



**THE DATASHEET OF  
ECLB60W-24S15**





# ECLB60W SERIES 60 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

## Features

- Efficiency Up to 92%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Low No Load Power Consumption
- Fully protected (OTP/OCP/OVP/UVLO)
- 1500Vdc I/O Isolation
- Operating Case Temperature -40 to +105°C
- 2.05"x1.2"x0.4" Six-Sided Shield Metal Case  
Standard 2"x1" Pin Out Compatible
- Safety Meets IEC/EN/UL 62368-1
- Full Load Operation up to 60°C with Heat Sink  
LBT127 (M-C655) Natural Convection
- -55°C Operating Available (Suffix "-M2")



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(3)	(2)	
ECLB60W-24S33	9-36 VDC	3.3 VDC	0 mA	15 A	10 mA	2279 mA	90.5	90	15000uF
ECLB60W-24S05	9-36 VDC	5.0 VDC	0 mA	12 A	10 mA	2717 mA	92	92	12000uF
ECLB60W-24S12	9-36 VDC	12 VDC	0 mA	5 A	10 mA	2717 mA	92.5	92	5000µF
ECLB60W-24S15	9-36 VDC	15 VDC	0 mA	4 A	10 mA	2717 mA	92	91	4000µF
ECLB60W-24D12	9-36 VDC	±12 VDC	0 mA	±2.5 A	12 mA	2747 mA	91	91	2500uF
ECLB60W-24D15	9-36 VDC	±15 VDC	0 mA	±2.0 A	12 mA	2747 mA	92	91	2000uF
ECLB60W-48S33	18-75 VDC	3.3 VDC	0 mA	15 A	8 mA	1140 mA	90.5	90	15000uF
ECLB60W-48S05	18-75 VDC	5.0 VDC	0 mA	12 A	8 mA	1359 mA	92	92	12000uF
ECLB60W-48S12	18-75 VDC	12 VDC	0 mA	5 A	8 mA	1359 mA	92.5	92	5000µF
ECLB60W-48S15	18-75 VDC	15 VDC	0 mA	4 A	8 mA	1359 mA	92	91	4000µF
ECLB60W-48D12	18-75 VDC	±12 VDC	0 mA	±2.5 A	8 mA	1374 mA	91	91	2500uF
ECLB60W-48D15	18-75 VDC	±15 VDC	0 mA	±2.0 A	8 mA	1374 mA	92	91	2000uF

**NOTE:**

1. Nominal Input Voltage 24 or 48VDC.
2. Measured at Nominal Input Voltage.
3. Measured at 12VDC for 24Vin, 24VDC for 48Vin.
4. -55°C Start-up Screen per MIL-STD105E S1 Sampling Procedure for "-M2" Version.

## PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic	Mounting Inserts	Operating Case Temp. Range
ECLB60W-	II	O	XX	L	-Y (Option)	-Z (Option)
ECLB60W	24 : 24 VDC 48 : 48 VDC	S : Single D : Dual	33 : 3.3VDC 05 : 5.0VDC 12 : 12VDC 15 : 15VDC 12 : ±12VDC 15 : ±15VDC	None : Positive N : Negative	None : M2.5x0.45 Mounting Inserts  -C : Clear Mounting Insert (2.65mm DIA.)	None : -40~105°C  -M2 : -55~105°C

Part Number Example:

**ECLB60W-24S12N-M2:** LB Case, 60W, 4:1 18-75Vdc Input, Single 12Vdc Output, Negative Logic, -55~105°C Operating Case Temp. Range



# ECLB60W Series

## 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	24Vin 48Vin	-0.3		36 75	V <sub>dc</sub>
Input Surge Voltage	100ms max.	24Vin 48Vin			50 100	V <sub>dc</sub>
Operating Ambient Temperature	At the center part of case plate (with derating) Suffix "-M2" (with Derating)	All -M2	-40 -55		105 105	°C
Maximum Case Temperature		All			105	°C
Storage Temperature		All	-55		125	°C

### INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		24Vin 48Vin	9 18	24 48	36 75	V <sub>dc</sub>
Input Under Voltage Lockout						
Turn-On Voltage Threshold		24Vin 48Vin	8 16.5	8.5 17	8.8 17.5	V <sub>dc</sub>
Turn-Off Voltage Threshold		24Vin 48Vin	7.7 15.5	8 16	8.3 16.5	V <sub>dc</sub>
Lockout Hysteresis Voltage		24Vin 48Vin		0.5 1		V <sub>dc</sub>
Maximum Input Current	V <sub>in</sub> =9V, Full load. V <sub>in</sub> =18V, Full load.	24Vin 48Vin		7.5 3.8		A
No-Load Input Current	V <sub>in</sub> =24, 48V, I <sub>o</sub> =0A		See Model Number Table			mA
Input Filter	Pi filter	All				
Inrush Current (I <sup>2</sup> t)	As per ETS300 132-2.	All			0.1	A <sup>2</sup> 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 <sub>in</sub> =24, 48V, Full load, T <sub>c</sub> =25°C	All	-1.5		+1.5	%
Output Voltage Balance	V <sub>in</sub> =24, 48V, Full load, T <sub>c</sub> =25°C	Dual	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full Load to no load	All			±0.5	%
Line Regulation	V <sub>in</sub> =High line to low line, full load	All			±0.2	%
Cross Regulation	Load cross variation 10%/100%	Dual			±5.0	%
Temperature Coefficient	T <sub>c</sub> =-40°C to 105°C	All			±0.02	%/°C
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 1uF ceramic capacitors	3.3Vo 5Vo Others			100 100 150	mV
Output Current Range	V <sub>in</sub> = 9 to 36V, 18 to 75V		See Model Number Table			A
Over Current Protection	Hiccup mode. Auto recovery	All	110	130	170	%
Short Circuit Protection		All	Continuous, auto recovery.			
External Load Capacitance	Full load (resistive)		See Model Number Table			uF
Output Voltage Trim Range	P <sub>o</sub> ≤ max rated power, I <sub>o</sub> ≤ I <sub>o_max</sub>	All	-10		+10	%



# ECLB60W Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Over Voltage Protection	Zener or TVS clamp	3.3Vo		3.9		V <sub>dc</sub>
		5Vo		6.2		
		12Vo		15		
		15Vo		18		
		±12Vo		±15		
		±15Vo		±18		

## EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	V <sub>in</sub> =24V, 48V		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 <sub>o_max</sub> step load change d <sub>i</sub> /d <sub>t</sub> =0.1A/us (within 1% V <sub>out</sub> 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 <sub>on/off</sub> to 10%V <sub>o_set</sub> , Remote On	All		15		ms
Turn-On Delay Time, From Input	V <sub>in_min</sub> to 10%V <sub>o_set</sub> , Power Up	All		15		ms
Output Voltage Rise Time	10%V <sub>o_set</sub> to 90%V <sub>o_set</sub>	All		15		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			1500	V <sub>dc</sub>
	1 Minute; input to case				1000	
	1 Minute; output to case				1000	
Isolation Resistance	Input to output	All	1000			MΩ
Isolation Capacitance	Input to output	All		1500		pF
	Input to case	All		1000		
	Output to case	All		1000		

## FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pulse width modulation (PWM), Fixed	Single	210	245	265	KHz
		Dual	270	300	330	
On/Off Control, Positive Remote On/Off Logic, Refer to -V <sub>in</sub> Pin.						
Logic Low (Module Off)	V <sub>on/off</sub> at I <sub>on/off</sub> =1.0mA	-M2	0		1.0	V
		Others	0		1.2	
Logic High (Module On)	V <sub>on/off</sub> at I <sub>on/off</sub> =0.0uA, Pin open=On	All	3.5		75	V
On/Off Control, Negative Remote On/Off Logic, Refer to -V <sub>in</sub> Pin						
Logic High (Module Off)	V <sub>on/off</sub> at I <sub>on/off</sub> =0.0uA, Pin open=Off	All	3.5		75	V
Logic Low (Module On)	V <sub>on/off</sub> at I <sub>on/off</sub> =1.0mA	-M2	0		1.0	V
		Others	0		1.2	
On/Off Current (for Both Remote On/Off Logic)	I <sub>on/off</sub> at V <sub>on/off</sub> =0V	All		0.3	1	mA
Leakage Current (for Both Remote On/Off Logic)	Logic high, V <sub>on/off</sub> =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		°C
Over Temperature Recovery				100		°C



# ECLB60W Series

## 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	3.3Vo		1116		K hours
		5Vo		872		
		12Vo		930		
		15Vo		1230		
		±12Vo		859		
		±15Vo		1063		
Weight		All		39		grams
Case Material	Aluminum, UL 94V-0					
Base Plate Material	FR4					
Potting Material	UL 94V-0					
Pin Material	Base: Copper Plating: Matte Tin					
Shock/Vibration	MIL-STD-810F Compliant					
Humidity	95% RH max. Non Condensing					
Altitude	5000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN45545-2 Compliant					
EMI	Meets EN55032 Compliant (with External Filter)					Class A
ESD	Meets EN61000-4-2	Level 3: Air ±8kV, Contact ±6kV				Perf. Criteria A
Radiated Immunity	Meets EN61000-4-3	Level 3: 80~1000MHz, 20V/m				Perf. Criteria A
Fast Transient	Meets EN61000-4-4	Level 3: On power input port, ±2kV, external input capacitor required				Perf. Criteria A
Surge	Meets EN61000-4-5	Level 4: Line to earth, ±4kV, Line to line, ±2kV				Perf. Criteria A
Conducted Immunity	Meets EN61000-4-6	Level 3: 0.15~80MHz, 10V				Perf. Criteria A
Application Note Link	<a href="#">ECLB60W Series App Notes</a>					
Packaging Information Link	<a href="#">Packaging Information</a>					



# ECLB60W Series

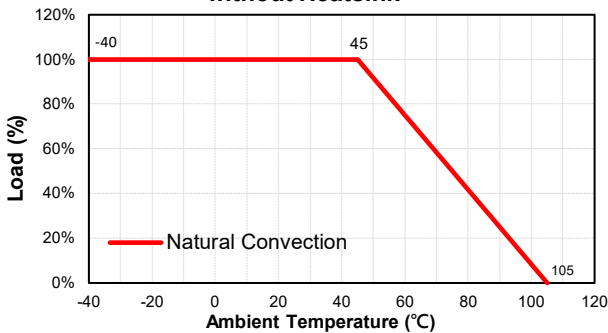
## EN45545-2 Fire & Smoke Test Conditions

