



IMA PLUS 2000 Watts Power Supply Series

for medical and industrial applications

Product Data Sheet

2000 Watts Power Supply Series

for medical and industrial applications

Features

- Safety approval for Medical (IEC 60601-1-2 and 3rd+A1 edition CB report) TUV EN60601-1:2006
 - CAN/CSA-C22.2 NO.60601-1 + ANSI/AAMI, ES 60601-1, 3000m altitude, 100-240Vac only
 - Industrial (IEC 62368) and IT IEC60950-1 CB report, IEC62368-1 CB report, TUV EN62368-1, UL62368-1 and CAN/CSA C22.2 No. 62368-1
 - 3000 Watt peak power (up to 5s)
 - Standby power < 2 Watt
 - Wide operating input voltage range: 80 Vac to 275 Vac or 120 Vdc to 300 Vdc
 - Wide adjustable output voltage range (+/- 20%)
 - Standby output 5 Vdc / 2 A
 - High efficiency: up to 94%
 - Size: 309.6 x 127 x 40.6 mm (12.2 x 5 x 1.6 in) (1U design)
 - Low acoustic noise level of less than 39 dB(A), variable speed fan control
 - Active current sharing
 - 2 × MOPP and BF appliances
 - PMBus™ compatible for control, programming and monitoring
 - 500,000 hour MTBF
 - Optional conformal coating
 - 3 years warranty
- Normal and Reversed Option for Remote On/Off, Power Good Signal, AC-Good Signal

Model variants

Model number ¹⁾	Input voltage range		Main DC Output		Auxiliary DC Output	
	AC (Vac)	DC (Vdc)	Voltage (Vdc)	Current (A)	Voltage (Vdc)	Current (A)
IMA-S2000-24-YVxxx	80 to 275	120 to 300	24	83.3	5	2
IMA-S2000-48-YVxxx	80 to 275	120 to 300	48	41.6	5	2

¹⁾ IMA-S2000:x = S for standard version (e.g. IMA-S2000-xx-YVxxx),
x = C for conformal coated version (e.g. IMA-C2000-xx-YVxxx)

AC/DC Input (J1)

	IMA-S2000-24-YVxxx	IMA-S2000-48-YVxxx
Nominal input voltage	100 Vac to 240 Vac	
AC Operating input voltage range	80 Vac to 275 Vac	
Nominal input frequency	50 / 60 Hz	
Input frequency range	47 Hz to 63 Hz	
DC Input voltage range	120 Vdc to 300 Vdc	
Maximum input current		
@ 80 Vac	17.2 A	17.2 A
@ 120 Vdc	12 A	12 A
Efficiency @ 70% load ¹⁾	see Fig. 10 - insert Figure	
@ 230 Vac	94 %	94 %
@ 115 Vac	92 %	92 %
Max inrush current ²⁾ @ 264 Vac	< 25 A	
Input fuse	DC input compliant, dual 25 A fuses used	

	IMA-S2000-24-YVxxx	IMA-S2000-48-YVxxx
Power factor ³⁾ (115 Vac and 230Vac /50 Hz)	> 0.97 (typical)	

¹⁾ Excluding fan power

²⁾ Hot and cold turn on

³⁾ EN 61000-3-2, Class A compliant

Main DC Output (J2)

