

Descriptions

1A Non-isolated Regulator



Features

- No-load input current as low as 0.1mA
- Operating ambient temperature range: -40°C to +105°C
- Up to 94% efficiency
- Continuous short circuit protection
- Ultra-small, ultra-thin DFN package(9.00 x 7.00 x 3.10mm)

Applications

- Industrial control
- Electric power
- Instrumentation

Selection Guide

Certification	Part No.	Input Voltage (VDC)*	Output		Full Load Efficiency (%) Vin Min. / Vin Max.	Capacitive Load (μF)Max.
		Nominal (Range)	Voltage (VDC)	Current (mA) Max.		
EN/BS EN	DNKMT1-7803V2	24 (4.75-36)	3.3	1000	89/84/81	680
		12 (8-27)	-3.3	-500	85/85/81	330
	DNKMT1-7805V2	24 (6.5-36)	5	1000	92/87/84	680
		12 (8-27)	-5	-500	85/85/83	330
	DNKMT1-78X6V2	24 (8-36)	6.5	1000	92/88/86	680
		12 (8-24)	-6.5	-500	83/85/84	330
	DNKMT1-7809V2	24 (12-36)	9	1000	92/90/87	680
		12 (8-24)	-9	-500	81/85/84	330
	DNKMT1-7812V2	24 (15-36)	12	1000	94/91/89	680
		12 (8-20)	-12	-300	83/85/84	330
	DNKMT1-7815V2	24 (18-36)	15	1000	94/93/90	680
		12 (8-18)	-15	-300	82/84/84	330

Note: For input voltage exceeding 30 VDC, an input capacitor of 22 μ F/50V is required.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	No-load Input Current	Nominal input voltage		--	0.1	--	mA
	Reverse Polarity at Input			Avoid / Not protected			
	Input Filter			Capacitance filter			
	Ctrl ^①	Module on		Ctrl pin open or pulled high(TTL 1.6~5VDC)			
		Module off		Ctrl pin pulled low to GND(-Vo)(0~0.6VDC)			
		Nominal input voltage, input current when off		--	240	--	uA
Output Specifications	Voltage Accuracy	Full load, input voltage range	3.3 VDC output	--	±2	±4	%
			Others	--	±2	±3	
	Linear Regulation	Full load, input voltage range		--	±0.2	--	
	Load Regulation	Nominal input voltage, 10% -100% load		--	±1.0	--	
	Ripple & Noise ^②	20MHz bandwidth, nominal input voltage, full load		--	75	150	mVp-p
		20MHz bandwidth, nominal input voltage, full load, external capacitor 22μF		--	20	75	
	Temperature Coefficient	Operating temperature -40°C to +105°C		--	±0.02	--	%/°C
	Transient Response Deviation	Nominal input voltage, 25% load step change	3.3 V/5V/6.5V/9VDC output	--	50	150	mV
			12V/15VDC output	--	100	300	
	Transient Recovery Time	Nominal input voltage, 25% load step change		--	0.1	0.8	ms
	Short-circuit Protection			Continuous, self-recovery			
	Trim	Input voltage range		--	±10	--	%Vo
	General Specifications	Operating Temperature	See Fig. 1		-40	--	+105
Storage Temperature				-55	--	+125	
Storage Humidity		Non-condensing		5	--	95	%RH
Reflow Soldering Temperature				Peak temperature ≤245°C, duration ≤60s max. over 217°C. Also refer to IPC/JEDEC J-STD-020D.1.			
Switching Frequency		Full load, nominal input voltage		--	1.0	--	MHz
MTBF		MIL-HDBK-217F@25°C		8552	--	--	k hours
Moisture Sensitivity Level (MSL)		IPC/JEDEC J-STD-020D.1		Level 3			
Pollution Degree				PD3			
Mechanical Specifications	Case Material	Black epoxy resin; flame-retardant and heat-resistant(UL94 V-0)					
	Dimensions	9.00 x 7.00 x 3.10 mm					
	Weight	0.58g(Typ.)					
	Cooling Method	Free air convection					

Note:

①The "parallel cable" method is used for ripple and noise test;

②The positive output ctrl pin voltage is referenced to input GND; Negative output ctrl pin voltage is referenced to -Vo.

