

TS19503CB10H

– 2A, Step-Down LED Driver

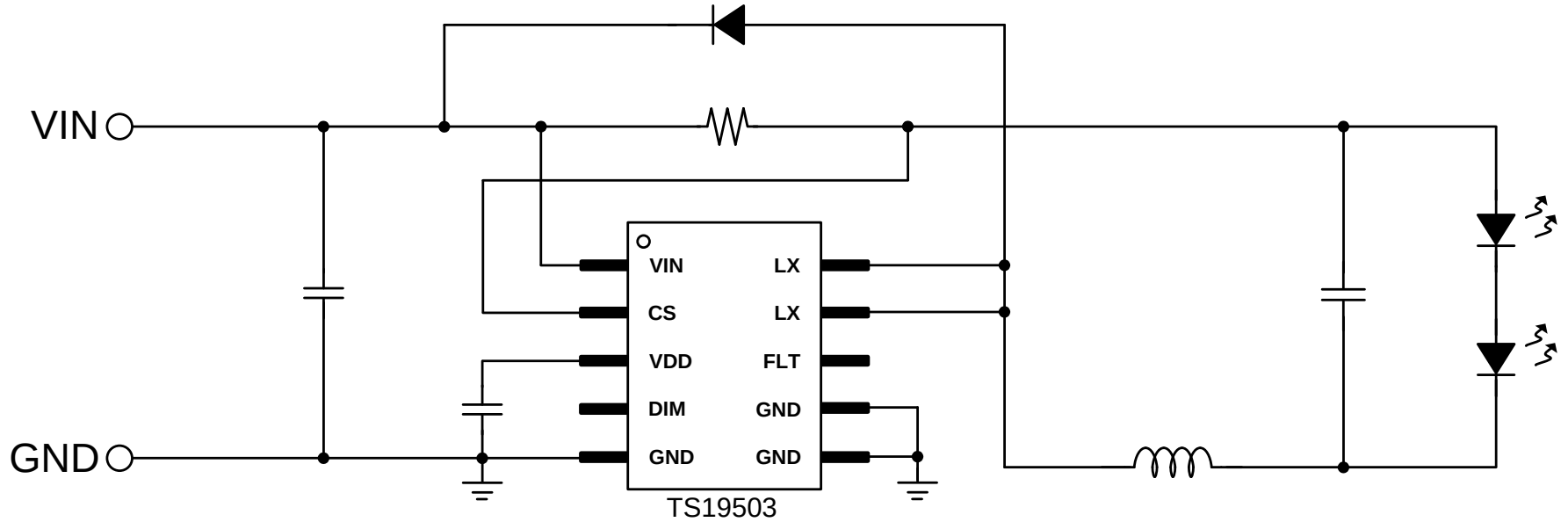
User Manual

Product Management IC

Lighting IC

DC-DC LED Lighting

TS19503 Typical Application Circuit



System Calculation Form – TS19503

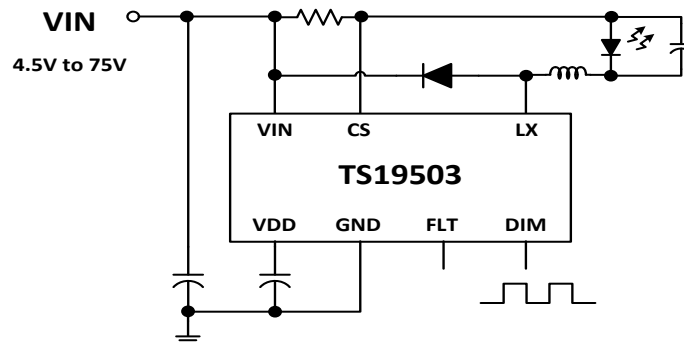


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System Calculation Form - TS19503CB10H

ver.: A2103

	Parameter	Symbol	Non-Dimming	Unit	Remark
Design Condition	Supply Voltage	V_{IN}	12	V	
	Output Voltage	V_{OUT}	6	V	
	LED Current	I_{OUT}	1	A	
	Inductor	L	20	μH	
	Ambient Temperature	T_C	100	$^{\circ}C$	
	Thermal Resistance	$R_{\theta JC}$	31	$^{\circ}C/W$	Parameter Fixed.
System Setting	Duty Cycle	D	52.00	%	
	T_{ON}	T_{ON}	2.09	μs	
	T_{OFF}	T_{OFF}	2.07	μs	
	Operating Frequency	F	232.32	kHz	
	IC Total Power Dissipation	P	0.22	W	PASS
	Junction Temperature	T_J	106.76	$^{\circ}C$	



