



EC6AW-110 SERIES 10 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

Features

- Efficiency up to 88.5%
- 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 +100°C
- 1.25"x0.8"x0.5" Size Meet Industrial Standard
- Meets EN 50155 with External Circuits
- UL 60950-1 2nd (Basic Insulation) Approval
- Shock & Vibration Meets EN 50155 (EN 61373)
- Fire & Smoke Meets EN 45545-2
- 3050m Operating Altitude
- Safety Meets UL/IEC/EN 62368-1



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF. (1)	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
EC6AW-110S33	43-160 VDC	3.3 VDC	0 mA	2500 mA	6 mA	89 mA	85	2500µF
EC6AW-110S05	43-160 VDC	5 VDC	0 mA	2000 mA	6 mA	105 mA	87	2000µF
EC6AW-110S12	43-160 VDC	12 VDC	0 mA	835 mA	6 mA	104 mA	88	835µF
EC6AW-110S15	43-160 VDC	15 VDC	0 mA	666 mA	6 mA	103 mA	88.5	666µF
EC6AW-110D05	43-160 VDC	±5 VDC	0 mA	±1000mA	6 mA	107 mA	85	1000µF
EC6AW-110D12	43-160 VDC	±12 VDC	0 mA	±416mA	6 mA	105 mA	87	416µF
EC6AW-110D15	43-160 VDC	±15 VDC	0 mA	±333mA	6 mA	104 mA	87.5	333µF

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
EC6AW-110-	II	O	XX	L
EC6AW-110	110 : 110 VDC	S : Single D : Dual	3.3 : 3.3VDC 05 : 5.0VDC 12 : 12VDC 15 : 15VDC 05 : ±5 VDC 12 : ±12 VDC 15 : ±15 VDC	None : Positive N : Negative

Part Number Example:

EC6AW-110S12: 1.25"x0.8", 10W, 4:1 43-160Vdc Input, Single 12Vdc Output, Positive Logic



EC6AW-110 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	All	-0.3		160	V _{dc}
Input Surge Voltage	100ms max.	All			200	V _{dc}
Operating Ambient Temperature	with derating (see derating curve)	All	-40		85	°C
Operating Case Temperature	At the center part of case plate	All			100	°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	100% Load	All	38.5	40	41.5	V _{dc}	
Turn-Off Voltage Threshold	100% Load	All	36.5	38	39.5	V _{dc}	
Lockout Hysteresis Voltage	100% Load	All		2		V _{dc}	
Maximum Input Current	V _{in} =43V, full load	All		290		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} =Nominal, full load, T _c =25°C	All	-1.0		+1.0	%	
Output Voltage Balance	V _{in} =Nominal, full load, T _c =25°C	Dual	-2.0		+2.0	%	
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 25%/100%	Dual			±5.0	%	
Temperature Coefficient	T _c =-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 5Vo 12Vo 15Vo ±5Vo ±12Vo ±15Vo			75 75 100 100 75 100 100	mV	
Output Current Range	V _{in} =Nominal	See Model Number Table					A
Over Current Protection	Hiccup mode. Auto recovery	All	110	140	170	%	
Short Circuit Protection		All	Continuous, Auto Recovery				
External Load Capacitance	Full load (resistive)	See Model Number Table					uF



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

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 dI/dt=0.1A/us (within 1% V _{out} 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 _{on/off} to 10%V _{o_set} , Remote on	All		5		ms
Turn-On Delay Time, From Input	V _{in_min} . to 10%V _{o_set} , Power up	All		5		ms
Output Voltage Rise Time	10%V _{o_set} to 90%V _{o_set}	All		10		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 _{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	215	240	265	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		160	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		160	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	4	mA



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GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	Io=100% of Io_max.; MIL-HDBK - 217F_Notice 1, GB, 25°C	All		1200		K hours
Weight		All		16		grams
Case Material	Plastic, DAP, UL 94V-0					
Base plate Material	Plastic, LCP, UL 94V-0					
Potting Material	UL 94V-0					
Pin Material	Base: Copper Plating: Nickel with Matte Tin					
Shock/Vibration	MIL-STD-810F/EN6 1373 Compliant					
Humidity	95% RH max. Non Condensing					
Altitude	3050m 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, ±2 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		Perf. Criteria A		
Supply Change Over	EN 50155	Class C2: During a supply break of 30ms		Perf. Criteria A		
Application Note Link				EC6AW-110 Series App Notes		
Packaging Information Link				Packaging Information		



EC6AW-110 Series

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	Temperature: 25°C±10°C 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°C±10°C 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°C±10°C 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

