IMA 2000 Watts Power Supply Series

for medical and industrial applications

Product data sheet

Smarter. Greener. Together.

2000 Watts Power Supply Series

for medical and industrial applications

Features

- Safety approval for Medical (IEC 60601-1-2), Industrial (IEC 62368) and IT
- Wide operating input voltage range: 80 Vac to 275 Vac or 120 Vdc to 300 Vdc
- Wide adjustable output voltage range (+/- 14%)
- 5 Vdc standby output
- High efficiency: up to 95%
- Size: 309.6 x 127 x 40.6 mm (12.2 x 5 x 1.6 in) (1U design)
- Variable speed fan control
- Low acoustic noise level of less than 39 dB(A)
- 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

Model variants

Model number [1]	Input voltage range		Main DC Output		Auxiliary DC Output		Remote ON/OFF standard setting [2]
	AC (Vac)	DC (Vdc)	Voltage (Vdc)	Current (A)	Voltage (Vdc)	Current (A)	
IMA-x2000-48-XYPLI	80 to 275	120 to 300	48	41.6	5	4	OFF
IMA-x2000-48-XYPLY							ON

[1] IMA-x2000: x = S for standard version (e.g. IMA-S2000-48-XYPLY),
x = C for conformal coated version (e.g. IMA-C2000-48-XYPLY)

[2] Model XYPLI and XYPLY have different settings for Remote ON/OFF, see *"Other features", p. 4.*

AC/DC Input (J1)

	IMA-x2000-48
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	17.2 A at 80 Vac / 11 A at 120 Vdc
Efficiency @ 70% load [1]	*see Fig. 10*
@ 230 Vac	95%
@ 115 Vac	93%
Max inrush current [2]	< 25 A
Input fuse	DC input compliant, dual 25 A fuses used
Power factor [3]	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-x2000-48
Nominal output voltage		48 V
Output voltage adjustment range		42.0 V to 54.0 V
Maximum output power		
@80 Vac to 109 Vac		1000 W
@110 Vac to 179 Vac		1600 W
@180 Vac to 275 Vac		2000 W
Output voltage regulation		
Total		2.3%
Over line	Full input range, full load	0.3 %
Over load	Nominal input, full load range	1%
Over temperature	Nominal input, full load, full temperature range	1%
Maximum output current		TBD
Maximum output capacitive load		10,000 µF
Dynamic load regulation [1]		< 5%
PARD (20 MHz) [2]		< 480 mV
Turn on overshoot		< 3%
Output rise time		< 200 ms
Hold up time		20 ms
Start up time		
AC OFF --> ON	Nominal input, max. load	< 2.5 s
REMOTE OFF --> ON	Nominal input, max. load	< 200 ms
Output over voltage protection		YES, latch mode
		58 V to 61 V
Output over current protection		10,000 µF
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	200 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-x2000-48
Connector type		Molex, Part number 501876-1440, 14 pin, see *Fig. 11, page 11*
Nominal output voltage		5 V
Output voltage adjustment range		–
Output voltage regulation		
Total		2.25%
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%
Maximum output current		4 A
Maximum output capacitive load		1,000 µF
Output over voltage protection		Yes, at 58 V to 61 V; latch mode
Output over current protection		YES, at 108% to 140% of maximal output current; auto recovery

	IMA-x2000-48
Short circuit protection	YES, auto recovery
Over temperature protection	YES, auto recovery

Galvanic isolation

		IMA-x2000-48
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

Leakage currents

	IMA-x2000-48			
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 µA	< 150 µA	
Single fault condition (low line)	132 Vac	< 250 µA	< 260 µA	
Normal condition (high line)	264 Vac	< 300 µA	< 300 µA	
Single fault condition (high line)	264 Vac	< 500 µA	< 520 µA	
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)	264 Vac	55 µA	< 70 µA	100 µA
Single fault condition (low line)	264 Vac	43 µA	< 80 µA	500 µA
Normal condition (high line)	264 Vac	172 µA	< 230 µA	500 µA
Single fault condition (high line)	264 Vac	< 1250 µA	< 1800 µA	5000 µA

