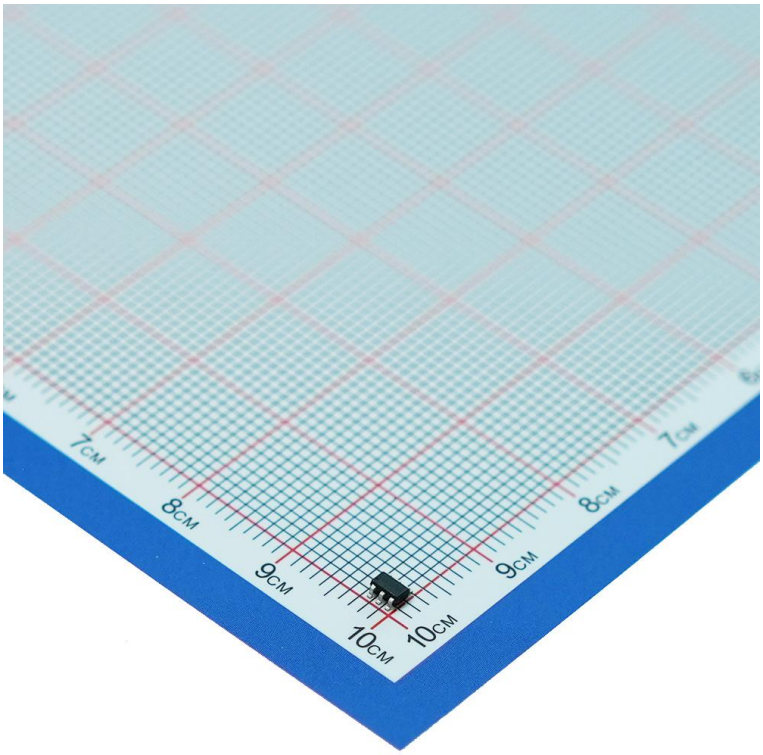
# LR690L Receiver IC Datasheet




| Item | Details |
| --- | --- |
| Product Model | LR690L |
| Document Version | V1.6 |
| Release Date | 2026-07-15 |
| Brand | FNRF |

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# 1 Product Overview

The LR690L is a wide-supply, low-power, high-sensitivity ASK wireless receiver IC covering 300-440 MHz. It integrates an RF amplifier, mixer, IF amplifier, frequency synthesizer, automatic gain control, reference oscillator, filters, and demodulator, making it suitable for wireless remote-control and smart-home receiving terminals.

The LR690L is an RF receiver IC; its DATA pin outputs the demodulated digital signal. For address learning, key decoding, switch-signal output, or serial output, add a decoder IC or MCU downstream.

# 2 Key Features

- Frequency range: 300-440 MHz, suitable for common ASK remote-control receiving applications.
- Receiver sensitivity: -110 dBm.
- Operating voltage: 2.0-5.5 V.
- Operating current: 2.8 mA (315 MHz) / 2.9 mA (433.92 MHz).
- Sleep current: 0.3 uA, supporting low-power designs.
- The SHUT pin supports active/sleep control.
- SOT23-6 package for compact receiving-terminal integration.

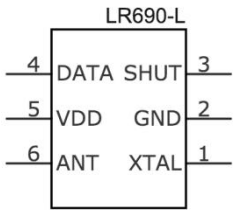
# 3 Typical Applications

- Wireless remote-control receiving terminals
- Smart-home receiver control boards
- Wireless doorbells and wireless switches
- Security-alarm receiving terminals
- Low-power ASK/OOK receiving equipment

