

# UTC 3422

# LINEAR INTEGRATED CIRCUIT

## HIGH PERFORMANCE DUAL BIPOLAR OPERATIONAL AMPLIFIER

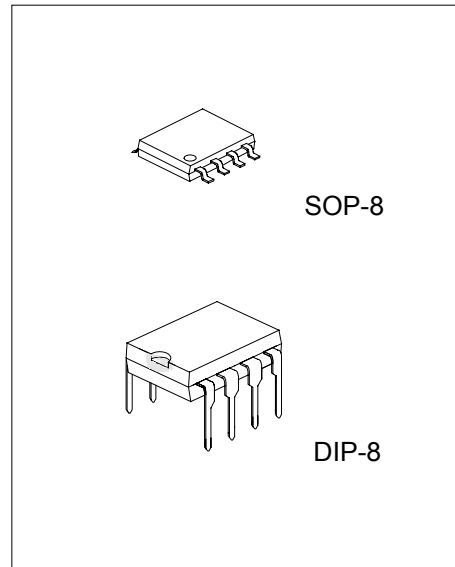
### DESCRIPTION

The UTC 3422 is a dual bipolar operational amplifier offering a single supply operation from 3V ~ 30V with very good performances: medium speed (25MHz), unity gain stability and low noise.

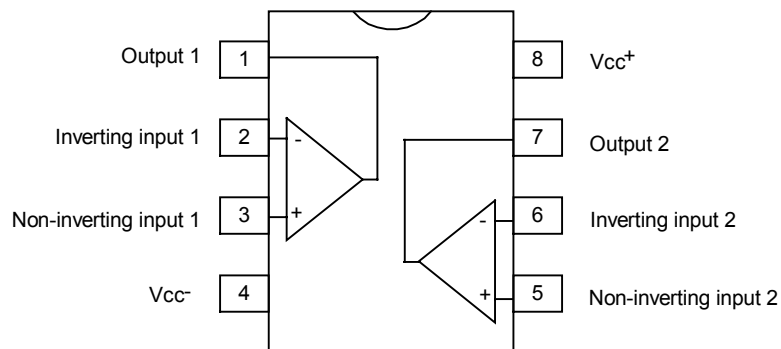
The UTC 3422 is therefore an enhanced replacement of standard dual operational amplifiers.

### FEATURES

- \*HIGH GAIN BANDWIDTH PRODUCT: 25MHz
- \*HIGH SLEW RATE: 15V/ $\mu$ s
- \*SINGLE OR DUAL SUPPLY OPERATION:  
3V ~ 30V ( $\pm 1.5V$  to  $\pm 15V$ )
- \*LOW VOLTAGE NOISE: 14nV/ $\sqrt{\text{Hz}}$
- \*NO PHASE INVERSION
- \*ESD TOLERANCE: 2kV
- \*LATCH-UP IMMUNITY

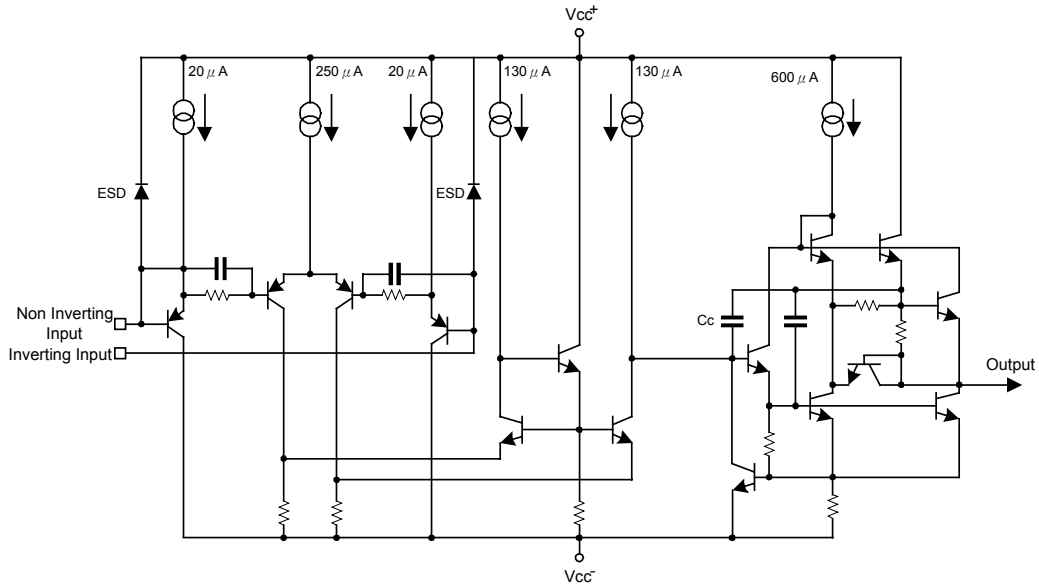


### PIN CONFIGURATION



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BLOCK DIAGRAM (1/2 Shown)



## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	$\pm 18 \sim 36$	V
Differential Input Voltage <sup>(1)</sup>	$V_{id}$	$\pm 36$	V
Input Voltage (see note 1)	$V_i$	$\pm 18$	V
Output Short-Circuit Duration <sup>(2)</sup>		Infinite	
Operating Free-Air Temperature Range	$T_{oper}$	$-40 \sim +125$	$^{\circ}\text{C}$
Maximum Junction Temperature	$T_j$	+150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{stg}$	$-65 \sim +150$	$^{\circ}\text{C}$
Maximum Power Dissipation (see note 2)	$P_{tot}$	500	mW

Notes: 1. Either or both input voltages must not exceed the magnitude of  $V_{CC}^{+}$  or  $V_{CC}^{-}$

2. Power dissipation must be considered to ensure maximum junction temperature ( $T_j$ ) is not exceeded

## OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	3 ~ 30	V

ELECTRICAL CHARACTERISTICS (Vcc<sup>+</sup>=15V, Vcc<sup>-</sup>=-15V, Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	V <sub>io</sub>	V <sub>ic</sub> =0V, V <sub>o</sub> =0V Vcc <sup>+</sup> =+15V, Vcc <sup>-</sup> =-15V T <sub>min</sub> ≤ Ta ≤ T <sub>max</sub> Vcc <sup>+</sup> =+5V, Vcc <sup>-</sup> =0V			2.5 3.5 2.5	mV
Input Offset Voltage Drift	ΔV <sub>io</sub>	V <sub>ic</sub> =0V, V <sub>o</sub> =0V		2		μV/°C
Input Offset Current	I <sub>io</sub>	V <sub>ic</sub> =0V, V <sub>o</sub> =0V		3	65	nA
Input Bias Current	I <sub>ib</sub>	V <sub>ic</sub> =0V, V <sub>o</sub> =0V		100	650	nA
Common Mode Input Voltage Range	V <sub>icm</sub>			Vcc <sup>-</sup> to Vcc <sup>+</sup> -1.8		V
Large Signal Voltage Gain	A <sub>vd</sub>	R <sub>L</sub> =2kΩ, V <sub>o</sub> =0V ~ +10V T <sub>min</sub> ≤ Ta ≤ T <sub>max</sub>	32 20	100		V/mV
Output Voltage Swing	±V <sub>opp</sub>	V <sub>id</sub> =±1V Vcc <sup>+</sup> =+15V, Vcc <sup>-</sup> =-15V, R <sub>L</sub> =2kΩ, V <sub>OH</sub> V <sub>OL</sub> R <sub>L</sub> =2kΩ, V <sub>OH</sub> V <sub>OL</sub> Vcc <sup>+</sup> =+5V, Vcc <sup>-</sup> =0V, R <sub>L</sub> =2kΩ, V <sub>OH</sub> V <sub>OL</sub>	13.4 13.4 3.7	13.9 -13.9 14 -14.7 0.15	-13.5 -14.1 0.2	V
Output Short Circuit Current	I <sub>o</sub>	V <sub>id</sub> =±1V, V <sub>o</sub> =0V, Source Sink	25 25	37 37		mA
Common Mode Rejection Ratio	CMR	V <sub>ic</sub> =-15V ~ +13.2V	80	100		dB
Supply Voltage Rejection Ratio	SVR	Vcc <sup>+</sup> /Vcc <sup>-</sup> =+15V/-15V ~ +5V/-5V	90	105		dB
Supply Current	I <sub>cc</sub>	V <sub>o</sub> =0V, no load, each amplifier Vcc <sup>+</sup> =+15V, Vcc <sup>-</sup> =-15V T <sub>min</sub> ≤ Ta ≤ T <sub>max</sub> Vcc <sup>+</sup> =+5V, Vcc <sup>-</sup> =0V		2.15	2.75 3 2.75	mA
Slew Rate	SR	V <sub>i</sub> =-10V ~ 10V, C <sub>L</sub> =100pF, R <sub>L</sub> =2kΩ, A <sub>v</sub> =+1	8	15		V/μs
Gain Bandwidth Product	GBP	f=100kHz, R <sub>L</sub> =2kΩ, C <sub>L</sub> =100pF	17	25		MHz
Unity Gain Bandwidth	B	Open loop		5		MHz
Phase Margin	∅ <sub>m</sub>	R <sub>L</sub> =2kΩ R <sub>L</sub> =2kΩ, C <sub>L</sub> =100pF		50 40		Degrees
Equivalent Input Noise Voltage	e <sub>n</sub>	R <sub>s</sub> =100Ω, f=1kHz		14		$\frac{nV}{\sqrt{Hz}}$
Channel Separation	V <sub>o1</sub> /V <sub>o2</sub>	f=20Hz ~ 20kHz		120		dB
Total Harmonic Distortion	THD	Vcc=±15V, f=1kHz, A <sub>vCL</sub> =20dB, R <sub>L</sub> =600Ω, V <sub>o</sub> =3Vrms		0.003		%

