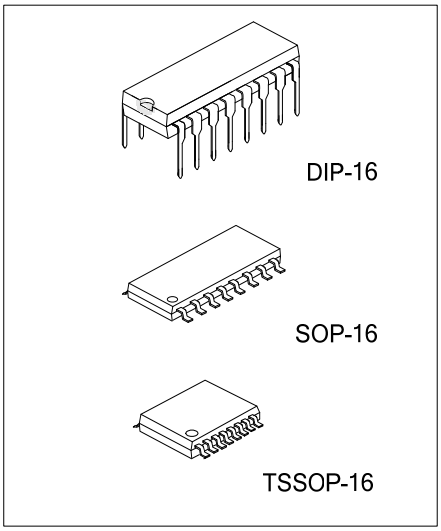
TWO-CHANNEL SWITCHING REGULATOR CONTORLLER



■ 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 (±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

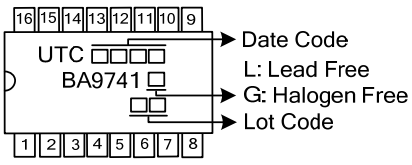
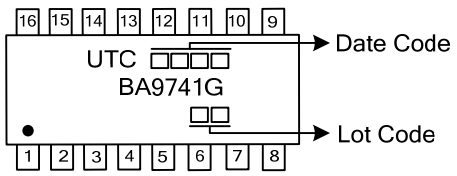
■ ORDERING INFORMATION

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

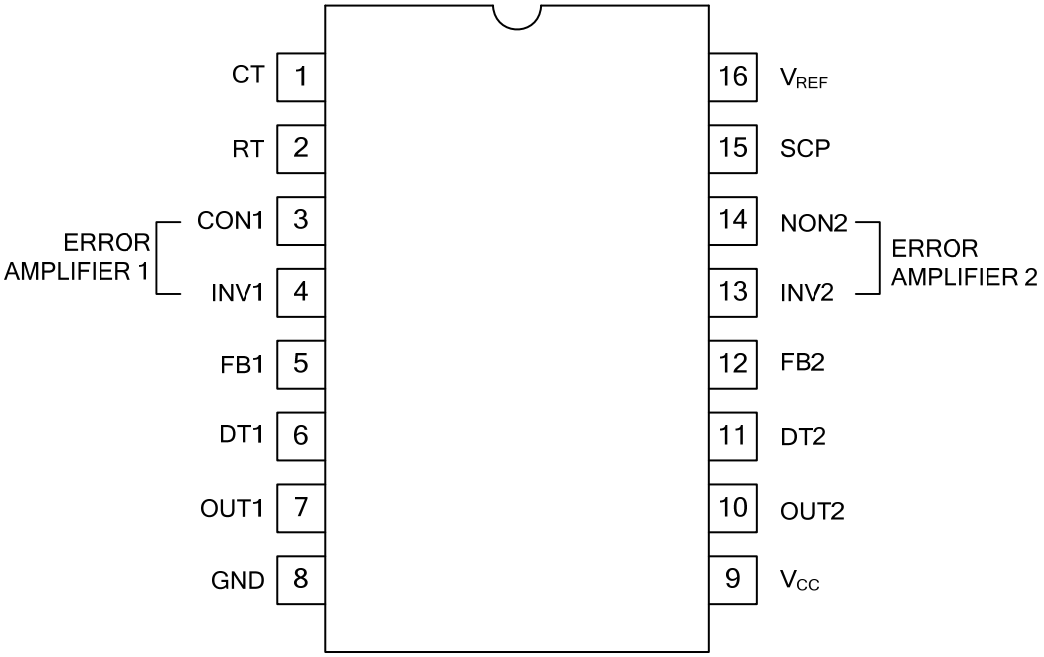
BA9741L-D16-T
(1)Packing Type
(2)Package Type
(3)Green Package

