Micropower Dual Comparator

FEATURES

- Maximum Offset Voltage 1mV
- Maximum Bias Current 15nA
- Typical Output Drive 70mA
- Operates from 1.1V to 40V
- Internal Pull-Up Current
- Output Can Drive Loads Above V+
- 30μA Supply Current (LT1017)
  110μA Supply Current (LT1018)

APPLICATIONS

- Power Supply Monitors
- Relay Driving
- Oscillators

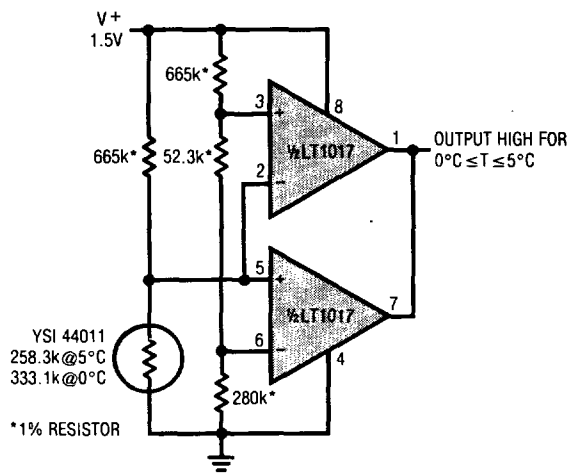
DESCRIPTION

The LT1017 and LT1018 are general purpose micropower comparators. The LT1017 is optimized for lowest operating power while the LT1018 operates at higher power and higher speed. Both devices can operate from a single 1.1V cell up to 40V. The output stage includes a class "B" pull-up current source, eliminating the need for an external resistive pull-up and saving power. The output stage is also designed to allow driving loads connected to a supply more positive than the device, as can comparators with open collector output stages.

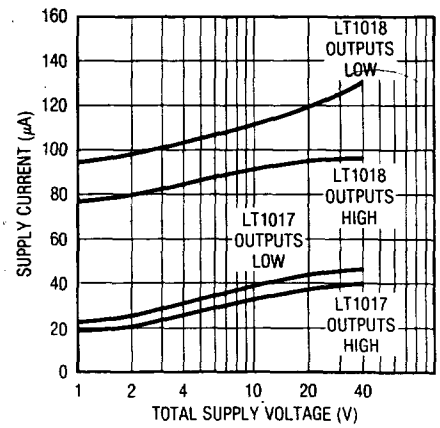
Input specifications are also excellent. On-chip trimming minimizes offset voltage, while high gain and common-mode rejection ratio keep other input-referred errors low. Common-mode voltage range includes ground. Special circuitry prevents false output states even if the input is overdriven.

The LT1017 and LT1018 are pin compatible with older dual comparators such as 393 type devices.

1.5V Powered Refrigerator Alarm



Supply Current



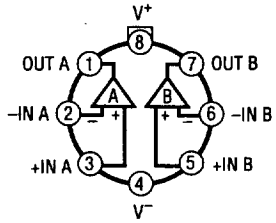
ABSOLUTE MAXIMUM RATINGS

Supply Voltage 40V
Differential Input Voltage 40V
Input Voltage ..... –0.3V to 40V
Short Circuit Duration ..... Indefinite
Storage Temperature Range ..... –65°C to 150°C

Operating Temperature Range
LT1017M, LT1018M ..... –55°C to 125°C
LT1017C, LT1018C ..... 0°C to 70°C
LT1017I, LT1018I ..... –40°C to 85°C
Lead Temperature (Soldering, 10 sec) ..... 300°C

PACKAGE/ORDER INFORMATION

TOP VIEW



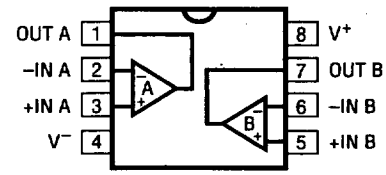
H PACKAGE
8-LEAD TO-5 METAL CAN

T_{JMAX} = 150°C, θ_{JA} = 150°C/W, θ_{JC} = 45°C/W

ORDER PART NUMBER

LT1017MH
LT1017CH
LT1018MH
LT1018CH

TOP VIEW



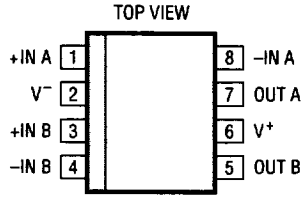
N8 PACKAGE
8-LEAD PLASTIC DIP

T_{JMAX} = 100°C, θ_{JA} = 130°C/W

ORDER PART NUMBER

LT1017CN8
LT1018CN8

TOP VIEW



S8 PACKAGE
8-LEAD PLASTIC SO
(0.150" BODY WIDTH)

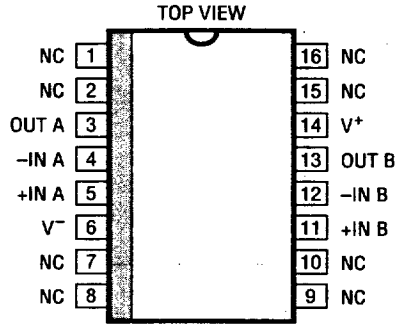
NOTE: PINOUT ON S8 PACKAGE DOES NOT MATCH 8 PIN DIP PINOUT.

