

Features

8:1/4:1 Wide Input Range

Operating Temperature Range: -40~100°C

Approved to UKCA, CE, RoHS & REACH

Safety Standards to IEC/EN 62368-1 & EN 50155

Efficiency up to 89%

Single output 9~160V DC



28ESCSxy-x-x-F100-IP Series

DC/DC PCB Mount Power Supply



Certified to UKCA, CE, RoHS, REACH & EN 62368-1/IEC 62368-1/EN 50155 Standards and complies with Efficiency Regulations. These are primarily used in ITE, Audio & Video, Railway Industries and customised solutions are available upon request.

Part Number Structure

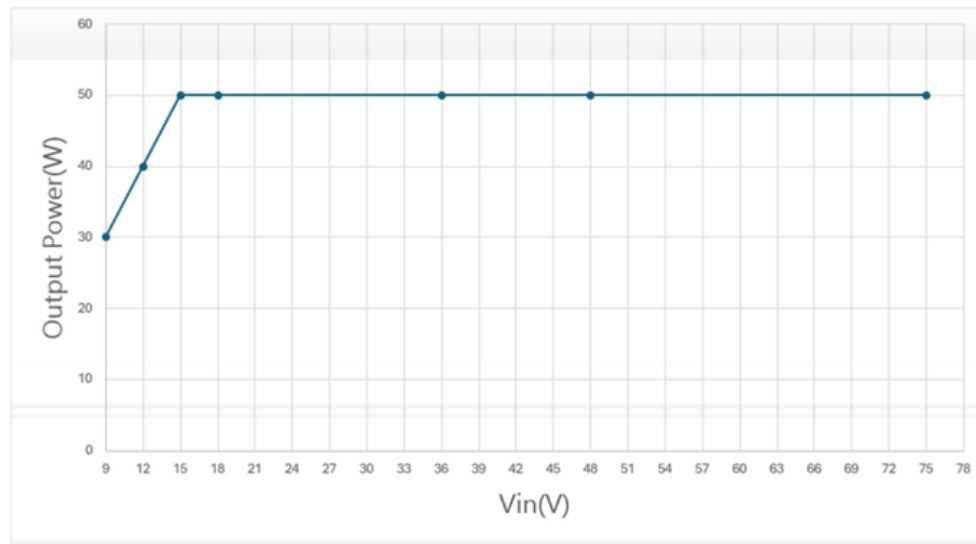
28ESCS	-	024W	050	-	S	-	P	-	F	100
Series Name		Input Voltage (VDC)	Output Voltage (VDC)		Output Quantity		Remote control option		Shape	Watt
Evolving		024W : 9-36	050 : 5				P : Positive logic		F : Flat	50
Sirius		036W : 9-75	120 : 12		S : single		N : Negative logic			80
Chivalry series		048W : 18-75	150 : 15							100
Second		110 : 40-160	240 : 24							
			120 : ±12							
			150 : ±15							
					D : Dual					

