LMTG78_0.5 series

Switching regulator - Positive Output - LGA package

Switching Regulator

- Up to 89% efficiency
- Only 11.25 x 6.25 x 3.00 mm
- Ultra thin package
- MTBF: 1,000,000 hours
- Short circuit protection (SCP)
- No load current as low as 0.1mA
- No need for an external radiator

Introducing our new LMTG78_0.5 Series — a compact, ultra-efficient, non-isolated DC-DC converter line designed for performance where every millimeter counts. With efficiencies of up to 89% and an ultra-thin package measuring only 11.25 × 6.25 × 3.00 mm, these converters deliver reliable, regulated power even in space-critical applications. Featuring a wide voltage input range, adjustable output, and no-load current as low as 0.1 mA, they combine precision with energy savings. Built for long-term dependability, each unit offers an impressive MTBF of 1,000,000 hours and short-circuit protection (SCP) — all without the need for an external radiator.

Common specifications

Short circuit protection	Input voltage range, continuous Recovery
Switching frequency	570kHz (typ.) nominal input voltage, 100% full load
Operating temperature	-40°C - +85°C (with derating)
Storage temperature	-55°C - +125°C
Shell temperature rise	30°C (typ.) / 46°C (max.) Ta = 25°C
Reflow soldering temperature	The peak temperature Tc ≤245°C, and the maximum time above 217°C is 60s
Relative humidity	95% (no condensation)
Moisture sensitivity level (MSL)	3
MTBF (MIL-HDBK-217F@25°C)	1,000,000 Hours
Reverse the input	Avoid / not protected
Input filter	Capacitor filter
Reverse input	Prohibit
Hot Plug	Unavailable
Cooling method	Natural air cooling
Case Material	Comply with UL94 V-0 standard
Package Dimensions	11.25 × 6.25 × 3.00 mm
Weight	1.8g (typ.)
Cooling Method	Free air convection

Note: This product adopts light load frequency reduction technology, and the switching frequency is the test value at full load output. When the load is lower than 40%, the switching frequency decreases with the load decrease.

EMC specifications

EMI	CE	EN 55032,CLASS B (figure 2-O2)	
EMI	RE	EN 55032,CLASS B (figure 2-O2)	
EMS	ESD	IEC/EN 61000-4-2 Contact ±4kV	Perf. criteria B

Notes: Unless specified specially, parameters in this manual are measured under the conditions of 25°C, 40%~75% humidity, input nominal voltage and rated output load.

Example:
LMTG78_05-0.5
LMTG78 = Series; 05 = 5Vout; 0.5 = 0.5A

Output specifications

Item	Operating condition	Min	Typ	Max	Units
Line regulation	Full load, input voltage is from low voltage to high voltage		±0.2	±0.5	%
Load regulation**	Nominal input voltage, load is from 5% to 100%		±1	±2	%
Output voltage accuracy*	Load is from 5% to 100%		±2	±3	%
Temperature drift	Nominal input voltage, 100% load	--	--	±0.03	%/°C
Output ripple noise***	20MHz bandwidth (output connected to 22uF capacitance test)		50 70	70 110	mVp-p
Output voltage regulation	Input voltage range		±10		%Vo

Note:
*0% - 5% load ripple-suspicious sound is less than or equal to 170mV: the parallel line test method is used to test ripple and noise;

**The way of overcurrent protection is hiccup protection.

Input specifications

Item	Operating condition	Min	Typ	Max	Units
Input voltage range	3.3V input 5.0V input	5 7	24 24	36 36	VDC
No load/full load input current	Nominal voltage input voltage		0.1/123		mA
Remote control foot (Ctrl)	Module on suspended or connected to >1.3VDC Module off connect GND (-Vo) or 0 ~ 0.6VDC Input current when nominal input voltage is off				
Input surge voltage* (1s, max)		-0.7		42	VDC

Note: * The input voltage cannot exceed the specified range, otherwise it may cause permanent and irreversible damage.

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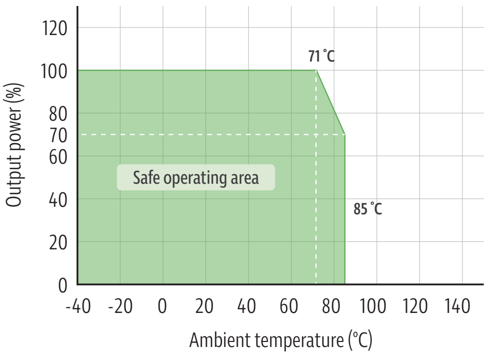
Product Selection Guide

Approval	Part number	Input Voltage Nominal Range (VDC)	Output Voltage (VDC)	Output Current (mA) max.	Efficiency (%,Typ) Vin-max @full load	Capacitive Load (µF) max.
	LMTG78_03-0.5	24 (5-36)	3.3	500	86	2200
	LMTG78_05-0.5	24 (7-36)	5	500	89	2200

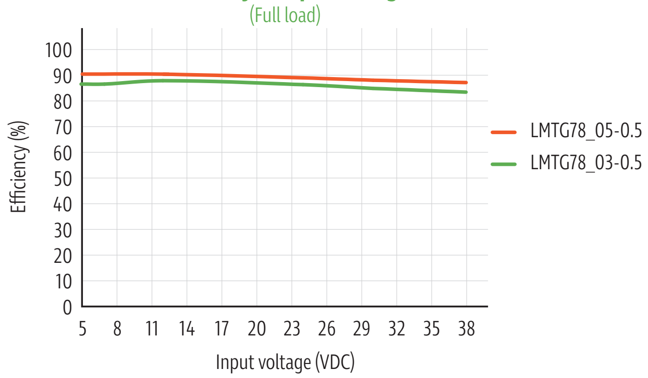
Note: (1) The input voltage cannot exceed the specified range, and the maximum value is transient, otherwise it may cause permanent and irreversible damage.

