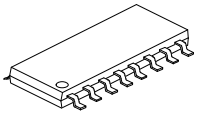
ULV2775

CMOS IC

2.7-V RAIL-TO-RAIL OUTPUT OPERATIONAL AMPLIFIERS WITH SHUTDOWN



SOP-16

■ DESCRIPTION

The UTC **ULV2775** is a high-performance quad-channel amplifier integrated with a shutdown function, boasting high slew rate, wide bandwidth, and rail-to-rail output swing. The device operates from a single 2.5V to 6V supply, and provides 10.5V/μs of slew rate and 4.8MHz of bandwidth while only consuming low supply current per channel .This ac performance is much higher than current competitive CMOS amplifiers.

The rail-to-rail output swing and high output drive make these devices a good choice for driving the analog input or reference of analog-to-digital converters. These devices also have low distortion while driving a 600Ω load, making them suitable for use in telecom systems.

■ FEATURES

* Supply Voltage Range: 2.5V ~ 6V
* Low Supply Current: 0.45mA (Per Channel) Typ.
* High Slew Rate: 10.5V/μs Typ.
* High-Gain Bandwidth: 4.8MHz Typ.
* Rail-to-Rail Output
* Micropower Shutdown Mode: I_{DD} < 1.5μA
* Green & Pb Free

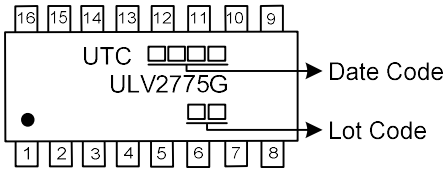
■ ORDERING INFORMATION

Ordering Number	Package	Packing
ULV2775G-S16-R	SOP-16	Tape Reel

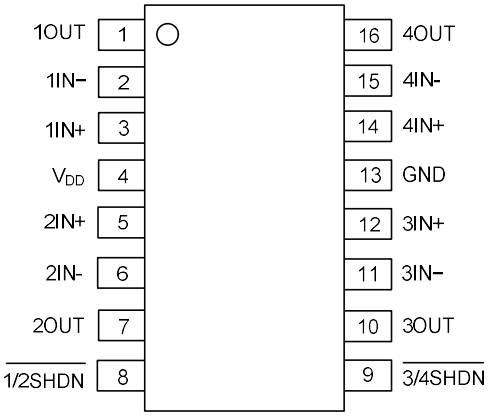
ULV2775G-S16-R (1)Packing Type (2)Package Type (3)Green Package	 (1) R: Tape Reel (2) S16: SOP-16 (3) G: Halogen Free and Lead Free

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■ MARKING



■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	1OUT	Output, Channel 1
2	1IN-	Inverting input, Channel 1
3	1IN+	Non-inverting input, Channel 1
4	V_{DD}	Supply voltage
5	2IN+	Non-inverting input, Channel 2
6	2IN-	Inverting input, Channel 2
7	2OUT	Output, Channel 2
8	1/2SHDN	Shutdown pin
9	3/4SHDN	Shutdown pin
10	3OUT	Output, Channel 3
11	3IN-	Inverting input, Channel 3
12	3IN+	Non-inverting input, Channel 3
13	GND	Ground
14	4IN+	Non-inverting input, Channel 4
15	4IN-	Inverting input, Channel 4
16	4OUT	Output, Channel 4

■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified) (Note 1、3)

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage (Note 1)	V_{DD}		7	V
Differential Input Voltage (Note 2)	V_{ID}		±V_{DD}	
Input Voltage Range (Any Input, Note 1)	V_I		-0.3 ~ V_{DD}	V
Input Current (Any Input)	I_I		±4	mA
Output Current	I_O		±50	mA
Total Current into V_{DD+}			±50	mA
Total Current out of GND			±50	mA
Storage Temperature	T_{STG}		-65 ~ +150	°C

Notes: 1. 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.
2. Differential voltages are at the noninverting input with respect to the inverting input. Excessive current flows when input is brought below GND - 0.3V.
3. It's guarantee by design, this parameter is not production tested.