T_{JMAX} = 100°C, θ_{JA} = 190°C/W

ORDER PART NUMBER

LT1017CS8
LT1017IS8
LT1018CS8

TOP VIEW



S PACKAGE
16-LEAD PLASTIC SOL

T_{JMAX} = 100°C, θ_{JA} = 130°C/W

ORDER PART NUMBER

LT1017CS8
LT1017CS
LT1018CS
LT1017IS
LT1017IS8

PART MARKING

1017CS
1018CS
1017IS

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ELECTRICAL CHARACTERISTICS

PARAMETER	CONDITIONS		LT1017 MIN	LT1017 TYP	LT1017 MAX	LT1018 MIN	LT1018 TYP	LT1018 MAX	UNITS
Offset Voltage (Note 1)	±0.75V ≤ V_S ≤ ±20V	25°C		0.4	1		0.4	1	mV
		●		0.5	1.4		0.5	1.4	mV
		125°C			1.5		0.7	1.5	mV
Bias Current	±0.75V ≤ V_S ≤ ±20V	25°C		5	15		15	75	nA
		●		7	25		18	100	nA
		125°C		10	40			110	nA
Offset Current	±0.75V ≤ V_S ≤ ±20V	25°C		0.4	2		1	8	nA
		●		0.5	3		1.6	12	nA
		125°C			12			20	nA

ELECTRICAL CHARACTERISTICS

PARAMETER	CONDITIONS		LT1017 MIN	LT1017 TYP	LT1017 MAX	LT1018 MIN	LT1018 TYP	LT1018 MAX	UNITS
Common-Mode Rejection Ratio	$V_S = \pm 20V$, $-20V \le V_{CM} \le 19.1V$	25°C	105	115		105	115		dB
		●	100	115		100	115		dB
		125°C	86	100		95	110		dB
Power Supply Rejection Ratio	$\pm 0.75V \le V_S \le \pm 20V$	25°C	96	110		96	110		dB
		●	95	105		95	105		dB
		125°C	86			86	100		dB
Gain	No Load, $V_{OUT} = \pm 19.9V$ (Note 2)	25°C	110	115		110	125		dB
		●	105	115		105	120		dB
		125°C	100			100			dB
	$R_L = 4k$, $V_{OUT} = \pm 19V$	25°C	100	110		100	110		dB
		●	94			94			dB
Output Sink Current	$V^+ = 4.5V$, $V^- = 0$ Overdrive > 30mV	25°C	30	65		35	70		mA
		●	25	50		25	50		mA
		125°C	10	20		10	30		mA
Output Source Current	$V^+ = 40V$, $V^- = 0$ $V_{IN} = 5mV$, $V_{OUT} = 0.4V$	25°C	30	75		75	250		µA
		●	25	70		50	220		µA
		125°C	25	75		50	200		µA
Output Source Current	$V^+ = 1.2V$, $V^- = 0$ $V_{IN} = 5mV$, $V_{OUT} = 0.4V$	25°C	25	35		70	140		µA
		●	15	20		45	120		µA
		125°C	25	40		40	110		µA
Negative Output Saturation	$I_{OUT} = 0$ $V^+ = 4.5V$, $V^- = 0$	25°C		5	20		5	15	mV
	$= 0.1mA$ $V_{IN} = -10mV$	25°C		35	60		35	60	mV
	$= 1mA$	25°C		60	120		60	120	mV
	$= 10mA$	25°C		120	200		120	250	mV
	$= 30mA$	25°C		350	600		350	700	mV
	$I_{OUT} = 0$	●		5	20		8	20	mV
	$= 0.1mA$	●		40	75		35	70	mV
	$= 1mA$	●		75	150		70	150	mV
	$= 10mA$	●		150	300		150	300	mV
	$= 30mA$	●		600	900		500	900	mV
	$I_{OUT} = 0$	125°C		25	50		10	40	mV
	$= 0.1mA$	125°C		60	100		60	100	mV
	$= 1mA$	125°C		100	200		110	200	mV
	$= 10mA$	125°C		300	600		300	400	mV
	$= 30mA$	125°C					900		mV
Positive Output Saturation	$I_{OUT} = 0$	25°C		40	80		35	80	mV
	$= 10\mu A$	25°C		175	250		175	250	mV
	$= 0$	●		45	90		45	90	mV
	$= 10\mu A$	●		190	300		190	300	mV
	$= 0$	125°C		50	100		50	100	mV
	$= 10\mu A$	125°C			300			300	mV
Leakage Current	$V_S = 5V$, $V_{OUT} = 40V$	25°C		0.5	3		1	8	µA
	$V_{IN} = 100mV$	●		0.6	3		1.8	10	µA
		125°C			5			15	µA
Supply Current	$V_S = 5V$	25°C		30	60		110	250	µA
		●		40	80		110	250	µA
		125°C			80			300	µA
	$V_S = 40V$	25°C		40	90		130	250	µA
		●		55	100		140	270	µA
		125°C			100			300	µA
Minimum Operating Voltage	$I_{OUT} = 1mA$	25°C			1.15			1.2	V
		●			1.15			1.2	V
		125°C			1.15			1.2	V

