



# EC4SAWH SERIES 6 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

## Features

- Efficiency Up to 87.5%
- Fixed Switching Frequency
- Regulated Outputs
- Negative Remote On/Off
- 3000Vdc I/O Isolation
- Continuous Short Circuit Protection
- Safety Meets IEC/EN/UL 62368-1
- Shock & Vibration MIL-STD-810F Compliant



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(3)	(2)	
EC4SAW-24S33HN	9-36 VDC	3.3 VDC	0 mA	1500 mA	4 mA	256 mA	81.5	80.5	4700 uF
EC4SAW-24S05HN	9-36 VDC	5 VDC	0 mA	1200 mA	4 mA	292 mA	85.5	85.5	2200 uF
EC4SAW-24S12HN	9-36 VDC	12 VDC	0 mA	500 mA	5 mA	291 mA	88	86	1100 uF
EC4SAW-24S15HN	9-36 VDC	15 VDC	0 mA	400 mA	5 mA	286 mA	88	87.5	470 uF
EC4SAW-24D05HN	9-36 VDC	±5 VDC	0 mA	±600 mA	4 mA	292 mA	85.5	85.5	1400 uF
EC4SAW-24D12HN	9-36 VDC	±12 VDC	0 mA	±250 mA	6 mA	291 mA	88	86	660 uF
EC4SAW-24D15HN	9-36 VDC	±15 VDC	0 mA	±200 mA	6 mA	289 mA	87	86.5	220 uF
EC4SAW-48S33HN	18-74 VDC	3.3 VDC	0 mA	1500 mA	3 mA	127 mA	81	81	4700 uF
EC4SAW-48S05HN	18-74 VDC	5 VDC	0 mA	1200 mA	3 mA	151 mA	84.5	83	2200 uF
EC4SAW-48S12HN	18-74 VDC	12 VDC	0 mA	500 mA	3 mA	145 mA	88	86.5	1100 uF
EC4SAW-48S15HN	18-74 VDC	15 VDC	0 mA	400 mA	3 mA	144 mA	88.5	87	470 uF
EC4SAW-48D05HN	18-74 VDC	±5 VDC	0 mA	±600 mA	4 mA	149 mA	85	84	1400 uF
EC4SAW-48D12HN	18-74 VDC	±12 VDC	0 mA	±250 mA	3 mA	144 mA	88	87	660 uF
EC4SAW-48D15HN	18-74 VDC	±15 VDC	0 mA	±200 mA	3 mA	144 mA	88	87	220 uF

NOTE:

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

## PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Isolation Voltage	Remote On/Off Logic
EC4SAW	II	O	XX	L	Y
EC4SAW	24: 24 VDC 48: 48 VDC	S: Single D: Dual	33: 3.3VDC 05: 5.0VDC 12: 12VDC 15: 15VDC	H: 3000Vdc	N: Negative

Part Number Example:

**EC4SAW-24S12HN:** 6W, 4:1 9-36Vdc Input, Single 12Vdc Output, 3000VDC Isolation, Negative Logic.



# EC4SAWH 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 -0.3		36 74	V <sub>dc</sub>
Input Surge Voltage	100ms max.	24Vin 48Vin			50 100	V <sub>dc</sub>
Operating Ambient Temperature	With de-rating, above 61°C	Vo=3.3V Vo=5V Vo=±5V				°C
	With de-rating, above 65°C	Vo=12V Vo=15V Vo=±12V Vo=±15V	-40		85	
Maximum Case Temperature	At the center part of case plate	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 74	V <sub>dc</sub>
Maximum Input Current	V <sub>in</sub> =9V, Full load.	24Vin		0.8		A
	V <sub>in</sub> =18V, Full load.	48Vin		0.4		
No-Load Input Current	V <sub>in</sub> =24, 48V, I <sub>o</sub> =0A	See Model Number Table				mA
Input Filter	Capacitive	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	V <sub>in</sub> =Nominal, L=12uH, C=47uF, Load=Full load	All		10		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	Single			±0.5	%
		Dual			±1.0	
Line Regulation	V <sub>in</sub> =High line to low line, full load	xxD05HN			±0.5	%
		Others			±0.2	
Cross Regulation	Asymmetrical load 25%/100%	Dual			±5.0	%
Temperature Coefficient	T <sub>c</sub> =-40°C to 85°C	All			±0.03	%/°C
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, T <sub>c</sub> =25°C	xxS15HN			120	mV
		Others			100	
Output Current Range	V <sub>in</sub> = 9 to 36V, 18 to 74V	See Model Number Table				A
Over Current Protection	Hiccup mode. Auto recovery	All		180		%
Short Circuit Protection		All	Continuous, Auto Recovery			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF



