



BA9741

LINEAR INTEGRATED CIRCUIT

TWO-CHANNEL SWITCHING REGULATOR CONTORLLER

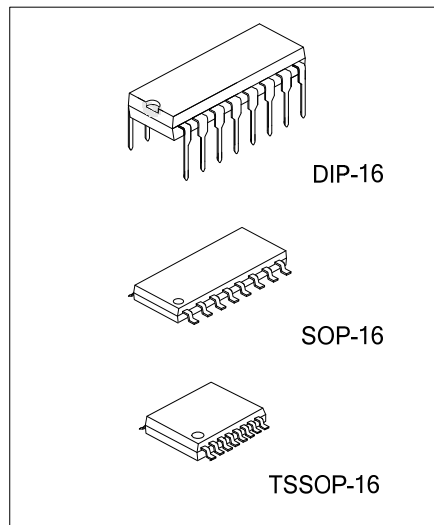
DESCRIPTION

The UTC **BA9741** is a two-channel switching regulator controllers that use the PWM method.

It 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.

FEATURES

- *High-accuracy reference voltage circuit ($\pm 1\%$)
- *Time-latch, short-circuit protection circuit
- *Miss-operation prevention circuit for low-voltage input
- *Reference voltage with output (2.5V)
- *Rest period adjustment is possible over the entire duty range



ORDERING INFORMATION

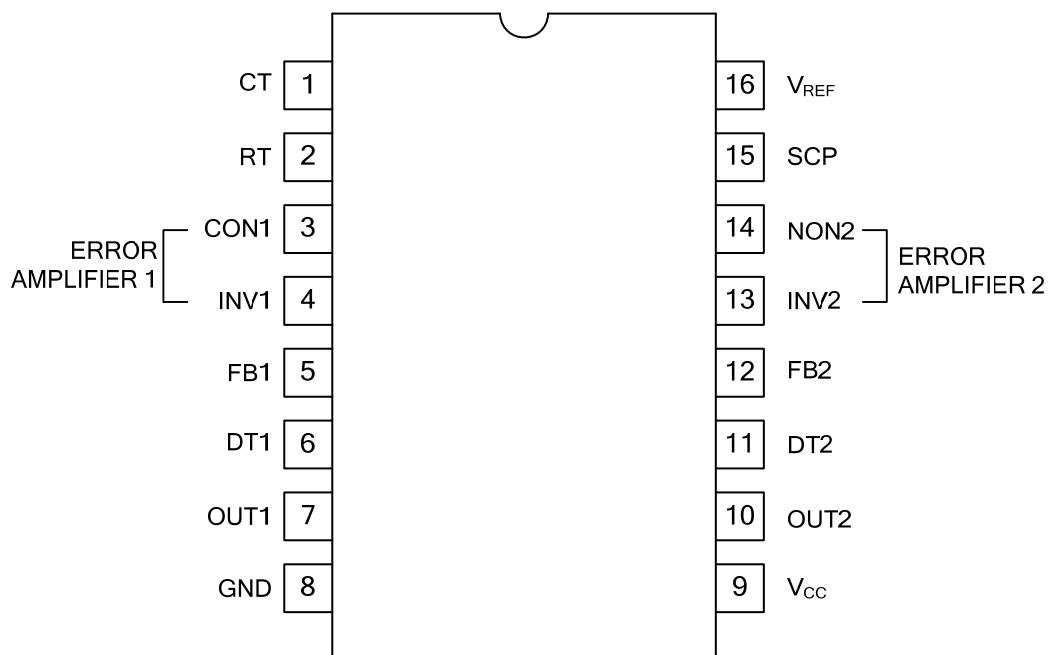
Ordering Number		Package	Packing
Lead Free	Halogen Free		
BA9741L-D16-T	BA9741G-D16-T	DIP-16	Tube
-	BA9741G-S16-R	SOP-16	Tape Reel
-	BA9741G-P16-R	TSSOP-16	Tape Reel

<p>BA9741L-D16-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) D16: DIP-16, S16: SOP-16, P16: TSSOP-16 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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MARKING

