

CINCON ELECTRONICS

# RAILWAY

## DC-DC CONVERTER

### CATALOG **2019**



# Cincon, Reliability Excellence

Cincon offers a wide range of EN50155 compliant DC-DC converters from 6.6W – 300W, which are specially designed for railway applications. These isolated DC-DC converters supply the electric and electronic systems on board and track side, particularly for the sophisticated device in trains, for such electronics as LED displays, audio amplifiers, safety monitors, lighting, communications and door control systems.

Cincon uses well proven technology to achieve extremely efficient industry leading performance, large-scale testing and examination to guarantee high quality and long operational life. Cincon railway DC-DC converters are fully encapsulated in a heat resistant silicone rubber compound, which protects against high levels of shock and vibration, moisture, dust and other contaminants. Full electronic protection, surge protection and transients protection also contribute to product reliability.

In addition to a range of track-side railway applications, the units are suitable for operation in industrial, mining, military, marine and other rugged environments.

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# RAILWAY DC-DC CONVERTER

## PRODUCT FEATURES

### Operational

- High efficiency to 92%
- Fixed switching frequency
- Output power from 6.6W-600W
- Low no load power consumption
- Input voltage range 8.5-160V, 14-160V, 43-160V & 66-160VDC
- Input voltage ranges fully cover the requirements of EN 50155
- External filtering solutions are available to your applications

### General Specification

- EN 50155 compliant
- Switching frequency 200-300KHz
- Output voltage accuracy +/-1.5%
- External trim range +10% to -10%
- Isolation voltage 2250 VDC & 3000 VRMS
- Storage temperature range from -55°C to +105°C & +125°C
- Operating case temperature range from -40°C to +100°C & +105°C

## QUICK SELECTION

Input Voltage	Package	Output Power	Output Voltage	Isolation	Series	EFF %	Page
24 , 28 , 36 & 48V ( 9 - 36V , 18 - 75V )	DIP 24	8W	3.3V, 5V, 12V, 15V, +/-5V, +/-12V, +/-15V	1500VDC	EC6AW	80-86%	4
72 , 96 & 110V ( 43 - 160V )	DIP 24	8.25 - 10W	3.3V, 5V, 12V, 15V, +/-5V, +/-12V, +/-15V	3000VDC	EC6AW-110S	85-88.5%	6
24 , 28 , 36 & 48V ( 9 - 36V , 18 - 75V )	2" x 1"	20W	3.3V, 5V, 12V, 15V, +/-12V, +/-15V	1500VDC	EC7BW	87-90%	8
72 , 96 & 110V ( 43 - 160V )	2" x 1"	20W	5V, 12V, 15V, +/-12V, +/-15V	3000VDC	EC7BW-110	88.5-90%	10
24 , 28 , 36 , 48 , 72 , 96 & 110V 8.5-160VDC	2" x 1"	20W	5V, 12V, 15V, +/-12V, +/-15V	3000VAC	EC7BW18-72S	84-90%	12
72 , 96 & 110V ( 43 - 160V )	2.05"x1.2"	40W	3.3V, 5V, 12V, 15V, +/-12V, +/-15V, +/-24V	3000VDC	ECLB40W-110	88-91%	14
24 , 28 , 36 , 48 , 72 , 96 & 110V 14-160VDC	Quarter Brick	50W	5V, 12V, 24V, 48V	3000VDC	CQB50W12	83-89%	16
72 , 96 & 110V ( 43 - 160V )	Quarter Brick	60W	5V, 12V, 15V, 24V, 28V, 48V	3000VDC	CQB60W-110S	89-92%	18
24 , 28 , 36 & 48V ( 9 - 36V , 18 - 75V )	Quarter Brick	75W	12V, 15V, 24V, 28V, 48V	3000VAC	CQB75W8-36	88-90%	20
96 & 110V ( 66 - 160V )	Quarter Brick	100W	3.3V, 5V, 12V, 24V	2250VDC	CQB100-110S	90-93%	22
96 & 110V ( 66 - 160V )	Half Brick	100W	12V, 15V, 24V, 48V	3000Vrms	CHB100-110S	85-86%	24
72 , 96 & 110V ( 43 - 160V )	Quarter Brick	100W	5V, 12V, 24V, 28V, 48V	3000VDC	CQB100W-110S	88.5-92%	26
24 , 28 , 36 & 48V ( 9 - 36V , 18 - 75V )	Quarter Brick	150W	5V, 12V, 24V, 28V, 48V	2250VDC	CQB150W	89.5-92%	28

**Protection**

- Input under-voltage lockout
- Output over current protection
- Output over voltage protection
- Over temperature protection
- Continuous short circuit protection

**Mechanical**

- Industry standard pin-out configuration
- Industry standard footprint :DIP 24,2" x 1", "2.05 x 1.2", Quarter-Brick, Half-Brick & Full-Brick

**Safety & Compliance**

- Safety standard: UL 60950-1 2nd (basic insulation)
- EMC: EN 50155 (EN 50121-3-2), external filter required
- Shock & Vibration: EN 50155 (EN 61373)

Input Voltage	Package	Output Power	Output Voltage	Isolation	Series	EFF %	Page
72 , 96 & 110V ( 43 - 160V )	Quarter Brick	150W	5V, 12V, 24V, 28V, 48V	3000VDC	CQB150W-110S	89-92%	30
24 , 36 , 48 , 72 , 96 & 110V ( 16.5 - 140V )	Half Brick	150W	5V, 12V, 24V, 28V, 48V	3000Vac	CHB150W10-72S	88-90.5%	32
96 & 110V ( 66 - 160V )	Half Brick	150W	5V, 12V, 24V	2250VDC	CHB150-110S	92-92.5%	34
24 , 36 , 48 , 72 , 96 & 110V ( 16.5 - 140V )	Half Brick	200W	5V, 12V, 15V, 24V, 48V	3000Vac	CHB200W10-72S	88-91.5%	36
72 , 96 & 110V ( 43 - 160V )	Half Brick	200W	5V, 12V, 27V, 28V, 48V	3000VDC	CHB200W-110S	88-91%	38
72 , 96 & 110V ( 43 - 160V )	Half Brick	300W	3.3V, 5V, 12V, 24V, 28V, 48V	3000VDC	CHB300W-110S	89-90%	40
72 , 96 & 110V ( 43 - 160V )	Full Brick	600W	12V, 24V, 28V, 48V	2250VDC	CFB600W-110S	87-88%	42
24 , 28 , 36 , 48 , 72 , 96 & 110V 14-160VDC	Chassis Mount 4.6" x 2.4"	50W	5V, 12V, 24V, 48V	3000VDC	CQB50W12-72SXX -CMFC(D)	82-87%	44
72 , 96 & 110V ( 43 - 160V )	Chassis Mount 4.6" x 2.4"	150W	5V, 12V, 24V, 28V, 48V	3000VDC	CQB150W-110SXX -CMFC(D)	88-91%	46
72 , 96 & 110V ( 43 - 160V )	Chassis Mount 6.5" x 3.0"	300W	5V, 12V, 24V, 28V, 48V	3000VDC	CHB300W-110SXX -CMFC(D)	86-90%	48
72 , 96 & 110V ( 43 - 160V )	Chassis Mount 9.45" x 4.33"	600W	12V, 24V, 28V, 48V	2250VDC	CFB600W-110SXX -CMFD	87-88%	50
80V maximum	Quarter Brick	30A maximum		none	FM30R080P	80-86%	52
200V maximum	Half Brick	10A maximum		none	FM10D200P	83-86%	54

**Modified Product Support**

Recognizing the requirements for matching standard products to unique applications, Cincon is dedicated to provide support for customers requiring additional features or modification to catalog products.

# EC6AW SERIES

## 8 WATT, 4:1 INPUT RANGE

### Features

- ◆ 8W Isolated Output
- ◆ DIP-24/SMD Package
- ◆ Efficiency to 86%
- ◆ 4 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Input Under-Voltage Protection
- ◆ Remote On/Off
- ◆ Continuous Short Circuit Protection
- ◆ Without Tantalum Capacitors Inside
- ◆ Safety Meets UL60950-1, EN60950-1, and IEC60950-1
- ◆ Meets EN50155 with External Circuits
- ◆ Shock & Vibration Meets EN50155 (EN61373)



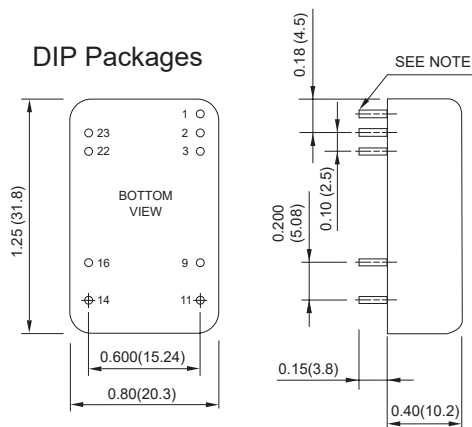
### Mechanical Dimensions

NOTE: Pin Size is 0.02±0.002 Inch (0.5±0.05 mm) DIA

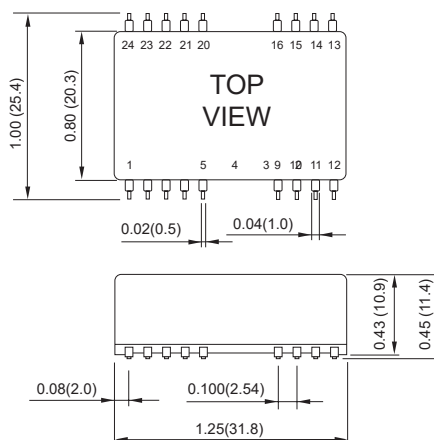
All Dimensions in Inches (mm)

Tolerance Inches: X.XX±0.02, X.XXX±0.010

Millimeters: X.X±0.5, X.XX±0.25



### SMD Packages



Pin	PIN CONNECTION			
	Single Output		Dual Output	
	DIP	SMD	DIP	SMD
1	Remote on/off	Remote on/off	Remote on/off	Remote on/off
2,3	-V Input		-V Input	
4,5	NP	NC	NP	NC
9	NP	NC	Common	
10	NP	NC	NP	NC
11	NC		-V Output	
12	NP	NC	NP	NC
13	NP	+V Output	NP	NC
14	+V Output		+V Output	
15	NP	-V Output	NP	NC
16	-V Output		Common	
20,21,24	NP	NC	NP	NC
22,23	+V Input		+V Input	

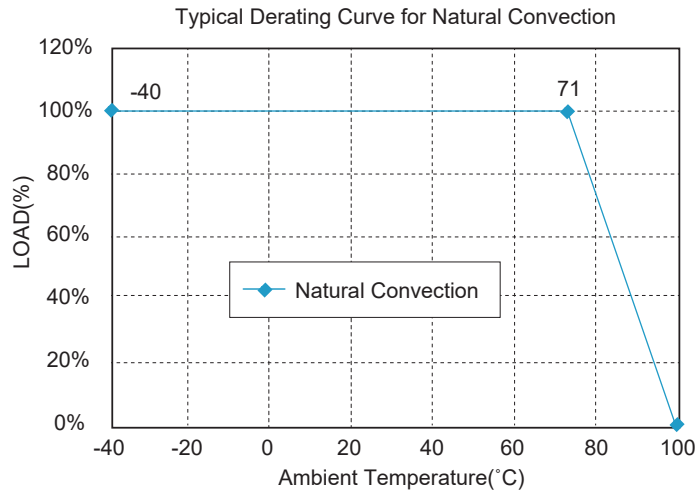
\* NC-NO CONNECTION WITH PIN

\* NP-NO PIN

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
EC6AW-24S33	9-36 VDC	3.3 VDC	0 mA	2000 mA	10 mA	344 mA	80	2000µF
EC6AW-24S05	9-36 VDC	5 VDC	0 mA	1600 mA	10 mA	406 mA	82	1600µF
EC6AW-24S12	9-36 VDC	12 VDC	0 mA	666 mA	10 mA	392 mA	85	666µF
EC6AW-24S15	9-36 VDC	15 VDC	0 mA	530 mA	10 mA	390 mA	85	530µF
EC6AW-24D05	9-36 VDC	±5 VDC	0 mA	±800 mA	10 mA	406 mA	82	800µF
EC6AW-24D12	9-36 VDC	±12 VDC	0 mA	±333 mA	10 mA	392 mA	85	333µF
EC6AW-24D15	9-36 VDC	±15 VDC	0 mA	±265 mA	10 mA	390 mA	85	265µF
EC6AW-48S33	18-75 VDC	3.3 VDC	0 mA	2000 mA	5 mA	172 mA	80	2000µF
EC6AW-48S05	18-75 VDC	5 VDC	0 mA	1600 mA	5 mA	201 mA	83	1600µF
EC6AW-48S12	18-75 VDC	12 VDC	0 mA	666 mA	5 mA	194 mA	86	666µF
EC6AW-48S15	18-75 VDC	15 VDC	0 mA	530 mA	5 mA	193 mA	86	530µF
EC6AW-48D05	18-75 VDC	±5 VDC	0 mA	800 mA	5 mA	201 mA	83	800µF
EC6AW-48D12	18-75 VDC	±12 VDC	0 mA	±333 mA	5 mA	194 mA	86	333µF
EC6AW-48D15	18-75 VDC	±15 VDC	0 mA	±265 mA	5 mA	193 mA	86	265µF

NOTE: 1. Nominal Input Voltage 24 or 48 VDC

## Derating Curve



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	24V ..... 9-36V
	48V ..... 18-75V
Input Surge Voltage (100ms max.)	24V ..... 50Vdc max.
	48V ..... 100Vdc max.
Under voltage lockout	24Vin
	power up.....8.8V typ.
	power down.....8.0V typ.
	48Vin
	power up.....17V typ.
	power down.....16V typ.
Input Filter	PI Type
Positive Logic Remote on/off Control (note 3):	
Logic Compatibility	CMOS or Open Collector
	TTL, ref. to -Vin
Module On	>+3.5V to 36VDC or Open
Module Off	Circuit
	0 to <1.2VDC

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.5% max.
Voltage Balance (Dual)	±1.0% max.
Transient Response: 75% - 100% Step Load Change	
Error Band	±5% Vout nominal,
Recovery Time	< 500µs
Ripple & Noise, 20MHz BW (with 0.1µF MLCC)	
Vo=3.3 & 5V	75mV pk-pk max.
Vo=12 & 15V	100mV pk-pk max.
Temperature Coefficient	±0.03%/°C max.
Short Circuit Protection	Continuous
Line Regulation (note1)	±0.5% max.
Load Regulation (note2)	±0.5% max.
	±1.0% max.
Cross Regulation (Dual output)	
Load cross variation 25%/100%	±5% max.
Over Voltage Protection	Zener or TVS Clamp
Start up time	3.5ms typ.

### GENERAL SPECIFICATIONS

Efficiency		See Table
Isolation Voltage		1500 VDC min.
Isolation Resistance		10 <sup>9</sup> ohms min.
Isolation Capacitance		1000pF typ.
Switching Frequency		100KHz min.
Operating Ambient Temperature Range		-40°C to +85°C
Derating, Above 71°C		Linearly to Zero Power at +100°C
Case Temperature (note 5)		100°C
Cooling		Natural Convection
Storage Temperature Range		-55°C to +125°C
Humidity		95% RH max. Non condensing
MTBF ..... MIL-HDBK-217F, GB, 25°C, Full Load		
	Single	1500Khrs typ.
	Dual	1300Khrs typ.
EMC		Meets EN50155(EN50121-3-2)
		with external filter
Shock/Vibration		Meets EN50155(EN61373)
Dimensions	DIP	1.25 x 0.80 x 0.40 inches
		(31.8 x 20.3 x 10.2 mm)
	SMD	1.25 x 0.80 x 0.45 inches
		(31.8 x 20.3 x 11.4 mm)
Case Material		Black Coated Copper with Non-Conductive Base
Weight		18.4 g

### NOTE

1. Measured from high line to low line.
2. Measured from full load to min. load.
3. Suffix "N" to the model number with negative logic remote On/Off  
Module On ..... 0 to <1.2VDC  
Module Off ..... >+3.5VDC to 36VDC or open circuit
4. Suffix "S" to the model number with SMD package.
5. Maximum case temperature under any operating condition should not be exceeded 100°C.

## 10 WATT 4:1 INPUT DC-DC CONVERTER

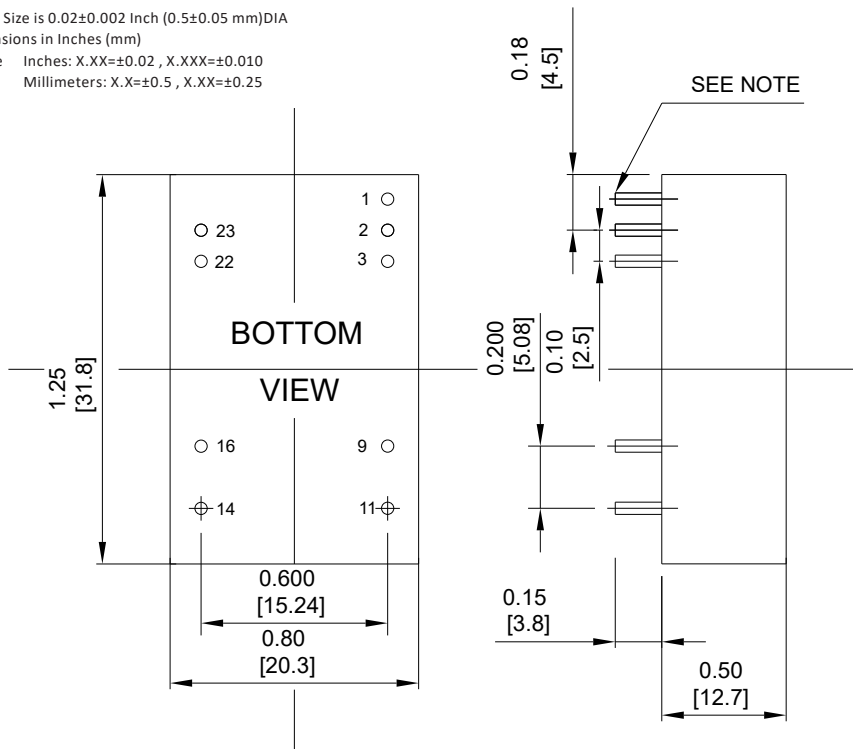
### Features

- ◆ 8.25-10W Isolated Output
- ◆ Efficiency to 88.5%
- ◆ Low No Load Power Consumption
- ◆ 4 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Input Under-Voltage Protection
- ◆ Remote On/Off
- ◆ Continuous Short Circuit Protection
- ◆ Over Current Protection
- ◆ All Ceramic Capacitor Design
- ◆ UL60950-1 2nd (Basic Insulation) Approval
- ◆ Meets EN50155 with External Circuits
- ◆ Shock & Vibration Meets EN50155 (EN61373)
- ◆ Fire & Smoke Meets EN45545-2
- ◆ 3050m Operating Altitude



### Mechanical Dimensions

NOTE: Pin Size is 0.02±0.002 Inch (0.5±0.05 mm) DIA  
 All Dimensions in Inches (mm)  
 Tolerance Inches: X.XX=±0.02, X.XXX=±0.010  
 Millimeters: X.X=±0.5, X.XX=±0.25



PIN CONNECTION		
PIN	Single Output	Dual Output
1	Remote On/Off	Remote On/Off
2,3	-V Input	-V Input
4,5	NP	NP
9	NP	Common
10	NP	NP
11	NC	-V Output
12	NP	NP
13	NP	NP
14	+V Output	+V Output
15	NP	NP
16	-V Output	Common
20,21,24	NP	NP
22,23	+V Input	+V Input

\* NC-NO CONNECTION WITH PIN

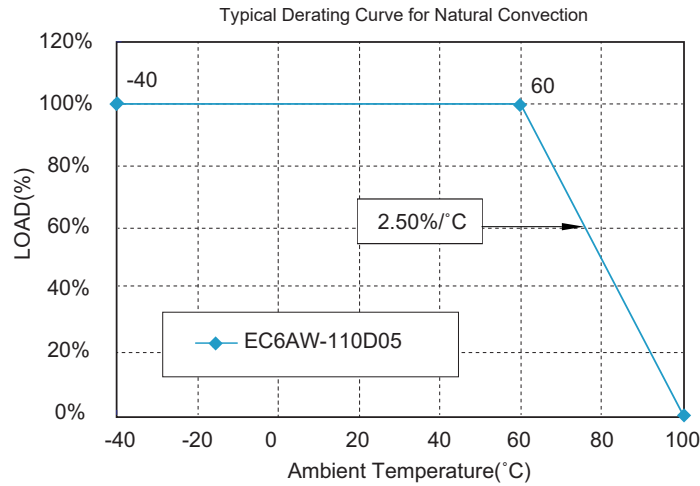
\* NP-NO PIN

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
EC6AW-110S33	43-160 VDC	3.3 VDC	0 mA	2500 mA	6 mA	89 mA	85	2500µF
EC6AW-110S05	43-160 VDC	5 VDC	0 mA	2000 mA	6 mA	105 mA	87	2000µF
EC6AW-110S12	43-160 VDC	12 VDC	0 mA	835 mA	6 mA	104 mA	88	835µF
EC6AW-110S15	43-160 VDC	15 VDC	0 mA	666 mA	6 mA	103 mA	88.5	666µF
EC6AW-110D05	43-160 VDC	±5 VDC	0 mA	±1000mA	6 mA	107 mA	85	1000µF
EC6AW-110D12	43-160 VDC	±12 VDC	0 mA	±416mA	6 mA	105 mA	87	416µF
EC6AW-110D15	43-160 VDC	±15 VDC	0 mA	±333mA	6 mA	104 mA	87.5	333µF

NOTE: 1. Nominal Input Voltage 110 VDC



## Derating Curve



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	43-160V
Input Surge Voltage (100ms max.)	200Vdc max.
Under Voltage Lockout	Power up 40V Power down 38V
Positive Logic Remote On/Off	see note 3 & 4
Input Filter	PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.0% max.
Voltage Balance (Dual Output)	±2.0% max.
Transient Response:	
75% ~ 100% Step Load Change	Error Band ±5% Vout nominal
	Recovery Time < 250µs
Ripple & Noise, 20MHz BW (Measured with 1µF MLCC)	
Vo= 3.3V & 5V, ±5V	75mV pk-pk, max
Vo= 12V, 15V, ±12V & ±15V	100mV pk-pk, max
Temperature Coefficient	±0.02%/°C max.
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	Single ±0.5% max. Dual ±1.0% max.
Cross Regulation (Dual output)	
Load Cross Variation 25%/100%	±5.0% max.
Over Voltage Protection	Zener or TVS Clamp
Current Limit	110%-170% Nominal Output
Start up time	10ms typ.

### NOTE

1. Measured from high line to low line.
2. Measured from full load to min. load.
3. Logic compatibility ... CMOS or open collector TTL, referenced to -Vin.
 

Module On	>3.5VDC to 160VDC or open circuit
Module Off	0 to <1.2VDC

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	3000 VDC min.
Isolation Resistance	10 <sup>9</sup> ohms min
Isolation Capacitance	1000pF typ.
Switching Frequency	240KHz typ.
Operating Ambient Temperature Range	-40°C to +85°C
De-rating, Above 60°C Vo=±5V	Linearly to Zero Power at +100°C
De-rating, Above 67°C (note 7)	Others .... Linearly to Zero Power at +100°C
Case Temperature (note 5)	100°C max.
Cooling	Natural Convection
Storage Temperature Range	-55°C to +125°C
Humidity	95% RH max. Non-Condensing
MTBF ..... MIL-HDBK-217F, GB, 25°C, Full Load	1200Khrs typ.
Safety	UL60950-1 2 <sup>nd</sup> (Basic insulation)
EMC (note 6)	Meets EN50155 (EN50121-3-2) with external filter Meets EN50155 (EN61373) Meet EN45545-2
Shock/Vibration	1.25 × 0.80 × 0.50 inches (31.8 × 20.3 × 12.7mm)
Fire & Smoke	Non-Conductive Black Plastic
Dimensions	16g
Case Material	
Weight	

4. Suffix "N" to the model number with negative logic remote On/Off
 

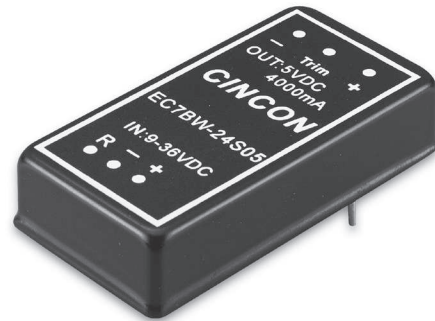
Module On	0 to < 1.2Vdc
Module Off	>3.5VDC to 160VDC or open circuit
5. Maximum case temperature under any operating condition should not be exceeded 100°C.
6. Design meet EN50155 and RIA12 refer to application note.
7. Others model refer to application note.