Electromagnetic Compatibility (EMC)

Electromagnetic Compatibility (EMC)	Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 3-② for recommended circuit)	
		RE	CISPR32/EN55032	CLASS B (see Fig. 3-② for recommended circuit)	
	Immunity	ESD*	IEC/EN 61000-4-2	Contact $\pm 6\text{kV}$	perf. Criteria B
		RS	IEC/EN 61000-4-3	10V/m	perf. Criteria A
		CS	IEC/EN 61000-4-6	3Vr.m.s	perf. Criteria A
		EFT	IEC/EN 61000-4-4	$\pm 1\text{kV}$ (see Fig. 3-① for recommended circuit)	perf. Criteria B
		Surge	IEC/EN 61000-4-5	line to line $\pm 1\text{kV}$ (see Fig. 3-① for recommended circuit)	perf. Criteria B

Note: * The static level of the Ctrl & Trim pin is $\pm 2\text{kV}$ when they are not connected to external devices; It is suggested to connect an external capacitor (225k/50V) from Ctrl to GND/-Vo to meet ESD ($\pm 6\text{kV}$) of the Ctrl pin, and to connect a varistor (22V/30A) from Trim to GND/-Vo to meet ESD($\pm 6\text{kV}$) of the Trim pin.

Characteristic Curve

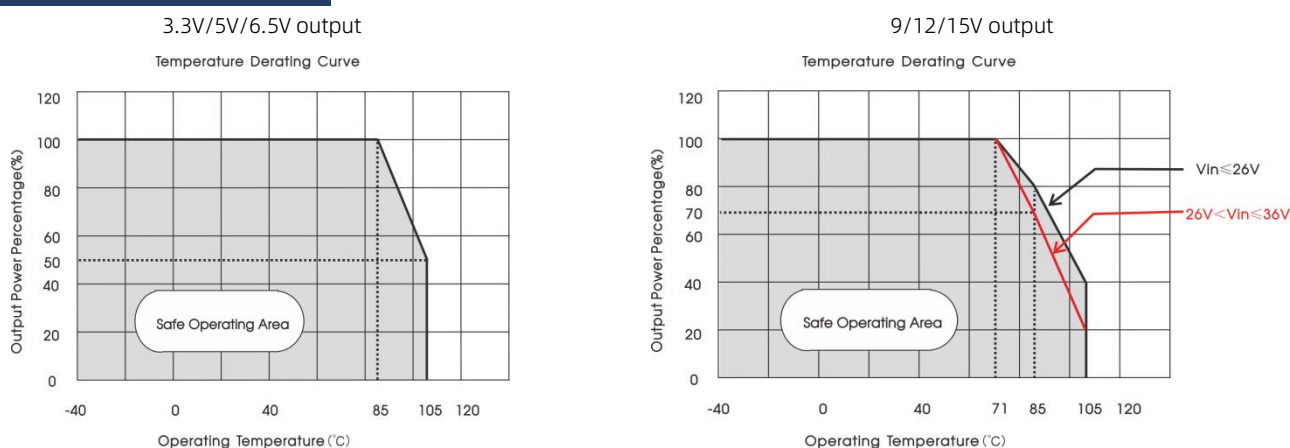


Fig. 1

Design Reference

1. Typical application circuit

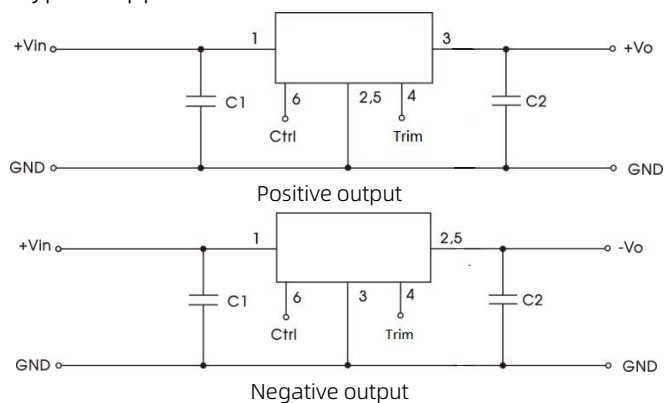


Fig. 2 Typical application circuit

Part No.	C1 (ceramic capacitor)	C2 (ceramic capacitor)	Ra1/Ra2 (Trim resistance)
DNKMT1-7803V2	10 μF /50V	22 μF /10V	Refer to Trim resistance calculation
DNKMT1-7805V2		22 μF /10V	
DNKMT1-78X6V2		22 μF /16V	
DNKMT1-7809V2		22 μF /16V	
DNKMT1-7812V2		22 μF /25V	
DNKMT1-7815V2		22 μF /25V	

Table 1

Notes:

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.

