

# Series AM1LS-NZ 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

ingle output								
Model	Input Voltage (V)	Output Voltage (V)	Output Current Max / Min (mA)	Isolation (VDC)	Input Cu Max   Loa (mA	No d	Max Capacitive Load (µF)	Efficiency (%) (Typ.)
AM1LS-0303S-NZ <b></b>	2.97-3.63	3.3	303 / 30	1500	415	25	220	69
AM1LS-0305S-NZ <b>‡</b> #	2.97-3.63	5.5	200 / 20	1500	404	25	220	74
AM1LS-0309S-NZ <b>‡</b>	2.97-3.63	9	111 / 12	1500	404	25	220	80
AM1LS-0312S-NZ <b>‡</b>	2.97-3.63	12	84/9	1500	404	25	220	80
AM1LS-0315S-NZ <b>‡</b>	2.97-3.63	15	67 / 7	1500	404	25	220	80
AM1LS-0324S-NZ <b></b>	2.97-3.63	24	42 / 4	1500	404	25	220	80
AM1LS-0503SJZ	4.5-5.5	3.3	303 / 30	1500	286	10	2400	74
AM1LS-0505SJZ**	4.5-5.5	5.5	200 / 20	1500	286	10	2400	82
AM1LS-0509SJZ	4.5-5.5	9	111 / 12	1500	254	20	1000	83
AM1LS-0509SJZ	4.5-5.5	12	84/9	1500	254	20	560	83
AM1LS-0515SJZ	4.5-5.5	15	67 / 7	1500	254	30	560	83
AM1LS-0524SJZ	4.5-5.5	24	42 / 4	1500	254	30	220	85
AM1LS-05245JZ AM1LS-0503S-NZ#**	4.5-5.5	3.3	303 / 30	1500	263	20	2400	74
AM1LS-0505S-NZ#**	4.5-5.5	5.3	200 / 20	1500	250	20	2400	82
AM1LS-0506S-NZ#	4.5-5.5	6	167 / 17	1500	250	20	220	80
M1LS-0509S-NZ#**	4.5-5.5	9	111 / 12	1500	250	20	1000	83
M1LS-0512S-NZ#**	4.5-5.5	12	84 / 9	1500	250	20	560	83
M1LS-0515S-NZ#**	4.5-5.5	15	67 / 7	1500	250	20	560	83
M1LS-0524S-NZ#**	4.5-5.5	24	42 / 4	1500	250	20	220	85
M1LS-1203S-NZ#	10.8-13.2	3.3	303 / 30	1500	111	15	220	75
M1LS-1205S-NZ#	10.8-13.2	5	200 / 20	1500	104	15	220	80
M1LS-1209S-NZ#	10.8-13.2	9	111 / 12	1500	104	15	220	80
M1LS-1212S-NZ#	10.8-13.2	12	84 / 9	1500	103	15	220	81
AM1LS-1215S-NZ#	10.8-13.2	15	67 / 7	1500	103	15	220	81
AM1LS-1224S-NZ	10.8-13.2	24	42 / 4	1500	103	15	220	81
AM1LS-1505S-NZ	13.5-16.5	5	200 / 20	1500	82	10	220	80
AM1LS-1509S-NZ	13.5-16.5	9	111 / 12	1500	82	10	220	80
M1LS-1515S-NZ	13.5-16.5	15	67 / 7	1500	82	10	220	81
M1LS-2403S-NZ <b>‡</b>	21.6-26.4	3.3	303 / 30	1500	52	7	220	71
M1LS-2405S-NZ <b>‡</b>	21.6-26.4	5	200 / 20	1500	52	7	220	80
AM1LS-2409S-NZ <b>‡</b>	21.6-26.4	9	111 / 12	1500	52	7	220	80
AM1LS-2412S-NZ <b>‡</b>	21.6-26.4	12	84 / 9	1500	52	7	220	80
AM1LS-2415S-NZ <b>‡</b>	21.6-26.4	15	67 / 7	1500	51	7	220	81
AM1LS-2424S-NZ <mark>‡</mark>	21.6-26.4	24	42 / 4	1500	51	7	220	81
AM1LS-0303SH30-NZ‡	2.97-3.63	3.3	303 / 30	3000	415	25	220	73
AM1LS-0305SH30-NZ <b>‡#</b>	2.97-3.63	5	200 / 20	3000	388	25	220	78
AM1LS-0503SH30-NZ#**	4.5-5.5	3.3	303 / 30	3000	263	20	2400	74
AM1LS-0505SH30-NZ#**	4.5-5.5	5	200 / 20	3000	250	20	2400	82
\M1LS-0509SH30-NZ#**	4.5-5.5	9	111 / 12	3000	250	20	1000	83
AM1LS-0512SH30-NZ#**	4.5-5.5	12	84 / 9	3000	250	20	560	83
AM1LS-0515SH30-NZ#**	4.5-5.5	15	67 / 7	3000	250	20	560	83
AM1LS-0524SH30-NZ#**	4.5-5.5	24	42 / 4	3000	250	20	220	85
AM1LS-1203SH30-NZ#	10.8-13.2	3.3	303 / 30	3000	111	15	220	75
AM1LS-1205SH30-NZ#	10.8-13.2	5	200 / 20	3000	104	15	220	80
AM1LS-1209SH30-NZ#	10.8-13.2	9	111 / 12	3000	104	15	220	80