DIP-16	SOP-16 / TSSOP-16
<p>16 15 14 13 12 11 10 9 → Date Code UTC □□□□ BA9741 □ □□ → Lot Code 1 2 3 4 5 6 7 8</p>	<p>16 15 14 13 12 11 10 9 → Date Code UTC □□□□ BA9741G □□ → Lot Code 1 2 3 4 5 6 7 8</p>

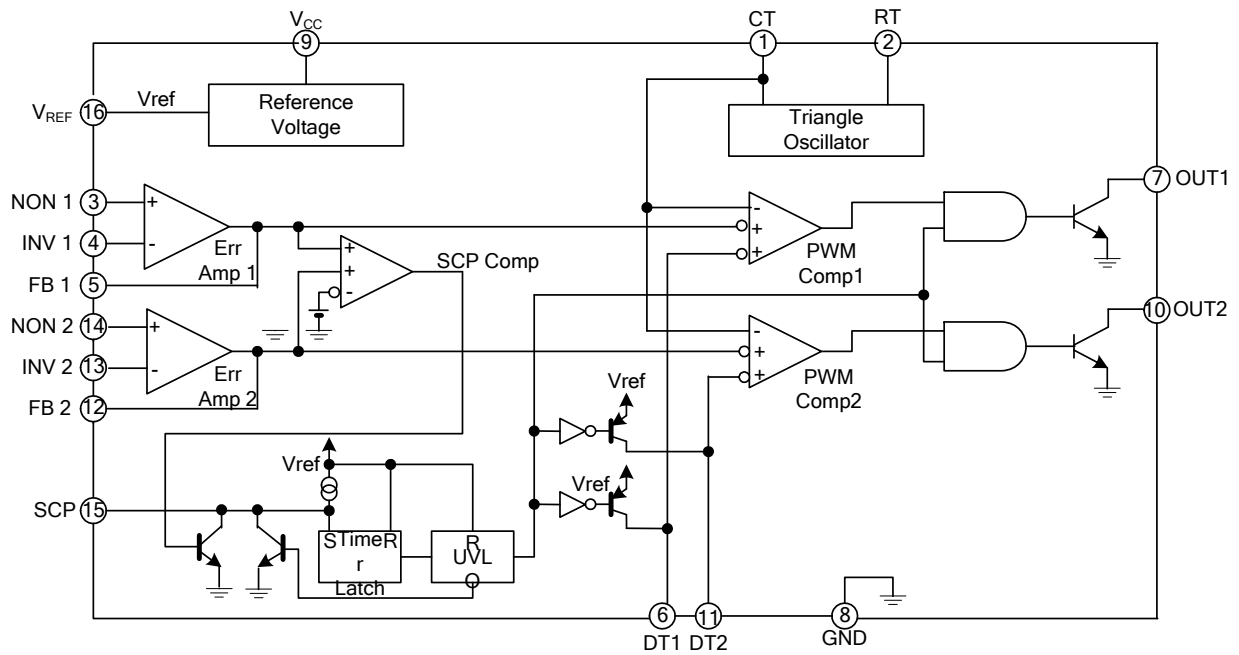
■ PIN CONFIGURATIONS



■ PIN DESCRIPTIONS

PIN NO.	PIN NAME	FUNCTOIN
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	V _{CC}	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	V _{REF}	Reference voltage output (2.5V)

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Power Supply Voltage	V_{CC}	36	V
Output Current	I_O	120(note 2)	mA
Output Voltage	V_O	36	V
Power Dissipation (Note 2)	P_D	500	mW
SOP-16 DIP-16		650	
Operating Temperature	T_{OPR}	-40 ~ +85	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 ~ +125	$^\circ\text{C}$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. When mounted on 70mm×70mm×1.6mm glass epoxy board.

Reduced by 5.0mW, for each increase in T_A of 1°C over 25°C .