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

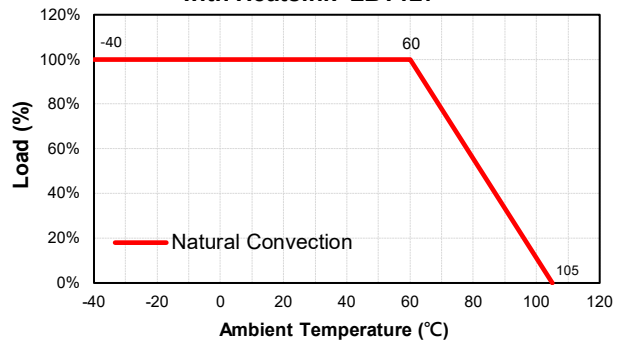
## CHARACTERISTIC CURVE

### Power Derating Curve

ECLB60W Derating Curve  
without Heatsink

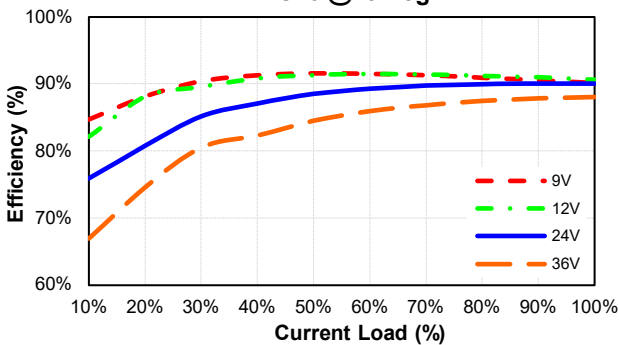


ECLB60W Derating Curve  
with Heatsink LBT127

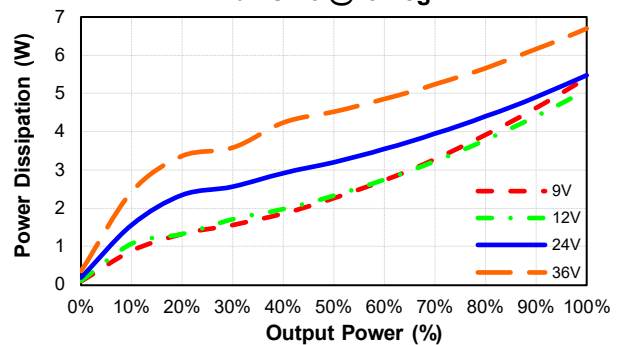


### Performance Data

ECLB60W-24S33  
Eff Vs Io @25 Deg. C



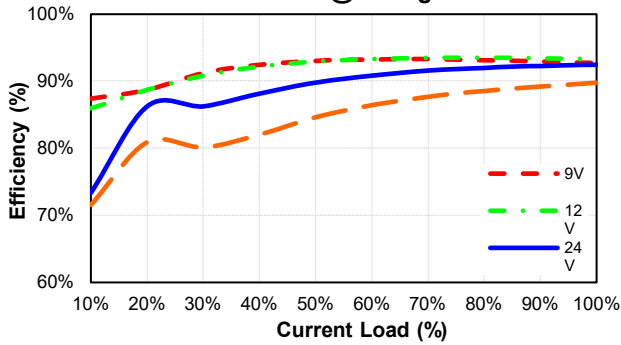
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Pd Vs Po @25 Deg. C



