

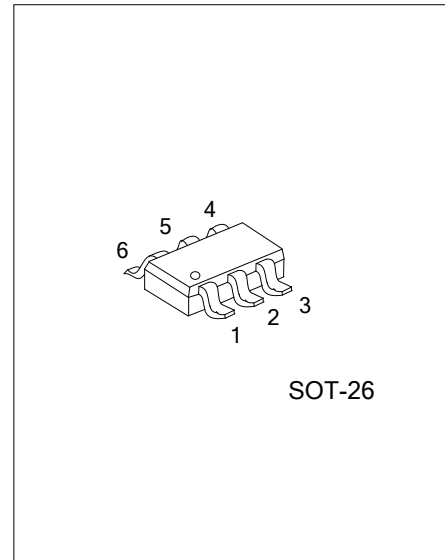


## LV715

Advance

CMOS IC

### LOW-POWER, RAIL TO RAIL INPUT AND OUTPUT, HIGH OUTPUT CURRENT DRIVE OPERATIONAL AMPLIFIER WITH SHUTDOWN



#### DESCRIPTION

The UTC **LV715** is CMOS input stage, rail to rail input and output, high output current drive BiCMOS operational amplifier.

The UTC **LV715** offers high speed of 5V/μs slew rate.

The UTC **LV715** offers a shutdown pin can be used to disable the device, in the shutdown mode, the output is tri-stated, and the supply current in shutdown mode only 0.2μA.

The UTC **LV715** is designed to meet the demands of low power, low cost, and small size required by cellular phones and similar battery-powered portable electronics.

#### FEATURES

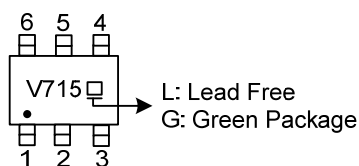
- \* Low Offset Voltage: 3mV (Maximum)
- \* Rail-to-Rail Input and Output
- \* Capable of Driving 600Ω Load
- \* Ensured 2.7V and 5V Performance
- \* Supply Current in Shutdown Mode: 0.2μA (Typical)
- \* Slew Rate: 5V/μs (Typical)

#### ORDERING INFORMATION

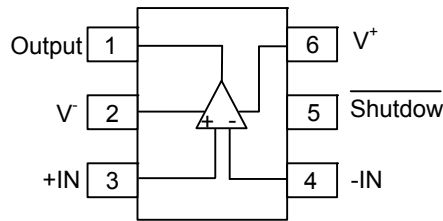
Ordering Number		Package	Packing
Lead Free	Halogen Free		
LV715L-AG6-R	LV715G-AG6-R	SOT-26	Tape Reel

<p>LV715G-AG6-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) AG6: SOT-26</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul>
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#### MARKING



