



157B_3UP series

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

3.3/5/12/15/24Vin DC-DC Converter 1 Watt

- ⊕ Continuous short-circuit protection
- ⊕ No-load input current 8mA Operating ambient temp. range: -40°C to +105°C
- ⊕ High efficiency up to 81%
- ⊕ I/O isolation test voltage: 3kVDC
- ⊕ Industry standard pin-out

The 157B_3UP series are specially designed for applications where one 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.



Common specifications	
Short circuit protection:	Continuous, self-recovery
Temperature rise at full load: (Ta = 25°C)	• 3.3VDC: 25°C TYP • Others: 15°C TYP
Operation temperature range:	-40°C – +105°C (see Fig. 2)
Storage temperature range:	-55°C – +125°C
Pin soldering resistance temperature:	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-HDBK-217F@25°C):	>3,500,000 hours
Cooling:	Free air convection
Case material:	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions:	19.65 x 6.00 x 10.16mm
Weight:	2.1g

Input specifications					
Item	Test condition	Min	Typ	Max	Units
Input current (no-load/full load)	• 3.3VDC input		416/8	440/-	mA
	• 5VDC input		270/5	286/10	mA
	• 12VDC input		112/8	118/-	mA
	• 15VDC input		84/8	88/-	mA
	• 24VDC input		56/8	59/-	mA
Input surge voltage (Isec. max.)	5VDC input	-0.7		9	VDC
	12VDC input	-0.7		18	VDC
	15VDC input	-0.7		21	VDC
	24VDC input	-0.7		30	VDC
Reflected ripple current*			15		mA
Input filter	Capacitance filter				
Hot plug	Unavailable				

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

EMC specifications		
Emissions	CE	CISPR32/EN55032 CLASS B (see EMC recommended circuit)
Emissions	RE	CISPR32/EN55032 CLASS B (see EMC recommended circuit)
Immunity	ESD	• 5VDC input IEC/EN61000-4-2 Air ±8KV, Contact ±8KV perf. Criteria B • Others IEC/EN61000-4-2 Air ±6kV, Contact ±6kV perf. Criteria B

Note: Refer to Fig.4 for recommended circuit test.

Example:
157B_0505D3UP
1 = 1Watt; S7 = SIP7; B = Pinning; 5Vin; 5Vout; D = Dual Output;
3 = 3kVDC; U = Unregulated Output; P = Short circuit protection

Output specifications					
Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	See output regulation curves (Fig. 1)				
Line regulation	For Vin change of ±1%			1.5	%
		• 3.3V output			1.2
Load regulation 10% to 100% load	3.3VDC input • 3.3VDC output • others 5VDC input • 3.3VDC output • 5VDC output • 9VDC output • 12VDC output • 15VDC output • 24VDC output Others input • 3.3VDC output • 5VDC output • Others			25	%
				15	%
			15	20	%
			10	15	%
			8	10	%
			7	10	%
			6	10	%
			5	10	%
			15	20	%
			10	15	%
			8	10	%
		Ripple & Noise* 20MHz Bandwidth	3.3/5VDC input • 3.3V output • Others Others input • 24VDC output • Others		30
	50			100	mVp-p
Temperature coefficient	Full load		±0.02		%/°C
Switching frequency	Full load, nominal input		260		KHz

* Ripple and noise tested with "parallel cable" method, please see DC-DC Converter Application Notes for specific operation methods.

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	3000			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	Input/Output, 100KHz/0.1V		20		pF

Note:

- 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;
- The maximum capacitive load offered were tested at input voltage range and full load;
- 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;
- All index testing methods in this datasheet are based on our company corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see „Features“ and „EMC“;
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

1S7B_3UP series

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

Product Selection Guide (single output)

