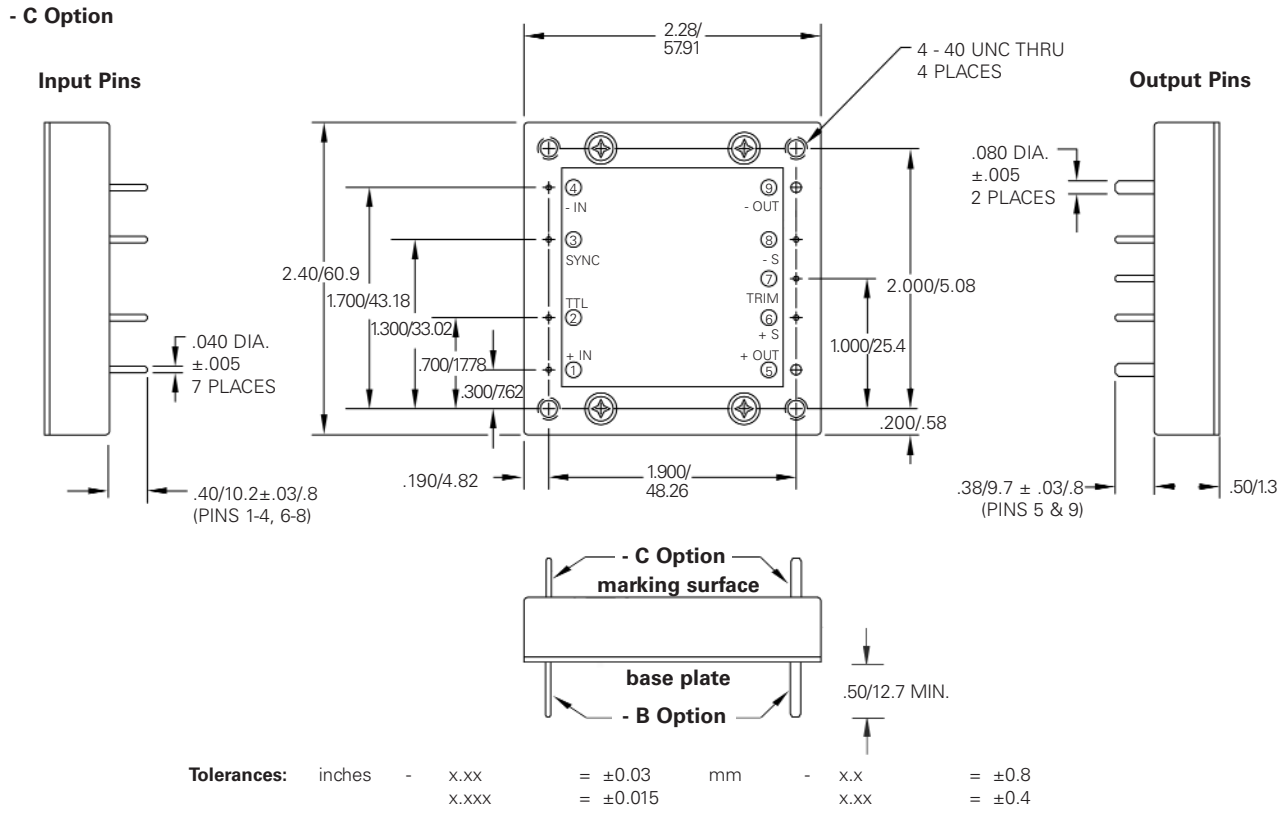
ISOLATION CHARACTERISTICS

	Min.	Units
Isolation:		
Input to Output	500	Vdc
Output to Case	250	Vdc
Input to Case	250	Vdc
Insulation Resistance (@50 Vdc)	50	MOhm

MECHANICAL CHARACTERISTICS

Weight	6.0 170	oz. grams
Size	2.4 x 2.3 x 0.50 61.0 x 58.4 x 12.7	inch mm
Volume	2.48 48.61	$inch^3$ cm^3
Material	Pin Baseplate Case Finish (Case)	Brass (Solder Plating) Aluminum 5052-H32 28 GA Steel (Cold Rolled) Nickel Plating
Mounting	Standard I Option D Option	4-40 inserts provided in baseplate M2.5 metric inserts 0.115 DIA thru holes

CASE DRAWINGS



Tolerances: inches - x.xx = ±0.03, x.xxx = ±0.015 mm - x.x = ±0.8, x.xx = ±0.4

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

CB150D

150 Watts Output Power

DUAL OUTPUT

How to Order:

CB 150 D M / 5 / 15 - C - D

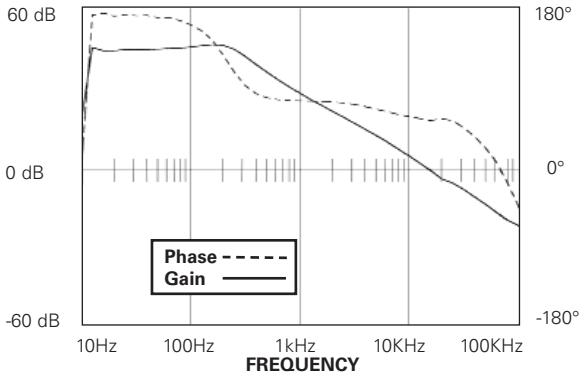
- Series
- Total Output Power
- Dual Output
- Unscreened (I) or Screened (M)
- Output Voltages
- Options

Options:
B - pins out bottom of unit
C - pins out top of unit
D - through hole inserts (.115 DIA) (Standard threaded)
I - M2.5 inserts (STD 4 - 40 inserts)

INPUT CHARACTERISTICS - PER CHANNEL

	Min.	Typ.	Max.	Units
Input Voltage	16	28	40	Vdc
Brown Out (75% of FL)		13.5	14.4	Vdc
No Load Power Dissipation		1.3		W
Input Inrush Charge			2.0	mc
Reflective Ripple Current		3		%
Input Ripple Rejection(120Hz, 5Vout)		70		dB
Input Ripple Rejection(800Hz, 5Vout)		50		dB
Logic Disable Current (Sink)			150	µA
Logic Disable Voltage (TTL)	0		.8	Vdc
Logic Disable Power In		175		mw
Sync Input Voltage	3.0	5.0	5.25	Vc
Sync Input Frequency	480	500	550	KHz
Sync Input Duty Cycle	30	35	55	%
Efficiency (Full Load)>= 5 Vdc output	80	84		%
3.3 Vdc output	75	80		%
2 Vdc output	68	72		%
EMI: Units conform to MIL-STD-461D with companion filter (CBF75)				
Input Transient: Units can withstand 50Vdc transients for up to 100ms per MIL-STD-704E				

STABILITY



FEATURES

- **.50 Inch Profile**
- **Provides 2 Independent 75W Outputs from 2V to 28V**
- **Remote Turn On / Output Status (TTL)**
- **Output Voltage Trim Pin**
- **Output Overvoltage Protection**
- **Output Overcurrent Protection**
- **Over Temperature Protection**
- **Fixed Frequency (500kHz) Conversion**
- **Synchronization Input**
- **High Temperature Burn-In**
- **100% Environmental Screening (M Models)**

SELECTION CHART

Nominal Output Voltage (Volts)	Output Current (Amps)
2	15
3.3	15
5	15
5.2	14.5
12	6.3
15	5.0
24	3.2
28	2.7

OUTPUT CHARACTERISTICS- PER CHANNEL

	Min.	Typ.	Max.	Units
Set Point Accuracy		25	50 [1]	mV
Load Regulation		5	10 [2]	mV
Line Regulation		5	10 [3]	mV
Ripple P-P (10 MHz)		60	100 [4]	mV
Overvoltage Protection		125		% V_{out}
Transient Response Time - Overshoot				
20-80% Load (@ Nom. Line)		100/100	500/250 [5]	µS /mV
Low Line - High Line (@ FL)		200/150	500/250 [5]	µS /mV
50-100% Load (@ Nom.Line)		100/100	500/250 [5]	µS /mV
Temperature Drift		0.02	0.05	%/°C
Long Term Drift		0.02	0.05	%/1KHrs
Current Limit	105	130	150	%
Short Circuit Current	20	25	75	%
Load Capacitance			30 [6]	µF
Remote Sense Compensation			0.5	Vdc
Status "OK" (TTL)	2.4		5	Vdc
Status "Bad" (TTL)	0		0.8	Vdc
Trim Range	90		110	%
Turn On Time		6	10	mS
Logic Turn On Time		5	10	mS

[1] or 1 % Vout, whichever is greater
[2] or 0.2 % Vout, whichever is greater from No Load to Full Load with line constant
[3] or 0.2 % Vout, whichever is greater from Low Line to High Line at Full Load
[4] or 1 % Vout, whichever is greater measured at 10 MHz Bandwidth
[5] or 5 % Vout, whichever is greater
[6] or 3 x Co, whichever is greater

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

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www.martekpowerabbott.com E-mail: sales.mpa@martekpower.com

TEMPERATURE CHARACTERISTICS

	Min.	Typ.	Max.	Units
Operating (Baseplate)	-55		+100	°C
Storage (Ambient)	-55		+125	°C
Thermal Resistance (Baseplate to Ambient)		8		°C/W
OverTemperature Shutdown		105		°C

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 5°C/ minute) similar to MIL-STD-883, M1010, Condition B
Burn in:	160 hours @ 85°C minimum with V_{in}= 28Vdc and output at full load
Final Testing	

ENVIRONMENTAL SCREENING - I MODEL

Burn in:	16 hours @ 85°C minimum with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

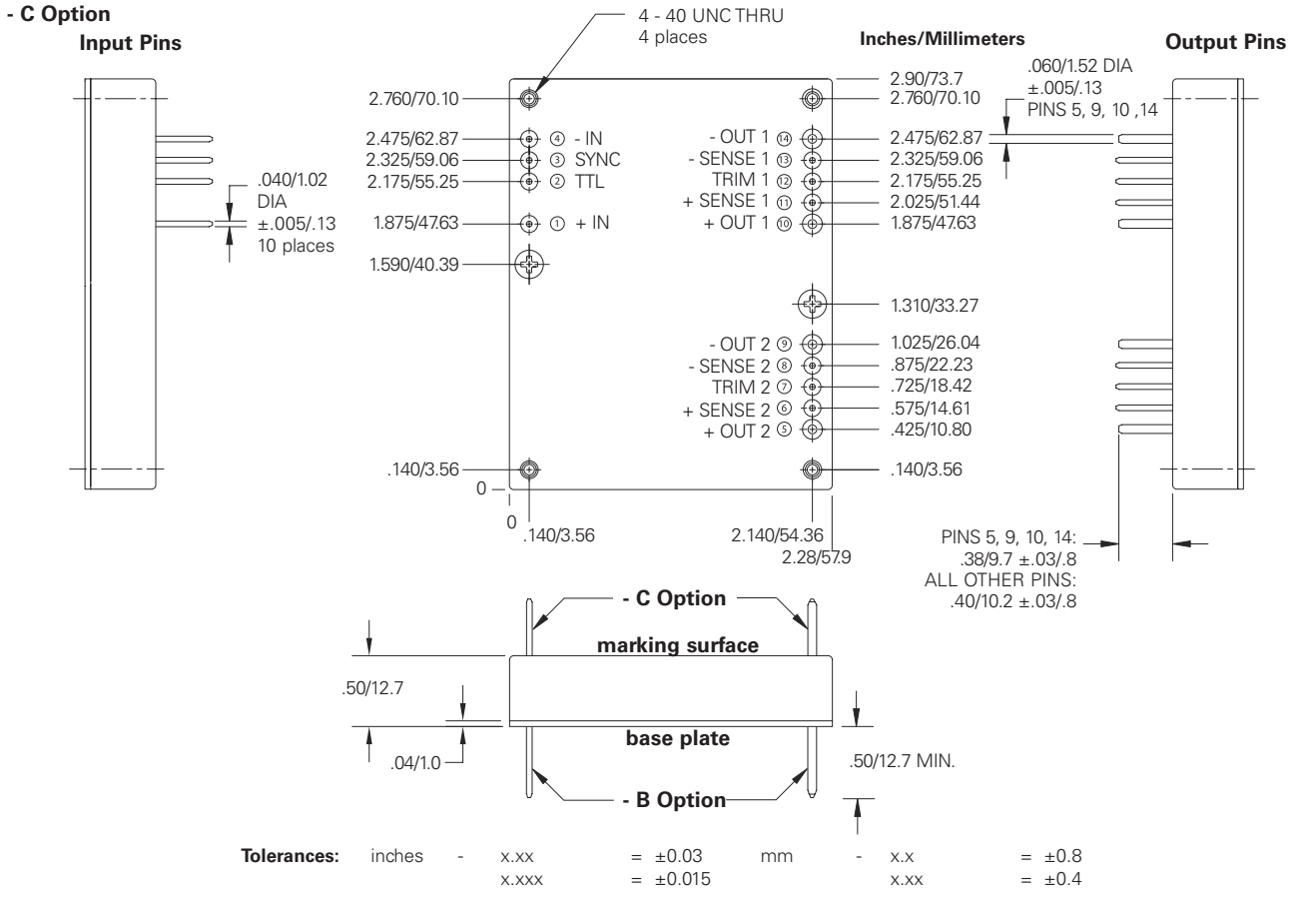
ISOLATION CHARACTERISTICS

	Min.	Units
Isolation:		
Input to Output	500	Vdc
Output to Base	250	Vdc
Input to Base	250	Vdc
Insulation Resistance (@50 Vdc)	50	MOhm

MECHANICAL CHARACTERISTICS

Weight		oz. grams
Size	2.28 x 2.90 x .50 57.9 x 73.7 x 12.7	inch mm
Volume	3.31 54.2	$inch^3$ cm^3
Material	Pin Baseplate Case	Brass (Solder Plating) Aluminum 5052-H32 28 GA Steel (Nickel Plating)
Mounting	Standard D Option I Option	4 - 40 inserts in baseplate 0.115 DIA thru hole inserts M2.5 inserts in baseplate

CASE DRAWINGS



Tolerances: inches - x.xx = ±0.03, x.xxx = ±0.015 mm - x.x = ±0.8, x.xx = ±0.4

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

CB225T

225 Watts Output Power

TRIPLE OUTPUT

How to Order:

CB 225 T M/ 5 /15 / 24 - C - D

- Series: CB
- Total Output Power: 225
- Triple Output: T
- Unscreened (I) or Screened (M): M/
- Output Voltages: 5 /15 / 24
- Options: - C - D

Options:
B - pins out bottom of unit
C - pins out top of unit
D - through hole inserts (.115 DIA) (Standard threaded)
I - M2.5 inserts (STD 4 - 40 inserts)

FEATURES

- **.50 Inch Profile**
- **Provides 3 Independent 75W outputs from 2V - 28V**
- **Remote Turn On / Output Status (TTL)**
- **Output Voltage Trim Pin**
- **Output Overvoltage Protection**
- **Output Overcurrent Protection**
- **Over Temperature Protection**
- **Fixed Frequency (500kHz) Conversion**
- **Synchronization Input**
- **High Temperature Burn-In**
- **100% Environmental Screening (M Models)**

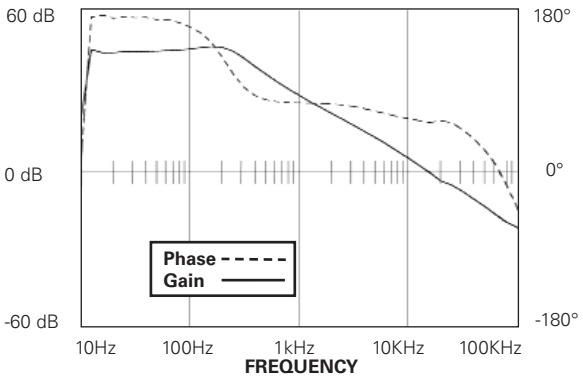
SELECTION CHART

Nominal Output Voltage (Volts)	Output Current (Amps)
2	15
3.3	15
5	15
5.2	14.5
12	6.3
15	5.0
24	3.2
28	2.7

INPUT CHARACTERISTICS - PER CHANNEL

	Min.	Typ.	Max.	Units
Input Voltage	16	28	40	Vdc
Brown Out (75% of FL)		13.5	14.4	Vdc
No Load Power Dissipation		1.3		W
Input Inrush Charge			2.0	mc
Reflective Ripple Current		3		%
Input Ripple Rejection(120Hz, 5Vout)		70		dB
Input Ripple Rejection(800Hz, 5Vout)		50		dB
Logic Disable Current (Sink)			150	µA
Logic Disable Voltage (TTL)	0		.8	Vdc
Logic Disable Power In		175		mw
Sync Input Voltage	3.0	5.0	5.25	Vc
Sync Input Frequency	480	500	550	KHz
Sync Input Duty Cycle	30	35	55	%
Efficiency (Full Load)>= 5 Vdc output	80	84		%
3.3 Vdc output	75	80		%
2 Vdc output	68	72		%
EMI: Units conform to MIL-STD-461D with companion filter (CBF75)				
Input Transient: Units can withstand 50Vdc transients for up to 100ms per MIL-STD-704E				

