

General Description

The SDC7500 is a voltage mode pulse width modulation switching regulator control circuit designed primarily for power supply control.

The SDC7500 consists of a reference voltage circuit, two error amplifiers, an on-chip adjustable oscillator, a dead-time control (DTC) comparator, a pulse-steering control flip-flop, and an output control circuit. The precision of voltage reference (V_{REF}) is $\pm 1\%$ through trimming and this provides a better output voltage regulation. The SDC7500 provides for push-pull or single-ended output operation, which can be selected through the output control.

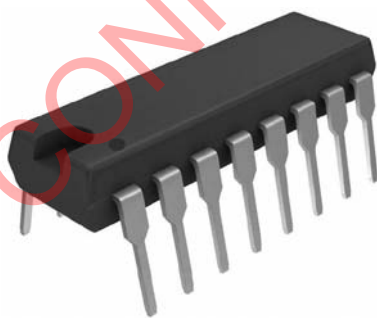
Features

- Complete PWM power control circuitry
- Uncommitted outputs for 200mA sink or source current
- Output control for single ended or push pull operation
- Internal regulator provides a stable 5V reference supply with 5% tolerance
- Adjustable dead-time control
- Package: DIP-16

Applications

- PC power supply
- DC-DC convertor

Pin Configuration



DIP-16

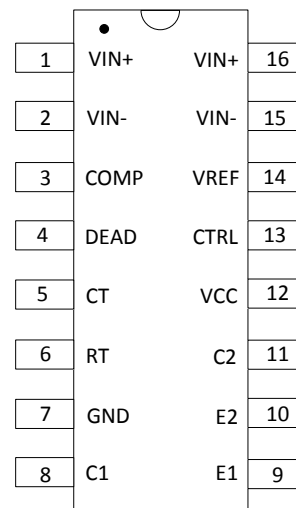


Figure 1. Pin Configuration

Pin Number	Pin Name	Function
1, 16	VIN+	Amplifier positive input
2, 15	VIN-	Amplifier negative input
3	COMP	Compensation pin
4	DEAD	Dead time control
5	CT	Oscillate capacitor pin, external timing capacitor
6	RT	Oscillate resistor pin, external timing resistor
7	GND	Ground
8, 11	C1, C2	Output transistor collector
9,10	E1, E2	Output transistor emitter
12	VCC	Power supply pin
13	CTRL	Output control pin
14	VREF	Reference pin