# 4 Technical Specifications

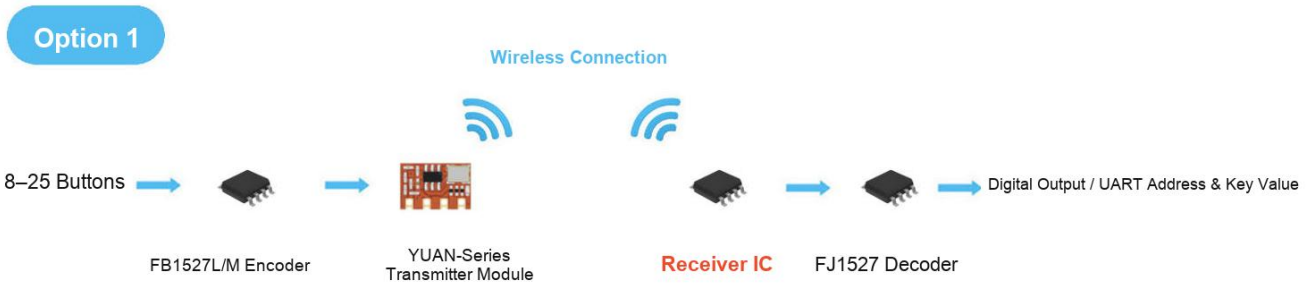
| Parameter | Min. | Typical | Max. | Unit | Condition / Description |
|---|---|---|---|---|---|
| Frequency Range | 300 | - | 440 | MHz | ASK receiving applications |
| Receiver Sensitivity | - | -110 | - | dBm | Typical condition |
| Operating Voltage | 2.0 | - | 5.5 | V | Between VDD and GND |
| Operating Current | - | 2.8 | - | mA | 315 MHz |
| Operating Current | - | 2.9 | - | mA | 433.92 MHz |
| Sleep Current | - | 0.3 | - | uA | SHUT high or floating |
| Data Output | - | DATA | - | - | Demodulated data output |
| Package | - | SOT23-6 | - | - | Surface-mount package |

