



electronic powersolutions

# EC2SBW-H SERIES 10 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

## Features

- Efficiency up to 89.5%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Low No Load Power Consumption
- Fully Protected (OCP/OVP/UVLO)
- 3000Vdc I/O Isolation
- Operating Ambient Temperature -40 to +105°C
- Meets Industrial Standard 1.0"x1.0"x0.40"
- Safety Meets IEC/EN/UL 62368-1
- EMI Meets EN 55032 Class A  
Without External Component
- No Tantalum Capacitor Inside
- -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	(1)	(2)	
EC2SBW-24S33H	9-36 VDC	3.3 VDC	0 mA	2000 mA	6 mA	340 mA	81	81	2000uF
EC2SBW-24S05H	9-36 VDC	5 VDC	0 mA	2000 mA	6 mA	485 mA	86	86	2000uF
EC2SBW-24S12H	9-36 VDC	12 VDC	0 mA	833 mA	6 mA	468 mA	89	89	833uF
EC2SBW-24S15H	9-36 VDC	15 VDC	0 mA	666 mA	8 mA	465 mA	89.5	89.5	666uF
EC2SBW-24D12H	9-36 VDC	±12 VDC	0 mA	±417 mA	8 mA	471 mA	88.5	89	417uF
EC2SBW-24D15H	9-36 VDC	±15 VDC	0 mA	±333 mA	12 mA	473 mA	88	89	333uF
EC2SBW-48S33H	18-74 VDC	3.3 VDC	0 mA	2000 mA	6 mA	172 mA	80	81	2000uF
EC2SBW-48S05H	18-74 VDC	5 VDC	0 mA	2000 mA	6 mA	244 mA	85.5	86	2000uF
EC2SBW-48S12H	18-74 VDC	12 VDC	0 mA	833 mA	6 mA	237 mA	88	89	833uF
EC2SBW-48S15H	18-74 VDC	15 VDC	0 mA	666 mA	6 mA	233 mA	89.5	90	666uF
EC2SBW-48D12H	18-74 VDC	±12 VDC	0 mA	±417 mA	6 mA	236 mA	88.5	89	417uF
EC2SBW-48D15H	18-74 VDC	±15 VDC	0 mA	±333 mA	7 mA	235 mA	88.5	89	333uF

NOTE:

1. Nominal Input Voltage 24 or 48 VDC.
2. Measured at 12VDC for 24Vin, 24VDC for 48Vin.

## PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	I/O Isolation	Remote On/Off Logic	Operating Case Temp. Range
EC2SBW-	II	O	XX	H	L	-Z (Option)
EC2SBW	24: 24VDC 48: 48VDC	S : Single D : Dual	33 : 3.3VDC 05 : 5.0VDC 12 : 12VDC 15 : 15VDC 12 : ±12VDC 15 : ±15VDC	3000Vdc	None : Positive N : Negative	None : -40~105°C -M2 : -55~105°C

Part Number Example:

**EC2SBW-24S12HN-M2:** 1.0"x1.0", 10W, 4:1 9-36Vdc Input, Single 12Vdc Output, Negative Logic, -55~105°C Operating Case Temp. Range

REVISION: V10



## 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	-0.3		36	V <sub>dc</sub>
		48Vin	-0.3		74	
Input Surge Voltage	100ms max.	24Vin			50	V <sub>dc</sub>
		48Vin			100	
Operating Ambient Temperature	At the center part of case plate (with derating) Suffix "-M2" (with Derating)	All	-40		105	°C
		-M2	-55		105	
Operating 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	9	24	36	V <sub>dc</sub>
		48Vin	18	48	74	
Input Under Voltage Lockout						
Turn-On Voltage Threshold	100% Load	24Vin	8	8.5	8.8	V <sub>dc</sub>
		48Vin	16.5	17	17.5	
Turn-Off Voltage Threshold	100% Load	24Vin	7.5	8	8.3	V <sub>dc</sub>
		48Vin	15.5	16	16.5	
Lockout Hysteresis Voltage	100% Load	24Vin		0.5		V <sub>dc</sub>
		48Vin		1		
Maximum Input Current	V <sub>in</sub> =9V, full load V <sub>in</sub> =18V, full load	24Vin		1.4		A
		48Vin		0.7		
No-Load Input Current	V <sub>in</sub> =Nominal, 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> =Nominal, full load, T <sub>c</sub> =25°C	All	-1.0		+1.0	%
Output Voltage Balance	V <sub>in</sub> =Nominal, full load, T <sub>c</sub> =25°C	Dual	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full load to no load	All			±1.0	%
Line Regulation	V <sub>in</sub> =High line to low line, full load	All			±0.2	%
Temperature Coefficient	T <sub>c</sub> =-40°C to 85°C	All			±0.02	%/°C
Output Voltage Ripple and Noise (5Hz to 20MHz Bandwidth)						
Peak-to-Peak	Full load, 1.0uF ceramic capacitors	3.3Vo			100	mV
		5Vo			100	
		12Vo			120	
		15Vo			150	
Output Current Range	V <sub>in</sub> =Nominal	See Model Number Table				A
Over Current Protection	Hiccup mode. Auto recovery	All	110	140	170	%