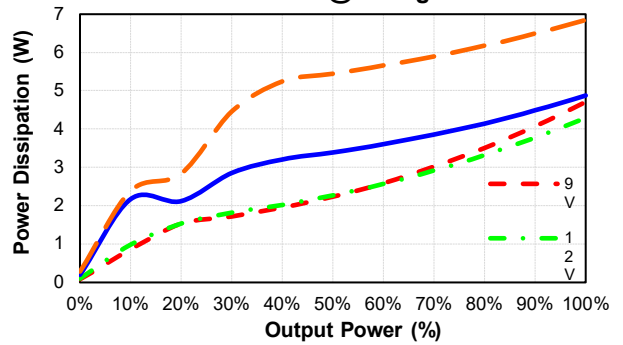


# ECLB60W Series

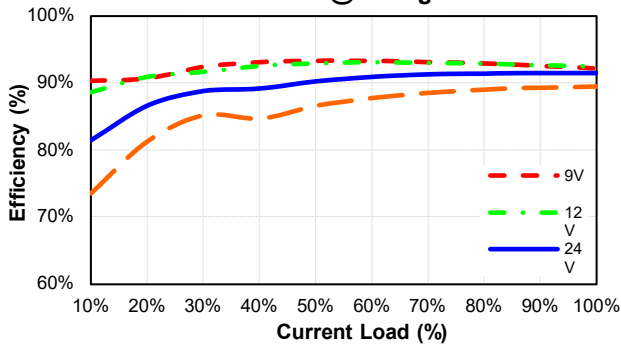
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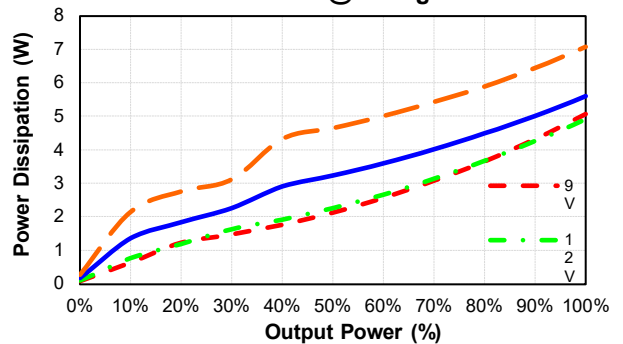
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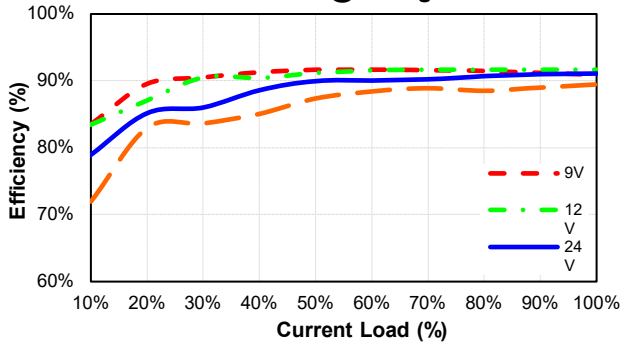
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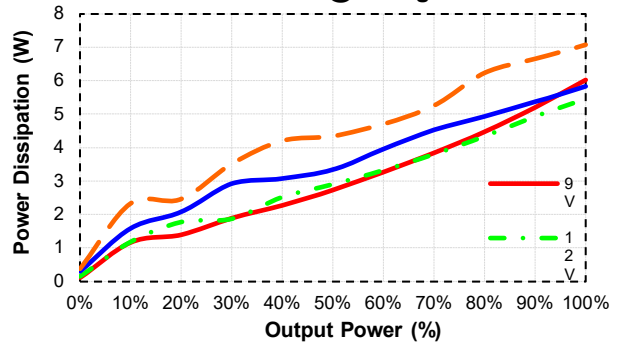
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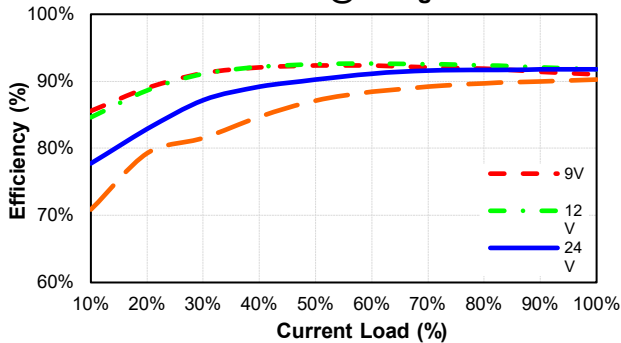
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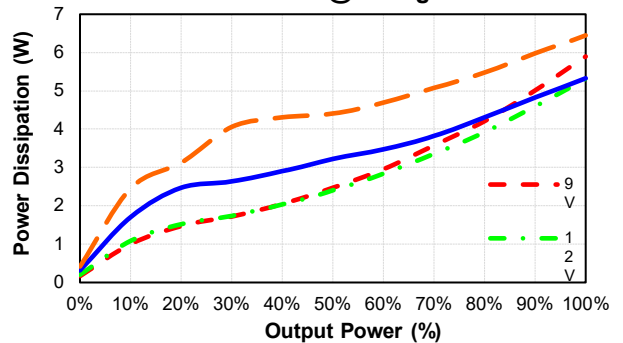
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**ECLB60W-24D15**  
Eff Vs Io @25 Deg. C



