



### 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

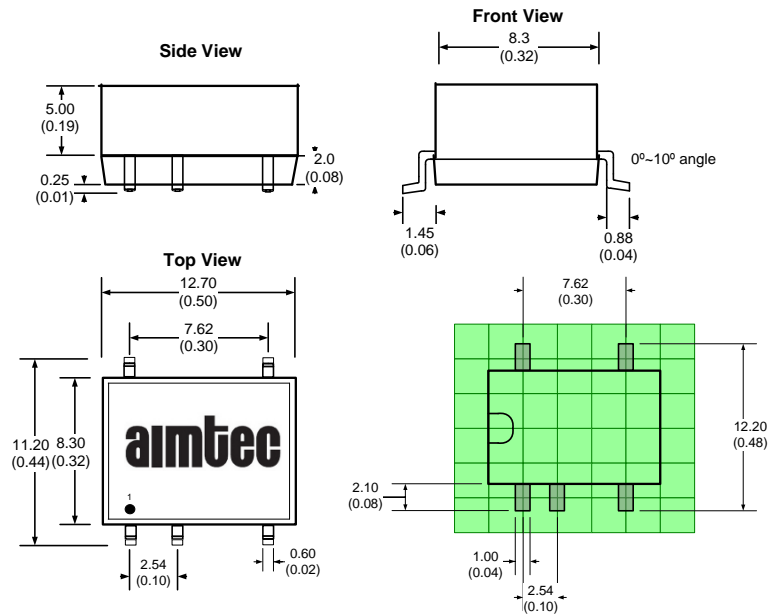
### Safety Specifications

Parameters				
Agency approvals	UL 60950-1		cULus (without 15V input and without 3.3V input of dual output models)	
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

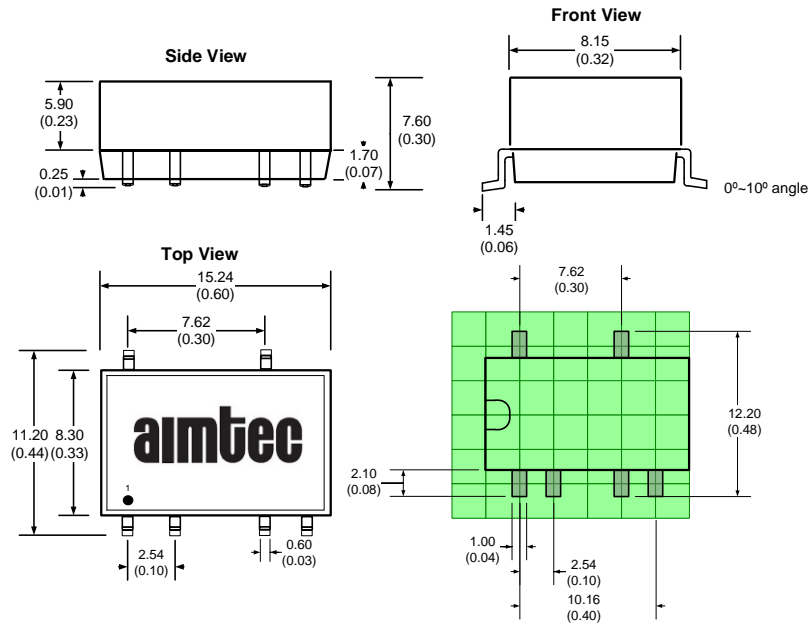
Pin	Single
1	- V Input
2	+ V Input
3	No Pin
4	-V Output
5	+V Output
6	No Pin
7	No Pin
8	N.C.