# EC2SBW-H Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Short Circuit Protection		All	Continuous, Auto Recovery			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF
Output Voltage Trim Range	$P_o \leq \text{max. rated power}$ , $I_o \leq I_{o\_max}$ .	Single	-10		+10	%
Over Voltage Protection	Zener 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> =Nominal, full load, T <sub>c</sub> =25°C	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 di/dt=0.1A/us (within 1% V <sub>out</sub> nominal)	All			±5	%
Recovery Time		All			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		5		ms
Turn-On Delay Time, From Input	V <sub>in_min</sub> . to 10%V <sub>o_set</sub> , Power up	All		5		ms
Output Voltage Rise Time	10%V <sub>o_set</sub> to 90%V <sub>o_set</sub>	All		5		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			2000 3000	V <sub>ac</sub> V <sub>dc</sub>
Isolation Resistance	Input to output	All	1000			MΩ
Isolation Capacitance	Input to output (10KHz, 0.25V)	All		1000		pF

## FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Output ripple frequency	All	477	530	583	KHz
On/Off Control, Positive Remote On/Off Logic, Refer to -Vin Pin						
Logic Low (Module Off)	V <sub>on/off</sub> at I <sub>on/off</sub> =1.0mA	All	0		1.2	V
Logic High (Module On)	V <sub>on/off</sub> at I <sub>on/off</sub> =0.0uA, Pin open=on	All	3.5 or Open Circuit		74	V
On/Off Control, Negative Remote On/Off Logic, Refer to -Vin Pin						
Logic High (Module Off)	V <sub>on/off</sub> at I <sub>on/off</sub> =0.0uA, Pin open=off	All	3.5 or Open Circuit		74	V
Logic Low (Module On)	V <sub>on/off</sub> at I <sub>on/off</sub> =1.0mA	All	0		1.2	V
On/Off Current (for Both Remote On/Off Logic)	I <sub>on/off</sub> at V <sub>on/off</sub> =0V	All		0.4	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		3	5	mA



## GENERAL SPECIFICATIONS

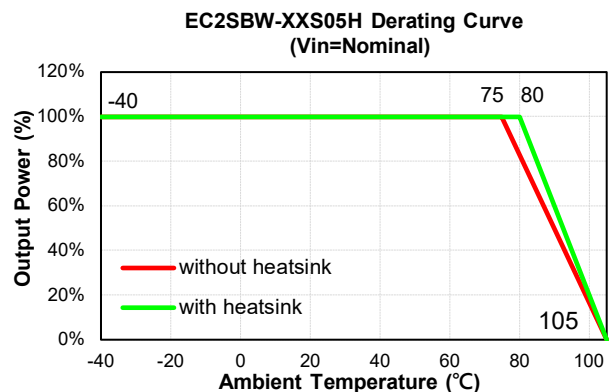
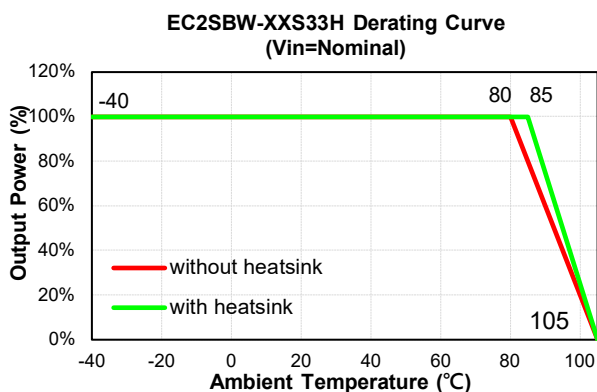
PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I <sub>o</sub> =100% of I <sub>o,max</sub> . MIL-HDBK - 217F_Notice 1, GB, 25°C	24S33H		1681		K hours
		24S05H		1493		
		24S12H		1562		
		24S15H		1642		
		24D12H		1481		
		24D15H		1558		
		48S33H		1695		
		48S05H		1504		
		48S12H		1571		
		48S15H		1649		
		48D12H		1490		
		48D15H		1509		
Weight		All		18		grams
Case Material	Black Coated Copper					
Base plate Material	Non-Conductive Base					
Potting Material	UL 94V-0					
Pin Material	Base: Copper Plating: Nickel with Matte Tin					
Shock/Vibration	MIL-STD-810F Compliant					
Humidity	95% RH max. Non Condensing					
Altitude	2000m Operating Altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN 45545-2 Compliant					

