



## U9751B

### LINEAR INTEGRATED CIRCUIT

## DOUBLE CHANNELS PWM CONTROLLER

### DESCRIPTION

The UTC **U9751B** consists of two PWM control circuits. Two PWM controllers is independent each other. It is low cost in many applications.

### FEATURES

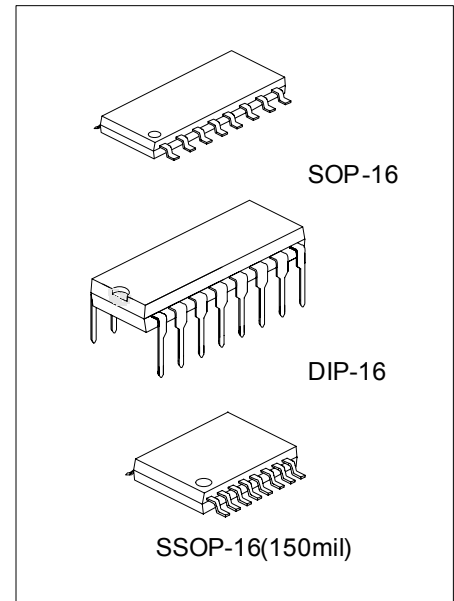
- \* Switch frequency: 400KHz
- \*  $I_{SINK} = 400mA$
- \* Wide work voltage
- \* Programmable dead-time control
- \* UVLO protection
- \* SCP protection
- \* Lower static supply current

### APPLICATION

\* DC/DC converters for video cameras, backlight inverter and notebook computers etc.

### ORDER INFORMATION

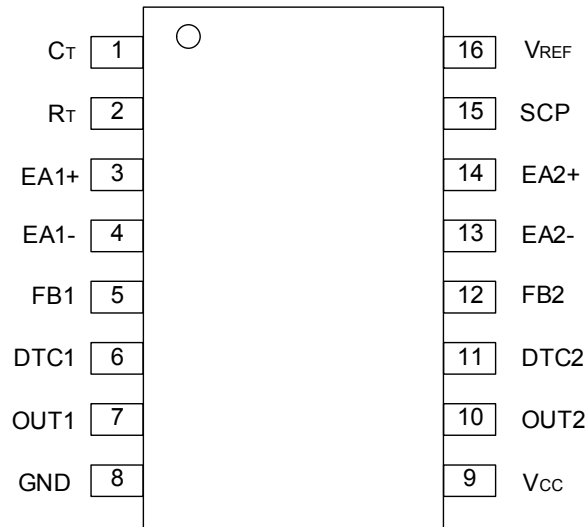
Order Number		Package	Packing
Normal	Lead Free Plating		
U9751B-D16-T	U9751BL-D16-T	DIP-16	Tube
U9751B-S16-R	U9751BL-S16-R	SOP-16	Tape Reel
U9751B-S16-T	U9751BL-S16-T	SOP-16	Tube
U9751B-R16-R	U9751BL-R16-R	SSOP-16	Tape Reel
U9751B-R16-T	U9751BL-R16-T	SSOP-16	Tube