### 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

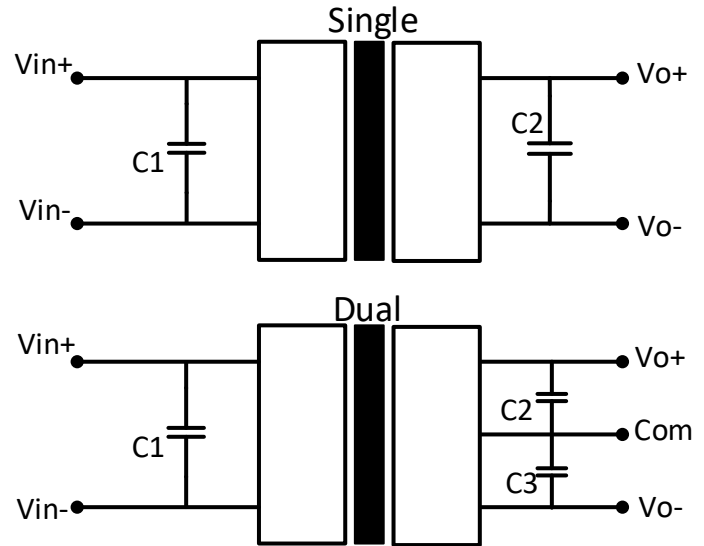


## Typical Application Circuits

Capacitor selection Table

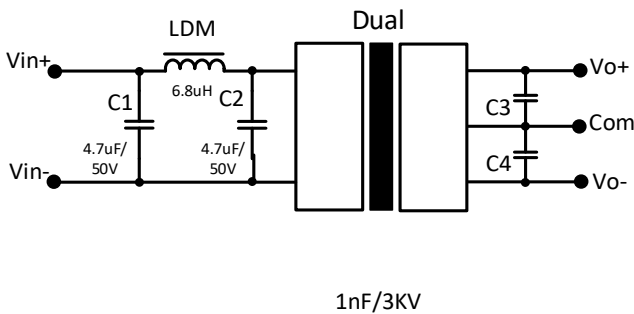
Vin	C1	Single VDC	C2	Dual VDC	C2/C3
3.3	4.7 $\mu$ F	3.3 V	10 $\mu$ F	$\pm$ 3.3	4.7 $\mu$ F
5	4.7 $\mu$ F	5V/6V	10 $\mu$ F	$\pm$ 5V	2.2 $\mu$ F
		9 V	4.7 $\mu$ F	$\pm$ 9V	
12	2.2 $\mu$ F	12 V	2.2 $\mu$ F	$\pm$ 12 V	1 $\mu$ F
15	2.2 $\mu$ F	15 V	1 $\mu$ F	$\pm$ 15 V	1 $\mu$ F
24	1 $\mu$ F	24V	0.47 $\mu$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