# EC4SAWH Series

## 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		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		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		8		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			3000	V <sub>dc</sub>
Isolation Resistance	Input to output	All	1000			MΩ
Isolation Capacitance	Input to output	All		50		pF

## FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pulse wide modulation (PWM), Fixed	All		580		KHz
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>	All	2		4	mA
Logic Low (Module On)	Pin open=On, high impedance	All				
Off Converter Input Current	Shutdown input idle current	All			2.5	mA

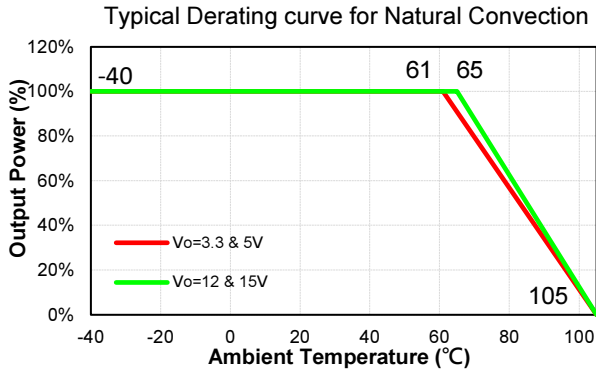
## GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I <sub>o</sub> =100% of I <sub>o,max</sub> ; MIL-HDBK - 217F_Note 1, GB, 25°C	All		1850		K hours
Weight		All		4.8		grams
Case Material	Non-Conductive Black Plastic, UL 94V-0					
Potting Material	UL 94V-0					
Pin Material	Base: Phosphor Bronze (C5191-H) Plating: Nickel and Bright Tin					
Shock/Vibration	MIL-STD-810F Compliant					
Humidity	95% RH max. Non Condensing					
Altitude	2000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
EMI	Meets EN55032 (with external filter)					Class A
ESD	Meets EN61000-4-2 Level 2: Air ±8kV, Contact ±4kV					Perf. Criteria A
Radiated immunity	Meets EN61000-4-3 Level 2: 80~1000MHz, 3V/m					Perf. Criteria A
Fast Transient	Meets EN61000-4-4 Level 2: On power input port, ±0.5kV, external input capacitor required					Perf. Criteria A
Surge	Meets EN61000-4-5 Level 2: Line to earth, ±1kV, Line to line, ±0.5kV, external input capacitor required					Perf. Criteria A
Conducted immunity	Meets EN61000-4-6 Level 2: 0.15~80MHz, 3V					Perf. Criteria A
Application Note Link	<a href="#">EC4SAWH Series App Notes</a>					
Packaging Information Link	<a href="#">Packaging Information</a>					

