



ULC831

Advance

CMOS IC

MICRO-POWER, CMOS INPUT, RRIO, 1.4V, PUSH-PULL OUTPUT COMPARATOR

DESCRIPTION

The UTC **ULC831** is a push-pull output comparator, allowing operation from 1.4V-5.5V. It has the best-in-class power supply current versus propagation delay performance. It features as low as 6 μ s response time with 100mV overdrive at 1.4V, and it has an ultra low power supply current of 300nA (TYP).

The UTC **ULC831** series is ideally suited for RC timers, Window Detectors, IR Receivers, Multivibrators, Alarm and Monitoring Circuits.

The UTC **ULC831** rated over the -40°C to +85°C temperature range.

FEATURES

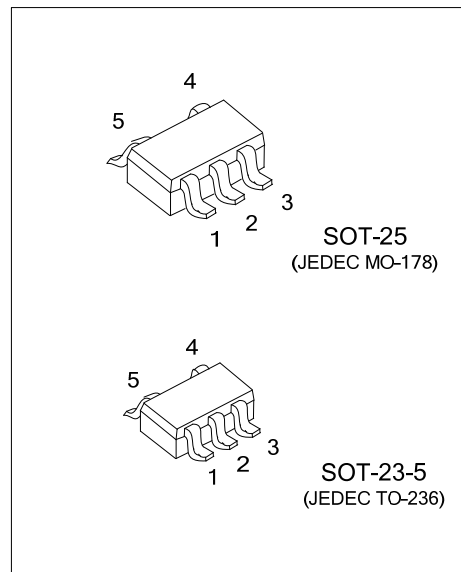
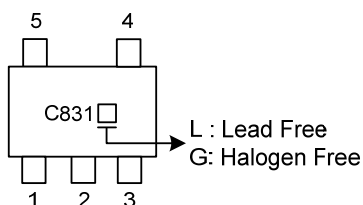
- * Very Low Supply Current: 300nA (TYP) at $V_S=1.4V$
- * Wide Supply Voltage Range: 1.4V~5.5V
- * Rail-to-Rail Input
- * High Speed: 6 μ s (TYP) at $V_S=1.4V$
- * Push-Pull Output Current Drive: 19mA (TYP) at $V_S=5V$
- * -40°C~+85°C Operating Temperature Range

ORDERING INFORMATION

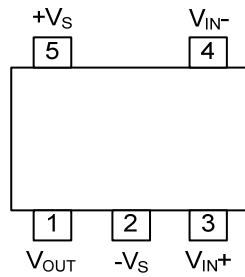
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULC831L-AE5-R	ULC831G-AE5-R	SOT-23-5	Tape Reel
ULC831L-AF5-R	ULC831G-AF5-R	SOT-25	Tape Reel

<p>ULC831G-AE5-R</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel (2) AE5: SOT-23-5, AF5: SOT-25 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



