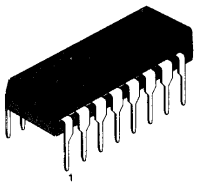
KA3825 SMPS CONTROLLER

HIGH SPEED PWM CONTROLLER

The KA3825 is a high speed PWM controller for high frequency SMPS applications. This controller includes precise voltage reference, low start up current circuit, soft start, high frequency oscillator, high speed Current limit comparator, wideband error amplifier, double pulse suppresion logic, and double totempole output drivers. Circuit design for high speed and schottky process result in very short propagation delays through the current limit comparator, logic and output drivers. Also KA3825 is available for both current mode and voltage mode power supply.

16-DIP



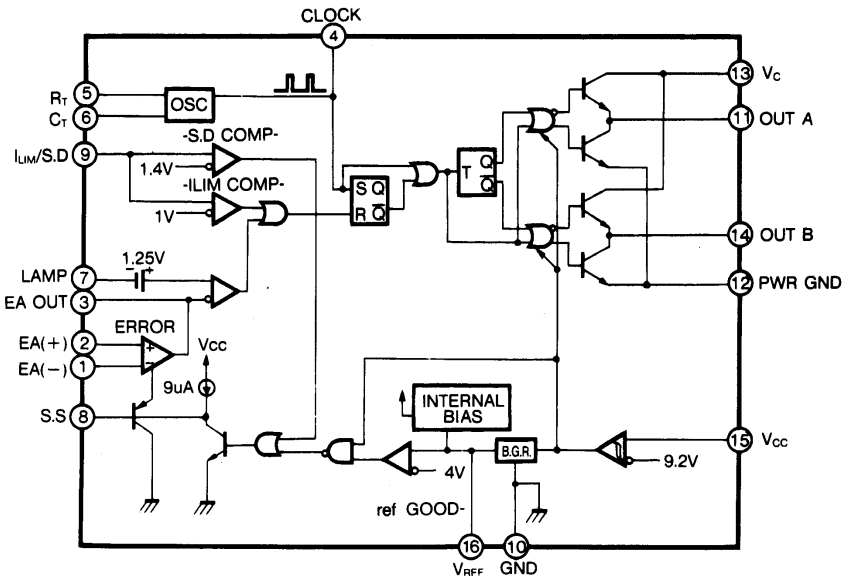
FEATURES

- Precision Voltage Reference
- Wide Bandwidth Error Amplifier
- 50ns Propagation Delay to Output
- Under Voltage Lock Out with Hysteresis
- Soft Start and Max. Duty Cycle Control
- Low Start Up Current
- Double Pulse Suppression Logic
- High Current Dual Totempole Outputs
- Current Mode or Voltage Mode Control

ORDERING INFORMATION

Device	Package	Operating Temperature
KA3825	16 DIP	0 ~ + 70℃

BLOCK DIAGRAM



FAIRCHILD SEMICONDUCTOR™

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	30	V
Output Current (DC)	I_{OD}	0.5	A
Output Current (PULSE)	I_{OP}	2	A
Clock Output Current	I_{CO}	5	mA
E.A Output Current	I_{EAO}	5	mA
S.S Sink Current	$I_{S.S}$	20	mA
Analog Input	V_{IN}	-0.3 ~ +6	V

ELECTRICAL CHARACTERISTICS

(V_{CC} = 15V, R_T = 3.6KΩ , C_T = 1.0nF, T_A = 0℃~70℃, Unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
REFERENCE SECTION						
Output Voltage	V_{REF}	T_J = 25℃, I_O = 1mA	5.0	5.1	5.2	V
Line Regulation	R_{LINE}	V_{CC} = 10V to 30V	-	2	20	mV
Load Regulation	R_{LOAD}	I_L = 1 to 10mA	-	5	20	mV
Temperature Stability	$\Delta V_{REF}/\Delta T$	T_A = 0 to + 70℃	-	0.2	0.4	mV/℃
Output Voltage Range	ΔV_{REF}	LINE, LOAD, TEMP.	4.95		5.25	V
Output Noise Voltage	V_N	f = 10Hz to 10KHz	-	50		uV_{RMS}
Long Term Stability	S	T_J = 125℃, 1000hrs	-	5	25	mV
Short Circuit Current	I_{SC}	V_{REF} = 0V	-15	-50	-100	mA
PWM COMPARATOR SECTION						
Ramp Input Bias Current	I_{RB}	V_{PIN7} = 0V		-1	-5	uA
Duty Cycle Range	DC		0		85	%
Zero Duty Cycle T.H	V_{THO}	V_{RAMP} = 0V	1.1	1.25		V
Delay to drive Output	T_D			50	80	ns

