CFB600W-110S SERIES
600 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

Features

- Efficiency Up to 88%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Fully Protected (OTP/OCP/OVP/UVLO)
- 2250Vdc I/O Isolation
- Operating Case Temperature -40 to +100℃
- Full-Brick Size Meet Industrial Standard 4.60"x2.40"x0.5"
- UL 60950-1 2nd (Basic Insulation) Approval
- EN50155 Compliant with External Circuits
- Shock & Vibration EN50155 (EN61373) Compliant
- Fire & Smoke EN45545-2 Compliant
- 2000m Operating Altitude
- Safety Meets IEC/EN 62368-1



E176177

Railway System

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

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.
3. The Output Terminal Required a Minimum Capacitor 470uF to Maintain Specified Regulation.

PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic	Mounting Inserts
CFB600W-	II	O	XX	L	-Y (Option)
CFB600W	110：110 VDC	S：Single	12：12VDC 24：24VDC 28：28VDC 48：48VDC	None: Negative P: Positive	None: Clear Mounting Inserts (3.5mm DIA.) -C0: M3x0.5 Mounting Inserts

Part Number Example:

CFB600W-24S28P: Full Brick, 600W, 4:1 43-160Vdc Input, Single 28Vdc Output, Positive Logic, Clear Mounting Insert

TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25°C unless otherwise noted.)

ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage	Continuous	All	-0.3		160	V_{dc}
Input Surge Voltage	100ms max.	All			180	V_{dc}
Operating Case Temperature	At the center part of base plate	All	-40		100	℃
Storage Temperature		All	-55		105	℃

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		All	43	110	160	V_{dc}
Input Under Voltage Lockout						
Turn-On Voltage Threshold	Full load	All	41	42	43	V_{dc}
Turn-Off Voltage Threshold	Full load	All	39	40	41	V_{dc}
Lockout Hysteresis Voltage	Full load	All		2.0		V_{dc}
Maximum Input Current	V_{in}=43, Full load	All		16		A
No-Load Input Current	V_{in}=110V, Io=0A	See Model Number Table				mA
Input Filter	Pi Filter.	All				
Inrush Current (I^2t)	As per ETS300 132-2	All			1.0	A^2s
Input Reflected Ripple Current	P-P Thru 12uH Inductor, 5Hz to 20MHz.	All		90		mA

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Voltage Set Point Accuracy	V_{in}=110V, Full load, T_C=25℃	All	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full load to no load	All			±0.5	%
Line Regulation	V_{in}=High line to low line, full load	All			±0.2	%
Temperature Coefficient	T_C=-40℃ to 100℃	All			±0.03	%/℃
Output Voltage Ripple and Noise (5Hz to 20MHz Bandwidth)						
Peak-to-Peak	Full Load, 10uF tantalum capacitor and 1uF ceramic capacitors, 48Vo: 10uF aluminum capacitor and 1.0uF ceramic capacitors	12Vo			120	mV
		24Vo			240	
		28Vo			280	
		48Vo			480	
RMS.		12Vo			60	mV
		24Vo			100	
		28Vo			100	
		48Vo			200	
Output Current Range	V_{in}= 43 to 160V	See Model Number Table				A
Over Current Protection	Continuous Current. Auto Recovery	All	105		140	%
Over Voltage Protection	Limited voltage, % of nominal V_o	All	115	125	140	%
Short Circuit Protection		All	Continuous, Auto Recovery.			
External Load Capacitance	Full Load (Resistive)	See Model Number Table				uF
Auxiliary Output Voltage		All	7	10	13	V
Auxiliary Output Current		All			20	mA
Power Good Signal (IOG)	V_{out} Ready: Low level, sink current	All			20	mA
	V_{out} not Ready: Open drain output, applied voltage				50	V
Output Voltage Trim Range	P_o≦max. Rated Power, I_o ≦ $I_{o_max.}$	All	-40		+10	%
Output Voltage Remote Sense Range	P_o≦max. rated power, I_o ≦ $I_{o_max.}$ % of nominal V_o	All			+10	%

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Load Share Accuracy (50%-100% load)		All	-10		+10	%

EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	V_{in}=110V	See Model Number Table				%