# EC7BW SERIES

## 20 WATT, 4 : 1 INPUT RANGE

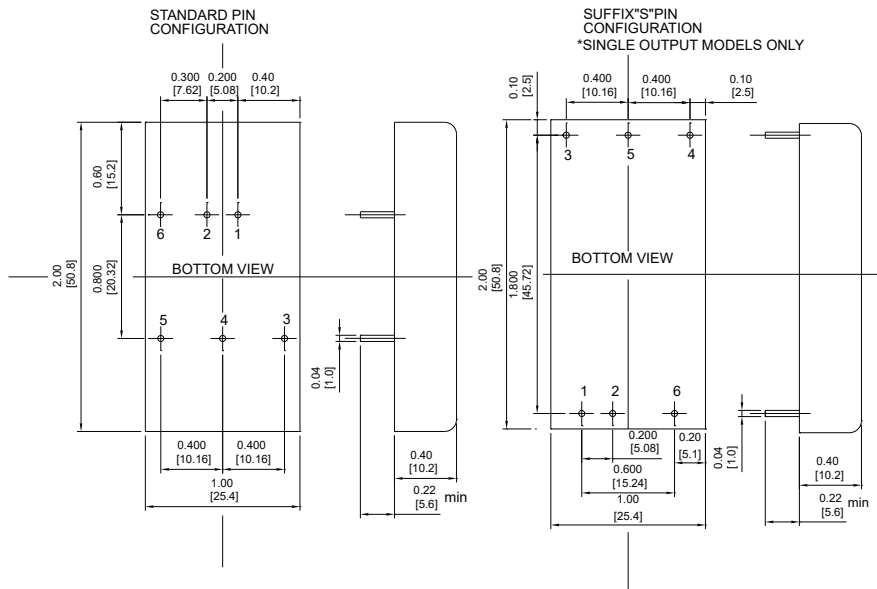
### Features

- ◆ 20W Isolated Output
- ◆ 2" x 1" x 0.4" Shielded Metal Case
- ◆ Efficiency to 90%
- ◆ Fixed Switching Frequency
- ◆ 4 : 1 Wide Input Range
- ◆ Regulated Outputs
- ◆ Continuous Short Circuit Protection
- ◆ Pi Input Filter
- ◆ CE Mark Meets 2004/108/EC
- ◆ Safety Meets UL60950-1, EN60950-1, and IEC60950-1
- ◆ Meets EN50155 with External Circuits
- ◆ Shock & Vibration Meets EN50155 (EN61373)
- ◆ Fire & Smoke meet EN45545-2



### Mechanical Dimensions

All Dimensions in Inches (mm)  
 Tolerance Inches: X.XX±0.04, X.XXX±0.010  
 Millimeters: X.X±0.5, X.XX±0.25

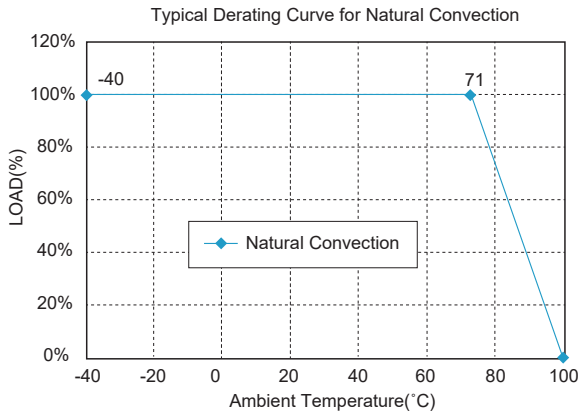


PIN CONNECTION		
PIN	Single Output	Dual Output
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	Trim	Common
5	-V Output	-V Output
6	Remote On/Off	

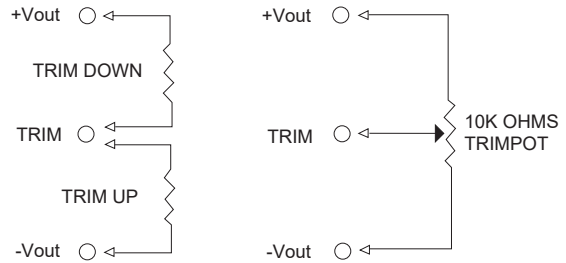
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
EC7BW-24S33	9-36 VDC	3.3 VDC	0 mA	5500 mA	55 mA	869 mA	87	5500µF
EC7BW-24S05	9-36 VDC	5 VDC	0 mA	4000 mA	55 mA	926 mA	90	4000µF
EC7BW-24S12	9-36 VDC	12 VDC	0 mA	1670 mA	55 mA	928 mA	90	1800µF
EC7BW-24S15	9-36 VDC	15 VDC	0 mA	1330 mA	55 mA	924 mA	90	1500µF
EC7BW-24D05	9-36 VDC	± 5 VDC	0 mA	±2000 mA	70 mA	937 mA	89	2000µF
EC7BW-24D12	9-36 VDC	± 12 VDC	0 mA	±835 mA	35 mA	947 mA	88	1000µF
EC7BW-24D15	9-36 VDC	± 15 VDC	0 mA	±666 mA	35 mA	947 mA	88	800µF
EC7BW-48S33	18-75 VDC	3.3 VDC	0 mA	5500 mA	25 mA	430 mA	88	5500µF
EC7BW-48S05	18-75 VDC	5 VDC	0 mA	4000 mA	25 mA	463 mA	90	4000µF
EC7BW-48S12	18-75 VDC	12 VDC	0 mA	1670 mA	25 mA	464 mA	90	1800µF
EC7BW-48S15	18-75 VDC	15 VDC	0 mA	1330 mA	25 mA	462 mA	90	1500µF
EC7BW-48D05	18-75 VDC	± 5 VDC	0 mA	±2000 mA	35 mA	468 mA	89	2000µF
EC7BW-48D12	18-75 VDC	± 12 VDC	0 mA	±835 mA	25 mA	474 mA	88	1000µF
EC7BW-48D15	18-75 VDC	± 15 VDC	0 mA	±666 mA	25 mA	474 mA	88	800µF

NOTE: 1. Nominal Input Voltage 24, 48VDC

## Derating Curve



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	24V	9-36V
	48V	18-75V
Input Surge Voltage (100ms max.)	24V	50Vdc max.
	48V	100Vdc max.
Under voltage lockout	24Vin	power up ..... 8.8V typ.
		power down..... 8.0V typ.
	48Vin	power up ..... 17V typ.
		power down.....16V typ.
Positive Logic Remote On/Off (note 3 & 4)		
Input Filter	PI Type	

### OUTPUT SPECIFICATIONS

Voltage Accuracy		±1.5% max.
Voltage Balance (Dual Output)		±1.0% max.
Transient Response: 75%-100% Step Load Change	Error Band	±5% Vout Nominal
	Recovery Time	< 500µs
Ripple & Noise, 20MHz BW (Measured with 0.1µF MLCC)		75mV pk-pk, max.
Temperature Coefficient		±0.03%/°C
Line Regulation (note 1)	Single	±0.2% max.
	Dual	±0.5% max.
Load Regulation (note 2)		±1.0% max.
Cross Regulation (Dual output)		
Load cross variation 25%/100%		±5.0% max. Over Voltage
Protection		Zener or TVS Clamp
Output Short Circuit Protection		Continuous
External Trim Adj. Range (Single Output Models only)		±10%
Start up time		5ms typ.

### GENERAL SPECIFICATIONS

Efficiency		See Table
Isolation Voltage		Input/Output ..... 1500VDC max.
Isolation Resistance		10 <sup>8</sup> ohm min.
Isolation Capacitance		1000pF typ.
Switching Frequency	Single	50KHz typ.
	Dual	400KHz typ.
EMI/RFI		Six Sided Continuous Shield
Operating Ambient Temperature		-40°C to +85°C
De-rating, Above 71°C		Linearly to Zero power at 105°C
Case Temperature (note 6)		105°C max.
Storage Temperature		-55°C to +125°C
Humidity		95% RH max. Non condensing
MTBF ..... MIL-STD-217F, GB, 25°C, Full Load		720Khrs typ.
Dimensions		2.00 x 1.00 x 0.40 inches
		(50.8 x 25.4 x 10.2 mm)
Case Material		Black Coated Copper with Non-Conductive Base
Weight		35 g

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Logic compatibility .... CMOS or open collector TTL, ref. to -Vin  
Module On ..... >5.5VDC to 75VDC or open circuit  
Module Off ..... 0 to <1.2VDC
4. Suffix "N" to the model number with negative logic remote on/off  
Module On ..... 0 to <1.2VDC  
Module Off ..... >5.5VDC to 75VDC or open circuit
5. Suffix "S" to the model number with alternative pin configuration, single output models only.
6. Maximum case temperature under any operating condition should not be exceeded 105°C.

# EC7BW-110 SERIES

## 20 WATT, INPUT 43-160 VDC

# RAILWAY

## DC-DC CONVERTER

### Features

- ◆ 20W Isolated Output
- ◆ Efficiency to 90%
- ◆ 250KHz Switching Frequency
- ◆ 4 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Continuous Short Circuit Protection
- ◆ 2" x 1" x 0.4" Size Meet Industrial Standard
- ◆ UL60950-1 (Basic Insulation) Approval
- ◆ Meets EN50155
- ◆ Shock & Vibration: EN 50155 (EN 61373)



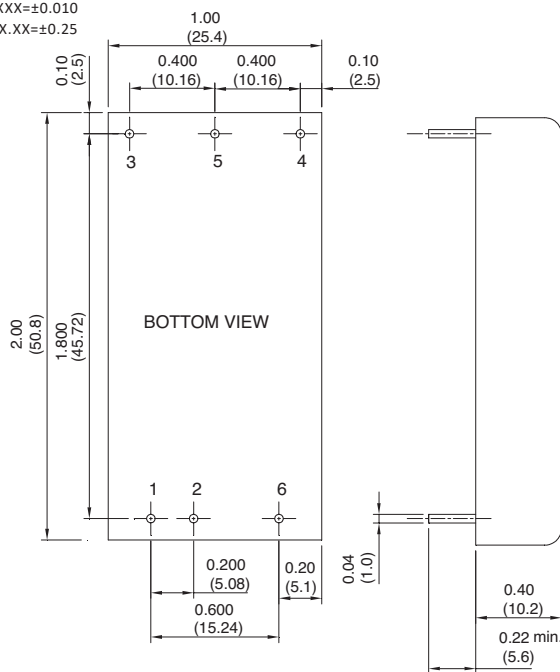
### Mechanical Dimensions

NOTE: Pin Size is 0.04±0.004 Inch (1.0±0.1 mm)DIA

All Dimensions in Inches (mm)

Tolerance Inches: X.XX=±0.02, X.XXX=±0.010

Millimeters: X.X=±0.5, X.XX=±0.25

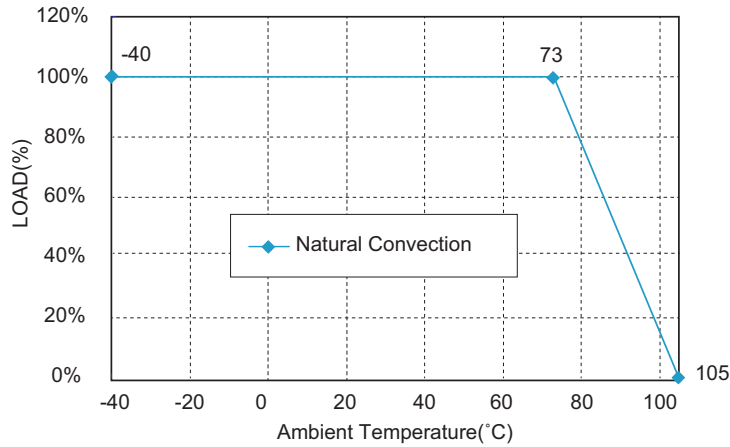


PIN CONNECTION		
PIN	Single Output	Dual Output
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	Trim	-V Output
5	-V Output	Common
6	Remote On/Off	

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
EC7BW-110S05	43-160 VDC	5 VDC	0 mA	4000 mA	3 mA	205.4 mA	88.5%	5600µF
EC7BW-110S12	43-160 VDC	12 VDC	0 mA	1670 mA	3 mA	202.0 mA	90%	1000µF
EC7BW-110S15	43-160 VDC	15 VDC	0 mA	1330 mA	3 mA	203.1 mA	89.5%	1000µF
EC7BW-110D12	43-160 VDC	±12 VDC	0 mA	±833 mA	3 mA	204.3 mA	89%	680µF
EC7BW-110D15	43-160 VDC	±15 VDC	0 mA	±667 mA	3 mA	205.4 mA	88.5%	350µF

NOTE: 1. Nominal Input Voltage 110VDC

## Derating Curve



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110, 43-160V
Input Surge Voltage (100ms max.)	200Vdc max.
Under Voltage Lockout	Power up.....40V Power down..... 38V
Positive Logic Remote On/Off	see note 4 & 5
Input Filter	PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.5% max.
Voltage Balance (Dual Output)	±1.0% max.
Transient Response:	
25% Step Load Change	< 250µs
External Trim Adj. Range	
(Single Output Models Only)	±10%
Ripple & Noise, 20MHz BW (note 3).....5V	40mV RMS max. 75mV pk-pk max.
12V & 15V & ±12V & ±15V	40mV RMS max. 100mV pk-pk max.
Temperature Coefficient	±0.03%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	Single ±0.5% max. Dual ±1.0% max.
Cross Regulation (Dual output)	
Load Cross Variation 10%/100%	±5.0% max
Over Voltage Protection	Zener or TVS Clamp
Current Limit	110%-160% Nominal Output
Start up time	Single 15ms typ. Dual 25ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output 3000VDC min.
Isolation Resistance	10 <sup>9</sup> ohm min.
Isolation Capacitance	1000pF typ.
Switching Frequency	250KHz typ.
EMI/RFI	Conductive EMI Meets EN55022 Class A
Operating Ambient Temperature	-40°C to +85°C
De-rating, Above 73°C	Linearly to Zero power at 105°C
Case Temperature	105°C max.
Storage Temperature	-55°C to +125°C
Humidity	95% RH max. Non condensing
Safety	UL60950-1 2 <sup>nd</sup> (Basic insulation)
EMC (note 6)	EN50155 (EN50121-3-2) with external filter EN50155 (EN61373)
Shock/Vibration	2.00 x 1.00 x 0.40 inches (50.8 x 25.4 x 10.2 mm)
Dimensions	Black Coated Copper with Non-Conductive Base
Case Material	35 g
Weight	

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 1µF ceramic capacitor across output.
4. Logic compatibility open collector ref. to -Input  
Module On > 3.5VDC to 75VDC or open circuit  
Module Off < 1.2VDC
5. Suffix "N" to the model number with negative logic remote On/Off  
Module On < 1.2VDC  
Module Off > 3.5VDC to 75VDC or open circuit
6. Design meet EN50155 and RIA12 refer to application note.

# EC7BW18 SERIES

## 20 WATT 18:1 INPUT DC-DC CONVERTERS

### Features

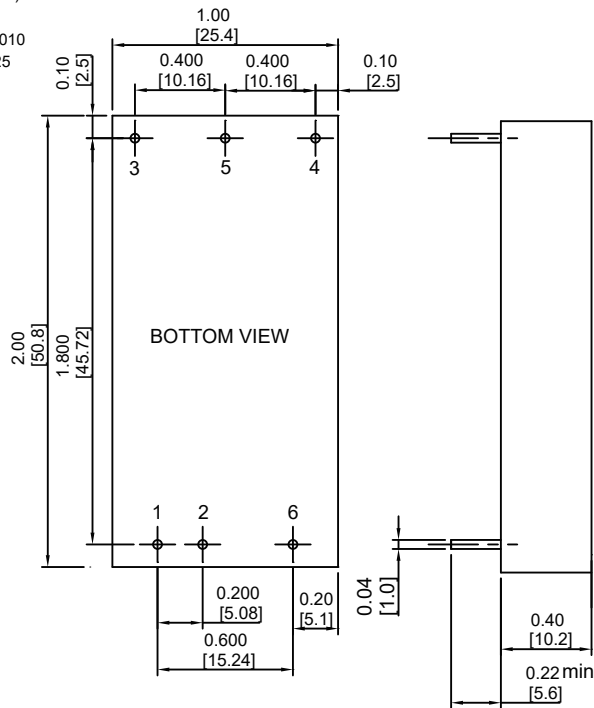
- ◆ 20W Isolated Output
- ◆ Efficiency Up to 90%
- ◆ Fixed Switching Frequency
- ◆ 18:1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ 2"x1"x0.4" Size Meet Industrial Standard
- ◆ Meet UL62368-1 (Reinforce Insulation)
- ◆ Meet EN50155 with External Circuits
- ◆ Shock & Vibration Meets EN50155 (EN61373)
- ◆ Fire & Smoke Meet EN45545-2
- ◆ 5000m Operating Altitude

Preliminary



### Mechanical Dimensions

NOTE: Pin Size is 0.04±0.004 Inch (1.0±0.1 mm)DIA  
 All Dimensions In Inches (mm)  
 Tolerances Inches: X.XX= ±0.02, X.XXX= ±0.010  
 Millimeters: X.X= ±1.0, X.XX= ±0.25

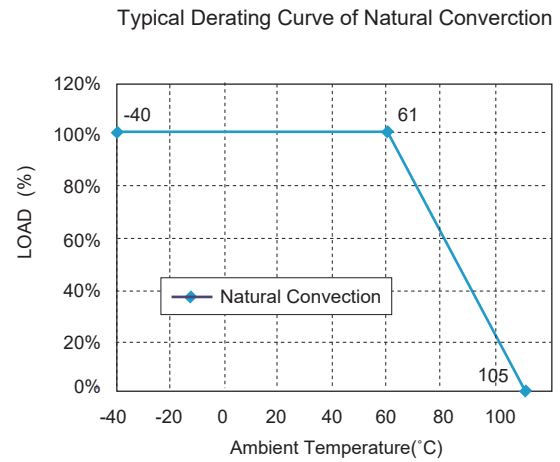
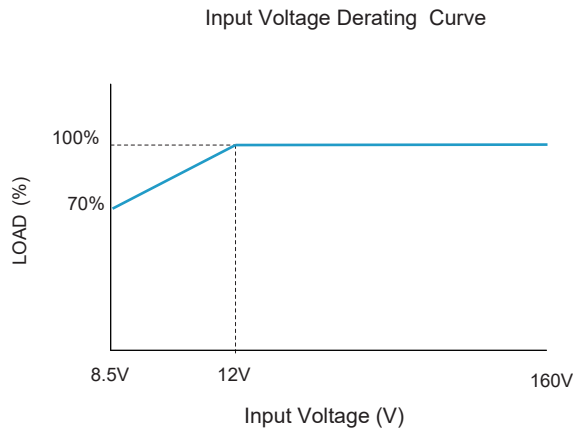


PIN CONNECTION		
PIN	Single	Dual
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	Trim	-V Output
5	-V Output	Common
6	Remote ON/OFF	

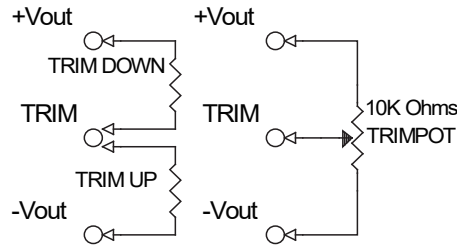
MODEL NUMBER	INPUT VOLTAGE(3)	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(1)	(2)	
EC7BW18-72S05	8.5-160 VDC	5 VDC	0 mA	4000 mA	5 mA	323 mA	86	85	5600uF
EC7BW18-72S12	8.5-160 VDC	12 VDC	0 mA	1670 mA	8 mA	315 mA	88	89	3300uF
EC7BW18-72S15	8.5-160 VDC	15 VDC	0 mA	1330 mA	8 mA	312 mA	89	88	2200uF
EC7BW18-72D12	8.5-160 VDC	±12 VDC	0 mA	±833 mA	8 mA	312 mA	89	88	820uF
EC7BW18-72D15	8.5-160 VDC	±15 VDC	0 mA	±667 mA	8 mA	312 mA	89	89	680uF
EC7BW18-72D24	8.5-160 VDC	±24 VDC	0 mA	±417 mA	8 mA	309 mA	90	89	330uF

NOTE: 1. Measured at Nominal Input Voltage 72VDC  
 2. Measured at Input Voltage 110VDC  
 3. EC7BW18 has De-rating by Input Voltage is required. Shown below.

## Derating Curve



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	72V.....8.5V-160V
Input Surge Voltage (100ms max.)	200Vdc max.
Under Voltage Lockout	Power up ..... 9.0V Power down.....7.5V
Positive Logic Remote On/Off	See note 4 & 5
Input Filter	PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Voltage Balance (Dual Output)	±1.0% max.
Transient Response: 75%~100% Step Load Change	±5% Vout nominal,
Error Band	<250us
Recovery Time	-20%,+15%
External Trim Adj. Range (Single Output Models Only)	
Ripple & Noise, 20MHz BW (note 3)	40mV RMS, max.
5V	75mV pk-pk, max.
Other	40mV RMS, max.
	100mV pk-pk, max.
Temperature Coefficient	±0.02%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max
Load Regulation (note 2)	
Single	±0.2% max
Dual	±1.0% max
Cross Regulation (Dual output)	±5.0% max
Load cross variation 25%/100%	
Over Voltage Protection	Zener Clamp
Current Limit	110%-180% Nominal Output
Start up time	10ms typ.

### GENERAL SPECIFICATIONS

Efficiency	Input/Output	See Table
Isolation Voltage		3000VAC min.
Isolation Resistance		10 <sup>9</sup> ohm min.
Isolation Capacitance		20pF typ.
Switching Frequency		200KHz typ.
Operating Ambient Temperature		-40°C to +85°C
De-rating, Above 61°C		Linearly to Zero power at 105°C
Case Temperature		105°C max.
Storage Temperature		-55°C to +125°C
Humidity		95% RH max. Non condensing
Operating Altitude		5000m
MTBF MIL-HDBK-217F, GB, 25°C, Full Load		TBD
Safety		Meet UL62368-1 (Reinforce insulation)
EMC (note6)		Meet EN50155(EN50121-3-2) with external filter
Shock/Vibration		Meet EN50155(EN61373)
Environmental		EN50155(EN60068-2-1)
Fire & Smoke		Meet EN45545-2
Dimensions		2.00x1.00x0.40 inches (50.8x25.4x10.2 mm)
Case Material		Non-Conductive Black Plastic
Weight		TBD

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 1uF ceramic capacitor across output.
4. Logic compatibility ..... open collector ref. to -Input  
Module on ..... > 4.0VDC to 160VDC or open circuit  
Module off ..... 0 to < 1.2VDC
5. Suffix "N" to the model number with negative logic remote on/off  
Module on ..... 0 to < 1.2VDC  
Module off ..... > 4.0VDC to 160VDC or open circuit
6. Design meet EN50155 and RIA12 refer to application note.

