THIS SERIES IS NOT recommended for new design-ins and this series is discontinued

Recommended alternative: LMS78_0.5R series

Please click here for the datasheet.

LMS78_0.5 series

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

Switching Regulator

- Efficiency up to 96%
- Operating temperature range:
- -40°C ~ +85°C
  Pin-out compatible with
- LM78XX linears
- Short circuit protection (SCP)
  Overheat protection
- Low ripple and noise
- SIP package, meet UL94-V0
- Low temperature rise
- Industry standard pinout
- Ultra low no-load power consumption

The LMS78_0.5 series are high efficiency switching regulators and ideal substitutes of LM78XX series three-terminal linear regulators. The product is featured with high efficiency, low loss, low radiation and no heat sink requirement. They are widely used in industrial control, instrumentation, and electric power applications.

Common specifications	
Short circuit protection:	Continuous, automatic recovery
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
Operating case temperature:	100°CMAX
Pin welding resistance temperature:	300°C MAX, 1.5mm from case for 10 sec
Storage humidity range:	< 95%RH
Safety-regulated certification:	EN60950
Package material:	Plastic [UL94-V0]
MTBF (MIL-HDBK-217F @25°C):	>2,000,000 hours
Weight:	2g

Input specifications					
Item	Test conditions	Min	Typ	Max	Units
No-load power consumption	Input voltage range		0.12	0.256	W
Reverse polarity input	Forbidden				
Input filter	Capacitor filter				

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	%
Ripple + Noise*	20MHz Bandwidth • positive output • negative output		 20 20	 30 35	 mVp-p mVp-p
Temperature coefficient	-40 °C to +85 °C			±0.02	%/°C
Over temperature protection	IC built-in			160	°C
Transient response deviation	Nominal input, 25% load step change		55	250	mV
Transient recovery time	Nominal input, 25% load step change		0.5	1	ms
Thermal impedance				85	°C/W
Switching frequency		280	330	450	KHz

* Test ripple and noise by “parallel cable” method, please see DC-DC Converter Application Notes for specific operation methods.

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.

Example:
LMS78_05-0.5
LM = Series; S = SIP Case; 05 = 5Vout; 0.5 = 0.5A

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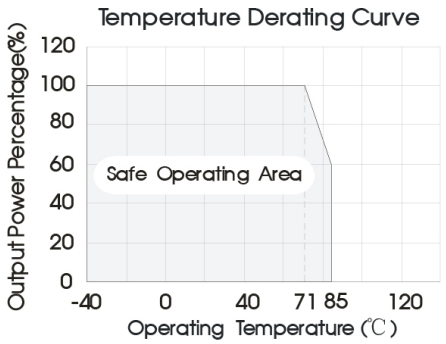
EMC specifications				
EMI	CE	CISPR22/EN55022	CLASS B	(External circuit refer to EMC recommended circuit ②)
EMI	RE	CISPR22/EN55022	CLASS B	(External circuit refer to EMC recommended circuit ②)
EMS	ESD	IEC/EN61000-4-2	Contact ±4KV	perf. Criteria B
EMS	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
EMS	EFT	IEC/EN61000-4-4	±1KV	perf. Criteria B (External circuit refer to EMC recommended circuit ①)
EMS	Surge immunity	IEC/EN61000-4-5	±1KV	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

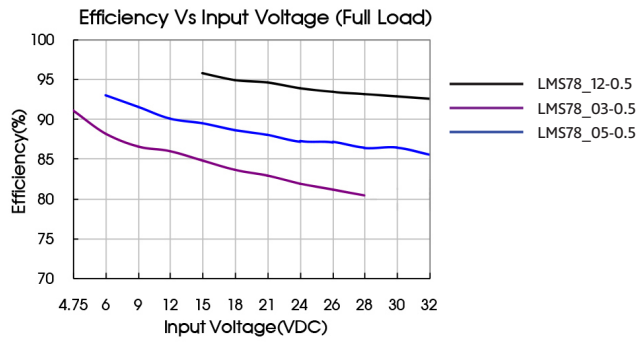
Part Number	Input Voltage [VDC] Nominal (Range)	Output Voltage [VDC]	Output Current [mA]	Efficiency [%, min/typ]	Max. capacitive load [µF]
LMS78_1.5-0.5	12 (4.75-28) 12 (4.75-25)	1.5 -1.5	500 -400	77/66 66/64	1000 470
LMS78_1.8-0.5	12 (4.75-28) 12 (4.75-25)	1.8 -1.8	500 -400	81/69 70/68	1000 470
LMS78_2.5-0.5	12 (4.75-28) 12 (4.75-25)	2.5 -2.5	500 -400	87/76 73/73	1000 470
LMS78_03-0.5	24 (4.75-28) 12 (4.75-25)	3.3 -3.3	500 -400	91/81 74/78	1000 470
LMS78_05-0.5	24 (6.5-32) 12 (6.5-27)	5 -5	500 -400	94/86 78/83	1000 470
LMS78_5.2-0.5	24 (7-32)	5.2	500	94/86	1000
LMS78_6.5-0.5	24 (8-32) 12 (6.5-25)	6.5 -6.5	500 -300	94/87 82/84	1000 470
LMS78_09-0.5	24 (11-32) 12 (7-23)	9 -9	500 -200	95/91 85/86	1000 470
LMS78_12-0.5	24 (15-32) 12 (7-20)	12 -12	500 -200	95/92 83/87	1000 470
LMS78_15-0.5	24 (18-32) 12 (7-17)	15 -15	500 -200	96/93 91/87	1000 470

