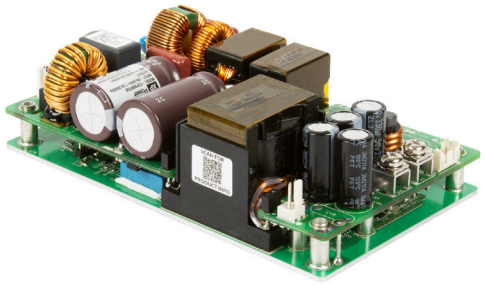
CCP550 series

550W Fan cooled | **400W** Conduction cooled | **300W** Convection cooled

AC-DC power supplies

The CCP550 series of compact single output AC-DC power supplies are designed to operate in convection cooled, conduction cooled, and fan cooled applications with power ratings from 300 to 550W. CCP550 offers high power density in a low profile design, high efficiency, and quiet operation for noise sensitive applications.

CCP550, with Class B conducted emissions, worldwide industrial and medical safety approvals, 2 x MOPP isolation and low leakage currents, 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, 400W conduction cooled
- Universal, single phase input: 80 to 264VAC
- 127.0 x 76.2mm footprint, 37.5mm profile
- High efficiency, up to 92%
- Low earth leakage <400µA
- Low patient leakage <90µA
- Medical (BF) & ITE safety approvals
- Standard fan supply on all models (excluding 15V)
- Optional 5VDC standby & remote on/off
- 3 year warranty

Applications

Healthcare | Instrumentation | Process control | Robotics | Technology

Dimensions

127.0 x 76.2 x 37.5mm (5.00" x 3.00" x 1.48")

More resources

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Models & ratings

Model number[2]	Output current			Output voltage	Standby power[2]		Fan output	Efficiency[3]
	Convection cooled	Conduction cooled[4]	Fan cooled[1]		Convection/ conduction cooled	Fan cooled[1]		
CCP550PS12	25.00A	33.30A	45.80A	12.0V	5V/1.0A	5V/2.0A	12 V/0.5A	90%
CCP550PS15	20.00A	26.67A	36.63A	15.0V	5V/1.0A	5V/2.0A	Not Available	90%
CCP550PS18	16.67A	22.22A	30.56A	18.0V	5V/1.0A	5V/2.0A	12 V/0.5A	90%
CCP550PS24	12.50A	16.67A	22.90A	24.0V	5V/1.0A	5V/2.0A	12 V/0.5A	92%
CCP550PS36	8.33A	11.10A	15.27A	36.0V	5V/1.0A	5V/2.0A	12 V/0.5A	92%
CCP550PS48	6.25A	8.33A	11.45A	48.0V	5V/1.0A	5V/2.0A	12 V/0.5A	92%

Notes:

1. Requires 34m³/h (20 CFM)
2. Optional standby and remote on/off.
   Add suffix -A to model number, eg. CCP550PS12-A.
3. Typical value at 230VAC input and 550W load.
4. Thermal resistance for conduction cooling ≤1°C/W.

Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage - operating	80	115/230	264	VAC	Derate output linearly from 550W at 115VAC to 430W at 90VAC & 360W at 80VAC – Fan cooled
					Derate output linearly from 400W at 125VAC to 290W at 90VAC & 250W at 80VAC – Conduction cooled
					Derate output linearly from 300W at 125VAC to 240W at 90VAC & 220W at 80VAC – convection cooled 48 models and from 270W at 125VAC to 220W at 90VAC & 200W at 80VAC - convection cooled, 12-36V models, PSU must be mounted on stand-offs with minimum length of 8mm
Input frequency	47	50/60	63	Hz	Agency approval, 47-63Hz
Power factor		>0.9			230VAC, 100% load EN61000-3-2 class A
Input current - full load		5.6/2.7		A	115/230 VAC
Inrush current		110		A	230 VAC cold start, 25°C
Earth leakage current			400	µA	264 VAC/60Hz (max)
No load input power			0.5	W	When main output is Inhibited
Input protection	T8A/250 V Internal fuse fitted in line and neutral.				

