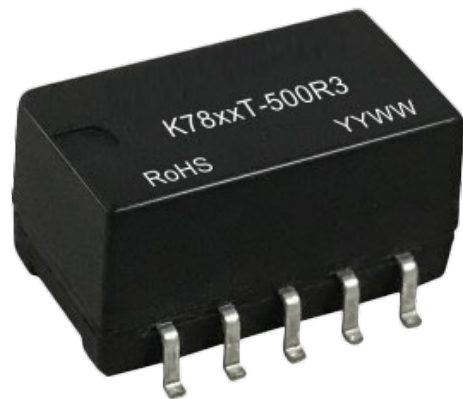


Features

- High efficiency up to 95%
- No-load input current as low as 0.2mA
- Operating ambient temperature range -40°C to +85°C
- Output short-circuit protection
- SMD package
- EN62368 Approval



Ideal Power's 36K78xxT-500R3 7.5W Non-Isolated DC/DC Converters in SMD Series are certified to UKCA, CE & RoHS & IEC/UL60950/EN62368 Standards and comply with the relevant Efficiency Regulations. These are primarily used in ITE, Audio & Video Industries and customised solutions are available upon request.

Models

Model No.	Input Voltage (VDC)* Nominal (Range)	Output		Full Load Efficiency (%) Vin Min/Vin Max	Capacitive Load (µF) Max.
		Voltage (VDC)	Current (mA) Max/Min.		
36K7801T-500R3	12 (4.75-28)	1.5	500	76/67	680
36K78X2T-500R3	12 (4.75-28)	1.8	500	76/69	680
36K7802T-500R3	12 (4.75-32)	2.5	500	81/74	680
36K7803T-500R3	24 (4.75-36)	3.3	500	86/80	680
36K7805T-500R3	24 (6.5-36)	5	500	90/84	680
36K78X6T-500R3	24 (8-36)	6.5	500	92/87	680
36K7809T-500R3	24 (12-36)	9	500	93/90	680
36K7809T-500R3	24 (12-36)	9	500	93/90	680
36K7815T-500R3	24 (19-36)	15	500	95/93	680

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

Input Specifications

Parameter	Conditions	Min	Typ	Max	Unit
No-load Input Current		--	0.2	1.5	mA
Reverse Polarity at Input		Avoid / Not protected			
Input Filter		Capacitance filter			
Ctrl*	Module on	Ctrl pin open or pulled high (TTL 3.5-5.5VDC)			
	Module off	Ctrl pin pulled low to GND (0-0.8VDC)			
	Input current when off	--	30	100	μA

Note: *The Ctrl pin voltage is referenced to input GND.

Output Specifications

Parameter	Conditions	Min	Typ	Max	Unit	
Voltage Accuracy	Full load, input voltage range	1.5/1.8/2.5/3.3 VDC	--	±2	±4	%
		Others	--	±2	±3	
Linear Regulation	Full load, input voltage range	--	±0.2	±0.4		
Load Regulation	5%-100% load	Vo1	--	±0.5	±1	%
		Vo2	--	--	±3	
Ripple & Noise*	20MHz bandwidth, nominal input voltage	1.5/1.8/2.5/3.3 VDC output, 20% -100% load	--	20	50	
		Others, 10% -100%	--	20	50	
Transient Recovery Time	Nominal input voltage, 25% load step change	--	0.2	1	ms	
Transient Response Deviation		--	50	200	mV	
Temperature Coefficient	Operating temperature -40°C to +85°C	--	--	±0.03	%/°C	
Short-circuit Protection	Nominal input voltage	Continuous, self-recovery				
Vadj	Input voltage range	--	±10	--	%Vo	

Note: *

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 1.5/1.8/2.5/3.3V output parts increases to 100mVp-p max. and a load below 10% for 5V/6.5V/9V/12V/15V output parts levels increase to 150mVp-p max.

General Specifications

Parameter	Conditions	Min	Typ	Max	Unit	
Operating Temperature	see Fig. 1	-40	--	+85	°C	
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 (PFM Mode)	Full load, nominal input voltage	36K7801T-500R3	--	300	--	KHz
		Others	--	700	--	
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours	

Mechanical Specifications

Case material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	15.24 x11.40 x 8.25mm
Weight	1.5g (Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 4-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig. 4-② for recommended circuit)	
Immunity	ESD	IEC/EN 61000-4-2	Contact ±4KV	perf. Criteria B
	RS	IEC/EN 61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN 61000-4-4	±1KV (see Fig. 4-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN 61000-4-5	line to line ±1KV (see Fig. 4-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN 61000-4-6	3Vr.m.s	perf. Criteria A