Table 1. Pin Configuration

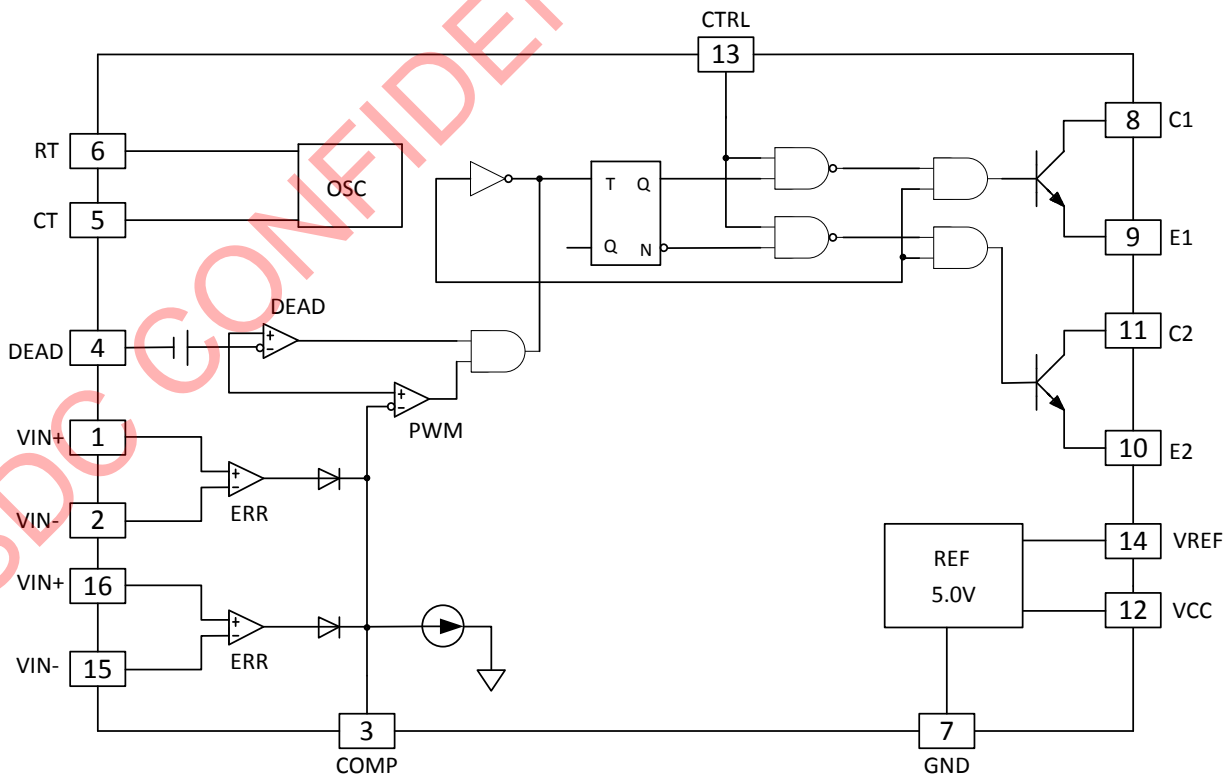
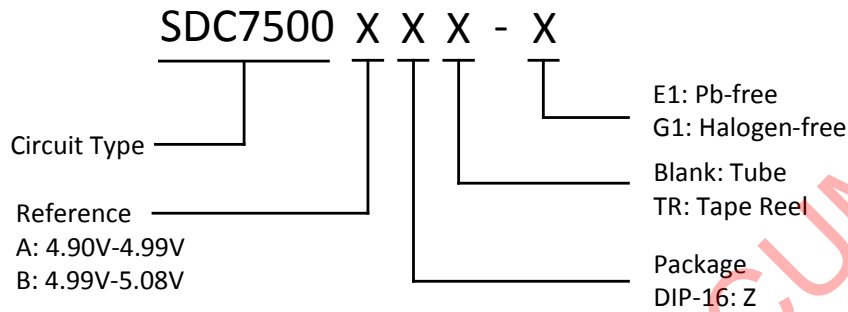
Functional Block Diagram


Figure 2. Functional Block Diagram

Ordering Information



Package	Part Number		Marking ID		Packing Type
	Pb-free	Halogen-free	Pb-free	Halogen-free	
DIP-16	SDC7500AZ -E1	SDC7500AZ -G1	SDC7500	SDC7500G	Tube
	SDC7500BZ -E1	SDC7500BZ -G1	SDC7500	SDC7500G	Tube

Absolute Maximum Ratings (NOTE: Stresses greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device.)

Parameter	Symbol	Value	Unit
Power supply voltage VCC	V _{CC}	42	V
Amplifier input voltage	V _{IN}	0.3	V
Collector output voltage	V _{OUT}	42	V
Collector output current	I _{CO}	200	mA
Total dissipation power	PD	1000	mW
Operating temperature	T _{OPR}	-25~85	°C
Storage temperature	T _{STG}	-65~150.	°C
Latch-up test per JEDEC 78	-	±100	mA
ESD, HBM model per Mil-Std-883, Method 3015	HBM	2000	V
ESD, MM model per JEDEC EIA/JESD22-A115	MM	200	V

Table 2. Absolute Maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Power supply voltage VCC	V _{CC}	7	36	V
Frequency	f _{osc}	10	200	kHz