Main output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage - V1	12		48	VDC	See models and ratings table
Initial set accuracy			±1	%	50% load, 115/230VAC
Minimum load	No minimum load required				
Start up delay			2	s	115/230VAC full load.
Hold up time	20/10			ms	<400W / >400W at 25°C
Drift			±0.02	A	After 20 min warm up
Line regulation			±0.5	%	90-264VAC
Load regulation			±0.5	%	0-100% load
Transient response			4	%	Recovery within 1% in less than 500µs for a 50-75% and 75-50% load step
Over/undershoot			7	%	Full load
Ripple & noise			1	%	20MHz bandwidth and 10µF electrolytic capacitator in parallel with 0.1µF ceramic capacitator at 25°C
Overvoltage protection	110		140	%	Vnom, recycle input to reset
Overload protection	110		160	%	Inom
Short circuit protection	Trip & restart				
Temperature coefficient			0.02	%/°C	
Overtemperature protection	Measured internally, auto resetting				
Remote on/off (-A option)	Connect pin 6 of CN3 to pin 1/2 to turn main output on. Connect to pin 3/4 or leave open to turn main output off				
Remote sense	Fitted on 12V to 24V models. Compensates for total of 10% drop of nominal output voltage. Not applicable for 36V & 48V models.				
Cold temperature start up load	When ambient temperature is below 0°C and input voltage is less than 90VAC, the following coniditions are imposed at start up. Between 0°C and -10°C switch-on load is limited to 400W max at 85VAC and 320W max at 80VAC. Between -10°C and -30°C, switch-on load is limited to 350W max at 85VAC. The power supply must be switched on for 5 seconds before full load can be applied.				

5VDC standby output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage		5		VDC	
Initial set accuracy			±1	%	50% load, 115/230VAC
Minimum load	No minimum load required, see derating curve for low input voltage and low temperature derating				
Start up delay			0.5/1.0	s	115 & 230VAC full load, increases to 1s below 0°C ambient
Drift			±0.02	%	After 20 min warm up
Line regulation			±0.5	%	90-264VAC
Load regulation			±0.5	%	0-100% load
Transient response			4	%	Recovery within 1% in less than 500µs for a 50-75% and 75-50% load step
Over/undershoot			5	%	Full load
Ripple & noise			2	% pk-pk	20MHz bandwidth and 10µF electrolytic capacitator in parallel with 0.1µF ceramic capacitator at 25°C
Overload protection		2.6	4	A	
Short circuit protection	Trip and restart				
Temperature coefficient			0.02	%/°C	

General

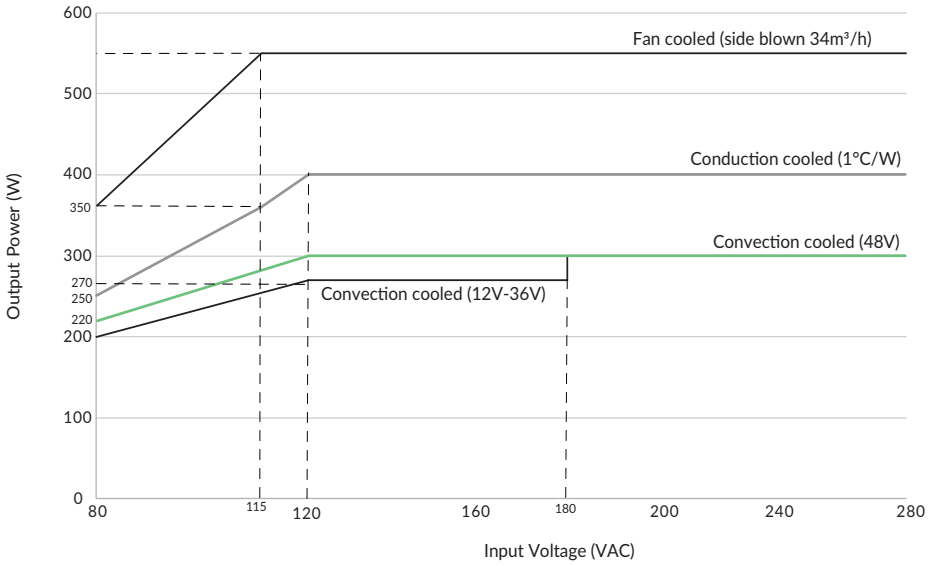
Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Efficiency		92		%	230VAC, full load
Isolation: input to output	4000			VAC	2 x MOPP
input to ground	1500			VAC	1 x MOPP
output to ground	1500			VAC	1 x MOPP
Switching frequency	18		125	kHz	PFC, 30-550W
	45		75		Main converter, 100-550W
Power density			1.465	W/cm³	Fan cooled
Patient leakage current			90	µA	
Mean time between failure	230	300		khrs	MIL-HDBK-217F, 25°C GB.
Weight		390 (0.86)		g (lb)	