STABILITY



OUTPUT CHARACTERISTICS- PER CHANNEL

	Min.	Typ.	Max.	Units
Set Point Accuracy		25	50 [1]	mV
Load Regulation		5	10 [2]	mV
Line Regulation		5	10 [3]	mV
Ripple P-P (10 MHz)		60	100 [4]	mV
Overvoltage Protection		125		% V_{out}
Transient Response Time - Overshoot				
20-80% Load (@ Nom. Line)		100/100	500/250 [5]	µS /mV
Low Line - High Line (@ FL)		200/150	500/250 [5]	µS /mV
50-100% Load (@ Nom.Line)		100/100	500/250 [5]	µS /mV
Temperature Drift		0.02	0.05	%/°C
Long Term Drift		0.02	0.05	%/1KHrs
Current Limit	105	130	150	%
Short Circuit Current	20	25	75	%
Load Capacitance			30 [6]	µF
Remote Sense Compensation			0.5	Vdc
Status "OK" (TTL)	2.4		5	Vdc
Status "Bad" (TTL)	0		0.8	Vdc
Trim Range	90		110	%
Turn On Time		6	10	mS
Logic Turn On Time		5	10	mS

[1] or 1 % Vout, whichever is greater
[2] or 0.2 % Vout, whichever is greater from No Load to Full Load with line constant
[3] or 0.2 % Vout, whichever is greater from Low Line to High Line at Full Load
[4] or 1 % Vout, whichever is greater measured at 10 MHz Bandwidth
[5] or 5 % Vout, whichever is greater
[6] or 3 x Co, whichever is greater

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

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www.martekpowerabbott.com E-mail: sales.mpa@martekpower.com

TEMPERATURE CHARACTERISTICS

	Min.	Typ.	Max.	Units
Operating (Baseplate)	-55		+100	°C
Storage (Ambient)	-55		+125	°C
Thermal Resistance (Baseplate to Ambient)		8		°C/W
OverTemperature Shutdown		105		°C

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 5°C/ minute) similar to MIL-STD-883, M1010, Condition B
Burn in:	160 hours @ 85°C minimum with V_{in}= 28Vdc and output at full load
Final Testing	

ENVIRONMENTAL SCREENING - I MODEL

Burn in:	16 hours @ 85°C minimum with V_{in}=28Vdc and output at full load
Final Testing	

See "Guide to Operation" for full details

ISOLATION CHARACTERISTICS

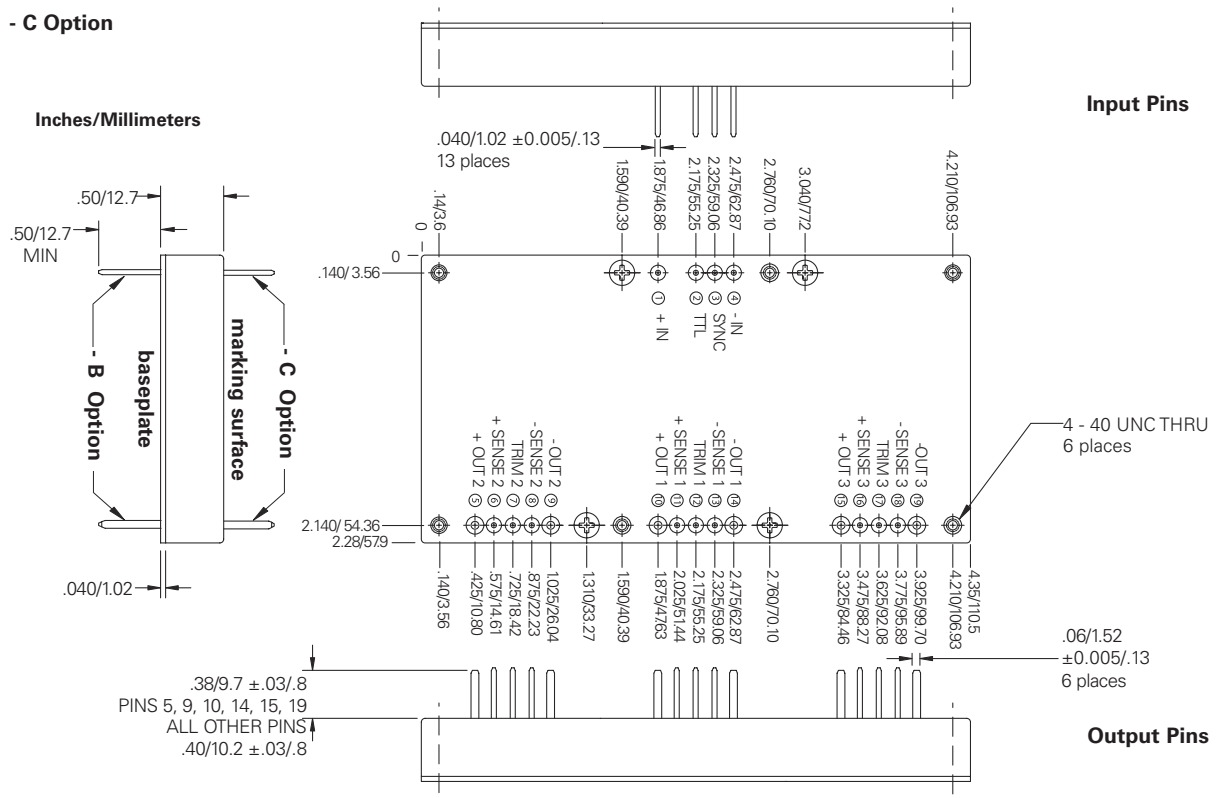
	Min.	Units
Isolation:		
Input to Output	500	Vdc
Output to Base	250	Vdc
Input to Base	250	Vdc
Insulation Resistance (@50 Vdc)	50	MOhm

MECHANICAL CHARACTERISTICS

Weight		oz. grams
Size	2.28 x 4.35 x .50 57.9 x 110.5 x 12.7	inch mm
Volume	4.96 81.2	$inch^3$ cm^3
Material	Pin Baseplate Case	Brass (Solder Plating) Aluminum 5052-H32 28 GA Steel (Nickel Plating)
Mounting	Standard D Option I Option	4 - 40 inserts in baseplate 0.115 DIA thru hole inserts M2.5 inserts in baseplate

CASE DRAWINGS

- C Option



Tolerances: inches - x.xx = ±0.03 mm - x.x = ±0.8
x.xxx = ±0.015 x.xx = ±0.4

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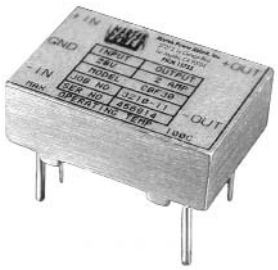
CBF30

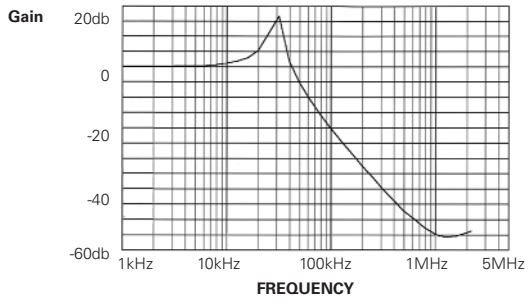
EMI Filter



FEATURES

- **MIL-STD-461D Compliance CE101 and CE102 for CB30S, CB5S & CB10D DC/DC converters**
- **Does Not Require External Components**
- **Meets Environmental Requirements of MIL-STD-810E and MIL-S-901C**

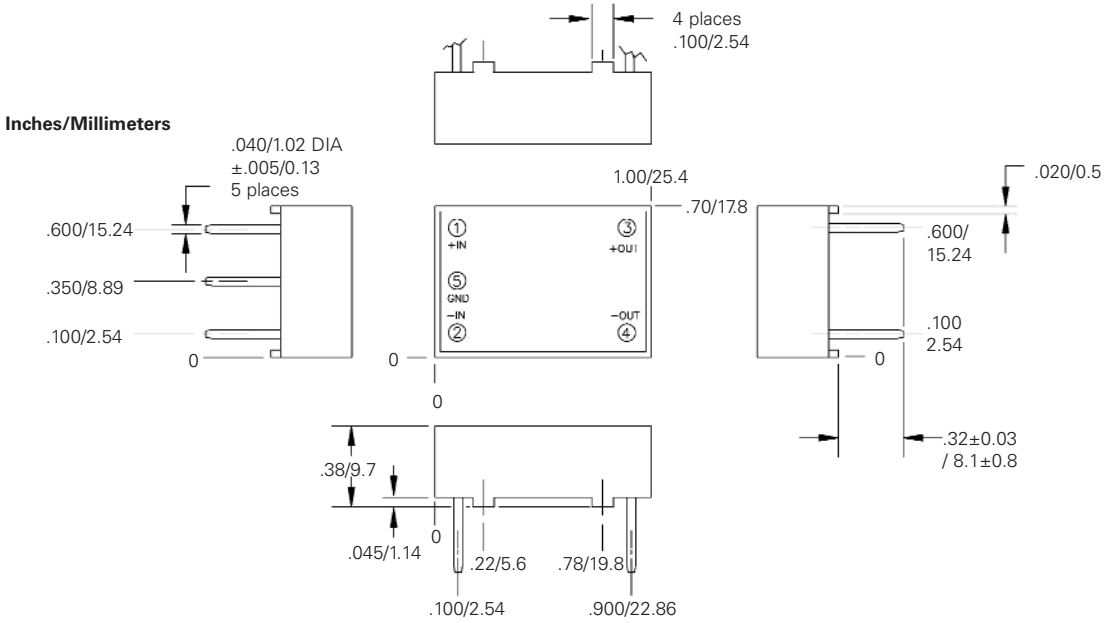
AC INSERTION LOSS



SPECIFICATIONS

Input Voltage (maximum)	50	Vdc
Rated Output Current	2.8	A
Isolation (Input/Output to Case)	500	Vdc
Operating Temperature	-55 to +100	ºC
Storage Temperature	-55 to +125	ºC
Insulation Resistance (measured at 50Vdc)	50	MOhm (min.)
Weight	0.36	oz.
	10.1	grams
Size	1.0 x 0.70 x 0.38	inch
	25.4 x 19.1 x 9.7	mm
Volume	.285	$inch^3$
	4.71	cm^3
DC Insertion Loss (nominal)	0.7	Vdc
Material	Pin	Brass(Solder Plating)
	Case	Aluminum 5052-H32

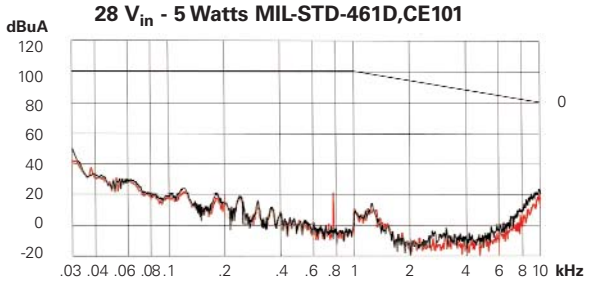
CASE DRAWINGS

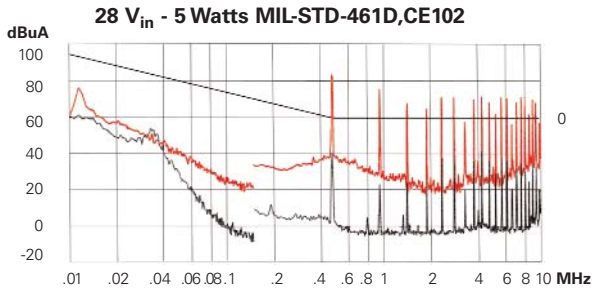


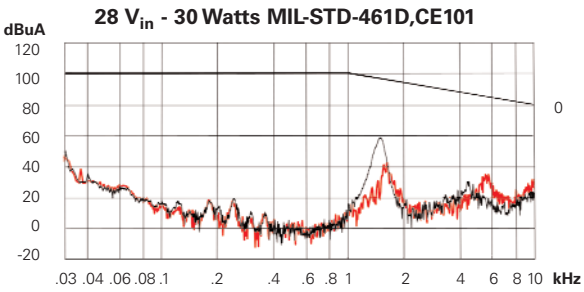
Tolerances: inches - x.xx = ±0.03, x.xxx = ±0.015 mm - x.x = ±0.8, x.xx = ±0.4

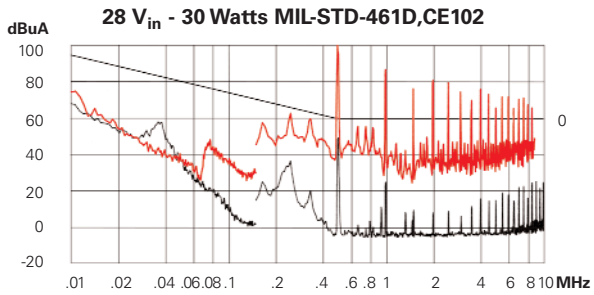
All specifications are typical @+25°C with nominal input voltage and under full output load conditions, unless otherwise noted. Specifications are subject to change without notice.

EMI COMPARISON GRAPHS - CB30S









CBF75

EMI Filter

FEATURES

- **MIL-STD-461D Compliance CE101 and CE102 for CB75S DC/DC converters**
- **Does Not Require External Components**
- **Meets Environmental Requirements of MIL-STD-810E and MIL-S-901C**

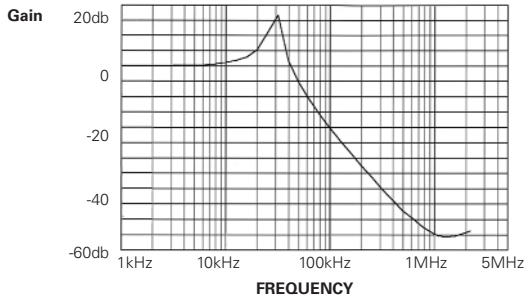
How to Order:

CBF 75 - C - D

Series
Total Output Power
Options

Options:
C - pins out top of unit
D - through hole inserts (.115 DIA)

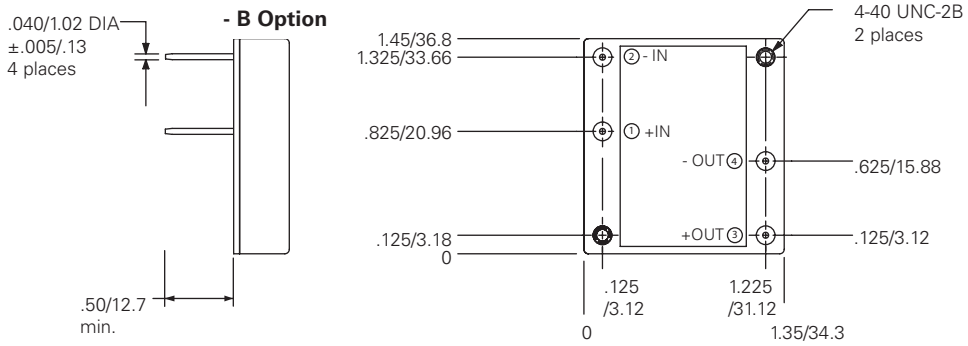
AC INSERTION LOSS

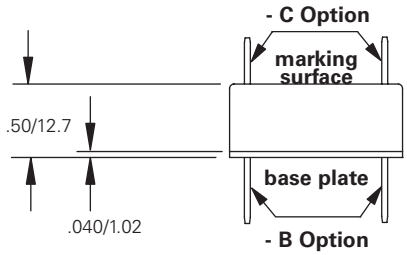


SPECIFICATIONS

Input Voltage (maximum)	50	Vdc
Rated Output Current	6	A
Isolation (Input/Output to Case)	500	Vdc
DC Insertion Loss (nominal)	0.7	Vdc
Operating Temperature	-55 to +100	°C
Storage Temperature	-55 to +125	°C
Insulation Resistance (measured at 50Vdc)	50	MOhm (min.)
Weight		oz. grams
Size	1.45 x 1.35 x 0.5 36.8 x 34.3 x 12.7	inch mm
Volume	.98 16.0	$inch^3$ cm^3
Material	Pin Baseplate Case	Brass(Solder Plating) Aluminum 5052-H32 28GA Steel (Nickel Plate)
Mounting	Standard B Option C Option D Option I Option	4 - 40 inserts in baseplate pins out bottom of unit pins out top of unit 0.115 DIA thru hole inserts M2.5 inserts in baseplate

CASE DRAWINGS





Inches/Millimeters

Tolerances:

inches	-	x.xx	= ±0.03
		x.xxx	= ±0.015
mm	-	x.x	= ±0.8
		x.xx	= ±0.4

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

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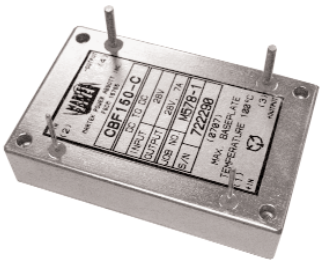
CBF150

