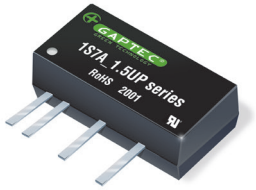


1S7A_1.5UP series

1W - Single/Dual Output DC-DC Converter - Fixed Input - Isolated & Unregulated

5Vin DC-DC Converter 1 Watt

- SIP package
- Efficiency up to 85%
- Short circuit protection (SCP)
- 1500VDC isolation voltage
- No-load input current as low as 5mA
- Operating temperature: -40°C to +105°C
- Industry standard pinout
- RoHS compliance
- UL62368, EN62368 approved

The 1S7A_1.5UP series are specially designed for applications where an isolated (two isolated) voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

UL-62368-1 (E347551)

Common specifications

Short circuit protection*:	Continuous, automatic recovery
Temperature rise at full load:	15°C TYP, Ta = 25°C
Cooling:	Free air convection
Operation temperature range:	-40°C~+105°C
Storage temperature range:	-55°C ~+125°C
Pin welding resistance temperature:	300°C max, 1.5mm from case for 10 sec
Storage humidity range:	< 95%
Package material:	Plastic [UL94-V0]
Switching frequency:	Full load, nominal input 270KHz typ.
MTBF (MIL-HDFK-217F@25°C):	>3500 Khours
Dimensions:	19.65*6.00*10.16mm
Weight:	2.1g

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (Full load/no load)	• 3.3/5V output • 9/12V output • 15/24V output		270/5 241/12 241/18	286/10 254/20 254/30	mA mA mA
Surge voltage (1sec. max.)	5VDC input	-0.7		9	VDC
Reflected ripple current			15		mA
Filter	Filter capacitor				
Hot plug	Unavailable				

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	1500			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation Capacitance	Input/output, 100KHz/0.1V		20		pF

Output specifications

Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy	See tolerance envelope curve				
Line regulation	For Vin change of ±1% 3.3VDC output others			1.5 1.2	% %
Load regulation	10% to 100% load • 3.3VDC output • 5VDC output • 9VDC output • 12VDC output • 15VDC output • 24VDC output		 15 10 8 7 6 5	 20 15 10 10 10 10	 % % % % % %
Temperature coefficient	100% full load		±0.02		%/°C
Ripple & Noise*	20MHz Bandwidth 24VDC output others		 50 30	 100 75	 mVp-p mVp-p

* Test ripple and noise by "parallel cable" method.

Example:
1S7A_0505D1.5UP
1 = 1Watt; S7 = SIP7; A = series; 5Vin; 5Vout; D = Dual Output;
1.5 = 1.5kVDC; U = Unregulated Output; P = Short Circuit Protection

Note:

1. If the product is operated under the min. required load, the product performance cannot be guaranteed to comply with all performance indexes in this datasheet;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on our Company's corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see „Features" and „EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

GAPTEC-Electronic GmbH & Co. KG
sales@gaptec-electronic.com – www.gaptec-electronic.com

EMC specifications				
EMI	CE	CISPR32/EN55032	CLASS B (see EMC recommended circuit)	
EMI	RE	CISPR32/EN55032	CLASS B (see EMC recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±4KV, Air ±8KV	perfect Criteria B

Product Selection Guide

Part Number	Input Voltage [V]	Output Voltage [VDC]	Current [mA, max]	Efficiency [%, typ]	Capacitive load [µF, max]	Certification
1S7A_0503S1.5UP	5	3.3	303	74	2400	UL
1S7A_0505S1.5UP	5	5	200	82	2400	UL
1S7A_0509S1.5UP	5	9	111	83	1000	UL
1S7A_0512S1.5UP	5	12	84	83	560	UL
1S7A_0515S1.5UP	5	15	67	83	560	UL
1S7A_0524S1.5UP	5	24	42	85	220	UL

