



## LMO78\_0.5R series

Negative/Positive Output

### Switching Regulator

- ⊕ SIP3 package type
- ⊕ Operating temperature range: -40°C to +85°C
- ⊕ Up to 95% efficiency
- ⊕ Short circuit protection (SCP)
- ⊕ MTBF: 2,000,000 hours
- ⊕ Package dimensions only: 10.00 x 7.20 x 11.00mm

Introducing our new LMO78\_0.5R series, a compact and highly efficient non-isolated DC-DC converter designed for reliable voltage regulation in space-sensitive applications. Housed in a robust SIP3 package measuring only 10.00 × 7.20 × 11.00 mm, the series combines minimal footprint with outstanding electrical performance. With efficiency levels of up to 95%, it significantly reduces power losses and heat generation, supporting energy-efficient system designs.

The converters operate reliably across a temperature range from -40°C to +85°C and feature integrated short circuit protection (SCP) for enhanced operational safety. An MTBF of 2,000,000 hours ensures long-term stability and dependable performance in industrial and embedded applications.



#### Common specifications

Short circuit protection	Nominal input, continuous, self recovery
Switching frequency	500kHz (typ.) full load, nominal input
Operating temperature	-40°C - +85°C (with derating)
Storage temperature	-55°C - +125°C
Soldering profile	Wave-soldering, 2605°C (±5°C); time: 5 - 10s Manual-welding, 3605°C (±10°C); time: 3 - 5s
Relative humidity	5 - 95%RH (non condensing)
MTBF (MIL-HDBK-217F@25°C)	>2,000,000 hours
Reverse polarity at input	Avoid/not protected
Input filter	Capacitor filter
Package dimensions	10.00 x 7.20 x 11.00mm
Weight	1.1g (typ.)
Cooling method	Free air convection

#### Input specifications

Item	Operating condition	Min	Typ	Max	Units
Input current (no-load)	Positive output		0.5	1.5	mA

#### Example:

**LMO78\_05-0.5R**

LMO78 = Series; 05 = 5Vout; 0.5 = 0.5A; R = Revised

#### Output specifications

Item	Operating condition	Min	Typ	Max	Units
Output voltage accuracy (full load, input voltage range)	3.3VDC output Other output		±2 ±2	±4 ±3	%
Linear regulation rate	Full load, input voltage range		±0.2	±0.4	%
Load regulation (nominal input, 10% - 100% load)	3.3/±5VDC Output Others		±0.6 ±0.3		%
Ripple & noise	20MHz bandwidth, 10%-100% load, parallel cable method 20MHz bandwidth, 0% - 10% load, parallel cable method		40 -	100 2	mVp-p %Vo
Transient recovery time	Nominal input, 25% Load Step Change		0.2	1	ms
Transient response deviation	Nominal input, 25% Load Step Change		50	250	mV
Temperature coefficient	Operating ambient temp. -40°C to +85°C			±0.03	%/°C

1. Maximum capacitive loads are tested in the input voltage range and under full load conditions;
2. 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;
3. For specific needs please contact our technical team directly;
4. All index test methods are based on our company's standards;
5. The copyright and final interpretation of this product belongs to GAPTEC.

#### EMC specifications

EMI	CE	CISPR32/EN55032 CLASS B (see Fig. 5-2) for recommended circuit)		
EMI	RE	CISPR32/EN55032 CLASS B (see Fig. 5-2) for recommended circuit)		
EMS	ESD	IEC/EN61000-4-2	Contact ±4kV	Perf. criteria B
EMS	RS	IEC/EN61000-4-3	10V/m	Perf. criteria A
EMS	EFT	IEC/EN61000-4-4	±1KV (see fig. 5-3) for recommended circuit)	Perf. criteria B
EMS	CS	IEC/EN61000-4-6	3Vr.m.s	Perf. criteria A

