Murata Power Solutions

MWOCP67-5500-B-RM

67mm 1U 5500W Front End Power Supply Module

FEATURES

- 80 Plus® Ruby certified
- Black-Box data-logging capability
- HVAC / HVDC input operation (180-305 Vac, 192-400 Vdc)
- 49.0Vdc @ 112.3A output
- Nominal Dimensions:
  - 67 (W) x 40 (H) x 640 (L) mm
- > 52.6 Watts per cubic inch density (W/in^3)
- N+1 redundancy including hot swap capability
- Holdup time:
  20 ms @ 5500 W output
- Operating ambient temperature:
  -5℃ – 45℃
- Integral ORing MOSFETS
- Active current sharing together with Droop current sharing for Main output.
- Internally cooled by advanced variable speed-controlled fan
- PMBus™ / I²C interface monitoring, configuration, and control
- RS485 interface function (Modbus RTU)
- PowerBlade connector provided for incoming voltage connection, DC output and signals configuration

RoHS COMPLIANT

For full details go to
www.murata-ps.com/rohs

80 PLUS RUBY

c UL us

PMBus

CB
Certificate and Test Report

CE

TÜV SÜD

CQC

R51379 RoHS

PRODUCT OVERVIEW

MWOCP67-5500-B-RM is a highly efficient (peak 97.5%), ORV3-HPR 5,500 W front-end power supply module featuring a 50.0 Vdc main output. The 50.0 V main output provides active current sharing together with output droop control for up to 33.0 kW (27.5 kW in N+1 configuration) when deployed in Open Compute compliant shelves from Murata. This power supply module can be hot plugged, recovers from over temperature faults, and provides hardware status LEDs and signals. PMBus™ 1.2 digital communication capability, the low profile 1U package and 52.6 W/in^3 power density make this power and rack solution ideal for delivering reliable power to OCP open rack architecture or stand-alone applications.

ORDERING GUIDE

Part Number	Output power @ highline (180-305Vac & 192-400Vdc)	Main Output	Standby Output	Airflow
MWOCP67-5500-B-RM	5500W	50.0 Vdc	12.0Vdc	Front to Back

INPUT CHARACTERISTICS

Parameter	Conditions	Min	Typ.	Max	Units
Input Voltage Operating Range	AC Voltage	180	230/277	305	Vac
	AC Line Frequency	47	50/60	63	Hz
	DC Voltage	192	240/380	400	Vdc
Turn-on Voltage	AC (Ramp-up)	172	176	179	Vac
	DC (Ramp-up)	182	186	190	Vdc
Turn-off Voltage	AC (Ramp-down)	168	171	174	Vac
	DC (Ramp-down)	172	176	180	Vdc
Maximum Input Current[2]	Vin; 180 Vac; 5071.5 W			30.0	Arms
	Vin; 192 Vdc; 5316.5 W			30.0	Adc
Inrush Current[3]	Cold Start; <200ms			42	Apk
Power Factor[1]	230 Vac; FL		0.99		W/VA
Efficiency (Including Fan Load)	208 – 277 Vac; 10 - 30% FL	94.0			%
	230 – 277 Vac; 30 - 100% FL	>96.5		>97.5*	
	208 Vac; 30 – 100% FL	>95.5		>96.5*	

* Peak efficiency

[1]The power Factor at 10% to 20% loading to be >0.95 for < 250Vac and >0.9 for > 250Vac.

[2] Output power de-rated linearly from 198 Vac(5500W) to 180 Vac(5071.5W) or 198Vdc(5500W) to 192 Vdc(5316.5W).

[3]Inrush current shall be less than 3 times of steady state rated current at AC recovery after dropout for less than 20ms.