Part Number	Input Voltage [V]	Output Voltage [VDC]	Current [mA, max]	Efficiency [%, typ]	Capacitive load [µF, max]	Certification
1S7A_0503D1.5UP	5	±3.3	±152	74	1200	UL
1S7A_0505D1.5UP	5	±5	±100	82	1200	UL
1S7A_0509D1.5UP	5	±9	±56	83	470	UL
1S7A_0512D1.5UP	5	±12	±42	83	220	UL
1S7A_0515D1.5UP	5	±15	±34	83	220	UL
1S7A_0524D1.5UP	5	±24	±21	85	100	UL

Typical characteristics

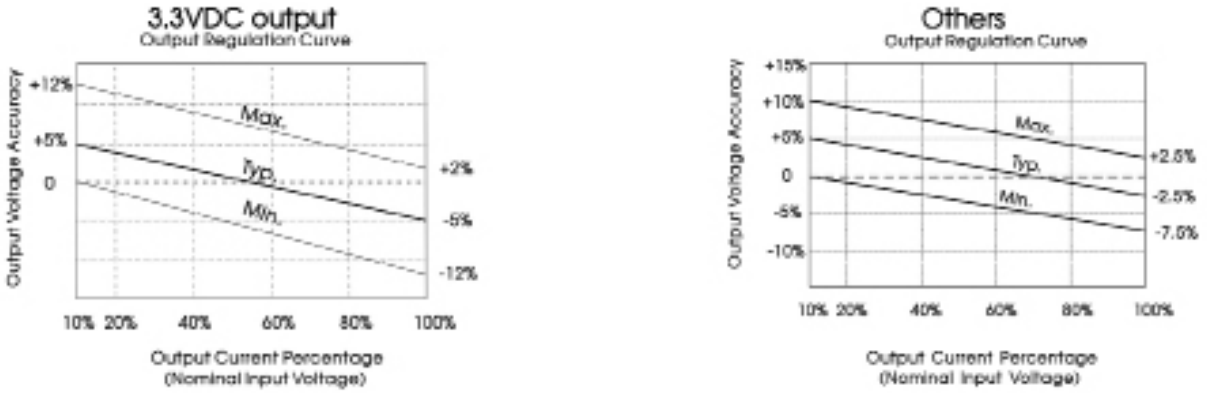


Fig. 1

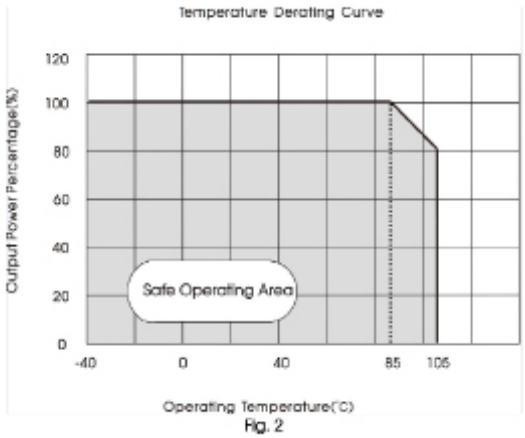
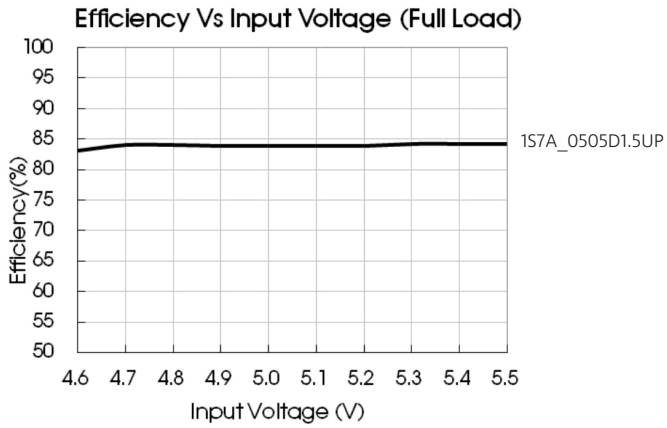
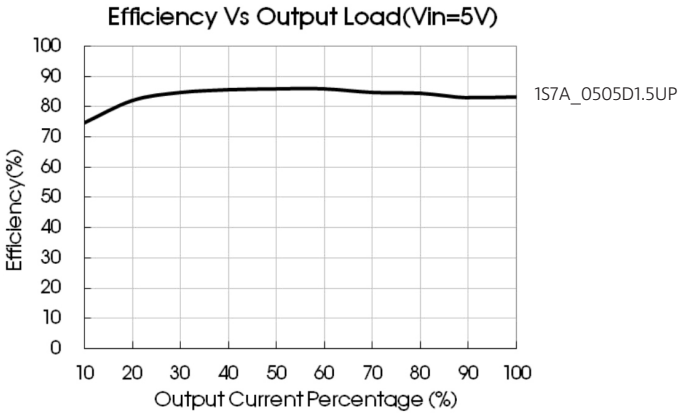
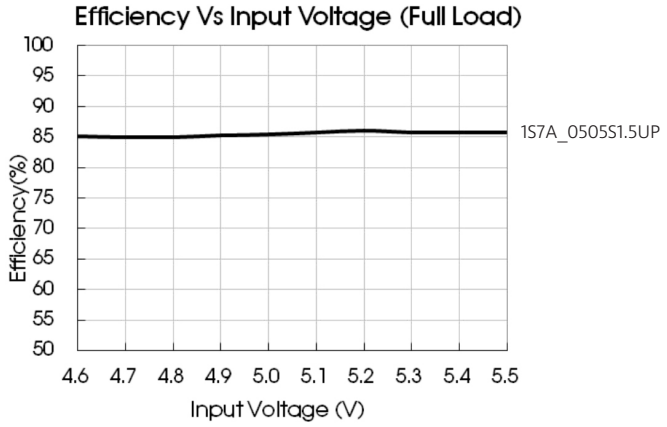


