

# UC3525A

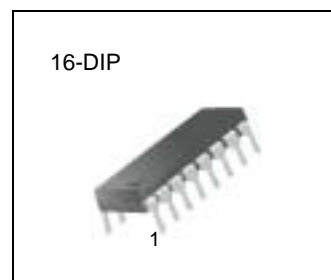
## SMPS Controller

### Features

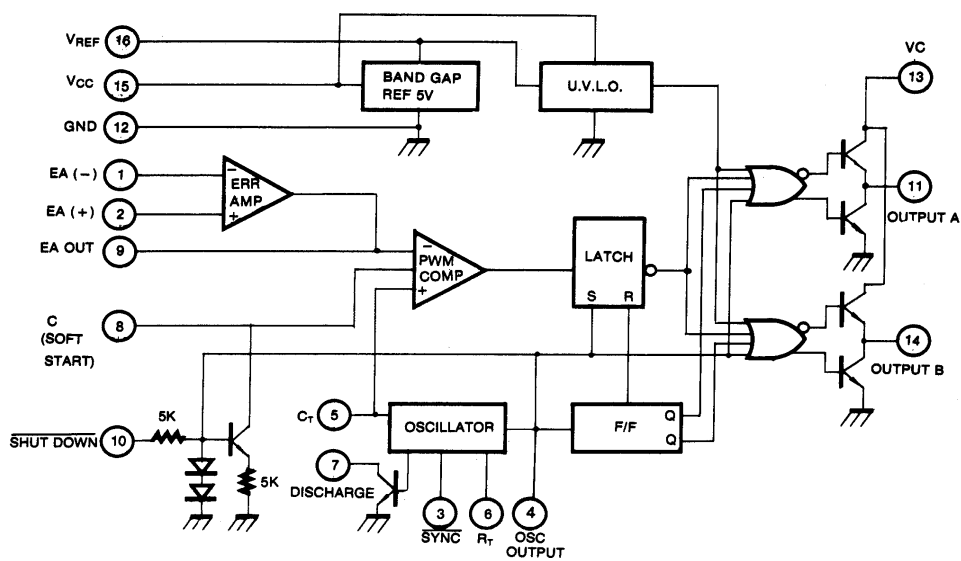
- 5V ± 1% Reference
- Oscillator Sync terminal
- Internal Soft Start
- Deadtime Control
- Under-Voltage Lockout

### Description

UC3525A is a monolithic integrated circuit that includes all of the control circuit necessary for a pulse width modulating regulator. There are a voltage reference, an error amplifier, a pulse width modulator, an oscillator, under-voltage lockout, soft start circuit, and output drivers in the chip.



### Internal Block Diagram



## Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V <sub>CC</sub>	40	V
Collector Supply Voltage	V <sub>C</sub>	40	V
Output Current, Sink or Source	I <sub>O</sub>	500	mA
Reference Output Current	I <sub>REF</sub>	50	mA
Oscillator Charging Current	I <sub>CHG(OSC)</sub>	5	mA
Power Dissipation (T <sub>A</sub> = 25°C)	P <sub>D</sub>	1000	m/W
Operating Temperature	T <sub>OPR</sub>	0 ~ +70	°C
Storage Temperature	T <sub>STG</sub>	-65 ~ +150	°C
Lead Temperature (Soldering, 10 sec)	T <sub>LEAD</sub>	+300	°C

## Electrical Characteristics

(V<sub>CC</sub> = 20V, T<sub>A</sub> = -30°C to +85°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>REFERENCE SECTION</b>						
Reference Output Voltage	V <sub>REF</sub>	T <sub>J</sub> = 25°C	5.0	5.1	5.2	V
Line Regulation	ΔV <sub>REF</sub>	V <sub>CC</sub> = 8 to 35V	-	9	20	mV
Load Regulation	ΔV <sub>REF</sub>	I <sub>REF</sub> = 0 to 20mA	-	20	50	mV
Short Circuit Output Current	I <sub>SC</sub>	V <sub>REF</sub> = 0, T <sub>J</sub> = 25°C	-	80	100	mA
Total Output Variation (Note 1)	ΔV <sub>REF</sub>	Line, Load and Temperature	4.95	-	5.25	V
Temperature Stability (Note 1)	ST <sub>T</sub>	-	-	20	50	mV
Long Term Stability (Note 1)	ST	T <sub>J</sub> = 125°C, 1 KHRs	-	20	50	mV
<b>OSCILLATOR SECTION</b>						
Initial Accuracy (Note 1, 2)	ACCUR	T <sub>J</sub> = 25°C	-	± 3	± 6	%
Frequency Change With Voltage	Δf/ΔV <sub>CC</sub>	V <sub>CC</sub> = 8 to 35V (Note 1, 2)	-	± 0.8	± 2	%
Maximum Frequency	f <sub>(MAX)</sub>	R <sub>T</sub> = 2KΩ, C <sub>T</sub> = 470pF	400	430	-	KHz
Minimum Frequency	f <sub>(MIN)</sub>	R <sub>T</sub> = 200KΩ, C <sub>T</sub> = 0.1uF	-	60	120	Hz
Clock Amplitude (Note 1, 2)	V <sub>(CLK)</sub>	-	3	4	-	V
Clock Width (Note 1, 2)	t <sub>W(CLK)</sub>	T <sub>J</sub> = 25°C	0.3	0.6	1	μs
Sync Threshold	V <sub>TH(SYNC)</sub>	-	1.2	2	2.8	V
Sync Input Current	I <sub>I(SYNC)</sub>	Sync = 3.5V	-	1.3	2.5	mA