DYNAMIC CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Current Transient						
Error Band	75% to 100% of $I_{o_max.}$ Step load change d_i/d_t=0.1A/us (within 1% Vout nominal)	All		±3	±5	%
Recovery Time		All			500	us
Turn-On Delay and Rise Time	Full load (constant resistive load)					
Turn-On Delay Time, From On/Off Control	$V_{on/off}$ to 10%$V_{o_set,}$ Remote on	All			75	ms
Turn-On Delay Time, From Input	$V_{in_min.}$ to 10%$V_{o_set,}$ Power up	All		135	250	ms
Output Voltage Rise Time	10%V_{o_set} to 90%V_{o_set}	All		25	50	ms

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Isolation Voltage (100% Factory Hi-Pot tested @2sec.)	1 Minute; input to output 1 Minute; input to case (base plate) 1 Minute; output to case (base plate)	All			2250 2250 1500	V_{dc}
Isolation Resistance	Input to output	All	20			MΩ
Isolation Capacitance	Input to output Input to case (base plate) Output to case (base plate)	All		4000 None None		pF

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pulse width modulation (PWM), fixed	All	225	250	275	KHz
On/Off Control, Positive Remote On/Off Logic, Refer to -Vin Pin.						
Logic Low (Module Off)	$V_{on/off}$ at $I_{on/off}$=1.0mA	All	1		10	mA
Logic High (Module On)	$V_{on/off}$ at $I_{on/off}$=0.0uA, Pin open=On	All	0		0.01	mA
On/Off Control, Negative Remote On/Off Logic, Refer to -Vin Pin						
Logic High (Module Off)	$V_{on/off}$ at $I_{on/off}$=0.0uA, Pin open=Off	All	0		0.01	mA
Logic Low (Module On)	$V_{on/off}$ at $I_{on/off}$=1.0mA	All	1		10	mA
Off Converter Input Current	Shutdown Input Idle Current	All			50	mA
Over Temperature Shutdown	Temperature at the center part of base plate, non-latching	All		110		℃
Over Temperature Recovery		All		90		℃

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I_o=100% of $I_{o_max.}$; MIL-HDBK - 217F_Notice 1, GB, 25℃	All		450		K hours
Weight		All		220		grams
Case Material	Plastic, DAP					
Base plate Material	Aluminum					
Potting Material	UL 94V-0					
Pin Material	Base: Copper Plating: Nickel with Matte Tin					
Shock/Vibration	EN61373 Compliant					

GENERAL SPECIFICATIONS

Humidity	95% RH max. Non Condensing		
Altitude	2000m Operating Altitude, 12000m Transport Altitude		
Thermal Shock	MIL-STD-810F		
Fire & Smoke	EN 45545-2 Compliant		
EMI	Meets EN 50155 Compliant (with external filter)		
ESD	EN 61000-4-2	Level 3: Air ±8kV, Contact ±6kV	Perf. Criteria B
Radiated immunity	EN 61000-4-3	Level 3: 80~1000MHz, 20V/m	Perf. Criteria A
Fast Transient	EN 61000-4-4	Level 3: On power input port, ±2kV, external input capacitor required	Perf. Criteria A
Surge	EN 61000-4-5	Level 2: Line to earth, ±2kV, Line to line, ±1kV	Perf. Criteria B
Conducted immunity	EN 61000-4-6	Level 3: 0.15~80MHz, 10V	Perf. Criteria A
Interruptions of Voltage Supply	EN 50155	Class S3: 20ms with external hold up circuit	Perf. Criteria A
Supply Change Over	EN 50155	Class C2: 30ms with external hold up circuit	Perf. Criteria B
Application Note Link			CFB600W-110S Series App Notes
Packaging Information Link			Packaging Information

