



Demo photo only. Actual product outlook and marking may vary.



UVLO	OCP	OVP	OTP
ON/OFF Remote	EMC Filter Built-in	Class B EN 55022	2000V_{DC} Isolation

Features

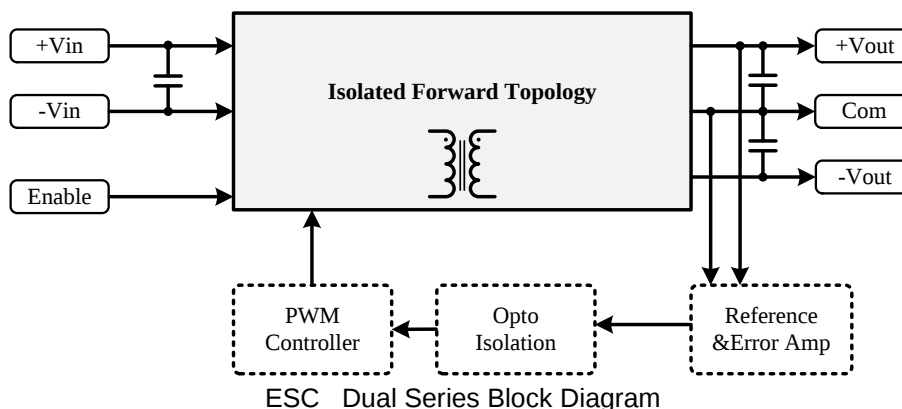
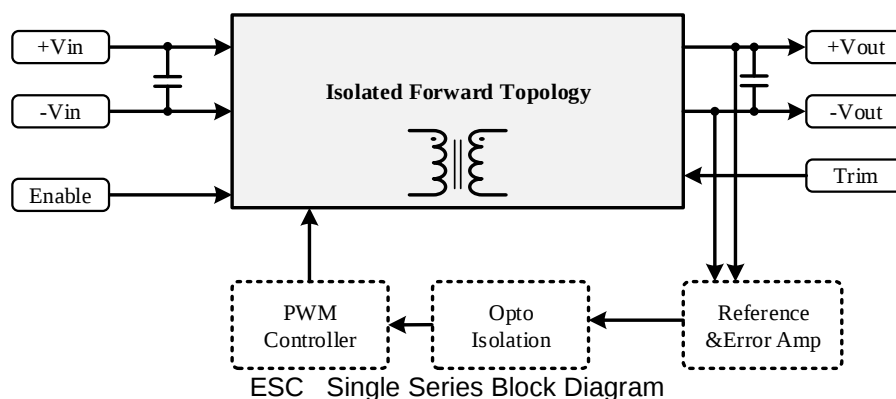
- High Efficiency **91% @ 5V** (SR topology)
- **2:1 / 4:1 Ultra-Wide** input range
- Compact size – **2.0" x 1.2" x 0.4"**
& **2.0" x 1.2" x 0.5"**
2.0" x 1.6" x 0.45"
- Standard pin out; **Fully replaceable** with 2"x1.6" standard case
- Metal Case Six-Sided Continuous Shield
- -40°C to +70°C operation without derating
- Save up to 20% board space
- Output current limit and short circuit protection
- No life-span constrained Capacitor inside
- **MTBF ≥ 1,989,000 hours** @ 50°C GB (BellCore TR-332)

Applications

- Railway System
- Wireless Network
- Telecom / Datacom
- Industry Control System
- Distributed Power Architectures
- Semiconductor Equipment

Description

Evolving Sirius-Chivalry series converter is composed of Isolated, board-mountable, fixed switching frequency dc-dc converters that use synchronous rectification to achieve extremely high power conversion efficiency. These DC-DC converter modules use advanced power processing, control and packaging technologies to enhance the performance, flexibility, reliability and cost effectiveness of mature power components. Each module is supplied completely encased to provide protection from the harsh environments seen in many industrial and transportation applications.





MODEL NUMBER STRUCTURE

ESC	018	033	-	S	-	P	-	F	50v0
Series Name	Input Voltage (VDC)	Output Voltage (VDC)		Output Quantity		Remote Control Option		Shape	Watt
Evolving Sirius- Chivalry series –	012 : 9-18	033 : 3.3				P: Positive logic			20
	018 : 9-36					N: Negative logic	F : Flat		30
	024 : 18-36	050 : 5		S: Single			P : HeatSink		40
	036 : 18-75	120 : 12				1: Positive logic + EMC Filter	B:BasePlate		50
	048 : 36-75	150 : 15				0: Negative logic + EMC Filter			60
	110 : 40-160	240 : 24							
		120 : ±12							
		150 : ±15		D: Dual					
		240 : ±24							

Model Selection Guide

Typical @ Ta=+25 °C under nominal line voltage conditions unless noted.