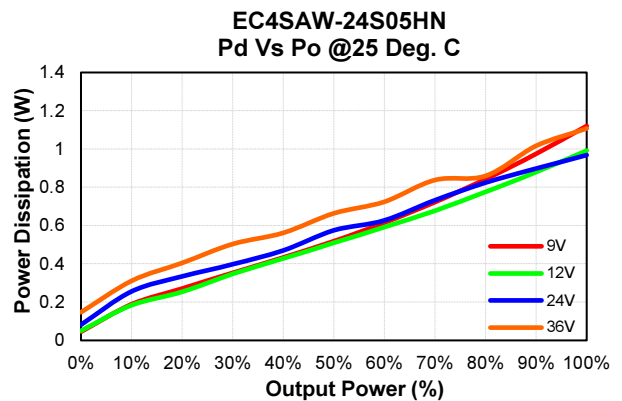
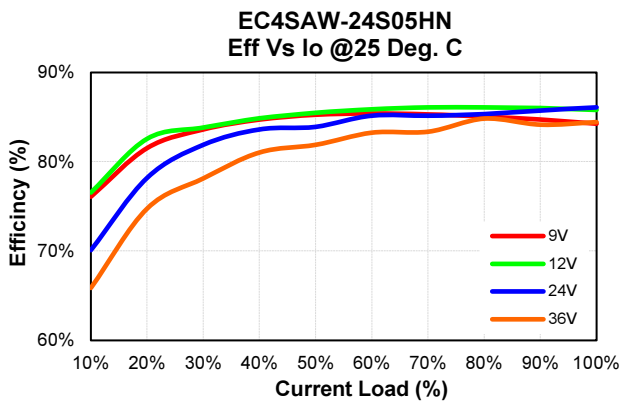
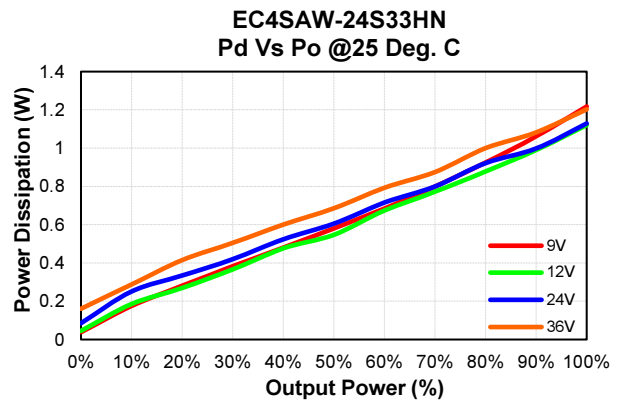
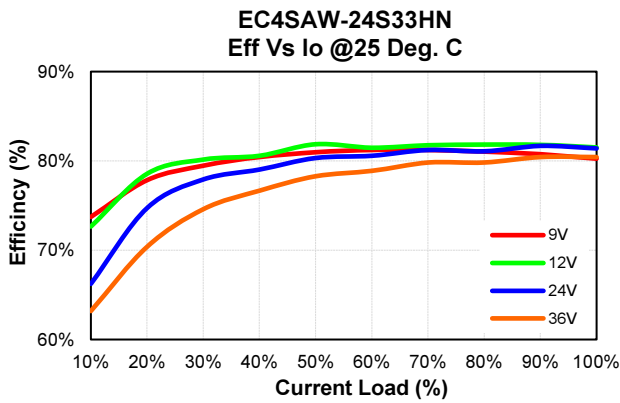


## CHARACTERISTIC CURVE

### Power Derating Curve



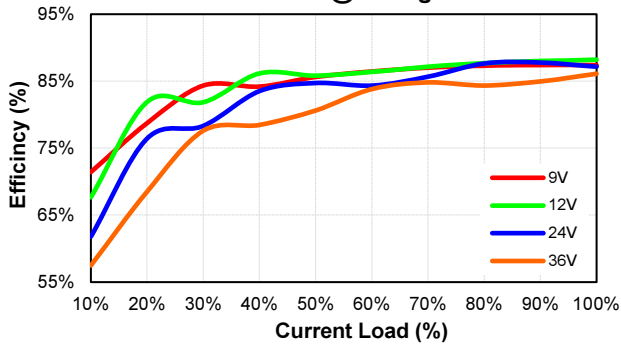
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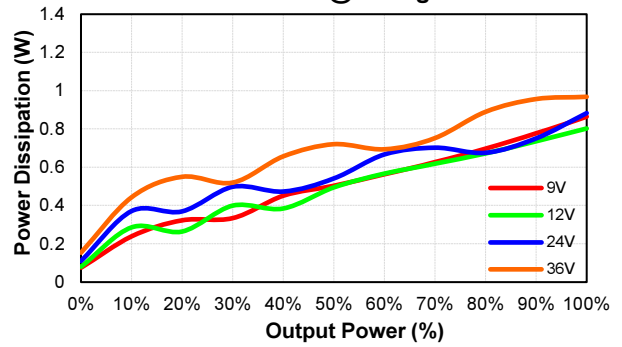