2. EMC compliance circuit

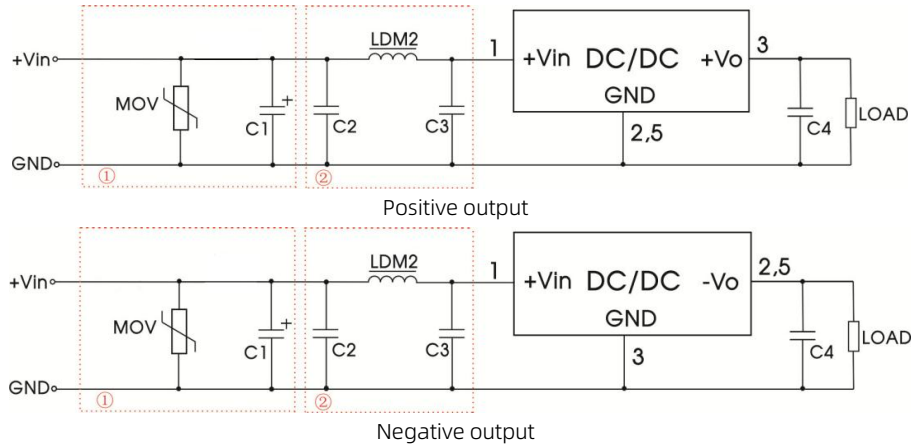


Fig.3 Recommended compliance circuit

Part No.	MOV	C1	C2	LDM2	C3	C4
KMT1-7803/05/X6V2 (Positive output)	S20K30	680μF /50V	10μF/50V	68μH	--	22μF/25V
Others	S20K30	680μF /50V	10μF/50V	68μH	10μF/50V	22μF/25V

Notes: For EMC tests we use Part ① in Fig.3 for immunity and part ② for emissions test. Selecting based on needs.

3. Trim Function for Output Voltage Adjustment (open if unused)

1. Positive output application: connect trim resistor to GND/ V_o respectively for adjusting up/down.
2. Negative output application: connect trim resistor to GND/ V_o - respectively for adjusting up/down.

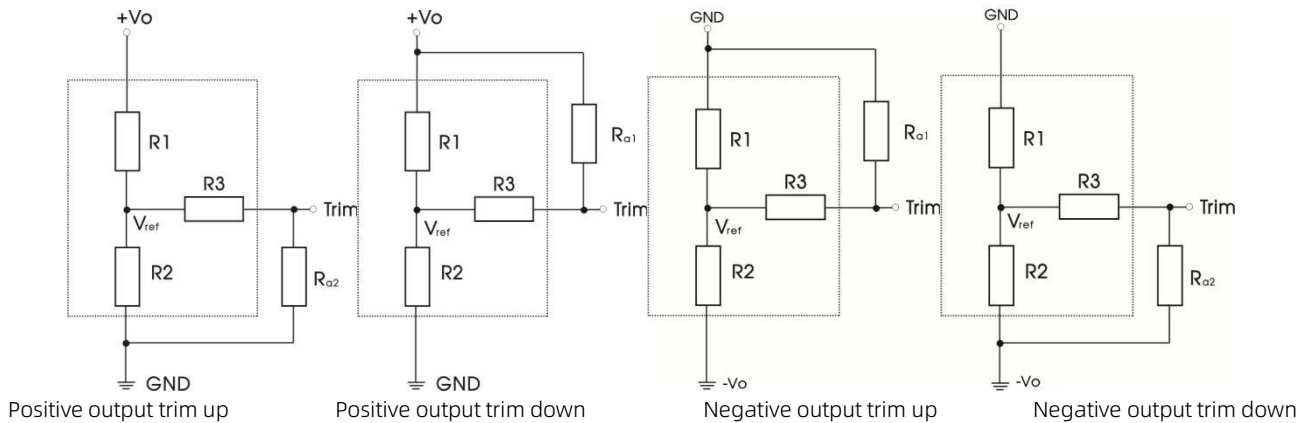


Fig. 4 Circuit diagram of Trim up and down (dashed line shows internal part of module)

