



Your Power Partner

Series AM1LS-NZ-E

1 Watt | DC-DC Converter



FEATURES:

- SMD Package
- Single Output Models
- Low Ripple and Noise
- Industry Standard Pinout
- Input / Output Isolation 1500 & 3000 VDC
- Operating Temperature -40°C to +105°C
- RoHS Compliant
- Continuous Short Circuit Protection †

Models Single output



Model	Input Voltage (V)	Output Voltage (V)	Output Current Max / Min (mA)	Isolation (VDC)	Input Current Max No Load (mA)	Max Capacitive Load (µF)	Efficiency (%) (Typ.)
AM1LS-0303S-NZ-E†	2.97-3.63	3.3	303 / 30	1500	404 25	220	69
AM1LS-0305S-NZ-E†#	2.97-3.63	5	200 / 20	1500	404 25	220	74
AM1LS-0309S-NZ-E†	2.97-3.63	9	111 / 12	1500	404 25	220	80
AM1LS-0312S-NZ-E†	2.97-3.63	12	84 / 9	1500	404 25	220	80
AM1LS-0315S-NZ-E†	2.97-3.63	15	67 / 7	1500	404 25	220	80
AM1LS-0324S-NZ-E†	2.97-3.63	24	42 / 4	1500	404 25	220	80
AM1LS-0503S-NZ-E#	4.5-5.5	3.3	303 / 30	1500	250 20	220	72
AM1LS-0505S-NZ-E#	4.5-5.5	5	200 / 20	1500	250 20	220	80
AM1LS-0506S-NZ-E#	4.5-5.5	6	167 / 17	1500	250 20	220	80
AM1LS-0509S-NZ-E#	4.5-5.5	9	111 / 12	1500	250 20	220	80
AM1LS-0512S-NZ-E#	4.5-5.5	12	84 / 9	1500	250 20	220	80
AM1LS-0515S-NZ-E#	4.5-5.5	15	67 / 7	1500	250 20	220	80
AM1LS-0524S-NZ-E†#	4.5-5.5	24	42 / 4	1500	250 20	220	80
AM1LS-1203S-NZ-E#	10.8-13.2	3.3	303 / 30	1500	104 15	220	72
AM1LS-1205S-NZ-E#	10.8-13.2	5	200 / 20	1500	104 15	220	80
AM1LS-1209S-NZ-E#	10.8-13.2	9	111 / 12	1500	104 15	220	80
AM1LS-1212S-NZ-E#	10.8-13.2	12	84 / 9	1500	104 15	220	80
AM1LS-1215S-NZ-E#	10.8-13.2	15	67 / 7	1500	104 15	220	80
AM1LS-1224S-NZ-E	10.8-13.2	24	42 / 4	1500	104 15	220	80
AM1LS-1505S-NZ-E	13.5-16.5	5	200 / 20	1500	82 10	220	80
AM1LS-1509S-NZ-E	13.5-16.5	9	111 / 12	1500	82 10	220	80
AM1LS-1515S-NZ-E	13.5-16.5	15	67 / 7	1500	82 10	220	80
AM1LS-2403S-NZ-E†	21.6-26.4	3.3	303 / 30	1500	52 7	220	71
AM1LS-2405S-NZ-E†#	21.6-26.4	5	200 / 20	1500	52 7	220	80
AM1LS-2409S-NZ-E†#	21.6-26.4	9	111 / 12	1500	52 7	220	80
AM1LS-2412S-NZ-E†	21.6-26.4	12	84 / 9	1500	52 7	220	80
AM1LS-2415S-NZ-E†#	21.6-26.4	15	67 / 7	1500	52 7	220	80
AM1LS-2424S-NZ-E†#	21.6-26.4	24	42 / 4	1500	52 7	220	80
AM1LS-0303SH30-NZ-E†	2.97-3.63	3.3	303 / 30	3000	404 25	220	69
AM1LS-0305SH30-NZ-E†#	2.97-3.63	5	200 / 20	3000	404 25	220	74
AM1LS-0503SH30-NZ-E#	4.5-5.5	3.3	303 / 30	3000	250 20	220	72
AM1LS-0505SH30-NZ-E#	4.5-5.5	5	200 / 20	3000	250 20	220	80
AM1LS-0509SH30-NZ-E#	4.5-5.5	9	111 / 12	3000	250 20	220	80
AM1LS-0512SH30-NZ-E#	4.5-5.5	12	84 / 9	3000	250 20	220	80
AM1LS-0515SH30-NZ-E#	4.5-5.5	15	67 / 7	3000	250 20	220	80
AM1LS-0524SH30-NZ-E†#	4.5-5.5	24	42 / 4	3000	250 20	220	80
AM1LS-1203SH30-NZ-E#	10.8-13.2	3.3	303 / 30	3000	104 15	220	72
AM1LS-1205SH30-NZ-E#	10.8-13.2	5	200 / 20	3000	104 15	220	80
AM1LS-1209SH30-NZ-E#	10.8-13.2	9	111 / 12	3000	104 15	220	80
AM1LS-1212SH30-NZ-E#	10.8-13.2	12	84 / 9	3000	104 15	220	80
AM1LS-1215SH30-NZ-E#	10.8-13.2	15	67 / 7	3000	104 15	220	80
AM1LS-1224SH30-NZ-E	10.8-13.2	24	42 / 4	3000	104 15	220	80
AM1LS-1515SH30-NZ-E	13.5-16.5	15	67 / 7	3000	82 10	220	80
AM1LS-2405SH30-NZ-E†#	21.6-26.4	5	200 / 20	3000	52 7	220	80
AM1LS-2409SH30-NZ-E†#	21.6-26.4	9	111 / 12	3000	52 7	220	80
AM1LS-2415SH30-NZ-E†#	21.6-26.4	15	67 / 7	3000	52 7	220	80
AM1LS-2424SH30-NZ-E†#	21.6-26.4	24	42 / 4	3000	52 7	220	80

