

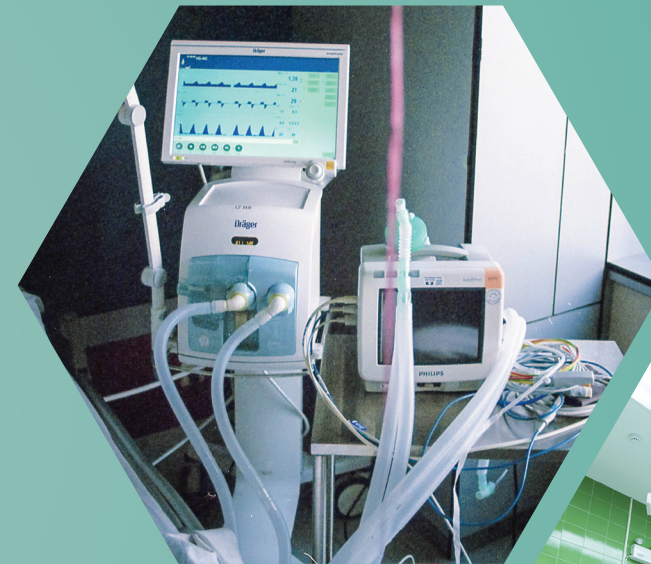
Since 1968 Cosel has been a leading provider of quality AC/DC, DC/DC and EMI Filters for Medical Applications worldwide.

Cosel products have an extremely low failure rate under 30 PPM. Robust, high efficiency, and small size make Cosel products ideal for Medical Applications. Cosel products can be found on many medical devices throughout the world from some of the premier medical device manufacturers.

COSEL



MEDICAL POWER SOLUTIONS



IEC/EN 60601

Means of Protection for Medical Power Supplies

IEC/EN 60601 electrical safety standard for medical equipment is now at 4th edition and is applicable to the power supplies used in medical equipment. The standard requires medical devices to have one or more Means of Protection (MOP) depending on the specific application to reduce the risk of electrocution. When a piece of equipment will not come in contact with a patient, but only the operator the equipment must meet at least one **Means of Operator Protection (MOOP)**. Or depending on the specific use of the equipment two means of Operator Protection may be required as outlined in TABLE 1 below with the associated isolation, creepage distance and clearance distance.

Any equipment that will come in contact with a patient requires at least one **Means of Patient Protection (MOPP)** and could require two means of patient protection (2xMOPP).

IEC 60601-1 uses the term Applied Parts (AP) to refer to the part of the medical equipment which comes into physical contact with the patient during normal use. There are three levels of classification for Applied Parts:

TYPE B

No electrical contact with a patient

TYPE BF

Electrically connected to a patient, but not directly connected to the heart.

TYPE CF

Electrically connected to the patient's heart.

IEC/EN 60601 Means of Protection					
Insulation Type	Input Vac	MOP	Creepage mm	Clearance mm	Isolation Vdc
Basic	120	1xMOOP	3	1.6	1,000
Double or Reinforced	120	2xMOOP	6	3.2	3,000
Basic	240	1xMOPP	4	2.5	1,500
Double or Reinforced	240	2xMOPP	8	5	4,000

In relation to the power supply there are two requirements to meeting the AP rating of the medical device; leakage current and isolation as outlined in Table 2 and 3.

TABLE 2

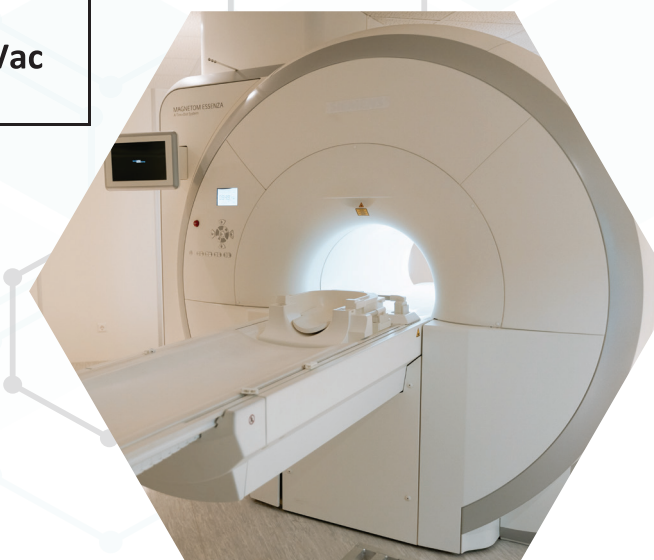
Maximum Leakage Current				
Applied Parts Type	Condition	Earth Leakage mA	Touch Current uA	Patient Leakage Current uA
Type B	NC	5	100	100
	SFC	10	500	500
Type BF	NC	5	100	100
	SFC	10	500	500
Type CF	NC	5	100	10
	SFC	10	500	50

