



LMT078_1.0 Series

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

Switching Regulator

- ⊕ Efficiency up to 96%
- ⊕ SMD package
- ⊕ Short circuit protection (SCP)
- ⊕ Non-isolated regulator with very low standby current
- ⊕ Remote ON/OFF control
- ⊕ Excellent line/load regulation
- ⊕ Low ripple and noise
- ⊕ Adjustable output voltage

The LMT078_1.0 series is a family of cost effective 1.2~15W single output buck DC-DC converters. These converters achieve low cost and small SMD package, output voltage adjustment, remote ON/OFF control, continuous short circuit protection with automatic restart, good line/load regulation and ultra low quiescence current.



Common specifications

Cooling*:	Nature convection
Short circuit protection:	Continuous, automatic recovery
Over temperature protection:	+150°C TYP (internal IC junction)
Operating temperature range:	-40°C ~ +105°C (see derating curve) -40°C ~ +65°C (for 100% load)
Storage temperature range:	-55°C ~ +125°C
Lead temperature:	260°C MAX, 1.5mm from case for 10 sec
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):	• 5V: >35,000,000hrs • 24V: > 4,700,000 hours
Package weight:	1.4g
Dimensions:	15.2 * 11.8 * 3.6mm

* „Nature Convection“ is usually about 30-65 LFM but is not equal to still air (0 LFM).

Input specifications

Item	Test conditions	Min	Typ	Max	Units
Start-up time	Nominal Vin, constant resistive load		5	0	ms
Input filter	Capacitor				
Input surge voltage	• 5V • 24V			6 40	VDC VDC
Input reflected ripple current			35		mApk-pk
Remote ON/OFF*	• ON • OFF • OFF idle current			2~5VDC or open circuit 0~0.4Vdc or short circuit pin10 and -Vin 5V: 0.3mA, max. 24V: 0.8mA, max.	

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

Example:

LMT078_0505-1.0
 LM= series; T = SMT case; O = open frame; 05=5Vin; 05=5Vout; 1.0 = 1.0A

Note:

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

Output specifications

Item	Test conditions	Min	Typ	Max	Units
Voltage accuracy				±2	
Vadj*	input voltage range			±10	%Vo
Output voltage accuracy				±2	
Line regulation	Input voltage range at full load			±0.2	%
Load regulation	Nominal input, 10% to 100% load			±0.6	%
Ripple + Noise	20MHz bandwidth • 5V series • 24V series			50 75	mVpk-pk mVpk-pk
Temperature coefficient				±0.02	%/°C
Capacitor load**	Tested by minimal Vin and constant resistive load.			330	µF
Transient recovery time	Normal Vin, 50% load step change		0.2	250	µs
Transient response deviation	Normal Vin, 50% load step change • Output<4Vdc • Output>4Vdc			±5 ±3	% %
Switching frequency	• 5V series • 24V series		1.2 410		MHz KHz

* The 1.2Vdc output models only support Vadj up, not Vadj down.

** Tested by minimal Vin and constant resistive load.

EMC specifications

CE*	EN55032	CLASS A
RE	EN55032	CLASS A
ESD	IEC/EN61000-4-2	perf. Criteria A
RS	IEC/EN61000-4-3	perf. Criteria A
EFT**	IEC/EN61000-4-4	perf. Criteria A
Surge**	IEC/EN61000-4-5	perf. Criteria A
CS	IEC/EN61000-4-6	perf. Criteria A
PFMF	IEC/EN61000-4-8	perf. Criteria A

* The LMT078_1.0 series can meet EN55032 Class B with an external filter in parallel with the input pins.