# EC4SAWH Series

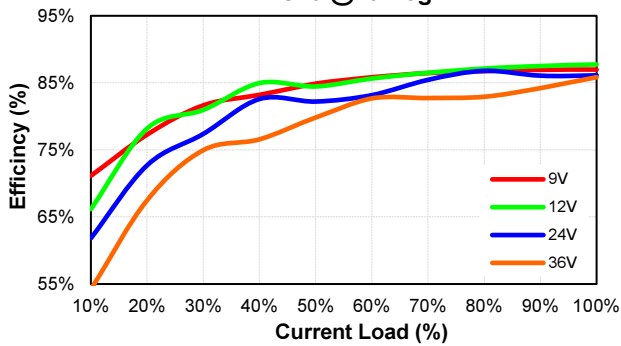
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Eff Vs Io @25 Deg. C



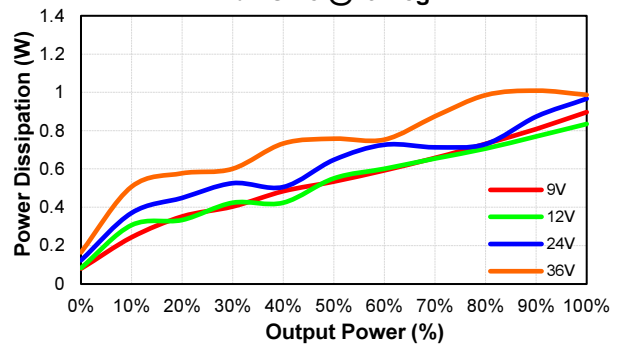
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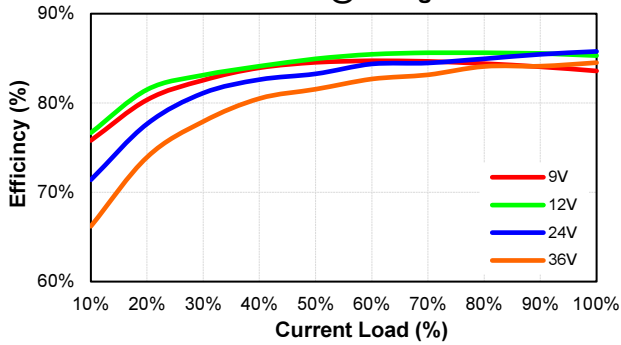
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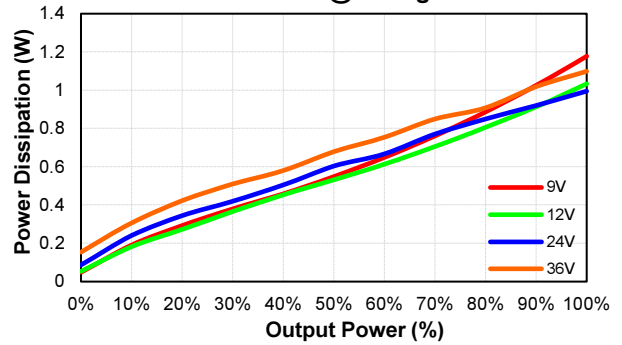