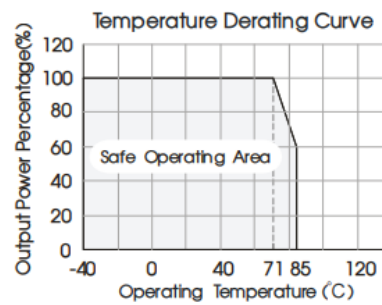
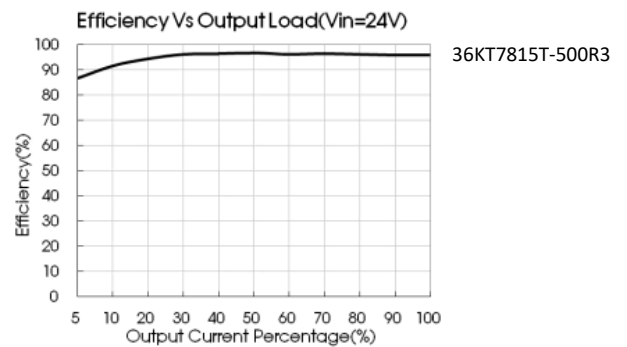
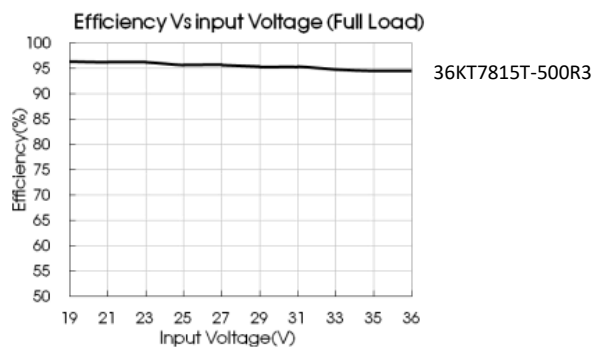
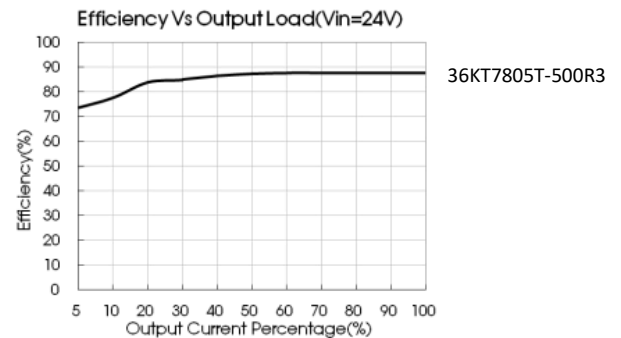
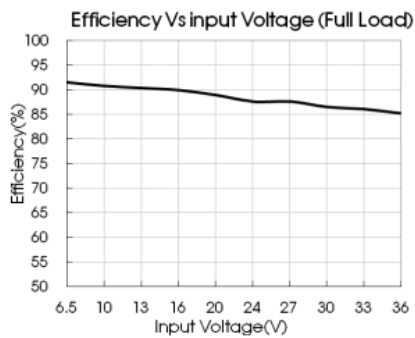
Characteristic Curve


Fig. 1



Design Reference (Figure 1)

1 Typical application

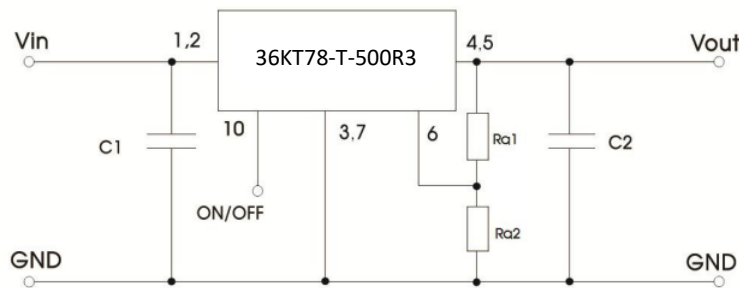


Fig. 2 Typical application circuit

Model No	C1 (Ceramic capacitor)	C2 (Ceramic capacitor)	Ra1/Ra2 (Vadj resistance)
36K7801T-500R3	10μF/50V	22μF/10V	Refer to Vadj resistance calculation
36K78X2T-500R3		22μF/10V	
36K7802T-500R3		22μF/10V	
36K7803T-500R3		22μF/10V	
36K7805T-500R3		22μF/16V	
36K78X6T-500R3		22μF/16V	
36K7809T-500R3		22μF/25V	
36K7812T-500R3		22μF/25V	
36K7815T-500R3		22μF/25V	

Note:

The required C1 and C2 capacitors must be connected as close as possible to the terminals of the module.

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.

Converter cannot be used for hot swap and with output in parallel.

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.

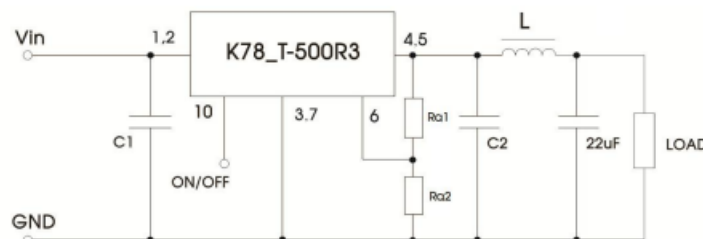


Fig. 3 External "LC" output filter circuit diagram

Design Reference (Continued)

