



ULV3541

Preliminary

CMOS IC

220MHz, RAIL-TO-RAIL I/O, CMOS OPERATIONAL AMPLIFIER

DESCRIPTION

The UTC **ULV3541** is high-speed, voltage-feedback CMOS operational amplifiers. It is designed for video and other applications which require wide bandwidth. It is unity-gain stable and can provide large output current. Quiescent current is only 4.5mA/Amplifier.

The UTC **ULV3541** is optimized for operation on single or dual supplies as low as 2.5V ($\pm 1.25V$) and up to 5.5V ($\pm 2.75V$). Input common mode range extends beyond the supplies. The output swing is within 15mV of the rails, supporting wide dynamic range.

The UTC **ULV3541** is suitable for applications requiring high continuous output current.

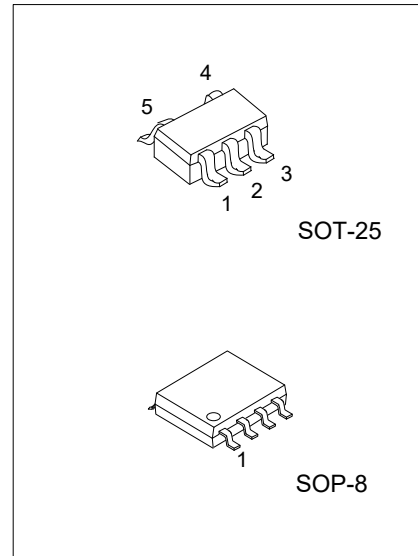
FEATURES

- * 2.5V to 5.5V Single Supply or $\pm 1.25V$ to $\pm 2.75V$ Dual Power Supplies
- * Quiescent Current: 4.5mA/Amplifier (TYP)
- * Wide Bandwidth: 100MHz GBP
- * Unity-Gain Bandwidth: 220MHz
- * Rail-to-Rail Input and Output
- * High Slew Rate: 160V/ μs
- * High Output Current: 150mA (TYP)
- * Thermal Shutdown

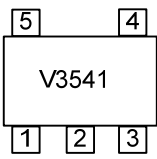
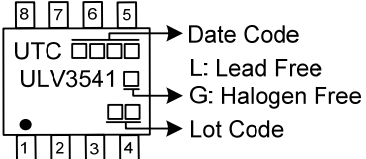
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULV3541L-AF5-R	ULV3541G-AF5-R	SOT-25	Tape Reel
ULV3541L-S08-R	ULV3541G-S08-R	SOP-8	Tape Reel

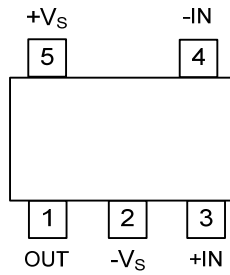
<p>ULV3541G-AF5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AF5: SOT-25, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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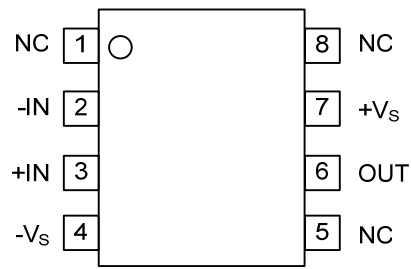
■ MARKING

SOT-25	SOP-8
 <p>A diagram of a SOT-25 package showing a rectangular chip with the text "V3541" in the center. The top-left corner is labeled "5" and the top-right corner is labeled "4". The bottom-left corner is labeled "1", the bottom-middle is labeled "2", and the bottom-right is labeled "3".</p>	 <p>A diagram of an SOP-8 package showing a rectangular chip with the text "UTC" and "ULV3541" on the top-left. The top-left corner is labeled "8", the top-middle is labeled "7", the top-right is labeled "6", and the top-most right corner is labeled "5". The bottom-left corner is labeled "1", the bottom-middle is labeled "2", the bottom-right is labeled "3", and the bottom-most right corner is labeled "4". To the right of the chip, there are three arrows pointing to specific locations: the top-right corner is labeled "Date Code", the middle-right edge is labeled "L: Lead Free" and "G: Halogen Free", and the bottom-right corner is labeled "Lot Code".</p>