EMI Filter



FEATURES

- **MIL-STD-461D Compliance CE101 and CE102 for CB150S DC/DC converters**
- **Does Not Require External Components**
- **Meets Environmental Requirements of MIL-STD-810E and MIL-S-901C**

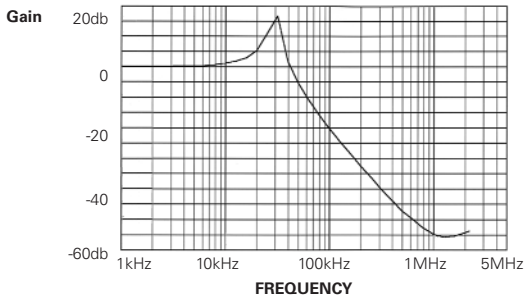
How to Order:

CBF 150 - C - D

Series
Total Output Power
Options

Options:
C - pins out top of unit
D - through hole inserts (.115 DIA)

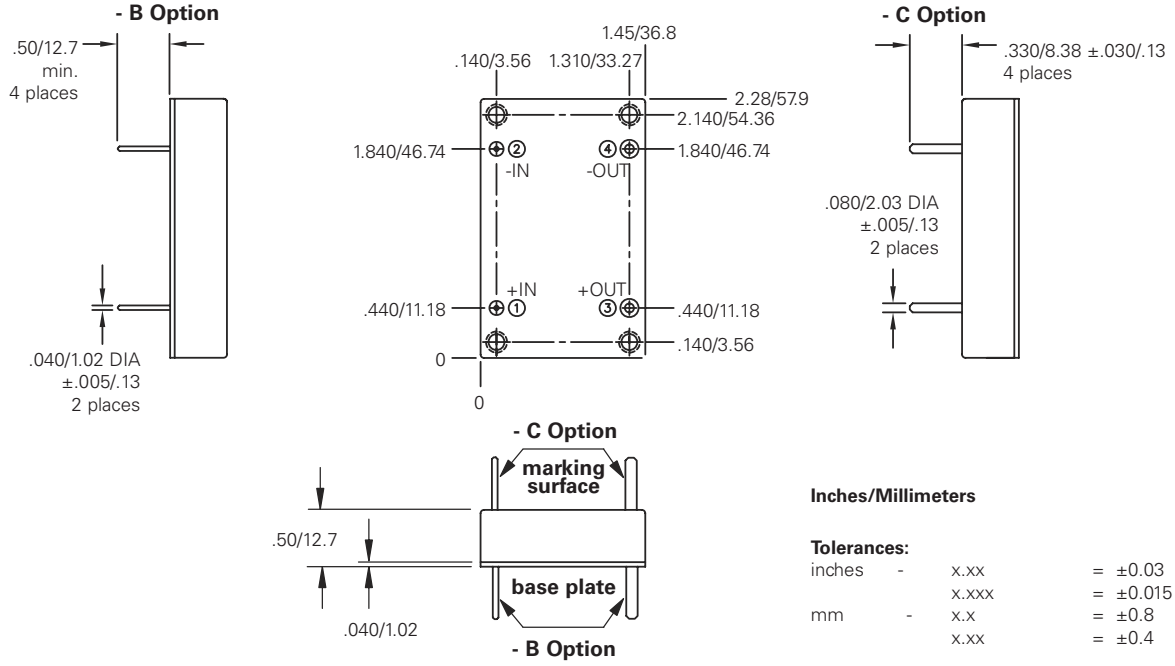
AC INSERTION LOSS



SPECIFICATIONS

Input Voltage (maximum)	50	Vdc
Rated Output Current	7	A
Isolation (Input/Output to Case)	500	Vdc
DC Insertion Loss (nominal)	0.7	Vdc
Operating Temperature	-55 to +100	ºC
Storage Temperature	-55 to +125	ºC
Insulation Resistance (measured at 50Vdc)	50	MOhm (min.)
Weight	3.02	oz.
	85.8	grams
Size	2.28 x 1.45 x 0.5	inch
	57.9 x 36.8 x 12.7	mm
Volume	1.65	$inch^3$
	27.1	cm^3
Material	Pin	Brass(Solder Plating)
	Baseplate	Aluminum 5052-H32
	Case	28GA Steel (Nickel Plate)
Mounting	Standard	4 - 40 inserts in baseplate
	B Option	pins out bottom of unit
	C Option	pins out top of unit
	D Option	0.115 DIA thru hole inserts
	I Option	M2.5 inserts in baseplate

CASE DRAWINGS



Inches/Millimeters

Tolerances:

inches	-	x.xx	= ±0.03
		x.xxx	= ±0.015
mm	-	x.x	= ±0.8
		x.xx	= ±0.4

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

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CBF300

EMI Filter

FEATURES

- **MIL-STD-461D Compliance CE101 and CE102 for CB225T or up to 4 of CB75 DC/DC converters**
- **Does Not Require External Components**
- **Meets Environmental Requirements of MIL-STD-810E and MIL-S-901C**

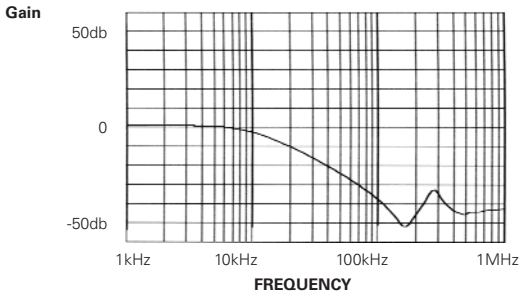
How to Order:

CBF 300 - C - D

Series
Total Output Power
Options

Options:
C - pins out top of unit
D - through hole inserts (.115 DIA)

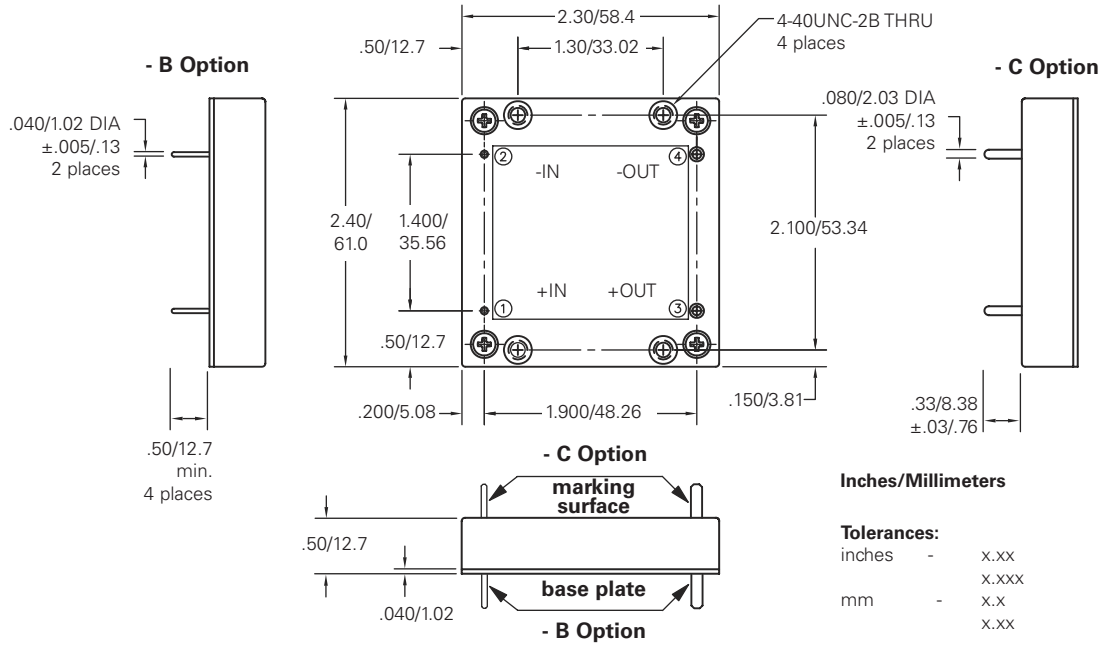
AC INSERTION LOSS



SPECIFICATIONS

Input Voltage (maximum)	50	Vdc
Rated Output Current	24	A
Isolation (Input/Output to Case)	500	Vdc
DC Insertion Loss (nominal)	0.22	Vdc, 28 Vin @ 10.7 A
Operating Temperature	-55 to +100	ºC
Storage Temperature	-55 to +125	ºC
Insulation Resistance (measured at 50Vdc)	50	MOhm (min.)
Weight	4.9	oz.
	141	grams
Size	2.40 x 2.30 x 0.50	inch
	61.0 x 59.0 x 13.0	mm
Volume	2.76	$inch^3$
	46.8	cm^3
Material	Pin	Brass(Solder Plating)
	Baseplate	Aluminum 5052-H32
	Case	28GA Steel (Nickel Plate)
Mounting	Standard	4 - 40 inserts in baseplate
	B Option	pins out bottom of unit
	C Option	pins out top of unit
	D Option	0.115 DIA thru hole inserts
	I Option	M2.5 inserts in baseplate

CASE DRAWINGS



Inches/Millimeters

Tolerances:

inches	-	x.xx	= ±0.03
		x.xxx	= ±0.015
mm	-	x.x	= ±0.8
		x.xx	= ±0.4

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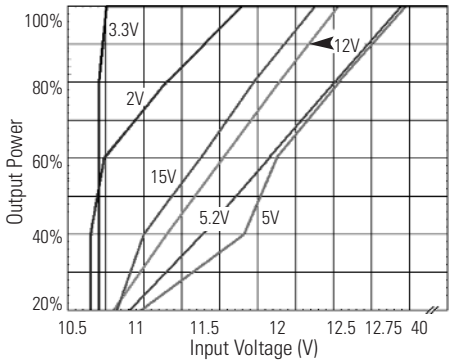
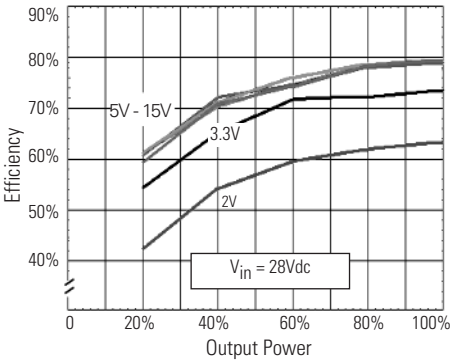
www.martekpowerabbott.com E-mail: sales.mpa@martekpower.com

PERFORMANCE CHARACTERISTICS: CB5S, CD10D

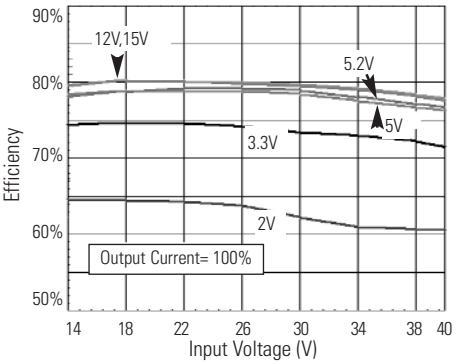
I. Input Voltage vs. Output Power



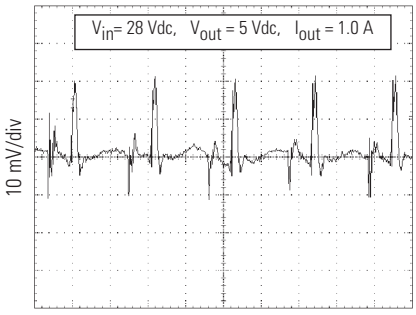
II. Efficiency vs. Output Power



III. Efficiency vs. Input Voltage

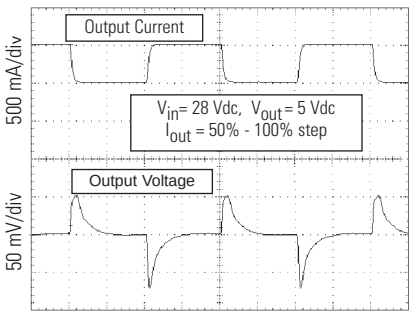


IV. Output Voltage Ripple



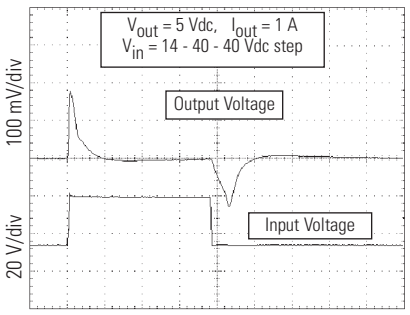
Time: 1 µS/div

V. Load Transient Response



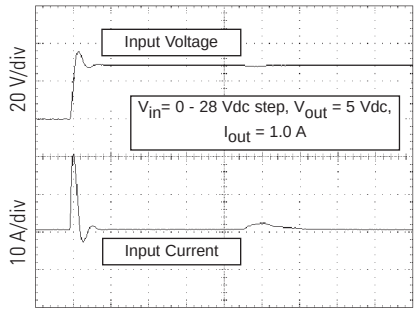
Time: 500 µS/div

VI. Input Transient Response



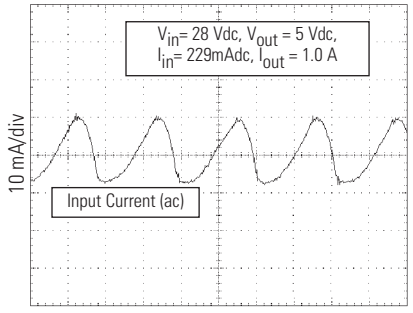
Time: 500 µS/div

VII. Input Inrush Current



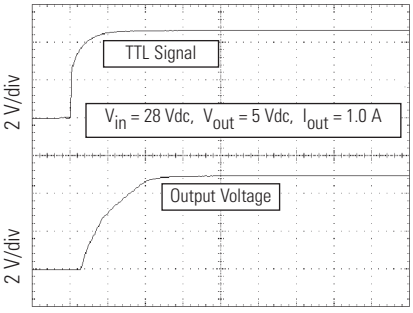
Time: 50 µS/div

VIII. Input Current Ripple



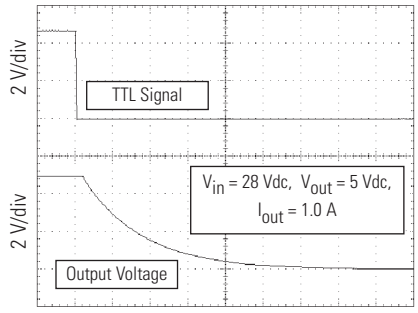
Time: 1.0 µS/div

IX. TTL Turn On



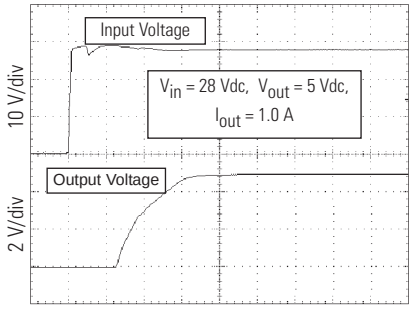
Time: 0.5 mS/div

X. TTL Turn-off



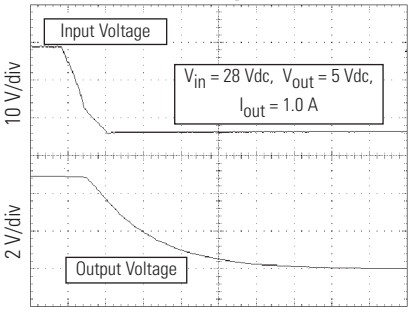
Time: 500 µS/div

XI. Turn-on



Time: 500 µS/div

XII. Turn-off / Hold-up Time

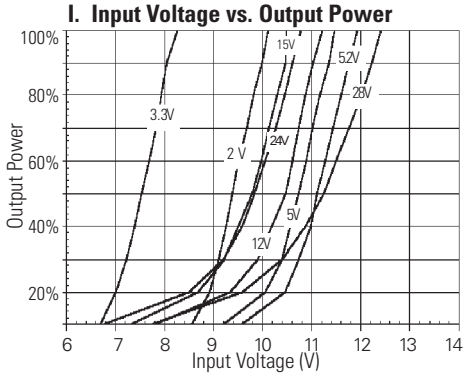


Time: 500 µS/div

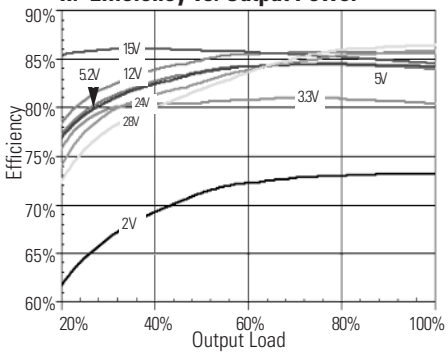
All specifications are typical @+25°C with nominal input voltage and under full output load conditions, unless otherwise noted. Specifications are subject to change without notice.