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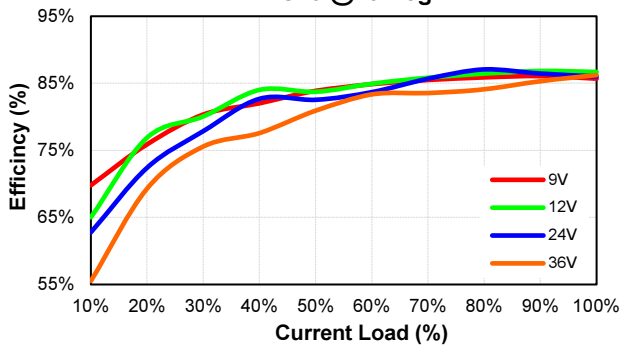
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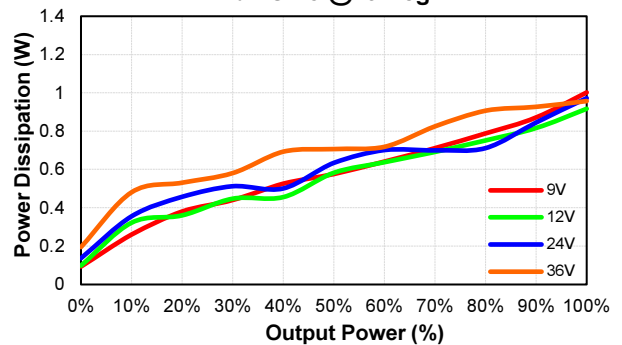
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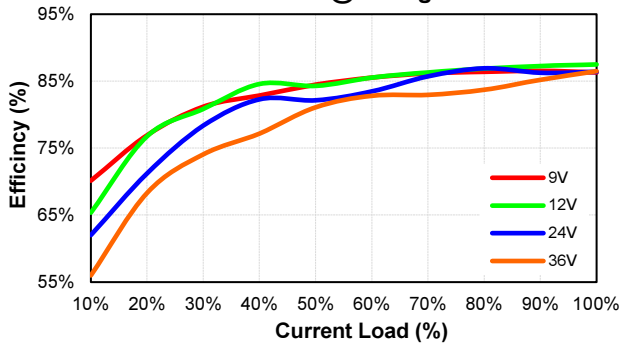
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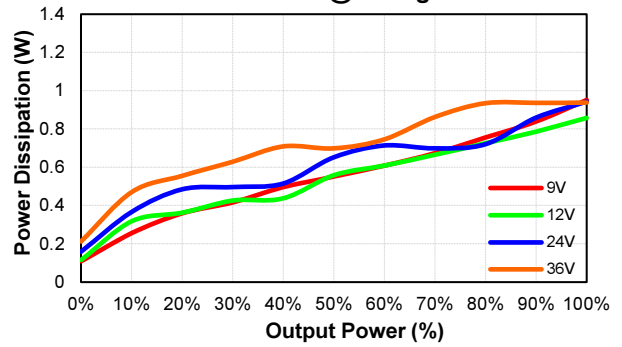