■ RECOMMENDED OPERATING COMDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{DD}		2.5		6	V
Input Voltage Range	V_I		GND		V_{DD}-1.3	V
Common-Mode Input Voltage	V_{IC}		GND		V_{DD}-1.3	V
Operating Free-Air Temperature	T_A		-40		+125	°C

Note: It's guarantee by design, this parameter is not production tested.

■ ELECTRICAL CHARACTERISTICS (V_{DD}=2.7V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	V_{IO}	V_{IC}=0,V_O=0, R_S=50Ω, V_{DD}=±1.35V, No Load			5.5	mV
Input Offset Current	I_{IO}	V_{IC}=0,V_O=0, R_S=50Ω, V_{DD}=±1.35V			10	nA
Input Bias Current	I_{IB}	V_{IC}=0,V_O=0, R_S=50Ω, V_{DD}=±1.35V			15	nA
High-Level Output Voltage	V_{OH}	I_{OH}=-0.675mA		2.6		V
		I_{OH}=-2.2mA		2.4		V
Low-Level Output Voltage	V_{OL}	V_{IC}=1.35V, I_{OL}=0.675mA		0.1		V
		V_{IC}=1.35V, I_{OL}=2.2mA		0.21		V
Large-Signal Differential Voltage Amplification	A_{VD}	V_{IC}=1.35V, R_L=10kΩ, V_O=0.6V ~ 2.1V	20			V/mV
Common-Mode Rejection Ratio	CMRR	V_{IC}=0~1.5V, V_O=V_{DD}/2, R_S=50Ω	60			dB
Supply Voltage Rejection Ratio (ΔV_{DD} /ΔV_{IO})	k_{SVR}	V_{DD}=2.7V~5V, V_{IC}=V_{DD}/2 No Load	60			dB
Supply Current (Per Channel)	I_{DD}	V_O=V_{DD}/2, No Load		0.45	2	mA
Supply Current in Shutdown (Per Channel)	$I_{DD(SHDN)}$			0.1	1.5	μA
Turn-on Voltage Level	$V_{(ON)}$	A_V=5		1.40		V
Turn-off Voltage Level	$V_{(OFF)}$	A_V=5		1.20		V

Note: It's guarantee by design, this parameter is not production tested.

■ OPERATING CHARACTERISTICS (V_{DD}=2.7V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Slew Rate at Unity Gain	SR	$V_{O(PP)}$=0.8V, C_L=100pF, R_L=10kΩ	5			V/μs
Total Harmonic Distortion Plus Noise	THD+N	R_L=600Ω, f=1kHz, A_V=1		0.0085		%
		R_L=600Ω, f=1kHz, A_V=10		0.025		%
		R_L=600Ω, f=1kHz, A_V=100		0.12		%
Gain-Bandwidth Product		f=10kHz, C_L=100pF, R_L=600Ω		4.8		MHz
Settling Time	t_s	A_V=-1, Step=1V, R_L=600Ω, C_L=100pF, 0.1%		0.186		μs
		A_V=-1, Step=1V, R_L=600Ω, C_L=100pF, 0.01%		0.3		μs
Phase Margin at Unity Gain	φ_m	R_L=600Ω, C_L=100pF		58		°
Gain Margin		R_L=600Ω, C_L=100pF		18		dB

Note: It's guarantee by design, this parameter is not production tested.