Immunity to Environmental Conditions

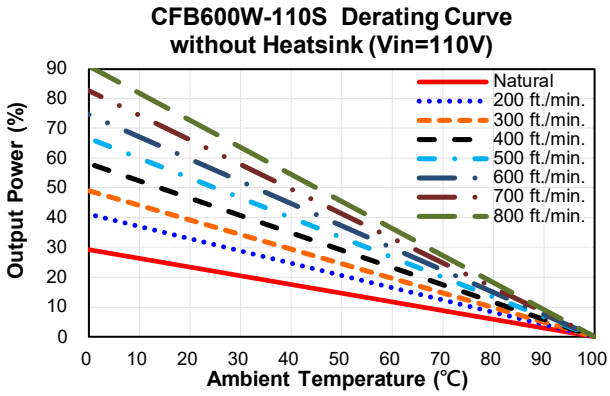
Phenomenon	EN50155; 2017 Reference Clause(s)	Reference Standard	Test Conditions	Result
Low Temperature Start-up test	13.4.4	EN 60068-2-1	Class OT4 Temperature: -40℃ Duration: 2 hrs	Pass
Dry Heat Test	13.4.5	EN 60068-2-2	Class OT4 Temperature: 70℃ Dry heat thermal test Cycle A	Pass
Low Temperature Storage Test	13.4.6	EN 60068-2-1	Temperature: -40℃ Duration: 16 hrs	Pass
Cyclic Damp Heat Test	13.4.7	EN 60068-2-30	Temperature: +55℃ and +25℃ Humidity: 90~96% RH Duration: 48 hrs	Pass
Random Vibration Test	13.4.11	EN 61373	Temperature: 25℃±10℃ Humidity: 50% ±25% RH Frequency range: 5 ~ 150 Hz X axis: 0.44 m/s^2 Y axis: 0.69 m/s^2 Z axis: 0.98 m/s^2 Duration: 10 min / axis	Pass
Simulated Long Life Test at Increased Random Vibration Levels	13.4.11	EN 61373	Temperature: 25℃±10℃ Humidity: 50% ±25% RH Frequency range: 5 ~ 150 Hz X axis: 2.5 m/s^2 Y axis: 3.96 m/s^2 Z axis: 5.72 m/s^2 Duration: 5 hrs / axis	Pass
Shock Test	13.4.11	EN 61373	Temperature: 25℃±10℃ Humidity: 50% ±25% RH a.Test Condition 1 (±X axes) Units are non-operating. Pulse shape: Half-sine waveform Impact acceleration: 50 m/s2 Pulse duration: 30 ms Number of shocks / Orientation: 6 shocks (3 shocks for ±X axis) b.Test Condition 2 (±Y and ±Z axes) Units are non-operating. Pulse shape : Half-sine waveform Impact acceleration : 30 m/s2 Pulse duration : 30 ms Number of shocks : 12 shocks (3 shocks for each ±axis) Orientation : ±Y and ±Z axes	Pass

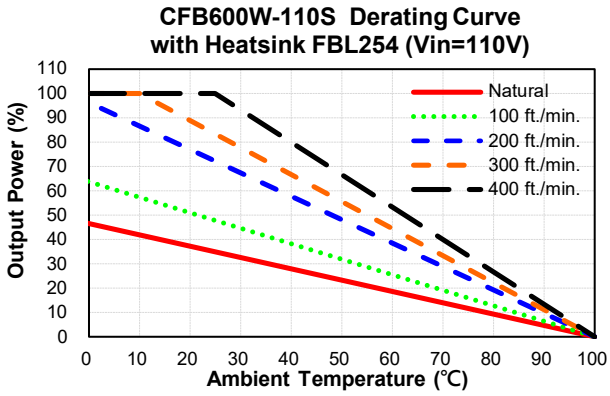
EN45545-2 Fire & Smoke Test Conditions

Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 2006	HL1, HL2, HL3
R24	Oxygen Index Test	EN45545-2: 2013 EN ISO 4589-2	HL1, HL2, HL3
R25	Glow - Wire Test	EN 45545-2:2013 EN 60695-2-11:2001	HL1, HL2, HL3
R26	Vertical Flame Test	EN 45545-2: 2013 EN 60695-11-10: 2013	HL1, HL2, HL3