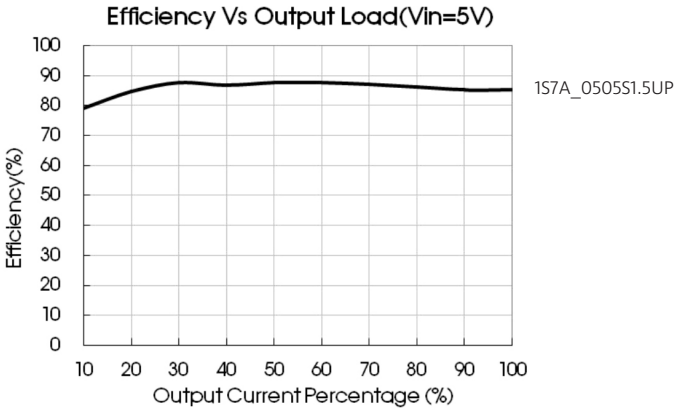
Fig. 2

Efficiency









Typical application

If it is required to further reduce input and output ripple, a filter capacitor may be connected to the input and output terminals, see Fig. 1.
Moreover, choosing a suitable filter capacitor is very important, start-up problems may be caused if the capacitance is too large. Under the condition of safe and reliable operation, the recommended capacitive load values are shown in Table 1.

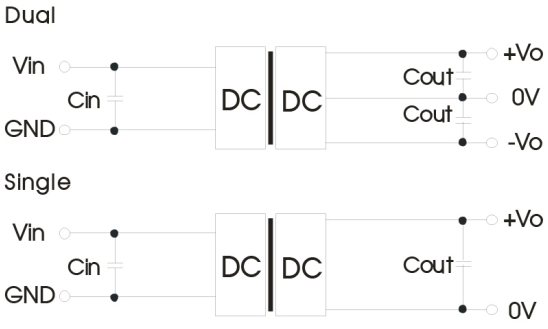
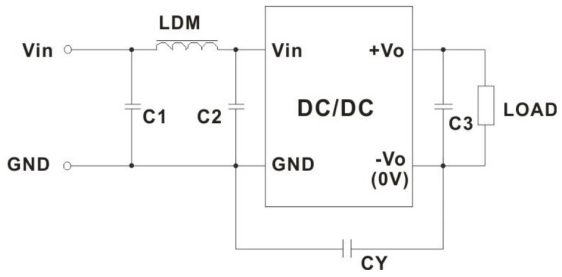


