GAPTEC®
GREEN TECHNOLOGY

LMTO78_0.5 Series

Wide input, non-isolated & regulated, single output, SMD package



Switching Regulator

- Efficiency up to 95%
- Ultra-thin SMD Package, thickness≤3.5mm
- Operating ambient temperature range: -40°C ~ +85°C
- Short circuit protection (SCP)
- No-load input current as low as 0.2mA
- RoHS compliance

The LMTO78_0.5 Series are high efficiency switching regulators. The converters feature high efficiency, low loss and short-circuit protection in a compact SMD package. These products are widely used in applications such as industrial control, instrumentation and electric power.

SHORT CIRCUIT PROTECTED

100% RoHS compliant

CE

Common specifications

Cooling:	Free air convection
Short circuit protection:	Continuous, automatic recovery
Operating temperature range:	-40°C ~ +85°C
Storage temperature range:	-55°C ~ +125°C
Reflow soldering temperature:	Peak temp. ≤245°C, maximum duration time ≤60s over 217°C. For actual application, please refer to IPC/JEDEC J-STD-020D.1.
Operating case temperature:	100°C MAX
Storage humidity range:	< 95%
Safety standard:	UL/cUL 60950-1, 62368-1 IEC/EN 60950-1, 62368-1
Case material:	Plastic [UL94-V0]
MTBF (MIL-HDBK-217F,+25°C):	> 2,000,000 hours
Package weight:	0.9g
Dimensions:	12.50 x 13.50 x 3.50mm

Input specifications

Item	Test conditions	Min	Typ	Max	Units
No-load input current			0.2	1.5	mA
Reverse polarity at input	Avoid / not protected				
Input filter	Capacitance filter				
Ctrl*	• Module on • Module off	Ctrl pin open or pulled high (TTL 3.2-8VDC) Ctrl pin pulled low to GND (0-0.8VDC)			
	• Input current when off		30	100	μA

* The remote ON/OFF pin is referenced to -Vin.

Output specifications

Item	Test conditions	Min	Typ	Max	Units
Voltage accuracy	• 3.3VDC input • Others		±2 ±2	±4 ±3	% %
Vadj*	input voltage range			±10	%Vo
Output voltage accuracy				±2	
Line regulation	Input voltage range at full load		±0.2	±0.4	%
Load regulation	Nominal input, 10% to 100% load • 3.3/5VDC input • Others		 ±0.6 ±0.3		 % %
Ripple + Noise*	20MHz bandwidth • 3.3VDC, 20-100% load • Others, 10-100% load		 20 20	 50 50	 mVp-p mVp-p
Temperature coefficient				±0.03	%/°C
Transient recovery time	Normal Vin, 25% load step change		0.2	1	ms
Transient response deviation	Normal Vin, 25% load step change		±50	±200	mV
Switching frequency			700		KHz

* The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.
With light loads at or below 20%, Ripple & Noise for 3.3V output parts increases to 100mVp-p max, and a load below 10% for 5V/9V/12V/15V output parts levels increase to 150mVp-p max.

Example:
LMTO78_05-0.5
LM = Series; T = SMT case; O= Open frame; yy = 5Vout; pp = 0.5A

Note:
1. All specifications measured at Ta = 25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified.
2. In this datasheet, all the test methods of indications are based on corporate standards.

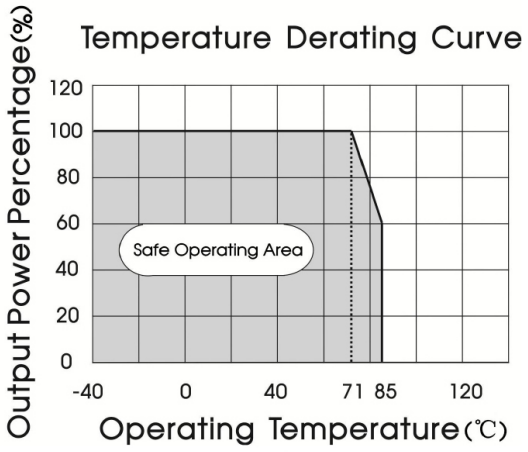
GAPTEC-Electronic GmbH & Co. KG
sales@gaptec-electronic.com – www.gaptec-electronic.com
Specifications subject to change without notice.