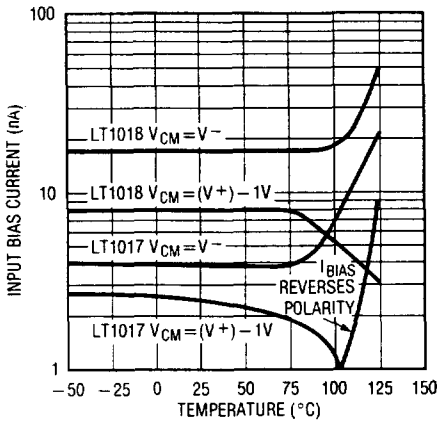
The ● denotes specifications which apply over operating temperature range of –55°C to 85°C for M grade parts and 0°C to 70°C for C grade parts.

Note 1: Offset voltage is guaranteed over a common-mode voltage range of $V^- \le V_{IN} \le (V^+ - 0.9V)$.

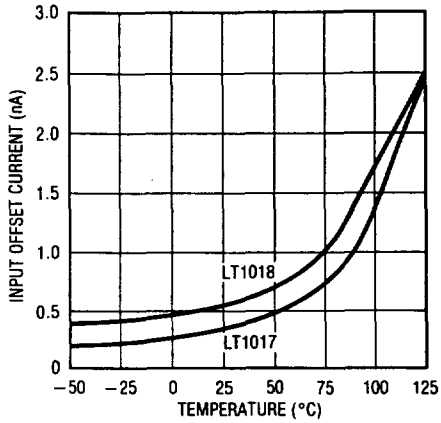
Note 2: No load gain is guaranteed but not tested (LT1017 only).