3. Should not exceed P_d and ASO values.

■ RECOMMENDED OPERATING CONDITIONS ($T_A=25^\circ\text{C}$, unless otherwise specified)

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	k Ω
Oscillator Frequency	F_{OSC}	10		800	kHz

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, V_{CC}=6V, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
REFERENCE VOLTAGE BLOCK						
Output Voltage	V _{REF}	I _{REF} =1mA	2.4	2.5	2.6	V
Input Stability	V _{DLI}	V _{CC} =3.6~35V		1	10	mV
Load Stability	V _{DLO}	I _{REF} =0~5mA		1	10	mV
TRIANGULAR WAVE OSCILLATOR						
Oscillation Frequency	F _{OSC}	R _{RT} =10 kΩ, C _{CT} =220pF	320	400	480	kHz
Frequency Deviation	F _{DV}	V _{CC} =3.6~35V		1		%
PROTECTION CIRCUIT						
Threshold Voltage	V _{IT}		1.48	1.64	1.80	V
Standby Voltage	V _{STB}	No pull up		50	100	mV
Latch Voltage	V _{LT}	No pull up		30	100	mV
Source Current	I _{SCP}		1.5	2.5	3.5	μA
Comparator Threshold Voltage	V _{CT}	5Pin,12Pin	0.9	1.05	1.2	V
REST PERIOD ADJUSTMENT CIRCUIT						
Input Threshold Voltage (fosc=10kHz)	V _{I0}	Duty Cycle =0%	1.79	1.97	2.15	V
	V _{I100}	Duty Cycle =100%	1.32	1.48	1.64	V
On Duty Cycle	D _{ON}	Divide V _{REF} using 13 kΩ and 27 kΩ	45	55	65	%
Input Bias Current	I _{BDT}	DT1, DT2=2.0V		0.1	1	μA
Latch Mode Source Current	I _{DT}	DT1, DT2=0V	200	560		μA
Latch Input Voltage	V _{DT}	I _{DT} =40μA	2.28	2.48		V
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}	V _{CC} =3.6~35V	0.3		1.6	V
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}	FB=1.25V	3	20		mA
Output Source Current	I _{OO}	FB=1.25V	45	75		μA
PWM COMPARATOR						
Input Threshold Voltage (fosc=10kHz)	V _{I0}	Duty Cycle =0%	1.79	1.97	2.15	V
	V _{I100}	Duty Cycle =100%	1.32	1.48	1.64	V
OUTPUT BLOCK						
Saturation Voltage	V _{SAT}	I _O =75mA		0.8	1.2	V
Leak Current	I _{REAK}	V _O =35V		0	5	μA
TOTAL DEVICE						
Standby Current	I _{CCS}	When output is off		1.3	1.8	mA
Average Current Consumption	I _{CCA}	R _{RT} =10 kΩ		1.6	2.3	mA

