LME78_3.0 series

Negative/Positive Output

Switching Regulator

- Up to 5:1 input voltage range
- Non-isolated & regulated output
- Up to 96% efficiency
- Low standby power consumption
- Miniature size SIP3 package
- Overheat protection
- Short circuit protection (SCP)
- Operating temperature from -40°C up to +95°C

Introducing our innovative LME78_3.0 series, designed to deliver efficient and reliable power conversion in a miniature SIP3 package. The series features a wide input voltage range of up to 5:1, a non-isolated, regulated output, and achieves efficiency of up to 94% with low standby power consumption.

With built-in overheat protection and short-circuit protection (SCP), the LME78_3.0 series ensures safe and stable operation across an extended operating temperature range from –40 °C up to +95 °C, making it ideal for space-constrained and thermally demanding applications.

Common specifications

Short circuit protection	Continuous, self-recovery
Switching frequency	300 kHz (nominal input voltage, full load)
Operating temperature	-40°C - +95°C (with derating)
Storage temperature	-55°C - +125°C
Case temperature	+110°C (within the operating derating range)
Pin soldering temperature	300°C (1.5mm from the case, soldering time 10s)
Relative humidity	5 - 95%RH (non condensing)
MTBF (MIL-HDBK-217F@25°C)	>1,000,000 hours
Input reversed	Not allowed
Input filter	Capacitor filter
Hot plug	Unavailable
Vibration	10-150Hz, 5G, 30 Min. (along X, Y and Z)
Case material	Plastic in Black, flame class UL94-V0
Weight	2.6g (typ.)
Cooling method	Natural air
Dimensions	14.00 × 7.60 × 10.20 mm

Input specifications

Item	Operating condition	Min	Typ	Max	Units
No load input current (Full input voltage range)	Positive output Negative output		0.2 1	1 4	mA
Full load input current	3.3V output -3.3V output 5V output -5V output 9V output -9V output 12V output -12V output 15V output -15V output		474 640 702 950 1019 843 1344 1163 1698 1437	1731 1254 2653 1854 2083 1324 2174 1829 2289 1807	mA

Example:
LME78_05-3.0
LME78 = Series; 05 = 5Vout; 3.0 = 3A

Output specifications

Item	Operating condition	Min	Typ	Max	Units
Output voltage accuracy	Full input voltage range, 0%-100% load		±1	±2	%
Line regulation	Full input voltage range, 100% load		±0.3	±0.5	%
Load regulation (0% - 100% load)	Positive output Negative output		1 2	2 3	%
Transient response deviation	25% load step change, nominal input voltage		50	300	mV
Transient recovery time	25% load step change, nominal input voltage		0.2	1	mS
Temperature drift coefficient				±0.03	%/°C
Ripple & noise (0% - 100% load, 20MHz bandwidth)	3.3 & 5V output Others		40 100	75 150	mVp-p
Over current protection	Full input voltage range		200		%Io

Note: The Ripple & noise is tested by the twisted pair method, please refer to the following test instruction.

1. The product is not available to be used in parallel, and not available for hot-plug.
2. The product should be used according to the specifications, otherwise it could be permanently damaged.
3. The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.
4. The product performance cannot be guaranteed if it works under over-load condition.
5. Unless otherwise specified, all values or indicators on this datasheet are tested at Ta = 25°C, humidity <75%RH, nominal input voltage and rated load (pure resistance load).
6. All values or indicators on this datasheet have been tested based on GAPTEC test specifications.
7. The specifications are specially for the parts listed on this datasheet, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.

EMC specifications				
EMI	CE	CISPR32/EN55032	Class B (with the recommended EMC circuit)	
EMI	RE	CISPR32/EN55032	Class B (with the recommended EMC circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±8kV	perf. criteria B