\*Pb-free plating product number: U9751BL

<p>U9751BL-D16-R</p> <p>(1)Packing Type (2)Package Type (3)Lead Plating</p>	<p>(1) R: Tape Reel, T: Tube (2) D16: DIP-16, S16: SOP-16, R16: SSOP-16 (3) L: Lead Free Plating, Blank: Pb/Sn</p>
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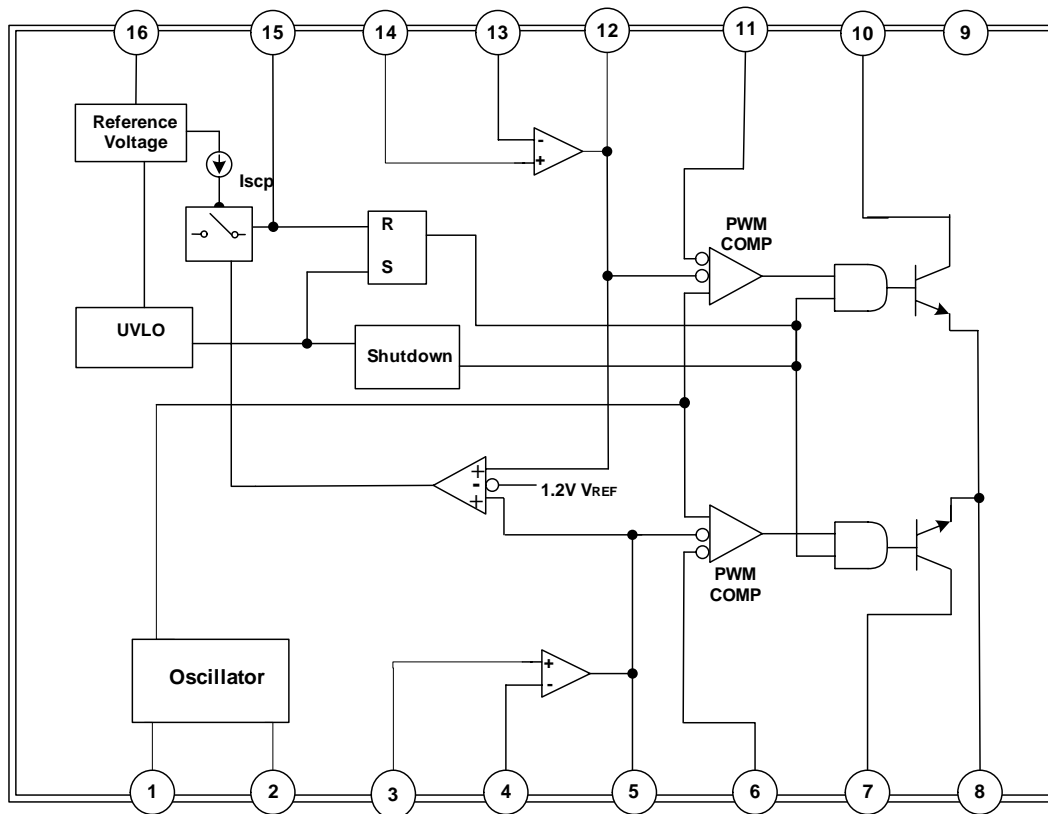
### ■ PIN CONFIGURATION



### ■ PIN DESCRIPTION

NO.	NAME	DESCRIPTION
1	C <sub>T</sub>	Capacitor connected to the pin controlling Oscillator frequency
2	R <sub>T</sub>	Resistor connected to the pin controlling Oscillator frequency
3	EA1+	Error Amplifier 1 positive Input
4	EA1-	Error Amplifier 1 Inverting Input
5	FB1	Error Amplifier 1 Output, used for feedback output 1
6	DTC1	Dead-Time Comparator Output 1
7	OUT1	Output 1
8	GND	Ground
9	V <sub>CC</sub>	Power Supply
10	OUT2	Output 2
11	DTC2	Dead-Time Comparator Output 2
12	FB2	Error Amplifier 2 Output, used for feedback output 2
13	EA2-	Error Amplifier 2 Inverting Input
14	EA2+	Error Amplifier 2 positive Input
15	SCP	Short Circuit Protection Input
16	V <sub>REF</sub>	Internal 2.5V Reference Voltage

## ■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	+38	V
Differential Input Voltage	$V_{I(DIFF)}$	+20	V
Output Voltage	$V_{OUT}$	+38	V
Output Current	$I_{OUT}$	+450	mA
Maximum Junction Temperature	$T_J$	+150	
Operating Temperature	$T_{OPR}$	-20 ~ +85	
Storage Temperature	$T_{STG}$	-55 ~ +150	

Note: 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.

