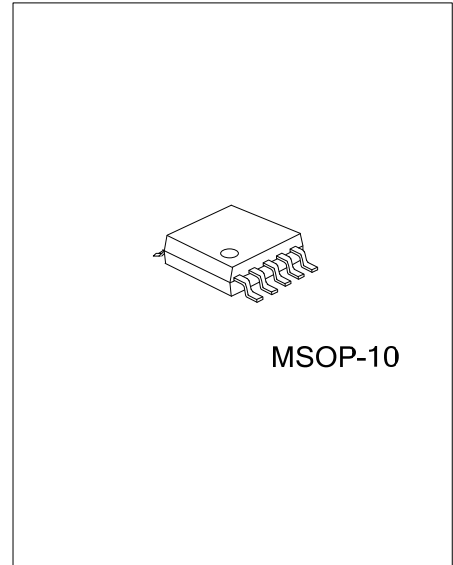




## LV712

CMOS IC

### RAIL-TO-RAIL, DUAL RRIO OPERATIONAL WITH INDEPENDENT SHUTDOWN



MSOP-10

#### DESCRIPTION

The UTC LV712 duals are high performance BiCMOS operational amplifiers intended for applications requiring Rail-to-Rail inputs combined with speed and low noise. They offer a bandwidth of 4MHz and a slew rate of 4.5 V/μs.

The UTC LV712 is guaranteed to operate from 2.7V to 5.5V and offers two independent shutdown pins. This feature allows disabling of each device separately and reduces the supply current to less than 0.8μA (typ.). The output voltage rapidly ramps up smoothly with no glitch as the amplifier comes out of the shutdown mode.

The UTC LV712 offered in 10-Pin MSOP package. The package are designed to meet the demands of small size, low power, and low cost required by cellular phones and similar battery operated portable electronics.

#### FEATURES

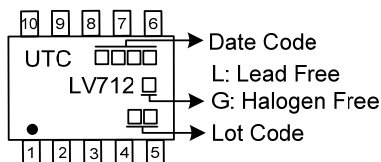
- \* Supply Voltage: 2.7~5V
- \* Supply current 1.3mA/ amplifier (Typ.)
- \* Shutdown Current: 0.8μA (Typ.)
- \* Input Offset Voltage: 3mV (Max.)
- \* Rail-to-Rail inputs and outputs
- \* Slew Rate 4.5V/μs(Typ.)

#### ORDERING INFORMATION

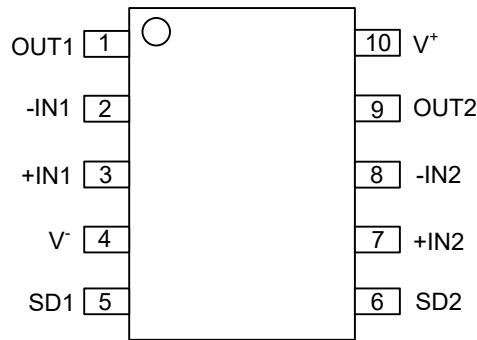
Ordering Number		Package	Packing
Lead Free	Halogen Free		
LV712L-SM2-R	LV712G-SM2-R	MSOP-10	Tape Reel

<p>LV712G-SM2-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) SM2: MSOP-10</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul>
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#### MARKING