Model	Input			Output			Efficiency
	Voltage(V)		Current (A)	Voltage	Current	Power	
	Range	Nominal	Full load	(V)	(A)	(W)	Typ.(%)
ESC012033-S-P-F30V0	9-18	12	2.81	3.3	9.1	30	89%
ESC012050-S-P-F30V0	9-18	12	2.78	5	6	30	90%
ESC012120-S-P-F30V0	9-18	12	2.81	12	2.5	30	89%
ESC012150-S-P-F30V0	9-18	12	2.81	15	2	30	89%
ESC012240-S-P-F30V0	9-18	12	2.81	24	1.3	30	89%
ESC012120-D-P-F30V0	9-18	12	2.81	±12	±1.3	30	89%
ESC012150-D-P-F30V0	9-18	12	2.81	±15	±1.0	30	89%
ESC012240-D-P-F30V0	9-18	12	2.84	±24	±0.6	30	88%
ESC012033-S-P-F40V0	9-18	12	3.75	3.3	12.1	40	89%
ESC012050-S-P-F40V0	9-18	12	3.70	5	8	40	90%
ESC012120-S-P-F40V0	9-18	12	3.75	12	3.3	40	89%
ESC012150-S-P-F40V0	9-18	12	3.75	15	2.7	40	89%
ESC012240-S-P-F40V0	9-18	12	3.75	24	1.7	40	89%
ESC012120-D-P-F40V0	9-18	12	3.75	±12	±1.7	40	89%
ESC012150-D-P-F40V0	9-18	12	3.75	±15	±1.3	40	89%
ESC012240-D-P-F40V0	9-18	12	3.79	±24	±0.8	40	88%
ESC012033-S-P-F50V0	9-18	12	4.68	3.3	15.1	50	89%
ESC012050-S-P-F50V0	9-18	12	4.63	5	10	50	90%
ESC012120-S-P-F50V0	9-18	12	4.68	12	4.2	50	89%
ESC012150-S-P-F50V0	9-18	12	4.68	15	3.3	50	89%
ESC012240-S-P-F50V0	9-18	12	4.68	24	2.1	50	89%
ESC012120-D-P-F50V0	9-18	12	4.68	±12	±2.1	50	89%
ESC012150-D-P-F50V0	9-18	12	4.68	±15	±1.7	50	89%
ESC012240-D-P-F50V0	9-18	12	4.73	±24	±1.0	50	88%

※ Modification or customized design is available. Please contact us for detail.



Model Selection Guide

Typical @ Ta=+25 °C under nominal line voltage conditions unless noted.

Model	Input			Output			Efficiency
	Voltage(V)		Current (A)	Voltage	Current	Power	
	Range	Nominal	Full load	(V)	(A)	(W)	
ESC024033-S-P-F30V0	18-36	24	1.40	3.3	9.1	30	89%
ESC024050-S-P-F30V0	18-36	24	1.39	5	6	30	90%
ESC024120-S-P-F30V0	18-36	24	1.40	12	2.5	30	89%
ESC024150-S-P-F30V0	18-36	24	1.40	15	2	30	89%
ESC024240-S-P-F30V0	18-36	24	1.40	24	1.3	30	89%
ESC024120-D-P-F30V0	18-36	24	1.40	±12	±1.3	30	89%
ESC024150-D-P-F30V0	18-36	24	1.40	±15	±1.0	30	89%
ESC024240-D-P-F30V0	18-36	24	1.40	±24	±0.6	30	89%
ESC024033-S-P-F40V0	18-36	24	1.87	3.3	12.1	40	89%
ESC024050-S-P-F40V0	18-36	24	1.85	5	8	40	90%
ESC024120-S-P-F40V0	18-36	24	1.87	12	3.3	40	89%
ESC024150-S-P-F40V0	18-36	24	1.87	15	2.7	40	89%
ESC024240-S-P-F40V0	18-36	24	1.87	24	1.7	40	89%
ESC024120-D-P-F40V0	18-36	24	1.87	±12	±1.7	40	89%
ESC024150-D-P-F40V0	18-36	24	1.87	±15	±1.3	40	89%
ESC024240-D-P-F40V0	18-36	24	1.87	±24	±0.8	40	89%
ESC024033-S-P-F50V0	18-36	24	2.34	3.3	15.1	50	89%
ESC024050-S-P-F50V0	18-36	24	2.31	5	10	50	90%
ESC024120-S-P-F50V0	18-36	24	2.34	12	4.2	50	89%
ESC024150-S-P-F50V0	18-36	24	2.34	15	3.3	50	89%
ESC024240-S-P-F50V0	18-36	24	2.34	24	2.1	50	89%
ESC024120-D-P-F50V0	18-36	24	2.34	±12	±2.1	50	89%
ESC024150-D-P-F50V0	18-36	24	2.34	±15	±1.7	50	89%
ESC024240-D-P-F50V0	18-36	24	2.37	±24	±1.0	50	88%
ESC048033-S-P-F30V0	36-75	48	0.70	3.3	9.1	30	89%
ESC048050-S-P-F30V0	36-75	48	0.69	5	6	30	90%
ESC048120-S-P-F30V0	36-75	48	0.70	12	2.5	30	89%
ESC048150-S-P-F30V0	36-75	48	0.70	15	2	30	89%
ESC048240-S-P-F30V0	36-75	48	0.70	24	1.3	30	89%
ESC048120-D-P-F30V0	36-75	48	0.70	±12	±1.3	30	89%
ESC048150-D-P-F30V0	36-75	48	0.70	±15	±1.0	30	89%
ESC048240-D-P-F30V0	36-75	48	0.70	±24	±0.6	30	89%
ESC048033-S-P-F50V0	36-75	48	1.17	3.3	15.1	50	89%
ESC048050-S-P-F50V0	36-75	48	1.16	5	10	50	90%
ESC048120-S-P-F50V0	36-75	48	1.17	12	4.2	50	89%
ESC048150-S-P-F50V0	36-75	48	1.17	15	3.3	50	89%
ESC048240-S-P-F50V0	36-75	48	1.17	24	2.1	50	89%
ESC048120-D-P-F50V0	36-75	48	1.17	±12	±2.1	50	89%
ESC048150-D-P-F50V0	36-75	48	1.17	±15	±1.7	50	89%
ESC048240-D-P-F50V0	36-75	48	1.17	±24	±1.0	50	89%

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Model Selection Guide

Typical @ Ta=+25 °C under nominal line voltage conditions unless noted.

