Two-channel switching regulator controller

BA9741F / BA9741FS

The BA9741F and BA9741FS are two-channel switching regulator controllers that use the PWM method. Both circuits can be used for DC to DC conversion for step-up, step-down, and inverting. The IC comes in a compact package, making it ideal for use in portable equipment.

●Applications

DC/DC converters for video cameras and notebook computers etc.

●Features

1) High-accuracy reference voltage circuit (±1%).
2) Timer-latch, short-circuit protection circuit
3) Miss-operation prevention circuit for low-voltage input.
4) Reference voltage with output (2.5V).
5) Rest period adjustment is possible over the entire duty range.

●Absolute maximum ratings (Ta = 25°C)

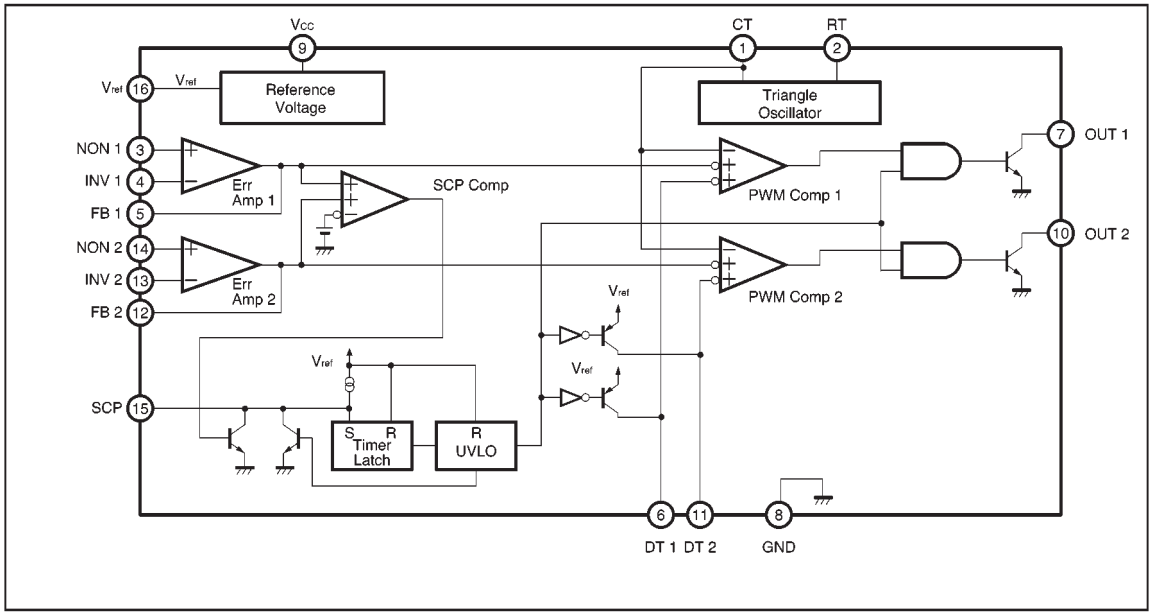
Parameter		Symbol	Limits	Unit
Power supply voltage		V_{CC}	36	V
Power dissipation	BA9741F	Pd	500*1	mW
	BA9741FS	Pd	650*1	mW
Operating temperture		Topr	−40～+85	℃
Storage temperture		Tstg	−55～+125	℃
Output current		I_O	120*2	mA
Output voltage		V_O	36	V

*1 When mounted on 70mm×70mm ×1.6mm glass epoxy board.
Reduced by 5.0mW(BA9741F),6.5mW(BA9741FS) for each increase in Ta of 1℃ over 25℃.
*2 Should not exceed Pd and ASO values.