		IMA-S2000-24	IMA-S2000-48
Nominal output voltage		24 V	48 V
Output voltage adjustment range		19.2 V to 28.8 V	38.4 V– 57.6 V
Maximum output power		1600 W	
@115 Vac		1600 W	
@230 Vac		2000 W	2000 W
Output voltage regulation		± 2.5%	
Total		± 2.5%	
Over line	Full input range, full load	0.25 %	
Over load	Nominal input, full load range	1%	
Over temperature	Nominal input, full load, full temperature range	1%	
Output power (peak)		3000 W	3000 W
Maximum output current		10,000 µF	
@115 Vac		0 to 60.4A	0 to 30.2 A
@230 Vac		0 to 83.3 A	0 to 41.7 A
Maximum output capacitive load		10,000 µF	
Ripple & Noise (max) (20MHz bandwidth, 10µF Tan&1µF ceramic cap, nominal output@ 25C)		1.25% Vrated pk-pk @ rated load (2000 W)	
Dynamic load regulation ¹⁾		< 5%	
PARC (20 MHz) ²⁾		TBD	< 480 mV
Turn on overshoot		< 2.5%	< 3%
Output rise time		< 200 ms	< 200 ms
Hold up time		20 ms	
Start up time		2000 ms with AC turn on	
Output over voltage protection		YES, latch mode	
		30 V to 35 V	58 V to 61 V
Output over current protection		3000 W for over 750 ms max Standby 3.2 A max with Hiccup Mode(Non-Latching, Auto-Recovery)	
Short circuit protection		YES, auto recovery	
Over temperature protection		YES, auto recovery	
Remote sense ³⁾	Total voltage drop compensation for +V_SENSE and -V_SENSE connections (J3 Pins 13 and 14) to the output load	500 mV	

¹⁾ 50% step from 5% load, 1 A/µs, 10 µF Tan and 1µF ceramic capacitor

²⁾ 10 µF Tan and 1µF ceramic capacitor

³⁾ Do not short or reversely connect +V_SENSE and -V_SENSE. Doing this can cause damage to the power supply.

Auxiliary DC Output (J3)

	IMA-S2000-24	IMA-S2000-48
Connector type	Molex, Part number 501646-1400, 14 pin, see Fig. 13, page 12	
Nominal output voltage	5 V	
Output voltage adjustment range	4.75 to 5.25 V	4.75 to 5.25 V
Output voltage regulation		
Total	2.5%	
Over line Full input range, full load	0.25%	0.3%
Over load Nominal input, full load range	1%	
Over temperature Nominal input, full load, full temperature range	1%	
Maximum output current	2 A	
Maximum output capacitive load	1000 μ F	
Output over voltage protection	Yes, at 30 V to 35 V; latch mode	Yes, at 58 V to 61 V; latch mode
Output over current protection	YES, at 108% to 140% of maximal output current; auto recovery	
Short circuit protection	YES, auto recovery	
Over temperature protection	YES, auto recovery	

Galvanic isolation

	IMA-S2000-xx
Input to Output Reinforced	4000 Vac; 2 x MOPP
Input to Case Basic	1500 Vac; 1 x MOPP
Output to Case Basic	1500 Vac; 1 x MOPP (Type BF application rated)

Leakage currents

	IMA-S2000-xx			
AC Leakage current from Input to earth ground	Measured at mains voltage	at 60 Hz	at 63 Hz	-
Normal condition (low line)	132 Vac	< 150 μ A	< 150 μ A	-
Single fault condition (low line)	132 Vac	< 250 μ A	< 260 μ A	-
Normal condition (high line)	264 Vac	< 300 μ A	< 300 μ A	-
Single fault condition (high line)	264 Vac	< 500 μ A	< 520 μ A	-
AC Leakage current from Output to earth ground	Measured at mains voltage	Typical at 60 Hz ¹⁾	Maximum value at 63 Hz ¹⁾	Limit per IEC 60601-1
Normal condition (low line)	132 Vac	55 μ A	< 70 μ A	100 μ A
Single fault condition (low line)	132 Vac	43 μ A	< 80 μ A	500 μ A
Normal condition (high line)	264 Vac	172 μ A	< 230 μ A	500 μ A
Single fault condition (high line)	264 Vac	< 1250 μ A	< 1800 μ A	5000 μ A