Models
Dual output

Model	Input Voltage (V)	Output Voltage (V)	Output Current Max / Min (mA)	Isolation (VDC)	Input Current Max No Load (mA)		Max Capacitive Load(μF)	Efficiency (%)
AM1LS-0305D-NZ-E‡	2.97-3.63	±5	±100 / ±10	1500	389	25	100	76
AM1LS-0312D-NZ-E‡	2.97-3.63	±12	±42 / ±5	1500	389	25	100	77
AM1LS-0315D-NZ-E‡	2.97-3.63	±15	±33 / ±3	1500	389	25	100	78
AM1LS-0505D-NZ-E#	4.5-5.5	±5	±100 / ±10	1500	250	20	100	80
AM1LS-0509D-NZ-E#	4.5-5.5	±9	±56 / ±6	1500	250	20	100	80
AM1LS-0512D-NZ-E#	4.5-5.5	±12	±42 / ±5	1500	250	20	100	79
AM1LS-0515D-NZ-E#	4.5-5.5	±15	±33 / ±3	1500	250	20	100	81
AM1LS-0524D-NZ-E‡#	4.5-5.5	±24	±21 / ±2	1500	250	20	100	81
AM1LS-1205D-NZ-E#	10.8-13.2	±5	±100 / ±10	1500	104	15	100	80
AM1LS-1209D-NZ-E#	10.8-13.2	±9	±56 / ±6	1500	104	15	100	80
AM1LS-1212D-NZ-E#	10.8-13.2	±12	±42 / ±5	1500	104	15	100	81
AM1LS-1215D-NZ-E#	10.8-13.2	±15	±33 / ±3	1500	104	15	100	81
AM1LS-1224D-NZ-E#	10.8-13.2	±24	±21 / ±2	1500	104	15	100	81
AM1LS-1515D-NZ-E	13.5-16.5	±15	±33 / ±3	1500	83	12	100	81
AM1LS-2405D-NZ-E‡#	21.6-26.4	±5	±100 / ±10	1500	52	10	100	80
AM1LS-2409D-NZ-E‡#	21.6-26.4	±9	±56 / ±6	1500	52	10	100	80
AM1LS-2412D-NZ-E‡#	21.6-26.4	±12	±42 / ±5	1500	52	10	100	81
AM1LS-2415D-NZ-E‡#	21.6-26.4	±15	±33 / ±3	1500	51	10	100	82
AM1LS-2424D-NZ-E‡#	21.6-26.4	±24	±21 / ±2	1500	51	10	100	80
AM1LS-0305DH30-NZ-E‡	2.97-3.63	±5	±100 / ±10	3000	389	25	100	76
AM1LS-0312DH30-NZ-E‡	2.97-3.63	±12	±42 / ±5	3000	389	25	100	77
AM1LS-0505DH30-NZ-E#	4.5-5.5	±5	±100 / ±10	3000	250	20	100	80
AM1LS-0509DH30-NZ-E#	4.5-5.5	±9	±56 / ±6	3000	250	20	100	80
AM1LS-0512DH30-NZ-E#	4.5-5.5	±12	±42 / ±5	3000	250	20	100	79
AM1LS-0515DH30-NZ-E#	4.5-5.5	±15	±33 / ±3	3000	250	20	100	81
AM1LS-0524DH30-NZ-E‡#	4.5-5.5	±24	±21 / ±2	3000	250	20	100	81
AM1LS-1205DH30-NZ-E#	10.8-13.2	±5	±100 / ±10	3000	104	15	100	80
AM1LS-1209DH30-NZ-E#	10.8-13.2	±9	±56 / ±6	3000	104	15	100	80
AM1LS-1212DH30-NZ-E#	10.8-13.2	±12	±42 / ±5	3000	104	15	100	81
AM1LS-1215DH30-NZ-E#	10.8-13.2	±15	±33 / ±3	3000	104	15	100	81
AM1LS-1224DH30-NZ-E#	10.8-13.2	±24	±21 / ±2	3000	104	15	100	81
AM1LS-1515DH30-NZ-E	13.5-16.5	±15	±33 / ±3	3000	83	12	100	81
AM1LS-2405DH30-NZ-E‡#	21.6-26.4	±5	±100 / ±10	3000	52	10	100	80
AM1LS-2409DH30-NZ-E‡#	21.6-26.4	±9	±56 / ±6	3000	52	10	100	80
AM1LS-2412DH30-NZ-E‡#	21.6-26.4	±12	±42 / ±5	3000	52	10	100	81
AM1LS-2415DH30-NZ-E‡#	21.6-26.4	±15	±33 / ±3	3000	52	10	100	82
AM1LS-2424DH30-NZ-E‡#	21.6-26.4	±24	±21 / ±2	3000	52	10	100	76