TYPICAL PERFORMANCE CHARACTERISTICS

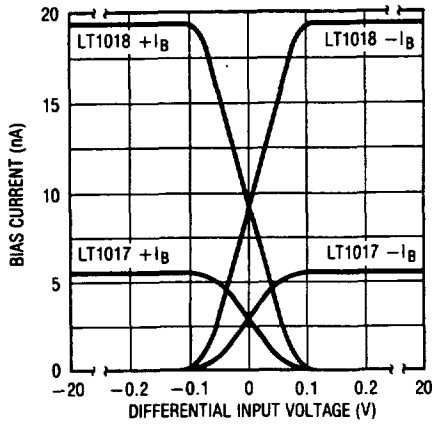
Input Bias Current



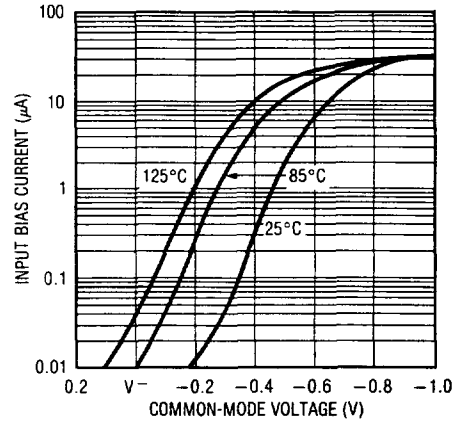
Input Offset Current



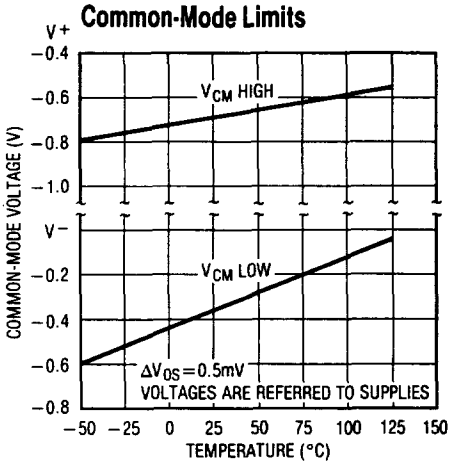
Bias Current vs Differential Input



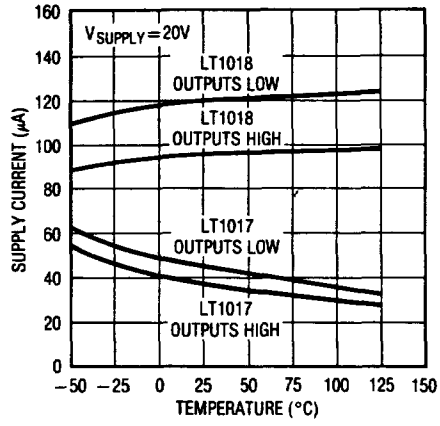
Input Bias Current with Inputs Driven Below the Supply



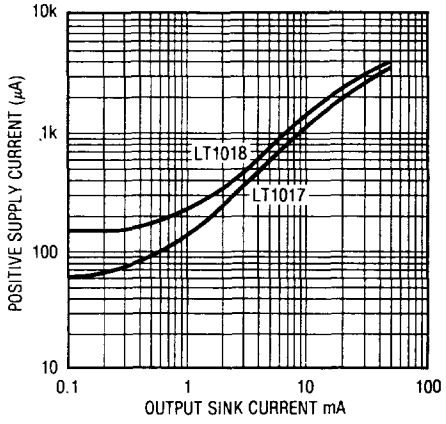
Common-Mode Limits



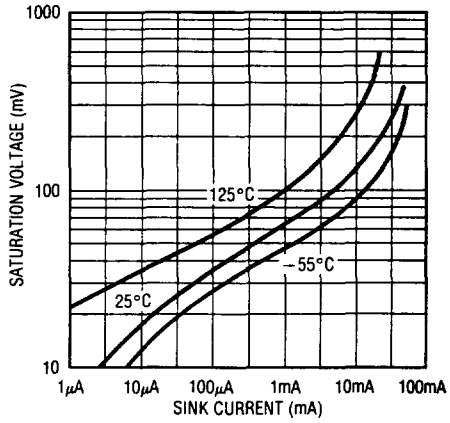
Supply Current



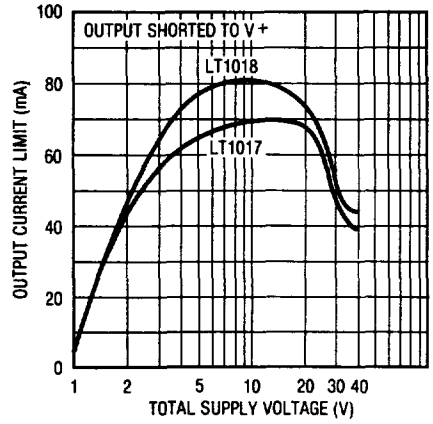
Positive Supply Current



NPN Output Saturation Voltage



Output Sinking Current Limit



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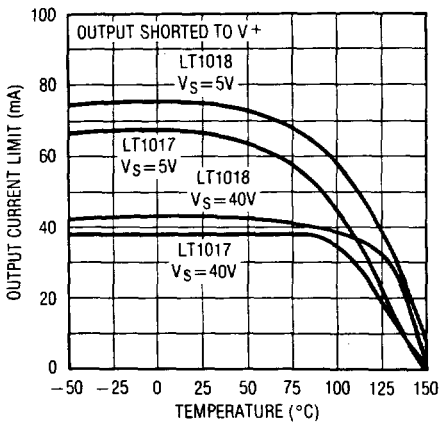
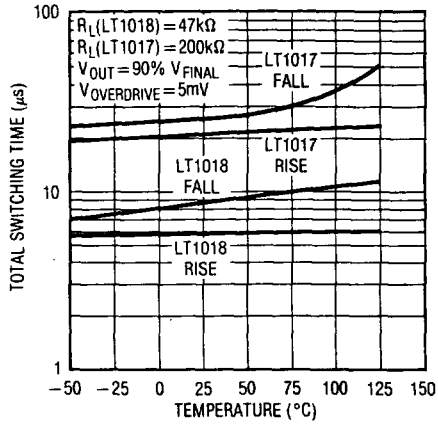
TYPICAL PERFORMANCE CHARACTERISTICS