Environmental

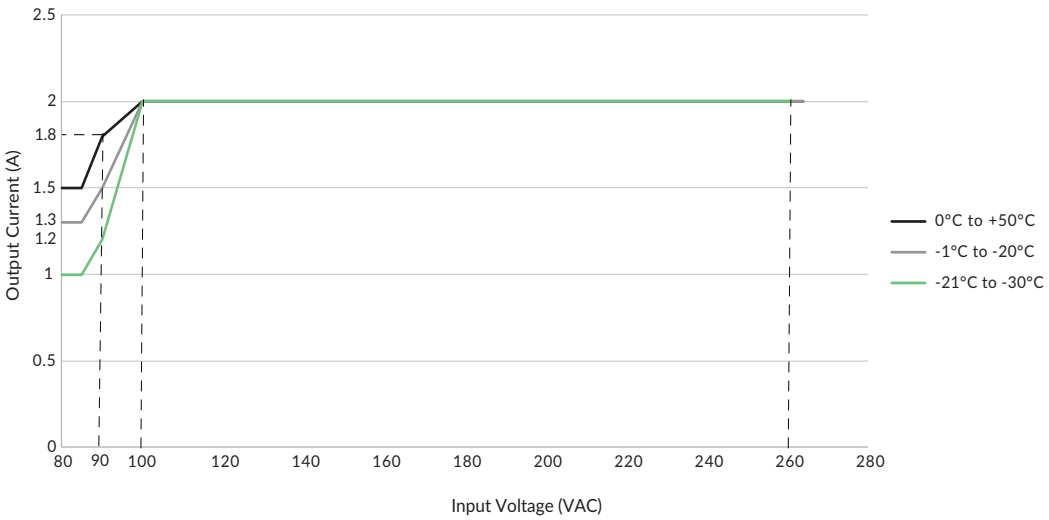
Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature	-30		+70	°C	Derate linearly from 100% load at 50°C ambient to 50% load at 70°C ambient. Refer to cold temperature start-up load spec on page 2.
Storage temperature	-40		+85	°C	
Cooling	34 (20)			m³/h (CFM)	For fan cooled operation
Humidity	5		95	%RH	Non-condensing
Operating altitude			4000 / 5000	m	Medical/ITE
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			110	°C	When using conduction cooling, max baseplate temperature is 110°C but some components are not thermally connected to the baseplate. The temperatures of these components may not exceed temperatures shown in the thermal consideration section on page 7

Input derating curve

Main output



5V standby



Emissions - EMC

Phenomenon	Standard	Test level	Notes & conditions
Conducted	EN55032/EN55011	Class B	
Radiated	EN55032/EN55011	Class A	Class B with Würth Electronic P/N 74271151S with 2 turns (or equivalent) on AC live and neutral, and TDK P/N ZCAT2032-0930 with 1 turn (or equivalent) on DC Output.
Harmonic currents	EN61000-3-2	Class A	
Voltage flicker	EN61000-3-3		