[1] Meets IEC 60601-1 BF leakage current limit

Other features

		IMA-x2000-48
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
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-x2000-48-XYPLI		IMA-x2000-48-XYPLY	
Remote On/Off Pin [1]	J3 Pin 10 (REMOTE ON/OFF)	REMOTE ON/OFF (J3 Pin 10) and 5VSB_RTN (J3 Pin 3 or 4)	Main DC Output	REMOTE ON/OFF (J3 Pin 10) and 5VSB_RTN (J3 Pin 3 or 4)	Main DC Output
		Shorted	OFF	Shorted	ON
		Open	ON	Open	OFF

[1] Logic can be switched with PMBus™

Environmental conditions

	IMA-x2000-48
Ambient operating temperature range [1]	*(see Fig. 8, page 10)*
Standard mounting orientation (see *Fig. 1, page 8*)	-20 °C ... +70 °C (-4°F to +158 °F)
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 10)*
Versus ambient temperature	*(see Fig. 8, page 10)*
@80 Vac	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.
@180 Vac to 275 Vac	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 > 48 Vdc, the output current is reduced by 0.8 A per 1 V *(see Fig. 9, page 10)*.
Relative humidity	5% to 95% (non-condensing)
Operating altitude [1] [2]	-200 m to 5,000 m (-650 ft to 16,400 ft)
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. 6

Reliability

	IMA-x2000-48
CMTBF [1]	500,000 hours
Expected capacitor life time [2]	10 years
Fan L_{10} 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-x2000-48	
	Applied standards	Criteria
Radiated emissions [1]	EN 550211, EN 55022 and FCC, Class B	
Conducted emissions [1]	EN 550211, EN 55022 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, 10 V/m	A
Electrical fast transient	EN 61000-4-4, level 4, ±4 kV	A
Surge immunity	EN 61000-4-5, level 4, 2 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	A
	EN 61000-4-11, 60%, 100 ms	B
	EN 61000-4-11, 100%, 10 ms	A
	EN 60601-1-2:2015 (4th edition), 30%, 500 ms	A
	EN 60601-1-2:2015 (4th edition), 60%, 100 ms	B
	EN 60601-1-2:2015 (4th edition), 100%, 20 ms	A
	EN 60601-1-2:2015 (4th 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-x2000-48
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; 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)
Protection class	I

[1] Designed to support Type B Applied Part End Product Requirements

Ecological characteristics

IMA-x2000-48
Waste Electrical and Electronic Equipment Directive (WEEE) 2002/96/EC
RoHS - EU DIRECTIVE 2002/65/EC RoHS compliancy

Mechanical data

	IMA-x2000-48
Dimensions (L x W x D)	309.6 x 127 x 40.6 mm (12.2 x 5 x 1.6 in)
Weight	2 kg (4.4 lb)
Indicator	Green LED
Cooling system [1]	2 fans with variable speed control
AC/DC input terminal block	Block M4 x 3 pins
Main DC output terminal block	Block M5 x 2 pins
Auxiliary DC output + signals port	Connector x 14 pins
Acoustic noise [1] [2]	< 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 [1]
IMA-S2000-48V	48 V	5 V/4 A	300 µA	●	●	○	●	-	●	●	○	○	●	●	-
IMA-C2000-48V	48 V	5 V/4 A	300 µA	●	●	○	●	-	●	●	○	○	●	●	●

