

STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCTSERIES 2-ch Switching Regulator Controller

TYPE **BA9744FV**

FEATURES

1. Built-in timer-latch type short prevention circuit
2. Built-in high-accuracy reference voltage output pin $1.222\text{V} \pm 1\%$
3. Rest period adjustable over the whole range of duty ratio

○ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Limits	Unit
Power supply voltage	Vcc	36	V
Power dissipation	Pd	450 *1	mW
Output pin current	Io	60 *2	mA
Output pin voltage	Vo	36	V
Operating temperature	Topr	-40~+85	°C
Storage temperature	Tstg	-55~+125	°C
Junction temperature	Tjmax	125	°C

*1: Reduced by 4.5 mW/°C over Ta = 25°C or more. (When mounted on 50 mm × 50 mm × 1.6 mm, glass epoxy)

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

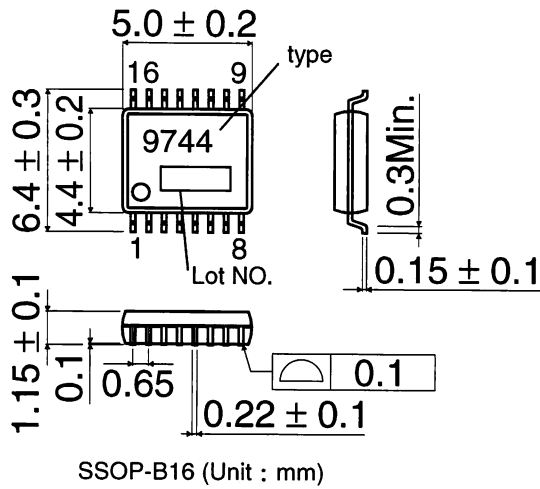
○ Recommendable operation range (Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	Vcc	2.5	3.0	35	V
Output pin current	Io	-	-	30	mA
Output pin voltage	Vo	-	-	35	V
Error amplifier input voltage	VOM	0.3	-	1.5	V
Timing capacitance	CCT	100	-	15000	pF
Timing resistance	RRT	3	-	15	kΩ
Oscillation frequency	Fosc	10	-	800	kHz

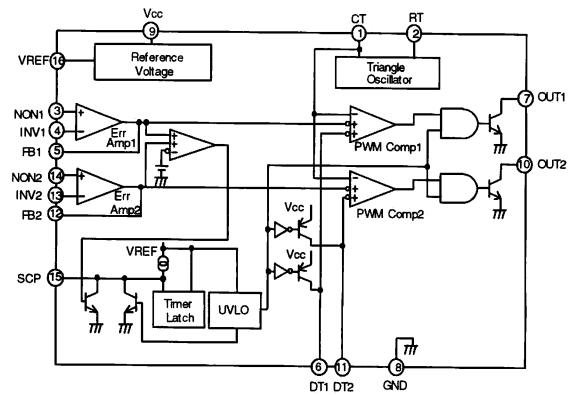
○ Electrical Characteristics (Ta=25°C, VCC=3.0V)

