



# TS461

## HIGH OUTPUT SWING SINGLE OPERATIONAL AMPLIFIER

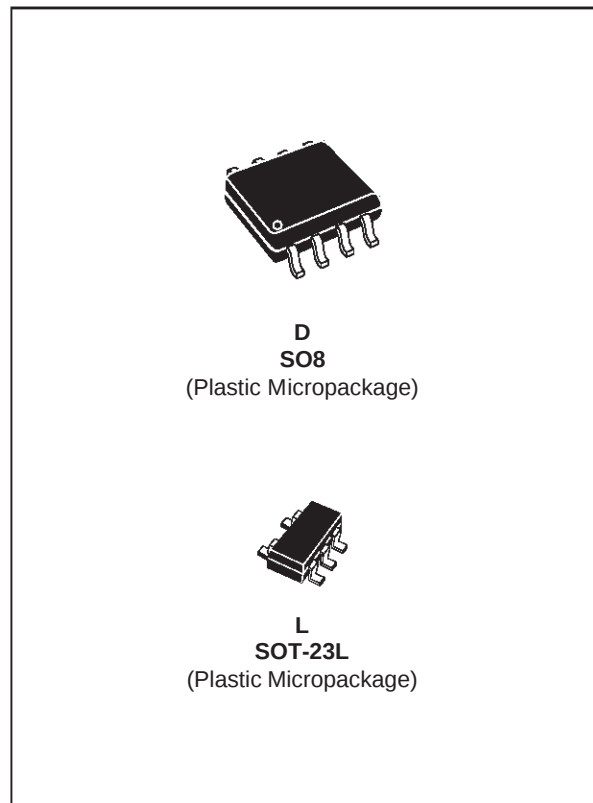
PRODUCT PREVIEW

- HIGH DYNAMIC FEATURES
  - LARGE OUTPUT SWING  
( $\pm 2.4V$  @  $V_{CC} = \pm 2.5V$ )
  - LOW NOISE LEVEL :  $4nV/\sqrt{Hz}$
  - LOW DISTORTION : **0.003%**
  - OPERATING RANGE : 2.7V to 10V
- 
- AVAILABLE IN **SOT23-5** MICROPACKAGE

### DESCRIPTION

The TS461 is a single operational amplifier able to operate with voltages as low as  $\pm 1.35V$  and to reach a minimum of  $\pm 2V_{pp}$  of output swing (when supplied with  $\pm 2.5V$ ).

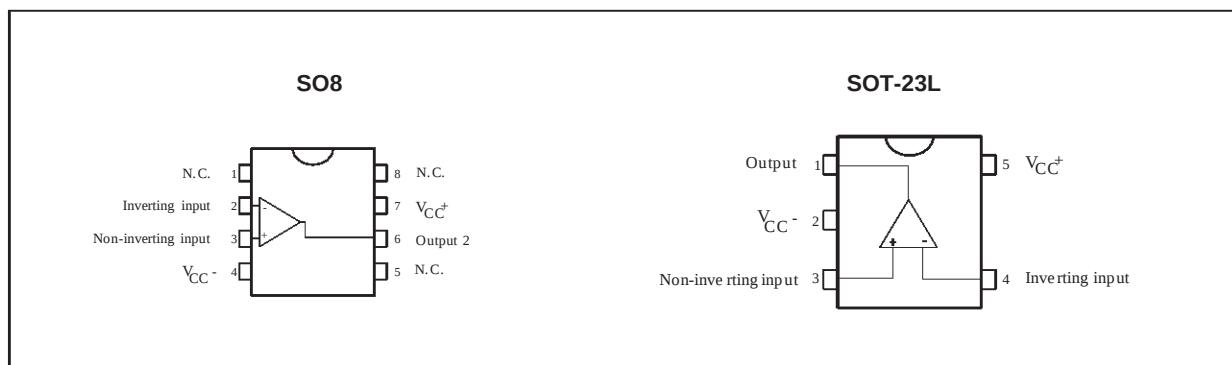
It is housed in the space-saving 5 pins SOT23-5 package which simplifies the board design because of the ability to be placed everywhere (outside dimensions are 2.8mm x 2.9mm)