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

EMI	Meets EN 55032, Conducted/Radiation	without external components required	Class A
	Meets EN 55032, Conducted/Radiation	external components required	Class B
ESD	IEC 61000-4-2 Level 3: Air ±8kV, Level 2: Contact ±4kV		Perf. Criteria A
Radiated Immunity	EN 61000-4-3 Level 2: 80~1000MHz, 3V/m		Perf. Criteria A
Fast Transient	EN 61000-4-4 Level 1: On power input port, ±0.5kV, external components required		Perf. Criteria A
Surge	EN 61000-4-5 Level 1: Line to line, ±0.5kV, external components required		Perf. Criteria A
Conducted Immunity	EN 61000-4-6 Level 2: 0.15~80MHz, 3V		Perf. Criteria A
Application Note Link			<a href="#">EC2SBW-H Series App Notes</a>
Packaging Information Link			<a href="#">Packaging Information</a>

## CHARACTERISTIC CURVE

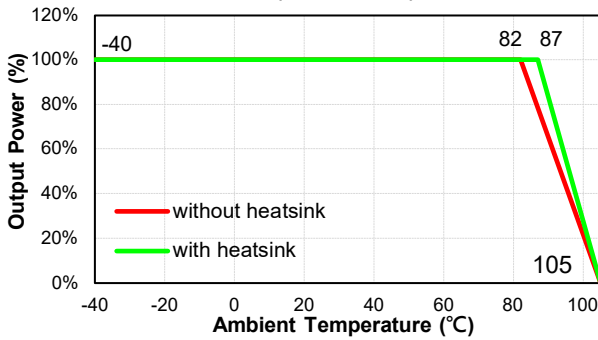
### Power Derating Curve



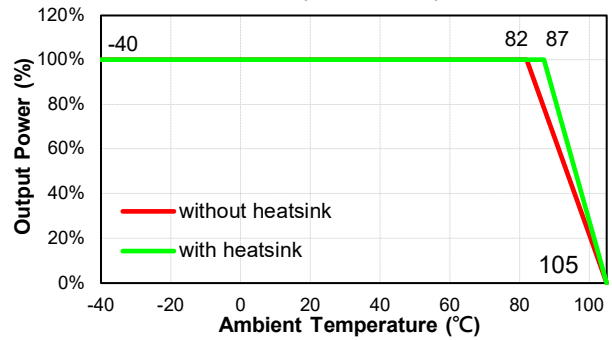


# EC2SBW-H Series

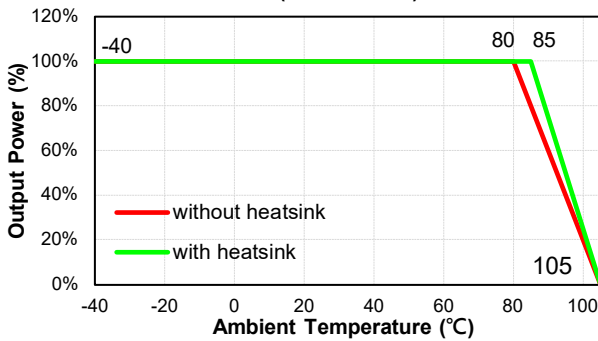
**EC2SBW-XXS12H Derating Curve (Vin=Nominal)**



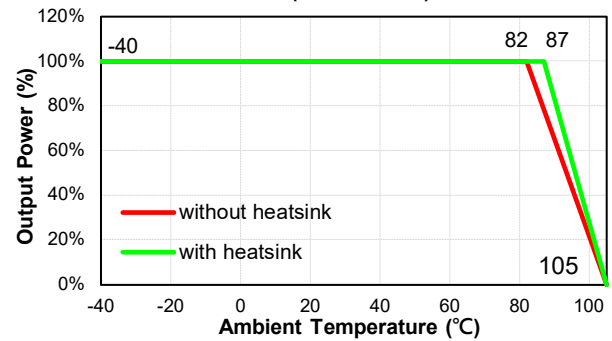
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**EC2SBW-XXD12H Derating Curve (Vin=Nominal)**