OUTPUT VOLTAGE CHARACTERISTICS

Output	Parameter	Conditions	Min	Nom	Max	Units
50V Main	Output voltage	230 Vac, no load		50.0		Vdc
	Output set point accuracy	230 Vac, 100% load, Ta=25℃	48.875	49.0	49.125	
	Ripple voltage & noise[1]	100 MHz bandwidth			500	mVpp
	Output current	180 Vac	0		103.5	A
		198 – 305 Vac			112.3	
		192 Vdc			108.5	
		198 – 400 Vdc			112.3	
	Load capacitance		0		20,000	uF

[1] Ripple and noise measured with a parallel combination of 0.1uF ceramic and 10uF low ESR capacitors on the power module respective output. A short coaxial cable connected directly to the input of a scope is required.

[2] Output voltage with 1.0V total droop from no load to full load.

OUTPUT CHARACTERISTICS						
Parameters	Conditions		Min	Typ.	Max	Units
Startup time[1]					4.5	sec
Transient Response[2]	Load step 50%, start from 10%; Slew Rate = 1A/us Output voltage undershoot / overshoot		-0.5		+0.5	V
Output current sharing accuracy up to 6 PSUs in parallel	Percentage of total host system load current/number sharing units	50% to 100% of FL	-2		+2	%
		20% to 50% of FL	-5		+5	%
Holdup time	5500 W load		20			ms
	8250 W load		13.33			ms

[1]Startup time included 2.5 seconds delay for output to ready turn on plus minimum random timer 2 seconds per OCP PSU spec.
[2]Proper capacitive load may be required to decouple the wiring inductance between PSUs and load.

ENVIRONMENTAL CHARACTERISTICS					
Parameters	Conditions	Min	Typ.	Max	Units
Operating temperature range	Altitude < 3050m	-5		45	℃
Storage temperature		-40		85	℃
Storage humidity		5		93	%
Operating humidity	Non-condensing	10		90	%
MTBF (Target)	Per Telcordia SR-332 issue 3 M1C3 @ 45℃ & 277 Vac	500k			hrs
Shock	Per EN 60068-2-27 Operating: 11 msec half-sine, 6g, 5 shocks per face, 6 faces Non-Operating: 11 msec half-sine, 12g, 10 shocks per face, 6 faces				
Vibration	Per EN 60068-2-6 Operating: Sine sweep, 5-500Hz, (5.0 – 9.0 Hz) 6mm peak to peak, (9.0Hz – 500Hz) 0.5g Non-Operating：Sinusoidal vibration, 5-500Hz, 1g				
Safety approval	UL62368-1: (2018 3rd Edition) (Information Technology Equipment – Safety - Part 1: General Requirements) CAN/CSA-C22.2 No. 62368-1: 2018 (3rd Edition) (Information Technology Equipment - Safety - Part 1: General Requirements) TUV: EN 62368-1:2020/A11:2020 CQC: GB4943.1-2022 BSMI: CNS15598-1 (June/2019) CB: IEC 62368-1:2018 (3rd Edition)				
Input fuse	Dual internal fuses (2x) 25A/500V fast blow on the AC line and neutral input connections				
Weight	2.75 kg				

PROTECTION CHARACTERISTICS								
Parameters	Conditions					Min	Typ.	Max	Units
Over temperature (intake)	Auto restart					45		55	℃
Main output OCP conditions	180 V_{AC}	198-305V_{AC}	192 V_{DC}	198-400V_{DC}	SMBALERT Delay		PSU Fault Delay[2]	
OC warning threshold	> 121.1A	> 131.4A	> 126.9A	> 131.4A	> 10 sec		None	
OCP1 threshold	> 121.1A	> 131.4A	> 126.9A	> 131.4A	> 10 sec		> 10.005sec	
OCP2 threshold	> 126.3A	> 135A	> 132.4A	> 135A	> 100ms		> 105ms	
CC mode threshold[2]	> 168.5 A	> 168.5 A	> 168.5 A	> 168.5 A	-		-	

[1]Short circuit protection is realized by CC mode + undervoltage protection.
[2]Repetitive over current with different duty cycle is limited by thermal performance and may be protected by OTP.
*Short circuit / OCP condition would cause PSU bounce 1 time with 5 seconds re-try delay time then latch off if fault retained.
*PSU under OCP conditions or other fault conditions will shutdown.