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
OSCILLATOR SECTION						
Initial Accuracy	F_{OSC}	T_J = 25℃, I_O = 1mA	360	400	440	KHz
Voltage Stability	$\Delta F_{OSC}/\Delta V_{CC}$	V_{CC} = 10V to 30V	-	0.2	2	%
Temperature Stability	$\Delta F_{OSC}/\Delta T_J$	T_J = 0 to + 70℃	-	5	-	%
Total Variation	ΔF_{OSC}	LINE, TEMP.	340	-	460	KHz
Clock High Level	V_{CH}	-	3.9	4.5	-	V
Clock Low Level	V_{CL}	-	-	2.3	2.9	V
Ramp Peak Voltage	V_{RH}	-	2.6	2.8	3.0	V
Ramp Valley Voltage	V_{RL}	-	0.7	1.0	1.25	V
Ramp Vlley to peak Voltage	ΔV_{RAMP}	-	1.6	1.8	2.0	V
ERROR AMPLIFIER SECTION						
Input Offset Voltage	V_{IO}	-	-	-	15	mV
Input Bias Current	I_{IB}	-	-	0.6	3	uA
Input Offset Current	I_{IO}	-	-	0.1	1	uA
Open Loop Gain	A_V	V_{ERROR} = 1 to 4V	60	95	-	dB
CMRR	**CMRR**	V_{CM} = 1.5 to 5.5V	75	95	-	dB
PSRR	**PSRR**	V_{CC} = 10V to 30V	85	110	-	dB
Output Sink Current	I_{SINK}	V_{ERROR} = 1V	1	2.5	-	mA
Output Source Current	I_{SOURCE}	V_{ERROR} = 4V	-0.5	-1.3	-	mA
Output High Voltage	V_{OH}	I_{ERROR} = -0.5mA	4.0	4.7	5.0	V
Output Low Voltage	V_{OL}	I_{ERROR} = 1mA	0	0.5	1.0	V
Unity Gain Bandwidth	**GBW**	A_{VOL} = 0dB	3	5.5	-	MHz
Slew Rate	**SR**	V_O = 2 to 4V	6	12	-	V/us

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
SOFT START SECTION						
S.S Charge Current	I_{CH}	$V_{S.S}$ = 0.5V	3	9	20	uA
S.S Discharge Current	I_{DICH}	$V_{S.S}$ = 1.0V	1	-	-	mA
CURRENT LIMIT/SHUTDOWN SECTION						
Input Bias Current	I_{LB}	$V_{S.D}$ = 0 to 4V	-	-	± 10	μA
Current Limit Threshold	V_{LIM}	-	0.9	1.0	1.1	V
Shutdown Threshold	V_{SD}	-	1.25	1.40	1.55	V
Delay to Drive Output	T_D	-	-	50	80	ns
OUTPUT SECTION						
Output Low Level 1	V_{OL1}	I_{OUT} = 20mA	-	0.25	0.4	V
Output Low Level 2	V_{OL2}	I_{OUT} = 200mA	-	1.2	2.2	V
Output High Level 1	V_{OH1}	I_{OUT} = - 20mA	13.0	13.5	-	V
Output High Level 2	V_{OH2}	I_{OUT} = - 200mA	12.0	13.0	-	V
V_C Standby Current	I_C	V_C = 30V	-	100	500	uA
Rise/Fall Time	T_F/T_R	C_L = 1nF	-	30	60	ns
UNDER-VOLTAGE LOCK SECTION						
Start Threshold	V_{STH}	V_{ERROR} = 4V	8.8	9.2	9.6	V
UVLO Hysteresis	V_{HYS}	I_{ERROR} = - 0.5mA	0.4	0.8	1.2	V
Start Up Current	I_{ST}	V_{CC} = 8V	-	1.1	2.5	mA
Operating Current	I_{CC}	$V_{PIN1,7,9}$ = 0V, V_{PIN2} = 1V	-	22	23	mA

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™
CoolFET™
CROSSVOLT™
E^2CMOS^{TM}
FACT™
FACT Quiet Series™
FAST®
FASTr™
GTO™
HiSeC™
ISOPLANAR™
MICROWIRE™
POP™
PowerTrench™
QS™
Quiet Series™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
TinyLogic™
UHC™
VCX™

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.
As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.