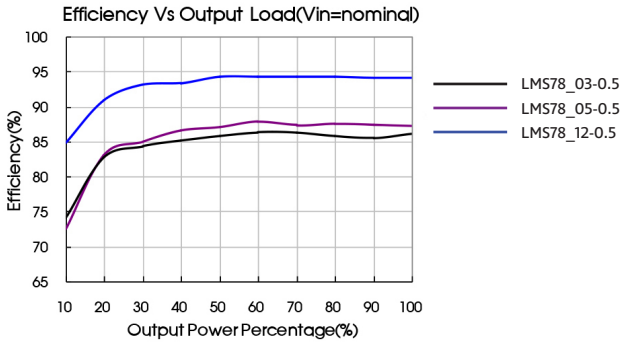
Typical characteristics

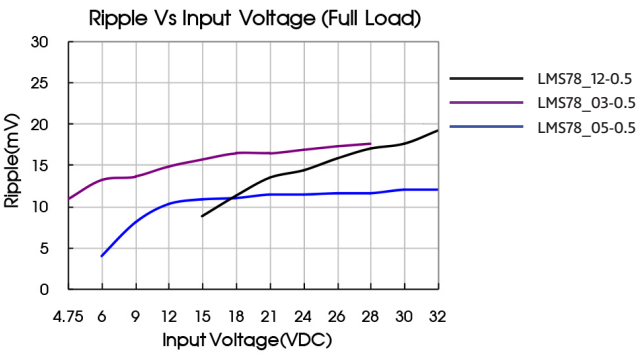


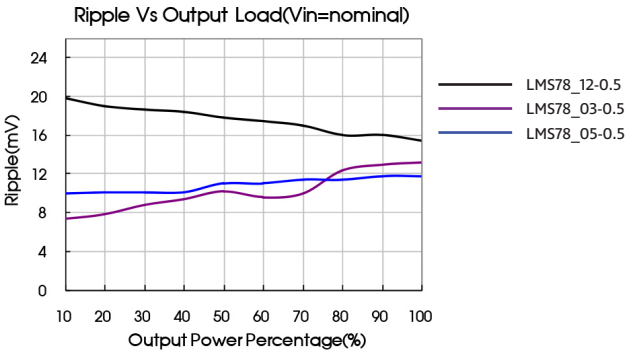
Typical characteristics

Positive output character curve

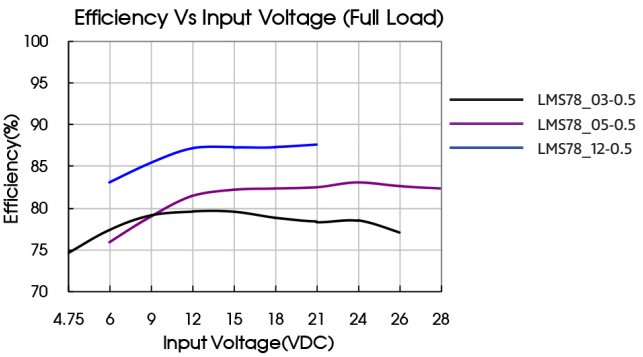


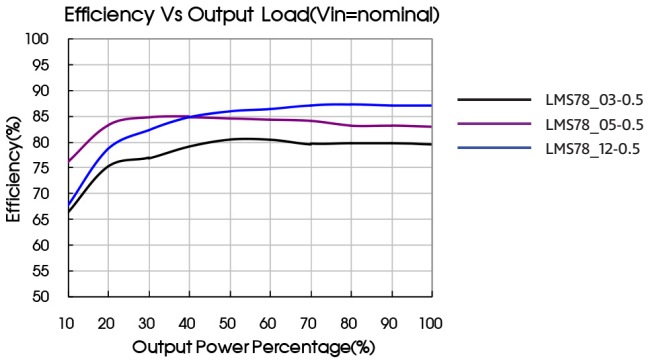


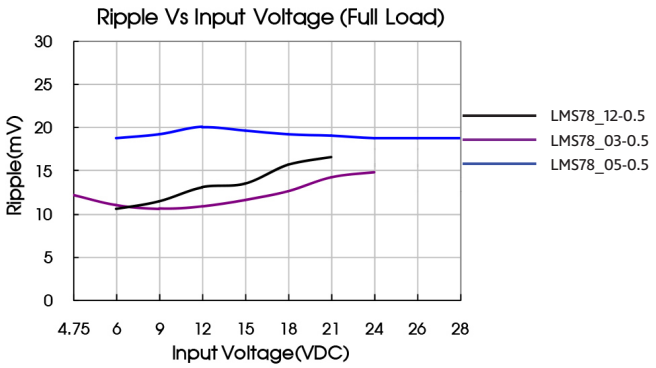


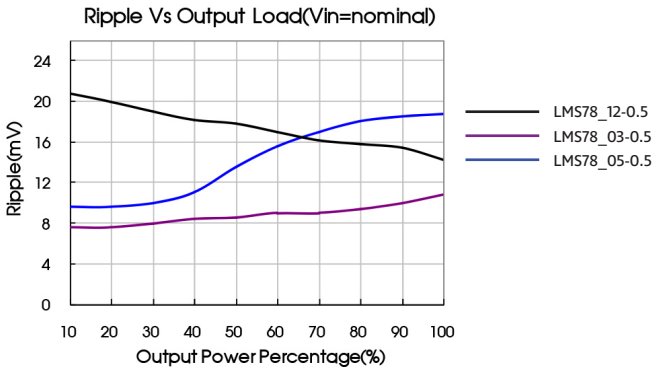


Negative output character curve









Typical application circuit

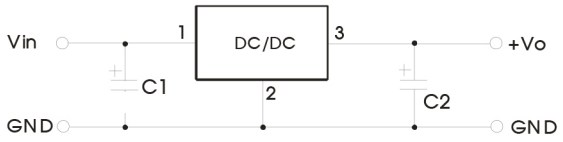


Fig. 2 Positive output application circuit

