

**550W** Fan cooled

**450W** Conduction cooled

**230W** Convection cooled

AC-DC power supplies

The CCR550 series of compact medical AC-DC power supplies are designed to operate in convection, conduction, and fan cooled applications with power ratings from 230W to 550W. CCR550 offers high efficiency and high power density in a low 1" profile, baseplate cooled design that ensures effective thermal management and quiet operation for noise sensitive applications.

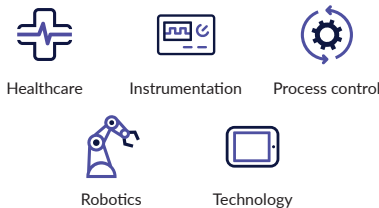
Featuring Class B conducted and radiated emissions, worldwide industrial and medical safety approvals, 2 x MOPP isolation and low leakage currents, the CCR550 is designed for easy integration into a wide range of BF rated medical applications including respiratory care, imaging, patient monitoring, patient treatment, and industrial applications such as process control, test & measurement, and industrial printing.



## Features

- ▶ 550W fan cooled, 450W conduction cooled
- ▶ Universal, single phase input: 85 to 264VAC
- ▶ 129.4 x 83.5mm footprint, 25.4mm profile
- ▶ High efficiency, up to 94%
- ▶ Low earth leakage <300μA
- ▶ Low patient leakage <90μA
- ▶ Medical (BF) & ITE safety approvals
- ▶ Class B conducted and radiated emissions
- ▶ 3 year warranty

## Applications



## Dimensions

129.4 x 83.5 x 25.4mm (5.09" x 3.29" x 1.00")

## Models & ratings

Model number	Output voltage	Output current			Efficiency <sup>(3)</sup>
		Convection cooled	Conduction cooled <sup>(2)</sup>	Fan cooled <sup>(1)</sup>	
CCR550PS12	12.0V	19.16A	37.50A	45.83A	92%
CCR550PS15	15.0V	15.33A	30.00A	36.66A	93%
CCR550PS24	24.0V	9.58A	18.75A	22.91A	93%
CCR550PS28	28.0V	8.21A	16.07A	19.64A	93%
CCR550PS30	30.0V	7.67A	15.00A	18.33A	93%
CCR550PS36	36.0V	6.39A	12.50A	15.27A	94%
CCR550PS48	48.0V	4.79A	9.37A	11.45A	94%
CCR550PS54	54.0V	4.26A	8.34A	10.18A	94%

### Notes:

1. Requires 37m<sup>3</sup>/h (22CFM)
2. Thermal resistance for conduction cooling ≤1.0°C/W.
3. Typical value at 230VAC input and 550W load.

## Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage - operating	85 <sup>(1)</sup>	115/230	264	VAC	Derate output linearly from 550W at 120VAC to 400W at 85VAC – fan cooled
					Derate output linearly from 450W at 110VAC to 350W at 85VAC – conduction cooled
					Derate output linearly from 230W at 110VAC to 200W at 85VAC – convection cooled
Input frequency	47	50/60	63	Hz	Agency approval, 47-63Hz
Power factor		0.98			230VAC, 100% load
Input current - full load			5.6/2.8	A	115/230VAC
Inrush current			45	A	240VAC cold start, +25°C
Earth leakage current			300	μA	264 VAC/60Hz
Input protection	T6.3A/250 V Internal fuse fitted in line and neutral.				