EMC specifications				
EMI	CE	CISPR32/EN55032	CLASS B	(see EMC recommended circuit, ②)
EMI	RE	CISPR32/EN55032	CLASS B	(see 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 (see EMC recommended circuit, ①)
EMS	Surge	IEC/EN61000-4-5	line to line ±1KV	perf. Criteria B (see EMC recommended circuit, ①)
EMS	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A

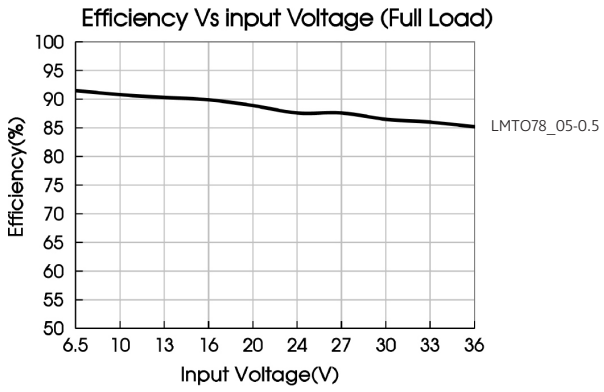
Part Number	Input Voltage [VDC] Nominal	Range	Output Voltage [VDC]	Output Current [mA, Max]	Capacitive load [µF, max]	Efficiency [Vin. max]
LMTO78_03-0.5	24	4.75-36	3.3	500	680	80
LMTO78_05-0.5	24	6.5-36	5	500	680	84
LMTO78_09-0.5	24	12-36	9	500	680	90
LMTO78_12-0.5	24	15-36	12	500	680	91
LMTO78_15-0.5	24	19-36	15	500	680	93

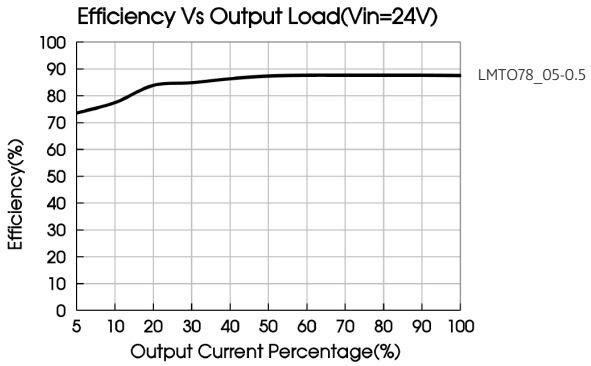
Note: For input voltage higher than 30VDC, a 22uF/50V input capacitor is required.

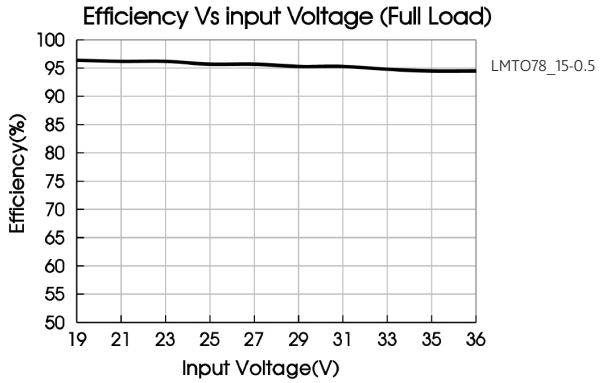
Typical characteristics

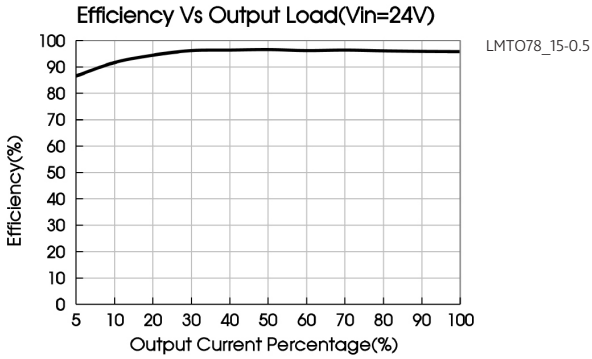


Efficiency









Typical application circuit

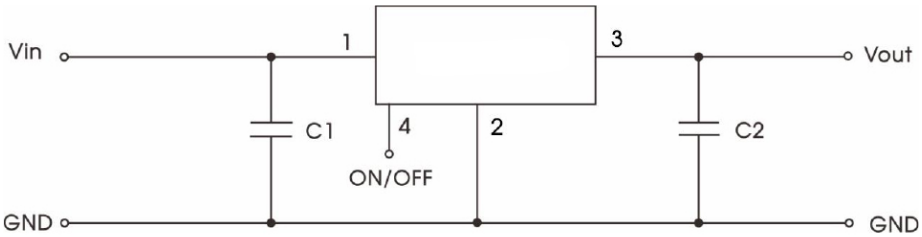
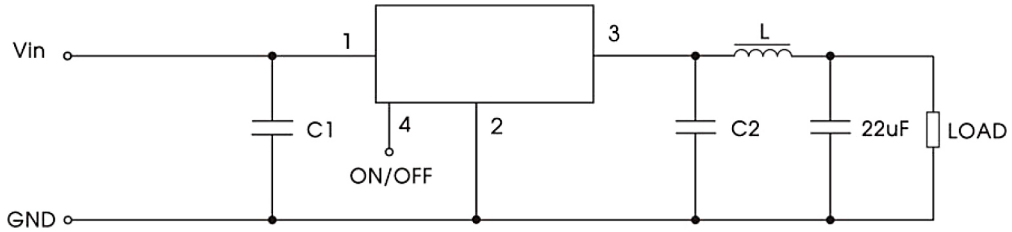


