2-channel switching regulator controller

BA9743AFV

The BA9743AFV is a 2-channel switching regulator controller that uses a pulse width modulation (PWM) system. Both channels can be used for DC / DC converter operations including step up, step down, and inverting. Because the IC is compactly packaged, it is best suited for use as a power supply in portable equipment.

●Applications

DC / DC converters in VCRs, notebook computers, etc.

●Features

1) Built-in reference voltage current (±1%).
2) Timer latch, short-circuit protection circuit is built in.
3) Circuit to prevent malfunction during low input voltage is built in.
4) Built-in reference voltage (2.505V) output pin.
5) Rest period is adjustable over the whole range of duty ratio.

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	36	V
Power dissipation	Pd	450*1	mW
Operating temperature	Topr	−40～+85	℃
Storage temperature	Tstg	−55～+125	℃
Output pin current	I_O	120*2	mA
Output pin voltage	V_O	36	V

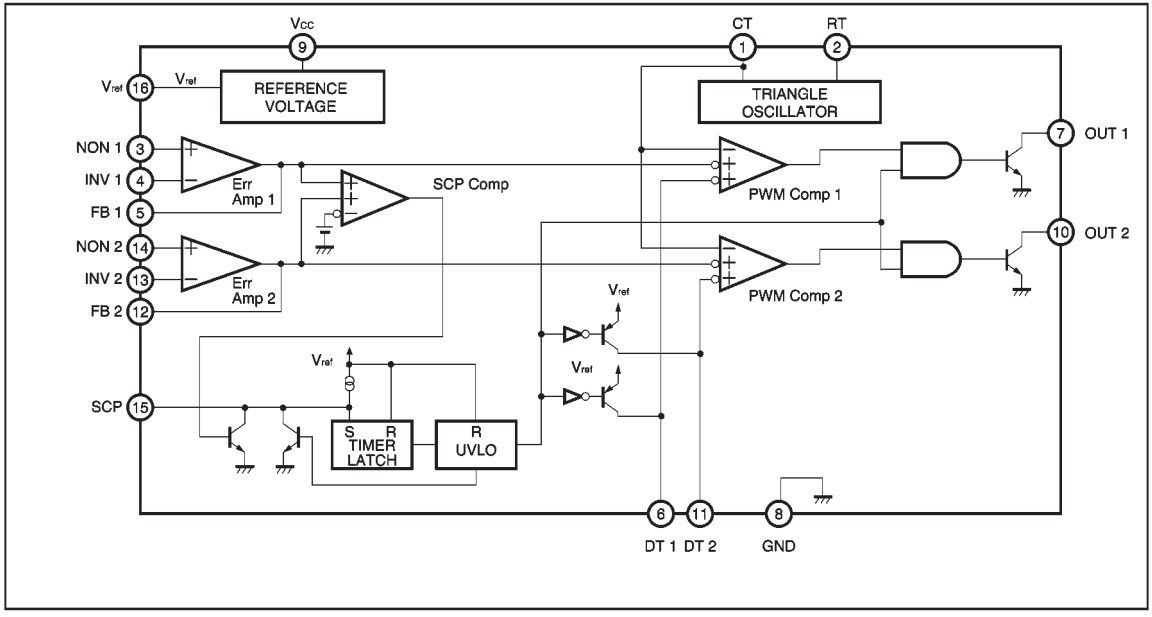
*1 Reduced by 4.5 mW for each increase in Ta of 1℃ over 25℃
(when mounted on a board 50.0×50.0×1.6 mm).

*2 Should not exceed Pd- or ASO-value.