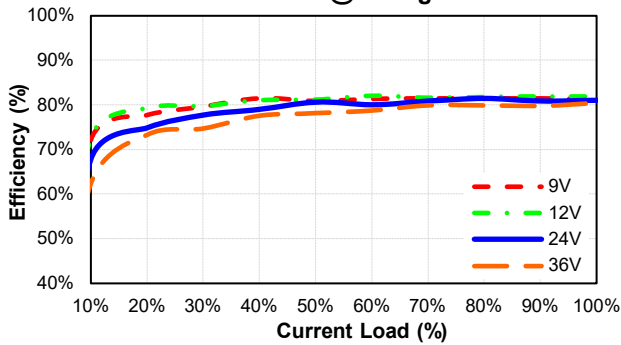


**EC2SBW-XXD15H Derating Curve (Vin=Nominal)**

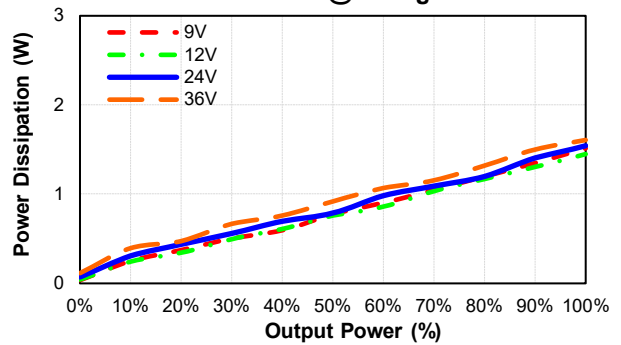


## Performance Data

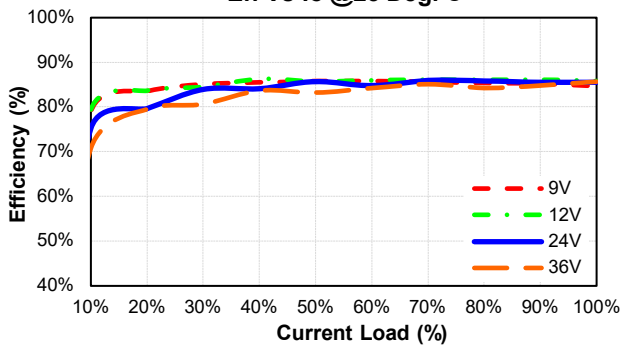
**EC2SBW-24S33H Eff Vs Io @25 Deg. C**



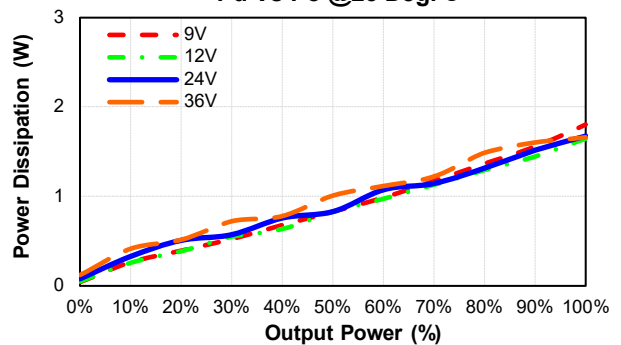
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**EC2SBW-24S05H Eff Vs Io @25 Deg. C**

