AXA Series

20 Watts

DC/DC Converter

Total Power: 20 Watts
Input Voltage: 9 to 36 Vdc
18 to 75 Vdc
# of Outputs: Single /Dual

Special Features

- Package size 1.0” x 1.0” x 0.4”
- Ultra-wide 4:1 input range:
- 9 - 36 Vin, 18 - 75 Vin
- Very high efficiency up to 89%
- Operating temperature range:
- -40 ^{O}C to +85 ^{O}C
- Output voltage adjustable
- I/O isolation voltage 1500VDC
- Remote ON/OFF control
- Shielded metal case with isolated baseplate
- CSA/UL/IEC/EN 60950-1
- Safety Approval

Safety

cUL/UL/CSA 60950-1
IEC/EN 60950-1

Product Descriptions

The AXA series is a new generation of high performance dc-dc converter modules setting a new standard concerning power density. The product offers fully 20W in a shielded metal package with dimensions of just 1.0”x1.0”x 0.4”. All models provide ultra-wide 4:1 input voltage range and tight output voltage regulation.

State-of the-art circuit topology provides a very high efficiency up to 89% which allows an operating temperature range of -40 ^{O}C to +85 ^{O}C. Further features include remote On/Off, trimmable output voltage as well as overload protection and over-temperature protection.

Typical applications for these converters are battery operated equipment, instrumentation, distributed power architectures in communication and industrial electronics and other space critical applications

Model Numbers

Model	Input Voltage	Output Voltage	Maximum Load	Efficiency
AXA04F18-L	9-36Vdc	3.3V	4.5A	87%
AXA04A18-L	9-36Vdc	5V	4A	89%
AXA01B18-L	9-36Vdc	12V	1.67A	89%
AXA01C18-L	9-36Vdc	15V	1.33A	89%
AXA00H18-L	9-36Vdc	24V	0.835A	88%
AXA00BB18-L	9-36Vdc	±12V	±0.835 A	89%
AXA00CC18-L	9-36Vdc	±15 V	±0.67 A	89%
AXA04F36-L	18-75 Vdc	3.3V	4.5A	88%
AXA04A36-L	18-75 Vdc	5V	4A	89%
AXA01B36-L	18-75 Vdc	12V	1.67A	89%
AXA01C36-L	18-75 Vdc	15V	1.33A	89%
AXA00H36-L	18-75 Vdc	24V	0.835A	88%
AXA00BB36-L	18-75 Vdc	±12 V	±0.835 A	89%
AXA00CC36-L	18-75 Vdc	±15 V	±0.67 A	89%

Options

Heatsink (-HS)

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	24V input Models 48V input Models	$V_{IN,DC}$	9 18	- -	36 75	Vdc Vdc
Maximum Output Power	All	$P_{O,max}$	-	-	20	W
Isolation Voltage Input to output	All models		1500	-	-	Vdc
Isolation Resistance 500Vdc	All models		1000	-	-	Mohm
Isolation Capacitance 100KHz, 1V	All models		-	-	1500	pF
Operating Case Temperature	All	T_{CASE}	-40		+105	^{O}C
Storage Temperature	All	T_{STG}	-50		+125	^{O}C
Humidity (non-condensing) Operating Non-operating	All All		- -	- -	95 95	% %
MTBF	MIL-STD-217F, TA =+25^{O}C,Ground Benign		-	451,600	-	Khours

Input Specifications

Table 2. Input Specifications:

Parameter		Condition	Symbol	Min	Nom	Max	Unit
Operating Input Voltage, DC	24V Input Models 48V Input Models	All	$V_{IN,DC}$	9 18	24 48	36 75	Vdc
Start-up Threshold Voltage	24V Input Models 48V Input Models	All	$V_{IN,ON}$	- -	- -	9 18	Vdc
Input Surge Voltage	24V Input Models 48V Input Models	1 sec, max	$V_{IN,surge}$	-0.7 -0.7	- -	50 100	Vdc
Input reflected ripple current	24V Input Models 48V Input Models	5 to 20MHz,12uH source impedance	$I_{IN,ripple}$	- -	50 30	- -	mA
Input Current	AXA04F18-L AXA04A18-L AXA01B18-L AXA01C18-L AXA00H18-L AXA00BB18-L AXA00CC18-L AXA04F36-L AXA04A36-L AXA01B36-L AXA01C36-L AXA00H36-L AXA00BB36-L AXA00CC36-L	$V_{IN,DC=}V_{IN,nom}$	$I_{IN,full\ load}$	- - - - - - - - - - - - - -	711 936 938 941 949 938 941 352 468 469 471 474 469 471	- - - - - - - - - - - - - -	mA
No Load Input Current (V_O On, I_O = 0A)	AXA04F18-L AXA04A18-L AXA01B18-L AXA01C18-L AXA00H18-L AXA00BB18-L AXA00CC18-L AXA04F36-L AXA04A36-L AXA01B36-L AXA01C36-L AXA00H36-L AXA00BB36-L AXA00CC36-L	$V_{IN,DC=}V_{IN,nom}$	I_{IN,no_load}	- - - - - - - - - - - - - -	80 90 40 40 40 40 40 40 45 25 25 25 25 25	- - - - - - - - - - - - - -	mA

Input Specifications

Table 2. Input Specifications con't:

Parameter		Condition	Symbol	Min	Nom	Max	Unit
Efficiency @Max. Load	AXA04F18-L AXA04A18-L AXA01B18-L AXA01C18-L AXA00H18-L AXA00BB18-L AXA00CC18-L AXA04F36-L AXA04A36-L AXA01B36-L AXA01C36-L AXA00H36-L AXA00BB36-L AXA00CC36-L	$V_{IN,DC=}V_{IN,nom}$ $I_O=I_{O,max}$ T_A =25 ^OC	η	- - - - - - - - - - - - - -	87 89 89 89 88 89 89 88 89 89 89 88 89 89	- - - - - - - - - - - - - -	%
Start Up Time	Power Up	$V_{IN,DC=}V_{IN,nom}$ Constant Resistive Load		-	-	30	mS
	Remote On/Off			-	-	30	
Remote On/OFF Control		Remote ON Remote OFF		3.5 0	- -	12 1.2	Vdc
Remote Off Stand by Input Current		All				10	mA
Input Current of Remote Control Pin		All				0.5	mA
Internal Filter Type			Internal LC Filter (for EN55022,Class A/ and FCC level Compliance)				

Output Specifications

Table 3. Output Specifications:

Parameter		Condition	Symbol	Min	Nom	Max	Unit
Output Voltage Set-Point	AXA04F18-L	$V_{IN,DC}=V_{IN,nom}$ $I_O=I_{O,max}$ $T_A=25\ ^{O}C$	V_O	3.27	3.3	3.33	Vdc
	AXA04A18-L			4.95	5	5.05	
	AXA01B18-L			11.88	12	12.12	
	AXA01C18-L			14.85	15	15.15	
	AXA00H18-L			23.76	24	24.24	
	AXA00BB18-L			±11.88	±12	±12.12	
	AXA00CC18-L			±14.85	±15	±15.15	
	AXA04F36-L			3.27	3.3	3.33	
	AXA04A36-L			4.95	5	5.05	
	AXA01B36-L			11.88	12	12.12	
	AXA01C36-L			14.85	15	15.15	
	AXA00H36-L			23.76	24	24.24	
	AXA00BB36-L			±11.88	±12	±12.12	
	AXA00CC36-L			±14.85	±15	±15.15	
Output Current	AXA04F18-L	Convection cooling	I_O	-	-	4.5	A
	AXA04A18-L			-	-	4	
	AXA01B18-L			-	-	1.67	
	AXA01C18-L			-	-	1.33	
	AXA00H18-L			-	-	0.835	
	AXA00BB18-L			-	-	±0.835	
	AXA00CC18-L			-	-	±0.67	
	AXA04F36-L			-	-	4.5	
	AXA04A36-L			-	-	4	
	AXA01B36-L			-	-	1.67	
	AXA01C36-L			-	-	1.33	
	AXA00H36-L			-	-	0.835	
	AXA00BB36-L			-	-	±0.835	
	AXA00CC36-L			-	-	±0.67	
V_O Load Capacitance	AXA04F18-L	All		-	-	10300	uF
	AXA04A18-L			-	-	6800	
	AXA01B18-L			-	-	1200	
	AXA01C18-L			-	-	750	
	AXA00H18-L			-	-	300	
	AXA00BB18-L			-	-	680	
	AXA00CC18-L			-	-	380	
	AXA04F36-L			-	-	10300	
	AXA04A36-L			-	-	6800	
	AXA01B36-L			-	-	1200	
	AXA01C36-L			-	-	750	
	AXA00H36-L			-	-	300	
	AXA00BB36-L			-	-	680	
	AXA00CC36-L			-	-	380	

Output Specifications

Table 3. Output Specifications con't:

Parameter		Condition	Symbol	Min	Nom	Max	Unit
Output Ripple, pk-pk	AXA04F18-L	20MHz bandwidth, measured with a 1uF MLCC and a 10uF Tantalum Capacitor	V_O	-	75	-	mV
	AXA04A18-L			-	75	-	
	AXA01B18-L			-	100	-	
	AXA01C18-L			-	100	-	
	AXA00H18-L			-	150	-	
	AXA00BB18-L			-	100	-	
	AXA00CC18-L			-	100	-	
	AXA04F36-L			-	75	-	
	AXA04A36-L			-	75	-	
	AXA01B36-L			-	100	-	
	AXA01C36-L			-	100	-	
	AXA00H36-L			-	150	-	
	AXA00BB36-L			-	100	-	
	AXA00CC36-L			-	100	-	
Line Regulation	Single Output	$V_{IN,DC=}V_{IN,min}$ to $V_{IN,max}$	±% V_O	-	-	0.2	%
	Dual Output			-	-	0.5	
Load Regulation	AXA04F18-L	$I_O=I_{O,min}$ to $I_{O,max}$	±% V_O	-	-	0.5	%
	AXA04A18-L			-	-	0.5	
	AXA01B18-L			-	-	0.2	
	AXA01C18-L			-	-	0.2	
	AXA00H18-L			-	-	0.2	
	AXA00BB18-L			-	-	1.0	
	AXA00CC18-L			-	-	1.0	
	AXA04F36-L			-	-	0.5	
	AXA04A36-L			-	-	0.5	
	AXA01B36-L			-	-	0.2	
	AXA01C36-L			-	-	0.2	
	AXA00H36-L			-	-	0.2	
	AXA00BB36-L			-	-	1.0	
	AXA00CC36-L			-	-	1.0	
Load Cross Regulation	Dual Output	Asymmetrical Load 25%/100% Full Load	±% V_O	-	-	5.0	%
V_O Dynamic Response	Peak Deviation	25% load change, slew rate = 1A/uS	±% V_O	-	3	5	%
	Settling Time		t_s	-	300	-	uSec
Output Voltage Overshoot		All	% V_O	-		5	%
Temperature Coefficient		All	%/^{O}C	-	-	0.02	%
Switching Frequency		All	f_{SW}	-	330	-	KHz
Output Over Current Protection		All	% $I_{O,max}$	-	150	-	%
Output Short Circuit Protection		All		Hiccip Auotmatic Recovery			

Output Specifications

Table 3. Output Specifications con't:

Parameter		Condition	Symbol	Min	Nom	Max	Unit
Output Over Voltage Protection	AXA04F18-L	All	V_O	-	3.9	-	Vdc
	AXA04A18-L			-	6.2	-	
	AXA01B18-L			-	15	-	
	AXA01C18-L			-	18	-	
	AXA00H18-L			-	30	-	
	AXA00BB18-L			-	±15	-	
	AXA00CC18-L			-	±18	-	
	AXA04F36-L			-	3.9	-	
	AXA04A36-L			-	6.2	-	
	AXA01B36-L			-	15	-	
	AXA01C36-L			-	18	-	
	AXA00H36-L			-	30	-	
	AXA00BB36-L			-	±15	-	
	AXA00CC36-L			-	±18	-	

AXA04F18-L Performance Curves

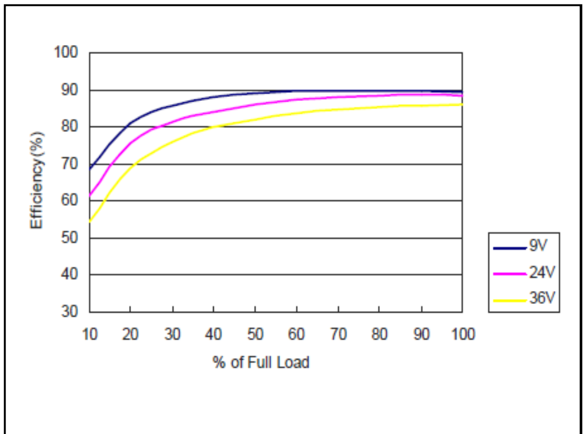


Figure 1: AXA04F18-L Efficiency Versus Output Current Curve
Vin = 9 to 36Vdc Load: Io = 0 to 4.5A

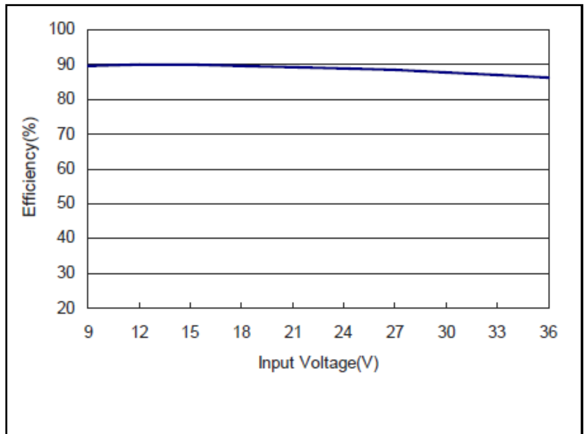


Figure 2: AXA04F18-L Efficiency Versus Input Voltage Curve
Vin = 9 to 36Vdc Load: Io = 4.5A

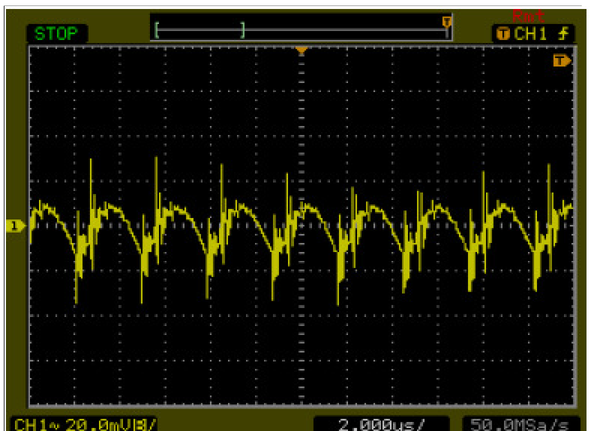


Figure 3 AXA04F18-L Ripple and Noise Measurement
Vin = 24Vdc Load: Io = 4.5A
Ch 1: Vo

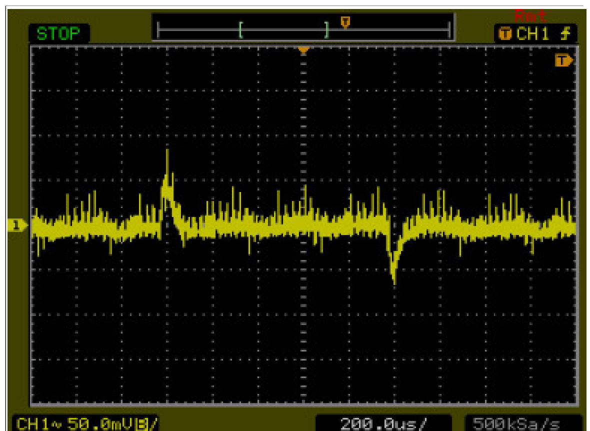


Figure 4: AXA04F18-L Transient Response
Vin = 24Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

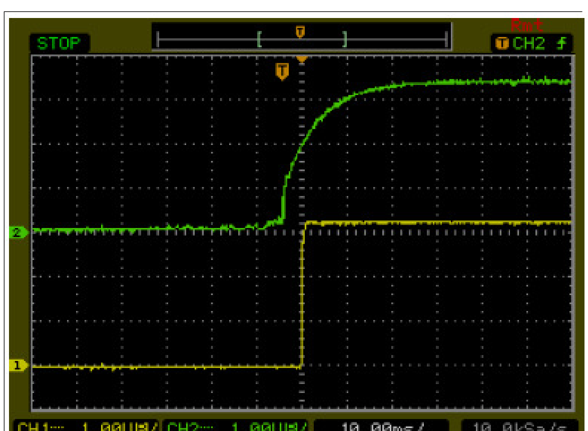


Figure 5: AXA04F18-L Output Voltage Startup Characteristic by ON/OFF
Vin = 24Vdc Load: Io = 4.5A
Ch1: Vo Ch2: Remote On/Off

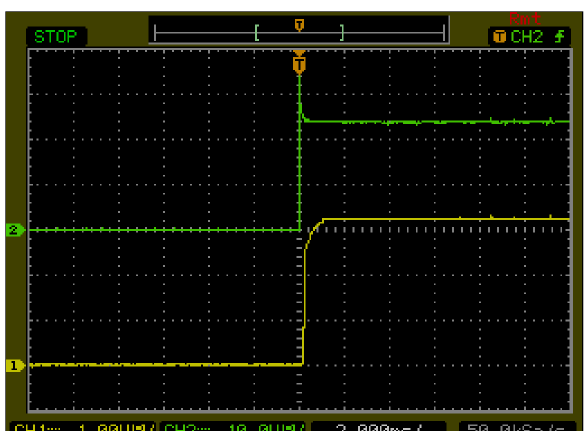


Figure 6: AXA04F18-L Output Voltage Startup Characteristic by Vin
Vin = 24Vdc Load: Io = 4.5A
Ch1: Vo Ch2: Vin

AXA04F18-L Performance Curves

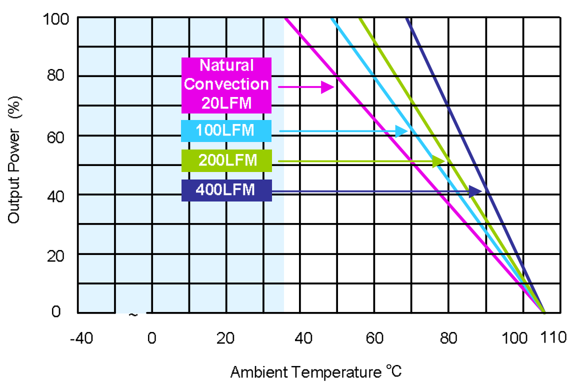


Figure 7: AXA04F18-L Derating Curves (without heatsink)
Vin = 24Vdc Load: Io = 0 to 4.5A

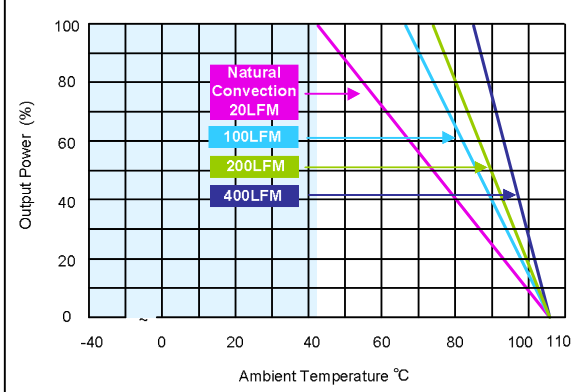


Figure 8: AXA04F18-L Derating Curves (with heatsink)
Vin = 24Vdc Load: Io = 0 to 4.5A