¹⁾ Meets IEC 60601-1 BF leakage current limit

Other features

		IMA-S2000-xx
Current Share Bus Pin	J3 Pin 11 (CURRENT SHARE_V)	Voltage at CS Pin will vary linearly with load current on main output, and will be 6 V at rated load current, when the output voltage is at its rated value.
Power Good Pin	J3 Pin 9 (PWR_GOOD)	Open collector. As soon as AC input voltage and DC output voltage are in the predefined range, the PWR_GOOD signal is set to HIGH.
AC Good Pin	J3 Pin 7 (AC_GOOD)	Open collector. As soon as AC input voltage is in the predefined range, the AC_GOOD signal is set to HIGH.
Green LED		Starts blinking when the Main DC Output is switched off by a REMOTE OFF signal and will turn ON as soon as PWR_GOOD signal is set to HIGH.
Component Derating Guideline		Refer to IPC 9592B and to Delta Guideline
OR-ing		Redundant operation with active circuit sharing, see Application Note "Redundant operation", p. 10
SDA, SCL for I²C		Internal 10 kΩ pull-up resistor to internal 3.3 V

		IMA-S2000-xx-YVxxx		IMA-S2000-xx-YVxxx	
Remote On/Off Pin ¹⁾	J3 Pin 8 & 10 (REMOTE ON/OFF)	SW (Switch) See Fig. 19	Main DC Output	SW (Switch) See Fig. 18	Main DC Output
		Switch ON (Close)	OFF	Switch ON (Close)	ON
		Switch OFF (Open)	ON	Switch OFF (Open)	OFF

Environmental conditions

	IMA-S2000-24	IMA-S2000-48
Ambient operating temperature range ¹⁾	-20 °C ... +70 °C (-40°F to +158 °F) (see Fig. 8, page 11)	
Standard mounting orientation	(see Fig. 3, page 9)	
Ambient storage temperature range	-40 °C ... +85 °C (-40 °F to +185 °F)	
Output power derating		
Versus input voltage	When AC input voltage is < 110 Vac, the output power is reduced by 20 W per 1 V. (see Fig. 7, page 11)	
Versus ambient temperature	(see Fig. 8, page 11)	
@80 Vac	When ambient temperature is > 50 °C (122 °F), the output power is reduced by 10 W per 1 °C.	When ambient temperature is > 50 °C (122 °F), the output power is reduced by 10 W per 1 °C.
@110 Vac	When ambient temperature is > 50 °C (122 °F), the output power is reduced by 40 W per 1 °C.	When ambient temperature is > 50 °C (122 °F), the output power is reduced by 40 W per 1 °C.
@180 Vac to 275 Vac	When ambient temperature is > 50 °C (122 °F), the output power is reduced by 60 W per 1 °C.	When ambient temperature is > 50 °C (122 °F), the output power is reduced by 60 W per 1 °C.
Output current derating Versus output voltage	When output voltage is > 24 Vdc, the output current is reduced by 0.8 A per 1 V (see Fig. 9, page 11).	When output voltage is > 48 Vdc, the output current is reduced by 0.8 A per 1 V (see Fig. 9, page 11).
Relative humidity	5% to 95% (non-condensing)	
Operating altitude ^{1) 2)}	5000 m (54kPa)	

	IMA-S2000-24	IMA-S2000-48
Shock test (non-operating)	IEC 60068-2-27 compliant, 50 g, 11 ms, 3 shocks for each direction	
Vibration	IEC 60068-2-6 compliant, 2.09 Grms, 5 - 500 Hz, 20 minutes per side (3 planes)	
Pollution degree	2	

¹⁾ Ambient operating temperature decreases by 1 °C per 305 m (1000 ft) altitude increase

²⁾ Maximum operating altitude requirements for different types of products, see "Safety standards and directives 1)", p. 7

Reliability

	IMA-S2000-xx
MTBF ¹⁾	500,000 hours
Expected capacitor life time ²⁾	10 years
Fan L₁₀ life @ 40 °C	70,000 hours
Warranty	3 years

¹⁾ Telecordia SR-332, Method I, Case III, Issue 2, 25 °C (77 °F), 230 Vac, full load, 90% confidence level, based on component stress

²⁾ Nominal input voltage, 40 °C (104 °F), 80% load

EMC

This device has been fully tested according to EN 60601-1-2:2015 (4th edition).