Models

Model	Input			Output			Efficiency Typ.(%)
	Voltage (V) Range	Nominal	Current (A) Full load	Voltage (V)	Current (A)	Power (W)	
28ESCS024W050-S-□-F50-IP	9-36	24	2.37	5	10	50	88
28ESCS024W120-S-□-F50-IP	9-36	24	2.34	12	4.16	50	89
28ESCS024W150-S-□-F50-IP	9-36	24	2.34	15	3.33	50	89
28ESCS024W240-S-□-F50-IP	9-36	24	2.34	24	2.08	50	89
28ESCS024W120-D-□-F50-IP	9-36	24	2.37	±12	±2.08	50	88
28ESCS024W150-D-□-F50-IP	9-36	24	2.37	±15	±1.66	50	88
28ESCS048W050-S-□-F50-IP	18-75	48	1.19	5	10	50	88
28ESCS048W120-S-□-F50-IP	18-75	48	1.17	12	4.16	50	89
28ESCS048W150-S-□-F50-IP	18-75	48	1.17	15	3.33	50	89
28ESCS048W240-S-□-F50-IP	18-75	48	1.17	24	2.08	50	89
28ESCS048W120-D-□-F50-IP	18-75	48	1.19	±12	±2.08	50	88
28ESCS048W150-D-□-F50-IP	18-75	48	1.19	±15	±1.66	50	88
28ESCS110050-S-□-F50-IP	40-160	110	0.52	5	10	50	88
28ESCS110120-S-□-F50-IP	40-160	110	0.51	12	4.16	50	89
28ESCS110150-S-□-F50-IP	40-160	110	0.51	15	3.33	50	89
28ESCS110240-S-□-F50-IP	40-160	110	0.51	24	2.08	50	89
28ESCS110120-D-□-F50-IP	40-160	110	0.52	±12	±2.08	50	88
28ESCS110150-D-□-F50-IP	40-160	110	0.52	±15	±1.66	50	88
28ESCS024W050-S-□-F80-IP	9-36	24	3.75	5	16	80	89
28ESCS024W120-S-□-F80-IP	9-36	24	3.75	12	6.67	80	89
28ESCS024W150-S-□-F80-IP	9-36	24	3.75	15	5.33	80	89
28ESCS024W240-S-□-F80-IP	9-36	24	3.75	24	3.33	80	89
28ESCS024W120-D-□-F80-IP	9-36	24	3.75	±12	±3.33	80	89
28ESCS024W150-D-□-F80-IP	9-36	24	3.75	±15	±2.67	80	89
28ESCS048W050-S-□-F80-IP	18-75	48	1.87	5	16	80	89
28ESCS048W120-S-□-F80-IP	18-75	48	1.87	12	6.67	80	89
28ESCS048W150-S-□-F80-IP	18-75	48	1.87	15	5.33	80	89
28ESCS048W240-S-□-F80-IP	18-75	48	1.87	24	3.33	80	89
28ESCS048W120-D-□-F80-IP	18-75	48	1.87	±12	±3.33	80	89
28ESCS048W150-D-□-F80-IP	18-75	48	1.87	±15	±2.67	80	89
28ESCS110050-S-□-F80-IP	40-160	110	0.82	5	16	80	89
28ESCS110120-S-□-F80-IP	40-160	110	0.82	12	6.67	80	89
28ESCS110150-S-□-F80-IP	40-160	110	0.82	15	5.33	80	89
28ESCS110120-D-□-F80-IP	40-160	110	0.82	±12	±3.33	80	89
28ESCS110150-D-□-F80-IP	40-160	110	0.82	±15	±2.67	80	89
28ESCS024W120-S-□-F100-IP	9-36	24	4.16	12	8.33	100	89
28ESCS024W150-S-□-F100-IP	9-36	24	4.16	15	6.67	100	89
28ESCS024W240-S-□-F100-IP	9-36	24	4.16	24	4.16	100	89
28ESCS024W120-D-□-F100-	9-36	24	4.16	±12	±2.08	100	88
28ESCS024W150-D-□-F100-	9-36	24	4.16	±15	±4.16	100	88
28ESCS048W120-S-□-F100-IP	18-75	48	2.08	12	8.33	100	89
28ESCS048W150-S-□-F100-IP	18-75	48	2.08	15	6.67	100	89
28ESCS048W240-S-□-F100-IP	18-75	48	2.08	24	4.16	100	89
28ESCS048W120-D-□-F100-	18-75	48	2.08	±12	±4.16	100	88
28ESCS048W120-D-□-F100-	18-75	48	2.08	±15	±3.33	100	88

28ESCS036W050-S-□-F50-IP	9-75	36	1.62	5	10	50	87
28ESCS036W120-S-□-F50-IP	9-75	36	1.62	12	4.16	50	87
28ESCS036W150-S-□-F50-IP	9-75	36	1.62	15	3.33	50	87
28ESCS036W240-S-□-F50-IP	9-75	36	1.62	24	2.08	50	87
28ESCS036W120-D-□-F50-IP	9-75	36	1.62	±12	±2.08	50	87
28ESCS036W150-D-□-F50-IP	9-75	36	1.62	±15	±1.66	50	87

