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# KA3525A

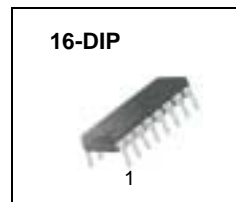
## SMPS Controller

### Features

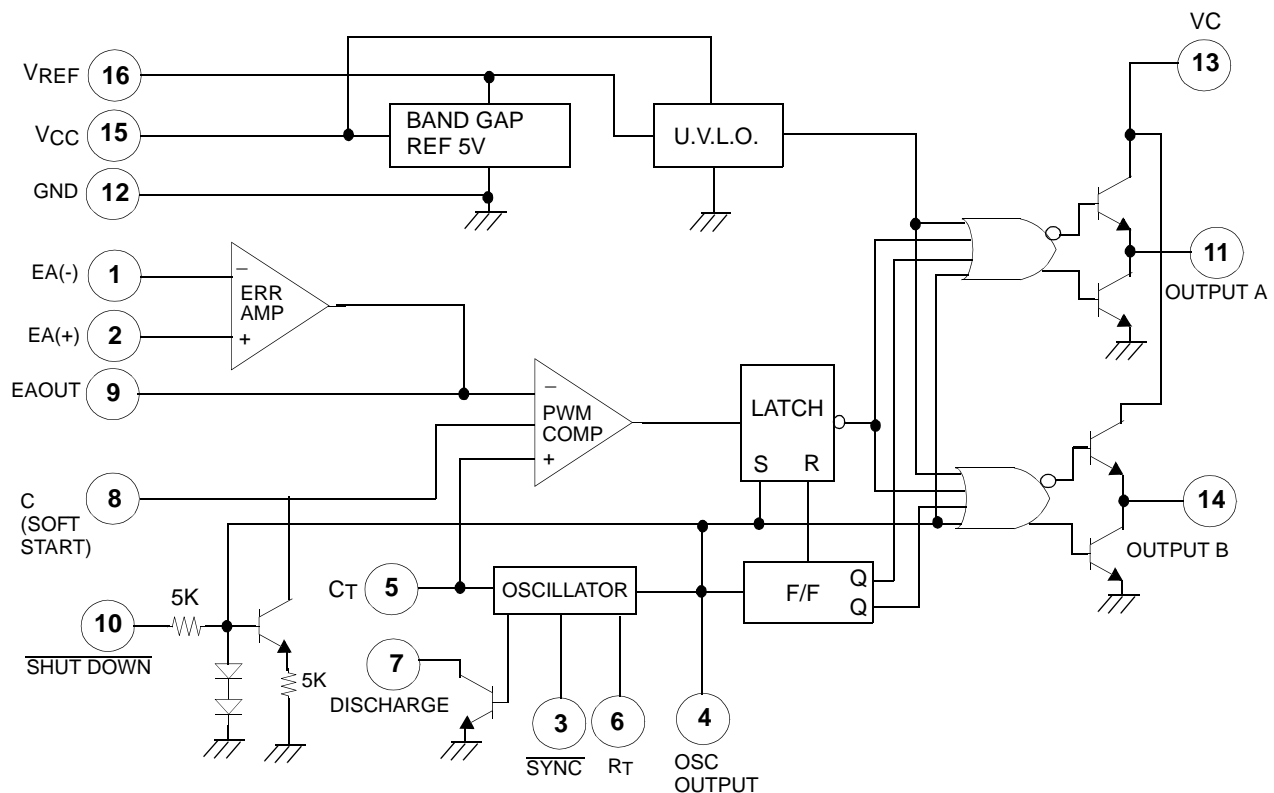
- 5V  $\pm 1\%$  Reference
- Oscillator Sync Terminal
- Internal Soft Start
- Deadtime Control
- Under Voltage Lockout

### Description

The KA3525A is a monolithic integrated circuit that includes all of the control circuits necessary for a pulse width modulating regulator. There are a voltage reference, an error amplifier, a pulse width modulator, an oscillator, an under voltage lockout, a soft start circuit, and the output driver 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, 10sec)	T <sub>LEAD</sub>	+300	°C

