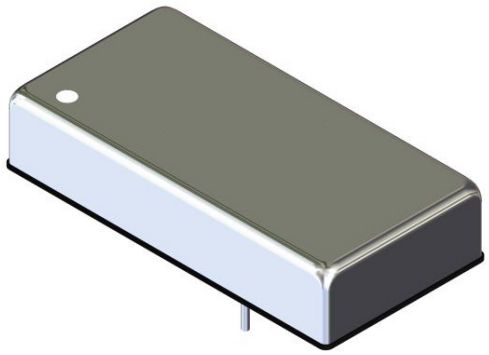
FW40S & FW40D
40W SINGLE & DUAL DC/DC CONVERTERS

Features
- *40 Watts output power*
- *Efficiency up to 92%*
- *4:1 Wide input voltage range*
- *-40C to +105C wide operating temperature with derating*
- *Low no-load power consumption_10mA with remote-on mode*
- *Continuous Short Circuit Protection*
- *Standard 2" x 1" Metal Package*
- *External ON/OFF control*
- *RoHS Compliant*
- *Built-in EMI filter to meet class A*
- *Designed to meet IEC 60950-1*



Electrical Specifications: Regulated

Measured at 25°C with the condition of V_{IN} = Nominal and Full Load. Specifications subject to change without notice.

INPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range	4:1; See Model Selection Guide				
Input Filter	π				
Start Up Times	V_{IN} = Nominal Input, full output load		40		ms
Under Voltage Lockout			8		V
Remote ON/OFF	DC/DC Converter ON, leave open, See Note 1	3.0		12	V
Remote ON/OFF	DC/DC Converter OFF, short to ground, See Note 1	0		1.2	V

OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage	See Model Selection Guide				
Output Current	See Model Selection Guide				
Output Voltage Accuracy				±1	%
Output Voltage Adjustment			±10		%
Ripple & Noise	@20MHz BW, see model selection guide, see note 2,5				mV_{PP}
Line Regulation	Single output, minimum V_{IN} to maximum V_{IN}			±0.2	%
Line Regulation	Dual output, minimum V_{IN} to maximum V_{IN}			±0.5	%
Load Regulation	Single models			±0.5	%
Load Regulation	Dual models (0% to 100% load)			±1	%
Cross Regulation	25% of FL to FL, dual models only, See Note 3			±5	%
Minimum Load	None, See Note 4				%
Over Load Protection	Nominal input		150		%
Short Circuit Protection	Continuous, Auto-Restarting				
Temperature Coefficient				±0.05	%/°C
Transient Response	75% of F.L to Full Load		500		μS

GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency @ FL	See Model Selection Guide				
Isolation Voltage (1 min.), Input to Output		1600			Vdc
Isolation Resistance		1			GΩ
Isolation Capacitance				1500	pF
Operating Frequency	100% of Load at nominal input	220	250	285	kHz
Vibration	MIL-STD-202G				
Safety	Designed to meet IEC 60950-1				

ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature Range	Ambient; V_{IN} = Nominal Input, see figure 3.	-40		+100	°C
Storage Temperature Range		-55		+125	°C
Case Temperature				105	°C
Humidity		5		95	%
MTBF	per MIL-HDBK-217F@25 °C		TBD		hrs

EMC

PARAMETER	CONDITION / NOTE	
EMI	EN55022,	CLASS A/B
ESD	EN61000-4-2, Air ±8kV; Contact ±4kV	Perf. Criteria A
Radiated Immunity	EN61000-4-3, 10V/M	Perf. Criteria A
Fast Transient	EN61000-4-4, ±1kV	Perf. Criteria A
Surge	EN61000-4-5, ±1kV	Perf. Criteria A
Conducted Immunity	EN61000-4-6, $10V_{RMS}$	Perf. Criteria A
PMF	EN61000-4-8, 50Hz, $1A/m_{rms}$	Perf. Criteria A

PHYSICAL CHARACTERISTICS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (L×W×H)	2.00 x 1.00 x 0.41 in. (50.80 × 25.40× 10.50mm)				
Weight	0.95 oz. (27g)				
Case Material	Nickel Plated Copper				
Base Material	FR4 PCB				
Potting Material	Silicon (UL94V-0)				

