



EC7BW-110 SERIES 20 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

Features

- Efficiency up to 90%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Low No Load Power Consumption
- Fully protected (OCP/OVP/UVLO)
- 3000Vdc I/O Isolation
- Operating Case Temperature -40 to +105°C
- 2"x1"x0.4" Size Meet Industrial Standard
- UL 60950-1 2nd (Basic Insulation) Approval
- EN 50155 Compliant with External Circuits
- Shock & Vibration EN 50155 (EN 61373) Compliant
- Fire & Smoke EN 45545-2 Compliant
- 4000m Operating Altitude
- Safety Meets IEC/EN/UL 62368-1



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF. (1)	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	5600uF
EC7BW-110S12	43-160 VDC	12 VDC	0 mA	1670 mA	3 mA	202.0 mA	90	1000uF
EC7BW-110S15	43-160 VDC	15 VDC	0 mA	1330 mA	3 mA	203.1 mA	89.5	1000uF
EC7BW-110D12	43-160 VDC	±12 VDC	0 mA	±833 mA	3 mA	204.3 mA	89	680uF
EC7BW-110D15	43-160 VDC	±15 VDC	0 mA	±667 mA	3 mA	205.4 mA	88.5	350uF

NOTE:

1. Nominal input voltage 110 VDC.
2. To meet EN50155 and RIA12 refer to application note.

PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic
EC7BW-	II	O	XX	L
EC7BW	110 : 110 VDC	S : Single D : Dual	05 : 5.0VDC 12 : 12VDC 15 : 15VDC 12 : ±12VDC 15 : ±15VDC	None : Positive N : Negative

Part Number Example:

EC7BW-110S12N: 2"x1", 20W, 4:1 43-160Vdc Input, Single 12Vdc Output, Negative Logic



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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			200	V _{dc}
Operating Ambient Temperature	with derating	All	-40		85	°C
Operating Case Temperature	At the center part of case	All			105	°C
Storage Temperature		All	-55		125	°C

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		All	38.5	40.0	41.5	V _{dc}
Turn-Off Voltage Threshold		All	36.5	38.0	39.5	V _{dc}
Lockout Hysteresis Voltage		All		2		V _{dc}
Maximum Input Current	V _{in} =43V, Full load	All		540		mA
No-Load Input Current	V _{in} =110V, I _o =0A	See Model Number Table				mA
Input Filter	Pi filter	All				
Inrush Current (I ² t)	As per ETS300 132-2.	All			0.1	A ² s
Input Reflected Ripple Current	P-P thru 12uH inductor, 5Hz to 20MHz	All		30		mA

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Voltage Set Point Accuracy	V _{in} =110V, Full load, T _c =25°C	All	-1.5		+1.5	%
Output Voltage Balance	V _{in} =110V, Full load, T _c =25°C	Dual	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full Load to no load	Single			±0.5	%
		Dual			±1.0	
Line Regulation	V _{in} =High line to low line, full load	All			±0.2	%
Cross Regulation	Load cross variation 10%/100%	Dual			±5.0	%
Temperature Coefficient	T _c =-40°C to 85°C	All			±0.03	%/°C
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 1uF ceramic capacitors	5V _o			75	mV
		12V _o			100	
		15V _o			100	
		±12V _o			100	
		±15V _o			100	
RMS.		All			40	mV
Output Current Range	V _{in} = 43 to 160V	See Model Number Table				mA
Over Current Protection	Hiccup Mode. Auto recovery	All	110	125	160	%
Short Circuit Protection		All	Continuous, Auto Recovery			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF
Output Voltage Trim Range	P _o ≤ max. rated power, I _o ≤ I _{o_max}	Single	-10		+10	%
Over Voltage Protection	Zener or TVS clamp	5V _o		6.2		V _{dc}
		12V _o		15		
		15V _o		18		
		±12V _o		±15		
		±15V _o		±18		



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EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	$V_{in}=110$, Full load	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% V _{out} nominal)	All			±5	%
Recovery Time		All			250	us
Turn-On Delay and Rise Time						
Turn-On Delay Time, From On/Off Control	V _{on/off} to 10%V _{o_set} , Remote on	All		7		ms
Turn-On Delay Time, From Input	V _{in_min.} to 10%V _{o_set} , Power up	All		7		ms
Output Voltage Rise Time	10%V _{o_set} to 90%V _{o_set}	Single		8		ms
		Dual		18		