### Notes:

1. Agency approval, 90-264VAC

## Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage	12		54	VDC	See models and ratings table
Initial set accuracy			±1	%	Full load, 115/230VAC
Minimum load	No minimum load required				
Start up			2	s	115/230VAC full load
Hold up time	8	12		ms	115VAC full load at +25°C
Line regulation			±0.2	%	
Load regulation			±0.5	%	10-100% load
Transient response			4	%	Recovery within 1% in less than 500μs for a 75-100% and 100-75% load step
Output voltage adjustment		±5		%	28V model adjustment range is 0 to 5%
Ripple & noise			1/200	%/mV	12V & 15V / others, measured at 20MHz bandwidth and 10μF electrolytic capacitor in parallel with 0.1μF ceramic capacitor at +25°C
Remote sense	Compensates for 5% drop of nominal output voltage				
Overvoltage protection	110		150	%	Vnom, 48V & 54V model OVP <60V Recycle input to reset
Overload protection	120		160	%	Inom
Short circuit protection	Trip & restart				
Drift			±0.02	%	After 20 min warm up
Temperature coefficient			0.02	%/°C	
Overtemperature protection	Measured internally, auto resetting				

## General

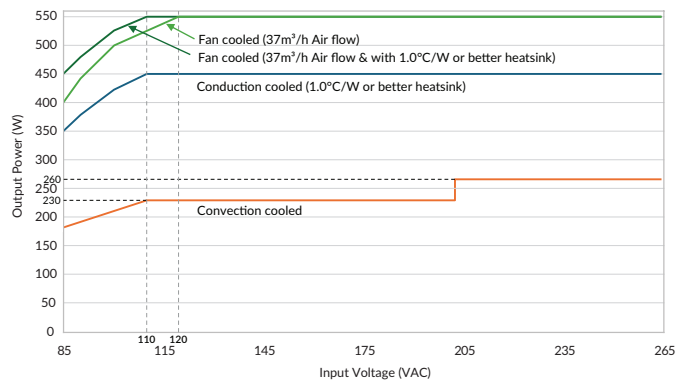
Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Efficiency		94		%	See models and ratings table
Isolation: input to output input to ground output to ground	4000			VAC	2 x MOPP
	1800			VAC	1 x MOPP
	1500			VAC	1 x MOPP
Switching frequency		65		kHz	Main converter full load
		115		kHz	PFC full load
Power density			2.0	W/cm <sup>3</sup>	Fan cooled
Patient leakage current			90	μA	
Mean time between failure	400			khrs	MIL-HDBK-217F, +25°C GB.
Weight		535 (1.18)		g (lb)	

## Environmental

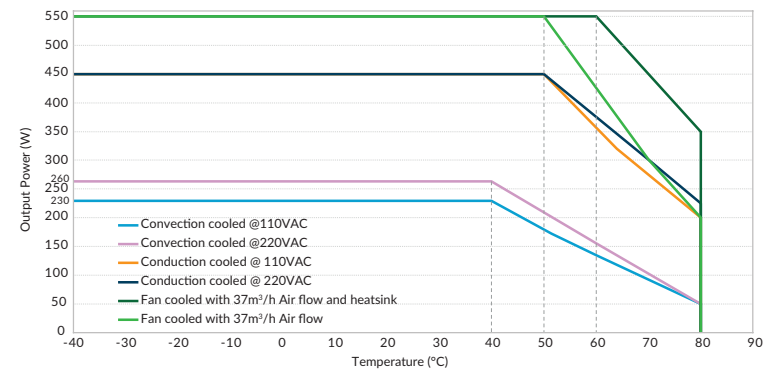
Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature	-40		+80	°C	See derating curve, safety approved to +50°C
Storage temperature	-40		+85	°C	
Cooling	37 (22)			m <sup>3</sup> /h (CFM)	For fan cooled operation
Humidity	5		95	%RH	Non-condensing
Operating altitude			5000 / 2000	m	OVC II / OVC III
Vibration	Single axis 10-500Hz at 2g sweep and endurance at resonance in all 3 planes. Conforms to EN60068-2-6				
Shock	±3 x 30g shocks in each plane, total 18 shocks. 30g = 11ms (±0.5msecs), half sine. Conforms to EN60068-2-27				
Baseplate temperature			+95	°C	When using conduction cooling, max baseplate temperature (measured at the center) is +95°C but some components are not thermally connected to the baseplate. The temperatures of these components may not exceed temperatures shown in the thermal considerations section on page 5.

