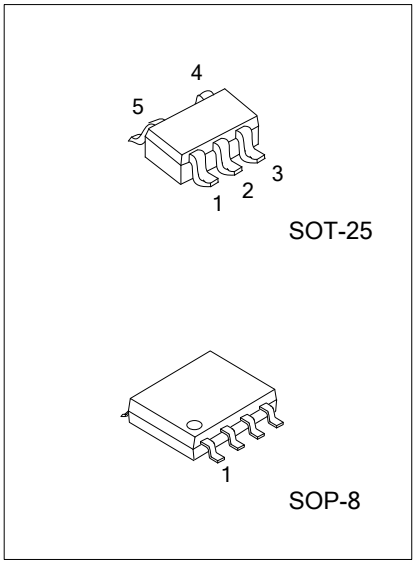
ULV8538

CMOS IC

LOW POWER, PRECISION, AUTO-ZERO OP AMPS



■ DESCRIPTION

The UTC **ULV8538** is very high precision amplifiers featuring extremely low offset voltage, low input bias current, and low power consumption. The supply current is less than 215μA maximum per amplifier at 5.0V. Operation is fully specified from 2.7V to 5.0V single supply (±1.35V to ±2.5V dual supply).

The UTC **ULV8538** operates at very low power making these amplifiers ideal for battery-powered devices and portable equipment.

■ FEATURES

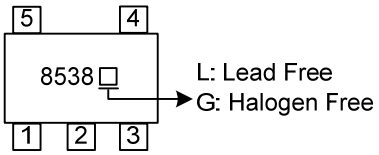
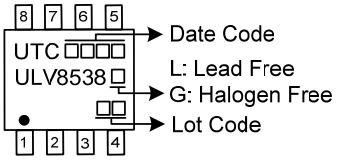
* Single-supply operation: 2.7V~5.5V
* Low supply current: 180μA
* Low offset voltage: 13μV maximum
* High gain, CMRR, and PSRR
* Qualified for automotive applications

■ ORDERING INFORMATION

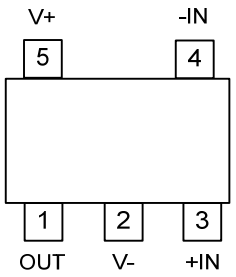
Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV8538L-AF5-R	ULV8538G-AF5-R	SOT-25	Tape Reel
ULV8538L-S08-R	ULV8538G-S08-R	SOP-8	Tape Reel

ULV8538G-AF5-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AF5: SOT-25, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free

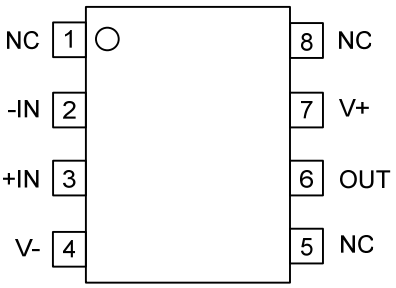
■ MARKING

SOT-25	SOP-8
	

■ PIN CONFIGURATION



SOT-25

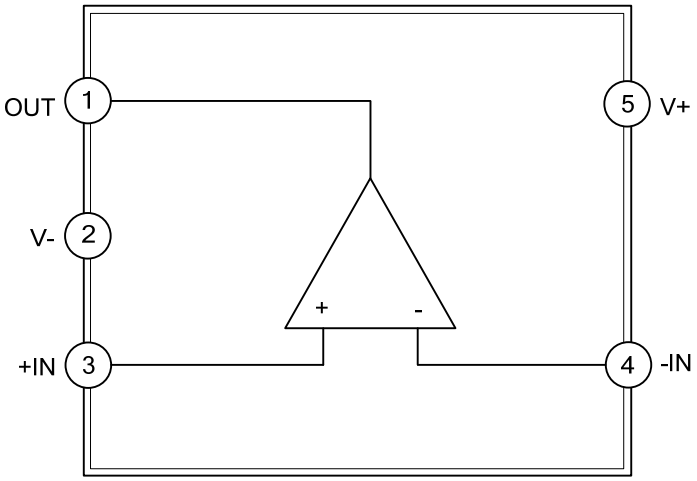


SOP-8

■ PIN DESCRIPTION

PIN NO.		PIN NAME	DESCRIPTION
SOT-25	SOP-8		
1	6	OUT	Output
2	4	V-	Negative (lowest) power supply
3	3	+IN	Non-inverting input
4	2	-IN	Inverting input
5	7	V+	Positive (highest) power supply
-	1, 5, 8	NC	No connection