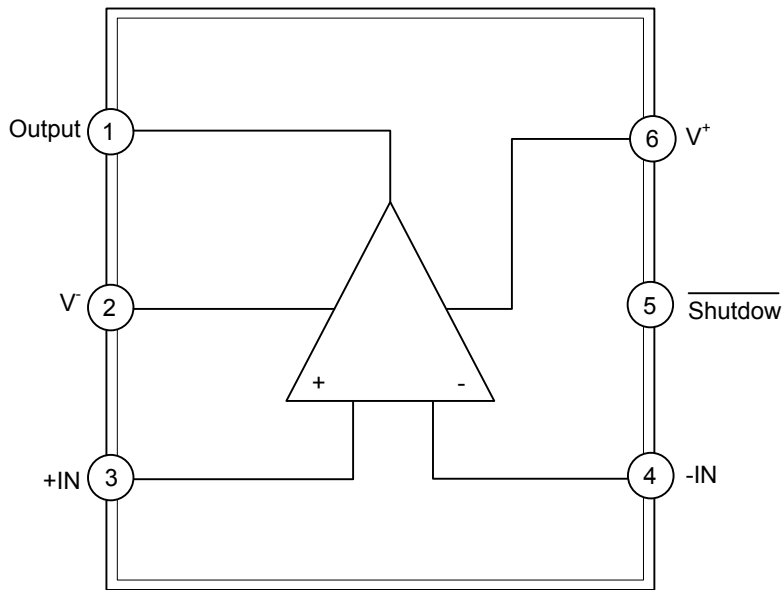
■ PIN CONFIGURATION



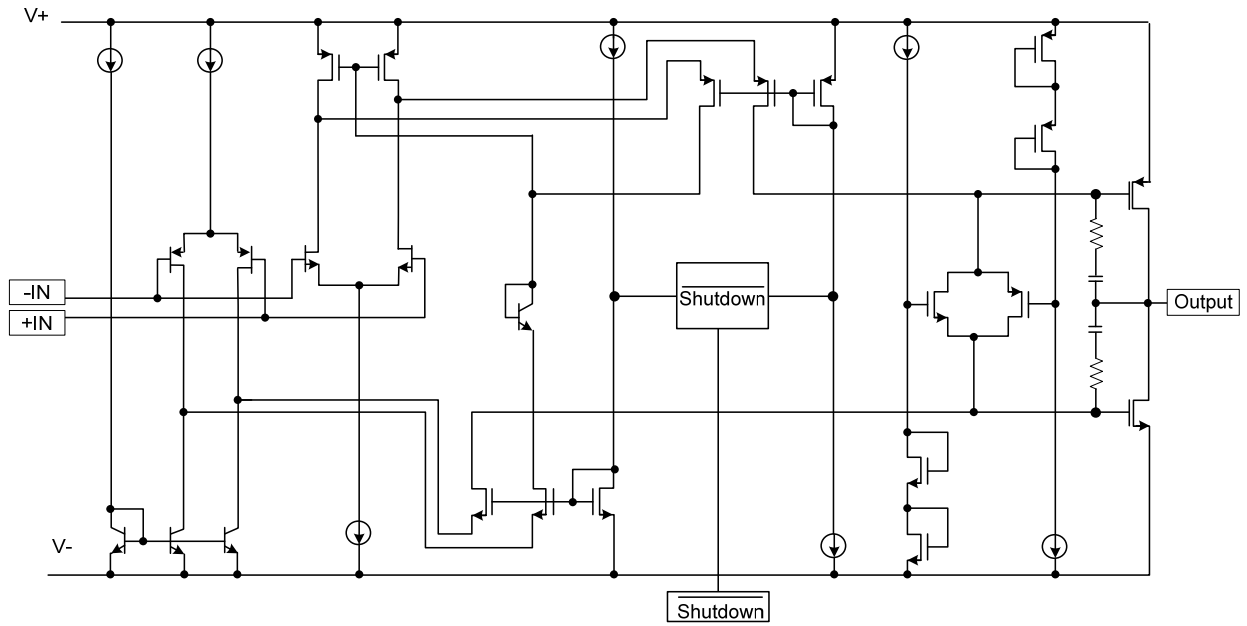
■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	Output	Output
2	V <sup>-</sup>	Negative supply input
3	+IN	Non-inverting input
4	-IN	Inverting input
5	Shutdown	Active low enable input
6	V <sup>+</sup>	Positive supply power

■ BLOCK DIAGRAM



■ INTERNAL SIMPLE CIRCUIT



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage ( $V^+ - V^-$ )		5.5	V
Differential Input Voltage		$\pm$ Supply voltage	
Voltage at Input or Output Pin		$(V^-) - 0.4 \sim (V^+) + 0.4$	V
Current at Input Pin		$\pm 10$	mA
Junction Temperature	$T_J$	+150	$^{\circ}\text{C}$
Storage Temperature	$T_{STG}$	-65 ~ +150	$^{\circ}\text{C}$

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	$V^+$	2.7 ~ 5	V
Temperature	$T_{OPR}$	-40 ~ +85	$^{\circ}\text{C}$

### ■ ELECTRICAL CHARACTERISTICS 2.7V

( $T_A=25^{\circ}\text{C}$ ,  $V^+ = 2.7\text{V}$ ,  $V^- = 0\text{V}$ ,  $V_{CM} = V^+/2$  and  $R_L > 1\text{M}\Omega$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_{OS}$	$V_{CM}=0.85\text{V}$ and $V_{CM}=1.85\text{V}$		0.4	3	mV
Input Bias Current	$I_B$			4		pA
Common-Mode Rejection Ratio	CMRR	$0 \leq V_{CM} \leq 2.7\text{V}$	50	75		dB
Power Supply Rejection Ratio	PSRR	$2.7\text{V} \leq V^+ \leq 5\text{V}$ , $V_{CM} = 0.85\text{V}$	70	110		dB
		$2.7\text{V} \leq V^+ \leq 5\text{V}$ , $V_{CM} = 1.85\text{V}$	70	95		
Input Common-mode Voltage Range	$V_{CM}$	For CMRR $\geq 50\text{dB}$ , $V^-$	-0.2	-0.3		V
		For CMRR $\geq 50\text{dB}$ , $V^+$		3	2.9	
Output Short-circuit Current	$I_{SC}$	Sourcing, $V_O=0\text{V}$	15	28		mA
		Sourcing, $V_O=2.7\text{V}$	25	40		
Output Swing	$V_O$	$R_L=10\text{k}\Omega$ to $1.35\text{V}$ , $V_{ID}=100\text{mV}$	2.62	2.68		V
		$T_A=25^{\circ}\text{C}$		0.01	0.12	
		$R_L=600\Omega$ to $1.35\text{V}$ , $V_{ID}=100\text{mV}$	2.52	2.55		
		$T_A=25^{\circ}\text{C}$		0.05	0.23	
Output Leakage Current in Shutdown Mode	$I_{O(SD)}$			1		pA
Output Capacitance in Shutdown Mode	$C_{O(SD)}$			32		pF
Supply Current	$I_Q$	ON mode		1.2	1.7	mA
		Shutdown mode, $V_{SD}=0\text{V}$		0.002	10	$\mu\text{A}$
Large Signal Voltage	$A_V$	Sourcing, $R_L=10\text{k}\Omega$ , $V_O=1.35\sim 2.3\text{V}$	80	115		dB
		Sinking, $R_L=10\text{k}\Omega$ , $V_O=0.4\sim 1.35\text{V}$	80	113		
		Sourcing, $R_L=600\Omega$ , $V_O=1.35\sim 2.2\text{V}$	80	110		
		Sinking, $R_L=600\Omega$ , $V_O=0.5\sim 1.35\text{V}$	80	100		
Slew Rate	SR		5			V/us
Gain-Bandwidth Product	GBWP		5			MHz
Phase Margin	$\Phi_M$		60			$^{\circ}$
Turnon Time	$T_{ON}$		<10			$\mu\text{s}$
Shutdown Pin Voltage Range	$V_{SD}$	ON mode	2.4	1.5	2.7	V
		Shutdown mode	0	1	0.8	
Input-Referred Voltage Noise	$e_n$	f=1kHz		20		$\frac{\text{nV}}{\sqrt{\text{Hz}}}$

