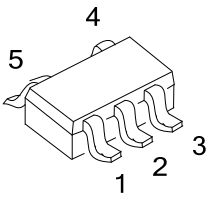
1.8V OPERATIONAL AMPLIFIERS WITH RAIL-TO-RAIL INPUT AND OUTPUT



SOT-25

■ 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).

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

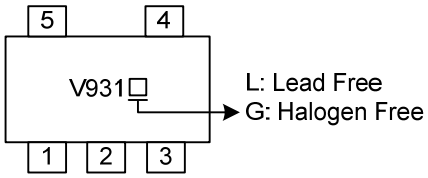
* Supply Voltage:1.8~5.5V
* Supply Current/Amplifier:210 μA (Max)
* Input Offset Voltage:4mV (Max)
* Rail-to-Rail Input and Output
* Slew Rate: 0.75V/μs (Typ.)

■ ORDERING INFORMATION

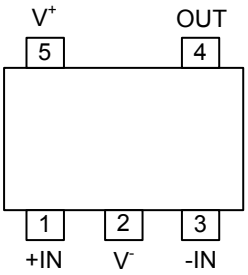
Ordering Number		Package	Packing
Lead Free	Halogen Free		
LMV931L-AF5-R	LMV931G-AF5-R	SOT-25	Tape Reel

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

■ MARKING



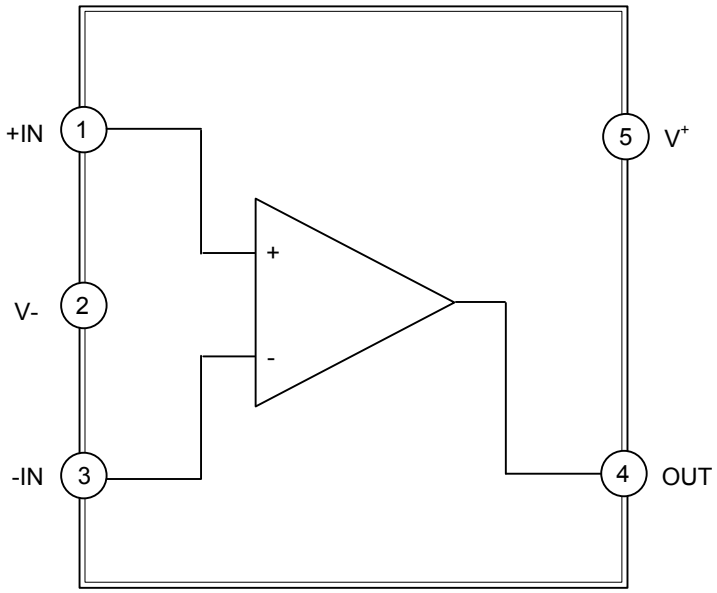
■ PIN CONFIGURATION



■ 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 ~ 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

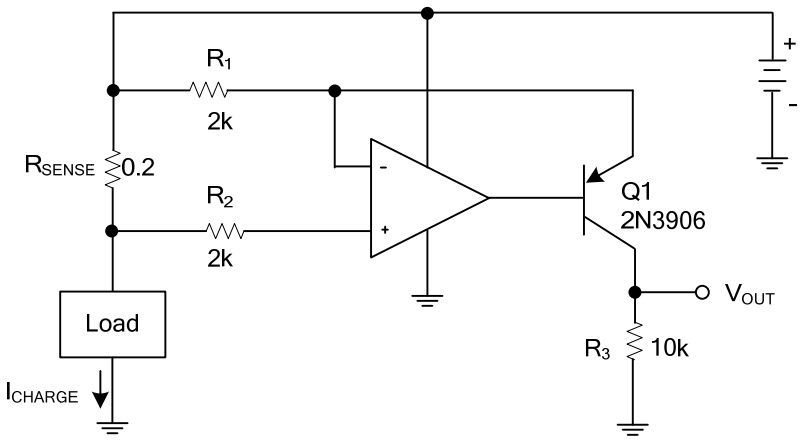
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+-V^-	1.8 ~ 5.5	V
Operating Free-Air Temperature	T_{OPR}	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

(T_A=25°C, V^+=1.8~5V, V^-=0V, V_{IC}=V^+/2, V_O=V^+/2, and R_L > 1 MΩ, 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, VIC=0.5V		75	100		dB
Input Offset Voltage	V_{OS}				1	4	mV
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta_T$				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^+-0.145V	V^+-0.09V		V
			V_{OL}		0.12	0.16	V
		R_L=2kΩ, V_{ID}=±100mV	V_{OH}	V^+-0.055V	V^+-0.03V		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 $\sqrt{Hz}$
Equivalent Input Noise Current	I_n	f=1kHz			0.07		pA $\sqrt{Hz}$
Total Harmonic Distortion	THD	f=1kHz,A_V=1, R_L=600Ω, V_{ID}=1V_{p-p}			0.05		%

■ TYPICAL APPLICATION CIRCUIT



$$V_{OUT}=\frac{R_{SENSE}*R_3}{R_1}*Ic_{harge}=1\Omega*I_{Charge}$$

High-Side Current Sense Amplifier