Emissions - immunity

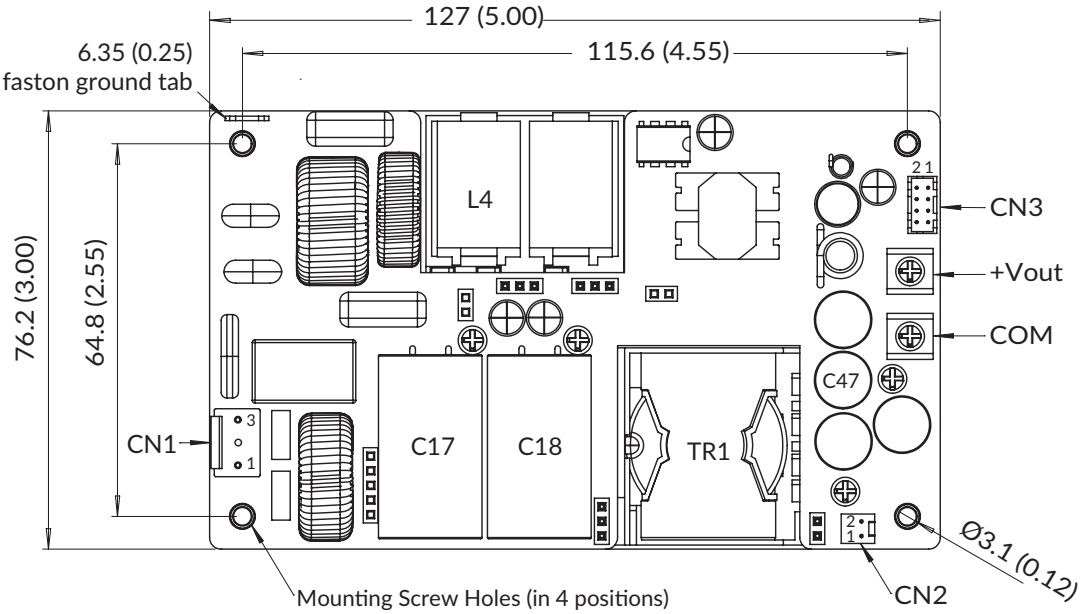
Phenomenon	Standard	Test level	Criteria	Notes & conditions
Medical device emc	IEC60601-1-2	Ed.4.0 : 2014	as below	
Low voltage psu emc	EN55035, EN55024		as below	
Esd immunity	EN61000-4-2	4	A	±8kV contact
Radiated immunity	EN61000-4-3	3	A	
Eft/burst	EN61000-4-4	3	A	
Surge	EN61000-4-5	Installation class 3	A	
Conducted	EN61000-4-6	3	A	
Magnetic field	EN61000-4-8	4	A	
Dips and interruptions	EN55024 (100VAC)	Dip >95% (0VAC), 8.3ms	A	
		Dip 30% (70VAC), 416ms	A	
		Dip >95% (0VAC), 4160ms	B	
	EN55024 (240VAC)	Dip >95% (0VAC), 10ms	A	
		Dip 30% (168VAC), 500ms	A	
		Dip >95% (0VAC), 5000ms	B	
	EN60601-1-2 (100VAC)	Dip 100% (0VAC), 10ms	A	
		Dip 100% (0VAC), 20ms	A/B	<400W / >400W
		Dip 60% (40VAC), 200ms	A/B	<200W / >200W
		Dip 30% (40VAC), 500ms	A/B	<400W / >400W
		Dip 100% (0VAC), 5000ms	B	
	EN60601-1-2 (240VAC)	Dip 100% (0VAC), 10ms	A	
		Dip 100% (0VAC), 20ms	A/B	<400W / >400W
		Dip 60% (96VAC), 200ms	A	
		Dip 30% (168VAC), 500ms	A	
		Dip 100% (0VAC), 5000ms	B	

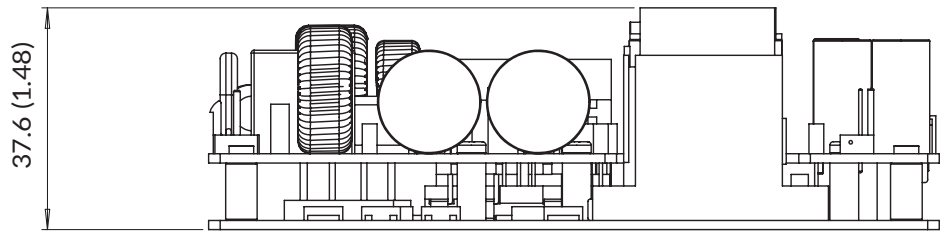
Safety approvals

Certification	Standard	Notes & conditions
CB report	IEC62368-1	Audio/video, information and communication technology equipment
	IEC60601-1 Ed 3 Including Risk Management	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)	IEC60601-1 Ed.3
Primary to Earth	1 x MOPP (Means of Patient Protection)	
Secondary to Earth	1 x MOPP (Means of Patient Protection)	

