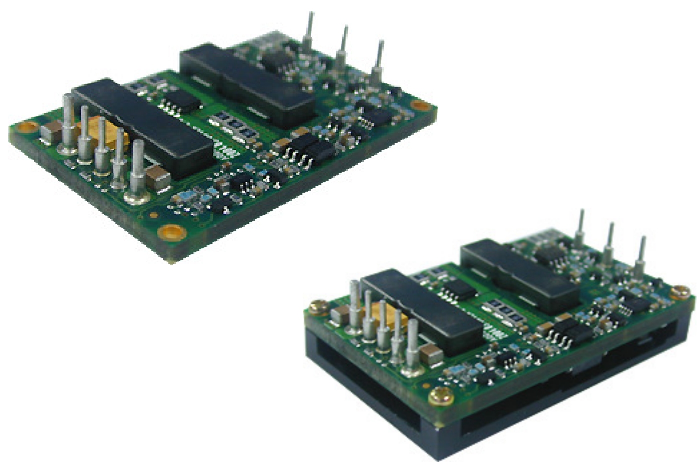
AGQ100 series

100 Watts

Quarter-brick Converter

Total Power: 100 Watts
Input Voltage: 36 to 75 Vdc
# of Outputs: Single



Special Features

- Delivering up to 25A output
- Ultra-high efficiency 90% typ. at full load
- Wide input range: 36V ~ 75V
- High power density
- Low output noise
- Excellent thermal performance: 25A@3.3V at 55 ºC at 300LFM
- RoHS 6 compliant
- Remote control function
- Remote output sense
- Trim function: 80% ~ 110%
- Input under voltage lockout
- Output over current protection
- Output over voltage protection
- Over temperature protection
- Industry standard pin-out
- Basic isolation
- Pin length optional

Safety

IEC/EN/UL/ 60950-1
CE Marki
UL/TUV
GB4943

Product Descriptions

The AGQ100 series are a single output DC/DC converter with standard eighth-brick form factor and pin configuration. It delivers up to 20A output current with 5V output. Ultra-high 90% efficiency and excellent thermal performance makes it an ideal choice for use in datacom and telecommunication applications and can operate over an ambient temperature range of -40 ^{O}C ~ +85 ^{O}C.

Applications

Telecom/ Datacom

Model Numbers

Standard	Output Voltage	Output Current	Structure	Remote ON/OFF logic
AGQ100-48S2V5-4	2.5	25	Open-frame	Negative
AGQ100-48S2V5P-4	2.5	25	Open-frame	Positive
AGQ100-48S2V5B-4	2.5	25	Baseplate	Negative
AGQ100-48S2V5PB-4	2.5	25	Baseplate	Positive
AGQ100-48S3V3-4	3.3	25	Open-frame	Negative
AGQ100-48S3V3P-4	3.3	25	Open-frame	Positive
AGQ100-48S3V3B-4	3.3	25	Baseplate	Negative
AGQ100-48S3V3PB-4	3.3	25	Baseplate	Positive
AGQ100-48S05-4	5	20	Open-frame	Negative
AGQ100-48S05P-4	5	20	Open-frame	Positive
AGQ100-48S05B-4	5	20	Baseplate	Negative
AGQ100-48S05PB-4	5	20	Baseplate	Positive
AGQ100-48S12-4	12	8.33	Open-frame	Negative
AGQ100-48S12P-4	12	8.33	Open-frame	Positive
AGQ100-48S12B-4	12	8.33	Baseplate	Negative
AGQ100-48S12PB-4	12	8.33	Baseplate	Positive
AGQ100-48S2V5-6	2.5	25	Open-frame	Negative

Ordering information

AGQ	-	100	48	S	3V3	P	B	-	6
①		②	③	④	⑤	⑥		⑦	⑧

①	Model series	AGQ100: series name
②	Output power	100W. The lower output is limited by its current.
③	Output number	48: 36V ~ 75V input range, rated input voltage 48V
④	Rated output voltage	S: single output
⑤	Remote ON/OFF logic	3V3: 3.3V output
⑥	Baseplate	Default: negative logic; P: positive logic
⑦	Pin length	B: with baseplate; default: open-frame;
⑧	RoHS status	6: 3.8mm pin length

Options

None

Electrical Specifications

Absolute Maximum Ratings

Stress in excess of those listed in the “Absolute Maximum Ratings” may cause permanent damage to the power supply. These are stress ratings only and functional operation of the unit is not implied at these or any other conditions above those given in the operational sections of this TRN. Exposure to any absolute maximum rated condition for extended periods may adversely affect the power supply’s reliability.

Table 1. Absolute Maximum Ratings:

Parameter	Model	Symbol	Min	Typ	Max	Unit
Input Voltage Operating -Continuous Non-operating -100mS	 All All	$V_{IN,DC}$	 - -	 - -	 80 100	 Vdc Vdc
Maximum Output Power	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12	$P_{O,max}$	-	-	62.5 82.5 100 100	W
Isolation Voltage[1] Input to outputs	 All		 -	 -	 1500	 Vdc
Ambient Operating Temperature	All	T_A	-40	-	+70	^{O}C
Storage Temperature	All	T_{STG}	-55	-	+125	^{O}C
Operating Board Temperature	All	Tc	-40	-	+105	^{O}C
Voltage at remote ON/OFF pin	All		-0.7	-	12	Vdc
Humidity (non-condensing) Operating Non-operating	 All All		 - -	 - -	 95 95	 % %

Note 1 - 1mA for 60s, slew rate of 1500V/10s

Input Specifications

Table 2. Input Specifications:

Parameter		Conditions	Symbol	Min	Typ	Max	Unit
Operating Input Voltage, DC		All	$V_{IN,DC}$	36	48	75	Vdc
Turn-on Voltage Threshold		$I_O = I_{O,max}$	$V_{IN,ON}$	31	34	36	Vdc
Turn-off Voltage Threshold		$I_O = I_{O,max}$	$V_{IN,OFF}$	30	33	35	Vdc
Maximum Input Current ($I_O = I_{O,max}$)		$V_{IN,DC} = 36V_{DC}$	$I_{IN,max}$	-	-	3.4	A
Recommended Input Fuse		Fast blow external fuse recommended		-	-	5	A
Recommended External Input Capacitance		Low ESR capacitor recommended	C_{IN}	-	100	-	uF
Input Reflected Ripple Current		Through 12uH inductor			10	20	mA
Operating Efficiency	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12	T_A=25 ^{O}C $I_O = I_{O,max}$ $I_O = 60I_{O,max}$	η	- - - -	88 89.5 90 90	- - - -	%
Supply Voltage Rejection (120Hz)		All		45	60	-	dB

Output Specifications

Table 3. Output Specifications:

Parameter		Condition	Symbol	Min	Typ	Max	Unit
Factory Set Voltage	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12	VI = VI,min to VI,max: Io = Io,max; Ta = 25 ºC	V_O	2.46 3.25 4.95 11.88	2.5 3.30 5 12	2.54 3.35 5.05 12.12	Vdc
Output Voltage Line Regulation	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12	All	$\%V_O$	-	5 5 5 12	8 10 10 25	mV
Output Voltage Load Regulation	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12	All	$\%V_O$	-	10 10 10 25	15 20 20 70	mV
Output Voltage Temperature Regulation		All	$\%V_O$	-	-	0.02	$\%/^{O}C$
Output Voltage Trim Range		All	V_O	80	-	110	%
Output Ripple, pk-pk	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12	Measure with a 1uF ceramic capacitor in parallel with a 10uF tantalum capacitor, 0 to 20MHz bandwidth	V_O	-	-	100 100 120 180	mV_{PK-PK}
Output Current	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12	All	I_O	0 0 0 0	- -	25 25 20 8.33	A
Output DC current-limit inception[1]	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12		I_O	27 27 22 9.2	-	35 35 28 13.5	A
V_O Load Capacitance[2]	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12	All	C_O	470	-	10,000 10,000 6,000 2,200	uF
Turn-on transient	Rise time	$I_O = I_{max}$	T_{rise}	-	5	20	mS
	Output voltage overshoot	$I_O = 0$	$\%V_O$	-	0	-	%
Switching frequency		All	f_{SW}		300		KHz

Note 1 - Hiccup: auto-restart when over-current condition is removed.
Note 2 - High frequency and low ESR is recommended.