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## APPLICATIONS INFORMATION

### UTC 3422 IN COMPARATOR APPLICATION

The UTC 3422 is a dual high performances operational amplifier featuring speed of 30MHz and single supply operation from 3V ~ 30V.

Most of operational amplifiers are not suited for comparator use because of low transition speed, output signal incompatible with standard logics level and mainly, phase inversion.

The phase inversion occurs when a strong differential signal is applied to the device inputs. The output level is then inverted and shows a wrong logic state. The UTC 3422 does not present this problematic behaviour.

Displayed curves below show the device response in standard comparator configuration without external components.

Transition speed : Typical transition speed under a single 5V supply voltage is about  $2 \mu\text{s}$  from 50mV overdrive.  $V_{OH}$  min. is 3.7V and  $V_{OL}$  max. is 0.2V ( $2\text{k}\Omega$  load) making it compatible with standard logic families.

Figures 3 & 4 show output signal transition for a 50mV and 250mV input signal overdrive respectively of  $3 \mu\text{s}$  and  $1 \mu\text{s}$ .

Figure.1 Basic comparator application

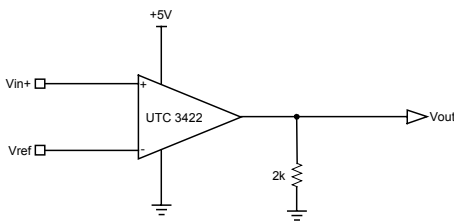


Figure.2 Operating conditions

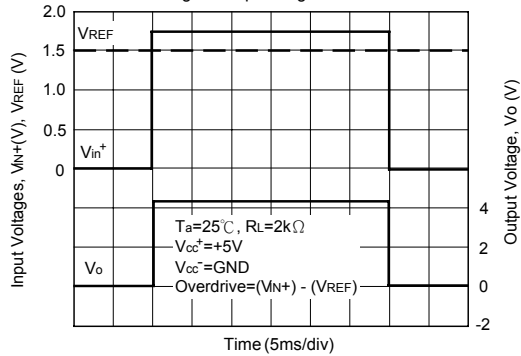


Figure.3 Transition speed @ 50mV overdrive

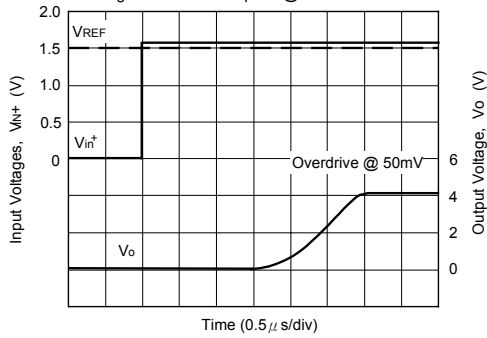
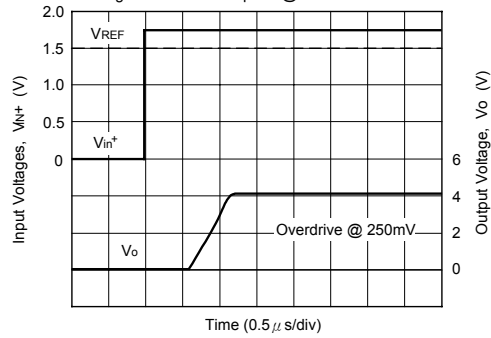