# ECLB40W-110 SERIES

## 40 WATT, INPUT 43-160 VDC

# RAILWAY

## DC-DC CONVERTER

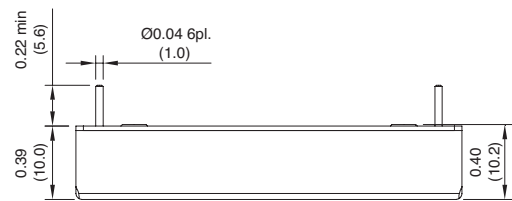
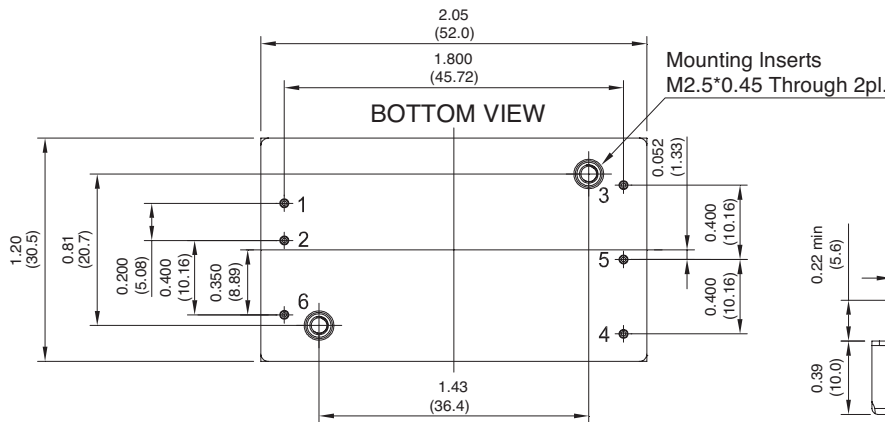
### Features

- ◆ 40W Isolated Output
- ◆ Efficiency to 91%
- ◆ 2.05" X 1.2" X 0.4" Six-Sided Shield Metal Case
- ◆ 4 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Fixed Switching Frequency
- ◆ Input Under Voltage Protection
- ◆ Over Current Protection
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Continuous Short Circuit Protection
- ◆ No Tantalum Capacitor Inside
- ◆ UL60950-1 2<sup>nd</sup> (Basic Insulation) Approval
- ◆ Meets EN50155 with External Circuits
- ◆ Fire & Smoke Meets EN45545-2
- ◆ 3000m Operating Altitude
- ◆ Full Load Operation Up to 69° C with Heat-Sink M-C655 Natural Convection



### Mechanical Dimensions

NOTE: Pin Size is 0.04±0.004 Inch (1.0±0.1 mm)DIA  
 All Dimensions in Inches (mm)  
 Tolerance Inches: X.XX=±0.02, X.XXX=±0.010  
 Millimeters: X.X=±0.5, X.XX=±0.25



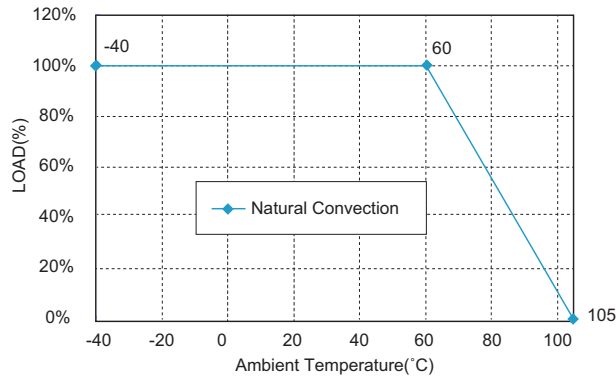
PIN CONNECTION		
PIN	Single Output	Dual Output
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	Trim	-V Output
5	-V Output	Common
6	Remote On/Off	

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
ECLB40W-110S33	43-160 VDC	3.3 VDC	0 mA	10000 mA	6 mA	340 mA	88%	10000µF
ECLB40W-110S05	43-160 VDC	5 VDC	0 mA	8000 mA	6 mA	409 mA	88.5%	8000µF
ECLB40W-110S12	43-160 VDC	12 VDC	0 mA	3333 mA	6 mA	404 mA	90%	3300µF
ECLB40W-110S15	43-160 VDC	15 VDC	0 mA	2666 mA	6 mA	399 mA	91%	2700µF
ECLB40W-110D12	43-160 VDC	±12 VDC	0 mA	±1667 mA	6 mA	408 mA	88%	1650µF
ECLB40W-110D15	43-160 VDC	±15 VDC	0 mA	±1333 mA	6 mA	408 mA	88.5%	1350µF
ECLB40W-110D24	43-160 VDC	±24 VDC	0 mA	±833 mA	6 mA	408 mA	89%	850µF

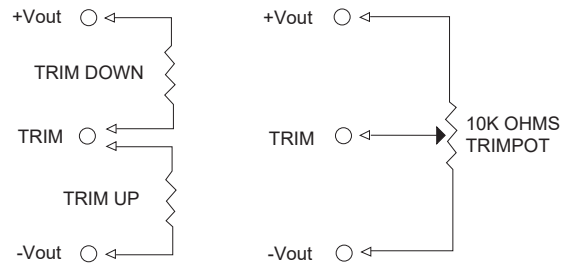
NOTE:  
 1. Nominal Input Voltage 110 VDC



## Derating Curve



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V...43-160V
Input Surge Voltage (100ms max.)	200Vdc max.
Under Voltage Lockout	Power up 40V Power down 38V
Positive Logic Remote On/Off	see note 4 & 5
Input Filter	PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.5% max.
Voltage Balance (Dual Output)	±1.0% max.
Transient Response:	
25% Step Load Change	Error Band Recovery Time
External Trim Adj. Range (Single Output Models Only)	±10%
Ripple & Noise, 20MHz BW (Measured with 1uF MLCC)	
Vo = 3.3V & 5V	100mV pk-pk max.
Vo = 12V, 15V, ±12V & ±15V	150mV pk-pk max.
Vo = ±24V	200mV pk-pk max.
Temperature Coefficient	±0.02%/°C max.
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.5% max.
	Single Dual
Cross Regulation (Dual output)	±1.0% max.
Load Cross Variation 10%/100%	±5.0% max.
Over Voltage Protection	Zener or TVS Clamp
Current Limit	110%-165% Nominal Output
Start up time	15ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output 2250VDC min. Input/Case 1600VDC min. Output/Case 1600VDC min. 10 <sup>9</sup> ohms min.
Isolation Resistance	1500pF typ.
Isolation Capacitance	Output/Case 1000pF typ.
Case Grounding	250KHz typ.
Switching Frequency	Six-Sided Continuous Shield
EMI/RFI	-40°C to +85°C
Operating Ambient Temperature Range	Linearly to Zero Power at +105°C
De-rating, Above 45°C	105°C max.
Case Temperature (note 5)	Natural Convection
Cooling	-55°C to +125°C
Storage Temperature Range	110°C typ.
Thermal Shutdown, Case Temp.	95% RH max. Non-Condensing
Humidity	905Khrs typ.
MTBF .....MIL-STD-217F, GB, 25°C, Full Load	UL60950-1 2 <sup>nd</sup> (Basic insulation)
Safety	EN50155 (EN50121-3-2)
EMC (note 6)	with external filter
Shock/Vibration	EN50155 (EN61373)
Dimensions	2.05 x 1.20 x 0.40 inches (52.0 x 30.5 x 10.2 mm)
Case Material	Aluminum with Non-Conductive Base
Weight	36 g

### NOTE

- Measured from high line to low line.
- Measured from full load to min. load.
- Logic compatibility ... CMOS or open collector TTL, referenced to -Vin.
 

Module On	>3.5VDC to 75VDC or open circuit
Module Off	0 to <1.2VDC
- Suffix "N" to the model number with negative logic remote On/Off
 

Module On	0 to <1.2VDC
Module Off	>3.5VDC to 75VDC or open circuit
- Maximum case temperature under any operating condition should not be exceeded 105°C.
- For information about EN50155 and RIA12, refer to application note.

# CQB50W12 SERIES

## 30-50 WATT 12:1 INPUT DC-DC CONVERTERS

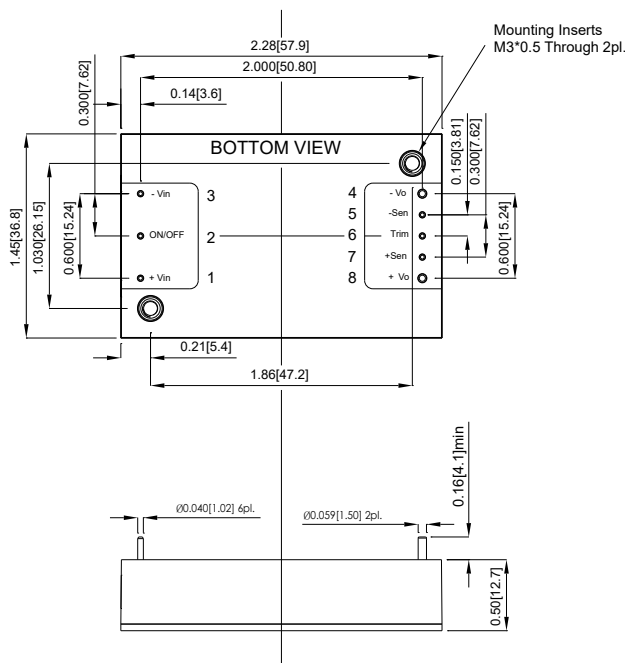
### Features

- ◆ 30-50W Isolated Output
- ◆ Efficiency to 89%
- ◆ Fixed Switching Frequency
- ◆ 12:1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Quarter Brick Size Meet Industrial Standard
- ◆ UL60950-1 2<sup>nd</sup> (Basic Insulation) Approval CB
- ◆ Test Certificate IEC60950-1
- ◆ Meet EN50155 with External Circuits
- ◆ Shock & Vibration Meets EN50155 (EN61373)
- ◆ Fire & Smoke Meet EN45545-2
- ◆ 5000m Operating Altitude



### Mechanical Dimensions

All Dimensions In Inches(mm)  
 Tolerances Inches: X.XX= ±0.02 , X.XXX= ±0.010  
 Millimeters: X.X= ±0.5 , X.XX=±0.25

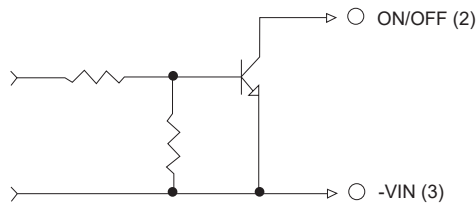


PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

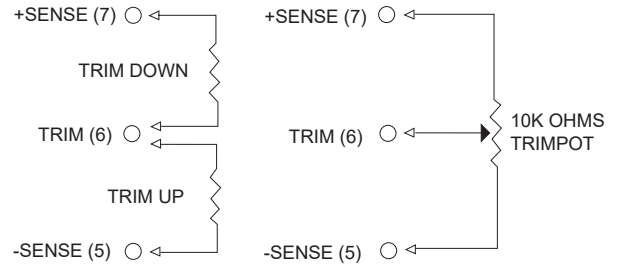
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(1)	(2)	
CQB50W12-72S05	14-160 VDC	5 VDC	0 mA	6.0 A	5 mA	530 mA	83	81	10000μF
CQB50W12-72S12	14-160 VDC	12 VDC	0 mA	4.2 A	5 mA	810 mA	87	86	6800μF
CQB50W12-72S24	14-160 VDC	24 VDC	0 mA	2.1 A	5 mA	810 mA	89	87	3300μF
CQB50W12-72S48	14-160 VDC	48 VDC	0 mA	1.05 A	8 mA	810 mA	88	81	680μF

NOTE:  
 1. Nominal Input Voltage 72 VDC  
 2. Measured at 110Vin

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	72V .....	14-160V
Input Surge Voltage (100ms max.)		200Vdc max.
Under voltage lockout	power up .....	14.6V
	power down .....	12.0V
Positive Logic Remote On/Off		See note 4 & 5
Input Filter		PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 25% Step Load Change	<250µs
External Trim Adj. Range	20%, +10%
Ripple & Noise, 20MHz BW ( see note 3)	40mV RMS, 100mV pk-pk max.
Temperature Coefficient	±0.02%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection trip Range, % Vo nom.	115-140%
Current Limit	110%-220% Nominal
	Output
Start up time	30ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 3000VDC min.
	Input/Case ..... 2500VDC min.
	Output/Case ..... 500VAC min.
Isolation Resistance	2x10 <sup>8</sup> ohm min.
Isolation Capacitance	1000pF typ
Switching Frequency	240KHz typ.
Operating Case Temperature	-40°C to 100°C
Storage Temperature	-55°C to +125°C
Thermal Shutdown, Case Temp.	110°C typ.
Humidity	95% RH max. Non condensing
Operating Altitude	5000m
MTBF ... MIL-STD-217F, GB, 25°C, Full Load	780Khrs typ.
Safety	UL60950-1 2 <sup>nd</sup> (Basic insulation)
EMC (note 8)	EN50155 (EN50121-3-2)
	with External Filter
Shock/Vibration	EN50155 (EN61373)
Environmental	EN50155 (EN60068-2-1)
Fire & Smoke	EN45545-2
Dimensions	2.28 x 1.45 x 0.50 inches
	(57.9 x 36.8 x 12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	61.5 g

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 22µF aluminum solid capacitor and 1µF ceramic capacitor across output.
4. Logic compatibility ..... open collector ref to -Input  
Module on ..... > 3.5VDC to 160VDC or open circuit  
Module off ..... 0 to <1.2 VDC
5. Suffix "N" to the model number with negative logic remote on/off  
Module on ..... 0 to <1.2 VDC  
Module off ..... >4.0VDC to 160VDC or open circuit
6. Suffix "C" to the model number with clear mounting insert (3.2mm DIA.)
7. An external input capacitor 68µF for all models are recommended to reduce input ripple voltage
8. For information about EN50155 and RIA12, refer to application note.

# CQB60W-110S SERIES

## 60 WATT, INPUT 43-160 VDC

# RAILWAY

## DC-DC CONVERTER

### Features

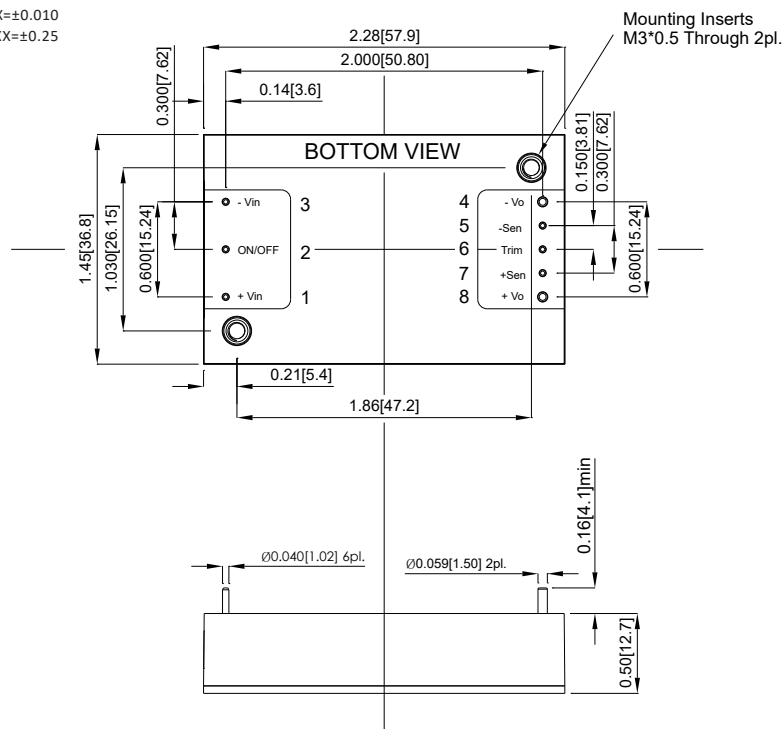
- ◆ 60W Isolated Output
- ◆ Efficiency to 92%
- ◆ Low No Load Power Consumption
- ◆ 4 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Over Temperature/Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Quarter Brick Size Meets Industrial Standard
- ◆ UL60950-1 (Basic Insulation) Approval
- ◆ Meets EN50155 with External Circuits
- ◆ Shock & Vibration: EN 50155 (EN 61373)
- ◆ Fire & Smoke Meets EN45545-2
- ◆ 4000m Operating Altitude



### Mechanical Dimensions

All Dimensions in Inches (mm)

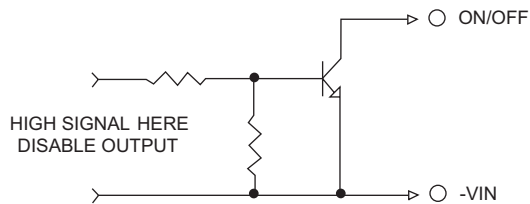
Tolerance Inches: X.XX=±0.02, X.XXX=±0.010  
Millimeters: X.X=±0.5, X.XX=±0.25



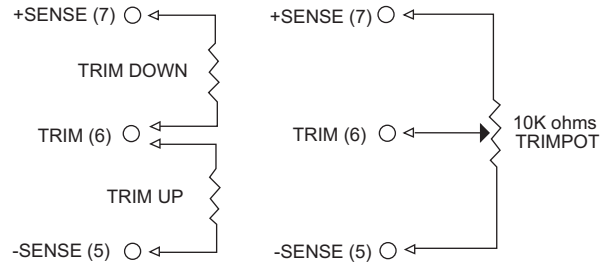
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB60W-110S05	43-160 VDC	5 VDC	0 mA	12 A	5 mA	600 mA	91	6800µF
CQB60W-110S12	43-160 VDC	12 VDC	0 mA	5 A	5 mA	593 mA	92	3300µF
CQB60W-110S15	43-160 VDC	15 VDC	0 mA	4 A	5 mA	606 mA	90	3300µF
CQB60W-110S24	43-160 VDC	24 VDC	0 mA	2.5 A	5 mA	606 mA	90	1200µF
CQB60W-110S28	43-160 VDC	28 VDC	0 mA	2.14 A	5 mA	606 mA	90	1200µF
CQB60W-110S48	43-160 VDC	48 VDC	0 mA	1.25 A	5 mA	613 mA	89	470µF

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V, 43-160V
Input Surge Voltage (100ms max.)	180Vdc max.
Under Voltage Lockout	Power up 42V Power down 38V
Positive Logic Remote On/Off	see note 4 & 5
Input Filter	PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.0% max.
Transient Response:	
25% Step Load Change	< 250µs
External Trim Adj. Range	±10%
Ripple & Noise, 20MHz BW (note 3)	
5V	40mV RMS, 100mV pk-pk max.
12V/15V	60mV RMS, 150mV pk-pk max.
24V/28V	100mV RMS, 240mV pk-pk max.
48V	200mV RMS, 480mV pk-pk max.
Temperature Coefficient	±0.03%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection Trip Range, % Vo nom.	115-140%
Current Limit	110%-165% Nominal Output
Start up time	15ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output.....3000VDC min. Input/Case.....3000VDC min. Output/Case.....1500VDC min.
Isolation Resistance	10 <sup>7</sup> ohm min.
Isolation Capacitance	1000pF typ.
Switching Frequency	200KHz typ.
Operating Case Temperature	-40°C to +100°C
Storage Temperature	-55°C to +105°C
Thermal Shutdown, Case Temp.	110°C typ.
Humidity	95% RH max. Non condensing
Operating Altitude	4000m
MTBF	MIL-HDBK-217F, GB, 25°C, Full Load 650Khrs typ
Safety	UL60950-1 2 <sup>nd</sup> (Basic insulation)
EMI	EN50155 (EN50121-3-2) with external filter
Shock/Vibration	EN50155 (EN61373)
Dimensions	2.28 × 1.45 × 0.50 inches (57.9 × 36.8 × 12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	61.5 g

### NOTE

- Measured from high line to low line.
- Measured from full load to zero load.
- Output ripple and noise measured with 10µF tantalum and 1µF ceramic capacitor across output.
- Logic compatibility ..... open collector ref to -Input  
Module On > 3.5VDC to 75VDC or open circuit  
Module Off < 1.2 VDC
- Suffix "N" to the model number with negative logic remote On/Off  
Module On < 1.2 VDC  
Module Off > 3.5VDC to 75VDC or open circuit
- Suffix "-C" to the model number with clear mounting insert (3.2mm DIA.)
- An external input capacitor 68µF for all models are recommended to reduce input ripple voltage.
- Design to meet EN50155 and RIA12 refer to application note.

# CQB75W8 SERIES

## 75 WATT 8:1 INPUT DC-DC CONVERTERS

### Features

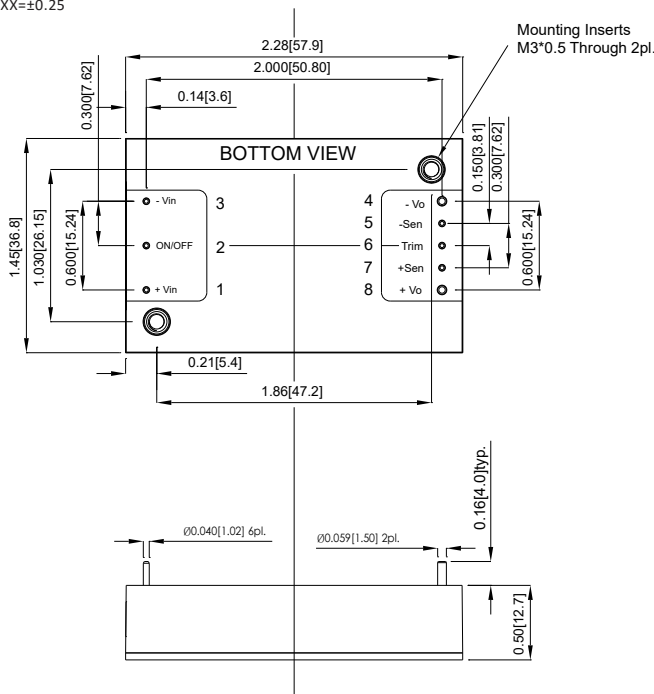
- ◆ 75W Isolated Output
- ◆ Efficiency to 90%
- ◆ Fixed Switching Frequency
- ◆ 8:1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Quarter Brick Size Meet Industrial Standard
- ◆ Safety Meet UL62368 (Reinforced Insulation)
- ◆ Meet EN50155 with External Circuits
- ◆ Shock & Vibration Meet EN50155 (EN61373)
- ◆ Fire & Smoke Meet EN45545-2
- ◆ 3000m Operating Altitude

**PRELIMINARY**



### Mechanical Dimensions

All Dimensions In Inches(mm)  
 Tolerances Inches: X.XX= ±0.02, X.XXX= ±0.010  
 Millimeters: X.X= ±0.5, X.XX= ±0.25

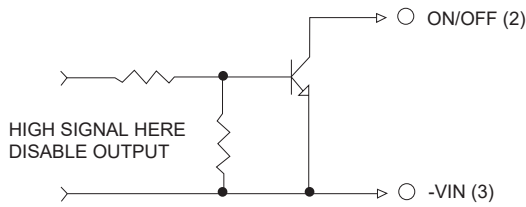


PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

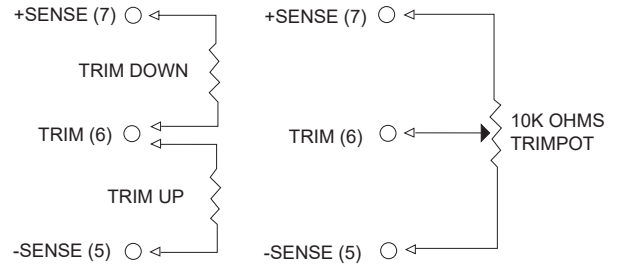
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(1)	(2)	
CQB75W8-36S12	9-75 VDC	12 VDC	0 mA	6.25 A	10 mA	2367 mA	88	88	6250µF
CQB75W8-36S15	9-75 VDC	15 VDC	0 mA	5.0 A	10 mA	2341 mA	89	89	5000µF
CQB75W8-36S24	9-75 VDC	24 VDC	0 mA	3.12 A	10 mA	2311 mA	90	90	3120µF
CQB75W8-36S28	9-75 VDC	28 VDC	0 mA	2.67 A	10 mA	2307 mA	90	90	2670µF
CQB75W8-36S48	9-75 VDC	48 VDC	0 mA	1.56 A	10 mA	2311 mA	90	90	1560µF

NOTE:  
 1. Nominal Input Voltage 36 VDC  
 2. Measured at 48V<sub>in</sub>  
 3. An External Input Capacitor 220µF for All Models are Recommended to Reduce Input Ripple Voltag

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	36V .....	9-75V
Input Surge Voltage (100ms max.)	100Vdc max.	
Under voltage lockout	power up .....	8.8V
	power down .....	8.0V
Positive Logic Remote On/Off	See note 4 & 5	
Input Filter (note 7)	PI Type	

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 25% Step Load Change	
Error Band	±5% Vout nominal
Recovery Time	<250us
External Trim Adj. Range	-20%, +15%
Ripple & Noise, 20MHz BW ( note 3)	
12V & 15V	80mV RMS, 150mV pk-pk max.
24V & 28V	120mV RMS, 240mV pk-pk max.
48V	220mV RMS, 480mV pk-pk max.
Temperature Coefficient	±0.02%/°C max.
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection trip Range, % Vo nom.	115-140%
Current Limit	110%-200% Nominal Output
Start up time	30ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 3000VDC min.
	Input/Case ..... 2700VDC min.
	Output/Case ..... 1600VDC min.
Isolation Resistance	10 <sup>8</sup> ohm min.
Isolation Capacitance	1000pF typ
Switching Frequency	200KHz typ.
Operating Case Temperature Storage	-40°C to 105°C
Temperature	-55°C to +125°C
Thermal Shutdown, Case Temp.	110°C typ.
Humidity	95% RH max. Non condensing
MTBF ...MIL-HDBK-217F, GB, 25°C, Full Load	TBD.
Safety	Meet UL62368 (Reinforced Insulation)
EMC (note 8)	Meet EN50155 (EN50121-3-2)
	with External Filter
Shock/Vibration	Meet EN50155 (EN61373)
Environmental	Meet EN50155(EN60068-2-1,2,30)
Fire & Smoke	Meet EN45545-2
Dimensions	2.28 x 1.45 x 0.50 inches
	(57.9 x 36.8 x 12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	61.5 g

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 22uF aluminum solid capacitor and 1uF ceramic capacitor across output.
4. Logic compatibility ..... open collector ref to -Input  
Module on..... > 3.5VDC to 75VDC or open circuit  
Module off ..... 0 to <1.2 VDC
5. Suffix "N" to the model number with negative logic remote on/off  
Module on ..... 0 to <1.2 VDC  
Module off ..... >3.5VDC to 75VDC or open circuit
6. Suffix "-C" to the model number with clear mounting insert (3.2mm DIA.)
7. An external input capacitor 220uF for all models are recommended to reduce input ripple voltage
8. For information about EN50155 and RIA12, refer to application note.