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## Product Selection Guide

Approval	Part number	Input Voltage Nominal Range (VDC)	Output Voltage (VDC)	Output Current (mA) max.	Full Load Efficiency (%) min./typ.	Capacitive Load (µF) max.
	LMO78_03-0.5R	24 (4.75-36)	3.3	500	92	680
	LMO78_05-0.5R	24 (6.5-36) 12 (7-31)	5 -5	500 -300	93 81	680 330
	LMO78_09-0.5R	24(12-36)	9	500	93	680
	LMO78_12-0.5R	24 (15-36) 12 (8-24)	12 -12	500 -150	94 85	680 330
	LMO78_15-0.5R	24 (19-36) 12 (8-21)	15 -15	500 -150	95 87	680 330

Notes:\* For input voltage exceeding 30 VDC, an input electrolytic capacitor of 22µF/50V is required to prevent the module from being damaged by voltage spikes.

## Product characteristic curve

Temperature derating graph

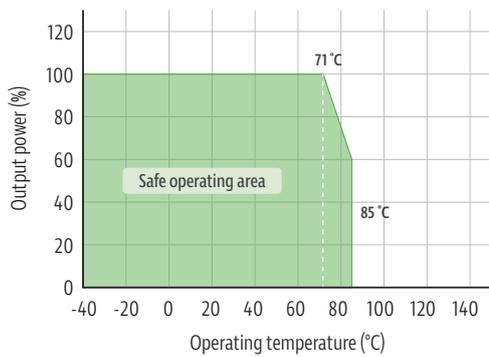
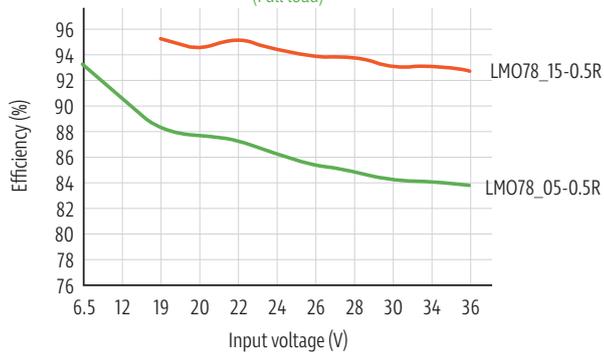
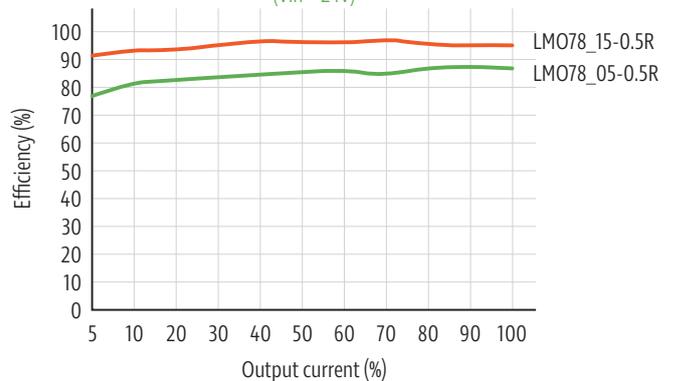


Fig.1

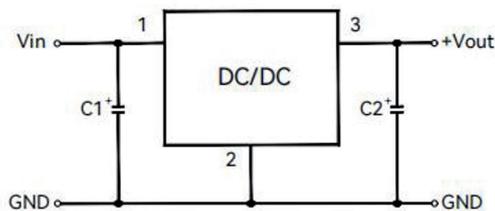
Efficiency vs input voltage (Full load)



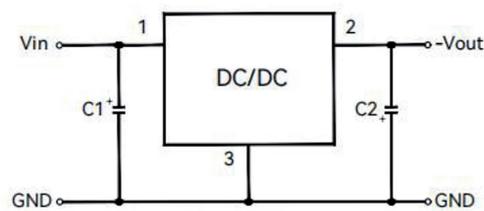
Efficiency vs output load (Vin = 24V)



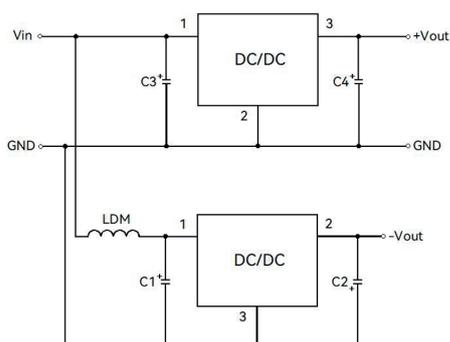
## Design and application circuit reference