## Derating curve

### Input derating curve



### Thermal derating curve



## Emissions - EMC

Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55032/EN55011	Class B	
Radiated	EN55032/EN55011	Class B	
Harmonic currents	EN61000-3-2	Class A & C	Class C $\geq 200W$
Voltage flicker	EN61000-3-3		

## Emissions - immunity

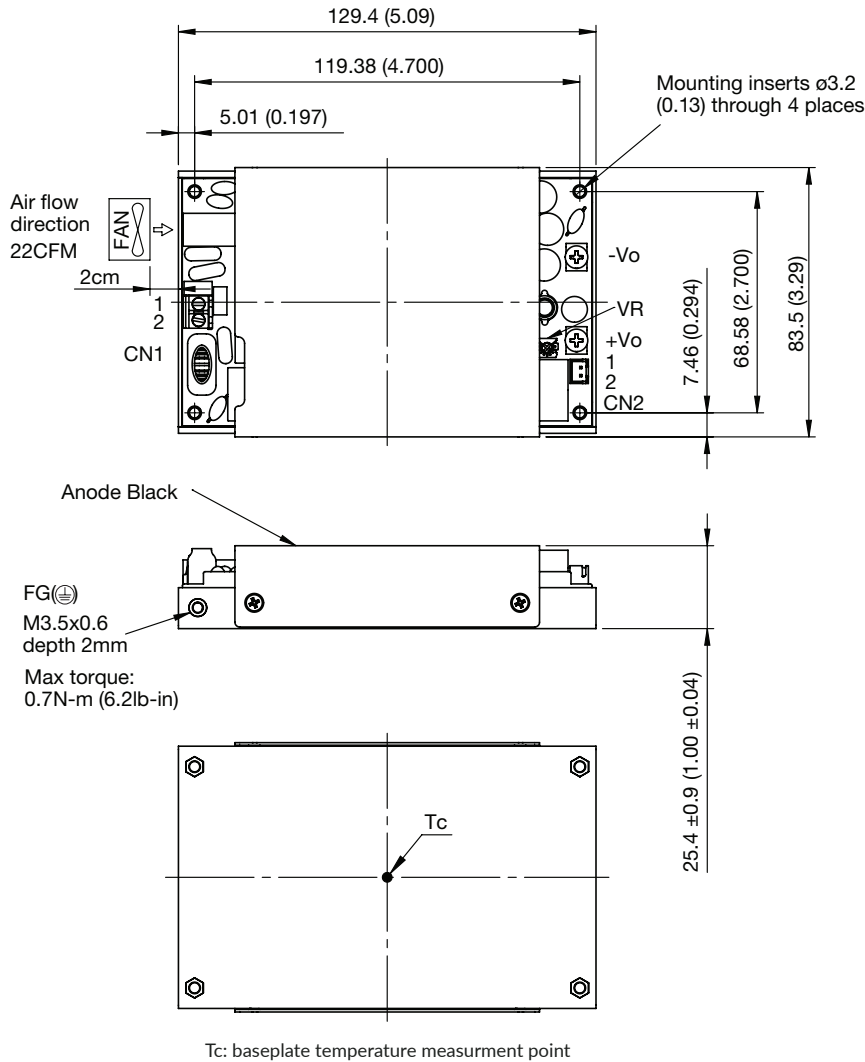
Phenomenon	Standard	Test level	Criteria	Notes & conditions
Medical device EMC	IEC60601-1-2	Ed.4.0 : 2014	as below	
Low voltage PSU EMC	EN55035		as below	
ESD immunity	EN61000-4-2	4	A	$\pm 15kV$ air, $\pm 8kV$ contact
Radiated immunity	EN61000-4-3	10V/m	A	
EFT/burst	EN61000-4-4	$\pm 2kV$	A	
Surge	EN61000-4-5	Installation class 4	A	$\pm 2kV$ line to line, $\pm 4kV$ line to earth
Conducted	EN61000-4-6	6V	A	
Magnetic field	EN61000-4-8	30A/m	A	
Dips and interruptions	EN55035 (115VAC)	Dip 100% (0VAC), 10ms	A	
		Dip 100% (0VAC), 20ms	A	
		Dip 30% (80.5VAC), 500ms	B	
		Dip 60% (46VAC), 100ms	B	
		Dip 100% (0VAC), 5000ms	B	
	EN55035 (230VAC)	Dip 100% (0VAC), 10ms	A	
		Dip 100% (0VAC), 20ms	A	
		Dip 30% (181VAC), 500ms	A	
		Dip 60% (92VAC), 100ms	A	
		Dip 100% (0VAC), 5000ms	B	
	EN60601-1-2 (100VAC)	Dip 100% (0VAC), 10ms	A	
		Dip 100% (0VAC), 20ms	A	
		Dip 30% (70VAC), 500ms	B	
		Dip 100% (0VAC), 5000ms	B	
	EN60601-1-2 (240VAC)	Dip 100% (0VAC), 10ms	A	
		Dip 100% (0VAC), 20ms	A	
Dip 30% (168VAC), 500ms		A		
Dip 100% (0VAC), 5000ms		B		