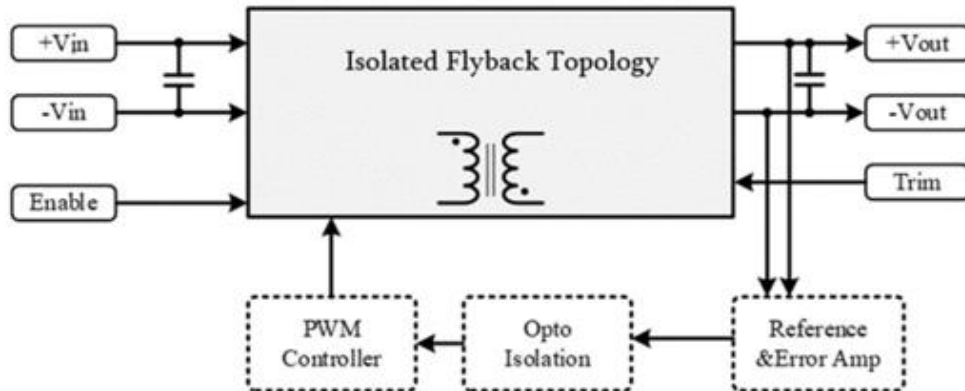
Output rated Power VS. Input Voltages



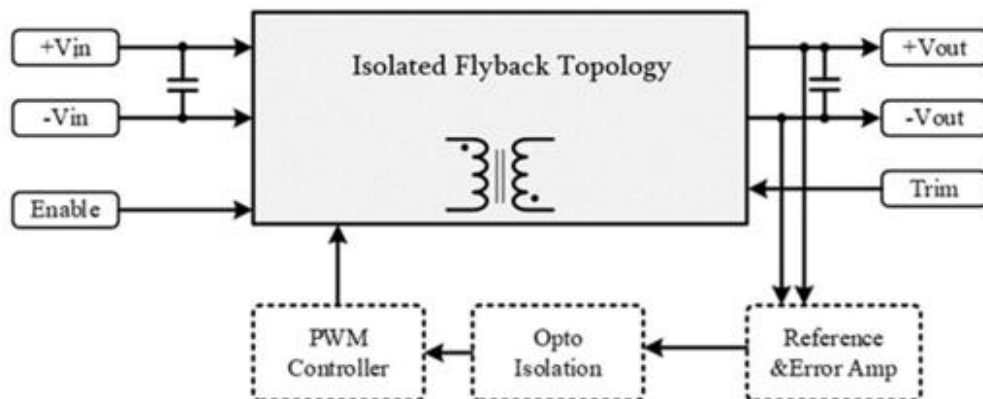
Output rated Power VS. Input Voltages

Description

Ideal Power Evolving Sirius - Chivalry series - Second generation 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.



28ESCS Single Series Block Diagram



28ESCS Dual Series Block Diagram

Input Data

Parameter	Notes and Conditions		Min.	Typ.	Max.	Unit
Transient Input Voltage Ranges	28ESCS024W models (100ms max)		--	--	50	VDC
	28ESCS036W models (100ms max)				80	
	28ESCS048W models (100ms max)				80	
	28ESCS110 models (100ms max)				250	
Operating Input Voltage Ranges	28ESCS024W models		9	24	36	VDC
	28ESCS036W models		9	36	75	
	28ESCS048W models		18	48	75	
	28ESCS110 models		40	110	160	
Under-Voltage Lockout Start up Voltage	28ESCS024W models		--	8.5	9	VDC
	28ESCS036W models			8.5	9	
	28ESCS048W models			17.5	18	
	28ESCS110 models			38	40	
Under-Voltage Lockout Shutdown Voltage	28ESCS024W models		7	8	--	VDC
	28ESCS036W models		7	8		
	28ESCS048W models		16	17		
	28ESCS110 models		35	37		
Input filter	All models, Built-in PI Filter					
Enable Function Input	Positive logic	ON OFF	Open Short or 0 ~ 1.2			
	Negative logic	ON OFF	Short or 0 ~ 1.2 Open			

Output Data

Parameter	Notes and Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	VNOM 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 1μF MLCC Output Capacitor each output	5V	--	2	%Vpk-pk
	All others	--	1	1.5	%Vpk-pk
Temperature Coefficient	--	--	--	+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 Protection	VNOM 10% Load	--	+10	--	%
Output power protection	VNOM 10% Load	--	120	--	%
Over Voltage Protection	VNOM	--	120	--	%