Output Specifications

Table 3. Output Specifications, con't:

Parameter		Condition	Symbol	Min	Typ	Max	Unit
Enable pin voltage	Logic Low	All		-0.7	-	0.8	V
	Logic High[3]	All		3.5	-	12	V
Enable pin current	Logic Low	All		-	-	1.0	mA
	Logic High(leakage current, @10V)	All		-	-	-	µA
V_O Dynamic Response Peak Deviation Settling Time	AGQ100-48S2V5 AGQ100-48S3V3 AGQ100-48S05 AGQ100-48S12	25%~50%~25% 25% load change slew rate = 0.1A/us	$\pm V_O$ T_s	- - - - -	125 165 200 480 400	- - - - -	mV mV mV mV uSec
		50%~75%~50% 25% load change slew rate = 1A/us	$\pm V_O$ T_s	- - - - -	180 200 250 600 -	- - - - -	mV mV mV mV uSec
		10%~100%~10% 25% load change slew rate = 1A/us	$\pm V_O$ T_s	- - - - -	250 330 500 1200 -	- - - - -	mV mV mV mV uSec
Output over-voltage protection[3]		All	V_O	3.0 3.9 6.0 14.4	- -	3.8 5.0 7.5 18	V
Output over-temperature protection[4]		All		110	120	130	^{O}C
Over-temperature hysteresis		All	T	5	-	-	^{O}C
Output voltage remote sense range		All	Vo	-	-	0.5	V
MTBF		Vin: 48V, Load: Ionom, Board@25^{O}C		-	2	-	10^6 h
Isolation Resistance		All	-	10	-	-	MΩ
Vibration (Sine wave)		Vibration level: 3.5mm (2 ~ 9Hz), 10m/s2 (9 ~ 200Hz),15m/s2 (200 ~ 500Hz) Directions and time: 3 axis (X, Y, Z), 30 minutes each Sweep velocity: 1oct / min					
Shock (Half-sine wave)		Peak acceleration: 300m/s2 Duration time: 6ms Continuous shock 3 times at each of 6 directions (± X, ± Y, ± Z)					

Note 3 - When CNT is left open, VCNT may reach 16V.
Note 4 - Hiccup: auto-restart when over-voltage condition is removed.

AGQ100-48S2V5 Performance Curves

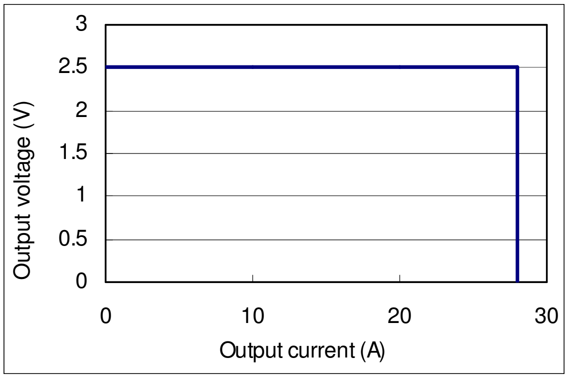


Figure 1: AGQ100-48S2V5 Typical Output Over-current

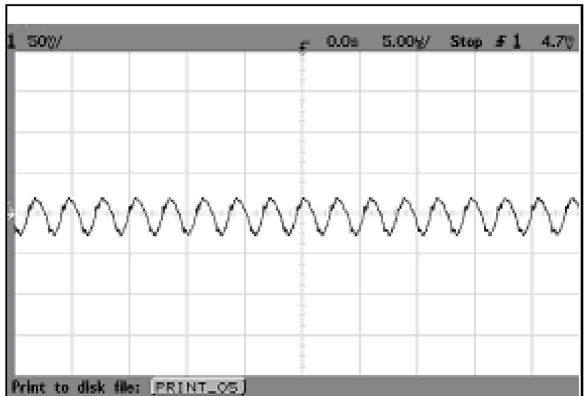


Figure 2: AGQ100-48S2V5 Ripple and Noise Measurement

Ch 1: Vo (5uS/div, 50mV/div)

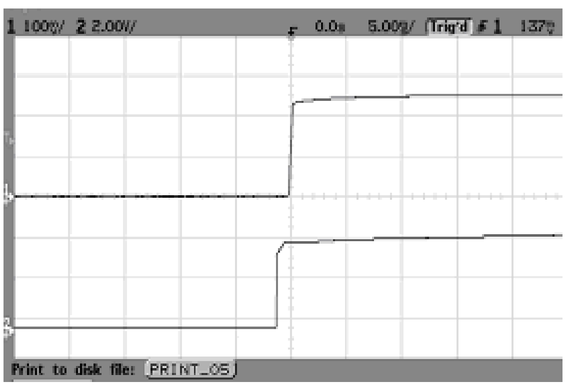


Figure 3: AGQ100-48S2V5 Output Voltage Startup Characteristic(5mS/div)

Ch 1: Vin Ch 2: Vo

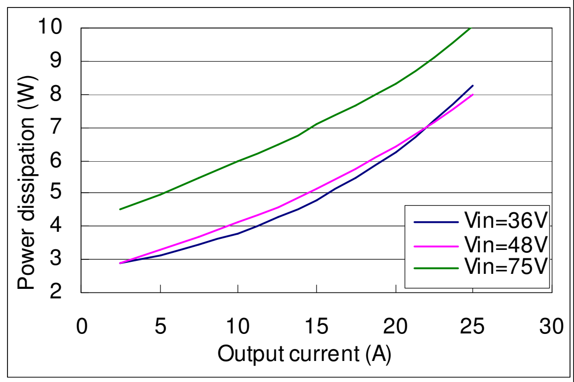


Figure 4: AGQ100-48S2V5 Typical power dissipation curve

Figure 5: AGQ100-48S2V5 Remote ON Waveform (2mS/div)

Ch 1: Remote ON Ch 3: Vo

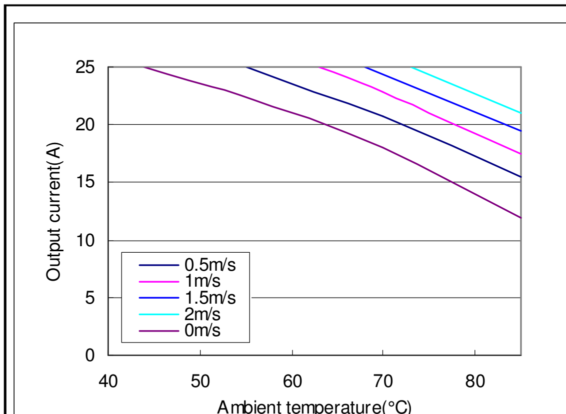


Figure 6: AGQ100-48S02V5 Output power derating

(airflow direction from output to input, open frame)

AGQ100-48S2V5 Performance Curves

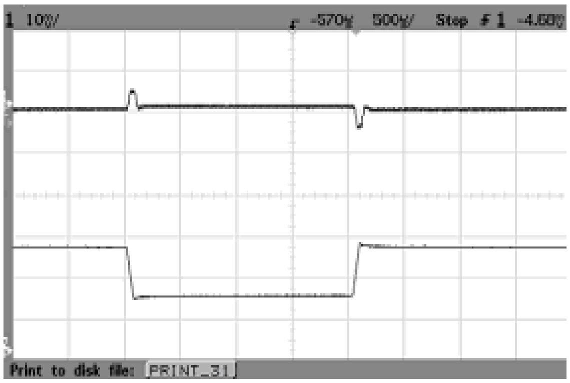


Figure 7: AGQ100-48S2V5 Transient Response (1mS/div)
50%~25%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (10mV/div) Ch 3: Io (5A/div)

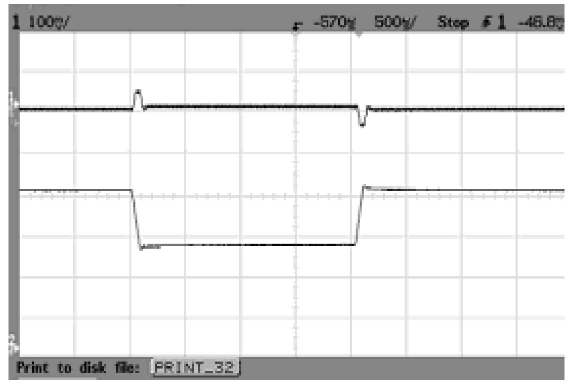


Figure 8: AGQ100-48S2V5 Transient Response (1mS/div)
50%~75%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (100mV/div) Ch 3: Io (5A/div)

