ECLB40W-110 SERIES
33-40 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

Features

- Efficiency Up to 91%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Low No Load Power Consumption
- Fully Protected (OTP/OCP/OVP/UVLO)
- 3000 Vdc I/O Isolation
- Operating Case Temperature -40 to +105℃
- No Tantalum Capacitor Inside
- 2.05"x1.2"x0.4" Six-Sided Shield Metal Case Standard 2"X1" Pin Out Compatible
- 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
- 3000m Operating Altitude
- Full Load Operation up to 69℃ with Heat Sink LBT127 (M-C655) Natural Convection
- Safety Meets IEC/EN/UL 62368-1



E176177

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(1)	
ECLB40W-110S33	43-160 VDC	3.3 VDC	0 mA	10 A	6 mA	340 mA	88	10000μF
ECLB40W-110S05	43-160 VDC	5 VDC	0 mA	8 A	6 mA	409 mA	88.5	8000μF
ECLB40W-110S12	43-160 VDC	12 VDC	0 mA	3.333 A	6 mA	404 mA	90	3300μF
ECLB40W-110S15	43-160 VDC	15 VDC	0 mA	2.666 A	6 mA	399 mA	91	2700μF
ECLB40W-110D12	43-160 VDC	±12 VDC	0 mA	±1.667 A	6 mA	408 mA	88	1650μF
ECLB40W-110D15	43-160 VDC	±15 VDC	0 mA	±1.333 A	6 mA	408 mA	88.5	1350μF
ECLB40W-110D24	43-160 VDC	±24 VDC	0 mA	±0.833 A	6 mA	408 mA	89	850μF

NOTE:

1. Nominal input voltage 110 V_{dc}.
2. To meet EN 50155 and RIA12 refer to application note.

PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic
ECLB40W-110	II	O	XX	L
ECLB40W	110：110 VDC	S：Single D：Dual	33： 3.3VDC 05： 5.0VDC 12： 12VDC 15： 15VDC 12： ±12VDC 15： ±15VDC 24： ±24VDC	None：Positive N：Negative

Part Number Example:

ECLB40W-110S12N: LB Case, 40W, 4:1 9-36Vdc Input, Single 12Vdc Output, Negative Logic

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TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25℃ 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	At the center part of case plate (with derating)	All	-40		105	℃
Maximum Case Temperature		All			105	℃
Storage Temperature		All	-55		125	℃

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	40V	41.5	V_{dc}
Turn-Off Voltage Threshold		All	36.5	38V	39.5	V_{dc}
Lockout Hysteresis Voltage		All		2		V_{dc}
Maximum Input Current	V_{in}=43V, Full load	All		1.1		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			0.1	A^2s
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℃	All	-1.0		+1.0	%
Output Voltage Balance	V_{in}=110V, Full load, T_c=25℃	Dual	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full Load to no load	Single Dual			±0.5 ±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℃ to 105℃	All			±0.02	%/℃
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 1uF ceramic capacitors	3.3Vo 5Vo ±24Vo Others			100 100 200 150	mV
Output Current Range	V_{in}= 43 to 110V	See Model Number Table				A
Over Current Protection	Hiccup mode. Auto recovery	All	110	135	170	%
Short Circuit Protection		All	Continuous, auto recovery			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF
Output Voltage Trim Range	$P_o \leqq$max. rated power, $I_o \leqq I_{o_max.}$	All	-10		+10	%
Over Voltage Protection	Zener or TVS clamp	3.3Vo 5.0Vo 12Vo 15Vo ±12Vo ±15Vo ±24Vo		3.9 6.2 15 18 ±15 ±18 ±30		V_{dc}

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EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	V_{in}=110V, 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					250	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		15		ms
Turn-On Delay Time, From Input	$V_{in_min.}$ to 10%V_{o_set}, Power up	All		15		ms
Output Voltage Rise Time	10%V_{o_set} to 90%V_{o_set}	Single Dual		15 20		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	All			1800 3000	V_{ac} V_{dc}
	1 Minute; input to case				1000 1600	V_{ac} V_{dc}
	1 Minute; output to case				1000 1600	V_{ac} V_{dc}
Isolation Resistance	Input to output	All	1000			MΩ
Isolation Capacitance	Input to output Input to case Output to case	All		1500 1000 1000		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	0		1.2	V
Logic High (Module On)	$V_{on/off}$ at $I_{on/off}$=0.0uA, Pin open=on	All	3.5 or Open Circuit		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 or Open Circuit		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		4	10	mA
Over Temperature Shutdown	Temperature at the center part of case, non-latching	All		110		℃
Over Temperature Recovery				100		℃