### ORDER CODES

| Part Number | Temperature Range | Package |   | SOT Marking |
|-------------|-------------------|---------|---|-------------|
|             |                   | D       | L |             |
| TS461C      | -20, +70°C        | •       | • | K105        |

### PIN CONNECTIONS (top view)



## ABSOLUTE MAXIMUM RATINGS

| Symbol     | Parameter                              | Value        | Unit |
|------------|----------------------------------------|--------------|------|
| $V_{CC}$   | Supply Voltage                         | 12           | V    |
| $V_{id}$   | Differential Input Voltage - note 1    | $\pm V_{CC}$ | V    |
| $T_{oper}$ | Operating Free Air Temperature Range   | -20 to +70   | °C   |
| $T_{stg}$  | Storage Temperature                    | -65 to +150  | °C   |
| $T_j$      | Maximum Junction Temperature           | 150          | °C   |
| $R_{thjc}$ | Thermal Resistance Junction to Case    | 81           | °C/W |
| $R_{thja}$ | Thermal Resistance Junction to Ambient | 256          | °C/W |

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

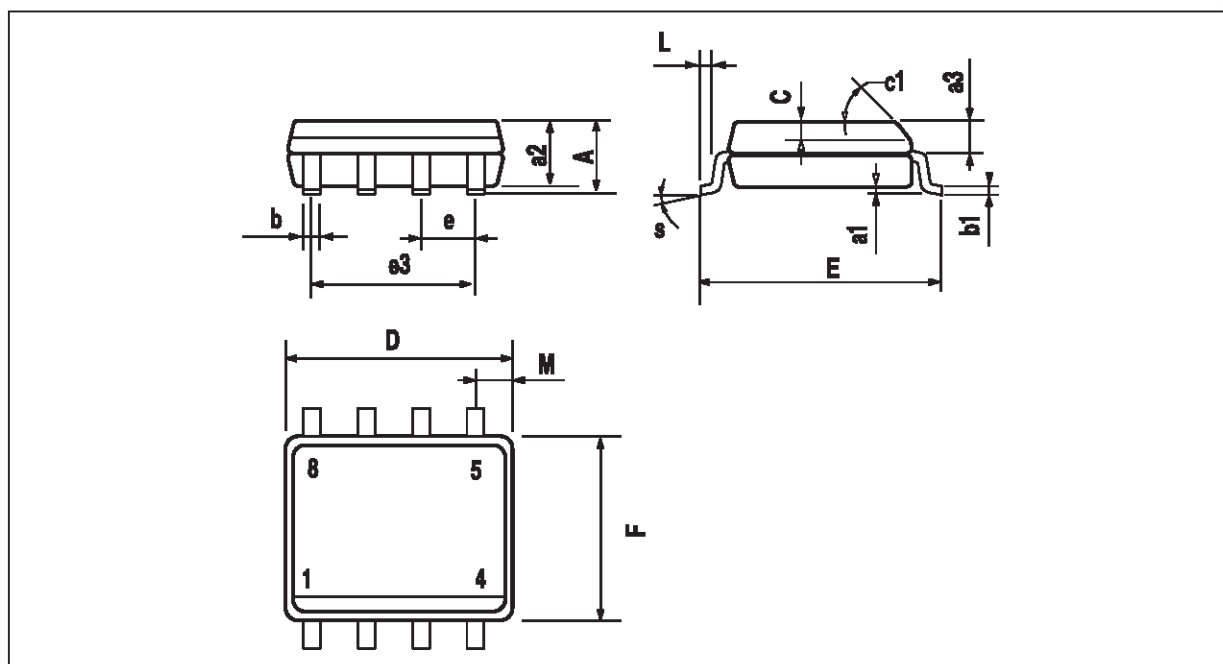
## OPERATING CONDITIONS

| Symbol   | Parameter      | Value     | Unit |
|----------|----------------|-----------|------|
| $V_{CC}$ | Supply Voltage | 2.7 to 10 | V    |

