

# NE5520

## LVDT Signal Conditioner

### Product Specification

#### DESCRIPTION

The NE5520 is a signal conditioning circuit for use with Linear Variable Differential Transformers (LVDT). The chip includes a low distortion amplitude stable sine wave oscillator with programmable frequency to drive the primary of the LVDT; a synchronous demodulator to convert the LVDT output amplitude and phase to position information; and an output amp to provide gain and filtering.

#### FEATURES

- Oscillator frequency: 1kHz to 20kHz
- Low distortion
- Capable of ratiometric operation
- Single supply operation 5V to 20V or dual supply  $\pm 2.5V$  to  $\pm 10V$
- Low power consumption

#### APPLICATIONS

- LVDT signal conditioning
- RVDT signal conditioning

#### ORDERING INFORMATION

| DESCRIPTION        | TEMPERATURE RANGE | ORDER CODE |
|--------------------|-------------------|------------|
| 14-Pin Plastic DIP | 0 to +70°C        | NE5520N    |
| 16-Pin SOL Package | 0 to +70°C        | NE5520D    |
| 16-Pin Ceramic DIP | 0 to +70°C        | NE5520F    |

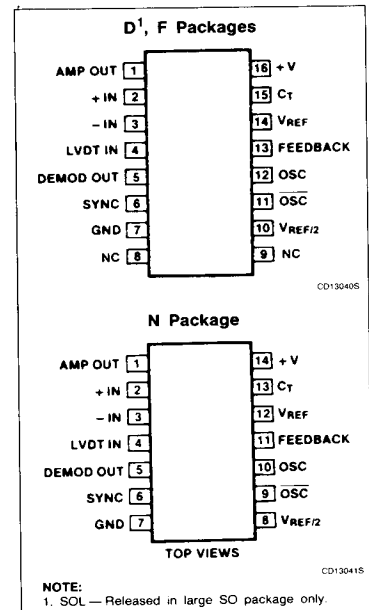
#### ABSOLUTE MAXIMUM RATINGS

| SYMBOL    | PARAMETER                      | RATING      | UNIT |
|-----------|--------------------------------|-------------|------|
| $V_S$     | Supply voltage                 | +20         | V    |
|           | Split supply voltage           | $\pm 10$    | V    |
| $T_A$     | Operating temperature range    | 0 to +70    | °C   |
| $T_{STG}$ | Storage temperature range      | -65 to +165 | °C   |
| $P_D$     | Power Dissipation <sup>1</sup> | 840         | mW   |

#### NOTES:

1. Supplied only in large SO (Small Outline) package. See package diagram.
2. Pin numbers are for N package.

#### PIN CONFIGURATIONS





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**DC ELECTRICAL CHARACTERISTICS**  $T_A = 25^\circ\text{C}$ ,  $V_R = V^+ = 10\text{V}$ , unless otherwise specified.

| SYMBOL                            | PARAMETER                                | TEST CONDITIONS                           | LIMITS                |                   |                       | UNIT                                   |
|-----------------------------------|------------------------------------------|-------------------------------------------|-----------------------|-------------------|-----------------------|----------------------------------------|
|                                   |                                          |                                           | Min                   | Typ               | Max                   |                                        |
| $I_{CC}$                          | Supply current                           | Over temperature                          |                       | 7.0               | 10                    | mA                                     |
| $I_{REF}$                         | Reference current                        | Over temperature                          |                       | 5.5               | 10                    | mA                                     |
| $V_{REF}$                         | Reference voltage range                  | Over temperature                          | 5                     |                   | $V^+$                 | V                                      |
| $P_D$                             | Power dissipation                        |                                           |                       | 120               | 220                   | mW                                     |
| <b>Oscillator section</b>         |                                          |                                           |                       |                   |                       |                                        |
|                                   | Oscillator output                        |                                           |                       | $\frac{V_R}{8.7}$ |                       | $V_{RMS}$                              |
|                                   | Sine wave distortion                     |                                           |                       | 4                 |                       | %                                      |
|                                   | Initial amplitude error                  |                                           |                       |                   | $\pm 3$               | %                                      |
|                                   | Tempco of amplitude                      |                                           |                       |                   | 0.05                  | %/ $^\circ\text{C}$                    |
|                                   | Voltage coefficient of amplitude error   |                                           |                       |                   | 2.5                   | %/V                                    |
|                                   | Initial accuracy of oscillator frequency |                                           |                       |                   | 20                    | %                                      |
|                                   | Tempco of frequency error                |                                           |                       | 0.05              |                       | %/ $^\circ\text{C}$                    |
|                                   | Voltage coefficient of frequency         |                                           |                       | 2.5               |                       | %/V( $V_R$ )                           |
|                                   | Oscillator output load current           | Over temperature                          | 8                     | 15                |                       | $\text{mA}_{RMS}$<br>$\text{mA}_{RMS}$ |
| <b>Demodulator section</b>        |                                          |                                           |                       |                   |                       |                                        |
| $E_r$                             | Linearity error                          | Over temperature                          |                       | 0.05              | 0.1                   | %                                      |
|                                   | Maximum demodulator input                | Over temperature range                    | $\frac{V_R}{2} - 0.5$ |                   | $\frac{V_R}{2} + 0.5$ | V                                      |
|                                   | Demodulator offset voltage               | Over temperature range                    |                       |                   | 65                    | mV                                     |
|                                   | Demodulator input current                | Over temperature                          | -1000                 | -300              |                       | nA                                     |
|                                   | $V_R/2$ accuracy                         | Over temperature                          | -3                    | $\pm 0.5$         | +3                    | %                                      |
| <b>Auxiliary output amplifier</b> |                                          |                                           |                       |                   |                       |                                        |
| $V_{OS}$                          | Input offset voltage                     | Over temperature                          | -10                   |                   | 10                    | mV                                     |
| $I_{BIAS}$                        | Input bias current                       | Over temperature range                    | -500                  | -300              |                       | nA                                     |
| $I_{OS}$                          | Input offset current                     |                                           | -100                  |                   | 100                   | nA                                     |
| $A_V$                             | Gain                                     | $R_L = 10\text{k}\Omega$ over temperature |                       | 100               |                       | V/mV                                   |
| SR                                | Slew rate                                |                                           |                       | 1.5               |                       | V/ $\mu\text{s}$                       |
| GBW                               | Gain bandwidth                           | $A_V = 1$                                 |                       | 1                 |                       | MHz                                    |
| $V_{OUT}$                         | Output voltage swing                     | $R_L = 10\text{k}\Omega$ over temperature | 1.5                   |                   | $V^+ - 1.5$           | V                                      |
| $I_{SC}$                          | Output short-circuit current             |                                           |                       | 50                |                       | mA                                     |

**NOTE:**Rating applies to ambient temperatures up to  $70^\circ\text{C}$ . Above  $70^\circ\text{C}$  derate linearly at  $7.6\text{mW}/^\circ\text{C}$  for the plastic package and  $7.3\text{mW}/^\circ\text{C}$  for the cerdip package.

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## TYPICAL PERFORMANCE CHARACTERISTICS