‡ With Momentary short circuit protection of 1 second

NOTE 1: Add suffix "TR" to a part number when ordering in tape and reel package

NOTE: All specifications in this datasheet are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified.

Input Specifications

Parameters	Nominal	Typical	Maximum	Units
Voltage Range	3.3	2.97-3.63		VDC
	5	4.5-5.5		
	12	10.8-13.2		
	15	13.5-16.5		
	24	21.6-26.4		

Absolute Max Input Voltage (1 sec max)	3.3 Vin 5 Vin 12 Vin 15 Vin 24 Vin		5 9 18 21 30	VDC
Filter	Capacitor			
Input Reflected Ripple Current		15		mA

Isolation Specifications

Parameters	Conditions	Typical	Maximum	Units
Tested I/O Voltage	60 sec	1500 3000		VDC
Resistance	500VDC	>1000		MOhm
Capacitance		20		pF

Output Specifications

Parameters	Conditions	Typical	Maximum	Units
Voltage Accuracy	100% load (see tolerance chart)	±5		%
Short Circuit Protection	Continuous, unless marked with ‡			
Short Circuit Restart	Auto-Recovery			
Line Voltage Regulation	For ±1% of Vin 3.3V models only	±1.2 ±1.5		% of Vin
Load Voltage Regulation (10% - 100% Load)	3.3V	18	20	%
	5 V	12	15	
	6 V	10	13	
	9 V	8	10	
	12 V	7	10	
	15 V	6	10	
24 V	5	10		
Temperature Coefficient	100% load	±0.03		%/°C
Ripple & Noise	20MHz bandwidth	60	150	mV p-p

General Specifications

Parameters	Conditions	Typical	Maximum	Units
Switching frequency	100% load	100		KHz
Operating temperature	With derating above +100		-40 to +105	°C
Storage temperature		-55 to +125		°C
Cooling	Free air convection			
Storage Humidity	Non Condensing		95	% RH
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1		Level 2	
Case material	Epoxy resin (UL94-V0)			
Weight		Single 1.6 Dual 2.0		g
Dimensions (L x W x H)	Single Output Models	0.50 x 0.44 x 0.28inches	12.70 x 11.20 x 7.25mm	
	Dual Output Models	0.60 x 0.44 x 0.28 inches	15.24 x 11.20 x 7.25 mm	
MTBF	>3500Khrs (MIL-HDBK -217F, Ground Benign, t=+25°C)hours			
Maximum soldering temperature	1.5mm from case for 10 sec		300	°C
	Reflow Soldering	Peak temp.≤245°C, maximum duration time≤60s at 217°C		
Maximum case temperature			130	°C