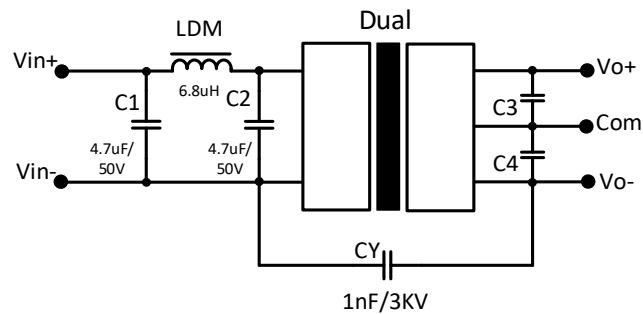


## EMI Recommended Circuit for dual output models(Class B)

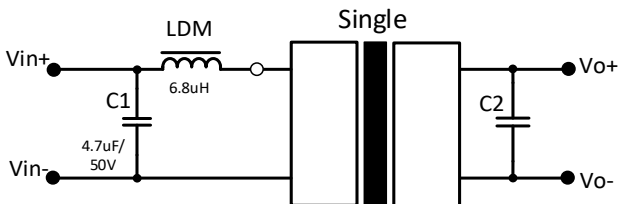
For 3.3/5/12 input models



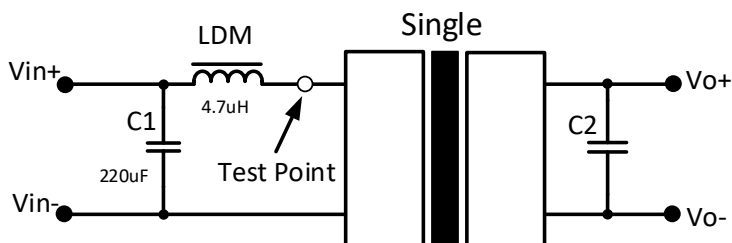
For 15/24 input models



## EMI Recommended Circuit for single output models(Class B)

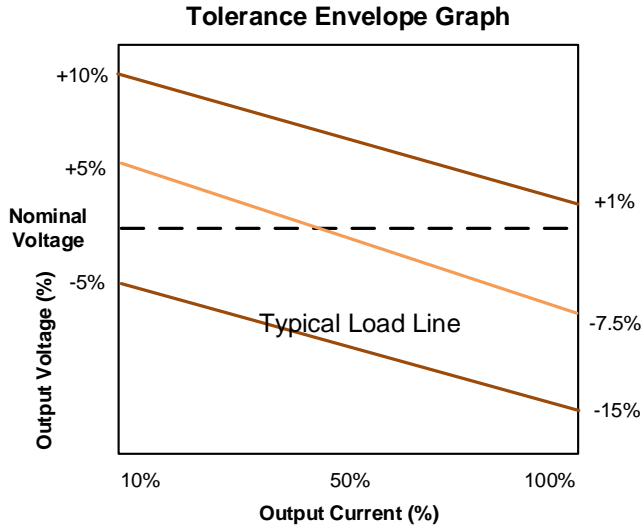


## Input Reflected Ripple Current Test Circuit

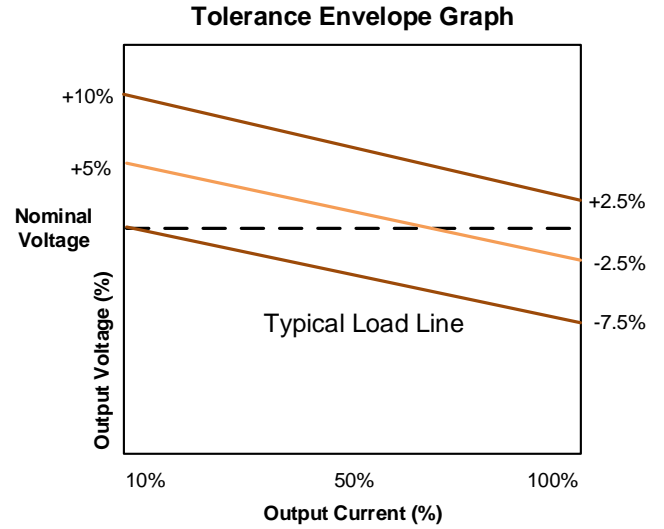