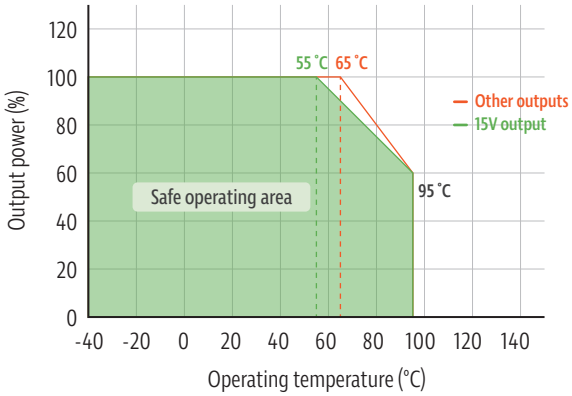
Product Selection Guide

Approval	Part number	Input Voltage Nominal (VDC)	Input Voltage Range (VDC)	Output Voltage Vo (VDC)	Output Current Io (mA)	Capacitive Load (µF) max.	Full Load Efficiency (%) min	Full Load Efficiency (%) max.
	LME78_03-3.0	24 12	6.5-32 6.5-27	3.3 -3.3	3000 -2000	4700 2200	90 83	87 86
	LME78_05-3.0	24 12	6.5-32 6.5-27	5 -5	3000 -2000	4700 2200	91 85	89 88
	LME78_09-3.0	24 12	12-32 8-23	9 -9	2500 -1000	2200 1000	92 87	92 89
	LME78_12-3.0	24 12	15-32 8-20	12 -12	2500 -1000	2200 1000	94 84	93 86
	LME78_15-3.0	24 12	18-32 10-17	15 -15	2500 -1000	1000 470	93 85	92 87

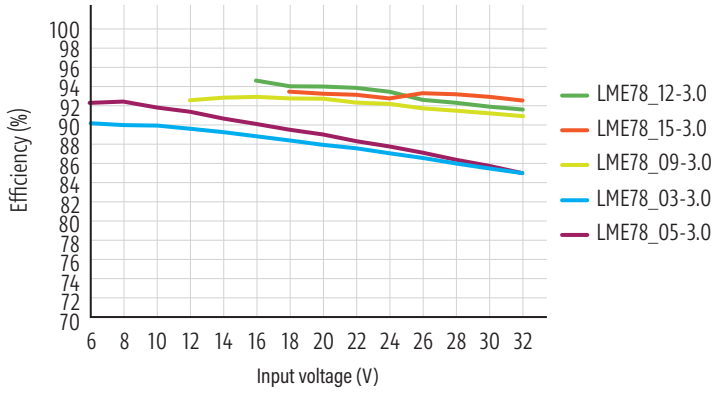
Note: It is recommended to use an electrolytic capacitor (47uF/50V) at the input to protect the unit against the peak voltage when the input voltage is more than 27VDC.

Product characteristic curve

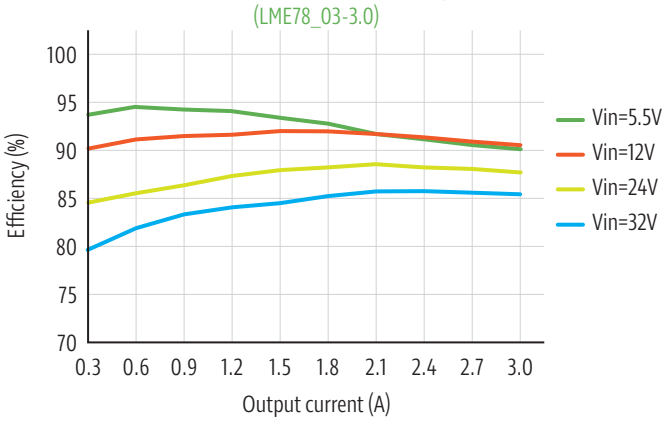
Temperature derating graph



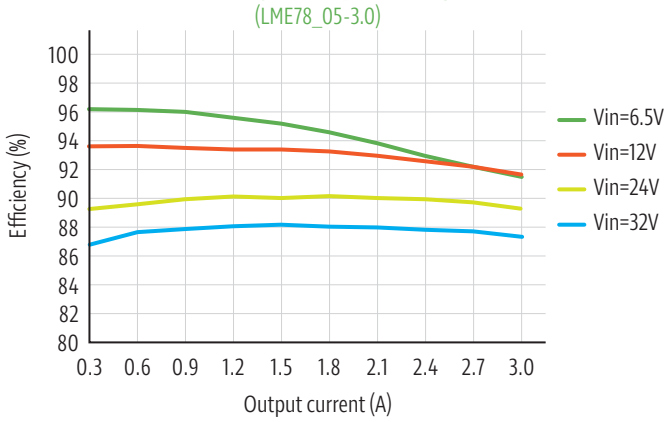
Efficiency vs input voltage



Efficiency vs output voltage
(LME78_03-3.0)