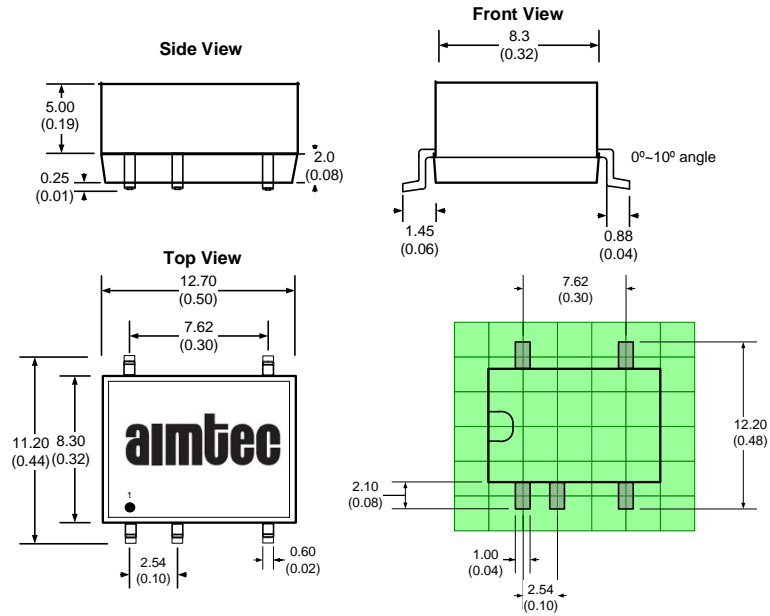
Safety Specifications

Parameters			
Agency approvals	UL 60950-1		cULus (the models marked with # only)
Standards	EMI - Conducted and radiated emission		CISPR32/EN55032, class B (with the recommended EMC circuit)
	Electrostatic Discharge Immunity	Dual Output	IEC 61000-4-2, Contact ±6kV, Criteria B
		Single Output	IEC 61000-4-2, Contact ±8kV, Criteria B

Pin Out Specifications and Dimensions

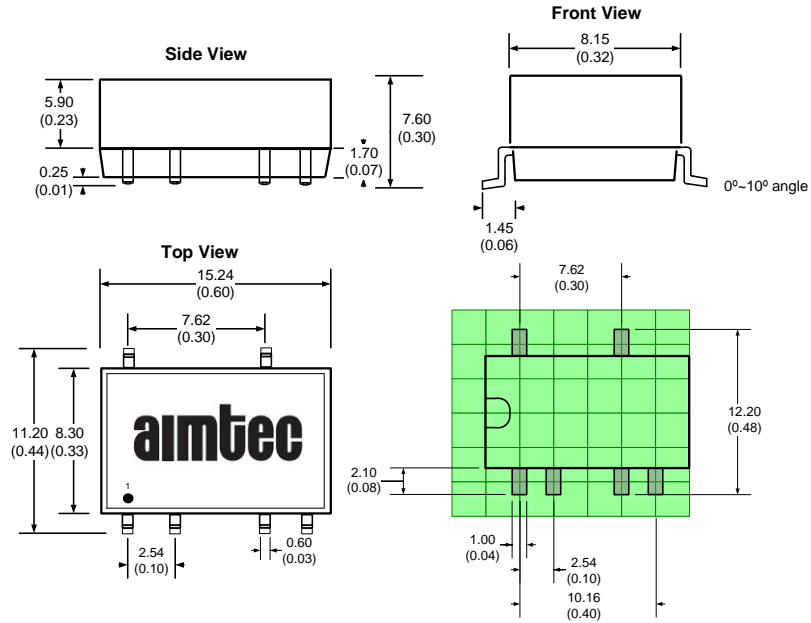
Pin	Single
1	- V Input
2	+ V Input
3	No Pin
4	-V Output
5	+V Output
6	No Pin
7	No Pin
8	N.C.