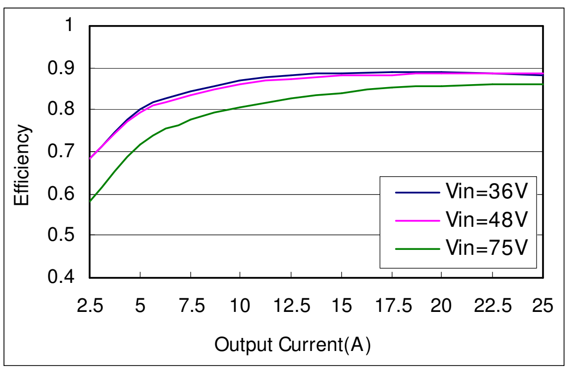


Figure 9: AGQ100-48S2V5 Efficiency Curves @ 25 ^{o}C

Vin =36-75Vdc

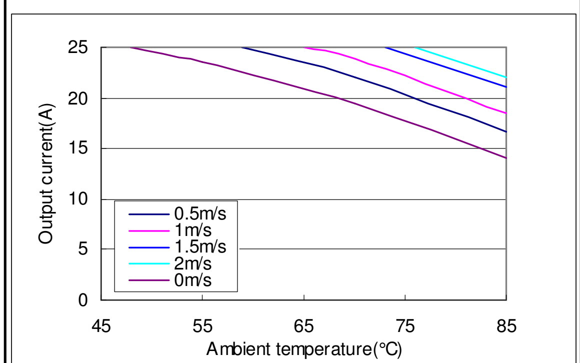


Figure 10: AGQ100-48S2V5 Output power derating

(airflow direction from output to input, base plate)

AGQ100-48S3V3 Performance Curves

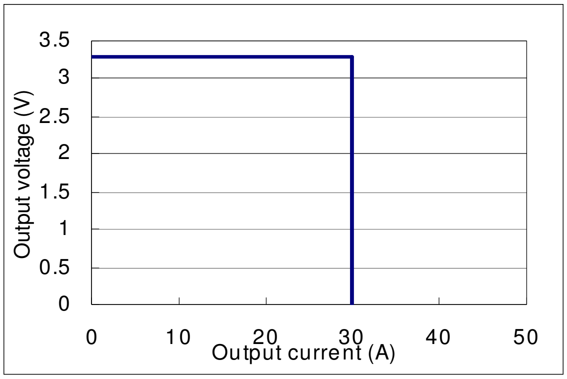


Figure 11: AGQ100-48S3V3 Typical Output Over-current

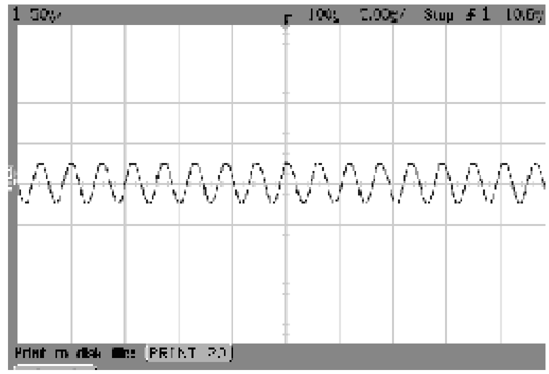


Figure 12: AGQ100-48S3V3 Ripple and Noise Measurement

Ch 1: Vo (5uS/div, 50mV/div)

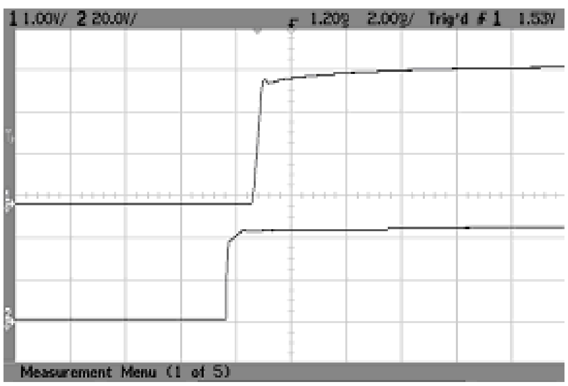


Figure 13: AGQ100-48S3V3 Output Voltage Startup Characteristic(5mS/div)

Ch 1: Vin (1V/div) Ch 2: Vo (20V/div)

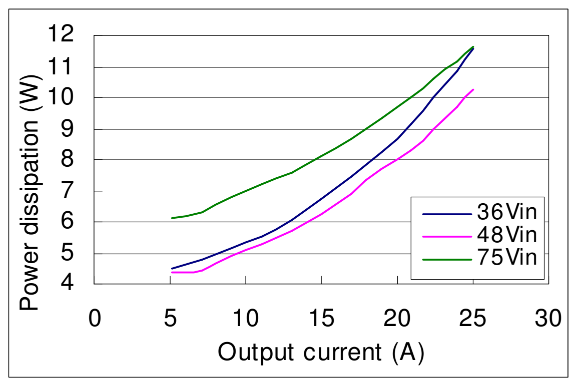


Figure 14: AGQ100-48S3V3 Typical power dissipation curve

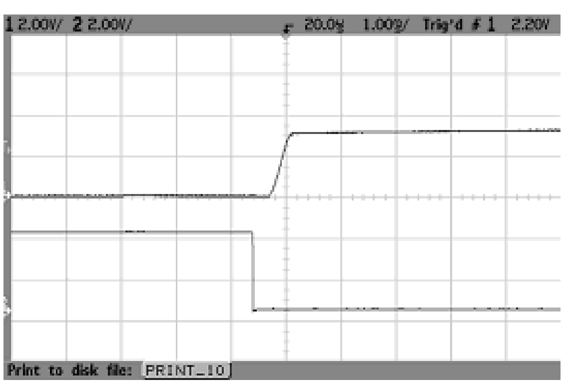


Figure 15: AGQ100-48S3V3 Remote ON Waveform (2mS/div)

Ch 1: Remote ON (2V/div) Ch 3: Vo (2V/div)

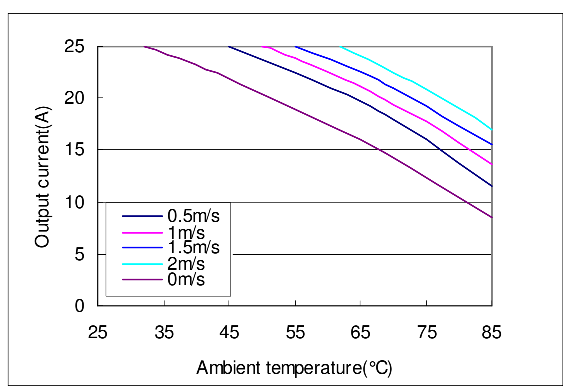


Figure 16: AGQ100-48S3V3 Output power derating

(airflow direction from output to input, open frame)

AGQ100-48S3V3 Performance Curves

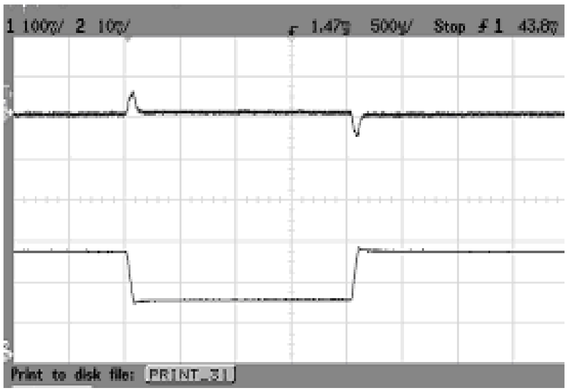


Figure 17: AGQ100-48S3V3 Transient Response (1mS/div)
50%~25%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (100mV/div) Ch 3: Io (5A/div)

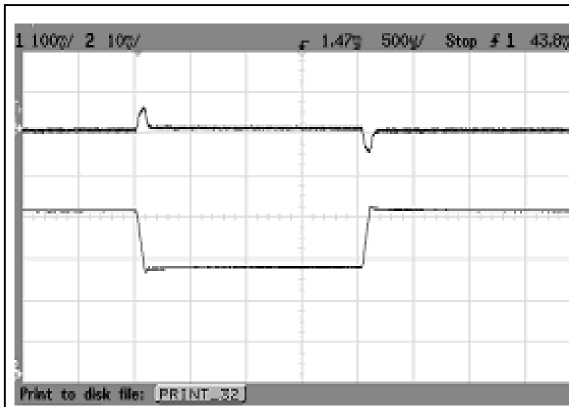


Figure 18: AGQ100-48S3V3 Transient Response (1mS/div)
50%~75%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (100mV/div) Ch 3: Io (5A/div)