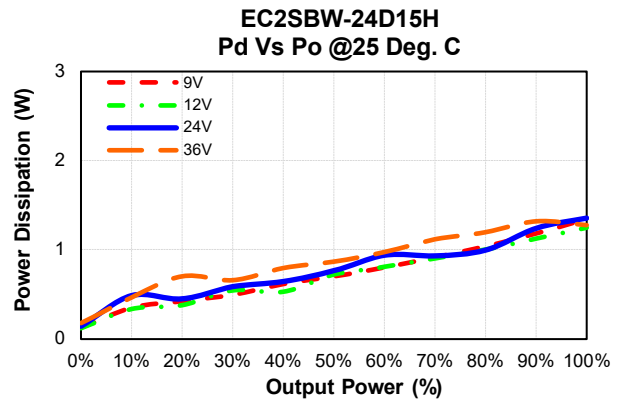
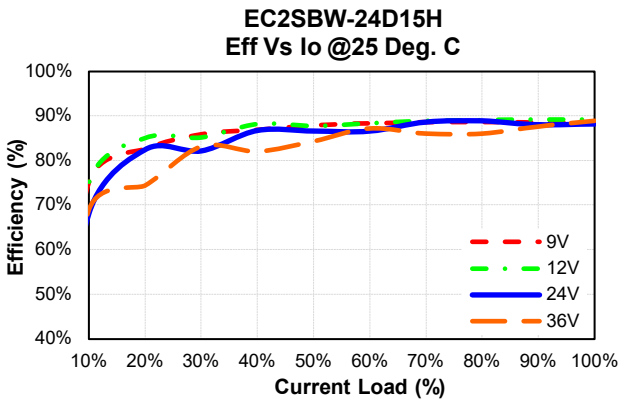
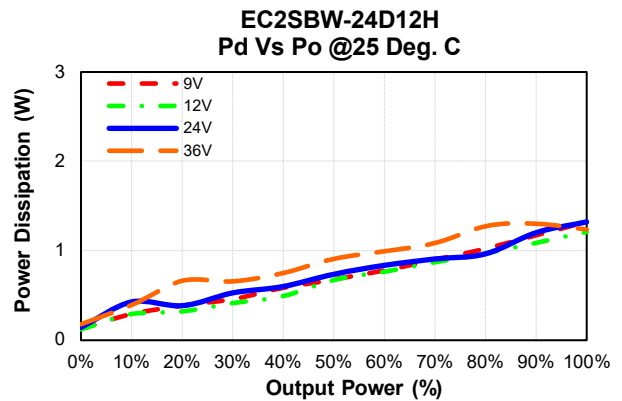
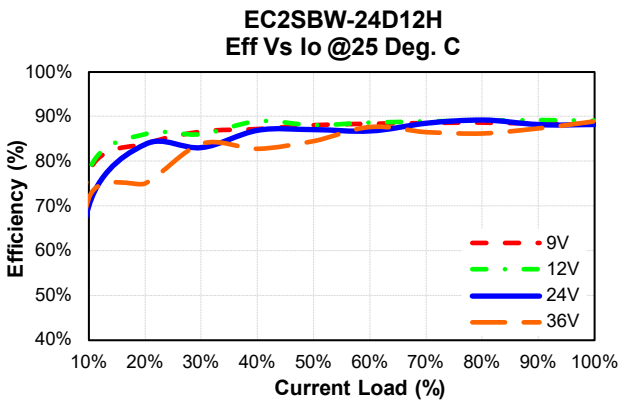
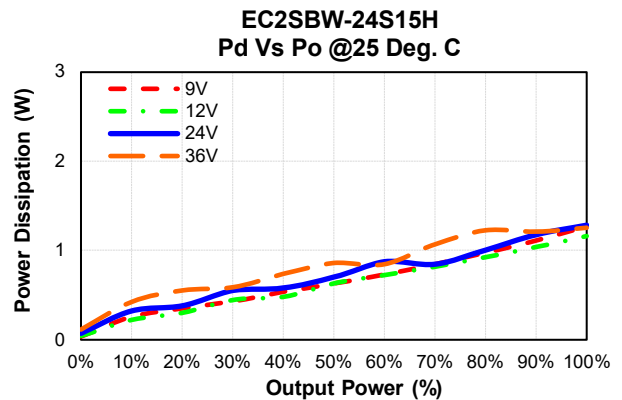
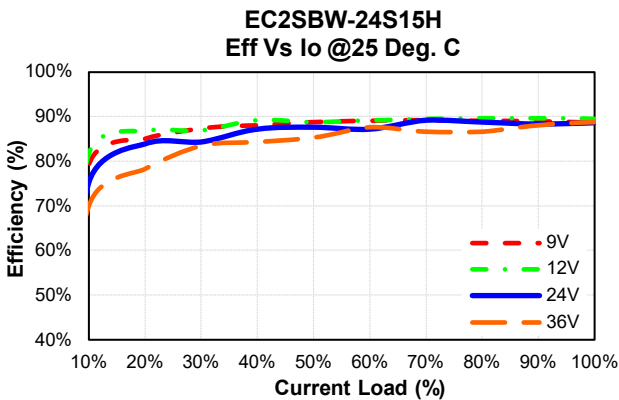
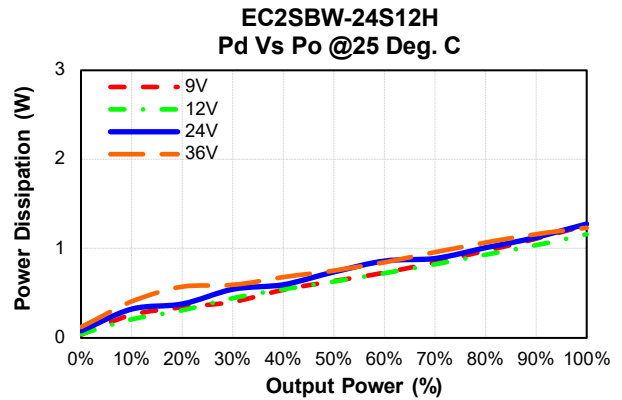
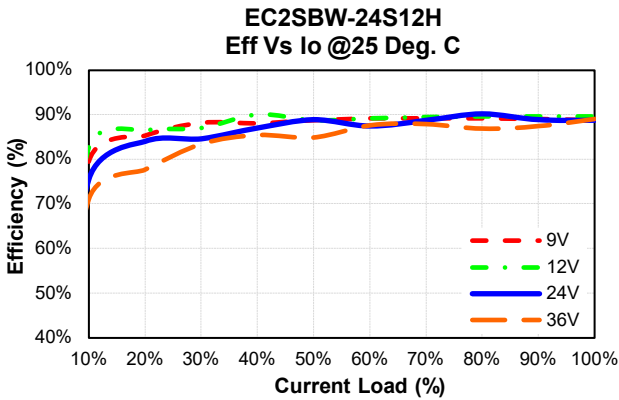