Calculating Trim resistor values:

$$\text{Trim up: } R_{a2} = \frac{aR_2}{R_2 - a} - R_3, \quad a = R_2 / (R_3 + R_{a2}) = \frac{V_{\text{ref}} - V_o}{V_{\text{ref}}} R_1$$

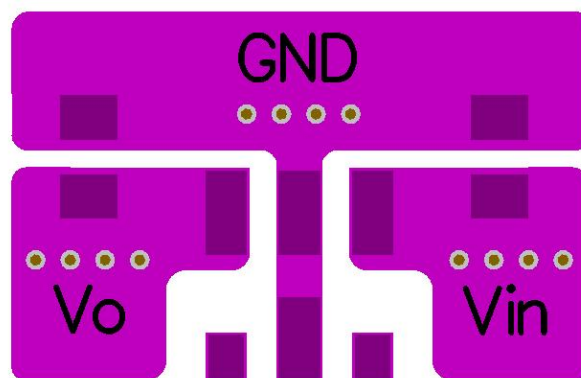
$$\text{Trim down: } R_{a1} = \frac{aR_1}{R_1 - a} - R_3, \quad a = R_1 / (R_3 + R_{a1}) = \frac{V_o - V_{\text{ref}}}{V_{\text{ref}}} R_2$$

Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
3.3	150	33	180	0.6
5	100	13.66	82	0.6
6.5	32.4	3.3	20	0.6
9	100	7.14	47	0.6
12	100	5.28	43	0.6
15	180	7.5	51	0.6

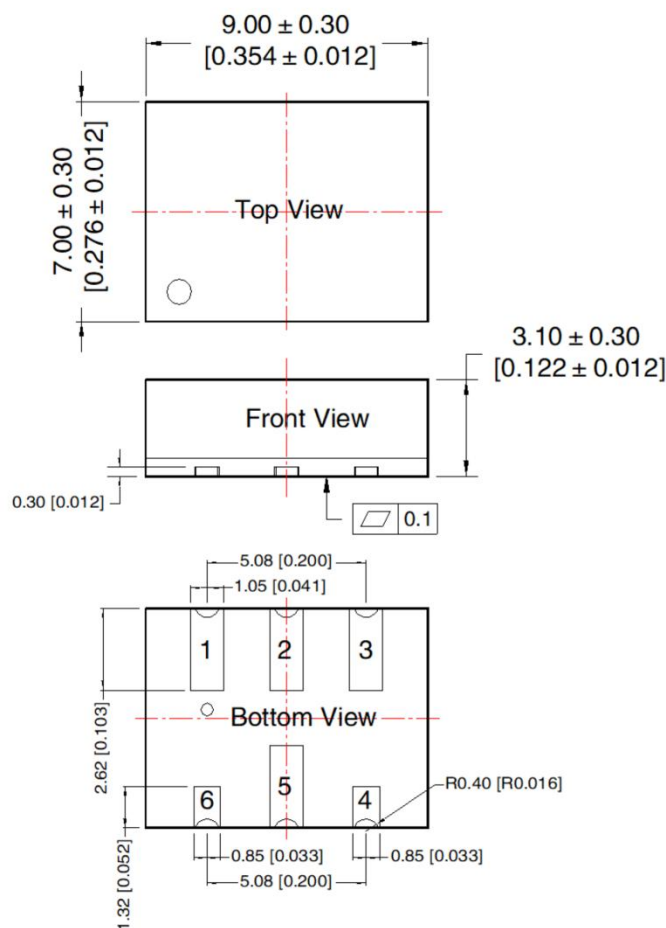
Table:

Vout nom.	±3.3VDC		±5.0VDC		±6.5VDC		±9.0VDC		±12VDC		±15VDC	
Vout Trim.	Ra1 (kΩ)	Ra2 (kΩ)	Ra1 (kΩ)	Ra2 (kΩ)	Ra1 (kΩ)	Ra2 (kΩ)	Ra1 (kΩ)	Ra2 (kΩ)	Ra1 (kΩ)	Ra2 (kΩ)	Ra1 (kΩ)	Ra2 (kΩ)
2.97	815	-	-	-	-	-	-	-	-	-	-	-
3.63	-	117.3	-	-	-	-	-	-	-	-	-	-
4.5	-	-	710	-	-	-	-	-	-	-	-	-
5.5	-	-	-	36.2	-	-	-	-	-	-	-	-
5.85	-	-	-	-	245.4	-	-	-	-	-	-	-
7.15	-	-	-	-	-	9.5	-	-	-	-	-	-
8.1	-	-	-	-	-	-	783.2	-	-	-	-	-
9.9	-	-	-	-	-	-	-	19.9	-	-	-	-
10.8	-	-	-	-	-	-	-	-	833.5	-	-	-
13.2	-	-	-	-	-	-	-	-	-	5.5	-	-
13.5	-	-	-	-	-	-	-	-	-	-	1497	-
16.5	-	-	-	-	-	-	-	-	-	-	-	21