General Specifications & Environmental Data

Parameter	Notes and Conditions	Min.	Typ.	Max.	Unit
Storage temperature range	All models	-60	--	125	°C
Switching frequency	VNOM	180	--	300	kHz
Operating case temperature	All models	-45	--	100	°C
Over temperature protection	All models, Auto. Recovery	--	105	--	°C
Thermal impedance	Natural convection (Metal Case – Flat)	11(Vertical) 13(horizontal)			°C/Watt
Isolation Voltage (Input to Output)	All models, 1 Minute	2250	--	--	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-B (Base Plate) Shape-F (No Flange Base Plate)	31 (1.09)			g (oz.)
Dimensions	Shape-B (Base Plate) Shape-F (No Flange Base Plate)	2.00" x 1.00" x 0.40"(50.8 x25.4 x10.16mm)			
Case Material	Aluminum + FR4 (Non-Conductive Base)				
Potting material	Silicone				

Standards Compliance

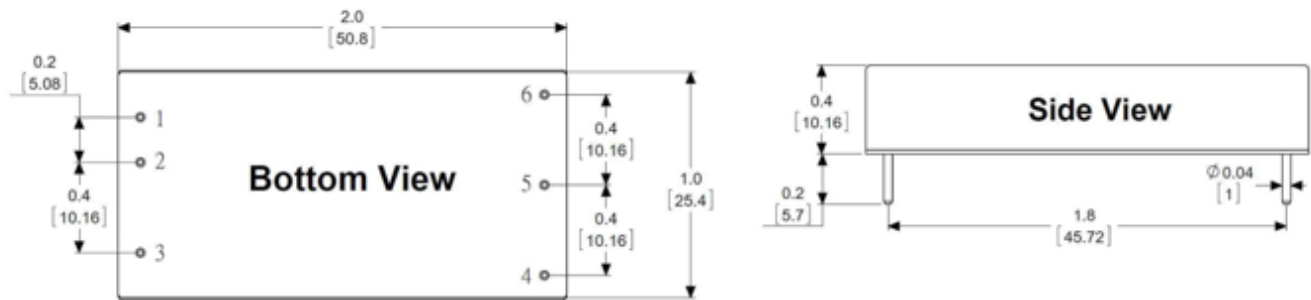
Parameter	Standard	Test conditions	Performance criteria
Environmental Compliance	Reach; RoHS	--	Pass
EMI	EN55032	--	Class A
ESD	EN61000-4-2	±4 kV Air Discharge ±4 kV Contact Discharge	Crit. A
Radiated Immunity	EN61000-4-3	Level 2, 3 V/m	Crit. A
Fast Transient	EN61000-4-4	±2 kV Applied	Crit. A
Surge	EN61000-4-5	±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.

Modules could meet EN55032 Class A and Class B standard with external components.

The information and specifications contained in this data sheet are believed to be correct at time of publication. All specifications are subject to change without notice. No rights under any patent accompany the sale of any such products or information contained herein.

Conducted EMI



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

Note:

Pin Pitch tolerance: ± 0.01 [0.25]

Pin Dimensions: $.XX \pm 0.03$ [$.X \pm 0.76\text{mm}$]

Pin Material: Copper Alloy

Pin Plating: Gold

Dimensions in inches [mm]