# **Series AM1LS-NZ**

## 1 Watt | DC-DC Converter

AM1LS-1212SH30-NZ#	10.8-13.2	12	84 / 9	3000	103	15	220	81
AM1LS-1215SH30-NZ#	10.8-13.2	15	67 / 7	3000	103	15	220	81
AM1LS-1224SH30-NZ	10.8-13.2	24	42 / 4	3000	103	15	220	81
AM1LS-1515SH30-NZ	13.5-16.5	15	67 / 7	3000	82	10	220	80
AM1LS-2405SH30-NZ‡#	21.6-26.4	5	200 / 20	3000	52	7	220	80
AM1LS-2409SH30-NZ‡#	21.6-26.4	9	111 / 12	3000	52	7	220	80
AM1LS-2415SH30-NZ‡#	21.6-26.4	15	67 / 7	3000	52	7	220	80
AM1LS-2424SH30-NZ <b>‡#</b>	21.6-26.4	24	42 / 4	3000	52	7	220	80

Models

ual 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‡	2.97-3.63	±5	±100 / ±10	1500	415	25	100	78
AM1LS-0312D-NZ‡	2.97-3.63	±12	±42 / ±5	1500	388	25	100	80
AM1LS-0315D-NZ‡	2.97-3.63	±15	±33 / ±3	1500	263	20	100	80
AM1LS-0505D-NZ#**	4.5-5.5	±5	±100 / ±10	1500	250	20	1200	82
AM1LS-0509D-NZ#**	4.5-5.5	±9	±56 / ±6	1500	250	20	470	82
AM1LS-0512D-NZ#**	4.5-5.5	±12	±42 / ±5	1500	250	20	220	83
AM1LS-0515D-NZ#**	4.5-5.5	±15	±33 / ±3	1500	250	20	220	83
AM1LS-0524D-NZ#**	4.5-5.5	±24	±21 / ±3	1500	254	30	100	85
AM1LS-1205D-NZ#	10.8-13.2	±5	±100 / ±10	1500	111	15	100	75
AM1LS-1209D-NZ#	10.8-13.2	±9	±56 / ±6	1500	104	15	100	80
AM1LS-1212D-NZ#	10.8-13.2	±12	±42 / ±5	1500	104	15	100	80
AM1LS-1215D-NZ#	10.8-13.2	±15	±33 / ±3	1500	103	15	100	81
AM1LS-1224D-NZ#	10.8-13.2	±24	±21 / ±2	1500	103	15	100	81
AM1LS-1515D-NZ	13.5-16.5	±15	±33 / ±3	1500	103	15	100	81
AM1LS-2405D-NZ <b>‡#</b>	21.6-26.4	±5	±100 / ±10	1500	83	12	100	82
AM1LS-2409D-NZ <b>‡#</b>	21.6-26.4	±9	±56 / ±6	1500	52	7	100	82
AM1LS-2412D-NZ <b>‡#</b>	21.6-26.4	±12	±42 / ±5	1500	52	7	100	82
AM1LS-2415D-NZ <b>‡#</b>	21.6-26.4	±15	±33 / ±3	1500	51	7	100	82
AM1LS-2424D-NZ <b>‡#</b>	21.6-26.4	±24	±21 / ±2	1500	51	7	100	82
AM1LS-0305DH30-NZ‡	2.97-3.63	±5	±100 / ±10	3000	389	25	100	76
AM1LS-0312DH30-NZ‡	2.97-3.63	±12	±42 / ±5	3000	389	25	100	77
AM1LS-0505DH30-NZ#**	4.5-5.5	±5	±100 / ±10	3000	250	20	1200	82
AM1LS-0509DH30-NZ#**	4.5-5.5	±9	±56 / ±6	3000	250	20	470	83
AM1LS-0512DH30-NZ#**	4.5-5.5	±12	±42 / ±5	3000	250	20	220	83
AM1LS-0515DH30-NZ#**	4.5-5.5	±15	±34 / ±4	3000	250	20	220	83
AM1LS-0524DH30-NZ#**	4.5-5.5	±24	±21 / ±3	3000	254	30	100	85
AM1LS-1205DH30-NZ#	10.8-13.2	±5	±100 / ±10	3000	111	15	100	80
AM1LS-1209DH30-NZ#	10.8-13.2	±9	±56 / ±6	3000	104	15	100	80
AM1LS-1212DH30-NZ#	10.8-13.2	±12	±42 / ±5	3000	104	15	100	81
AM1LS-1215DH30-NZ#	10.8-13.2	±15	±33 / ±3	3000	103	15	100	81
AM1LS-1224DH30-NZ#	10.8-13.2	±24	±21 / ±2	3000	103	15	100	81
AM1LS-1515DH30-NZ	13.5-16.5	±15	±33 / ±3	3000	83	12	100	81
AM1LS-2405DH30-NZ <b>‡</b> #	21.6-26.4	±5	±100 / ±10	3000	82	10	100	82
AM1LS-2409DH30-NZ <b>‡</b> #	21.6-26.4	±9	±56 / ±6	3000	52	7	100	82
AM1LS-2412DH30-NZ <b>‡#</b>	21.6-26.4	±12	±42 / ±5	3000	52	7	100	82
AM1LS-2415DH30-NZ <b>‡</b> #	21.6-26.4	±15	±33 / ±3	3000	51	7	100	82
AM1LS-2424DH30-NZ <b>‡</b> #	21.6-26.4	±24	±21 / ±2	3000	51	7	100	82

