

LMS78_0.5R Series

Wide Input Non-Isolated & Regulated, Single Positive/Negative Output

Switching Regulator

- ⊕ Efficiency up to 93%
- ⊕ Operating temperature range: -40°C ~ +85°C
- ⊕ Pin-out compatible with LM78xx linears
- ⊕ Short circuit protection (SCP)
- ⊕ Thermal shutdown
- ⊕ Low ripple and noise
- ⊕ Sip package, meet UL94-V0
- ⊕ Low temperature rise
- ⊕ Industry standard pinout
- ⊕ Ultra low no-load power consumption

The LMS78_0.5R series high efficiency switching regulators are ideally suited to replace LM78xx linear regulators and are pin compatible.



Common specifications	
Short circuit protection:	Continuous, automatic recovery
No-load input current:	0.2mA TYP, 1.5mA MAX
Reverse Polarity Input:	Forbidden
Input Filter:	Capacitor Filter
Temperature rise at full load:	25°C MAX, 15°C TYP
Cooling:	Free air convection
Operation temperature range:	-40°C~+85°C Power derating above 71°C
Storage temperature range:	-55°C ~+125°C
Pin welding resistance temperature:	260°C MAX, 1.5mm from case for 10 sec
Operating case temperature:	100°C
Storage humidity range:	< 95%RH
Package material:	Plastic [UL94-V0]
MTBF:	>2,000,000 hours +25°C MIL-HDBK-217F
Weight:	2g

Output specifications						
Item	Test conditions	Min	Typ	Max	Units	
Output voltage accuracy	100% load		±2	±3	%	
Line regulation	Input Voltage Range		±0.2	±0.4	%	
Load regulation	10% to 100% load		±0.4	±0.6	%	
Output current limit				3000	mA	
Ripple + Noise*	20MHz Bandwidth Vin=24VDC 0% -100% load		20	75	mVp-p	
Over heat protection	Internal IC junction			170	°C	
Short circuit input power			0.5	1.8	W	
Switching frequency			550	850	KHz	
Transient response deviation	Nominal input, 25% load step change		55	250	mV	
Transient recovery time	Nominal input, 25% load step change		0.5	2	ms	
Temperature coefficient	-40 °C to +85 °C ambient			0.03	%/°C	

Note:

1. The max. capacitive load should be tested within the input voltage range and under full load conditions;
2. Without any special statement, all indexes are only specific to positive output application;
3. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta = 25°C, humidity <75% when inputting nominal voltage and outputting rated load;
4. All index testing methods in this datasheet are based on our Company's corporate standards;
5. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact with our technician for specific information;
6. Specifications subject to change without prior notice.

* Test ripple and noise by "parallel cable" method. With the load lower than 10%, maximum ripple and noise will be 150mVp-p.

Example:

LMS78_05-0.5R

LM = Series; S = SIP Case; 05 = 5Vout; 0.5 = 0.5A; R = Revised

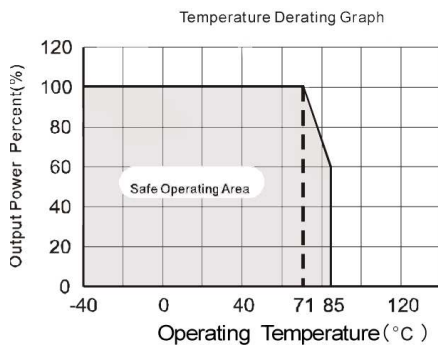
EMC specifications					
EMI	CE	CISPR22/EN55022	CLASS B	(External circuit refer to EMC recommended circuit, ② or EMC module application circuit)	
EMI	RE	CISPR22/EN55022	CLASS B	(External circuit refer to EMC recommended circuit, ② or EMC module application circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±4KV	perf. Criteria B	
EMS	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A	
EMS	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B (External circuit refer to EMC recommended circuit, ①)	
EMS	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A	
EMS	Voltage dips, short and interruptions immunity	IEC/EN61000-4-29	0%-70%	perf. Criteria B	

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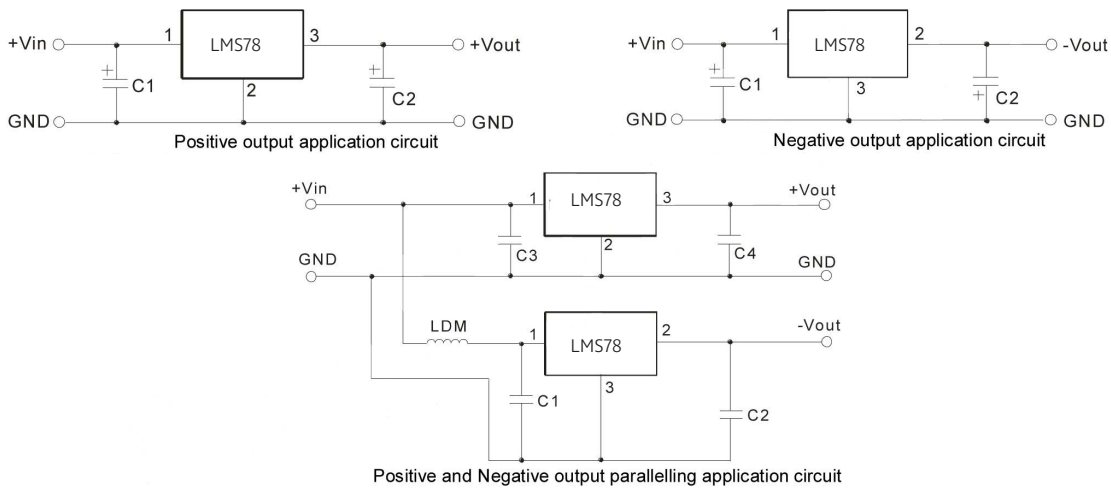
Wide Input Non-Isolated & Regulated, Single Positive/Negative Output