Table 3. Recommended Operating Conditions

Electrical Characteristics (Ta=25°C, VCC=15.0V, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference Section						
Output voltage(SDC7500A)	V _{REF}	I _{REF} =1mA	4.90	-	4.99	V
Output voltage(SDC7500B)			4.99	-	5.08	V
Input regulation	V _{Delta_VV}	V _{CC} =7V~40V		2	25	mV
Output regulation	V _{Delta_VL}	I _{REF} =1mA~10mA		1	15	mV
Short-circuit output current	I _{SC}	V _{REF} =0V, Ta=25°C		55		mA
Output voltage change with temperature	Delta_VT	Ta=-25°C~85°C		0.2	1	%
PWM Section						
Input threshold voltage	V _{TH}	DUTY=0		4	4.5	V
Input sink current	I _{SINK}	V _{COMP} =0.7V	0.3	0.7		mA
Oscillator Section						
Frequency	f _{OSC}	CT=1nf, RT=12kΩ	23	29	34	kHz
Standard deviation of frequency	Delta	ALL Value of CT RT Ta constant		10		%
Frequency change with temperature	Delta_FT	Ta=-25°C~85°C			12	%
Frequency change with voltage	Delta_FV	V _{CC} =7V~40V		0.1		%
Amplifier Section						
Input offset voltage	V _{OFFSET}	V _{O(PIN3)} =2.5V		2	10	mV
Input offset current	I _{OFFSET}	V _{O(PIN3)} =2.5V		25	250	nA
Input bias current	I _{BIAS}	V _{O(PIN3)} =2.5V		0.2	1	uA
Output sink current	I _{SINK}	V _{COMP} =0.5V	0.3	0.7		mA
Output source current	I _{SOURCE}	V _{COMP} =3.5V	-2			mA
Common-mode input voltage range	V _{IN}	V _{CC} =7V~40V		-0.3~V _{CC}		V
Open-loop voltage amplification	G _V	V _O =0.5V~3.5V	70	95		dB
Unity-gain bandwidth	f _{BAND}			800		kHz
Common-mode rejection ratio	R _{REJ}	V _{CC} =40V	65	80		dB
Dead Time Control Section						
Input bias	I _{BIAS}	V _I =0V~5.25V		-2	-10	uA
Maximum duty cycle	G _V	V _{I(PIN4)} =0	45			%
Input threshold voltage	V _{TH}	DUTY=0		2.7	3.3	V
Input threshold voltage	V _{TH}	DUTY=MAX	0			
Power Current Section						
Standby supply current	I _{CC1}	V _{CC} =15V		6	10	mA
Standby supply current	I _{CC}	V _{CC} =40V		9	15	mA
Average supply current	I _{AV}	V _{PIN4} =2V		7.5		mA

Electrical Characteristics (Ta=25°C,VCC=15.0V, unless otherwise specified.)(Continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Section						
Collector off-state current	I_C	$V_{CE}=40V$ $V_{CC}=40V$		2	100	μA
Emitter off-state current	I_E	$V_{CC}=V_C=40V$ $V_E=0$			-100	μA
Collector-emitter saturation voltage	Common-emitter	$V_E=0, I_C=100mA$		1.0	1.3	V
	Emitter-follower	$V_C=15V, I_E=-100mA$		1.5	2.5	V
Output control input current	I_{IN}	$V_I=V_{REF}$			3.5	mA
Switching Characteristics						
Output voltage rise time	t_r	Common-emitter configuration		100	200	ns
Output voltage fall time	t_f	configuration		25	100	ns
Output voltage rise time	t_r	Emitter-follower configuration		100	200	ns
Output voltage fall time	t_f	configuration		40	100	ns