## Electrical Characteristics

(V<sub>CC</sub> = 20V, T<sub>A</sub> = 0 to +70°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 (Note1)	ΔV <sub>REF</sub>	Line, Load and Temperature	4.95	-	5.25	V
Temperature Stability (Note1)	ST <sub>T</sub>	-	-	20	50	mV
Long Term Stability (Note1)	ST	T <sub>J</sub> = 125°C, 1KHS	-	20	50	mV
<b>OSCILLATOR SECTION</b>						
Initial Accuracy (Note1, 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 (Note1, 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 (Note1, 2)	V <sub>(CLK)</sub>	-	3	4	-	V
Clock Width (Note1, 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 (Continued)

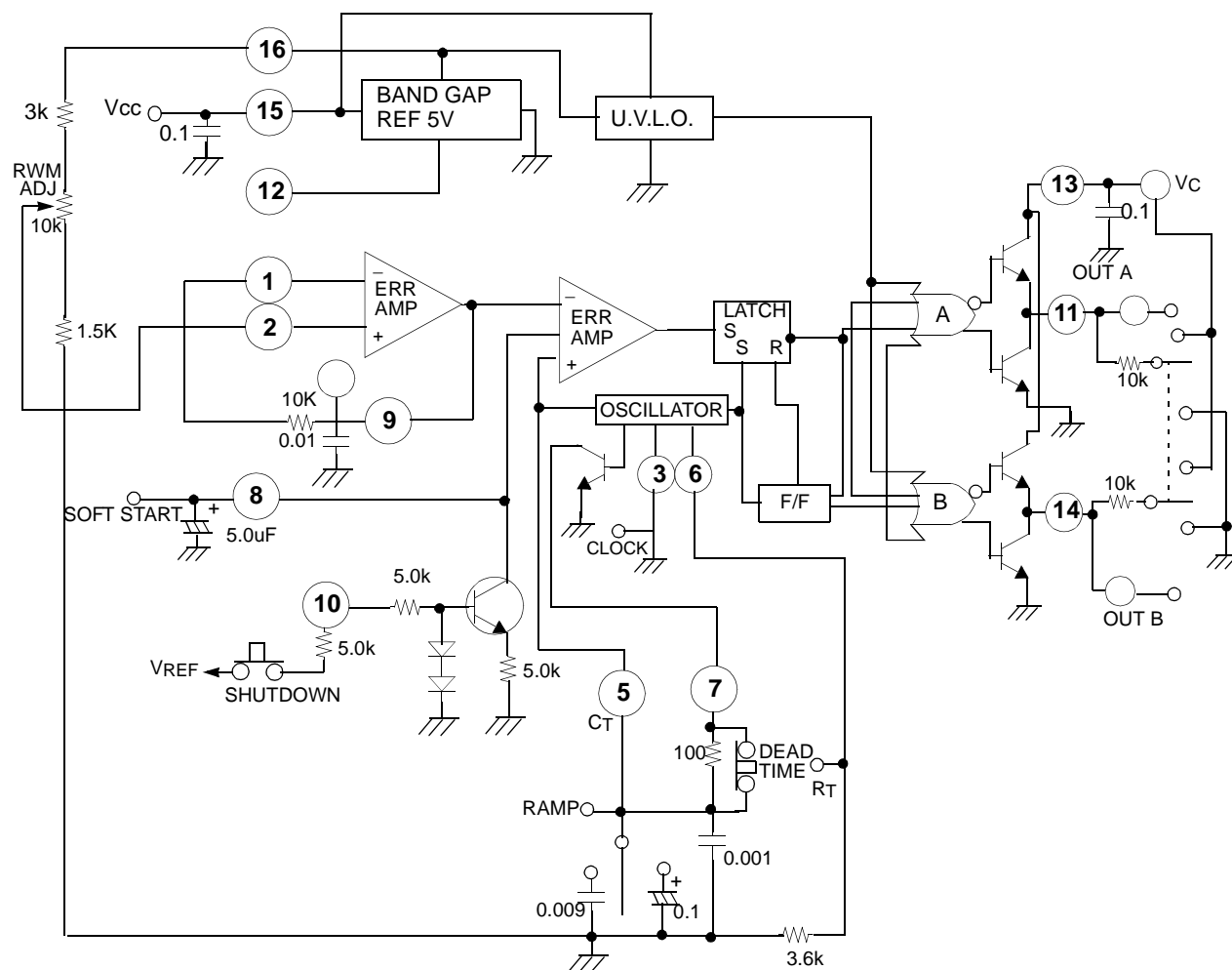
(VCC = 20V, TA = 0 to +70°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>ERROR AMPLIFIER SECTION (V<sub>CM</sub> = 5.1V)</b>						
Input Offset Voltage	V <sub>IO</sub>	-	-	1.5	10	mV
Input Bias Current	I <sub>BIAS</sub>	-	-	1	10	μA
Input Offset Current	I <sub>IO</sub>	-	-	0.1	1	μA
Open Loop Voltage Gain	G <sub>VO</sub>	R <sub>L</sub> ≥ 10MΩ	60	80	-	dB
Common Mode Rejection Ratio	CMRR	V <sub>CM</sub> = 1.5 to 5.2V	60	90	-	dB
Power Supply Rejection Ratio	PSRR	V <sub>CC</sub> = 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 (Note2)	V <sub>TH1</sub>	Zero Duty Cycle	0.7	0.9	-	V
Input Threshold Voltage (Note2)	V <sub>TH2</sub>	Max Duty Cycle	-	3.2	3.6	V
