



LMV931

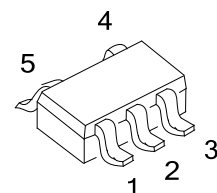
Preliminary

CMOS IC

1.8V OPERATIONAL AMPLIFIERS WITH RAIL-TO-RAIL INPUT AND OUTPUT

■ DESCRIPTION

The UTC **LMV931** is a low-voltage, low-power, operating for operation of 1.8V to 5.5V, it can be used in portable applications that is powered from a single-cell Li-ion or two-cell batteries. It has rail-to-rail input and output capability for maximum signal swings in low-voltage application. The UTC **LMV931** input common-mode voltage extends 200 mV beyond the rails for increased flexibility. The output can swing rail-to-rail unloaded and typically can reach 105mV from the rails, while driving a 600Ω load (at 1.8V operation).



SOT-25

During 1.8V operation, the devices typically consume a quiescent current of 80μA, and yet it is able to achieve excellent electrical specifications. Furthermore, the amplifier offer good output drive characteristic, with the ability to drive a 600Ω load with minimal ringing.

■ FEATURES

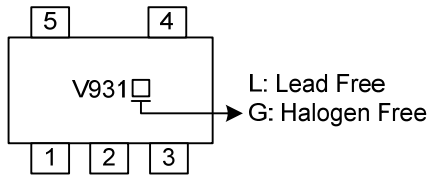
- * Supply Voltage:1.8~5.5V
- * Supply Current/Amplifier:210 μA (Max)
- * Input Offset Voltage:4mV (Max)
- * Rail-to-Rail Input and Output
- * Slew Rate: 0.75V/μs (Typ.)

■ ORDERING INFORMATION

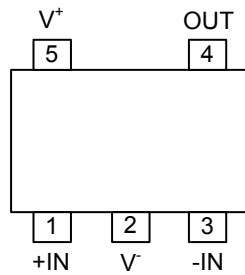
Ordering Number		Package	Packing
Lead Free	Halogen Free		
LMV931L-AF5-R	LMV931G-AF5-R	SOT-25	Tape Reel

LMV931G-AF5-R	
(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) AF5: SOT-25
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

MARKING



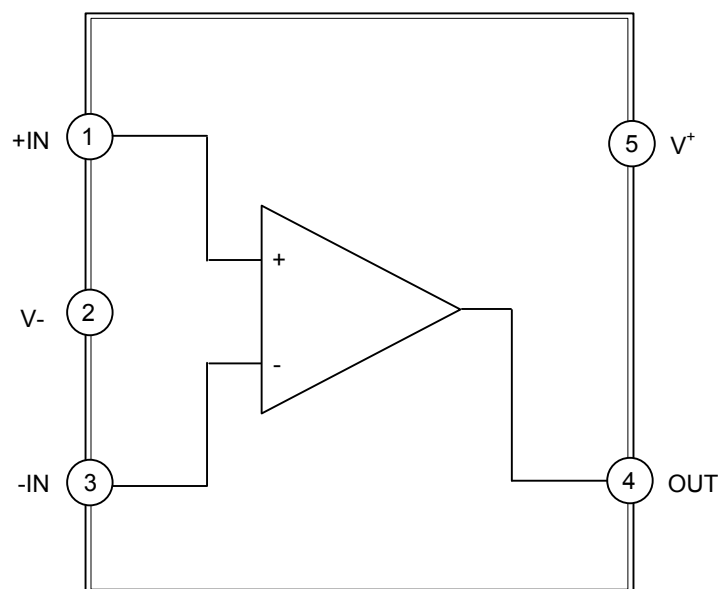
PIN CONFIGURATION



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	+IN	Non-inverting Input
2	V ⁻	Negative Supply Input
3	-IN	Inverting Input
4	OUT	Output
5	V ⁺	Positive Supply Input

BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+-V^-	6	V
Differential Input Voltage	V_{ID}	Supply voltage	V
Input or Output Pin Voltage		$V^- - 0.2 \sim V^+ + 0.2$	V
Junction Temperature	T_J	+150	°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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	206	°C/W