### ■ DC ELECTRONIC CHARACTERISTICS

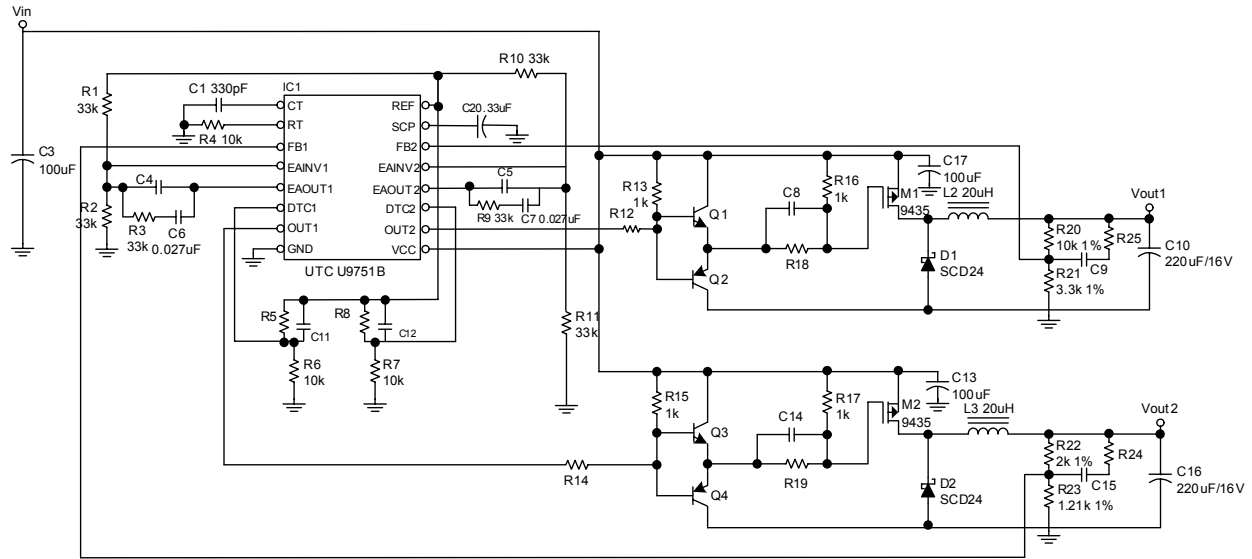
$V_{CC}=6V$ ,  $f=200kHz$  (unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>Reference section</b>						
Internal Reference Voltage	$V_{REF}$	$I_{OUT} = 1mA$	2.40	2.46	2.53	V
$V_{REF}$ Regulation with $V_{CC}$	$V_{REF}$	$V_{CC} = 3.6V \sim 40V$		3.5		mV
$V_{REF}$ Regulation with $I_{O(REF)}$	$V_{REF}$	$I_{OUT} = 0.1mA \text{ to } 1mA$		2		mV
$V_{REF}$ Regulation with Temperature		$T_A = -20 \sim 25$		-0.1%	$\pm 1\%$	
		$T_A = 25 \sim 85$		-0.2%	$\pm 1\%$	
Short-Circuit Output Current	$I_{O(SC)}$	$V_{OUT} = 0$	18	22	30	mA
<b>Undervoltage Lockout Section</b>						
threshold Voltage( $V_{CC}$ )	$V_{THR}$	$I_{O(REF)} = 0.1mA, T_A = 25$	2.5	2.8	3.2	V
<b>Short-Circuit Protection Control Section</b>						
SCP Input Threshold Voltage	$V_{I(THR)}$	$T_A = 25$	1.2	1.3	1.5	V
SCP Comparator Threshold Voltage	$V_{COM(THR)}$			1.26		V
SCP Standby Voltage	$V_{STN-BY}$	No pull-up		110	220	mV
SCP Latched Input voltage	$V_{I(LTH)}$	No pull-up		77	200	mV
Input (Source) Current	$I_{I(SOURCE)}$	$V_{IN} = 0.7V, T_A = 25$	-1.5	-2.0	-2.5	$\mu A$
<b>Oscillator Section</b>						
Frequency	$f$	$C_T = 220pF, R_T = 10K$		400		KHz
Deviation of Frequency	$f$	$C_T = 220pF, R_T = 10K$		10%		
Frequency Regulation with Voltage	$f / V$	$V_{CC} = 3.6V \text{ to } 40V$		1%		
Frequency Regulation with Temperature	$f / T$	$T_A = -20 \sim 25$		-0.4%	$\pm 2\%$	
		$T_A = 25 \sim 85$		-0.2%	$\pm 2\%$	
<b>Dead-time control section</b>						
Latched Input Voltage	$V_{I(LTH)}$	$I_{OUR(DTC)} = 40\mu A$	1.9			V
Input Threshold Voltage at $f=10kHz$	$V_{I(THR)}$	Zero duty cycle	1.75	1.95	2.15	V
		Maximum duty cycle	1.3	1.45	1.7	
Input Bias Current	$I_{I(BIAS)}$			0.2	1	$\mu A$
Latch Mode (Source) Current	$I_{SOURCE}$	$T_A = 25$		-620		$\mu A$
<b>Error-Amplifier Section</b>						
Input Offset Voltage	$V_{I(OFF)}$	$V_{O(FB)} = 1.25V$			$\pm 6$	mV
Common-Mode Input Voltage Range	$V_{I(CM)}$	$V_{CC} = 3.6V \text{ to } 40V$	0.3		1.6	V
Positive Output Voltage Swing	$V_{O(POS)}$		$V_{REF} - 0.2$			V
Negative Output Voltage Swing	$V_{O(NEG)}$				1	V
Input Offset Current	$I_{I(OFF)}$	$V_{O(FB)} = 1.25V$			$\pm 100$	nA