<b>SOFT-START SECTION</b>						
Soft Start Current	I <sub>SOFT</sub>	V <sub>SD</sub> = 0V, V <sub>SS</sub> = 0V	25	51	80	μA
Soft Start Low Level Voltage	V <sub>SL</sub>	V <sub>SD</sub> = 25V	-	0.3	0.7	V
Shutdown Threshold Voltage	V <sub>TH(SD)</sub>	-	0.9	1.3	1.7	V
Shutdown Input Current	I <sub>N(SD)</sub>	V <sub>SD</sub> = 2.5V	-	0.3	1	mA
<b>OUTPUT SECTION</b>						
Low Output Voltage I	V <sub>OL I</sub>	I <sub>SINK</sub> = 20mA	-	0.1	0.4	V
Low Output Voltage II	V <sub>OL II</sub>	I <sub>SINK</sub> = 100mA	-	0.05	2	V
High Output Voltage I	V <sub>CH I</sub>	I <sub>SOURCE</sub> = 20mA	18	19	-	V
High Output Voltage II	V <sub>CH II</sub>	I <sub>SOURCE</sub> = 100mA	17	18	-	V
Under Voltage Lockout	V <sub>UV</sub>	V <sub>8</sub> and V <sub>9</sub> = High	6	7	8	V
Collector Leakage Current	I <sub>LKG</sub>	V <sub>CC</sub> = 35V	-	80	200	μA
Rise Time (Note1)	t <sub>R</sub>	C <sub>L</sub> = 1μF, T <sub>J</sub> = 25°C	-	80	600	ns
Fall Time (Note1)	t <sub>F</sub>	C <sub>L</sub> = 1μF, T <sub>J</sub> = 25°C	-	70	300	ns
<b>STANDBY CURRENT</b>						
Supply Current	I <sub>CC</sub>	V <sub>CC</sub> = 35V	-	12	20	mA

### Note :

1. These parameters, although guaranteed over the recommended operating conditions, are not 100% tested in production
2. Tested at f<sub>OSC</sub>=40kHz (R<sub>T</sub> =3.6K, C<sub>T</sub> =0.01μF, R<sub>I</sub> = 0Ω)

