



157AE_1RP series

1W Single Output DC-DC Converter - Fixed Input - Isolated & Regulated SIP Package

DC-DC Converter 1 Watt

- ⊕ Continuous short-circuit protection
- ⊕ No-load input current as low as 8mA
- ⊕ Operating ambient temp. range: -40°C to +85°C
- ⊕ High efficiency up to 75%
- ⊕ I/O isolation test voltage 1.5kVDC
- ⊕ Industry standard pin-out SIP package
- ⊕ IEC62368, UL62368, EN62368 approved

The 157AE_1RP series is especially designed for distributed power supply systems where an isolated voltage is required. They are suitable for occasions of: pre-interference isolation, ground interference elimination, pure digital circuit, voltage isolation conversion, general low frequency analog circuit, relay drive circuit, etc.



Common specifications	
Short circuit protection:	Continuous, self-recovery
Operation temperature range:	-40°C – +85°C (Derating when operating temperature ≥ 71°C, see Fig.1)
Storage temperature range:	-55°C – +125°C
Temperature rise at full load: (Ta=25°C)	5VDC input • 3.3VDC output: 30°C TYP • Others: 25°C TYP
Lead temperature	300°C (1.5mm from case for 10 sec.)
Storage Humidity: (Non-condensing)	• 5VDC input 95% RH • Other 5% ~ 95% RH
MTBF (MIL-HDBK-217F@25°C):	3,500,000 hours
Vibration:	10-150Hz, 5G, 30 Min. along X, Y and Z
Case material:	Black plastic; flame-retardant and heat-resistant (UL94-V0)
Dimensions	19.65 x 6.00 x 10.16mm
Weight	2.1g (Typ.)
Cooling:	Free air convection

Output specifications					
Item	Test condition	Min	Typ	Max	Units
Voltage Accuracy				±3	%
Line regulation	Vin change: ±1%			±0.25	%
Load regulation	10% to 100% full load • 3.3VDC output • Others			±3 ±2	%
Temperature drift	100% load		±0.02		%/°C
Ripple & Noise* (20MHz Bandwidth)	5VDC input • Others • 24V output 12/15/9VDC input • 3.3/5/9/12VDC output • 15VDC output		30 50	75 100	mVp-p mVp-p
Switching frequency	100% load, nominal input voltage • 5VDC input • Others		270 260		kHz kHz

Note: * The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

Input specifications					
Item	Test condition	Min	Typ	Max	Units
Input current (no-load/full load)	5VDC input				
	• 3.3/5VDC output		286/5	303/10	mA
	• 9/12VDC output		282/12	299/20	mA
	• 15/24VDC output		274/18	290/30	mA
12VDC input	• 5/9/12VDC output		115/8	121/-	mA
	• 15VDC output		112/8	118/-	mA
15VDC input	• 5VDC output		92/8	97/-	mA
	• 15VDC output		89/8	94/-	mA
24VDC input	• 3.3VDC output		59/8	65/-	mA
	• 5/9/12/15VDC output		58/8	63/-	mA
Reflected ripple current*			15		mA
Input filter	Capacitance filter				
Hot plug	Unavailable				

*Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Input-output electric strength test for 1 minute with a leakage current of 1mA max.	1500			VDC
Isolation resistance	Input-output resistance at 500VDC	1000			MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		20		pF

Example:

157AE_0505S1RP

1 = 1Watt; S7 = SIP7; AE = Pinning; 05 = 5Vin; 05 = 5Vout; S = Single Output; 1 = 1kVDC; R = Regulated Output; P = Short Circuit Protection

Note:

- Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
- All specifications measured at Ta = 25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified.
- In this datasheet, all the test methods of indications are based on corporate standards.
- Only typical models listed, other models may be different, please contact our technical person for more details.