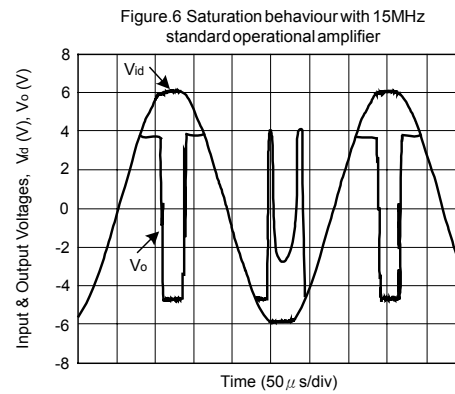
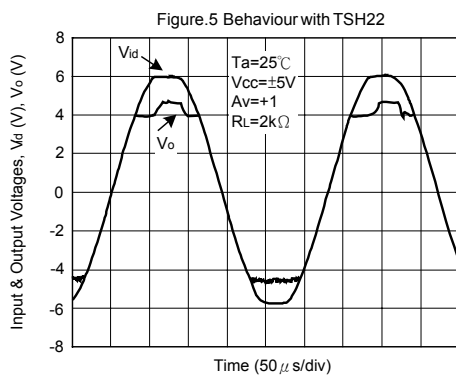
Figure.4 Transition speed @ 250mV overdrive



## PHASE INVERSION

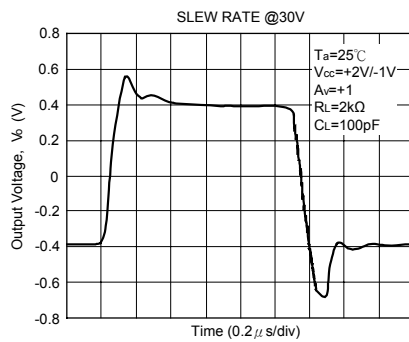
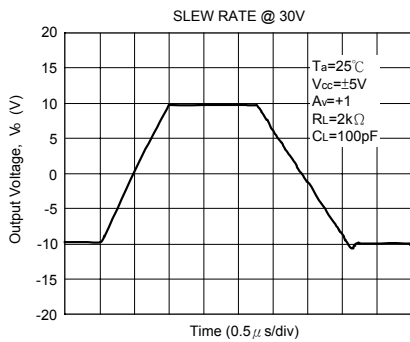
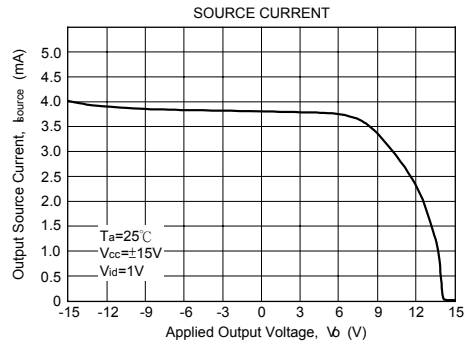
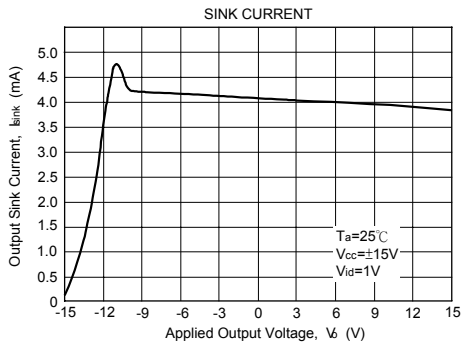
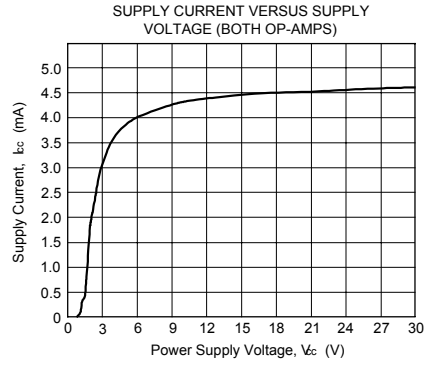
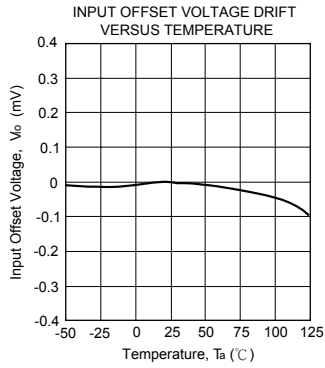
At high differential input voltage, the UTC 3422 keeps the right output level thanks to its specific input structures. The advantage is obvious on the following figures and can be also an advantage in linear use when saturation might occur.