Model	Input			Output			Efficiency
	Voltage(V)		Current (A)	Voltage	Current	Power	
	Range	Nominal	Full load	(V)	(A)	(W)	
ESC018033-S-P-F30V0	9-36	18	1.89	3.3	9.1	30	88%
ESC018050-S-P-F30V0	9-36	18	1.87	5	6	30	89%
ESC018120-S-P-F30V0	9-36	18	1.89	12	2.5	30	88%
ESC018150-S-P-F30V0	9-36	18	1.89	15	2	30	88%
ESC018240-S-P-F30V0	9-36	18	1.89	24	1.3	30	88%
ESC018120-D-P-F30V0	9-36	18	1.89	±12	±1.3	30	88%
ESC018150-D-P-F30V0	9-36	18	1.89	±15	±1.0	30	88%
ESC018240-D-P-F30V0	9-36	18	1.92	±24	±0.6	30	87%
ESC018033-S-P-F40V0	9-36	18	2.53	3.3	12.1	40	88%
ESC018050-S-P-F40V0	9-36	18	2.50	5	8	40	89%
ESC018120-S-P-F40V0	9-36	18	2.53	12	3.3	40	88%
ESC018150-S-P-F40V0	9-36	18	2.53	15	2.7	40	88%
ESC018240-S-P-F40V0	9-36	18	2.53	24	1.7	40	88%
ESC018120-D-P-F40V0	9-36	18	2.53	±12	±1.7	40	88%
ESC018150-D-P-F40V0	9-36	18	2.53	±15	±1.3	40	88%
ESC018240-D-P-F40V0	9-36	18	2.55	±24	±0.8	40	87%
ESC036033-S-P-F30V0	18-75	36	0.95	3.3	9.1	30	88%
ESC036050-S-P-F30V0	18-75	36	0.94	5	6	30	89%
ESC036120-S-P-F30V0	18-75	36	0.95	12	2.5	30	88%
ESC036150-S-P-F30V0	18-75	36	0.95	15	2	30	88%
ESC036240-S-P-F30V0	18-75	36	0.95	24	1.3	30	88%
ESC036120-D-P-F30V0	18-75	36	0.95	±12	±1.3	30	88%
ESC036150-D-P-F30V0	18-75	36	0.95	±15	±1.0	30	88%
ESC036240-D-P-F30V0	18-75	36	0.96	±24	±0.6	30	87%
ESC036033-S-P-F40V0	18-75	36	1.26	3.3	12.1	40	88%
ESC036050-S-P-F40V0	18-75	36	1.25	5	8	40	89%
ESC036120-S-P-F40V0	18-75	36	1.26	12	3.3	40	88%
ESC036150-S-P-F40V0	18-75	36	1.26	15	2.7	40	88%
ESC036240-S-P-F40V0	18-75	36	1.26	24	1.7	40	88%
ESC036120-D-P-F40V0	18-75	36	1.26	±12	±1.7	40	88%
ESC036150-D-P-F40V0	18-75	36	1.26	±15	±1.3	40	88%
ESC036240-D-P-F40V0	18-75	36	1.28	±24	±0.8	40	87%

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Model Selection Guide

Typical @ Ta=+25 °C under nominal line voltage conditions unless noted.