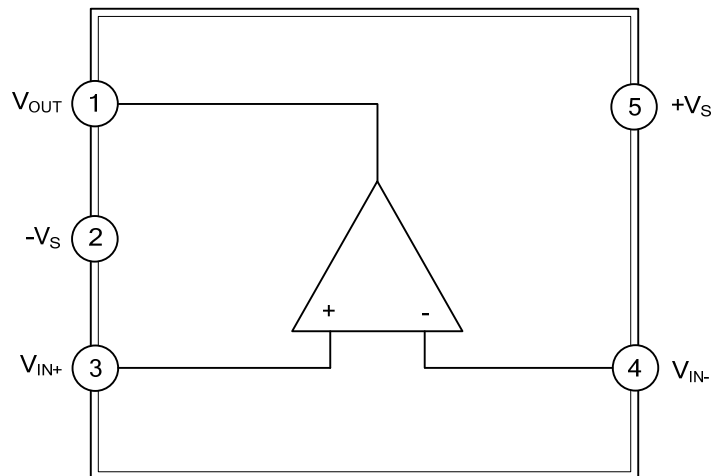
■ PIN CONFIGURATION



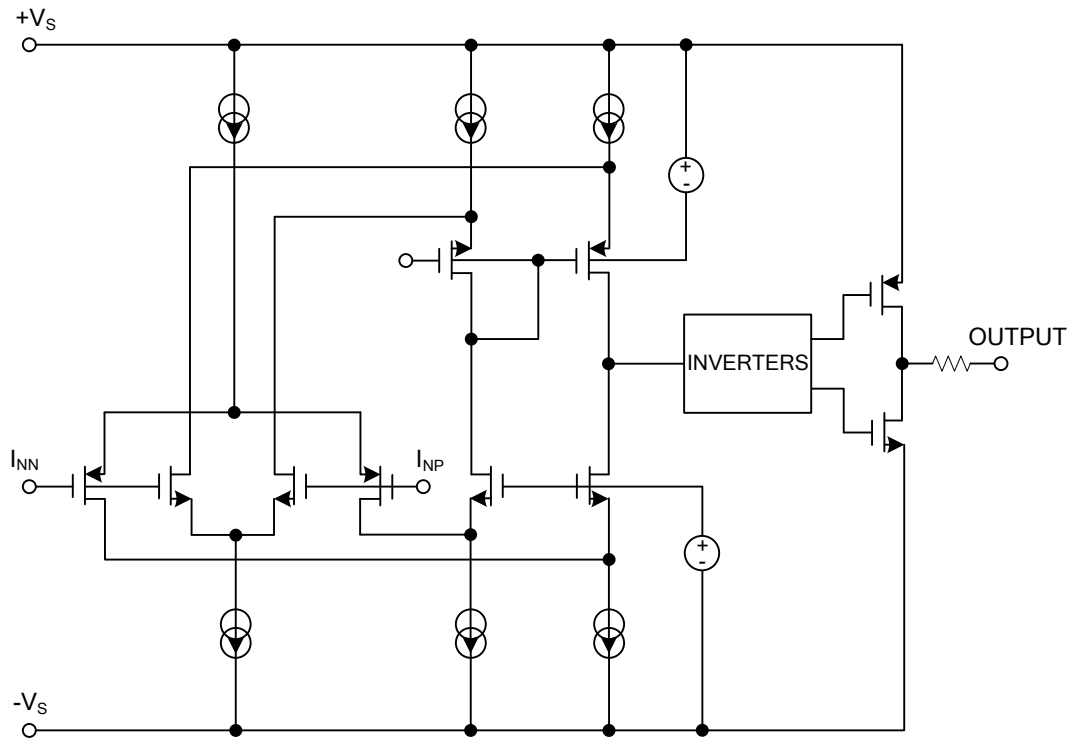
■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V_{OUT}	Output pin of Comparator
2	$-V_S$	Negative supply
3	V_{IN+}	Positive Input pin of Comparator
4	V_{IN-}	Negative Input pin of Comparator
5	$+V_S$	Positive supply

■ BLOCK DIAGRAM



■ SIMPLIFIED SCHEMATIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage, +V _S to -V _S		6	V
V _{IN} Differential		±V _S	V
Voltage at Input/Output Pins		(-V _S) - 0.3 ~ (+V _S) + 0.3	V
Junction Temperature	T _J	+150	°C
Operating Temperature Range	T _{OPR}	-40 ~ +85	°C
Storage Temperature	T _{STG}	-65 ~ +150	°C

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.

■ ELECTRICAL CHARACTERISTICS

(+V_S=1.4V, -V_S=0V, V_{CM}=+V_S/2 and V_O=-V_S, T_A=25°C, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current	I _S	V _{CM} =0.3V		300	1200	nA
		V _{CM} =1.1V		250	1200	nA
Input Offset Voltage	V _{OS}	V _{CM} =0V		0.5		mV
		V _{CM} =1.4V		0.5		mV
Input Offset Average Drift				2		µV/°C
Common Mode Rejection Ratio	CMRR	V _{CM} Stepped from 0V to 0.3V		65		dB
		V _{CM} Stepped from 0.8V to 1.4V		75		dB
		V _{CM} Stepped from 0V to 1.4V		75		dB
Power Supply Rejection Ratio	PSRR	V _S =1.8V~5.5V, V _{CM} =0V		95		dB
Large Signal Voltage Gain	A _{VO}			100		dB
Output Swing High	V _{OH}	V _S =1.8V, I _O =500µA	1.598	1.669		V
		-40°C ≤ T _A ≤ +85°C	1.581			V
		V _S =1.8V, I _O =1mA	1.324	1.508		V
		-40°C ≤ T _A ≤ +85°C	1.288			V
Output Swing Low	V _{OL}	V _S =1.8V, I _O =-500µA		82	112	mV
		-40°C ≤ T _A ≤ +85°C			127	mV
		V _S =1.8V, I _O =-1mA		167	225	mV
		-40°C ≤ T _A ≤ +85°C			253	mV
Output Current	I _{OUT}	Source		0.7		mA
		Sink		2.0		mA
Propagation Delay (High to Low)		Overdrive=10mV		12		µs
		Overdrive=100mV		6		µs
Propagation Delay (Low to High)		Overdrive=10mV		26		µs
		Overdrive=100mV		17		µs
Rise Time	t _{Rise}	Overdrive=10mV, C _L =30pF, R _L =1MΩ		220		ns
		Overdrive=100mV, C _L =30pF, R _L =1MΩ		220		ns
Fall Time	t _{Fall}	Overdrive=10mV, C _L =30pF, R _L =1MΩ		155		ns
		Overdrive=100mV, C _L =30pF, R _L =1MΩ		155		ns

■ ELECTRICAL CHARACTERISTICS (Cont.)