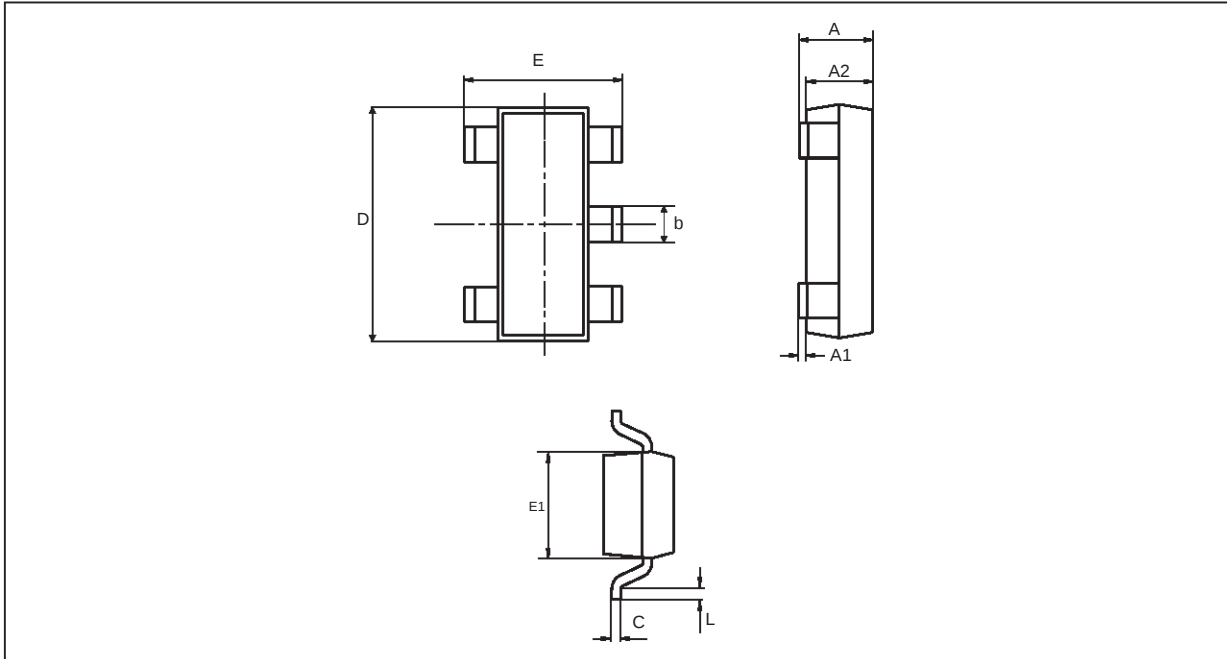
## ELECTRICAL CHARACTERISTICS

$V_{CC}^+ = 2.5V$ ,  $V_{CC}^- = -2.5V$ ,  $T_{amb} = 25^\circ C$  (unless otherwise specified)