EN45545-2 Fire & Smoke Test Conditions

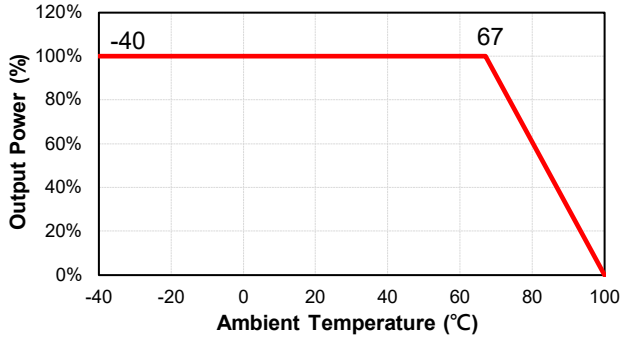
Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1,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



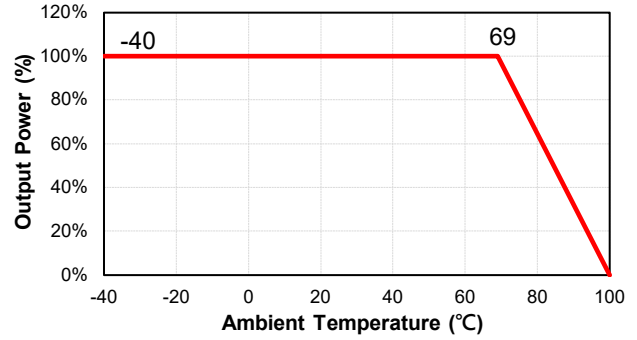
CHARACTERISTIC CURVE

Power Derating Curve

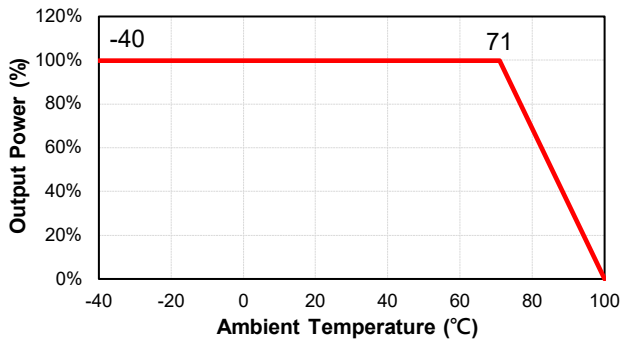
EC6AW-110S33 & 05 Derating Curve



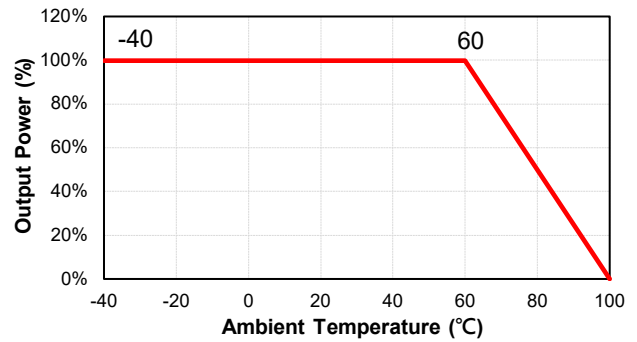
EC6AW-110S12 Derating Curve



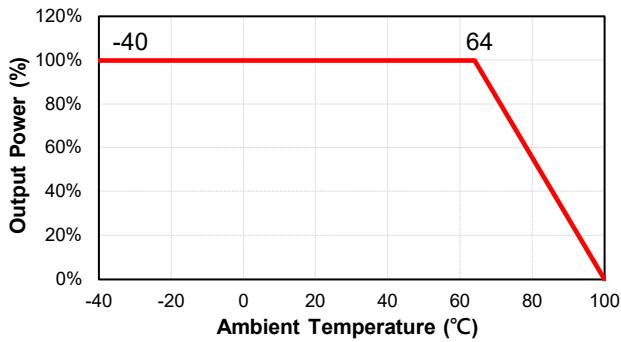
EC6AW-110S15 Derating Curve



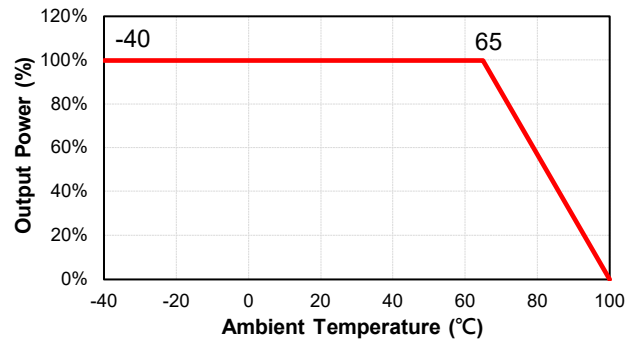