	IMA-S2000-xx	
	Applied standards	Criteria
Radiated emissions ¹⁾	EN 55032, EN 55032 and FCC, Class B	-
Conducted emissions ¹⁾	EN 55032, EN 55032 and FCC, Class B	-
Power line harmonics	EN 61000-3-2, Class A	-
Voltage flicker	EN 61000-3-3	-
ESD	EN 61000-4-2, level 4, 8 kV contact, 15 kV air	A
Radiated immunity	EN 61000-4-3, level 3, 12 V/m	A
Electrical fast transient	EN 61000-4-4, level 4, ±2 kV	A
Surge immunity	EN 61000-4-5, level 4, 1 kV DM, 2 kV CM	A
Conducted RF immunity	EN 61000-4-6, level 3, 10 Vrms	A
Power frequency magnetic field	EN 61000-4-8, level 3, 10 A/m	A
Voltage dips and sags	EN 61000-4-11, 30%, 20 ms - R&D	A
	EN 61000-4-11, 60%, 100 ms	B
	EN 61000-4-11, 100%, 500 ms	24V B, 48V B
	EN 60601-1-2:2015 (4 th edition), 30%, 500 ms	A
	EN 60601-1-2:2015 (4 th edition), 60%, 100 ms	B
	EN 60601-1-2:2015 (4 th edition), 100%, 20 ms	A
	EN 60601-1-2:2015 (4 th edition), 100%, 5000 ms	B
Ring wave	EN 61000-4-12, level 3, 1 kV DM, 2 kV CM	A
Voltage fluctuations	EN 61000-4-14, Class 3	A

¹⁾ Power Supply Unit inside a dummy system

Safety standards and directives ¹⁾

	IMA-S2000-xx
IEC 62368 Edition 2	IEC 62368-1 (2014) Edition 2 5000 m (16,400 ft) altitude, 120 V to 300 Vdc and 100 V to 240±10% Vac
IEC/EN 60950-1, Edition 2 and all national deviations	UL 60950-1/CSA 22.2 No 60950-1, Edition 2; UL 62368-1 5000 m (16,400 ft) altitude, 120 V to 300 Vdc and 100 V to 240 ±10% Vac (UL File E135494)
IEC/EN 60601-1, Edition 3 (tested against Edition 2, too) and all national deviations	IEC 60601-1(2005), EN60601-1(2006) ANSI/AAMI ES 60601-1(2005) CAN/CSA C22.2 No. 60601-1 (2008); 3,000 m (9,800 ft) altitude, 100 V to 240 Vac ±10%
IEC 60601-1-2 Edition 4	IEC 60601-1-2 (2014) Fig. 2, page 9
Protection class	I

¹⁾ Designed to support Type B Applied Part End Product Requirements

Ecological characteristics

IMA-S2000-24	IMA-S2000-48
Waste Electrical and Electronic Equipment Directive (WEEE) 2002/96/EC	
RoHS - EU DIRECTIVE 2002/65/EC RoHS compliancy	RoHS - EU DIRECTIVE 2002/65/EC RoHS compliancy

Mechanical data

	IMA-S2000-24	IMA-S2000-48
Dimensions (L x W x D)	309.6 x 127 x 40.6 mm (12.2 x 5 x 1.6 in)	309.6 x 127 x 40.6 mm (12.2 x 5 x 1.6 in)
Weight	2 kg (4.4 lb)	2 kg (4.4 lb)
Indicator	Green LED	Green LED
Cooling system ¹⁾	2 fans with variable speed control	2 fans with variable speed control
AC/DC input terminal block	Block M4 x 3 pins	Block M4 x 3 pins
Main DC output terminal block	Block M5 x 2 pins	Block M5 x 2 pins
Auxiliary DC output + signals port	Connector x 14 pins	Connector x 14 pins
Acoustic noise ^{1) 2)}	< 39 dB(A)	< 39 dB(A)

¹⁾ To keep the noise low the fan will be turned off in standby mode

²⁾ At 1 Hz to 20 kHz and a distance of 1 m. Test conditions: 100 Vac, 50% load, ambient temperature 30 °C (86 °F)