Model	Input			Output			Efficiency
	Voltage(V)		Current (A)	Voltage	Current	Power	
	Range	Nominal	Full load	(V)	(A)	(W)	
ESC110033-S-P-B20V0	40-160	110	0.21	3.3	6.1	20	88%
ESC110050-S-P-B20V0	40-160	110	0.20	5	4	20	89%
ESC110120-S-P-B20V0	40-160	110	0.21	12	1.7	20	88%
ESC110150-S-P-B20V0	40-160	110	0.21	15	1.3	20	88%
ESC110240-S-P-B20V0	40-160	110	0.21	24	0.8	20	88%
ESC110120-D-P-B20V0	40-160	110	0.21	±12	±0.8	20	88%
ESC110150-D-P-B20V0	40-160	110	0.21	±15	±0.7	20	88%
ESC110240-D-P-B20V0	40-160	110	0.21	±24	±0.4	20	87%
ESC110033-S-P-B30V0	40-160	110	0.31	3.3	9.1	30	88%
ESC110050-S-P-B30V0	40-160	110	0.31	5	6	30	89%
ESC110120-S-P-B30V0	40-160	110	0.31	12	2.5	30	88%
ESC110150-S-P-B30V0	40-160	110	0.31	15	2	30	88%
ESC110240-S-P-B30V0	40-160	110	0.31	24	1.3	30	87%
ESC110120-D-P-B30V0	40-160	110	0.31	±12	±1.3	30	88%
ESC110150-D-P-B30V0	40-160	110	0.31	±15	±1.0	30	88%
ESC110240-D-P-B30V0	40-160	110	0.31	±24	±0.6	30	87%
ESC110033-S-P-B40V0	40-160	110	0.41	3.3	12.1	40	88%
ESC110050-S-P-B40V0	40-160	110	0.41	5	8	40	89%
ESC110120-S-P-B40V0	40-160	110	0.41	12	3.3	40	88%
ESC110150-S-P-B40V0	40-160	110	0.41	15	2.7	40	88%
ESC110240-S-P-B40V0	40-160	110	0.42	24	1.7	40	87%
ESC110120-D-P-B40V0	40-160	110	0.41	±12	±1.7	40	88%
ESC110150-D-P-B40V0	40-160	110	0.41	±15	±1.3	40	88%
ESC110240-D-P-B40V0	40-160	110	0.42	±24	±0.8	40	87%
ESC110033-S-P-B50V0	40-160	110	0.52	3.3	15.1	50	88%
ESC110050-S-P-B50V0	40-160	110	0.51	5	10	50	89%
ESC110120-S-P-B50V0	40-160	110	0.52	12	4.2	50	88%
ESC110150-S-P-B50V0	40-160	110	0.52	15	3.3	50	88%
ESC110240-S-P-B50V0	40-160	110	0.52	24	2.1	50	87%
ESC110120-D-P-B50V0	40-160	110	0.52	±12	±2.1	50	88%
ESC110150-D-P-B50V0	40-160	110	0.52	±15	±1.7	50	88%
ESC110240-D-P-B50V0	40-160	110	0.52	±24	±1.0	50	87%

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Electrical Specifications (Typical @ Ta=+25 °C under nominal line voltage conditions unless noted.)

Input Specifications

Parameter	Notes and Conditions			Min.	Typ	Max.	Unit
Transient Input Voltage Ranges	ESC012&18&24 Models (100ms max)					50	VDC
	ESC036&48 Models (100ms max)					80	
	ESC110 Models (100ms max)					180	
Operating Input Voltage Ranges	ESC012&18 Models			9	18	36	VDC
	ESC024 Models			18	24	36	
	ESC036 Models			18	36	75	
	ESC048 Models			36	48	75	
	ESC110 Models			40	110	160	
Under-Voltage Lockout Start Up Voltage	ESC012&18 Models				8.5	9	VDC
	ESC024 Models				17.5	18	
	ESC036 Models				17.5	18	
	ESC048 Models				35	36	
	ESC110 Models				38	40	
Under-Voltage Lockout Shutdown Voltage	ESC012&18 Models			7	8		VDC
	ESC024 Models			16	17		
	ESC036 Models			16	17		
	ESC048 Models			32	34		
	ESC110 Models			35	37		
Enable Function Input	ESC110 Models	Positive Logic	ON	Open or 8 ~ 20 Short or 0 ~ 1.2			VDC
		OFF	OFF				
	ESC012 Models ESC018 Models ESC024 Models ESC036 Models ESC048 Models	Negative Logic	ON	Short or 0 ~ 1.2 Open or 8 ~ 20			VDC
		OFF	OFF				
		Positive Logic	ON	Open or 4.5 ~ 5.5 Short or 0 ~ 1.2			
			OFF				
Negative Logic	ON	Open or 0 ~ 1.2 Short or 4.5 ~ 5.5					
	OFF				OFF		
Input Filter	All models			Built-in PI or EMC Filter			

Output Specifications

Parameter	Notes and Conditions		Min.	Typ	Max.	Unit
Output Voltage Accuracy	V _{NOM} 50% Load				±1.5	%
Line Regulation	Low line to High Line				±0.3	%
Load Regulation	10% to 100% Load				±0.5	%
Minimum Load	Single Output		0			%
	Dual Output		10			%
Output Ripple & Noise Voltage	Bandwidth 20MHz And With 1uFMLCC.Output Capacitor Each Output	3.3V&5V			100	mVp-p
		All others		1	1.5	%V _{pk-pk}
Temperature Drift					±0.04	% / °C
Transient Recovery Time	25% load step change			800		µSec.
Transient Peak Deviation	ΔIo/ Δt=2.5A/us				±2	%Vo
Start-Up Time	When use Enable Function			20		mSec.
Trimming Output Voltage	V _{NOM} 10% Load			±10		%
Over Voltage Protection	V _{NOM} 10% Load			120		%
Output Power Protection	V _{NOM} (Current limit / Hiccup Mode)			120		%