2 EMC Compliance circuit

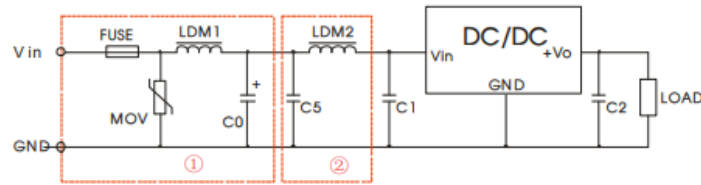
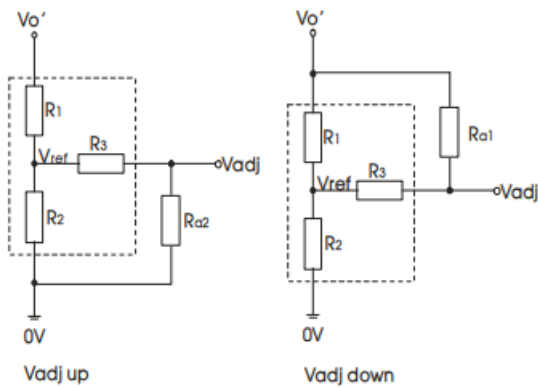


Fig.4 Recommended compliance circuit

FUSE	MOV	LDM1	C0	C1/C2	C5	LDM2
Select fuse value according to actual input current	S20K30	82µH	680µF /50V	Refer to table 1	4.7µF /50V	12µH

Note: Part ① in Fig. 4 shows Immunity compliance filter and part ② filter for Emission compliance; depending on requirement both filters ① and ② can be used in series as shown.

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



Calculating Trim resistor values:

$$\text{up: } R_{a2} = \frac{\alpha R_2}{R_2 - \alpha} - R_3$$

$$\alpha = \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1$$

$$\text{down: } R_{a1} = \frac{\alpha R_1}{R_1 - \alpha} - R_3$$

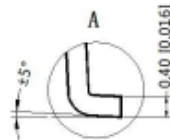
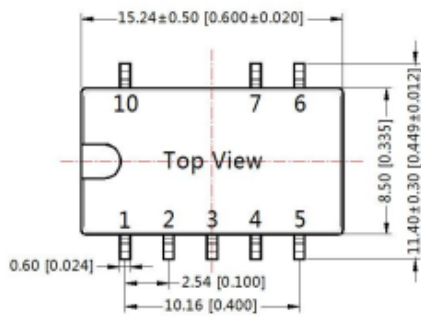
$$\alpha = \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2$$

Ra1, Ra2= Trim Resistor value;
 α= self-defined parameter;
 Vo' =desired output voltage.

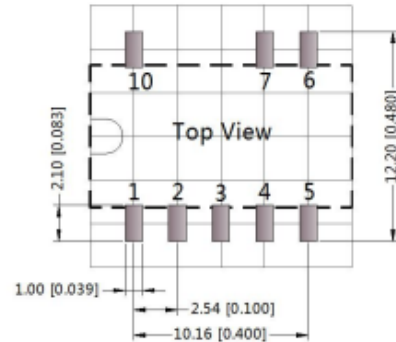
Fig.5 Circuit diagram of Vadj up and down (dashed line shows internal part of module)

Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
1.5	7.5	7.5	15	0.75
1.8	35.7	26.29	100	0.765
2.5	27	11.858	51	0.765
3.3	33	9.9	47	0.765
5	75	13.5	75	0.765
6.5	75	10	51	0.765
9	51	4.7	27	0.765
12	75	5.1	27	0.765
15	82	4.423	27	0.765

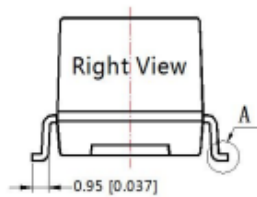
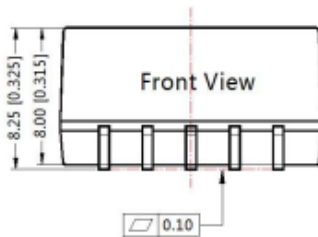
Note: The 1.5V model's output voltage can only be adjusted up (Vadj up) and cannot be adjusted to a lower voltage (Vadj down is not applicable).

Dimensions and Recommended Layout


THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm



Note:
 Unit: mm[inch]
 Pin section tolerances: $\pm 0.10[\pm 0.004]$
 General tolerances: $\pm 0.25[\pm 0.010]$

Pin-Out	
Pin	Function
1	+Vin
2	+Vin
3	GND
4	+Vout
5	+Vout
6	V adj
7	GND
10	Remote On/Off

NC: Pin to be isolated from circuitry

Notes:

For additional information on Product Packaging please refer to www.idealpower.com.

The specified maximum capacitive load is tested under full load condition and over the input voltage range.

All parameters in this datasheet were measured under following conditions: $T_a=25^\circ\text{C}$, relative humidity <75%RH, nominal input voltage and rated output load (unless otherwise specified).

All index testing methods in this data table are based on our Company's corporate standards.

The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact with our technician for specific information.

Products are related to laws and regulations: see "Features" and "EMC".

Our products shall be classified according to ISO14001 and related environmental laws and regulations and shall be handled by qualified units.