

## 60W

AC-DC  
power supplies

101.6 x 50.8mm (4" X 2") open frame 60W AC-DC power supplies for household appliance, medical (2 x MOPP) & ITE applications

The FCS60 low-profile, open-frame power supplies address the need for low-cost 60W solutions that support a broad range of applications within the medical (2 x MOPP), domestic/household and ITE/industrial electronics sectors.

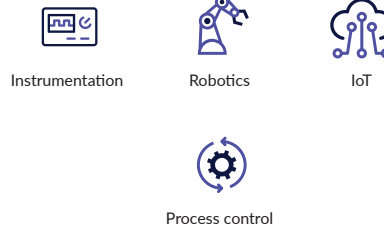
The FCS60 is designed for integration into multiple end equipment markets with international agency approvals, high efficiency and low emissions.



### Features

- ▶ 60W convection cooled
- ▶ 101.6 x 50.8mm (4" x 2") footprint, 26.4mm profile
- ▶ Regulated single outputs 12V to 48VDC
- ▶ input range 80 to 264VAC
- ▶ Medical, ITE & household appliance approvals
- ▶ Class I & Class II installations
- ▶ High power density
- ▶ Less than 0.3W no load input power
- ▶ 3 year warranty

### Applications



### Dimensions

50.8 x 101.6 x 26.4mm (2.00 x 4.00 x 1.04")

### Models & ratings

Model number	Output voltage	Output current	Output power	Efficiency <sup>(1)</sup>
FCS60US12	12.0V	5.00A	60W	85%
FCS60US15	15.0V	4.00A		85%
FCS60US18	18.0V	3.33A		85%
FCS60US24	24.0V	2.50A		85%
FCS60US36	36.0V	1.67A		86%
FCS60US48	48.0V	1.25A		86%

**Notes:**

1. Typical efficiency measured at full load and 230VAC input.

## Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input Voltage - Operating	80	115/230	264	VAC	Derate output from 100% at 90VAC to 90% at 85VAC and 80% at 80VAC
Input Frequency	47	50/60	63	Hz	Agency approval, 47-63Hz
Power Factor					EN61000-3-2 class A
Input Current - Full Load		0.9/0.5		A	115/230 VAC
Inrush Current			60	A	264 VAC cold start, 25°C
Earth Leakage Current			270	μA	264 VAC/60 Hz
No load Input Power			0.3	W	
Input Protection	T3.15A/250A, 250V Internal fuse fitted in line and neutral.				

## Output - main output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output Voltage	12		48	VDC	See models and ratings table
Initial Set Accuracy			±1	%	50% load, 115/230VAC
Output Voltage Adjustment	±10			%	
Minimum Load	No minimum load required				
Start Up Delay		1	2	s	
Output Rise Time		50		ms	
Hold Up Time	8.3/20			ms	Min at full load 115/230VAC
Drift			±0.5	%	90-264VAC
Line Regulation			1	%	0-100% load.
Load Regulation			4	%	Recovery within 1% in less than 500μs for a 50-75% and 75-50% load step
Transient Response			5	%	Full load
Over/Undershoot			5	% pk-pk	20MHz bandwidth
Ripple & Noise			1.0	%Vnom	Continuous trip and restart (hiccup)
Overvoltage Protection	115		140	% I nom	
Overload Protection	110		160		
Short Circuit Protection	Continuous trip and restart (hiccup)				
Temperature Coefficient			0.05	%/°C	

## General

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Efficiency		85		%	115/230VAC, 100% load
Isolation: Input to output Input to ground Output to ground	4000			VAC	2 MOPP
	1500			VAC	1 MOPP
	1500			VAC	1 MOPP at output voltage
Power density			0.43 (7.2)	W/cm <sup>3</sup> (W/in <sup>3</sup> )	
MTBF	500			khrs	MIL-HDBK-217F, Notice 2 +25°C GB
Weight		112 (0.25)		g (lbs)	

## Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature	-25		+70	°C	See derating curve
Storage temperature	-40		+85	°C	
Humidity	5		95	%RH	Non-condensing
Operating altitude			5000/4000	m	ITE/Medical
Shock	±3 x 30g shocks in each plane, total 18 shocks. 30g = 11ms (+/- 0.5msecs), half sine. Conforms to EN60068-2-27				
Vibration	Single axis 10-500 Hz at 2g sweep and endurance at resonance in all 3 planes. Conforms to EN60068-2-6				