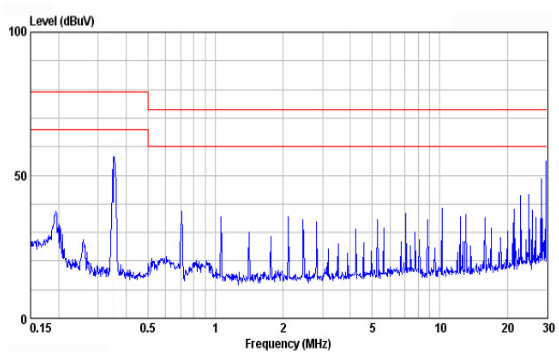


Figure 9: AXA04F18-L Conduction Emission of EN550122 Class A
Vin = 24Vdc Load: Io = 4.5A

Note - All test conditions are at 25 °C

AXA04A18-L Performance Curves

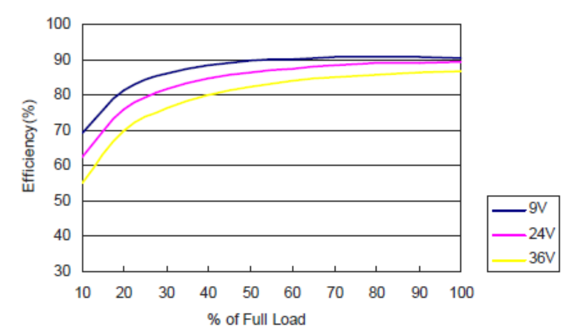


Figure 10: AXA04A18-L Efficiency Versus Output Current Curve
Vin = 9 to 36Vdc Load: Io = 0 to 4A

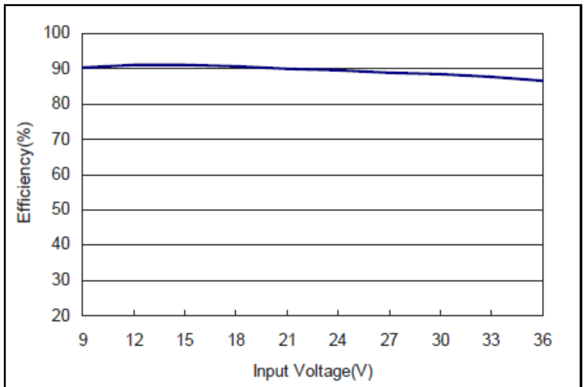


Figure 11: AXA04A18-L Efficiency Versus Input Voltage Curve
Vin = 9 to 36Vdc Load: Io = 4A

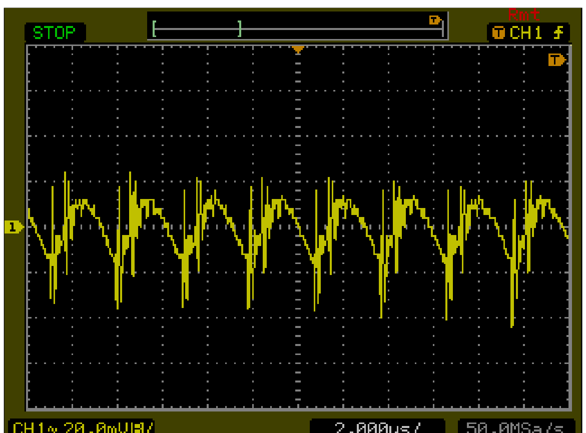


Figure 12: AXA04A18-L Ripple and Noise Measurement
Vin = 24Vdc Load: Io = 4A
Ch 1: Vo

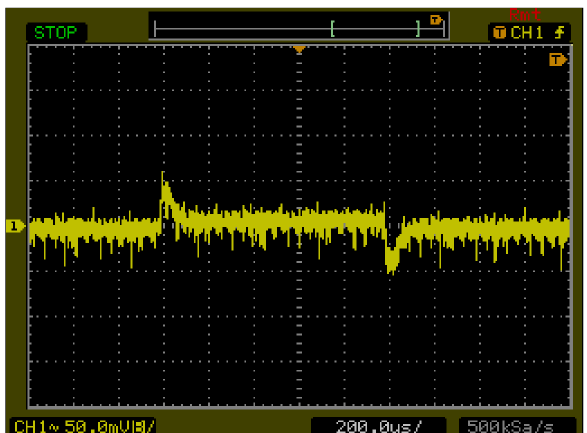


Figure 13: AXA04A18-LTransient Response
Vin = 24Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

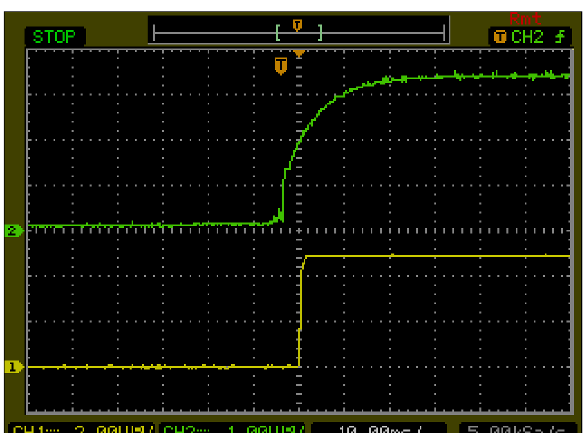


Figure 14: AXA04A18-L Output Voltage Startup Characteristic by ON/OFF
Vin = 24Vdc Load: Io = 4A
Ch1: Vo Ch2: Remote On/Off

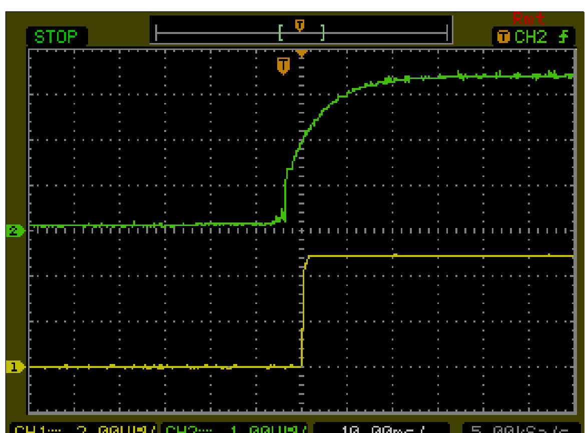


Figure 15: AXA04A18-L Output Voltage Startup Characteristic by Vin
Vin = 24Vdc Load: Io = 4A
Ch1: Vo Ch2: Vin

AXA04A18-L Performance Curves

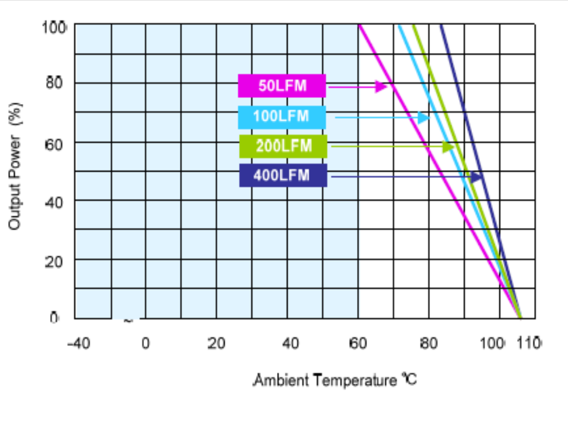


Figure 16: AXA04A18-L Derating Curves (without heatsink)
Vin = 24Vdc Load: Io = 0 to 4A

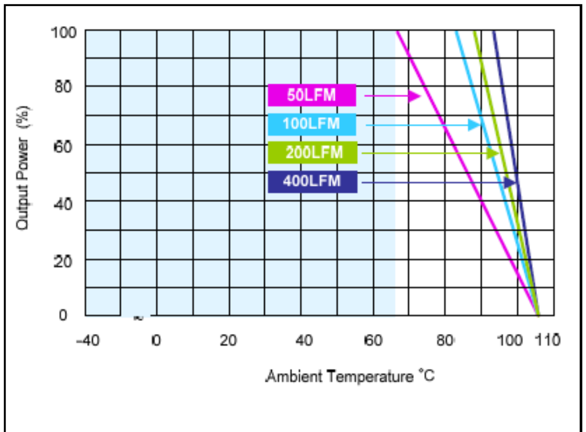
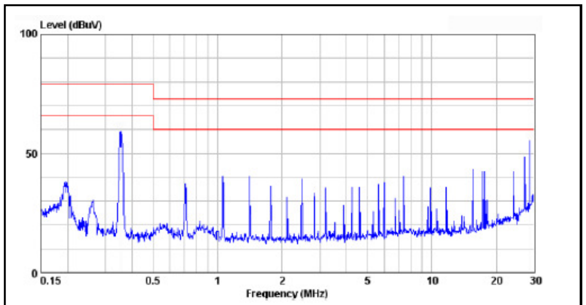


Figure 17: AXA04A18-L Derating Curves (with heatsink)
Vin = 24Vdc Load: Io = 0 to 4A



Conduction Emission of EN55022 Class A
$V_{in=}$ = $V_{in\ nom}$; Full Load

Figure 18: AXA04A18-L Conduction Emission of EN550122 Class A
Vin = 24Vdc Load: Io = 4A

Note - All test conditions are at 25 ^{O}C

AXA01B18-L Performance Curves

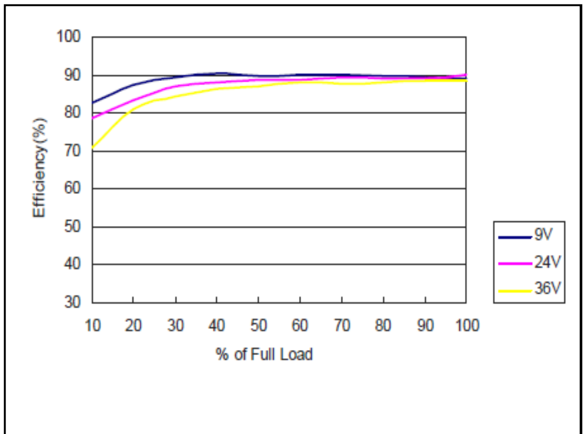


Figure 19: AXA01B18-L Efficiency Versus Output Current Curve
Vin = 9 to 36Vdc Load: Io = 0 to 1.67A

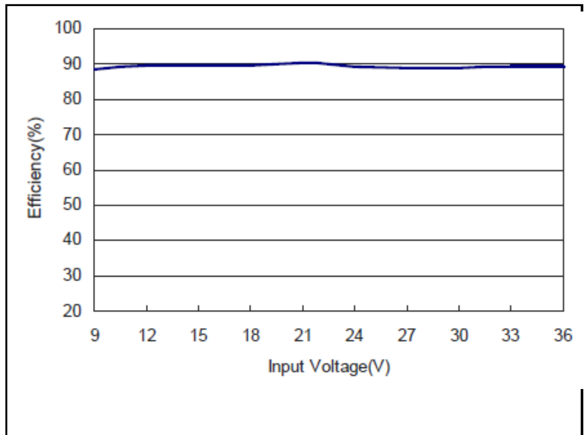


Figure 20: AXA01B18-L Efficiency Versus Input Voltage Curve
Vin = 9 to 36Vdc Load: Io = 1.67A

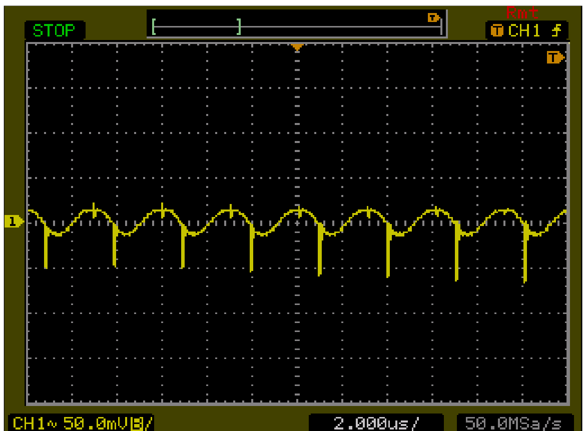


Figure 21: AXA01B18-L Ripple and Noise Measurement
Vin = 24Vdc Load: Io = 1.67A
Ch 1: Vo

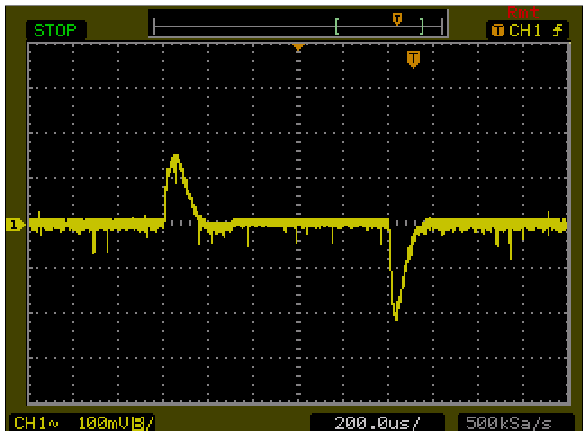


Figure 22: AXA01B18-LTransient Response
Vin = 24Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

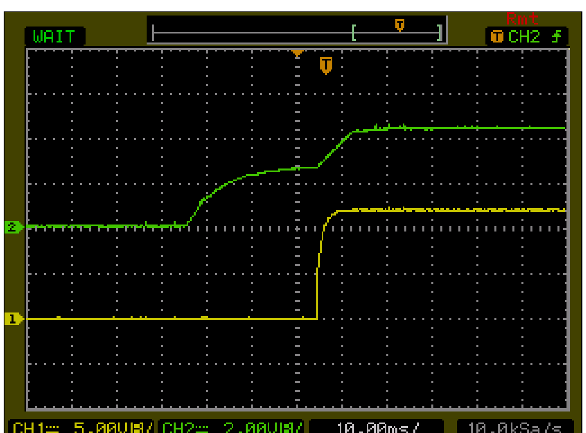


Figure 23: AXA01B18-L Output Voltage Startup Characteristic by ON/OFF
Vin = 24Vdc Load: Io = 1.67A
Ch1: Vo Ch2: Remote On/Off

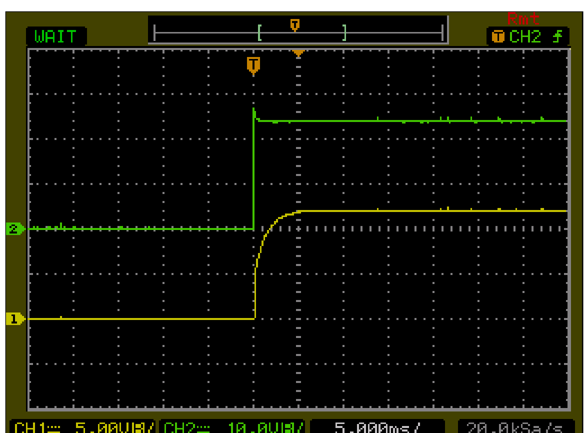


Figure 24: AXA01B18-L Output Voltage Startup Characteristic by Vin
Vin = 24Vdc Load: Io = 1.67A
Ch1: Vo Ch2: Vin

AXA01B18-L Performance Curves

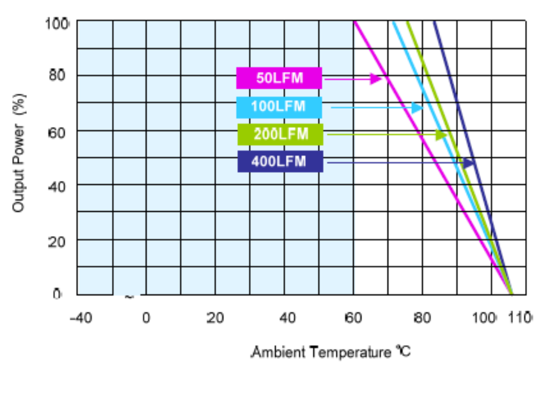


Figure 25: AXA01B18-L Derating Curves (without heatsink)
Vin = 24Vdc Load: Io = 0 to 1.67A

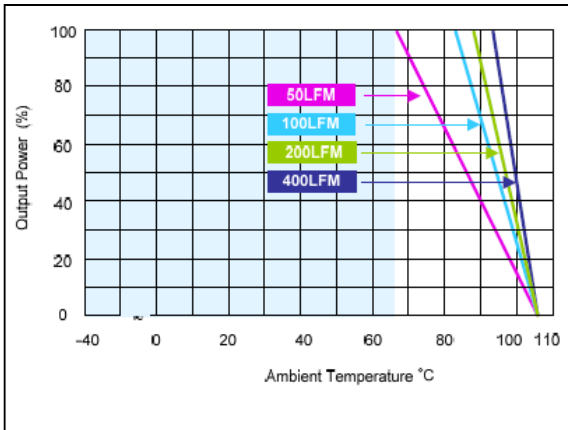


Figure 26: AXA01B18-L Derating Curves (with heatsink)
Vin = 24Vdc Load: Io = 0 to 1.67A

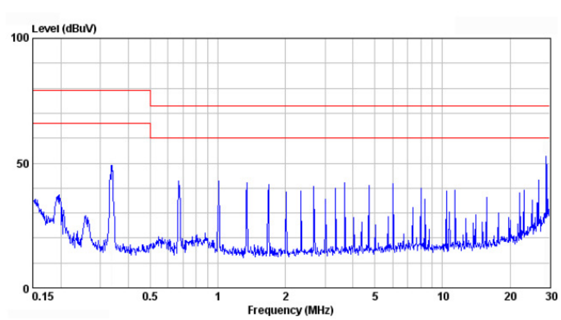


Figure 27: AXA01B18-L Conduction Emission of EN550122 Class A
Vin = 24Vdc Load: Io = 1.67A

Note - All test conditions are at 25 °C

AXA01C18-L Performance Curves

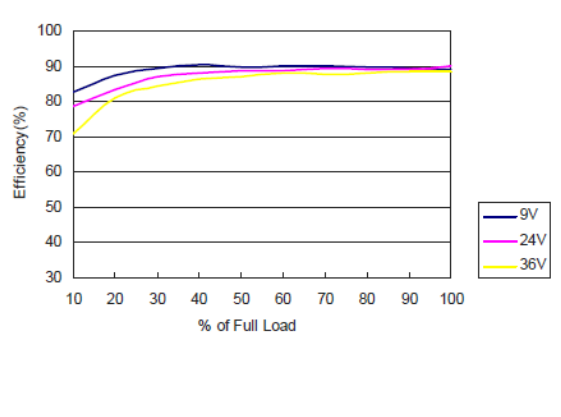


Figure 28: AXA01C18-L Efficiency Versus Output Current Curve
Vin = 9 to 36Vdc Load: Io = 0 to 1.33A