### ■ ELECTRICAL CHARACTERISTICS 3.2V

( $T_A=25^\circ\text{C}$ ,  $V^+=3.2\text{V}$ ,  $V^-=0\text{V}$ ,  $V_{\text{CM}}=V^+/2$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Swing	$V_O$	$I_O=6.5\text{mA}$	2.95	3		V
		$T_A=25^\circ\text{C}$		0.01	0.18	

### ■ ELECTRICAL CHARACTERISTICS 5V

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_{\text{OS}}$	$V_{\text{CM}}=0.85\text{V}$ , $V_{\text{CM}}=4.15\text{V}$		0.4	3	mV
Input Bias Current	$I_B$			4		pA
Common-Mode Rejection Ratio	CMRR	$0\leq V_{\text{CM}}\leq 5\text{V}$	50	70		dB
Power Supply Rejection Ratio	PSRR	$2.7\text{V}\leq V^+\leq 5\text{V}$ , $V_{\text{CM}}=4.15\text{V}$	70	110		dB
			70	95		
Input Common-mode Voltage Range	$V_{\text{CM}}$	For CMRR $\geq 50\text{dB}$ , V-	-0.2	-0.3		V
		For CMRR $\geq 50\text{dB}$ , V+		5.3	5.2	
Output Short-circuit Current	$I_{\text{SC}}$	Sourcing, $V_O=0\text{V}$	25	35		mA
		Sinking, $V_O=5\text{V}$	25	40		
Output Swing	$V_O$	$R_L=10\text{k}\Omega$ to 2.5V, $V_{\text{ID}}=100\text{mV}$	4.92	4.98		V
		$R_L=10\text{k}\Omega$ to 2.5V, $V_{\text{ID}}=-100\text{mV}$		0.01	0.12	
		$R_L=600\Omega$ to 2.5V, $V_{\text{ID}}=100\text{mV}$	4.82	4.85		
		$R_L=600\Omega$ to 2.5V, $V_{\text{ID}}=-100\text{mV}$		0.05	0.23	
Output Leakage Current in Shutdown Mode	$I_{\text{O(SD)}}$			1		pA
Output Capacitance in Shutdown Mode	$C_{\text{O(SD)}}$			32		pF
Supply Current	$I_Q$	ON mode		1.17	1.7	mA
		Shutdown mode		0.2	10	
Large Signal Voltage	$A_V$	Sourcing, $R_L=10\text{k}\Omega$ , $V_O=2.5\sim 4.6\text{V}$	80	123		dB
		Sinking, $R_L=10\text{k}\Omega$ , $V_O=0.4\sim 2.5\text{V}$	80	120		
		Sourcing, $R_L=600\Omega$ , $V_O=2.5\sim 4.5\text{V}$	80	110		
		Sinking, $R_L=600\Omega$ , $V_O=0.5\sim 2.5\text{V}$	80	118		
Slew Rate	SR		5			V/us
Gain-Bandwidth Product	GBWP			5		MHz
Phase Margin	$\Phi_M$			60		°
Turn on Time	$T_{\text{ON}}$			<10		us
Shutdown Pin Voltage Range	$V_{\text{SD}}$	ON mode	2.4	2.0	5.0	V
		Shutdown mode		1.5	0.8	
Input-Referred Voltage Noise	$e_n$	f=1kHz	0	20		$\frac{\text{nV}}{\sqrt{\text{Hz}}}$

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