## **‡** 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 5 12 15 24	2.97-3.63 4.5-5.5 10.8-13.2 13.5-16.5 21.6-26.4		VDC	
Absolute Max Input Voltage (1 sec max)	3 Vin 5 Vin 12 Vin 15 Vin 24 Vin		5 9 18 21 30	VDC	
Filter	Capacitor				

**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,	Continuous, unless marked with ‡				
Short Circuit Restart	Au	to-Recovery				
Line Voltage Regulation	For ±1% of Vin, 3.3V output models only		±1.5	% of Vin		
Line Voltage Regulation	For ±1% of Vin, others		±1.2	76 OI VIII		
	3.3V	18	20			
	5V	12	15			
and Valtage Degralation	6V	10	13			
Load Voltage Regulation (10% - 100% Load)	9V	8	10	%		
10 % - 100 % Loau)	12V	7	10			
	15V	6	10			
	24 V	5	10			
Comporatura Coefficient	100% load, 5V input models	±0.02		%/°C		
Temperature Coefficient	100% load, Others	±0.03		%/°C		
Ripple & Noise	5V input, 24V output	50	100			
	5V input, other models	30	75	mV p-p		
	Others		150			

**General Specifications** 

Parameters	Conditions	Typical	Maximum	Units		
Cuitabing fraguancy	100% load, 5V input models	270		VU-		
Switching frequency	100% load, others	100	300	KHz		
Operating temperature	With derating above +100	-40 to	+105	°C		
Storage temperature	-55	to +125		°C		
Cooling	Fr	ee air convection				
Storage Humidity	Non-condensing		95	% RH		
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1 For 5Vin models only					
Case material	Flame retardant plastic (UL94-V0)					
Weight	Single 1.5(5Vin models 1.4) Dual 1.8(5Vin models 1.4)					
	5V Input Single Output Models	0.52 x 0.45 x 0.28 inc	ches (13.20 x 11.40 x 7.2	5 mm)		
Dimensions (L x W x H)	Other Single Output Models 0.50 x 0.44 x 0.28 inches (12.70 x 11.20 x 7.25					
Diffier Isloris (L x W x H)	5V Input Dual Output Models 0.60 x 0.45 x 0.28 inches (15.24 x 11.40 x 7.25					
	Other Dual Output Models 0.60 x 0.44 x 0.28 inches (15.24 x 11.20 x 7.29					
MTBF	>3500Khrs (MIL-HDBK -217F, Ground Benign, t=+25°C)					
Maximum soldering temperature	Lead temp. 1.5mm from case for 10 sec Reflow Soldering					