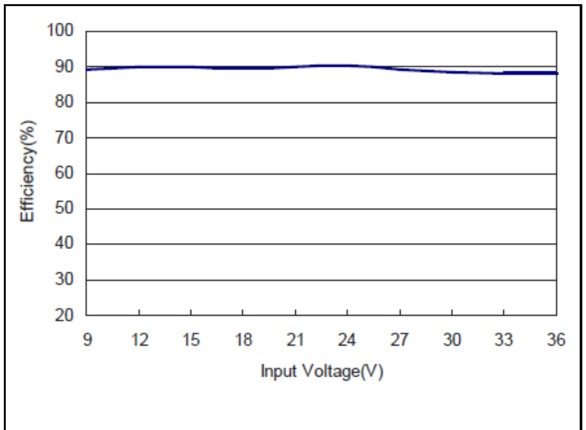


Figure 29: AXA01C18-L Efficiency Versus Input Voltage Curve
Vin = 9 to 36Vdc Load: Io = 1.33A

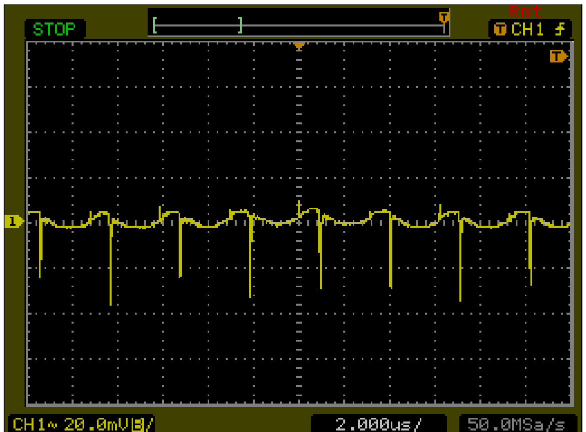


Figure 30: AXA01C18-L Ripple and Noise Measurement
Vin = 24Vdc Load: Io = 1.33A
Ch 1: Vo

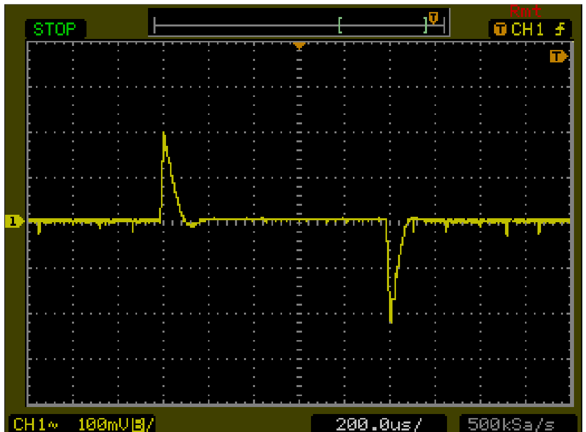


Figure 31: AXA01C18-L Transient Response
Vin = 24Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

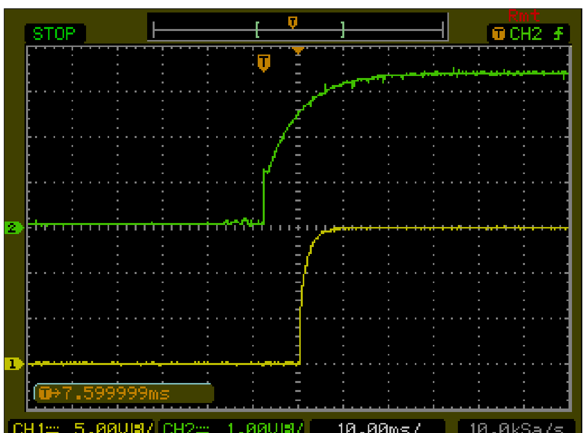


Figure 32: AXA01C18-L Output Voltage Startup Characteristic by ON/OFF
Vin = 24Vdc Load: Io = 1.33A
Ch1: Vo Ch2: Remote On/Off

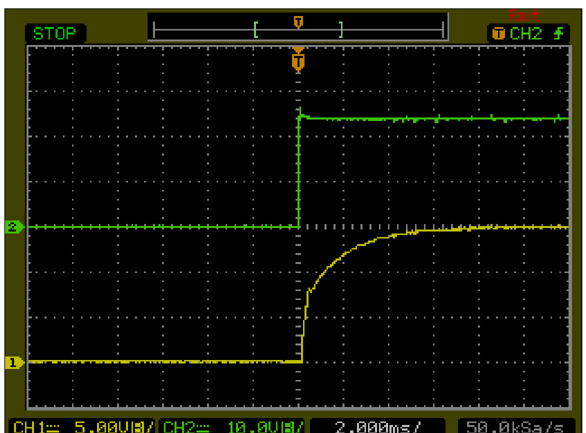


Figure 33: AXA01C18-L Output Voltage Startup Characteristic by Vin
Vin = 24Vdc Load: Io = 1.33A
Ch1: Vo Ch2: Vin

AXA0C18-L Performance Curves

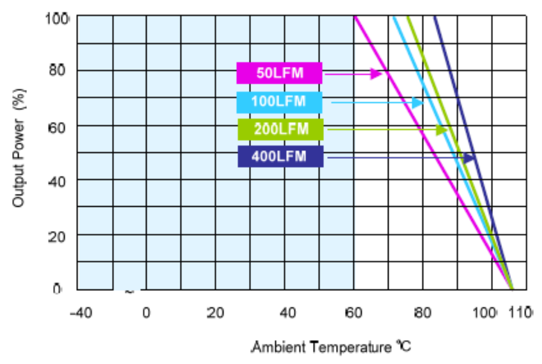


Figure 34: AXA01C18-L Derating Curves (without heatsink)
Vin = 24Vdc Load: Io = 0 to 1.33A

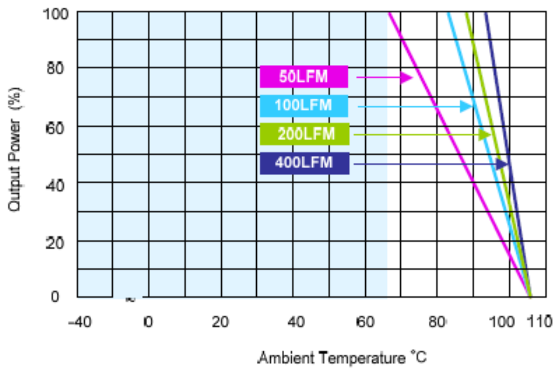


Figure 35: AXA01C18-L Derating Curves (with heatsink)
Vin = 24Vdc Load: Io = 0 to 1.33A

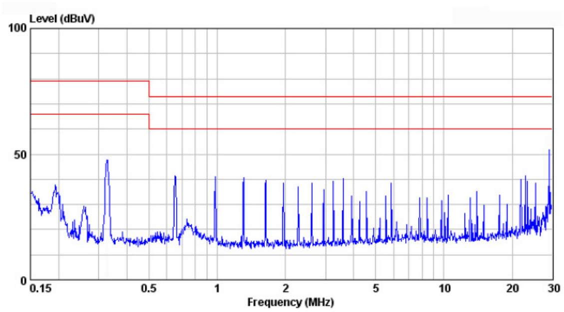


Figure 36: AXA01C18-L Conduction Emission of EN550122 Class A
Vin = 24Vdc Load: Io = 1.33A

Note - All test conditions are at 25 ^{O}C

AXA00H18-L Performance Curves

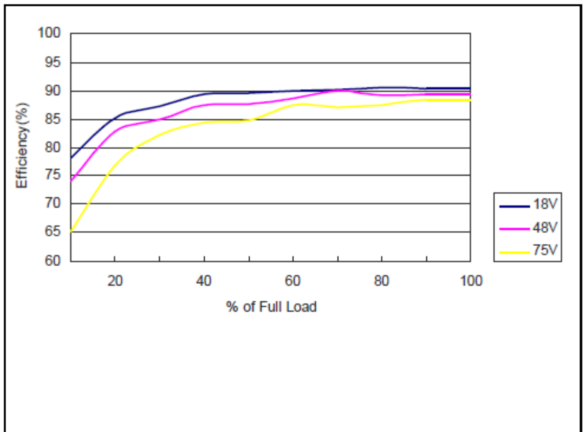


Figure 37: AXA00H18-L Efficiency Versus Output Current Curve
Vin = 9 to 36Vdc Load: Io = 0 to 0.835A

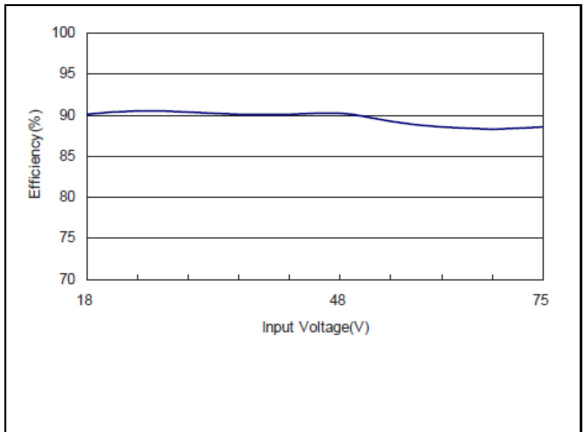


Figure 38: AXA00H18-L Efficiency Versus Input Voltage Curve
Vin = 9 to 36Vdc Load: Io = 0.835A

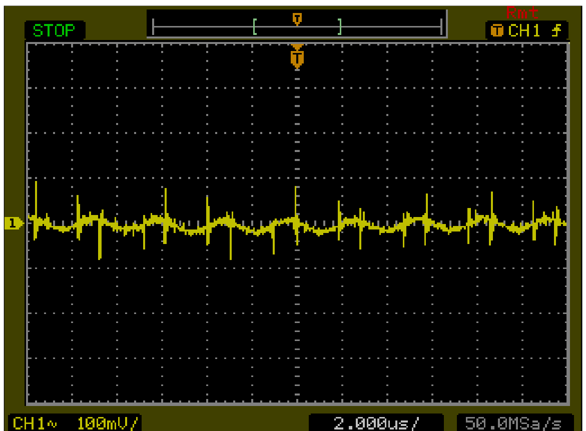


Figure 39: AXA00H18-L Ripple and Noise Measurement
Vin = 24Vdc Load: Io = 0.835A
Ch 1: Vo

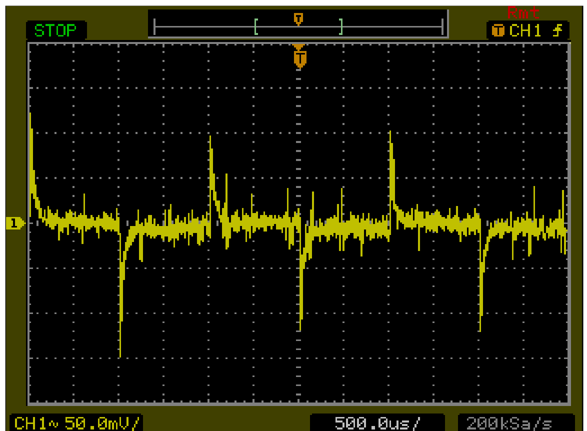


Figure 40: AXA00H18-L Transient Response
Vin = 24Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

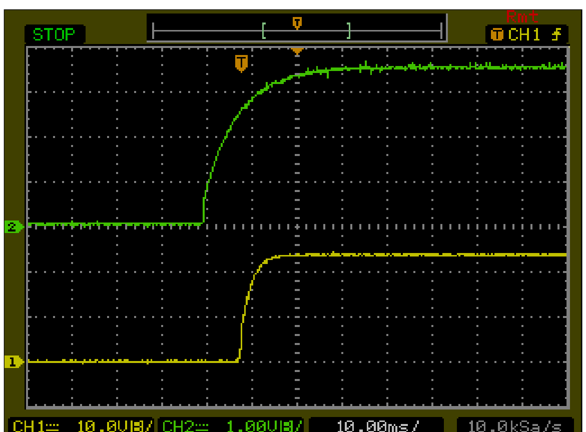


Figure 41: AXA00H18-L Output Voltage Startup Characteristic by ON/OFF
Vin = 24Vdc Load: Io = 0.835A
Ch1: Vo Ch2: Remote On/Off

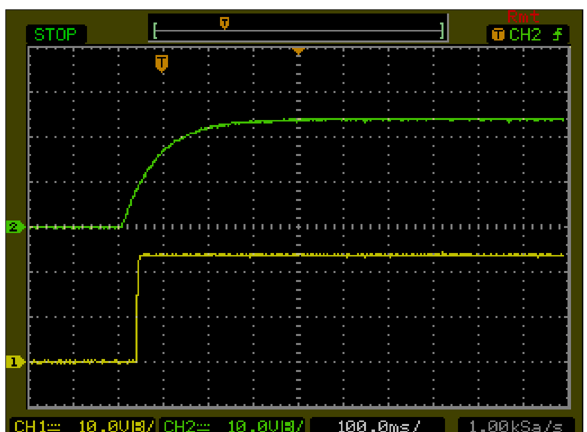


Figure 42: AXA00H18-L Output Voltage Startup Characteristic by Vin
Vin = 24Vdc Load: Io = 0.835A
Ch1: Vo Ch2: Vin

AXA00H18-L Performance Curves

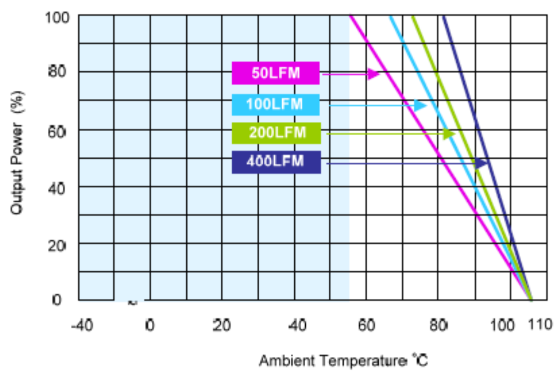


Figure 43: AXA00H18-L Derating Curves (without heatsink)
Vin = 24Vdc Load: Io = 0 to 0.835A

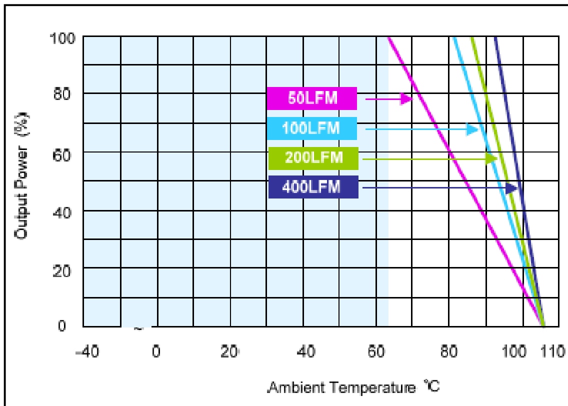


Figure 44: AXA00H18-L Derating Curves (with heatsink)
Vin = 24Vdc Load: Io = 0 to 0.835A

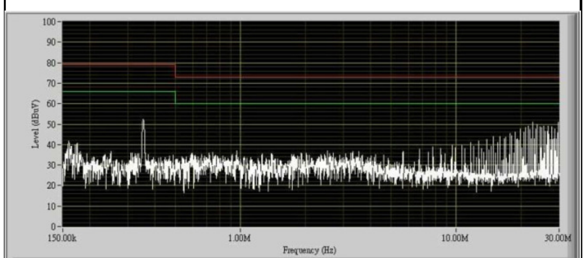


Figure 45: AXA00H18-L Conduction Emission of EN550122 Class A
Vin = 24Vdc Load: Io = 0.835A

Note - All test conditions are at 25 ^{O}C

AXA00BB18-L Performance Curves

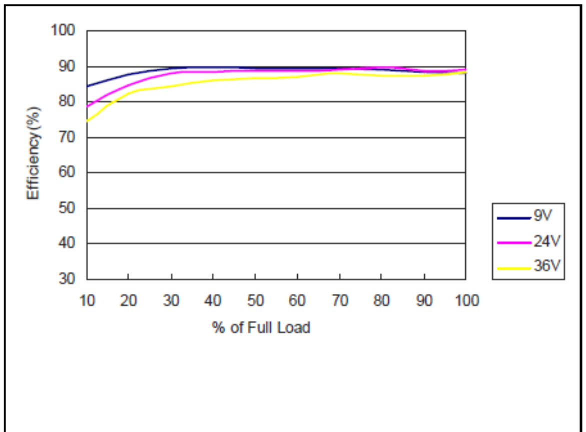


Figure 46: AXA00BB18-L Efficiency Versus Output Current Curve
Vin = 9 to 36Vdc Load: Io = 0 to ±0.835 A

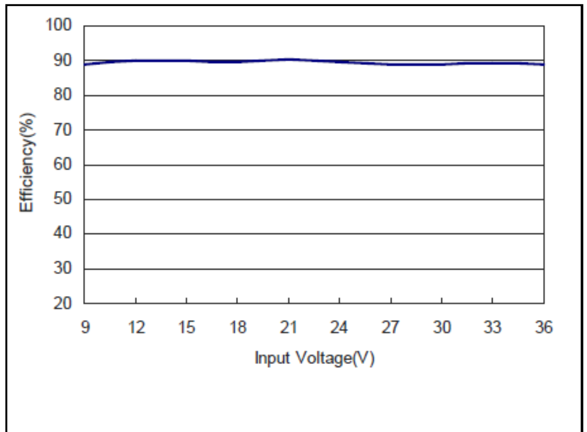


Figure 47: AXA00BB18-L Efficiency Versus Input Voltage Curve
Vin = 9 to 36Vdc Load: Io = ±0.835 A

Figure 48: AXA00BB18-L Ripple and Noise Measurement
Vin = 24Vdc Load: Io = ±0.835 A
Ch 1: Vo1 Ch2: Vo2

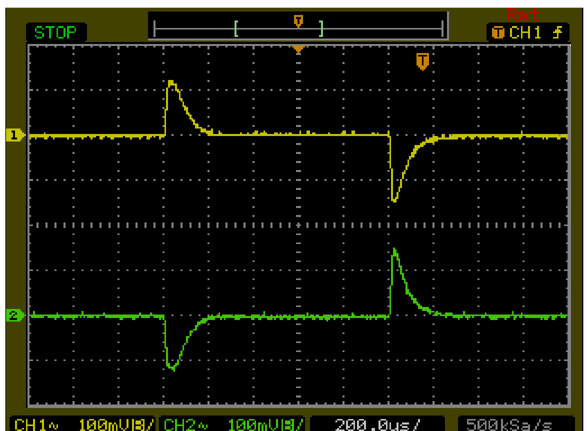


Figure 49: AXA00BB18-L Transient Response
Vin = 24Vdc Load: Io = 100% to 75% load change
Ch 1: Vo1 Ch2: Vo2

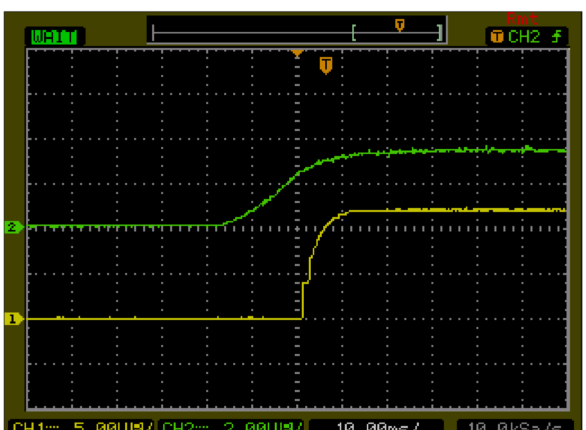


Figure 50: AXA00BB18-L Output Voltage Startup Characteristic by ON/OFF
Vin = 24Vdc Load: Io = ±0.835 A
Ch1: Vo Ch2: Remote On/Off

