



AP1503

300Khz, 2.5A PWM Buck DC/DC Converter

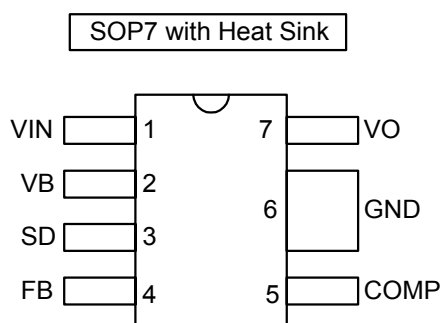
■ Features

- Output voltage: 3.3V
- 300KHz $\pm 15\%$ fixed switching frequency
- Voltage mode non-synchronous PWM control
- Thermal-shutdown and current-limit protection
- ON/OFF shutdown control input
- Operating voltage can be up to 22V
- Output load current: 2.5A
- SOP-7L packages
- Low power standby mode
- Built-in switching transistor on chip

■ Applications

- Simple High-efficiency step-down regulator
- On-card switching regulators
- Positive to negative converter
- DSL Modems
- Portable Computers
- Regulated Wall Adapters
- Distributed Power

■ Pin Assignment



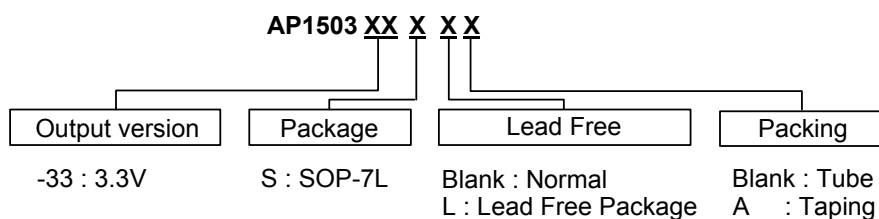
■ General Description

The AP1503 series are monolithic ICs designed for step-down DC/DC converters, and own the ability of driving a 2.5A load without additional transistor components. Due to reducing the number of external component, the board space can be saved easily. The external shutdown function can be controlled by logic level and then come into standby mode. The external compensation makes feedback control have good line and load regulation. Regarding protected function, thermal shutdown is to prevent over temperature operating from damage, and current limit is against over current operating of the output switch. The AP1503 series operates at a switching frequency of 300KHz thus allowing smaller sized filter components than what would be needed with lower frequency switching regulators. Other features include a guaranteed $\pm 2\%$ tolerance on output voltage under specified input voltage and output load conditions, and $\pm 15\%$ on the oscillator frequency. The output version included fixed 3.3V, 5V. The packages are available in a standard SOP-7 lead package.

