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.

CONTENTS

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	Packge	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	Packge	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

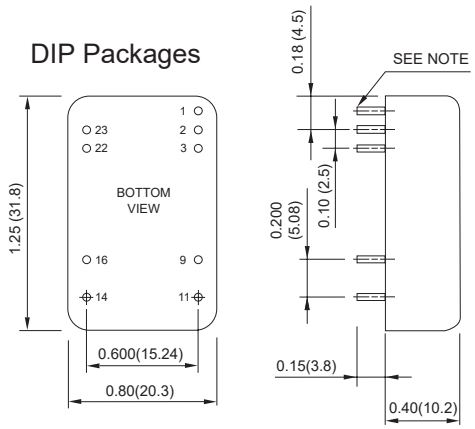
Features

- 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)

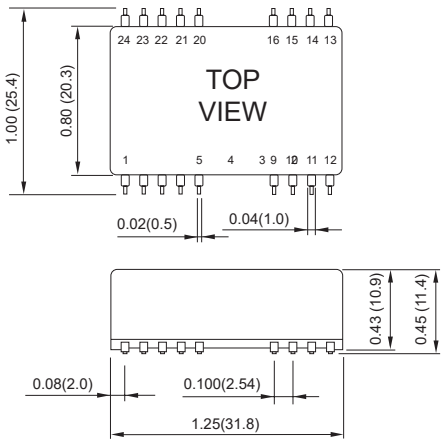
Mechanical Dimensions

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

DIP Packages



SMD Packages



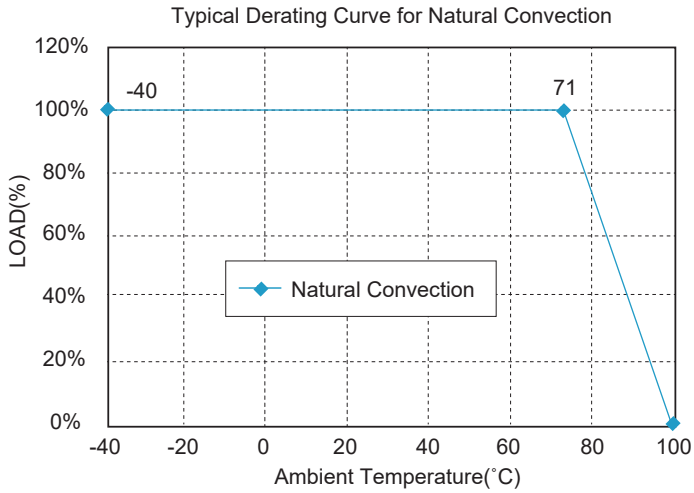
PIN CONNECTION				
Pin	Single Output		Dual Output	
	DIP	SMD	DIP	SMD
1	Remote on/off	Remote on/off	Remote on/off	Remote on/off
2,3	-V Input		-V Input	
4,5	NP	NC	NP	NC
9	NP	NC	Common	
10	NP	NC	NP	NC
11	NC		-V Output	
12	NP	NC	NP	NC
13	NP	+V Output	NP	NC
14	+V Output		+V Output	
15	NP	-V Output	NP	NC
16	-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 MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF.	CAPACITOR LOAD MAX.
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 Circuit
Module Off		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 0.1uF 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)	Single/Dual	±0.5% max.
Load Regulation (note2)	Single	±0.5% max.
	Dual	±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		10^9 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.

EC6AW-110 SERIES

RAILWAY

10 WATT 4:1 INPUT DC-DC CONVERTER

Features

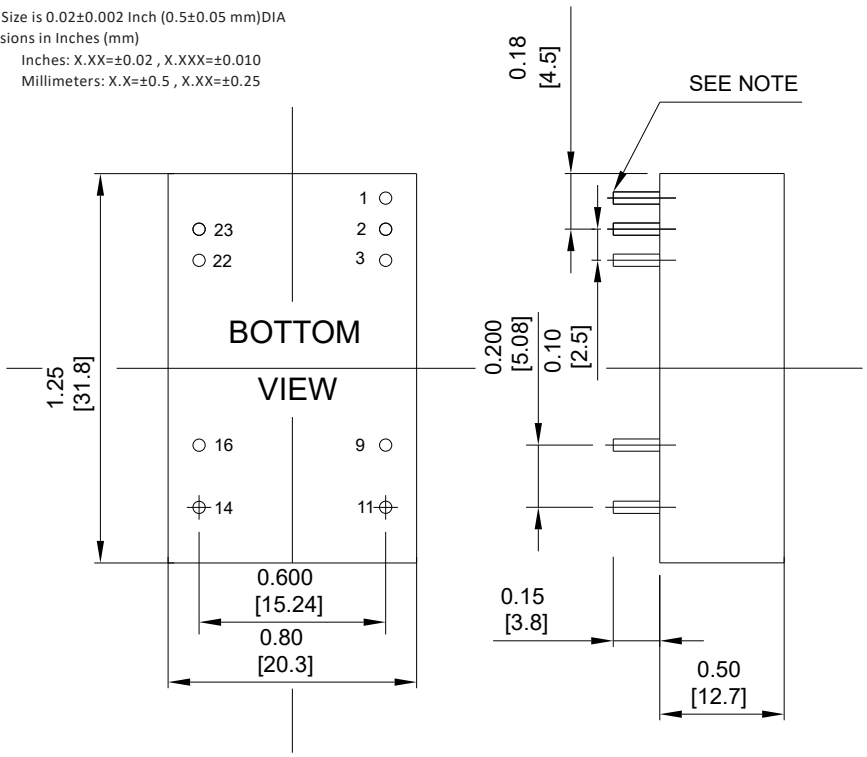
- 8.25-10W Isolated Output
- Efficiency to 88.5%
- Low No Load Power Consumption
- 4 : 1 Input Range
- Regulated Outputs
- Input Under-Voltage Protection
- Remote On/Off
- Continuous Short Circuit Protection
- Over Current Protection
- All Ceramic Capacitor Design
- UL60950-1 2nd (Basic Insulation) Approval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

E176177

Railway System

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



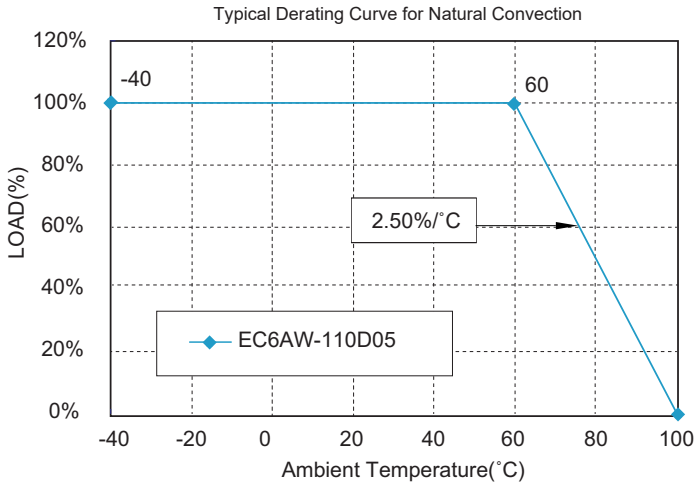
PIN CONNECTION		
PIN	Single Output	Dual Output
1	Remote On/Off	Remote On/Off
2,3	-V Input	-V Input
4,5	NP	NP
9	NP	Common
10	NP	NP
11	NC	-V Output
12	NP	NP
13	NP	NP
14	+V Output	+V Output
15	NP	NP
16	-V Output	Common
20,21,24	NP	NP
22,23	+V Input	+V Input

* NC-NO CONNECTION WITH PIN
* NP-NO PIN

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF.	CAPACITOR LOAD MAX.
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 1uF 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.

GENERAL SPECIFICATIONS

Efficiency	See Table
Isolation Voltage	3000 VDC min.
Isolation Resistance	10^9 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 2nd (Basic insulation)
EMC (note 6)	Meets EN50155 (EN50121-3-2) with external filter
Shock/Vibration	Meets EN50155 (EN61373)
Fire & Smoke	Meet EN45545-2
Dimensions	1.25 × 0.80 x 0.50 inches (31.8 x 20.3 × 12.7mm)
Case Material	Non-Conductive Black Plastic
Weight	16g

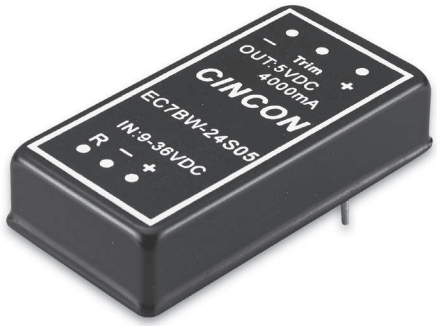
NOTE

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
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

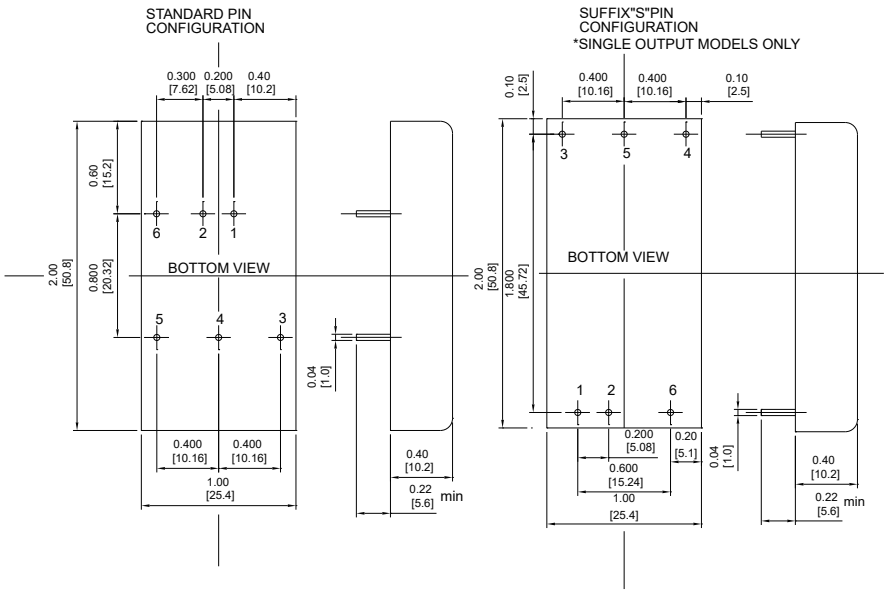
- 20W Isolated Output
- 2" x 1" x 0.4" Shielded Metal Case
- Efficiency to 90%
- Fixed Switching Frequency
- 4 : 1 Wide Input Range
- Regulated Outputs
- Continuous Short Circuit Protection
- Pi Input Filter
- CE Mark Meets 2004/108/EC
- Safety Meets UL60950-1, EN60950-1, and IEC60950-1
- Meets EN50155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



E176177 Railway System

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

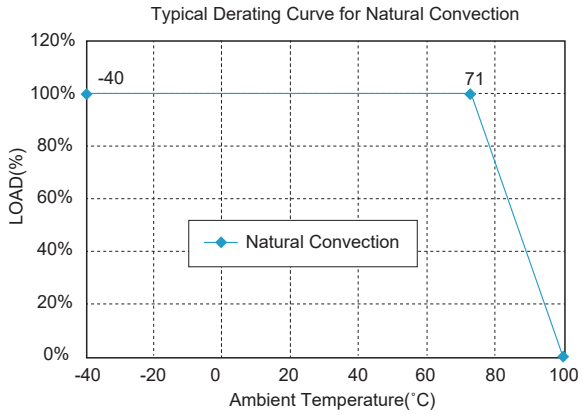


PIN CONNECTION		
PIN	Single Output	Dual Output
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	Trim	Common
5	-V Output	-V Output
6	Remote On/Off	

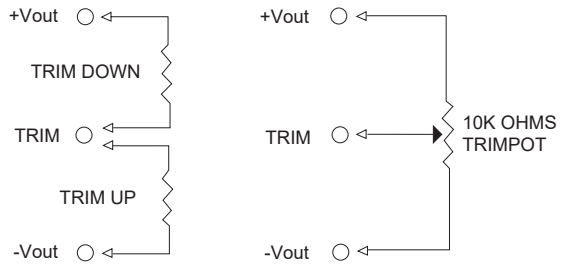
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF.	CAPACITOR LOAD MAX.
EC7BW-24S33	9-36 VDC	3.3 VDC	0 mA	5500 mA	55 mA	869 mA	87	5500µF
EC7BW-24S05	9-36 VDC	5 VDC	0 mA	4000 mA	55 mA	926 mA	90	4000µF
EC7BW-24S12	9-36 VDC	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 0.1uF 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		10^8 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

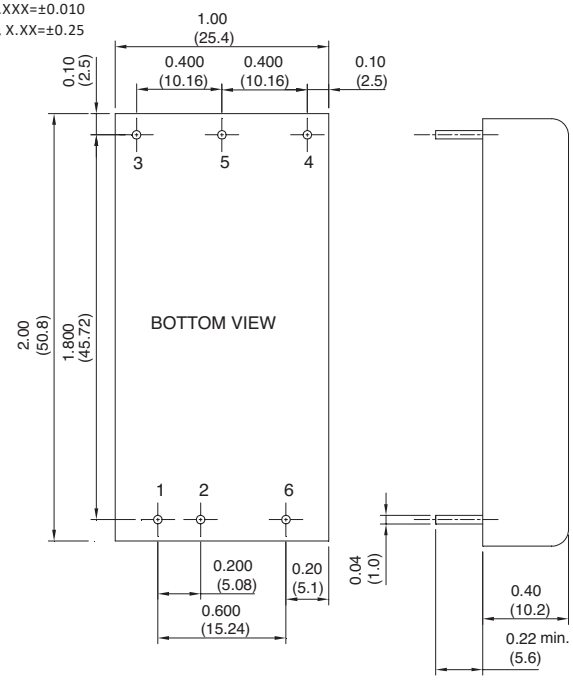
Features

- 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)