General Specifications

Parameter	Notes and Conditions		Min.	Typ	Max.	Unit
Switching Frequency	V _{NOM}	2:1 wide	270	300	330	kHz
		4:1 wide	220	260	300	
Storage Temperature Range	All models		-60		125	°C
Operating Case Temperature	All models		-45		115	°C
Over temperature Protection	All models, Auto. Recovery			120		
Thermal Impedance	Natural Convection (Metal Case –Base Plate)		4.8(Vertical)			°C/Watt
			7.0(horizontal)			
Isolation Voltage Input to Output	All Models, 1 Minute		2000			VDC
Isolation Resistance Input to Output	All Models, 500VDC,At 70%RH		100			MΩ
Isolation Capacitance Input to Output	All Models			1500		pF
Humidity (Non Condensing)	All Models				95	%
Calculated MTBF	BellCore-TR-332@ 50 °C G.B			1.5		M HR
Thermal Shock	Environmental Engineering Experimental Tests		MIL-STD-810F			
Vibration			MIL-STD-810F			
Drop			MIL-STD-810F			
Weight	Shape-F (Flat)		33(1.2)			g (oz.)
	Shape-P (With Heat Sink On Top)		39(1.38)			
	Shape-R (Base Plate)		41(1.45)			
Dimensions	Shape-F (Flat)		2.0" x 1.20" x 0.4" (50.8 x 30.5 x 10.16mm)			
	Shape-P (With Heat Sink On Top)		2.0" x 1.20" x 0.5" (50.8 x 30.5 x 13.2mm)			
	Shape-R (Base Plate)		2.0" x 1.60 " x 0.45" (50.8 x 40.64 x 11.43mm)			
Case Material	Six-Sided Continuous Shield		Aluminum			
Potting Material			Silicone			

Standards Compliance

Parameter	Standard	Test Conditions	Performance Criteria
Environmental Compliance	Reach; RoHS		PASS
EMI	EN55022		Class B
ESD	EN61000-4-2	±4 kV Air Discharge ±4 kV Contact Discharge	Crit. A
Radiated Immunity	EN61000-4-3	Level 2, 3 V/m	Crit. A
Fast Transient	EN61000-4-4	±2 kV Applied	Crit. A
Surge	EN61000-4-5	±2 kV Applied	Crit. A
Conducted Immunity	EN61000-4-6	Level 2, 3 V rms	Crit. A

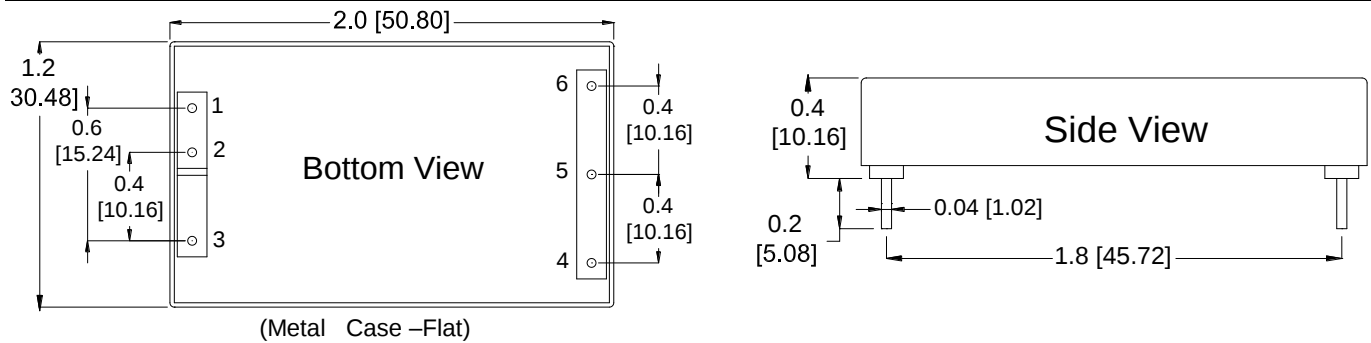
It is recommended to protect the input by fuses or other protection devices.

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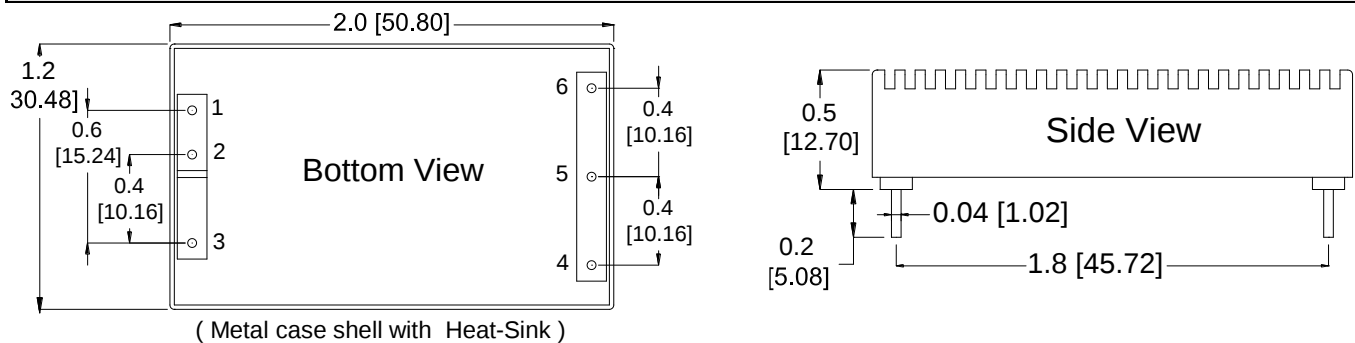