■ ELECTRICAL CHARACTERISTICS (V_{DD}=5V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	V_{IO}	V_{IC}=0, V_O=0, R_S=50Ω, V_{DD}=±2.5V, No Load			3.5	mV
Input Offset Current	I_{IO}	V_{IC}=0, V_O=0, R_S=50Ω, V_{DD}=±2.5V			10	nA
Input Bias Current	I_{IB}	V_{IC}=0, V_O=0, R_S=50Ω, V_{DD}=±2.5V			15	nA
High-Level Output Voltage	V_{OH}	I_{OH}=-1.3mA		4.9		V
		I_{OH}=-4.2mA		4.7		V
Low-Level Output Voltage	V_{OL}	V_{IC}=2.5V, I_{OL}=1.3mA		0.1		V
		V_{IC}=2.5V, I_{OL}=4.2mA		0.25		V
Large-Signal Differential Voltage Amplification	A_{VD}	V_{IC}=2.5V, R_L=10kΩ, V_O=1V ~ 4V	20			V/mV
Common-Mode Rejection Ratio	CMRR	V_{IC}=0~3.7V, V_O=V_{DD}/2, R_S=50Ω	60			dB
Supply Voltage Rejection Ratio (ΔV_{DD} /ΔV_{IO})	k_{SVR}	V_{DD}=2.7V ~ 5V, V_{IC}=V_{DD}/2 No Load	60			dB
Supply Current (Per Channel)	I_{DD}	V_O=V_{DD}/2, No Load		0.6	2	mA
Supply Current in Shutdown (Per Channel)	$I_{DD(SHDN)}$			0.52	1.5	μA
Turn-on Voltage Level	$V_{(ON)}$	A_V=5		2.48		V
Turn-off Voltage Level	$V_{(OFF)}$	A_V=5		2.29		V

Note: It's guarantee by design, this parameter is not production tested.

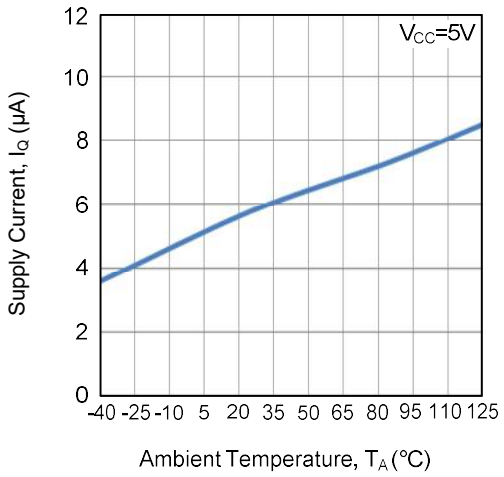
■ OPERATING CHARACTERISTICS (V_{DD}=5V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Slew Rate at Unity Gain	SR	$V_{O(PP)}$=2V, C_L=100pF, R_L=10kΩ	5	10.5		V/μs
Total Harmonic Distortion Plus Noise	THD+N	R_L=600Ω, f=1kHz, A_V=1		0.005		%
		R_L=600Ω, f=1kHz, A_V=10		0.016		%
		R_L=600Ω, f=1kHz, A_V=100		0.095		%
Gain-Bandwidth Product		f=10kHz, C_L=100pF, R_L=600Ω		4.8		MHz
Settling Time	t_s	A_V=-1, Step=2V, R_L=600Ω, C_L=100pF, 0.1%		0.335		μs
		A_V=-1, Step=2V, R_L=600Ω, C_L=100pF, 0.01%		0.6		μs
Phase Margin at Unity Gain	φ_m	R_L=600Ω, C_L=100pF		58		°
Gain Margin		R_L=600Ω, C_L=100pF		18		dB

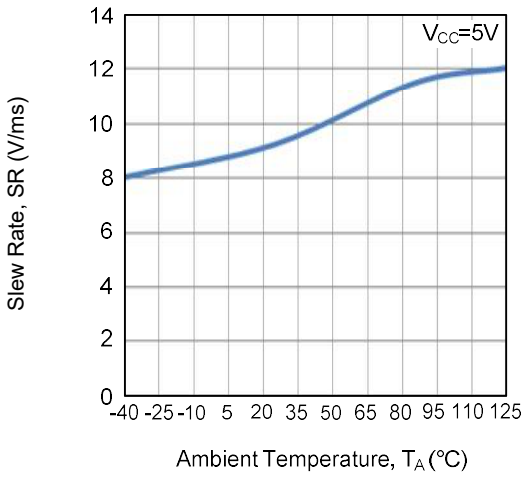
Note: It's guarantee by design, this parameter is not production tested.