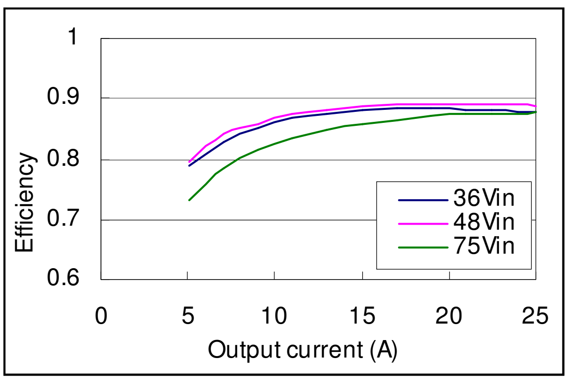


Figure 19: AGQ100-48S3V3 Efficiency Curves @ 25 °C

Vin =36-75Vdc

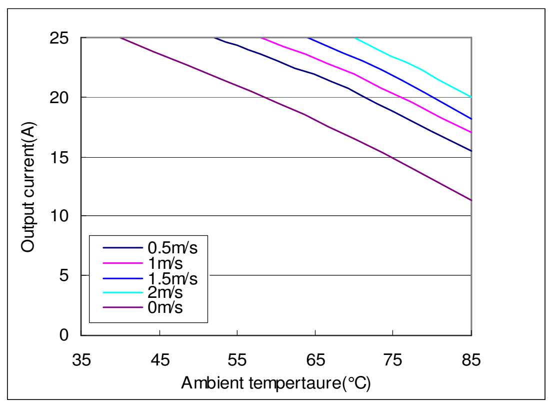


Figure 20: AGQ100-48S3V3 Output power derating

(airflow direction from output to input, base plate)

AGQ100-48S05 Performance Curves

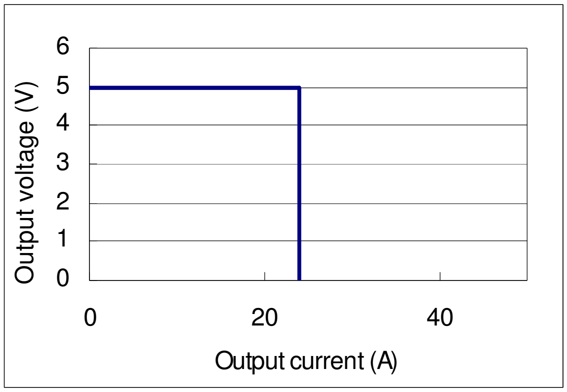


Figure 21: AGQ100-48S05 Typical Output Over-current

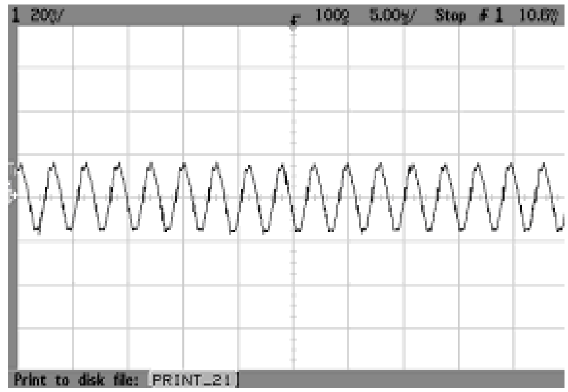


Figure 22: AGQ100-48S05 Ripple and Noise Measurement

Ch 1: Vo (5uS/div, 20mV/div)

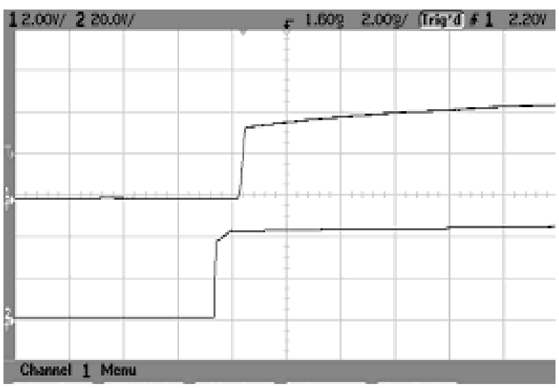


Figure 23: AGQ100-48S05 Output Voltage Startup Characteristic (5mS/div)

Ch 1: Vin (2V/div) Ch 2: Vo (20V/div)

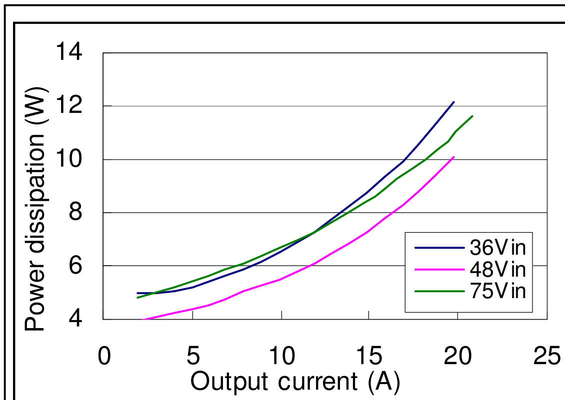


Figure 24: AGQ100-48S05 Typical power dissipation curve

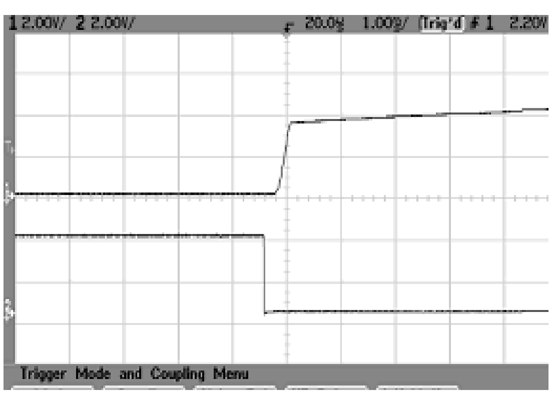


Figure 25: AGQ100-48S05 Remote ON Waveform (2mS/div)

Ch 1: Remote ON Ch 3: Vo (2V/div)

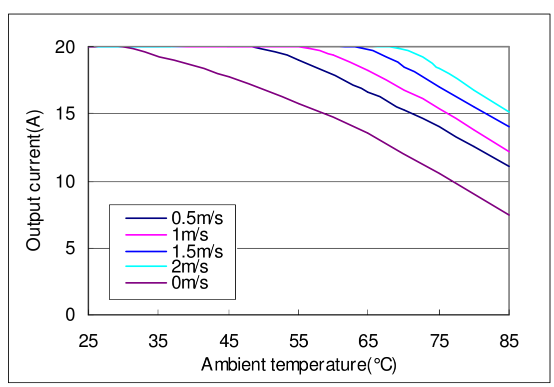


Figure 26: AGQ100-48S05 Output power derating

(airflow direction from output to input, open frame)

AGQ100-48S05 Performance Curves

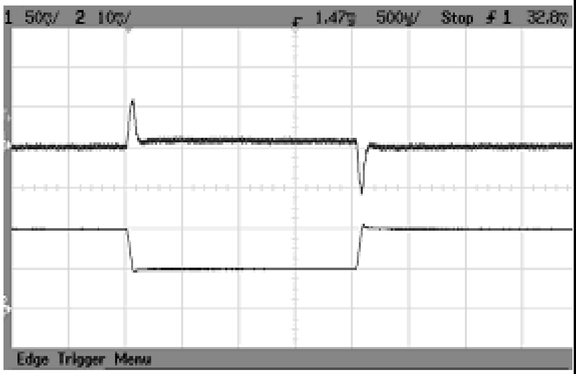


Figure 27: AGQ100-48S05 Transient Response (1mS/div)
50%~25%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (50mV/div) Ch 3: Io (5A/div)

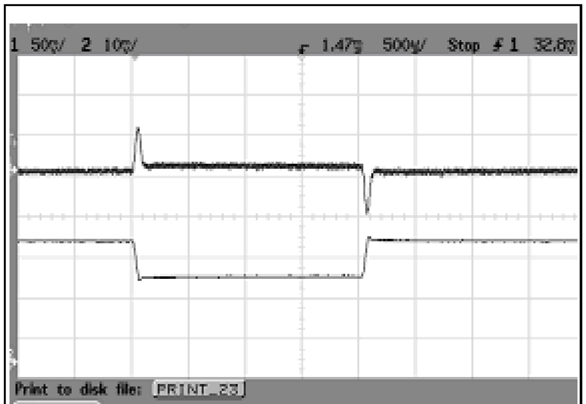


Figure 28: AGQ100-48S05 Transient Response (1mS/div)
50%~75%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (50mV/div) Ch 3: Io (5A/div)