LEAKAGE MEASUREMENT LIMITS FOR EQUIPMENT TYPES AND MEASUREMENTS INCLUDE:
NC—NORMAL CONDITIONS
SFC—SINGLE FAULT CONDITION



TABLE 3

Isolation by Type			
Applied Parts Type	Input to Output Isolation Vac	Input to Ground Isolation	Output to Ground Isolation
Type B	4000 Vac 2xMOPP	1500 Vac 1xMOPP	500 Vac
Type BF/CF	4000 Vac 2xMOPP	1500 Vac 1xMOPP	1500 Vac

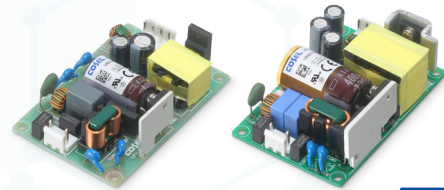


COSEL
MEDICAL
POWER
SOLUTIONS

COSCEL MEDICAL PRODUCT LINE UP

AC/DC 2MOPP BF RATED UMA BF RATED

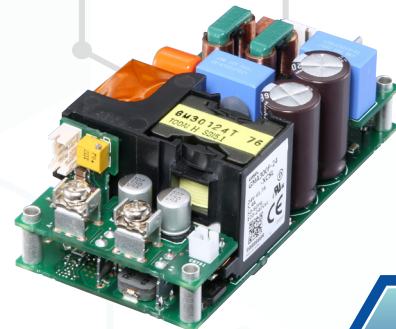
- 2" X 3" Industry Standard footprint
- Medical Safety Standards ES60601-1
- EN60601-1 3rd Edition
- UL62368-1,
- Leakage current 0.2/240 VAC
- Output Voltages 5V to 48VDC



30 & 60
Watt
Convection
cooled

GMA BF RATED

- 2" X 4" Industry Standard footprint
- Medical Safety Standards
- ES60601-1, EN60601-1 3rd Edition
- UL62368-1,
- Leakage current .13/.30 100/240
- Output Voltages 12V to 56VDC

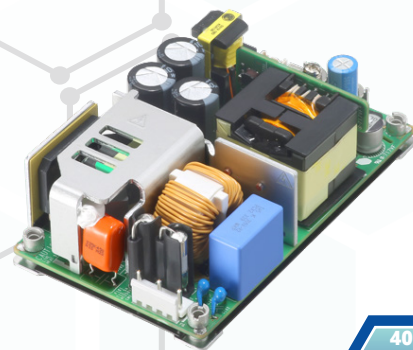


300
Watt
w/Forced Air

GHA700 BF RATED 3" X 5" <1U HIGH

Medical Safety Approvals
(ANSI/AAMI ES60601-1, EN60601-1 3rd Ed.)

- IEC60601-1-2 4th Ed.)
- Medical Isolation Grade 2MOPP
- Leakage Current 0.125/0.250 mA
- Optional RC, 5 & 12V Aux
- Output 12-65 VDC



400W
base Plate
Cooled
700W
forced
Air

AEA BF RATED

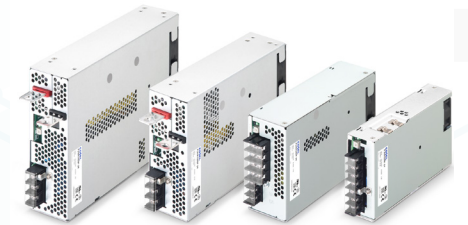
- Small Foot Print
- High Power Density
- Medical Safety Standards ES60601-1,
- EN60601-1 3rd Edition
- UL62368-1,
- Leakage current .3 mA @240 VAC
- Output Voltages 24V to 48VDC
- High Peaking up to 3 Times convection rating
- Less than 1U high (600W only)



600W
to
1000W
Convection/
Forced
Air

PJMA BF RATED

- Enclosed with Fan
- Parallel Operation (optional)
- Remote Sense and LV Alarm (optional)
- Output Voltages 12 to 48 VDC
- Medical Safety Standards ES60601-1,
- EN60601-1 3rd Edition, UL62368-1



300W
to
1500W
Enclosed
with
Fan



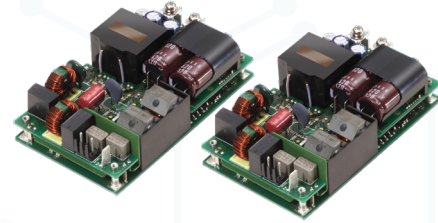
AC/DC 2MOPP B RATED GHA300F & 500F

3" X 5" <1U SINGLE OUTPUT

Medical Safety Approvals

ANSI/AAMI ES60601-1, EN60601-1 3rd Ed. IEC60601-1-2 4th Ed.

