

KA3525A

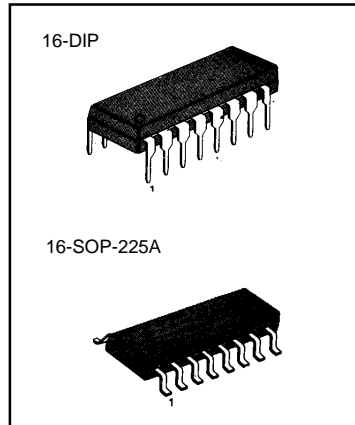
SMPS CONTROLLER

VOLTAGE-MODE PWM CONTROLLER

The KA3525A is a monolithic integrated circuit that included 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.

FEATURES

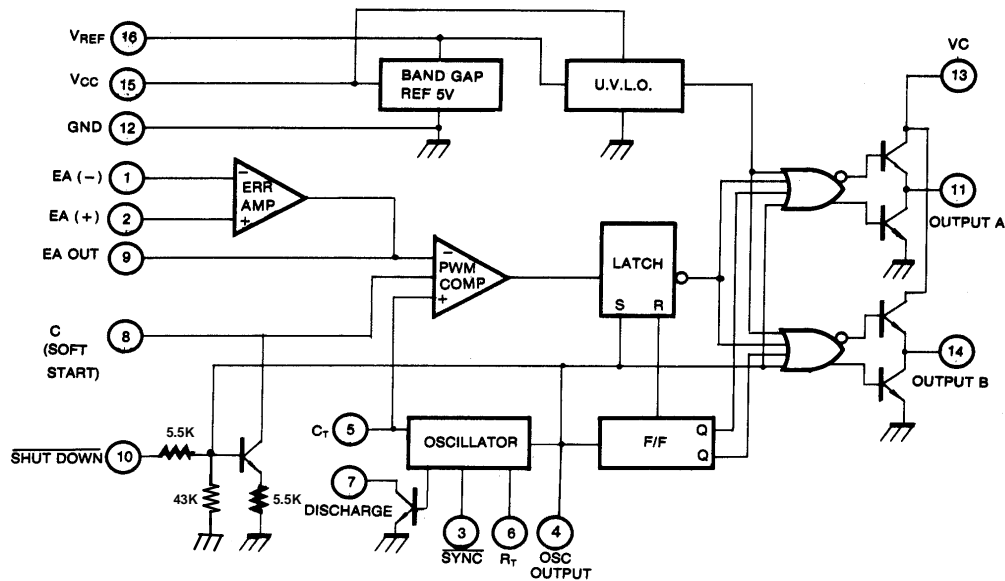
- $5V \pm 1\%$ Reference
- Oscillator Sync Terminal
- Internal Soft Start
- Deadtime Control
- Under-Voltage Lockout



ORDERING INFORMATION

Device	Package	Operating Temperature
KA3525A	16 DIP	-30 ~ +85°C
KA3525AD	16-SOP-225A	-30 ~ +85°C

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	40	V
Collector Supply Voltage	V_C	40	V
Output Current, Sink or Source	I_O	500	mA
Reference Output Current	I_{REF}	50	mA
Oscillator Charging Current	$I_{CHG(OSC)}$	5	mA
Power Dissipation ($T_A = 25^\circ\text{C}$)	P_D	1000	m/W
Operating Temperature	T_{OPR}	0 ~ +70	$^\circ\text{C}$
Storage Temperature	T_{STG}	-65 ~ +150	$^\circ\text{C}$
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	+300	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS

($V_{CC} = 20\text{V}$, $T_A = -35^\circ\text{C}$ to $+85^\circ\text{C}$, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
REFERENCE SECTION						
Reference Output Voltage	V_{REF}	$T_J = 25^\circ\text{C}$	5.0	5.1	5.2	V
Line Regulation	ΔV_{REF}	$V_{CC} = 8$ to 35V		9	20	mV
Load Regulation	ΔV_{REF}	$I_{REF} = 0$ to 20mA		20	50	mV
Short Circuit Output Current	I_{SC}	$V_{REF} = 0$, $T_J = 25^\circ\text{C}$		80	100	mA
Total Output Variation (Note 1)	ΔV_{REF}	Line, Load and Temperature	4.95		5.25	V
Temperature Stability (Note 1)	ST_T			20	50	mV
Long Term Stability (Note 1)	ST	$T_J = 125^\circ\text{C}$, 1 KH_{RS}		20	50	mV
OSCILLATOR SECTION						
Initial Accuracy (Note 1, 2)	ACCUR	$T_J = 25^\circ\text{C}$		± 3	± 6	%
Frequency Change With Voltage	$\Delta f/\Delta V_{CC}$	$V_{CC} = 8$ to 35V (Note 1, 2)		± 0.8	± 2	%
Maximum Frequency	$f_{(MAX)}$	$R_T = 2\text{K}\Omega$, $C_T = 470\text{pF}$	400	430		KHz
Minimum Frequency	$f_{(MIN)}$	$R_T = 200\text{K}\Omega$, $C_T = 0.1\mu\text{F}$		60	120	Hz
Clock Amplitude (Note 1, 2)	$V_{(CLK)}$		3	4		V
Clock Width (Note 1, 2)	$t_{W(CLK)}$	$T_J = 25^\circ\text{C}$	0.3	0.6	1	μs
Sync Threshold	$V_{TH(SYNC)}$		1.2	2	2.8	V
Sync Input Current	$I_{I(SYNC)}$	Sync = 3.5V		1.3	2.5	mA