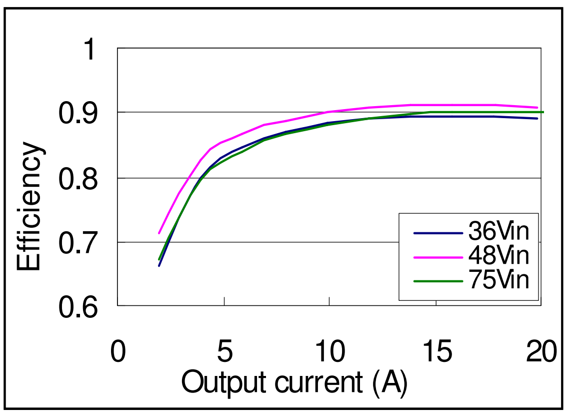


Figure 29: AGQ100-48S05 Efficiency Curves @ 25 °C
Vin =36-75Vdc

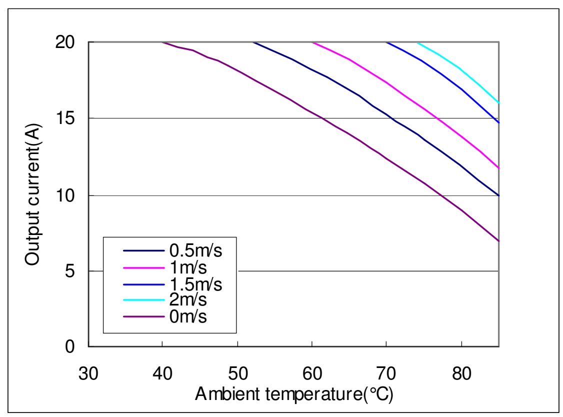


Figure 30: AGQ100-48S05 Output power derating
(airflow direction from output to input, base plate)

AGQ100-48S12 Performance Curves

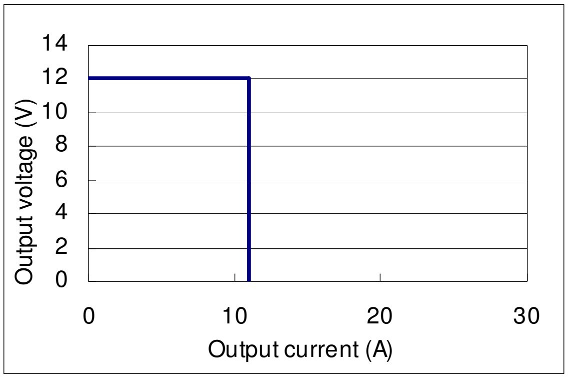


Figure 31: AGQ100-48S12 Typical Output Over-current

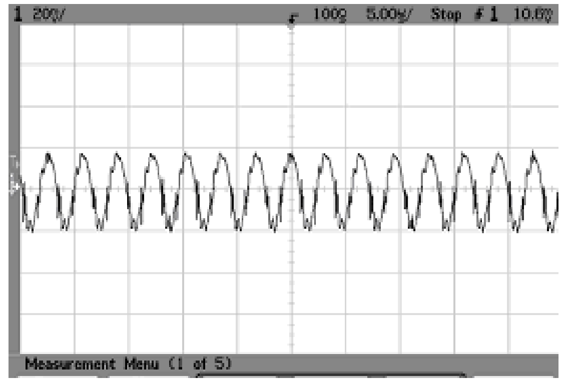


Figure 32: AGQ100-48S12 Ripple and Noise Measurement

Ch 1: Vo (5uS/div, 20mV/div)

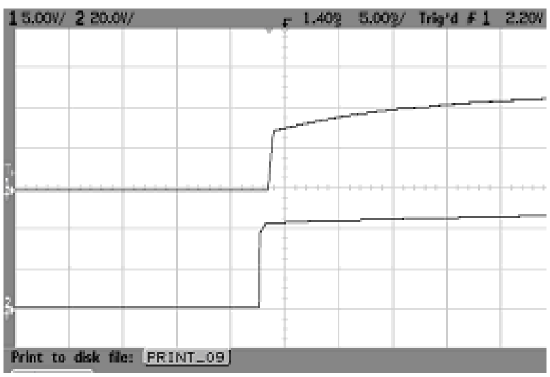


Figure 33: AGQ100-48S12 Output Voltage Startup Characteristic (5mS/div)

Ch 1: Vin (1V/div) Ch 2: Vo (20V/div)

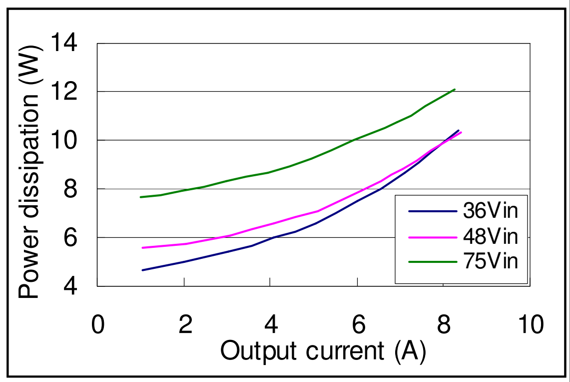


Figure 34: AGQ100-48S12 Typical power dissipation curve

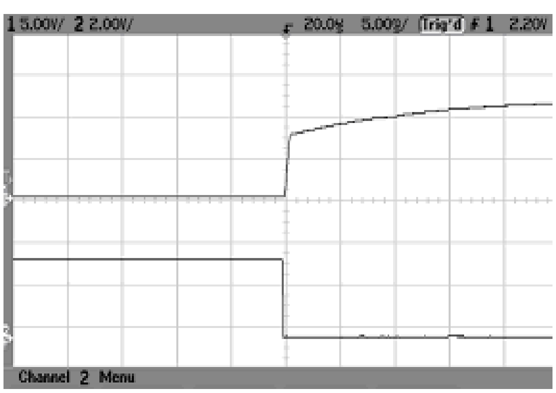


Figure 35: AGQ100-48S12 Remote ON Waveform (2mS/div)

Ch 1: Remote ON Ch 3: Vo (2V/div)

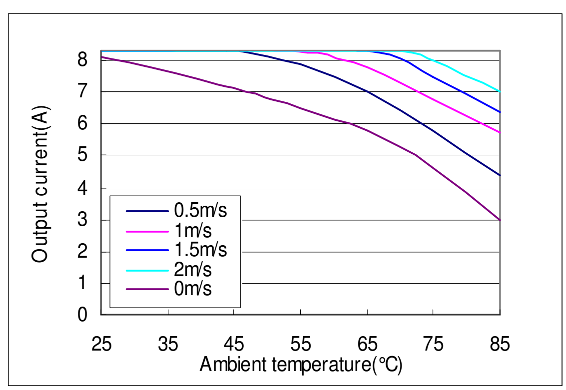


Figure 36: AGQ100-48S012 Output power derating

(airflow direction from output to input, open frame)

AGQ100-48S12 Performance Curves

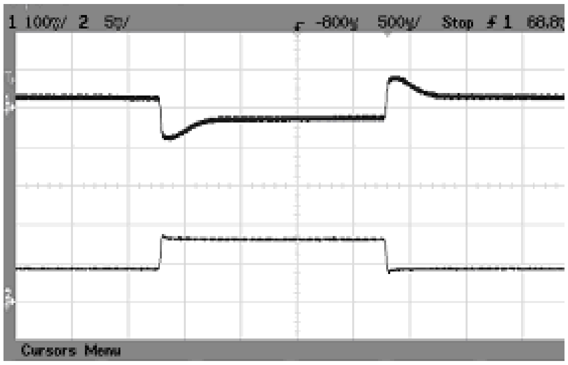


Figure 37: AGQ100-48S12 Transient Response
50%~25%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (100mV/div) Ch 3: Io (5A/div)

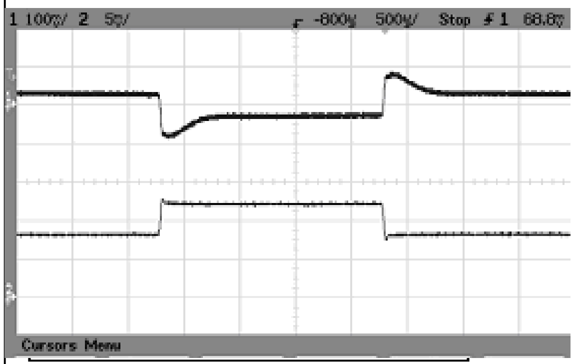


Figure 38: AGQ100-48S12 Transient Response
50%~75%~50% load change, 0.1A/uS slew rate, Vin = 48Vdc
Ch 1: Vo (100mV/div) Ch 3: Io (5A/div)