PERFORMANCE CHARACTERISTICS: CB30S

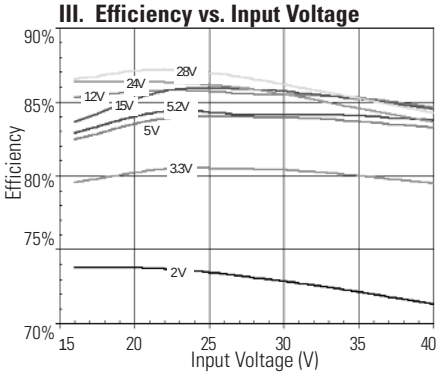
I. Input Voltage vs. Output Power



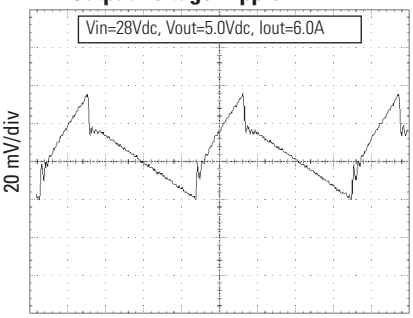
II. Efficiency vs. Output Power



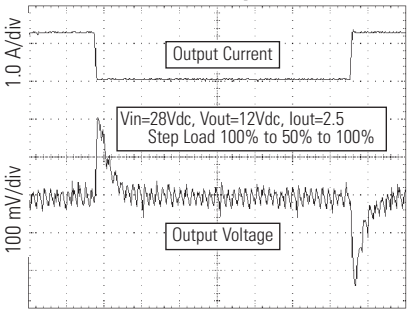
III. Efficiency vs. Input Voltage



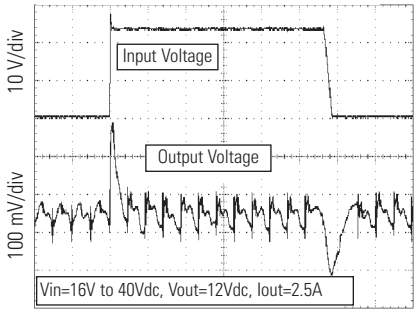
IV. Output Voltage Ripple



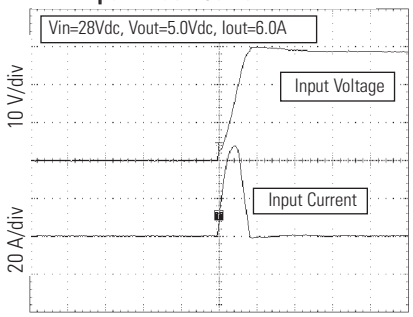
V. Load Transient Response



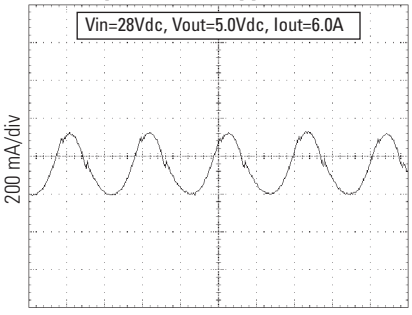
VI. Line Transient Power



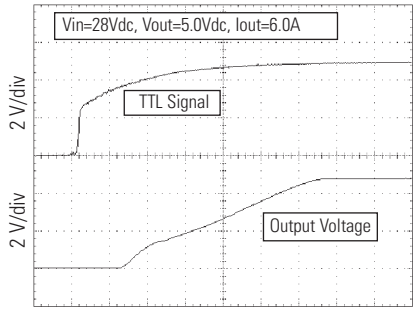
VII. Input Inrush Current



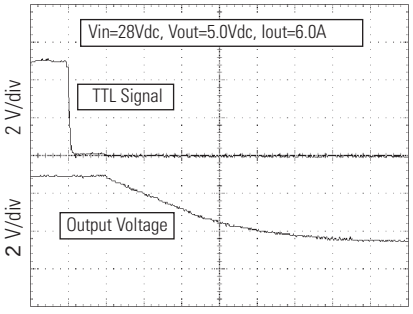
VIII. Input Current Ripple



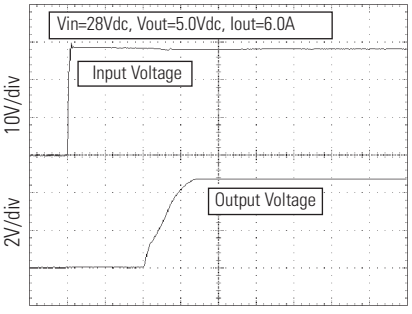
IX. TTL Turn On



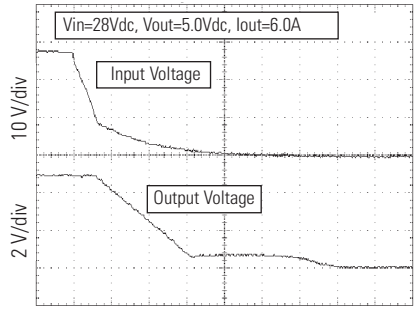
X. TTL Turn Off



XI. Input Turn-On



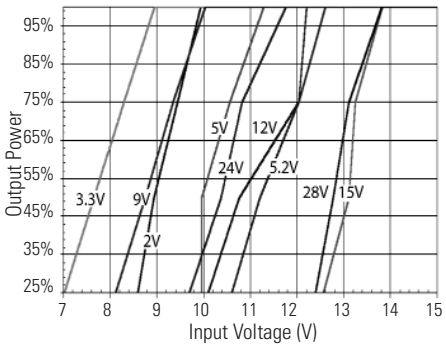
XII. Turn Off/ Hold-Up Time



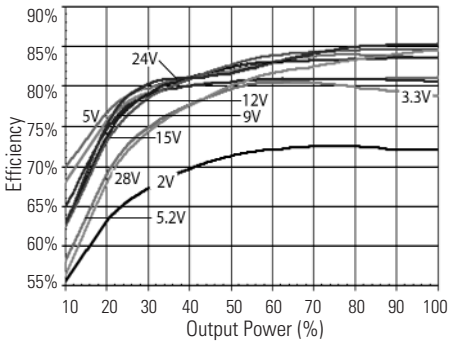
All specifications are typical @+25°C with nominal input voltage and under full output load conditions, unless otherwise noted. Specifications are subject to change without notice.

PERFORMANCE CHARACTERISTICS: HB30S

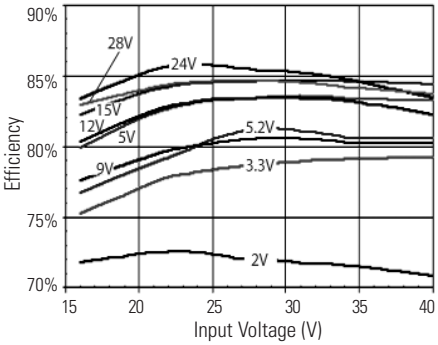
I. Input Voltage vs. Output Power



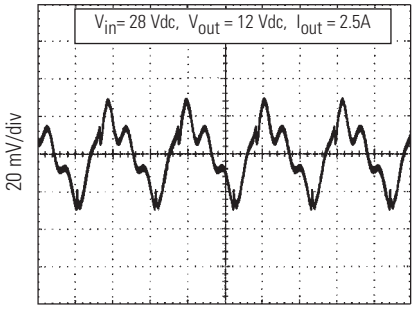
II. Efficiency vs. Output Power



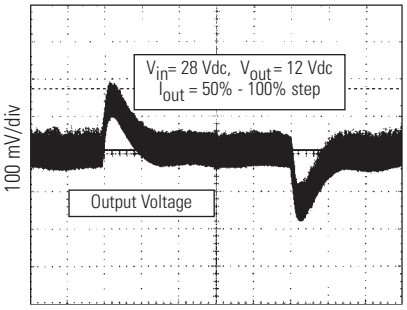
III. Efficiency vs. Input Voltage



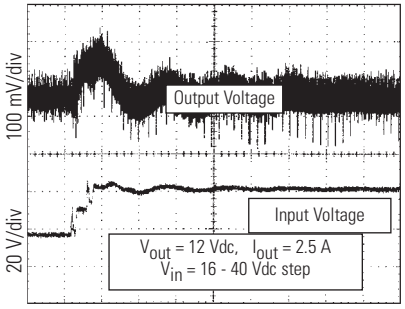
IV. Output Voltage Ripple



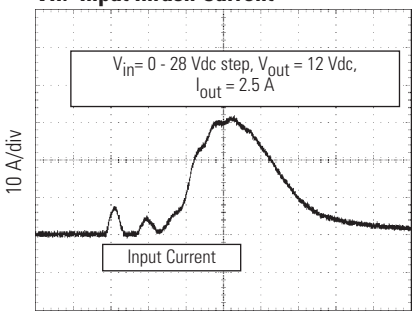
V. Load Transient Response



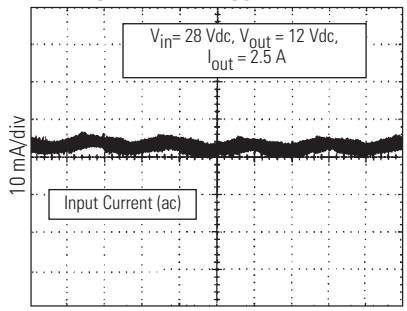
VI. Input Transient Response



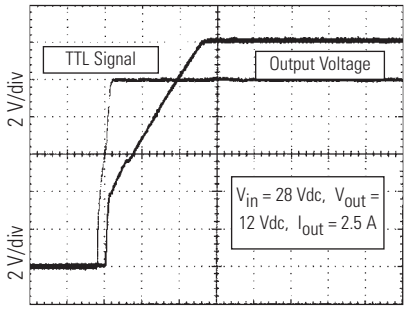
VII. Input Inrush Current



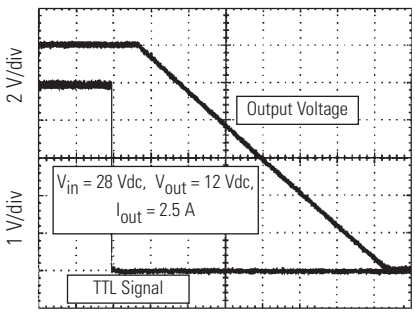
VIII. Input Current Ripple



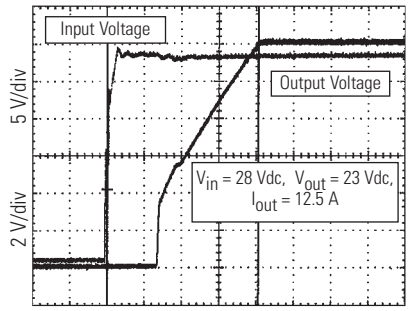
IX. TTL Turn On



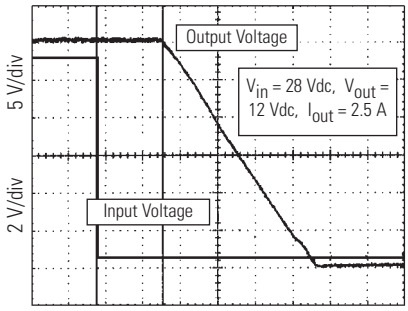
X. TTL Turn-off



XI. Turn-on



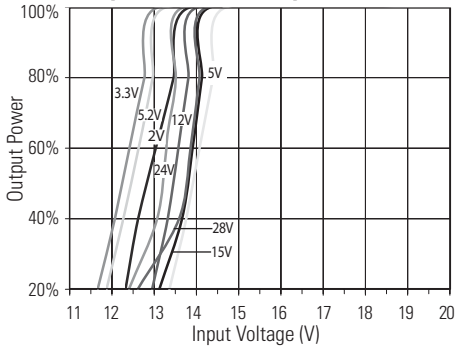
XII. Turn-off / Hold-up Time



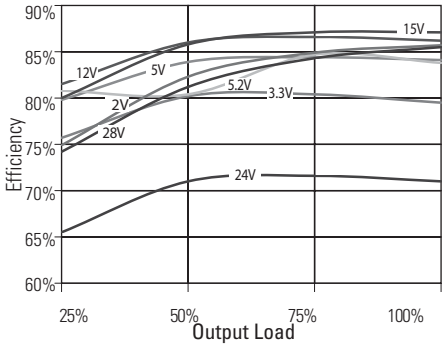
All specifications are typical @+25°C with nominal input voltage and under full output load conditions, unless otherwise noted. Specifications are subject to change without notice.

PERFORMANCE CHARACTERISTICS: CB75S

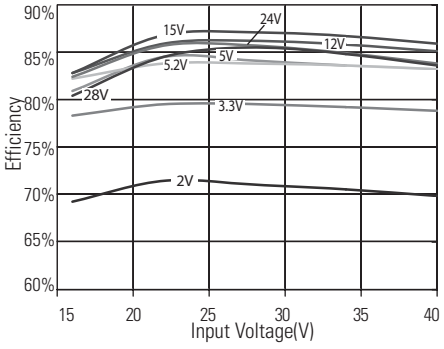
I. Input Voltage vs. Output Power



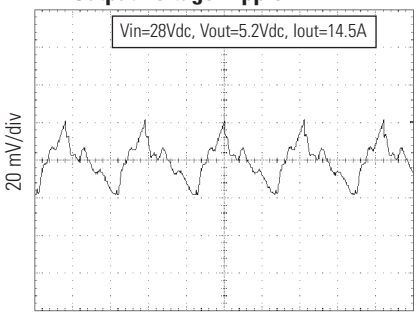
II. Efficiency vs. Output Power



III. Efficiency vs. Input Voltage

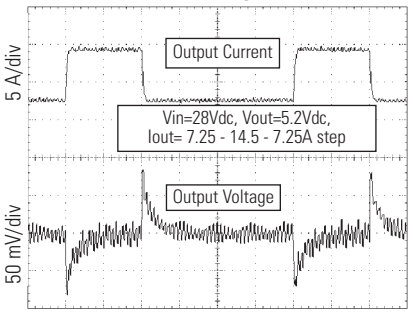


IV. Output Voltage Ripple



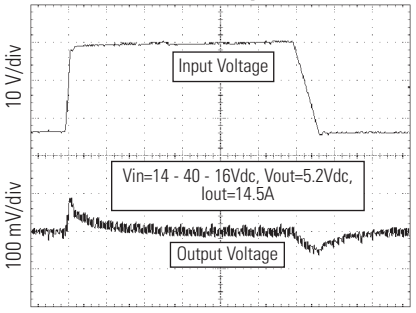
Time: 1.0 µS/div

V. Load Transient Response



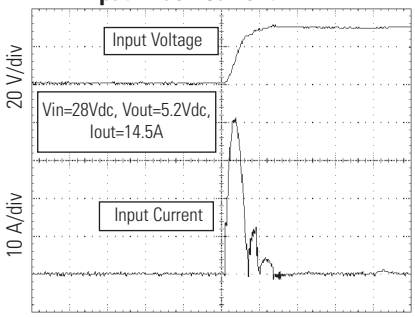
Time: 500 µS/div

VI. Line Transient Response



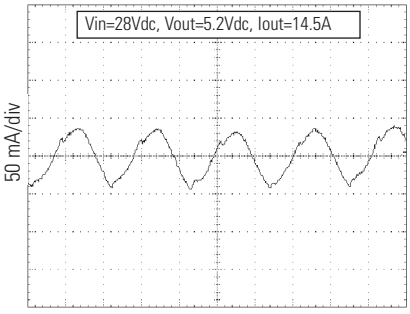
Time: 250 µS/div

VII. Input Inrush Current



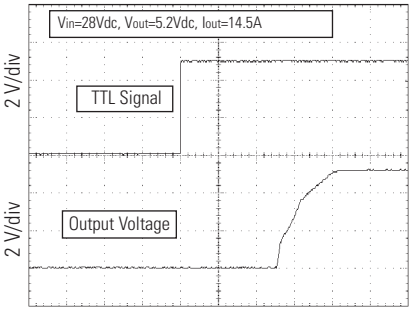
Time: 50 µs/div

VIII. Input Current Ripple



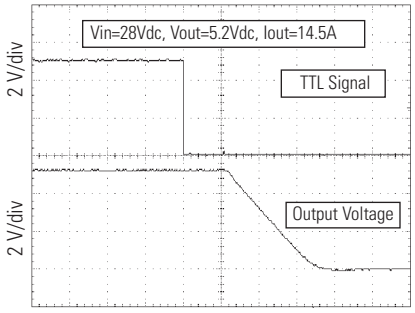
Time: 1.0 µS/div

IX. TTL Turn On



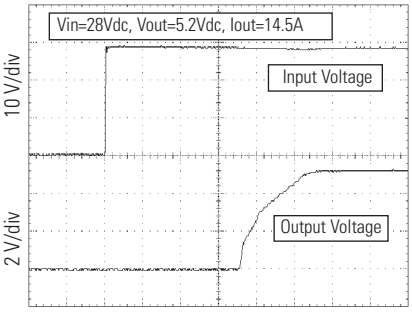
Time: 1.0 mS/div

X. TTL Turn Off



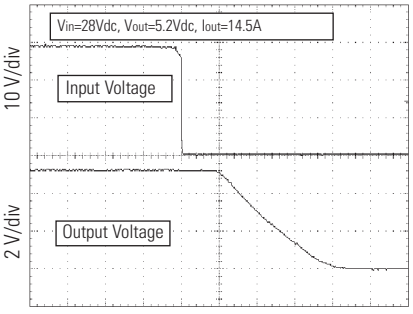
Time: 100 µS/div

XI. Input Turn-On



Time: 1.0 mS/div

XII. Turn Off/ Hold-Up Time



Time: 100 µS/div

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

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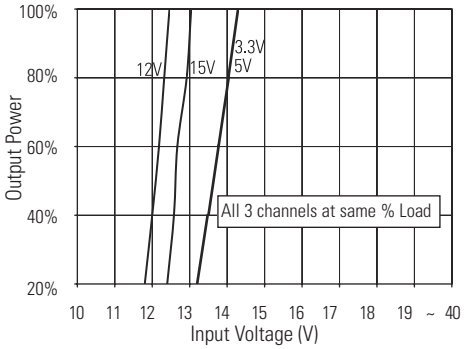
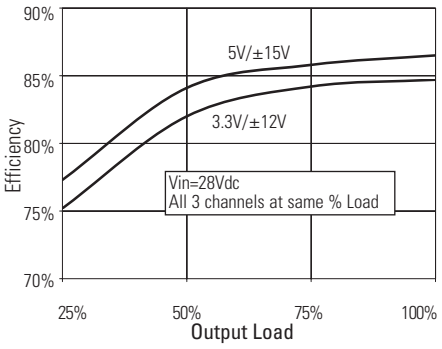
PERFORMANCE CHARACTERISTICS: CB75T