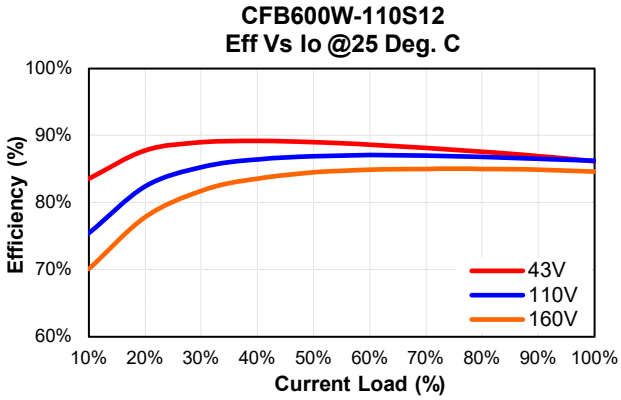
CHARACTERISTIC CURVE

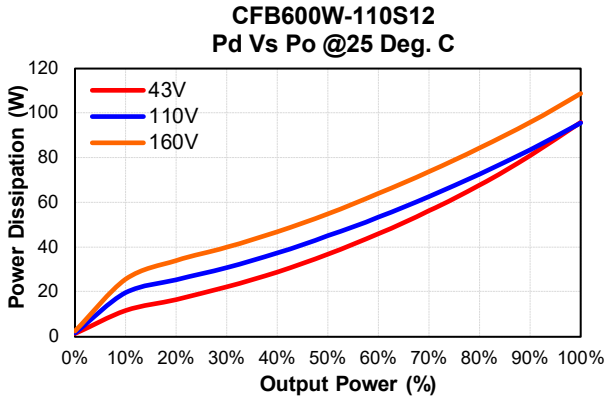
Power Derating Curve

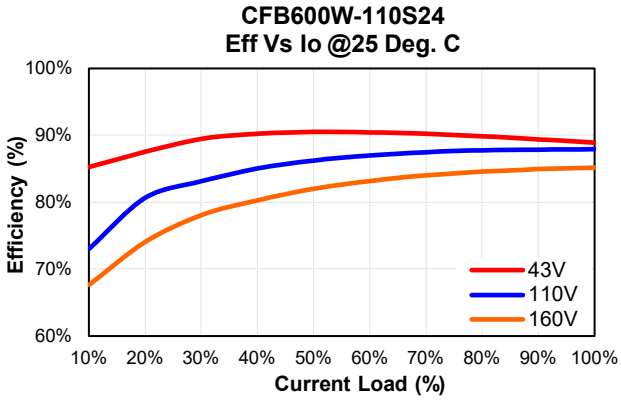


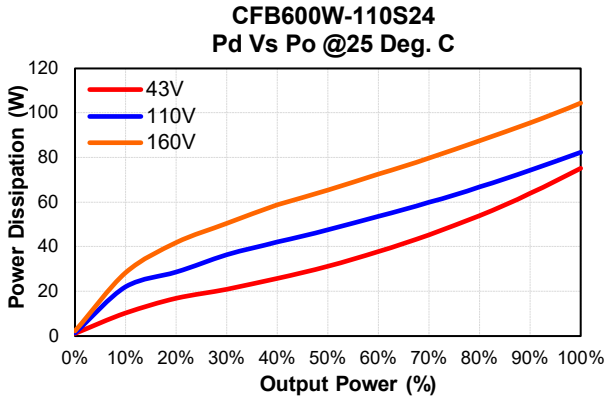


Performance Data

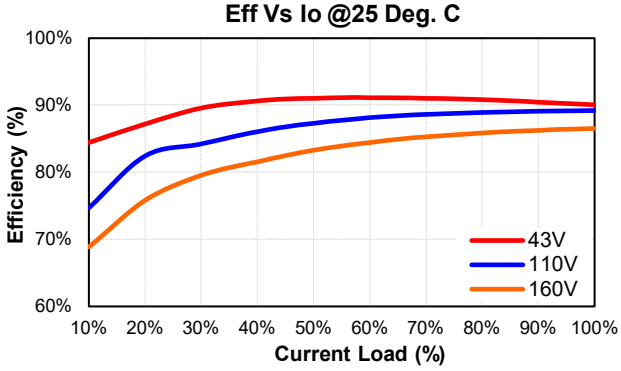




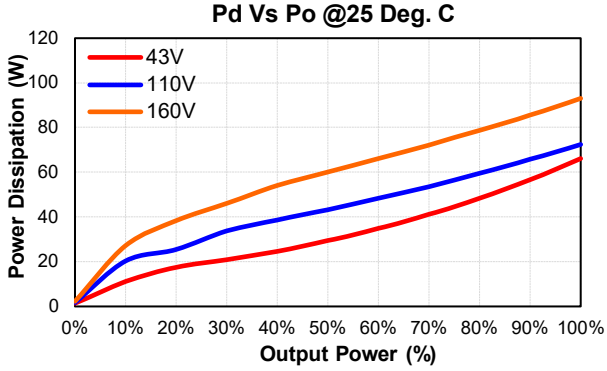




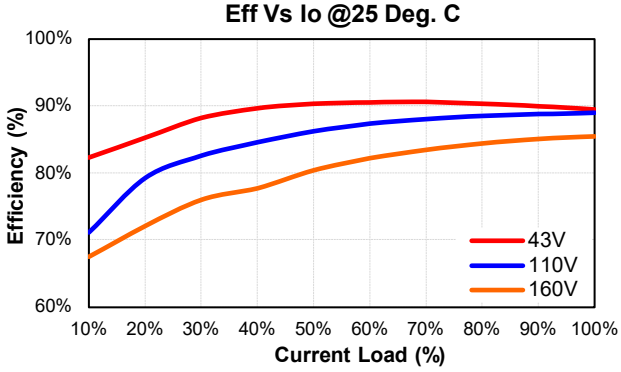