EC6AW-110D05 Derating Curve



EC6AW-110D12 Derating Curve



EC6AW-110D15 Derating Curve

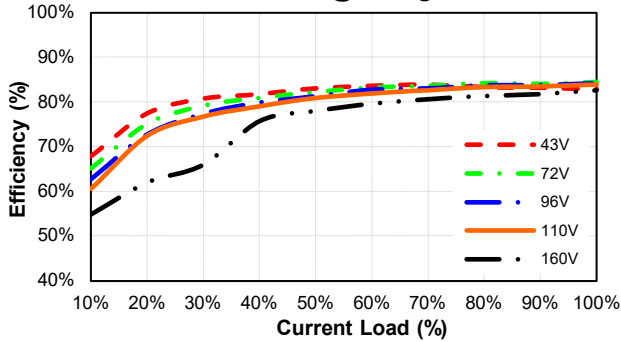




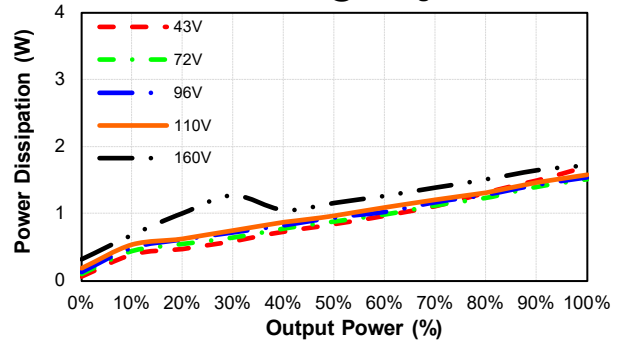
EC6AW-110 Series

Performance Data

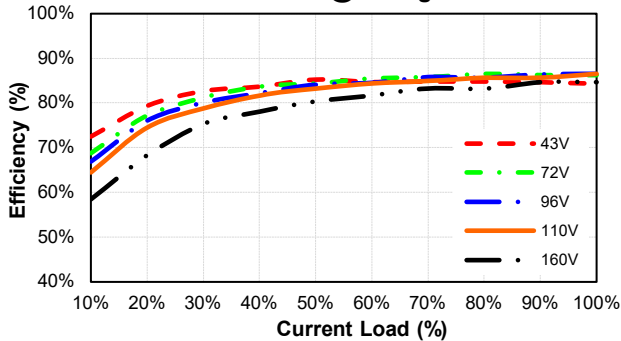
EC6AW-110S33
Eff Vs Io @25 Deg. C



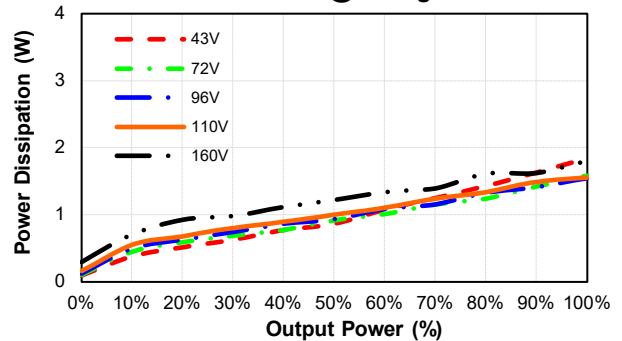
EC6AW-110S33
Pd Vs Po @25 Deg. C



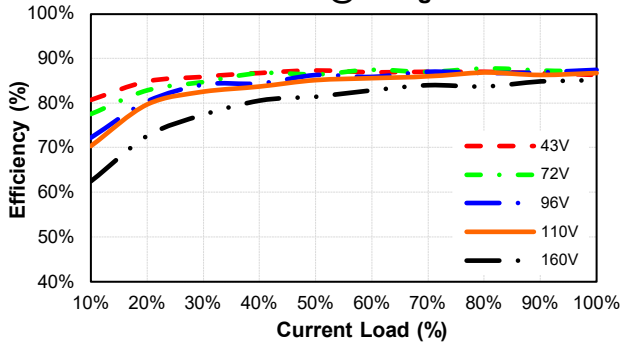
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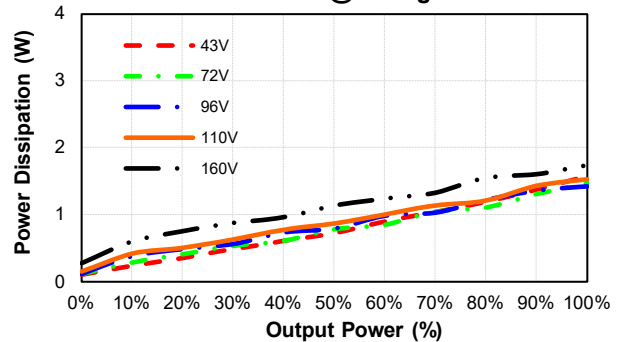