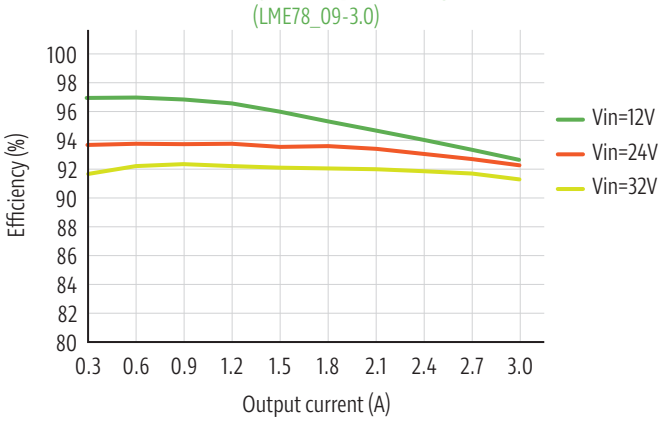


Efficiency vs output voltage
(LME78_05-3.0)

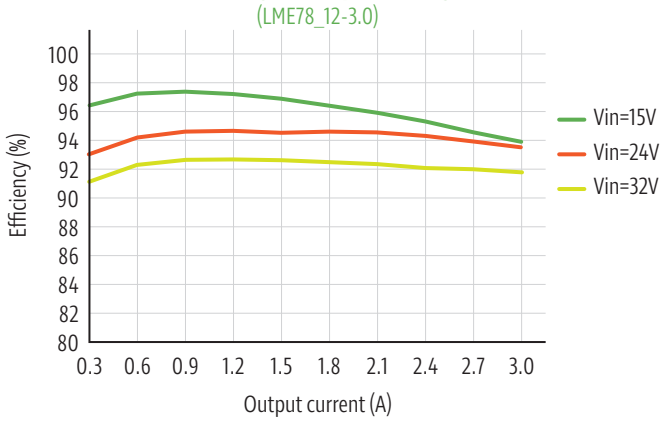


Product characteristic curve

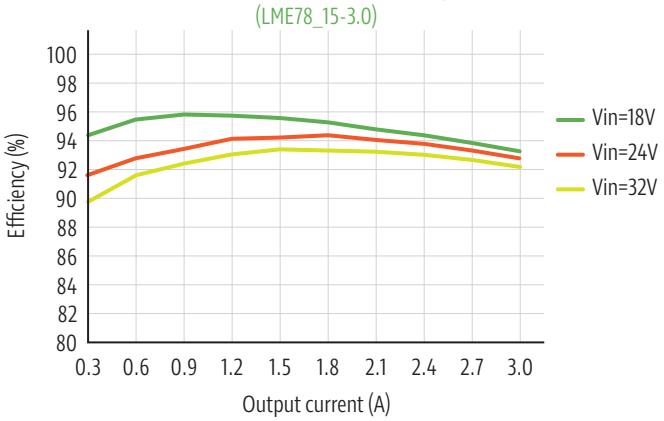
Efficiency vs output voltage
(LME78_09-3.0)



Efficiency vs output voltage
(LME78_12-3.0)

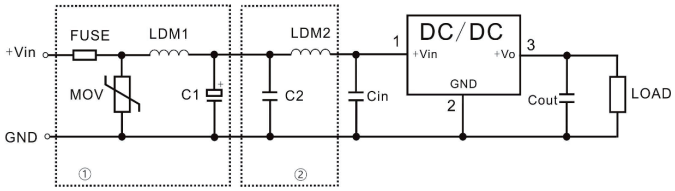


Efficiency vs output voltage
(LME78_15-3.0)



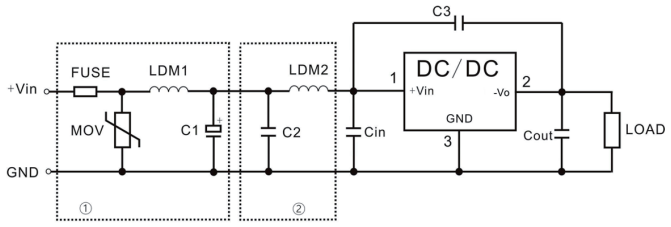
Recommended EMC circuit diagrams

Positive output circuit diagram



FUSE	TBD by the input current
MOV	20D330K
C1	680uF/50V
C2	4.7uF/50V
Cin/Cout	Refer to Table 1
LDM1	82uH
LDM2	6.8uH

Negative output circuit diagram



FUSE	TBD by the input current
MOV	20D330K
C1	680uF/50V
C2/C3	4.7uF/50V
Cin/Cout	Refer to Table 1
LDM1	82uH
LDM2	6.8uH

Note: Part ① circuit is for EMS test, part ② for EMI filtering, both can be adjusted according to the actual situation.