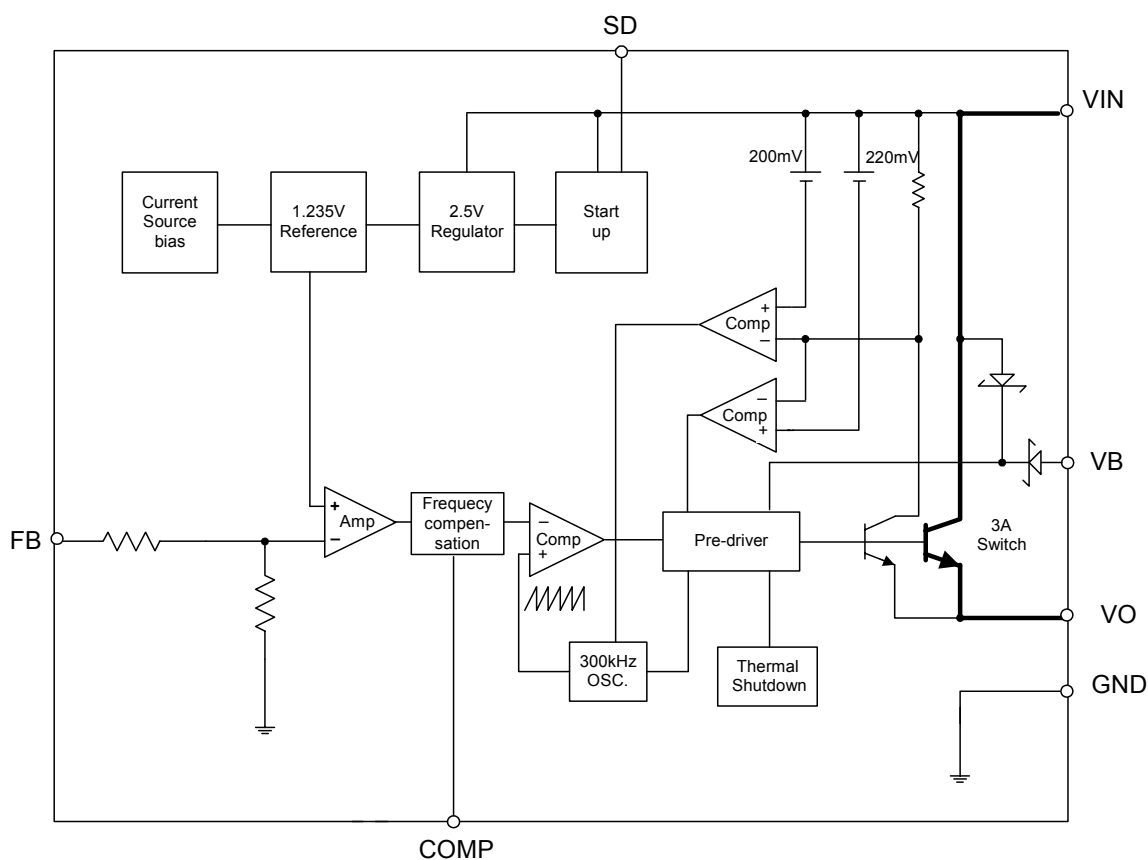
■ Pin Descriptions

Name	Description
V _{IN}	Operating voltage input
VB	Boost pin
SD	ON/OFF Shutdown
FB	Output voltage feedback control
COMP	Compensation pin
GND	Ground
VO	Switching output

■ Ordering Information



■ Block Diagram



■ Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{CC}	Supply Voltage	+26	V
V_{SD}	ON/OFF Pin input voltage	-0.3 to +25	V
V_{FB}	Feedback Pin voltage	-0.3 to +25	V
V_{OUT}	Output voltage to Ground	-1	V
P_D	Power dissipation	Internally limited	W
T_{ST}	Storage temperature	-65 to +150	°C
T_{OP}	Operating temperature	-40 to +125	°C
V_{OP}	Operating voltage	+7 to +40	V

■ Electrical Characteristics (All Output Voltage Versions)

Unless otherwise specified, $V_{IN}=12V$ for 3.3V, 5V, $I_{LOAD} = 0.5A$

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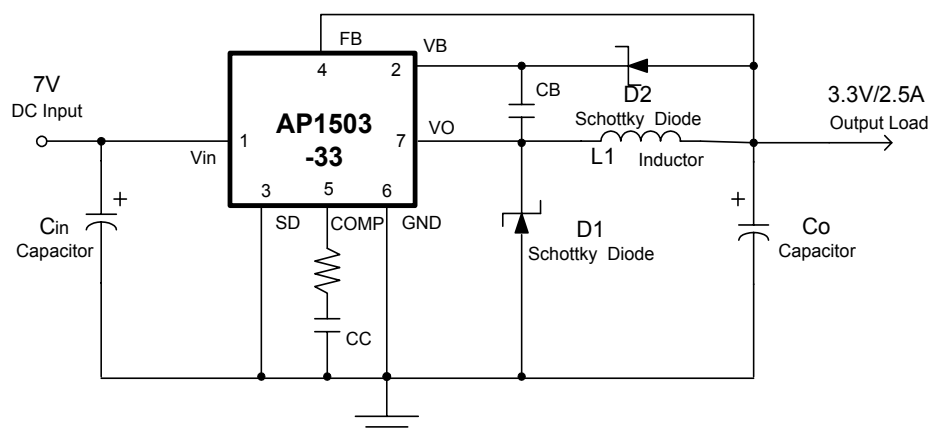
Symbol	Parameter		Conditions		Min.	Typ.	Max.	Unit
F_{OSC}	Oscillator frequency				255	300	345	KHz
					230		360	
V_{SAT}	Saturation voltage		$I_{SW}=2A$ $V_B=V_{IN}+2.5V$.			0.4	0.5 0.6	V
DC	Max. Duty Cycle (ON)		$V_{FB}=0V$ force driver on			90		%
	Min. Duty cycle (OFF)		$V_{FB}=6V$ force driver off			0		
I_{CL}	Current limit		Peak current		3	3.25	3.5	A
			No outside circuit $V_{FB}=0$ force driver on				4	
I_L	Output = 0	Output leakage current	no outside circuit $V_{FB}=6V$ force driver off				-1	uA
	Output = -1		$V_{IN}=24V$				-1	mA
V_C	COMP Min SW threshold		Duty Cycle=0%, $F_B=3.5V$			0.04		V
	2A I_{SW} threshold					0.8		
V_B	Min V_B above switch		$I_{SW}=2A$			2.6	3	V
I_B	Boost current		$I_{SW}=1A$			120		mA
			$I_{SW}=2A$			130	140	
I_Q	Quiescent Current		$V_{FB}=6$ force driver off			5	10	mA
I_{STBY}	Standby Quiescent Current		ON/OFF pin=5V			80	150	uA
			$V_{IN}=24V$				200	
V_{IL}	ON/OFF pin logic input threshold voltage		Low (regulator ON)		-	1.3	0.6	V
V_{IH}			High (regulator OFF)		2.0		-	
I_H	ON/OFF pin logic input current		$V_{LOGIC}=2.5V$ (OFF)				-0.1	uA
I_L	ON/OFF pin input current		$V_{LOGIC}=0.5V$ (ON)				-1	
Θ_{JC}	Thermal Resistance		SOP-7L	Junction to case		20		°C/W
Θ_{JA}	Thermal Resistance With copper area of approximately 0.5 in ²		SOP-7L	Junction to ambient		50		°C/W

