
TG-LR82, TG-LR92 Manual

Release 0.99

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1 Functionality

Model	Description
TG-LR82	LoRaWAN 1.0.4 compatible sensor tag operating in 863.0 - 869.0 MHz band.
TG-LR92	LoRaWAN 1.0.4 compatible sensor tag operating in 900.0 - 928.0 MHz band.

Table 1.1: Operating modes.

Numeric code	Mode	Description
0	SHUTDOWN	Device deactivated in low power mode with all functionality disabled. Factory default mode.
1	RUN	Normal application functionality.

Note

New device is in *SHUTDOWN* mode and is inactive. To change device configuration or set *RUN* mode, use *Magnet Switch* input method.

Table 1.2: Bands.

Numeric code	Name	Description
1	BAND_1GHz	Sub-GHz operating band. Actual supported frequency range is based on device model.
2	BAND_2GHz	2.4GHz ISM band.

Table 1.3: Supported LoRaWAN regions

Numeric code <i>X-Y</i>	Common Name	<i>TG-LR82</i>	<i>TG-LR92</i>
1-1	EU868	Yes	
2-1	AS923_GRP1		Yes
3-1	US915		Yes
4-1	AU915		Yes
5-1	WW2G4	Yes	Yes
6-1	AS923_GRP2		Yes
7-1	AS923_GRP3		Yes
8-1	IN865	Yes	
9-1	KR920		Yes

1.1 Magnet Switch

Device has magnet switch that can be used for configuration commands or as external input signal.

When using magnet switch for configuration user must apply sequence of 1 to 4 digits. Each digit in sequence is entered consecutively. When magnetic field is applied to device, LED starts blinking with interval 500ms ON, 500ms OFF (or according to [LED Mode](#)). When LED is switched on, internal counter is incremented starting from 0. When magnetic field is removed counter value is latched as user input digit. If magnetic field is applied again, next digit in input sequence is started. If interval after applying digit is larger than 2.5s, sequence code is executed as command.

Note

When applying input code based on time, ensure to follow this equation: $T = N - 0.5$, where N is input digit and T is time in seconds to apply magnetic field. The interval between digits should be less than 1s.

If valid input command sequence is detected device executes requested operation and indicates status using device LED signals.

Table 1.4: Magnetically activated commands.

Sequence	PIN protected	Command description
2	optional	Activate - enable <i>RUN</i> operating mode.
3-1	optional	Trigger <i>current-state</i> frame uplink.
4-1-X	optional	Switch device profile, where X is profile number [1..6].
4-2-1	optional	Set primary band to <i>BAND_1GHz</i> .
4-2-2	optional	Set primary band to <i>BAND_2GHz</i> .
4-3-1	optional	Enable secondary band.
4-3-9	optional	Disable secondary band.
6-1	optional	Device reset.
6-2-9	optional	Deactivate device.
9-X-Y	optional	Set LoRaWAN region as per <i>Supported LoRaWAN regions</i> .
6-9-9	yes	Device factory reset.
3-1-5	yes	Exit PIN mode.
A-B-C-D	-	Enter PIN mode. A-B-C-D is digits of device factory PIN code.

Note

If applied command doesn't exist device ignores it.

Caution

LED indications during digit input can change based on device configuration. It is possible to change or completely disable LED indications.

1.2 Sensors and Data

Device has temperature, humidity, magnetic field, acceleration/orientation sensors. Data from these sensors can be sent to LoRaWAN application server periodically or based on configurable rules.

See “ul_decoder.js” script for data field decoding details. This script is compatible with TTN JavaScript engine.

Following data fields are contained in these UL frame types:

Table 1.5: Data fields.