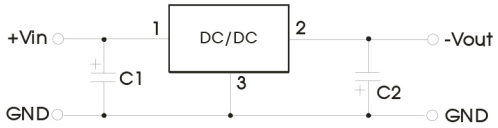
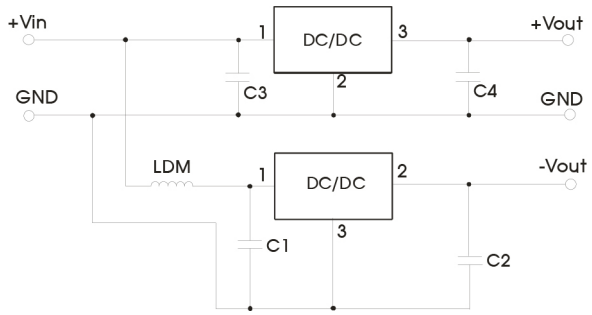


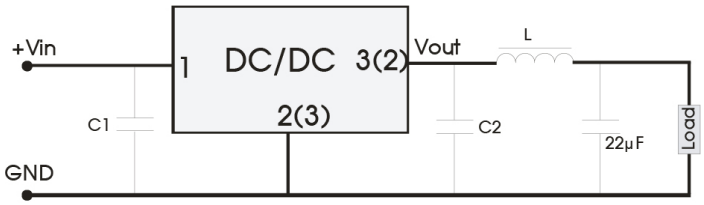
Fig. 3 Negative output application circuit



Part number	C1,C3 (Ceramic Capacitor)	C2,C4 (Ceramic Capacitor)
LMS78_1.5-0.5	10μF/50V	10μF/6.3V
LMS78_1.8-0.5	10μF/50V	10μF/6.3V
LMS78_2.5-0.5	10μF/50V	10μF/6.3V
LMS78_03-0.5	10μF/50V	10μF/6.3V
LMS78_05-0.5	10μF/50V	10μF/10V
LMS78_5.2-0.5	10μF/50V	10μF/10V
LMS78_6.5-0.5	10μF/50V	10μF/16V
LMS78_09-0.5	10μF/50V	10μF/16V
LMS78_12-0.5	10μF/50V	10μF/25V
LMS78_15-0.5	10μF/50V	22μF/25V