(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

■ MARKING

DIP-16	SOP-16 / TSSOP-16
	

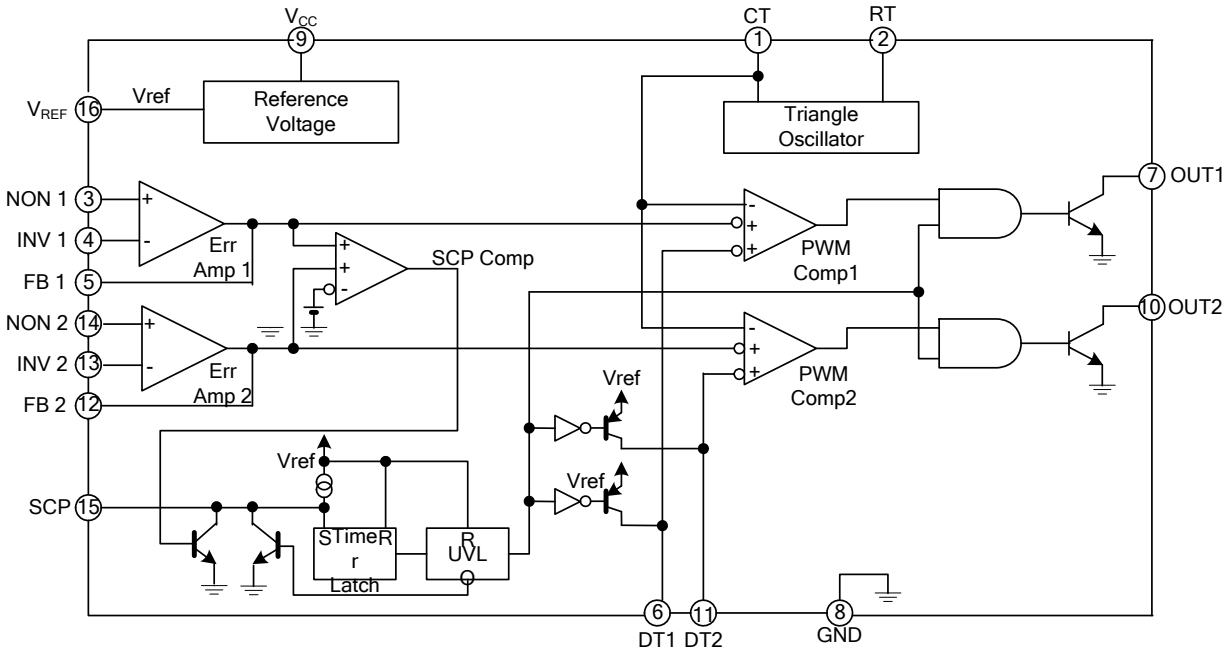
■ PIN CONFIGURATIONS



■ 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°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) SOP-16 DIP-16	P_D	 500 650	mW
Operating Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-55 ~ +125	°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 Pd and ASO values.

■ RECOMMENDED OPERATING CONDITIONS (T_A=25°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	kΩ
Oscillator Frequency	F_{OSC}	10		800	kHz

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

PARAMETER	SYMBOL	TEST CONIDITIONS	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	V_{t0}	Duty Cycle =0%	1.79	1.97	2.15	V
(fosc=10kHz)	V_{t100}	Duty Cycle =100%	1.32	1.48	1.64	V
On Duty Cycle	D_{ON}	Divide V_{REF} using 13 kΩ and27 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	V_{t0}	Duty Cycle =0%	1.79	1.97	2.15	V
(fosc=10kHz)	V_{t100}	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