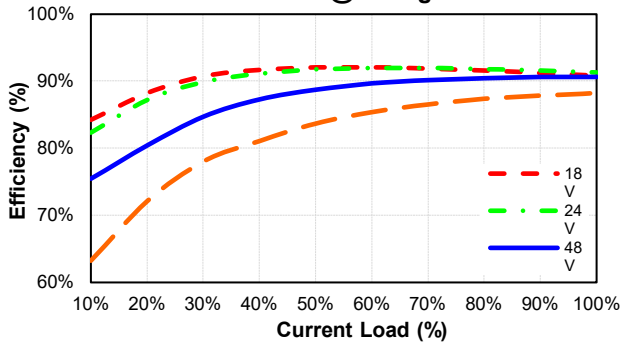
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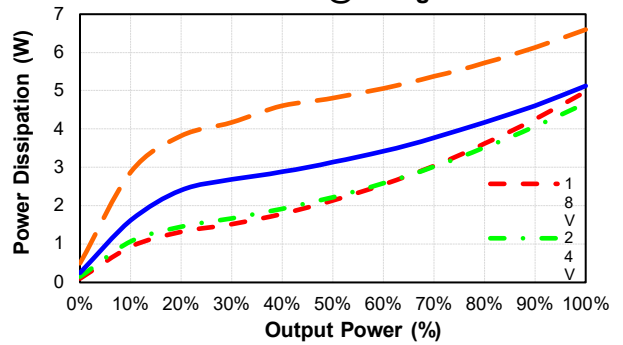