OVP CHARACTERISTICS					
Outputs	Reset conditions	Min	Typ.	Max	Units
Main output	Latching, recycling AC source to reset	55.5	56.25	57.02	V

ISOLATION CHARACTERISTICS					
Parameters	Conditions	Min	Typ.	Max	Units
Insulation safety rating / test voltage	Input to output - Reinforced	5,000			Vdc
	Input to chassis - Basic	2,500			
Isolation	Output to chassis	60			Vdc

EMISSION AND IMMUNITY		
Characteristics	Standard	Criteria
Input current harmonics	IEC/EN 61000-3-12	Complies with Class A Limits
Voltage fluctuation and flicker	IEC/EN 61000-3-11	Complies
Conducted emission	FCC /ICES-003 / CISPR 32/ EN55032	Class A with 6dB margin
ESD immunity	IEC/EN 61000-4-2	Contact discharge: 5.6kV Air discharge: 11.2kV
Radiated field immunity	IEC/EN 61000-4-3	Level 2 (3V/m) criteria A
Electrical fast transient/burst immunity	IEC/EN 61000-4-4	Level 2 (1kV) criteria A
Surge immunity	IEC/EN 61000-4-5	Level 4 (D.M 2kV, C.M 4kV) criteria B
RF conducted immunity	IEC/EN 61000-4-6	Level 2 (3Vrms) criteria A
Magnetic field immunity	IEC/EN 61000-4-8	1A/m criteria B
Voltage dips, interruptions	IEC/EN 61000-4-11	230 Vin, 100% load, phase 0°, dip 100% duration 10ms (A) 230 Vin, 50% load, phase 0°, dip 100% duration 20ms (A) 230 Vin, 100% load, phase 0°, dip 100% duration >20ms (B)

RELATED PRODUCTS		
Model	Function	Description
MWOCES-191-P-D	OCP ORV3 High-Power Shelf	19” x 1RU up to 33.0 kW ORV3-HPR Compliant Power Shelf comprised of the Power Shelf, 6PSUs, 1 RMU.
MWOCES-211-P-D	OCP ORV3 High-Power Shelf	21” x 1OU up to 33.0 kW ORV3-HPR Compliant Power Shelf comprised of the Power Shelf, 6PSUs, 1 RMU.

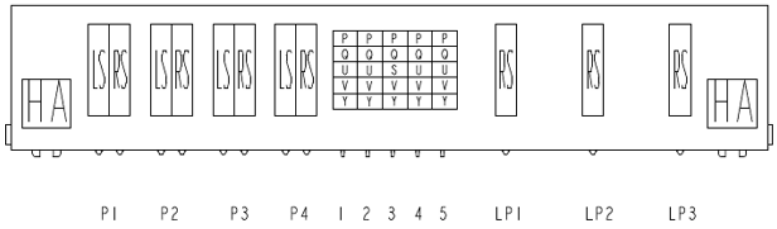
*Status and control signals below followed ORV3-HPR 5.5kW PSU spec. Rev. 0.4 dated Aug-12-2024

STATUS AND CONTROL SIGNALS					
Connector pinout	Signal name	Type	Individual / Parallel amount PSUs	Function	Comments
P1	PSU_A0	Input		Address 0-PSU ID A0	Internal pull up to 3.3 V by 10k
P2	PSU_A1	Input		Address 1-PSU ID A1	Internal pull up to 3.3 V by 10k
P3	PSU_A2	Input		Address 2-PSU ID A2	Internal pull up to 3.3 V by 10k
P4	Busbar_Clip+_Temp	Input		Busbar clip+ contact temperature sensor	
P5	Busbar_Clip-_Temp	Input		Busbar clip+ contact temperature sensor	
Q1	Ground	Ground			
Q2	Alert	Output /Active L	Individual	Logic L = Fault or warning Logic H = OK	Open collector/drain output, internal pull up to 3.3 V by 10k
Q3	PWOK	Active H	Individual	Logic H = Output present valid and exhibit no faults (within operational limits).	Internal pull down to ground by 10k
Q4	Shelf_addr_Int_A0	Input	Share bus		Internal pull up to 3.3 V by 100k
Q5	Shelf_addr_Int_A1	Input	Share bus		Internal pull up to 3.3 V by 100k
U1	Shelf_addr_Int_A2	Input	Share bus		Internal pull up to 3.3 V by 100k
U2	AC_Loss_L	Output /Active L		Low: AC Loss	Open collector/drain output, internal pull up 100k + diode to 3.3V
U3(※)	PSKILL (Short pin)	Input / Active H		Logic L = Output turn on Logic H = Output turn off	Quick shut down output. Internal pull up to 3.3 V by 10k