■ PIN CONFIGURATION



SOT-25

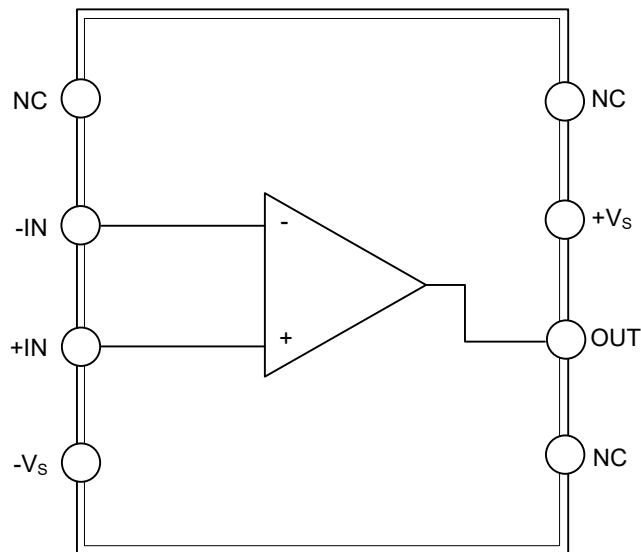


SOP-8

■ PIN DESCRIPTION

PIN NO.		PIN NAME	DESCRIPTION
SOT-25	SOP-8		
-	1, 5, 8	NC	No connect
4	2	-IN	Invert input pin of AMP
3	3	+IN	Non-invert input pin of AMP
2	4	-Vs	Negative supply
1	6	OUT	Output pin of AMP
5	7	+Vs	Positive supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage, +V _S to -V _S	V _S	7.5	V
Input Common Mode Voltage Range	V _{CM}	(-V _S)-0.1 ~ (+V _S)+0.1	V
Signal Input Terminals Voltage Range		(-V _S)-0.5 ~ (+V _S)+0.5	
Junction Temperature	T _J	+150	°C
Storage Temperature Range	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.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage Range		2.5 ~ 5.5	V
Operating Temperature Range	T _{OPR}	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

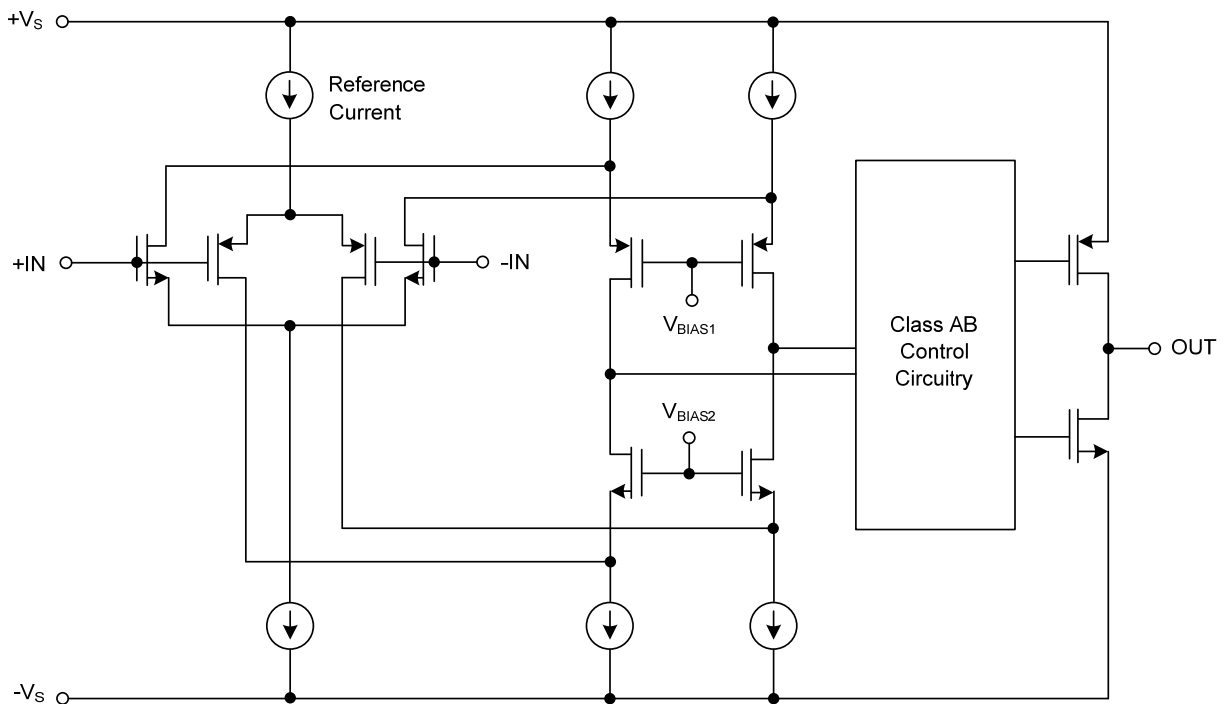
(At T_A=+25°C, V_S=2.7~5.5V, V_{CM}=V_S/2, V_{OUT}=V_S/2, R_L=1kΩ connected to V_S/2, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
INPUT CHARACTERISTICS						
Input Offset Voltage	V _{OS}	V _S =5V		2.0	10	mV
Input Bias Current	I _B			3		pA
Input Offset Current	I _{OS}			1		pA
Common-Mode Voltage Range	V _{CM}		(-V _S) - 0.1		(+V _S) + 0.1	V
Common-Mode Rejection Ratio	CMRR	V _S =5.5V, -0.1V < V _{CM} < 5.6V	56	71		dB
		V _S =5.5V, -0.1V < V _{CM} < 3.5V	60	71		dB
Open-Loop Voltage Gain	A _{OL}	(-V _S)+0.3V < V _{OUT} < (+V _S)-0.3V, R _L = 1kΩ	89	109		dB
		(-V _S)+0.4V < V _{OUT} < (+V _S)-0.4V, R _L = 1kΩ	89	109		dB
INPUT IMPEDANCE						
Differential				10 ¹² 4		Ω pF
Common Mode				10 ¹² 6		Ω pF
OUTPUT CHARACTERISTICS						
Output Voltage Swing from Rail	V _O	V _S =5V, R _L =1kΩ		15	62	mV
Short-Circuit Current	I _{SC}	V _S =5V	110	150		mA
		V _S =3V		90		mA
Closed-Loop Output Impedance		f < 100kHz		0.1		Ω