● included
○ on request
- not available

Mounting orientations

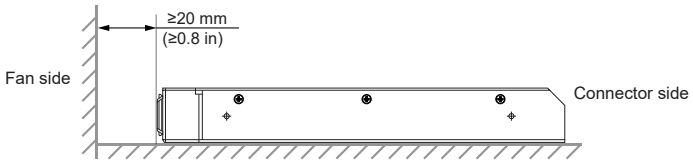


Fig. 1: Standard mounting orientation

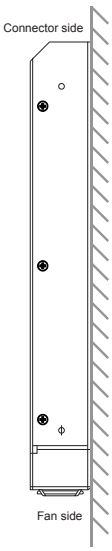


Fig. 2: Vertical mounting

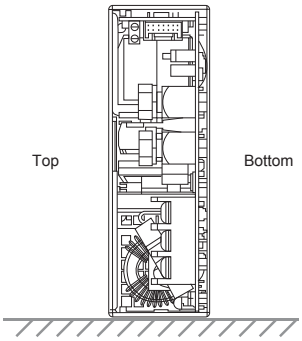


Fig. 3: Mounting on the left side

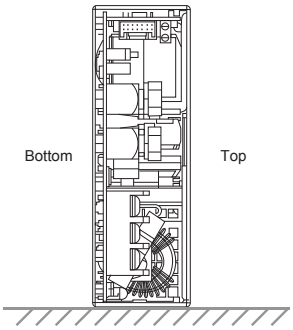
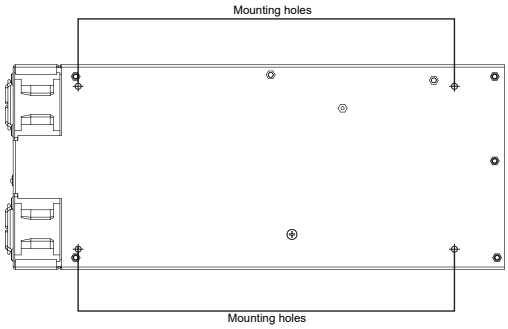