EMC specifications				
Emissions	CE	CISPR32/EN55032	CLASS B	(see EMC recommended circuit)
Emissions	RE	CISPR32/EN55032	CLASS B	(see EMC recommended circuit)
Immunity	ESD	IEC/EN61000-4-2	Air ±8kV, Contact ±6kV	perf. Criteria B

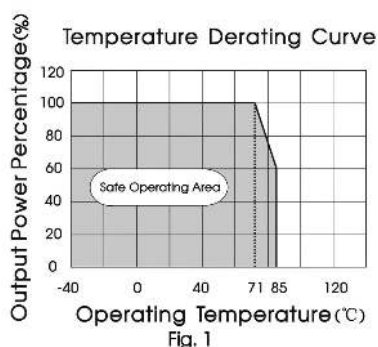
1S7AE_1RP series

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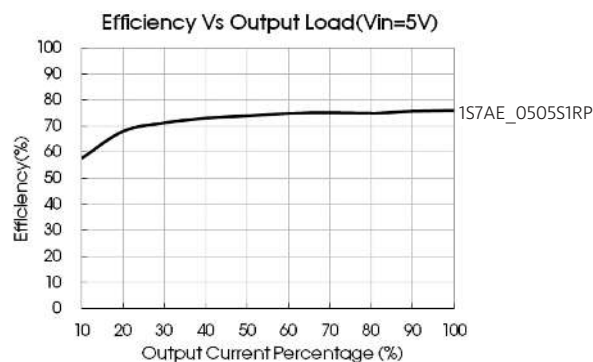
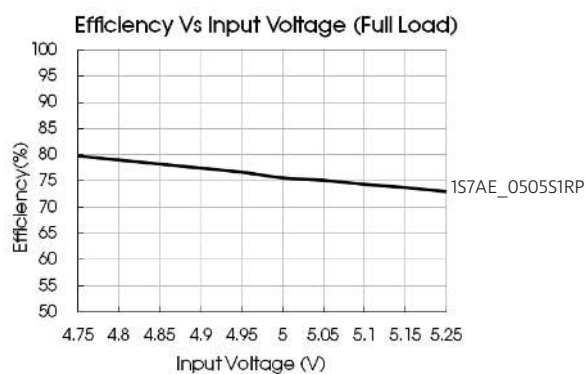
Product Selection Guide

Certification	Part Number	Input Voltage [VDC, Nominal (Range)]	Output Voltage [VDC]	Output Current [mA, Max./Min.]	Full Load Efficiency [%, Min./Typ.]	Capacitive Load [μ F, Max.]
	1S7AE_0305S1RP	5 (4.75-5.25)	3.3	250/25	63/67	2400
UL	1S7AE_0505S1RP	5 (4.75-5.25)	5	200/20	66/70	2400
UL	1S7AE_0509S1RP	5 (4.75-5.25)	9	111/12	67/71	1000
UL	1S7AE_0512S1RP	5 (4.75-5.25)	12	84/9	68/72	560
UL	1S7AE_0515S1RP	5 (4.75-5.25)	15	67/7	69/73	560
	1S7AE_0524S1RP	5 (4.75-5.25)	24	41/4	69/73	100
UL	1S7AE_1205S1RP	12 (11.4-12.6)	5	200/20	69/73	2400
	1S7AE_1209S1RP	12 (11.4-12.6)	9	111/12	69/73	1000
UL	1S7AE_1212S1RP	12 (11.4-12.6)	12	83/9	69/73	560
UL	1S7AE_1215S1RP	12 (11.4-12.6)	15	67/7	71/75	560
	1S7AE_1505S1RP	15 (14.25-15.75)	5	200/20	69/73	2400
	1S7AE_1515S1RP	15 (14.25-15.75)	15	67/7	71/75	560
	1S7AE_2403S1RP	24 (22.8-25.2)	3.3	250/25	65/71	2400
	1S7AE_2405S1RP	24 (22.8-25.2)	5	200/20	67/73	2400
	1S7AE_2409S1RP	24 (22.8-25.2)	9	111/12	67/73	1000
	1S7AE_2412S1RP	24 (22.8-25.2)	12	83/9	67/73	560
	1S7AE_2415S1RP	24 (22.8-25.2)	15	67/7	67/73	560