U4	RS485A	BI	Share bus	For Module Modbus	
U5	RS485B	BI	Share bus	For Module Modbus	
V1	Present_L	Output	Individual	Low: PSU/BBU present	1. 10ohm pull down inside PSU/BBU module 2. 4.7k pull up inside PMM 3. connecting to PMM edge connector pin A27/A28/A28/B28A29/B29 respectively
V2	I2C_SDA	BI	Share bus	I2C data	
V3	I2C_SCL	BI	Share bus	I2C clock	
V4	Ground	Ground	Share bus	I2C ground	
V5	12Vstb	Output	Individual	12Vstb for RMU	For Powering RMU
Y1	ISHARE	Analog	Share bus	Main output current share bus	Full scale = 7.0 V
Y2	Reserved	BI	Share bus	-	Open collector/drain output; internal pull up to 3.3 V by 100k + diode
Y3	SYNC_START	BI	Share bus	Synchronizing turn-on main output	Open collector/drain output; internal pull up to 3.3 V by 100k + diode
Y4	PULSE_MGMT_L	Output	Active Low	Logic L = request BBU support for pulse load Logic H = No request BBU support of pulse load	Open collector/drain output; internal pull up to 3.3 V by 100k + diode
Y5	Ground	Ground	Share bus		
LP1	Earth				
LP2	AC Neutral (DC input negative)				
LP3	AC Live (DC input positive)				
P1	Main output 50V positive				
P2	Main output 50V positive				
P3	Main output 50V negative				
P4	Main output 50V negative				

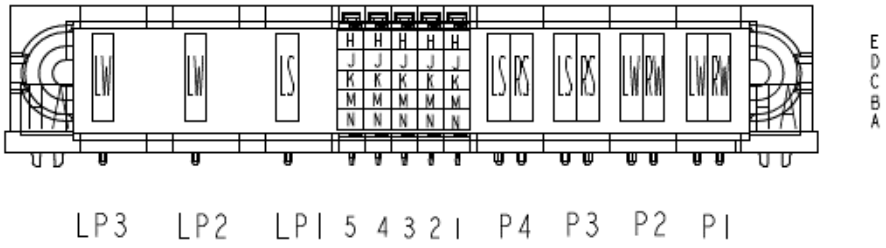
(※)Please note that, in the ORV3-HPR power shelves (MWOCES-191-P-D and MWOCES-211-P-D), the PSKILL signal is permanently tied LOW.
As a result, the main output can only be turned ON or OFF through PMBus commands.
For detailed information on PMBus commands, please refer to ACAN-157.