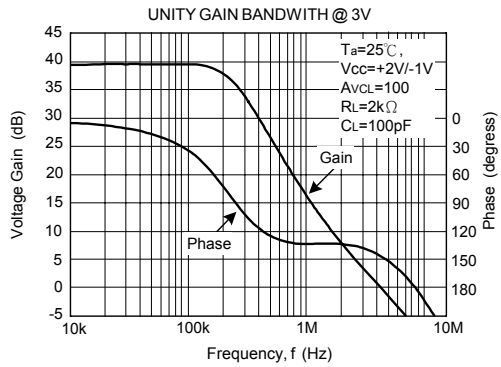
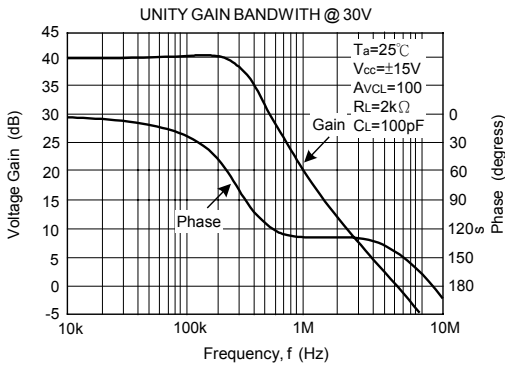
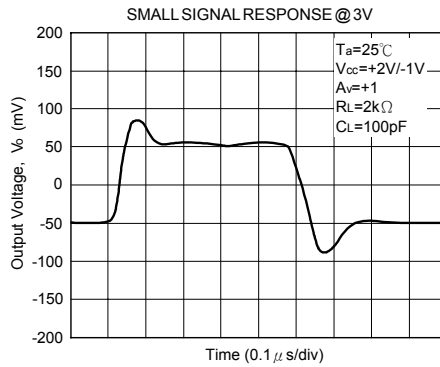
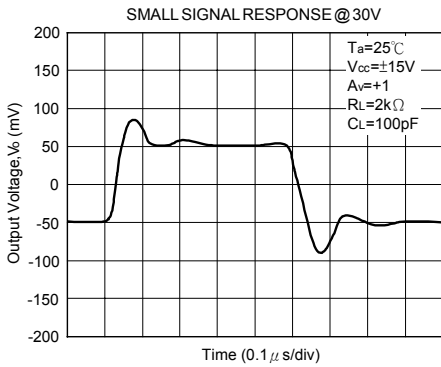
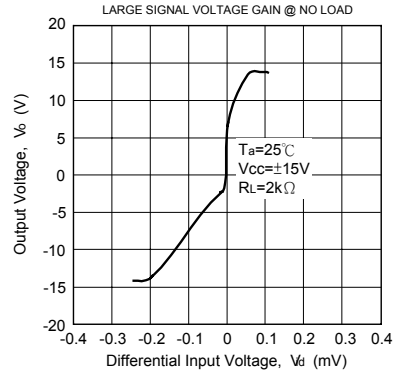
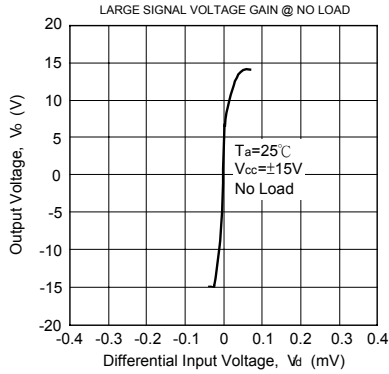
Figure 5 & 6 show the behaviour in follower stage with saturation output of UTC 3422 versus 15MHz standard operational amplifier.

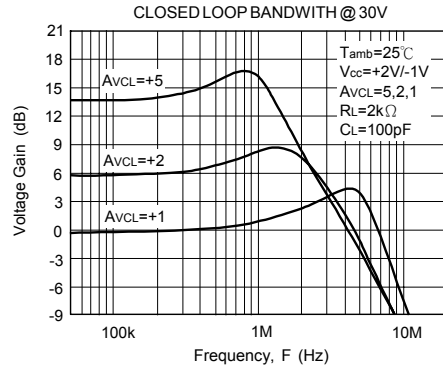
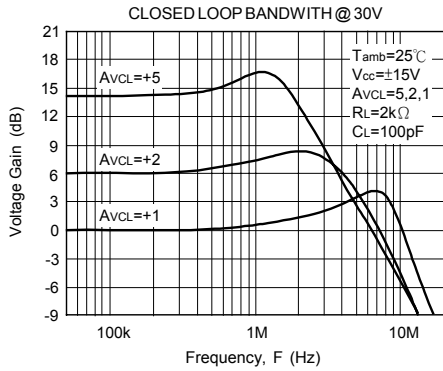


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## ELECTRICAL CHARACTERISTIC







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