- Medical Isolation Grade 2MOPP
- Leakage Current (.25mA MAX)
- Optional RC, 5& 12V Aux
- Output 12-56 VDC
- GHA500F has base plate cooling



Up to
300W
&
500W

AME MULTI-OUTPUT

- Modular/Configurable
- Flexible with hundreds of output configurations
- EN60601-1 3rd Ed. IEC60601-1-2 4th Ed.
- Low Profile, 1U high
- RC, 5V AUX, Alarm, Global Inhibit
- Digital Interface Control
- Low leakage .30mA Max



300W
& 1200W
Enclosed
with
Fan

PMBus
Power Management
Defined

GHA300 & 500-SNF SINGLE OUTPUT

Medical Safety Approvals

Enclosed version of the GHA300/500

(ANSI/AAMI ES60601-1, EN60601-1 3rd Ed. IEC60601-1-2 4th Ed.)

- Medical Isolation Grade 2MOPP
- Leakage Current (.25mA MAX)
- Standard with RC, 5& 12V Aux and Conformal Coating
- Output 12-56 VDC



300W
& 500W
Enclosed
with
Fan

PCA SINGLE OUTPUT

Medical Safety Approvals

(ANSI/AAMI ES60601-1, EN60601-1 IEC60601-1-2 4th Ed.)

- Leakage Current (0.50mA MAX)
- Low Profile (41mm) for 1U Applications
- Constant Current Operation
- Output Voltage Adjustable to near 0VDC
- Remote Monitoring via Communication Interface
- Alarm Function
- AUX (Selectable Voltage Range 5V-12V)
- Digital Interface RS232 or PMBus



300W
& 1500W
Enclosed
with
Fan

PMBus
Power Management
Defined



EMI FILTERS

Cosel offers many EMI Filters to meet your specific requirements.

Selections from 3 Amps to 600 Amps in Single and Three Phase versions.

Low leakage and DIN Rail mount types.

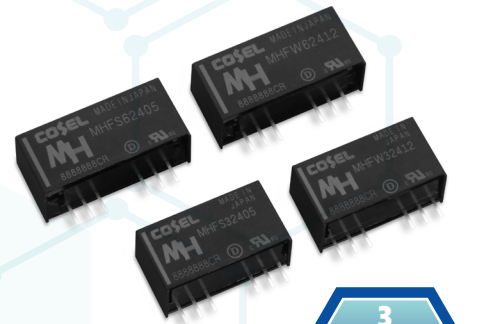
Give us your requirements and we can suggest a solution



DC/DC CONVERTER

MH SERIES PCB MOUNT

- High Isolation up to 3KV
- 2 MOOP
- Wide Input Range 4:1
- Remote On/Off
- UL62368-1, EN62368-1, EN60601-1 3RD Ed.
- SIP 8 Foot Print
- Output Voltage Adjustment
- OCP Auto-Recovery
- Output 3.3 to 15 VDC and +/-12 & 15 VDC



3
and
6
Watt

BOARD LEVEL AC/DC

TUNS1200F

- Conduction Cooled
- Small foot print 117.3 X 12.7 X 86.8 (4.62" X 0.5" X 3.42") W x H x D
- High Reliability with NO built in Aluminum or tantalum capacitors
- Wide AC input range from 85 to 305 VAC
- Operates up to 100C at base plate
- 2MOOP Isolation
- Leakage Current 0.5 Max
- IEC60601-1-2 4th Ed
- Can be put in Constant Current regulation
- Output Voltage can be controlled from near Zero to 120% rated output voltage up to 79 VDC
- Parallel Operation possible



1200
Watts
Conduction
Cooled







MEDICAL PRODUCT LINE UP

All Cosel Products have UL, CE, and EN Safety Approvals as well as RoHS compliance
All Cosel Medical Power Supplies have a 5 Year warranty