■ Electrical Characteristics (Continued)

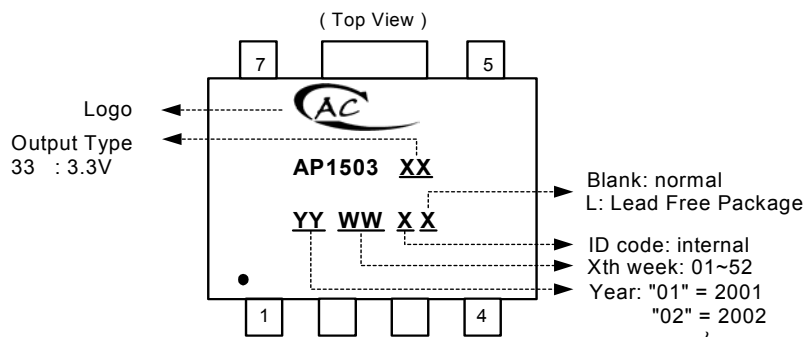
	Symbol	Parameter	Conditions	Typ.	Limit	Unit
AP1503-3.3V	V_{OUT}	Output voltage	$7V \leq V_{IN} \leq 24V$ $0.2A \leq I_{LOAD} \leq 2.5A$	3.3	3.23/3.2 3.37/3.4	V V_{MIN} V_{MAX}
	η	Efficiency	$V_{IN} = 12V, I_{LOAD}=2A$	79		%

Specifications with **boldface type** are for full operating temperature range, the other type are for $T_J=25^\circ C$.

■ Typical Application Circuit

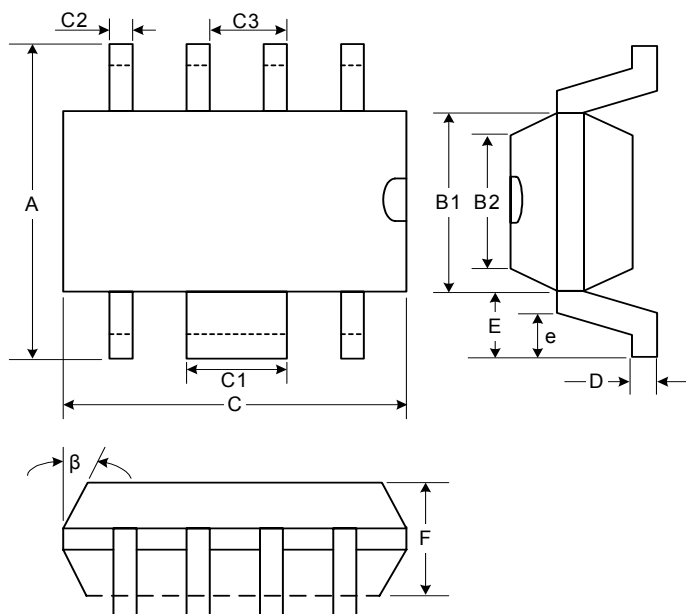


■ Marking Information



■ Package Information

Package Type: SOP-7L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	5.79	5.99	6.19	0.228	0.236	0.244
B1	3.83	3.91	3.99	0.151	0.154	0.157
B2	3.78	3.86	3.94	0.149	0.152	0.155
C	4.80	4.87	4.94	0.189	0.192	0.194
C1	1.57	1.67	1.77	0.062	0.066	0.070
C2	0.32	0.4	0.48	0.013	0.016	0.019
C3	1.17	1.27	1.37	0.046	0.050	0.054
D	0.19	0.22	0.25	0.007	0.009	0.010
E	1.04REF			0.041REF		
e	0.48	0.68	0.88	0.019	0.027	0.035
F	1.35	1.45	1.55	0.053	0.057	0.061
β	7°			7°		