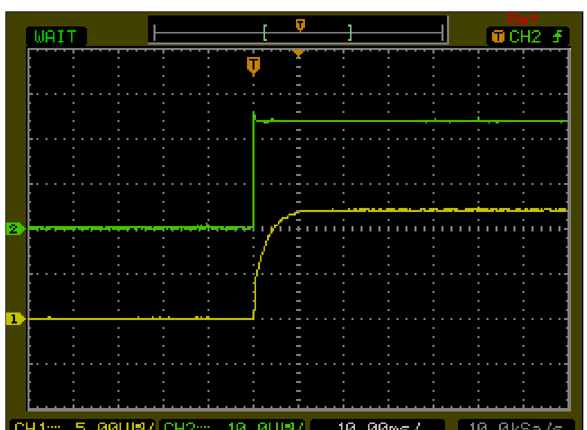


Figure 51: AXA00BB18-L Output Voltage Startup Characteristic by Vin
Vin = 24Vdc Load: Io = ±0.835 A
Ch1: Vo Ch2: Vin

AXA00BB18-L Performance Curves

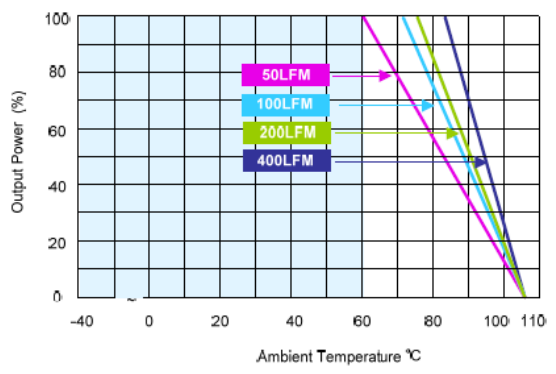


Figure 52: AXA00BB18-L Derating Curves (without heatsink)
Vin = 24Vdc Load: Io = 0 to ±0.835 A

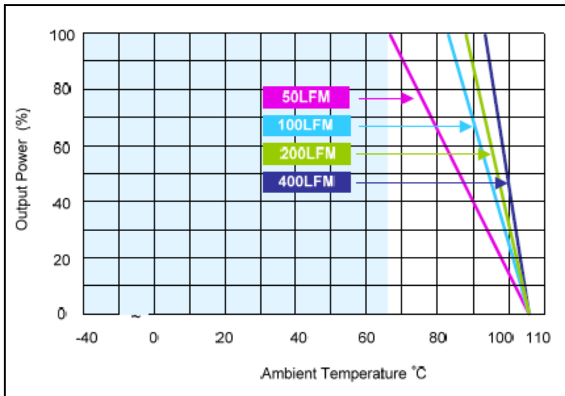


Figure 53: AXA00BB18-L Derating Curves (with heatsink)
Vin = 24Vdc Load: Io = 0 to ±0.835 A

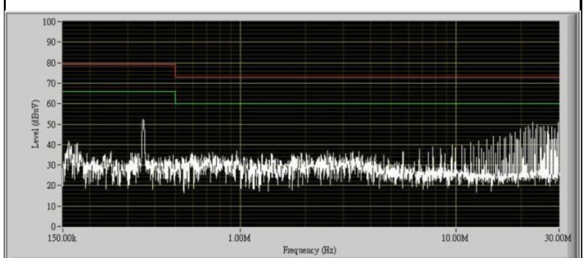


Figure 54: AXA00BB18-L Conduction Emission of EN550122 Class A
Vin = 24Vdc Load: Io = ±0.835 A

Note - All test conditions are at 25 ^{o}C

AXA00CC18-L Performance Curves

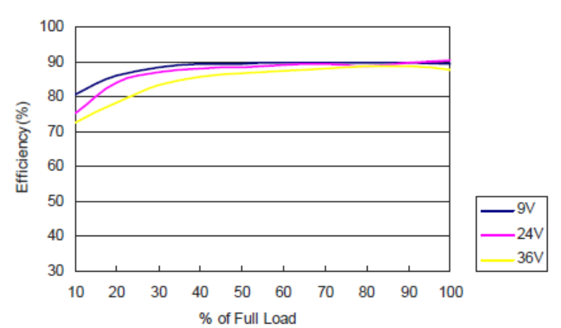


Figure 55: AXA00CC18-L Efficiency Versus Output Current Curve
Vin = 9 to 36Vdc Load: Io = 0 to ±0.67 A

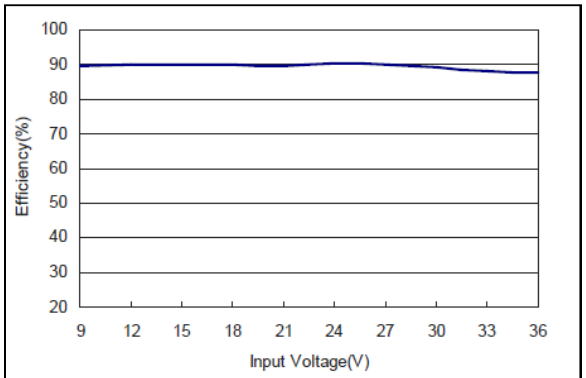


Figure 56: AXA00CC18-L Efficiency Versus Input Voltage Curve
Vin = 9 to 36Vdc Load: Io = ±0.67 A

Figure 57: AXA00CC18-L Ripple and Noise Measurement
Vin = 24Vdc Load: Io = ±0.67 A
Ch 1: Vo1 Ch2: Vo2

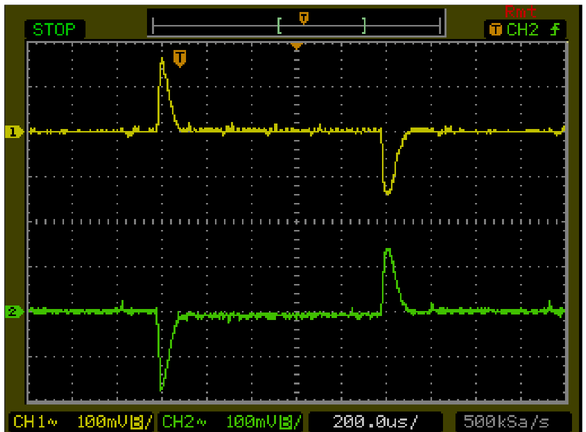


Figure 58: AXA00CC18-L Transient Response
Vin = 24Vdc Load: Io = 100% to 75% load change
Ch 1: Vo1 Ch2: Vo2

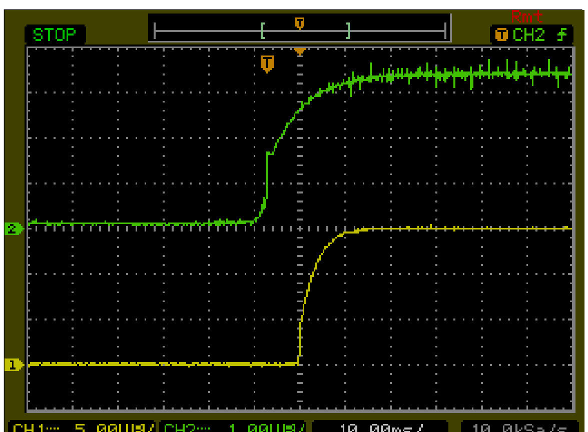


Figure 59: AXA00CC18-L Output Voltage Startup Characteristic by ON/OFF
Vin = 24Vdc Load: Io = ±0.67 A A
Ch1: Vo Ch2: Remote On/Off

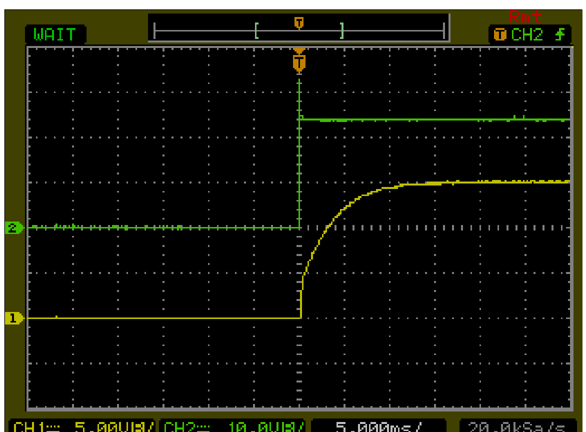


Figure 60: AXA00CC18-L Output Voltage Startup Characteristic by Vin
Vin = 24Vdc Load: Io = ±0.67 A
Ch1: Vo Ch2: Vin

AXA00CC18-L Performance Curves

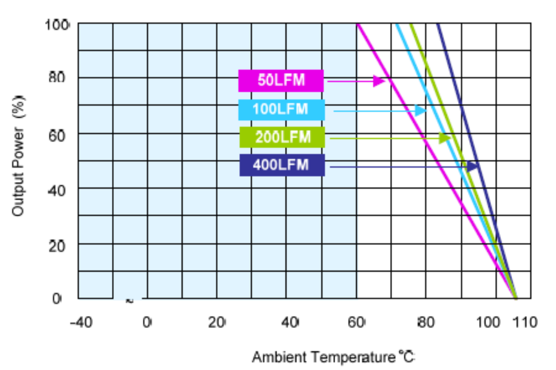


Figure 61: AXA00CC18-L Derating Curves (without heatsink)
Vin = 24Vdc Load: Io = 0 to ±0.67 A

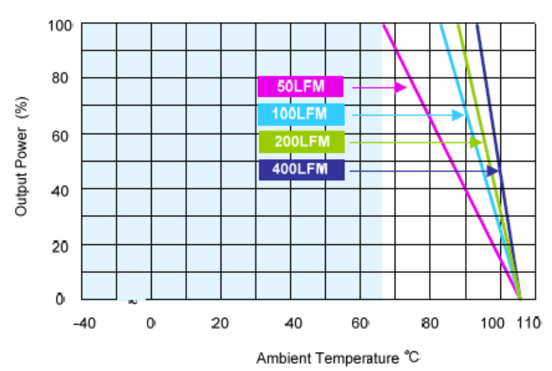


Figure 62: AXA00CC18-L Derating Curves (with heatsink)
Vin = 24Vdc Load: Io = 0 to ±0.67 A

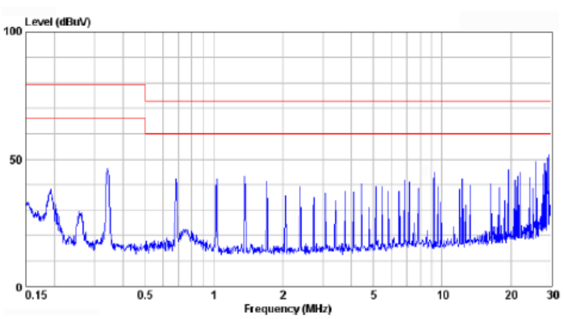


Figure 63: AXA00CC18-L Conduction Emission of EN550122 Class A
Vin = 24Vdc Load: Io = ±0.67 A

Note - All test conditions are at 25 °C

AXA04F36-L Performance Curves

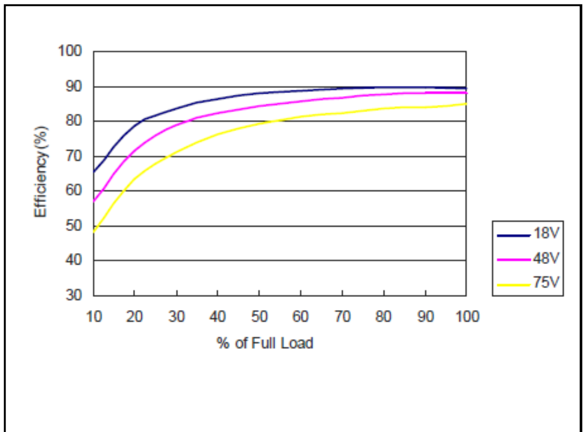


Figure 64: AXA04F36-L Efficiency Versus Output Current Curve
Vin = 18 to 75Vdc Load: Io = 0 to 4.5 A

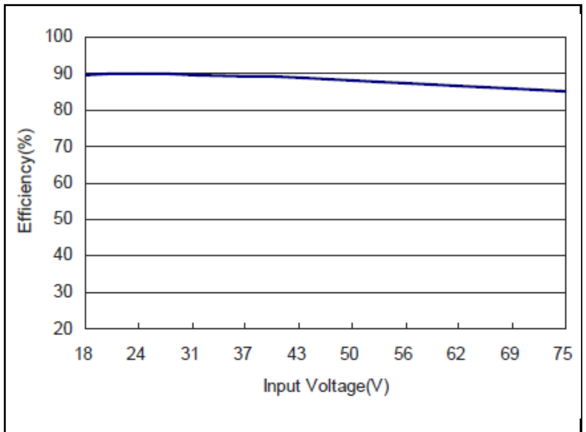


Figure 65: AXA04F36-L Efficiency Versus Input Voltage Curve
Vin = 18 to 75Vdc Load: Io = 4.5 A

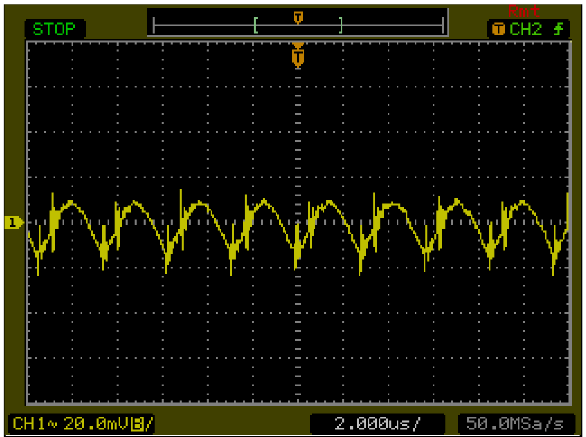


Figure 66 AXA04F36-L Ripple and Noise Measurement
Vin = 48Vdc Load: Io = 4.5A
Ch 1: Vo

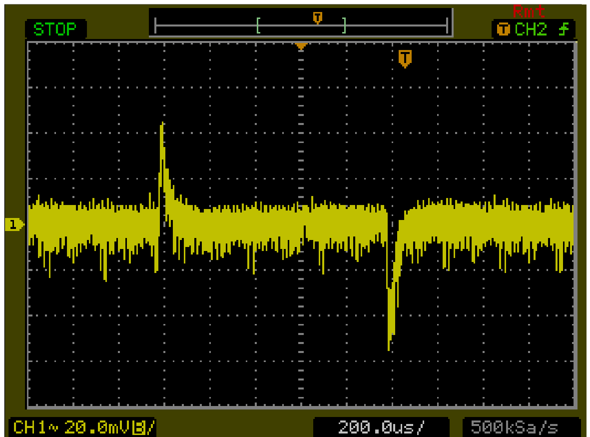


Figure 67: AAXA04F36-L Transient Response
Vin = 48Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

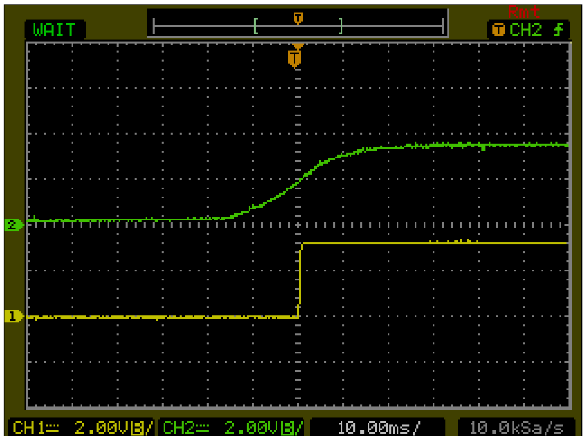


Figure 68: AXA04F36-L Output Voltage Startup Characteristic by ON/OFF
Vin = 48Vdc Load: Io = 4.5A
Ch1: Vo Ch2: Remote On/Off

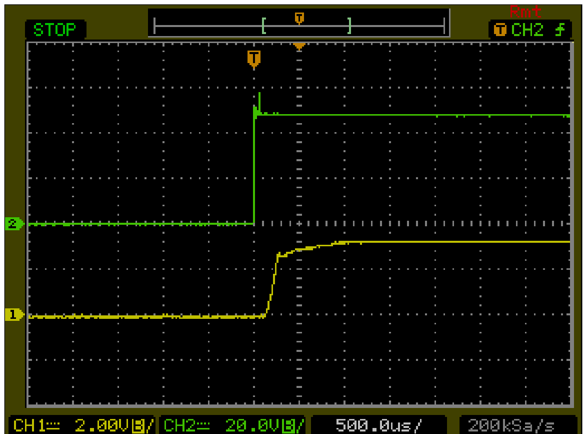


Figure 69: AXA04F36-L Output Voltage Startup Characteristic by Vin
Vin = 48Vdc Load: Io = 4.5A
Ch1: Vo Ch2: Vin

AXA04F36-L Performance Curves

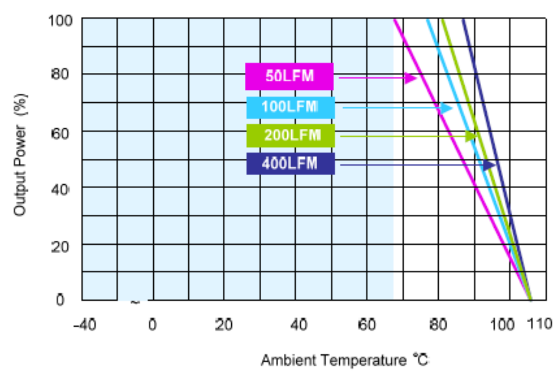


Figure 70: AXA04F36-L Derating Curves (without heatsink)
Vin = 48Vdc Load: Io = 0 to 4.5A

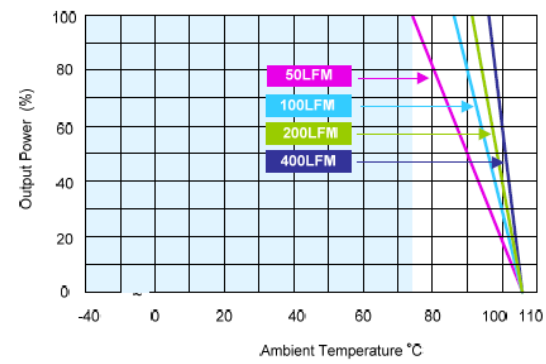


Figure 71: AXA04F36-L Derating Curves (with heatsink)
Vin = 48Vdc Load: Io = 4.5A

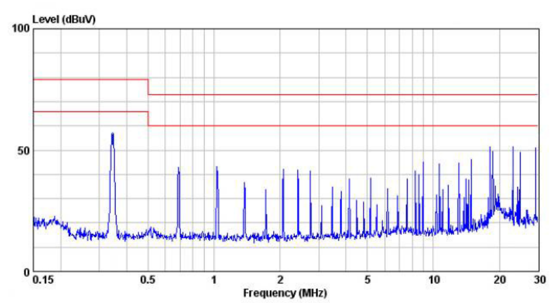


Figure 72: AXA04F36-L Conduction Emission of EN550122 Class A
Vin = 24Vdc Load: Io = 4.5A