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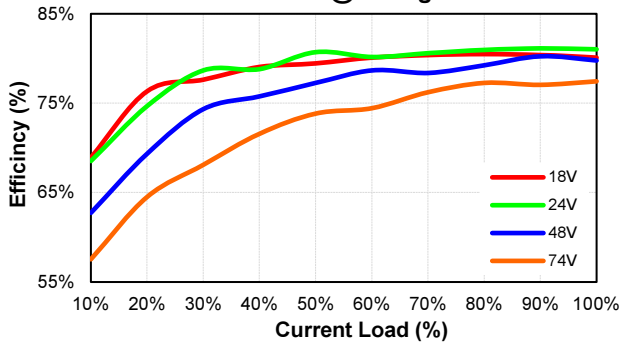
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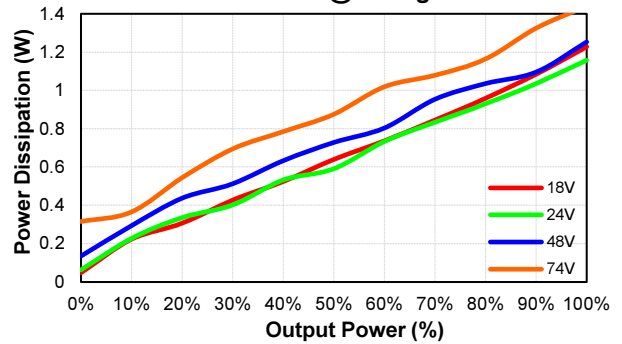
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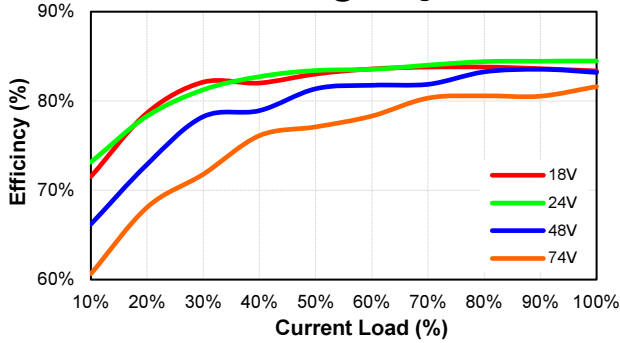
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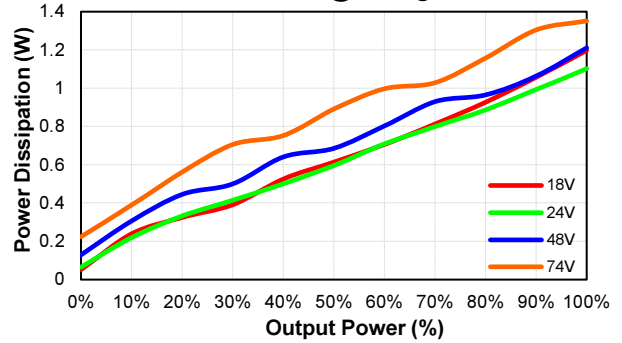
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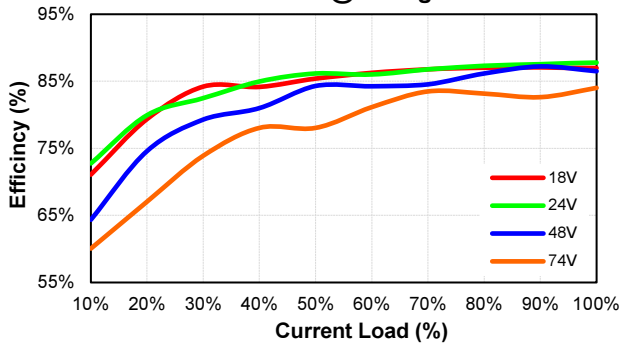
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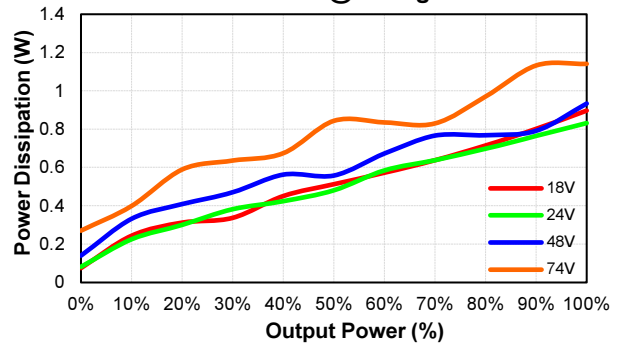
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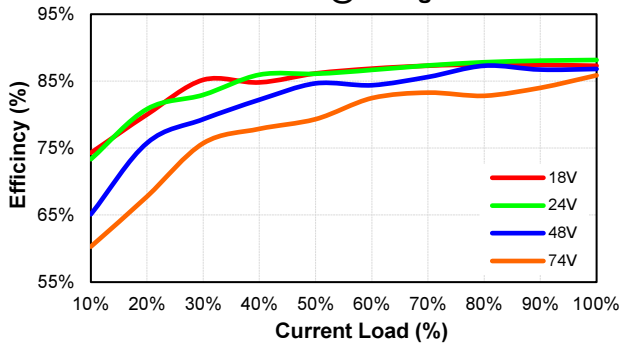
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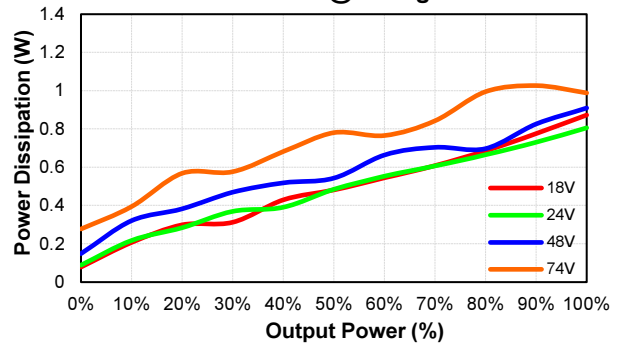