**EC2SBW-24S05H Pd Vs Po @25 Deg. C**





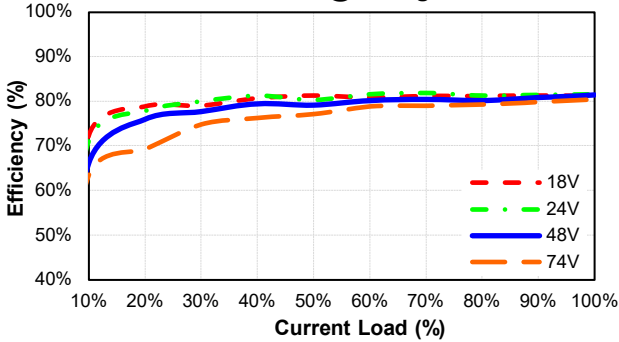
# EC2SBW-H Series



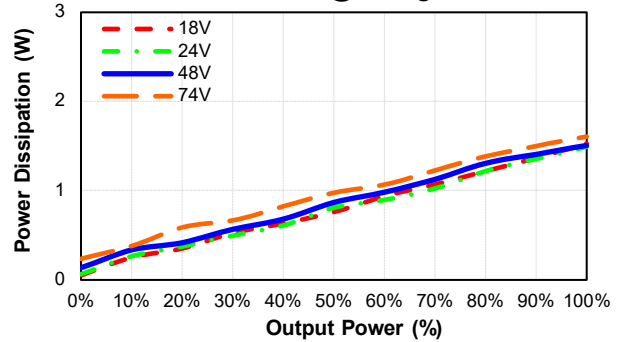


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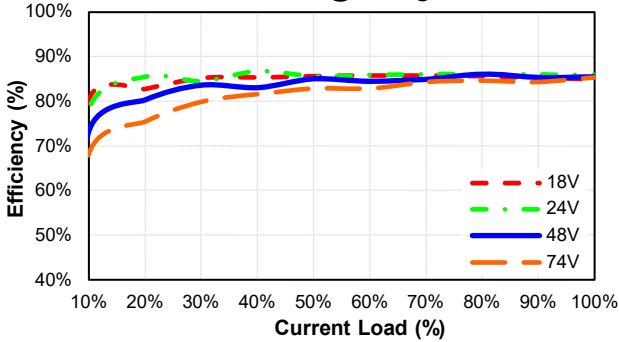
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Eff Vs Io @25 Deg. C