Mechanical Drawing & Pin Assignments

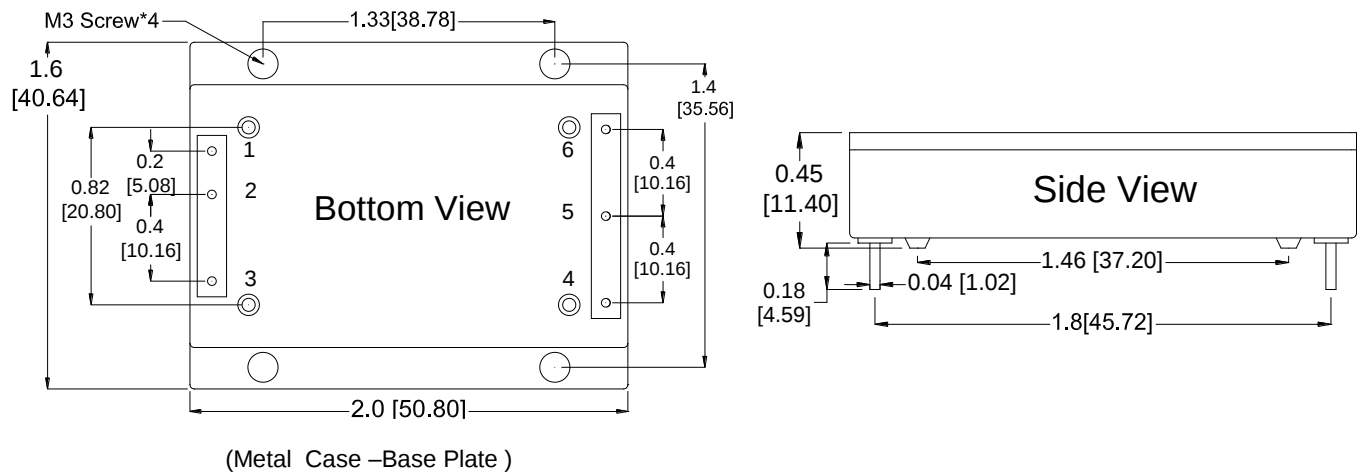
Suffix -F



Suffix -P (Heat Sink)



Suffix -B (BasePlate)



Pin Assignments:

Pin#	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Enable	Enable
4	Trim	-Vout
5	-Vout	Com
6	+Vout	+Vout

Note:

Pin Pitch tolerance: ± 0.01 [0.25]
Pin Dimensions: $.XX \pm 0.02$ [$.X \pm 0.5\text{mm}$]
Pin Material: Copper Alloy
Pin Plating: Gold
Dimensions in inches [mm]
Tolerances: $.XX \pm 0.02$ [$.X \pm 0.5\text{mm}$]
 $.XXX \pm 0.001$ [$.X \pm 0.025\text{mm}$]



Characteristic Curves

Testing conditions are at typical input, $T_a = +25^\circ\text{C}$, full load (horizontal mount) Unless otherwise indicated

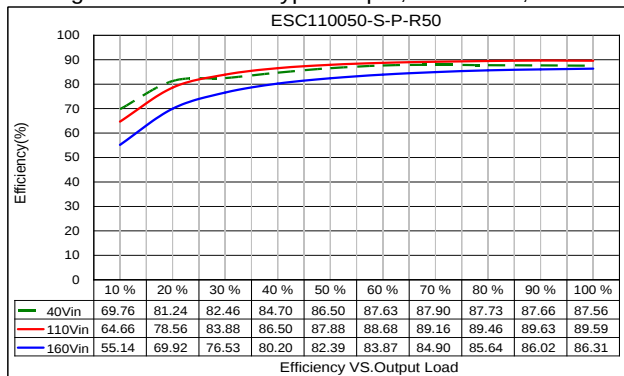


Figure 1: Efficiency at Minimum, Nominal and Maximum Input voltages VS. output load.