Part Number	Input Voltage [VDC] Nominal (Range)	Output Voltage [VDC]	Output Current [mA]	Efficiency [%, min/typ]	Max. capacitive load [μF]
LMS78_03-0.5R	24 (4.75-36)	3.3	500	78/81	680
LMS78_05-0.5R	24 (6.5-36) 12 (7-31)	5 -5	500 -300	82/85 78/81	680 330
LMS78_09-0.5R	24 (12-36)	9	500	87/90	680
LMS78_12-0.5R	24 (15-36) 12 (8-24)	12 -12	500 -150	89/92 82/85	680 330
LMS78_15-0.5R	24 (19-36) 12 (8-21)	15 -15	500 -150	90/93 82/85	680 330

Typical characteristics



Typical application circuit



Part number	C1,C3 (Ceramic Capacitor)	C2,C4 (Ceramic Capacitor)
LMS78_03-0.5R	10μF/50V	22μF/10V
LMS78_05-0.5R	10μF/50V	22μF/10V
LMS78_09-0.5R	10μF/50V	22μF/16V
LMS78_12-0.5R	10μF/50V	22μF/25V
LMS78_15-0.5R	10μF/50V	22μF/25V

Note:

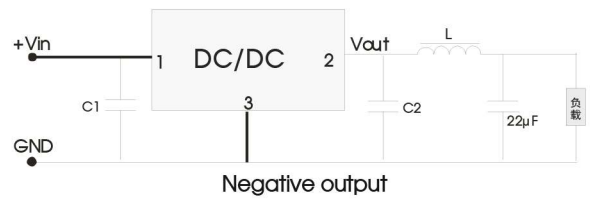
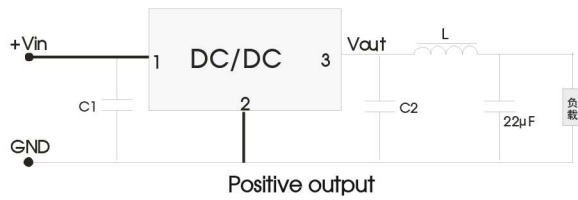
- C1 and C2 are required and should be connected close to the pin terminal of the module.
- The capacitance of C1 and C2 refer to Sheet 1, it can be increased properly if required, and tantalum or low ESR electrolytic capacitors may also suffice.
- When the products used as the circuit like figure 3, an inductor named as LDM up to 10μH is recommended in the circuit to reduce the mutual interference.
- Cannot be used in parallel for output and hot swap.
- Operation under no load will not damage these devices, however they may not meet all specifications. In order to ensure the converter can work reliably with high efficiency, please parallel a resistor on the output side (The sum of the efficient power and resistor consumption power is not less than 10%).

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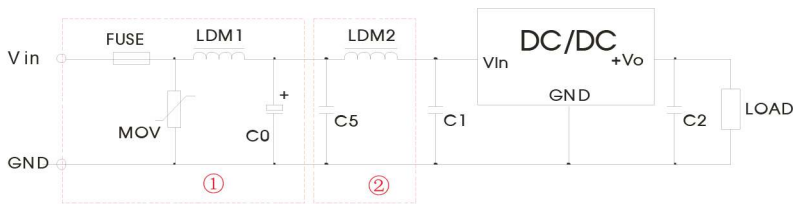
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Typical application circuit

To reduce the output ripple furtherly, it is suggested to connect a "LC" filter at the output terminal, and recommended value of L is 10μH-47μH.



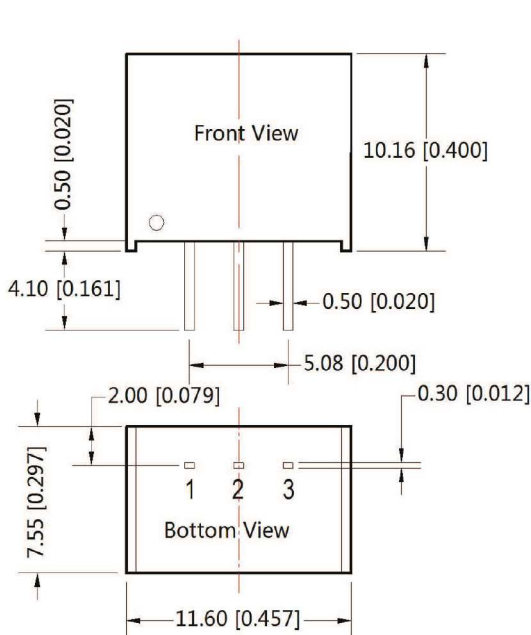
EMC solution-recommended circuit



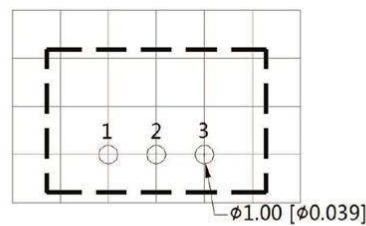
Part ① in the Fig. 5 is for EMS test, part ② is for EMI filtering; parts \square and \boxtimes can be added based on actual requirement.

FUSE	MOV	LDM1	C0	C1/C2	C5	LDM2
Selected based on the actual input current from the customer	S10K35	82μH	680μF /50V	Refer to table above	4.7μF /50V	12μH

Mechanical dimension and footprint



THIRD ANGLE PROJECTION



Note : Grid 2.54*2.54mm

Pin-Out		
Pin	Positive Output	Negative Output
1	Vin	Vin
2	GND	-Vo
3	+Vo	GND

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