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	+6	V
Input Voltage		V_{SS} - 0.3 ~ V_{DD} + 0.3	V
Differential Input Voltage		±6	V
Junction Temperature Range	T_J	-65 ~ +150	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C
Operating Temperature Range	T_{OPR}	-40 ~ +125	°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=5.0V, V_{CM}=2.5V, V_O=2.5V, T_A=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			5	13	μV
Input Bias Current	I_B			15		pA
Input Offset Current	I_{OS}			20		pA
Input Voltage Range			0		5	V
Common-Mode Rejection Ratio	CMRR	V_{CM}=0V~5V	105	120		dB
Large Signal Voltage Gain	A_{VO}	R_L=10kΩ, V_O=0.1V~4.9V	115	141		dB
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	R_L=100kΩ to Ground	4.99	4.998		V
		R_L=10kΩ to Ground	4.95	4.970		V
Output Voltage Low	V_{OL}	R_L=100kΩ to V+		8	20	mV
		R_L=10kΩ to V+		22	30	mV
Short-Circuit Limit	I_{SC}			±25		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S=2.7V~5.0V	105	125		dB
Supply Current/Amplifier	I_{SY}	I_O=0		150	180	μA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L=10kΩ		0.4		V/μs
Settling Time 0.01%	t_S	G=±1.2V step, C_L=20pF, R_L= 1kΩ		10		μs
Overload Recovery Time				0.05		ms
Gain Bandwidth Product	GBP			430		kHz
Phase Margin	$Ø_M$	R_L=10kΩ, R_L=100kΩ, C_L=20pF		65		Degrees
NOISE PERFORMANCE						
Voltage Noise	$e_{n\ p-p}$	f=0.1Hz~10Hz		2.0		μV p-p
Voltage Noise Density	e_n	f=1kHz		50		nV/√Hz

■ ELECTRICAL CHARACTERISTICS

(V_S=2.7V, V_{CM}=1.35V, V_O=1.35V, T_A=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			5	13	μV
Input Bias Current	I_B			15		pA
Input Offset Current	I_{OS}			20		pA
Input Voltage Range			0		2.7	V
Common-Mode Rejection Ratio	CMRR	V_{CM}=0V~2.5V	100	115		dB
Large Signal Voltage Gain	A_{VO}	R_L=10kΩ, V_O=0.1V~1.7V	110	140		dB
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	R_L=100kΩ to Ground	2.68	2.698		V
		R_L=10kΩ to Ground	2.65	2.67		V
Output Voltage Low	V_{OL}	R_L=100kΩ to V+		7	20	mV
		R_L=10kΩ to V+		22	30	mV
Short-Circuit Limit	I_{SC}			±8		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_S=2.7V~5.5V	105	125		dB
Supply Current/Amplifier	I_{SY}	I_O=0		150	180	μA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L=10kΩ		0.35		V/μs
Settling Time 0.01%	t_S	G=±1.1V step, C_L=20pF, R_L=1kΩ		5		μs
Overload Recovery Time				0.05		ms
Gain Bandwidth Product	GBP			430		kHz
Phase Margin	$Ø_M$	R_L=10kΩ, R_L=100kΩ, C_L=20pF		65		Degrees
NOISE PERFORMANCE						
Voltage Noise	$e_{n\ p-p}$	f=0.1Hz~10Hz		2.0		μV p-p
Voltage Noise Density	e_n	f=1kHz		50		nV/√Hz