E176177

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

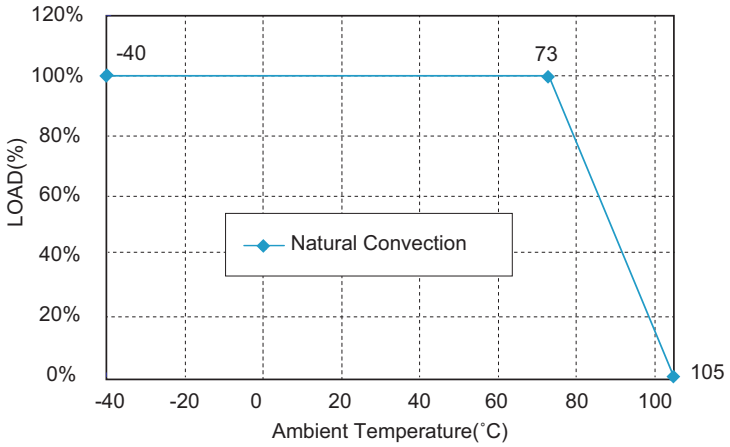


PIN CONNECTION		
PIN	Single Output	Dual Output
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	Trim	-V Output
5	-V Output	Common
6	Remote On/Off	

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	10^9 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 2nd (Basic insulation)
EMC (note 6)	EN50155 (EN50121-3-2) with external filter
Shock/Vibration	EN50155 (EN61373)
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. 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

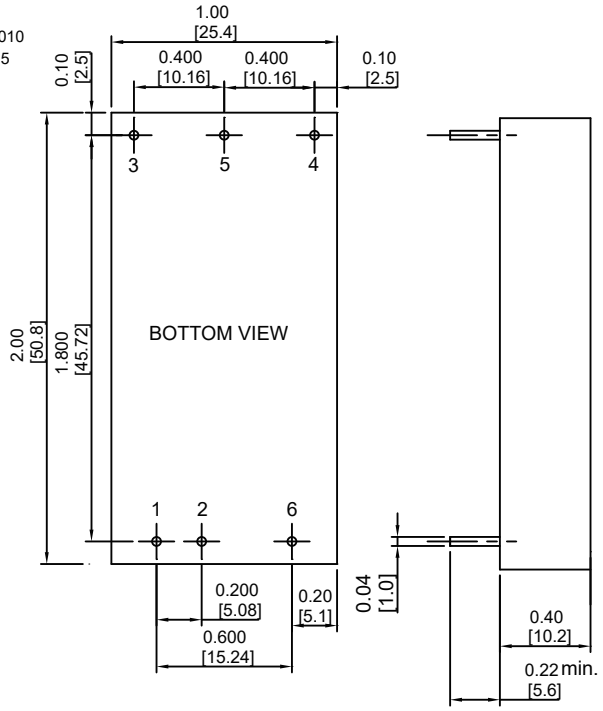
Preliminary

- 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

CE Railway System

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



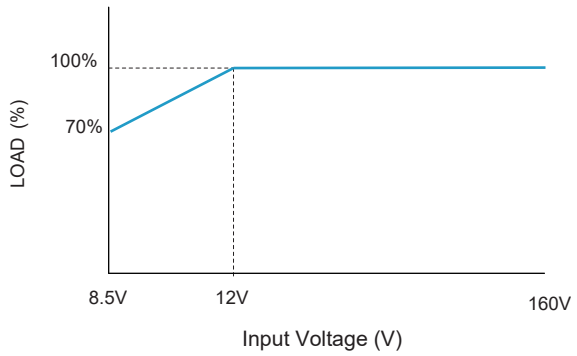
PIN CONNECTION		
PIN	Single	Dual
1	+V Input	+V Input
2	-V Input	-V Input
3	+V Output	+V Output
4	Trim	-V Output
5	-V Output	Common
6	Remote ON/OFF	

MODEL NUMBER	INPUT VOLTAGE(3)	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF. (1)	% EFF. (2)	CAPACITOR LOAD MAX.
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

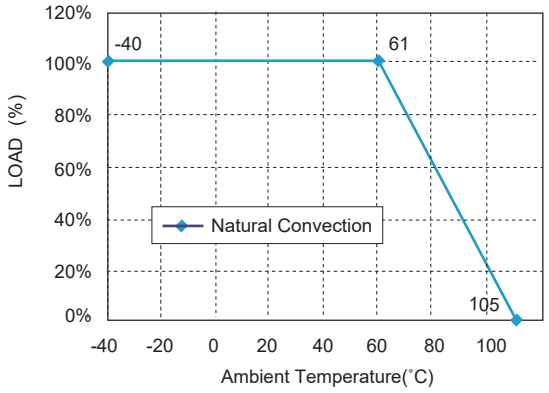
NOTE: 1. Measured at Nominal Input Voltage 72VDC
2. Measured at Input Voltage 110VDC
3. EC7BW18 has De-rating by Input Voltage is required. Shown below.

Derating Curve

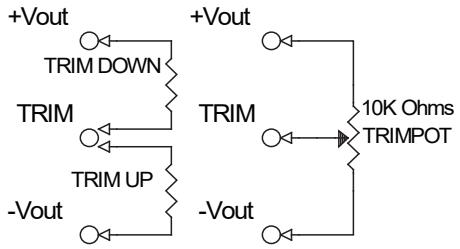
Input Voltage Derating Curve



Typical Derating Curve of Natural Converction



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	
Error Band	±5% Vout nominal,
Recovery Time	<250us
External Trim Adj. Range (Single Output Models Only)	-20%,+15%
Ripple & Noise, 20MHz BW (note 3)	
5V	40mV RMS, max.
	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) Load cross variation 25%/100%	±5.0% max
Over Voltage Protection	Zener Clamp
Current Limit	110%-180% Nominal Output
Start up time	10ms typ.

GENERAL SPECIFICATIONS

Efficiency		See Table
Isolation Voltage	Input/Output	3000VAC min.
Isolation Resistance		10^9 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

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 2nd (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

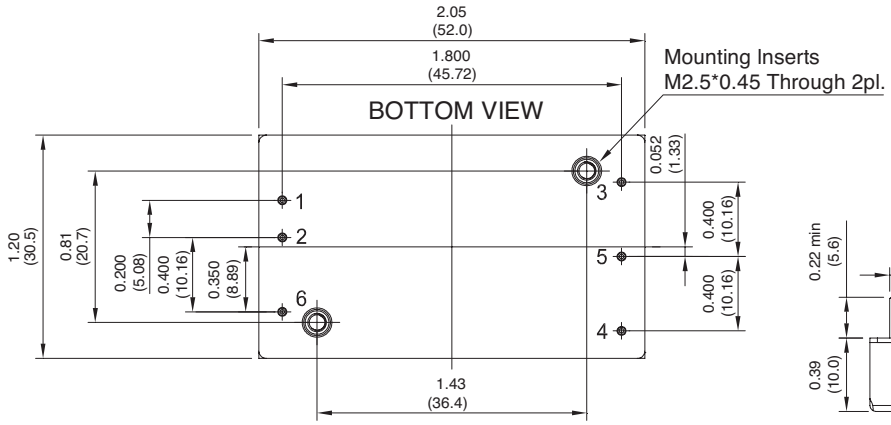
Railway System

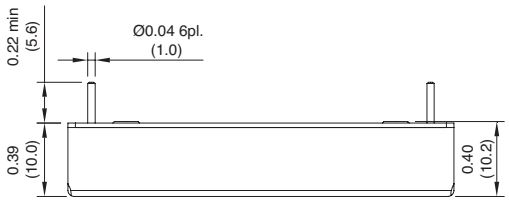
E176177

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	

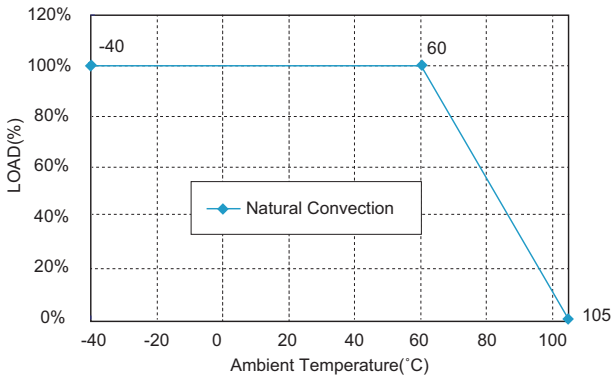




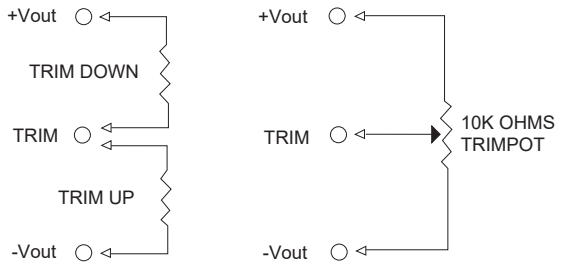
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF.	CAPACITOR LOAD MAX.
ECLB40W-110S33	43-160 VDC	3.3 VDC	0 mA	10000 mA	6 mA	340 mA	88%	10000μF
ECLB40W-110S05	43-160 VDC	5 VDC	0 mA	8000 mA	6 mA	409 mA	88.5%	8000μF
ECLB40W-110S12	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	+/-5% Vout Nominal
	Recovery Time	< 250µs
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)	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%-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.
Isolation Resistance	10^9 ohms min.
Isolation Capacitance	1500pF typ.
Case Grounding	Output/Case 1000pF typ.
Switching Frequency	250KHz typ.
EMI/RFI	Six-Sided Continuous Shield
Operating Ambient Temperature Range	-40˚C to +85˚C
De-rating, Above 45˚C	Linearly to Zero Power at +105˚C
Case Temperature (note 5)	105˚C max.
Cooling	Natural Convection
Storage Temperature Range	-55˚C to +125˚C
Thermal Shutdown, Case Temp.	110˚C typ.
Humidity	95% RH max. Non-Condensing
MTBF .....MIL-STD-217F, GB, 25˚C, Full Load	905Khrs typ.
Safety	UL60950-1 2nd (Basic insulation)
EMC (note 6)	EN50155 (EN50121-3-2)
	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

1. Measured frome 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 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 >3.5VDC to 75VDC or open circuit
5. Maximum case temperature under any operating condition should not be exceeded 105˚C.
6. For information about EN50155 and RIA12, refer to application note.

CQB50W12 SERIES
30-50 WATT 12:1 INPUT DC-DC CONVERTERS

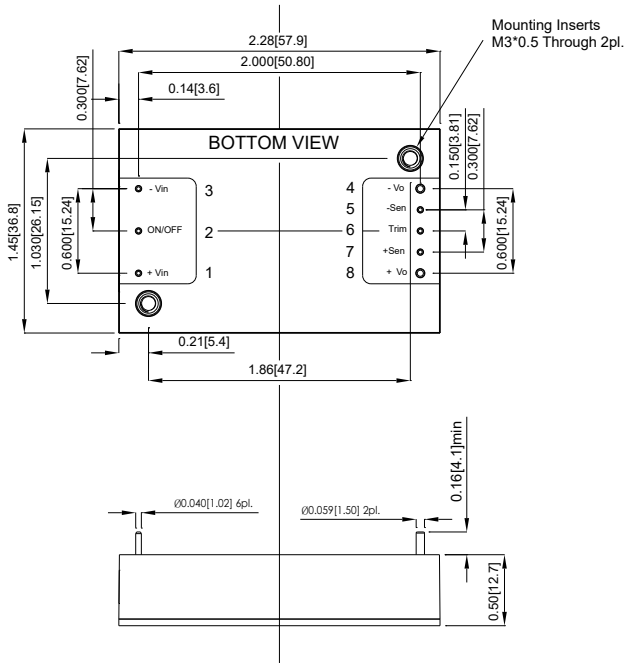
Features

- 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 2nd (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

E176177

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

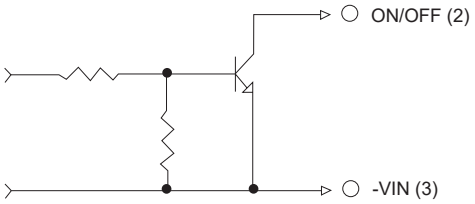


PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

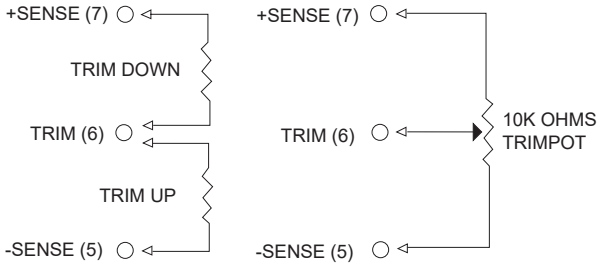
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF. (1)	% EFF. (2)	CAPACITOR LOAD MAX.
CQB50W12-72S05	14-160 VDC	5 VDC	0 mA	6.0 A	5 mA	530 mA	83	81	10000μF
CQB50W12-72S12	14-160 VDC	12 VDC	0 mA	4.2 A	5 mA	810 mA	87	86	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	₴0%, +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	$2x10^8$ 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 2nd (Basic insulation)
EMC (note 8)	EN50155 (EN50121-3-2) with External Flter
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 22uF aluminum solid 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 <1.2 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 68uF 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