CFB600W-110S28
Eff Vs Io @25 Deg. C



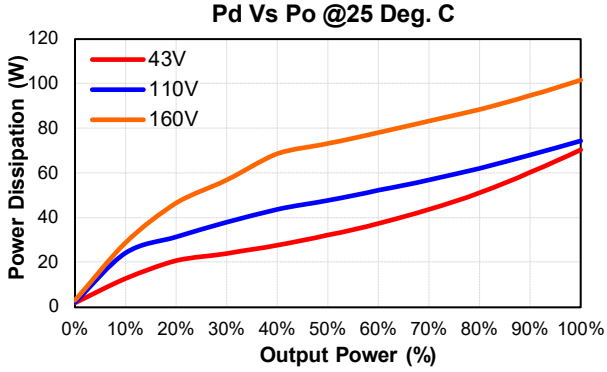
CFB600W-110S28
Pd Vs Po @25 Deg. C



CFB600W-110S48
Eff Vs Io @25 Deg. C

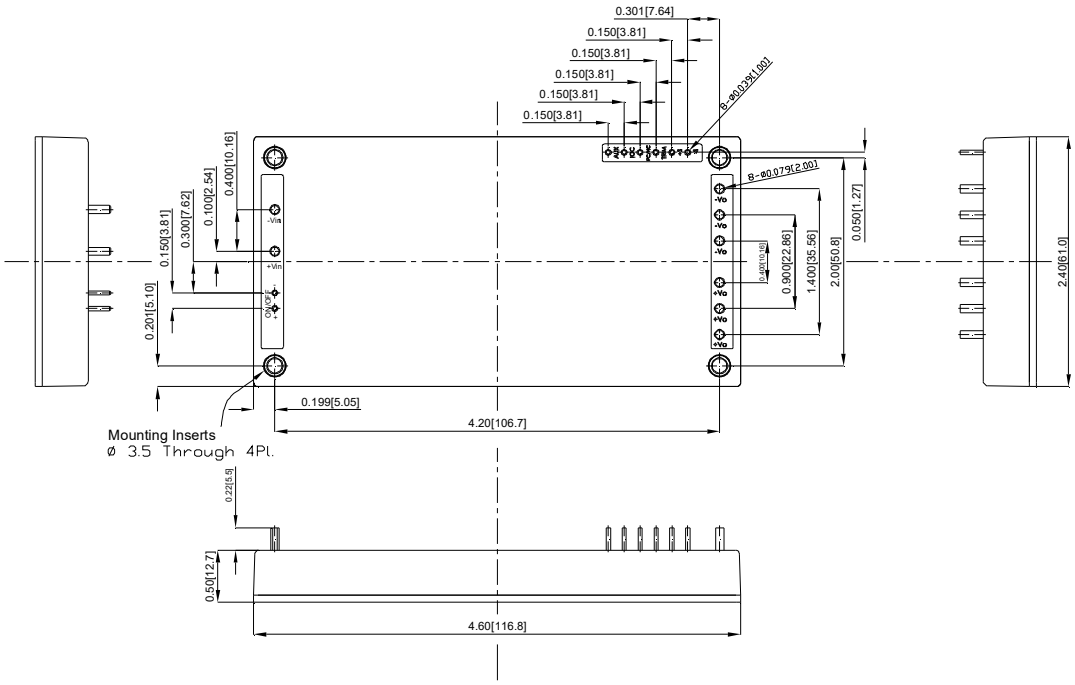


CFB600W-110S48
Pd Vs Po @25 Deg. C



MECHANICAL SPECIFICATION

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

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