●Recommended operating conditions (Ta = 25°)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{CC}	3.6	6.0	35	V
Output pin current	Io	—	—	100	mA
Output pin voltage	Vo	—	—	35	V
Error amplifier input voltage	V_{OM}	0.3	—	1.6	V
Timing capacitance	C_{CT}	100	—	15000	pF
Timing resistance	R_{RT}	5.1	—	50	kΩ
Oscillation frequency	F_{OSC}	10	—	800	kHz

●Block diagram



●Pin descriptions

Pin No.	Pin name	Function
1	CT	External timing capacitance
2	RT	External timing resistance
3	NON1	Positive input for error amplifier 1
4	INV1	Negative input for error amplifier 1
5	FB1	Output for error amplifier 1
6	DT1	Output 1 dead time / soft start setting
7	OUT1	Output 1
8	GND	Ground
9	Vcc	Power supply
10	OUT2	Output 2
11	DT2	Output 2 dead time / soft start setting
12	FB2	Output for error amplifier 2
13	INV2	Negative input for error amplifier 2
14	NON2	Positive input for error amplifier 2
15	SCP	Timer latch setting
16	Vref	Reference voltage (2.505 V) output

●Electrical characteristics (unless otherwise noted, Ta = 25°C and V_{CC} = 6V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
〈Reference voltage section〉						
Output voltage	V_{ref}	2.48	2.505	2.53	V	I_{ref}=1mA
Input stability	V_{DLI}	—	1	10	mV	V_{CC}=3.6～35V
Load stability	V_{DLO}	—	1	10	mV	I_{ref}=0～5mA
〈Triangular wave oscillatior section〉						
Oscillation frequency	F_{OSC}	320	400	480	kHz	R_{RT}=10kΩ, C_{CT}=220pF
Frequency variation	F_{DV}	—	1	—	%	V_{CC}=3.6～35V
〈Protection circuit section〉						
Threshold voltage	V_{IT}	1.48	1.64	1.80	V	
Standby voltage	V_{STB}	—	50	100	mV	No pull-up
Latch voltage	V_{LT}	—	30	100	mV	No pull-up
Source current	I_{SCP}	1.5	2.5	3.5	μA	
Comparator threshold voltage	V_{CT}	0.95	1.05	1.15	V	5pin, 12pin
〈Rest period adjustment circuit section〉						
Input threshold voltage (f_{OSC}=10kHz)	V_{t0}	1.87	1.97	2.07	V	Duty cycle=0%
	V_{t100}	1.38	1.48	1.58	V	Duty cycle=100%
ON duty cycle	D_{ON}	45	55	65	%	V_{ref} is divided by 13k and 27kΩ resistors
Input bias current	I_{BDT}	—	0.1	1	μA	DT1, DT2=2.0V
Latch mode source current	I_{DT}	200	560	—	μA	DT1, DT2=0V
Latch input voltage	V_{DT}	2.28	2.48	—	V	I_{DT}=40μA
〈Low-input malfunction prevention circuit section〉						
Threshold voltage	V_{UT}	2.23	2.53	2.83	V	
〈Error amplifier section〉						
Input offset voltage	V_{IO}	—	—	6	mV	
Input offset current	I_{IO}	—	—	30	nA	
Input bias current	I_{IB}	—	15	100	nA	
Open loop gain	AV	70	85	—	dB	
Common-mode input voltage	V_{OM}	0.3	—	1.6	V	V_{CC}=3.6～35V
Common-mode rejection ratio	CMRR	60	80	—	dB	
Maximum output voltage	V_{OH}	2.3	2.5	—	V	
Minimum output voltage	V_{OL}	—	0.7	0.9	V	
Output sink current	I_{OI}	3	20	—	mA	FB=1.25V
Output source current	I_{OO}	45	75	—	μA	FB=1.25V
〈PWM comparator section〉						
Input threshold voltage (f_{OSC}=10kHz)	V_{t0}	1.87	1.97	2.07	V	Duty cycle=0%
	V_{t100}	1.38	1.48	1.58	V	Duty cycle=100%
〈Output section〉						
Saturation voltage	V_{SAT}	—	0.8	1.2	V	I_O=75mA
Leakage current	I_{REAK}	—	—	5	μA	V_O=35V
〈Total device〉						
Standby current	I_{CCS}	—	1.3	1.8	mA	When output is OFF
Average current dissipation	I_{CCA}	—	1.6	2.3	mA	R_{RT}=10kΩ

◎Not designed for radiation resistance.