Part Number	Input Voltage [V]	Output Voltage [VDC]	Output current [mA, max.]	Efficiency [%, typ]	Capacitive load [μ F, max]	Certification
1S7B_0303S3UP	3.3 (2.97 - 3.63)	3.3	303	75	2400	
1S7B_0305S3UP	3.3 (2.97 - 3.63)	5	200	80	2400	
1S7B_0309S3UP	3.3 (2.97 - 3.63)	9	111	80	1000	
1S7B_0312S3UP	3.3 (2.97 - 3.63)	12	83	80	560	
1S7B_0315S3UP	3.3 (2.97 - 3.63)	15	67	80	560	
1S7B_0324S3UP	3.3 (2.97 - 3.63)	24	42	80	220	
1S7B_0503S3UP	5	3.3	303	74	2400	
1S7B_0505S3UP	5	5	200	82	2400	
1S7B_0509S3UP	5	9	111	83	1000	
1S7B_0512S3UP	5	12	84	83	560	
1S7B_0515S3UP	5	15	67	83	560	
1S7B_0524S3UP	5	24	42	85	220	
1S7B_1203S3UP	12 (10.8-13.2)	3.3	303/30	71/75	2400	UL
1S7B_1205S3UP	12 (10.8-13.2)	5	200/20	76/80	2400	UL
1S7B_1209S3UP	12 (10.8-13.2)	9	111/12	76/80	1000	UL
1S7B_1212S3UP	12 (10.8-13.2)	12	83/9	76/80	560	UL
1S7B_1215S3UP	12 (10.8-13.2)	15	67/7	77/81	560	UL
1S7B_1224S3UP	12 (10.8-13.2)	24	42/5	77/81	220	UL
1S7B_1505S3UP	15 (13.5-16.5)	5	200/20	76/80	2400	UL
1S7B_1509S3UP	15 (13.5-16.5)	9	111/12	76/80	1000	UL
1S7B_1512S3UP	15 (13.5-16.5)	12	83/9	76/80	560	UL
1S7B_1515S3UP	15 (13.5-16.5)	15	67/7	77/81	560	UL
1S7B_1524S3UP	15 (13.5-16.5)	24	42/5	77/81	220	UL
1S7B_2403S3UP	24 (21.6-26.4)	3.3	303/30	69/75	2400	UL
1S7B_2405S3UP	24 (21.6-26.4)	5	200/20	73/79	2400	UL
1S7B_2407S3UP	24 (21.6-26.4)	7.2	139/13	74/80	1000	
1S7B_2409S3UP	24 (21.6-26.4)	9	111/12	74/80	1000	UL
1S7B_2412S3UP	24 (21.6-26.4)	12	83/9	75/81	560	UL
1S7B_2415S3UP	24 (21.6-26.4)	15	67/7	75/81	560	UL
1S7B_2424S3UP	24 (21.6-26.4)	24	42/5	75/81	220	UL

1S7B_3UP series

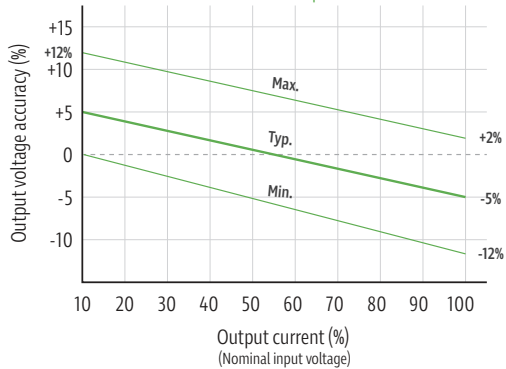
1W - Single/Dual Output DC-DC Converter - Fixed Input - Isolated & Unregulated

Product Selection Guide (dual output)