MODEL SELECTION GUIDE

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY	CAPACITIVE LOAD	RIPPLE & NOISE
	Vdc	Vdc	mA	%	µF	mV_{PP}
FW40S3.3/24	9-36	3.3	10000	88	26600	100
FW40S524	9-36	5	8000	90	20000	100
FW40S12/24	9-36	12	3333	92	3900	125
FW40S15/24	9-36	15	2666	92	2600	125
FW40D12/24	9-36	±12	±1666	90	±2600	125
FW40D15/24	9-36	±15	±1333	90	±1600	125
FW40D24/24	9-36	±24	±833	91	±650	200
FW40S3.3/48	18-75	3.3	10000	88	26600	100
FW40S5/48	18-75	5	8000	90	20000	100
FW40S12/48	18-75	12	3333	92	3900	125
FW40S15/48	18-75	15	2666	92	2600	125
FW40D12/48	18-75	±12	±1666	90	±2600	125
FW40D15/48	18-75	±15	±1333	90	±1600	125
FW40D24/48	18-75	±24	±833	91	±650	200

ORDERING GUIDE

FW40 ___ __ /__

- Power
- Number of Outputs (**S** = Single, **D** = Dual)
- Output Voltage
- Input Voltage

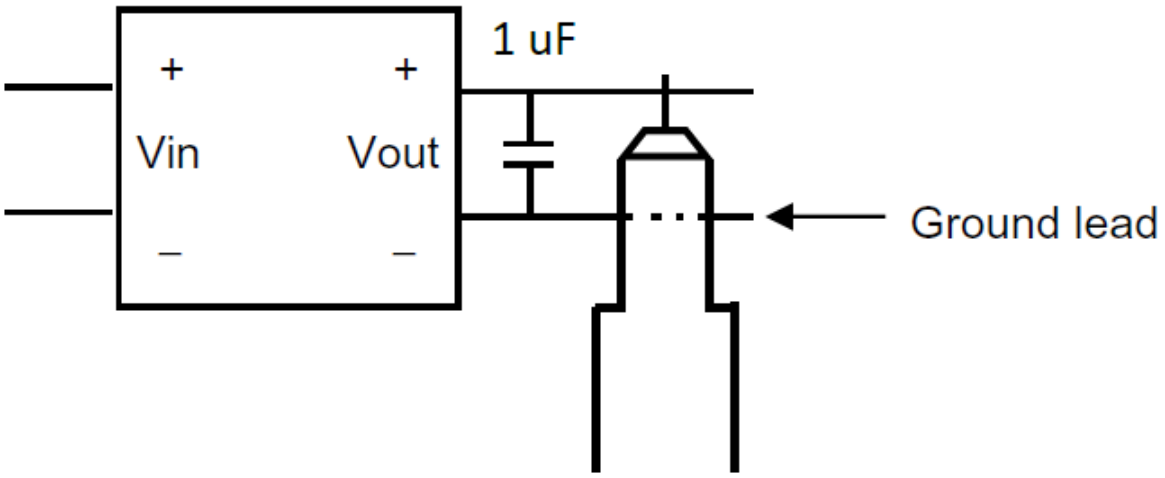
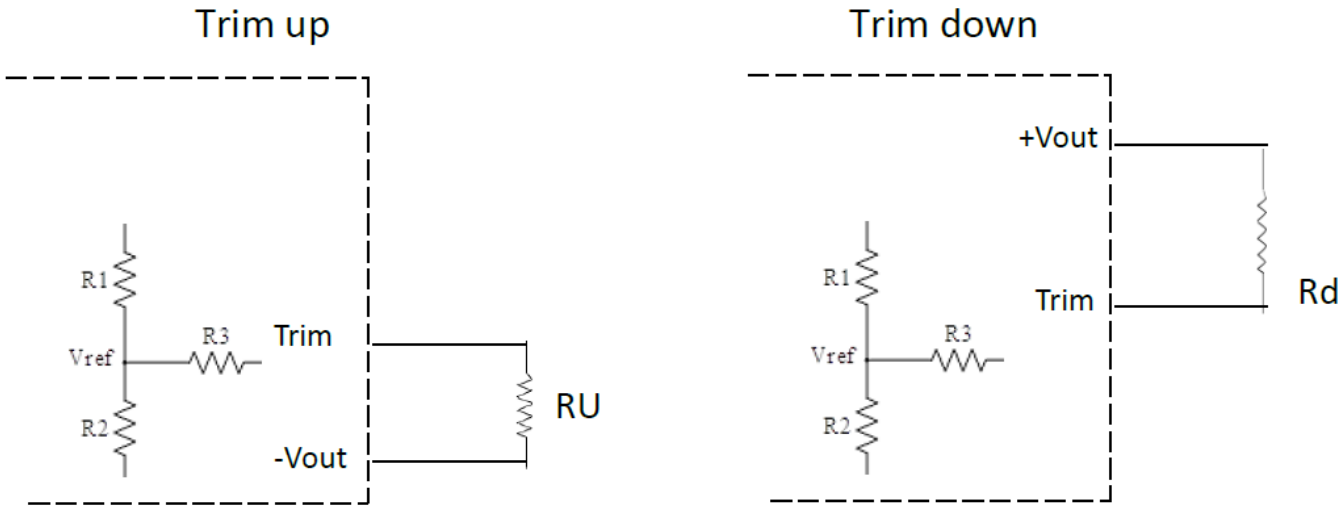