Mechanical details





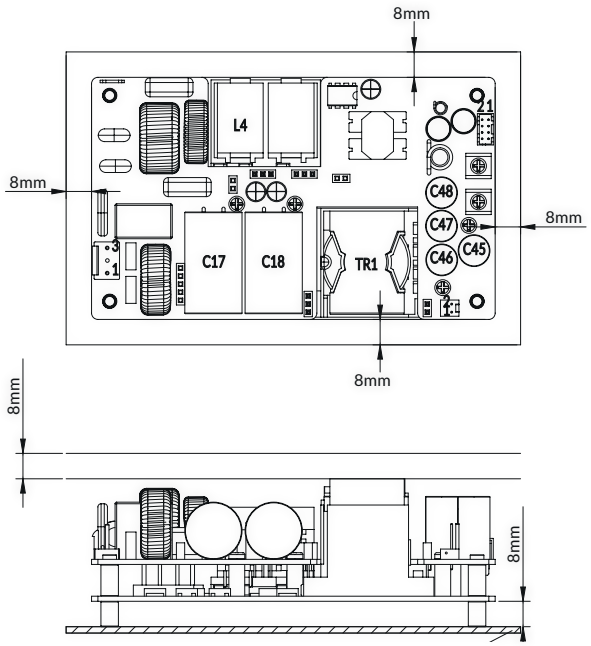
Pin connections				
Pin	CN1[3]	CN2[4]	CN3[5]	
			Standard version	-A option
1	AC-N	-VFAN		+5V Standby
2		+VFAN		+5V standby
3	AC-L		COM	COM
4			COM	COM
5			Power good	Power good
6				Remote On/Off
7			-Sense	-Sense
8			+Sense	+Sense

Notes:

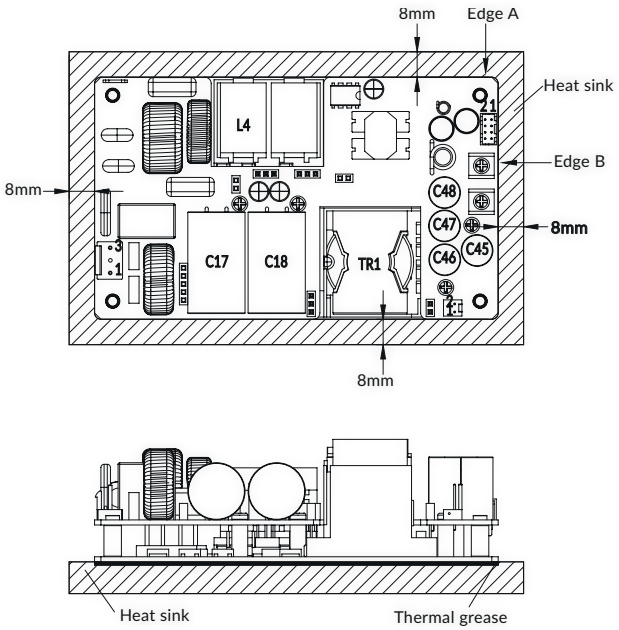
1. All dimensions shown in mm (inches). Tolerance: ±0.5 (0.02).
2. Weight: Standard versions: 390g (0.86lbs) approx.
   -A versions: 400g (0.88lbs) approx.
3. Mates with JST Housing VHR-3N JST Series SVH-21T-P1.1 crimp terminals.
4. Mates with Molex housing 22-01-1022 and 2759 crimp terminals.
5. Mates with JST Housing PHDR-08VS and SHPD-002T-P0.5.
6. DC output terminal screws are M3.5.
7. DC output terminal screw maximum torque 1.17Nm (0.86lbs-ft).

