

LL204

LINEAR INTEGRATED CIRCUIT

DUAL OUTPUT FLASHER

DESCRIPTION

The UTC **LL204** is a dual output stages flasher designed as a relay driver for flashing light control in automotive applications. Both sides direction indicator input with only a small control current makes switch contacts for small loads possible. Each side of the vehicle is controlled separately.

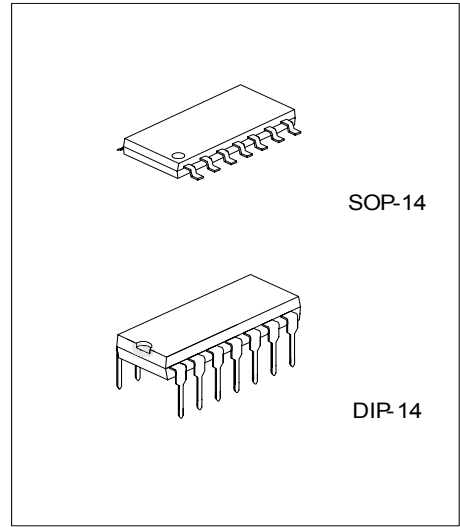
The construction of the hazard switch could be simplified due to hazard warning input is separate. The flasher will dramatically increase the flash frequency by a typical ratio of 2:1 if lamp fault is detected. The UTC **LL204** can be directly connected to the battery due to extreme low current consumption.

FEATURES

- * Temperature and supply voltage compensated flashing frequency
- * Frequency doubling indicates lamp fault.
- * Two relay driver outputs with high current-carrying capacity and low saturation voltage
- * Minimum lamp load for flasher operation: $\geq 1W$
- * Very low sensitivity to EMI
- * Extremely low current consumption $< 10\mu A$ (at switches open)
- * Reverse polarity protection
- * Three control inputs: left, right and hazard warning

ORDERING INFORMATION

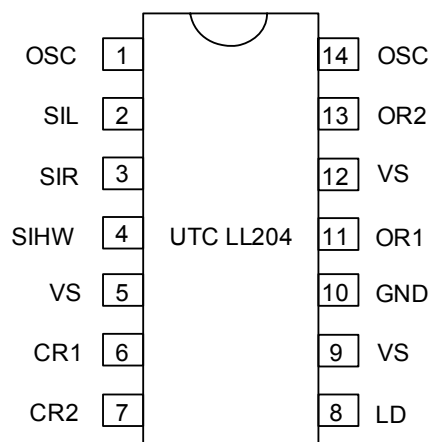
| Order Number | | Package | Packing |
|--------------|--------------|---------|-----------|
| Normal | Lead Free | | |
| LL204-D14-T | LL204L-D14-T | DIP-14 | Tube |
| LL204-S14-R | LL204L-S14-R | SOP-14 | Tape Reel |
| LL204-S14-T | LL204L-S14-T | SOP-14 | Tube |



*Pb-free plating product number: LL204L

| | | |
|---------------------|---|---|
| <p>LL204L-D14-T</p> | <p>(1) Packing Type (2) Package Type (3) Lead Plating</p> | <p>(1) R: Tape Reel, T: Tube (2) D14: DIP-14, S14: SOP-14 (3) L: Lead Free Plating Blank: Pb/Sn</p> |
|---------------------|---|---|