Table 1

Part number	C1 (ceramic capacitor)	C2 (ceramic capacitor)
LMTO78_03-0.5	10µF/50V	22µF/10V
LMTO78_05-0.5	10µF/50V	22µF/16V
LMTO78_09-0.5	10µF/50V	22µF/25V
LMTO78_12-0.5	10µF/50V	22µF/25V
LMTO78_15-0.5	10µF/50V	22µF/25V

Note:
1. The required C1 and C2 capacitors must be connected as close as possible to the terminals of the module;
2. Refer to Table 1 for C1 and C2 capacitor values. For certain applications, increased values 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. To further reduce the output ripple and noise, we suggested the use of a "LC" filter at the output terminals, with an inductor value (L) of 10µH-47µH.

External "LC" output filter circuit diagram



EMC solution-recommended circuit

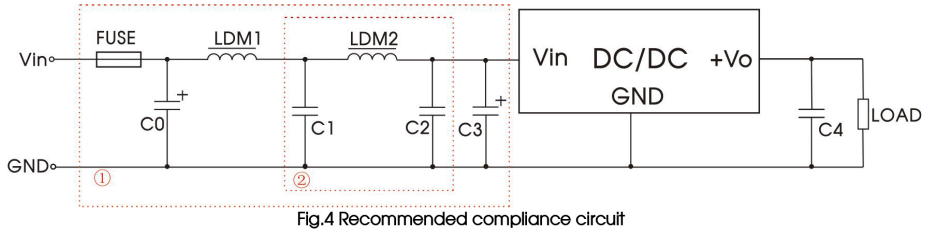
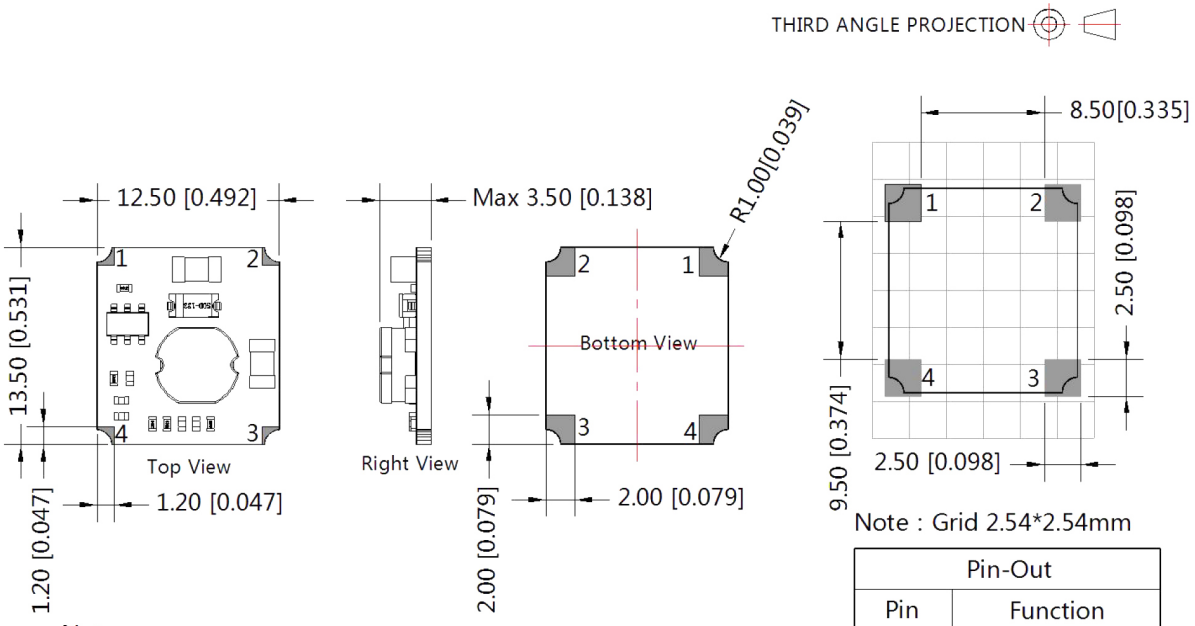


Fig.4 Recommended compliance circuit

FUSE	LDM1	C0/C3	C4	C1/C2	LDM2
Selected based on the actual input current in application	82μH	330μF /50V		10μF /50V	22μH

Note: For EMC tests we use Part ① in Fig. 4 for immunity and part ② for emissions test. Selecting based on needs.

Mechanical dimensions



Note :
Unit :mm[inch]
General tolerances: ±0.25[±0.010]
The layout of the device is for reference only, please refer to the actual product

Note : Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	+Vin
2	GND
3	+Vo
4	Remote On/Off