Note - All test conditions are at 25 °C

AXA04A36-L Performance Curves

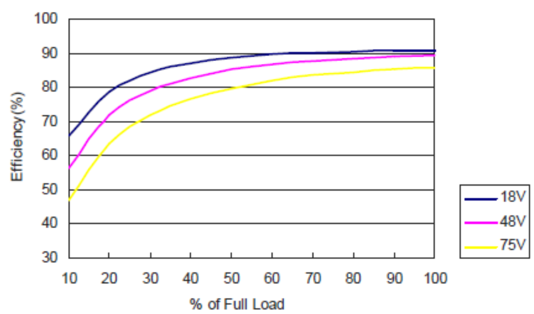


Figure 73: AXA04A36-L Efficiency Versus Output Current Curve
Vin = 18 to 75Vdc Load: Io = 0 to 4A

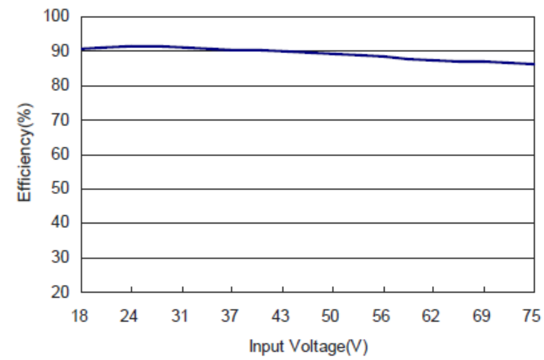


Figure 74: AXA04A36-L Efficiency Versus Input Voltage Curve
Vin = 18-75 Vdc Load: Io = 4A

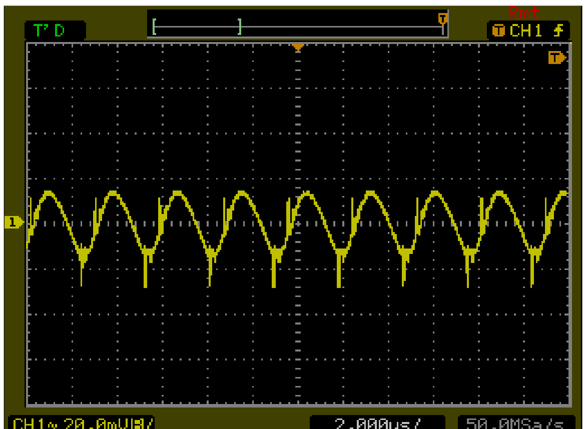


Figure 75: AXA04A36-L Ripple and Noise Measurement
Vin = 48Vdc Load: Io = 4A
Ch 1: Vo

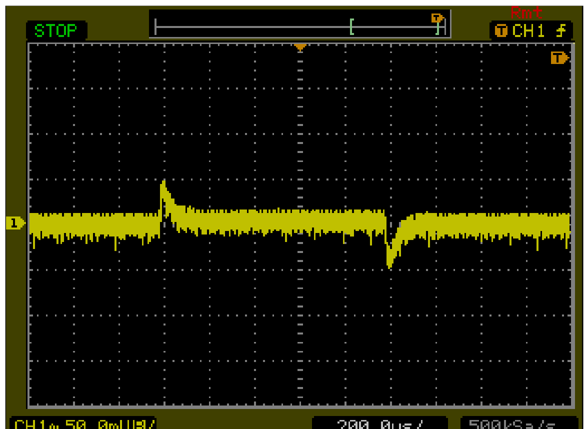


Figure 76: AXA04A36-L Transient Response
Vin = 48Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

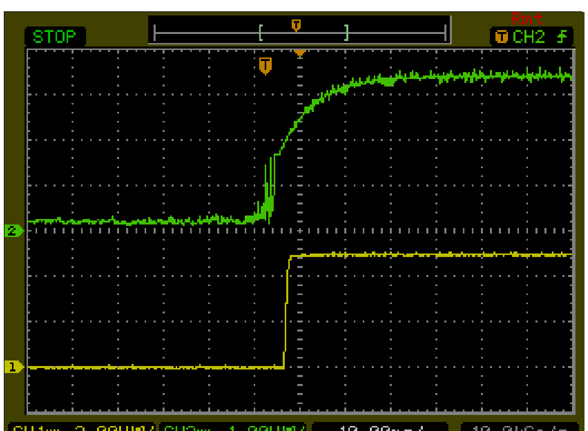


Figure 77: AXA04A36-L Output Voltage Startup Characteristic by ON/OFF
Vin = 48Vdc Load: Io = 4A
Ch1: Vo Ch2: Remote On/Off

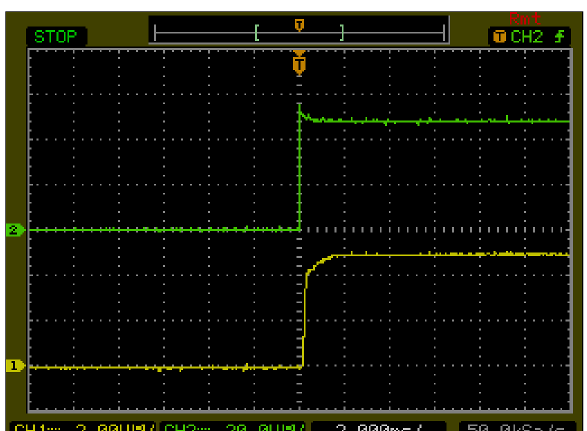


Figure 78: AXA04A36-L Output Voltage Startup Characteristic by Vin
Vin = 48Vdc Load: Io = 4A
Ch1: Vo Ch2: Vin

AXA04A36-L Performance Curves

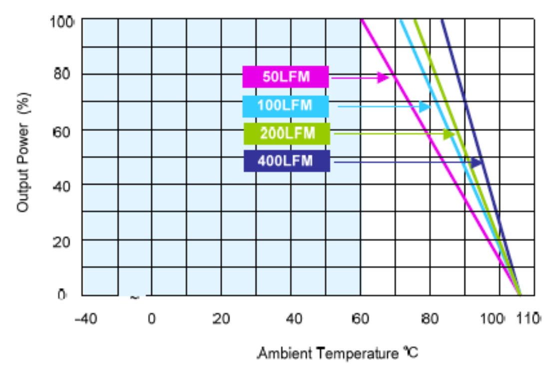


Figure 79: AXA04A36-L Derating Curves (without heatsink)
Vin = 48Vdc Load: Io = 0 to 4A

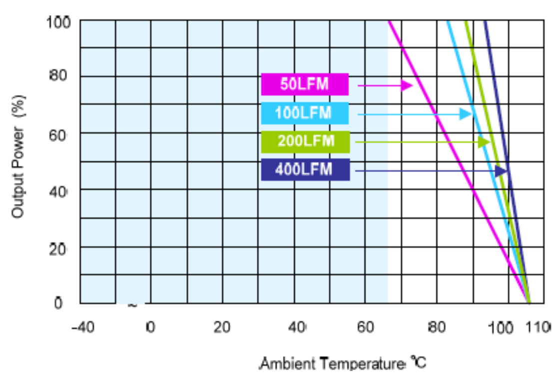


Figure 80: AXA04A36-L Derating Curves (with heatsink)
Vin = 48Vdc Load: Io = 0 to 4A

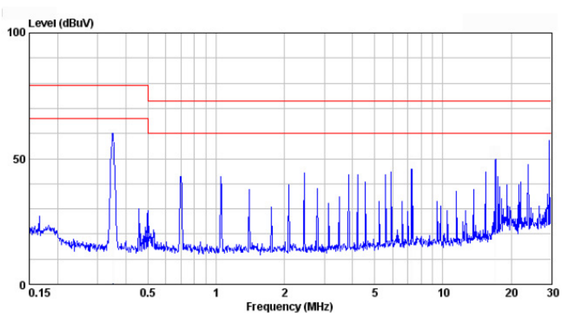


Figure 81: AXA04A36-L Conduction Emission of EN550122 Class A
Vin = 48Vdc Load: Io = 4A

Note - All test conditions are at 25 ^{O}C

AXA01B36-L Performance Curves

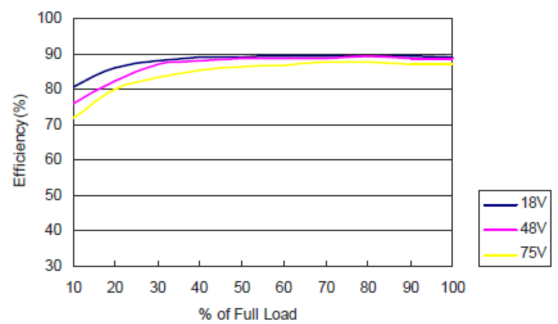


Figure 82: AXA01B36-L Efficiency Versus Output Current Curve
Vin = 18 to 75Vdc Load: Io = 0 to 1.67A

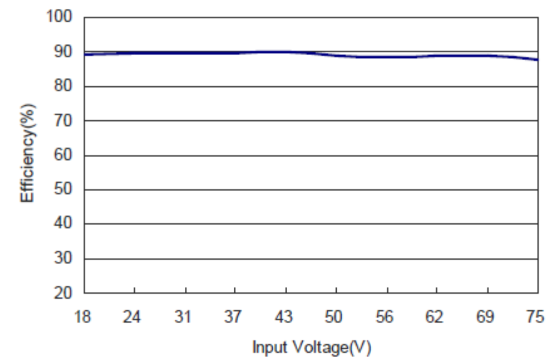


Figure 83: AXA01B36-L Efficiency Versus Input Voltage Curve
Vin = 18-75 Vdc Load: Io = 1.67A

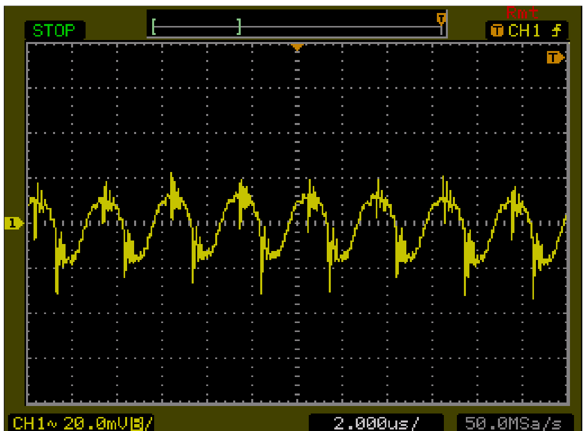


Figure 84: AXA01B36-L Ripple and Noise Measurement
Vin = 48Vdc Load: Io = 1.67A
Ch 1: Vo

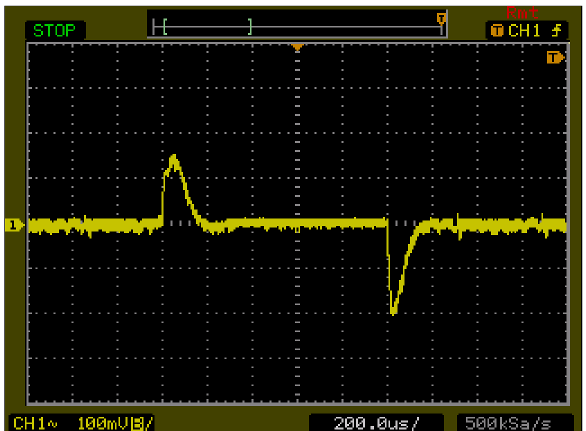


Figure 85: AXA01B36-L Transient Response
Vin = 48Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

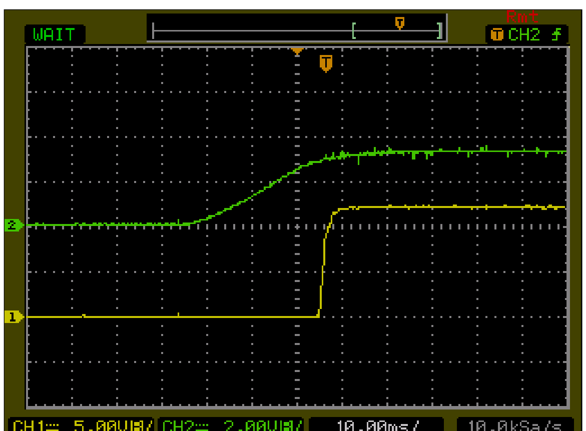


Figure 86: AXA01B36-L Output Voltage Startup Characteristic by ON/OFF
Vin = 48Vdc Load: Io = 1.67A
Ch1: Vo Ch2: Remote On/Off

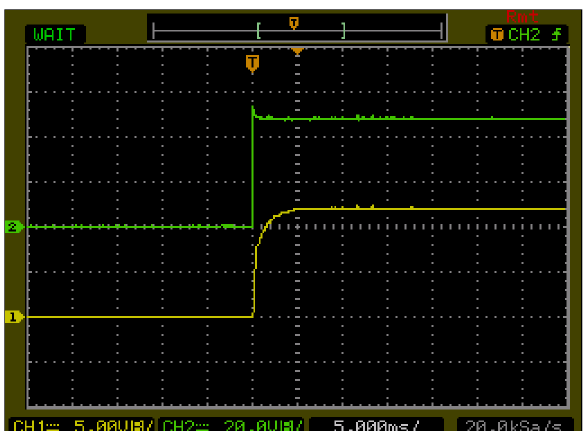


Figure 87: AXA01B36-L Output Voltage Startup Characteristic by Vin
Vin = 48Vdc Load: Io = 1.67A
Ch1: Vo Ch2: Vin

AXA01B36-L Performance Curves

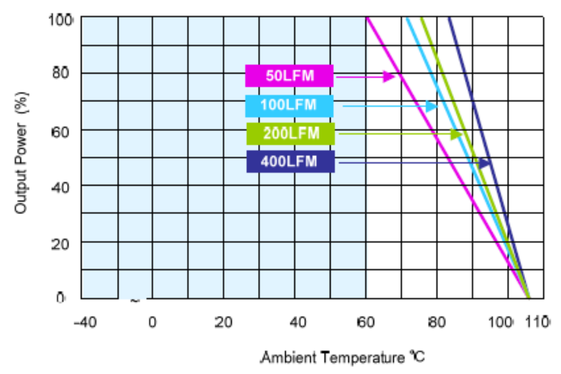


Figure 88: AXA01B36-L Derating Curves (without heatsink)
Vin = 48Vdc Load: Io = 0 to 1.67 A

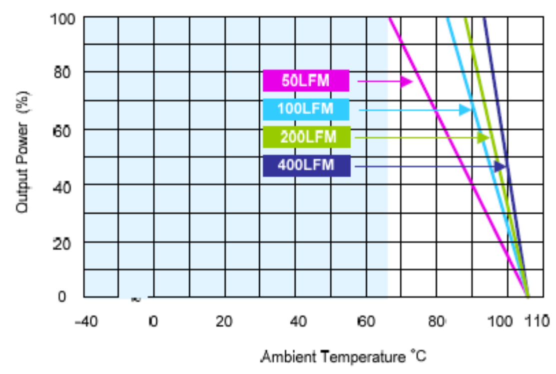


Figure 89: AXA01B36-L Derating Curves (with heatsink)
Vin = 48Vdc Load: Io = 0 to 1.67 A

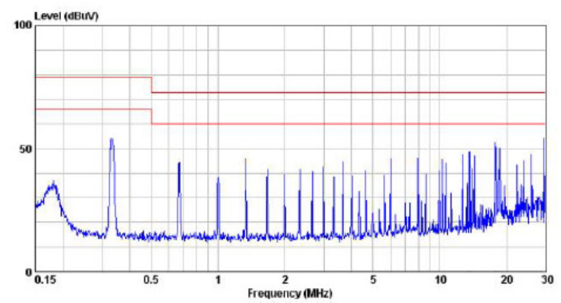


Figure 90: AXA01B36-L Conduction Emission of EN550122 Class A
Vin = 48Vdc Load: Io = 1.67 A

Note - All test conditions are at 25 ^{O}C

AXA01C36-L Performance Curves

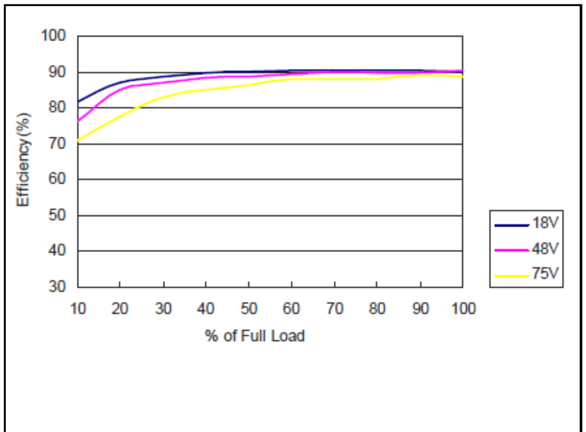


Figure 91: AXA01B36-L Efficiency Versus Output Current Curve
Vin = 18 to 75Vdc Load: Io = 0 to 1.33A

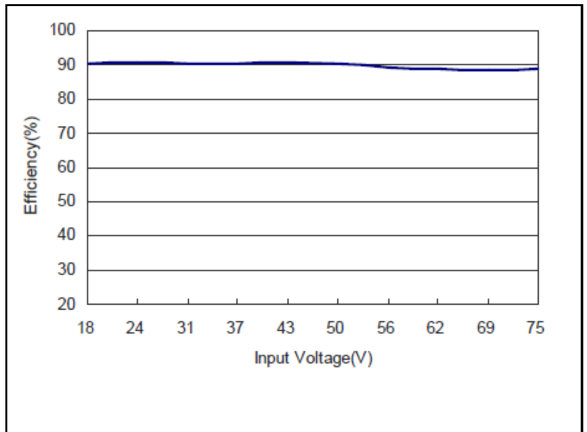


Figure 92: AXA01B36-L Efficiency Versus Input Voltage Curve
Vin = 18-75 Vdc Load: Io = 1.33A

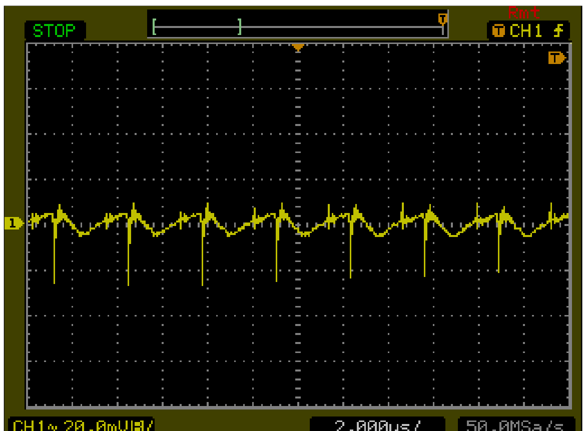


Figure 93 : AXA01B36-L Ripple and Noise Measurement
Vin = 48Vdc Load: Io = 1.33A
Ch 1: Vo

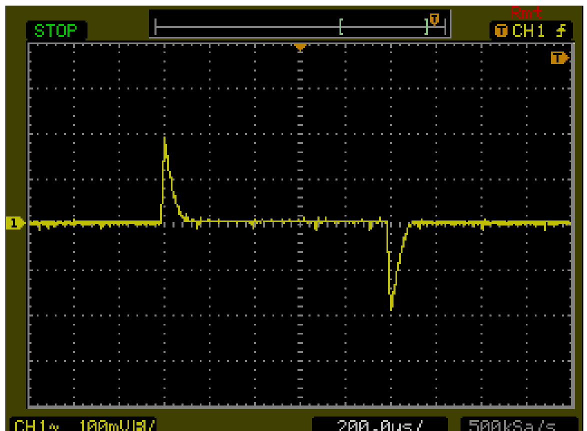


Figure 94: AXA01B36-L Transient Response
Vin = 48Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