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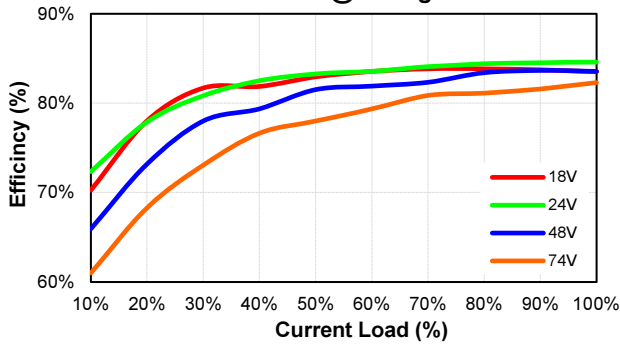
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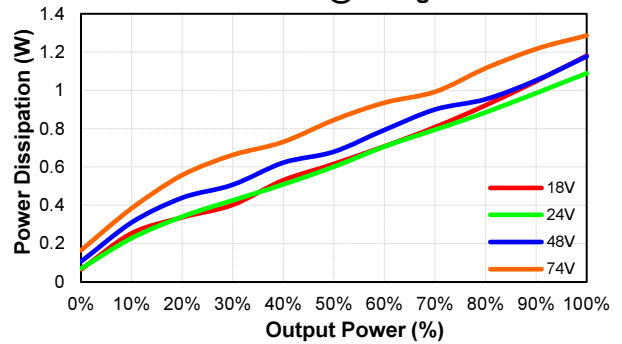
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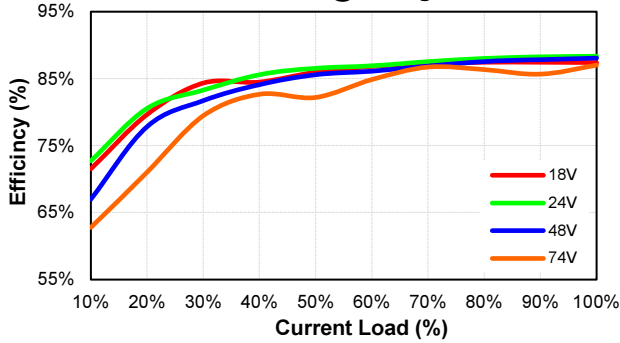
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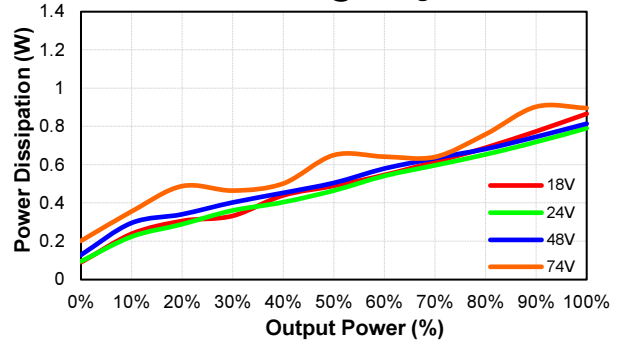
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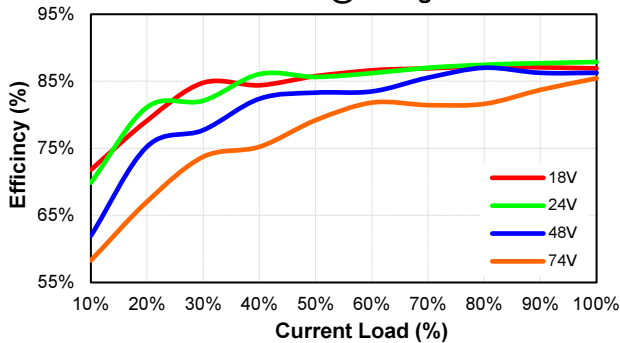