# CQB100-110S SERIES

## 100 WATT, INPUT 66-160 VDC

# RAILWAY

## DC-DC CONVERTER

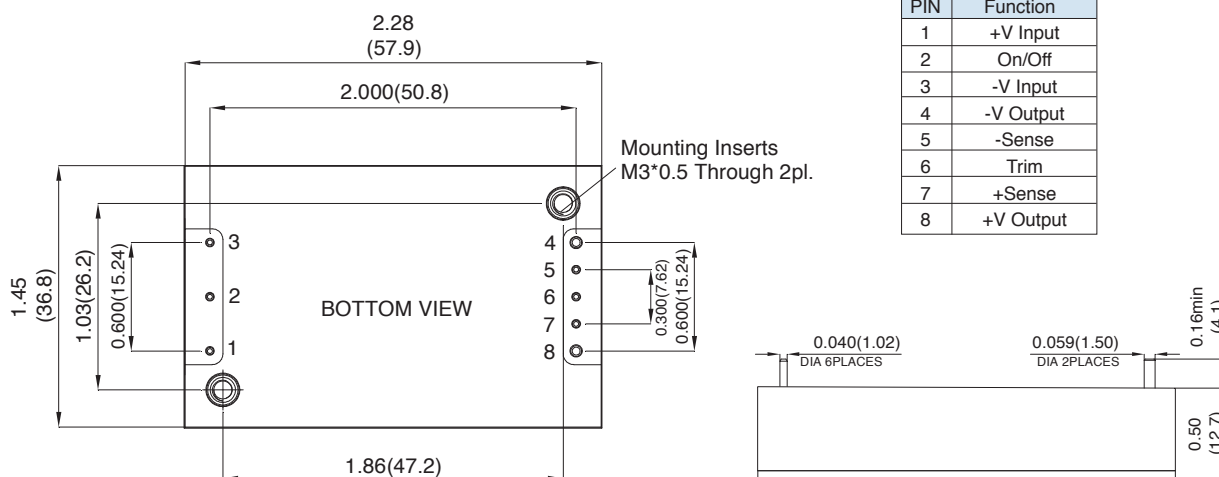
### Features

- ◆ 100W Isolated Output
- ◆ Efficiency to 93%
- ◆ 200KHz Switching Frequency
- ◆ 3 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Quarter Brick Size Meets Industrial Standard
- ◆ UL60950-1 Approval (Except 3.3 Vout)
- ◆ Meets EN50155



### Mechanical Dimensions

All Dimensions in Inches (mm)  
 Tolerance Inches: X.XX=±0.02, X.XXX=±0.010  
 Millimeters: X.X=±0.5, X.XX=±0.25



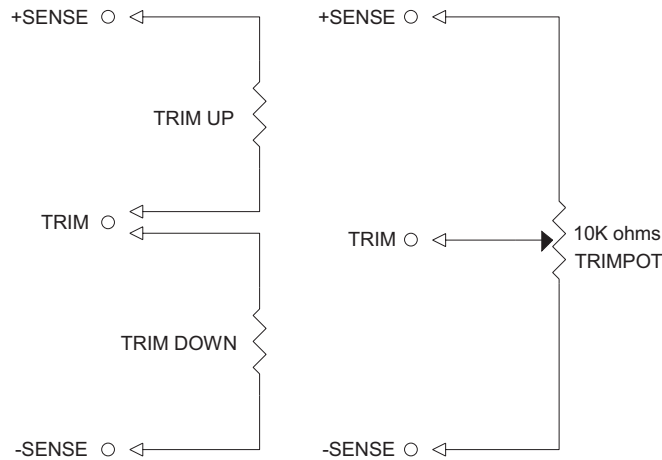
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB100-110S3V3	66-160 VDC	3.3 VDC	0 mA	25 A	40 mA	833 mA	90	10000µF
CQB100-110S05	66-160 VDC	5 VDC	0 mA	20 A	30 mA	983 mA	92.5	10000µF
CQB100-110S12	66-160 VDC	12 VDC	0 mA	8.4 A	40 mA	985 mA	93	8800µF
CQB100-110S24	66-160 VDC	24 VDC	0 mA	4.2 A	60 mA	996 mA	92	1500µF

NOTE: 1. Nominal Input Voltage 110VDC



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V, 66-160V
Input Surge Voltage (100ms max.)	180Vdc max.
Under Voltage Lockout	power up 62V power down 56V
Positive Logic Remote On/Off:	
Logic Compatibility	Open Collector ref. to -Input
Module On	> 3.5Vdc to 75Vdc or Open Circuit
Module Off	< 1.8Vdc
Input Filter	Pi Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.0% max.
Transient Response:	3.3V:±1.5% max
25% Step Load Change	< 200µs
External Trim Adj. Range	±10%
Ripple & Noise, 20MHz BW (note 3)	
3.3 & 5V	40mV RMS, 100mV pk-pk max.
12V	60mV RMS, 150mV pk-pk max.
24V	100mV RMS, 240mV pk-pk max.
Temperature Coefficient	±0.03%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection Trip Range, % Vo nom.	115-140%
Current Limit	110%-180% Nominal Output
Start up time	45ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 2250VDC min. Input/Case ..... 2250VDC min. Output/Case ..... 1500VDC min.
Isolation Resistance	10 <sup>7</sup> ohm min.
Isolation Capacitance	1000pF typ.
Switching Frequency	200KHz typ.
Operating Case Temperature	-40°C to 100°C
Storage Temperature	-55°C to +105°C
Thermal Shutdown, Case Temp.	105°C typ.
Humidity	95% RH max. Non condensing
MTBF ..... MIL-HDBK-217F, GB, 25°C, Full Load	XXS3V3:400Khrs typ. Others:320Khrs typ. XXS05:240Khrs typ.
Safety (Except 3.3 Vout)	UL60950-1 2 <sup>nd</sup> (Basic insulation), Approval
EMC (note 7)	Meet EN50155 (EN50121-3-2) with External Filter
Shock/Vibration	Meet EN50155 (EN61373)
Environmental	Meet EN50155 (EN60068-2-1)
Dimensions	2.28 x 1.45 x 0.50 inches (57.9 x 36.8 x 12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	61.5 g

### NOTE

- Measured from high line to low line.
- Measured from full load to zero load.
- Output ripple and noise measured with 10µF tantalum and 1µF ceramic capacitor across output.
- Suffix "N" to the model number with negative logic remote On/Off  
Module On < 1.8VDC  
Module Off > 3.5VDC to 75VDC or open circuit
- Suffix "-C" to the model number with clear mounting insert (3.2mm DIA.)
- An external input capacitor 120µF for all models are recommended to reduce input ripple voltage.
- Design meet EN50155 and RIA12 refer to application note.

# CHB100-110S SERIES

## 100 WATT, INPUT 66-160 VDC

# RAILWAY

## DC-DC CONVERTER

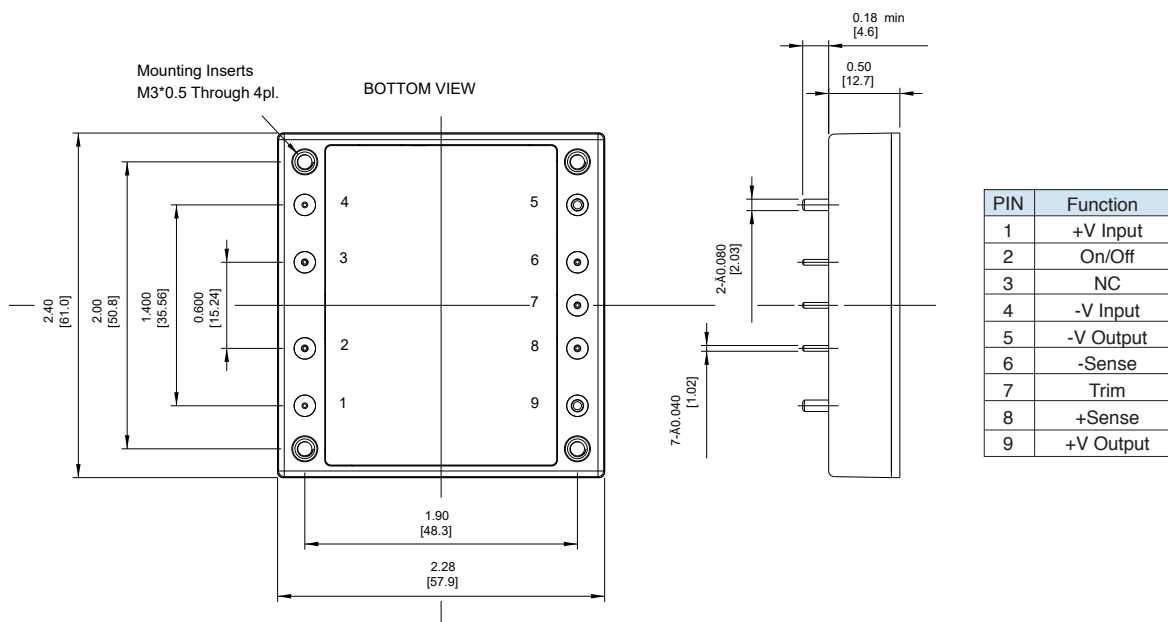
### Features

- ◆ 100W Isolated Output
- ◆ Efficiency to 89%
- ◆ Low No Load Input Power
- ◆ 3:1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Half Brick Size meets industrial standard
- ◆ Meets EN50155 With External Circuits
- ◆ Shock & Vibration Meet EN50155 (EN61373)
- ◆ Fire & Smoke meets EN45545-2
- ◆ 3000m Operating Altitude
- ◆ Meets UL60950-1
- ◆ LVD Approval



### Mechanical Dimensions

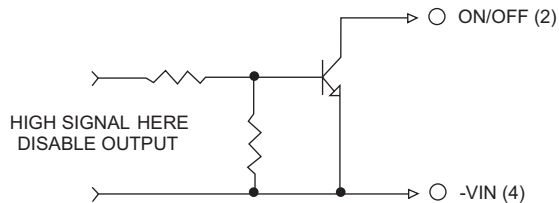
All Dimensions in Inches (mm)  
 Tolerance Inches: X.XX±0.02, X.XXX±0.010  
 Millimeters: X.X±0.5, X.XX±0.25



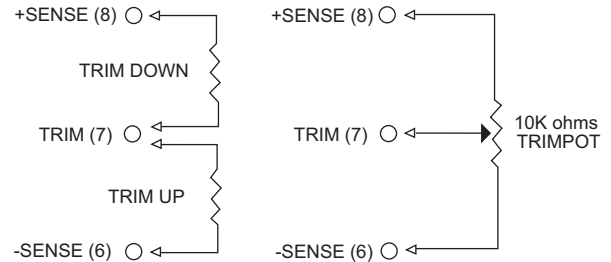
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CHB100-110S12	66-160 VDC	12 VDC	0mA	8.3 A	5mA	1050 mA	86.5	8300µF
CHB100-110S15	66-160 VDC	15 VDC	0mA	6.7 A	5mA	1040 mA	87.5	4170µF
CHB100-110S24	66-160 VDC	24 VDC	0mA	4.17 A	5mA	1040 mA	87.5	4170µF
CHB100-110S48	66-160 VDC	48 VDC	0mA	2.08 A	5mA	1020 mA	89	1500µF

NOTE: 1. Nominal Input Voltage 110VDC

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V, 66-160V
Input Surge Voltage (100ms max.)	180Vdc max.
Under voltage lockout	power up 62V power down 56V
Positive Logic Remote On/Off:	
Logic Compatibility	Open Collector ref to -Input
Module On	Open Circuit
Module Off	0 to < 1.8Vdc
Input Filter	PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.0% max.
Transient Response:	
25% Step Load Change	< 500µs
External Trim Adj. Range	±10%
Ripple & Noise, 20MHz BW (note 3)	
12V, 15V	60mVRMS, 150mVpk-pk max.
24V	100mVRMS, 240mVpk-pk max.
48V	200mVRMS, 480mVpk-pk max.
Temperature Coefficient	±0.03%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection Trip Range, % Vo nom.	115-140%
Current Limit	110%-160% Nominal Output
Start up time	120ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output .....3000Vrms min. Input/Case.....1500Vrms min. Output/Case.....500Vrms min.
Isolation Resistance	10 <sup>9</sup> ohm min.
Isolation Capacitance	500pF typ.
Switching Frequency	250KHz typ.
Operating Case Temperature	-40°C to 100°C
Storage Temperature	-55°C to +105°C
Thermal Shutdown, Case Temp.	105°C typ.
Humidity	95% RH max. Non condensing
MTBF	MIL-HDBK-217F, GB, 25°C, Full Load 700Khrs typ.
Safety	meet UL60950-1
EMI	EN50155(EN50121-3-2) with external filter
Shock/Vibration	EN50155 (EN61373) EN50155 meet
Environmental	EN50155(EN60068-2-1)
Dimensions	2.28 × 2.40 × 0.50 inches (57.9 × 61.0 × 12.7 mm) Aluminum Baseplate
Case Material	with Plastic Case
Weight	95g

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 10µF tantalum and 1µF ceramic capacitor across output. (48V: 1µF ceramic cap. only).
4. An external input capacitor 47µF for all models are recommended to reduce input ripple voltage.
5. Require a 47µF aluminum capacitor connected between +Vout and -Vout for 48Vout models.
6. For information about EN50155 and RIA12, refer to application note.

# CQB100W-110S SERIES

## 100 WATT 4:1 INPUT DC-DC CONVERTERS

### Features

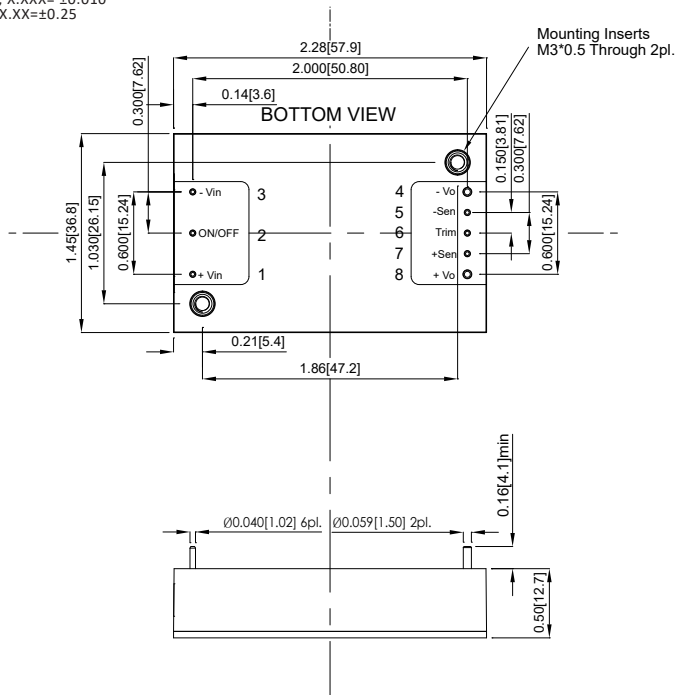
- ◆ 100W Isolated Output
- ◆ Efficiency up to 92%
- ◆ Fixed Switching Frequency
- ◆ 4:1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Quarter Brick Size Meet Industrial Standard
- ◆ UL60950-1 2<sup>nd</sup> (Basic Insulation)
- ◆ Approval Meets EN50155 with External
- ◆ Circuits Shock & Vibration Meet EN50155 (EN61373)
- ◆ Fire & Smoke Meet EN45545-2
- ◆ 3000m Operating Altitude

**PRELIMINARY**



### Mechanical Dimensions

All Dimensions In Inches(mm)  
 Tolerances Inches: X.XX= ±0.02, X.XXX= ±0.010  
 Millimeters: X.X= ±0.5, X.XX= ±0.25

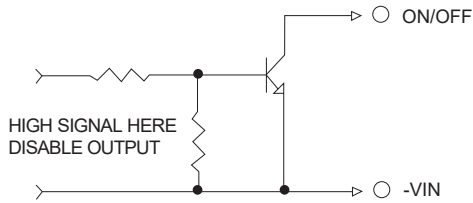


PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

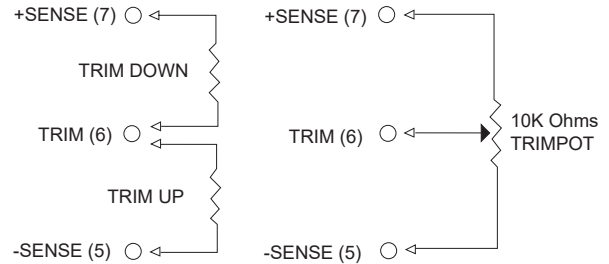
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB100W-110S05	43-160 VDC	5 VDC	0 mA	20 A	10 mA	1.00A	91	20000µF
CQB100W-110S12	43-160 VDC	12 VDC	0 mA	8.4 A	10 mA	1.00A	92	8400µF
CQB100W-110S24	43-160 VDC	24 VDC	0 mA	4.2 A	10 mA	1.03A	89	4200µF
CQB100W-110S28	43-160 VDC	28 VDC	0 mA	3.6 A	10 mA	1.04A	88.5	3600µF
CQB100W-110S48	43-160 VDC	48 VDC	0 mA	2.1 A	10 mA	1.02A	90	1000µF

NOTE:  
 1. Nominal Input Voltage 110VDC  
 2. An external input capacitor 220µF for all models are recommended to reduce input ripple voltage.

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V .....	43-160V
Input Surge Voltage (100ms max.)	110V .....	200Vdc max.
Under voltage lockout	power up .....	41.5V
	power down .....	38V
Positive Logic Remote On/Off		See note 4 & 5
Input Filter (note 7)		PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 75%-100% Step Load Change	
Error Band	±5% Vout nominal
Recovery Time	<250us
External Trim Adj. Range	±10%
Ripple & Noise, 20MHz BW ( see note 3)	
5V	40mV RMS, 100mV pk-pk max.
12V	60mV RMS, 150mV pk-pk max.
24V&28V	100mV RMS, 280mV pk-pk max.
48V	200mV RMS, 480mV pk-pk max.
Temperature Coefficient	±0.02%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection trip Range, % Vo nom.	115-140%
Current Limit	110%-160% Nominal
	Output
Start up time	60ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 3000VDC min.
	Input/Case ..... 2250VDC min.
	Output/Case ..... 500VAC min.
	10 <sup>8</sup> ohm min.
Isolation Resistance	1500pF typ
Isolation Capacitance	300KHz typ.
Switching Frequency	-40°C to 105°C
Operating Case Temperature	-55°C to +125°C
Storage Temperature	110°C typ.
Thermal Shutdown, Case Temp. Humidity	95% RH max. Non condensing
MTBF ... MIL-STD-217F, GB, 25°C, Full Load	
	5V/12V ..... 720Khrs typ.
	Others ..... 840Khrs typ.
Safety	UL60950-1 2 <sup>nd</sup> (Basic Insulation)
EMC (note 8)	EN50155(EN50121-3-2)
	with External Filter
	EN50155(EN61373)
Shock/Vibration	EN50155(EN60068-2-1)
Environmental	Meet EN45545-2
Fire & Smoke	2.28 x 1.45 x 0.50 inches
Dimensions	(57.9 x 36.8 x 12.7 mm)
Case Material	Aluminum Base Plate with Plastic Case
Weight	68 g

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 10uF aluminum and 1uF ceramic capacitor across output for 48Vout and with 10uF tantalum and 1uF ceramic capacitor for others.
4. Logic compatibility ..... open collector ref to -Input  
Module on ..... >3.5Vdc to 160Vdc or open circuit  
Module off ..... 0 to < 1.2Vdc
5. Suffix "N" to the model number with negative logic remote on/off  
Module on ..... 0 to < 1.2Vdc  
Module off ..... >3.5Vdc to 160Vdc or open circuit
6. Suffix "C" to the model number with clear mounting insert (3.2mm DIA.).
7. An external input capacitor 220uF for all models are recommended to reduce input ripple voltage.
8. For information about EN50155 and RIA12, refer to application note.

# CQB150W SERIES

## 150 WATT, 4:1 INPUT RANGE

### Features

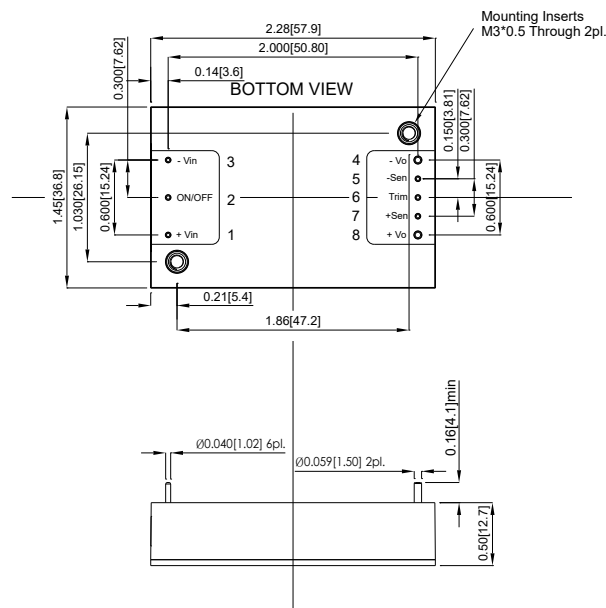
- ◆ 150W Isolated Output
- ◆ Efficiency to 92%
- ◆ Fixed Switching Frequency
- ◆ 4 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Ci rcuit Protection
- ◆ Quarter Brick Size Meet Industrial Standard
- ◆ UL60950-1 2nd Approval
- ◆ CB Test Certificate IEC60950-1
- ◆ Meets EN50155 with External Circuits
- ◆ Shock & Vibration Meets EN50155 (EN61373)
- ◆ Fire & Smoke Meets EN45545-2
- ◆ 3000m Operating Altitude



### Mechanical Dimensions

All Dimensions in Inches (mm)

Tolerance Inches: X.XX=±0.02, X.XXX=±0.010  
Millimeters: X.X=±0.5, X.XX=±0.25



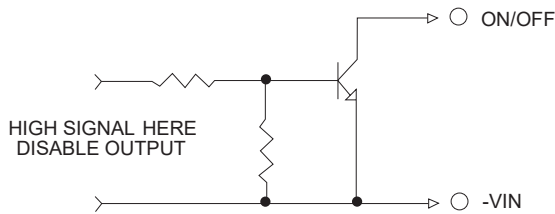
PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(3)	(2)	
CQB150W-24S05	9-36 VDC	5 VDC	0 mA	30 A	10 mA	7.02 A	91	92	30000µF
CQB150W-24S12	9-36 VDC	12 VDC	0 mA	12.5 A	10 mA	7.02 A	91	92	12500µF
CQB150W-24S24	9-36 VDC	24 VDC	0 mA	6.3 A	10 mA	7.08 A	89.5	89.5	6300µF
CQB150W-24S28	9-36 VDC	28 VDC	0 mA	5.4 A	10 mA	7.08 A	90	90	5400µF
CQB150W-24S48	9-36 VDC	48 VDC	0 mA	3.2 A	10 mA	3.19 A	90.5	90.5	1000µF
CQB150W-48S05	18-75 VDC	5 VDC	0 mA	30 A	8 mA	3.74 A	92	92	30000µF
CQB150W-48S12	18-75 VDC	12 VDC	0 mA	12.5 A	8 mA	7.74 A	92	91	12500µF
CQB150W-48S24	18-75 VDC	24 VDC	0 mA	6.3 A	8 mA	7.50 A	91	90.5	6300µF
CQB150W-48S28	18-75 VDC	28 VDC	0 mA	5.4 A	8 mA	7.50 A	91.5	90.5	5400µF
CQB150W-48S48	18-75 VDC	48 VDC	0 mA	3.2 A	8 mA	7.56 A	92	91.5	1000µF

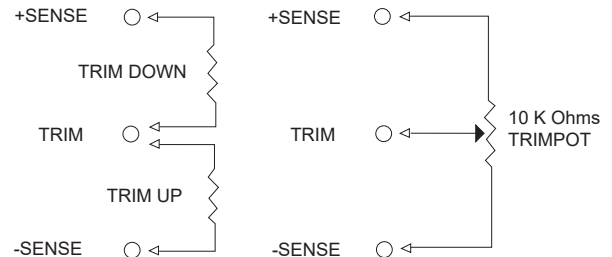
NOTE:

1. Nominal Input Voltage 24, 48 VDC
2. Measured at Nominal Input Voltage
3. Measured at 12VDC for 24Vin, 24VDC for 48Vin

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	24V ..... 9-36V	48V ..... 18-75V
Input Surge Voltage (100ms max.)	24V ..... 50Vdc max.	48V ..... 100Vdc max.
Under voltage lockout	24Vin	power up ..... 8.8V
	48Vin	power down ..... 8.0V
		power up ..... 17V
		power down ..... 16V
Positive Logic Remote On/Off Input Filter	see note 4 & 5	
	PI Type	

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response:75% to 100% Step Load Change	
Error Band	±5% Vout Recover
Recover Time	250us
External Trim Adj. Range	±10%
Ripple & Noise, 20MHz BW	
5V	40mV RMS, 100mV pk-pk max.
12V	60mV RMS, 150mV pk-pk max.
24V & 28V	100mV RMS, 280mV pk-pk max.
48V	200mV RMS, 480mV pk-pk max.
Temperature Coefficient	±0.02%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection trip Range ,% Vo nom.	115-140%
Current Limit	110%-160% Nominal Output
Start up time	60ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage :	
CQB150W-24SXX and CQB150W-48SXX:	Input/Output ..... 2250VDC min.
	Input/Case ..... 2250VDC min.
	Output/Case ..... 2250VDC min.
Isolation Resistance	10 <sup>8</sup> ohm min.
Isolation Capacitance	1500pF typ.
Switching Frequency	300KHz typ.
Operating Ambient Temperature	-40°C to +105°C
Storage Temperature	-55°C to +105°C
Thermal Shutdown, Case Temperature	110°C typ.
Humidity	95% RH max. Non condensing
Shock/Vibration	Meet MIL-STD-810F/EN6137
Dimensions	2.28 × 1.45 × 0.50 inches (57.9 × 36.8 × 12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	68 g

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 10µF aluminum and 1µF ceramic capacitor across output for 48Vout and with 10µF tantalum and 1µF ceramic capacitor for others.
4. Logic compatibility ..... open collector ref to -Input  
 Module On ..... >3.5VDC to 75VDC or open circuit  
 Module Off ..... 0 to < 1.2Vdc
5. Suffix "N" to the model number with negative logic remote On/Off  
 Module On ..... 0 to < 1.2Vdc  
 Module Off ..... >3.5VDC to 75VDC or open circuit
6. Suffix "-C" to the model number with clear mounting insert (3.2mm DIA.)
7. An external input capacitor 220µF for all models are recommended to reduce input ripple voltage.