Figure 1: **Output ripple measured with 20MHz bandwidth and 1uF ceramic capacitor across the output**



Formula for trim resistor:

UP: $R_u = \frac{aR_2}{R_2 - a} - R_3$ $\quad a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$

DOWN: $R_d = \frac{bR_1}{R_1 - b} - R_3$ $\quad b = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$

V_{OUT}	***3.3V***	***5V***	***12V***	***15V***
R1	8.5K	15.47K	12.62K	15.1K
R2	5.1K	5.1K	3.3K	3K
R3	27K	33K	22K	22K
V_{REF}	1.24V	1.24V	2.5K	2.5K

RESISTOR NOTES:

1. R_U, R_d THE trim resistor, please check the formula
2. a & b are user defined parameter
3. V'_O is mean trim up/down voltage
4. Value for R1,R2,R3 and V_{REF} refer to table

Figure 2: **Trim equations for output trim up/down resistor with resistor values and notes**

Derating Curve of FW40

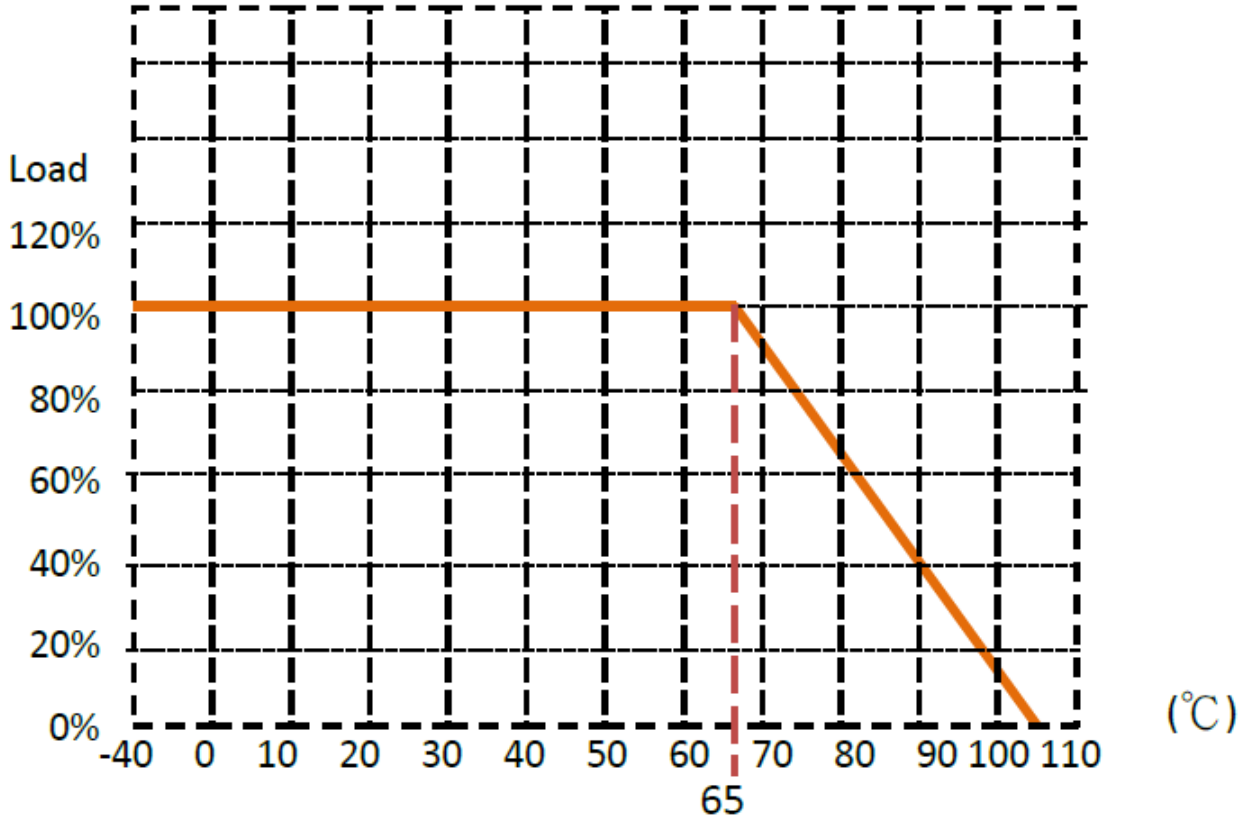