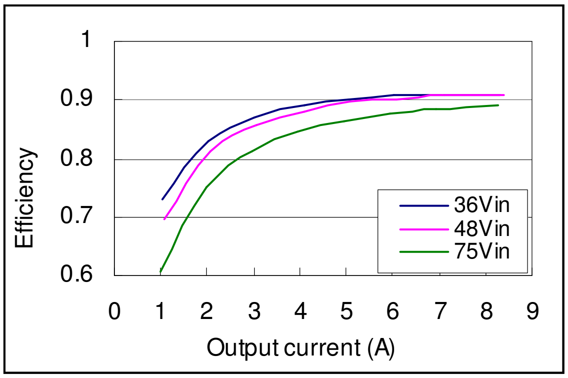


Figure 39: AGQ100-48S12 Efficiency Curves @ 25 °C
Vin =36-75Vdc

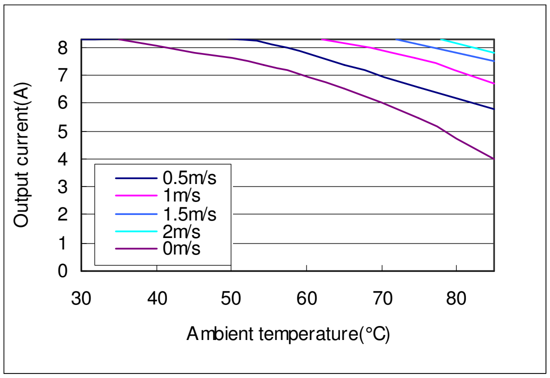


Figure 40: AGQ100-48S12 Output power derating
(airflow direction from output to input, base plate)

Protection Function Specification

Input Fusing

The AGQ100 converters have no internal fuse. An external fuse must always be employed! To meet international safety requirements, a 250 Volt rated fuse should be used. If one of the input lines is connected to chassis ground, then the fuse must be placed in the other input line.

Standard safety agency regulations require input fusing. Recommended ratings is 5A for the AGQ100 Series

Note: The fuse is fast blow type.

Over Voltage Protection (OVP)

The output over-voltage protection consists of circuitry that monitors the voltage on the output terminals. If the voltage on the output terminals exceeds the over voltage protection threshold, the converter will shut down and attempt to restart normally once a second.

Over Current Protection (OCP)

AGQ100 series DC/DC converters feature foldback current limiting as part of their OCP (Over-current Protection) circuits. When output current exceeds 110 to 150% of rated current, such as during a short circuit condition, the converter will shut down and attempt to restart normally once a second.

Input Reverse Voltage Protection

Under installation and cabling conditions where reverse polarity across the input may occur, reverse polarity protection is recommended. Protection can easily be provided as shown in Figure 41. In both cases the diode used is rated for 10A/100V. Placing the diode across the inputs rather than in-line with the input offers an advantage in that the diode only conducts in a reverse polarity condition, which increases circuit efficiency and thermal performance.

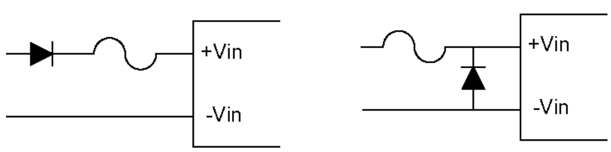


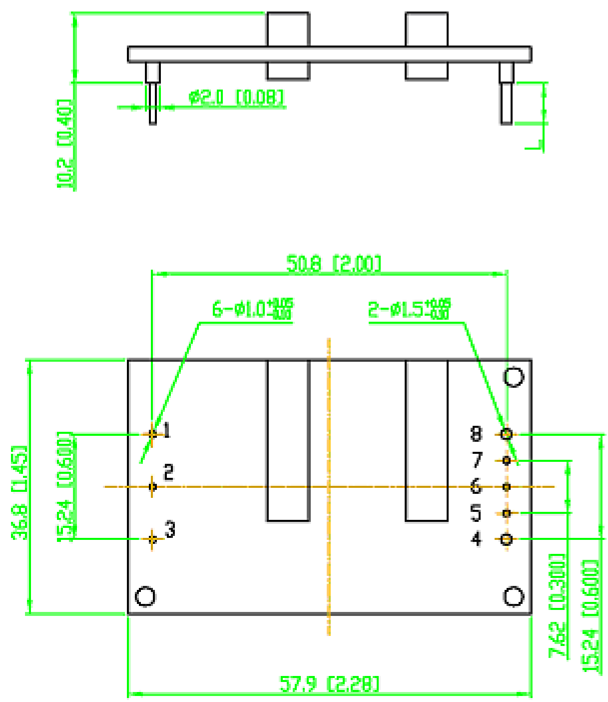
Fig. 41 Reverse polarity protection circuit

Over-Temperature Protection

The AGQ100 converter features an over-temperature protection circuit to safeguard against thermal damage. The converter will work on intermittent mode when the maximum device reference temperature is exceeded. When the over-temperature condition is removed, the converter will automatically restart.

Mechanical Specifications

Mechanical Outlines – Open-Frame Module



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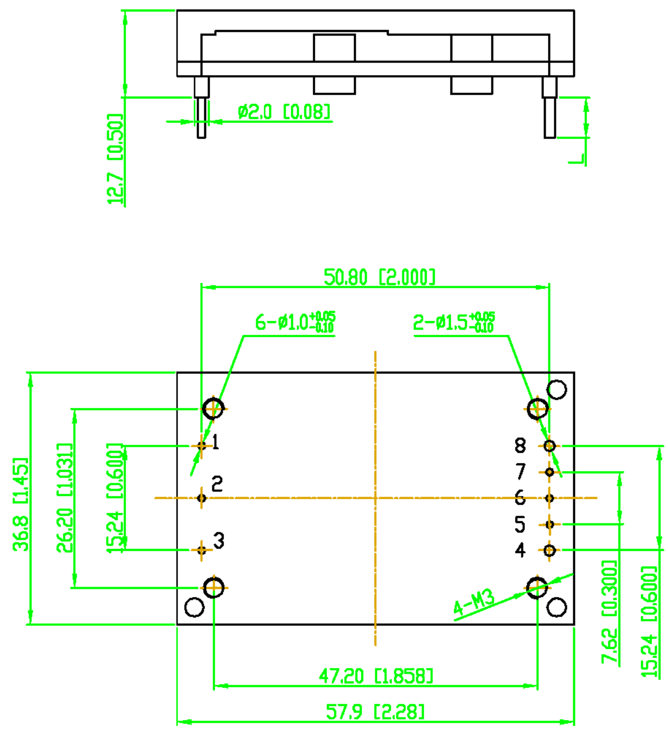
Mechanical Outlines – Baseplate Module



Notes:M3 hole is only for 3.3v,5v

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Pin Length Option

Device code suffix	L
-4	4.8mm±0.2 mm
-6	3.8mm±0.2 mm
-8	2.8mm±0.2 mm
None	5.8mm±0.2 mm

Pin Designations

Pin No	Name	Function
1	Vin+	Positive input voltage
2	Remote On/Off	Remote control
3	Vin-	Negative input voltage
4	Vo-	Negative output voltage
5	S-	Negative remote sense
6	Trim	Output voltage trim
7	S+	Positive remote sense
8	Vo+	Positive output voltage

Environmental Specifications

EMC Immunity

For conditions where EMI is a concern, a different input filter can be used. Figure 42 shows the filter designed to reduce EMI effects for AGQ100 series.