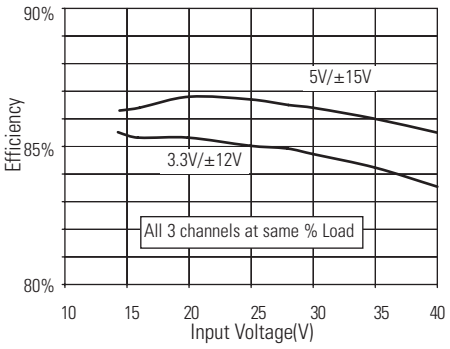
I. Input Voltage vs. Output Power



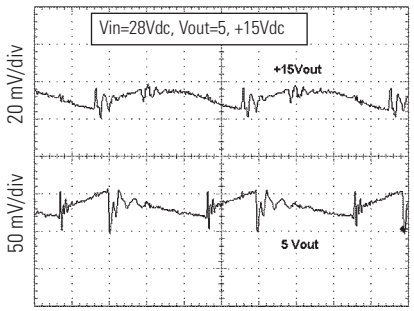
II. Efficiency vs. Output Power



III. Efficiency vs. Input Voltage (FL)

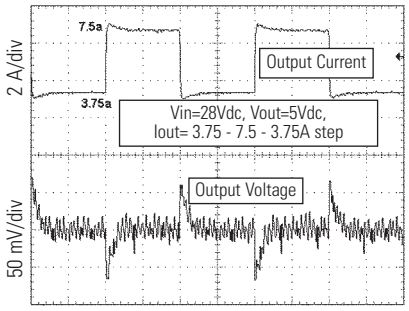


IV. Output Voltage Ripple



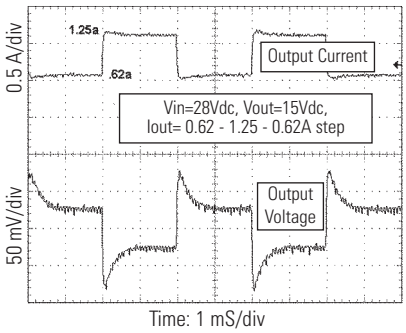
Time: 0.5 µS/div

V-i. Load Transient Response (5Vout)



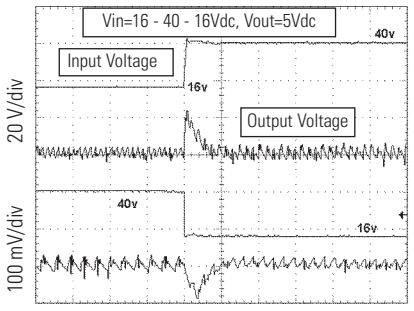
Time: 1 mS/div

V-ii. Load Transient Response (15Vout)



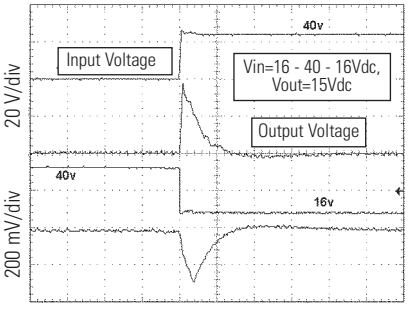
Time: 1 mS/div

VI-i. Line Transient Response (5Vout)



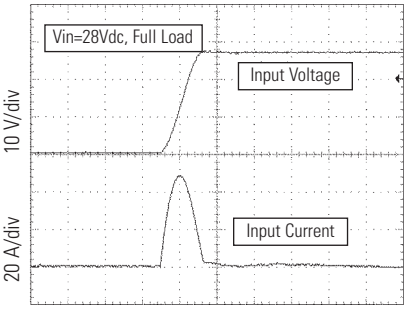
Time: 500 µs/div

VI-ii. Line Transient Response (15Vout)



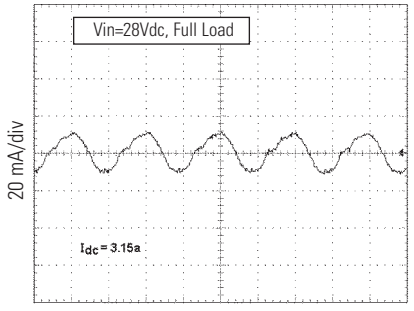
Time: 500 µS/div

VII. Inrush Current



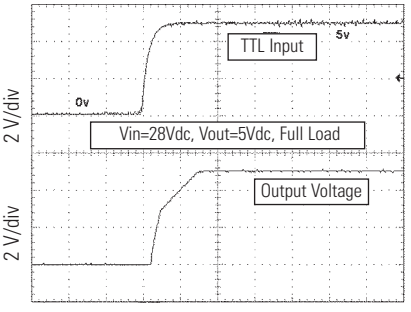
Time: 25 µS/div

VIII. Input Ripple Current



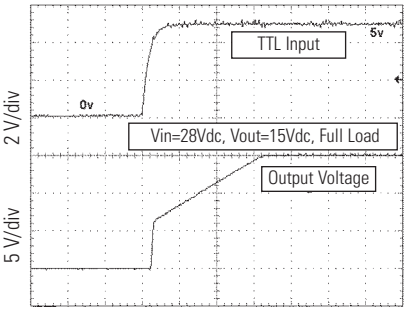
Time: 1 µS/div

IX-i. TTL Turn On (5Vout)



Time: 2.5 mS/div

IX-ii. TTL Turn On (15Vout)



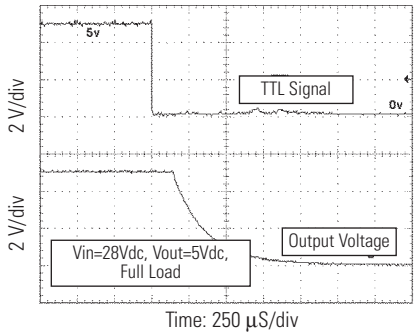
Time: 2.5 mS/div

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

Martek Power Abbott, Inc. 1111 Knox Street, Torrance, CA 90502 U.S.A. Tel: 310.202.8820 Fax: 310.836.4926
www.martekpowerabbott.com E-mail: sales.mpa@martekpower.com

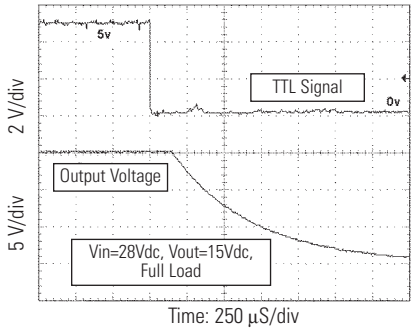
PERFORMANCE CHARACTERISTICS: CB75T

X-i. TTL Turn Off (5Vout)



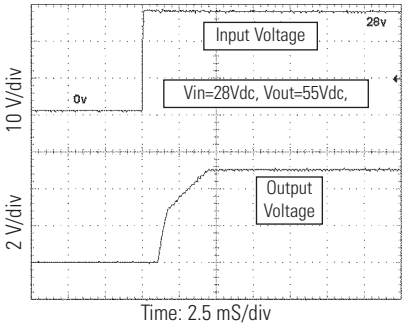
Time: 250 µS/div

X-ii TTL Turn Off (15Vout)



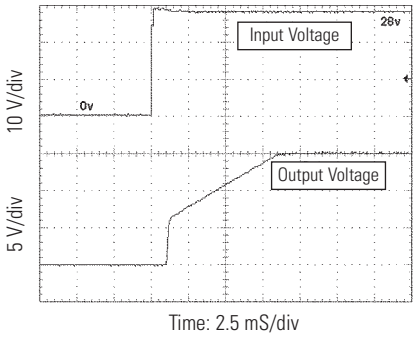
Time: 250 µS/div

XI-i. Input Turn On (5Vout)



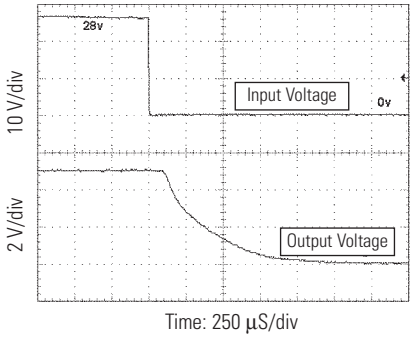
Time: 2.5 mS/div

XI-ii. Input Turn On (15Vout)



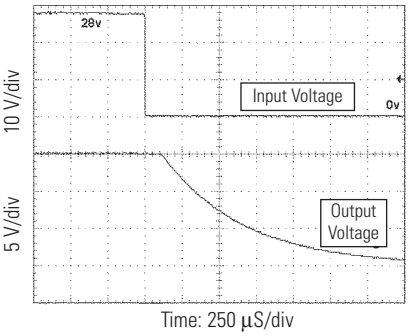
Time: 2.5 mS/div

XII-i. Turn Off /Hold-up Time (5Vout)



Time: 250 µS/div

XII-ii. Turn Off /Hold-up Time (15Vout)

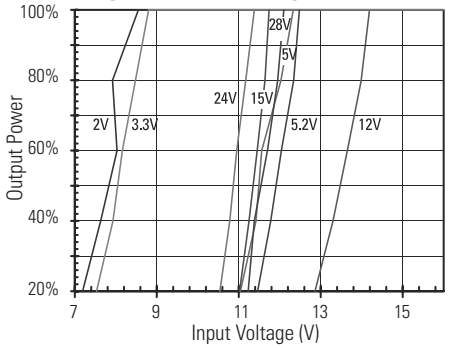


Time: 250 µS/div

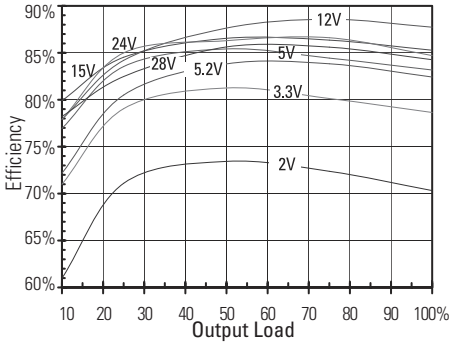
All specifications are typical @+25°C with nominal input voltage and under full output load conditions, unless otherwise noted. Specifications are subject to change without notice.

PERFORMANCE CHARACTERISTICS: CB150S

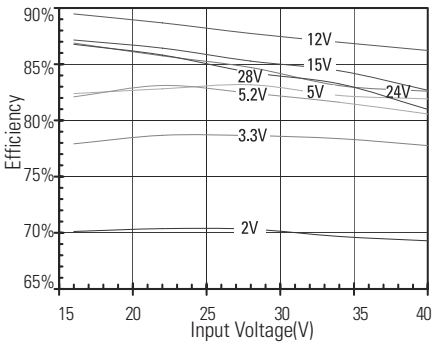
I. Input Voltage vs. Output Power



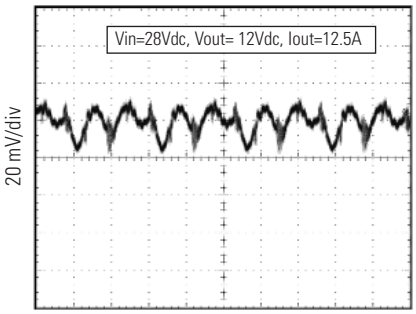
II. Efficiency vs. Output Power



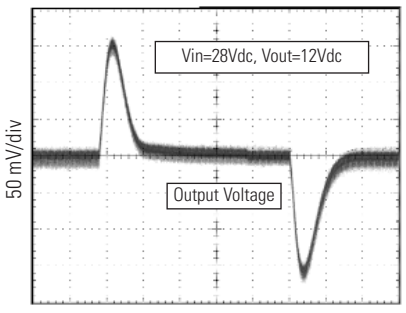
III. Efficiency vs. Input Voltage



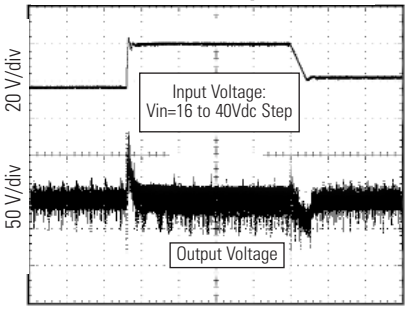
IV. Output Voltage Ripple



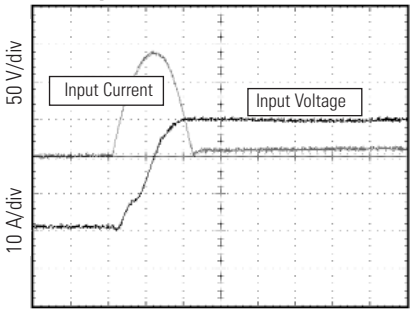
V. Load Transient Response



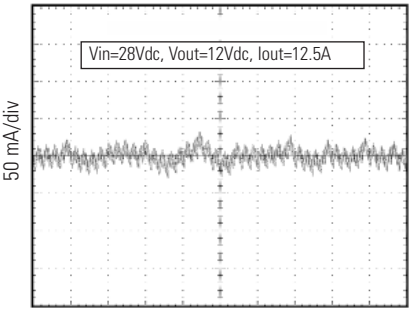
VI. Line Transient Response



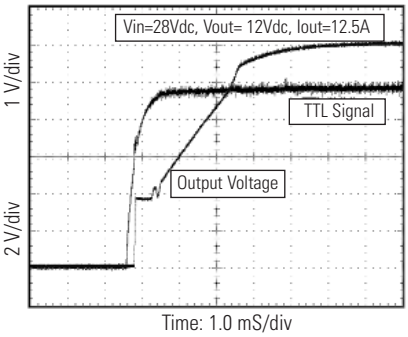
VII. Input Inrush Current



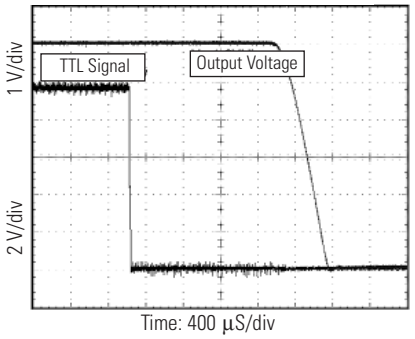
VIII. Input Current Ripple



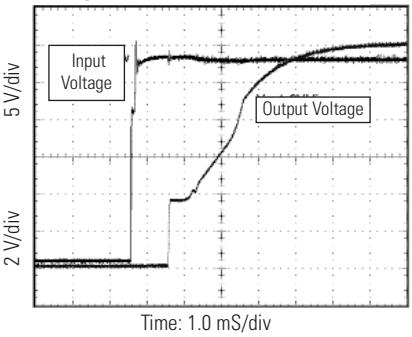
IX. TTL Turn On



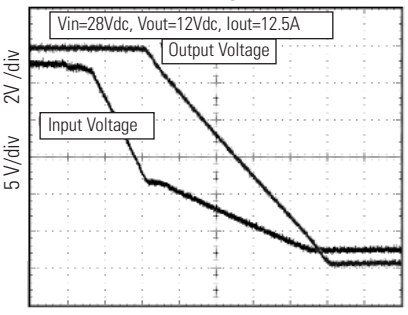
X. TTL Turn Off



XI. Input Turn-On



XII. Turn Off/ Hold-Up Time



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

GUIDE TO OPERATION

I. Electrical Description

The CB5/CB10D Series of DC-DC converters utilize a unique planar flyback power transformer while the CB30S and CB75S converters use a planar forward converter topology to yield significantly greater power densities and lower output ripple. Advanced current mode control is utilized enabling a fast transient response time. The switching frequency of the CB Series are fixed at 500kHz(factory set; greater than 450kHz but less than 520 kHz) to minimize noise and allow for simplified EMI filtering (companion EMI modules are available). Sufficient capacitance on the input and output, internal to the unit, allows for simple use and operation with no external components in most applications.