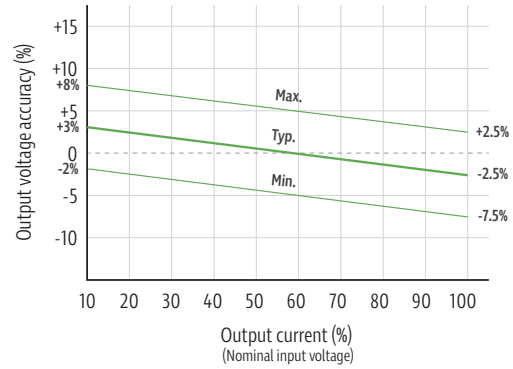
Part Number	Input Voltage [V]	Output Voltage [VDC]	Output current [mA, max.]	Efficiency [%, typ]	Capacitive load [μ F, max]	Certification
1S7B_0303D3UP	3.3 (2.97 - 3.63)	\pm 3.3	\pm 152	75	1200	
1S7B_0305D3UP	3.3 (2.97 - 3.63)	\pm 5	\pm 100	80	1200	
1S7B_0309D3UP	3.3 (2.97 - 3.63)	\pm 9	\pm 56	80	470	
1S7B_0312D3UP	3.3 (2.97 - 3.63)	\pm 12	\pm 42	80	220	
1S7B_0315D3UP	3.3 (2.97 - 3.63)	\pm 15	\pm 34	80	220	
1S7B_0324D3UP	3.3 (2.97 - 3.63)	\pm 24	\pm 20	80	100	
1S7B_0503D3UP	5	\pm 3.3	\pm 152	74	470	
1S7B_0505D3UP	5	\pm 5	\pm 100	82	470	
1S7B_0509D3UP	5	\pm 9	\pm 56	83	470	
1S7B_0512D3UP	5	\pm 12	\pm 42	83	220	
1S7B_0515D3UP	5	\pm 15	\pm 34	83	220	
1S7B_0524D3UP	5	\pm 24	\pm 21	85	220	
1S7B_1203D3UP	12 (10.8-13.2)	\pm 3.3	\pm 152/ \pm 15	71/75	1200	UL
1S7B_1205D3UP	12 (10.8-13.2)	\pm 5	\pm 100/ \pm 10	76/80	1200	UL
1S7B_1209D3UP	12 (10.8-13.2)	\pm 9	\pm 56/ \pm 5	76/80	470	
1S7B_1212D3UP	12 (10.8-13.2)	\pm 12	\pm 42/ \pm 5	77/81	220	UL
1S7B_1215D3UP	12 (10.8-13.2)	\pm 15	\pm 34/ \pm 4	77/81	220	UL
1S7B_1224D3UP	12 (10.8-13.2)	\pm 24	\pm 21/ \pm 2	76/80	100	UL
1S7B_1505D3UP	15 (13.5-16.5)	\pm 5	\pm 100/ \pm 10	76/80	1200	
1S7B_1509D3UP	15 (13.5-16.5)	\pm 9	\pm 56/ \pm 5	76/80	470	
1S7B_1512D3UP	15 (13.5-16.5)	\pm 12	\pm 42/ \pm 5	76/80	220	UL
1S7B_1515D3UP	15 (13.5-16.5)	\pm 15	\pm 34/ \pm 4	77/81	220	UL
1S7B_1524D3UP	15 (13.5-16.5)	\pm 24	\pm 21/ \pm 2	77/81	100	
1S7B_2403D3UP	24 (21.6-26.4)	\pm 3.3	\pm 150/ \pm 15	72/76	1200	
1S7B_2405D3UP	24 (21.6-26.4)	\pm 5	\pm 100/ \pm 10	74/80	1200	UL
1S7B_2409D3UP	24 (21.6-26.4)	\pm 9	\pm 56/ \pm 5	74/80	470	
1S7B_2412D3UP	24 (21.6-26.4)	\pm 12	\pm 42/ \pm 5	75/81	220	UL
1S7B_2415D3UP	24 (21.6-26.4)	\pm 15	\pm 34/ \pm 4	73/79	220	UL
1S7B_2424D3UP	24 (21.6-26.4)	\pm 24	\pm 21/ \pm 2	74/80	100	UL