Design and application circuit reference

1. Requirement for the output load
The maximum capacitive load is tested at the full load. The converter may not start or be damaged at the capacitive over-load.

2.Typical application circuits
To effectively decrease the input and output ripple and noise, a capacitor filter net can be used at the input and output as below circuit diagrams (Figure 1 for the Positive output application, Figure 2 for the Negative output application and Figure 3 for Positive & Negative outputs connected in parallel application, 10uH is recommended for LDM). Suitable filtering capacitors should be chosen as the recommended capacitive load values in Table 1. The converter could not start if the capacitance is too big. (The capacitances of C1 C2 can be increased according to the actual situation, low ESR Tantalum capacitors or Electrolytic capacitors can be used.)

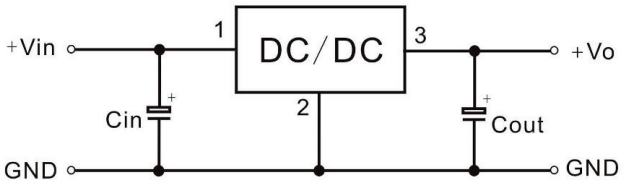


Figure 1 (Positive output circuit diagram)

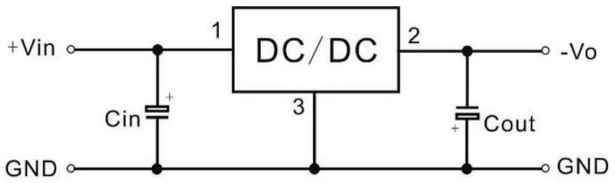


Figure 2 (Negative output circuit diagram)

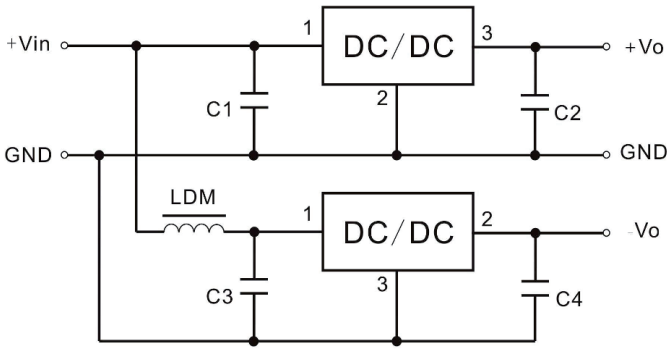
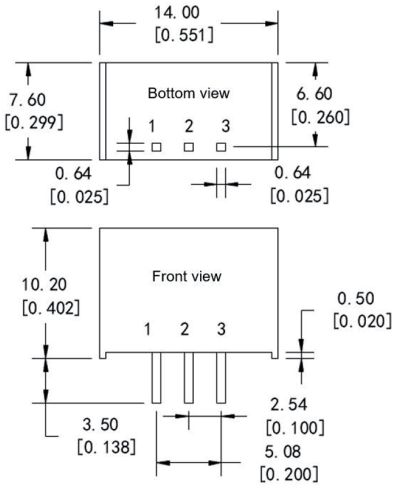


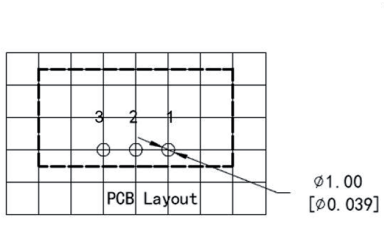
Figure 3 (Positive & negative outputs parallel application circuit diagram)

Recommended capacitive load values (table 1)

Product Model	Cin (Electrolytic capacitor)	C1/C3 (Ceramic capacitor)	Cout (Electrolytic capacitor)	C2/C4 (Ceramic capacitor)
LME78_03-3.0	47uF/50V	22uF/50V	100uF/16V	47uF/10V
LME78_05-3.0	47uF/50V	22uF/50V	100uF/16V	47uF/10V
LME78_09-3.0	100uF/50V	47uF/50V	220uF/16V	47uF/16V
LME78_12-3.0	100uF/50V	47uF/50V	220uF/25V	47uF/25V
LME78_15-3.0	100uF/50V	47uF/50V	220uF/25V	47uF/25V

Mechanical dimensions and installation





PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

Pin definition table

Pin No.	1	2	3
Positive output	+Vin	GND	+Vo
Negative output	+Vin	-Vo	GND (Common)

Note:
Unit: mm [inch]
Pin section tolerance ±0.10 [±0.004]
General tolerance ±0.50 [±0.020]