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Isolation Voltage (100% factory Hi-Pot tested @2sec.)	1 minute; Input to output	All			3000	V_{dc}
Isolation Resistance	Input to output	All	1000			MΩ
Isolation Capacitance	Input to output	All		1000		pF

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Output ripple frequency	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	0		1.2	V
Logic High (Module On)	$V_{on/off}$ at $I_{on/off}=0.0uA$, Pin open=On	All	3.5		75	V
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	3.5		75	V
Logic Low (Module On)	$V_{on/off}$ at $I_{on/off}=1.0mA$	All	0		1.2	V
On/Off Current (for Both Remote On/Off Logic)	$I_{on/off}$ at $V_{on/off}=0V$	All		0.3	1	mA
Leakage Current (for Both Remote On/Off Logic)	Logic high, $V_{on/off}=15V$	All			30	uA
Off Converter Input Current	Shutdown input idle current	All		2	5	mA

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°C	All		880		K hours
Weight		All		35		grams
Case Material	Copper					
Base plate Material	Plastic DAP					
Potting Material	UL 94V-0					
Pin Material	Base: Copper Plating: Nickel with Matte Tin					
Shock/Vibration	MIL-STD-810F/EN 61373 Compliant					
Humidity	95% RH max. Non Condensing					
Altitude	4000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN 45545-2 Compliant					



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EMC SPECIFICATIONS (External components required, please refer to application note.)

EMI	EN 50155 Compliant (with external filter)	Class A
ESD	EN 61000-4-2 Level 3: Air $\pm 8\text{kV}$, Contact $\pm 6\text{kV}$	Perf. Criteria A
Radiated Immunity	EN 61000-4-3 Level 3: 80~1000MHz, 20V/m	Perf. Criteria A
Fast Transient	EN 61000-4-4 Level 4: On power input port, $\pm 2\text{kV}$, external components required	Perf. Criteria A
Surge	EN 61000-4-5 Level 3: Line to line, $\pm 1\text{kV}$, external components required	Perf. Criteria A
Conducted Immunity	EN 61000-4-6 Level 3: 0.15~80MHz, 10V	Perf. Criteria A
Interruptions of Voltage Supply	EN 50155 Class S3: 20ms interruptions, with external hold up circuit and capacitor required	Perf. Criteria A
Supply Change Over	EN 50155 Class C2: During a supply break of 30ms, with external hold up circuit and capacitor required	Perf. Criteria A
Application Note Link		EC7BW-110 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°C Duration: 2 hrs	Pass
Dry Heat Test	13.4.5	EN 60068-2-2	Class OT4 & Cycle B Temperature: 70°C Duration: 6 hrs Extended temperature: 85°C Extended Duration: 10min	Pass
Low Temperature Storage Test	13.4.6	EN 60068-2-1	Temperature: -40°C Duration: 16 hrs	Pass
Cyclic Damp Heat Test	13.4.7	EN 60068-2-30	Temperature: 25°C ~ 55°C Humidity: 90% RH Duration: 48 hrs	Pass
Random Vibration Test	13.4.11	EN 61373	Frequency range: 5 ~ 150 Hz Vertical: 1.01 m/s^2 Transverse: 0.450 m/s^2 Longitudinal: 0.700 m/s^2 Duration: 10 min / axis	Pass
Simulated Long Life Test at Increased Random Vibration Levels	13.4.11	EN 61373	Frequency range: 5 ~ 150 Hz Vertical: 5.72 m/s^2 Transverse: 2.55 m/s^2 Longitudinal: 3.96 m/s^2 Duration: 5 hrs / axis	Pass
Shock Test	13.4.11	EN 61373	$\pm$ Vertical: 30 m/s^2 $\pm$ Transverse: 30 m/s^2 $\pm$ Longitudinal: 50 m/s^2 Duration: 30ms x18 (Each axis 3 shocks)	Pass



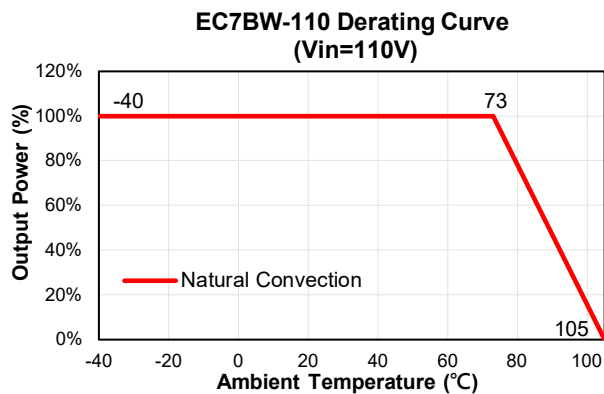
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EN45545-2 Fire & Smoke Test Conditions