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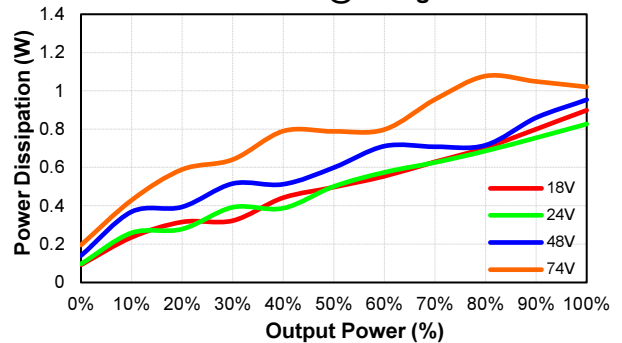
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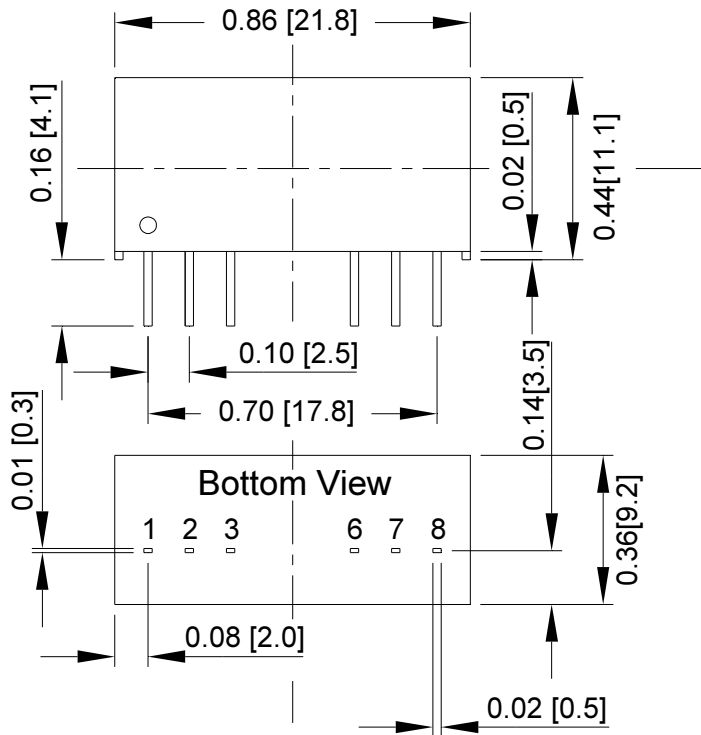
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# EC4SAWH Series

## MECHANICAL SPECIFICATION



PIN CONNECTION		
Pin	Single	Dual
1	-V Input	-V Input
2	+V Input	+V Input
3	On/Off	On/Off
6	+V Output	+V Output
7	-V Output	Common
8	NC	-V Output

All Dimensions In Inches(mm)

Tolerances : Inches millimeters

	X.XX±0.02	X.X±0.5
Pin	±0.002	±0.05