Mechanical details

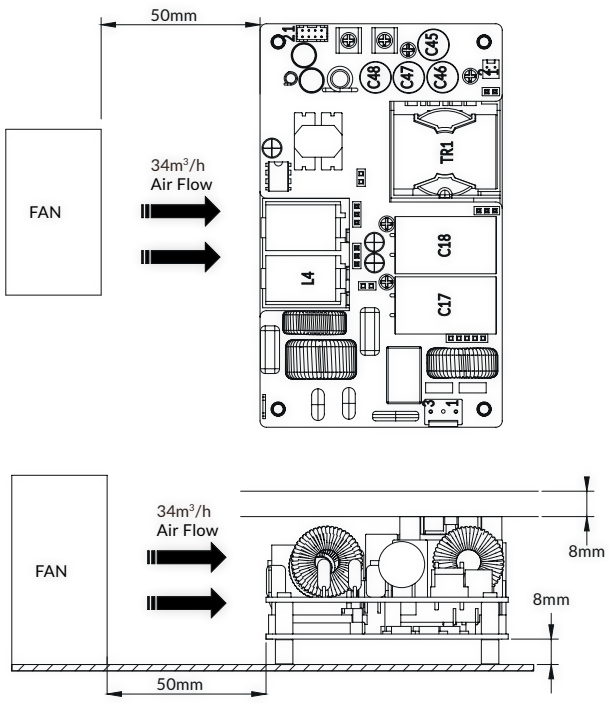
Convection cooling



Conduction cooling



Fan cooling



Notes:

1. A gap of 8mm is required between the lower aluminium PCB and mounting surface to allow for air flow in convection and forced cooled applications.
2. The thermal measurement point to determine base plate temperature in conduction cooled applications is 24mm from edge marked 'A' and 48mm from edge marked 'B'.

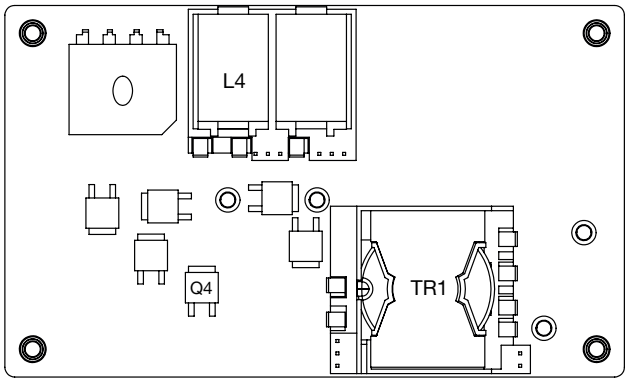
Thermal considerations

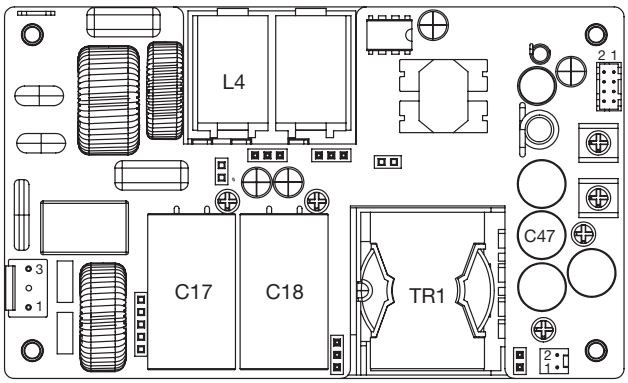
Temperature measurements (at maximum ambient)	
Component	**Max temperature °C**
L4 coil	130°C
TR1 coil	130°C
Q4	120°C
C17	105°C
C18	105°C
C47	105°C
Baseplate	110°C

In order to ensure safe operation of the PSU in the end-use equipment, the temperature of the components listed in the table below 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).

See mechanical details for component locations.

Service life





The estimated service life of the CCP550 is determined by the cooling arrangements and load conditions experienced in the end application. Due to the uncertain nature of the end application this estimated service life is based on the actual measured temperature of two key capacitors within the product when installed in the end application.

The graph (right) expresses the estimated lifetime of a given component temperature and assumes continuous operation at this temperature.