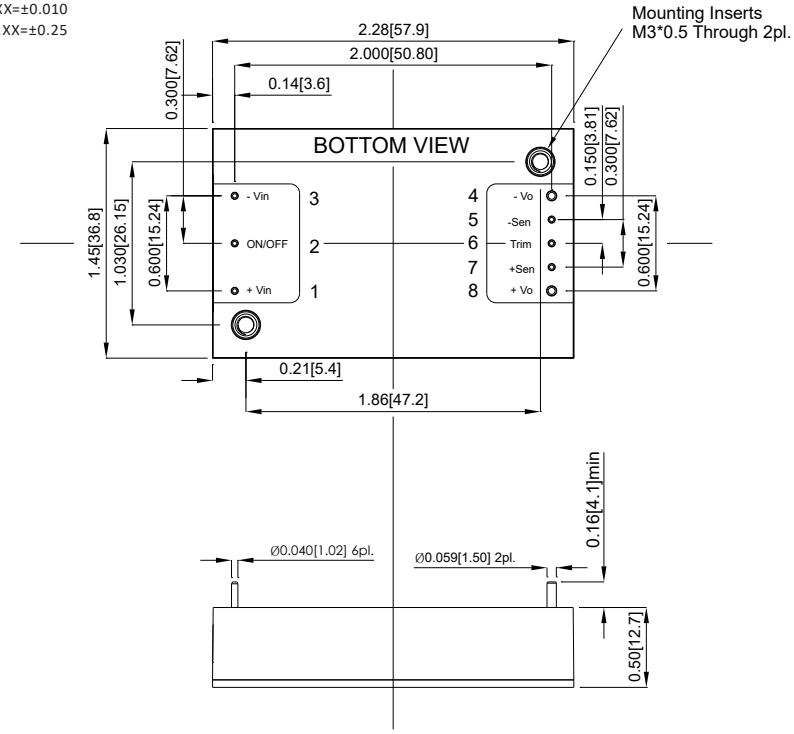
E176177

Railway System

Mechanical Dimensions

All Dimensions in Inches (mm)

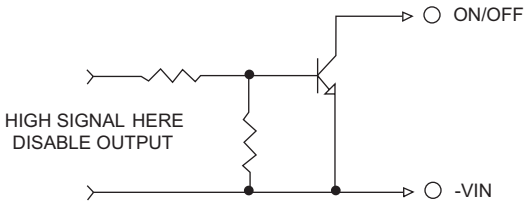
Tolerance Inches: X.XX=±0.02 , X.XXX=±0.010
Millimeters: X.X=±0.5 , X.XX=±0.25



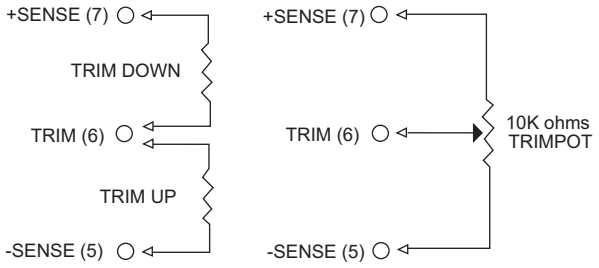
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

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	10^7 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 2nd (Basic insulation)
EMI	EN50155 (EN50121-3-2)
	with external filter
Shock/Vibration	EN50155 (EN61373)
Dimensions	2.28 × 1.45 x 0.50 inches
	(57.9 x 36.8 × 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 10µF tantalum and 1µF ceramic capacitor across output.
4. Logic compatibility ..... open collector ref to -Input
   Module On > 3.5VDC to 75VDC or open circuit
   Module Off < 1.2 VDC
5. 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
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. Design to meet EN50155 and RIA12 refer to application note.

CQB75W8 SERIES
75 WATT 8:1 INPUT DC-DC CONVERTERS

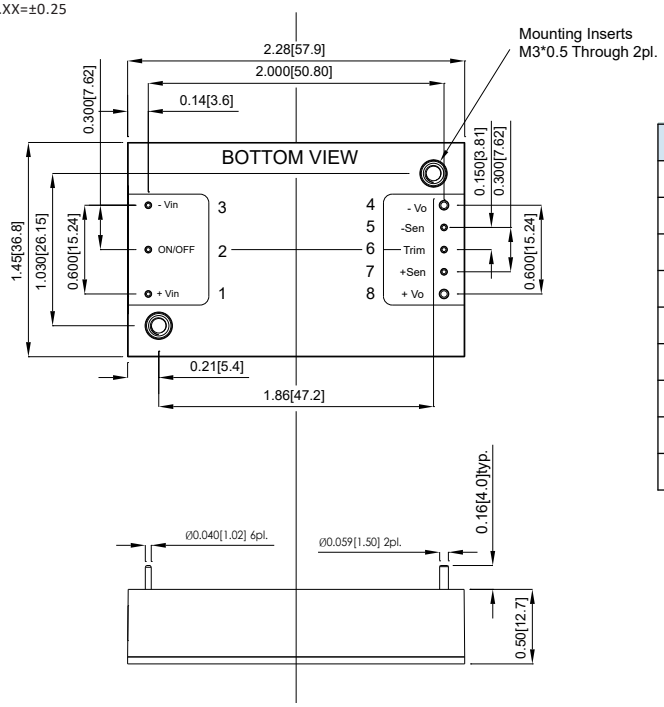
Features

PRELIMINARY

- 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

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

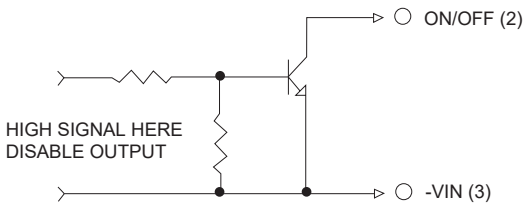


PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

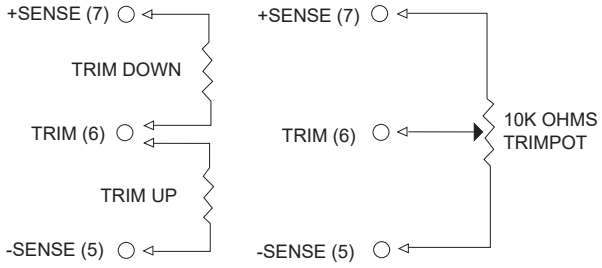
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF. (1)	% EFF. (2)	CAPACITOR LOAD MAX.
CQB75W8-36S12	9-75 VDC	12 VDC	0 mA	6.25 A	10 mA	2367 mA	88	88	6250μF
CQB75W8-36S15	9-75 VDC	15 VDC	0 mA	5.0 A	10 mA	2341 mA	89	89	5000μF
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 48Vin
3. An External Input Capacitor 220uF 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	10^8 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 FIter
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

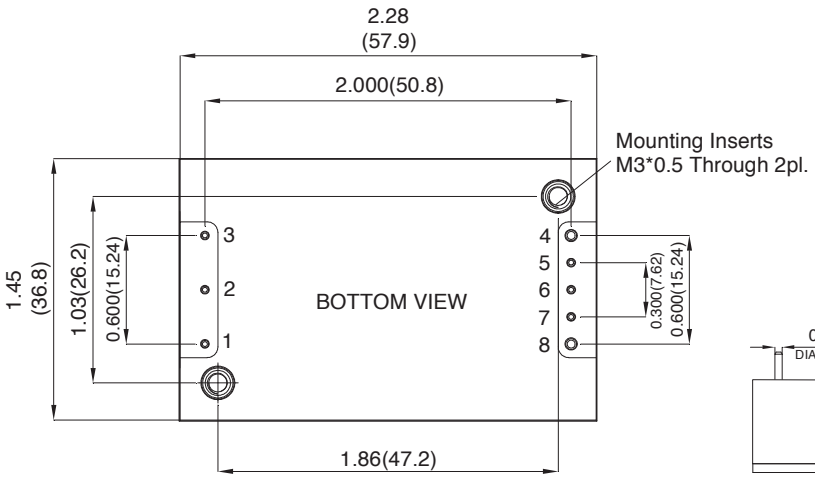
RAILWAY
DC-DC CONVERTER

Features

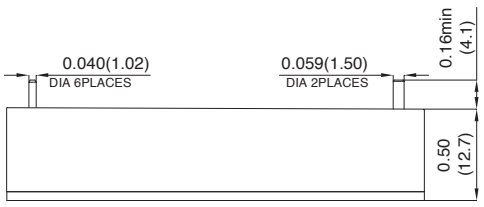
- 100W Isolated Output
- Efficiency to 93%
- 200KHz Switching Frequency
- 3 : 1 Input Range
- Regulated Outputs
- Remote On/Off
- Over Temperature Protection
- Over Voltage/Current Protection
- Continuous Short Circuit Protection
- Quarter Brick Size Meets Industrial Standard
- UL60950-1 Approval (Except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



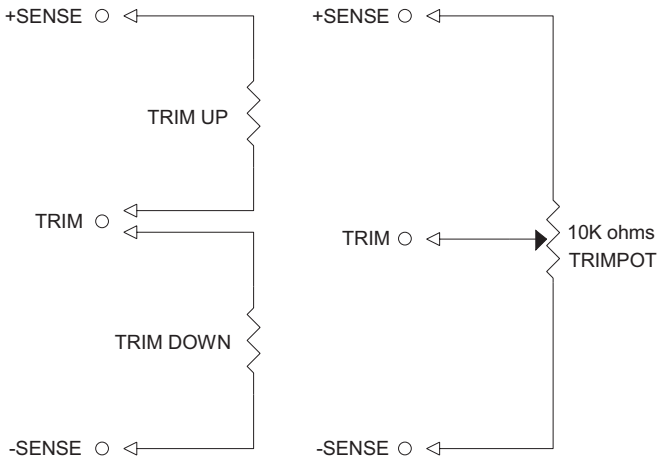
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF.	CAPACITOR LOAD MAX.
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	10^7 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 2nd(Basic insulation), Approval
EMC (note 7)	Meet EN50155 (EN50121-3-2) with External Flter
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

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 apacitor across output.
4. 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
5. Suffix "-C" to the model number with clear mounting insert (3.2mm DIA.)
6. An external input capacitor 120µF for all models are recommended to reduce input ripple voltage.
7. Design meet EN50155 and RIA12 refer to application note.

CHB100-110S SERIES
100 WATT, INPUT 66-160 VDC

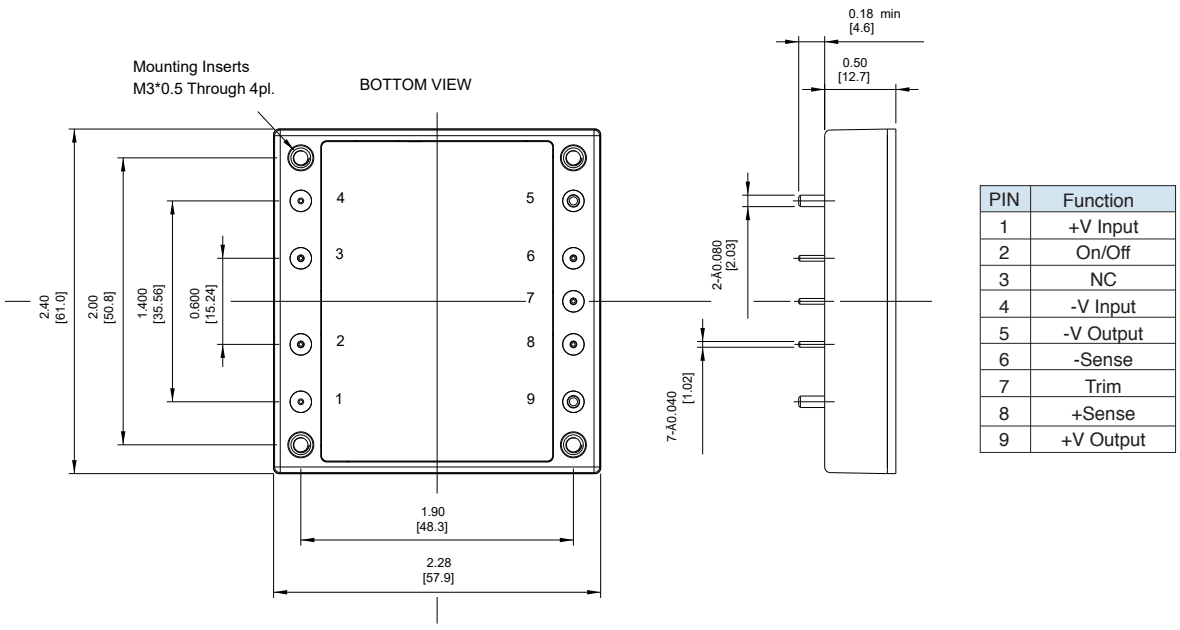
RAILWAY
DC-DC CONVERTER

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

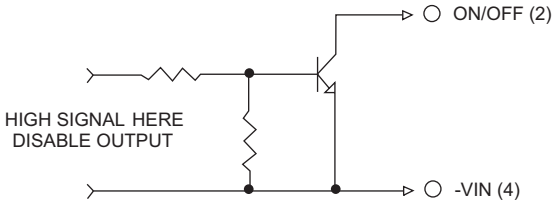


PIN	Function
1	+V Input
2	On/Off
3	NC
4	-V Input
5	-V Output
6	-Sense
7	Trim
8	+Sense
9	+V Output