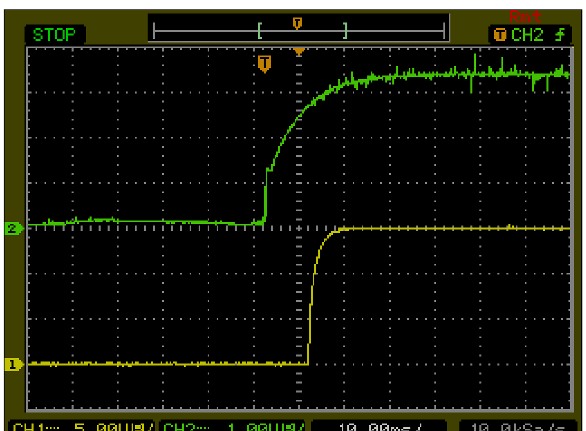


Figure 95: AXA01B36-L Output Voltage Startup Characteristic by ON/OFF
Vin = 48Vdc Load: Io = 1.33A
Ch1: Vo Ch2: Remote On/Off

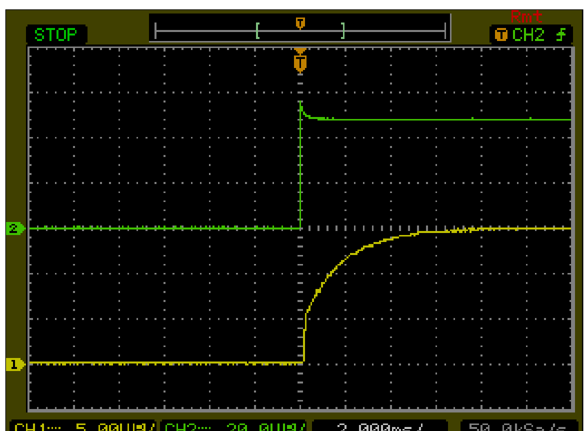


Figure 96: AXA01B36-L Output Voltage Startup Characteristic by Vin
Vin = 48Vdc Load: Io = 1.33A
Ch1: Vo Ch2: Vin

AXA01C36-L Performance Curves

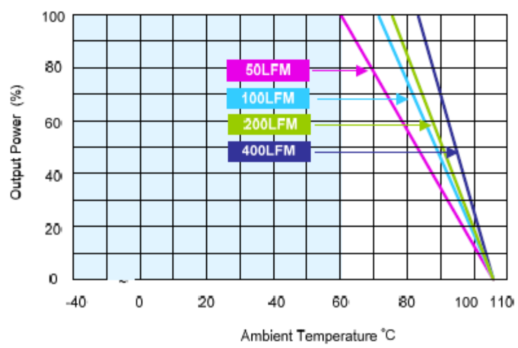


Figure 97: AXA01C36-L Derating Curves (without heatsink)
Vin = 48Vdc Load: Io = 0 to 1.33 A

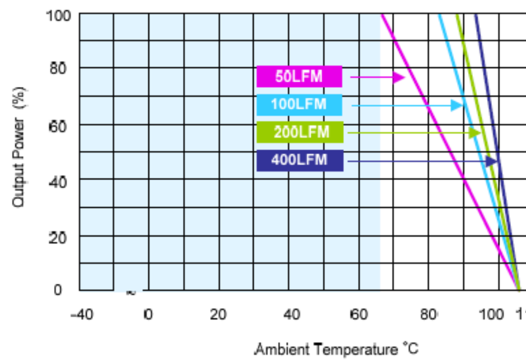


Figure 98: AXA01C36-L Derating Curves (with heatsink)
Vin = 48Vdc Load: Io = 0 to 1.33 A

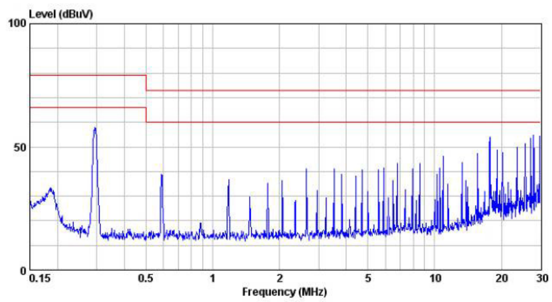


Figure 99: AXA01B36-L Conduction Emission of EN550122 Class A
Vin = 48Vdc Load: Io =1.33 A

Note - All test conditions are at 25 ^{O}C

AXA00H36-L Performance Curves

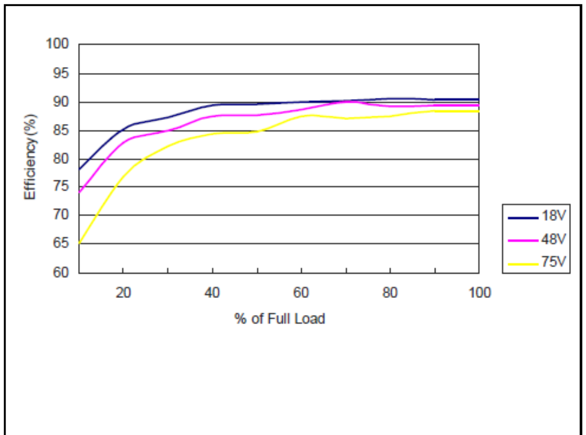


Figure 100: AXA00H36-L Efficiency Versus Output Current Curve
Vin = 18 to 75Vdc Load: Io = 0 to 0.835A

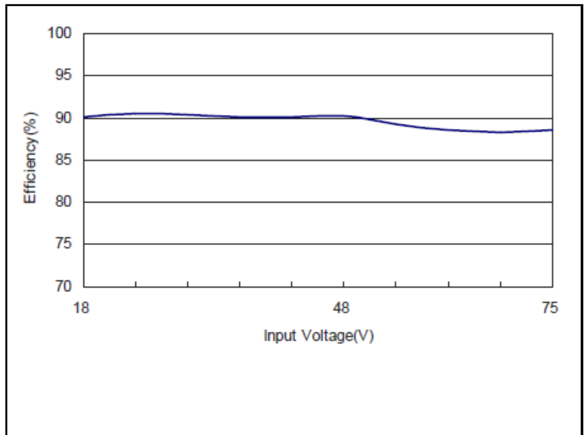


Figure 101: AXA00H36-L Efficiency Versus Input Voltage Curve
Vin = 18-75 Vdc Load: Io = 0.835A

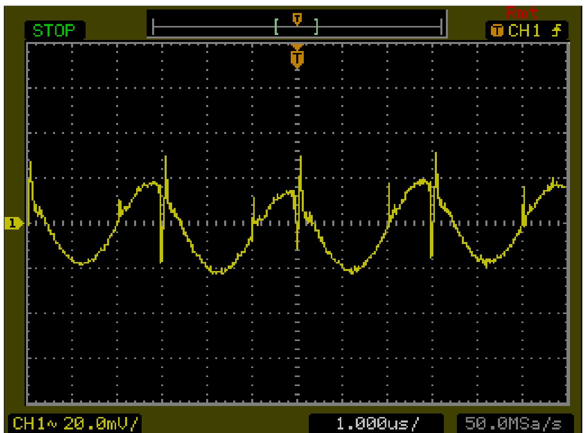


Figure 102: AXA00H36-L Ripple and Noise Measurement
Vin = 48Vdc Load: Io = 0.835A
Ch 1: Vo

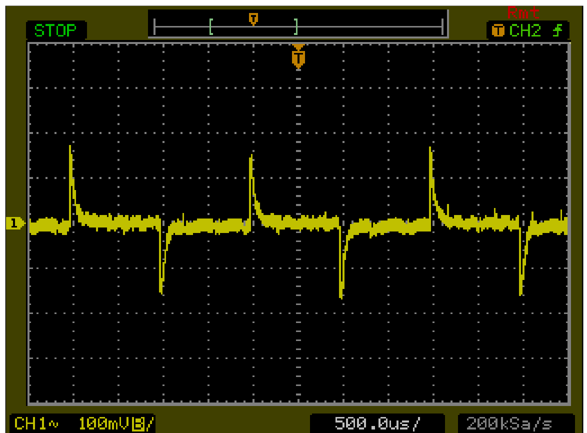


Figure 103: AXA00H36-L Transient Response
Vin = 48Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

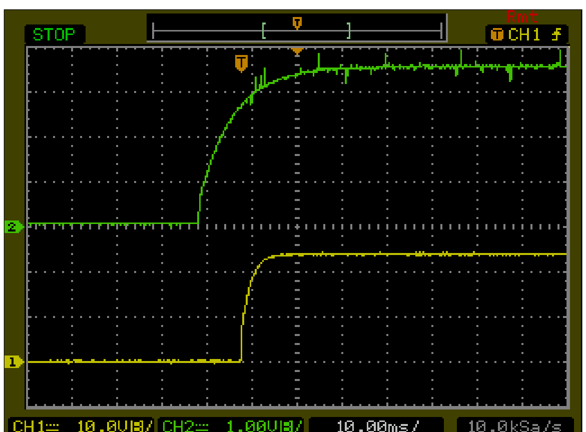


Figure 104: AXA00H36-L Output Voltage Startup Characteristic by ON/OFF
Vin = 48Vdc Load: Io = 0.835A
Ch1: Vo Ch2: Remote On/Off

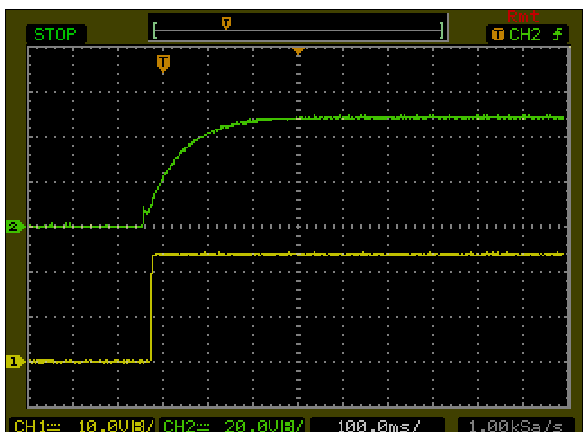


Figure 105: AXA00H36-L Output Voltage Startup Characteristic by Vin
Vin = 48Vdc Load: Io = 0.835A
Ch1: Vo Ch2: Vin

AXA00H36-L Performance Curves

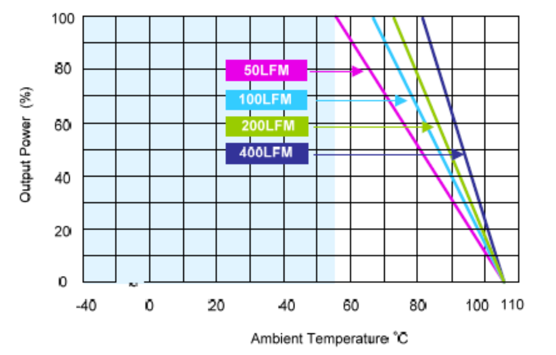


Figure 106: AXA00H36-L Derating Curves (without heatsink)
Vin = 48Vdc Load: Io = 0 to 0.835 A

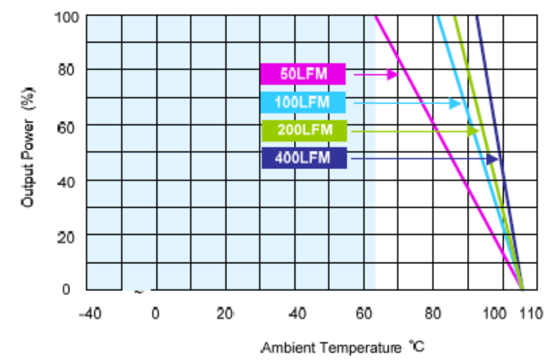


Figure 107: AXA00H36-L Derating Curves (with heatsink)
Vin = 48Vdc Load: Io = 0 to 0.835 A

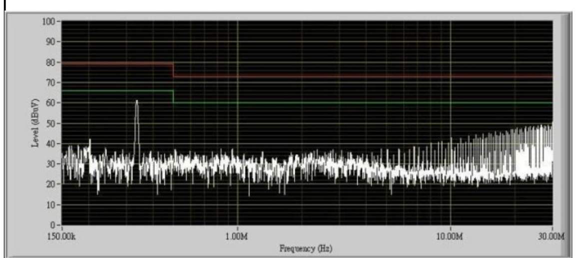


Figure 108: AXA00H36-L Conduction Emission of EN550122 Class A
Vin = 48Vdc Load: Io =0.835 A

Note - All test conditions are at 25 ^{O}C

AXA00BB36-L Performance Curves

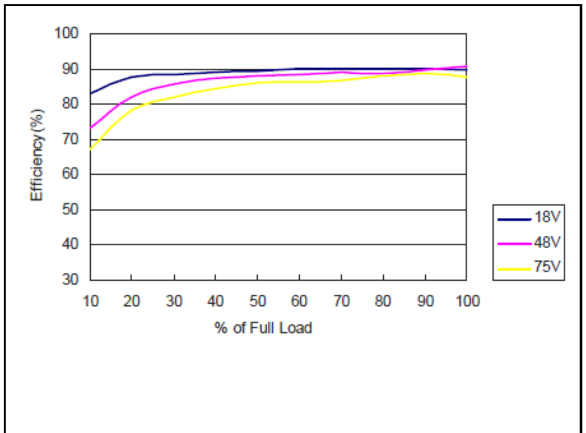


Figure 109: AXA00BB36-L Efficiency Versus Output Current Curve
Vin = 18 to 75Vdc Load: Io = 0 to ±0.835 A

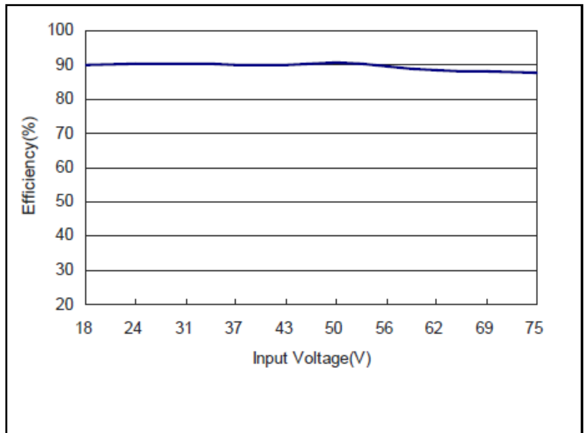


Figure 110: AXA00BB36-L Efficiency Versus Input Voltage Curve
Vin = 18-75 Vdc Load: Io = ±0.835 A

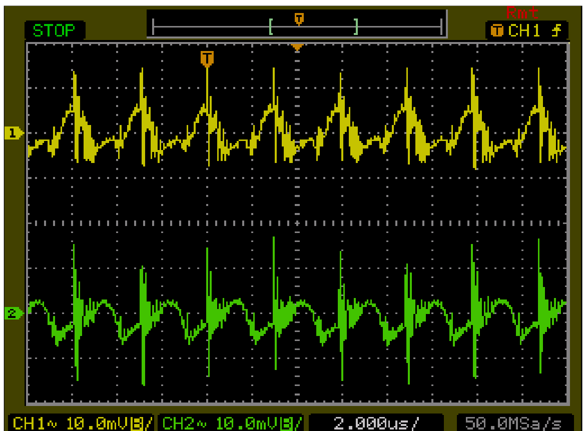


Figure 111 : AXA00BB36-L Ripple and Noise Measurement
Vin = 48Vdc Load: Io = ±0.835 A
Ch 1: Vo1 Ch2:Vo2

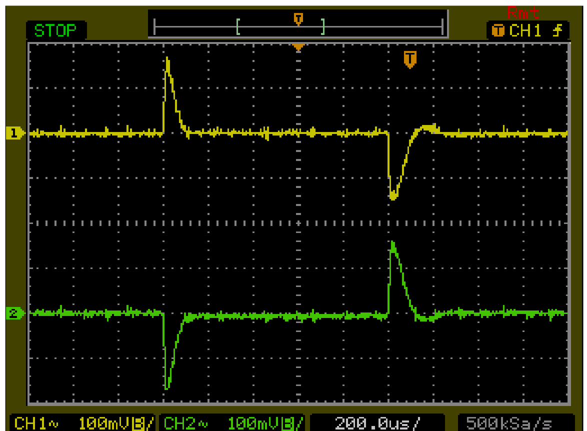


Figure 102: AXA00BB36-L Transient Response
Vin = 48Vdc Load: Io = 100% to 75% load change
Ch 1: Vo1 Ch2:Vo2

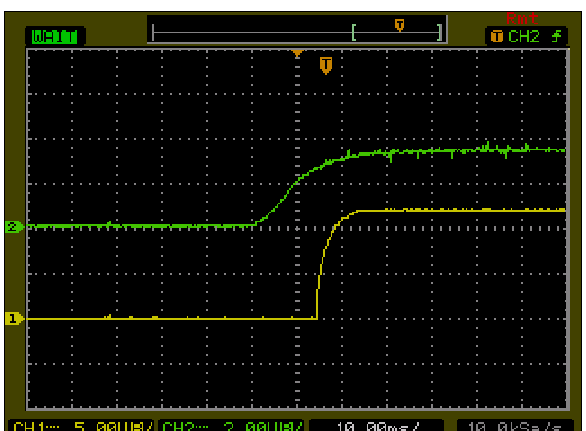


Figure 103: AXA00BB36-L Output Voltage Startup Characteristic by ON/OFF
Vin = 48Vdc Load: Io = ±0.835 A
Ch1: Vo Ch2: Remote On/Off

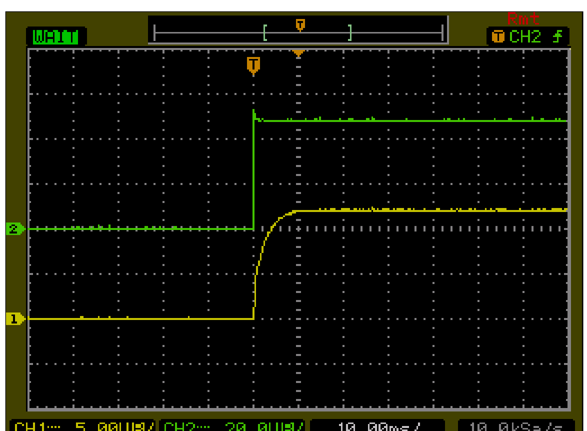


Figure 104: AXA00BB36-L Output Voltage Startup Characteristic by Vin
Vin = 48Vdc Load: Io = ±0.835 A
Ch1: Vo Ch2: Vin

AXA00BB36-L Performance Curves

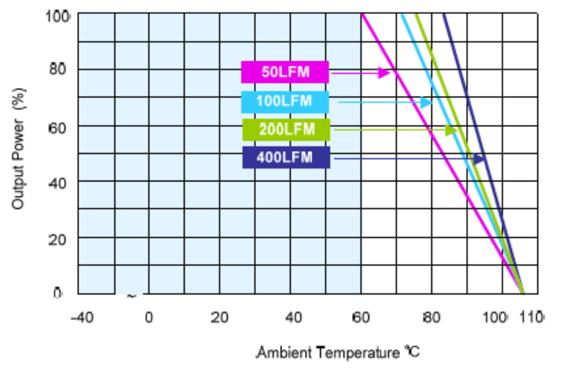


Figure 105: AXA00BB36-L Derating Curves (without heatsink)
Vin = 48Vdc Load: Io = 0 to ±0.835 A