(+V_S=2.5V, -V_S=0V, V_{CM}=+V_S/2 and V_O=-V_S, T_A=25°C, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current	I _S	V _{CM} =0.3V		310		nA
		V _{CM} =2.2V		260		nA
Input Offset Voltage	V _{OS}	V _{CM} =0V		0.5		mV
		V _{CM} =2.5V		0.5		mV
Input Offset Average Drift				2		μV/°C
Common Mode Rejection Ratio	CMRR	V _{CM} Stepped from 0V to 1.4V		75		dB
		V _{CM} Stepped from 1.9V to 2.5V		80		dB
		V _{CM} Stepped from 0V to 2.5V		80		dB
Power Supply Rejection Ratio	PSRR	V _S =1.8V~5.5V, V _{CM} =0V		95		dB
Large Signal Voltage Gain	A _{VO}			100		dB
Output Swing High	V _{OH}	I _O =500μA		2.419		V
		I _O =1mA		2.333		V
Output Swing Low	V _{OL}	I _O =-500μA		66		mV
		I _O =-1mA		133		mV
Output Current	I _{OUT}	Source		5.3		mA
		Sink		7.7		mA
Propagation Delay (High to Low)		Overdrive=10mV		12		μs
		Overdrive=100mV		5		μs
Propagation Delay (Low to High)		Overdrive=10mV		28		μs
		Overdrive=100mV		19		μs
Rise Time	t _{Rise}	Overdrive=10mV, C _L =30pF, R _L =1MΩ		120		ns
		Overdrive=100mV, C _L =30pF, R _L =1MΩ		120		ns
Fall Time	t _{Fall}	Overdrive=10mV, C _L =30pF, R _L =1MΩ		85		ns
		Overdrive=100mV, C _L =30pF, R _L =1MΩ		70		ns

■ ELECTRICAL CHARACTERISTICS (Cont.)

(+V_S=5.0V, -V_S=0V, V_{CM}=+V_S/2 and V_O=-V_S, T_A=25°C, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Current	I _S	V _{CM} =0.3V		350	2000	nA
		V _{CM} =4.7V		300	2000	nA
Input Offset Voltage	V _{OS}	V _{CM} =0V		0.5		mV
		V _{CM} =5V		0.5		mV
Input Offset Average Drift				2		μV/°C
Common Mode Rejection Ratio	CMRR	V _{CM} Stepped from 0V to 3.9V		85		dB
		V _{CM} Stepped from 4.4V to 5.0V		85		dB
		V _{CM} Stepped from 0V to 5.0V		85		dB
Power Supply Rejection Ratio	PSRR	V _S =1.8V~5.5V, V _{CM} =0V		95		dB
Large Signal Voltage Gain	A _{VO}			105		dB
Output Swing High	V _{OH}	I _O =500μA	4.923	4.952		V
		-40°C ≤ T _A ≤ +85°C	4.916			V
		I _O =1mA	4.864	4.904		V
		-40°C ≤ T _A ≤ +85°C	4.848			V
Output Swing Low	V _{OL}	I _O =-500μA		52	80	mV
		-40°C ≤ T _A ≤ +85°C			90	mV
		I _O =-1mA		104	130	mV
		-40°C ≤ T _A ≤ +85°C			143	mV
Output Current	I _{OUT}	Source	14	18		mA
		-40°C ≤ T _A ≤ +85°C	12.1			mA
		Sink	15	19		mA
		-40°C ≤ T _A ≤ +85°C	12.9			mA
Propagation Delay (High to Low)		Overdrive=10mV		13		μs
		Overdrive=100mV		6		μs
Propagation Delay (Low to High)		Overdrive=10mV		42		μs
		Overdrive=100mV		33		μs
Rise Time	t _{Rise}	Overdrive=10mV, C _L =30pF, R _L =1MΩ		85		ns
		Overdrive=100mV, C _L =30pF, R _L =1MΩ		85		ns
Fall Time	t _{Fall}	Overdrive=10mV, C _L =30pF, R _L =1MΩ		70		ns
		Overdrive=100mV, C _L =30pF, R _L =1MΩ		60		ns

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