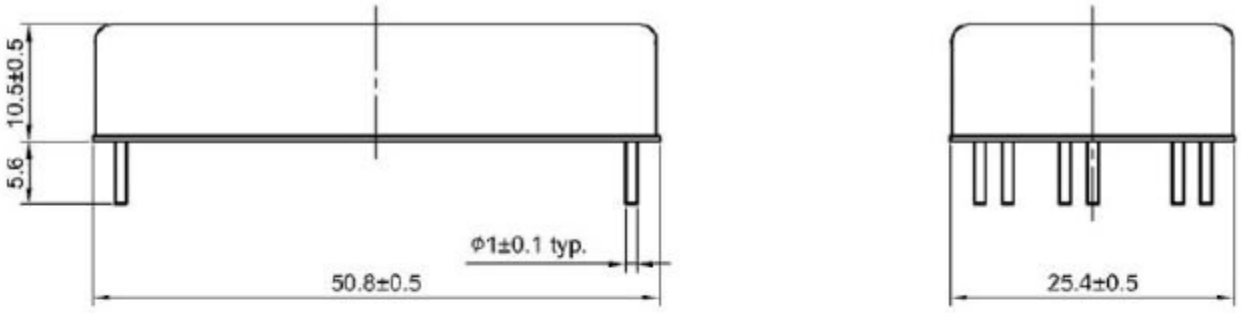
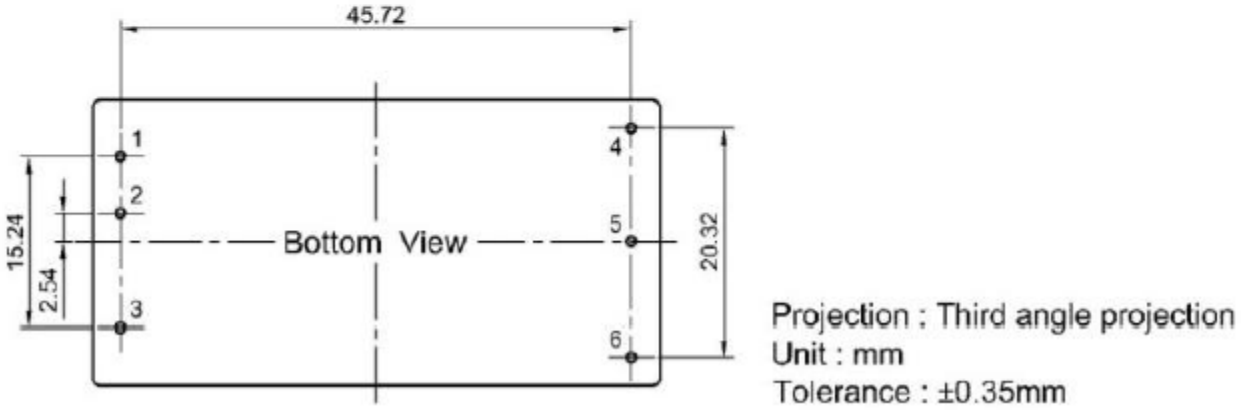


Figure 3: **Derating curve of FW40S12/24 at nomimal input with natural air convention**

Notes

1. The ON/OFF pin voltage is referenced to negative input.
2. Measured with 20MHz bandwidth and 0.1uF ceramic capacitor
3. One load is 25% of full load to 100% of full load, while the other load is 100% of full load. The output voltage is within ±5%.
4. The converter requires a minimum of 10% of full load to maintain specific regulation.
5. Requires external filter to meet EN55022 Class A.





Mechanical Specifications

Pin	Function	
	SINGLE	***DUAL***
1	$+V_{IN}$	$+V_{IN}$
2	$-V_{IN}$	$-V_{IN}$
3	$+V_{OUT}$	$+V_{OUT}$
4	Trim	COM
5	$-V_{OUT}$	$-V_{OUT}$
6	ON/OFF	ON/OFF

Unit: mm
Tolerance: ±0.35mm
Pin: ±0.05mm
Case Tolerance: ±0.05mm