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TS19503 – PWM / Linear Dimming

- PWM can be applied via DIM pin to adjust the output current to a value, which is below the nominal average value set by the resistor R_{CS} :

$$I_{LED} = 0.1V \times D / R_{CS} \quad ; \quad D = \text{Duty Cycle}$$

- A linear signal with the analog voltage can be applied to DIM pin, too. To adjust the output current to a value, which is below the nominal average value set by the resistor R_{CS} :

$$I_{LED} = 0.1V / R_{CS} \times V_{DIM} / 1.6V$$

For Example :

$$V_{DIM} = 0.4V$$

$$R_{CS} = 0.1\Omega$$

$$I_{LED} = 0.1V / 0.1\Omega \times 0.4V / 1.6V = 250mA$$

TS19503 – DIM Application

- DIM voltage from 0.1V to 1.6V.
LED current will cut-off when $V_{DIM} < 0.1V$ and restart if $V_{DIM} > 0.15V$.
- DIM pin also provides a constant current of 50uA to GND pin for external resistor application, shown below :

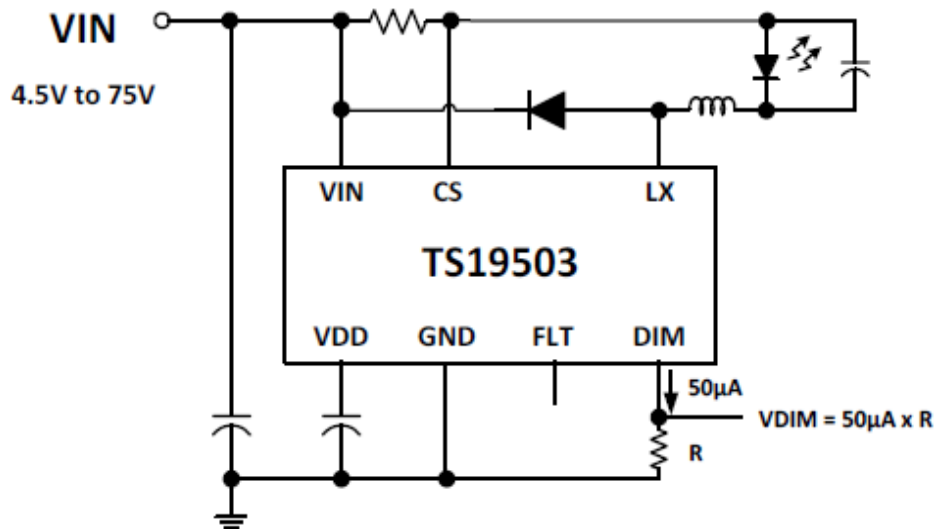


Fig. (a)

Example :

$$R = 20k\Omega, R_{CS} = 0.1\Omega$$

$$I_{LED} = (0.1V \div 0.1\Omega) \times \\ (20k\Omega \times I_{DIM} (50\mu A) \div 1.6V) \\ = 625mA$$

TS19503 – DIM Application (cont.)

- To series a NTC component as fig.(b) from DIM pin to GND pin. When the temperature of LED module or driver increase, the V_{DIM} decrease the inverse ratio with NTC.
- To series a resistor as fig. (c) from VDD pin to DIM pin, and a NTC from DIM pin to GND pin. V_{DIM} will be divided across the resistor and NTC.

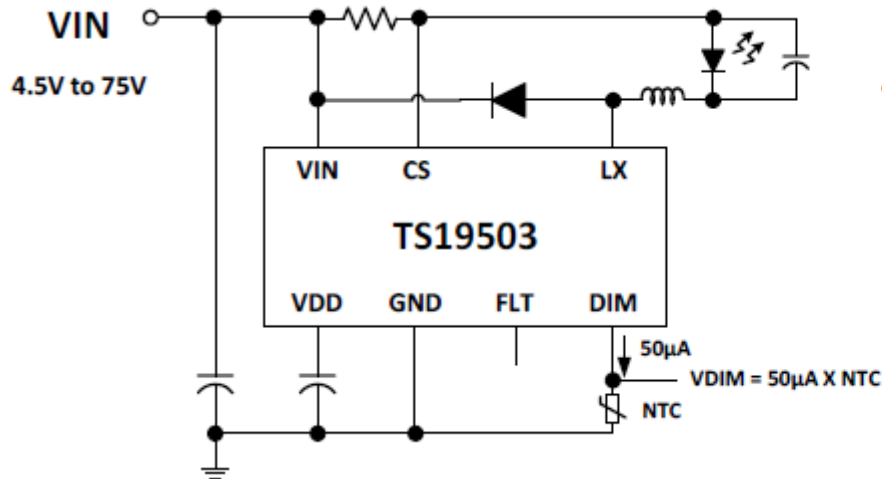


Fig. (b)