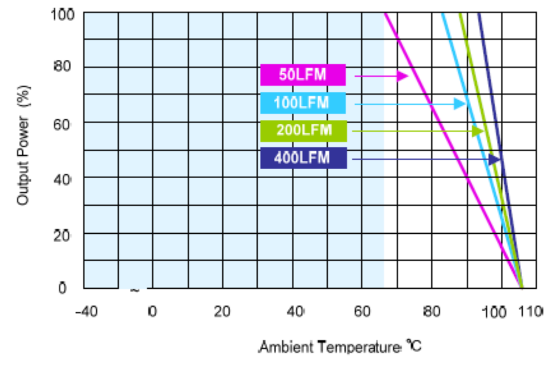


Figure 106: AXA00BB36-L Derating Curves (with heatsink)
Vin = 48Vdc Load: Io = 0 to ±0.835 A

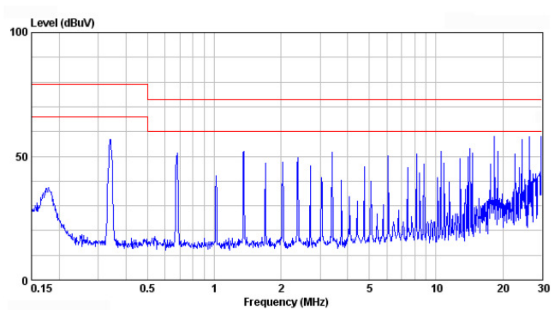


Figure 107: AXA00BB36-L Conduction Emission of EN550122 Class A
Vin = 48Vdc Load: Io = ±0.835 A

Note - All test conditions are at 25 ^{O}C

AXA00CC36-L Performance Curves

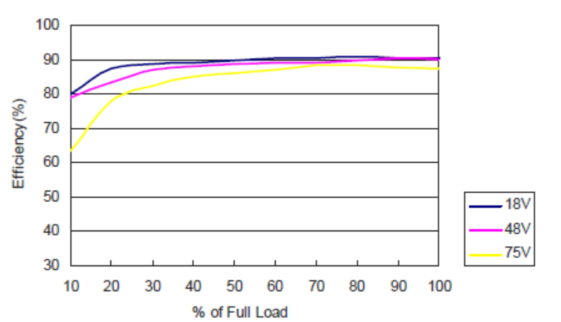


Figure 108: AXA00CC36-L Efficiency Versus Output Current Curve
Vin = 18 to 75Vdc Load: Io = 0 to ±0.67 A

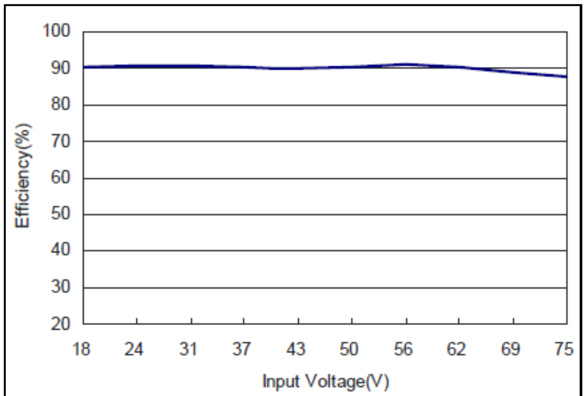


Figure 109: AXA00CC36-L Efficiency Versus Input Voltage Curve
Vin = 18-75 Vdc Load: Io = ±0.67 A

Figure 110: AXA00CC36-L Ripple and Noise Measurement
Vin = 48Vdc Load: Io = ±0.67 A
Ch 1: Vo

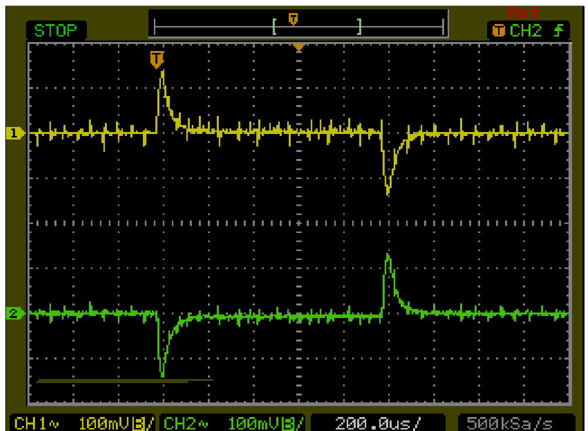


Figure 111: AXA00CC36-L Transient Response
Vin = 48Vdc Load: Io = 100% to 75% load change
Ch 1: Vo

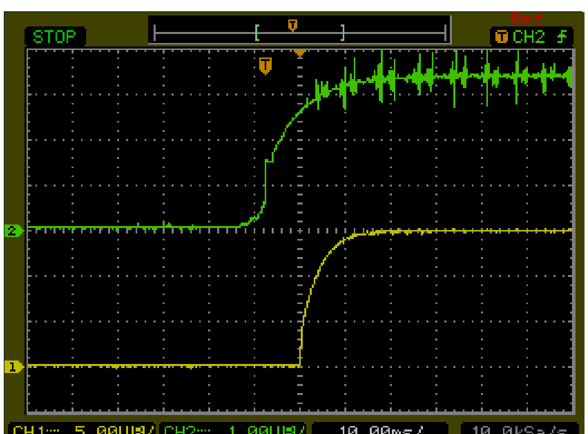


Figure 112: AXA00CC36-L Output Voltage Startup Characteristic by ON/OFF
Vin = 48Vdc Load: Io = ±0.67 A
Ch1: Vo Ch2: Remote On/Off

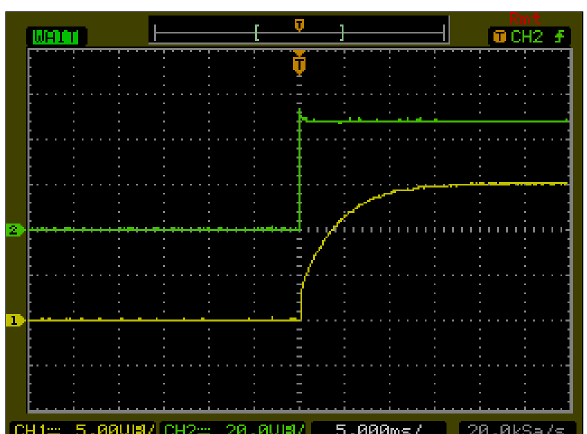


Figure 113: AXA00CC36-L Output Voltage Startup Characteristic by Vin
Vin = 48Vdc Load: Io = ±0.67 A
Ch1: Vo Ch2: Vin

AXA00CC36-L Performance Curves

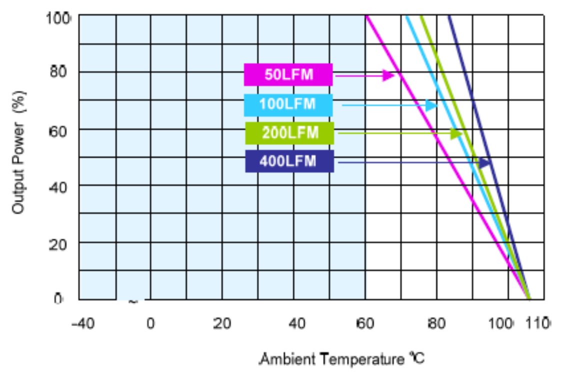


Figure 114: AXA00CC36-L Derating Curves (without heatsink)
Vin = 48Vdc Load: Io = 0 to ±0.67 A

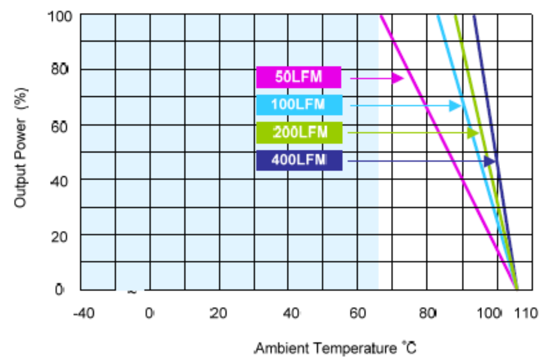


Figure 115: AXA00CC36-L Derating Curves (with heatsink)
Vin = 48Vdc Load: Io = 0 to ±0.67A

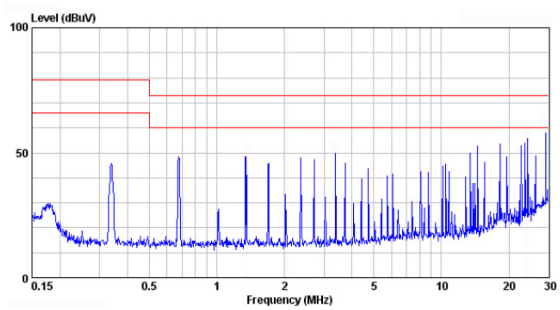
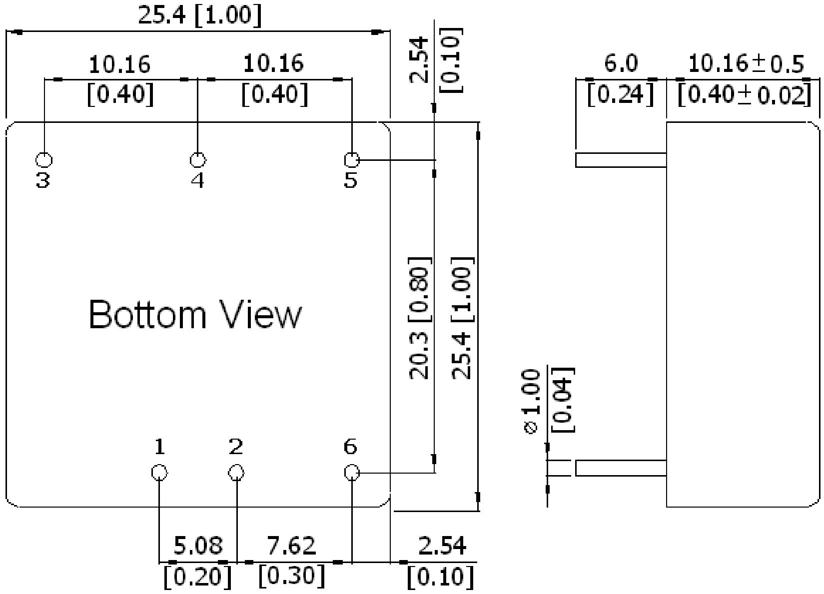


Figure 116: AXA00CC36-L Conduction Emission of EN550122 Class A
Vin = 48Vdc Load: Io = ±0.67 A

Note - All test conditions are at 25 °C

Mechanical Specifications

Mechanical Outlines



Note:
1.All dimensions in mm (inches)
2.Tolerance: X.X±0.25 (X.XX±0.01)
X.XX±0.13 (X.XXX±0.005)
3.Pin diameter 1.0 ±0.05 (0.04±0.002)

Pin Connections

Single output

Pin 1 – +Vin
Pin 2 – -Vin
Pin 3 – +Vout
Pin 4 – Trim
Pin 5 – -Vout
Pin 6 – Remote On/Off

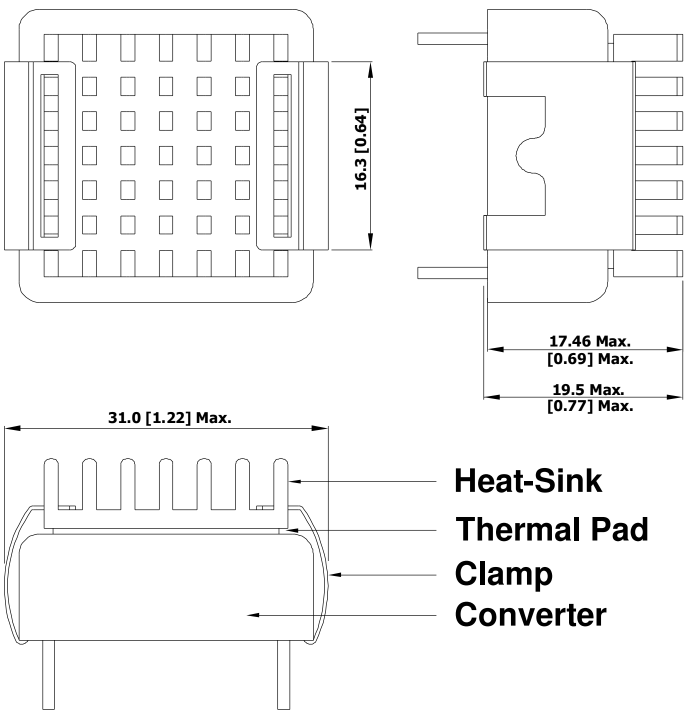
Dual Output

Pin 1 – +Vin
Pin 2 – -Vin
Pin 3 – +Vout
Pin 4 – Common
Pin 5 – -Vout
Pin 6 – Remote On/Off

Physical Characteristics

Device code suffix	L
Case Size	25.4x25.4x10.16mm (1.0x1.0x0.4 inches)
Case Material	Aluminium Alloy, Black Anodized Coating
Base Material	FR4 PCB (flammability to UL 94V-0 rated)
Pin Material	Copper Alloy with Gold Plate Over Nickel Subplate
Weight	15g

Heatsink (Option –HS)



Heatsink Material: Aluminum

Finish: Anodoc treatment (Black)

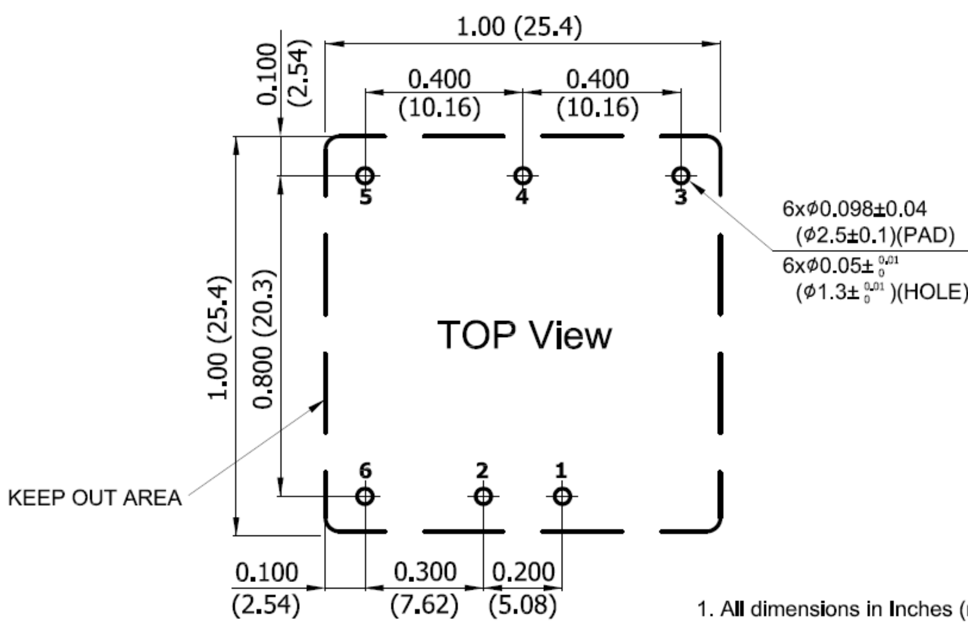
Weight: 2g

The advantages of adding a heatsink are:

1. To improve heat dissipation and increase the stability and reliability of the DC/DC converters at high operating temperatures.

2. To increase operating temperature of the DC/DC converter, please refer to Derating Curve.

Recommended Pad Layout for Single & Dual Output Converter

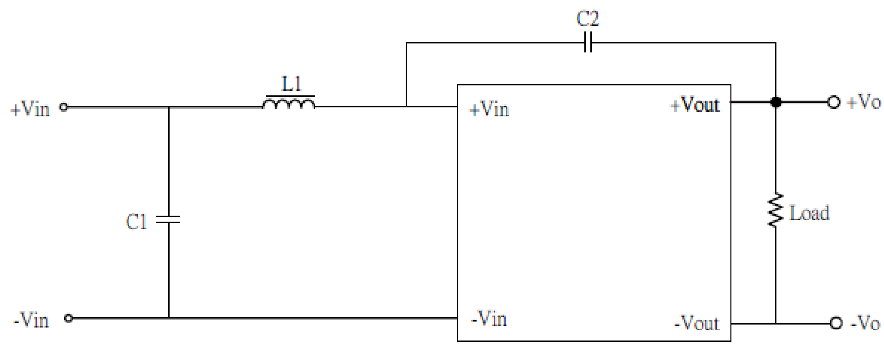


1. All dimensions in Inches (mm)
   Tolerance: X.XX±0.02" (X.X±0.5)
   X.XXX±0.01" (X.XX±0.25mm)
2. Pin pitch tolerance:±0.01" (±0.25mm)
3. Pin dimension tolerance:±0.004" (±0.1mm)

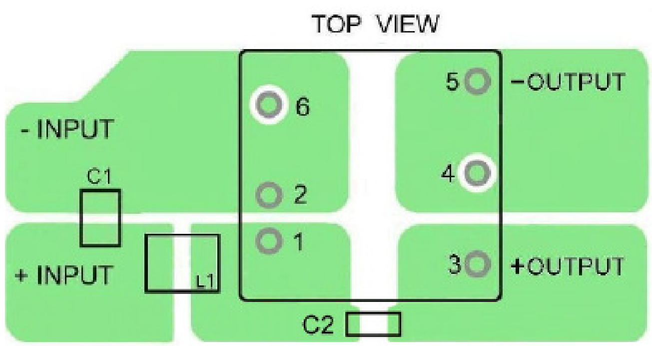
EMC Considerations

EMI-Filter to meet EN 55022, class A, FCC part 15, level

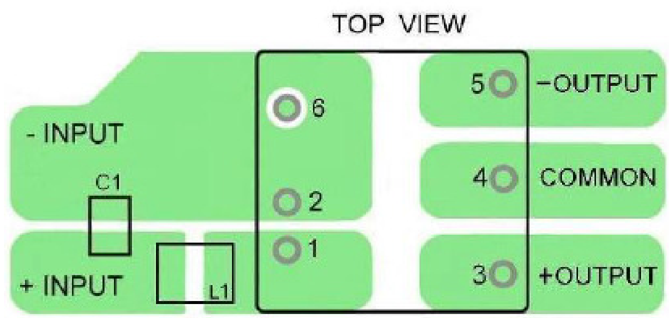
Conducted and radiated emissions EN55022 Class A



Recommended EN55022 Class A Filter



AXA Module Single output



AXA Module Dual Output

Table 4. Conducted EMI emission specifications

Model	Component	Value
AXAXXX18-L	C1	3.3µF/50V 1210 X7R MLCC
	C2	220pF/2KV 1808 MLCC
	L1	SMTDR54-6R5M-JT8
AXAXXX36-L	C1	2.2µF/100V 1210 X7R MLCC
	C2	220pF/2KV 1808 MLCC
	L1	SMTDR54-120M-JT8

Safety Certifications

The AXA power supply is intended for inclusion in other equipment and the installer must ensure that it is in compliance with all the requirements of the end application. This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.