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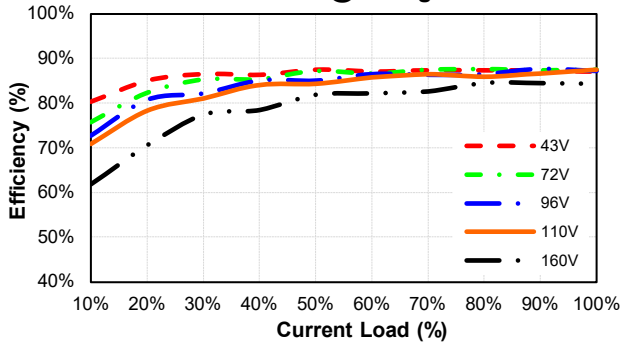
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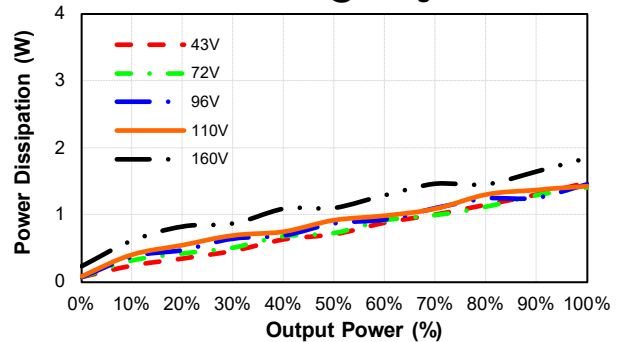
EC6AW-110S12
Pd Vs Po @25 Deg. C



EC6AW-110S15
Eff Vs Io @25 Deg. C



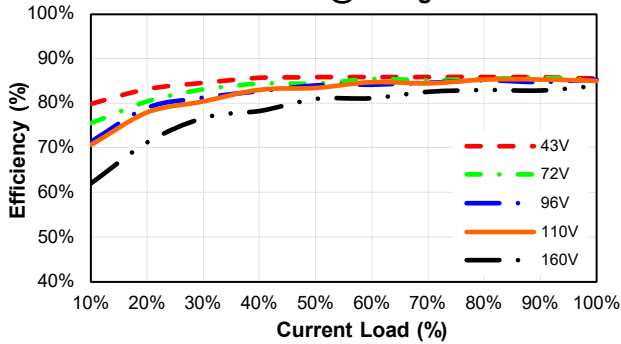
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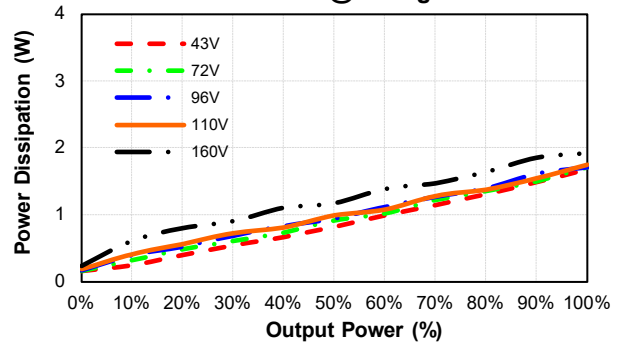


EC6AW-110 Series

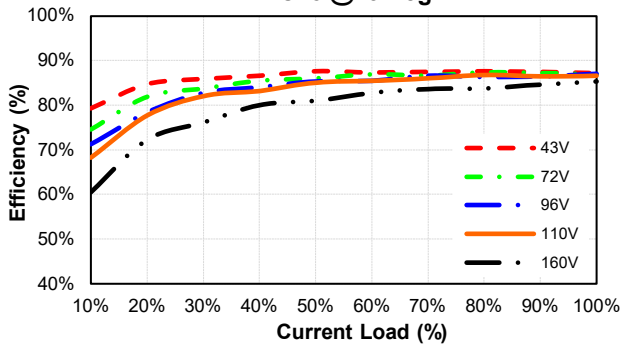
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Eff Vs Io @25 Deg. C