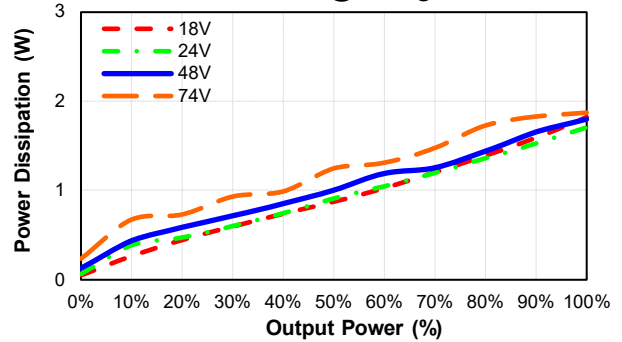
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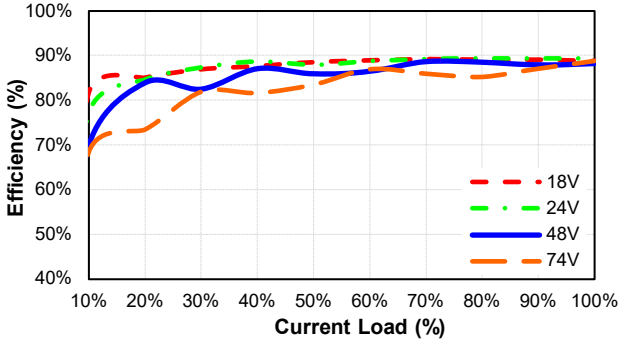
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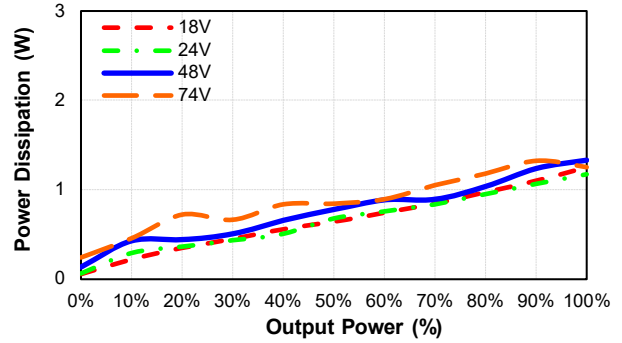
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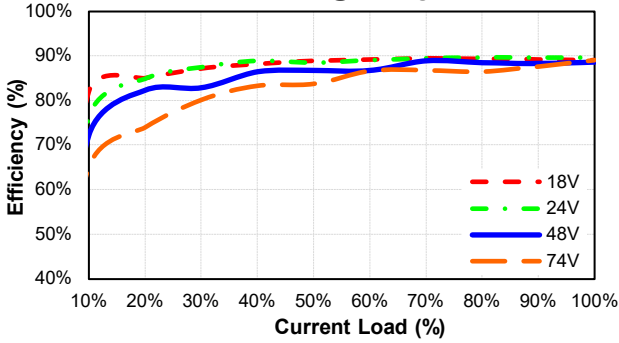
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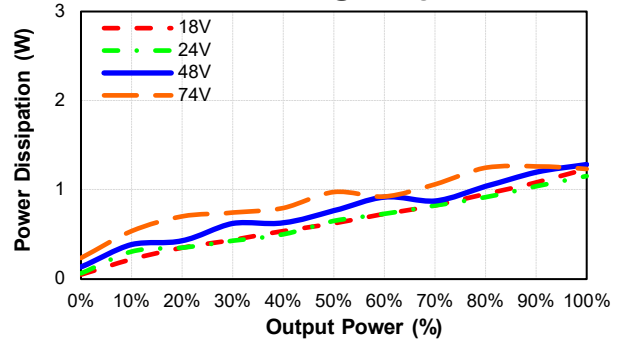
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**EC2SBW-48S15H**  
Eff Vs Io @25 Deg. C



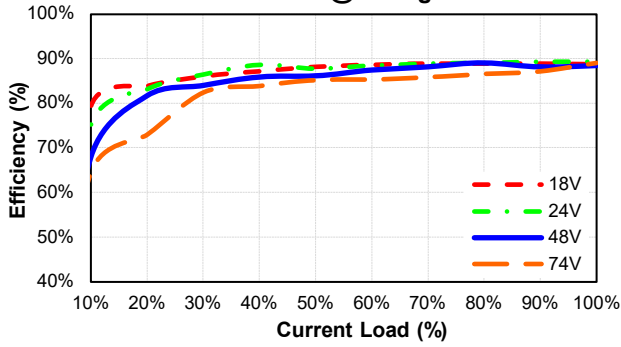
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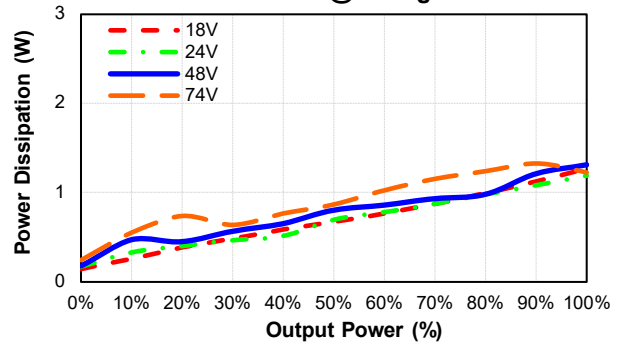