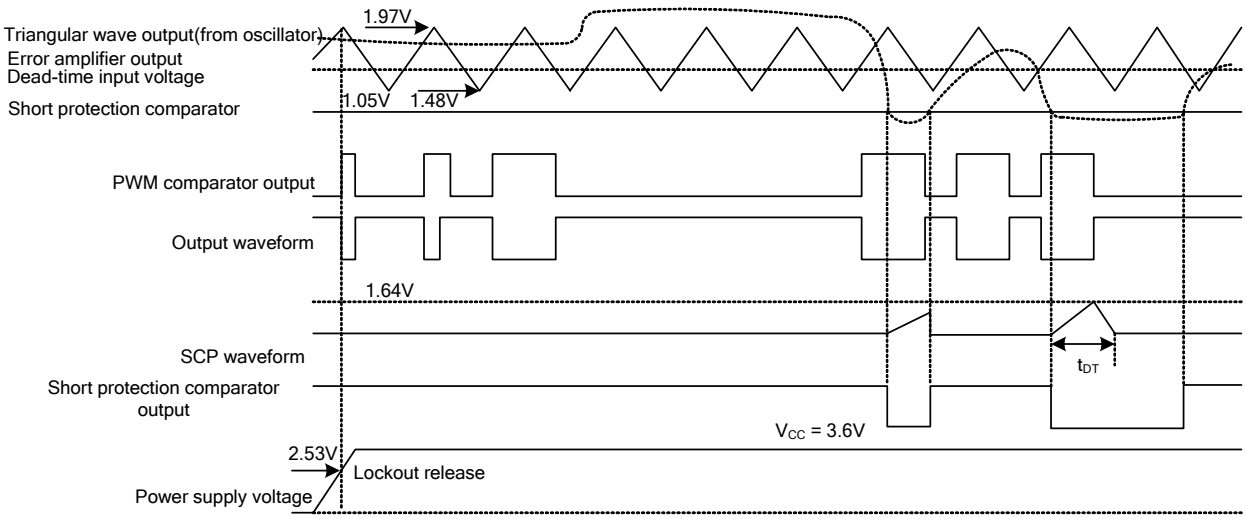


Figure. 1

■ ELECTRICAL CHARACTERISTIC CURVES

Figure 2. Reference Voltage vs.Ambient Temperature

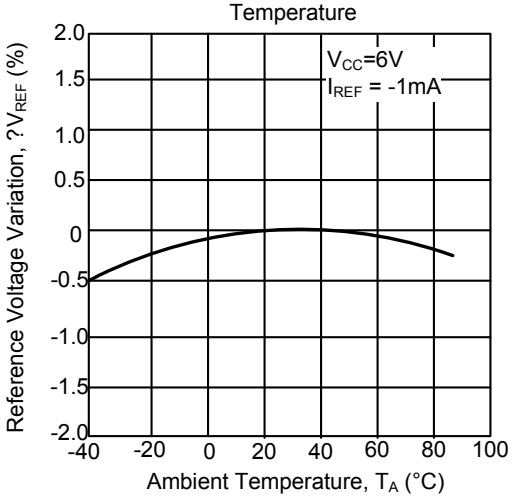


Figure 3. Swing Voltage vs. Frequency

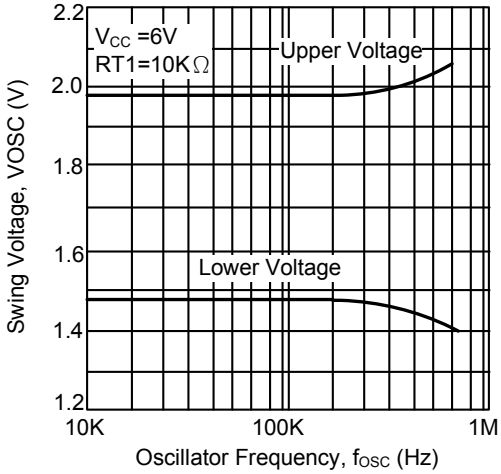


Figure4. Output Current vs.Output Saturation Voltage

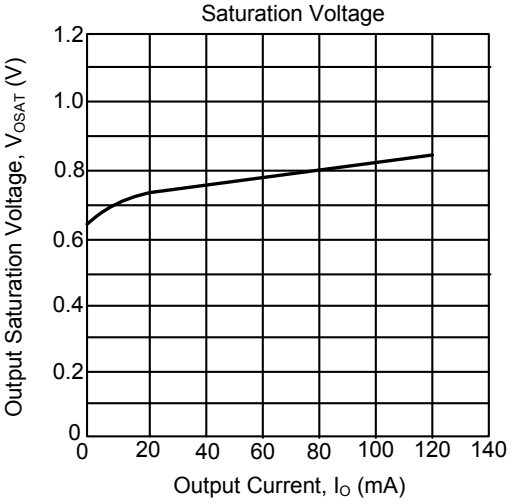


Figure 5. Error Amplifier AC Gain Characteristic (40dB close)