●Timing chart

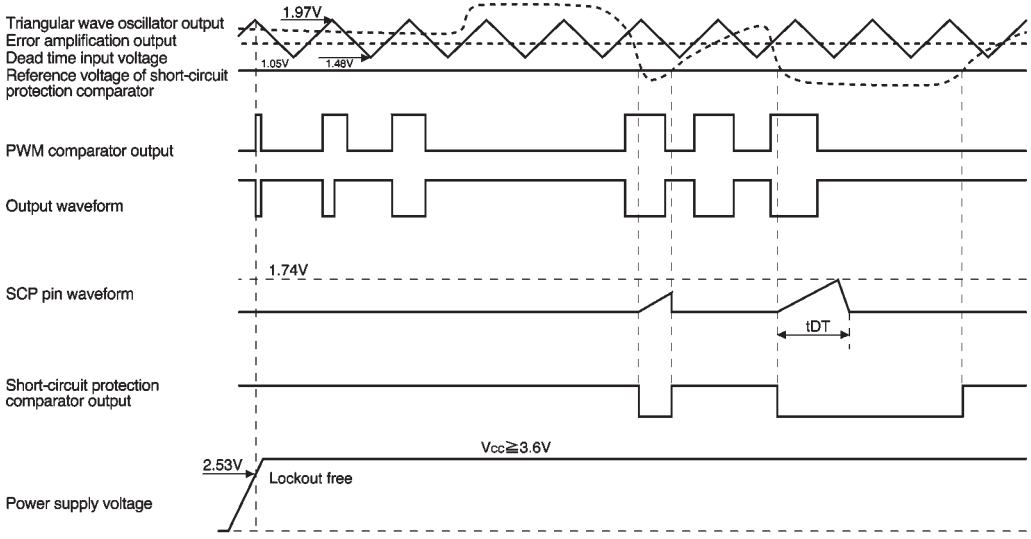


Fig.1

●Electrical characteristic curves

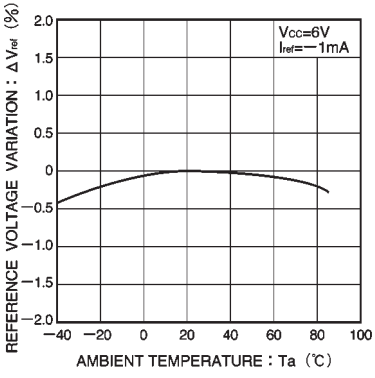


Fig.2 Reference voltage variation vs. ambient temperature

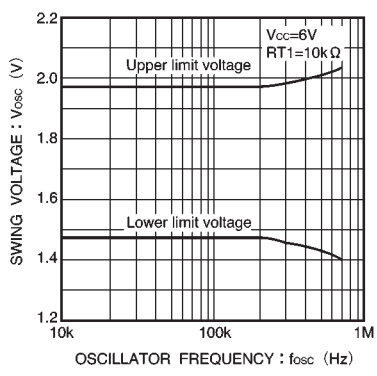


Fig.3 Swing voltage vs. oscillation frequency

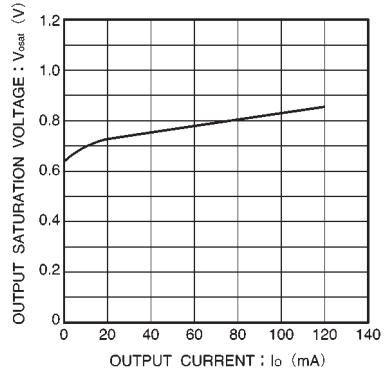


Fig.4 Output saturation voltage vs. output current

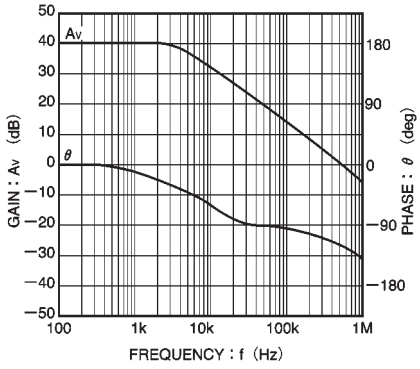


Fig.5 Gain and phase plotted against frequency for the error amplifier (40dB close)

●External dimensions (Units: mm)