# Series AM1LS-NZ 1 Watt | DC-DC Converter

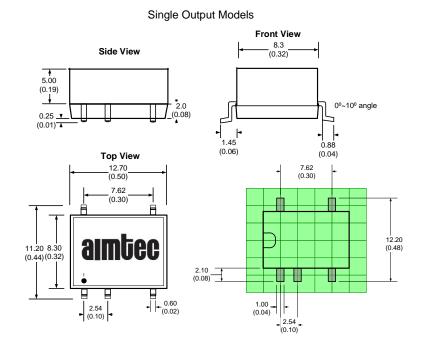
	Peak temp.≤245°C, maximum duration	
	time≤60s at 217°C	
Maximum case temperature	130	°C

**Safety Specifications** 

Parameters					
Agency approvals	cULus				
	Information to absolute Co	au inmant	UL 60950-1 (The models marked with # only)		
	Information technology Ed	quipment	UL 62368 (The models marked with ** only)		
	EMI - Conducted and	5V input	CISPR32/EN55032, class B (with the recommended EMC circuit for 5V		
Standards	radiated emission	5v iriput	input models)		
	radiated emission	Others	EN55022, class B (with the recommended EMC circuit)		
	Electrostatic Discharge	5V input	IEC 61000-4-2, Contact ±4kV, Air ±8kV, Criteria B		
	Immunity		IEC 61000-4-2, Contact ±8kV, Criteria B		

# Pin Out Specifications and Dimensions for 3.3V, 12V, 15V, 24V Input Models

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.





#### Pin **Dual Output** Models -V Input 1 2 +V Input 3 No Pin 4 Common 5 -V Output 6 No Pin 7 +V Output 8 No Pin 9 No Pin

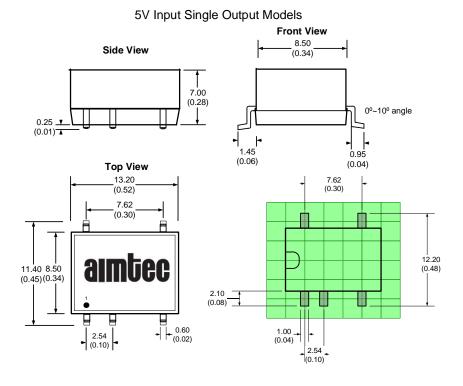
N.C.

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### **Dual Output Models** Front View 8.15 (0.32) Side View 5.90 (0.23) 7.60 (0.30) 0.25 \_ \_(0.07) 0°~10° angle (0.01) 1.45 (0.06) Top View 15 24 (0.60) (0.30)12.20 (0.48) aımtec 11.20 8.30 (0.44)(0.33) 2.10 (0.08) - 0.60 (0.03) 1.00 (0.04) 2.54 (0.10) 10.16 (0.40)

## **Pin Out Specifications and Dimensions for 5V Input Models**

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.





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.

#### **Front View** Side View (0.34)7.00 (0.28)0.25 👤 0°~10° angle 0.95 1.45 (0.04)(0.06)**Top View** 7.62 (0.30) 15.24 (0.60)7.62 (0.30)12.20 11.40 8.50 (0.45)(0.34) 2.10 (0.08)

0.60

(0.03)

10.16

(0.40)

2 54

(0.10)

1.00 \_

(0.10)

10.16

(0.40)

(0.04)

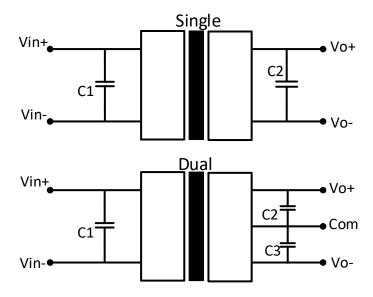
5V Input Dual Output Models

## **Typical Application Circuits**

**Capacitor selection Table** 

Vin	C1	Single VDC	C2	Dual VDC	C2/C3
3.3	4.7 μF	3.3 V	10 μF	±3.3	4.7 µF
5	4.7 µF	5V/6V	10μF	±5V	4.7 µF
		9 V	4.7 µF	±9V	2.2 µF
12	2.2µF	12 V	2.2µF	±12 V	1 μF
15	2.2µF	15 V	1µF	±15 V	1 μF
24	1μF	24V	0.47 μF	±24 V	1 μF