II. Mechanical Description

The CB5S/CB10D converters are encased in a 5 sided aluminum can, while the CB30S/CB75S converters are encased in a 5 sided steel can with an aluminum baseplate to facilitate heat transfer. The CB5S, CB10D, and CB30S height dimension of 0.38" allows for mounting in standard 1/2 inch width circuit card racks. The pins are non-rigid and may be formed to suit specific mounting configurations. Care should be taken not to excessively bend or over stress the pins to avoid breakage.

The high efficiency of the CB reduces heat dissipation and minimizes heat sinking requirements. Maximum dissipation at full load of CB5/CB10D will be between 1.1 and 1.67 watts per channel (between 5 and 7.5 watts for CB30S, and between 14 and 18.7 watts for the CB75S). Though this reduces heat sinking requirements, the baseplate temperature must be maintained below +100°C.

Each CB unit has a label on it that will clearly identify pin functions and electrical ratings. Description of these functions can be found in the "Guide to Operation" and the "Application Notes" sections. Before electrically wiring the converter we recommend carefully reviewing the application notes section entitled "General Application Notes" and "Wire Gage & Distance to Load".

III. Military Specifications

Each CB unit is environmentally sealed and are designed to meet the following military environmental specifications:

Specification	*Condition*	*Method*	*Procedure*	*Test Condition*
MIL-STD-704D	Input Transient			Transients up to 50 V for 0.1 second
MIL-STD-810E	Vibration	514.4	1	Up to 30gs, each axis for 1 hour
MIL-STD-810E	Humidity	507.3	1	95% humidity, non-condensing for 10 days
MIL-STD-810E	Temp/Altitude	520.1	3	40 hours from -55°C to +71°C
MIL-STD-810E	Acceleration	513.4	3	14gs each axis
MIL-STD-810E	Temperature Shock	503.3		-55°C to +100°C (non-operating, one hour each cycle)
MIL-S-901C	High Impact Shock			5 foot hammer drop

The CB Series have been tested and found to meet the requirements of MIL-STD-461D for conducted emissions/interference on the input power leads (CE101 and CE102) when used with the CBF30 passive EMI filter. In addition, the series have been designed to meet MIL-STD-461D for radiated emissions (RE101, RE102), conducted susceptibility (CS101, CS114, CS115 and CS116) and radiated susceptibility (RS101, RS103).

IV. Product Features

TTL (Remote on/off and Output status)

The TTL feature is used to command the CB series on and off and is referenced to the input return. When the TTL pin is left unconnected or, if a voltage between 2.4V and 5.0V is applied to the pin, the converter will remain on. When the TTL pin is pulled down below 0.8V the unit will turn off. For the CB5S, CB10D, and CB75S modules the TTL pin can be used as an output status indicator, with "high" indicating OK and "low" indicating out of specifications.

Over Temperature Protection (CB30S and CB75S only)
An integral electronic over temperature shut down circuit is provided to protect the CB series from accidental over heating. If the temperature (measured at the baseplate) of the converter exceeds 5% (105°C) above the rated high operating temperature, the unit will automatically shut down. Once the temperature (measured at the baseplate) is reduced to 85% of the rated high operating temperature, power will be automatically restored.

Output Voltage Trim (CB30S and CB75S only)
An output voltage trim pin is provided for the adjustment of the output voltage and is referenced to the output return. Using this feature the output voltage can be trimmed up to +10% of nominal and down to 90% of nominal. To increase the output voltage, simply attach a resistor between the Trim pin and the Output Return of the unit. To decrease output voltage, simply attach a resistor between the Trim pin and +Output of the unit. Consult Application Notes for CB30S resistor values to achieve the desired output voltage for the CB30S.

Switching Frequency Synchronization (CB75S only)
The CB75S switching frequency is factory set to 500kHz. The converters can be synchronized to an external system clock running at 480kHz to 550kHz by using the Sync Input pin. The Sync feature is a unidirectional input only, meaning that one converter cannot be used as a master to synchronize other slave modules - an external system clock (referenced to the 28volt input return) will always be required for synchronization. See appliation notes for more details.

Overload/Short Circuit Protection
The output of the CB Series is protected from an accidental overload or short circuit condition of any duration. When the output load exceeds the full load capability of the supply (105% to 150% of the maximum rated output current) the converter switches into a "Burp-Mode" (this is where the converter is sensing the overload and is continuously turning on and off in a controlled fashion). When the overload/short circuit is removed the converter automatically returns to its normal mode of operation.

Over Voltage Protection
The CB series provides an internal overvoltage protection circuit. Should an overvoltage condition occur the converter will shut off (output voltage will fall in accordance with Figure X). The CB5S/CB10D will auto recover when the overvoltage condition is removed; for the CB30S and CB75S, the input must be recycled to restore output.

V. Reliability

In order to achieve superior reliability, the CB series converters adhere to stringent component derating guidelines based on NAVMAT P4855-1. The Mean Time Between Failure (MTBF) per MIL-HBDK-217F Notice 2 calculated for the CB5S/CB10D operating at rated output power at three baseplates temperatures and various environments are calculated in the following table. For the CB5SI, MTBF is calculated to be 457,192 hours GB, 71,000 hours NS, 50,840 hours AIC, at 50°C baseplate. The MTBF per MIL-HBDK-217F Notice 2 calculated for the CB30SM under the operating conditions of 50°C baseplate, maximum rated output is presented as a set of curves, based on Environment in the main catalog. For the CB30SI, MTBF is calculated to be 5.04E5 GB, 7.57E4 NS, 5.12E4 AIC at +50°C.

CB5S MEAN TIME BETWEEN FAILURE (MTBF)

M Grade	0ºC	25ºC	50ºC	100ºC
GB	5,216,680	2,923,210	1,525,930	281,527
GF	960,045	527,222	286,150	78,883
GM	526,940	287,788	154,885	44,308
NS	670,479	389,076	226,758	73,071
NU	294,991	173,003	102,517	35,909
ARW	211,363	118,718	66,358	20,831
AIC	487,795	279,991	161,760	52,493
AIF	246,166	143,593	86,019	31,627
AUC	314,272	176,108	99,054	31,305
AUF	164,025	94,529	55,684	19,910
SF	9,940,340	5,495,230	2,644,820	361,513
MF	371,820	211,528	119,753	37,650
ML	156,057	88,567	50,065	16,137
CL	11,969	6,975	4,026	1,362

I Grade	0ºC	25ºC	50ºC	100ºC
GB	1,748,650	941,481	457,192	67,798
GF	318,726	172,901	92,217	23,477
GM	180,250	96,436	50,922	13,708
NS	214,016	123,346	71,100	21,434
NU	97,767	69,496	33,035	11,084
ARW	71,005	3,921	21,676	6,622
AIC	154,932	88,549	50,840	15,782
AIF	76,850	44,688	26,694	9,589
AUC	99,314	55,533	31,192	9,660
AUF	50,851	29,305	17,280	6,130
SF	3,228,880	1,707,260	743,067	81,132
MF	124,068	69,535	38,844	11,698
ML	52,693	29,400	16,410	5,161
CL	4,219	2,400	1,359	449

Note: MTBF for CB10DM and CB10DI are 1/2 the values given above.

CB30S MEAN TIME BETWEEN FAILURE (MTBF)

M Grade	0ºC	10ºC	20ºC	30ºC	40ºC	50ºC	60ºC	70ºC	80ºC
GB	4.33E+06	3.44E+06	2.72E+06	2.13E+06	1.66E+06	1.28E+06	9.72E+05	7.28E+05	5.37E+05
GF	7.75E+05	6.02E+05	4.68E+05	3.63E+05	2.81E+05	2.18E+05	1.68E+05	1.30E+05	1.01E+05
GM	4.15E+05	3.23E+05	2.51E+05	1.94E+05	1.50E+05	1.16E+05	8.93E+04	6.90E+04	5.34E+04
NS	5.52E+05	4.41E+05	3.53E+05	2.82E+05	2.26E+05	1.81E+05	1.45+E05	1.16E+05	9.29E+04
NU	2.40E+05	1.93E+05	1.55E+05	1.25E+05	1.01E+05	8.13E+04	6.57+E04	5.31E+04	4.29E+04
ARW	1.66E+05	1.31E+05	1.03E+05	8.09E+04	6.35E+04	4.99E+04	3.92E+04	3.08E+04	2.42E+04
AIC	3.96E+05	3.14E+05	2.50E+05	1.99E+05	1.59E+05	1.26E+05	1.01E+05	8.03E+04	6.40E+04
AIF	2.05E+05	1.64E+05	1.31E+05	1.06E+05	8.56E+04	6.95E+04	5.65E+04	4.60E+04	3.75E+04
AUC	2.49E+05	1.96E+05	1.54E+05	1.21E+05	9.54E+04	7.51E+04	5.92E+04	4.66E+04	3.68E+04
AUF	1.34E+05	1.07E+05	8.50E+04	6.81E+04	5.46E+04	4.39E+04	3.54E+04	2.86E+04	2.31E+04
SF	8.33E+06	6.62E+06	5.21E+06	4.04E+06	3.09E+06	2.31E+06	1.69E+06	1.21E+06	8.44E+05
MF	2.93E+05	2.33E+05	1.84E+05	1.46E+05	1.15E+05	9.11E+04	7.19E+04	5.67E+04	4.48E+04
ML	1.23E+05	9.74E+04	7.71E+04	6.09E+04	4.80E+04	3.79E+04	2.99E+04	2.36E+04	1.87E+04
CL	9.33E+03	7.50E+03	6.01E+03	4.80E+03	3.83E+03	3.05E+03	2.43E+03	1.93E+03	1.54E+03

I Grade	0ºC	10ºC	20ºC	30ºC	40ºC	50ºC	60ºC	70ºC	80ºC
GB	1,970,000	1,540,000	1,200,000	915,000	687,000	504,000	362,000	254,000	175,000
GF	333,000	256000	196,000	149,000	113,000	85,900	64,900	49,000	36,900
GM	181,000	140,000	107,000	81,200	61,600	46,700	35,300	26,700	20,300
NS	237,000	190,000	151,000	120,000	95,600	75,700	59,600	46,800	36,500
NU	105,000	84,400	67,700	54,200	43,400	34,700	27,700	22,000	17,500
ARW	71,300	55,900	43,600	33,900	26,200	20,300	15,700	12,100	9,400
AIC	167,000	132,000	105,000	82,600	65,100	51,200	40,200	31,400	24,600
AIF	87,900	70,000	56,000	44,900	36,000	29,000	23,300	18,700	15,000
AUC	104,000	81,000	63,300	49,300	38,300	29,800	23,100	18,000	13,900
AUF	56,500	44,800	35,500	28,300	22,500	17,900	14,300	11,400	9,080
SF	3,610,000	2,840,000	2,190,000	1,640,000	1,190,000	833,000	565,000	374,000	243,000
MF	126,000	99,400	78,100	61,100	47,700	37,100	28,800	22,400	17,400
ML	53,300	41,900	32,900	25,700	20,000	15,600	12,100	9,410	7,330
CL	4,100	3,290	2,620	2,080	1,640	1,300	1,020	801	631

CB75S MEAN TIME BETWEEN FAILURE (MTBF)

M Grade	25ºC	50ºC	100ºC
GB	1,320,660	828,760	211,841
GF	221,983	139,079	45,826
GM	130,647	79,136	25,333
NS	160,945	109,626	43,977
NU	73,631	50,380	21,172
ARW	52,218	33,104	11,766
AIC	112,360	75,822	30,101
AIF	54,673	38,715	17,835
AUC	70,700	46,268	17,358
AUF	36,082	25,046	10,975
SF	2,565,250	1,526,330	296,882
MF	92,108	59,464	21,651
ML	39,222	25,109	9,144
CL	3,406	2,168	795

I Grade	25ºC	50ºC	100ºC
GB	413,282	251,366	54,076
GF	69,830	43,917	14,057
GM	41,785	25,386	8,011
NS	49,773	33,963	13,257
NU	23,094	15,836	6,593
ARW	16,553	10,549	3,758
AIC	34,697	23,528	9,242
AIF	16,715	11,885	5,472
AUC	21,845	14,410	5,433
AUF	11,027	7,704	3,409
SF	789,914	444,740	69,995
MF	29,087	18,852	6,811
ML	12,457	8,013	2,929
CL	1,109	706	260

APPLICATION NOTES

General Application Notes

The CB series power converters were designed as military grade stand alone DC-DC converters which can also be used as components in complex power systems. The CB5S/CB10D utilize a flyback converter topology and the CB30S and CB75S power converters use a Forward converter topology. Advanced current mode control is utilized enabling fast transient response time. The switching frequency is fixed at 500 KHz to minimize noise and allow for simplified EMI filtering. Sufficient capacitance on the input and output, internal to the unit, allows for simple use and operation with no external components.

The CB5S/CB10D and the CB30S/CB75S units are supplied in a five-sided and six-sided metal case respectively to minimize radiated noise. The CB5S/CB10D /CB30S height dimension of 0.38" allows for mounting in standard 1/2-inch width circuit card racks. The CB series is available with pins out the base-plate for conduction cooling via a metal clad board. The thermal operating range is -55 °C to +100 °C. All "M" level units are fully screened similar to MIL-STD-883 test procedures (see spec. sheets for details).

Basic CB30S Converter Hook-up

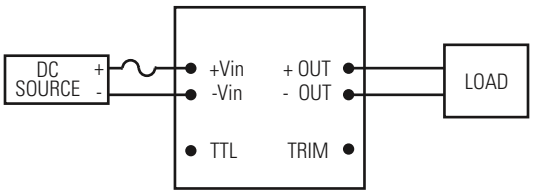


Figure 1

The most basic use of the power converter is shown in Figure 1. An input fuse is always recommended to protect both the source and the power supply in the event of failures. Bus fuse type MDX or equivalent slow-blow is recommended with a current rating approximately 200% of the full load input current to the converter. Having a slow-blow type fuse will allow for the converter's inrush charge at turn-on. The CB series power converters comes with Current Limit, Short Circuit, Over Voltage protection, Trim (CB30S and CB75S only) and TTL as standard features.

Wire Gage & Distance to Load

If the resistance of the wire, printed circuit board runs or connectors used to connect a converter to system components is too high, excessive voltage drop will result between the converter and system components, degrading overall system performance.

For example, if the DC/DC converter in Figure 2 is a 50W unit (5 VDC @ 10 Amps) with output load regulation specified at 0.2%; the connection as shown will degrade load regulation by a factor of 10. In this example, the 4 feet of #14 AWG wire used to connect the converter output to the load, has a total line resistance of 10mW(ignoring any contact resistance). For a 50W, 5VDC output converter, the drop across the lead resistance will be 100 mV (10 A X 0.010W) or 2% of the output. Thus, the converter was selected for 0.2% regulation, but the power system layout achieves only 2.2%.

Converter Hook-Up Losses

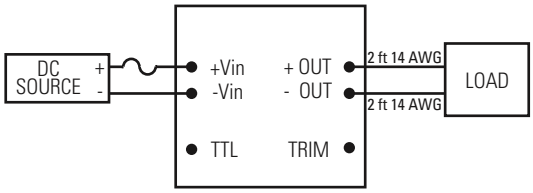


Figure 2

This can be corrected by decreasing the distance between the converter output and load. If that is not possible, using larger diameter wire (see Table 1), or PCB runs that have a larger cross sectional area and shorter length will also reduce conductor resistance. The use of the converter's Trim capability is the ideal means of hook-up.

#AWG	Resistance mΩ / Foot	#AWG	Resistance mΩ / Foot
9	0.792	21	12.77
10	0.998	22	16.20
11	1.261	23	20.30
12	1.558	24	25.67
13	2.001	25	32.37
14	2.524	26	41.02
15	3.181	27	51.44
16	4.020	28	65.31
17	5.054	29	81.21
18	6.386	30	103.7
19	8.046	31	130.9
20	10.13	32	162.0

Table 1. Wire Table Resistance

Note: High IR drops between the converter and load may cause converter parameters such as output voltage accuracy, trim range, etc. to appear to be out of specification. High IR drops on input lines may cause start up problems (voltage at the input pins below the input range of the converter).

Obviously, any connections made to the power distribution bus may present a problem. Poor connections (such as microcracking around solder joints) can cause serious problems such as arcing. Contact resistance must be minimized. Proper workmanship standards must be followed to insure reliable solder joints for board mount converters.

Terminal strips, spade lugs and edge connectors must be free of any corrosion, dust or dirt. If parallel lines or connections are available for routing converter output currents, they should be utilized.

TTL & Remote On/Off

The TTL feature is especially useful in portable / mobile applications where battery power conservation is critical.

The CB series employs a typical TTL open collector with internal pull-up resistor. The voltage level at the TTL pin is referenced with respect to the converter -Vin pin. When the TTL circuit is pulled to less than 0.8 V ("logic 0") with respect to the -Vin pin, via either an open collector (see Figure 3), or optocoupler, or a mechanical switch, with a 0.5mA capability, the converter shuts down. An optocoupler (as shown) can also be used if the TTL signal needs to be referenced from the output side. If the TTL pin is left floating or is pulled above 2.4V up to 5.0V ('logic 1') the unit will remain on. Many more devices can be used to activate the TTL pin shutdown function, consult the factory for your specific requirements.