## Emissions - EMC

Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55011/32	Class B	For class I applications, ensure the two mounting holes marked with the ground symbol are connected together and to safety earth to meet conducted and radiated emissions.
Radiated	EN55011/32	Class A	Class B with Würth Electronics 742 700 91 with 4 turns on AC Input. For class I applications, ensure the two mounting holes marked with the ground symbol are connected together and to safety earth to meet conducted and radiated emissions.
Harmonic current	EN61000-3-2	Class A	
Voltage flicker	EN61000-3-3		

## Safety approvals

Certification	Standard	Notes & Conditions
CB	IEC60950-1:2005, IEC62368-1:2014	Information technology
	IEC60601-1 Ed 3.1 Including Risk Management	Medical
	IEC60335-1	Household
UL	cUL62368-1	Information technology
	ANSI/AAMI ES60601-1: & CSA C22.2 No.6061-1:08	Medical
EN	EN62368-1	Information technology
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

Isolation	Standard	Notes & Conditions
Primary to Secondary	2 x MOPP (Means of Patient Protection)	IEC60601-1 Ed 3.1
Primary to Earth	1 x MOPP (Means of Patient Protection)	
Secondary to Earth	1 x MOPP (Means of Patient Protection at output voltage)	

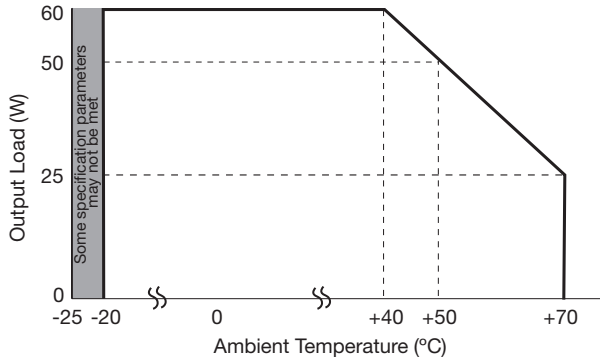
## Immunity - EMC

Phenomenon	Standard	Test Level	Criteria	Notes & conditions
Medical device EMC	IEC60601-1-2	Ed.4.0 : 2014	as below	
Low voltage PSU EMC	EN61204-3	High severity level	as below	
ESD	EN61000-4-2	±8kV contact, ±15kV air	A	
Radiated	EN61000-4-3	3	A	
EFT	EN61000-4-4	3	A	
Surge	EN61000-4-5	Installation class 3	A	
Conducted	EN61000-4-6	3	A	
Magnetic fields	EN61000-4-8	4	A	
Dips and interruptions	EN61000-4-11 (100VAC)	Dip 100% (0VAC), 8.4ms	A	25% derating
		Dip 100% (0VAC), 16.7ms	B	
		Dip 60% (40VAC), 200ms	B	
		Dip 30% (70VAC), 500ms	B	
		Dip 20% (80VAC), 5000ms	B	
		Int 100% (0VAC), 5000ms	B	
	EN61000-4-11 (115VAC)	Dip 100% (0VAC), 8.4ms	A	
		Dip 100% (0VAC), 16.7ms	B	
		Dip 60% (40VAC), 200ms	B	
		Dip 30% (70VAC), 500ms	B	
		Dip 20% (80VAC), 5000ms	B	
		Int 100% (0VAC), 5000ms	B	
	EN61000-4-11 (240VAC)	Dip 100% (0VAC), 10ms	A	
		Dip 100% (0VAC), 20ms	B	
		Dip 60% (96VAC), 200ms	B	
		Dip 30% (168VAC), 500ms	B	
		Dip 20% (192VAC), 5000ms	B	
		Int 100% (0VAC), 5000ms	B	
	EN60601-1-2 (100VAC)	Dip 100% (0VAC), 10ms	A	45% derating
		Dip 100% (0VAC), 20ms	A	65% derating
		Dip 60% (40VAC), 100ms	A	85% derating
		Dip 30% (70VAC), 500ms	A	20% derating
		Int 100% (0VAC), 5000ms	B	
	EN60601-1-2 (240VAC)	Dip 100% (0VAC), 10ms	A	
Dip 100% (0VAC), 20ms		A		
Dip 60% (96VAC), 100ms		A		
Dip 30% (168VAC), 500ms		A		
Int 100% (0VAC), 5000ms		B		