Single Output Models



Pin	Dual Output Models
1	-V Input
2	+V Input
3	No Pin
4	Common
5	-V Output
6	No Pin
7	+V Output
8	No Pin
9	No Pin
10	N.C.

Dual Output Models

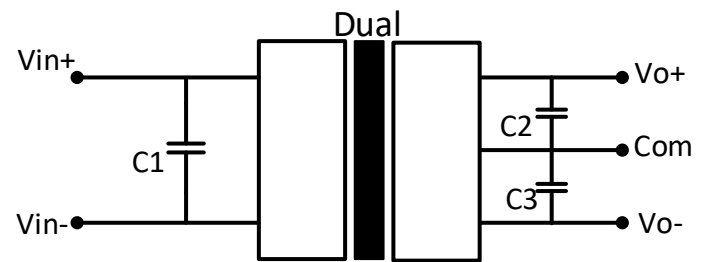
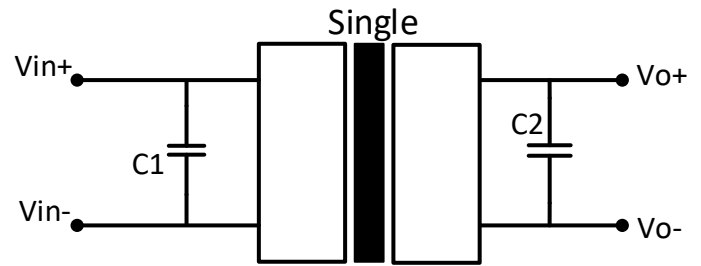


Typical Application Circuits

Capacitor selection Table

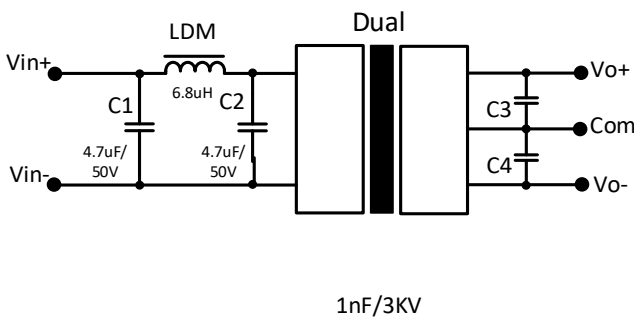
Vin	C1	Single VDC	C2	Dual VDC	C2/C3
3.3	4.7 μ F	3.3 V	10 μ F	\pm 3.3	4.7 μ F
5	4.7 μ F	5V/6V	10 μ F	\pm 5V	2.2 μ F
		9 V	4.7 μ F	\pm 9V	
12	2.2 μ F	12 V	2.2 μ F	\pm 12 V	1 μ F
15	2.2 μ F	15 V	1 μ F	\pm 15 V	1 μ F
24	1 μ F	24V	0.47 μ F	\pm 24 V	0.47 μ F

- 1) Ensure output load of Min 10%, or specifications may not be met
- 2) Under normal operation, there is no protection for overload condition
- 3) Converter may exhibit start up delay if capacitive load exceeds recommended
- 4) Ceramic or electrolytic type capacitors are recommended, tantalum type may damage converter
- 5) Parallel connections, or hot swapping is not recommended

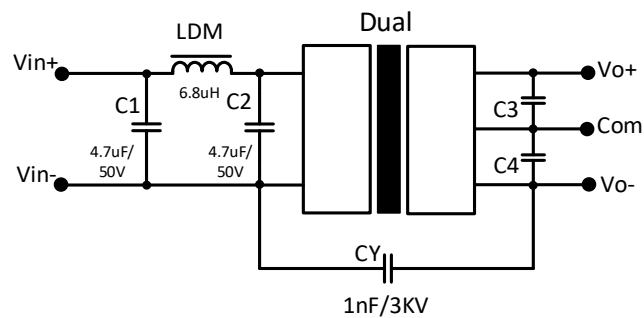


EMI Recommended Circuit for dual output models(Class B)