Remote Turn On/Off

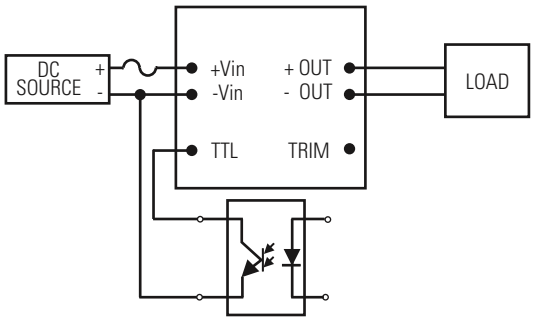


Figure 3

Output Trim

(CB30S, CB75S and CB150S only)

The output voltage can be increased or decreased (+10% Max, -10% Min.) by simply connecting a resistor between the trim pin and the Output Return pin or the +Output pin, respectively (see Figure 4).

Basic Trim Hook-up

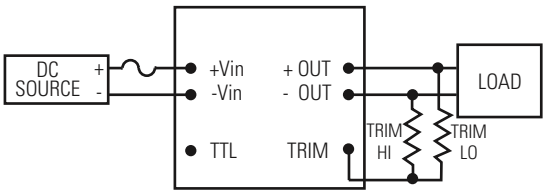


Figure 4

The value of the resistor required to Trim Hi is shown in the Table 2, 3 and 4. The external resistor is connected between the Trim Pin and the Output Return Pin at the power supply. (Use standard value 1% resistor closest to the Table value). The value of the resistor required to Trim Lo is shown in the Table 2 above. The external resistor is connected between the Trim Pin and the +Output Pin at the power supply. (Use standard value 1% resistor closest to the Table value). A potentiometer can be substituted for the resistor to achieve a more precise output voltage setting. Use the table resistor values to determine the value of the potentiometer to use. CB75S resistor values are shown in Table 3, Trim connections are same as CB30S except -Sense is used instead of Output Return (Trim Hi), and +Sense is used instead of +Output (Trim Lo).

Table 2 Output Trim Values (CB30S only)

	2Vout		3.3Vout		5Vout		5.2Vout		12Vout		15Vout		24Vout		28Vout	
	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ
110% Vout	2.20	4.34	3.63	6.58	5.50	5.74	5.72	6.47	13.20	1.11	16.50	1.37	.40	1.76	30.80	13.3
105% Vout	2.10	9.08	3.47	14.3	5.25	15.1	5.46	15.9	12.60	12.2	15.75	12.7	25.20	13.5	29.40	36.6
100% Vout	2.00	OPEN	3.30	OPEN	5.00	OPEN	5.20	OPEN	12.00	OPEN	15.00	OPEN	24.00	OPEN	28.00	OPEN
95% Vout	1.90	4.7	3.14	22.3	4.75	48.9	4.94	54.4	11.40	171	14.25	228	22.80	396	26.60	439
90% Vout	1.80	1.77	2.97	9.57	4.50	20.8	4.68	23.7	10.80	75.2	13.50	102	21.60	182	25.20	202

Table 3 Output Trim Values (CB75S only)

	2Vout		3.3Vout		5Vout		5.2Vout		12Vout		15Vout		24Vout		28Vout	
	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ
110% Vout	2.20	2.61	3.63	0	5.50	0	5.72	0	13.20	0	16.50	0	26.4	0	30.8	0
105% Vout	2.10	7.32	3.47	7.87	5.25	9.31	5.46	9.53	12.60	19.6	15.75	21.0	25.2	22.6	29.4	22.6
100% Vout	2.00	OPEN	3.30	OPEN	5.00	OPEN	5.20	OPEN	12.00	OPEN	15.00	OPEN	24.0	OPEN	28.0	OPEN
95% Vout	1.90	2.94	3.14	16.2	4.75	44.2	4.94	47.5	11.40	121	14.25	178	22.8	348	26.6	422
90% Vout	1.80	0	2.97	3.24	4.50	15.4	4.68	16.9	10.80	45.3	13.50	69.8	21.6	150	25.2	187

Table 4 Output Trim Values (CB150S only)

	2Vout		3.3Vout		5Vout		5.2Vout		12Vout		15Vout		24Vout		28Vout	
	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ	Volts	kΩ
110% Vout	2.20	0.84	3.63	3.90	5.50	5.48	5.72	5.65	13.20	7.28	16.50	7.75	26.4	8.16	30.8	18.9
105% Vout	2.10	5.52	3.47	11.6	5.25	14.8	5.46	15.1	12.60	18.4	15.75	19.3	25.2	20.1	29.4	41.7
100% Vout	2.00	OPEN	3.30	OPEN	5.00	OPEN	5.20	OPEN	12.00	OPEN	15.00	OPEN	24.0	OPEN	28.0	OPEN
95% Vout	1.90	1.07	3.14	19.7	4.75	48.6	4.94	53.6	11.40	177	14.25	239	22.8	413	26.6	435
90% Vout	1.80	-	2.97	6.89	4.50	20.5	4.68	22.9	10.80	81.4	13.50	111	21.6	193	25.2	203

Output Voltage Adjustment (CB30S)

The converter's output voltage may be trimmed by up to ±10% of the nominal output voltage.

TRIM UP

Trim output voltage up by connecting an external resistor between Pins 6 and 5. Use the following equation, reference Table 5 for variables A and B.

$$\text{Radj-up} = \frac{A}{\Delta\ \%} - B\ (k\Omega)$$

Example:
Trim 3%up for 5V Output units,
where A = 0.931, B = 3.57, Δ% = 0.03

$$\text{Radj-up} = \frac{0.931}{0.03} - 3.57\ k\Omega = 27.5\ k\Omega$$

Output Voltage(V)	A	B
2	0.474	0.402
3.3	0.773	1.15
5	0.931	3.57
5.2	0.948	3.01
12	1.11	10
15	1.14	10
24	1.18	10
28	2.33	10

Table 5.

TRIM DOWN

Trim output voltage down by connecting an external resistor between Pins 4 and 6. Use the following equation, reference Table 6 for variables C and D.

$$\text{Radj-down} = \frac{C}{\Delta\ \%} - D\ (k\Omega)$$

Example:
Trim 8% down for 15V Output units,
where C = 12.60, D = 23.7, Δ% = 0.08

$$\text{Radj-down} = \frac{12.6}{0.08} - 23.7\ k\Omega = 133.8\ k\Omega$$

Output Voltage(V)	C	D
2	0.294	1.17
3.3	1.28	3.2
5	2.81	7.3
5.2	3.07	7.0
12	9.59	20.7
15	12.6	23.7
24	21.4	32.6
28	23.8	36.1

Table 6.

Output Voltage Adjustment (CB75S)

The converter's output voltage may be trimmed by up to ±10% of the nominal output voltage.

TRIM UP

Trim output voltage up by connecting an external resistor between Pins 7 and 8. Use the following equation, reference Table 7 for variables A and B.

$$\text{Radj-up} = \frac{A}{\Delta\,\%} - B\ (k\Omega)$$

Example:
Trim 5% up for 5V Output units,
where A = 0.931, B = 9.09, Δ% = 0.05

$$\text{Radj-up} = \frac{0.931}{0.05} - 9.09\ k\Omega = 9.53\ k\Omega$$

Output Voltage(V)	A	B
2	0.467	2
3.3	0.773	7.5
5	0.931	9.09
5.2	0.942	9.09
12	1.97	19.1
15	2.08	20
24	2.24	22.1
28	2.28	22.6

Table 7.

TRIM DOWN

Trim output voltage down by connecting an external resistor between Pins 7 and 6. Use the following equation, reference Table 8 for variables C and D.

$$\text{Radj-down} = \frac{C}{\Delta\,\%} - D\ (k\Omega)$$

Example:
Trim 10% down for 15V Output units,
where C = 10.3, D = 32.4, Δ% = 0.1

$$\text{Radj-down} = \frac{10.3}{0.1} - 32.4\ k\Omega = 70.6\ k\Omega$$

Output Voltage(V)	C	D
2	0.283	2.75
3.3	1.28	9.55
5	2.81	12.8
5.2	2.98	13.0
12	7.34	28.4
15	10.3	32.4
24	19.3	43.6
28	23.2	48.1

Table 8.

Output Voltage Adjustment (CB150S)

The converter's output voltage may be trimmed by up to ±10% of the nominal output voltage.

TRIM UP

Trim output voltage up by connecting an external resistor between Pins 7 and 8. Use the following equation, reference Table 9 for variables A and B.

$$\text{Radj-up} = \frac{A}{\Delta\ \%} - B\ (k\Omega)$$

Example:
Trim 3% up for 5V Output units,
where A = 0.931, B = 3.83, Δ% = 0.03

$$\text{Radj-up} = \frac{0.931}{0.03} - 3.83\ k\Omega = 27.2\ k\Omega$$

Output Voltage(V)	A	B
2	0.467	3.83
3.3	0.773	3.83
5	0.931	3.83
5.2	0.948	3.83
12	1.11	3.83
15	1.16	3.83
24	1.20	3.83
28	2.28	3.83

Table 9.

TRIM DOWN

Trim output voltage down by connecting an external resistor between Pins 7 and 6. Use the following equation, reference Table 10 for variables C and D.

$$\text{Radj-down} = \frac{C}{\Delta\ \%} - D\ (k\Omega)$$

Example:
Trim 8% down for 15V Output units,
where C = 12.8, D = 17.8, Δ% = 0.08

$$\text{Radj-down} = \frac{12.8}{0.08} - 17.8\ k\Omega = 142\ k\Omega$$

Output Voltage(V)	C	D
2	0.283	4.58
3.3	1.28	5.88
5	2.81	7.6
5.2	3.07	7.9
12	9.59	14.5
15	12.8	17.8
24	22	27
28	23.2	29.3

Table 10.

Ripple & Noise

Output ripple and noise (sometimes referred to as PARD or "Periodic and Random Deviations") can be defined as unwanted variations in the output voltage of a power supply. In switching power supplies this output noise is seen as a series of pulses with a high frequency content and is therefore measured as a peak value (i.e., specified as "peak-to-peak").

Martek Power Abbott, Inc. CB series of power supplies are specified and tested in our factory with a 10 MHz bandwidth oscilloscope/probe. Measurements taken by a scope set at higher frequencies (i.e. 300 MHz) may produce significantly different results due to noise coupling on to the probe from sources other than the power supply.

Noise that is common to all output leads of a power converter with respect to the chassis is referred to as common mode noise. Noise that is apparent on one output lead with respect to the other output lead is referred to as differential mode noise. Common mode noise is produced in switching action. Martek Power Abbott, Inc. typically minimizes the level of output common mode noise by incorporating line to chassis ground capacitors (on input and output leads) into the power converters. In most cases this is sufficient to minimize the level of common mode noise. However, if further attenuation is required, additional line to chassis ground capacitance may be added by the customer at the system level. Martek Power Abbott, Inc. noise specifications (output ripple specifications) all reference the level of differential mode noise at a given bandwidth, not the level of common mode noise. The measurement of differential mode noise is detailed in the following paragraphs.

Measurement Techniques

The length of all measurements leads (especially the ground lead) should be minimized and the sense pins should be tied to their respective outputs (+Sense to +V out, -Sense to -Vout). We recommend measurement as close to the supply as possible, using a XI scope probe with a 10MHz bandwidth. This can be accomplished by connecting a short bus wire (generally 0.5 inches or less, making a loop at the end to place the probe in) to the negative and positive outputs on the back side of the connector mate. Place the tip of the probe on the +output, and the ground ring (or ground band) on the -output for a true ripple measurement. (see Figure 5).

Utilizing the probe ground ring (as opposed to a ground wire) will minimize the chance of noise coupling from sources other than the power supply.

If this is not practical or possible then attached a 6 to 8 inch twisted pair wire to the outputs of the power supply and place a 10-20µF tantalum capacitor (low ESR type, with an appropriate voltage rating) across the load. This test method is shown on Figure 6. This test method will enable a remote measurement and eliminate any noise that may couple on to the extended leads coming off the converter.

Ripple & Noise

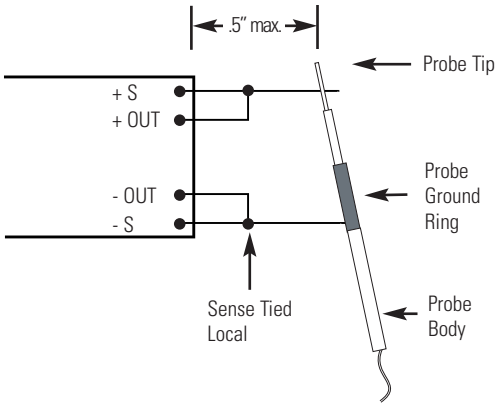


Figure 5

Ripple Reduction Techniques

In applications where the output ripple of the converter is higher than desired various techniques can be employed to reduce output ripple and noise (PARD). One method is to add additional capacitance in parallel with the output leads of the converter (low ESR type tantalums or ceramics are recommended). This should substantially reduce PARD, but be aware that excessive additional output capacitance can cause converter oscillations.

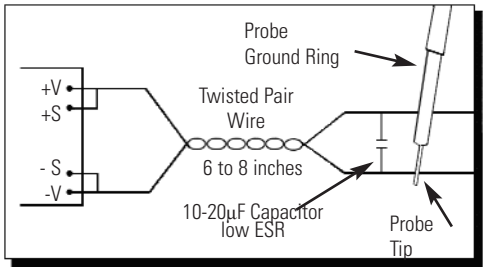


Figure 6

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

Series Operation

The CB family of power converters may be arranged in a series operating mode to supply higher output voltages when required (see Figure 7). In this configuration D1 and D2 are added to protect against the application of a negative voltage across the outputs of the power converters during power up and power down. The two (or more) units need not have the same output voltage, but the output current supplied in this configuration will be limited to the lowest maximum output current of the modules used.

The Trim Pins may be used, but only if the external Trim Resistor is tied between the Trim Pin and Output Pin of the same power supply.

Series Operation

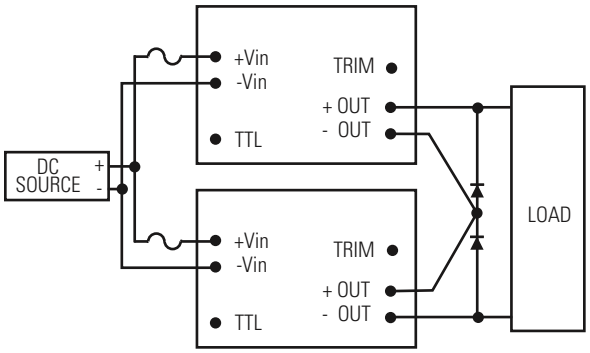


Figure 7

Switching Frequency Synchronization

(CB75S only)

Synchronization of switch-mode converters to a central system clock frequency is often essential in noise sensitive systems. The CB75S modules can be synchronized by connecting all Sync pins to a TTL compatible system clock that is referenced to the 28volt input return (-Vin). The clock's square wave signal frequency must be between 480kHz and 550kHz, with standard 0 to .8 volt "Low" and 3.0 to 5.25 volt "Hi" pulse amplitude, and with duty cycles from 30% to 55%. The optimum sync signal is 0 to 5 volt pulses at 500kHz and 35% duty cycle. The input impedance of the Sync input is 33 ohms in series with 0.01mF. System clock output impedance can be 50 ohms when driving only one sync input with 5V pulses, but must be standard TTL or CMOS totem pole output when driving multiple converters, especially with 3V pulses. Care must be taken in how the Sync pin is connected to the system clock – in some cases shielding of the Sync signal will help eliminate noise problems. Do not add any capacitance from the Sync signal to -Vin.

Electromagnetic Interference (EMI) Filter

For applications where Electromagnetic Interference is a concern, the CBF30, a passive input filter may be installed at the input of the CB5S/CB10D /CB30S converters (see Figure 8).

EMI Filter Connection

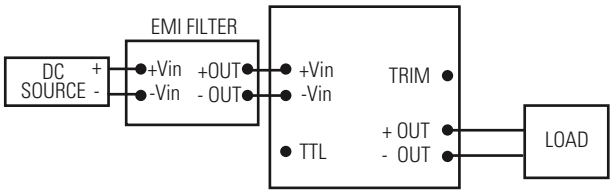


Figure 8

With the EMI filter MIL-STD-461D, CE101 and CE102 are within compliance on the input leads. Test reports characterizing filters for conducted and radiated emission and susceptibility are available. Filters guarantee conducted emissions (on the input leads) only. All test reports are certified by an independent testing lab.The CB75S's companion EMI filter, the CBF75 will undergo formal emissions and susceptibility testing soon. Engineering samples are currently available. During MIL-STD-461D testing, C_{TEST} is required across the outputs of two LISNs, as shown in Figure 9. C_{TEST} is 47µF@100V aluminum electrolytic such as United Chemi-Con style KME or equivalent. C_{TEST} is not required for normal operation, or for MIL-STD-461C testing.