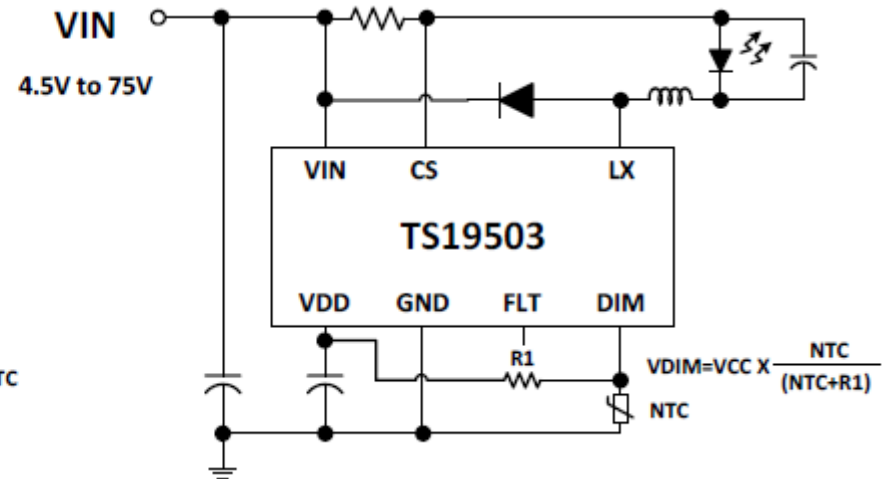
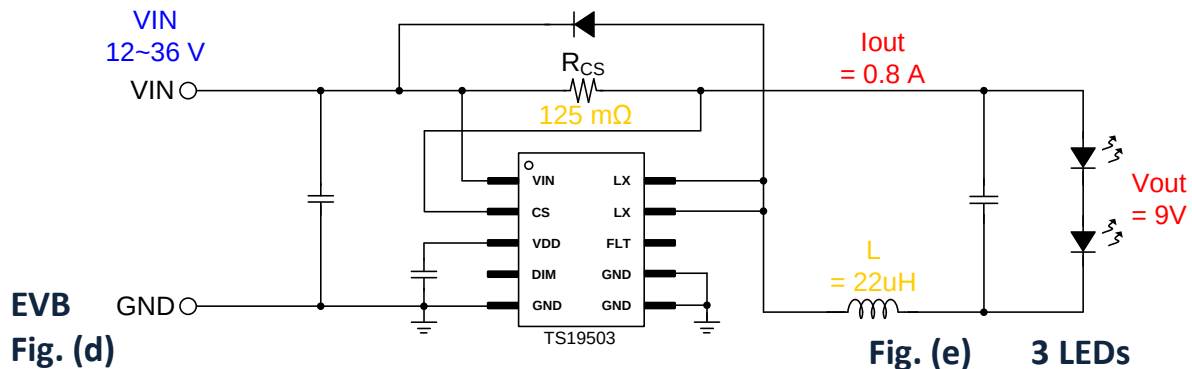
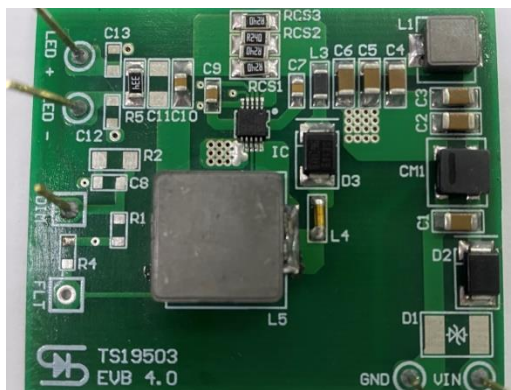


Fig. (c)