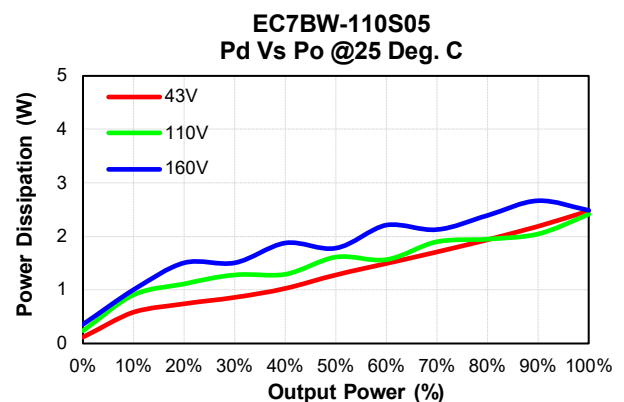
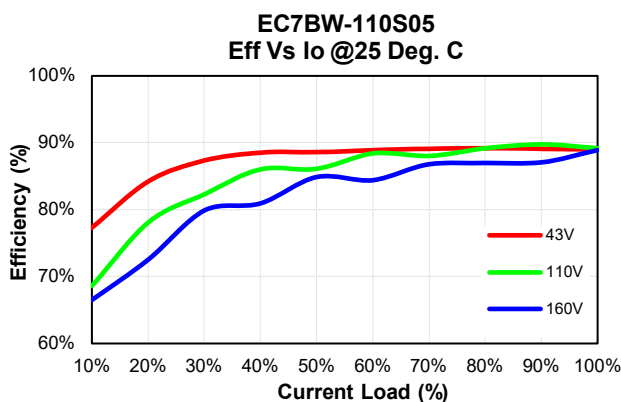
Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2020 EN ISO 4589-2: 2017	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2020 EN ISO 5659-2: 2017	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2020 EN 17084 Method 2: 2018	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2020 EN ISO 4589-2: 2017	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2020 EN ISO 5659-2: 2017	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2020 EN 17084 Method 2: 2018	HL1, HL2, HL3
R24	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2	HL1, HL2, HL3
R25	Glow - Wire Test	EN 45545-2:2013+A1:2016 EN 60695-2-11:2014	HL1, HL2, HL3
R26	Vertical Flame Test	EN 45545-2: 2013+A1:2015 EN 60695-11-10: 2013	HL1, HL2, HL3