Figure 1

Recommended capacitive load value table (Table 1)

Vin (VDC)	Cin (µF)	Single Vout (VDC)	Cout (µF)	Dual Vout (VDC)	Cout (µF)
5	4.7	3.3/5	10	±5	4.7
–	–	9/12	2.2	±9/±12	1
–	–	15/24	1	±15/±24	0.47

EMC solution-recommended circuit

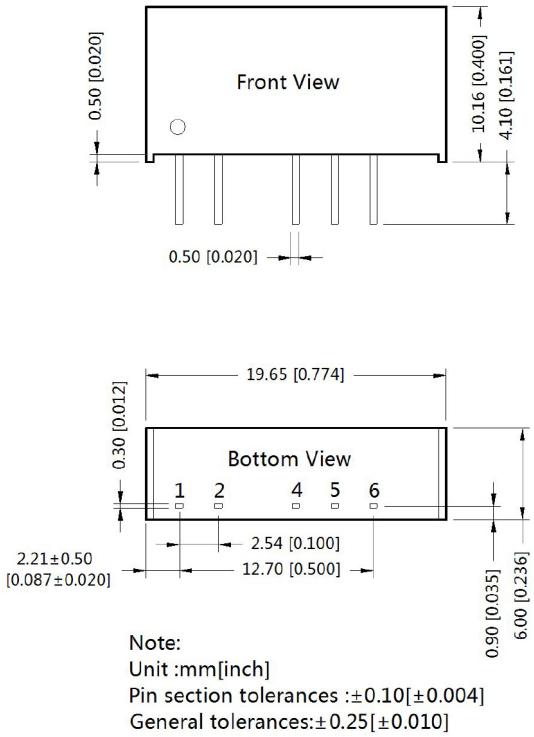


EMC recommended circuit value table

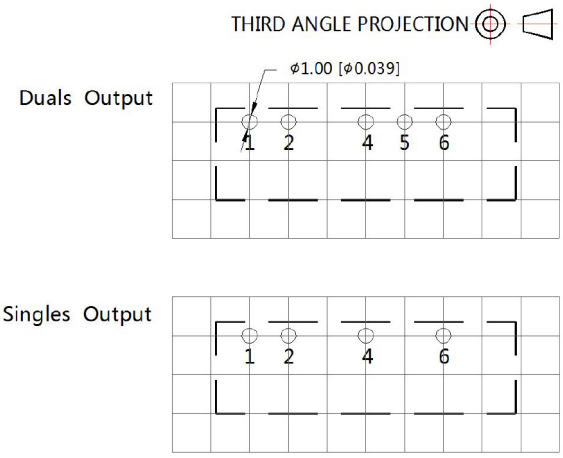
EMI // Output voltage	Vout: 5/9V	Vout: 12/15V
C1/C2	4.7μF/25V	4.7μF/25V
CY	-	1nF/4KVDC VISHAY HGZ102MBP TDK CD45-E2GA102M-G
C3	Refer to the Cout in typical application	
LDM	6.8μH	

Note:
In the case of actual use, the requirements for EMI are high, it is subject to CY .