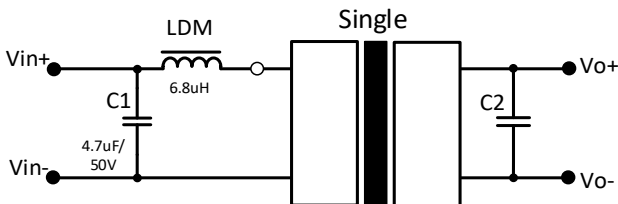
For 3.3/5/12 input models



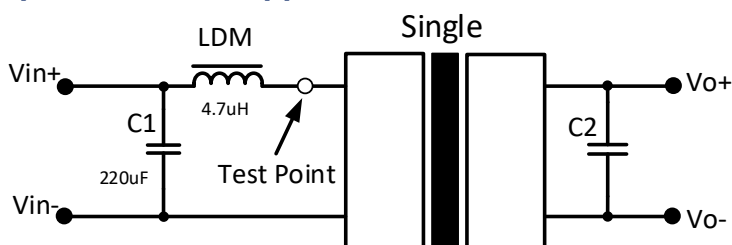
For 15/24 input models



EMI Recommended Circuit for single output models(Class B)

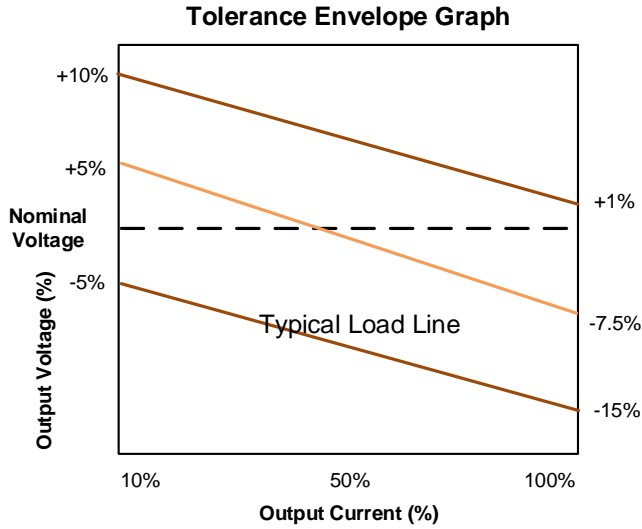


Input Reflected Ripple Current Test Circuit

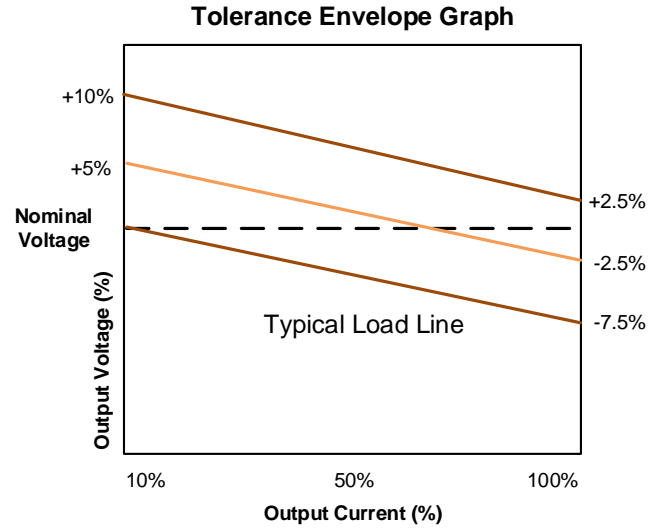