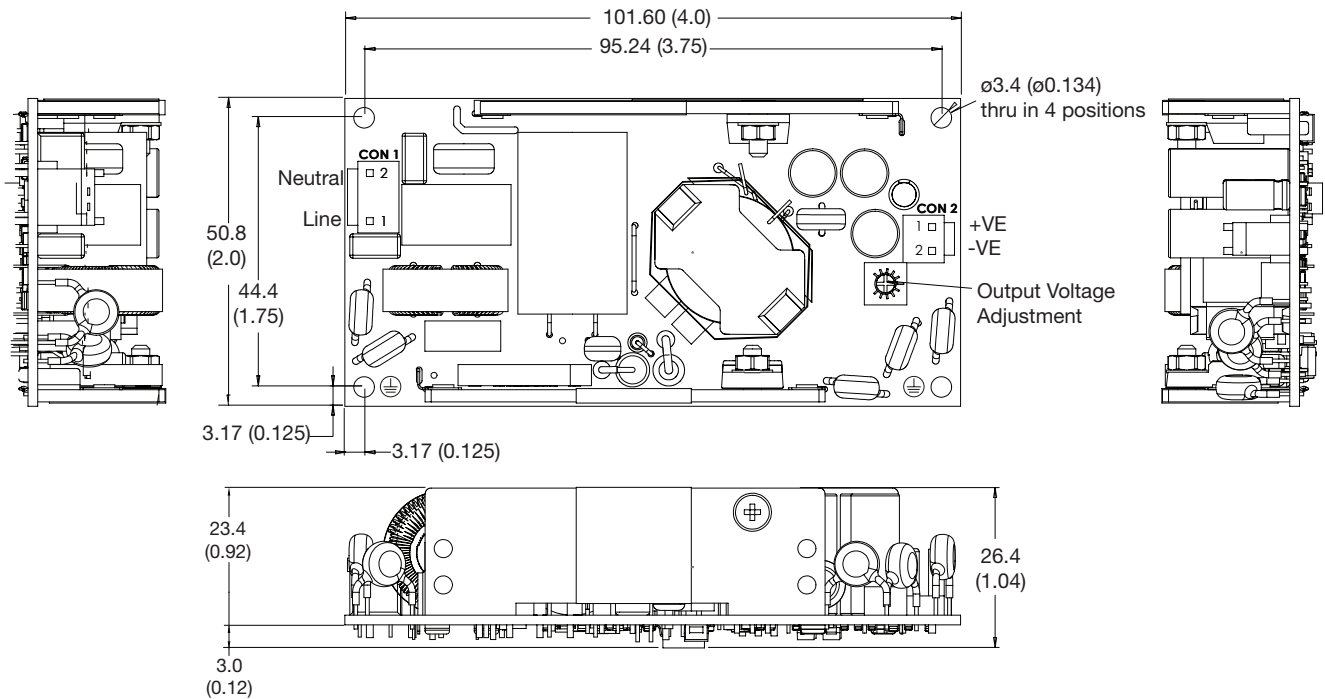
## Application notes

### Temperature derating curve

FCS60US12 ripple and noise is <1.5% from -25°C to 0°C reducing to <1% after 1 minute warm up.



## Mechanical details



CN1 - Output Connector	
Pin 1	Line
Pin 2	Not Fitted
Pin 3	Neutral

CN2 - Output Connector	
Pin 1	+Vout
Pin 2	-Vout

Mates with JST housing VHR-2N and JST Series SVH-21T-P1.1 crimp terminals.  
Mounting hole marked with the ground symbol must be connected to safety earth for class I applications

Mates with JST housing VHR-2N and JST Series SVH-21T-P1.1 crimp terminals

### Notes:

1. All dimensions in mm (inches). Tolerance .xx = 0.50 (±0.02); .xxx = 0.25 (±0.01)

2. Weight: 112g (0.25lbs)

Specifications subject to change without notice.