Mechanical dimensions

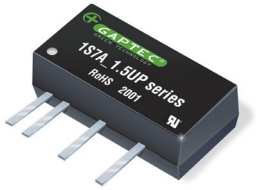


Note:
Unit :mm[inch]
Pin section tolerances :±0.10[±0.004]
General tolerances:±0.25[±0.010]



Note : Grid 2.54*2.54mm

Pin-Out		
Pin	Singles	Duals
1	Vin	Vin
2	GND	GND
4	0V	-Vo
5	No Pin	0V
6	+Vo	+Vo



1S7A_1.5UP series

1W - Single/Dual Output DC-DC Converter - Fixed Input - Isolated & Unregulated

12/15/24Vin DC-DC Converter 1 Watt

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temp range: -40°C to +105°C
- High efficiency up to 81%
- I/O isolation test voltage: 1.5kVDC
- Industry standard pin-out
- IEC62368, UL62368, EN62368 approved

The 1S7A_1.5UP series are specially designed for applications where an isolated (two isolated) voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

UL-62368-1 (E347551)

Common specifications

Short circuit protection*:	Continuous, self-recovery
Operation temperature range:	-40°C~+105°C (Derating when operating temperature ≥100°C, see Fig. 2)
Storage temperature range:	-55°C ~+125°C
Temperature rise at full load:	25°C TYP, Ta = 25°C
Pin welding resistance temp.:	300°C max, 1.5mm from case for 10 sec
Storage humidity range:	5 ~ 95 %RH (Non-condensing)
Vibration:	10-150Hz, 5G, 0.75mm. along X, Y and Z
MTBF (MIL-HDFK-217F@25°C):	>3500 Khours
Cooling:	Free air convection
Package material:	10-150Hz, 5G, 0.75mm. along X, Y and Z
Dimensions:	19.65 x 6.00 x 10.16mm
Weight:	2.1g

Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (Full load/no load)	• 12VDC input • 15VDC input • 24VDC input		105/8 84/8 56/8	110/- 88/- 61/-	mA mA mA
Reflected ripple current			15		mA
Surge voltage (1sec. max.)	• 12VDC input • 15VDC input • 24VDC input	-0.7 -0.7 -0.7		18 21 30	VDC VDC VDC
Filter	Filter capacitor				
Hot plug	Unavailable				

Note: * Reflected ripple current testing method please see DC-DC Converter Application Notes for specific operation.

Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	1500			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation Capacitance	Input/output, 100KHz/0.1V		20		pF

Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	See output regulation curves (Fig. 1)				
Line regulation	Input voltage change:±1% • 3.3VDC output • others			1.5 1.2	% %
Load regulation	10% to 100% load • 3.3VDC output • 5VDC output • 9VDC output • 12VDC output • 15VDC output • 24VDC output		 8 5 3 3 3 2	 20 15 10 10 10 10	 % % % % % %
Temperature coefficient	100% full load		±0.02		%/°C
Ripple & Noise*	20MHz Bandwidth 24VDC output others		 50 30	 100 75	 mVp-p mVp-p
Switching frequency:	Full load, nominal input			260	KHz

* The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

Example:
1S7A_1205D1.5UP
1 = 1Watt; S7 = SIP7; A = series; 12 = 12Vin; 05 = 5Vout; D = Dual Output; 1.5 = 1.5kVDC; U = Unregulated Output; P = Short Circuit

Note:

1. If the product is operated under the min. required load, the product performance cannot be guaranteed to comply with all performance indexes in this datasheet;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on our Company's corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see „Features" and „EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV	perf. Criteria B

Refer to Fig.4 for recommended circuit test.