Positive output application circuit (fig.2)



Negative output application circuit (fig.3)

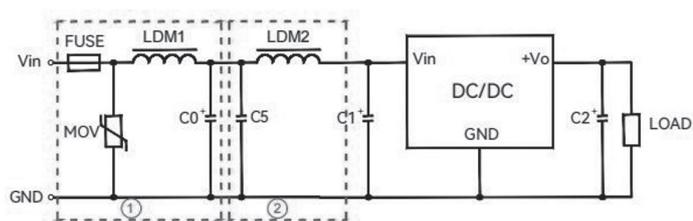


Positive and negative output application circuit (fig.4)

Recommended component parameters (Table 1)

Product Model	C1/C3 (uF)	C2/C4 (uF)
3.3	10uF/50V	22uF/10V
5	10uF/50V	22uF/10V
9	10uF/50V	22uF/25V
12	10uF/50V	22uF/25V
15	10uF/50V	22uF/25V

## „LC“ Filter Application Circuit



EMC recommended component parameters

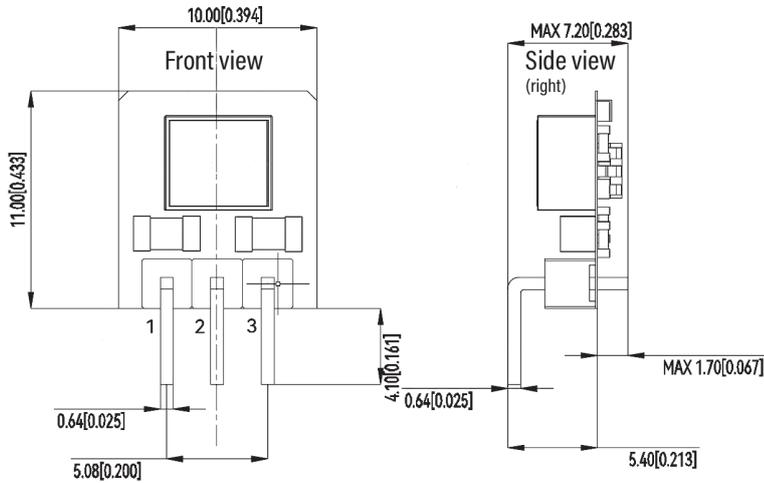
Part No.	Vin: 24V
FUSE	Selected fuse value according to actual input current
MOV	20D470K
LDM1	82uH
C0	680uF/50V
C1/C2	Refer to table 1
C5	4.7uF/50V
LDM2	12uH

- Notes:
1. The required C1 and C2 (C3 and C4) capacitors must be connected as close as possible to the terminals of the module;
  2. Refer to Table 1 for C1 and C2 (C3 and C4) capacitor values; For certain applications, increased values for C2 and C4 and/or tantalum or low ESR electrolytic capacitors may also be used instead;
  3. Converter cannot be used for hot swap and with output in parallel.
  4. When using configurations as shown in Fig.4, we recommended to add an inductor (LDM) with a value of up to 10-47uH which helps reducing mutual interference;

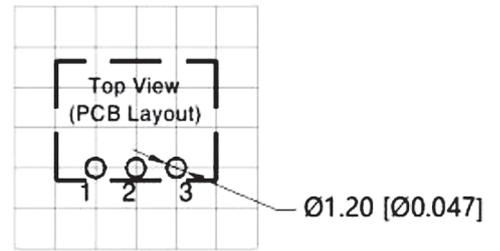
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## Dimensions and installation



Note:  
 Unit: mm [inch]  
 Pin section tolerances:  $\pm 0.10$  [ $\pm 0.004$ ]  
 General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]



Note: Grid 2.54\*2.54mm

Pin definition table

Pin	Positive output	Negative output
1	Vin	Vin
2	GND	-Vo
3	+Vo	GND