TS19503 – Design Example & Performance



V_{IN} (V)	I_{IN} (A)	P_{IN} (W)	V_{OUT} (V)	I_{OUT} (A)	P_{OUT} (W)	Efficiency η (%)	I_{OUT} Variation (%)
12	0.746	8.950	10.273	0.802	8.241	92.08	0.00%
15	0.601	9.015	10.290	0.808	8.311	92.19	0.69%
20	0.450	9.004	10.151	0.811	8.233	91.44	1.11%
25	0.363	9.070	10.176	0.813	8.277	91.26	1.40%
30	0.303	9.099	10.157	0.816	8.283	91.03	1.66%
35	0.262	9.177	10.157	0.817	8.297	90.41	1.83%
40	0.231	9.252	10.161	0.818	8.311	89.83	1.96%
45	0.207	9.329	10.161	0.819	8.324	89.23	2.12%
50	0.188	9.390	10.163	0.820	8.337	88.78	2.26%
55	0.172	9.460	10.163	0.821	8.341	88.17	2.31%
60	0.159	9.522	10.163	0.821	8.345	87.64	2.36%

TS19503 – Typical Example & Performance (cont.)

PWM Dimming

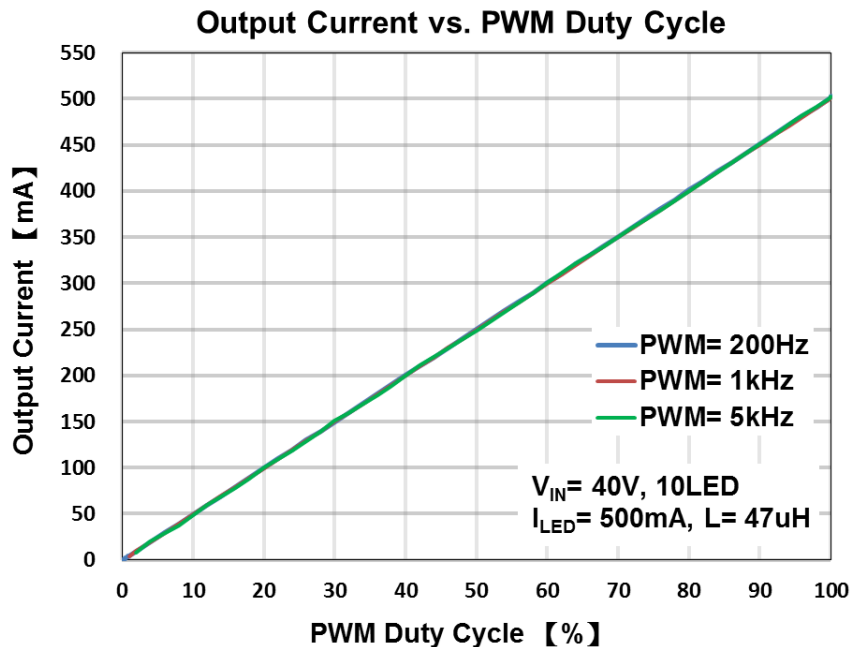


Fig. (f)

Linear Dimming

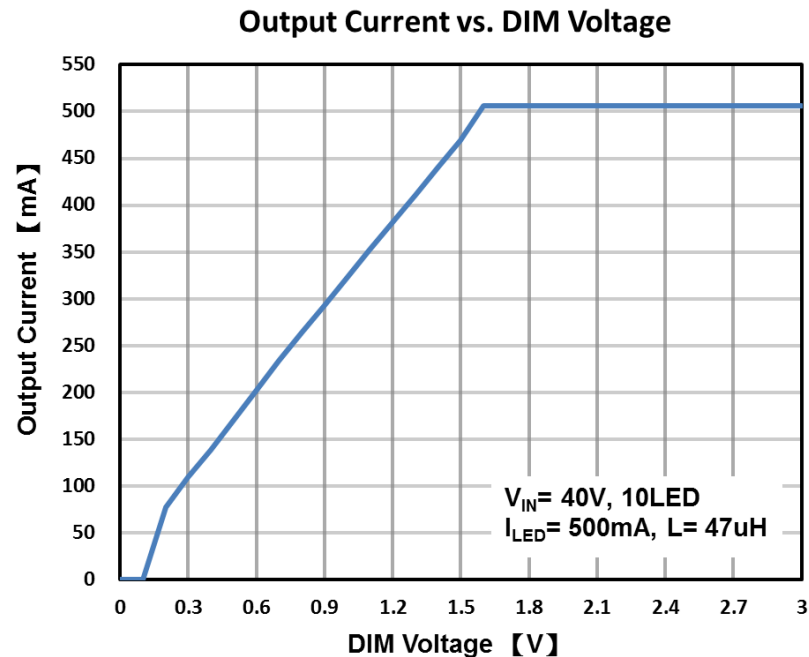


Fig. (g)

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