Product Selection Guide

Part Number	Input Voltage [V]	Output Voltage [VDC]	Current [mA, max]	Efficiency [%, typ]	Capacitive load [µF, max]	Certification
1S7A_1203S1.5UP	12 (10.8-13.2)	3.3	303/30	71/75	2400	UL
1S7A_1205S1.5UP	12 (10.8-13.2)	5	200/20	76/80	2400	UL
1S7A_1209S1.5UP	12 (10.8-13.2)	9	111/12	76/80	1000	UL
1S7A_1212S1.5UP	12 (10.8-13.2)	12	83/9	76/80	560	UL
1S7A_1215S1.5UP	12 (10.8-13.2)	15	67/7	77/81	560	UL
1S7A_1224S1.5UP	12 (10.8-13.2)	24	42/4	77/81	220	UL
1S7A_1505S1.5UP	15 (13.5-16.5)	5	200/20	76/80	2400	UL
1S7A_1509S1.5UP	15 (13.5-16.5)	9	111/12	76/80	1000	UL
1S7A_1512S1.5UP	15 (13.5-16.5)	12	83/9	76/80	560	UL
1S7A_1515S1.5UP	15 (13.5-16.5)	15	67/7	77/81	560	UL
1S7A_2403S1.5UP	24 (21.6-26.4)	3.3	303/30	69/75	2400	UL
1S7A_2405S1.5UP	24 (21.6-26.4)	5	200/20	73/79	2400	UL
1S7A_2409S1.5UP	24 (21.6-26.4)	9	111/12	74/80	1000	UL
1S7A_2412S1.5UP	24 (21.6-26.4)	12	83/9	75/81	560	UL
1S7A_2415S1.5UP	24 (21.6-26.4)	15	67/7	75/81	560	UL
1S7A_2424S1.5UP	24 (21.6-26.4)	24	42/4	75/81	220	UL

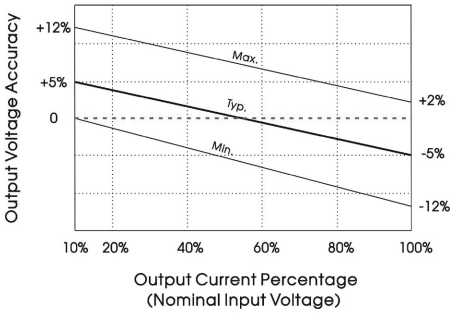
Part Number	Input Voltage [V]	Output Voltage [VDC]	Current [mA, max]	Efficiency [%, typ]	Capacitive load [µF, max]	Certification
1S7A_1203D1.5UP	12 (10.8-13.2)	±3.3	±152/±15	71/75	1200	UL
1S7A_1205D1.5UP	12 (10.8-13.2)	±5	±100/±10	76/80	1200	UL
1S7A_1212D1.5UP	12 (10.8-13.2)	±12	±42/±5	77/81	220	UL
1S7A_1215D1.5UP	12 (10.8-13.2)	±15	±34/±4	77/81	220	UL
1S7A_1224D1.5UP	12 (10.8-13.2)	±24	±21/±3	76/80	100	UL
1S7A_1505D1.5UP	15 (13.5-16.5)	±5	±100/±10	76/80	1200	UL
1S7A_1512D1.5UP	15 (13.5-16.5)	±12	±42/±5	76/80	220	UL
1S7A_1515D1.5UP	15 (13.5-16.5)	±15	±34/±4	77/81	220	UL
1S7A_2405D1.5UP	24 (21.6-26.4)	±5	±100/±10	74/80	1200	UL
1S7A_2412D1.5UP	24 (21.6-26.4)	±12	±42/±5	75/81	220	UL
1S7A_2415D1.5UP	24 (21.6-26.4)	±15	±34/±4	73/79	220	UL
1S7A_2424D1.5UP	24 (21.6-26.4)	±24	±21/±3	74/80	100	UL

Note: * The specified maximum capacitive load for positive and negative output is identical.