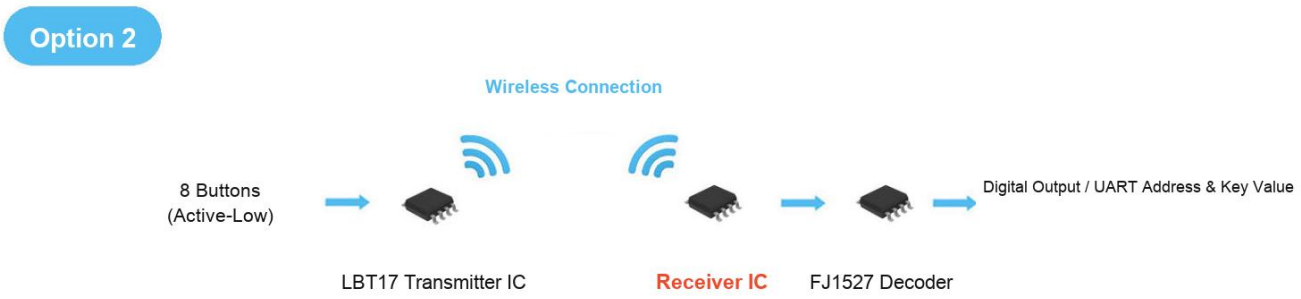
# 5 Pin Assignment

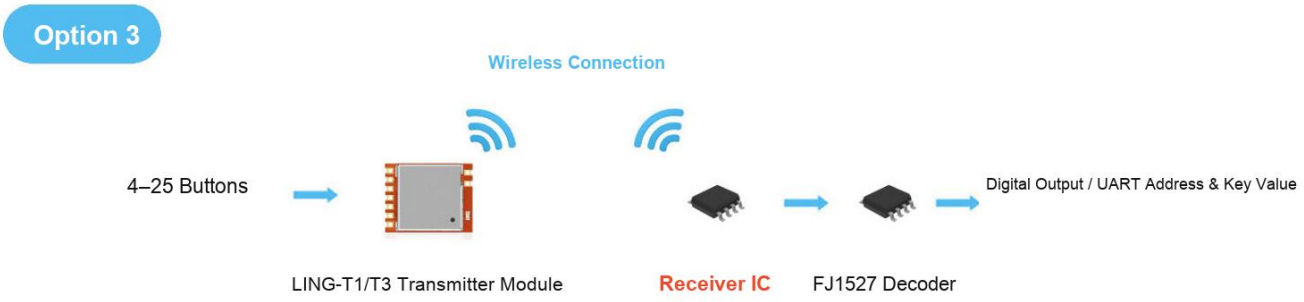



| Pin Name | Type | Function | Description |
|---|---|---|---|
| XTAL | Crystal | Crystal Oscillator Pin | External crystal or reference-frequency-related pin. |
| GND | Power | Ground | System ground. |
| SHUT | Input | Active/Sleep Control | Low level for active operation; floating or high level for sleep. |
| DATA | Output | Data Output | Outputs the demodulated digital signal. |
| VDD | Power | Positive Supply | Operating range: 2.0–5.5 V. |
| ANT | Input | RF Input | Connect to the antenna or RF matching network. |