Options

Model	Main Output voltage	Standby Output	Leakage current	Main Output adjustable	Constant Voltage or Constant Current output selectable	U channel	Enclosed	Convection cooling	Fan	Fan, airflow from end to front	Fan, airflow from front to end	Top FAN solution	Active current sharing	Remote ON/OFF	Coated
IMA-S2000-24-YVxxx	24 V	5 V/2 A		●	●	○	●	-	●	●	○	○	●	●	-
IMA-S2000-48-YVxxx	48 V	5 V/2 A		●	●	○	●	-	●	●	○	○	●	●	-
IMA-C2000-24-YVxxx	24 V	5 V/2 A		●	●	○	●	-	●	●	○	○	●	●	●
IMA-C2000-48-YVxxx	48 V	5 V/2 A		●	●	○	●	-	●	●	○	○	●	●	●

- included
- on request
- not available

Mounting orientations

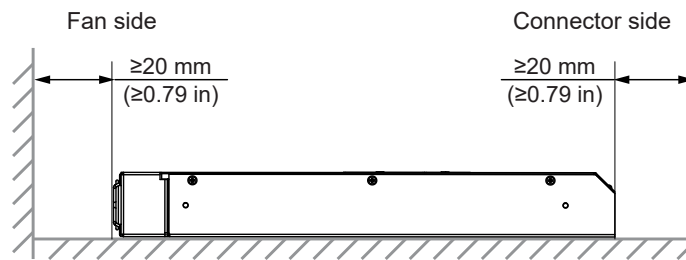
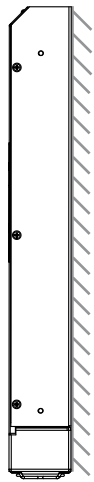


Fig. 1: Standard mounting orientation

Connector side



Fan side

Fig. 2: Vertical mounting

Top Bottom

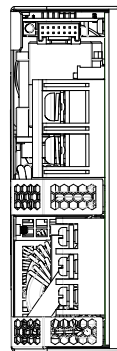


Fig. 3: Mounting on the left side

Bottom Top

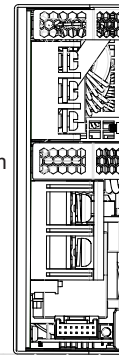
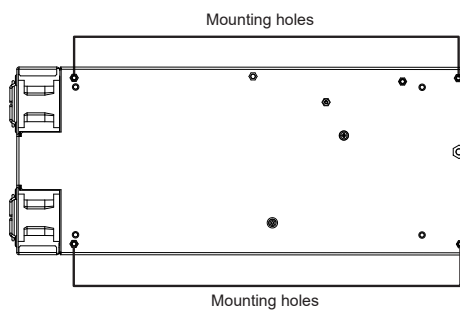