Typical characteristics

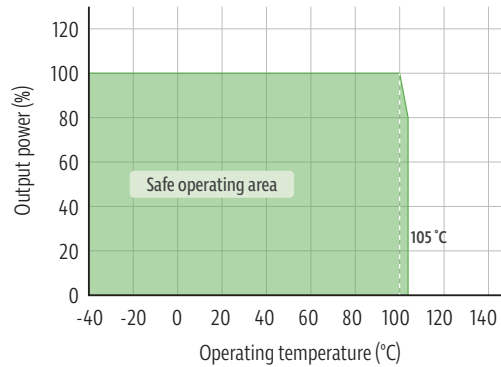
Output regulation curve
3.3VDC output



Output regulation curve
Others

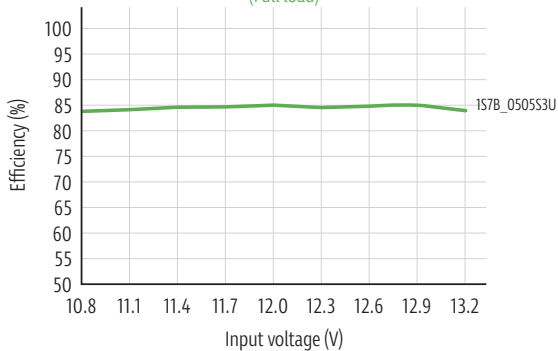


Temperature derating graph

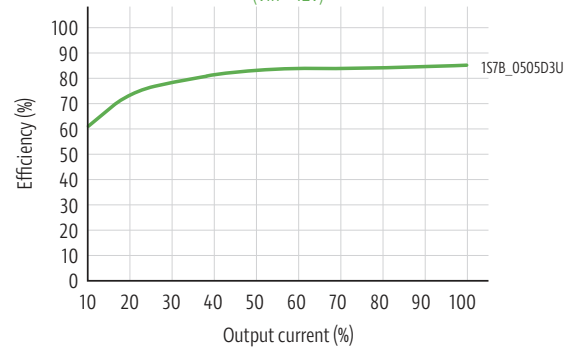


Efficiency

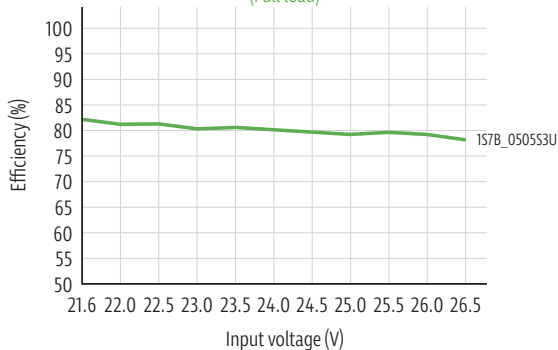
Efficiency vs input voltage
(Full load)



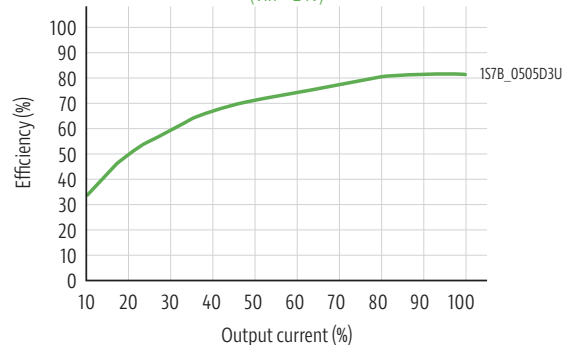
Efficiency vs output load
(Vin = 12V)



Efficiency vs input voltage
(Full load)



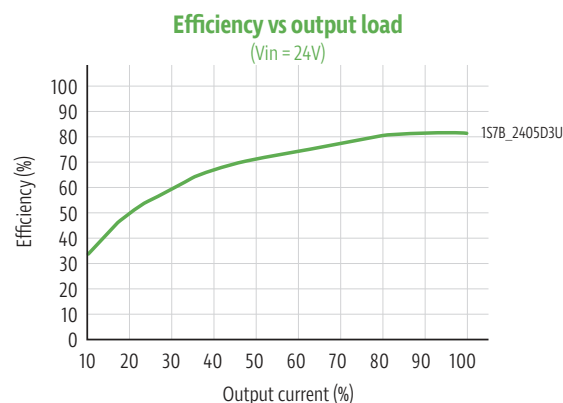
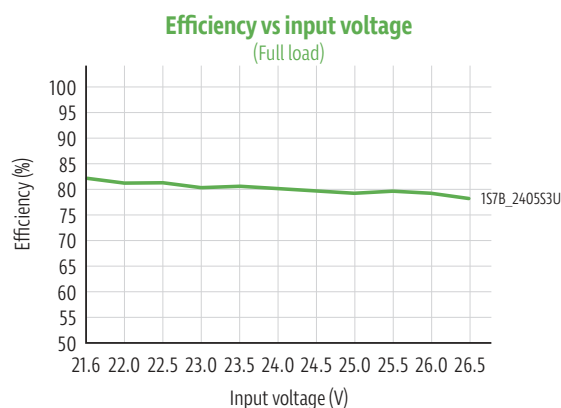
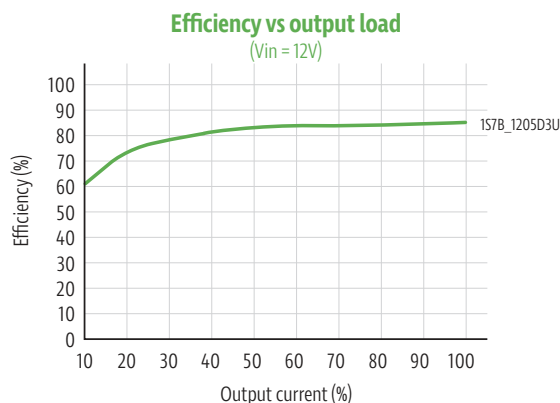
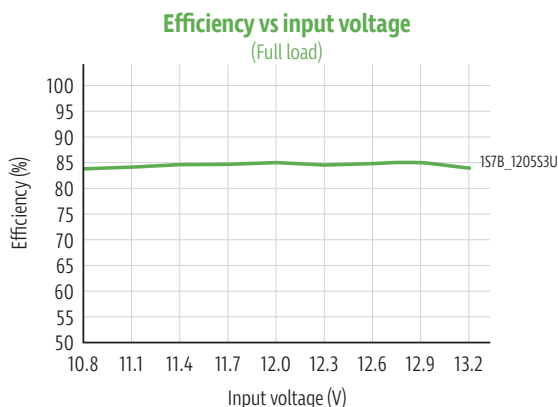
Efficiency vs output load
(Vin = 24V)