# CQB150W-110S SERIES

## 150 WATT, INPUT 43-160 VDC

# RAILWAY

## DC-DC CONVERTER

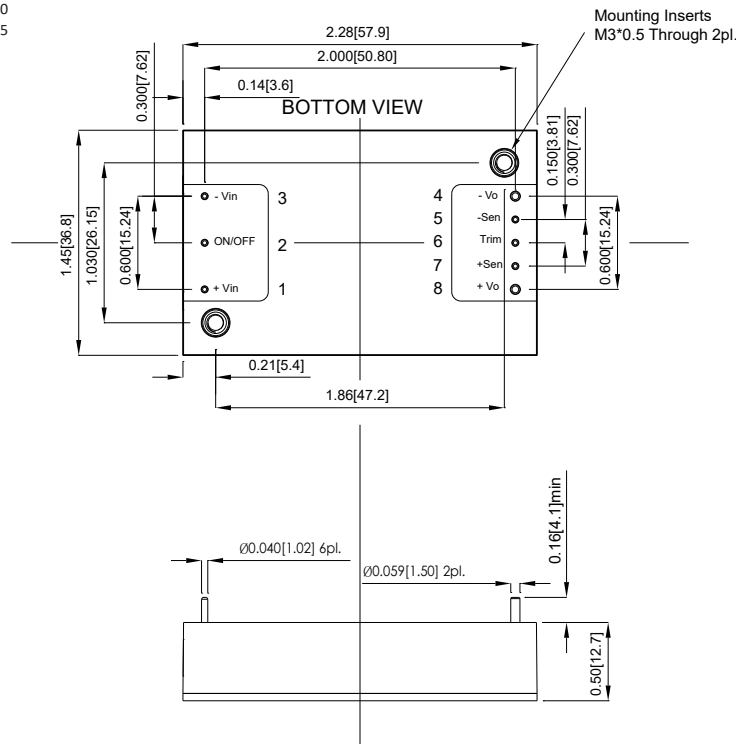
### Features

- ◆ 150W Isolated Output
- ◆ Efficiency to 92%
- ◆ Fixed Switching Frequency
- ◆ 4 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Quarter Brick Size Meets Industrial Standard
- ◆ UL60950-1 2<sup>nd</sup> (Basic Insulation) Approval
- ◆ CB Test Certificate IEC60950-1
- ◆ Meets EN50155 with External Circuits
- ◆ Shock & Vibration Meets EN50155 (EN61373)
- ◆ Fire & Smoke Meets EN45545-2
- ◆ 3000m Operating Altitude



### Mechanical Dimensions

All Dimensions in Inches (mm)  
 Tolerance Inches: X.XX=±0.02, X.XXX=±0.010  
 Millimeters: X.X=±0.5, X.XX=±0.25

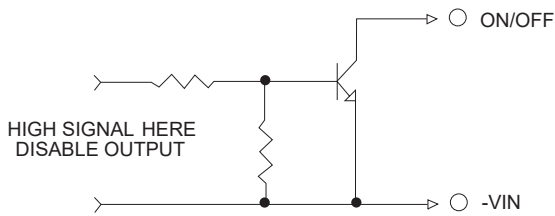


PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

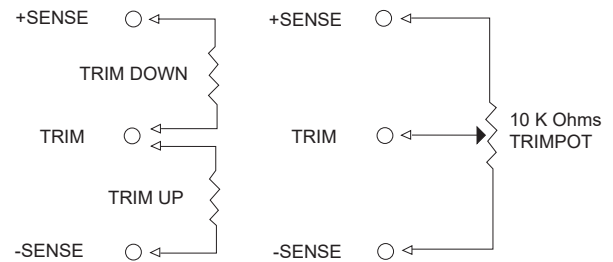
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB150W-110S05	43-160VDC	5 VDC	0mA	30 A	10 mA	1.50 A	91	30000µF
CQB150W-110S12	43-160VDC	12 VDC	0mA	12.5 A	10 mA	1.48 A	92	12500µF
CQB150W-110S24	43-160VDC	24 VDC	0mA	6.3 A	10 mA	1.54 A	89	6300µF
CQB150W-110S28	43-160VDC	28 VDC	0mA	5.4 A	10 mA	1.54 A	89	5400µF
CQB150W-110S48	43-160VDC	48 VDC	0mA	3.2 A	10 mA	1.54 A	90.5	1000µF



## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V, 43-160V
Input Surge Voltage (100ms max.)	110V, 200Vdc max.
Under voltage lockout	110Vin power up 41.5V
	110Vin power down 38V

Positive Logic Remote On/Off (see note 4 & 5)  
Input Filter

PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 25% Step Load Change	< 250µs
External Trim Adj. Range	±10%
Ripple & Noise, 20MHz BW	
5V	40mV RMS, 100mV pk-pk max.
12V	60mV RMS, 150mV pk-pk max.
24V & 28V	100mV RMS, 280mV pk-pkmax.
48V	200mV RMS, 480mV pk-pkmax.
Temperature Coefficient	±0.02%/°C max.
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection trip Range, % Vo nom.	115-140%
Current Limit	110%-160% Nominal Output
Start up time	60ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output .....3000VDC min. Input/Case ..... 2250VDC min. Output/Case ..... 500VDC min.
Isolation Resistance	10 <sup>8</sup> ohm min.
Isolation Capacitance	1500pF typ.
Switching Frequency	300KHz typ.
Operating Ambient Temperature	-40°C to +105°C
Storage Temperature	-55°C to +105°C
Thermal Shutdown, Case Temperature	110°C typ.
Humidity	95% RH max. Non condensing
MTBF	MIL-HDBK-217F, GB, 25°C, Full Load 5V/12V:720Khrs typ.
Dimensions	2.28 × 1.45 × 0.50 inches (57.9 × 36.8 × 12.7 mm)
Safety	UL60950-1 2 <sup>nd</sup> (Basic Insulation)
EMC (note 8)	EN50155 (EN50121-3-2) with External Filter
Shock/Vibration	EN50155 (EN61373)
Environmental	EN50155 (EN60068-2-1)
Case Material	Aluminum Base Plate with Plastic Case
Weight	68 g

### NOTE

- Measured from high line to low line.
- Measured from full load to zero load.
- Output ripple and noise measured with 10µF tantalum and 1µF ceramic capacitor across output for 48Vout and with 10µF tantalum and 1µF ceramic capacitor for others.
- Logic compatibility ..... open collector ref to -Input  
Module On >3.5Vdc to 160Vdc or open circuit  
Module Off 0 to < 1.2Vdc
- Suffix "N" to the Model Number with Negative Logic Remote On/Off  
Module On 0 to < 1.2Vdc  
Module Off >3.5Vdc to 160Vdc or Open Circuit
- Suffix "-C" to the Model Number with Clear Mounting Insert (3.2mm DIA.)
- An external input capacitor 220µF for all models are recommended to reduce input ripple voltage
- For information about EN50155 and RIA12, refer to application note.

# CHB150W10 SERIES

## 150 WATT 10:1 INPUT DC-DC CONVERTERS

### Features

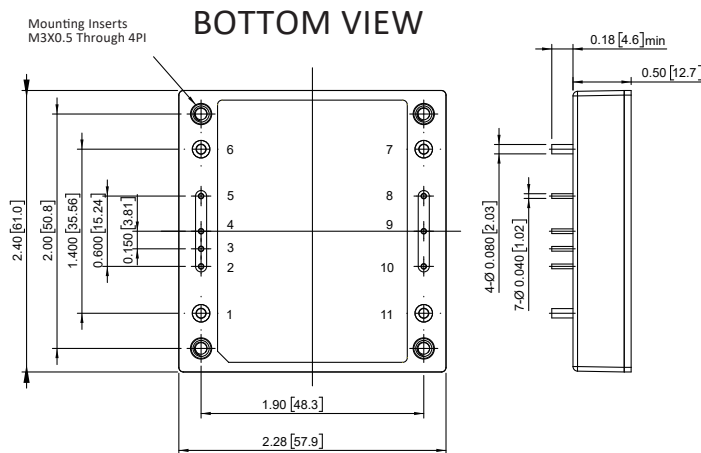
- ◆ 150W Isolated Output
- ◆ Efficiency up to 93%
- ◆ Fixed Switching Frequency
- ◆ Input Under-Voltage Protection
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Remote ON/OFF
- ◆ External Synchronization Function
- ◆ Bus Capacitor Pin for Hold up Time Option
- ◆ UVLO Set up Option
- ◆ Half-Brick Size meets Industrial standard
- ◆ Safety Meets UL62368, EN62368 and IEC62368
- ◆ Shock & Vibration Meet EN50155 (EN61373)
- ◆ Fire & Smoke Meet EN45545-2

**PRELIMINARY**



### Mechanical Dimensions

All Dimensions In Inches[mm]  
 Tolerance Inches:x.xx= ±0.02, x.xxx= ±0.010  
 Millimeters:x.x= ±0.5, x.xx=±0.25

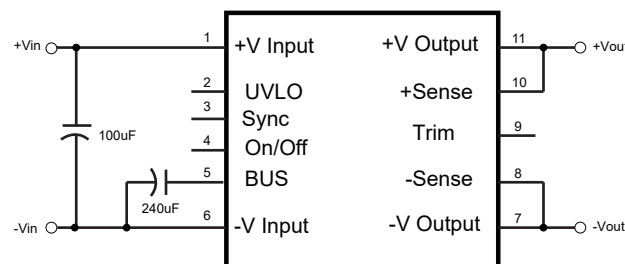


PIN CONNECTION	
PIN	Function
1	+V Input
2	UVLO
3	Sync
4	On/Off
5	BUS
6	-V Input
7	-V Output
8	-Sense
9	Trim
10	+Sense
11	+V Output

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(2)	(3)	
CHB150W10-72S05	16.5-140VDC	5 VDC	0mA	25 A	30 mA	1.93 A	90	90	25000uF
CHB150W10-72S12	16.5-140VDC	12 VDC	0mA	12.5 A	30 mA	2.31 A	90	90	12500uF
CHB150W10-72S15	16.5-140VDC	15 VDC	0mA	10 A	30 mA	2.31 A	90.5	93	10000uF
CHB150W10-72S24	16.5-140VDC	24 VDC	0mA	6.25 A	30 mA	2.37 A	88	88	6250uF
CHB150W10-72S48	16.5-140VDC	48 VDC	0mA	3.2 A	30 mA	2.37 A	90	90	2200uF

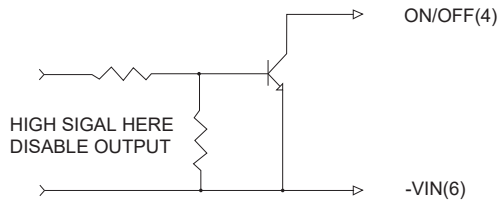
NOTE:  
 1. Nominal Input Voltage 72 VDC  
 2. Measured at Nominal Input Voltage  
 3. Measured at 110VDC

4. An External Input Capacitor 100uF for All Models are Recommended to Reduce Input Ripple Voltage  
 5. An External Bus Capacitor 240uF for All Models

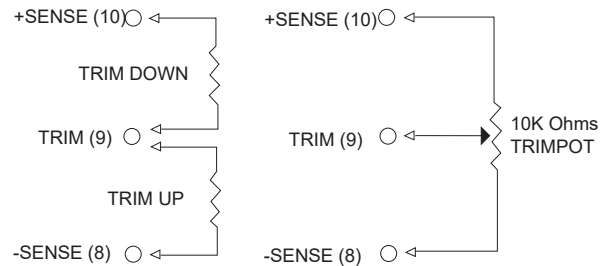


Simplified Application Circuit

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	72V .....16.5-140V
Input Over Voltage Protection	UVLO Pin Floating
	Module on.....146V
	Module off.....156V
Input Surge Voltage (1s max.)	156V max.
Under voltage lockout	72Vin power up.....16.0V
	72Vin power down.....14.0V
Positive Logic Remote On/Off	See note 4 & 5
Under voltage lockout	Pi Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 75%~100% Step Load Change	
Error Band	±5% Vout nominal,
Recovery Time	<250us
External Trim Adj. Range	+15%, -20%
Ripple & Noise, 20MHz BW (note 3)	
5V	100mV RMS max., 200mV pk-pk max.
12, 15V	150mV RMS max., 250mV pk-pk max..
24V	150mV RMS max., 250mV pk-pk max.
48V	150mV RMS max., 300mV pk-pk max.
Temperature Coefficient	±0.02%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2%
Load Regulation (note 2)	±0.2%
Over Voltage Protection trip Range, % Vo nom.	115-140%
Current Limit	105% ~140% Nominal Output.
Start up time	200ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 3000VAC min.
	Input/Case ..... 3000VAC min.
	Output/Case ..... 500VAC min.
Isolation Resistance	10 <sup>8</sup> ohm min.
Switching Frequency	140KHz typ
Operating Case Temperature	-40°C to 100°C
Storage Temperature	-55°C to +125°C
Thermal Shutdown, Case Temperature	105°C typ.
Humidity	95% RH max. Non condensing
MTBF ... MIL-HDBK-217F, GB, 25°C, Full Load	T.B.D. hrs
Dimensions	2.28x2.40x0.50 inches (57.9x61.0x12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	215g

### NOTE

1. Measured from high line to low line
2. Measured from full load to zero load.
3. Output ripple and noise measured with 10uF tantalum and 1uF ceramic capacitor across output (48V: 10uF aluminum capacitor and 1uF ceramic capacitor across output).
4. Logic compatibility.....open collector refer to -Vin  
Module on.....>3.5Vdc to +Vin or Open Circuit  
Module off..... 0Vdc to 1.2Vdc
5. Suffix "N" to the model number with negative logic remote on/off  
Module on.....0Vdc to 1.2Vdc  
Module off.....>3.5Vdc to +Vin or Open Circuit
6. An external input capacitor 100uF for all models are recommended to reduce input ripple voltage.

# CHB150-110S SERIES

## 150 WATT, INPUT 66-160 VDC

# RAILWAY

## DC-DC CONVERTER

### Features

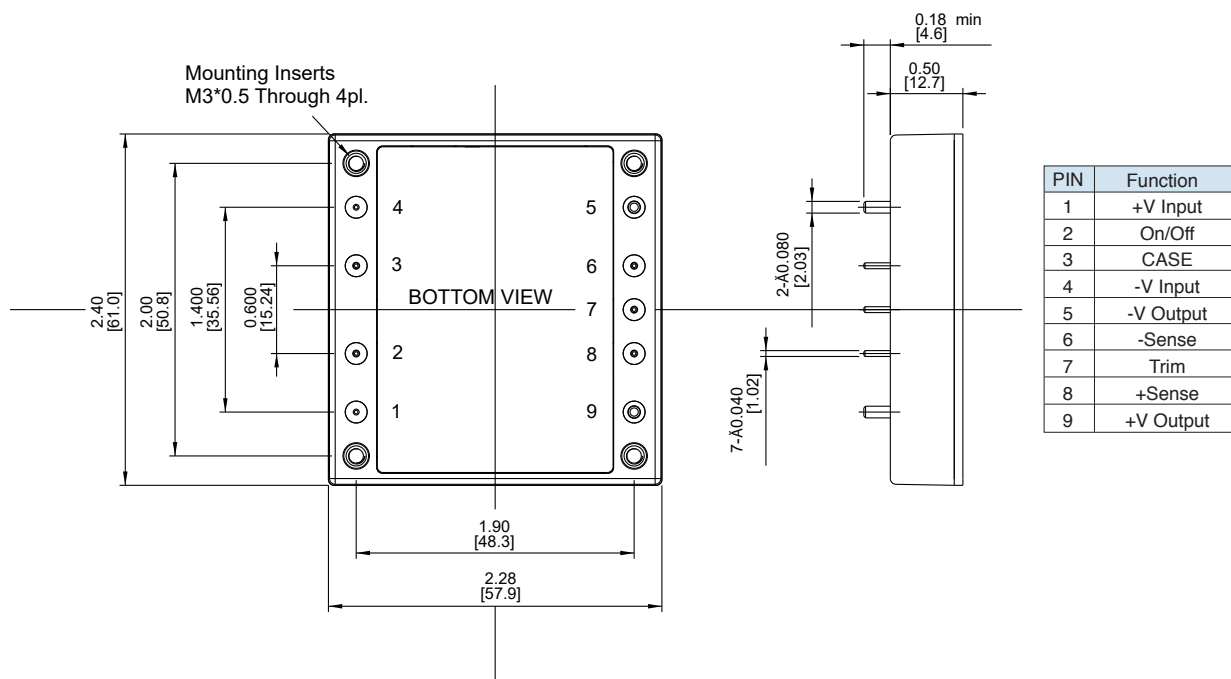
- ◆ 150W Isolated Output
- ◆ Efficiency to 92.5%
- ◆ 200KHz Switching Frequency
- ◆ 3 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Half-Brick Size Meets Industrial Standard
- ◆ UL60950-1 Approval
- ◆ Meets EN50155



### Mechanical Dimensions

All Dimensions in Inches (mm)

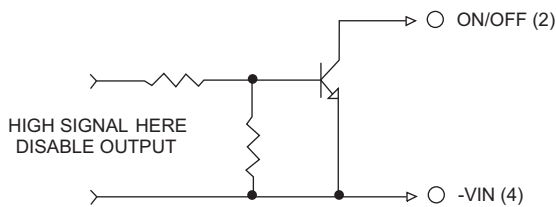
Tolerance Inches: X.XX±0.02, X.XXX±0.010  
 Millimeters: X.X±0.5, X.XX±0.25



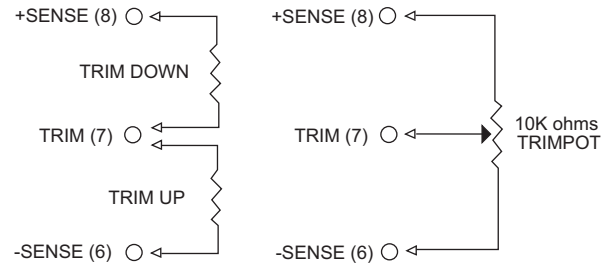
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CHB150-110S05	66-160 VDC	5 VDC	0 mA	30 A	40 mA	1474 mA	92.5	10000µF
CHB150-110S12	66-160 VDC	12 VDC	0 mA	12.5 A	40 mA	1474 mA	92.5	5600µF
CHB150-110S24	66-160 VDC	24 VDC	0 mA	6.5 A	60 mA	1541 mA	92	2200µF

NOTE: 1. Nominal Input Voltage 110VDC

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V.....66-160V
Input Surge Voltage (100ms max.)	180Vdc max.
Under Voltage Lockout	power up: 62V power down: 56V
Positive Logic Remote On/Off:	
Logic Compatibility	Open Collector ref to -Input
Module On	> 3.5Vdc to 75Vdc or Open Circuit
Module Off	0 to < 1.8Vdc
Input Filter	Pi Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.0% max.
Transient Response:	
25% Step Load Change	Error Band ±5% Vout Recover Time < 200µs
External Trim Adj. Range	±10%
Ripple & Noise, 20MHz BW (note 3)	
5V	40mV RMS, 100mV pk-pk max.
12V	60mV RMS, 150mV pk-pk max.
24V	100mV RMS, 240mV pk-pk max.
Temperature Coefficient	±0.03%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection Trip Range, % Vo nom.	115-140%
Current Limit	110%-180% Nominal Output
Start up time	45ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output, Input/Case 2250VDC min. Output/Case 1500VDC min.
Isolation Resistance	10 <sup>7</sup> ohm min.
Isolation Capacitance	1000pF typ.
Switching Frequency	200KHz typ.
Operating Case Temperature Storage	-40°C to 100°C
Temperature	-55°C to +105°C
Thermal Shutdown Case Temp.	105°C typ.
Humidity	95% RH max. Non condensing
MTBF.....MIL-HDBK-217F, GB, 25°C, Full Load	XXS05: 240Khrs typ. Others: 320Khrs typ.
Safety	UL60950-1 2 <sup>nd</sup> (Basic Insulation)
EMC (note 7)	EN50155 (EN50121-3-2) with External Filter
Shock/Vibration	EN50155 (EN61373)
Environmental	EN50155 (EN60068-2-1)
Dimensions	2.28 x 2.40 x 0.50 inches (57.9 x 61.0 x 12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	90 g

### NOTE

- Measured from high line to low line.
- Measured from full load to zero load.
- Output ripple and noise measured with 10µF tantalum and 1µF ceramic apacitor across output.
- Suffix "N" to the model number with negative logic remote On/Off  
Module On 0 to <1.8VDC  
Module Off > 3.5VDC to 75VDC or open circuit
- Suffix "-C" to the model number with clear mounting insert (3.2mm DIA.)
- An external input capacitor 220µF for all models are recommended to reduce input ripple voltage.
- Design meet EN50155 and RIA12 refer to application note.

# CHB200W-110S SERIES

## 200 WATT 4:1 INPUT DC-DC CONVERTERS

### Features

- ◆ 200W Isolated Output
- ◆ Efficiency to 91%
- ◆ Low No Load Power Consumption
- ◆ Fixed Switching Frequency
- ◆ 4:1 Input Range
- ◆ Regulated Outputs
- ◆ Input Under-Voltage Protection
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Remote On/Off
- ◆ Half-Brick Size Meet Industrial standard
- ◆ Safety Meets UL60950-1 2<sup>nd</sup> (Basic Insulation)
- ◆ Meet EN50155 With External Circuits
- ◆ Shock & Vibration Meet EN50155 (EN61373)
- ◆ Fire & Smoke meet EN45545-2
- ◆ 5000m Operating Altitude

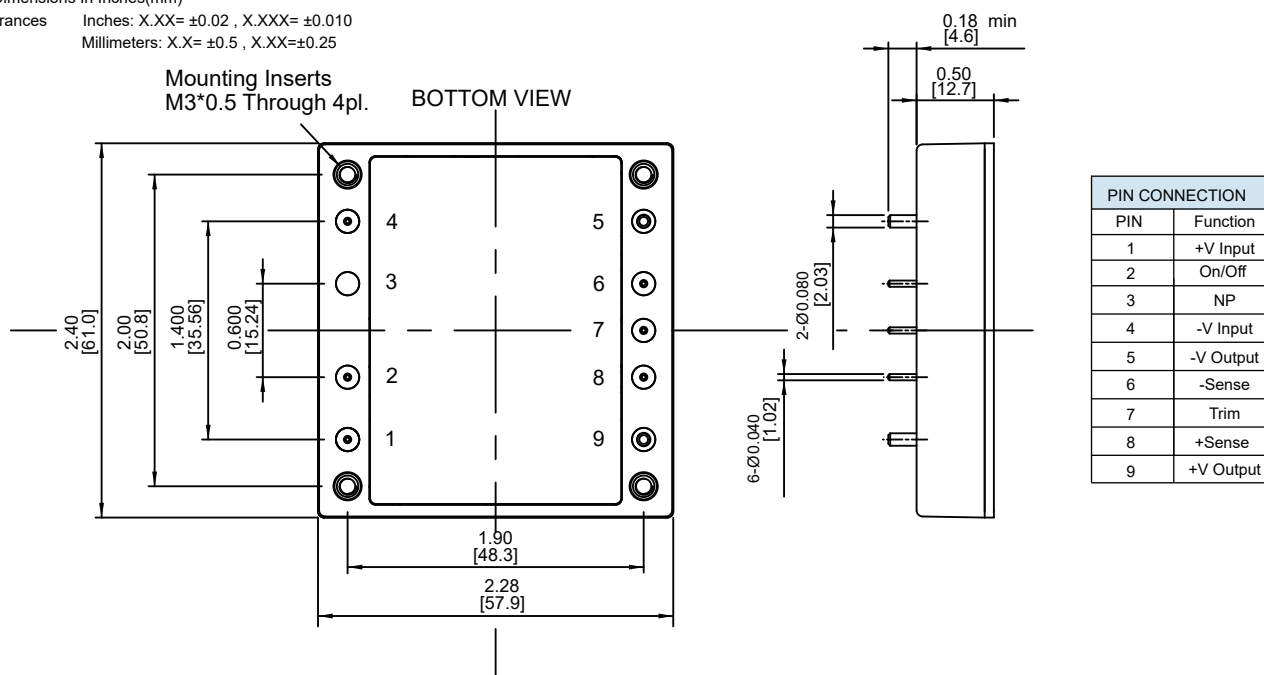


### Mechanical Dimensions

CASE HB

All Dimensions In Inches(mm)

Tolerances Inches: X.XX= ±0.02 , X.XXX= ±0.010  
 Millimeters: X.X= ±0.5 , X.XX=±0.25



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF. (2)	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CHB200W-110S05	43-160 VDC	5 VDC	0mA	40 A	10 mA	2066 mA	88	40000uF
CHB200W-110S12	43-160 VDC	12 VDC	0mA	16.7 A	10 mA	2024 mA	90	16700uF
CHB200W-110S24	43-160 VDC	24 VDC	0mA	8.3 A	10 mA	2034 mA	89	8300uF
CHB200W-110S28	43-160 VDC	28 VDC	0mA	7.14 A	10 mA	2042 mA	89	7140uF
CHB200W-110S48	43-160 VDC	48 VDC	0mA	4.2 A	10 mA	2014 mA	91	3000uF

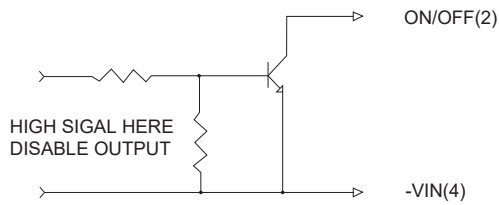
NOTE:

1. Nominal Input Voltage 110 VDC.

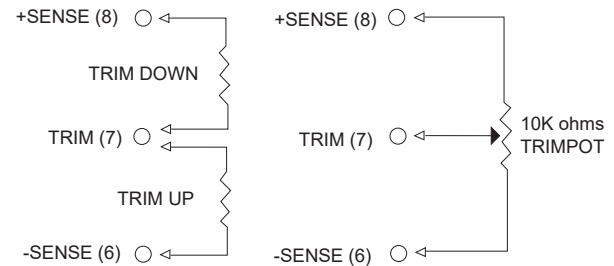
2. Measure at Nominal Input Voltage.