### Load Accuracy Tolerance Graph

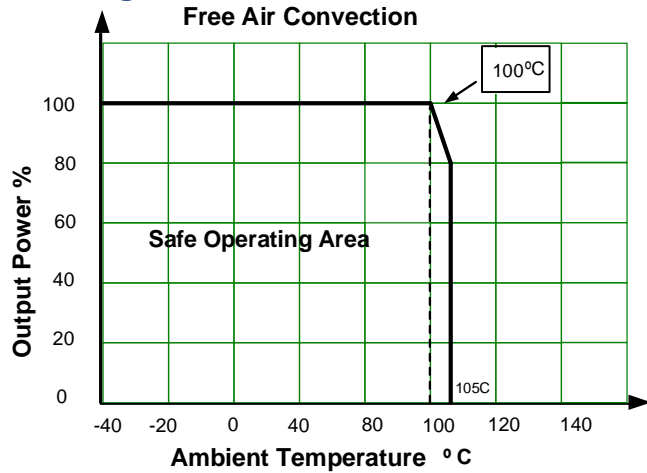
For 3.3VDC single output



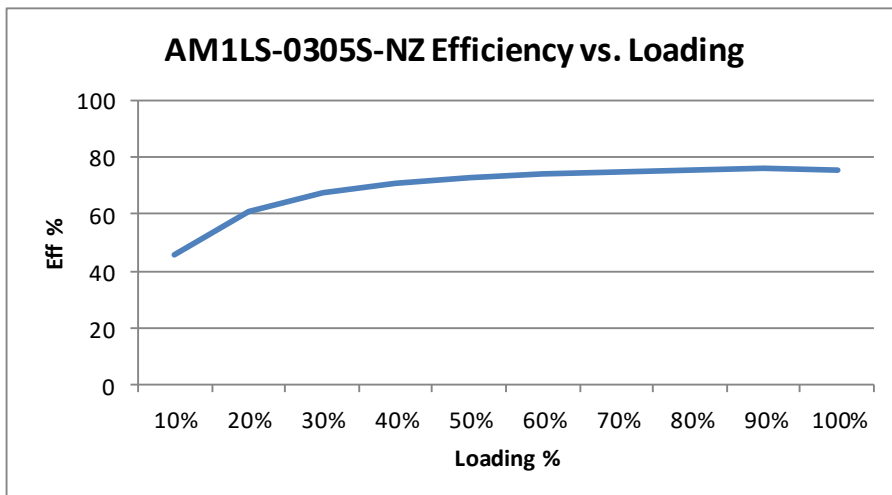
For other models

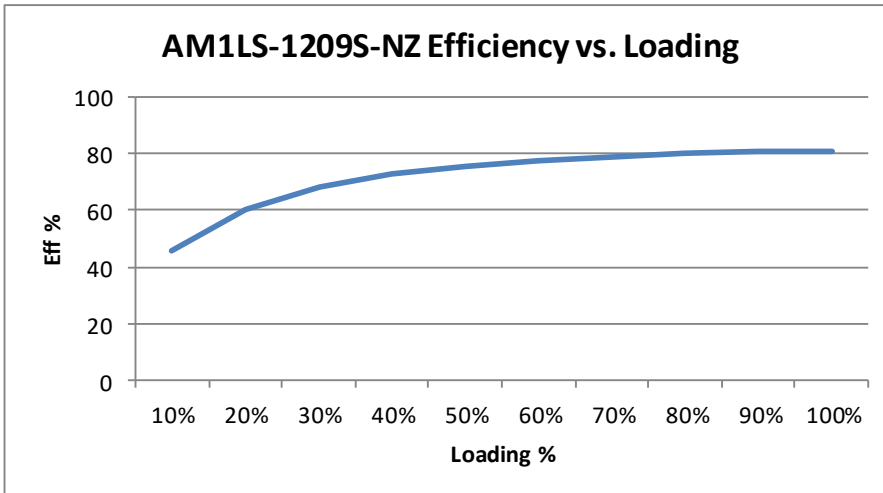
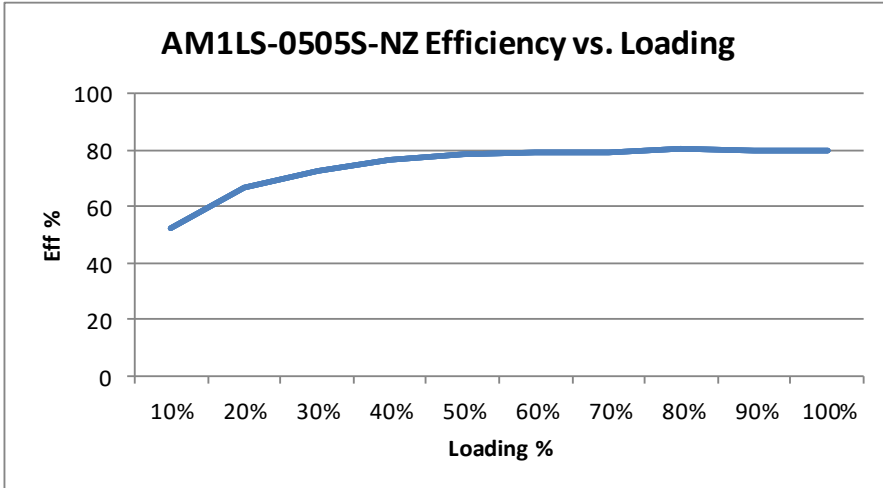


### Derating



### Typical Efficiency vs. Loading





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