Table 4. Electrical Characteristics

Typical Performance Characteristics

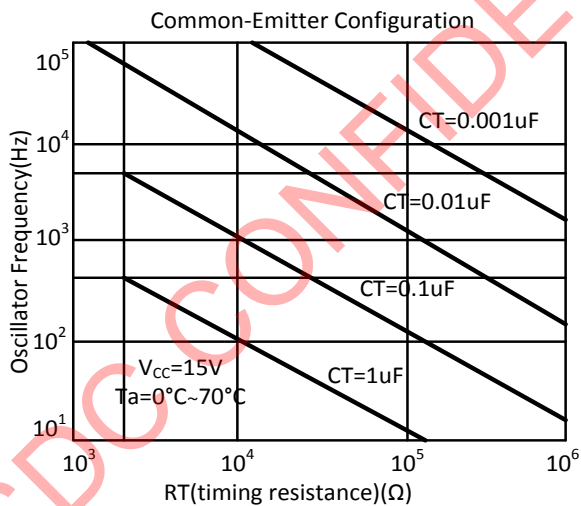


Figure 3. Oscillator frequency and frequency variation vs. Timing resistance

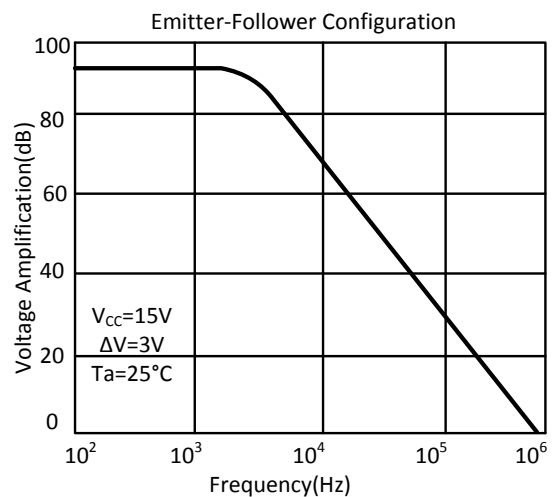


Figure 4. Amplifier voltage amplification

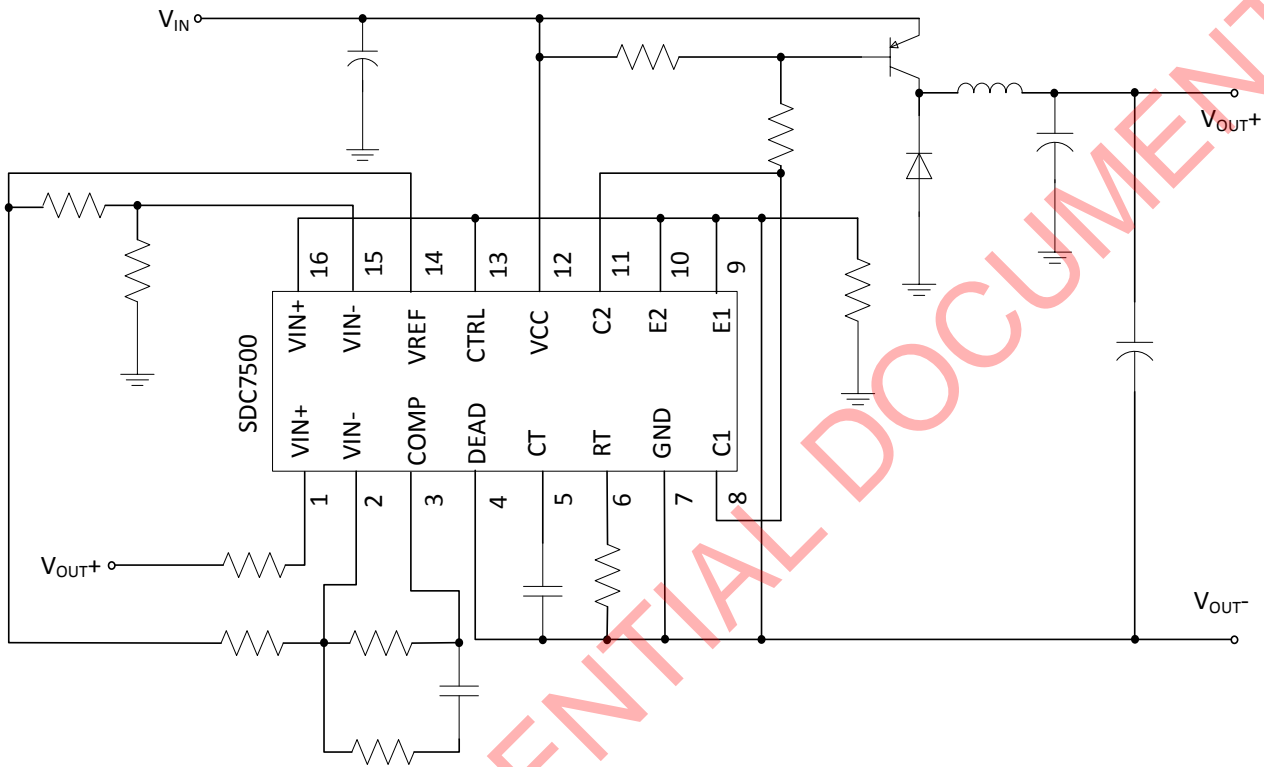
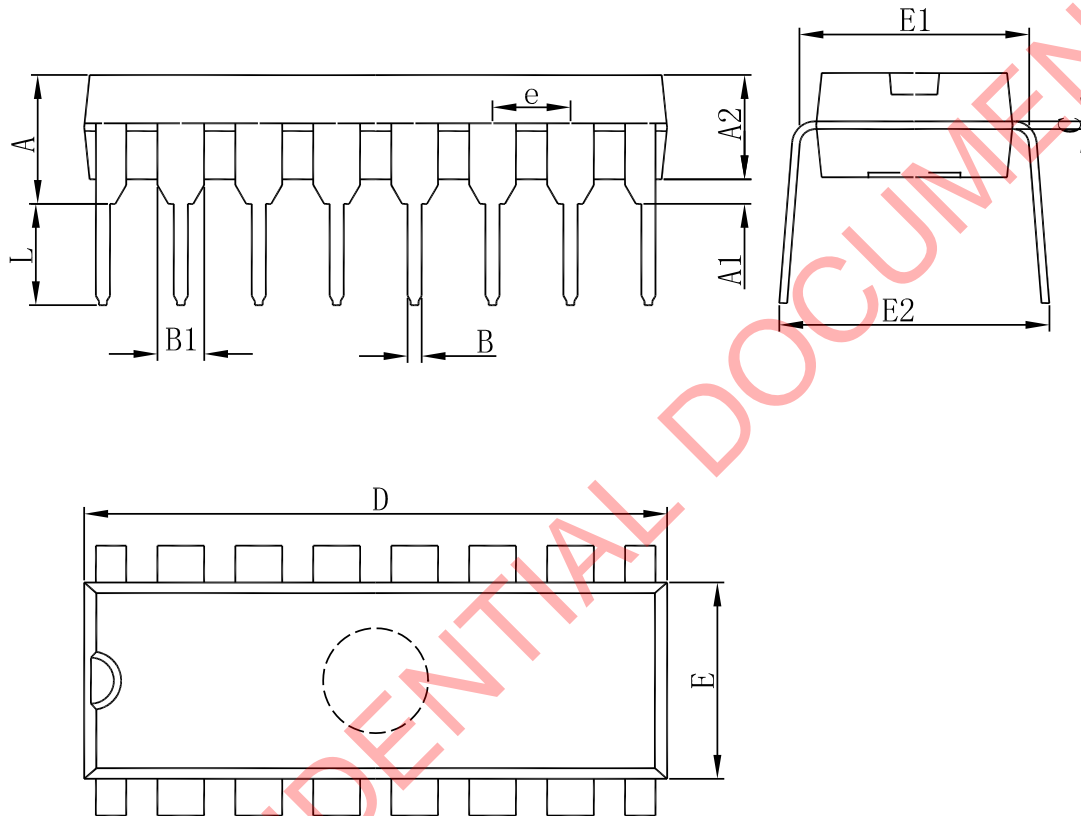
Typical Application


Figure 5. Typical Application

Package Dimension
DIP-16


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510	-	0.020	-
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	18.800	19.200	0.740	0.756
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354



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