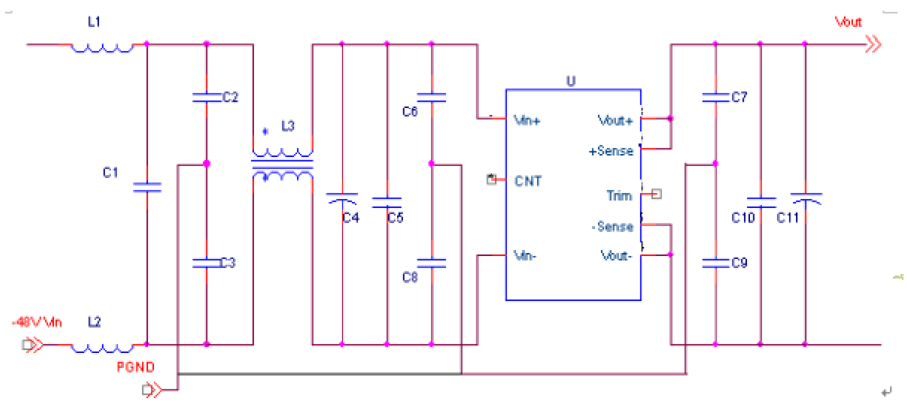

Figure 42 EMI reduction filter

Recommended values:

Component	Value/Rating	Type		Component	Value/Rating	Type
C1	2.2µF	Metal-film		C10	10µF/25V	Chip
C2, C3	0.22µF	Metal-film		C11	1000µF/25V	Aluminum Electrolytic
C4	100µF/100V	Aluminum Electrolytic		L1,L2	H5B SMB	Bead
C5	1µF/100V*4	Chip		L3	1.8mH	Common
C6, C7 C8, C9	1000P/2KV	Chip				

Remark:

For AGQ100-48S3V3B-4 and AGQ100-48S12B-4, it is no need to use L1 and L2.
For AGQ100-48S3V3-4 and AGQ100-48S12-4, it is no need to use L1, L2, C6, and C8.

Safety Consideration

For safety-agency approval of the system in which the converter is used, the converter must be installed in compliance with the spacing and separation requirements of the end-use safety agency standard, i.e., UL1950, CSA C22.2 No. 950-95, and EN60950. The AGQ100 series input-to-output isolation is a basic insulation. The DC/DC converter should be installed in end-use equipment, in compliance with the requirements of the ultimate application, and is intended to be supplied by an isolated secondary circuit. When the supply to the DC/DC converter meets all the requirements for SELV (<60Vdc), the output is considered to remain within SELV limits (level 3). If connected to a 60Vdc power system, double or reinforced insulation must be provided in the converter that isolates the input from any hazardous voltages, including the AC mains. One input pin and one output pin are to be grounded or both the input and output pins are to be kept floating. Single fault testing in the power supply must be performed in combination with the DC/DC converter to demonstrate that the output meets the requirement for SELV. The input pins of the converter are not operator accessible.

Note: Do not ground either of the input pins of the converter, without grounding one of the output pins. This may allow a non-SELV voltage to appear between the output pin and ground.

Operating Temperature

The AVO100 series power supplies will start and operate within stated specifications at an ambient temperature from -40 ^{O}C to 70 ^{O}C under all load conditions. The storage temperature is -55 ^{O}C to 125 ^{O}C.

Thermal Considerations – Open-Frame module

AGQ100 converters have ultra high efficiency at full load. With less heat dissipation and temperature-resistant components such as ceramic capacitors, these converters exhibit good performance during pro-longed exposure to high temperatures. Maintaining the operating board temperature within the specified range help keep internal component temperatures within their specifications which in turn help keep MTBF from falling below the specified rating. Proper cooling of the converter is also necessary for reliable and consistent operation.

Basic Thermal Management

Measuring the board temperature of the converter as the method shown in Figure 43 can verify the proper cooling. If the converter has a baseplate, the measurement location is the case of the converter.

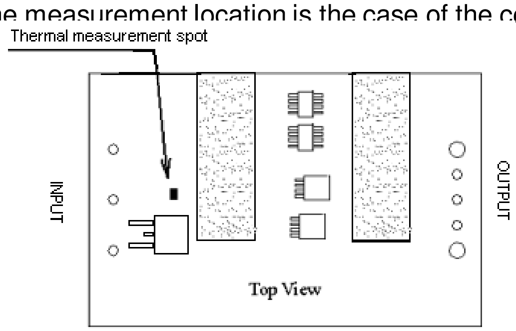

Fig. 43 Temperature measurement spot

The converter should work under 70° C ambient for the reliability of operation and the temperature of measurement spot must not exceed 110° C while operating in the final system configuration. The measurement can be made with a surface probe after the converter has reached thermal equilibrium. Be careful that the thermocouple must not touch the pads of any components. No heat sink is mounted, make the measurement as close as possible to the indicated position. It makes the assumption that the final system configuration exists and can be used for a test environment. Note that the board temperature of converter must always be checked in the final system configuration to verify proper operation due to the variation in test conditions. Thermal management acts to transfer the heat dissipated by the converter to the surrounding environment. The amount of power dissipated by the converter as heat (PD) is got by the equation below:

PD = PI - PO

Where: PI is input power; PO is output power; PD is dissipated power.

Also, converter efficiency (η) is defined as the following equation:

η = PO / PI

By eliminating the input power term, we can get the equation below from the above two equations:

PD = PO (1-η) / η

The converter power dissipation then can be calculated through the equation.

Because each converter output voltage has a different power dissipation curve.

Converter Derating

With 48V input, 25 ^{O}C ambient temperature, and 200LFM airflow, AGQ100 series are rated for full power. For operation above ambient temperature of 25 ^{O}C . The board

temperature should be used to determine maximum temperature limits. The converter cannot work continuously when the board temperature is over 100 ^{O}C . The minimum operating temperature for the AGQ100 is -40 ^{O}C. Increasing airflow over the converter enhances the heat transfer via convection.

The converter is not designed to operate for a long time with the baseplate temperature being above 100 ^{O}C.

The use of output power derating curve is shown in the following example.

Example:

What is the minimum airflow necessary for AGQ100-48S05 operating at VI = 48 V, an output current of 20A, and a maximum ambient temperature of 55 ^{O}C?

Solution: Given: VI = 48V, Io = 20A, Ta = 55 ^{O}C

Determine airflow (v) : V = 1.5m/sec.

MTBF

The MTBF, calculated in accordance with Bellcore TR-NWT-000332, is 2,000,000 hours. Obtaining this MTBF in practice is entirely possible. If the board temperature is expected to exceed +25 ^{O}C, then we also advise an oriented for the best possible cooling in the air stream.

Emerson Network Power can supply replacements for converters from other manufacturers, or offer custom solutions. Please contact the factory for details.

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Application Notes

Typical Application

Below is the typical application of the AGQ100 series series power supply.

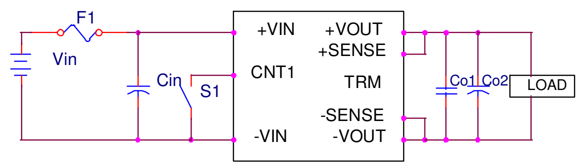

Figure 44 Typical application

F1: Fuse*: 5A fuse (fast blow type).

Cin: Recommended input capacitor. Use 100µF/100V high frequency low ESR electrolytic type capacitor.

Co1: Recommended 1µF /25V ceramic capacitor

Co2: Recommended output capacitor Recommended 1,000µF/25V high frequency low ESR electrolytic type capacitor.

If Ta<-5 °C , use 220µF//220µF tantalum capacitor parallel with Co2.

Note: The AGQ100 converter cannot be used in parallel mode directly!

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Remote ON/OFF

Two CNT logic options are available. The CNT logic, CNT voltage and the converter working state are as the following table.

	L	H	OPEN
N	ON	OFF	OFF
P	OFF	ON	ON

N--- “Negative Logic”

P--- “Positive Logic”

L--- “Low Voltage”, -0.7V≤L≤0.8V

H--- “High Voltage”, 3.5V≤H≤12V

ON--- “Converter is on”, OFF--- “Converter is off”

Open--- “CNT pin is left open “

Note: Normally, VCNT ≤12V.

The following figure shows a few simple CNT circuits.

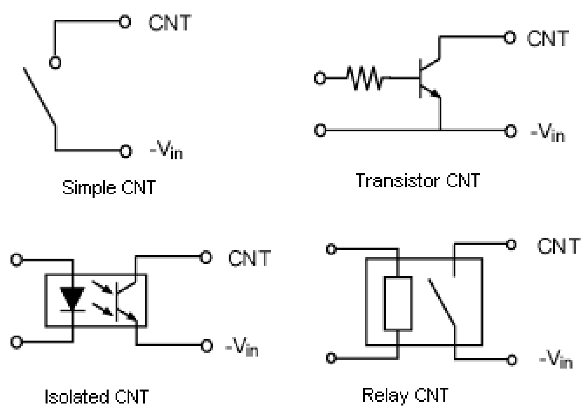

Figure 45 CNT circuit

Trim Characteristics

The +Vo output voltage of the AGQ100 series can be trimmed using the trim pin provided. Applying a resistor to the trim pin through a voltage divider from the output will cause the +Vo output to increase by up to 10%or decrease by up to 20%. Trimming up by more than 10% of the nominal output may activate the OVP circuit or damage the converter. Trimming down more than 20% can cause the converter to regulate improperly. If the trim pin is not needed, it should be left open.

