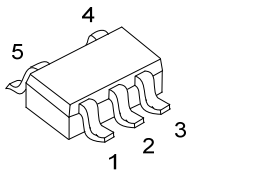
# ULV8615

**CMOS IC**

## RAIL-TO-RAIL INPUT/OUTPUT CMOS OPERATIONAL AMPLIFIERS




SOT-25

### ■ DESCRIPTION

The UTC **ULV8615** is a new generation of low-voltage CMOS operational amplifiers optimized for wide bandwidth.

The UTC **ULV8615** offer the highest output drive capability, which is excellent for audio line drivers and other low impedance applications. Applications for the parts include portable and low powered instrumentation, audio amplification for portable devices, portable phone headsets, bar code scanners, and multipole filters.

In addition amplifiers useful in a wide variety of applications. Filters, integrators, photodiode amplifiers, and high impedance sensors all benefit from the combination of performance features. AC applications benefit from the wide bandwidth and low distortion.

The UTC **ULV8615** is fully specified to operate from 2.7 V to 5 V single supplies. The UTC **ULV8615** is specified over the extended industrial temperature range (−40°C to +125°C).

### ■ FEATURES

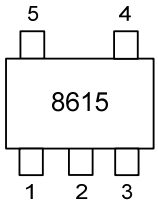
* Supply Voltage: 2.7~5.0V
* Supply Current/Amplifier: 2mA (Max.)
* Input Offset Voltage: 1mV (Max.)
* Rail-to-Rail Input and Output
* Slew Rate: 11V/μs (Typ.)

### ■ ORDERING INFORMATION

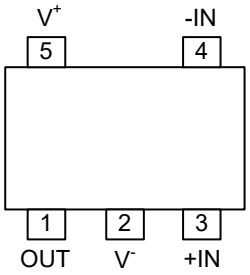
| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| ULV8615L-AF5-R | ULV8615G-AF5-R | SOT-25 | Tape Reel |

| | |
|---|---|
| ULV8615G-AF5-R<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | (1) R: Tape Reel<br>(2) AF5: SOT-25<br>(3) G: Halogen Free and Lead Free, L: Lead Free |

## ■ MARKING




## ■ PIN CONFIGURATION




## ■ PIN DESCRIPTION

| PIN NO. | PIN NAME | DESCRIPTION |
|---|---|---|
| 1 | OUT | Output |
| 2 | $V^-$ | Negative power supply |
| 3 | +IN | Non-inverting input |
| 4 | -IN | Inverting input |
| 5 | $V^+$ | Positive power supply |

## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage | $(V^+ - V^-)$ | 6 | V |
| Input Voltage | | $V^-$ to $V^+$ | |
| Differential Input Voltage | $V_{ID}$ | Supply Voltage | V |
| Output Short-Circuit Duration to GND | | Indefinite | |
| Storage Temperature Range | $T_{STG}$ | −65 ~ +150 | °C |
| Operating Temperature Range | $T_{OPR}$ | −40 ~ +125 | °C |
| Junction Temperature | $T_J$ | +150 | °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 OPWRAING CONDITIONS

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage | $V^+ - V^-$ | 2.7 ~ 5.0 | V |
| Operating Free-Air Temperature | $T_{OPR}$ | -40 ~ +125 | °C |

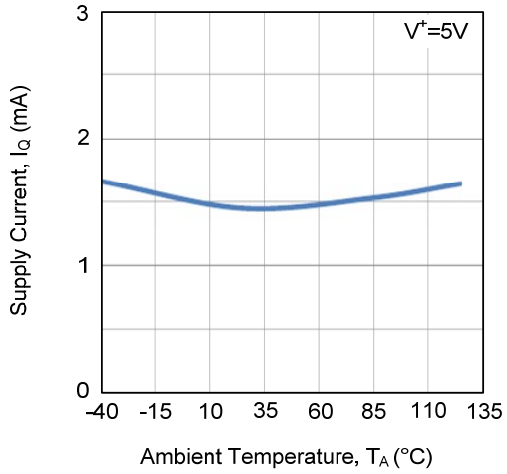
## ■ ELECTRICAL CHARACTERISTICS

($T_A$=25°C. $V^+$=2.7~5V, $V^-$=0V, $V_{iC}$= $V^+$/2V.)