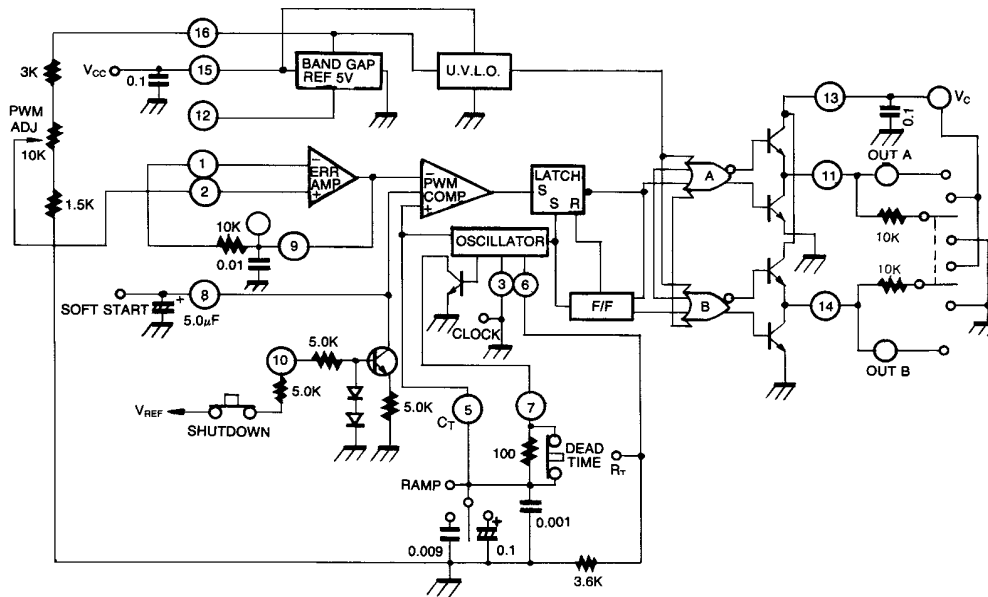
ELECTRICAL CHARACTERISTICS(V_{CC} = 20V, T_A = -35°C to +85°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
ERROR AMPLIFIER SECTION (V_{CM} = 5.1V)						
Input Offset Voltage	V _{IO}			1.5	10	mV
Input Bias Current	I _{BAIS}			1	10	μA
Input Offset Current	I _{IO}			0.1	1	μA
Open Loop Voltage Gain	G _{VO}	R _L ≥ 10MΩ	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
PWM COMPARATOR SECTION						
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
SOFT-START SECTION						
Soft Start Current	I _{SOFT}	V _{SD} = 0V, V _{SS} = 0V	25	51	80	μA
Soft Start Low Level Voltage	V _{SL}	V _{SD} = 25V		0.3	0.7	V
Shutdown Threshold Voltage	V _{TH(SD)}		0.7	1.3	1.7	V
Shutdown Input Current	I _{N(SD)}	V _{SD} = 2.5V		0.3	1	mA
OUTPUT SECTION						
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	μA
Rise Time (Note 1)	t _R	C _L = 1μF, T _J = 26°C		80	600	nS
Fall Time (Note 1)	t _F	C _L = 1μF, T _J = 25°C		70	300	nS
STANDBY CURRENT						
Supply Current	I _{CC}	V _{CC} = 35V		12	20	mA

(Note)

- These parameters, although guaranteed over the recommended operating conditions, are not 100% tested in production
- Tested at f_{OSC} = 40 KHz (R_T = 3.6K, C_T = 0.01μF, R_I = 0Ω)

TEST CIRCUIT



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