QUICK LOOK UP TABLE

Type	Series	Model	O/P Voltage	O/P Current	MOOP MOPP	Isolation	Cooling Method	Dimensions WxHxL (inches)						
AC/DC Open Frame	UMA	UMA30F	5	3	2 x MOPP	BF	Convection	2.0 x 3.0 x 0.95						
			12	2.5										
			15	2										
			24	1.3										
			36	0.85										
		UMA60F	48	0.65	2 x MOPP	BF	Convection	2.0 x 3.0 x 1.05						
			5	6										
			7.5	6										
			12	4.5										
			15	3.5										
	GMA	GMA300F	24	12.5	2 x MOPP	BF	Forced Air	2.0 x 1.5 x 4.0						
			48	6.3										
			56	5.4										
			GHA	GHA300F					12	8.4 Convection 25 Forced Air	2 x MOPP	B	Convection Forced Air	3.0 x 1.4 x 5.0
									24	4.2 Convection 12.5 Forced Air				
	48	2.1 Convection 6.3 Forced Air												
	GHA	GHA500F	12	12.5 Convection 30.0 Conduction 41.7 Forced Air	2 x MOPP	B	Convection/ Conduction/Forced Air	3.0 x 1.4 x 5.0						
			15	10.0 Convection 24.0 Conduction 33.4 Forced Air										
			24	6.30 Convection 15.0 Conduction 21.0 Forced Air										
			30	5.00 Convection 12.0 Conduction 16.7 Forced Air										
			48	3.20 Convection 7.50 Conduction 10.5 Forced Air										
			56	2.70 Convection 6.40 Conduction 9.00 Forced Air										
	GHA	GHA700F	12	33.3 Conduction 58.3 Forced Air	2 x MOPP	BF	Convection/ Conduction/Forced Air	3.0 x 1.5 x 5.0						
			24	16.6 Conduction 29.2 Forced Air	2 x MOPP	BF	Convection/ Conduction/Forced Air	3.0 x 1.5 x 5.0						
30			12.5 Conduction 23.3 Forced Air	2 x MOPP	BF	Convection/ Conduction/Forced Air	3.0 x 1.5 x 5.0							
48			8.30 Conduction 14.6 Forced Air	2 x MOPP	BF	Convection/ Conduction/Forced Air	3.0 x 1.5 x 5.0							
56			7.1 Conduction 12.5 Forced Air	2 x MOPP	BF	Convection/ Conduction/Forced Air	3.0 x 1.5 x 5.0							

Type	Series	Model	O/P Voltage	O/P Current	MOOP MOPP	Isolation	Cooling Method	Dimensions WxHxL (inches)		
AC/DC Open Frame	AEA 3X HIGH PEAK POWER	AEA600F 	24	17.5(52.5) Convection/Peak 25.0(52.5) Forced Air/Peak	2 x MOPP	BF	Convection Forced Air	1.61 x 5.0 x 7.32		
			32	13.2(39.4) Convection/Peak 18.8(39.4) Forced Air/Peak						
			36	11.7(35.0) Convection/Peak 16.7(35.0) Forced Air/Peak						
			48	8.80(26.3) Convection/Peak 12.5(26.3) Forced Air/Peak						
		AEA800F 	24	23.5(72.5) Convection/Peak 34.0(72.5) Forced Air/Peak	2 x MOPP	BF	Convection Forced Air	1.97 x 5.0 x 8.0		
			36	15.7(48.4) Convection/Peak 22.7(48.4) Forced Air/Peak						
			48	11.8(36.3) Convection/Peak 17.0(36.3) Forced Air/Peak						
		AEA1000F 	24	30.0(100.0) Convection/Peak 42.0(100.0) Forced Air/Peak	2 x MOPP	BF	Convection Forced Air	1.97 x 5.0 x 9.0		
			36	20.0(66.7) Convection/Peak 28.0(66.7) Forced Air Peak						
			48	15.0(50) Convection/Peak 21.0(50) Forced Air/Peak						
		AC/DC Enclosed	PCA	PCA300F 	5	60	2 x MOPP	B	Forced Air	3.5 x 1.61 x 5.98
					12	27				
15	22									
24	14									
32	10									
48	7									
PCA600F 	5			120						
	12			53						
	15			43						
	24			27						
	32			20						
	48			13						
AC/DC Enclosed	PCA	PCA1000F 	5	200	2 x MOPP	B	Forced Air	4.02 x 1.61 x 7.01		
			12	88						
			15	70						
			24	44						
			32	33						
			48	22						
		PCA1500F 	5	300				5.52 x 1.61 x 7.99		
			12	125						
			15	100						
			24	65						
			32	47						
			48	32						