3. An external input capacitor 220uF for all models are Recommended to Reduce Input Ripple Voltage.

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V.....43-160V
Input Surge Voltage (100ms max.)	110V.....200Vdc max.
Under Voltage Lockout	110Vin Power Up.....42V
	110Vin Power Down.....39V
Positive Logic Remote ON/OFF	See note 4 & 5
Input Filter (note 6)	Pi Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 75%~100% Step Load Change	
Error Band	±5% Vout nominal,
Recovery Time	<250us
External Trim Adj. Range	+10%
Ripple & Noise, 20MHz BW (note 3)	
5V	60mV RMS, 120mV pk-pk max.
12V	80mV RMS, 150mV pk-pk max.
24V	120mV RMS, 240mV pk-pk max.
28V	140mV RMS, 280mV pk-pk max.
48V	220mV RMS, 480mV pk-pk max.
Temperature Coefficient	±0.02%/°C max
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max
Load Regulation (note 2)	±0.2% max
Over Voltage Protection trip Range, % Vo nom.	115 - 140%
Current Limit	110% ~160% Nominal Output.
Start up time	35ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 3000VDC min.
	Input/Case ..... 3000VDC min.
	Output/Case ..... 500VAC min.
	10 <sup>8</sup> ohm min.
Isolation Resistance	3000pF typ.
Isolation Capacitance	300KHz typ
Switching Frequency	-40°C to 100°C
Operating Case Temperature	-55°C to +125°C
Storage Temperature	110°C typ.
Thermal Shutdown, Case Temperature	95% RH max. Non condensing
Humidity	48V ..... TBDKhrs typ.
MTBF ... MIL-HDBK-217F, GB, 25°C, Full Load	Others..... TBDKhrs typ.
Safety	Meet UL60950-1 2 <sup>nd</sup> (Basic Insulation)
EMC (note7)	Meet EN50155 (EN50121-3-2) with External Filter.
Shock/Vibration	Meet EN50155(EN61373)
Environmental	Meet EN50155(EN60068-2-1,2,30).
Fire & Smoke	Meet EN45545-2
Dimensions	2.28x2.40x0.50 inches (57.9x61.0x12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	114g

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 10uF aluminum solid capacitor and 1uF ceramic capacitor across output. (5V: 47uF polymer tantalum capacitor and 1uF ceramic capacitor across output).
4. Logic compatibility ..... open collector ref to -Input  
Module on..... >3.5Vdc to 160Vdc or open circuit  
Module off ..... 0 to <1.2Vdc
5. Suffix "N" to the model number with negative logic remote on/off  
Module on ..... 0 to <1.2Vdc  
Module off ..... >3.5Vdc to 160Vdc or open circuit
6. An external input capacitor 220uF for all models are recommended to reduce input ripple voltage.
7. For information about EN50155 and RIA12, refer to application note.
8. Suffix "-C" to the model number with clear mounting insert. (3.2mm DIA).

# CHB200W10 SERIES

## 200 WATT 10:1 INPUT DC-DC CONVERTERS

### Features

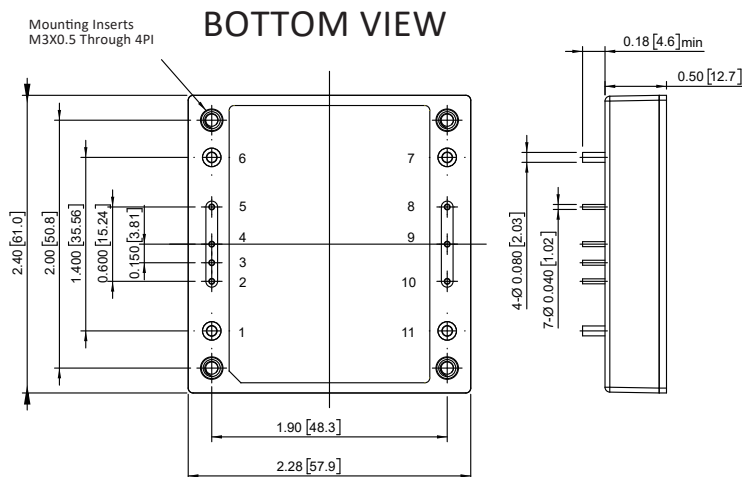
- ◆ 200W Isolated Output
- ◆ Efficiency to 93%
- ◆ Fixed Switching Frequency
- ◆ Input Under-Voltage Protection
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Remote On/Off
- ◆ External Synchronization Function
- ◆ Bus Capacitor Pin for Hold Up Time Option
- ◆ UVLO Set Up Option
- ◆ Half-Brick size meet Industrial standard
- ◆ Safety Meet UL62368, EN62368 and IEC62368
- ◆ Shock & Vibration Meet EN50155 (EN61373)
- ◆ Fire & Smoke Meets EN45545-2

PRELIMINARY



### Mechanical Dimensions

All Dimensions In Inches[mm]  
 Tolerance Inches:x.xx= ±0.02, x.xxx= ±0.010  
 Millimeters:x.x= ±0.5, x.xx=±0.25

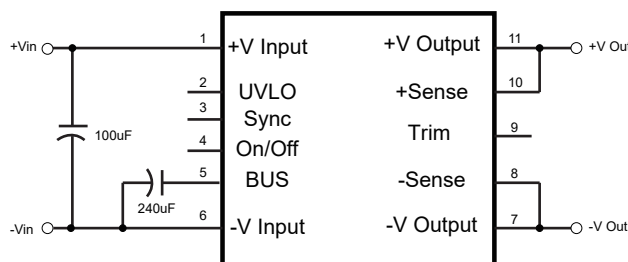


PIN CONNECTION	
PIN	Function
1	+V Input
2	UVLO
3	Sync
4	On/Off
5	BUS
6	-V Input
7	-V Output
8	-Sense
9	Trim
10	+Sense
11	+V Output

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(2)	(3)	
CHB200W10-72S05	16.5-140VDC	5 VDC	0mA	40 A	20 mA	3.09 A	90	90	40000uF
CHB200W10-72S12	16.5-140VDC	12 VDC	0mA	16.7 A	20 mA	3.09 A	90	90	16700uF
CHB200W10-72S15	16.5-140VDC	15 VDC	0mA	13.5A	20 mA	3.07 A	91.5	93	13500uF
CHB200W10-72S24	16.5-140VDC	24 VDC	0mA	8.5 A	20 mA	3.22 A	88	88	8000uF
CHB200W10-72S48	16.5-140VDC	48 VDC	0mA	4.2 A	20 mA	3.11 A	90	90	4000uF

NOTE:  
 1. Nominal Input Voltage 72 VDC  
 2. Measured at Nominal Input Voltage  
 3. Measured at 110VDC

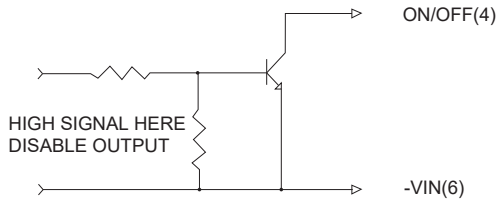
4. An External Input Capacitor 100uF for All Models are Recommended to Reduce Input Ripple Voltage  
 5. An External Bus Capacitor 240uF for All Models



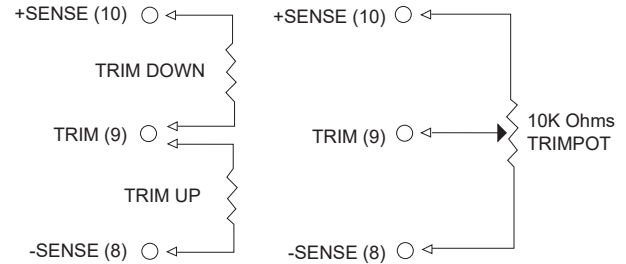
Simplified Application Circuit



## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical at Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	72V.....16.5-140V
Input Over Voltage Protection	Module on.....146V
	Module off.....156V
	156V max
Input Surge Voltage (1s max.)	UVLO Pin Floating
Under Voltage Lockout	72Vin power up.....16.0V
	72Vin power down.....14.0V
	See note 4 & 5
Positive Logic Remote ON/OFF	Pi Type
Input Filter (note 6)	

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 75%~100% Step Load Change	
Error Band	±5% Vout Nominal,
Recovery Time	<250us
External Trim Adj. Range	+15%,-20%
Ripple & Noise, 20MHz BW (note 3)	
5V	100mV RMS max., 200mV pk-pk max.
12, 15V	150mV RMS max., 250mV pk-pk max.
24V	150mV RMS max., 300mV pk-pk max.
48V	150mV RMS max., 350mV pk-pk max.
Temperature Coefficient	±0.02%/°C max
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max
Load Regulation (note 2)	±0.2% max
Over Voltage Protection trip Range, % Vo nom.	115 - 140%
Current Limit	105% -140% Nominal Output
Start up time	200ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 3000VAC min.
	Input/Case ..... 3000VAC min.
	Output/Case ..... 500VAC min.
Isolation Resistance	10 <sup>8</sup> ohm min.
Switching Frequency	140KHz typ.
Operating Case Temperature	-40°C to100°C
Storage Temperature	-55°C to +125°C
Thermal Shutdown, Case Temperature	105°C typ.
Humidity	95% RH max. Non Condensing
MTBF ... MIL-HDBK-217F, GB, 25°C, Full Load	T.B.D. hrs
Dimensions	2.28x2.40x0.50 Inches
	(57.9x61.0x12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	T.B.D. g

### NOTE

1. Measured from high line to low line
2. Measured from full load to zero load
3. Output ripple and noise measured with 10uF tantalum and 1uF ceramic capacitor across output (48V: 10uF aluminum capacitor and 1uF ceramic capacitor across output).
4. Logic compatibility.....open collector refer to -Vin  
Module on.....>3.5Vdc to +Vin or Open Circuit  
Module off..... 0Vdc to 1.2Vdc
5. Suffix "N" to the model number with negative logic remote on/off  
Module on.....0Vdc to 1.2Vdc  
Module off.....>3.5Vdc to +Vin or Open Circuit
6. An external input capacitor 100uF for all models are recommended to reduce input ripple voltage.

# CHB300W-110S SERIES

## 300 WATT, INPUT 43-160 VDC

# RAILWAY

## DC-DC CONVERTER

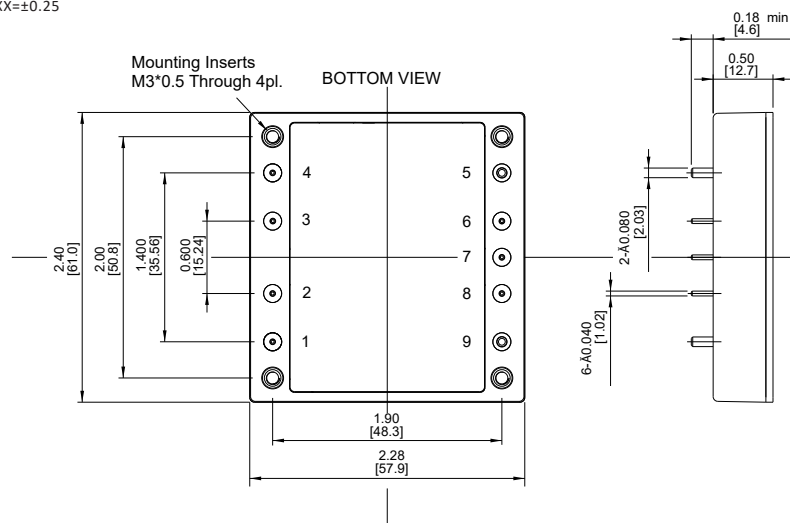
### Features

- ◆ 198-300W Isolated Output
- ◆ Efficiency to 91%
- ◆ Low No Load Power Consumption
- ◆ Fixed Switching Frequency
- ◆ 4 : 1 Input Range
- ◆ Regulated Outputs
- ◆ Input Under-Voltage Protection
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Remote On/Off
- ◆ Half-Brick Size Meet Industrial Standard
- ◆ UL60950-1 2<sup>nd</sup> (Basic Insulation) Approval (Except 3.3Vout)
- ◆ CB Test Certificate IEC60950-1 (Except 3.3Vout)
- ◆ Meet EN50155 With External Circuits
- ◆ Shock & Vibration Meet EN50155 (EN61373)
- ◆ Fire & Smoke Meet EN45545-2
- ◆ 5000m Operating Altitude



### Mechanical Dimensions

All Dimensions in Inches (mm)  
 Tolerance Inches: X.XX=±0.02, X.XXX=±0.010  
 Millimeters: X.X=±0.5, X.XX=±0.25



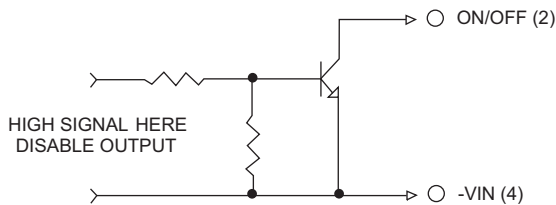
PIN	Function
1	+V Input
2	ON/OFF
3	NC
4	-V Input
5	-V Output
6	-Sense
7	Trim
8	+Sense
9	+V Output

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF. (2)	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CHB300W-110S3V3	43-160 VDC	3.3 VDC	0 mA	60 A	10 mA	2093 mA	86	60000µF
CHB300W-110S05	43-160 VDC	5 VDC	0 mA	60 A	10 mA	3099 mA	88	60000µF
CHB300W-110S12	43-160 VDC	12 VDC	0 mA	25 A	10 mA	3030 mA	90	25000µF
CHB300W-110S24	43-160 VDC	24 VDC	0 mA	12.5 A	10 mA	3064 mA	89	12500µF
CHB300W-110S28	43-160 VDC	28 VDC	0 mA	10.7 A	10 mA	3064 mA	89	10700µF
CHB300W-110S48	43-160 VDC	48 VDC	0 mA	6.25 A	10 mA	2997 mA	91	4700µF

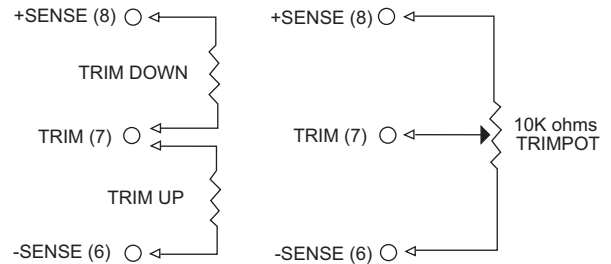
#### NOTE:

1. Nominal Input Voltage 110 VDC.
2. Measure at Nominal Input Voltage.

## Remote On/Off Control



## External Output Trim



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V .....43-160V
Input Surge Voltage (100ms max.)	110V .....200Vdc max.
Under Voltage Lockout	110Vin power up.....42V power down...39V
Positive Logic Remote On/Off	See note 4 & 5
Input Filter	Pi Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.0% max.
Transient Response: 25% Step Load Change Recover Time	<250µs
External Trim Adj. Range	±10%
Ripple & Noise, 20MHz BW (note 3)	
3.3 & 5V	60mV RMS, 120mV pk-pk max.
24V	80mV RMS, 150mV pk-pk max.
28V	120mV RMS, 240mV pk-pk max.
48V	140mV RMS, 280mV pk-pk max.
Temperature Coefficient	220mV RMS, 480mV pk-pk max.
Short Circuit Protection .	±0.02%/°C
Line Regulation (note 1)	Continuous
Load Regulation (note 2)	±0.2% max. ±0.2% max.
Over Voltage Protection Trip Range, % Vo nom.	115-140%
Current Limit	110%-160% Nominal Output
Start up time	35ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output, Input/Case Output/Case
Isolation Resistance	3000VDC min. 500VAC min.
Isolation Capacitance	10 <sup>8</sup> ohm min.
Switching Frequency	3000pF typ. 3.3V ..... 250KHz typ. Others ....300KHz typ.
Operating Case Temperature Storage Temperature	-40°C to 100°C -55°C to +125°C
Thermal Shutdown Case Temp.	110°C typ.
Humidity	95% RH max. Non condensing
MTBF	MIL-HDBK-217F, GB,25°C, Full Load 48V... 900Khrs typ. Others .... 600Khrs typ. UL60950-1 2 <sup>nd</sup> (Basic Insulation) EN50155 (EN50121-3-2) with External Filter EN50155 (EN61373) EN50155 (EN60068-2-1) Meet EN45545-2 2.28 x 2.40 x 0.52 inches (57.9 x 61.0 x 13.2 mm)
Safety	Aluminum Baseplate with Plastic Case
EMC (note 7)	Case
Shock/Vibration	Weight
Environmental	114g
Fire & Smoke	
Dimensions	
Case Material	
Weight	

### NOTE

- Measured from high line to low line.
- Measured from full load to zero load.
- Output ripple and noise measured with 10µF aluminum solid capacitor and 1µF ceramic capacitor across output. (3.3V&5V: 47µF polymer tantalum capacitor and 1µF ceramic capacitor across output).
- Logic compatibility ..... open collector ref to -input  
Module On ..... >3.5VDC to 160Vdc or Open Circuit  
Module Off ..... 0 to <1.2Vdc
- Suffix "N" to the model number with negative logic remote On/Off  
Module On ..... 0 to <1.2Vdc  
Module Off ..... >3.5VDC to 160Vdc or open circuit
- An external input capacitor 220µF for all models are recommended to reduce input ripple voltage.
- For information about EN50155 and RIA12, refer to application note.
- Suffix "-C" to the model number with clear mounting insert. (3.2mm DIA).

# CFB600W-110S SERIES

## 600 WATT DC-DC CONVERTERS

### Features

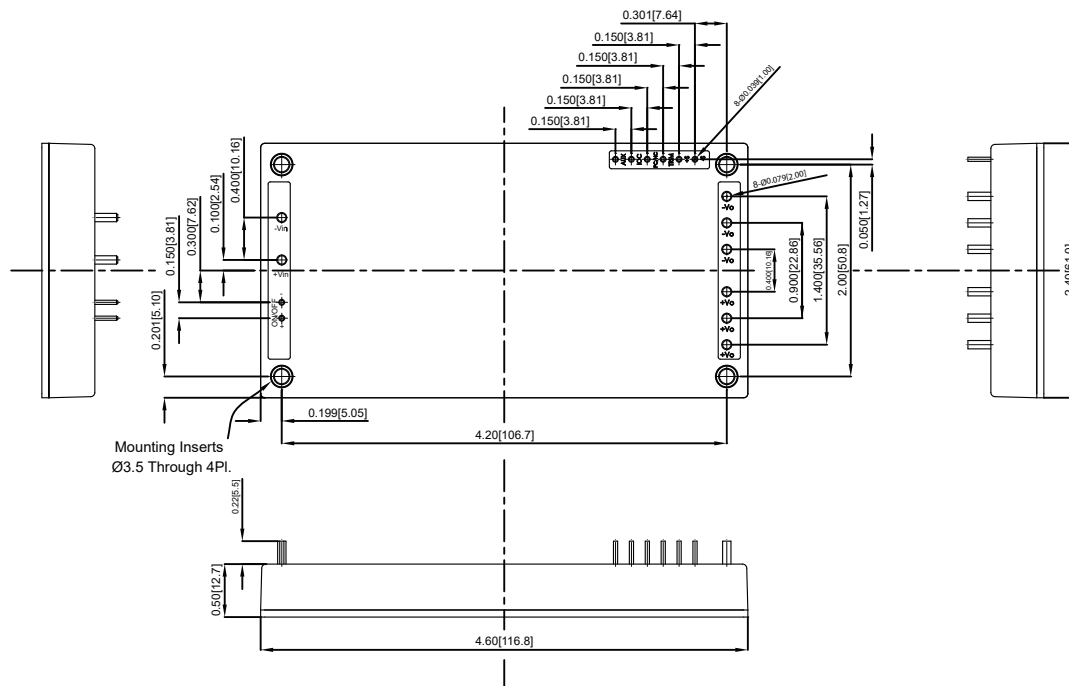
- ◆ 600W Isolated Output
- ◆ Efficiency to 88%
- ◆ Regulated Outputs
- ◆ Isolated Remote On/Off
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Full-Brick Size Meet Industry Standard
- ◆ Meet EN50155 with External Circuits
- ◆ Shock & Vibration Meet EN50155 (EN61373)
- ◆ Meet UL60950-1 2<sup>nd</sup> (Basic Insulation)
- ◆ Fire & Smoke Meet EN45545-2



### Mechanical Dimensions

All Dimensions in Inches[mm]  
 Tolerance Inches:x.xx±0.02, x.xxx±0.01  
 Millimeters:x.x±0.5, x.xx±0.25

Pin  
 ±0.004  
 ±0.1



#### PIN CONNECTION

PIN NUMBER	CONNECTION
1	-V Input
2	+V Input
3	-On/Off
4	+On/Off
5~7	+V Output
8~10	-V Output
11	-Sense
12	+Sense
13	TRIM
14	PC
15	IOC
16	AUX

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF. (3)	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CFB600W-110S12	43-160 VDC	12 VDC	0 mA	50 A	25 mA	6.3 A	87	10000µF
CFB600W-110S24	43-160 VDC	24 VDC	0 mA	25 A	25 mA	6.2 A	88	10000µF
CFB600W-110S28	43-160 VDC	28 VDC	0 mA	21.4 A	25 mA	6.2 A	88	10000µF
CFB600W-110S48	43-160 VDC	48 VDC	0 mA	12.5 A	25 mA	6.2 A	88	10000µF

#### NOTE:

1. Nominal Input Voltage 110 VDC.
2. The Output Terminal Required a Minimum Capacitor 470uF to Maintain Specified Regulation.
3. Measure at Nominal Input Voltage.

## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V ..... 43-160V
Input Surge Voltage (100ms max.)	180Vdc max.
Under voltage lockout	power up ..... 42V power down ..... 40V
Opto Isolated Remote On/Off	See note 8
Input Filter	PI Type

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 25% Step Load Change	<500µs
External Trim Adj. Range	60%, +110%
Ripple & Noise, 20MHz BW ( see note 3)	
12V	60mV RMS, 120mV pk-pk max.
24V	100mV RMS, 240mV pk-pk max.
28V	100mV RMS, 280mV pk-pk max.
48V	200mV RMS, 480mV pk-pk max.
Temperature Coefficient	±0.03%/°C
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.5% max.
Over Voltage Protection trip Range, % Vo nom.	115-140%
Current Limit	105%-140% Nominal Output
Auxiliary Output Voltage/Current	10±3Vdc/20mA max.
Start up time	160ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 2250VDC min. Input/Case ..... 2250VDC min. Output/Case ..... 1500VDC min.
Isolation Resistance	10 <sup>7</sup> ohm min.
Isolation Capacitance	4000pF typ
Switching Frequency	250KHz typ.
Operating Case Temperature	-40°C to 100°C
Storage Temperature	-55°C to +105°C
Thermal Shutdown, Case Temp.	110°C typ.
Humidity	95% RH max. Non condensing
Operating Altitude	2000m
MTBF ... MIL-STD-217F, GB, 25°C, Full Load	450Khrs typ.
Safety	UL60950-1 2 <sup>nd</sup> (Basic insulation)
EMC (note 5)	EN50155(EN50121-3-2) with External Filter
Shock/Vibration	EN50155 (EN61373)
Environmental	EN50155 (EN60068-2-1)
Dimensions	4.60x2.40x0.50 inches (116.8x61.0x12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	220 g

### NOTE

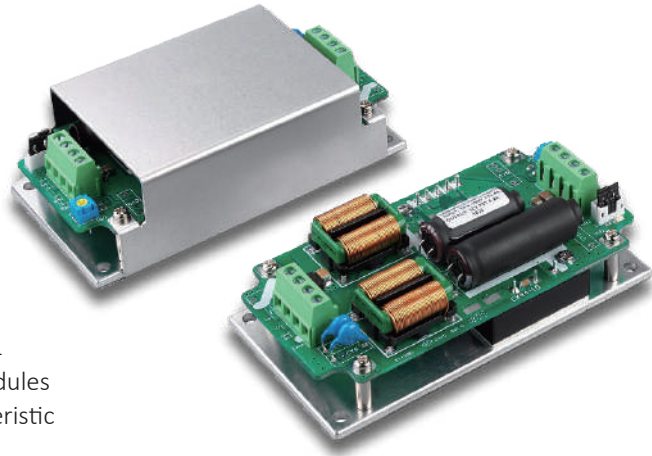
1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 10µF tantalum capacitor and 1µF ceramic capacitor across output.(48Vo: 10µF aluminum capacitor and 1.0µF ceramic capacitors)
4. An external input capacitor 220µF for all models are recommended to reduce input ripple voltage.
5. For information about EN50155 and RIA12, refer to application note.
6. Trim-up: connect a resistor between trim pin and +sense.  
Trim-down: connect a resistor between trim pin and -sense.
7. Suffix "-C0" to the model number with threaded mounting holes (M3x0.5).
8. Standard model is negative logic, suffix "P" to the model number with positive logic.  
(refer application note)

# CHASSIS MOUNT CQB50W12 SERIES

## 30-50 WATT 12:1 INPUT DC-DC CONVERTERS

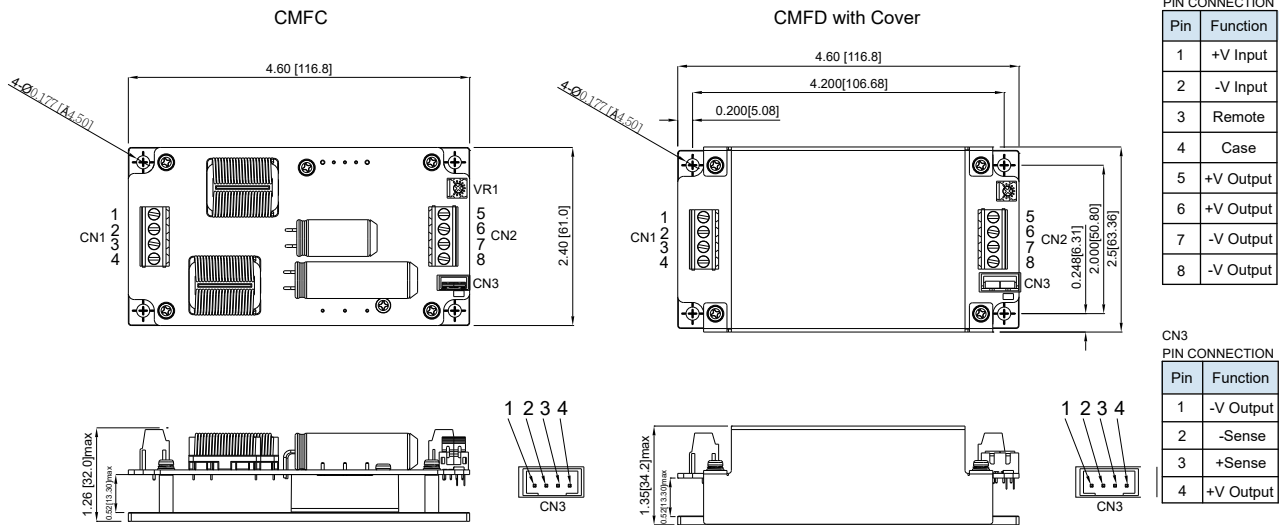
### Features

- ◆ 30-50W Isolated Output
- ◆ Efficiency to 89%
- ◆ Fixed Switching Frequency
- ◆ 12:1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Shock & Vibration Meets EN50155 (EN61373)
- ◆ Safety Meets UL60950-1, EN60950-1 and IEC60950-1
- ◆ UL60950-1 2<sup>nd</sup> (Basic Insulation) Approval for DC Modules
- ◆ EN50155:2007 for EMC, Environmental and Characteristic
- ◆ Build-In EMI Filter
- ◆ Baseplate Cooled
- ◆ Fire & Smoke Meets EN45545-2



### Mechanical Dimensions

All Dimensions in Inches(mm)  
 Tolerance Inches: x.xx=±0.02, X.XXX=±0.010  
 Millimeters: x.x=±0.5, XXX=±0.25



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB50W12-72S05□-CMFC	14-160 VDC	5 VDC	0 mA	6.0 A	8 mA	530 mA	83	10000µF
CQB50W12-72S05□-CMFD								
CQB50W12-72S12□-CMFC	14-160 VDC	12 VDC	0 mA	4.2 A	8 mA	810 mA	87	6800µF
CQB50W12-72S12□-CMFD								
CQB50W12-72S24□-CMFC	14-160 VDC	24 VDC	0 mA	2.1 A	8 mA	800 mA	89	3300µF
CQB50W12-72S24□-CMFD								
CQB50W12-72S48□-CMFC	14-160 VDC	48 VDC	0 mA	1.05 A	12 mA	810 mA	88	680µF
CQB50W12-72S48□-CMFD								

NOTE:  
 1. Nominal Input Voltage 72VDC  
 2. □ = N or none  
 3. VR1 is Used for Output Voltage Adjustment.  
 4. Refer to Application Note for Thermal Resistance and Derating Informations.

5. TVS is Included for Input Surge Voltage Protection.  
 6. Recommend an External Fuse for Input Reverse Polarity Protection (shunt diode is include inside).  
 7. Input Voltage Range: 14-16.8 VDC (t ≤ 60 sec.)

## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	72V .....14-160V
Input Surge Voltage (100ms max.)	200Vdc max.
Under voltage lockout	power up .....14.6V power down .....12.6V
Positive Logic Remote On/Off (note4&5)	

### OUTPUT SPECIFICATIONS

Voltage Accuracy	±1.0% max.
Transient Response: 25% Step Load Change	<250µs
Trim Adj. Range (By VR1)	-20%,+10%
Ripple & Noise, 20MHz BW ( see note 3)	40mV RMS, 100mV pk-pk max.
Temperature Coefficient	±0.02%/°C max.
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±0.2% max.
Over Voltage Protection trip Range, % Vo nom.	115-140%
Current Limit	110% -220% Nominal Output
Start up Time	30ms typ.
Hold up Time	See Application Note

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 3000VDC min. Input/Case ..... 2500VDC min. Output/Case ..... 500VAC min. 2x10 <sup>8</sup> ohm min.
Isolation Resistance	2x10 <sup>8</sup> ohm min.
Isolation Capacitance	3000pF typ.
Switching Frequency	240KHz typ.
Operating Case Temperature	-40°C to +100°C
Storage Temperature	-40°C to +105°C
Thermal Shutdown, Case Temp.	110°C typ.
Humidity	95% RH max. Non Condensing
MTBF ... MIL-HDBK-217F,GB, 25°C, Full Load	500Khrs typ.
Safety	Meets UL60950-1
EMC (note 5)	Meets EN50155(EN50121-3-2:2008) with External Output Filter Meets EN50155(EN50121-3-2:2015) Meets EN50155(EN61373) EN50155(EN60068-2-1, 2, 30)
Shock/Vibration	
Environmental	
Dimensions	
-CMFC	4.60x2.40x1.26 inches (116.8x61.0x32.0 mm)
-CMFD	4.60x2.49x1.35 inches (116.8x63.4x34.2 mm)
Case Material	
-CMFC	Aluminum Base
-CMFD	Aluminum Base and Aluminum Cover
Weight	
-CMFC	210g
-CMFD	296g

### NOTE

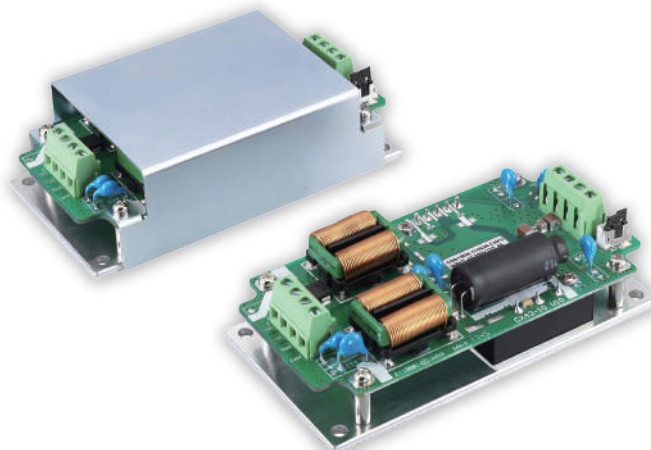
1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 1µF ceramic capacitor across output.
4. Logic Compatibility ..... open collector ref to -input  
Module on ..... >3.5Vdc to 160Vdc or open circuit  
Module off ..... 0 to<1.2Vdc
5. Suffix "N" to the model number with negative logic remote on/off  
Module on ..... 0 to< 1.2Vdc  
Module off ..... >4.0Vdc to 160Vdc or open circuit
6. Output connector CN3 wafer with TAIWAN KING PIN TERMINAL P110I series and mate with JST housing PH series or equivalent.
7. CN1 & CN2 connection: DINKLE EK500V-04P series or equivalent, suitable electric wire: 24\*12AWG(IEC 0.5~2.5mm<sup>2</sup>).

# CHASSIS MOUNT CQB150W-110S SERIES

## 150 WATT 4:1 INPUT DC-DC CONVERTERS

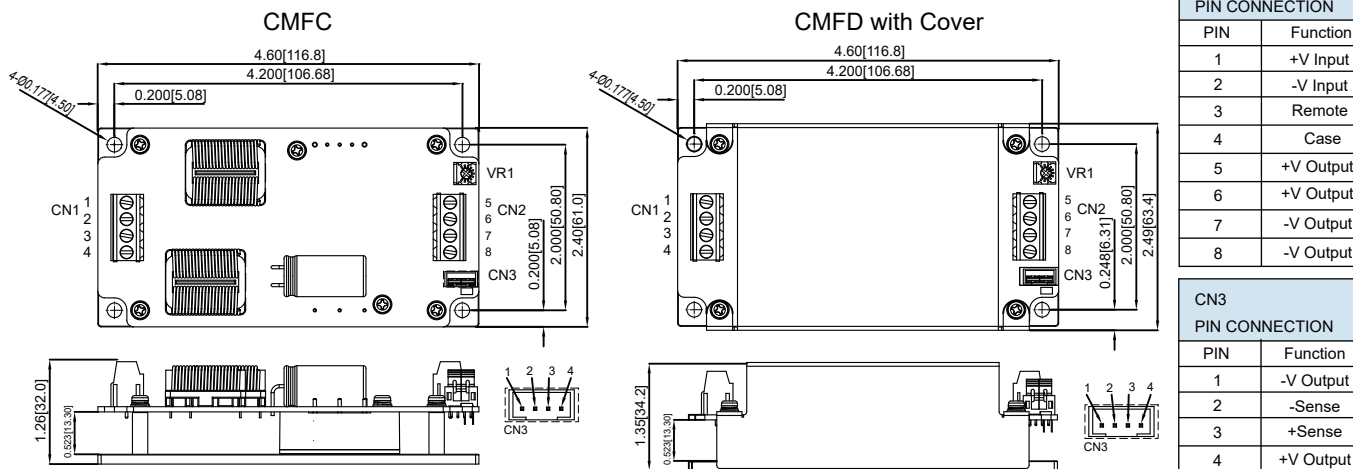
### Features

- ◆ 150W Isolated Output
- ◆ Efficiency to 91%
- ◆ Fixed Switching Frequency
- ◆ 4 :1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Low No Load Power Consumption
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Shock & Vibration Meet EN50155 (EN61373)
- ◆ Safety Meets UL60950-1, EN60950-1 and IEC60950-1
- ◆ UL60950-1 2<sup>nd</sup> (Basic Insulation) Approval for DC Modules
- ◆ EN50155:2007 for EMC, Environmental and Characteristic
- ◆ Build-In EMI Filter
- ◆ Fire & Smoke Meet EN45545-2



### Mechanical Dimensions

All Dimensions In Inches (mm)  
 Tolerance Inches: X.XX=±0.02, X.XXX=±0.010  
 Millimeters: X.X=±0.5, X.XX=±0.25



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB150W-110S05□-CMFC CQB150W-110S05□-CMFD	43-160 VDC	5 VDC	0mA	30.0 A	15 mA	1.53 A	89	30000µF
CQB150W-110S12□-CMFC CQB150W-110S12□-CMFD	43-160 VDC	12 VDC	0mA	12.5 A	15 mA	1.50 A	91	12500µF
CQB150W-110S24□-CMFC CQB150W-110S24□-CMFD	43-160 VDC	24 VDC	0mA	6.3 A	15 mA	1.56 A	88	6300µF
CQB150W-110S28□-CMFC CQB150W-110S28□-CMFD	43-160 VDC	28 VDC	0mA	5.4 A	15 mA	1.56 A	88	5400µF
CQB150W-110S48□-CMFC CQB150W-110S48□-CMFD	43-160 VDC	48 VDC	0mA	3.2 A	15 mA	1.56 A	89.5	1000µF

NOTE:  
 1. Nominal Input Voltage 110VDC  
 2. □ = N or None.  
 3. VR1 is used for Output Voltage Adjustment.  
 4. Refer to application note for thermal resistance and derating informations.  
 5. TVS is included for input surge voltage protection.  
 6. Recommend an external fuse for input reverse polarity protection (shunt diode is included inside)



## Specifications

All Specifications Typical at Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V .....	43-160V
Input Surge Voltage (100ms max.)	110V.....	200Vdc max.
Under voltage lockout	110Vin power up.....	41.5V
	110Vin power down.....	38.5V
Positive Logic Remote On/Off	See note 4 & 5	

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 25% Step Load Change	<250usec
Trim Adj. Range (By VR1)	±10%
Ripple & Noise, 20MHz BW	
5V&12V	40mV RMS, 100mV pk-pk max.
24V&28V	100mV RMS, 200mV pk-pk max.
48V	150mV RMS, 300mV pk-pk max.
Temperature Coefficient	±0.02%/°C max.
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	5V.....±0.5% max.
	Others.....±0.2% max.
Over Voltage Protection Trip Range, % Vo nom.	115-140%
Current Limit	110%-160% Nominal Output
Start up time	100ms typ.
Hold up Time	See Application Note

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 3000VDC min.
	Input/Case ..... 2250VDC min.
	Output/Case ..... 500VAC min.
Isolation Resistance	10 <sup>8</sup> ohm min.
Isolation Capacitance (DC Module)	1500pF typ
Switching Frequency	300KHz typ
Operating Case Temperature	-40°C to +100°C
Storage Temperature	-40°C to +105°C
Thermal Shutdown, Case Temperature(DC Module)	110°C typ.
Humidity	95% RH max. Non condensing
MTBF ... MIL-HDBK-217F, GB, 25°C, Full Load	600Khrs typ.
Safety	Meets UL60950-1
EMC	Meets EN50155(EN50121-3-2:2008)
	Meets EN50155(EN50121-3-2:2015)
	with External Output Filter
	Meets EN50155(EN61373)
Shock/Vibration	EN50155(EN60068-2-1,2,30)
Environmental	Aluminum Base
Case Material -CMFC	Aluminum Base and Aluminum Cover
-CMFD	4.60x2.40x1.26 inches
Dimensions -CMFC	(116.8x61.0x32.0 mm)
-CMFD	4.60x2.49x1.35 Inches
-CMFD	(116.8x63.4x34.2 mm)
Weight -CMFC	215g
-CMFD	300g

### NOTE

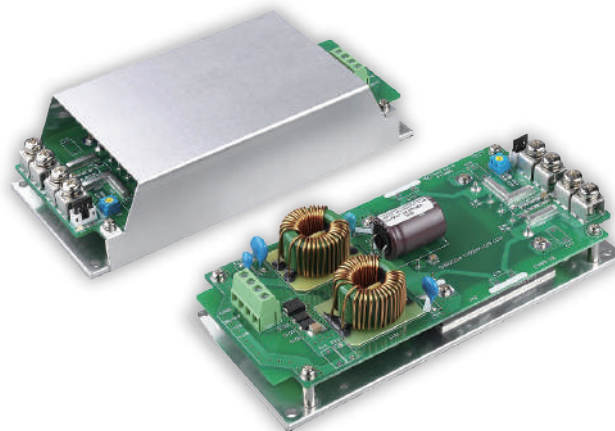
1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 1uF ceramic capacitor across output.
4. Logic Compatibility ..... open collector ref to -input  
Module on ..... >3.5Vdc to 160Vdc or open circuit  
Module off ..... 0 to < 1.2Vdc
5. Suffix "N" to the model number with negative logic remote on/off  
Module on ..... 0 to < 1.2Vdc  
Module off ..... >3.5Vdc to 160Vdc or open circuit
6. Output connector CN3 wafer with TAIWAN KING PIN TERMINAL P110I series and mate with JST housing PH series or equivalent.
7. CN1 & CN2 connection: DINKLE EK500V-04P series or equivalent, suitable electric wire: 24~12AWG( IEC 0.5~2.5mm<sup>2</sup> ).

# CHASSIS MOUNT CHB300W-110S SERIES

## 300 WATT 4:1 INPUT DC-DC CONVERTERS

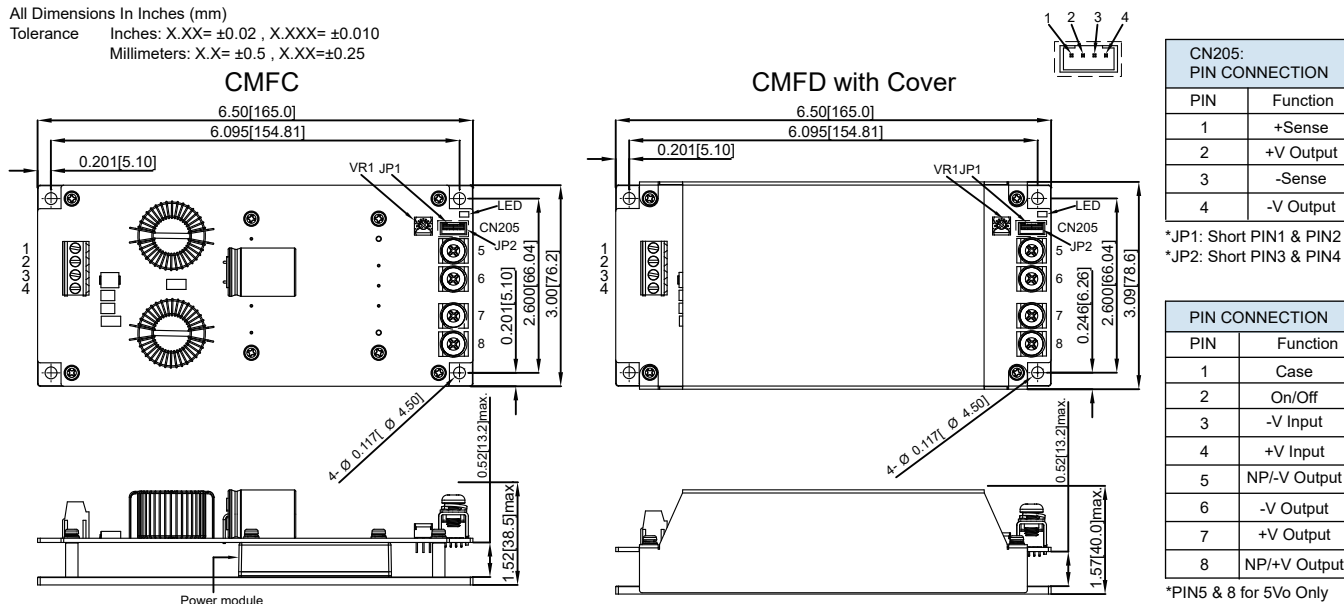
### Features

- ◆ 300W Isolated Output
- ◆ Efficiency to 90.5%
- ◆ Low No Load Power Consumption
- ◆ Fixed Switching Frequency
- ◆ 4 :1 Input Range
- ◆ Regulated Outputs
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Remote On/Off
- ◆ Continuous Short Circuit Protection
- ◆ Shock & Vibration Meet EN50155 (EN61373)
- ◆ Safety Meets UL60950-1, EN60950-1, and IEC60950-1
- ◆ UL60950-1 2<sup>nd</sup> (Basic Insulation) Approval for DC Modules
- ◆ Meets EN50155:2007 for EMC, Environmental and Characteristic
- ◆ Build-In EMI Filter
- ◆ Fire & Smoke Meet EN45545-2
- ◆ Baseplate Cooled



### Mechanical Dimensions

All Dimensions In Inches (mm)  
 Tolerance Inches: X.XX= ±0.02 , X.XXX= ±0.010  
 Millimeters: X.X= ±0.5 , X.XX=±0.25



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CHB300W-110S05□-CMFC CHB300W-110S05□-CMFD	43-160 VDC	5 VDC	0mA	60.0 A	15 mA	3153 mA	86.5	60000uF
CHB300W-110S12□-CMFC CHB300W-110S12□-CMFD	43-160 VDC	12 VDC	0mA	25.0 A	15 mA	3047 mA	89.5	25000µF
CHB300W-110S24□-CMFC CHB300W-110S24□-CMFD	43-160 VDC	24 VDC	0mA	12.5 A	15 mA	3064 mA	89	12500uF
CHB300W-110S28□-CMFC CHB300W-110S28□-CMFD	43-160 VDC	28 VDC	0mA	10.7A	15 mA	3060 mA	89	10700uF
CHB300W-110S48□-CMFC CHB300W-110S48□-CMFD	43-160 VDC	48 VDC	0mA	6.25A	15 mA	3013 mA	90.5	4700uF

NOTE:  
 1. Nominal Input Voltage 110VDC  
 2. □ = N or None  
 3. VR1 is used for Output Voltage Adjustment.  
 4. Refer to application note for thermal resistance and derating informations.  
 5. TVS is included for input surge voltage protection.  
 6. Recommend an external fuse for input reverse polarity protection (shunt diode is include inside).

## Specifications

All Specifications Typical at Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V.....43-160V
Input Surge Voltage (100ms max.)	200Vdc max.
Under voltage lockout	110Vin Power up.....42V 110Vin Power down.....39.5V
Positive Logic Remote On/Off	See note 4 & 5

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 25% Step Load Change	<250usec
Trim Adj. Range (By VR1)	±10%
Ripple & Noise, 20MHz BW (note3)	
5V	60mV RMS, 120mV pk-pk max
12V	80mV RMS, 150mV pk-pk max.
24V&28V	100mV RMS, 200mV pk-pk max.
48V	150mV RMS, 300mV pk-pk max.
Temperature Coefficient	±0.02%/°C max.
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	5V.....±0.5% max. Others.....±0.2% max.
Over Voltage Protection Trip Range, % Vo nom.	115-140%
Current Limit	110%-160% Nominal Output
Start up time	50mS typ.
Hold up Time	See Application Note

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 3000VDC min. Input/Case ..... 3000VDC min. Output/Case ..... 500VAC min. 10 <sup>8</sup> ohm min.
Isolation Resistance	8000pF typ
Isolation Capacitance	300KHz typ
Switching Frequency	-40°C to 100°C
Operating Case Temperature	-40°C to +105°C
Storage Temperature	110°C typ.
Thermal Shutdown, Case Temperature(DC Module)	95% RH max. Non Condensing
Humidity	
MTBF ... MIL-HDBK-217F, GB, 25°C, Full Load	460Khrs typ.
Safety	Meets UL60950-1
EMC	Meets EN50155(EN50121-3-2:2008) with External Output Filter Meets EN50155(EN50121-3-2:2015) EN50155(EN61373) EN50155(EN60068-2-1,2,30) Aluminum Base Aluminum Base and Aluminum Cover
Shock/Vibration	
Environmental	
Case Material -CMFC	
-CMFD	
Dimensions -CMFC	6.50×3.00×1.52 Inches (165.0×76.2×38.5mm)
-CMFD	6.50×3.09×1.57 Inches (165.0×78.6×40.0mm)
Weight -CMFC	380g
-CMFD	435g

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 1uF ceramic capacitor across output.
4. Logic Compatibility ..... open collector ref to -input  
Module on ..... >3.5Vdc to 160Vdc or open circuit  
Module off ..... 0 to < 1.2Vdc
5. Suffix "N" to the model number with negative logic remote on/off.  
Module on ..... 0 to < 1.2Vdc  
Module off ..... >3.5Vdc to 160Vdc or open circuit
6. Input connectors PIN1~4 use DINKLE EK500V-04P series or equivalent,  
suitable electric wire: 24~10AWG( IEC 0.5~2.5mm<sup>2</sup> ).
7. Connector CN205 wafer with TAIWAN KING PIN TERMINAL P110I  
series and mate with JST housing PH series or equivalent.
8. Output connectors PIN5~8 use M5 terminal screw.