## Safety approvals

Certification	Standard	Notes & conditions
CB report	IEC62368-1	Audio/video, information and communication technology equipment
	IEC60601-1	Medical
UL	UL62368-1	Audio/video, information and communication technology equipment
	ANSI/AAMI ES60601-1 & CSA C22.2 No.60601-1	Medical
EN	EN62368-1	Audio/video, information and communication technology equipment
	EN60601-1	Medical
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

Isolation	Standard	Notes & conditions
Primary to Secondary	2 x MOPP (Means of Patient Protection)	Class I & Class II for both ITE & Medical
Primary to Earth	1 x MOPP (Means of Patient Protection)	
Secondary to Earth	1 x MOPP (Means of Patient Protection)	

## Mechanical details



### AC input connector (CN1): ECE ETB22

Pin connections		
Pin	Function	Mating wire range
1	ACL	14-18AWG
2	ACN	

Max torque: 0.4 N-m (3.5 lb-in)

### Remote sense (CN2): TKP 8822-02-NHB or equivalent

Pin connections			
Pin	Function	Mating housing	Terminal
1	S+	JST XHP-2 or equivalent	JST SXH-001T-P0.6N or equivalent
2	S-		

DC output terminal screws are M4.

Washer size (ID): 4.3mm (0.17") nom, (OD): 7.3mm (0.29") max

Max torque: 0.7N-m (6.2lb-in)

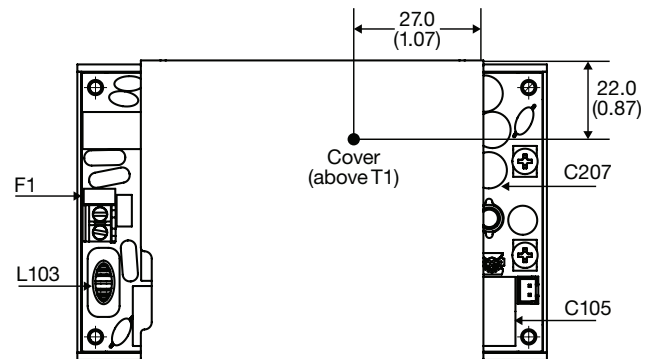
### Notes:

1. All dimensions shown in mm (inches). Tolerance:  $\pm 0.5$  (0.02).

2. Weight: Standard versions: 535g (1.18lbs) approx.

## Thermal considerations

Temperature measurements (at maximum ambient)	
Component	Max temperature °C
L103	+130°C
F1	+125°C
C105	+105°C
C207	+125°C
Cover (above T1)	+100°C
Baseplate (Tc)	+95°C



In order to ensure safe operation of the PSU in the end-use equipment, the temperature of the components listed in the table must not be exceeded. Temperature should be monitored using K type thermocouples placed on the hottest part of the component (out of direct air flow).

Specifications subject to change without notice.