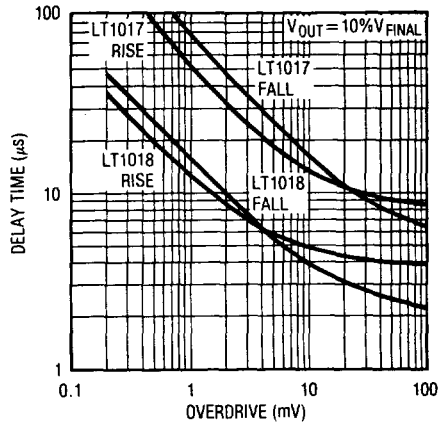
Output Sinking Current Limit



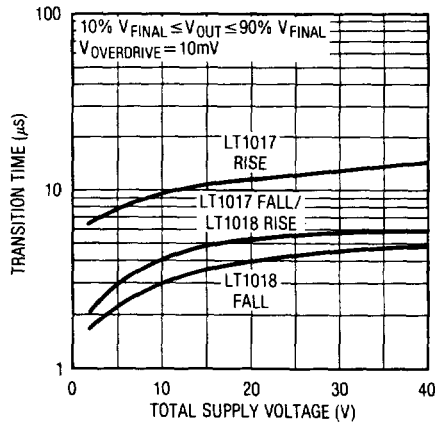
Total Switching Time



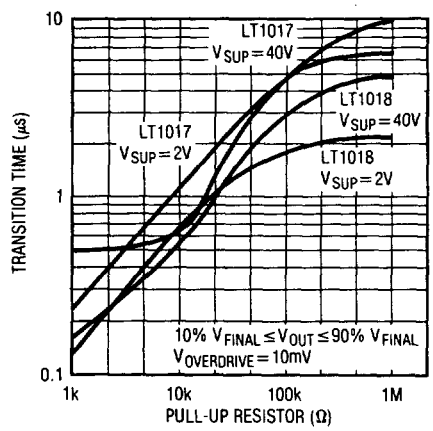
Output Delay



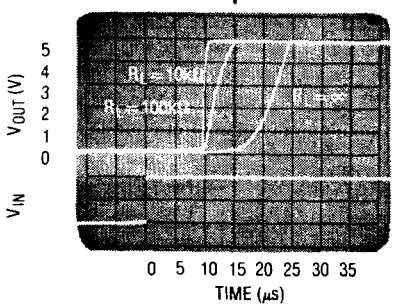
Transition Time



Positive Transition Time

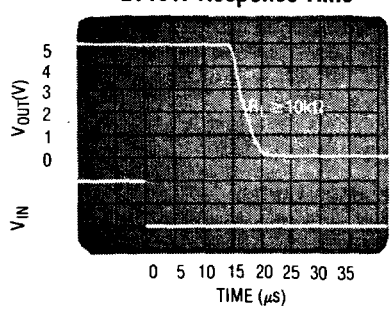


LT1017 Response Time



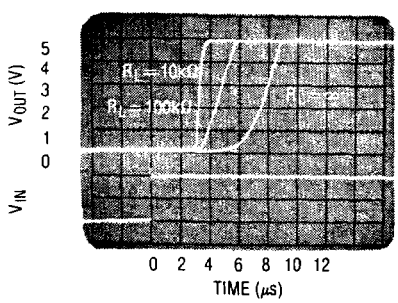
V+ = 5V; V– = 0V
VIN = 100mV WITH
10mV OVERDRIVE

LT1017 Response Time



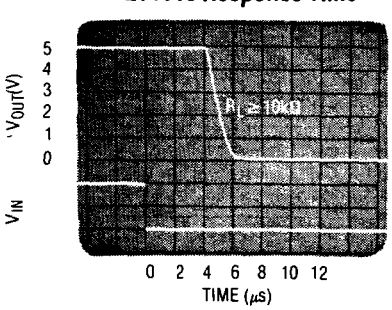
V+ = 5V; V– = 0V
VIN = 100mV WITH
10mV OVERDRIVE

LT1018 Response Time



V+ = 5V; V– = 0V
VIN = 100mV WITH
10mV OVERDRIVE

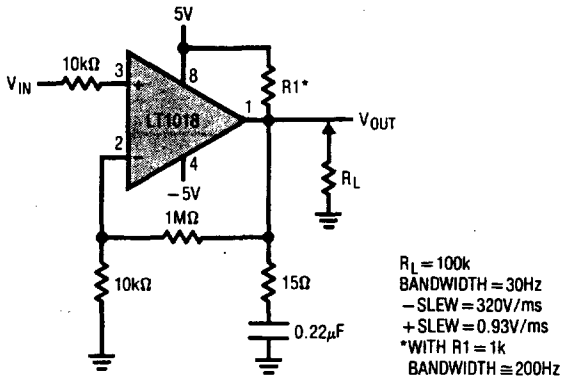
LT1018 Response Time



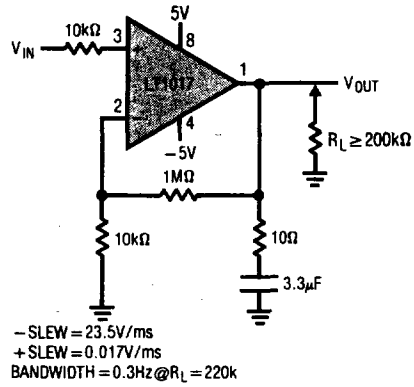
V+ = 5V; V– = 0V
VIN = 100mV WITH
10mV OVERDRIVE