Fig. 4: Mounting on the right side



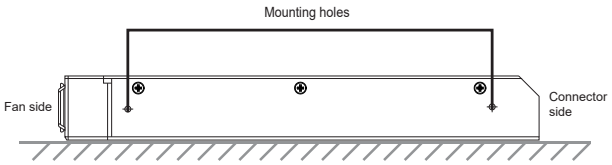


Fig. 5: Position of mounting holes

Dimensional drawings

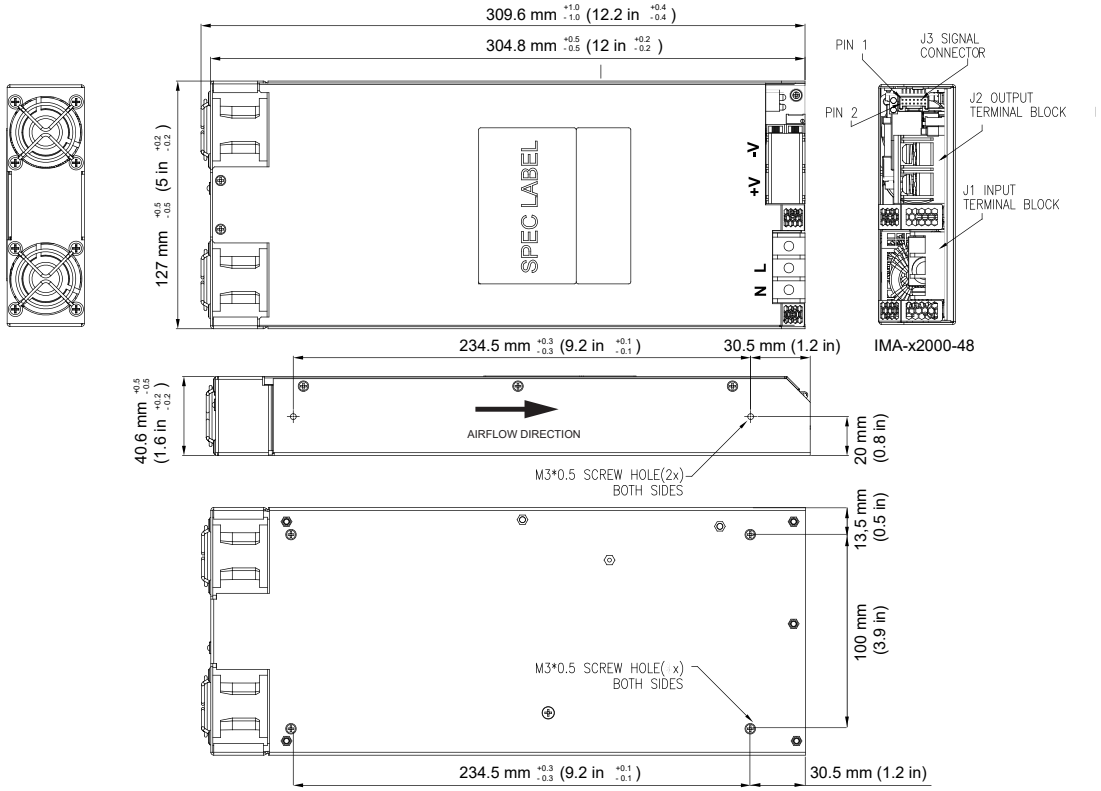


Fig. 6: Dimensional drawing IMA-x2000-48

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 1.3 Nm (11.5 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 either Molex, part number 51110-1450 (without locking ramp), or Molex part number 51110-1451 (with locking ramp). The connector is not shipped with the power supply unit.

Curves

IMA-x2000-48

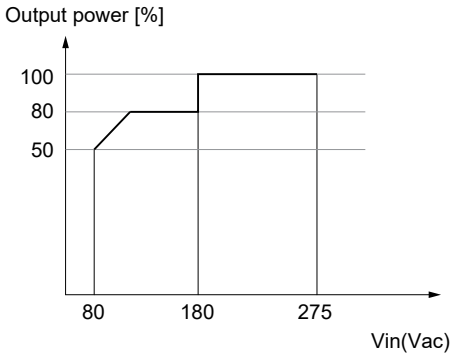


Fig. 7: Output power versus input voltage

IMA-x2000-48

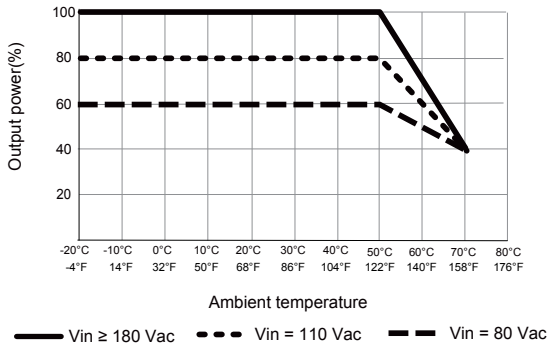


Fig. 8: Output power versus ambient temperature

IMA-x2000-48

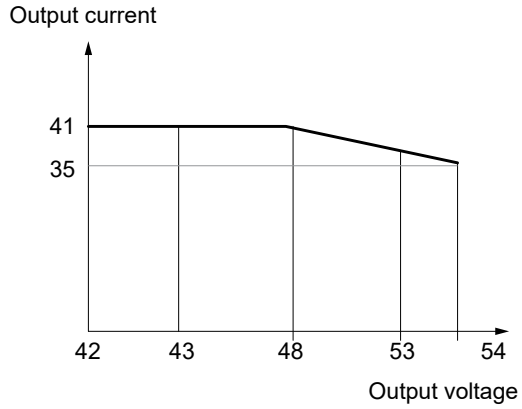


Fig. 9: Output current versus output voltage 48 V

IMA-x2000-48

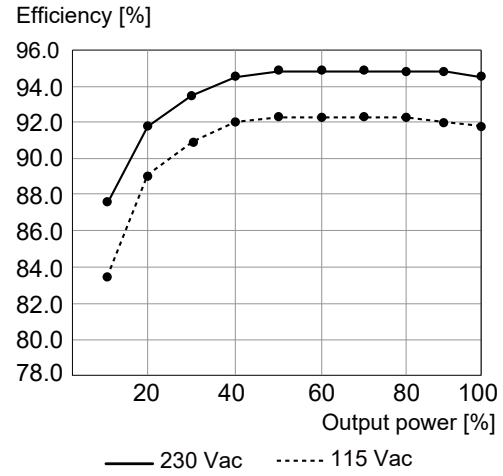


Fig. 10: Typical efficiency curves 48 V

Pin assignment (J3)