1S7B_3UP series

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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. 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 Vout	Cout	Dual Vout	Cout
3.3VDC	2.2µF/25V	3.3/5VDC	10µF/16V	±3.3/±5VDC	10µF/16V
--	--	9VDC	2.2µF/16V	±9VDC	2.2µF/16V
--	--	12VDC	2.2µF/25V	±12VDC	1µF/25V
--	--	15VDC	1µF/25V	±15VDC	1µF/25V
--	--	24VDC	1µF/50V	±24VDC	1µF/50V

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	7.2VDC	2.2µF/16V	±9VDC	1µF/16V
--	--	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	--	--

Table: Recommended input and output capacitor values

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

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EMC compliance circuit

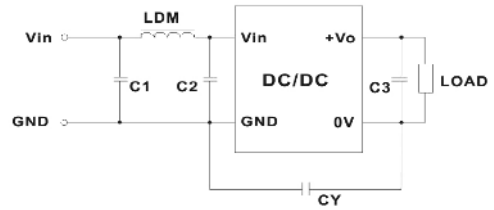
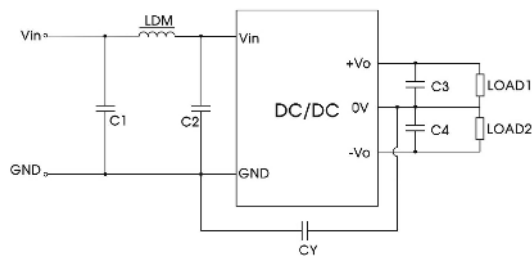


Fig. 4

Table : EMC recommended circuit value table (3.3vin)

Emissions	C1/C2	4.7µF /50V
	C3/C4	Refer to the Cout in Fig.3
	LDM	6.8µH
	CY	270pF/3kV

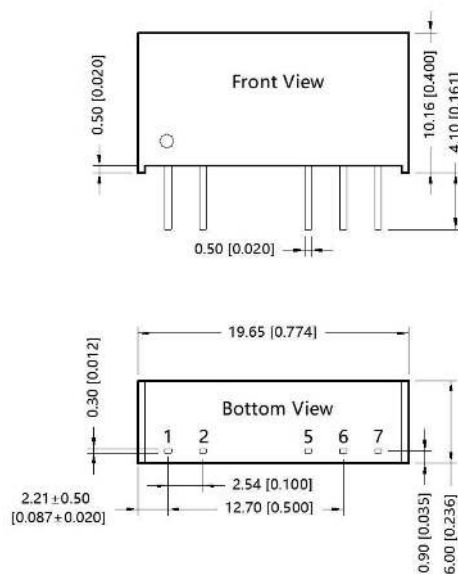
Table : EMC recommended circuit value table (5vin)

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

Table : EMC recommended circuit value table (others)

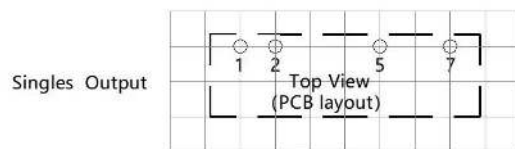
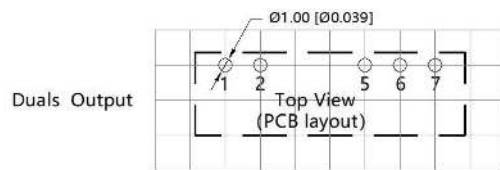
Emissions	C1/C2	4.7µF /50V
	CY	270pF /3kVDC
	C3/C4	Refer to the Cout in table 1 6.8µH
	LDM	7.2VDC

Mechanical dimensions



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

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

Pin	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No Pin	0V
7	+Vo	+Vo