Product characteristic curve

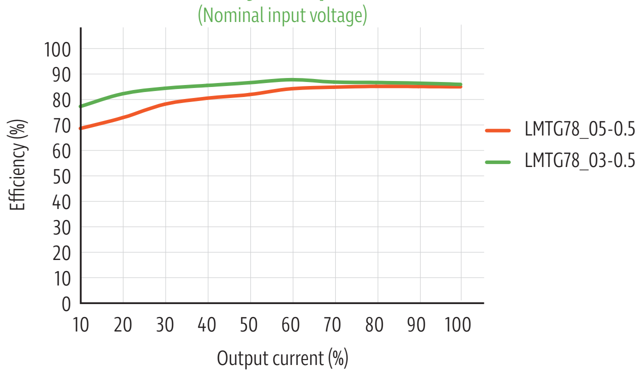
Temperature derating graph



Efficiency vs input voltage
(Full load)



Efficiency vs output load
(Nominal input voltage)



Design and application circuit reference

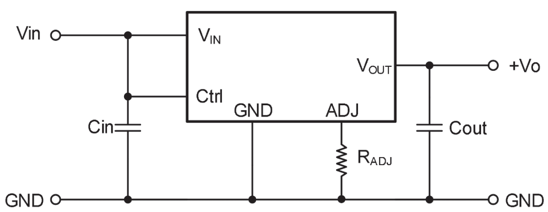


Figure 1 Recommended circuit

Table 1 The reference value of the external capacitor

Vin (VDC)	Cin (µF)	Vo (VDC)	Cout1/Cout2 (µF)
24	10	5.0	22
24	10	3.3	22

Application circuit parameters

In order to further stabilize the input power supply, a capacitor Cin is added at the input end;In order to reduce the output ripple and noise, it is necessary to increase the capacitor Cout at the output end. Note that the output capacitance cannot exceed the maximum capacitive load. Excessive output capacitance may easily lead to poor startup of the power module. Recommended external capacitance values are shown in Table 1.

EMC recommended circuit

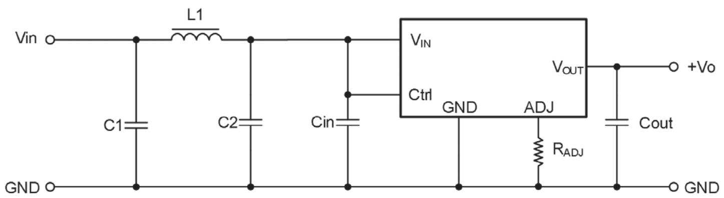


Figure 2 EMC recommended circuit

Table 2 Recommended EMC external circuit parameters

EMC	Positive output
C1/C2	10µF/50V
Cout	Refer to Cout parameters in Table 1
L1	6.8µH

ADJ resistance selection

The output voltage of this product can be selected by different voltage regulating resistors RADJ according to the requi rements, and different output voltage values can be obtained, as shown in Table 3.

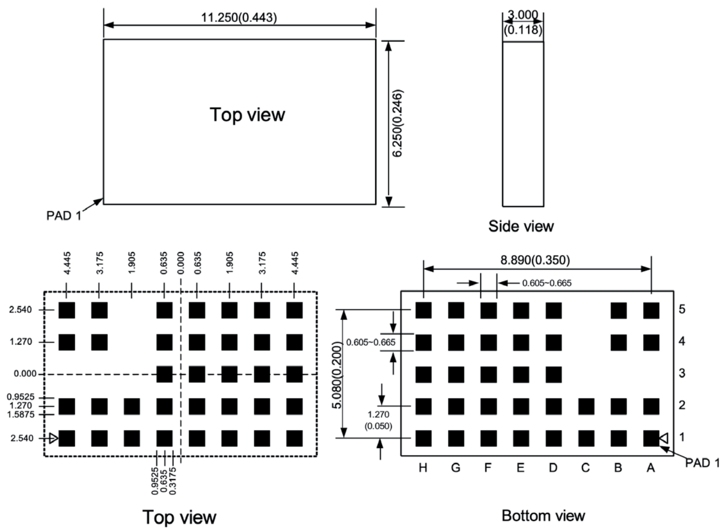
Table 3 Electrical resistance corresponding to output voltage

Vout (V)	2.5	3.3	5.0
RADJ (K Ω)	47.5	32.4	19.2

Load requirements

To ensure this module can operate efficiently and reliably, the output load should be 5%~100% of the rated load. It is not recommended to run for a long time in the case of the load is less than 5%, otherwise part of the prodct performance can't conform to the performance index of this manual. If the output load is too light, place a dummy load resistance on output terminal in parallel. The sum of the fake load resistance power plus the actual load power is greater than 5% of the load.

Mechanical dimensions and pin-out



Pin	Function
A1	Ctrl
A2	ADJ
A4	VIN
A5	VIN
B1	GND
B2	GND
B4	VIN
B5	VIN
C1	GND
C2	GND
D1	GND
D2	GND
D3	GND
D4	GND
D5	GND
E1	GND
E2	GND
E3	GND
E4	GND
E5	GND
F1	GND
F2	GND
F3	VOUT
F4	VOUT
F5	VOUT
G1	GND
G2	GND
G3	VOUT
G4	VOUT
G5	VOUT
H1	GND
H2	GND
H3	NC
H4	VOUT
H5	VOUT

Notes:
Unit: mm (inch)
Unlabeled tolerance: ±0.1mm (0.004inch)