APPLICATIONS

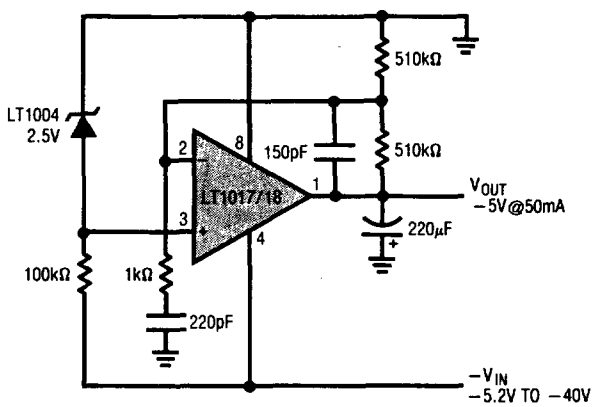
LT1018 Op Amp, $A_V = 100$



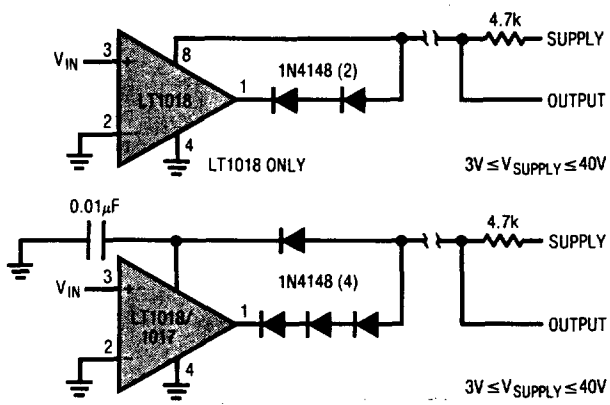
LT1017 Op Amp, $A_V = 100$



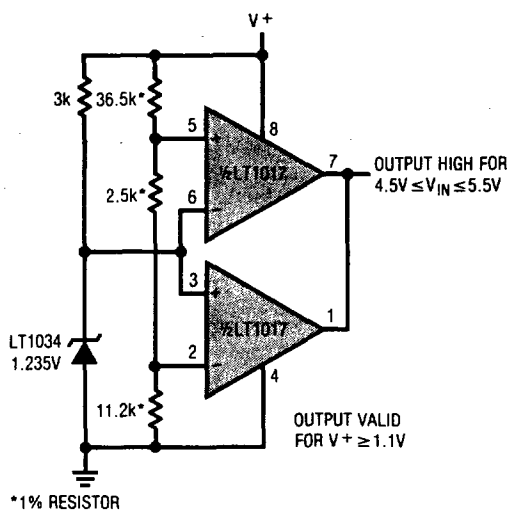
Negative Voltage Regulator



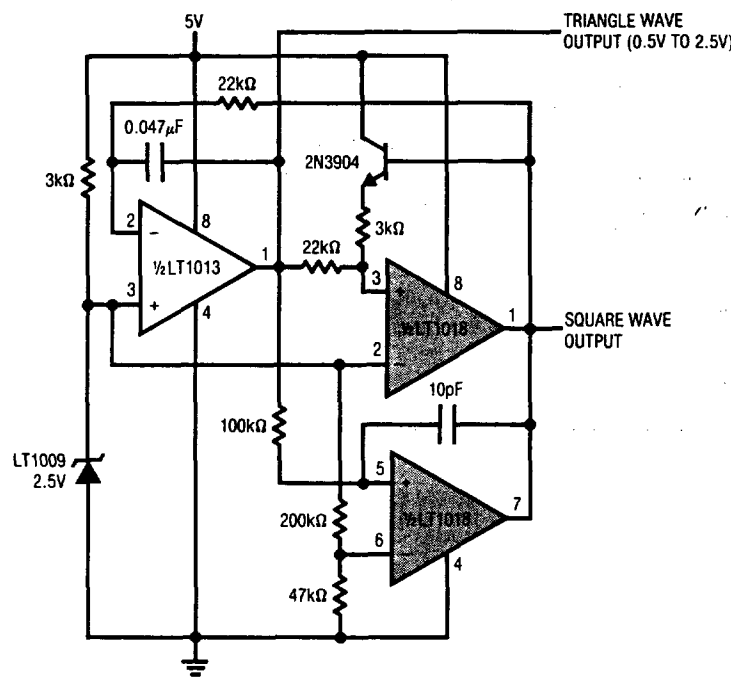
2-Wire Comparator



5V Power Supply Monitor