Typical characteristics



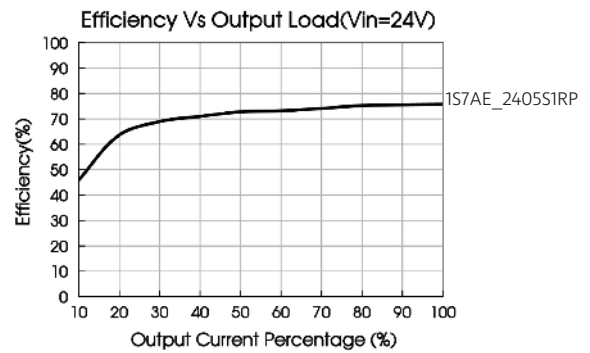
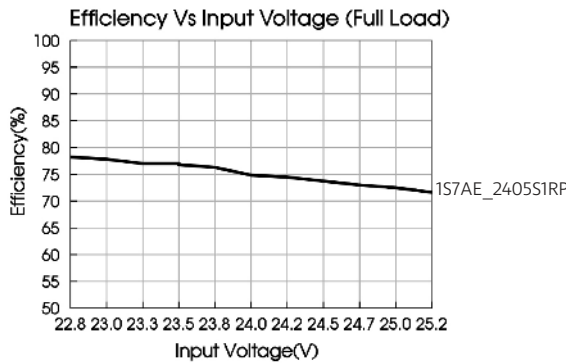
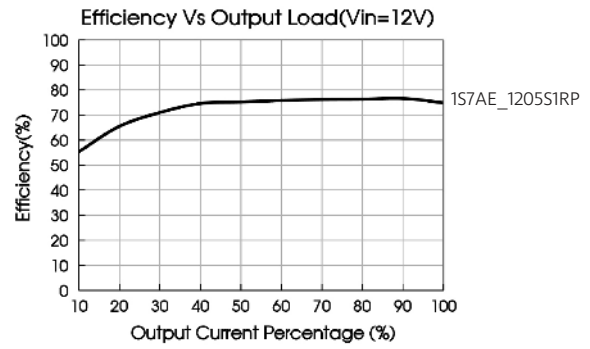
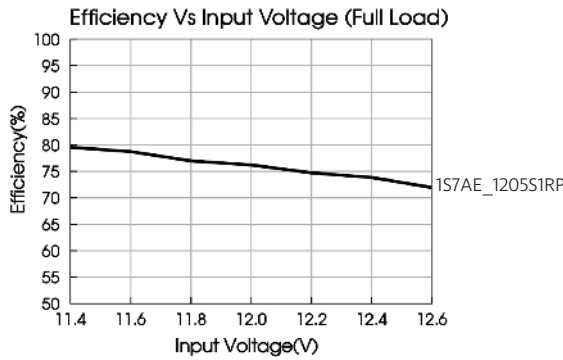
Efficiency



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Efficiency



Typical application circuit

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.2. Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

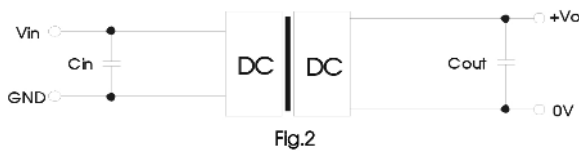


Table: Recommended input and output capacitor values (5VDC)

Vin(VDC)	Cin(μF)	Vo(VDC)	Cout(μF)
5	4.7	3.3/5	10
		9/12	2.2
		15	1

Table: Recommended input and output capacitor values (Others)

Vin(VDC)	Cin(μF)	Vo(VDC)	Cout(μF)
12VDC/15VDC	2.2μF/25V	3.3VDC/5VDC	10μF/16V
24VDC	1μF/50V	9VDC	2.2μF/16V
		12VDC	2.2μF/25V
		15VDC	1μF/25V

EMC compliance circuit

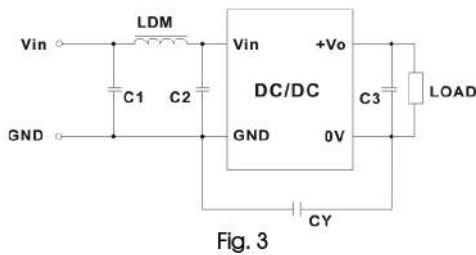


Table: EMC recommended circuit value table (5VDC)

Input voltage 5VDC	Output voltage (VDC)		Emissions
	3.3/5/9	12/15/24	
	C1/C2	4.7μF /25V	4.7μF /50V
	CY		1nF/4KVDC VISHAY HGZ102MBP TDK CD45-E2GA102M-GKA
	C3/C4	Refer to the Cout in table 1 6.8μH	
	LDM	6.8μH	6.8μH

Table: EMC recommended circuit value table (others input)

Emissions	Output voltage (VDC)	
	C1/C2	4.7μF /50V
	CY	270pF /3kVDC
	C3/C4	Refer to the Cout in table 1 6.8μH
LDM	6.8VDC	

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Mechanical dimensions