●Recommended operating conditions (Ta = 25°C)

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

●Block diagram



●Pin descriptions

Pin No.	Pin name	Function
1	CT	External timing capacitor
2	RT	External timing resistor
3	NON1	Positive input for error amplifier 1
4	INV1	Negative input for error amplifier 1
5	FB1	Error amplifier 1 output
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	Error amplifier 2 output
13	INV2	Negative input for error amplifier 2
14	NON2	Positive input for error amplifier 2
15	SCP	Time latch setting
16	Vref	Reference voltage output (2.5V)

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Coniditions
〈Reference voltage block〉						
Output voltage	V_{ref}	2.4	2.5	2.6	V	I_{ref}=1mA
Input stability	V_{DLI}	—	1	10	mV	Vcc=3.6～35V
Load stability	V_{DLO}	—	1	10	mV	I_{ref}=0～5mA
〈Triangular wave oscillator〉						
Oscillation frequency	F_{OSC}	320	400	480	kHz	R_{RT}=10kΩ, C_{CT}=220pF
Frequency deviation	F_{DV}	—	1	—	%	Vcc=3.6～35V
〈Protection circuit〉						
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}	0.9	1.05	1.2	V	5pin, 12pin
〈Rest period adjustment circuit〉						
Input threshold voltage (f_{OSC} =10kHz)	V_{t0}	1.79	1.97	2.15	V	Duty cycle=0%
	V_{t100}	1.32	1.48	1.64	V	Duty cycle=100%
On duty cycle	D_{ON}	45	55	65	%	Divide V_{ref} usung 13kΩ and 27kΩ
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-voltage input miss-operation prevention circuit〉						
Threshold voltage	V_{UT}	—	2.53	—	V	—
〈Error amplifier〉						
Input offset voltage	V_{IO}	—	—	6	mV	—
Input offset current	I_{IO}	—	—	30	nA	—
Input bias current	I_{IB}	—	15	100	nA	—
Open circuit gain	AV	70	85	—	dB	—
Common-mode input voltage range	V_{OM}	0.3	—	1.6	V	Vcc=3.6～35V
Common-mode rejection ratio	CMRR	60	80	—	dB	—
Maximum output voltage	V_{OH}	2.3	2.5	—	V	—
Minimum input 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〉						
Input threshold voltage (f_{OSC} =10kHz)	V_{t0}	1.79	1.97	2.15	V	Duty cycle=0%
	V_{t100}	1.32	1.48	1.64	V	Duty cycle=100%

◎Not designed for radiation resistance.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Coniditions
〈Output block〉						
Saturation voltage	V_{SAT}	—	0.8	1.2	V	I_O=75mA
Leak current	I_{REAK}	—	0	5	μA	V_O=35V
〈Total device〉						
Standby current	I_{CCS}	—	1.3	1.8	mA	When output is off
Average current consumption	I_{CCA}	—	1.6	2.3	mA	R_{RT}=10kΩ

◎Not designed for radiation resistance.