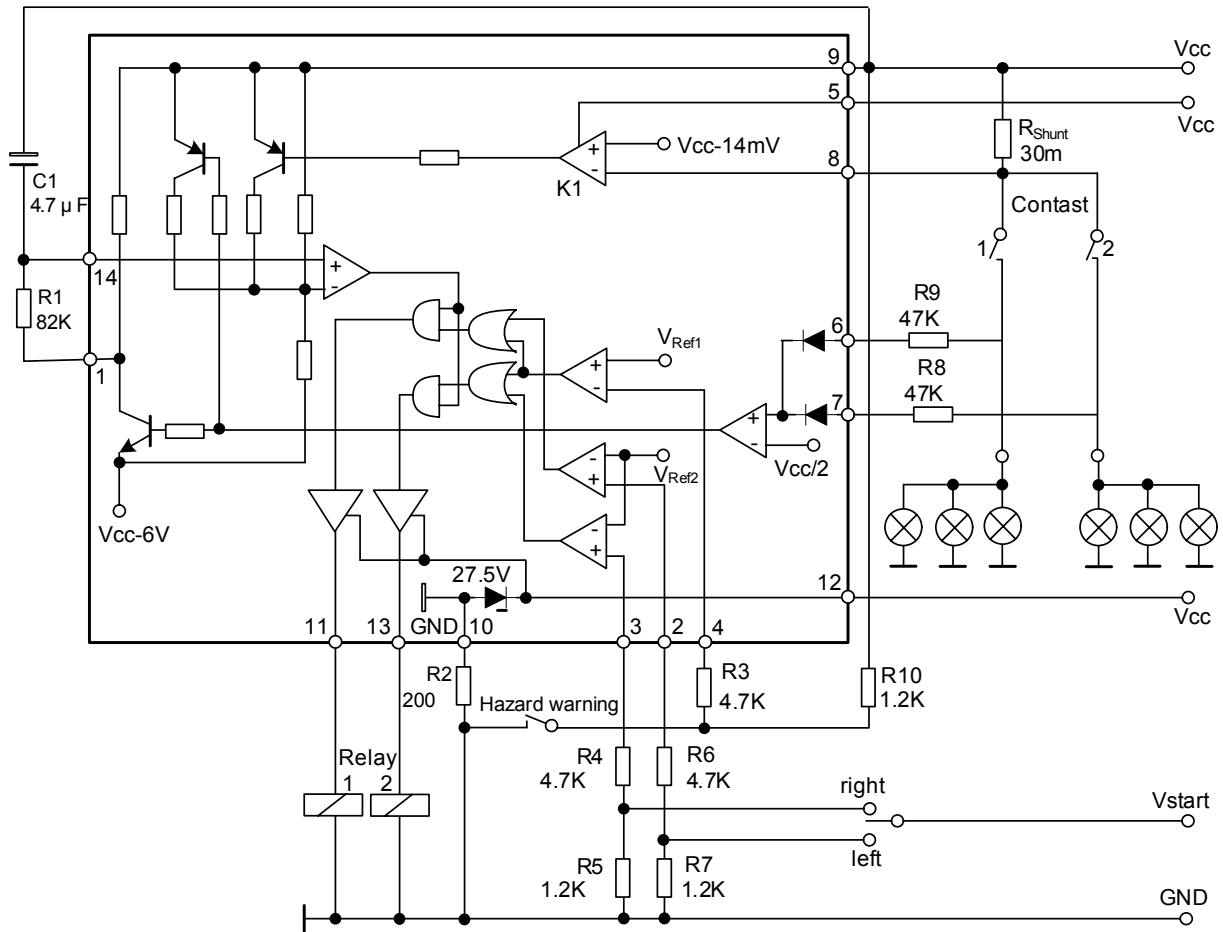
■ PIN CONFIGURATION



■ PIN DESCRIPTION

| PIN No. | PIN NAME | FUNCTION |
|---------|----------|----------------------------|
| 1 | OSC | Oscillator |
| 2 | SIL | Start input left |
| 3 | SIR | Start input right |
| 4 | SIHW | Start input hazard warning |
| 5 | VS | V _{CC} |
| 6 | CR1 | Control input relay 1 |
| 7 | CR2 | Control input relay 2 |
| 8 | LD | Lamp failure detection |
| 9 | VS | V _{CC} |
| 10 | GND | Ground |
| 11 | OR1 | Output relay 1 |
| 12 | VS | V _{CC} |
| 13 | OR2 | Output relay 2 |
| 14 | OSC | Oscillator |

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|-----------|------------|------|
| Supply Voltage, 1 min, pins 5, 9 and 12 | V_{CC} | 24 | V |
| Junction Temperature | T_J | +150 | |
| Operating Temperature | T_{OPR} | -20 ~ +85 | |
| Storage Temperature | T_{STG} | -40 ~ +150 | |

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 |
|--|--------|---------|------|
| Thermal Resistance Junction to Ambient | DIP-14 | 90 | /W |
| | SOP-14 | 120 | |

■ ELECTRICAL CHARACTERISTICS ($V_{CC} = 12V$, $T_a = 25$, unless otherwise specified.)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|-----------|--|------|---------------|------|-----------|
| Supply Voltage Range | V_{CC} | Pins 5, 9, 12 | 8 | | 18 | V |
| Saturation Voltage | V_{OUT} | $R_L = 82\Omega$ | | | 1.0 | V |
| | | | | | 1.2 | |
| Clamping Voltage | V_{12} | $T_a = -20 \sim 85$ | 25.0 | 27.5 | 30.0 | V |
| Relay output overvoltage detection (relay disabled) | V_{12} | $T_a = -20 \sim 85$ | 18 | 20 | 22 | V |
| Control signal threshold | V_{CC} | $V_{CC} = 9V$ $V_{CC} = 13.5V$ $V_{CC} = 16V$ | | 6 10 12 | | mV |
| Output current for relay driver | I_{OUT} | Pins 11, 13 | | | 300 | mA |
| Relay output reverse current | I_{OUT} | Pins 11, 13 | | | 0.1 | mA |
| Supply current, switches open | I_{CC} | Pins 5, 9, 12 | | | 10 | μA |
| Relay coil resistance | R_L | | | | | Ω |
| Start delay | t_{ON} | First bright phase | | | 10 | ms |
| Tolerance of control signal threshold | | $V_{CC} = 9V \sim 16V$, Pin 8, $T_a = -20 \sim 85$ | -6 | | +6 | % |
| Temperature coefficient of control signal Threshold | T_{CV0} | $V_{CC} = 13.5V$, Pin 8 | | 10 | | $\mu V/K$ |

■ TOLERANCES ($V_{CC} = 12V$, $T_a = 25$, unless otherwise specified.)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------------|--------|--|-------------------|-----|------------------|------------|
| Frequency determining resistor | R_1 | | 6.8 | | 510 | k Ω |
| Frequency determining capacitor | C_1 | | | | 47 | μF |
| Frequency tolerance | f_1 | Normal flashing, basic frequency f_1 excluding the tolerance of R_1 and C_1 | -5 | | +5 | % |
| Bright period | f_1 | Basic frequency f_1 | 47 | | 53 | % |
| | f_2 | Control frequency f_2 | 35 | | 43 | |
| Frequency increase | f_2 | Lamp failure | $2.15 \times f_1$ | | $2.3 \times f_1$ | Hz |
| Lamp load | P_L | | 1 | | | W |

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