### ■ DC ELECTRONIC CHARACTERISTICS(Cont.)

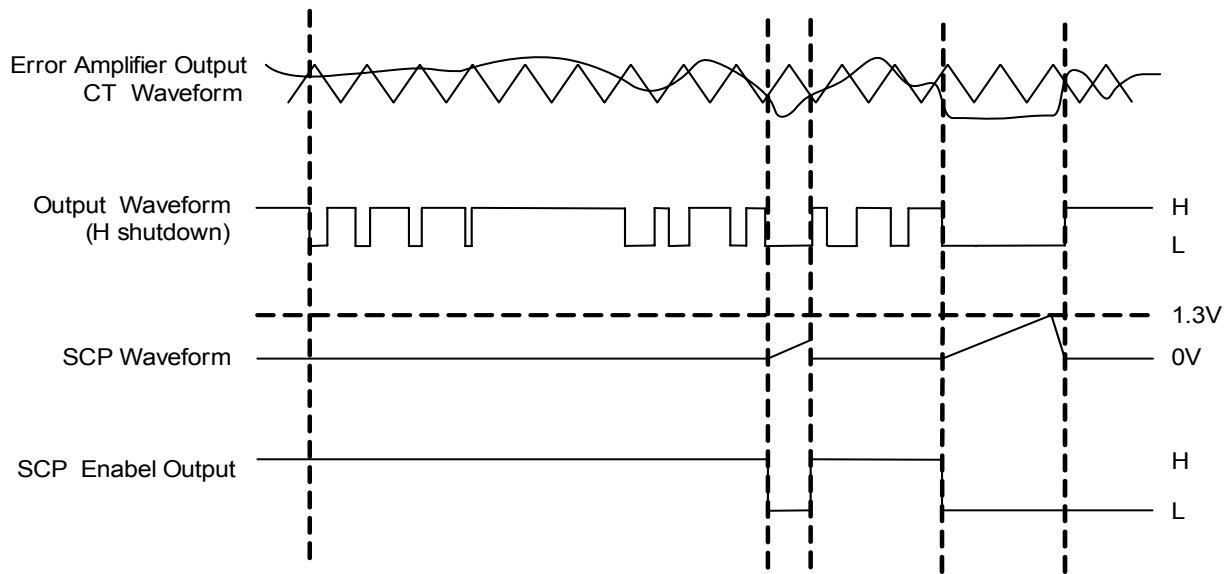
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Bias Current	$I_{I(BIAS)}$	$V_{O(FB)}=1.25V$		160	500	nA
Output Sink Current	$I_{O(SINK)}$	$V_{I(DIFF)}=-0.1V, V_{OUT}=1.25V$	1	4.0		mA
Output Source Current	$I_{O(SOURCE)}$	$V_{I(DIFF)}=0.1V, V_{OUT}=1.25V$	-45	-90		$\mu A$
Common-Mode Rejection Ratio	CMRR		60	80		dB
Open-Loop Voltage Gain	$G_{VO}$	$R_F=200K\Omega$	70	80		dB
Unity-Gain Bandwidth	$GB_W$			1.5		MHz
<b>Output Section</b>						
Output Saturation Voltage	$V_{O(SAT)}$	$I_{OUT}=10mA$		0.7	1	V
Short-Circuit Output Current	$I_{O(SC)}$	$V_{OUT}=6V$		450		mA
Off-State Current	$I_{O(OFF)}$	$V_{OUT}=50V$			10	$\mu A$
<b>PWM Comparator Section</b>						
Input Threshold Voltage at f=10kHz	$V_{I(THR)}$	Zero duty cycle	1.75	1.95	2.15	V
		Maximum duty cycle	1.3	1.45	1.8	
<b>Total Device</b>						
Standby Supply Current	$I_{STN-BY}$	Off-state		1.7		mA
Average Supply Current	$I_{AVE}$	$R_T=10K$		2.0	2.6	mA

## ■ TYPICAL APPLICATION



Typical Application

## ■ TIMING WAVEFORM



Timing Diagram

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