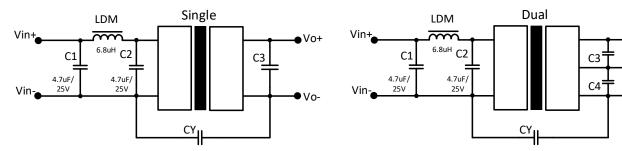
- Ensure output load of Min 10%, or specifications may not be met
- Under normal operation, there is no protection for overload condition
- Converter may exhibit start up delay if capacitive load exceeds recommended
- 4) Ceramic or electrolytic type capacitors are recommended, tantalum type may damage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



● Vo-

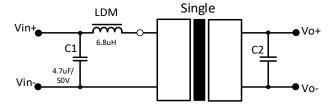


## EMI Recommended Circuit for 5V input models (Class B)

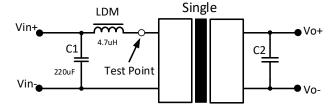


Vout	CY	
3.3	-	
5	-	
9	-	
12	4 n F/OK//DC for 4 FK//DC inclotion models	
15	1nF/2KVDC for 1.5KVDC isolation models 1nF/4KVDC for 3KVDC isolation models	
24	THE ARYDO TO SKYDO ISOIALION Models	

## **EMI Recommended Circuit for other input models (Class B)**

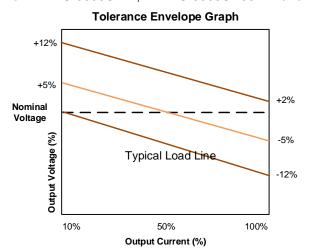


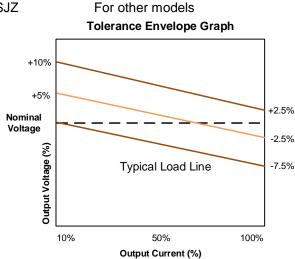
## **Input Reflected Ripple Current Test Circuit**



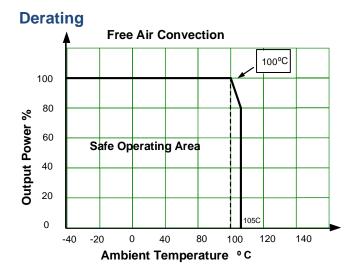
## **Load Accuracy Tolerance Graph**

For AM1LS-0503S-NZ, AM1LS-0503SH30-NZ and AM1LS-0503SJZ

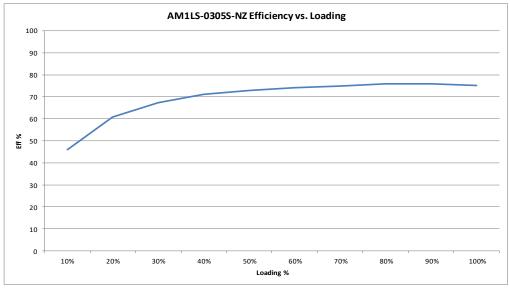


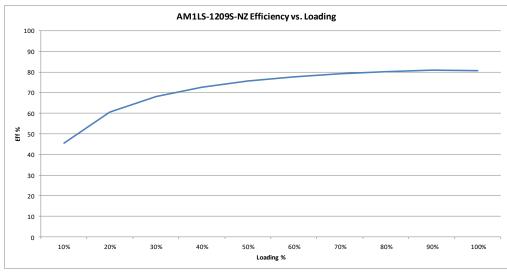




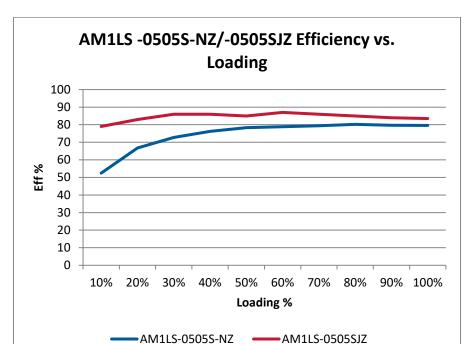


## Typical Efficiency vs. Loading









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