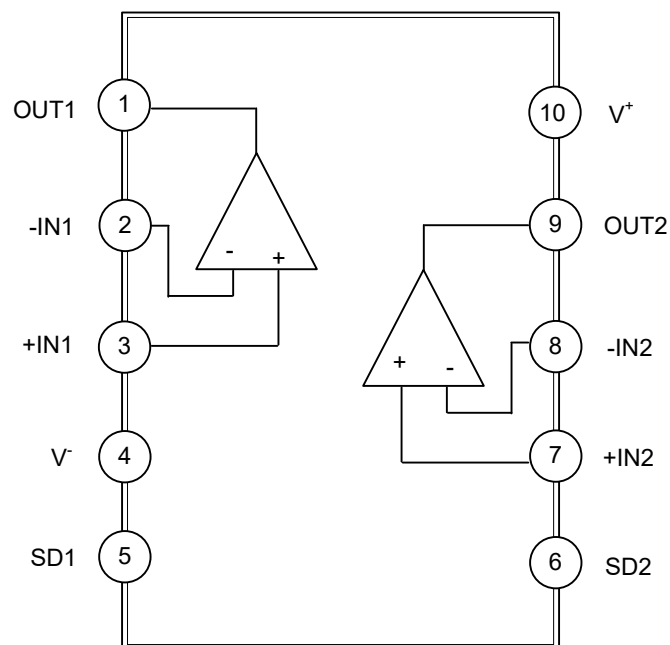
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUT1	Output of A AMP
2	-IN1	Inverting Input of 1 AMP
3	+IN1	Non-inverting input of 1 AMP
4	V <sup>-</sup>	Negative power supply
5	SD1	Active low enable input of 1 AMP
6	SD2	Active low enable input of 2 AMP
7	+IN2	Non-inverting input of 2 AMP
8	-IN2	Inverting input of 2 AMP
9	OUT2	Output of 2 AMP
10	V <sup>+</sup>	Positive power supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+ - V^-$	6.0	V
Differential Input Voltage		$\pm$ Supply Voltage	
Voltage at Input/Output Pin		$V^+ - 0.4 \sim V^- + 0.4$	V
Current at Input Pin		$\pm 10$	mA
Current at Output Pin		$\pm 50$	mA
Storage Temperature	$T_{STG}$	-65 ~ +150	$^\circ\text{C}$
Junction Temperature	$T_J$	+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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	258	$^\circ\text{C/W}$

■ RECOMMENDED OPERATING CONDITIONS

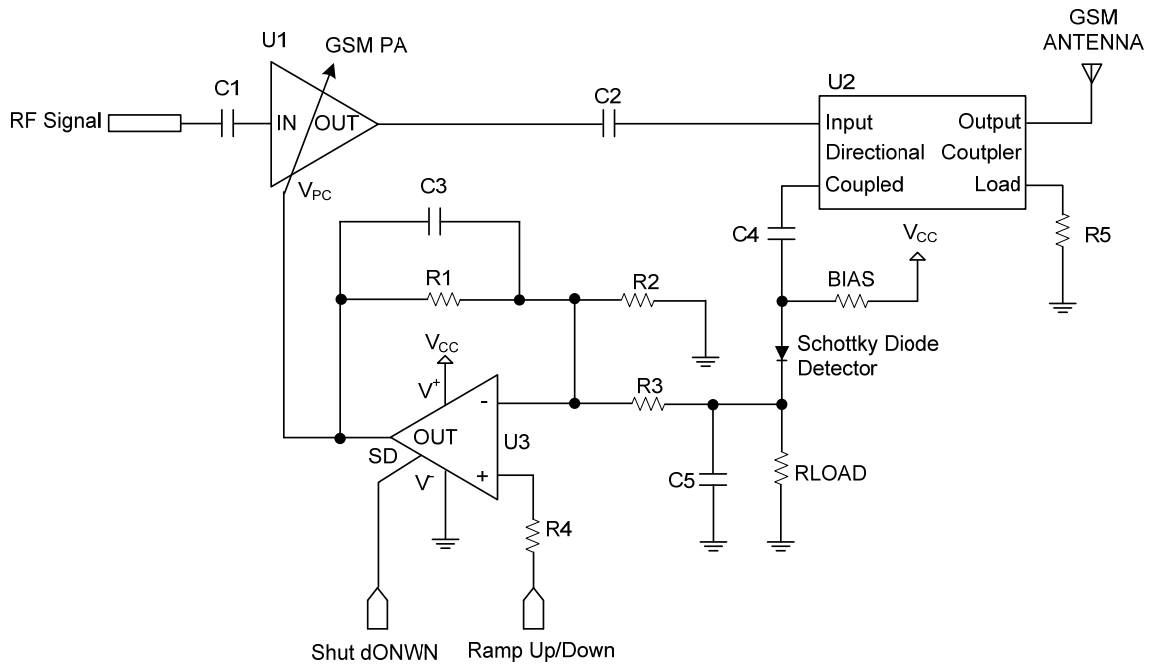
PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	$V^+ - V^-$	2.7 ~ 5.5	V
Operating Free-Air Temperature	$T_{OPR}$	-40 ~ +125	$^\circ\text{C}$