Table 5. Safety Certifications for AXA series power supply system

Document	Description
cUL/UL 60950-1 (CSA certificate)	US and Canada Requirements
IEC/EN 60950-1 (CB-scheme)	European Requirements

Operating Temperature

Table 6. Environmental Specifications:

Parameter	Model / Condition	Min	Max: Without Heatsink	Max: With Heatsink	Unit
Operating Temperature Range Natural Convection Nominal Vin, Load 100%I_O. (for Power Derating see relative Derating Curves)	AXA04F18-L	-40	64	71	°C
	AXA04F36-L		68	74	
	AXA04AXX-L		60	67	
	AXA01BXXL		60	67	
	AXA01CXX-L		60	67	
	AXA00BBXX-L		60	67	
	AXA00CCXX-L		60	67	
	AXA00HXX-L		55	63	
Thermal Impedance	50LFM Convection without Heatsink	18.2	-	-	°C/W
	50LFM Convection with Heatsink	15.3	-	-	
	100LFM Convection without Heatsink	13.9	-	-	
	100LFM Convection with Heatsink	8.8	-	-	
	200LFM Convection without Heatsink	12.1	-	-	
	200LFM Convection with Heatsink	6.8	-	-	
	400LFM Convection without Heatsink	9.1	-	-	
	400LFM Convection with Heatsink	4.6	-	-	
Case Temperature		-	105		°C
Storage Temperature Range		-50	+125		°C
Humidity (non condensing)		-	95		%
Cooling	Free-Air convection				
RFI	Six-Sided Shielded, Metal Case				
Lead Temperature (1.5mm from case for 10Sec.)		-	260		°C

Note1 - The “natural convection” is about 20LFM but is not equal to still air (0 LFM).

MTBF and Reliability

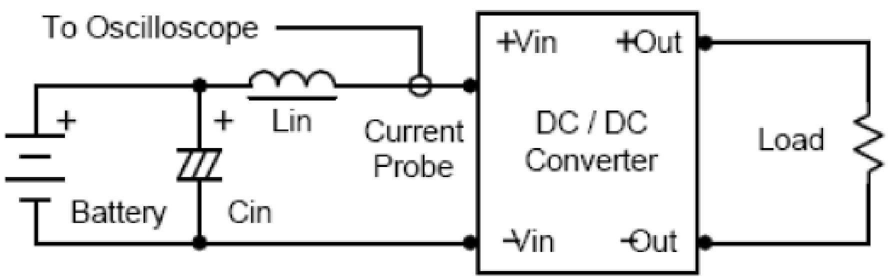
The MTBF of AXA series of DC/DC converters has been calculated using MIL-HDBK 217F NOTICE2, Operating Temperature 25 ^{O}C, Ground Benign.

Model	MTBF	Unit
AXA04F18-L	327200	Hours
AXA04A18-L	362500	
AXA01B18-L	516500	
AXA01C18-L	522100	
AXA00H18-L	647500	
AXA00BB18-L	474500	
AXA00CC18-L	506500	
AXA04F36-L	331100	
AXA04A36-L	365100	
AXA01B36-L	519100	
AXA01C36-L	620100	
AXA00H36-L	620000	
AXA00BB36-L	440900	
AXA00CC36-L	508600	

Application Notes

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with a inductor Lin (4.7µH) and Cin (220uF, ESR < 1.0Ω at 100 KHz) to simulate source impedance. Capacitor Cin, offsets possible battery impedance. Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 KHz.



Component	Value	Reference
Lin	4.7µH	-
Cin	220uF (ESR<1.0Ω at 100KHz)	Aluminum Electrolytic Capacitor

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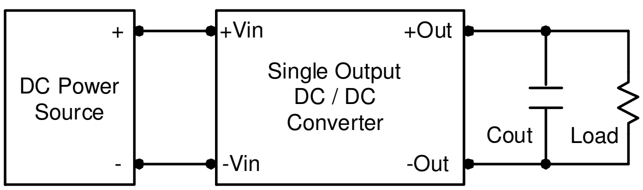
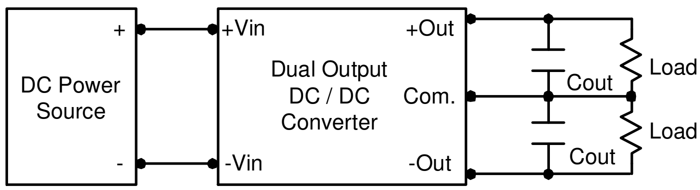
Output Ripple Reduction

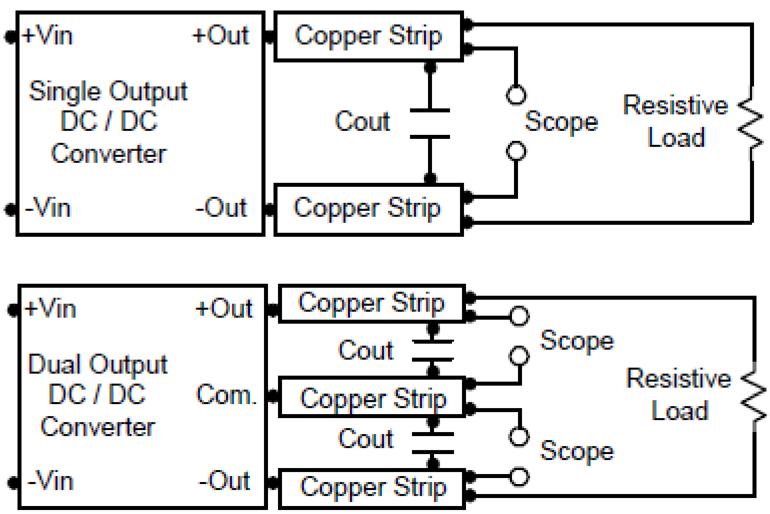
A good quality low ESR capacitor placed as close as practicable across the load will give the best ripple and noise performance. To reduce output ripple, it is recommended to use 4.7uF capacitors at the output.

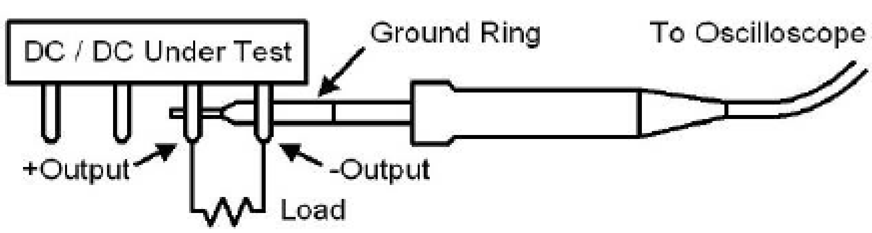




Peak-to-Peak Output Noise Measurement Test

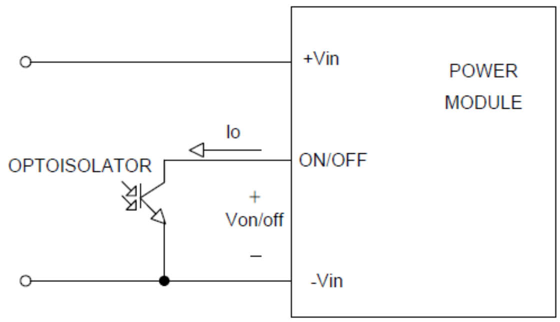
Use a 1uF ceramic capacitor and a 10uF tantalum capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20MHz. Position the load between 50 mm and 75 mm from the DC/DC Converter



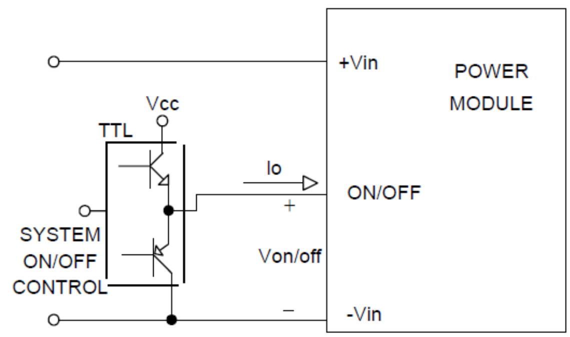


Remote ON/OFF

Positive logic remote on/off turns the module on during a logic high voltage on the remote on/off pin, and off during a logic low. To turn the power module on and off, the user must supply a switch to control the voltage between the on/off terminal and the -Vin terminal. The switch can be an open collector or equivalent. A logic low is 0V to 1.2V. A logic high is 3.5V to 12V. The maximum sink current at the on/off terminal (Pin 6) during a logic low is -500μA. The maximum allowable leakage current of a switch connected to the on/off terminal (Pin 6) at logic high (3.5V to 12V) is 10mA.



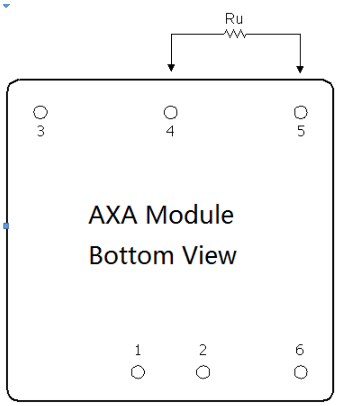
Isolated-Closure Remote ON/OFF



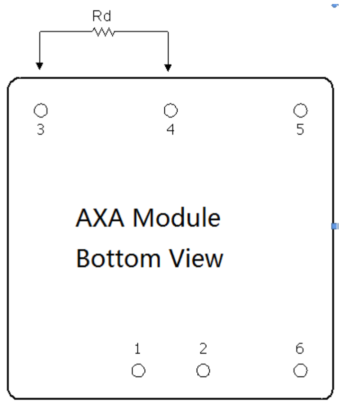
Level Control Using TTL Output

External Output Trimming

Output can be externally trimmed by using the method shown below. The trim up/down range is ±10% minimum of the nominal output voltage



Trim Up



Trim Down

AXA04FXX-L Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	72.61	32.55	19.20	12.52	8.51	5.84	3.94	2.51	1.39	0.50	KOhms
Trim up	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**%**
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	60.84	27.40	16.25	10.68	7.34	5.11	3.51	2.32	1.39	0.65	KOhms

AXA04AXX-L Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	138.88	62.41	36.92	24.18	16.53	11.44	7.79	5.06	2.94	1.24	KOhms
Trim up	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**%**
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	106.87	47.76	28.06	18.21	12.30	8.36	5.55	3.44	1.79	0.48	KOhms

AXA01BXX-L Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	413.55	184.55	108.22	70.05	47.15	31.88	20.98	12.80	6.44	1.35	KOhms
Trim up	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**%**
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	351.00	157.50	93.00	60.75	41.40	28.50	19.29	12.37	7.00	2.70	KOhms

AXA01CXX-L Trim Table

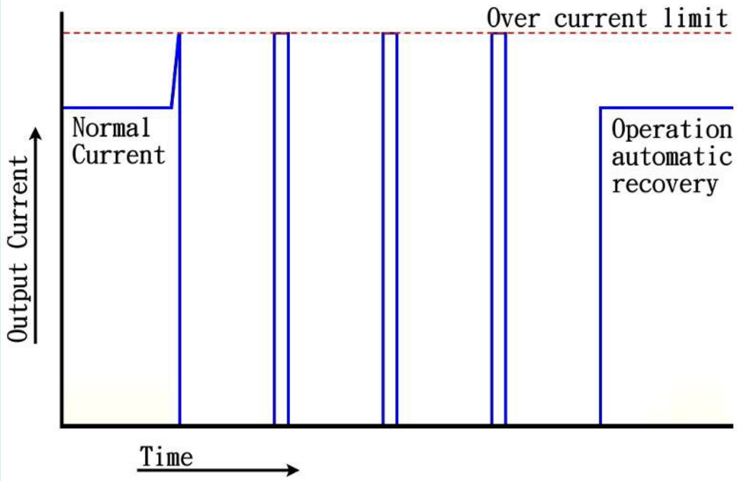
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	530.73	238.61	141.24	92.56	63.35	48.37	29.96	19.53	11.41	4.92	KOhms
Trim up	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**%**
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	422.77	189.89	112.26	73.44	50.15	34.63	23.54	15.22	8.75	3.58	KOhms

AXA00HXX-L Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	598.66	267.78	157.49	102.34	69.25	47.19	31.44	19.62	10.43	3.08	KOhms
Trim up	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**%**
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	487.14	218.31	128.31	83.46	56.55	38.61	25.19	16.18	8.70	2.72	KOhms

Overcurrent Protection

The AXA series converters contain hiccup mode output over current protection that prevents damage to the product in the event of an overload or a short circuit. Normally, over current is maintained at approximately 150 percent of rated current for AXA series. Depending upon the converter design, there are other ways of protecting the converter against over current conditions such as the constant current limiting or current foldback methods. With “hiccup” over current protection, the converter shuts off upon an occurrence of an over current condition. After a brief time interval, it automatically tries to restart the converter. If the restart is successful, normal operation continues. If the over current condition still exists, the converter will shut off again. With a sustained over current condition, such as a short circuit on the output, this automatic retry behavior will result in periodic pulses of current and voltage on the output. The output current waveform with hiccup over current protection is shown in figure below.



Hiccup operation has none of the drawbacks of the other two protection methods, although its circuit is more complicated because it requires a timing circuit. The excess heat due to overload lasts for only a short duration in the hiccup cycle, hence the junction temperature of the power devices is much lower. The hiccup operation can be done in various ways. For example, one can start hiccup operation any time once an over-current event is detected; or prohibit hiccup during a designated start-up is usually larger than normal operation and it is easier for an over-current event is detected; or prohibit hiccup during a designated start-up interval (usually a few milliseconds). The reason for the latter operation is that during start-up, the converter needs to provide extra current to charge up the output capacitor. Thus the current demand during start-up is usually larger than during normal operation and it is easier for an over-current event to occur. If the converter starts to hiccup once there is an over-current, it might never start up successfully. Hiccup mode protection will give the best protection for a converter against over current situations, since it will limit the average current to the load at a low level, so reducing power dissipation and case temperature in the power devices.

Overvoltage Protection

The output overvoltage clamp consists of control circuitry, which is independent of the primary regulation loop, that monitors the voltage on the output terminals.

The control loop of the clamp has a higher voltage set point than the primary loop. This provides a redundant voltage control that reduces the risk of output overvoltage. The OVP level can be found in the output data.

Short Circuitry Protection

Continuous, hiccup and auto-recovery mode.

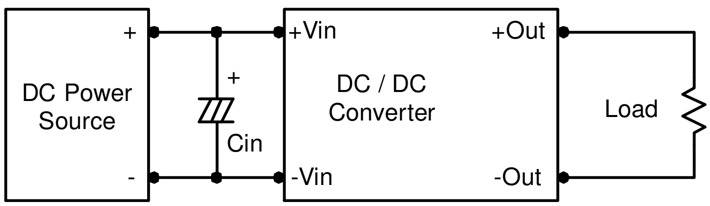
During short circuit, converter still shut down, The average current during this condition will be very low and the device will be safe in this condition.

Input Source Impedance

The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.

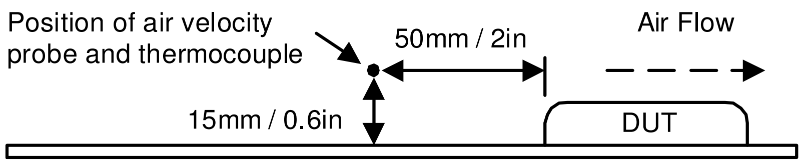
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.

Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100 KHz) capacitor of a 10μF for the 24V and 48V devices



Thermal Considerations

Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 105^{O}C. The derating curves are determined from measurements obtained in a test setup.



Maximum Capacitive Load

The AXA series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. The maximum capacitance can be found in the data sheet.

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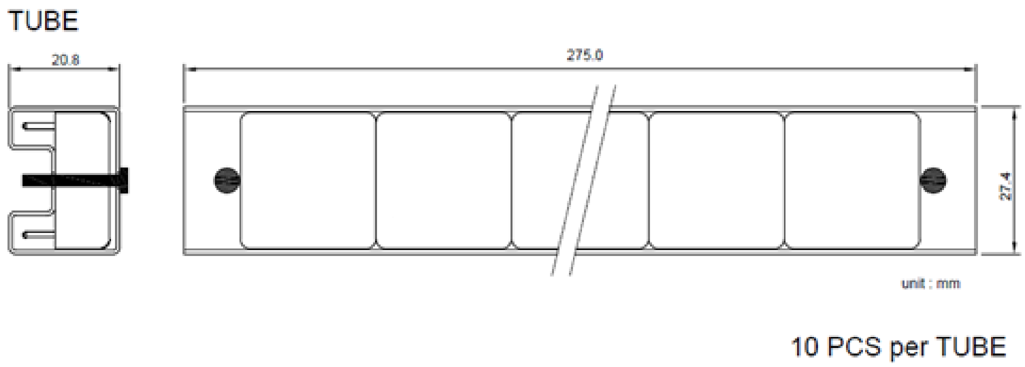
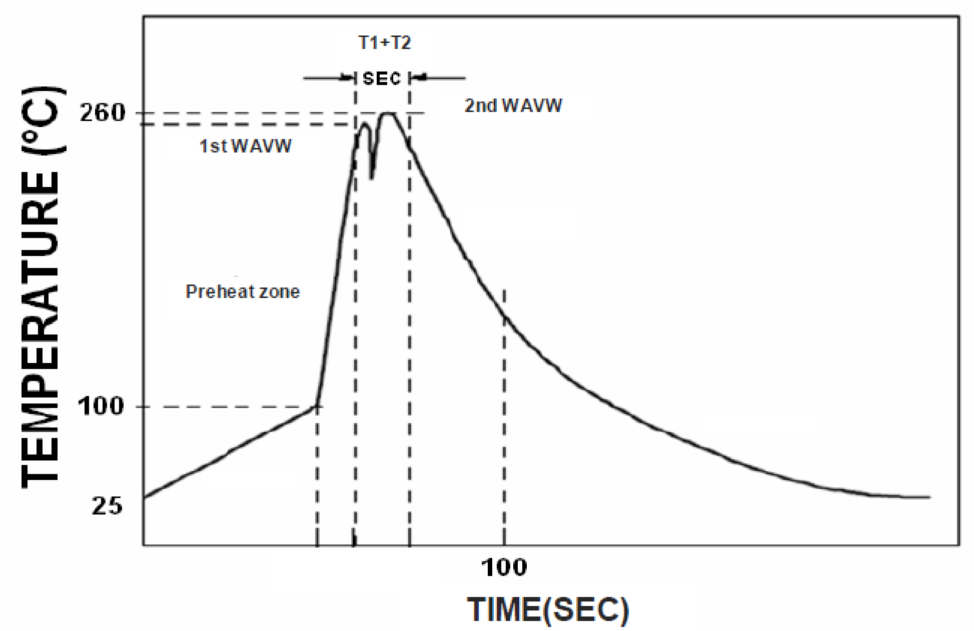
Packaging Information



Soldering and Reflow Considerations

Lead free wave solder profile for AXA Series



Zone	Reference Parameter
Preheat zone	Rise temp speed：3°C/sec max.
	Preheat temp : 100~130°C
Actual heating	Peak temp: 250~260°C Peak Time
	Peak time(T1+T2)：4~6 sec

Reference Solder: Sn-Ag-Cu：Sn-Cu：Sn-Ag
Hand Welding: Soldering iron：Power 60W
Welding Time: 2~4 sec
Temp.: 380~400 °C

Weight

The AXA series weight is 15g maximum.