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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℃	3.3Vo		889		K hours
		5.0Vo		722		
		12Vo		798		
		15Vo		874		
		±12Vo		889		
		±15Vo		1007		
		±24Vo		1188		
Weight		All		36		grams
Case Material	Aluminum					
Base Plate Material	FR4					
Potting Material	UL 94V-0					
Pin Material	Base: Copper Plating: Matte Tin					
Shock/Vibration	MIL-STD-810F/EN 61373 Compliant					
Humidity	95% RH max. Non condensing					
Altitude	3000m Operating altitude, 12000m Transport altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN 45545-2 Compliant					

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

EMI	Meet EN 55011/EN 55032/EN 50155 (with external filter)		Class A
ESD	EN 61000-4-2	Level 3: Air ±8kV, Contact ±6kV	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, ±4kV, external components required	Perf. Criteria A
Surge	EN 61000-4-5	Level 4: Line to line, ±1kV, 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			ECLB40W-110 Series App Notes
Packaging Information Link			Packaging Information

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Immunity to Environmental Conditions

Phenomenon	EN 50155; 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 & Cycle B Temperature: 70℃ Duration: 6 hrs Extended temperature: 85℃ Extended Duration: 10min	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: 25℃-55℃ Humidity: 90% 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 Vertical: 0.98 m/s^2 Transverse: 0.44 m/s^2 Longitudinal: 0.69 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 Vertical: 5.72 m/s^2 Transverse: 2.5 m/s^2 Longitudinal: 3.96 m/s^2 Duration: 5 hrs / axis	Pass
Shock Test	13.4.11	EN 61373	Temperature: 25℃±10℃ Humidity: 50% ±25% RH Frequency range: 5 ~ 150 Hz ±Vertical: 30 m/s^2 ±-Transverse: 30 m/s^2 ±Longitudinal: 50 m/s^2 Duration: 30ms x18 (Each axis 3 shocks)	Pass

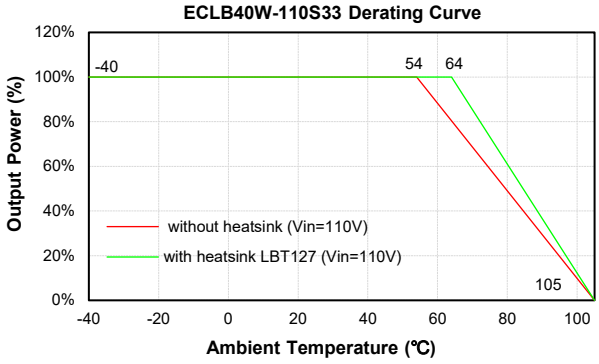
EN 45545-2 Fire & Smoke Test Conditions

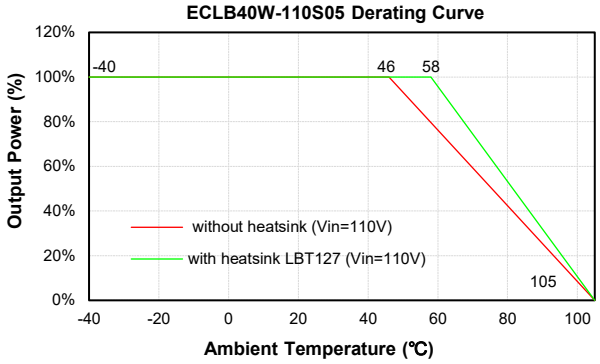
Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, 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	EN 45545-2: 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