Load Accuracy Tolerance Graph

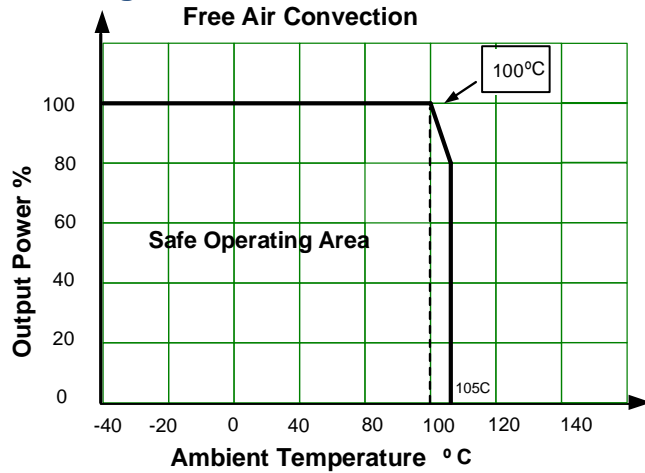
For 3.3VDC single output



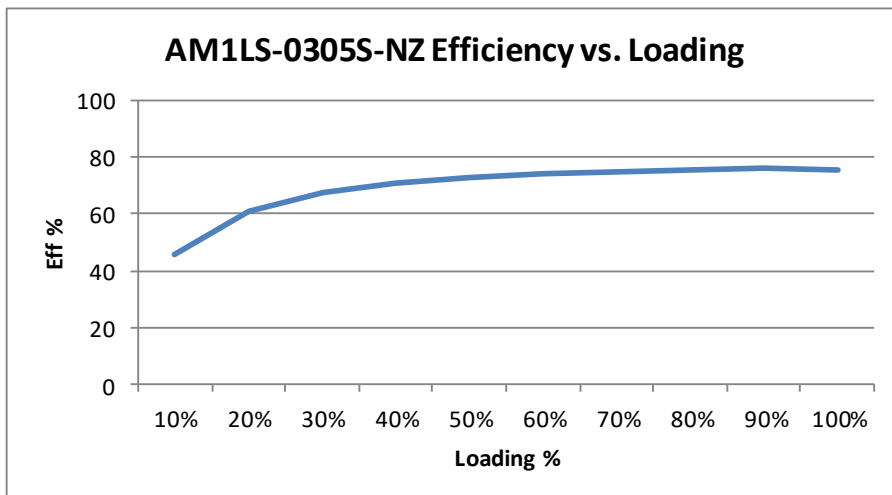
For other models

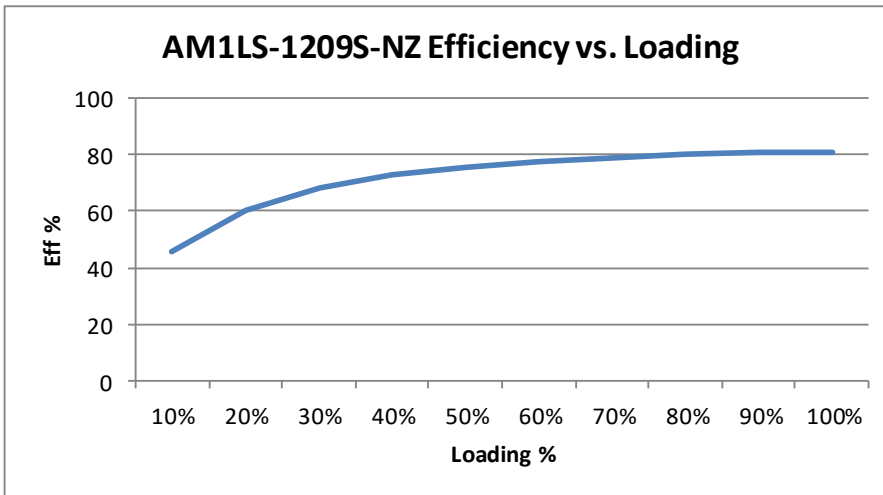
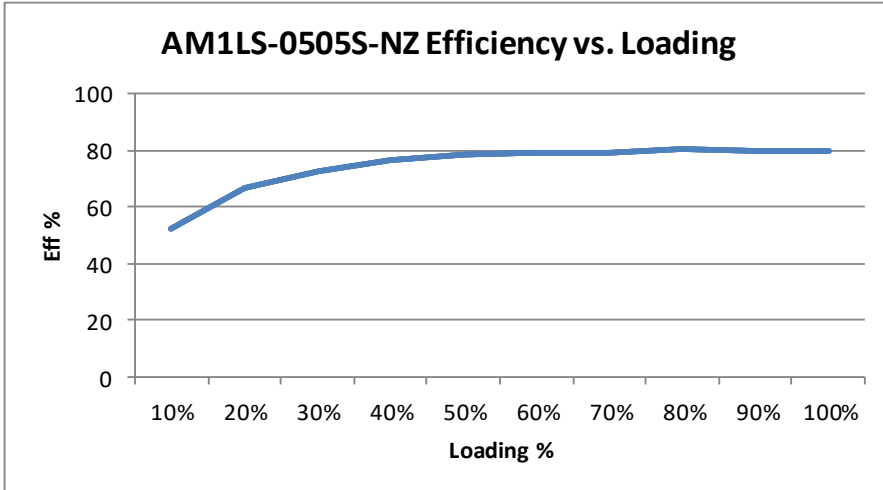


Derating



Typical Efficiency vs. Loading





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