Fig. 4: Mounting on the right side

Bottom view



Side view

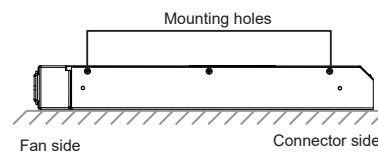


Fig. 5: Position of mounting holes

Dimensional drawings

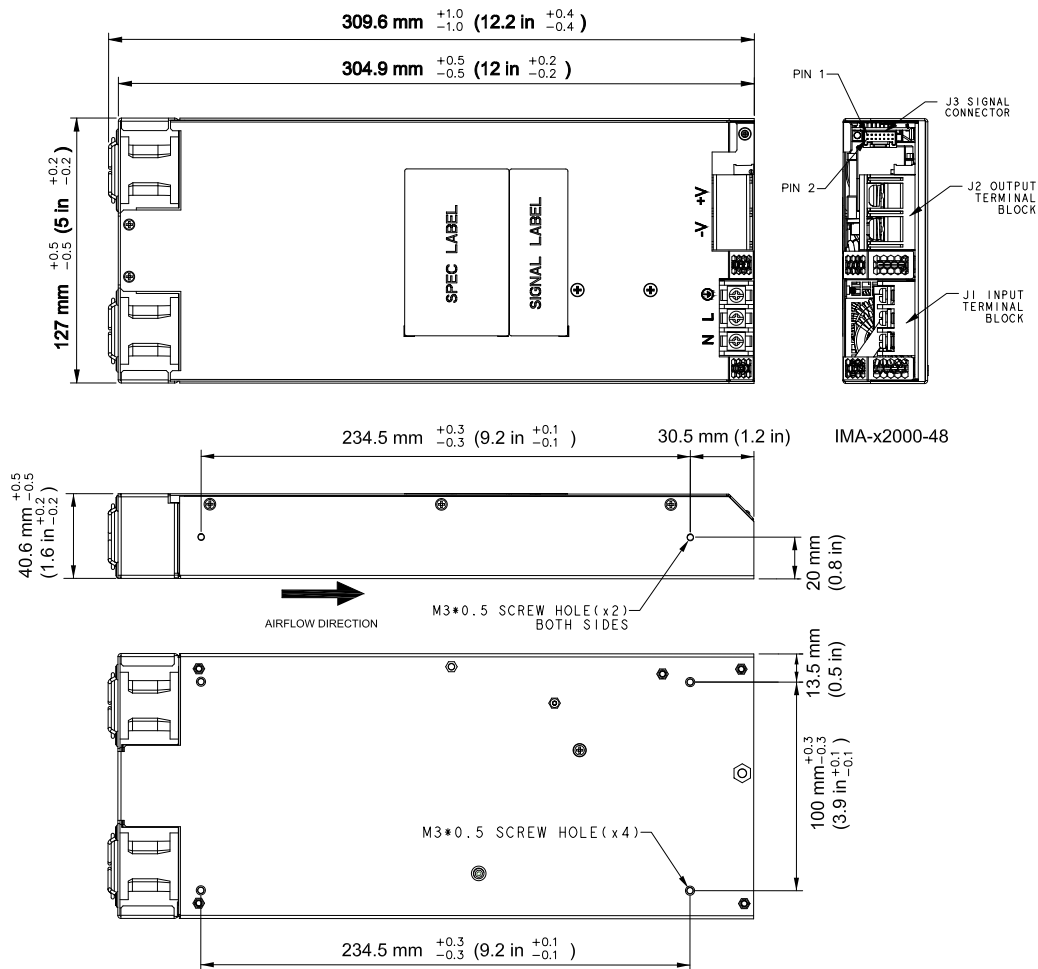


Fig. 6: Dimensional drawing IMA-S2000-xx

Notes:

- Base plate mounting, M3 thread holes, maximum penetration 4.0 mm (0.16 in) from outside face of chassis, maximum torque 0.6 Nm (5.31 lb-in)
- (J1) Input terminal block, Switchlab T14-EMII03, M3.5 screw in 3 positions, torque 1.8 Nm (16 lb-in)
- (J2) Output terminal block, Dinkle 0166-8002C, M5 screw in 2 positions, torque 2.4 Nm (21.24 lb-in)
- (J3) Mating connector for J3 is Molex housing 501646-1400 (with locking ramp) and Molex terminal 5030952200 or 501647-1000. The connector is not shipped with the power supply unit.