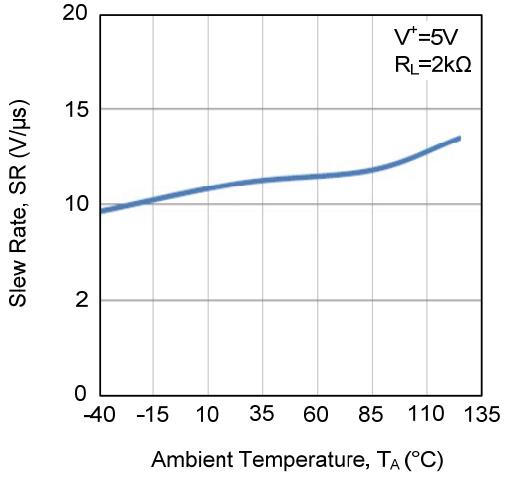
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Supply Current/Amplifier | $I_Q$ | $V_O$=0V | | | 1.5 | 2 | mA |
| Power Supply Rejection Ratio | PSRR | 2.7V ≤$V^+$ ≤ 5.5V | | 70 | 95 | | dB |
| Input Offset Voltage | $V_{OS}$ | $V_{iC}$= 0~ $V^+$ | | | 0.3 | 1 | mV |
| Input Bias Current | $I_B$ | | | | 0.5 | | pA |
| Input Offset Current | $I_{OS}$ | | | | 0.2 | | pA |
| Common-Mode Voltage Range | $V_{CM}$ | | | 0 | | $V^+$ | V |
| Common Mode Rejection Ratio | CMRR | 0V≤$V_{iC}$≤ $V^+$-0.5V | | 70 | 80 | | dB |
| Large Signal Voltage Gain | $A_V$ | $R_L$=2kΩ,$V_O$=0.5V ~ $V^+$-0.5V | | 80 | 100 | | dB |
| Output Voltage | $V_O$ | $I_L$=1mA | $V_{OH}$ | $V^+$-0.05 | $V^+$-0.02 | | V |
| | | | $V_{OL}$ | | 0.011 | 0.025 | V |
| | | $V^+$=5V, $I_L$=10mA | $V_{OH}$ | 4.88 | 4.92 | | V |
| | | | $V_{OL}$ | | 0.07 | 0.1 | V |
| Short-Circuit Current | $I_{SC}$ | Sourcing, $V_O$=0V | | | 245 | | mA |
| | | Sinking, $V_O$= $V^+$ | | | 230 | | mA |
| Slew Rate | SR | | | | 11 | | V/μs |
| Gain-Bandwidth Product | GBW | | | | 20 | | MHz |
| Phase Margin | $\Phi_M$ | | | | 40 | | Deg. |
| Input-Referred Voltage Noise | $e_n$ | f =1kHz, $V_{iC}$=1V | | | 13 | | nV/$\sqrt{Hz}$ |
| Input-Referred Current Noise | $i_n$ | f =1kHz | | | 0.2 | | pA/$\sqrt{Hz}$ |

## ■ TYPICAL CHARACTERISTICS

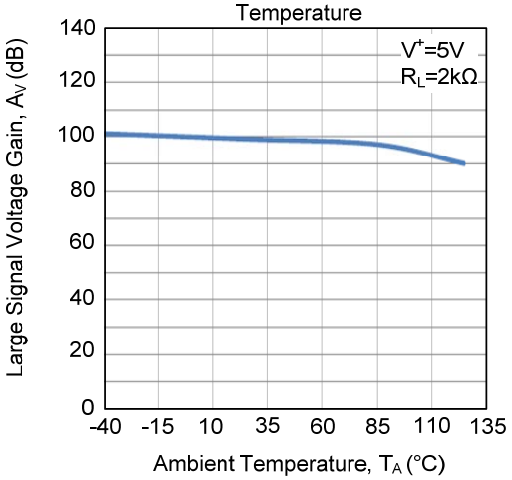
Supply Current vs. Temperature



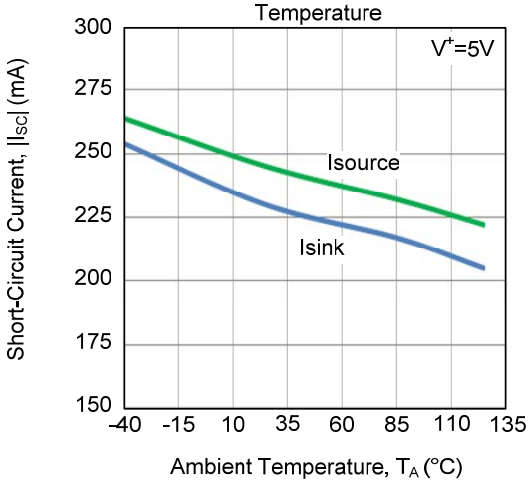

Slew Rate vs. Temperature



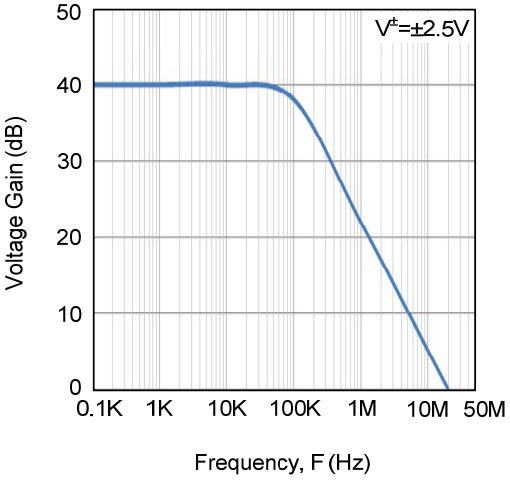

Large Signal Voltage Gain vs. Temperature




Output Short Circuit Current vs. Temperature




Voltage Gain vs. Frequency




Phase Shift vs. Frequency