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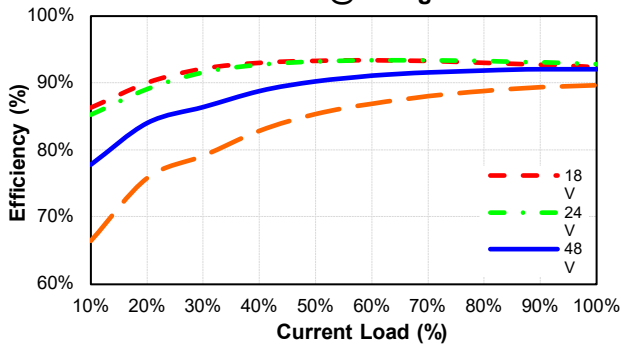
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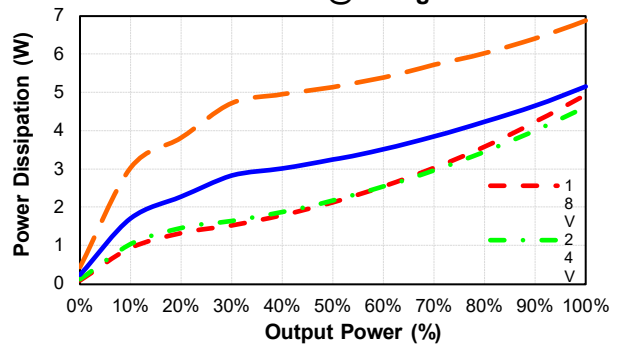
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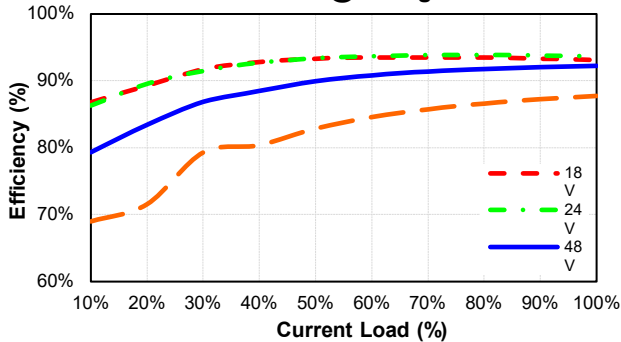
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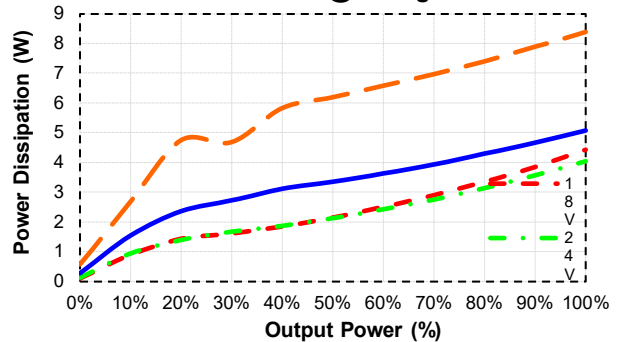
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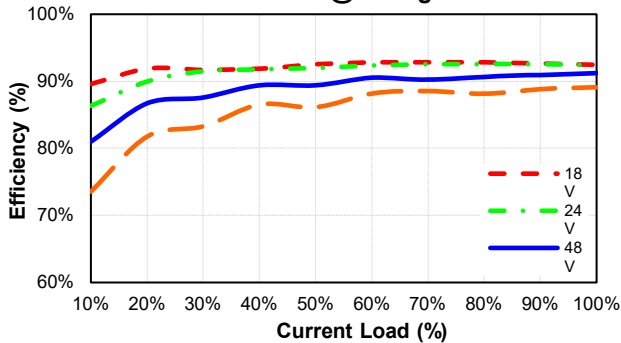
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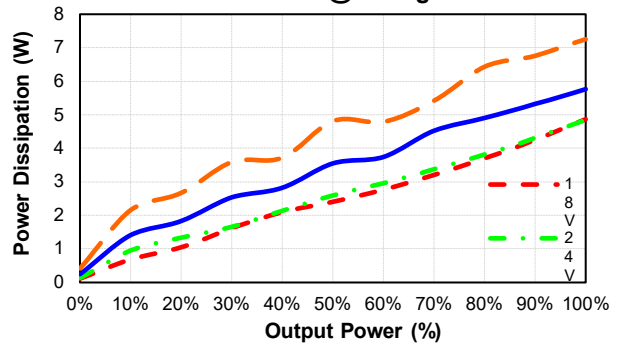
**ECLB60W-48S12**  
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**ECLB60W-48S15**  
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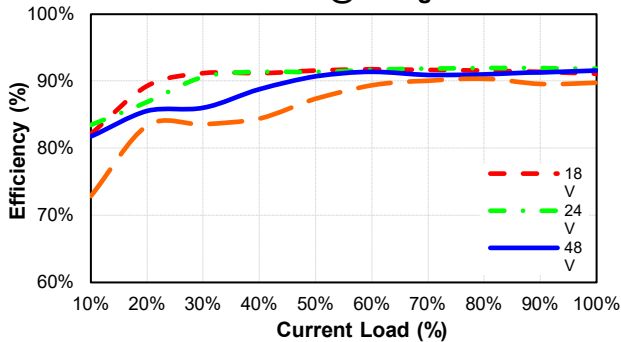
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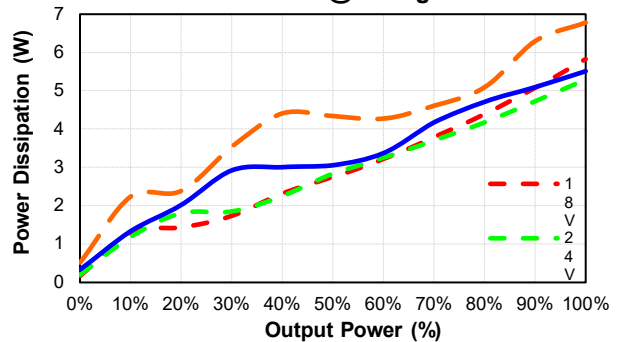


