



ULC831

Preliminary

LINEAR INTEGRATED CIRCUIT

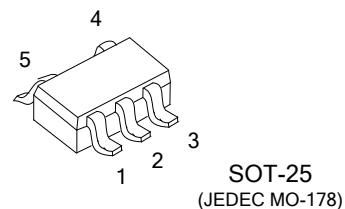
MICRO-POWER, CMOS INPUT, RRIO, 1.4V, PUSH-PULL OUTPUT COMPARATOR

DESCRIPTION

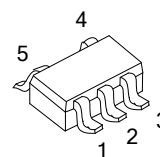
The UTC **ULC831** is a push-pull output comparator, allowing operation from 1.4V-5.5V. It has the best-in-class power supply current versus propagation delay performance. It features as low as 6 μ s response time with 100mV overdrive at 1.4V, and it has an ultra low power supply current of 300nA (TYP).

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

The UTC **ULC831** is available in Green SOT-25 space-saving packages. It is rated over the -40°C to +85°C temperature range.



SOT-25
(JEDEC MO-178)



SOT-23-5
(JEDEC TO-236)

FEATURES

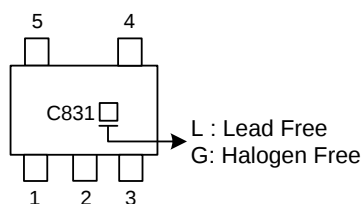
- * Very Low Supply Current: 300nA (TYP) at $V_S=1.4V$
- * Wide Supply Voltage Range: 1.4V~5.5V
- * Rail-to-Rail Input
- * High Speed: 6 μ s (TYP) at $V_S=1.4V$
- * Push-Pull Output Current Drive: 19mA (TYP) at $V_S=5V$
- * -40°C~+85°C Operating Temperature Range

ORDERING INFORMATION

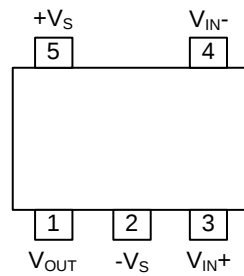
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULC831L-AE5-R	ULC831G-AE5-R	SOT-23-5	Tape Reel
ULC831L-AF5-R	ULC831G-AF5-R	SOT-25	Tape Reel

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



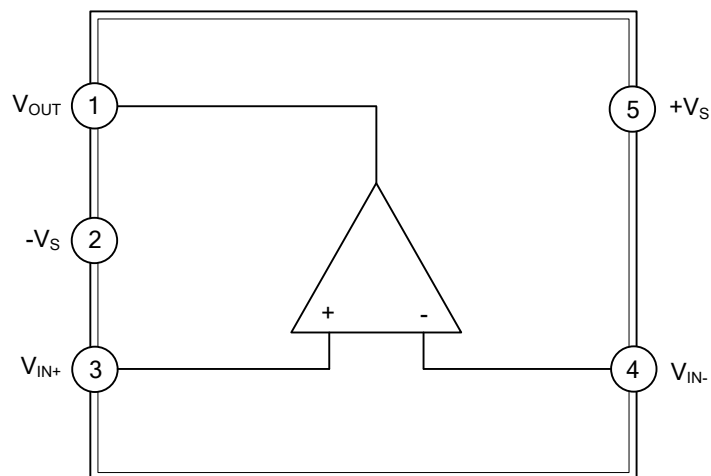
■ PIN CONFIGURATION



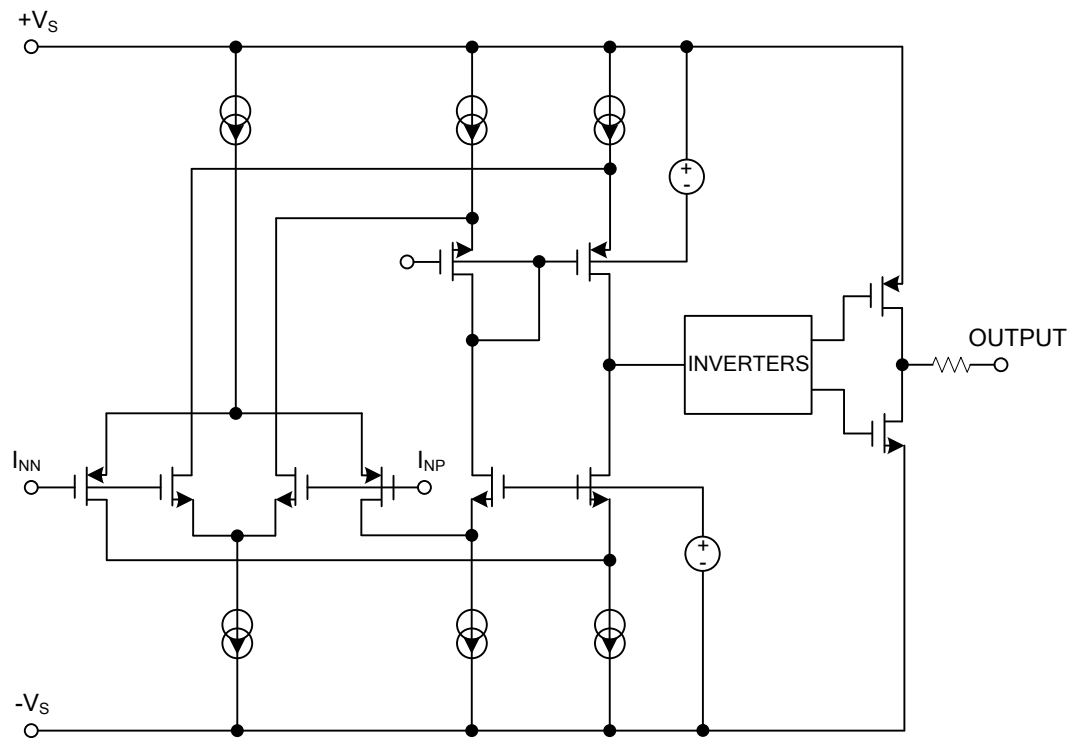
■ PIN DESCRIPTION

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		± 2.5	V
Voltage at Input/Output Pins		$(-V_S) - 0.3 \sim (+V_S) + 0.3$	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 $V_O=-V_S$, $T_A=25^\circ C$, 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		$\mu V/^\circ C$
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	$V_S=1.8V \sim 5.5V$, $V_{CM}=0V$		95		dB
Large Signal Voltage Gain	A_{VO}			100		dB
Output Swing High	V_{OH}	$V_S=1.8V$, $I_O=500\mu A$	1.598	1.669		V
		$-40^\circ C \leq T_A \leq +85^\circ C$	1.581			V
		$V_S=1.8V$, $I_O=1mA$	1.324	1.508		V
		$-40^\circ C \leq T_A \leq +85^\circ C$	1.288			V
Output Swing Low	V_{OL}	$V_S=1.8V$, $I_O=-500\mu A$		82	112	mV
		$-40^\circ C \leq T_A \leq +85^\circ C$			127	mV
		$V_S=1.8V$, $I_O=-1mA$		167	225	mV
		$-40^\circ C \leq T_A \leq +85^\circ C$			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, $C_L=30pF$, $R_L=1M\Omega$		220		ns
		Overdrive=100mV, $C_L=30pF$, $R_L=1M\Omega$		220		ns
Fall Time	t_{Fall}	Overdrive=10mV, $C_L=30pF$, $R_L=1M\Omega$		155		ns
		Overdrive=100mV, $C_L=30pF$, $R_L=1M\Omega$		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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