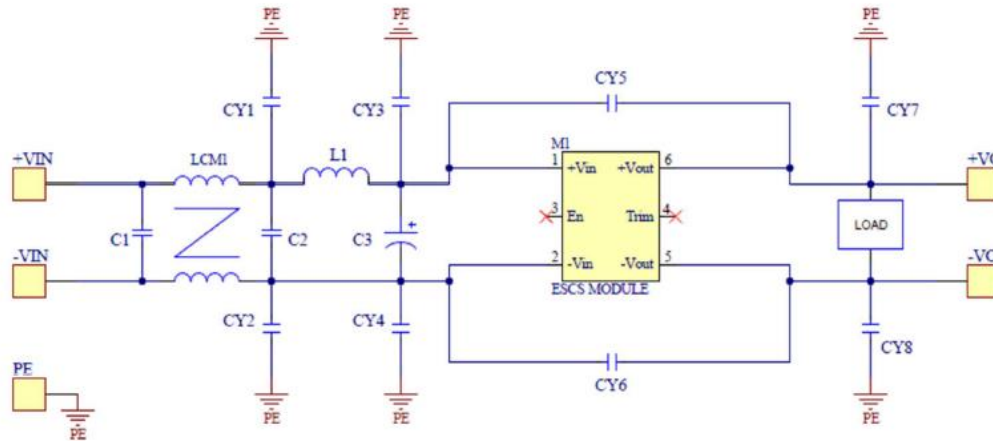
Tolerances: $.XX \pm 0.02$ [$.X \pm 0.5\text{mm}$]

 $.XXX \pm 0.001$ [$.X \pm 0.025\text{mm}$]

Conducted EMI

Input terminal value (typ.) 28ESCS110240-S-P-F80@Vin = 110VDC, Iout = 3.33A

Recommended Circuit Diagram

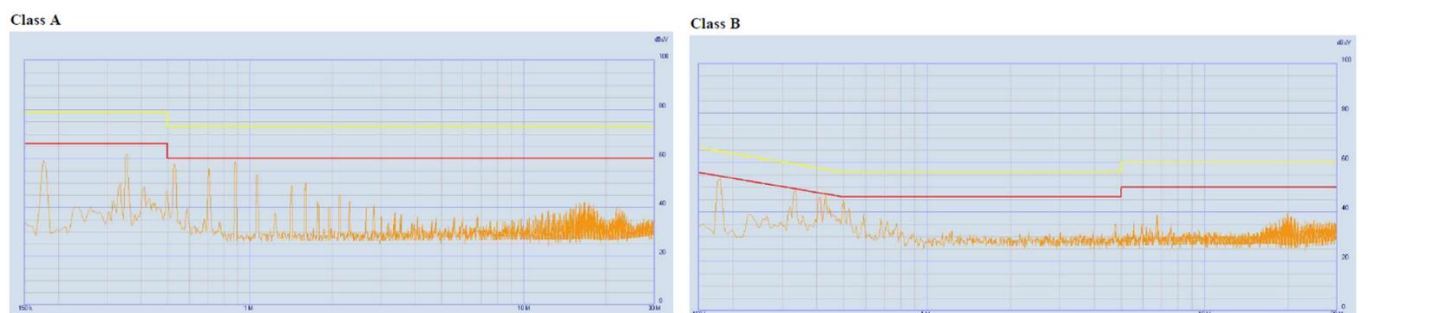


Class A

C1	LCM1	C2	L1	C3	CY1	CY2	CY3	CY4	CY5	CY6	CY7	CY8
0.22uF	55uH	0.47uF	200uH	470uF	x	x	x	x	1500p	1500p	x	X
MLCC		MLCC		EC					Y Cap	Y Cap		

Class B

C1	LCM1	C2	L1	C3	CY1	CY2	CY3	CY4	CY5	CY6	CY7	CY8
0.22uf	450uH	0.47uF	350uH	470uF	4700pF	4700pF	x	x	4700p	4700p	x	x
MLCC		MLCC		EC	Y Cap	Y Cap			Y Cap	Y Cap		



Characteristic curves

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

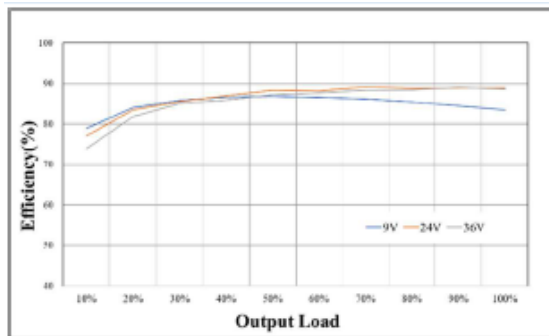


Figure 1 : Efficiency at Minimum, Nominal and Maximum Input Voltages VS. Output Load.