Trim up

With an external resistor connected between the TRIM and +SENSE pins, the output voltage set point increases (see Figure 46).

The following equation determines the required external-resistor value to obtain a percentage output voltage change of 1%.

$$R_{adj-up} = \frac{5.1 \times V_{nom} \times (100 + \Delta)}{1.225 \times \Delta} - \frac{510}{\Delta} - 10.2(K\Omega)$$

Note: △= (Vo-Vnom)   100/Vnom

Trim down

With an external resistor between the TRIM and -SENSE pins, the output voltage set point decreases (see Figure 47).

The following equation determines the required external-resistor value to obtain a percentage output voltage change of 1%.

$$R_{adj-down} = \frac{510}{\Delta} - 10.2(K\Omega)$$

Note: △= (Vnom-Vo)   100/Vnom

Although the output voltage can be increased by both the remote sense and by the trim, the maximum increase for the output voltage is not the sum of both. The maximum increase is the larger of either the remote sense or the trim.

Note that at elevated output voltages the maximum power rating of the converter remains the same, and the output current capability will decrease correspondingly.

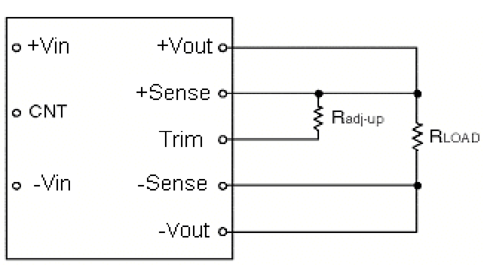

Figure 46 Trim up

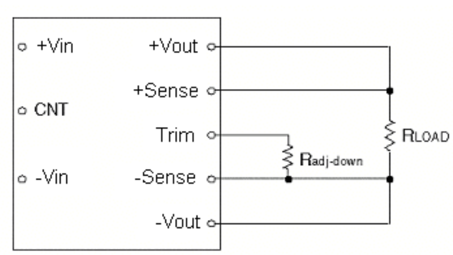

Figure 47 Trim down

Sense Characteristics

The AGQ100 converter can remotely sense both lines of its output which moves the effective output voltage regulation point from the output terminals of the unit to the point of connection of the remote sense pins. This feature automatically adjusts the real output voltage of the AGQ100 in order to compensate for voltage drops in distribution and maintain a regulated voltage at the point of load.

When the converter is supporting loads far away, or is used with undersized cabling, significant voltage drop can occur at the load. The best defense against such drops is to locate the load close to the converter and to ensure adequately sized cable is used. When this is not possible, the converter can compensate for a drop of up to 10%Vo, through use of the sense leads.

When used, the + Sense and - Sense leads should be connected from the converter to the point of load as shown in Figure 48, using twisted pair wire, or parallel pattern to reduce noise effect. The converter will then regulate its output voltage at the point where the leads are connected. Care should be taken not to reverse the sense leads. If reversed, the converter will trigger OVP protection.

When not used, the +Sense lead must be connected with +Vo, and -Sense with -Vo. Although the output voltage can be increased by both the remote sense and by the trim, the maximum increase for the output voltage is not the sum of both.

The maximum increase is the larger of either the remote sense or the trim.

Note that at elevated output voltages the maximum power rating of the converter remains the same, and the output current capability will decrease correspondingly.

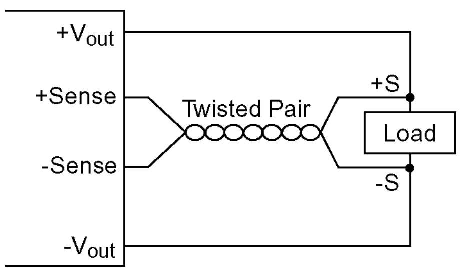

Fig. 48 Sense connections

Minimum Load Requirements

There is no minimum load requirement for the AGQ100 series converter.

Output Capacitance

High output current transient rate of change (high di/dt) loads may require high values of output capacitance to supply the instantaneous energy requirement to the load. To minimize the output voltage transient drop during this transient, low ESR (Equivalent Series Resistance) capacitors may be required, since a high ESR will produce a correspondingly higher voltage drop during the current transient.

When the load is sensitive to ripple and noise, an output filter can be added to minimize the effects. A simple output filter to reduce output ripple and noise can be made by connecting a capacitor C1 across the output as shown in Figure 49. The recommended value for the output capacitor C1 is 1,000µF.

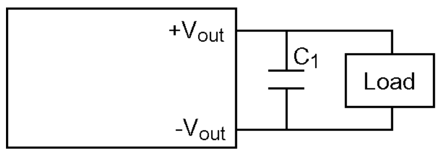

Fig. 49 Output ripple filter

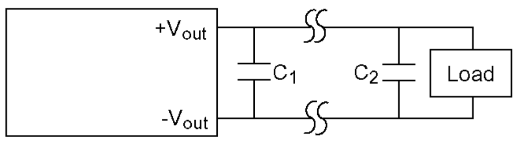

Fig. 50 Output ripple filter for a distant load

Extra care should be taken when long leads or traces are used to provide power to the load. Long lead lengths increase the chance for noise to appear on the lines. Under these conditions C1 can be added across the load, with a 1µF ceramic capacitor C2 in parallel generally as shown in Figure 50.

Decoupling

Noise on the power distribution system is not always created by the converter. High speed analog or digital loads with dynamic power demands can cause noise to cross the power inductor back onto the input lines. Noise can be reduced by decoupling the load. In most cases, connecting a 10µF tantalum or ceramic capacitor in parallel with a 0.1µF ceramic capacitor across the load will decouple it. The capacitors should be connected as close to the load as possible.

Ground Loops

Ground loops occur when different circuits are given multiple paths to common or earth ground, as shown in Figure 51. Multiple ground points have slightly different potential and cause current flow through the circuit from one point to another. This can result in additional noise in all the circuits. To eliminate the problem, circuits should be designed with a single ground connection as shown in Figure 52.

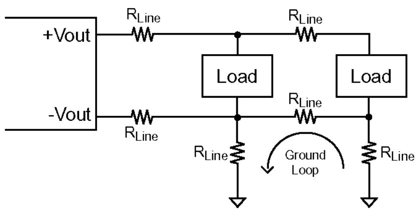

Fig. 51 Ground loops

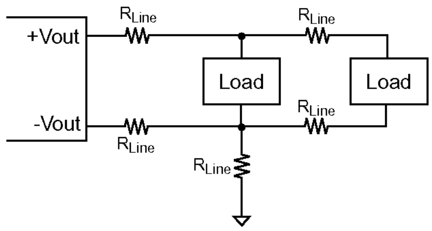

Fig. 52 Single point ground

Weight

The AGQ100 series (open-frame) weight is 42g.maximum.

Installation

Although AGQ100 series converters can be mounted in any orientation, free air-flowing must be taken. Normally power components are always put at the end of the airflow path or have the separate airflow paths. This can keep other system equipment cooler and increase component life spans.

Note:

1. There should be no electrical connection between the case and the PE or any converter ports.

2. The fixing screw of the heatsink should not be too long. Please refer to the mechanical chart for detail.

Soldering

AGQ100 series converters are compatible with standard wave soldering techniques. When wave soldering, the converter pins should be preheated for 20-30 seconds at 110 ^{O}C, and wave soldered at 260 ^{O}C for less than 10 seconds.

When hand soldering, the iron temperature should be maintained at 425 ^{O}C and applied to the converter pins for less than 5 seconds. Longer exposure can cause internal damage to the converter. Cleaning can be performed with cleaning solvent IPA or with water.

Hazardous Substances Announcement (RoHS of China R6)

Parts	Hazardous Substances					
	Pb	Hg	Cd	Cr^{6+}	PBB	PBDE
AGQ100 series	√	x	x	x	x	x

x: Means the content of the hazardous substances in all the average quality materials of the part is within the limits specified in SJ/T-11363-2006

√: Means the content of the hazardous substances in at least one of the average quality materials of the part is outside the limits specified in SJ/T11363-2006

Artesyn Embedded Technologies has been committed to the design and manufacturing of environment-friendly products. It will reduce and eventually eliminate the hazardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain hazardous substances due to the lack of reliable substitute or mature solution:

1. Solders (including high-temperature solder in parts) contain plumbum.
2. Glass of electric parts contains plumbum.
3. Copper alloy of pins contains plumbum

WORLDWIDE OFFICES

Americas
2900 S.Diablo Way
Tempe, AZ 85282
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United Kingdom
+44 (0) 1384 842 211

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