Type	Series	Model	O/P Voltage	O/P Current	MOOP MOPP	Isolation	Cooling Method	Dimensions WxHxL (inches)		
AC/DC Enclosed	GHA	GHA300F-SNF 	12	25 Forced Air	2 x MOPP	B	Forced Air	3.35 x 1.61 x 6.5		
			24	12.5 Forced Air						
			48	6.3 Forced Air						
		GHA500F-SNF 	12	41.7 Forced Air	2 x MOPP	B	Forced Air	3.35 x 1.61 x 6.5		
			15	33.4 Forced Air						
			24	21.0 Forced Air						
			30	16.7 Forced Air						
			48	10.5 Forced Air						
			56	9.00 Forced Air						
			AC/DC Enclosed	PJMA					PJMA300F 	12
		24			12.5					
		36			8.4					
PJMA600F 	48	6.3			4.72 x 2.40 x 8.46					
	12	50								
	24	25								
PJMA1000F 	36	16.7			5.91 x 2.40 x 9.45					
	48	12.5								
	12	84								
PJMA1500F 	24	42			7.01 x 2.40 x 10.55					
	36	28								
	48	21								
	12	125								
	24	64								
	36	42								
48	32									

COSEL
MEDICAL PRODUCT LINE UP

Type	Series	Model	# Slots	Watts	MOOP MOPP	Isolation	Cooling Method	Dimensions WxHxL (inches)
AC/DC Enclosed	AME	AME400 	4 Slots	400	2 x MOOP	B	Forced Air	3.5 x 1.61 x 10.12
		AME600 	4 Slots	600				
		AME800 	6 Slots	800				5.0 x 1.61 x 10.12
		AME1200 	6 Slots	1200				
Type	Series	Model	O/P Voltage	O/P Current	MOOP MOPP	Isolation	Cooling Method	Dimensions WxHxL (inches)
AC/DC PCB Type	TUNS	TUNS1200 	12	84	2 x MOOP	N/A	Conduction/ Forced Air	4.62 x 0.5 x 3.42
			28	43				
			48	25				
			65	18.5				
Type	Series	Model	Input Voltage	Output Voltage	MOOP MOPP	Isolation	Cooling Method	Dimensions WxHxL (inches)
DC/DC Encapsulated	MH	MHFS3 	4.5-18	3.3, 5.0, 9.0, 12.0, 15	2 x MOOP	N/A	Convection	0.87 x 0.48 x 0.38
			9-36	3.3, 5.0, 9.0, 12.0, 15				
			18-76	3.3, 5.0, 9.0, 12.0, 15				
		MHFS6 	4.5-18	3.3, 5.0, 9.0, 12.0, 15				
			9-36	3.3, 5.0, 9.0, 12.0, 15				
			18-76	3.3, 5.0, 9.0, 12.0, 15				
		MHFW3 	4.5-18	±12(+24); ±15 (+30)				
			9-36	±12(+24); ±15 (+30)				
			18-76	±12(+24); ±15 (+30)				
		MHFW6 	4.5-18	±12(+24); ±15 (+30)				
			9-36	±12(+24); ±15 (+30)				
			18-76	±12(+24); ±15 (+30)				

Cosel designs and manufactures all products to assure you of high quality and the latest technology.



Cosel Co LTD R&D Center Toyama Japan

TECHNICAL SUPPORT

Cosel provides direct USA based technical support with additional support from factory engineers in Japan. This includes on-site technical assistance from FAE's and Regional Engineers. The Powerbox division of Cosel Company can provide custom and value added solutions.

Email techsupport@coselusa.com

Phone – 888-661-1692



SALES SUPPORT

Cosel USA Main Office
2055 Gateway Place Suite 240, San Jose, CA 95110
sales@coselusa.com
408-980-5144
Toll Free 888-661-1705
www.coselusa.com

REGIONAL SALES:

US Western, Western Canada & Mexico Region
Max Uyematsu
Regional Manager
TEL : 408-529-4338
max@coselusa.com

US Central Region
David Miskell
Regional Sales Engineer
TEL : 618-406-4250
miskell@coselusa.com

US New England and Mid-Atlantic
Peter Laroque
Regional Sales Engineer
TEL : 508-215-6795
peter@coselusa.com

US South East, South America and Eastern Canada
Kevin Groves
National Sales Manager
TEL : 614-257-7663
kgroves@coselusa.com