Curves

IMA-S2000-xx

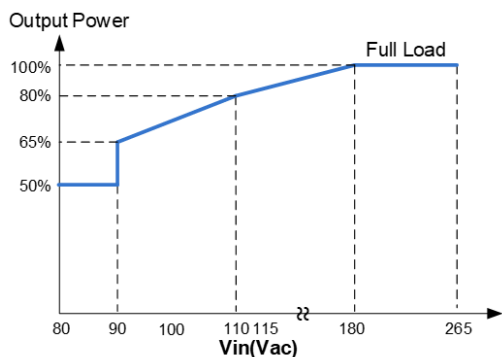


Fig. 7: Output power versus input voltage

IMA-S2000-xx

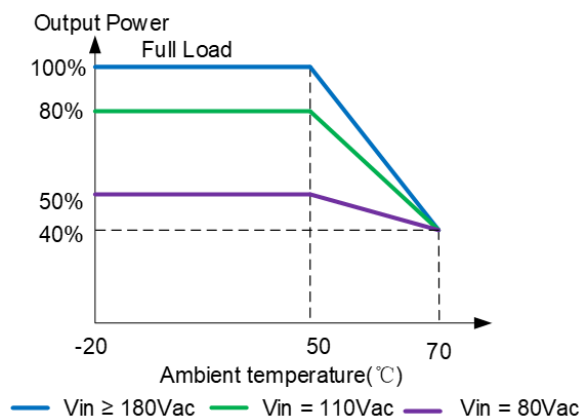


Fig. 8: Output power versus ambient temperature

IMA-S2000-24

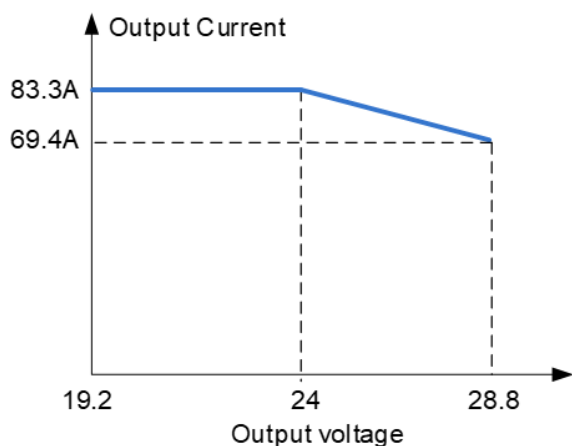


Fig. 9: Output current versus output voltage 24 V

IMA-S2000-48

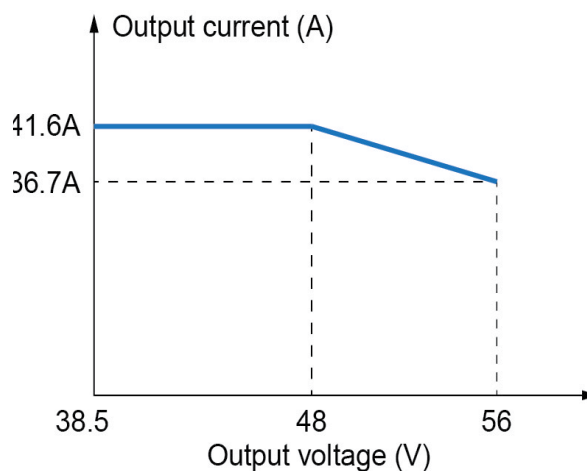


Fig. 10: Output current versus output voltage 48 V

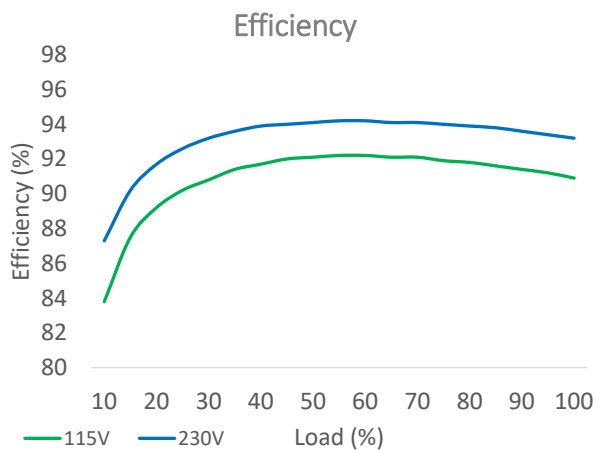


Fig. 11: Typical efficiency curves 24 V

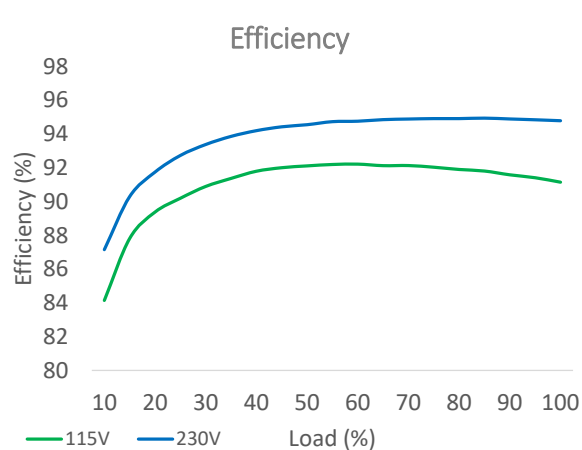
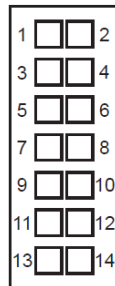