** An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.

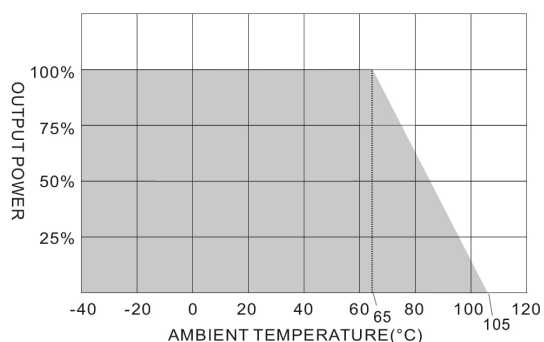
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Part Number	Input Voltage [VDC]		Input Current [mA]		Output Voltage [VDC]	Output Current [mA, Max]	Capacitive load [μ F, max]	Efficiency [Vin. max]
	Nominal	Range	No-load	Full load Vin (Max)				
LMT078_051.2-1.0	5	3-5.5	0.4	442	1.2	1000	330	90.5
LMT078_051.5-1.0	5	3-5.5	0.4	544	1.5	1000	330	92
LMT078_051.8-1.0	5	3-5.5	0.4	649	1.8	1000	330	92.5
LMT078_052.5-1.0	5	3.8-5.5	0.4	484	2.5	1000	330	94
LMT078_1.2-1.0	24	4.6-36	1.5	300	1.2	1000	330	72
LMT078_1.5-1.0	24	4.6-36	1.5	367	1.5	1000	330	76
LMT078_1.8-1.0	24	4.6-36	1.5	433	1.8	1000	330	79
LMT078_2.5-1.0	24	4.6-36	1.5	588	2.5	1000	330	83
LMT078_03-1.0	24	4.75-36	1.5	740	3.3	1000	330	86.5
LMT078_05-1.0	24	6.5-36	1.5	806	5	1000	330	89.5
LMT078_6.5-1.0	24	9-36	1.5	765	6.5	1000	330	90
LMT078_09-1.0	24	12-36	1.5	786	9	1000	330	92
LMT078_12-1.0	24	15-36	1.5	843	12	1000	330	93
LMT078_15-1.0	24	18-36	1.5	869	15	1000	330	94

Typical characteristics

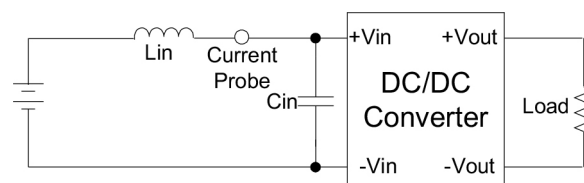
Derating Curve



Test configurations

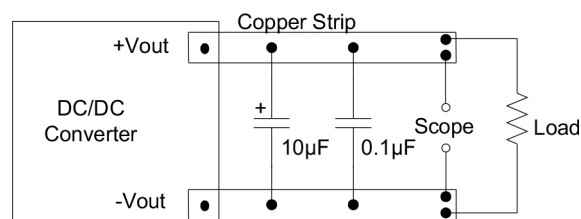
Input reflected ripple current test step

Input reflected ripple current is measured through a source inductor L_{in} (12 μ H) and a source capacitor C_{in} (10 μ F, ESR<1.0 Ω at 100KHz) at nominal input and full load.



Output ripple & noise measurement test

Use a 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor. The scope measurement bandwidth is 0~20MHz.



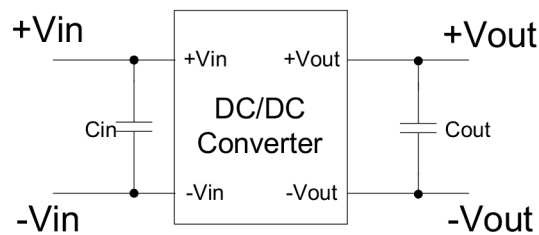
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Test configurations

Standard application circuit

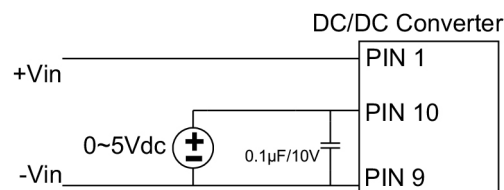
1. C_{in} is required and must be connected close to the pin terminal of the module. ($C_{in}=10\mu F$)
2. $C_{out}=47\mu F$ (optional)



Remote ON / OFF Test Step

Input voltage (2~5Vdc) connect to Pin10 or open, converter ON.

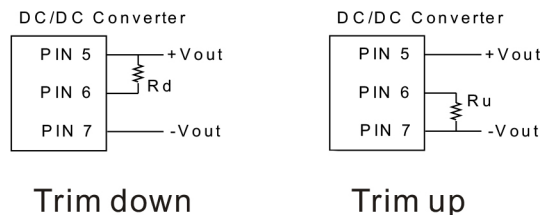
Input voltage (0~0.4Vdc) connect to Pin10 or short, converter OFF.