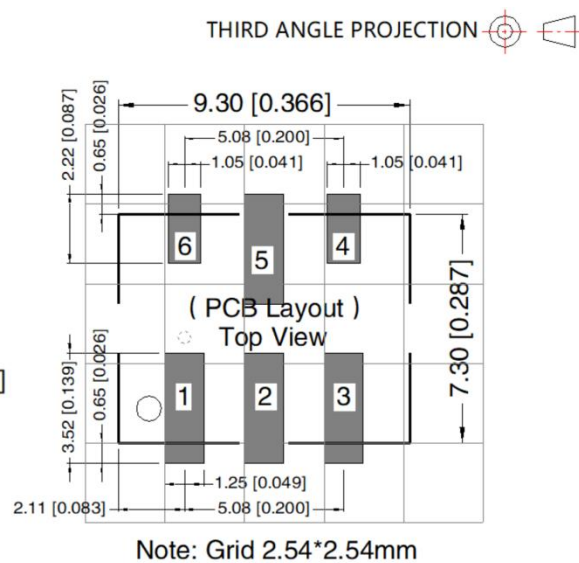
Temperature Rise Test PCB Layout



Standard Dimension

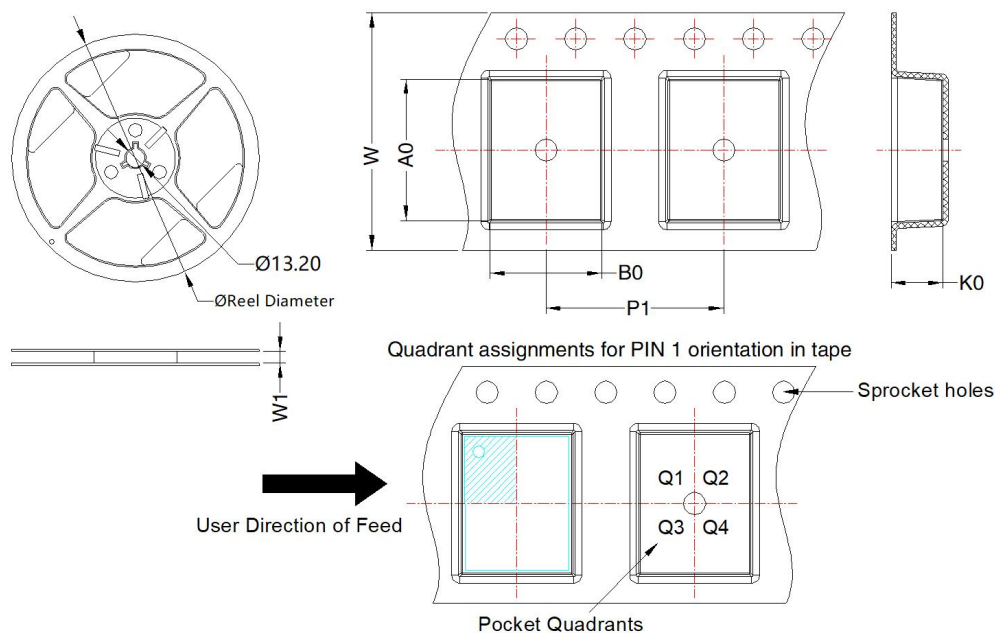


Note:
 Unit: mm[inch]
 General tolerances: ± 0.10 [± 0.004]



Pin-Out		
Pin	Positive output	Negative output
1	+Vin	+Vin
2	GND	-Vo
3	+Vo	GND
4	Trim	Trim
5	GND	-Vo
6	Ctrl	Ctrl

Tape/Reel packaging



Package Type	Pin	MPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
DFN 7x9	7	400	180.0	16.4	9.56	7.56	3.5	12.0	16.0	Q1

Note:

1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75% with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. Products are related to laws and regulations: see "Features" and "EMC";
5. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.