IMA-x2000-48

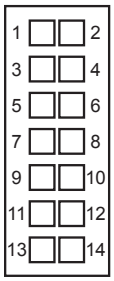


Fig. 11: Pin assignment J3 terminal block

Pin	Assignment	Pin	Assignment
1	+5VSB	2	+5VSB
3	5VSB_RTN	4	5VSB_RTN
5	SCL	6	SDA
7	AC_GOOD	8	5VSB
9	PWR_GOOD	10	Remote ON/OFF
11	Current_Share_V	12	Address
13	+V_SENSE	14	-V_SENSE

Mating connector type: Molex, Part number 51110-145x

Circuit diagrams

IMA-x2000-48

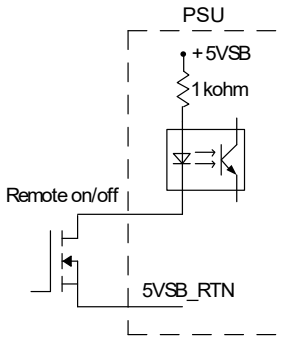


*Fig. 12: Circuit diagram **J3 Pin 10 (REMOTE ON/OFF)***

IMA-x2000-48

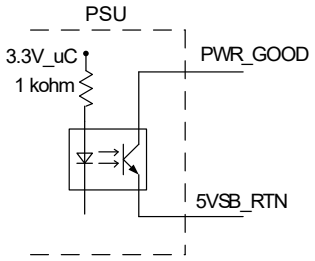


*Fig. 13: Circuit diagram **J3 Pin 9 (PWR_GOOD)***

IMA-x2000-48

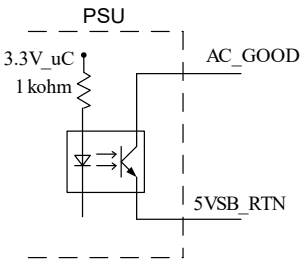


*Fig. 14: Circuit diagram **J3 Pin 7 (AC_GOOD)***

IMA-x2000-48

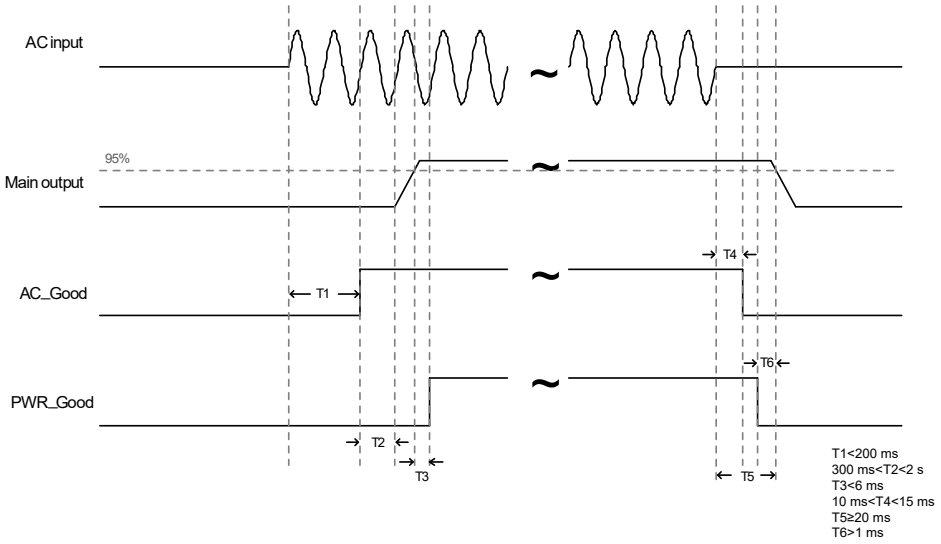


Fig. 15: Power Good/AC_Good function Timing

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

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Sales Contact

Europe

Delta Energy Systems (Germany) GmbH
Tscheulinstrasse 21
79331 Teningen
Germany
deu.sales@deltaww.com
www.deltaenergysystems.com

USA

Delta Electronics (Americas)
46101 Fremont Blvd.
Fremont, CA 94538
USA
na.sales@deltaww.com
www.deltaenergysystems.com

Other regions

Delta Energy Systems (Germany) GmbH
Tscheulinstrasse 21
79331 Teningen
Germany
im.sales@deltaww.com
www.deltaenergysystems.com