Precise Tri-Wave Generator



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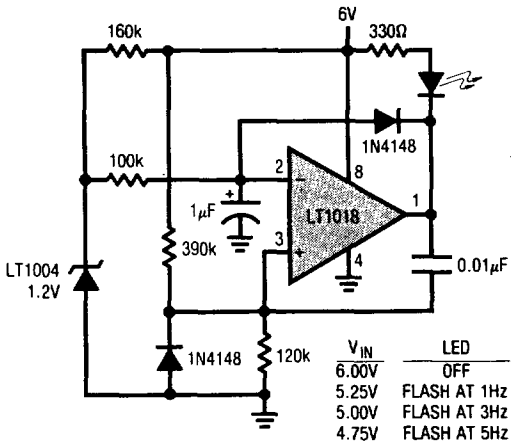
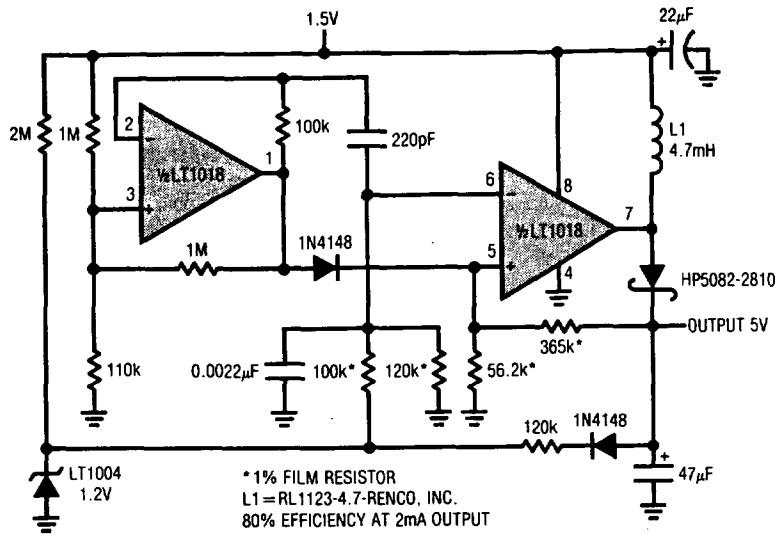
APPLICATIONS

Power Supply Monitor



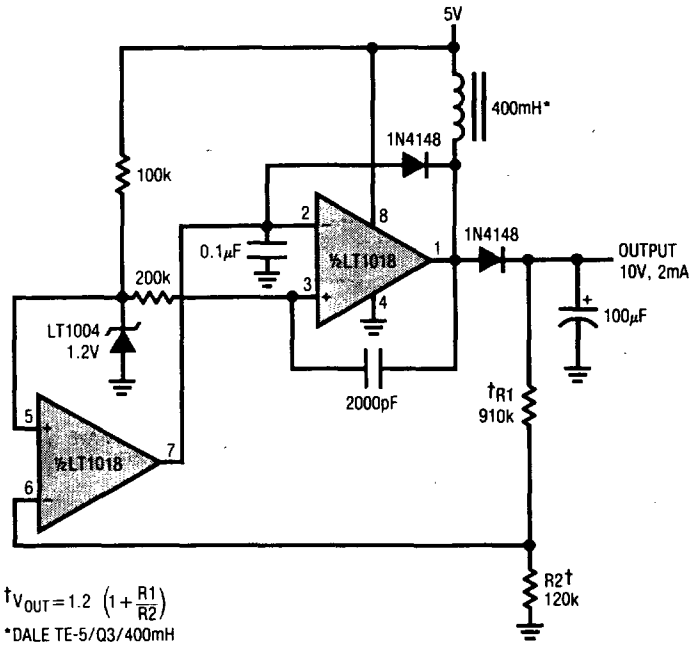
V_{IN}	LED
6.00V	OFF
5.25V	FLASH AT 1Hz
5.00V	FLASH AT 3Hz
4.75V	FLASH AT 5Hz