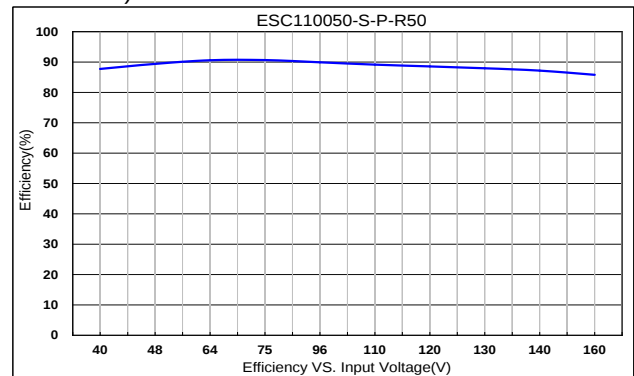


Figure 2: Efficiency VS. Input Voltages at 100% rated power

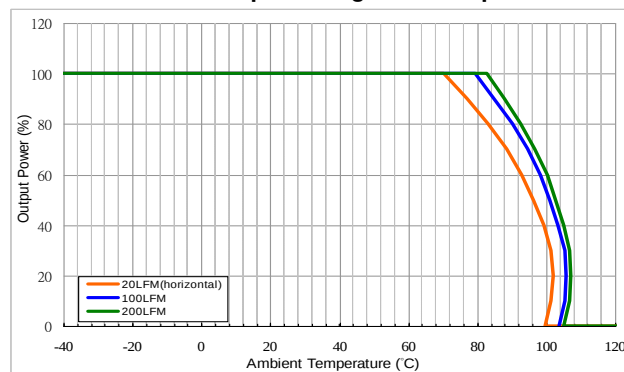


Figure 3: Ambient Temperature VS. Output Power Derating Curves

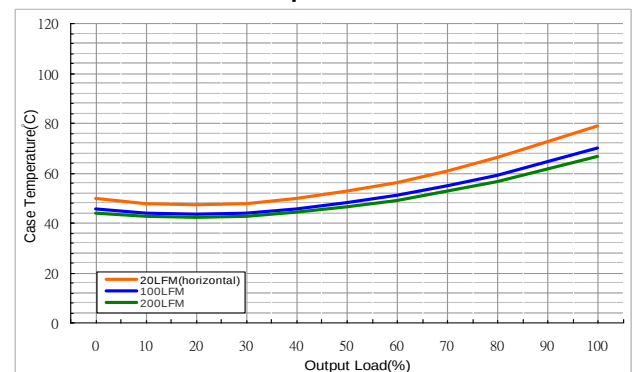


Figure 4: Case Temperature VS. Output rated Power

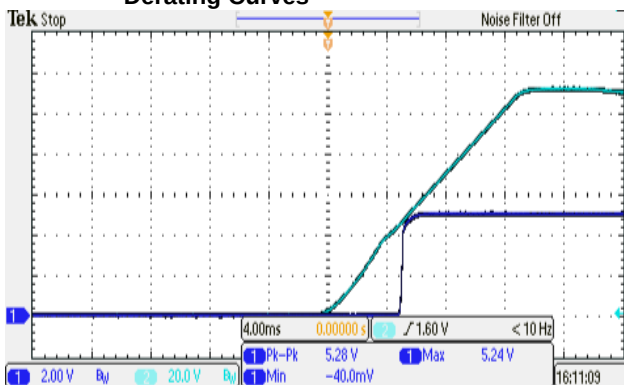


Figure 5: CH1 = Vout, CH2 = Nominal Input Typical Start-up waveform at Full load.

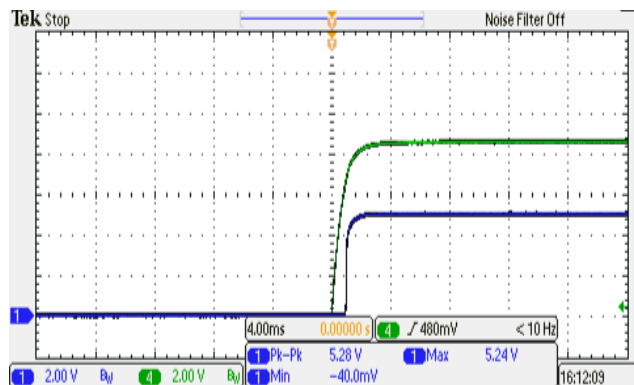


Figure 6: CH1 = Vout, CH4 = Enable Pin Typical Start-up waveform. Input voltage pre-applied

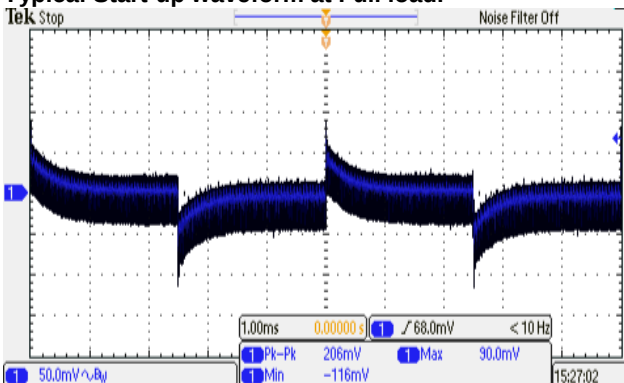


Figure 7: Transient Response at Output step load
(V_{in} : Typical, 50~75% of output current; $\Delta I_o/\Delta t = 0.01\text{A}/\mu\text{s}$)

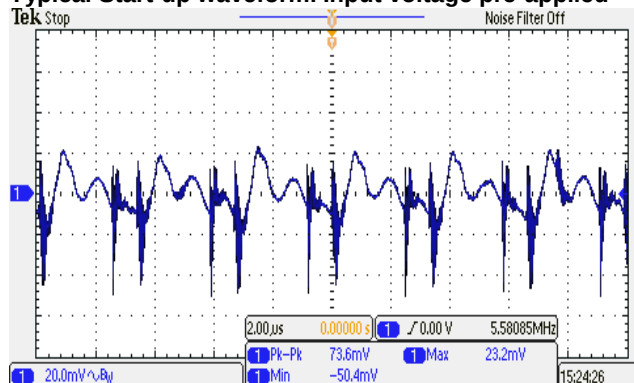
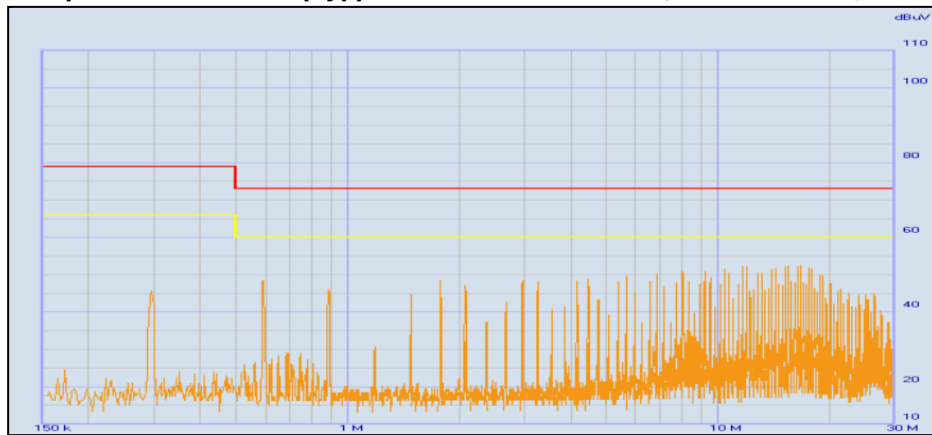