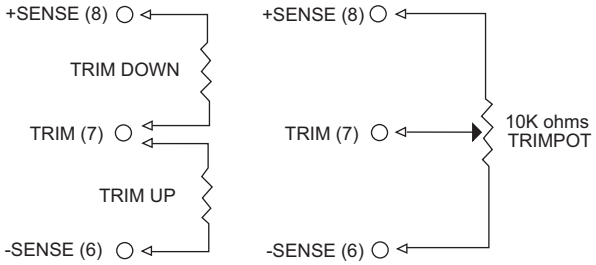
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CHB100-110S12	66-160 VDC	12 VDC	0mA	8.3 A	5mA	1050 mA	86.5	8300µF
CHB100-110S15	66-160 VDC	15 VDC	0mA	6.7 A	5mA	1040 mA	87.5	4170µF
CHB100-110S24	66-160 VDC	24 VDC	0mA	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	10^9 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 x 0.50 inches (57.9 x 61.0 × 12.7 mm) Aluminum
Case Material	Baseplate 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

PRELIMINARY

Features

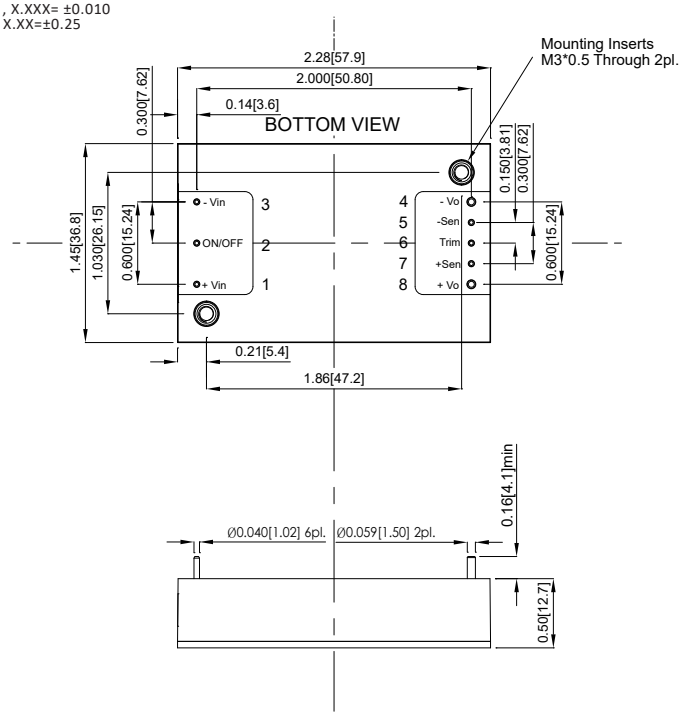
- 100W Isolated Output
- Efficiency up to 92%
- Fixed Switching Frequency
- 4:1 Input Range
- Regulated Outputs
- Remote On/Off
- Low No Load Power Consumption
- Over Temperature Protection
- Over Voltage/Current Protection
- Continuous Short Circuit Protection
- Quarter Brick Size Meet Industrial Standard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

E176177

Railway System

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

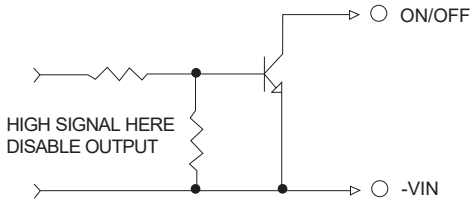


PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

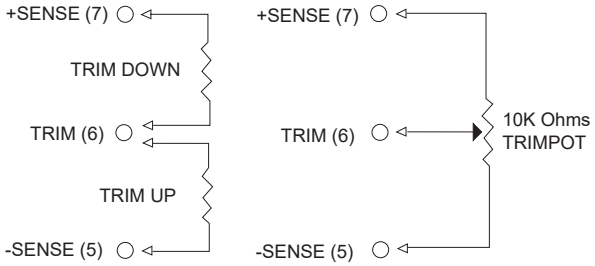
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF.	CAPACITOR LOAD MAX.
CQB100W-110S05	43-160 VDC	5 VDC	0 mA	20 A	10 mA	1.00A	91	20000μF
CQB100W-110S12	43-160 VDC	12 VDC	0 mA	8.4 A	10 mA	1.00A	92	8400μF
CQB100W-110S24	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 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	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.
Isolation Resistance	10^8 ohm min.
Isolation Capacitance	1500pF typ
Switching Frequency	300KHz typ.
Operating Case Temperature	-40˚C to 105˚C
Storage Temperature	-55˚C to +125˚C
Thermal Shutdown, Case Temp. Humidity	110˚C typ.
	95% RH max. Non condensing
MTBF ... MIL-STD-217F, GB, 25˚C, Full Load	
	5V/12V ..... 720Khrs typ.
	Others ..... 840Khrs typ.
Safety	UL60950-1 2nd(Basic Insulation)
EMC (note 8)	EN50155(EN50121-3-2)
	with External Flter
Shock/Vibration	EN50155(EN61373)
Environmental	EN50155(EN60068-2-1)
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 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

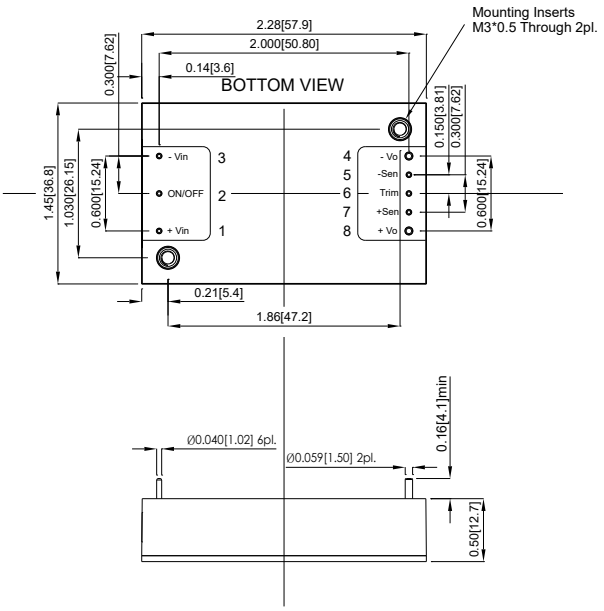
Features

- 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

E176177

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

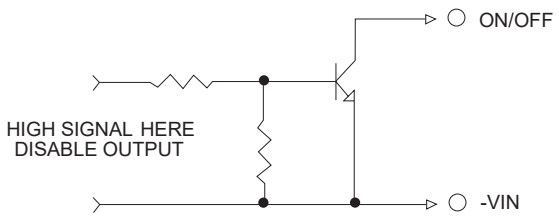


PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

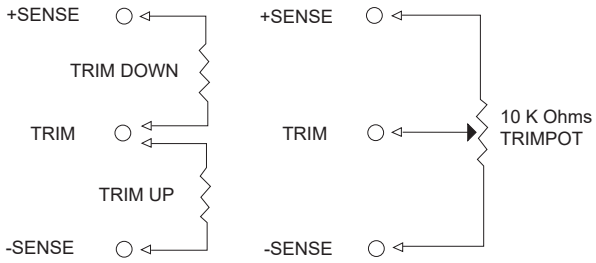
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF. (3)	% EFF. (2)	CAPACITOR LOAD MAX.
CQB150W-24S05	9-36 VDC	5 VDC	0 mA	30 A	10 mA	7.02 A	91	92	30000μF
CQB150W-24S12	9-36 VDC	12 VDC	0 mA	12.5 A	10 mA	7.02 A	91	92	12500μF
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
		power down 8.0V
	48Vin	power up 17V
		power down 16V
Positive Logic Remote On/Off Input		see note 4 & 5
Filter		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	10^8 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 x 0.50 inches
	(57.9 x 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

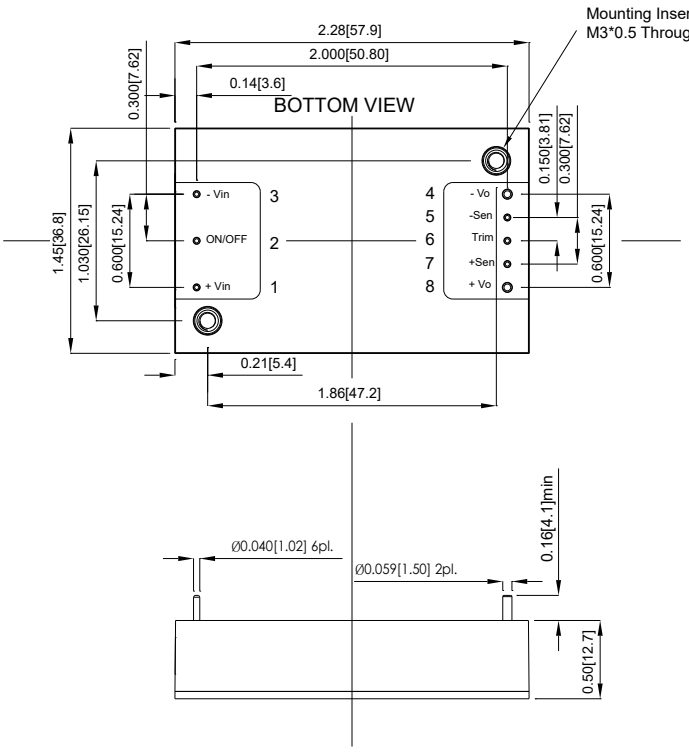
Features

- 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 2nd (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

E176177

Mechanical Dimensions

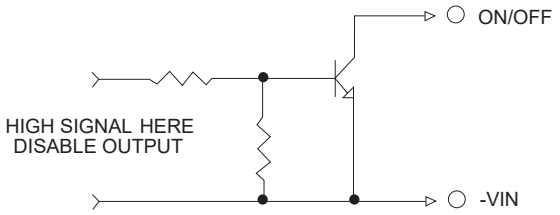
All Dimensions in Inches (mm)
Tolerance Inches: X.XX=±0.02 , X.XXX=±0.010
Millimeters: X.X=±0.5 , X.XX=±0.25



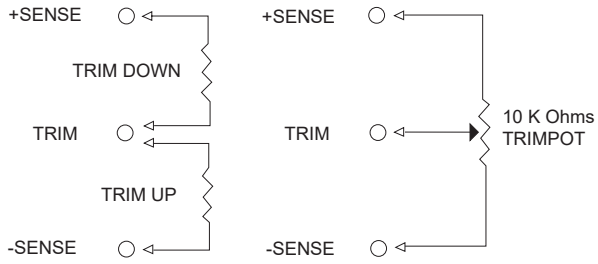
PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	-V Input
4	-V Output
5	-Sense
6	Trim
7	+Sense
8	+V Output

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	10^8 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 x 0.50 inches (57.9 x 36.8 × 12.7 mm)
Safety	UL60950-1 2nd (Basic Insulation)
EMC (note 8)	EN50155 (EN50121-3-2) with External Filter EN50155 (EN61373) EN50155 (EN60068-2-1)
Shock/Vibration	
Environmental	
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 10µF tantalum and 1µF 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.