●Timing chart

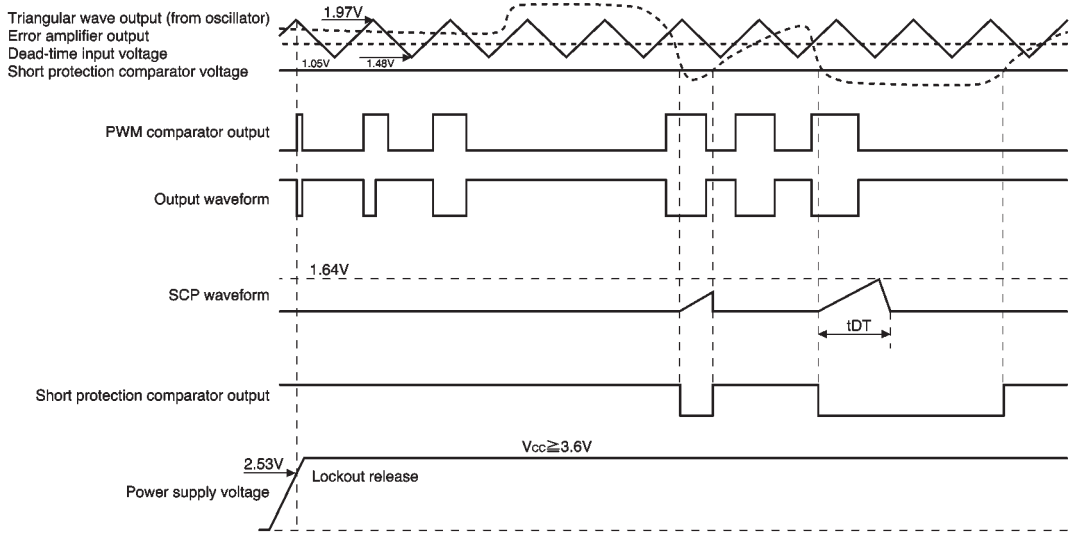


Fig.1

●Electrical characteristic curves

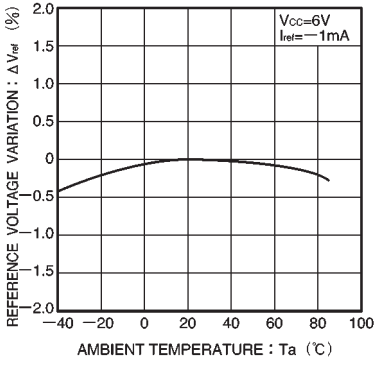


Fig.2 Reference voltage vs. ambient temprature

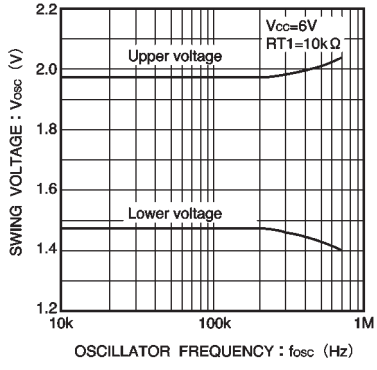


Fig.3 Swing voltage vs. frequency

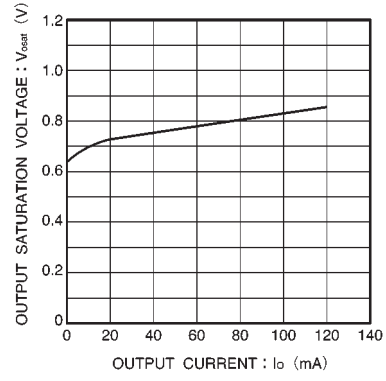


Fig.4 Output current vs. output saturation voltage

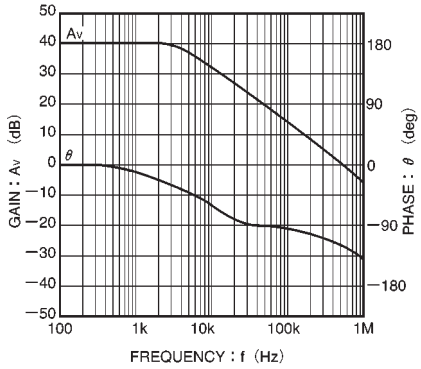
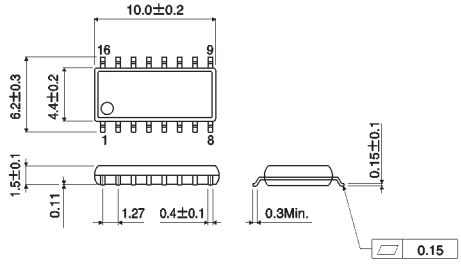


Fig.5 Error amplifier AC gain characteristic
(40dB close)

●External dimensions (Units: mm)

BA9741F



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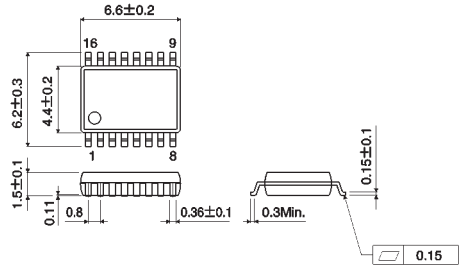

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