1.5V Input Flyback Regulator



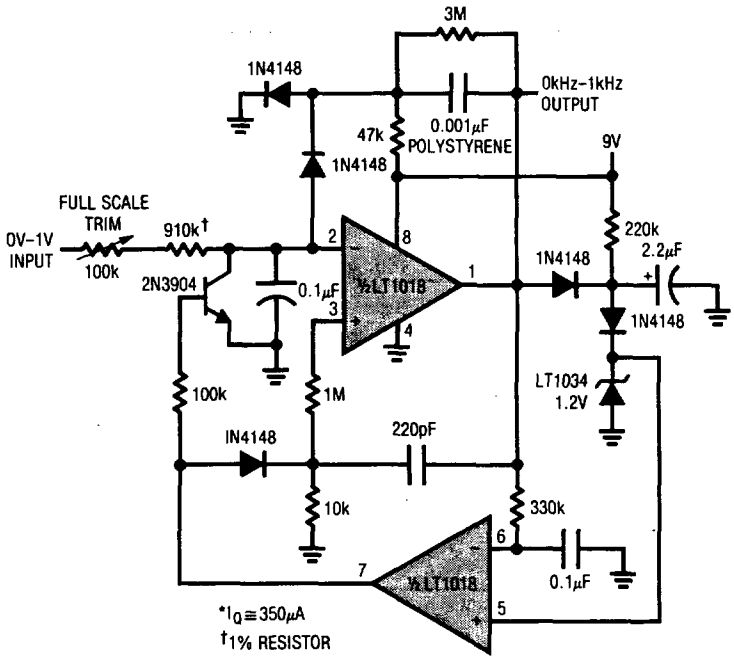
*1% FILM RESISTOR
L1=RL1123-4.7-RENCO, INC.
80% EFFICIENCY AT 2mA OUTPUT

Regulated Up Converter



$\dagger V_{OUT} = 1.2\ \left(1 + \frac{R1}{R2}\right)$
*DALE TE-5/Q3/400mH

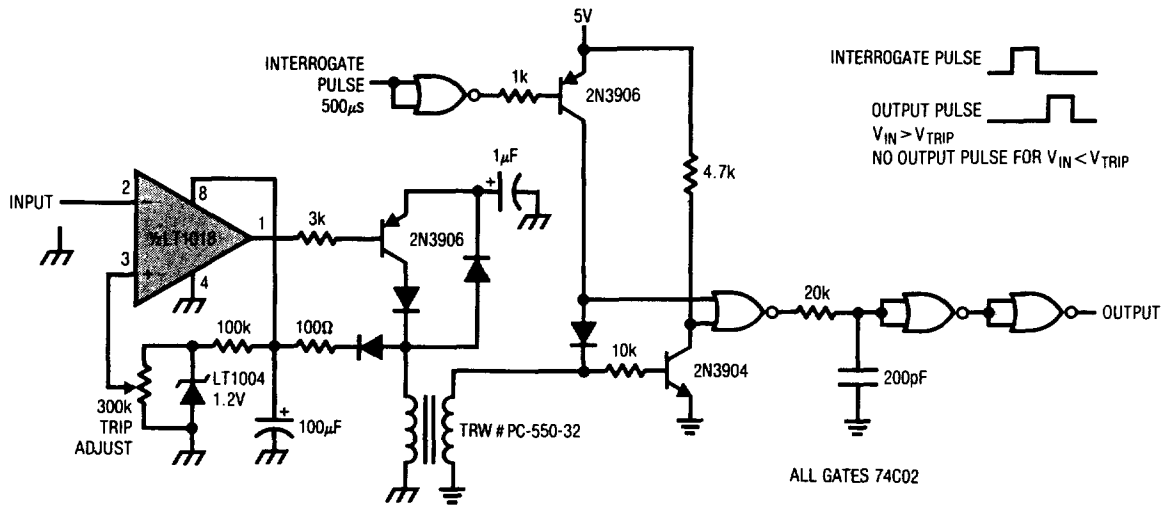
Low Power* V to F Converter



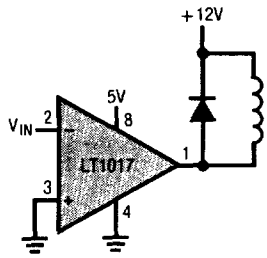
*$I_Q \cong 350\mu A$
†1% RESISTOR

APPLICATIONS

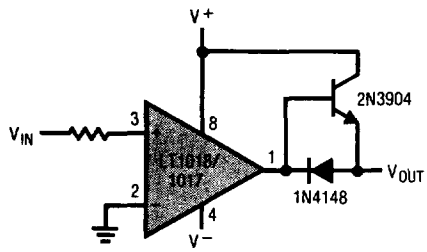
Fully Isolated Limit Comparator



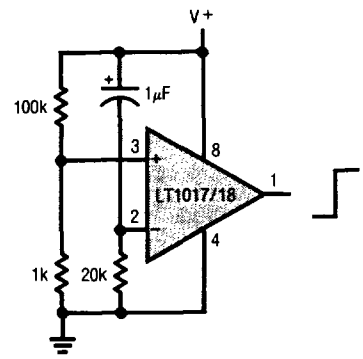
Driving Relays



Increasing Positive Output Current



Delay On Power Up



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