Figure 8: Output Voltage Ripple & Noise at full load.
(V_{in} : Typical, With Output Capacitor to add 1uF MLCC)



Conducted EMI Input terminal value (Typ) ESC110050-S-1-P50 @Vin = 110VDC, Iout = 10A



The fundamental switching frequency of the module is 260 kHz.

Trimming Output Voltage – for Single output models

Only the single output converters have a trim function. that allows users to adjust the output voltage from +10% to –10%, please refer to the trim table that follow for details. Adjustments to the output voltage can be used with a simple fixed resistor as shown in Figures 2 and 3. A single fixed resistor can increase or decrease the output voltage depending on its connection.

Note:

- ✘ Trim adjustments higher than the specified range can have an adverse effect on the converter's performance and are not recommended.
- ✘ If the trim function is not used, leave the trim pin open.

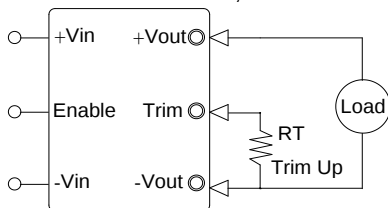


Figure 2. Trim Connections To increase Output Voltages Using Fixed Resistors

	Trim Up register value(KΩ) RT									
Vout	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
3.3	75	34	20.6	13.7	9.6	6.9	4.9	3.5	2.3	1.4
5	113	51	31.0	20.7	14.6	10.5	7.6	5.4	3.7	2.3
12	274	128	79.5	55.1	40.5	30.7	23.8	18.6	14.5	11.2
15	341	157	95.6	64.9	46.6	34.3	25.5	19.0	13.9	9.8
24	542	247	149	100	70.7	51.1	37.1	26.6	18.4	11.9

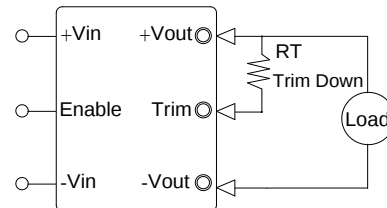


Figure 3. Trim Connections To Decrease Output Voltages Using Fixed Resistors

	Trim Down register value(KΩ) RT									
Vout	-1%	-2%	-3%	-4%	-5%	-6%	-7%	-8%	-9%	-10%
3.3	83	37	21.9	14.3	9.7	6.7	4.5	2.9	1.6	0.6
5	117	52	30.5	19.7	13.3	9.0	5.9	3.6	1.8	0.4
12	230	103	61.0	39.9	27.2	18.8	12.8	8.2	4.7	1.9
15	329	147	86.8	56.5	38.4	26.2	17.6	11.1	6.1	2.0
24	592	266	158	104	70.9	49.2	33.7	22.1	13.0	5.8

Enable Control Function

The primary-side, Enable Control function can be specified to operate with either positive or negative polarity. Positive-polarity devices are enabled when the enable pin is left open or is pulled high. See "Enable Function Input."

Positive-polarity devices are disabled when the enable pin is pulled low (under +1.0V with respect to –input). Negative-polarity devices are off when the enable pin is high/open and on when the enable pin is pulled low. See Figure 4.

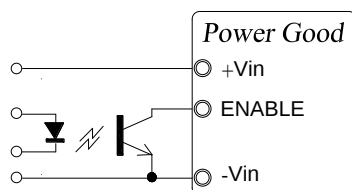


Figure 4. Driving the Enable Control pin

Output Ripple Noise

the two copper strips simulate real-world PCB impedances between the converter and its load. Scope measurements should be made using BNC connectors or The probe ground should be less than 1/2 inch and soldered directly to the fixture. All external capacitors should have appropriate voltage ratings and be located as close to the converter as possible. Temperature variations for all relevant parameters should be taken into consideration. The most effective combination of external I/O capacitors will be a function of line voltage and source impedance, as well as particular load and layout conditions. See Figure 5.

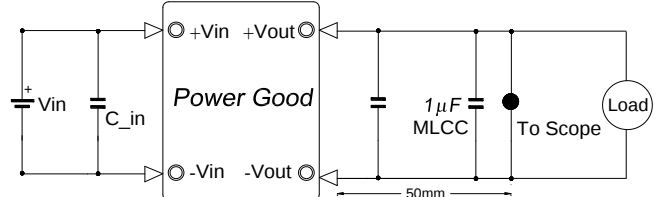


Figure 5. Measuring Output Ripple/Noise(20MHz bandwidth)