Output voltage adjustment

Pin 6 via a resistor to Pin 5 (+Vout), V_o trim down.

Pin 6 via a resistor to Pin 7 (-Vout), V_o trim up.

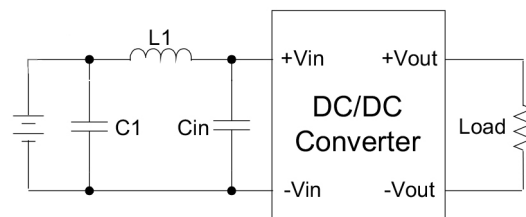


EMC countermeasures

EMI countermeasures

Input filter components (C_1 , L_1) are used to help meet EMI requirement for the module.

These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



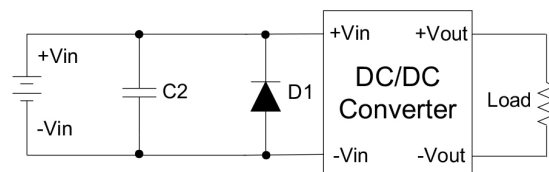
	C_1	L_1	C_{in}
LMTO78_05xx-1.0	1206, 10µF, 50V	6.8µH	1206, 10µF, 50V
LMTO78_24xx-1.0	1206, 4.7µF, 50V	33µH	1206, 10µF, 50V

EFT & Surge Test Countermeasures

The filter GAPTEC suggests:

05Vin models: Nippon - chemi - con KY series, 2200µF/50V and a TVS, 3KW, 6.0V

24Vin models: Nippon - chemi - con KY series, 330µF/100V and a TVS, 3KW, 36V

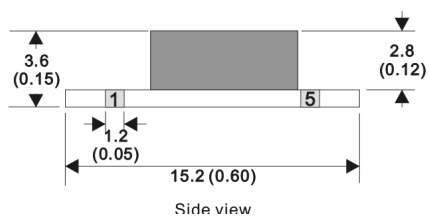
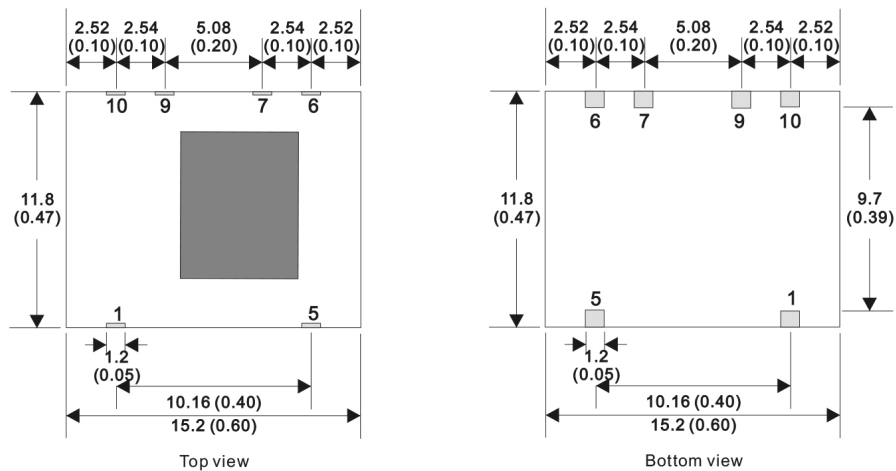


	C_2	D1
LMTO78_05xx-1.0	2200µF, 50V	SMDJ6.0A
LMTO78_24xx-1.0	330µF, 100V	SMDJ36A

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Mechanical dimensions



SMD 10Pin Package

Notes : All dimensions are typical in millimeters (inches).

1. Pin pitch tolerances: ± 0.25 (± 0.01)
2. Pin profile tolerance: ± 0.1 (± 0.004)
3. Other tolerances: ± 0.5 (± 0.02)

PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	+V Input
5	+V Output
6	Trim
7	-V Output
9	-V Input
10	Remote ON/OFF