Typical characteristics

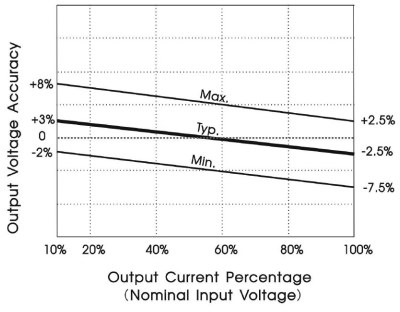
3.3VDC output

Output Regulation Curve



5VDC/9VDC/12VDC/15VDC/24VDC output

Output Regulation Curve



Typical characteristics

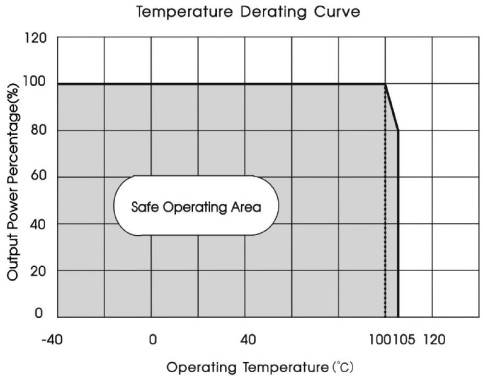
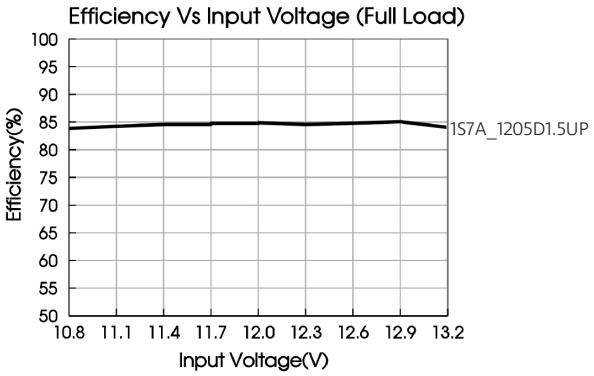
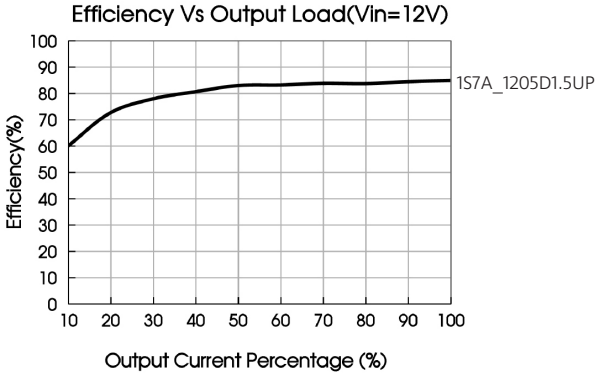
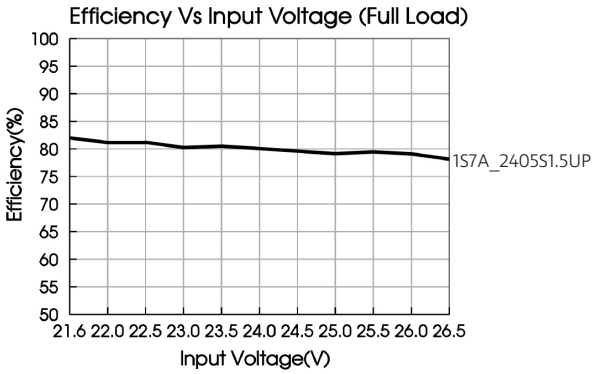


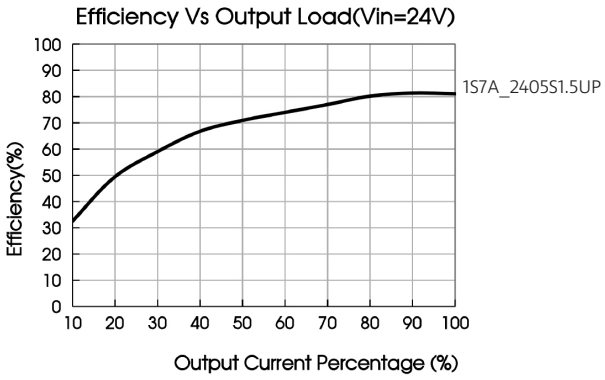
Fig. 2

Efficiency









Typical application

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.3. 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.