CHB150W10 SERIES
150 WATT 10:1 INPUT DC-DC CONVERTERS

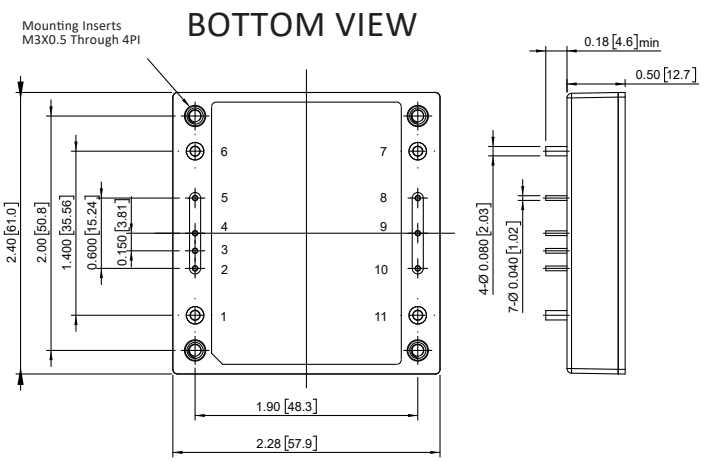
Features

PRELIMINARY

- 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

Mechanical Dimensions

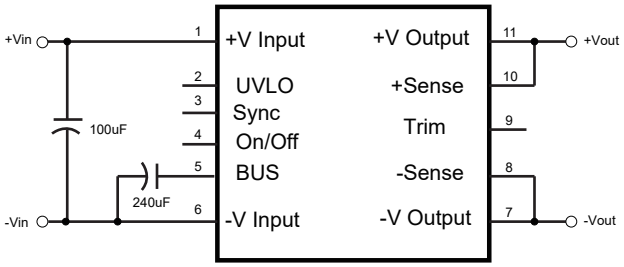
All Dimensions In Inches[mm]
Tolerance Inches:x.xx= ±0.02, x.xxx= ±0.010
Millimeters:x.x= ±0.5, x.xx=±0.25



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

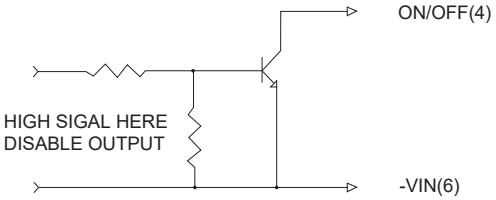
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(2)	(3)	
CHB150W10-72S05	16.5-140VDC	5 VDC	0mA	25 A	30 mA	1.93 A	90	90	25000uF
CHB150W10-72S12	16.5-140VDC	12 VDC	0mA	12.5 A	30 mA	2.31 A	90	90	12500uF
CHB150W10-72S15	16.5-140VDC	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

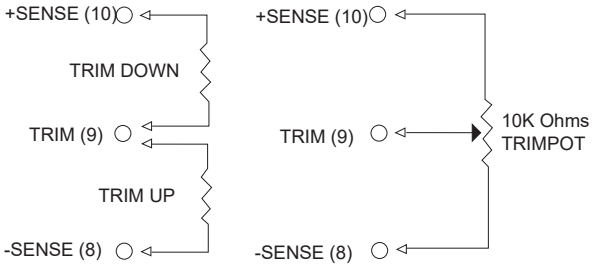


Simplified Application Circuit

Remote On/Off Cotrol



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	10^8 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

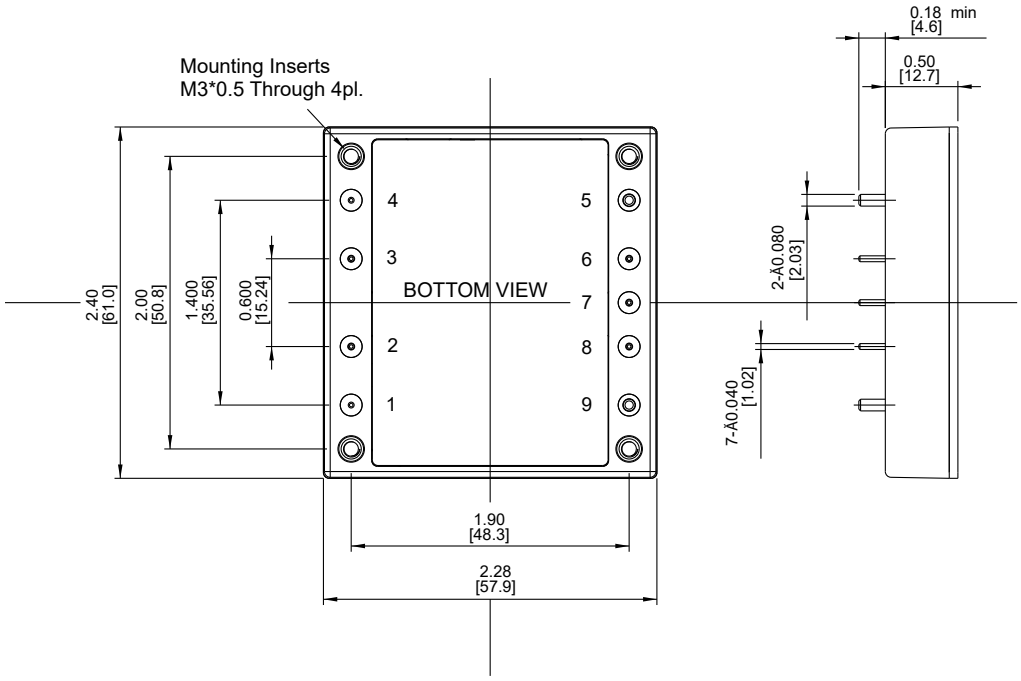
Features

- 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

E176177 Railway System

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

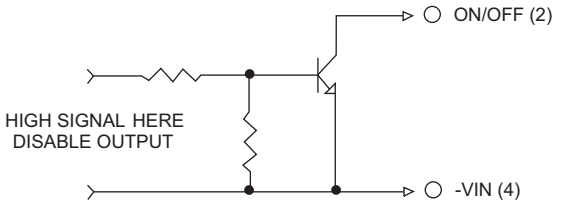


PIN	Function
1	+V Input
2	On/Off
3	CASE
4	-V Input
5	-V Output
6	-Sense
7	Trim
8	+Sense
9	+V Output

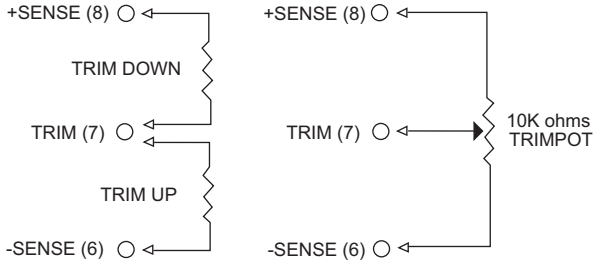
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF.	CAPACITOR LOAD MAX.
CHB150-110S05	66-160 VDC	5 VDC	0 mA	30 A	40 mA	1474 mA	92.5	10000µF
CHB150-110S12	66-160 VDC	12 VDC	0 mA	12.5 A	40 mA	1474 mA	92.5	5600µF
CHB150-110S24	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	10^7 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 2nd (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

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 apacitor across output.
4. 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
5. Suffix "-C" to the model number with clear mounting insert (3.2mm DIA.)
6. An external input capacitor 220µF for all models are recommended to reduce input ripple voltage.
7. Design meet EN50155 and RIA12 refer to application note.

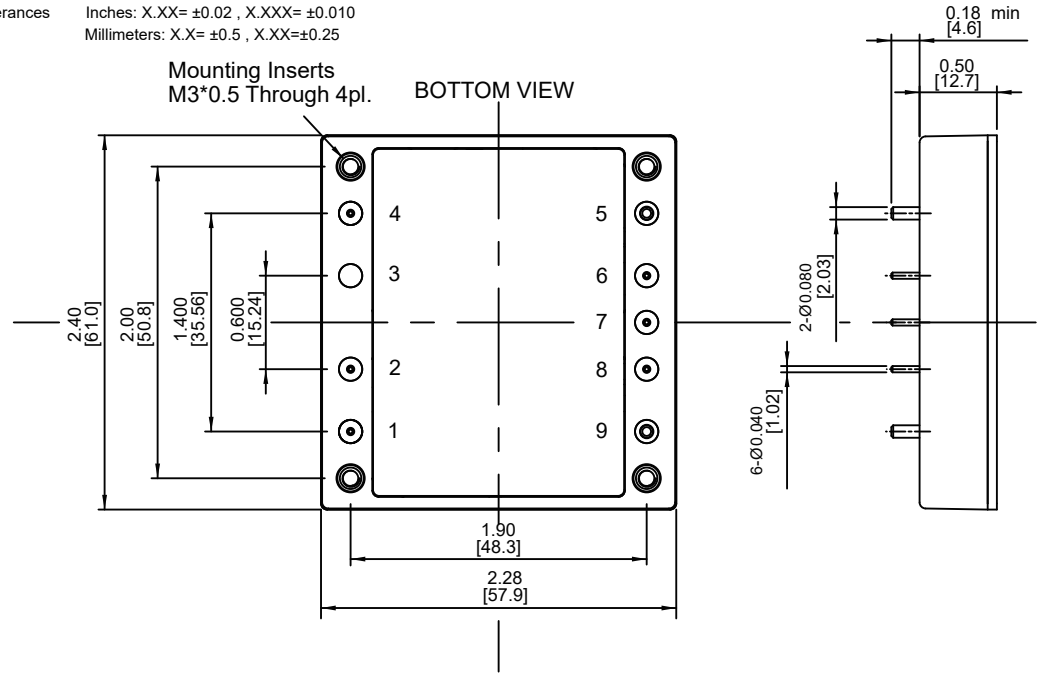
CHB200W-110S SERIES
200 WATT 4:1 INPUT DC-DC CONVERTERS

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 2nd (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

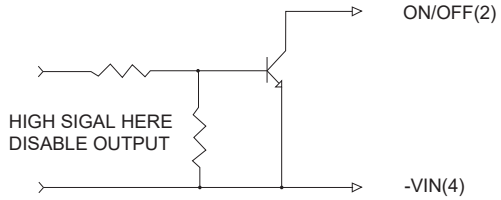


PIN CONNECTION	
PIN	Function
1	+V Input
2	On/Off
3	NP
4	-V Input
5	-V Output
6	-Sense
7	Trim
8	+Sense
9	+V Output

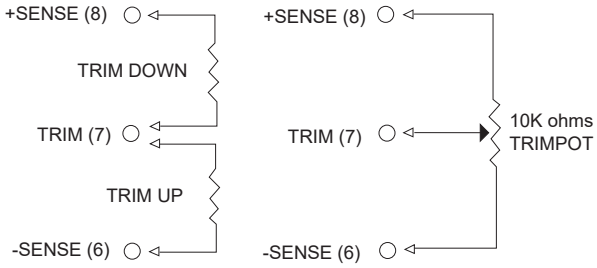
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF. (2)	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CHB200W-110S05	43-160 VDC	5 VDC	0mA	40 A	10 mA	2066 mA	88	40000uF
CHB200W-110S12	43-160 VDC	12 VDC	0mA	16.7 A	10 mA	2024 mA	90	16700uF
CHB200W-110S24	43-160 VDC	24 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.
Isolation Resistance	10^8 ohm min.
Isolation Capacitance	3000pF typ.
Switching Frequency	300KHz typ
Operating Case Temperature	-40˚C to 100˚C
Storage Temperature	-55˚C to +125˚C
Thermal Shutdown, Case Temperature	110˚C typ.
Humidity	95% RH max. Non condensing
MTBF ... MIL-HDBK-217F, GB, 25˚C, Full Load	48V .....TBDKhrs typ.
	Others..... TBDKhrs typ.
Safety	Meet UL60950-1 2nd(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

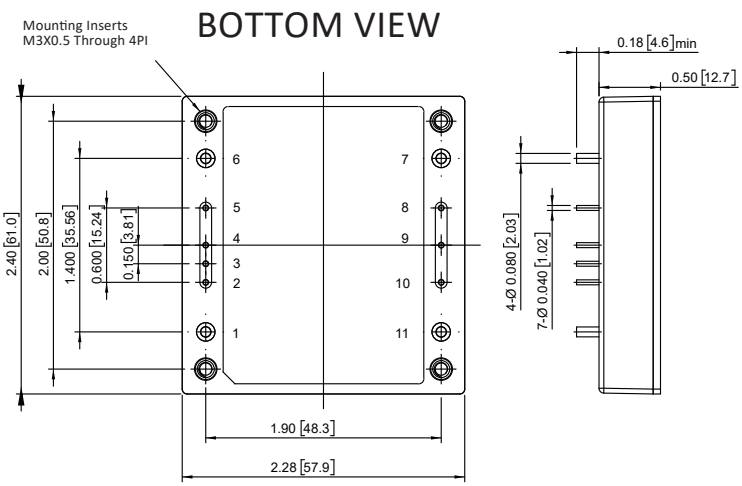
Features

PRELIMINARY

- 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

Mechanical Dimensions

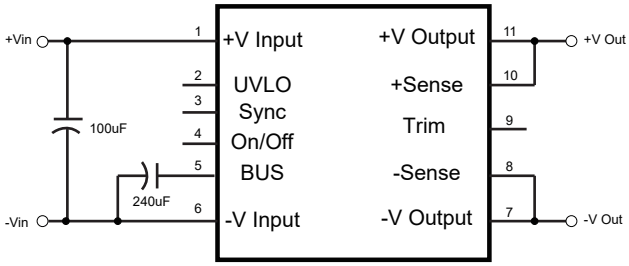
All Dimensions In Inches[mm]
Tolerance Inches:x.xx= ±0.02, x.xxx= ±0.010
Millimeters:x.x= ±0.5, x.xx=±0.25



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

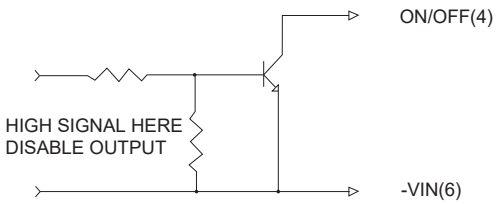
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF. (2)	% EFF. (3)	CAPACITOR LOAD MAX.
CHB200W10-72S05	16.5-140VDC	5 VDC	0mA	40 A	20 mA	3.09 A	90	90	40000uF
CHB200W10-72S12	16.5-140VDC	12 VDC	0mA	16.7 A	20 mA	3.09 A	90	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

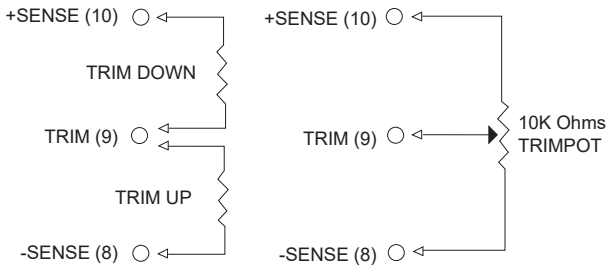


Simplified Application Circuit

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
Input Surge Voltage (1s max.)	156V max
Under Voltage Lockout	UVLO Pin Floating
	72Vin power up.....16.0V
	72Vin power down.....14.0V
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	+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	10^8 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