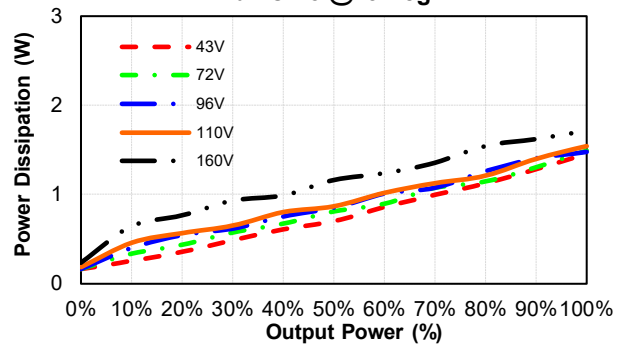
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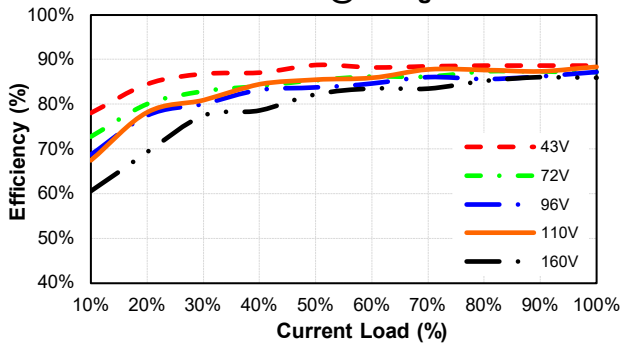
EC6AW-110D12
Eff Vs Io @25 Deg. C



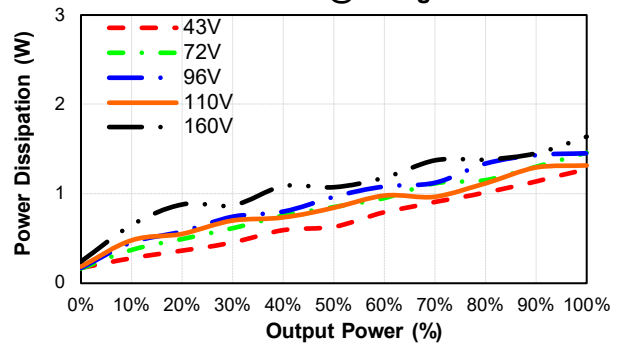
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Pd Vs Po @25 Deg. C



EC6AW-110D15
Eff Vs Io @25 Deg. C



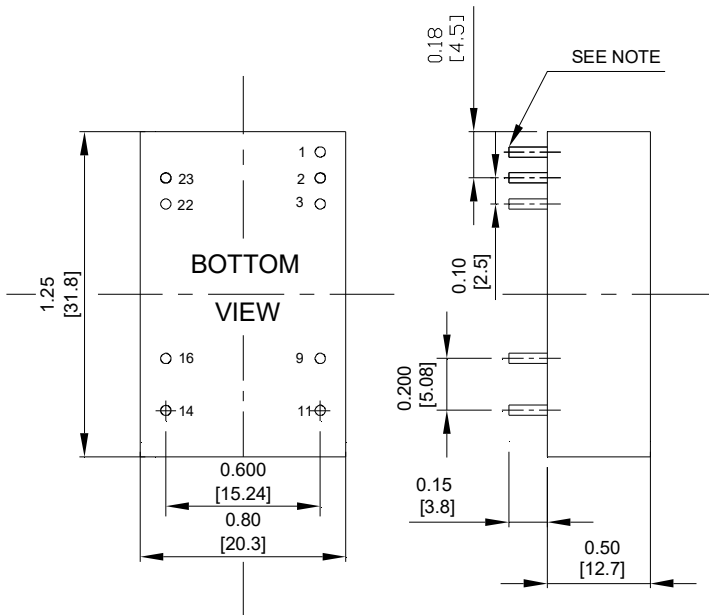
EC6AW-110D15
Pd Vs Po @25 Deg. C





EC6AW-110 Series

MECHANICAL SPECIFICATION



PIN CONNECTION		
Pin	Single Output	Dual Output
1	Remote On/Off	Remote On/Off
2,3	-V Input	-V Input
9	NP	Common
11	NC	-V Output
14	+V Output	+V Output
16	-V Output	Common
22,23	+V Input	+V Input

* NC-NO CONNECTION WITH PIN

* NP-NO PIN

NOTE: Pin Size is 0.02±0.002 Inch (0.5±0.05 mm) DIA
All Dimensions In Inches (mm)

Tolerances Inches: X.XX= ±0.02 , X.XXX= ±0.010

Millimeters: X.X= ±0.5 , X.XX=±0.25

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