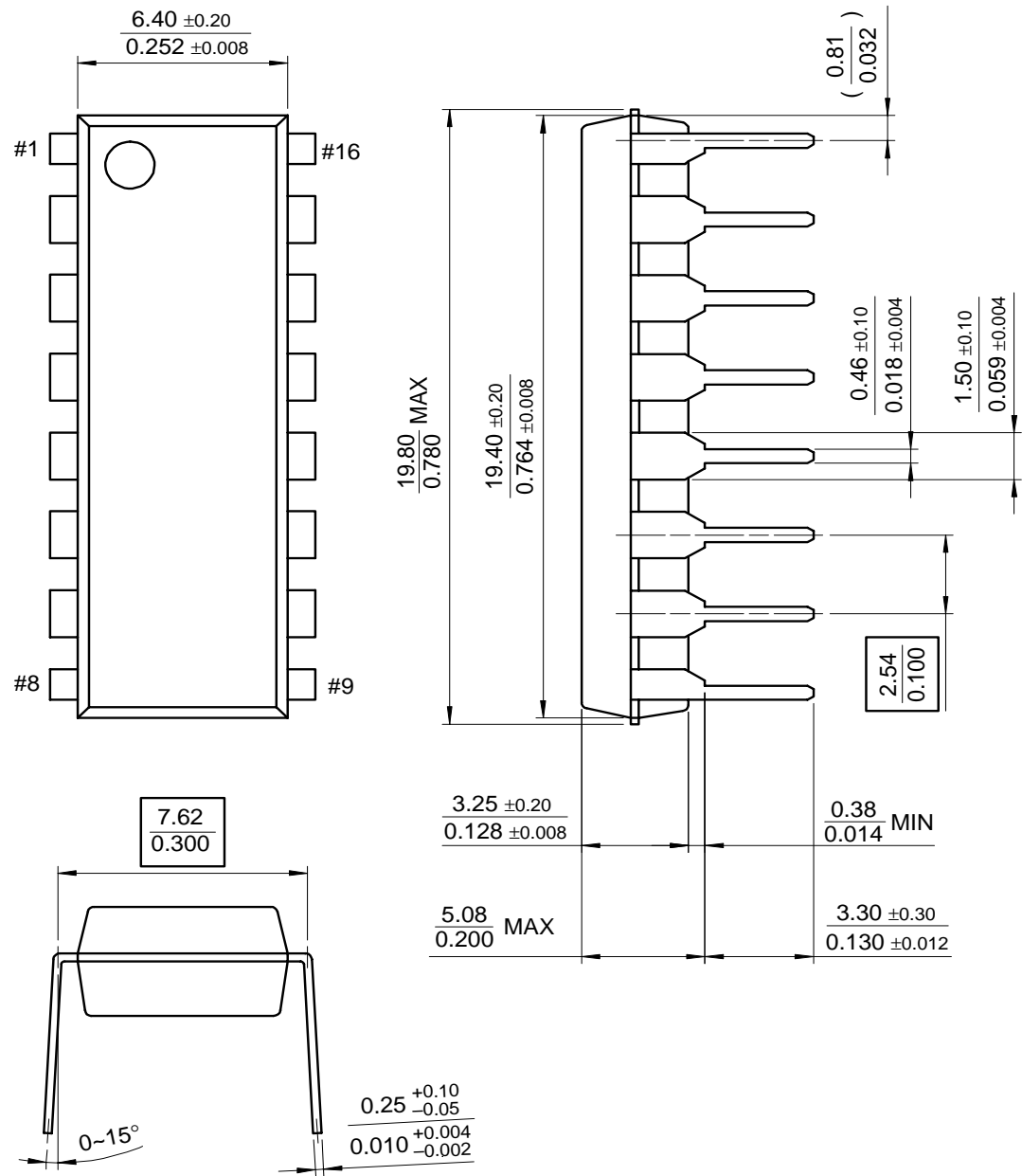
## Test Circuit



# Mechanical Dimensions

## Package

### 16-DIP



## Ordering Information

Product Number	Package	Operating Temperature
KA3525A	16-DIP	0 ~ +70°C

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