■ TYPICAL CHARACTERISTICS

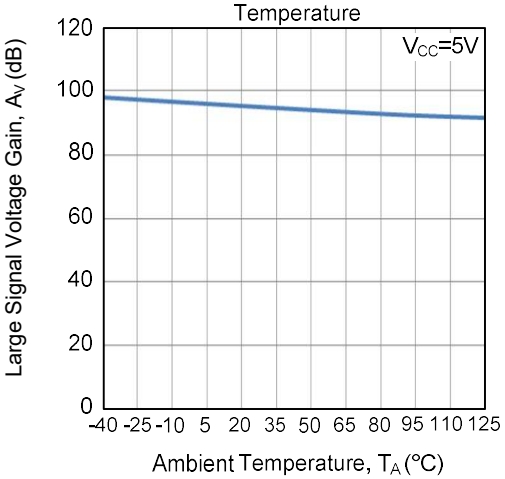
Supply Current vs. Temperature



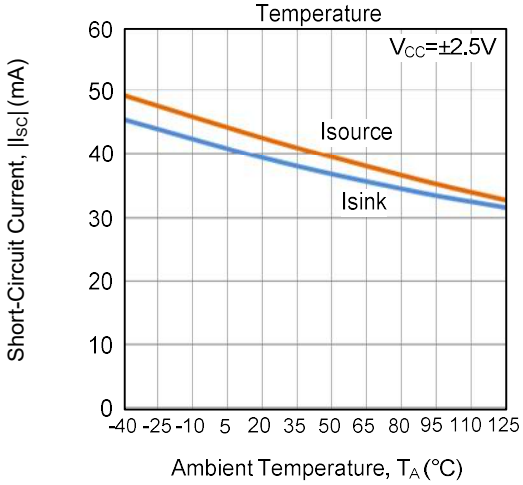
Slew Rate vs. Temperature



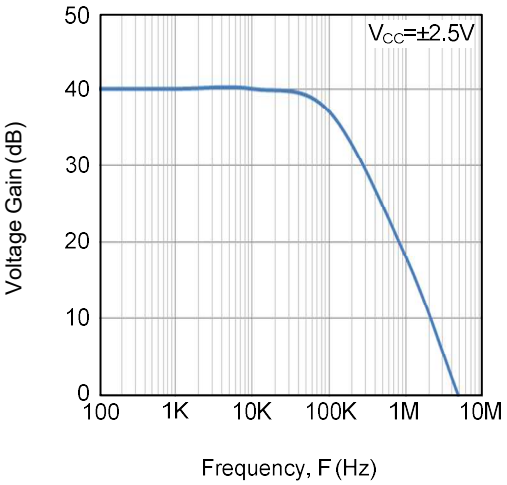
Large Signal Voltage Gain vs. Temperature



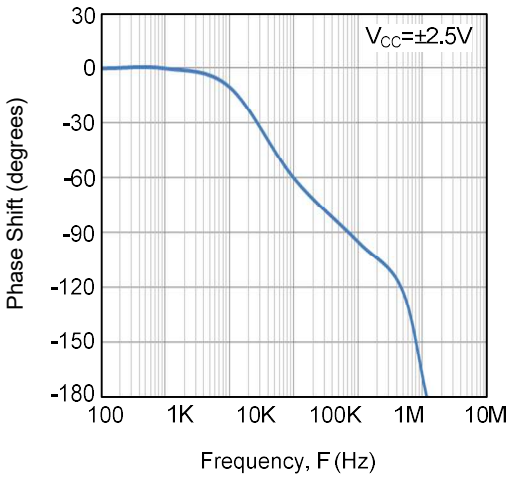
Output Short Circuit Current vs. Temperature



Voltage Gain vs. Frequency



Phase Shift vs. Frequency



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