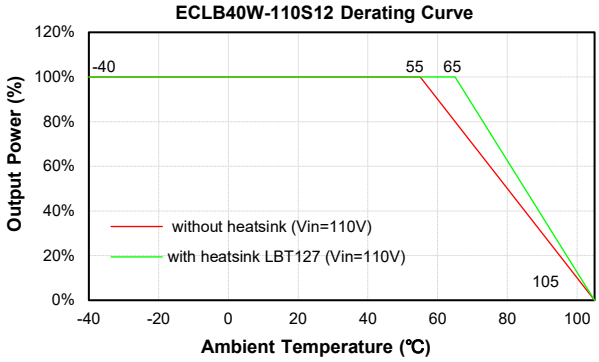
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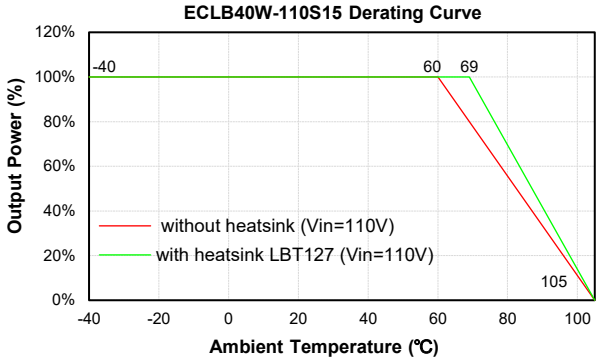
CHARACTERISTIC CURVE