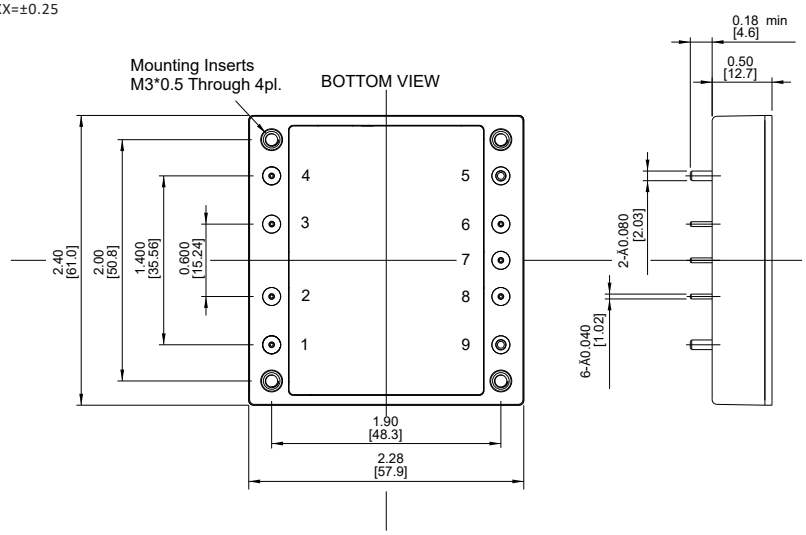
Features

- 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 2nd (Basic Insulation) Approval (Except3.3Vout)
- 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

E176177

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

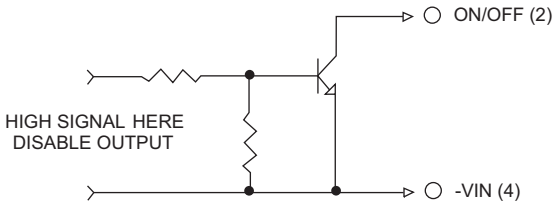


PIN	Function
1	+V Input
2	ON/OFF
3	NC
4	-V Input
5	-V Output
6	-Sense
7	Trim
8	+Sense
9	+V Output

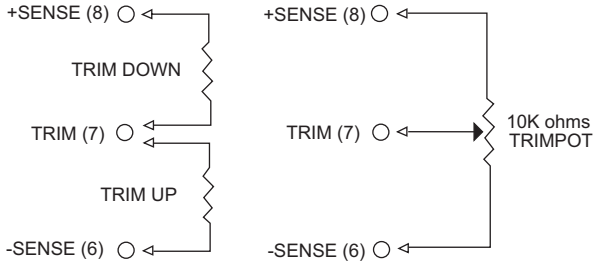
MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF. (2)	CAPACITOR LOAD MAX.
CHB300W-110S3V3	43-160 VDC	3.3 VDC	0 mA	60 A	10 mA	2093 mA	86	60000μF
CHB300W-110S05	43-160 VDC	5 VDC	0 mA	60 A	10 mA	3099 mA	88	60000μF
CHB300W-110S12	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	3000VDC min.
	Output/Case	500VAC min.
Isolation Resistance		10^8 ohm min.
Isolation Capacitance		3000pF typ.
Switching Frequency		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.
Safety		UL60950-1 2nd (Basic Insulation)
EMC (note 7)		EN50155 (EN50121-3-2) with External Filter EN50155 (EN61373)
Shock/Vibration		EN50155 (EN60068-2-1)
Environmental		Meet EN45545-2
Fire & Smoke		
Dimensions		2.28 × 2.40 x 0.52 inches (57.9 x 61.0 × 13.2 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. (3.3V&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 220µF 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).

CFB600W-110S SERIES
600 WATT DC-DC CONVERTERS

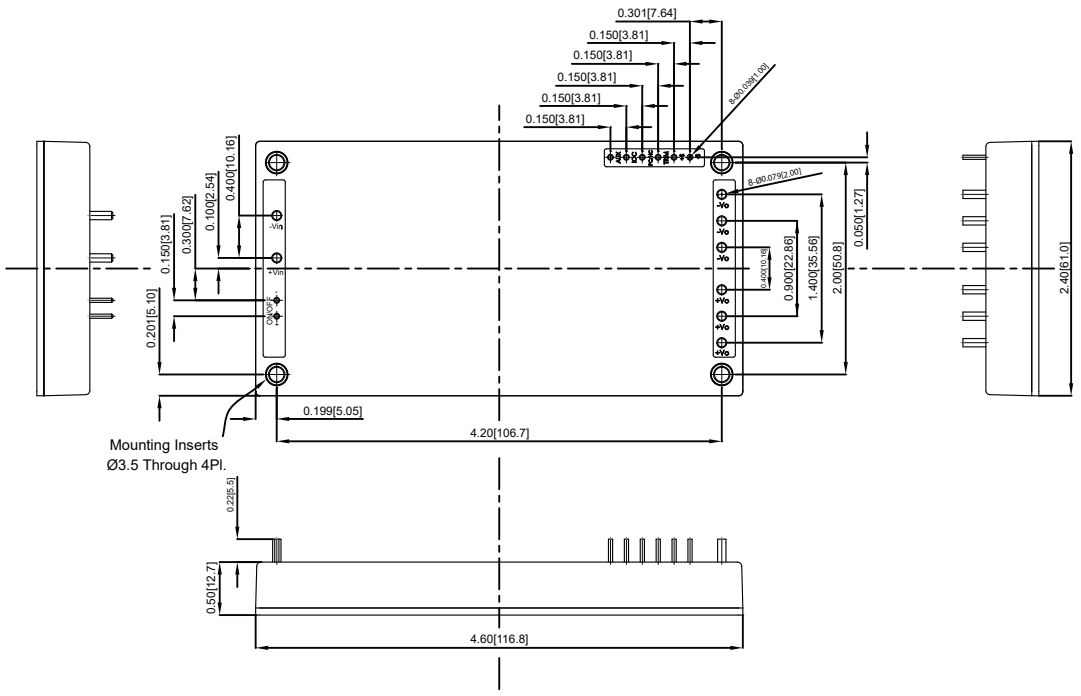
Features

- 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 2nd (Basic Insulation)
- Fire & Smoke Meet EN45545-2

E176177 Railway System

Mechanical Dimensions

All Dimensions in Inches[mm] Pin
Tolerance Inches:x.xx=±0.02 , x.xxx=±0.01 ±0.004
Millimeters:x.x=±0.5 , x.xx=±0.25 ±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 MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF. (3)	CAPACITOR LOAD MAX.
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	10^7 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 2nd (Basic insulation)
EMC (note 5)	EN50155(EN50121-3-2)
	with External Flter
Shock/Vibration	EN50155 (EN61373)
Environmental	EN50155 (EN60068-2-1)
Dimensions	4.60×2.40x0.50 inches
	(116.8x61.0x12.7 mm)
Case Material	Aluminum Baseplate with Plastic Case
Weight	220 g

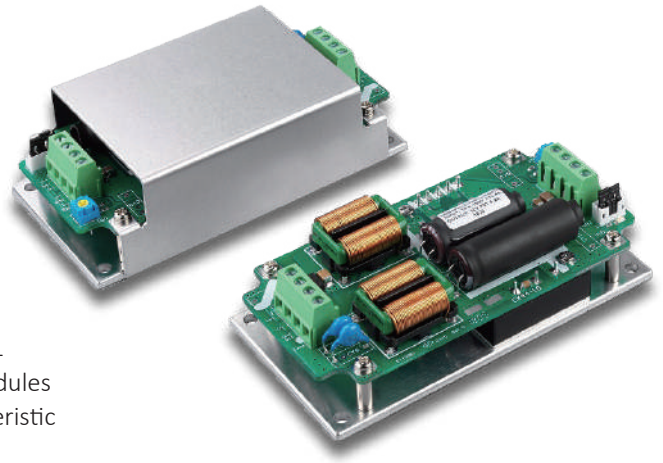
NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 10uF tantalum capacitor and 1uF ceramic capacitor across output.(48Vo: 10uF aluminum capacitor and 1.0uF ceramic capacitors)
4. An external input capacitor 220uF 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 2nd (Basic Insulation) Approval for DC Modules
- EN50155:2007 for EMC, Environmental and Characteristic
- Build-In EMI Filter
- Baseplate Cooled
- Fire & Smoke Meets EN45545-2

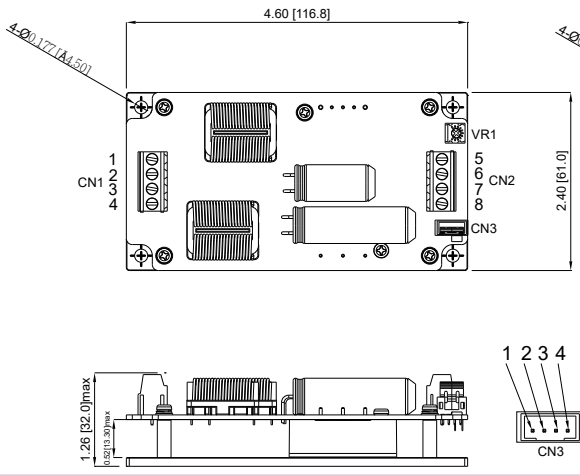


CE Railway System

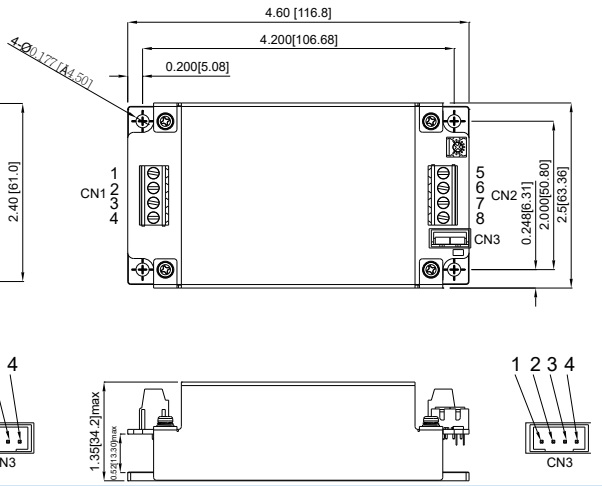
Mechanical Dimensions

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

CMFC



CMFD with Cover



CN1&CN2
PIN CONNECTION

Pin	Function
1	+V Input
2	-V Input
3	Remote
4	Case
5	+V Output
6	+V Output
7	-V Output
8	-V Output

CN3
PIN CONNECTION

Pin	Function
1	-V Output
2	-Sense
3	+Sense
4	+V Output

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

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.
Isolation Resistance	$2x10^{8}$ 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)
Shock/Vibration	Meets EN50155(EN61373)
Environmental	EN50155(EN60068-2-1, 2, 30)
Dimensions	
-CMFC	4.60×2.40x1.26 inches (116.8x61.0x32.0 mm)
-CMFD	4.60×2.49x1.35 inches (116.8x63.4x34.2 mm)
Case Material	
-CMFC	Aluminum Base
-CMFD	Aluminum Base and Aluminum Cover
Weight	
-CMFC	210g
-CMFD	296g

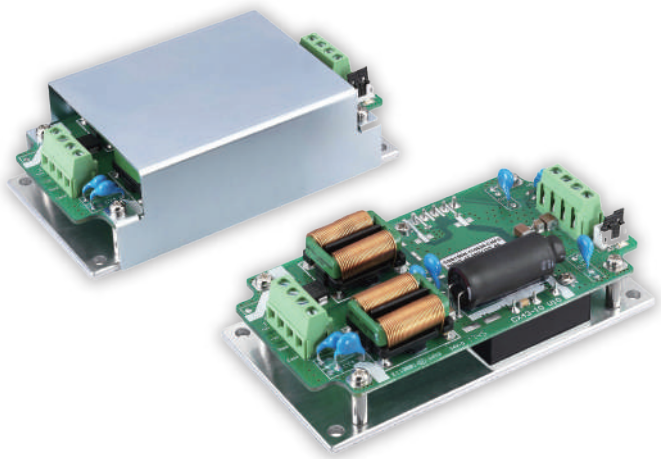
NOTE

1. Measured from high line to low line.
2. Measured from full load to zero load.
3. Output ripple and noise measured with 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 ..... >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^2).