### ■ ELECTRICAL CHARACTERISTICS

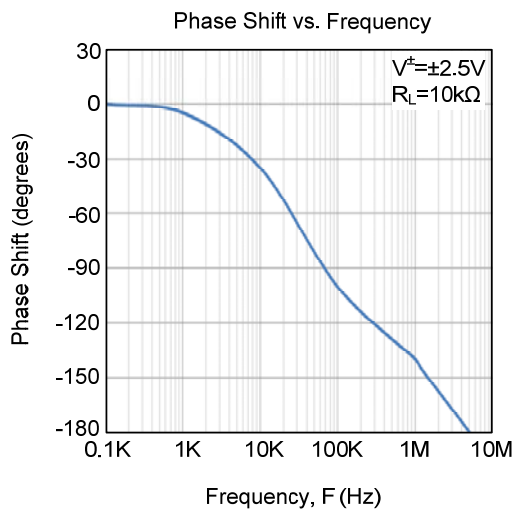
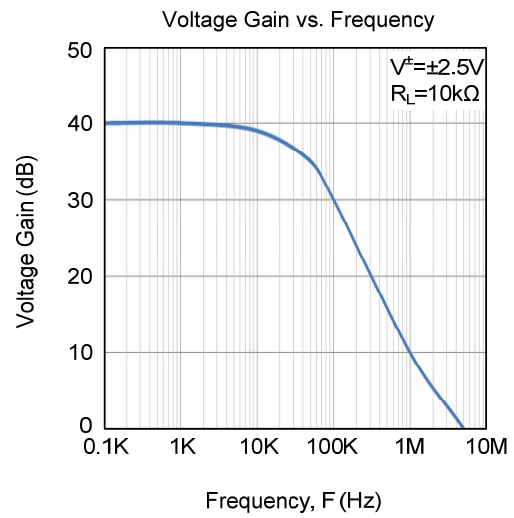
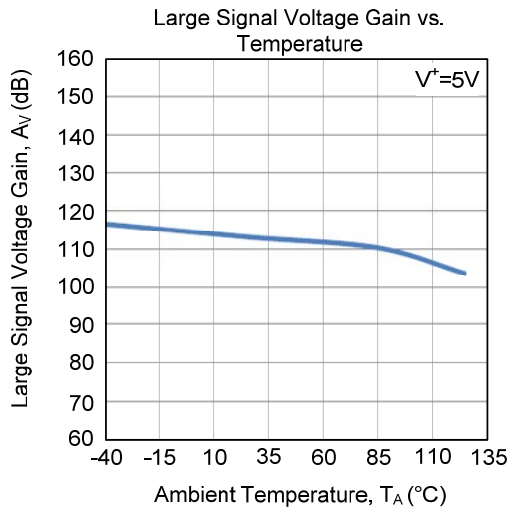
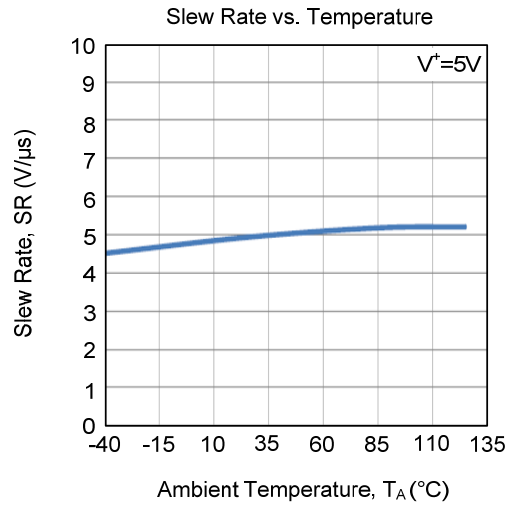
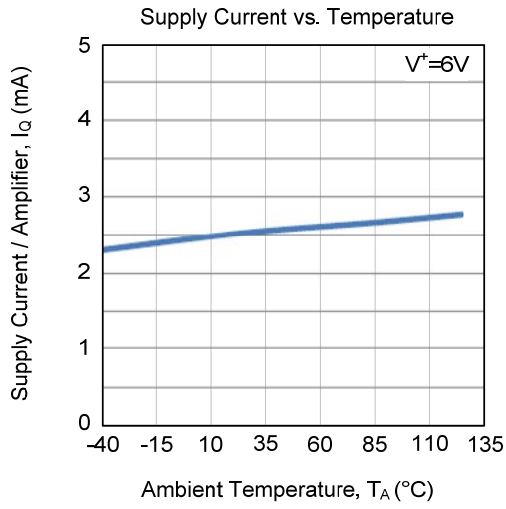
( $V^+ = +2.7 \sim +5.0V$ ,  $V^- = 0V$ ,  $V_{CM} = V^+/2$  and  $R_L > 1M\Omega$ ,  $T_A=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Supply Current/Amplifier	IQ	On Mode		1.3	1.7	mA	
		Shutdown Mode		0.8	1.5	uA	
Power Supply Rejection Ratio	PSRR	$2.7V \leq V^+ \leq 5V$ , $V_{CM} = 0.85V$	70	90		dB	
		$2.7V \leq V^+ \leq 5V$ , $V_{CM} = 1.85V$	70	90		dB	
Input Offset Voltage	$V_{OS}$	$V_{CM} = 0.85V$ and $V_{CM} = 1.85V$		0.1	3	mV	
Input Bias Current	$I_B$			5.5		pA	
Common-mode Voltage Range	$V_{CM}$		-0.2		$V^+ + 0.2$	V	
Common-Mode Rejection Ratio	CMRR	$0V \leq V_{CM} \leq 2.7V$	50	75		dB	
Large Signal Voltage Gain	$A_V$	Sourcing $R_L = 10k\Omega$ , $V_O = 1.35V$ to $2.3V$	80	115		dB	
		Sinking $R_L = 10k\Omega$ , $V_O = 0.4V$ to $1.35V$	80	115		dB	
		Sourcing $R_L = 600\Omega$ , $V_O = 1.35V$ to $2.2V$	80	95		dB	
		Sinking $R_L = 600\Omega$ , $V_O = 0.5V$ to $1.35V$	80	95		dB	