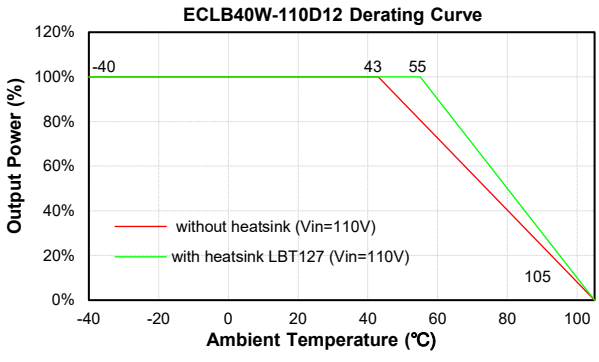
Power Derating Curve

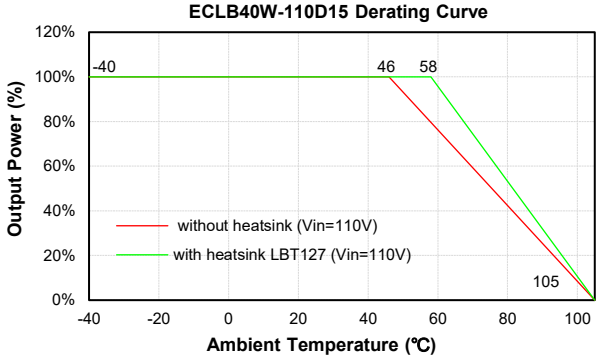


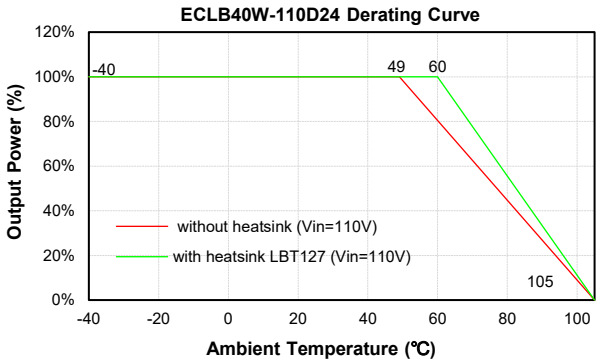








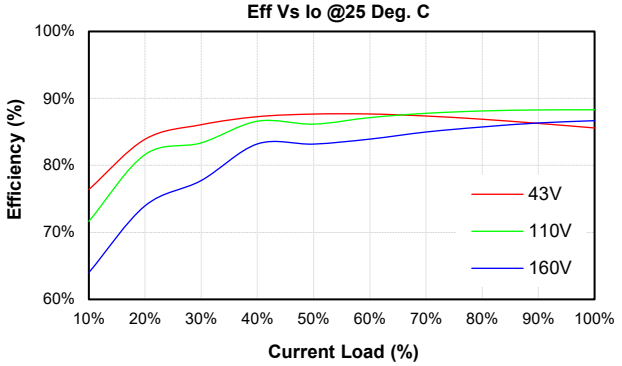




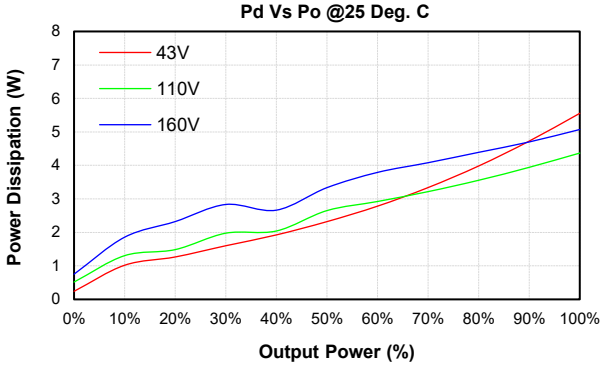
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Performance Data

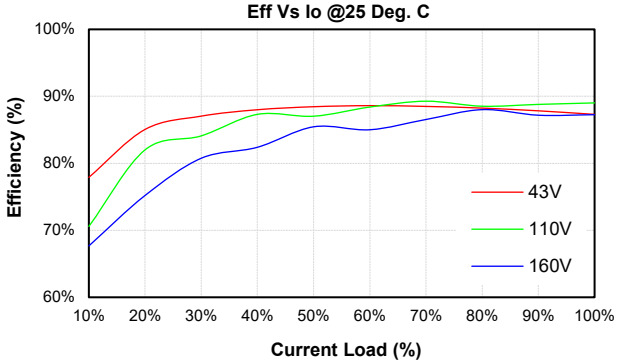
ECLB40W-110S33
Eff Vs Io @25 Deg. C



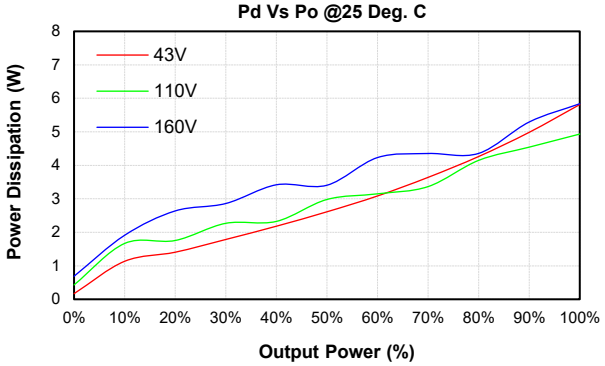
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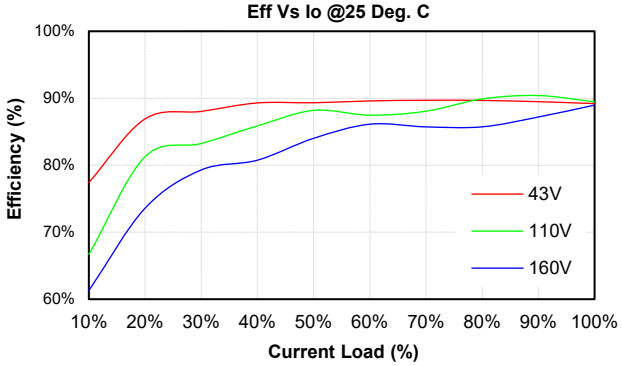
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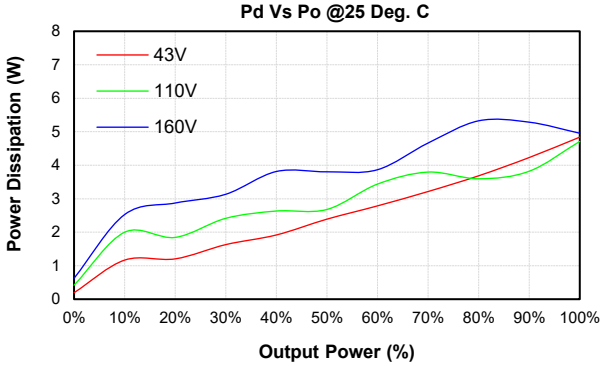
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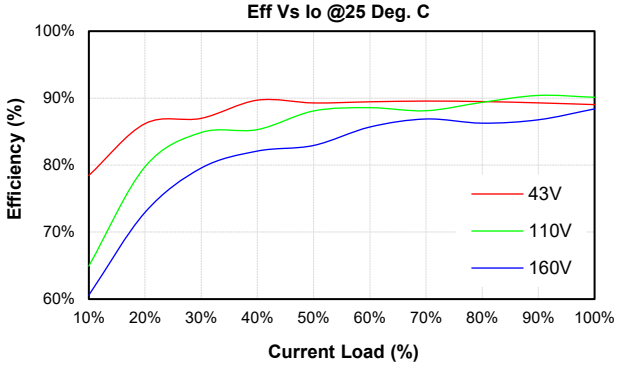
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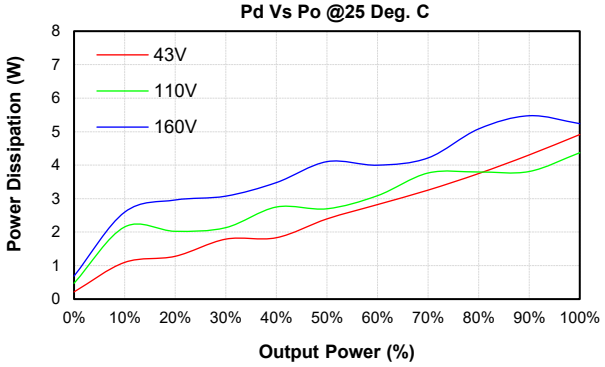
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ECLB40W-110S15
Eff Vs Io @25 Deg. C