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 2nd (Basic Insulation) Approval for DC Modules
- EN50155:2007 for EMC, Environmental and Characteristic
- Build-In EMI Filter
- Fire & Smoke Meet EN45545-2

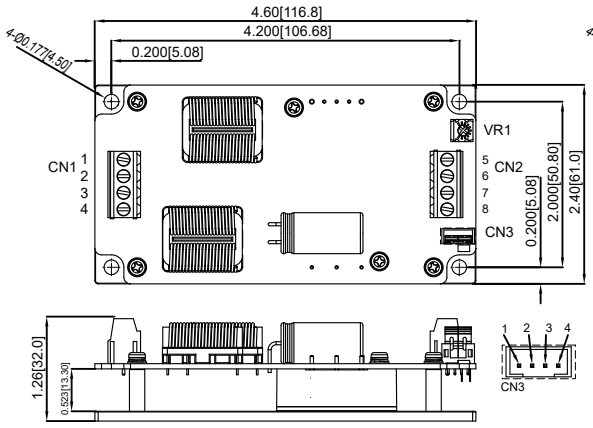


CE Railway System

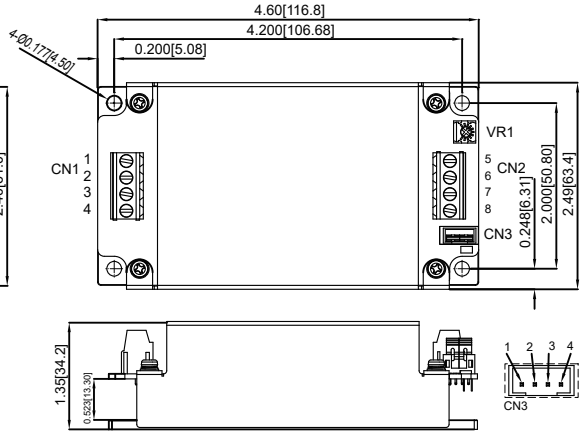
Mechanical Dimensions

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

CMFC



CMFD with Cover



CN1&CN2 PIN CONNECTION	
PIN	Function
1	+V Input
2	-V Input
3	Remote
4	Case
5	+V Output
6	+V Output
7	-V Output
8	-V Output

CN3 PIN CONNECTION	
PIN	Function
1	-V Output
2	-Sense
3	+Sense
4	+V Output

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF.	CAPACITOR LOAD MAX.
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		10^8 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
Shock/Vibration		Meets EN50155(EN61373)
Environmental		EN50155(EN60068-2-1,2,30)
Case Material	-CMFC	Aluminum Base
	-CMFD	Aluminum Base and Aluminum Cover
Dimensions	-CMFC	4.60x2.40x1.26 inches (116.8x61.0x32.0 mm)
	-CMFD	4.60x2.49x1.35 Inches (116.8x63.4x34.2 mm)
Weight	-CMFC	215g
	-CMFD	300g

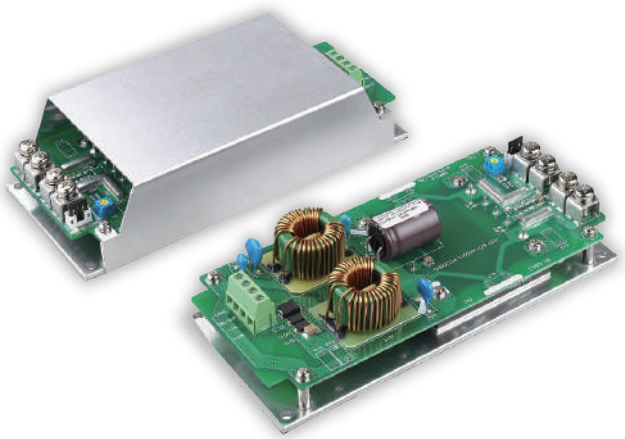
NOTE

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 0.5~2.5mm²).

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 2nd (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

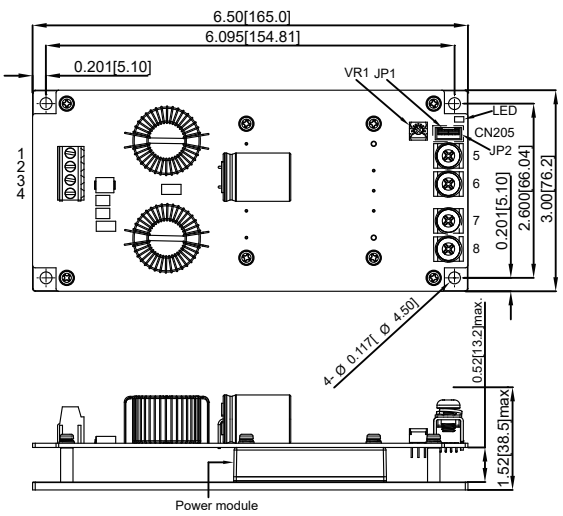


CE Railway System

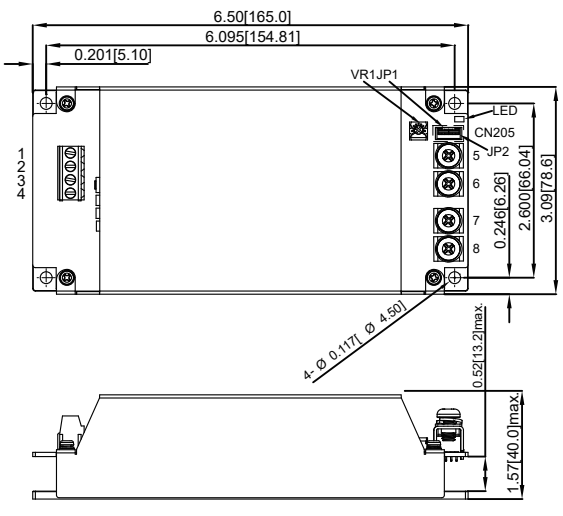
Mechanical Dimensions

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

CMFC



CMFD with Cover



CN205: PIN CONNECTION	
PIN	Function
1	+Sense
2	+V Output
3	-Sense
4	-V Output

*JP1: Short PIN1 & PIN2
*JP2: Short PIN3 & PIN4

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

*PIN5 & 8 for 5Vo Only

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MIN.	OUTPUT CURRENT MAX.	INPUT CURRENT NO LOAD	INPUT CURRENT FULL LOAD	% EFF.	CAPACITOR LOAD MAX.
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.
Isolation Resistance		10^8ohm min.
Isolation Capacitance		8000pF 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		460Khrs typ.
Safety		Meets UL60950-1
EMC		Meets EN50155(EN50121-3-2:2008) with External Output Filter
		Meets EN50155(EN50121-3-2:2015)
Shock/Vibration		EN50155(EN61373)
Environmental		EN50155(EN60068-2-1,2,30)
Case Material	-CMFC	Aluminum Base
	-CMFD	Aluminum Base and Aluminum Cover
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^2).
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

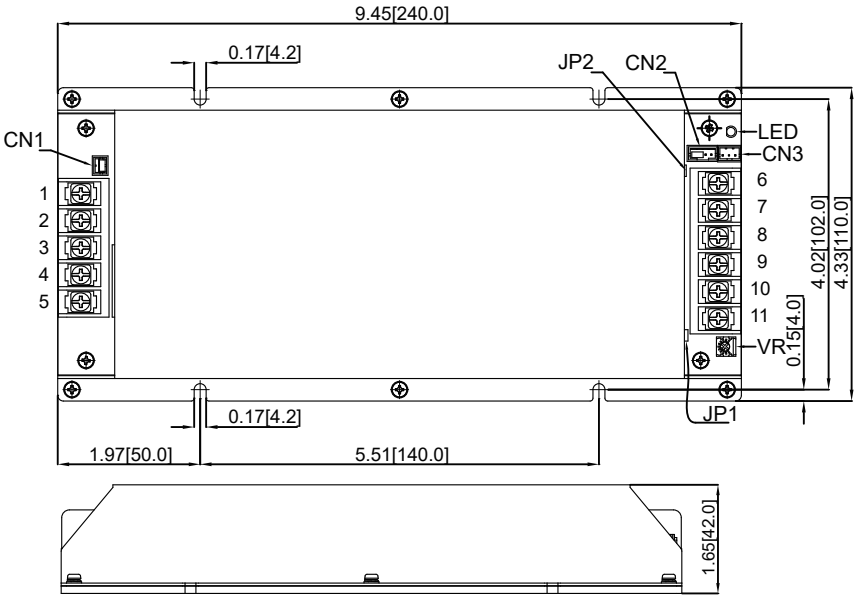
Features

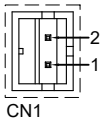
- 600W Isolated Output
- Efficiency to 88%
- Fixed Switching Frequency
- 4:1 Input Range
- Regulated Outputs
- Remote On/Off
- Over Temperature Protection
- Over Voltage/Current Protection
- Continuous Short Circuit Protection
- Shock & Viberation Meets EN50155 (EN61373)
- Safety Meets UL60950-1, EN60950-1,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

CE Railway System

Mechanical Dimensions

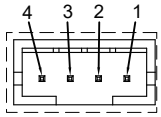
All Dimensions In Inches (mm)
Tolerance Inches: X.XX= ±0.02 , X.XXX= ±0.010
Millimeters: X.X= ±0.5 , X.XX=±0.25





CN1 (On/Off JP)

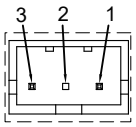
PIN CONNECTION	
PIN	Function
1	-V Input
2	-On/Off



CN2 (Trim JP)

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

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



CN3 (PC JP)

PIN CONNECTION	
PIN	Function
1	AUX
2	IOG
3	PC

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	10^7ohm 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 2nd (Basic Insulation)
EMC	Meets EN50155(EN50121-3-2:2007) with External Output Filter
	Meets EN50155(EN50121-3-2:2015)
Shock/Vibration	Meets EN50155(EN61373)
Environmental	EN50155(EN60068-2-1,2,30)
Case Material	Aluminum
Dimensions	9.45×4.33×1.65 Inches (240.0×110.0×42.0mm)
Weight	995g

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^2)
6. Output connectors PIN6~11 use DINKLE DT-49-B01W-06 series or equivalent. suitable electric wire: 22~12AWG(IEC 0.5~4mm^2)
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

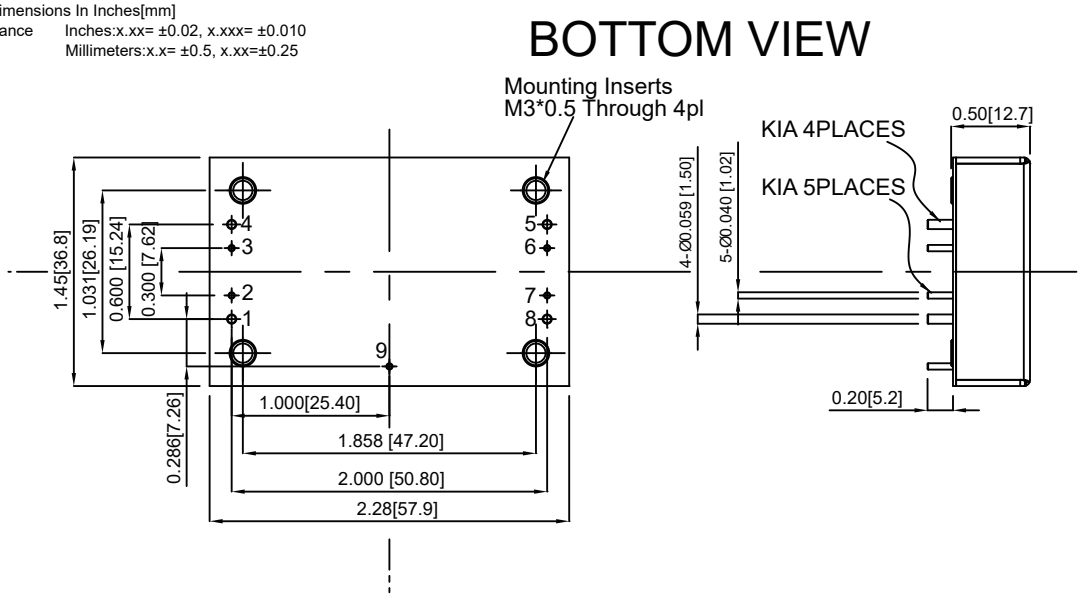
FM SERIES
30 AMP OUTPUT FILTER MODULE

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

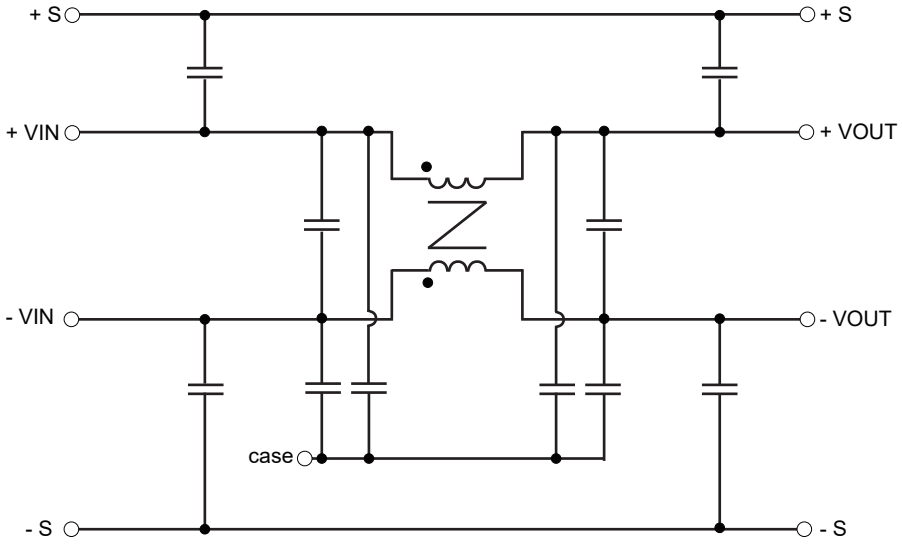
Mechanical Dimensions

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



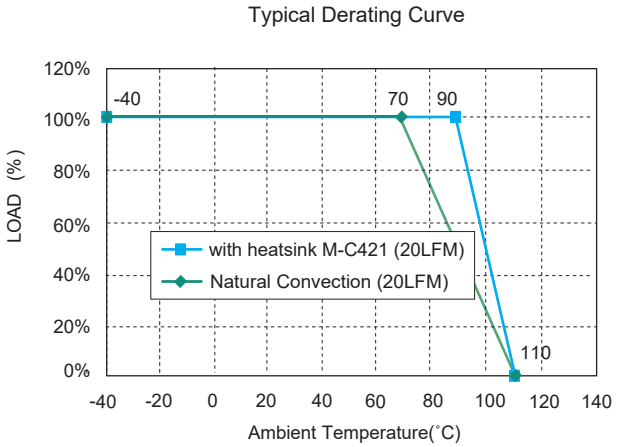
PIN CONNECTION	
PIN	Function
1	+V Input
2,7	+Sense
3,6	-Sense
4	-V Input
5	-V Output
8	+V Output
9	Case

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		10^8 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℃.