MIL-STD-461D Test Set-up

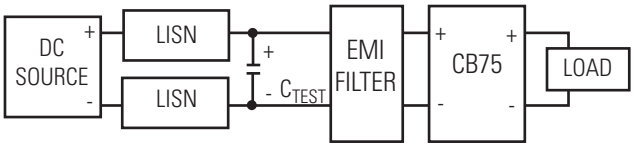


Figure 9

Common Equations

Calculation of Input Current

Calculating the required current draw for your converter is as follows.

$$\text{Maximum Input current} = \frac{\left[\frac{\text{Output Power}}{\text{Efficiency}}\right]}{\text{Minimum Steady state Input Line}}$$

The above calculation will yield the converter's input current. For Example;
Model: CB30SM/5-C
Output Power: 30 watts
Steady State Low Line: 22 VDC
Efficiency; 72% at 22 VDC line, full load assuming 5% safety factor efficiency is then 67%
Minimum Steady State Input Line: 22 VDC

$$\text{Input Current} = \frac{\left[\frac{30 \text{ watts}}{0.67}\right]}{22 \text{ VDC}} \qquad \text{Input Current} = 2.04 \text{ amps}$$

The worst case steady state input current to the CB series converter operating at full load with an input of 22 VDC is 2.04 amps.

Note: it is always best to be conservative. The figures for input voltage and efficiency should always include some additional margin for error.

Power Dissipation

The calculation of the total power dissipated from the converter will be essential for thermal management of the device. Unlike other types of electronic devices DC/DC converters tend to generate a significant amount of heat. This heat is channeled (by design) to the bottom or baseplate of the module. The following equations assist when designing a suitable heat sink.

The basic equation is;

$$P_{Diss} = P_{in} - P_{out}$$

Where P_{out} is defined as the maximum load condition and P_{in} is defined as a function of P_{out} and efficiency. The equation is therefore;

$$P_{Diss} = \left[\frac{P_{out}}{\text{Efficiency}}\right] - P_{out}$$

The energy loss calculated from the above equation will be dissipated via the converter's baseplate in the form of heat. A key parameter in this equation is the converter efficiency. Efficiency will be dependent upon the line and load characteristics of the application.

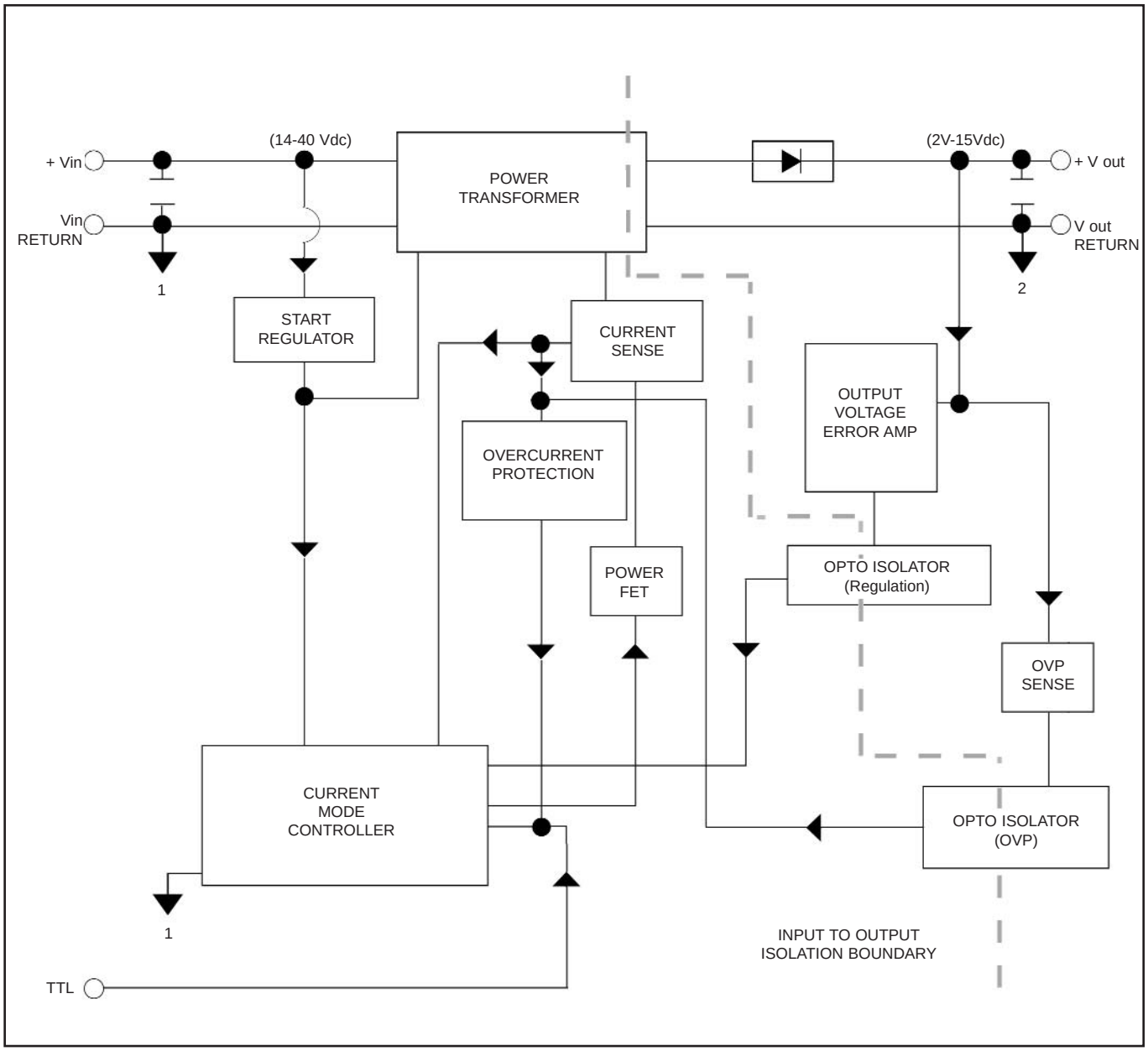
The above calculation will yield the converter's power dissipation. For example;
Model: CB30SM/5-C
Output Power: 30 watts
Efficiency; 78% at 28 VDC line, 100% load assuming 5% safety factor efficiency is then 73%

$$P_{Diss} = \left[\frac{30}{0.73}\right] - 30 \qquad P_{Diss} = 11.1 \text{ watts}$$

The maximum power dissipated from the converter under these conditions will be 11.1 watts.

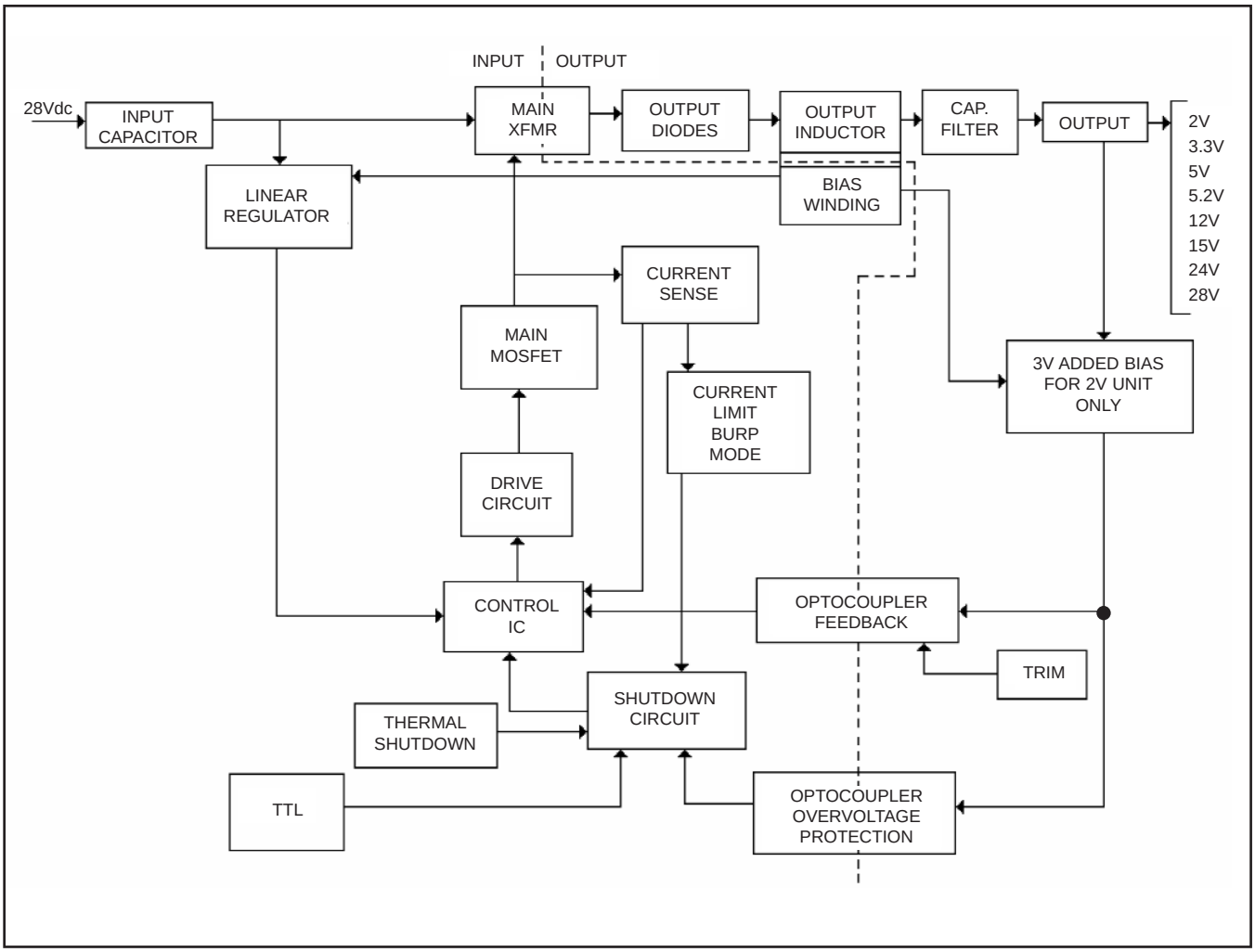
BLOCK DIAGRAM

5 watt (CB5S / 1/2 CB10D)



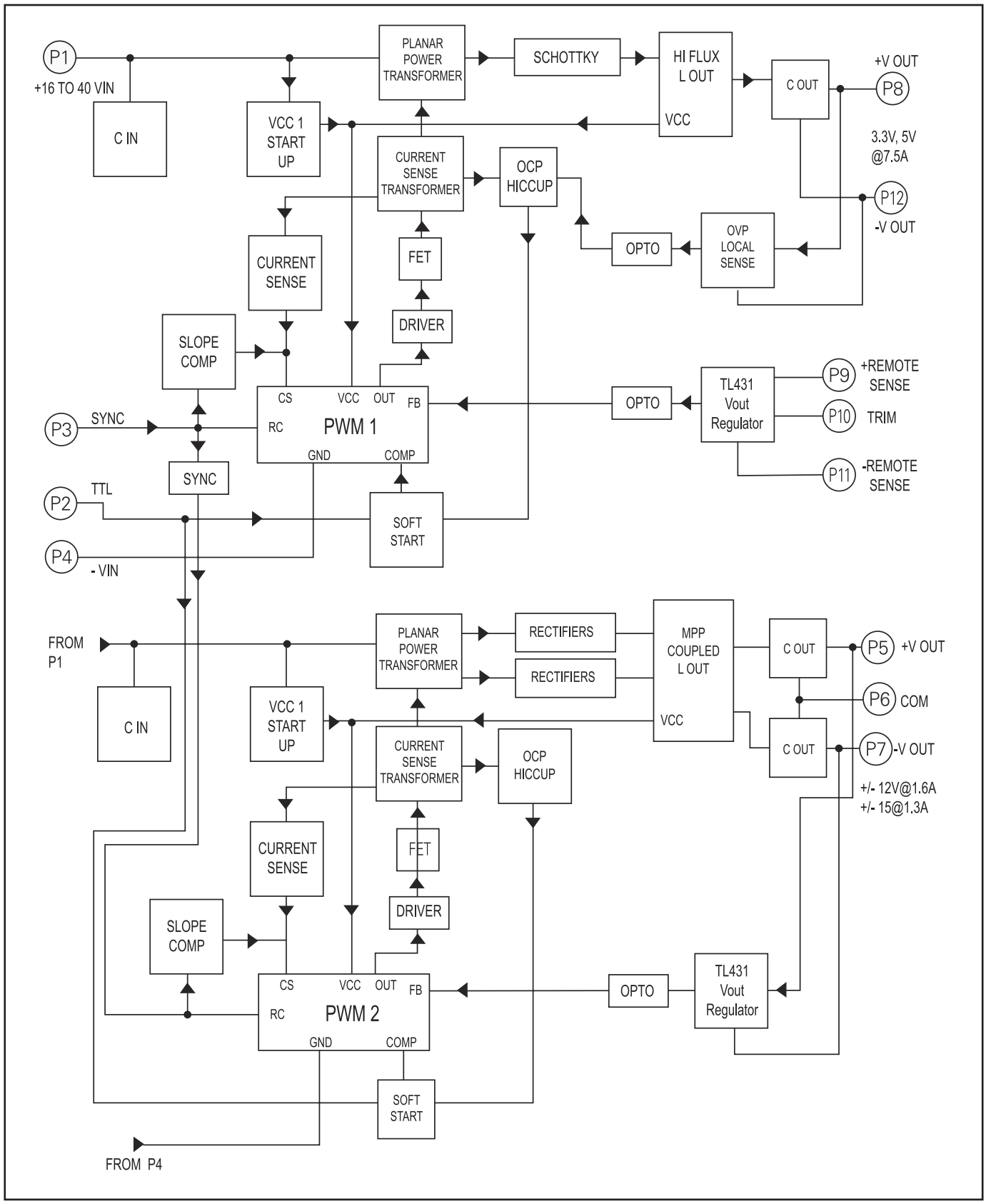
BLOCK DIAGRAM

30 watts (CB30S) and 75 watts (CB75S)



BLOCK DIAGRAM

CB75T



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

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WARRANTY & REPAIR

Martek Power Abbott's converters and power supplies are built to exacting standards to assure customer satisfaction. Should you ever experience a problem with one of our products please contact your local sales representative to assist in a solution. The terms of the warranty and the length of warranty period* will vary between product lines. Please consult your local sales representative for terms and length of the warranty for any specific model or purchase.

The Company warrants that all of its Products will be free from defects in material and workmanship for twelve months. The Company shall, at its option, and as the Customer's and user's role and exclusive remedy, issue a credit in the amount of the then-applicable price of such Product, or repair or replace any such Product which is defective under the terms of the foregoing warranty, free of charge.

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Warranty Period*

I. A, B, C, M, NW, PFC, W and LV Series: One (1) year warranty.

II. CB, HM, NB, NL and SM Series: Three (3) years warranty.

***Repairs**

I. A, B, C, M, NW, PFC, W and LV Series: Martek Power Abbott will repair products covered by our warranty. To return products a Return Material Authorization Number is required. Products beyond the warranty will be repaired only after the customer has authorized quoted repair charges. Any Martek Power Abbott product over seven(7) years old from the date of original shipment will not be serviced or repaired.

II. CB, HM, NB, NL and SM Series: During warranty period, Martek Power Abbott will repair or replace (at Martek Power Abbott's discretion) products found to be defective. Martek Power Abbott will not repair products that are out of warranty.

***After Repair Warranty**

I. A, B, C, M, NW, PFC, W and LV Series: Upon completion of repair, the products will be under warranty for a period of one year. Regardless of the date of repair, no product will be serviced or warranted beyond seven (7) years from the date of original shipment.

II. CB, NL, NB and SM Series: Upon completion of repair, the products will be under warranty for a period of one year. Regardless of the date of repair, no product from the CB, NL, NH, NB and SM Series will be serviced or warranted beyond three (3) years from the date of original shipment.

Return Material Authorization Numbers

All returning goods must be accompanied by a Return Material Authorization (RMA) number. The RMA number must be clearly marked on the outside of the shipping carton. To receive and RMA number contact Martek Power Abbott at (310) 202-8820, extension 4276. Please be prepared with the correct model and serial number of the product to be returned. For out of warranty products a company purchase order will be required for processing.

Evaluation Charges
All out of warranty products returned to Martek Power Abbott are subject to a $50.00 evaluation charge. If the returned product is found to be in need of repair, and these repairs are authorized, the $50.00 evaluation fee will be waived.

Repair Charges
Repair charges for all models are quoted per Martek Power Abbott published repair price list RPL97-07D. The repair charges do not include any additional processing or testing fees (i.e. ESS testing).

Shipping Instructions
All returning goods must have a RMA number marked on the carton. The number should be marked on a minimum of 2 sides of the carton, 3 inches (76mm) high, 6 inches (152mm) long. All goods must be shipped prepaid. Martek Power Abbott reserves the right to refuse all shipments received without a RMA number.