Fig. 12: Typical efficiency curves 48 V

Pin assignment (J3)

IMA-S2000-xx



Pin	Assignment	Pin	Assignment
1	+5VSB	2	+5VSB
3	5VSB_RTIN	4	5VSB_RTIN
5	SCL	6	SDA
7	AC_GOOD	8	REMOTE +
9	PWR_GOOD	10	REMOTE -
11	Current_Share_V	12	Address
13	+V_SENSE	14	-V_SENSE

Fig. 13: Pin assignment J3 terminal block

Mating connector type: Molex, Part number 501646-1400, 14 pin

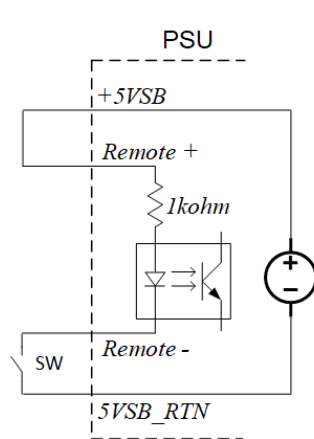


Fig. 18: Circuit diagram J3 Pin 8 & 10 (REMOTE ON/OFF) - 1a

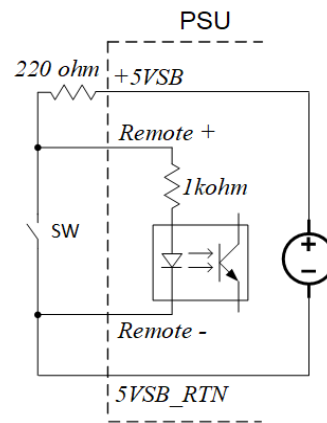


Fig. 19: Circuit diagram J3 Pin 8 & 10 (REMOTE ON/OFF) - 1b

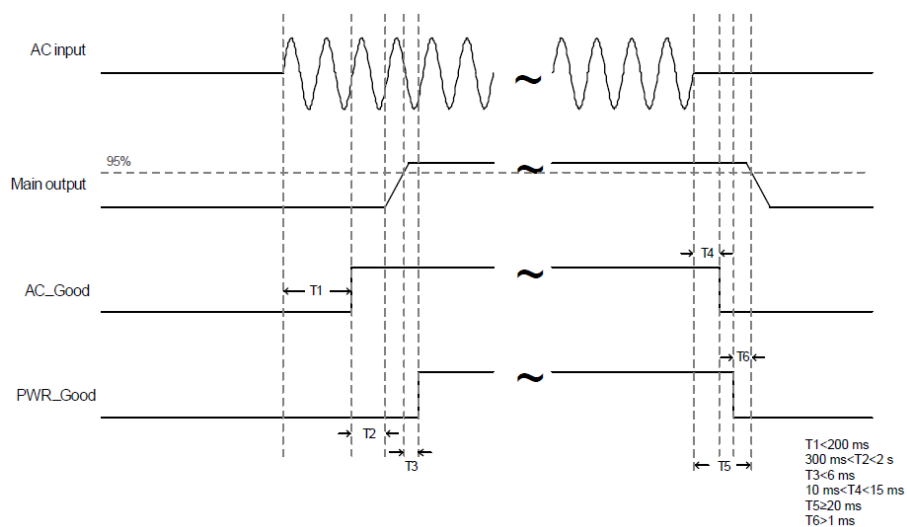


Fig. 20: Power Good/AC_Good function Timing

¹⁾ For DC output voltage ≤ Nominal output voltage; will reduce at DC output voltages > Nominal output voltage

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