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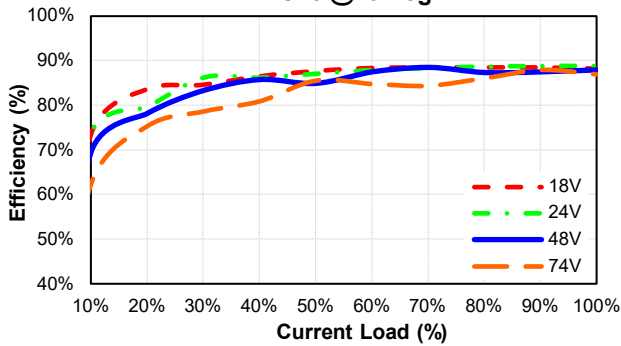
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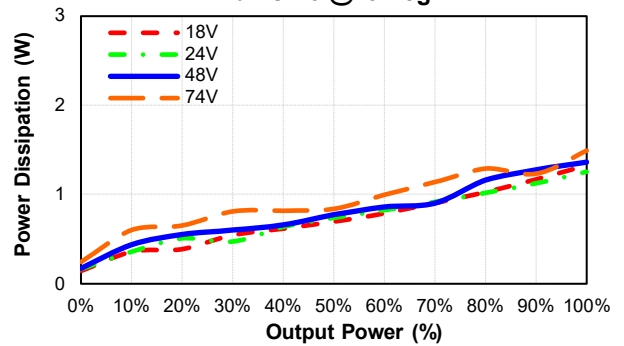
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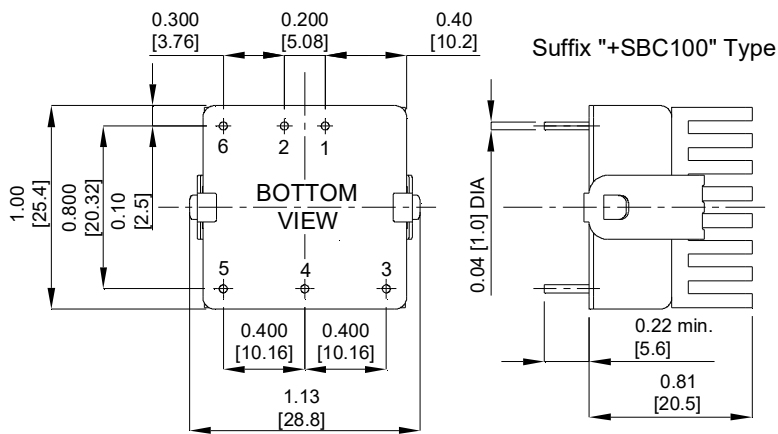
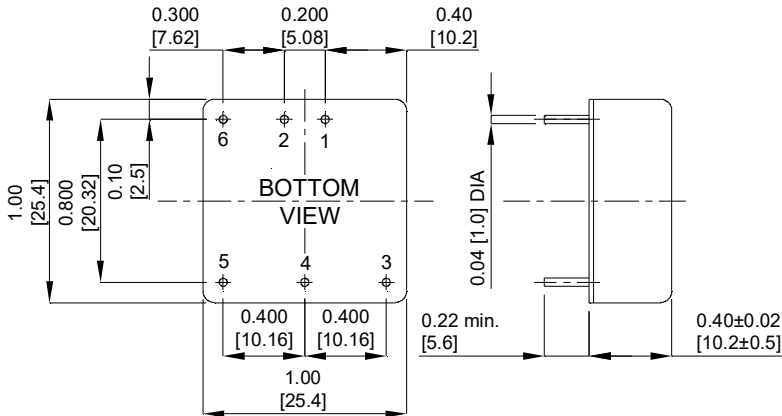
**EC2SBW-48D15H**  
Pd Vs Po @25 Deg. C







## MECHANICAL SPECIFICATION



NOTE: Pin Size is 0.04±0.004 Inch [1.0±0.1 mm]DIA  
 All Dimensions In Inches [mm]  
 Tolerances Inches: X.XX= ±0.04 , X.XXX= ±0.010  
 Millimeters: X.X= ±1.0 , X.XX=±0.25

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