Item	Symbol	Limits			Unit	Conditions
		Min.	Typ.	Max.		
【Reference voltage section】						
Output voltage	VREF	1.210	1.222	1.234	V	IREF=1mA
Input stability	VDLI	—	3	10	mV	Vcc=2.5~35V
Load stability	VDLO	—	1	10	mV	IREF=0~5mA
【Triangular wave oscillator section】						
Oscillation frequency	FOSC	320	400	480	KHz	RRT=5.1kΩ,CCT=220pF
Frequency variation	Fdv	—	1	—	%	Vcc=2.5~35V
【Protection circuit section】						
Threshold voltage	VIT	0.98	1.18	1.38	V	
Standby voltage	VSTB	—	50	100	mV	No pull-up
Latch voltage	VLT	—	23	100	mV	No pull-up
Source current	ISCP	1.0	2.0	3.0	μA	
Comparator threshold voltage	VCT	0.15	0.25	0.35	V	5pin, 12pin
【Rest period adjustment circuit section】						
Input threshold voltage (fosc=10kHz)	Vto	0.96	1.01	1.06	V	Duty cycle =0%
	Vt100	0.46	0.49	0.52	V	Duty cycle =100%
ON duty cycle	DON	45	55	65	%	
Input bias current	IBDT	—	0.1	1	μA	DTC=2V
Latch mode source current	IDT	390	780	—	μA	DTC=0V
Latch input voltage	VDI	Vcc-0.5	Vcc-0.04	—	V	IDT=40μA
【Low-input-voltage malfunction prevention circuit section】						
Threshold voltage	VUT	1.6	1.9	2.2	V	
【Error amplifier section】						
Input offset voltage	VIO	—	0	6	mV	
Input offset current	IIO	—	0	30	nA	
Input bias current	IIB	—	15	100	nA	
Open loop gain	AV	65	85	—	dB	
Common-mode input voltage	VCM	0.3	—	1.5	V	Vcc=2.5~35V
Common-mode rejection ratio	CMRR	60	80	—	dB	
Maximum output voltage	VOM	1.5	2.0	—	V	
Minimum output current	VOL	—	0.1	0.3	V	
Output sink current	IOI	1	2.1	—	mA	FB=0.75V
Output source current	IOO	50	70	90	μA	FB=0.75V
【PWM comparator section】						
Input threshold voltage (fosc=10kHz)	Vto	0.96	1.01	1.06	V	Duty cycle =0%
	Vt100	0.46	0.49	0.52	V	Duty cycle =100%
【Output section】						
Saturation voltage 1	VSAT1	—	0.06	0.3	V	Io=10mA
Saturation voltage 2	VSAT2	—	0.15	0.4	V	Io=30mA
Leak current	ILEAK	—	0	5	μA	Vo=35V
【Total device】						
Standby current	ICCS	—	3.6	5.0	mA	When output is OFF
Average current dissipation	ICCA	—	3.9	5.6	mA	RRT=5.1kΩ

○ Outline figure



○ Block Diagram



○ PIN No./ name / function

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 output

○ Cautions on use

1. Absolute maximum ratings

An excess in the absolute maximum ratings, such as applied voltage, operating temperature range, etc., can degrade or break down devices, thus making impossible to identify breaking mode such as short circuit mode or an open mode. If any special mode exceeding the absolute maximum ratings is assumed, consideration should be given to take physical safety measures including use of fuses, etc.

2. GND potential

Make setting of the potential of the GND terminal so that it will be maintained at the minimum in any operating state. Furthermore, check to be sure no pins other than the GND pin fall below the GND voltage, including an actual electric transient.

3. Thermal design

With consideration given to power dissipation(Pd) in the actual use state, provide the thermal design with an adequate margin.

4. Short circuit between pins and erroneous mounting

In order to mount ICs on a set PCB, pay thorough attention to the direction and offset of the ICs. Erroneous mounting can break down the ICs. Furthermore, if a short circuit occurs due to foreign matters entering between pins or between the pin and the power supply or the GND pin, the ICs can break down.

5. Operation in strong electromagnetic field

Be noted that using ICs in the strong electromagnetic field can malfunction them.

6. Inspection with set printed circuit board

On the inspection with the set printed circuit board, if a capacitor is connected to a low-impedance pin, the IC can suffer stress. Therefore, be sure to discharge from the set printed circuit board by each process. For protection against static electricity, establish a ground for the assembly process and pay thorough attention to the transportation and the storage of the set printed circuit board. Furthermore, in order to connect the jig for the inspection process, be sure to turn OFF the power supply and then mount the set printed circuit board to the jig. After the completion of the inspection, be sure to turn OFF the power supply and then dismount the set printed circuit board from the jig.

7. Common impedance

For power supply and GND wirings, thorough consideration should be given, for example, to reduce common impedance, minimize ripple currents(in other words, to provide as thick and short wirings as possible or reduce ripple currents according to L and C values), etc.

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