## Electrical Characteristics

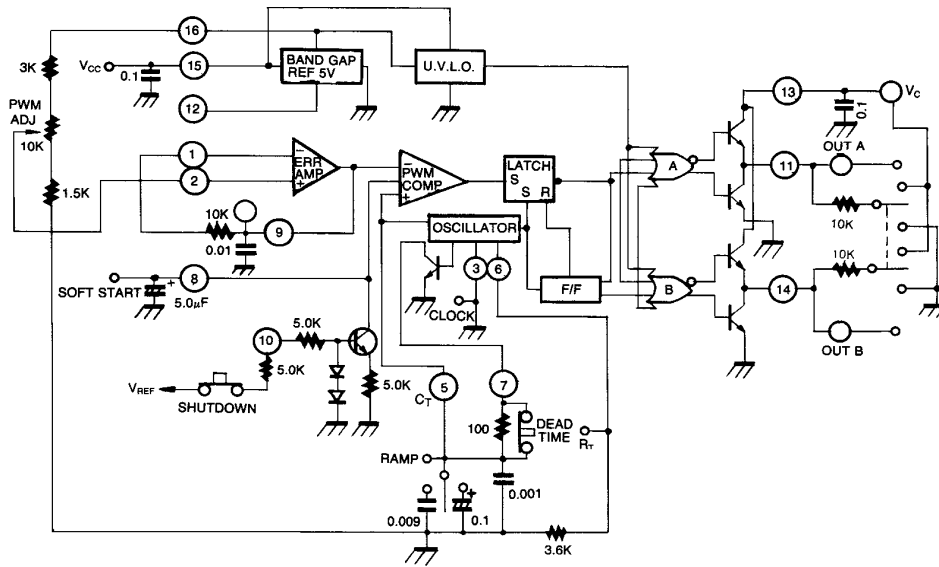
( $V_{CC} = 20V$ ,  $T_A = 0$  to  $+85^{\circ}C$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>ERROR AMPLIFIER SECTION (<math>V_{CM} = 5.1V</math>)</b>						
Input Offset Voltage	$V_{IO}$	-	-	1.5	10	mV
Input Bias Current	$I_{BIAS}$	-	-	1	10	$\mu A$
Input Offset Current	$I_{IO}$	-	-	0.1	1	$\mu A$
Open Loop Voltage Gain	$G_{VO}$	$R_L \geq 10M\Omega$	60	80	-	dB
Common Mode Rejection Ratio	CMRR	$V_{CM} = 1.5$ to $5.2V$	60	90	-	dB
Power Supply Rejection Ratio	PSRR	$V_{CC} = 8$ to $3.5V$	50	60	-	dB
<b>PWM COMPARATOR SECTION</b>						
Minimum Duty Cycle	$D(MIN)$	-	-	-	0	%
Maximum Duty Cycle	$D(MAX)$	-	45	49	-	%
Input Threshold Voltage (Note 2)	$V_{TH1}$	Zero Duty Cycle	0.7	0.9	-	V
Input Threshold Voltage (Note 2)	$V_{TH2}$	Max Duty Cycle	-	3.2	3.6	V
<b>SOFT-START SECTION</b>						
Soft Start Current	$I_{SOFT}$	$V_{SD} = 0V$ , $V_{SS} = 0V$	25	51	80	$\mu A$
Soft Start Low Level Voltage	$V_{SL}$	$V_{SD} = 25V$	-	0.3	0.7	V
Shutdown Threshold Voltage	$V_{TH(SD)}$	-	0.6	0.8	1	V
Shutdown Input Current	$I_{N(SD)}$	$V_{SD} = 2.5V$	-	0.3	1	mA
<b>OUTPUT SECTION</b>						
Low Output Voltage I	$V_{OL I}$	$I_{SINK} = 20mA$	-	0.1	0.4	V
Low Output Voltage II	$V_{OL II}$	$I_{SINK} = 100mA$	-	0.05	2	V
High Output Voltage I	$V_{CH I}$	$I_{SOURCE} = 20mA$	18	19	-	V
High Output Voltage II	$V_{CH II}$	$I_{SOURCE} = 100mA$	17	18	-	V
Under Voltage Lockout	$V_{UV}$	$V_8$ and $V_9 = High$	6	7	8	V
Collector Leakage Current	$I_{LKG}$	$V_{CC} = 35V$	-	80	200	$\mu A$
Rise Time (Note 1)	$t_R$	$C_L = 1\mu F$ , $T_J = 25^{\circ}C$	-	80	600	ns
Fall Time (Note 1)	$t_F$	$C_L = 1\mu F$ , $T_J = 25^{\circ}C$	-	70	300	ns
<b>STANDBY CURRENT</b>						
Supply Current	$I_{CC}$	$V_{CC} = 35V$	-	12	20	mA