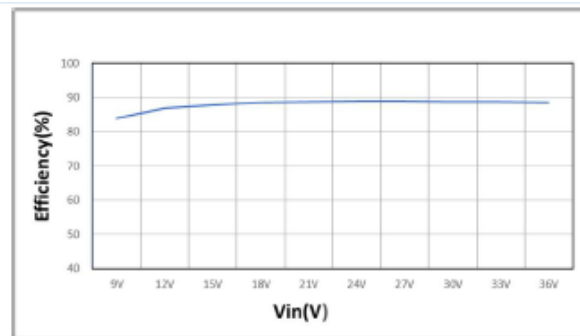


Figure 2 : Efficiency VS. Input Voltages at 100% rated power

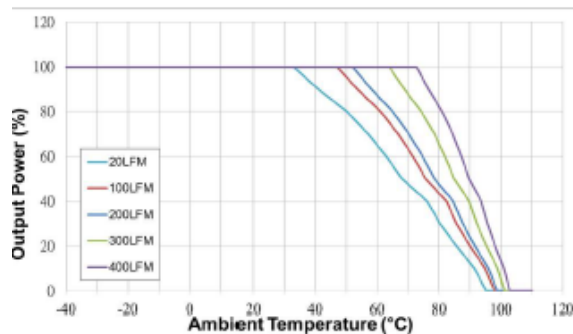


Figure 3 : Ambient Temperature VS. Output Power Derating Curves (Note: 20LFM = Free Air)

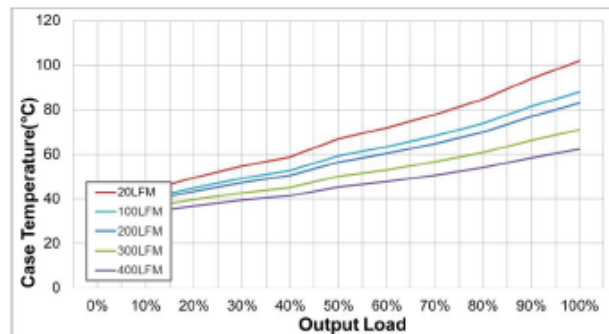


Figure 4 : Case Temperature VS. Output rated Power (Note: 20LFM = Free Air)

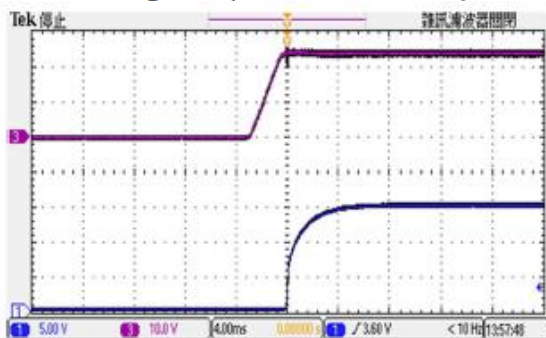


Figure 5 : CH1 = Vout, CH3 = Nominal Input
Typical Start-up waveform at Full load.

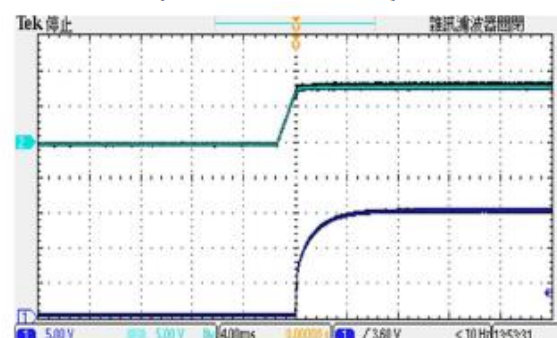


Figure 6 : CH1 = Vout, CH3 = Enable Pin
Typical Start-up waveform. Input voltage pre-applied