# 6 Use and Operating Modes

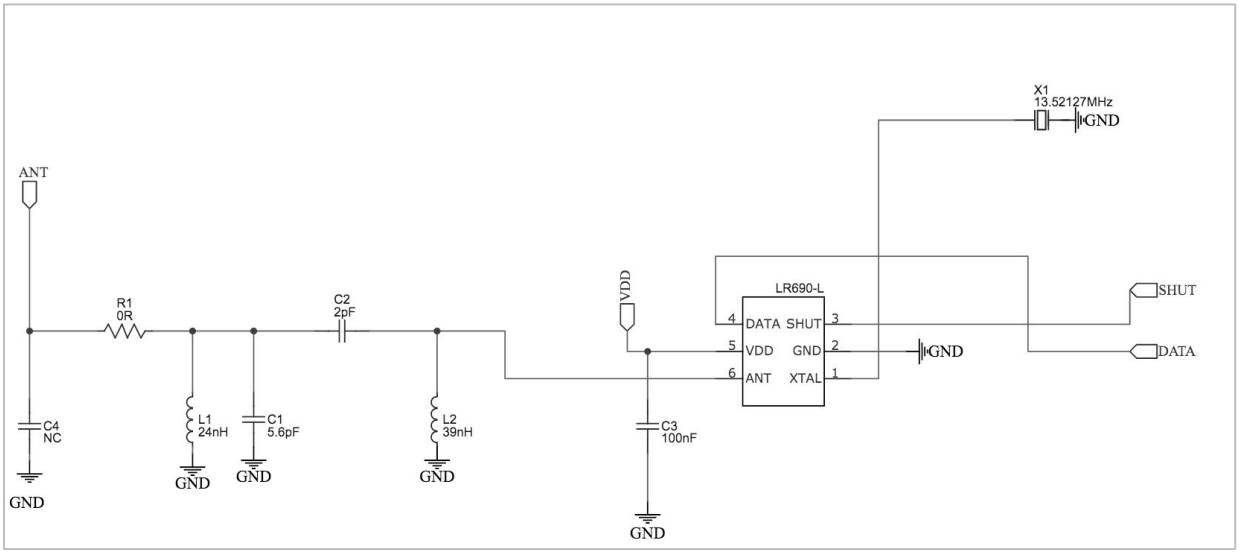


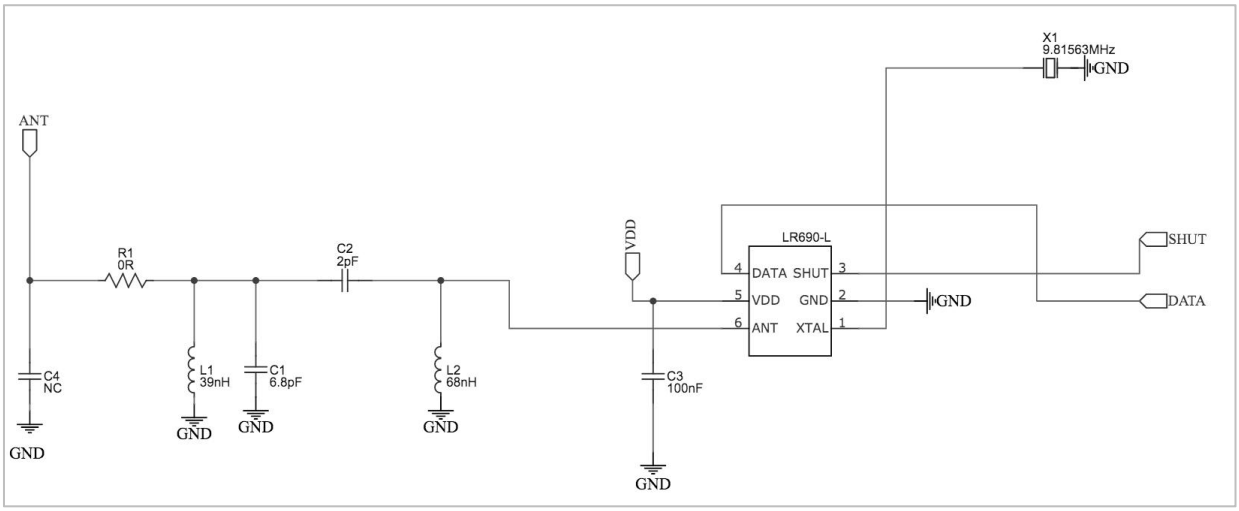




| Mode | SHUT Pin | DATA State | Description |
|---|---|---|---|
| Active Mode | Low | Outputs Demodulated Data | Used for normal ASK signal reception. |
| Sleep Mode | High or Floating | No Valid Received Data Output | Used to reduce system standby power consumption. |

# 7 Typical Circuits




433 MHz Application Reference Circuit




315 MHz Application Reference Circuit

Note: R1 and C4 may be resistors, inductors, or capacitors. Match the reserved footprints to the antenna; R1 may initially be tested as 0R.
Crystal: 15 pF, ± 10 ppm.

# 8 Decoding

The LR690L DATA pin outputs digital pulses demodulated from the ASK signal. This is a baseband pulse signal, not UART data and not a predecoded address code or key value. The FJ1527 decoder IC is recommended for direct switch-signal output or serial address-plus-key-value output.

For MCU decoding, the downstream MCU or decoder IC must identify the synchronization interval, pulse width, bit order, and valid bit count for the target encoding protocol, then convert them into an address code, key code, or control command. Pairing, whitelisting, repeat-code filtering, and serial output must be implemented by the downstream logic.

Common 1527-type remote-control protocols can be decoded as a 24-bit stream. Actual protocols may differ in pulse width, synchronization interval, and key-code allocation; use the transmitter encoding and measured DATA waveform as the reference.