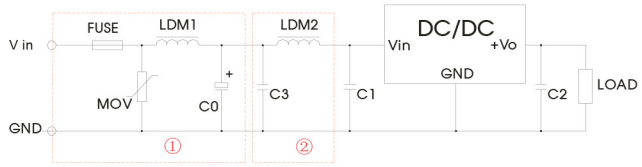
Note:
1. When the products used as negative output and the input-voltage under (Vin-min+2V),C1 and C2 must be added in the circuit, and they should be placed as near as the products' footprints. Others apply to the application-environment.
2. The capacitance of C1,C2 sees external capacitor table, it can be increased properly if required, and tantalum or low ESR electrolytic capacitors may also suffice.
3. When the products used as the circuit like figure 7,an inductor named as LDM up to 10μH is recommended in the circuit to reduce the mutual interference.
4. For the product of output voltage is below 3.3V or at 3.3V, if the input voltage of model´s negative output is less than 4.85V, The output need to add a dummy load of not less than 5mA.
5. Cannot use in parallel for output and hot swap for input.

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.

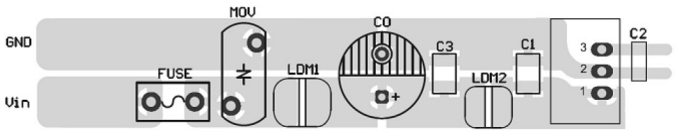


EMC solution-recommended circuit

Recommended EMC circuit



Recommended EMC circuit - PCB layout

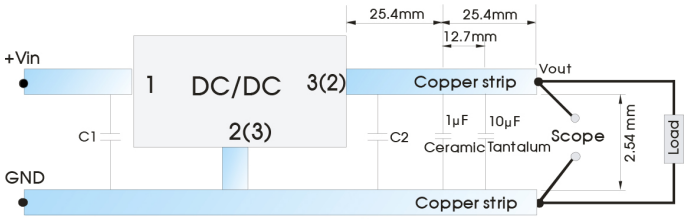


Part ① in the Fig. 5 is for EMS test, part ② is for EMI filtering; parts and can be added based on actual requirement.

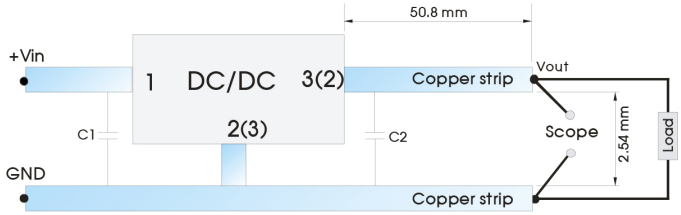
FUSE	MOV	LDM1	C0	C1/C2	C5	LDM2

Test configurations (TA=25°C)

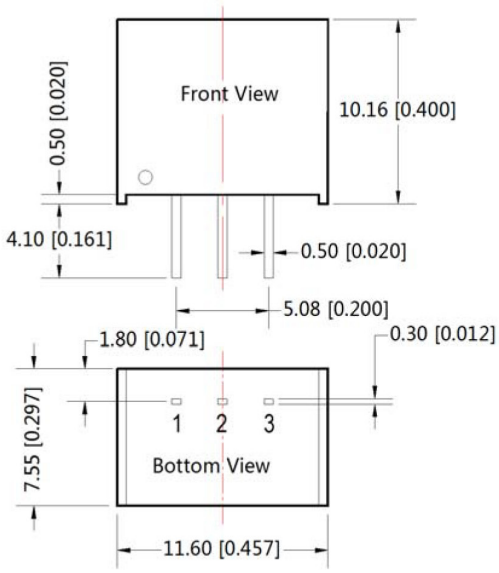
Efficiency and Output Voltage Ripple Test

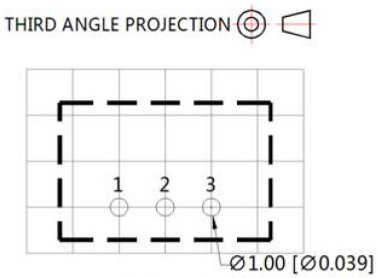


Start-up and Load Transient Response Test



Mechanical dimension and footprint





Note : Grid 2.54*2.54mm

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