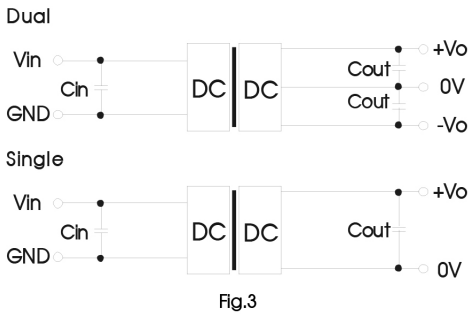


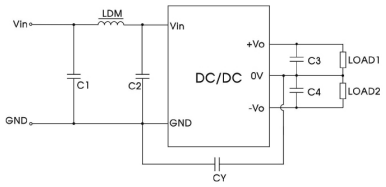
Fig.3

Table: Recommended input and output capacitor values

Vin	Cin	Single output	Cout	Dual output	Cout
12VDC	2.2µF/25V	3.3VDC	10µF/16V	±3.3VDC	4.7µF/16V
15VDC	2.2µF/25V	5VDC	10µF/16V	±5VDC	4.7µF/16V
24VDC	1µF/50V	9VDC	2.2µF/16V	±12VDC	1µF/25V
	--	12VDC	2.2µF/25V	±15VDC	0.47µF/25V
	--	15VDC	1µF/25V	±24VDC	0.47µF/50V
	--	24VDC	1µF/50V		

EMC solution-recommended circuit

Dual



Single

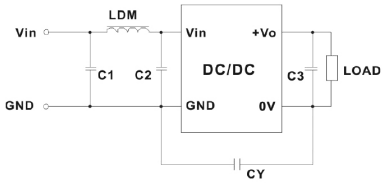
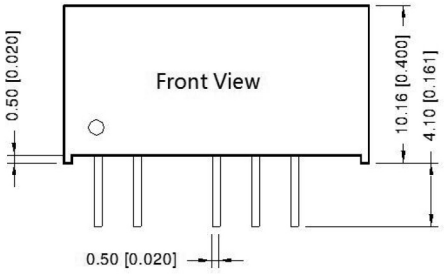


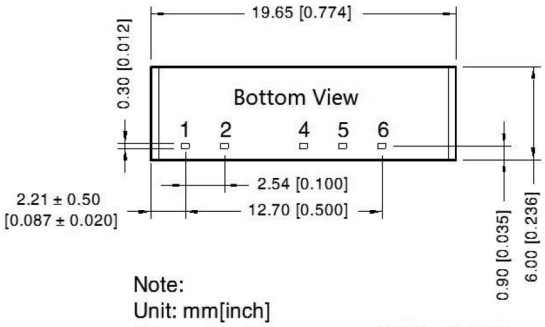
Fig.4

EMC recommended circuit value table

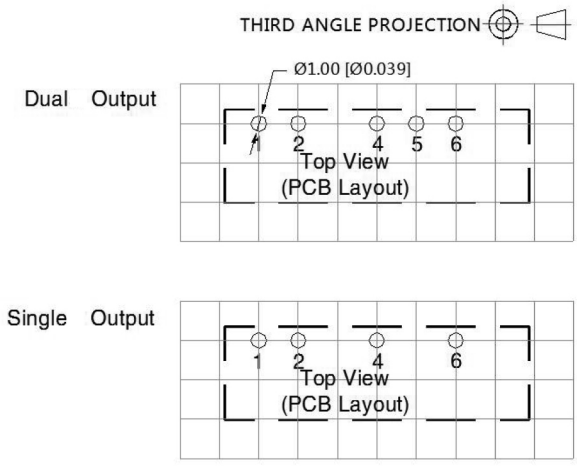
Emissions	C1	4.7µF /50V
	C2	4.7µF /50V
	CY	270pF/2kV
	C3	Refer to the Cout in table 1
	C4	Refer to the Cout in table 1
	LDM	6.8µH

Mechanical dimensions





Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.25[± 0.010]



Note: Grid 2.54*2.54mm

Pin–Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
4	0V	–Vo
5	No Pin	0V
6	+Vo	+Vo