PSU INPUT, OUTPUT/SIGNAL INTERFACE DETAILS



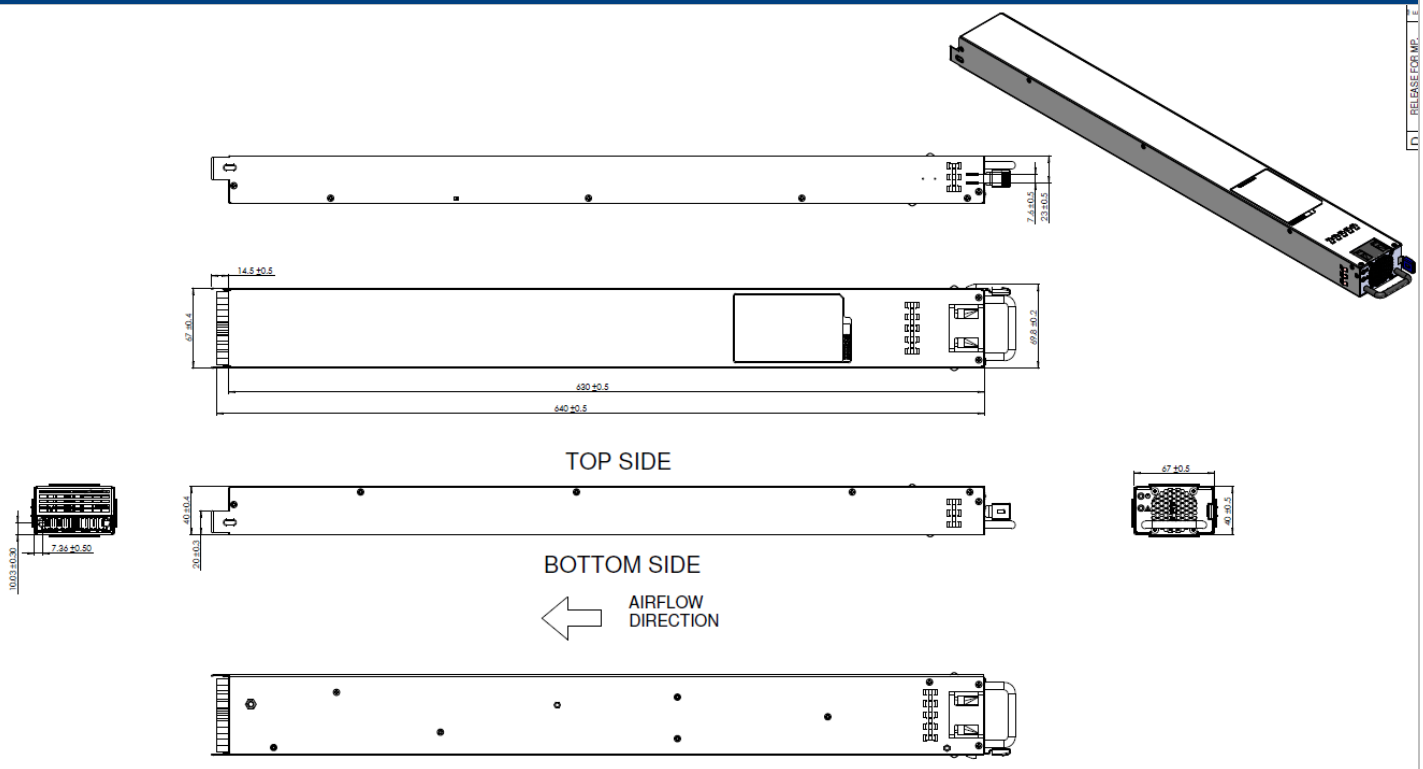
PSU Connector **Amphenol 10127396-01U520LF**

INPUT, OUTPUT/SIGNAL INTERFACE DETAILS



Mating Connector (System Side) **Amphenol 10127400-01U520LF**

MECHANICAL DIMENSIONS



1. This drawing is a graphical representation of the product and may not show all fine details such as molded part surface features, internal components, screw head type. Please contact Murata for 3D model for additional details
2. Dimensions in mm
3. Subject to change without notice; contact Murata for latest version

OPTIONAL ACCESSORIES

Part Number	Description
MWOCP67-CONC	Single power supply, output, and signal break-out connector board

APPLICATION NOTES

Document Number	Description	Click link below to open online document
ACAN-156	Output Connector Card	Link to :Document
ACAN-157	MWOCP67-5500-B-RM PMBus™ Protocol	Link to :Document

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ISO 9001 REGISTERED

This product is subject to the following operating requirements and the Life and Safety Critical Application Sales Policy: Refer to: https://www.murata-ps.com/requirements/

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