CHARACTERISTIC CURVE

Power Derating Curve



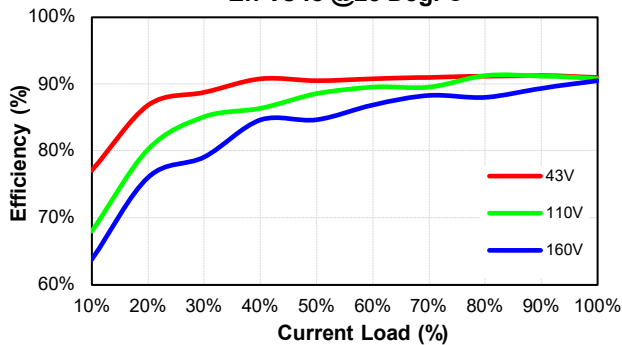
Performance Data



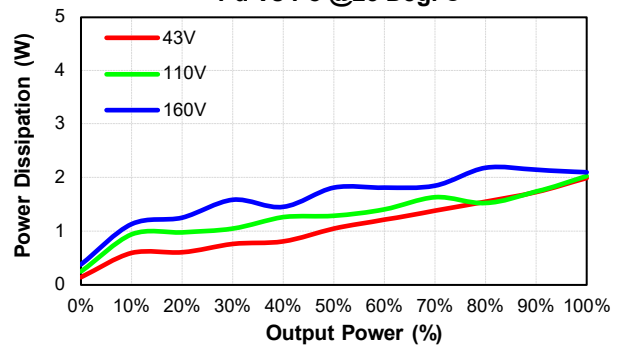


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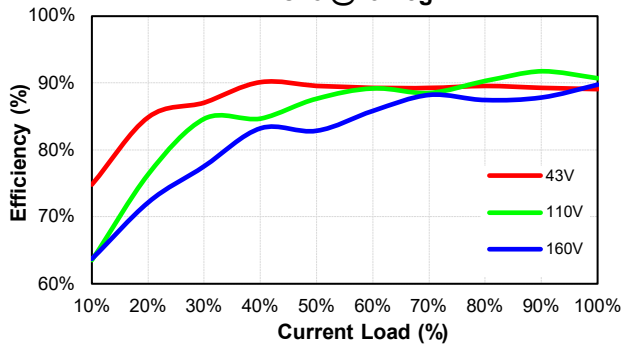
EC7BW-110S12
Eff Vs Io @25 Deg. C



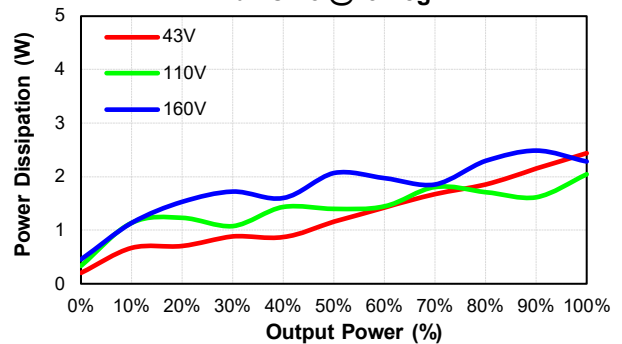
EC7BW-110S12
Pd Vs Po @25 Deg. C



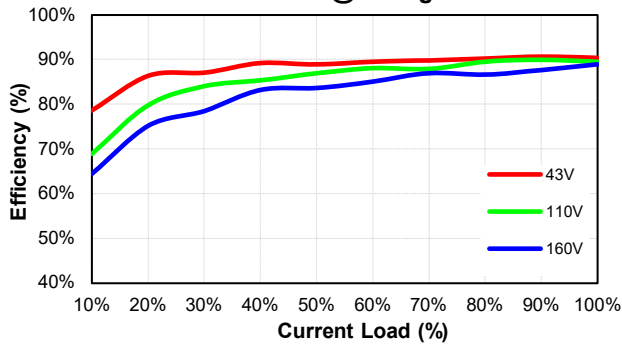
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Eff Vs Io @25 Deg. C



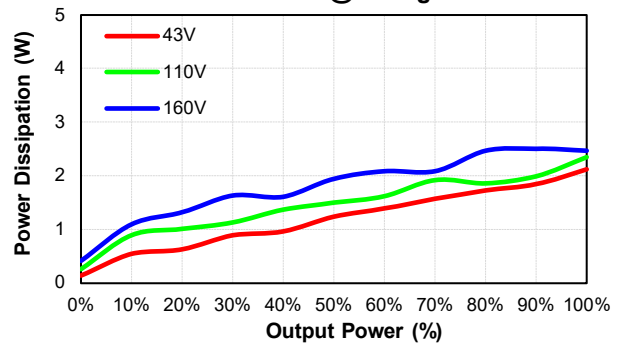
EC7BW-110S15
Pd Vs Po @25 Deg. C



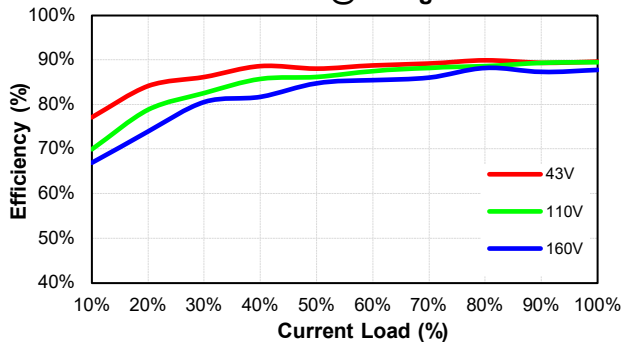
EC7BW-110D12
Eff Vs Io @25 Deg. C



EC7BW-110D12
Pd Vs Po @25 Deg. C



EC7BW-110D15
Eff Vs Io @25 Deg. C



EC7BW-110D15
Pd Vs Po @25 Deg. C