■ TIMING CHART

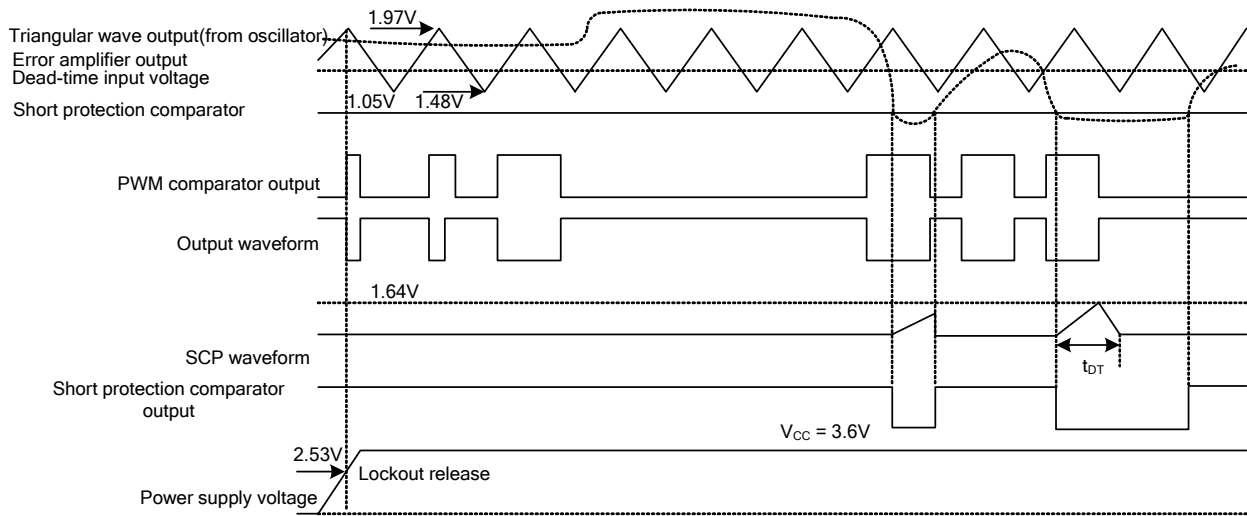


Figure. 1

ELECTRICAL CHARACTERISTIC CURVES

Figure 2. Reference Voltage vs. Ambient Temperature

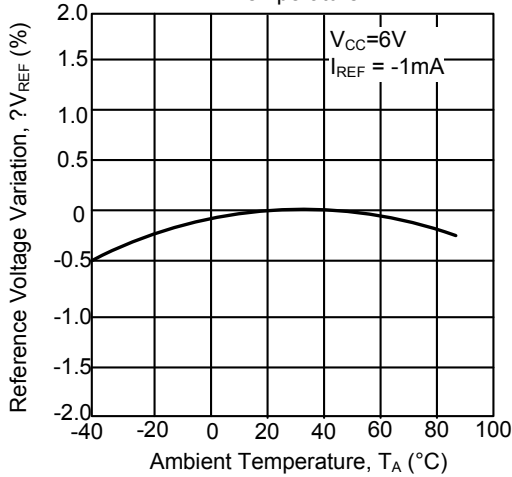


Figure 3. Swing Voltage vs. Frequency

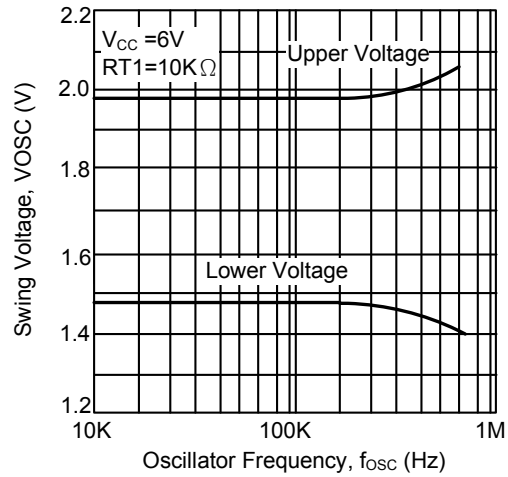


Figure 4. Output Current vs. Output Saturation Voltage

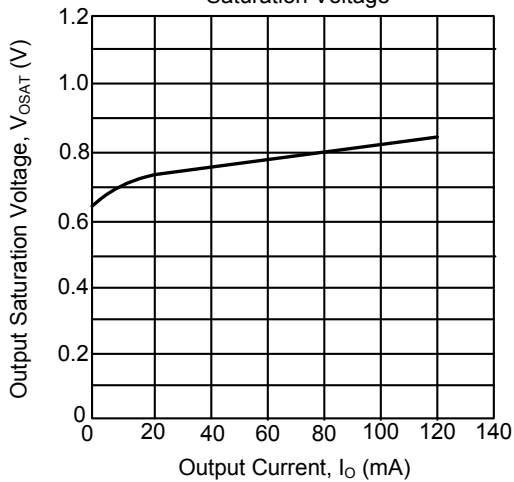
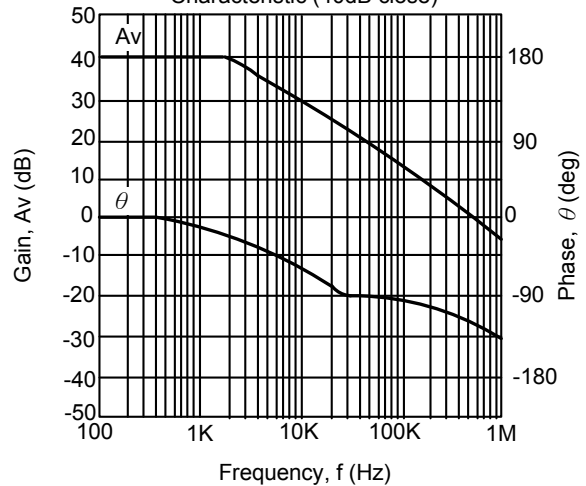


Figure 5. Error Amplifier AC Gain Characteristic (40dB close)



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