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DYNAMIC PERFORMANCE						
-3dB Small-Signal Bandwidth	f _{3dB}	G = +1, V _{OUT} =100mV _{PP} , R _F =25Ω		220		MHz
		G = +2, V _{OUT} =100mV _{PP}		106		MHz
Gain-Bandwidth Product	GBP	G = +10, V _{OUT} =100mV _{PP}		100		MHz
Bandwidth for 0.1dB Gain Flatness		G = +2, V _{OUT} =100mV _{PP}		30		MHz
Slew Rate	SR	V _S =5V, V _{OUT} =2V _{PP}		160		V/μs
		V _S =5V, V _{OUT} =4V _{PP}		170		V/μs
Rise-and-Fall Time		G = +1, V _{OUT} =200mV _{PP} , 10% to 90%		3.5		ns
		G = +1, V _{OUT} =2V _{PP} , 10% to 90%		12		ns
Settling Time to 0.1%	t _S	V _{OUT} =2V _{PP}		75		ns
		V _{OUT} =4V _{PP}		35		ns
Overload Recovery Time	t _{OR}	V _{IN} × G = V _S		18		ns
POWER SUPPLY						
Specified Voltage Range	V _S		2.7		5.5	V
Operating Voltage Range			2.5		5.5	V
Power Supply Rejection Ratio	PSRR	V _S =2.7V~5.5V V _{CM} =(V _S /2)-0.55V		100	540	μV/V
Quiescent Current / Amplifier	I _Q	V _S =5V, I _{OUT} =0		4.5	7	mA
NOISE/DISTORTION PERFORMANCE						
Input Voltage Noise Density	e _N	f=1MHz		7		nV/√Hz
Input Current Noise Density	i _n	f=1MHz		10		fA/√Hz
Differential Gain Error		PAL, R _L =150Ω		0.01		%
Differential Phase Error		PAL, R _L =150Ω		0.1		°
Harmonic Distortion (2nd-Harmonic)		G = +1, f = 1MHz, V _{OUT} =2V _{PP} , R _L =200Ω, V _{CM} =1.5V		-66		dBc
Harmonic Distortion (3rd-Harmonic)		G = +1, f = 1MHz, V _{OUT} =2V _{PP} , R _L =200Ω, V _{CM} =1.5V		-76		dBc
THERMAL SHUTDOWN						
Thermal Shutdown				150		°C
Reset from Shutdown				120		°C

■ SIMPLIFIED SCHEMATIC



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.