Output Voltage	$V_O$	$V^+ = 2.7V$	$R_L = 10k\Omega$ to $1.35V$ , $V_{OH}$	2.62	2.64		V
			$R_L = 10k\Omega$ to $1.35V$ , $V_{OL}$		0.01	0.12	V
			$R_L = 600\Omega$ to $1.35V$ , $V_{OH}$	2.52	2.55		V
			$R_L = 600\Omega$ to $1.35V$ , $V_{OL}$		0.05	0.23	V
		$V^+ = 5.0V$	$R_L = 10k\Omega$ to $2.5V$ , $V_{OH}$	4.9	4.92		V
			$R_L = 10k\Omega$ to $2.5V$ , $V_{OL}$		0.01	0.12	V
			$R_L = 600\Omega$ to $2.5V$ , $V_{OH}$	4.8	4.83		V
			$R_L = 10k\Omega$ to $2.5V$ , $V_{OL}$		0.05	0.23	V
Output Voltage in Shutdown	$V_{O(SD)}$			50	200	mV	
Short-Circuit Current	$I_{SC}$	$V^+ = 2.7V$	Sourcing $V_O = 0V$	15	60		mA
			Sinking $V_O = 2.7V$	25	55		mA
		$V^+ = 5.0V$	Sourcing $V_O = 0V$	20	75		mA
			Sinking $V_O = 5.0V$	25	70		mA
Slew Rate	SR			4.5		V/ $\mu s$	
Gain-Bandwidth Product	GBW			4		MHz	
Phase Margin	$\Phi_M$			50		Deg	
Input Referred Voltage Noise	$e_n$	$f = 1kHz$		20		nV/ $\sqrt{Hz}$	
Shutdown Pin Voltage Range	$V_{SD}$	On Mode	$V^+ - 0.5$			V	
		Shutdown Mode			0.8	V	
Turn-On Time from Shutdown	$T_{ON}$			2.2	4.6	$\mu s$	
Turn-On Time from Shutdown		micro SMD	6			$\mu s$	

■ TYPICAL APPLICATION CIRCUIT



■ TYPICAL CHARACTERISTICS



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