■ RECOMMENDED OPERATING CONDITIONS

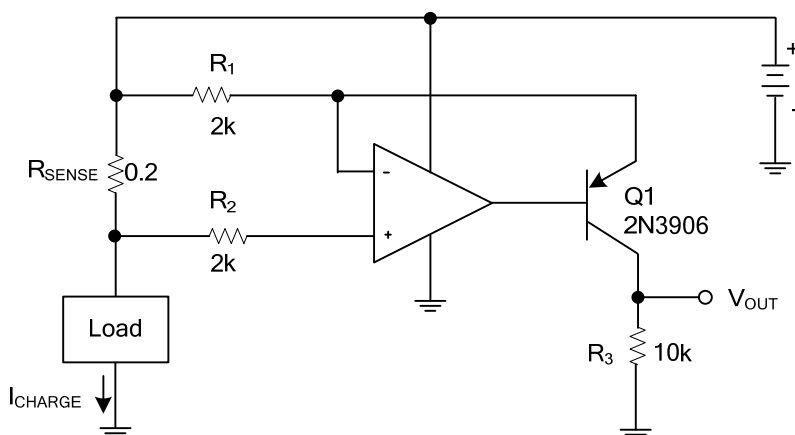
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+-V^-	1.8 ~ 5.5	V
Operating Free-Air Temperature	T_{OPR}	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

($T_A=25^\circ\text{C}$, $V^+=1.8\sim 5\text{V}$, $V^-=0\text{V}$, $V_{IC}=V^+/2$, $V_O=V^+/2$, and $R_L > 1\text{ M}\Omega$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Supply Current/Amplifier	I _Q				120	210	μA
Power Supply Rejection Ratio	PSRR	1.8V ≤ V ₊ ≤ 5V, V _{IC} =0.5V		75	100		dB
Input Offset Voltage	V _{OS}				1	4	mV
Input Offset Voltage Drift	ΔV _{OS} /ΔT				10		μ/°C
Input Bias Current	I _B				20		nA
Input Offset Current	I _{OS}				10		nA
Common-Mode Voltage Range	V _{CM}			V ⁻ -0.2		V ⁺ -0.2	V
Common-Mode Rejection Ratio	CMRR	0V ≤ V _{IC} ≤ 1.5V, 2.3V ≤ V _{IC} ≤ 2.7V		60	85		dB
		-0.2V ≤ V _{IC} ≤ 0V, 2.7V ≤ V _{IC} ≤ 2.9V		50	78		dB
Large Signal Voltage Gain	A _V	R _L =600Ω, V _O =0.2V to V ⁺ -0.2V		82	96		dB
		R _L =2kΩ, V _O =0.2V to V ⁺ -0.2V		88	105		dB
Output Voltage	V _O	R _L =600Ω, V _{ID} =±100mV	V _{OH}	V ⁺ -0.14 5V	V ⁺ -0.09 V		V
			V _{OL}		0.12	0.16	V
		R _L =2kΩ, V _{ID} =±100mV	V _{OH}	V ⁺ -0.05 5V	V ⁺ -0.03 V		V
			V _{OL}		0.037	0.065	V
Slew Rate	SR				0.75		V/μS
Gain Bandwidth Product	GBW				2.2		MHz
Phase Margin	φ _M				70		°
Gain Margin					7.5		dB
Equivalent Input Noise Voltage	V _n	f=1kHz			50		nV √Hz
Equivalent Input Noise Current	I _n	f=1kHz			0.07		pA √Hz
Total Harmonic Distortion	THD	f=1kHz, A _V =1, R _L =600Ω, V _{ID} =1V _{p-p}			0.05		%

■ TYPICAL APPLICATION CIRCUIT



$$V_{OUT} = \frac{R_{SENSE} \cdot R_3}{R_1} \cdot I_{CHARGE} = 1\Omega \cdot I_{CHARGE}$$

High-Side Current Sense Amplifier

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