### Notes :

1. These parameters, although guaranteed over the recommended operating conditions, are not 100% tested in production
2. Tested at  $f_{OSC} = 40$  KHz ( $R_T = 3.6K$ ,  $C_T = 0.01\mu F$ ,  $R_I = 0\Omega$ )

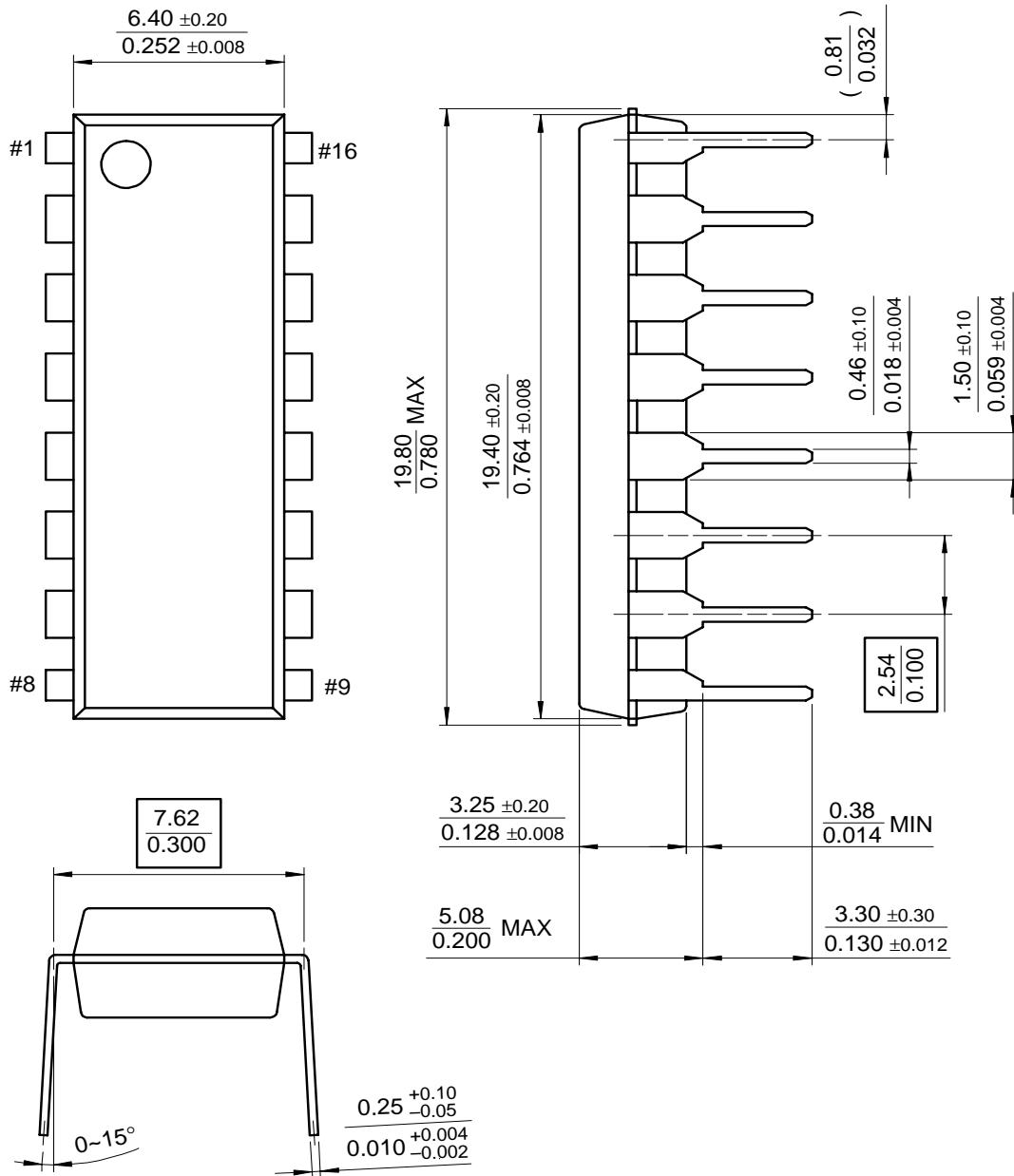
# Test Circuit



# Mechanical Dimensions

## Package

### 16-DIP



## Ordering Information

Product Number	Package	Operating Temperature
UC3525AN	16-DIP	-30 ~ +85°C



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