| Symbol    | Parameter                                                                             | Min. | Typ.      | Max.          | Unit                   |
|-----------|---------------------------------------------------------------------------------------|------|-----------|---------------|------------------------|
| $V_{io}$  | Input Offset Voltage<br>$T_{min.} < T_{amb} < T_{max.}$                               |      | 1         | 5<br>7        | mV                     |
| $DV_{io}$ | Input Offset Voltage Drift<br>$V_{ic} = 0V$ , $V_o = 0V$                              |      | 5         |               | $\mu V/^\circ C$       |
| $I_{io}$  | Input Offset Current<br>$T_{min.} < T_{amb} < T_{max.}$<br>$V_{ic} = 0V$ , $V_o = 0V$ |      | 10        | 150<br>T.B.D. | nA                     |
| $I_{ib}$  | Input Bias Current<br>$T_{min.} < T_{amb} < T_{max.}$<br>$V_{ic} = 0V$ , $V_o = 0V$   |      | 250       | 750<br>T.B.D. | nA                     |
| $V_{icm}$ | Common Mode Input Voltage Range                                                       |      | $\pm 1.5$ |               | V                      |
| CMR       | Common Mode Rejection Ratio<br>$V_{ic} = \pm 1.35V$                                   | 60   | 85        |               | dB                     |
| SVR       | Supply Voltage Rejection Ratio<br>$V_{CC} = \pm 2V$ to $\pm 3V$                       | 60   | 70        |               | dB                     |
| $V_{oh}$  | High Level Output Voltage<br>$R_L = 2k$                                               | 2    | 2.4       |               | V                      |
| $V_{ol}$  | Low Level Output Voltage<br>$R_L = 2k$                                                |      | -2.4      | -2            | V                      |
| $A_{vd}$  | Large Signal Voltage Gain<br>$R_L = 2k$                                               | 70   | 80        |               | dB                     |
| GBP       | Gain Bandwidth Product<br>$f = 100kHz$ , $R_L = 2k\Omega$ , $C_L = 100pF$             | 8.5  | 12        |               | MHz                    |
| SR        | Slew Rate<br>$A_v = 1$ , $V_{in} = \pm 1V$                                            | 2.8  | 4         |               | V/ $\mu s$             |
| $I_{CC}$  | Supply Current<br>Unity gain - no load                                                |      | 2         | 2.8           | mA                     |
| $e_n$     | Equivalent Input Noise Voltage<br>$f = 100kHz$                                        |      | 4         |               | $\frac{nV}{\sqrt{Hz}}$ |
| THD       | Total Harmonic Distortion<br>$f = 1kHz$ , $A_v = -1$ , $R_L = 10k$                    |      | 0.003     |               | %                      |

**PACKAGE MECHANICAL DATA****8 PINS - PLASTIC MICROPACKAGE (SO)**

| Dimensions | Millimeters |      |      | Inches |       |       |
|------------|-------------|------|------|--------|-------|-------|
|            | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A          |             |      | 1.75 |        |       | 0.069 |
| a1         | 0.1         |      | 0.25 | 0.004  |       | 0.010 |
| a2         |             |      | 1.65 |        |       | 0.065 |
| a3         | 0.65        |      | 0.85 | 0.026  |       | 0.033 |
| b          | 0.35        |      | 0.48 | 0.014  |       | 0.019 |
| b1         | 0.19        |      | 0.25 | 0.007  |       | 0.010 |
| C          | 0.25        |      | 0.5  | 0.010  |       | 0.020 |
| c1         | 45° (typ.)  |      |      |        |       |       |
| D          | 4.8         |      | 5.0  | 0.189  |       | 0.197 |
| E          | 5.8         |      | 6.2  | 0.228  |       | 0.244 |
| e          |             | 1.27 |      |        | 0.050 |       |
| e3         |             | 3.81 |      |        | 0.150 |       |
| F          | 3.8         |      | 4.0  | 0.150  |       | 0.157 |
| L          | 0.4         |      | 1.27 | 0.016  |       | 0.050 |
| M          |             |      | 0.6  |        |       | 0.024 |
| S          | 8° (max.)   |      |      |        |       |       |

**PACKAGE MECHANICAL DATA**  
**5 PINS - TINY PACKAGE (SOT23)**

| Dim. | Millimeters |      | Inches |       |
|------|-------------|------|--------|-------|
|      | Min.        | Max. | Min.   | Max.  |
| A    | 0.90        | 1.45 | 0.034  | 0.057 |
| A1   | 0           | 0.15 |        | 0.006 |
| A2   | 0.90        | 1.30 | 0.034  | 0.051 |
| b    | 0.35        | 0.50 | 0.013  | 0.020 |
| C    | 0.09        | 0.20 | 0.003  | 0.008 |
| D    | 2.80        | 3.00 | 0.110  | 0.118 |
| E    | 2.60        | 3.00 | 0.102  | 0.118 |
| E1   | 1.50        | 1.75 | 0.059  | 0.069 |
| L    | 0.10        | 0.60 | 0.003  | 0.024 |

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