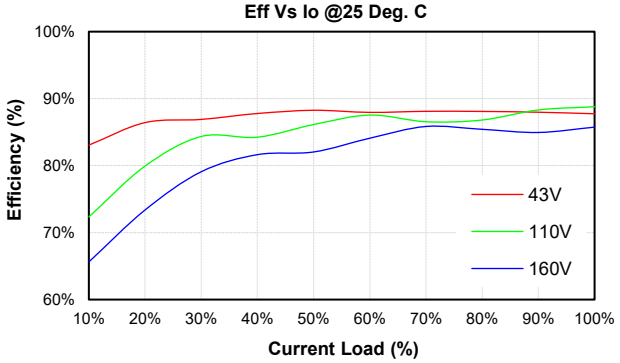


ECLB40W-110S15
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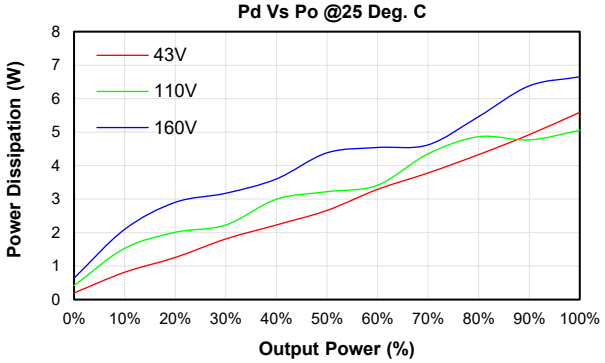