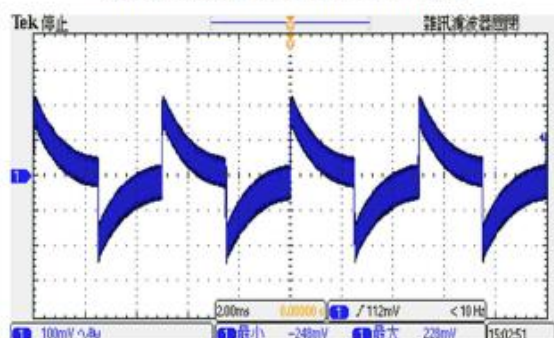


Figure 7 : Transient Response at Output step load
(V_{in} : Typical, 50~75% of output current; $\Delta I_o/\Delta t = 1\text{A}/\mu\text{s}$)

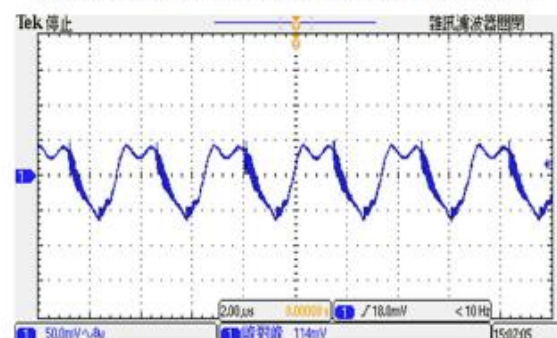


Figure 8 : Output Voltage Ripple & Noise at full load.
(V_{in} : Typical, With Output Capacitor to add 10 μF MLCC)

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 1 and 2. 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.

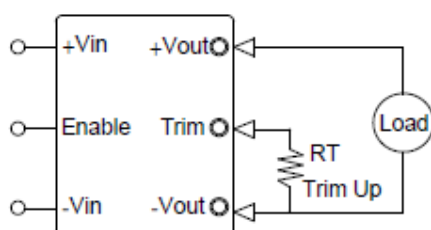


Figure 1. Trim Connections To increase Output Voltages Using Fixed Resistors

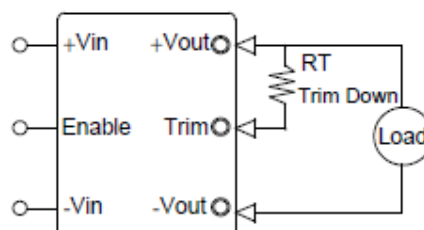


Figure 2. Trim Connections To Decrease Output Voltages Using Fixed Resistors

Trim up resistor value(KΩ)										
Vout	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
5	112.2	51.1	30.7	20.5	14.4	10.4	7.5	5.3	3.6	2.2
12	267.8	121.9	73.3	49.0	34.4	24.6	17.7	12.5	8.4	5.2
15	332.9	151.5	91	60.7	42.6	30.5	21.8	15.4	10.3	6.3

Trim down resistor value(KΩ)										
Vout	-1%	-2%	-3%	-4%	-5%	-6%	-7%	-8%	-9%	-10%
5	139.8	63.5	38.1	25.4	17.8	12.7	9.0	6.3	4.2	2.5
12	342.5	155.9	93.7	62.6	44.0	31.5	22.7	16.0	10.8	6.7
15	454.5	205	125.8	84.7	60.1	43.6	31.9	23.1	16.2	10.7

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 3.

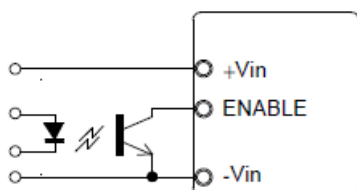


Figure 3. Driving the Enable Control pin

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 load and layout conditions. See Figure 4

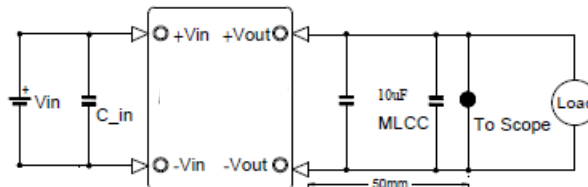


Figure 4. Measuring Output Ripple/Noise(20MHz bandwidth)

Characteristic Curves

To ensure module's functionality, we suggest adding an additional capacitor on the input side. This method can be used to avoid possible voltage drop or voltage fluctuation on the input side caused by using a longer or thinner cable. Recommended Capacitance: 47uF – 100uF