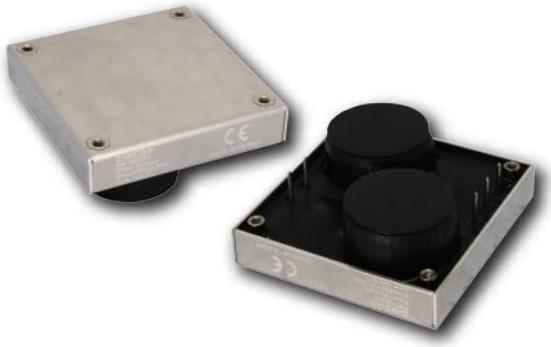
Typical Common-mode Loss for FM30R080P

Typical Differential-mode Loss for FM30R080P

FM10D200P SERIES
10 AMP FILTER MODULE

Features

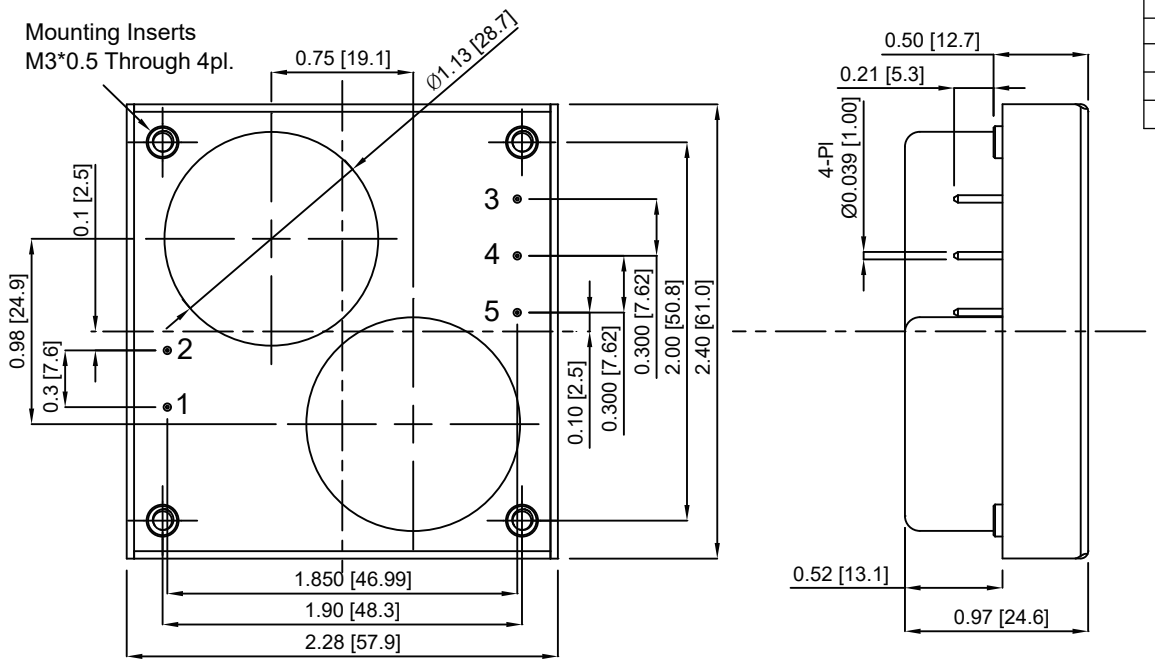
- Half Brick Size Meet Industrial Standard
- PCB Mount
- 10A Filter Module
- 200VDC Input Voltage Maximum
- All capacitor are multi-layer ceramic
- Fire & Smoke Meets EN45545-2



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)
FM10D200P	200 VDC max	250 VDC max	10 A max.	50 mΩ typ.	50 mΩ typ.

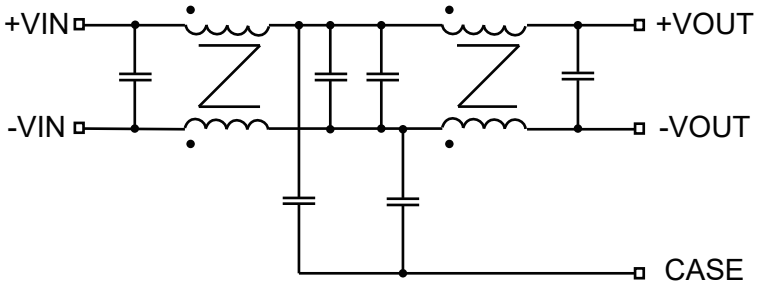
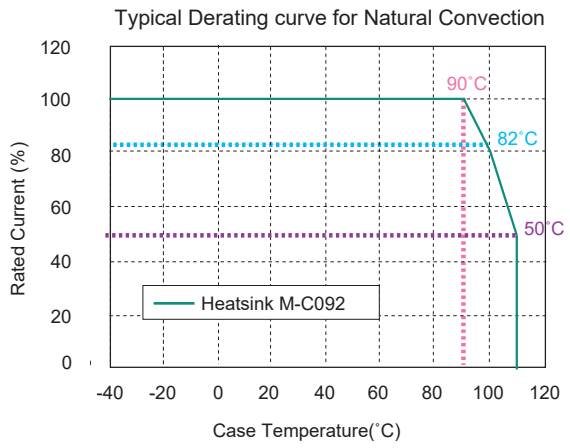
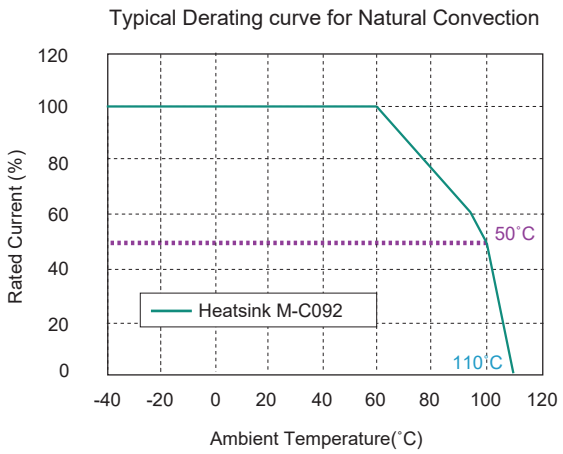


Figure1 Internal Schematic for FM10D200P Module

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

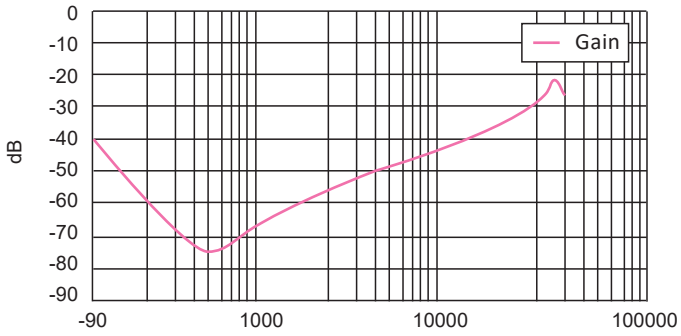
GENERAL SPECIFICATIONS

Isolation Voltage	Input/Case ..... 3000Vdc min
Isolation Voltage	Output/Case ..... 3000Vdc min.
Isolation Resistance	10^8 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

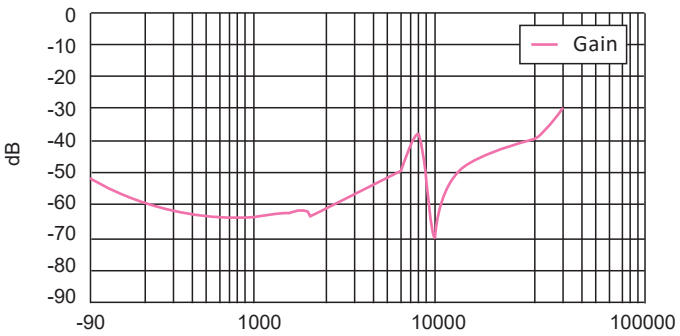
NOTE

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

Common-mode Insertion Loss



Differential-mode Insertion Loss



Typicl 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

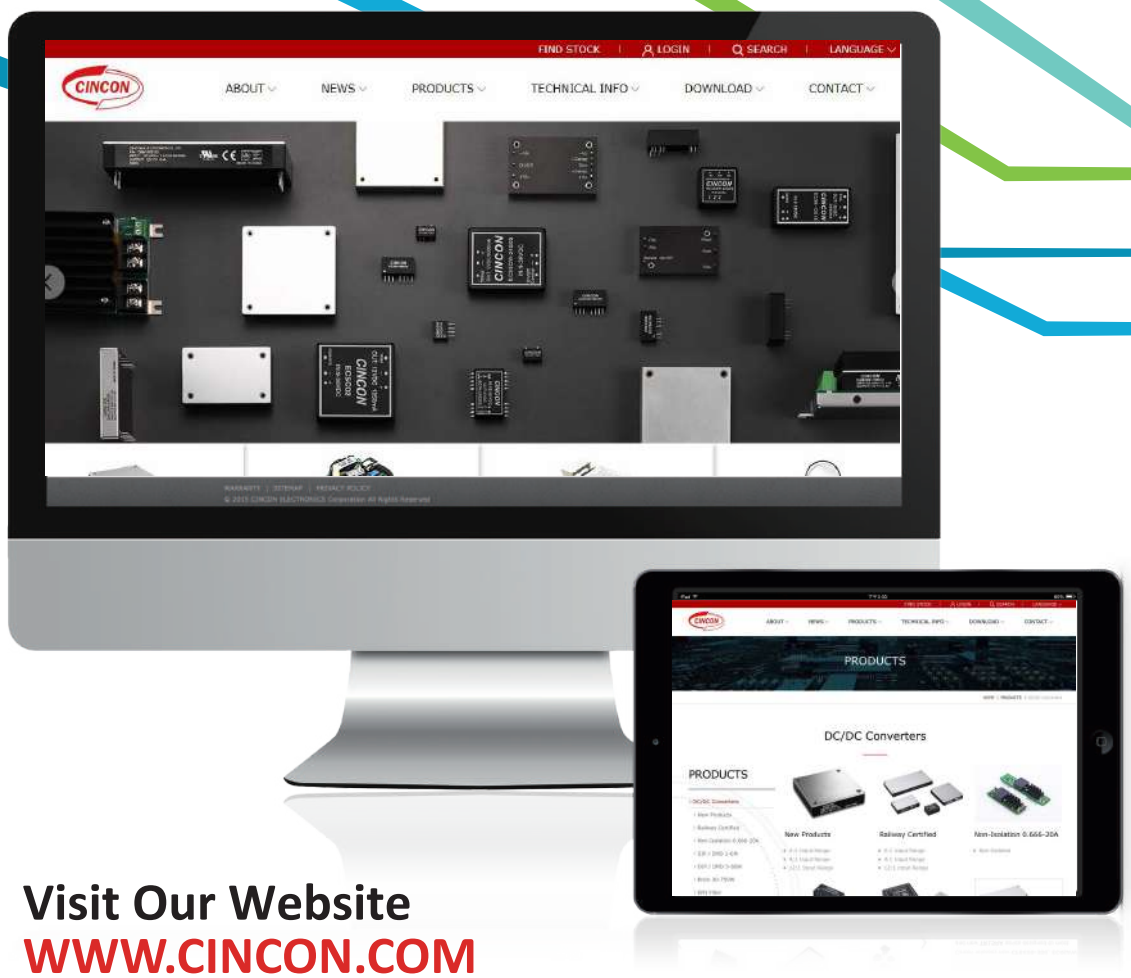
Safety Standard	EMC Standard

Mechanical Description

Remarks

Cincon Headquarters
14F, No. 306, Section 4, Hsin Yi Rd., Taipei, Taiwan
Tel: (886-2) 2708-6210
E-mail: sales@cincon.com.tw

Cincon USA
1655 Mesa Verde Ave, Ste 180
Ventura, CA 93003 USA
Tel: (805) 639-3350
E-mail: info@cincon.com



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CINCON HEADQUARTERS
14F , No. 306, Section 4, Hsin Yi Road Taipei, Taiwan, R.O.C.
Tel : (886-2) 2708-6210 | Fax : (886-2) 2702-9852
E-mail : sales@cincon.com.tw

CINCON USA
1655 Mesa Verde Ave, Ste 180 Ventura , CA 93003 USA
Tel : (805) 639-3350 | Fax : (805) 639-4101
E-mail : info@cincon.com