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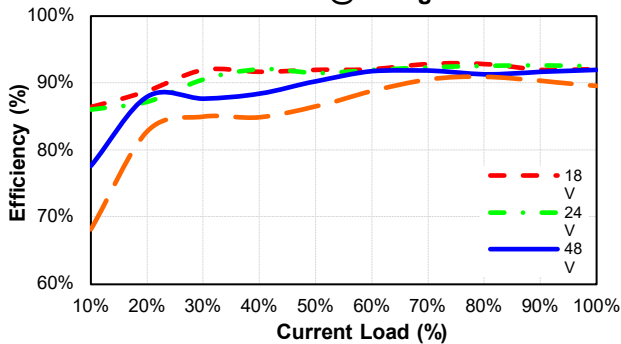
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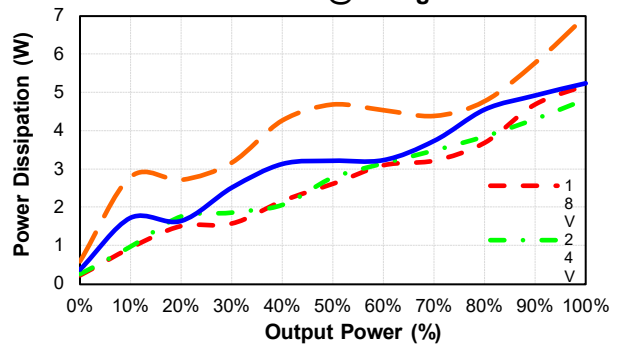
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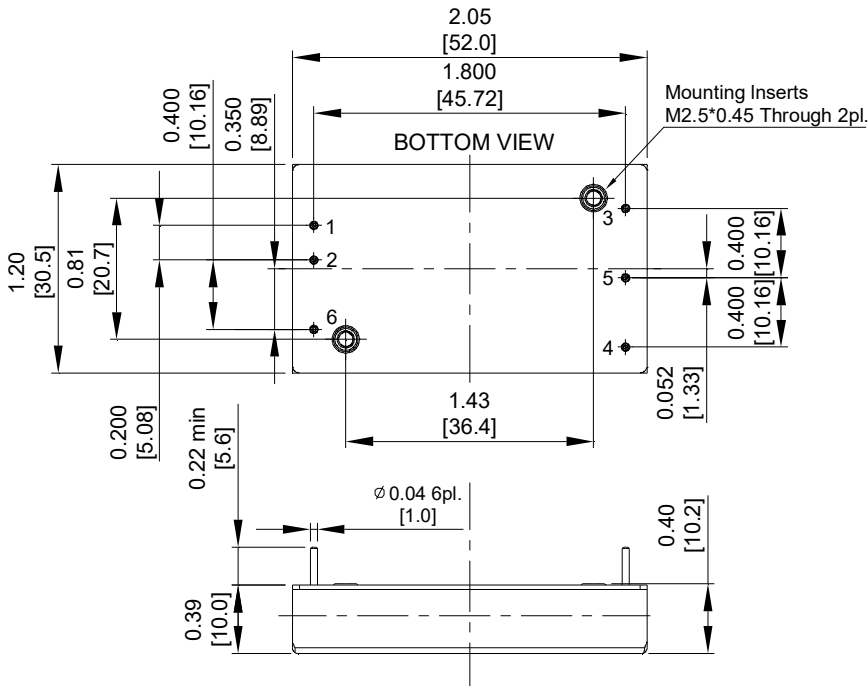
**ECLB60W-48D15**  
Eff Vs Io @25 Deg. C



**ECLB60W-48D15**  
Pd Vs Po @25 Deg. C



## 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

CINCON Electronics Co. Ltd.  
Add: 14F, No. 306, Sec.4, Hsin Yi Rd., Taipei, Taiwan  
Tel: 886-2-27086210  
Fax: 886-2-27029852  
E-mail: [sales@cincon.com.tw](mailto:sales@cincon.com.tw)  
Web: [www.cincon.com](http://www.cincon.com)

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