## Decoder Routine Framework (Reference)

The following routine illustrates the basic process for an MCU to read DATA pulses through an external interrupt or input capture and decode 1527-type 24-bit data. Adjust the thresholds for the transmitter protocol, received waveform, and MCU timer accuracy.

```
#define LR690L_SYNC_MIN_US    6000u
#define LR690L_SYNC_MAX_US    18000u
#define LR690L_PULSE_MIN_US   200u
#define LR690L_PULSE_MAX_US   1600u
#define LR690L_PULSE_MID_US   600u
static uint32_t lr690l_code = 0;
static uint8_t lr690l_bits = 0;
static uint32_t lr690l_last_edge_us = 0;
// DATA edge-interrupt callback.
// level_after_edge is the DATA level after the edge; now_us is the current microsecond count.
void LR690L_OnDatEdge(uint8_t level_after_edge, uint32_t now_us)
{
    uint32_t width = now_us - lr690l_last_edge_us; // Duration of the previous level.
    lr690l_last_edge_us = now_us;
    if (level_after_edge != 1) {
        return;                    // This example decodes the previous low-level width only on rising edges.
    }
    if (width >= LR690L_SYNC_MIN_US && width <= LR690L_SYNC_MAX_US) {
        lr690l_code = 0;           // Synchronization interval detected; prepare for a new frame.
```

```
        lr690l_bits = 0;
        return;
    }
    if (width < LR690L_PULSE_MIN_US || width > LR690L_PULSE_MAX_US) {
        lr690l_code = 0;            // Invalid pulse width; discard the current frame.
        lr690l_bits = 0;
        return;
    }
    lr690l_code <<= 1;
    if (width > LR690L_PULSE_MID_US) {
        lr690l_code |= 1u;          // Treat a longer low level as logic 1.
    }
    if (++lr690l_bits == 24u) {
        LR690L_OnCodeReceived(lr690l_code); // Application layer processes address, key, and repeat codes.
        lr690l_code = 0;
        lr690l_bits = 0;
    }
}
```

## 9 Power Supply Design Recommendations

- Place a 100 nF decoupling capacitor close to VDD; keep the power loop short and complete.
- For low-power products, the MCU may control SHUT to enter sleep mode when reception is not required.
- Keep the receiver IC supply away from noise-return paths of motors, relays, DC-DC converters, and high-current loads.

## 10 PCB Layout Recommendations

- Keep traces from ANT to the matching network and IC input short and continuous; avoid high-noise signals.
- Place crystal-related components close to the IC; keep traces short and symmetric to reduce parasitic effects.
- Keep the DATA trace away from ANT, the crystal, and switching-power inductors to reduce errors and interference.

- For reserved matching positions such as R1 and C4, select a resistor, inductor, capacitor, or no component according to the actual antenna.

## 11 Antenna and RF Input Recommendations

Connect the ANT pin to an antenna matched for the target band or to an RF input network. Antenna length, matching components, enclosure material, installation orientation, and surrounding metal structures affect receiver sensitivity and communication distance.

Receiver mismatch or unsuitable antenna placement can significantly reduce communication distance. Before production, verify reception stability using the actual enclosure, installation position, and target transmitter conditions.

## 12 EMC and Interference Immunity Recommendations

- Keep ANT, the crystal, and matching-network areas away from DC-DC converters, motors, relays, and high-frequency digital signals.
- Before DATA enters the MCU or decoder IC, add appropriate filtering according to trace length and the interference environment.
- Complete-product certification and interference immunity depend on the antenna, enclosure, power supply, and PCB layout; verify them for the target product.

## 13 Ordering and Technical Support

Technical documentation, configuration software, and test tools are available from the FNRF Wireless website:

WWW.FNRF-TECH.COM

# Appendix Antennas、Development Tools

Antennas are important. No antenna or an unmatched antenna can seriously affect performance. Actual performance also depends on the PCB, enclosure, and mechanical structure; purchase several types for practical testing.

| | | | |
|---|---|---|---|
| TT02 |  | 433MHz | 27.5mm*5.0mm |

Development Tools:

| Development Assistant | Signal Assistant |
| --- | --- |
|  |  |
| Difference:<br>1、Measures data values<br>2、Requires an encoding type (1527, etc.) | Difference:<br>1、Measures signal strength<br>2、No encoding restriction (ASK/OOK modulation) |
| Use:<br>1、Displays the address code and key value of a remote control/transmitter module<br>2、Displays remote-control frequency, pulse width, and encoding type<br>3、Volume testing of remote-control products | Use:<br>1. Displays signal strength of a remote control/transmitter module (relative value)<br>2. Compares antenna performance<br>3. Volume testing of remote-control products |
| Power Supply:<br>TYPE-C | Power Supply:<br>TYPE-C |