# CHASSIS MOUNT CFB600W-110S SERIES

## 600 WATT 4:1 INPUT DC-DC CONVERTER

### Features

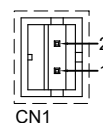
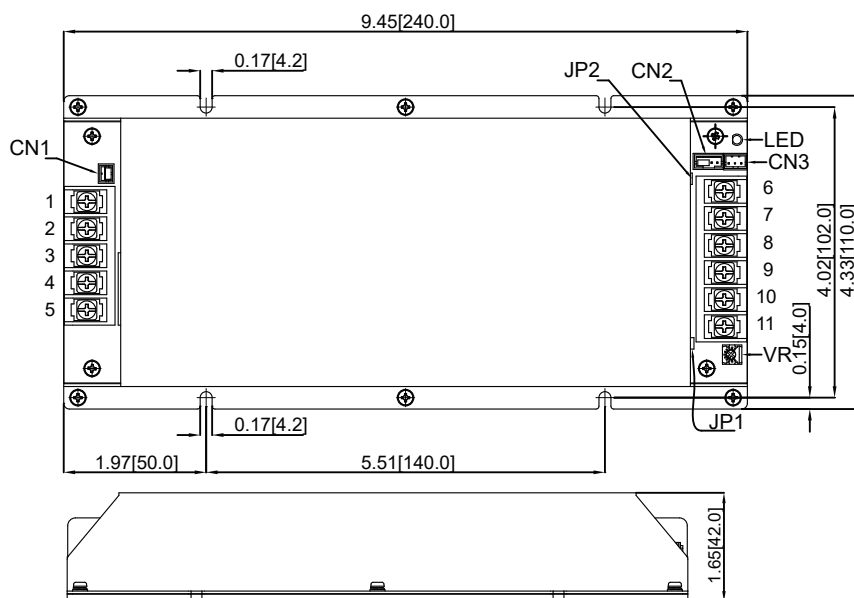
- ◆ 600W Isolated Output
- ◆ Efficiency to 88%
- ◆ Fixed Switching Frequency
- ◆ 4:1 Input Range
- ◆ Regulated Outputs
- ◆ Remote On/Off
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Continuous Short Circuit Protection
- ◆ Shock & Vibration Meets EN50155 (EN61373)
- ◆ Safety Meets UL60950-1, EN60950-1, and IEC60950-1
- ◆ UL60950-1 2<sup>nd</sup> (Basic Insulation) Approval for DC Modules
- ◆ Build-In EMI Filter
- ◆ Fire & Smoke Meet EN45545-2
- ◆ Baseplate cooled



### Mechanical Dimensions

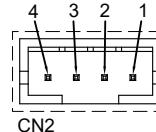
All Dimensions In Inches (mm)

Tolerance Inches: X.XX= ±0.02 , X.XXX= ±0.010  
 Millimeters: X.X= ±0.5 , X.XX=±0.25



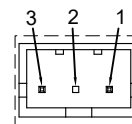
CN1 (On/Off JP)

PIN CONNECTION	
PIN	Function
1	-V Input
2	-On/Off



CN2 (Trim JP)

PIN CONNECTION	
PIN	Function
1	-Sense
2	+Sense
3	Trim
4	Rt



CN3

CN3 (PC JP)

PIN CONNECTION	
PIN	Function
1	AUX
2	IOG
3	PC

PIN CONNECTION	
PIN	Function
1	PE
2,3	-V Input
4,5	+V Input
6,7,8	-V Output
9,10,11	+V Output
JP1	Short +S&+Vo
JP2	Short -S&-Vo

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CFB600W-110S12□-CMFD	43-160 VDC	12 VDC	0mA	50 A	25 mA	6.3 A	87	10000µF
CFB600W-110S24□-CMFD	43-160 VDC	24 VDC	0mA	25 A	25 mA	6.2 A	88	10000µF
CFB600W-110S28□-CMFD	43-160 VDC	28 VDC	0mA	21.4 A	25 mA	6.2 A	88	10000µF
CFB600W-110S48□-CMFD	43-160 VDC	48 VDC	0mA	12.5 A	25 mA	6.2 A	88	10000µF

NOTE:

1. Nominal Input Voltage 300VDC
2. □ = P or None
3. VR is used for Output Voltage Adjustment.
4. Refer to Application Note for Thermal Resistance and Derating Informations.
5. TVS is Included for Input Surge Voltage Pprotection.
6. Recommend an External Fuse for Input Reverse Polarity Protection (shunt diode is include inside).

## Specifications

All Specifications Typical at Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	110V .....43-160V
Input Surge Voltage (100ms max.)	110V .....180Vdc max.
Under voltage lockout	110Vin power up ..... 42V 110Vin power down ..... 40V
Remote ON/OFF	See note 4

### OUTPUT SPECIFICATIONS

Voltage Accuracy:	±1.0% max.
Transient Response: 25% Step Load Change	<500us
Trim Adj. Range (By VR)	±10%
Ripple & Noise, 20MHz BW	
12V	60 mV RMS, 120mV pk-pk max.
24V	100mV RMS, 240mV pk-pk max.
28V	100mV RMS, 280mV pk-pk max.
48V	200mV RMS, 480mV pk-pk max.
Temperature Coefficient	±0.03%/°C max.
Short Circuit Protection	Continuous
Line Regulation (note 1)	±0.2% max.
Load Regulation (note 2)	±2.0% max.
Over Voltage Protection Trip Range, % Vo nom.	115-140%
Current Limit	105%-140% Nominal Output
Auxiliary Output Voltage/Current	10±3Vdc/20mA max.
Load Share Accuracy	±10% at 50% to 100% Full Load
Start up time	160ms typ.

### GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	Input/Output ..... 2250VDC min. Input/Case ..... 2250VDC min. Output/Case ..... 1500VDC min.
Isolation Resistance	10 <sup>7</sup> ohm min.
Isolation Capacitance (DC Module)	4000pF typ
Switching Frequency	250KHz typ
Operating Case Temperature	-40°C to +100°C
Storage Temperature	-40°C to +105°C
Thermal Shutdown, Case Temperature(DC Module)	110°C typ.
Humidity	95% RH max. Non condensing
MTBF ... MIL-HDBK-217F, GB, 25°C, Full Load	280Khrs typ.
Safety	Meets UL60950-1 2 <sup>nd</sup> (Basic Insulation)
EMC	Meets EN50155(EN50121-3-2:2007) with External Output Filter Meets EN50155(EN50121-3-2:2015) Meets EN50155(EN61373) EN50155(EN60068-2-1,2,30)
Shock/Vibration	Aluminum
Environmental	9.45×4.33×1.65 Inches (240.0×110.0×42.0mm)
Case Material	995g
Dimensions	
Weight	

### NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load
3. Output ripple and noise measured with 1uF ceramic capacitor across output.
4. Suffix "P" to the model number with positive logic remote on/off, standard model is negative logic
5. Input connectors PIN1~5 use DINKLE DT-49-B01W-05 series or equivalent. suitable electric wire: 22~12AWG( IEC 0.5~4mm<sup>2</sup> )
6. Output connectors PIN6~11 use DINKLE DT-49-B01W-06 series or equivalent. suitable electric wire: 22~12AWG( IEC 0.5~4mm<sup>2</sup> )
7. Connector CN1 wafer with TAIWAN KING PIN TERMINAL 8822-02 series or equivalent
8. Connector CN2 wafer with CHYAO SHIUNN TERMINAL JS-1001-04(K) series or equivalent.
9. Connector CN3 wafer with CHIA-SOON TERMINAL B3B-PH-K-S series or equivalent

# FM SERIES

## 30 AMP OUTPUT FILTER MODULE

### Features

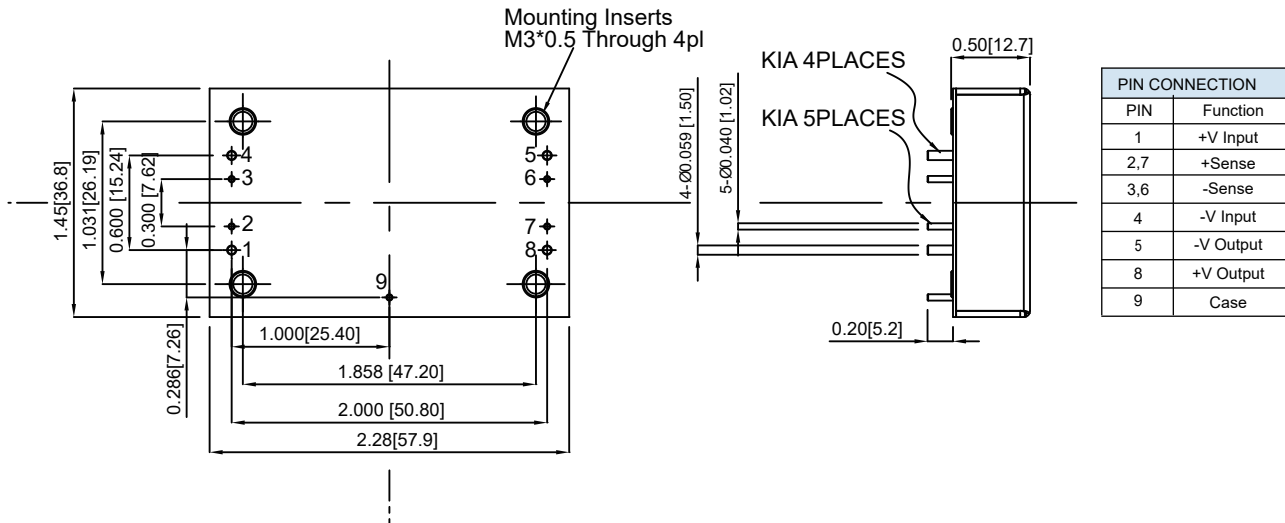
- ◆ Compact Size 2.28"x1.45"
- ◆ Quarter-Brick Size
- ◆ Six-Sided Shield Metal Case
- ◆ PCB Mount
- ◆ 30A Filter Module
- ◆ 80VDC Input Voltage Maximum
- ◆ Suitable for EN50121-3-2:2015 Output Specification
- ◆ Fire & Smoke Meets EN45545-2



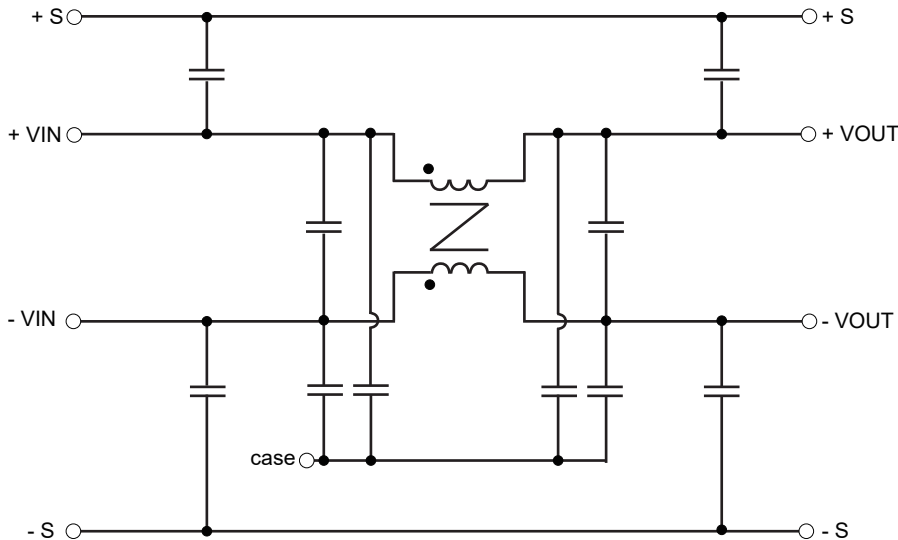
### Mechanical Dimensions

All Dimensions In Inches[mm]  
 Tolerance Inches:x.xx= ±0.02, x.xxx= ±0.010  
 Millimeters:x.x= ±0.5, x.xx=±0.25

### BOTTOM VIEW

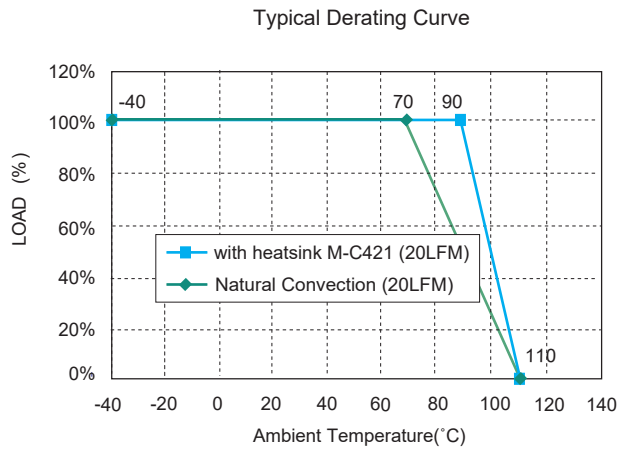


MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT RATED CURRENT	DC RESISTANCE (+Vin to +Vo)	DC RESISTANCE (-Vin to -Vo)
FM30R080P	80 VDC max.	100 VDC max.	30 A max.	3.0 mΩ typ.	3.0 mΩ typ.



Schematic for FM30R080P Module

## Derating Curve



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	80Vdc max.
Input Surge Voltage	100Vdc/1s
Input Rated Current (note 1)	30A max.

### GENERAL SPECIFICATIONS

Isolation Voltage	Input/Case/Output/Case	1000Vdc min.
Isolation Resistance		10 <sup>8</sup> ohm min.
DC Resistance		See Table
Operating Case Temperature Range (note1)		-40°C to +110°C
Storage Temperature Range		-55°C to +125°C
Dimensions		2.28x1.45x0.50inches (57.9 x 36.8 x 12.7 mm)
Case Material		Aluminum with Non-Conducted Base
Weight		60 g

### NOTE

NOTE :  
1. Maximum case temperature under any operating condition should not exceed 110°C.

### Typical Common-mode Loss for FM30R080P



### Typical Differential-mode Loss for FM30R080P

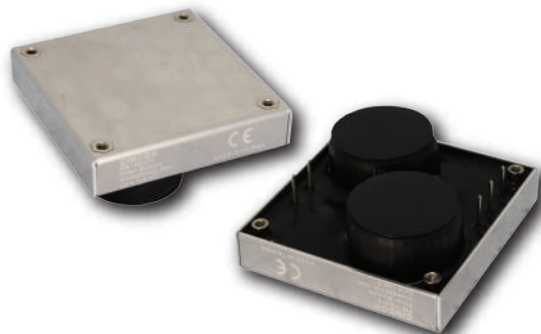


# FM10D200P SERIES

## 10 AMP FILTER MODULE

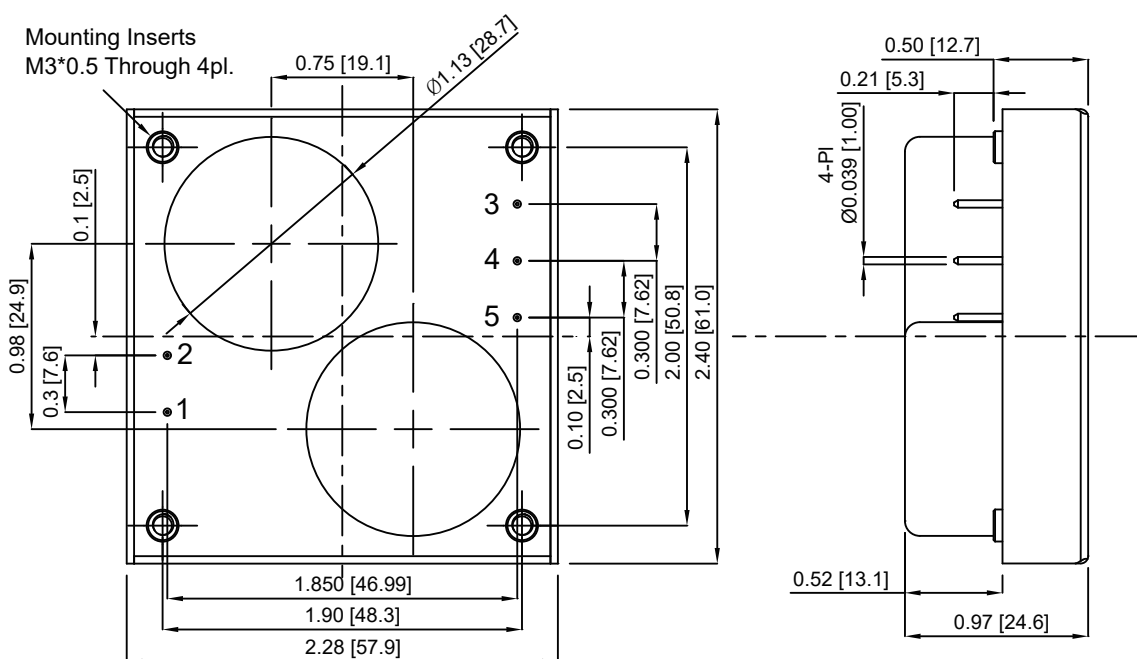
### Features

- ◆ Half Brick Size Meet Industrial Standard
- ◆ PCB Mount
- ◆ 10A Filter Module
- ◆ 200VDC Input Voltage Maximum
- ◆ All capacitor are multi-layer ceramic
- ◆ Fire & Smoke Meets EN45545-2



### Mechanical Dimensions

NOTE: Pin Size is 0.04±0.004 Inch (1.0±0.1mm) DIA  
 All Dimensions In Inches[mm]  
 Tolerance Inches: x.xx = ± 0.02 ,x.xxx = ± 0.010  
 Millimeters: x.x = ± 0.5 ,x.xx = ± 0.25



PIN CONNECTION	
PIN	Function
1	+V Input
2	-V Input
3	CASE
4	-V Output
5	+V Output

MODEL NUMBER	INPUT VOLTAGE	INPUT SURGE VOLTAGE	OUTPUT RATED CURRENT	DC RESISTANCE (+Vin to +Vo)	DC RESISTANCE (-Vin to -Vo)
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FM10D200P	200 VDC max	250 VDC max	10 A max.	50 mΩ typ.	50 mΩ typ.
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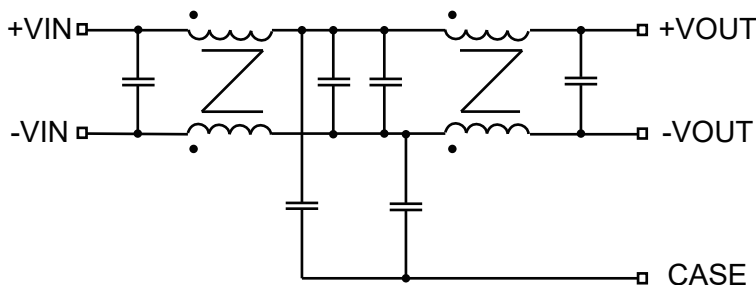
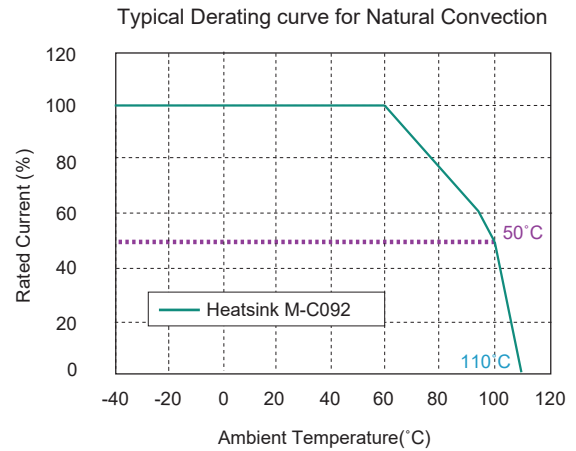
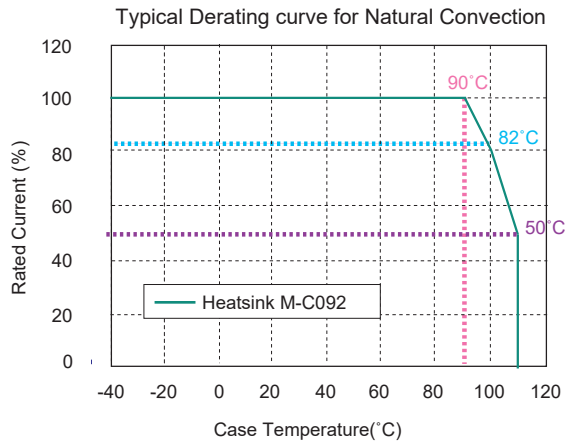


Figure1 Internal Schematic for FM10D200P Module



## Derating Curve



## Specifications

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

### INPUT SPECIFICATIONS

Input Voltage Range	200Vdc max.
Input Surge Voltage	250Vdc/1s
Input Rated Current (note 1)	10A max

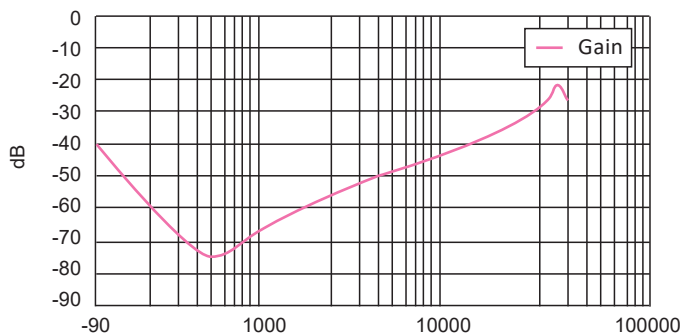
### GENERAL SPECIFICATIONS

Isolation Voltage	Input/Case ..... 3000Vdc min
Isolation Voltage	Output/Case ..... 3000Vdc min.
Isolation Resistance	10 <sup>8</sup> ohm min.
DC Resistance	See Table
Operating Case Temperature Range (note1)	-40°C to +100°C
Storage Temperature Range	-55°C to +105°C
Dimensions	2.28x2.40x0.97 inches (57.9x 61x24.6 mm)
Case Material	Aluminum Case with Silicone Potting
Weight	TBD Typ

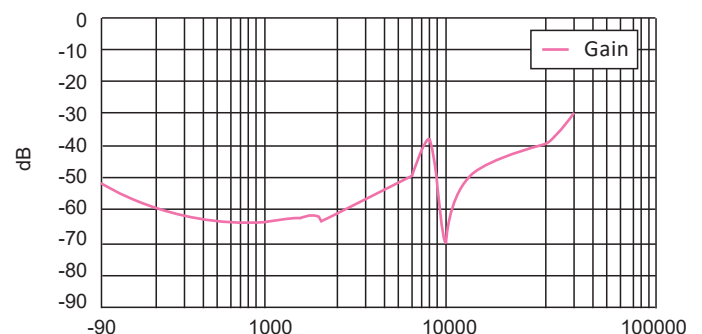
### NOTE

1. Maximum case temperature under any operating condition should refer derating curve

Common-mode Insertion Loss



Differential-mode Insertion Loss



Typical Common-mode and Differential-mode Loss for FM for FM10D200P

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Product Type

Application

Output Voltages

Output Currents

Input Voltages

Efficiency

Isolation

Protection

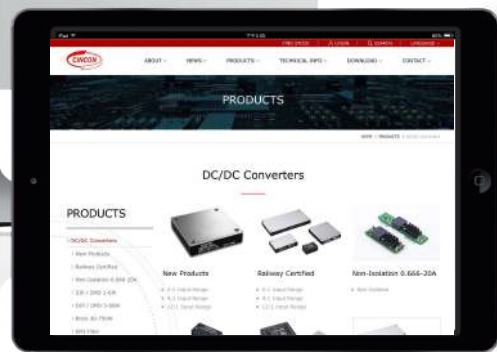
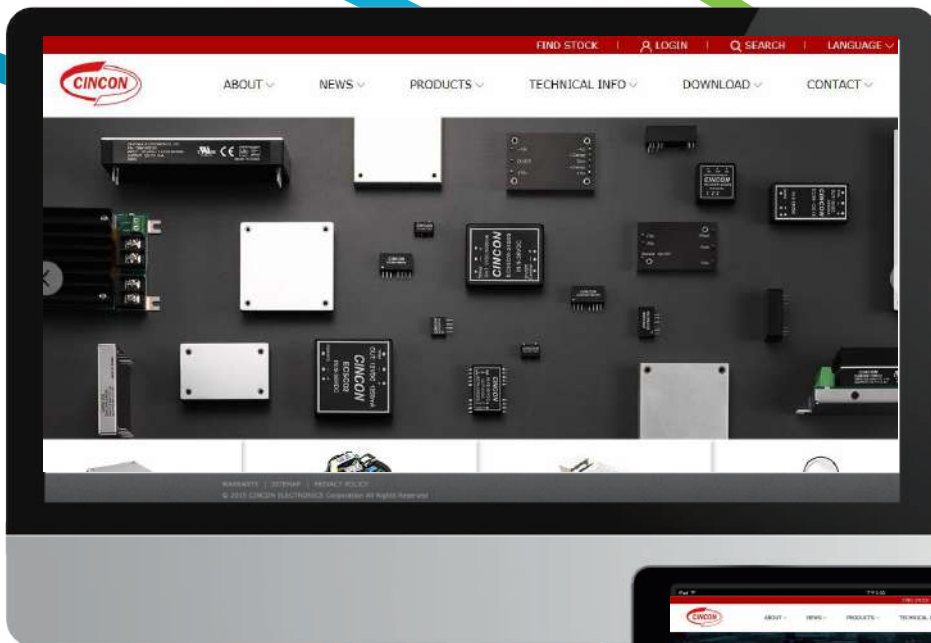
Storage / Operating Temperature Range

Safety Standard

EMC Standard

Mechanical Description

Remarks

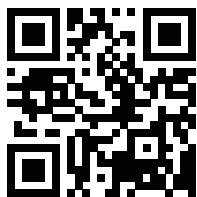


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