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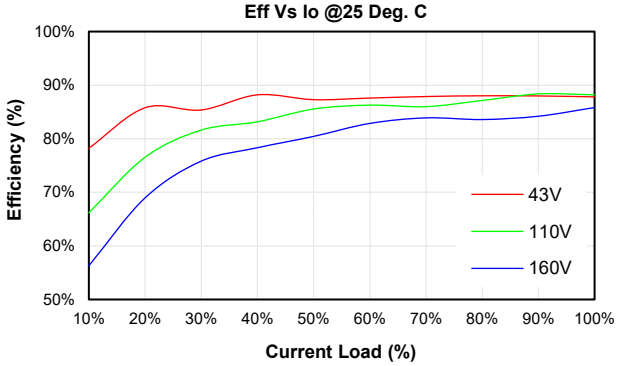
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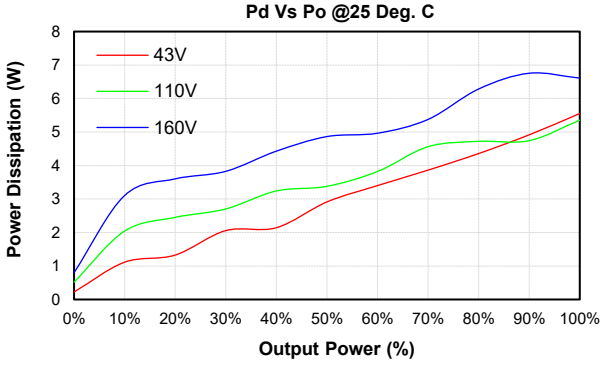
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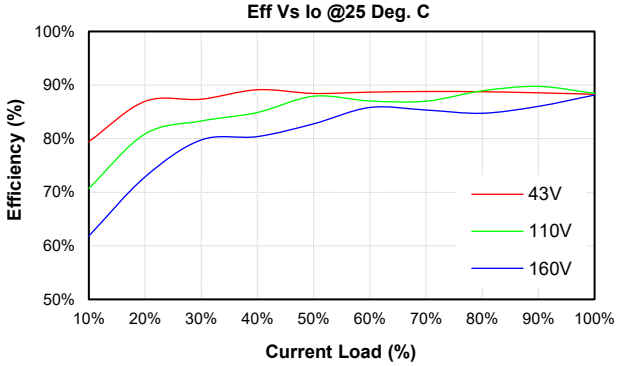
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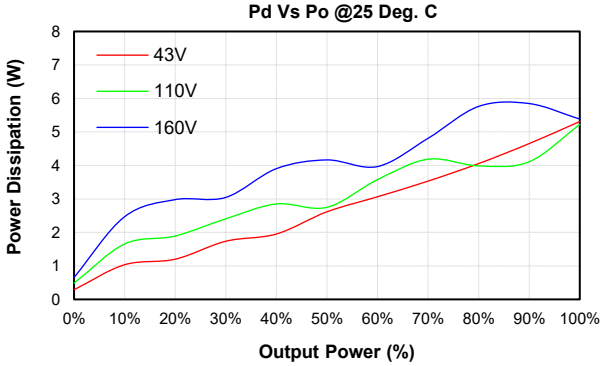
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Pd Vs Po @25 Deg. C



ECLB40W-110D24
Eff Vs Io @25 Deg. C

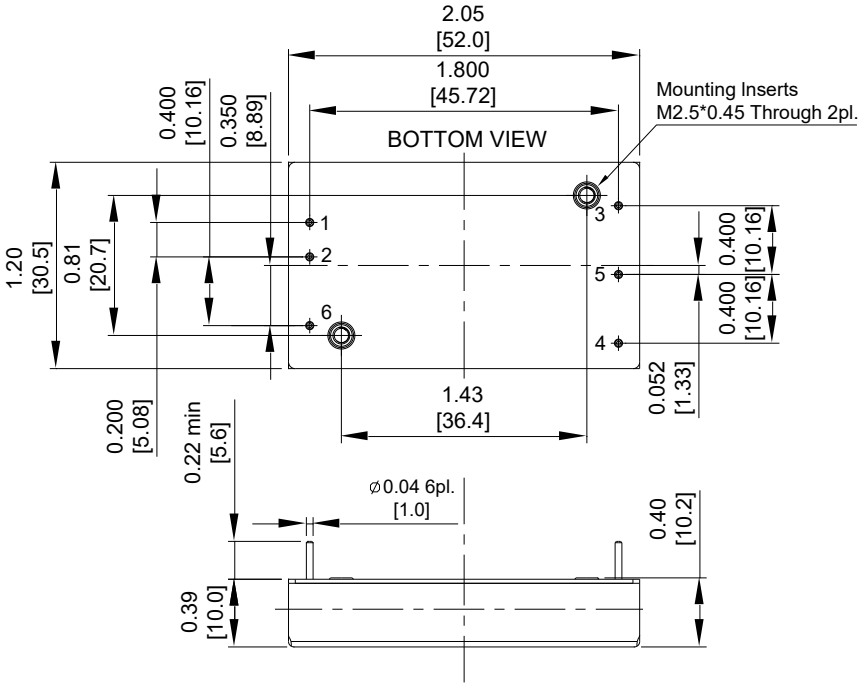


ECLB40W-110D24
Pd Vs Po @25 Deg. C



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MECHANICAL SPECIFICATION



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	

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

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