Key	Frame types	Description
temperature	<i>current-state, last-temp</i>	Last measured temperature °C.
avg_temperature	<i>ema-temp</i>	Exponential moving average of temperature samples.
temp_histogram	<i>temp-histogram</i>	Epoch number and bin counter values for temperature histogram.
humidity	<i>current-state, last-humid</i>	Last measured relative humidity RH%.
humid_histogram	<i>humid-histogram</i>	Epoch number and bin counter values for humidity histogram.
avg_humidity	<i>ema-humid</i>	Last measured relative humidity RH%.
mag_sw_cnt_lsb	<i>current-state</i>	LSB of magnet switch 32bit counter value.
mag_sw_cnt	<i>mag-switch</i>	Magnet switch 32bit counter value.
mag_switch_ts	<i>mag-switch</i>	Last magnet switching time stamp. UNIX time or device uptime [s].
activity_state	<i>current-state, activity, activity</i>	Current device <i>Activity state code</i> .
activity_s	<i>full-activity</i>	Activity time 32bit counter [s].
high_activity_s	<i>full-activity</i>	High level activity (if configured) time 32bit counter [s].
total_activity_s	<i>activity</i>	Current device activity state.
major_axis_orien	<i>current-state</i>	Approximate device <i>Major axis orientation code</i> .
orientation	<i>device-orientation</i>	Device orientation normal vector: x, y, z.
free_fall_evnt	<i>current-state</i>	Flag indicating that free fall event is pending.
free_fall_cnt	<i>motion-events</i>	Free fall event 32bit counter.
impact_cnt	<i>motion-events</i>	Impact event 32bit counter.
impact_cnt_u16	<i>impact-count</i>	Impact event 16 LSB bit counter.
impact_cnt_x	<i>impact-count</i>	X axis impact event 16 LSB bit counter.
impact_cnt_y	<i>impact-count</i>	Y axis impact event 16 LSB bit counter.
impact_cnt_z	<i>impact-count</i>	Z axis impact event 16 LSB bit counter.
uptime_s	<i>dev-time</i>	Device uptime [s].
unix_time	<i>dev-time</i>	Current device UNIX time.
battery_mv	<i>dev-health</i>	Battery voltage mV.
version_str	<i>version</i>	Device version data.
serial_number	<i>serial-number</i>	Device serial number string.
config_checksum	<i>cfg-state</i>	Device current configuration checksums.
pending_evnt	<i>current-state</i>	Flag indicating pending device events.

Table 1.6: Activity state code.

Code	State
0	IDLE
1	LOW
2	HIGH
3	DISABLED

Table 1.7: Major axis orientation code.

Code	Orientation
0	XH
1	XL
2	YH
3	YL
4	ZH
5	ZL

1.3 Data Frames

Each LoRaWAN uplink message may contain multiple data frames depending on maximum payload size and pending frames. See “ul_decoder.js” script for frame encoding details.

Table 1.8: Frame types.

ID	Name	Description
1	current-state	Basic sensor and state data.
2	device-events	List of device events with time stamp.
3	temp-histogram	Temperature histogram data.
4	humid-histogram	Humidity histogram data.
5	device-orientation	Orientation data.
6	full-activity	Complete activity data.
7	motion-events	Impact and free-fall event counters.
8	mag-switch	Full magnetic switch data.
9	impact-count	Detailed impact counters - includes specific axis.
10	last-temp	Last measured temperature.
11	ema-temp	Exponential moving average of temperature samples.
12	last-humid	Last measured humidity.
13	ema-humid	Exponential moving average of humidity samples.
14	activity	Activity state and total active time.
20	dev-time	Device uptime and UNIX time stamp.
21	dev-health	Device health status: battery voltage.
22	version	Version information.
23	serial-number	Serial number string.
24	cfc-state	CRC of each configuration block.

1.4 Configuring Frames

Each frame can be configured to be sent periodically, on network join and either as confirmed or unconfirmed message.

To configure frames following command must be encoded as msgpack array and sent to device as a downlink on port 2:

```
2,2,<profile>,<frame-id>,<ul-period-s>,<confirmed>,<on-join>
```

profile: device profile 0..5.

frame-id: frame ID number or name string.

ul-period-s: interval to send frame or 0 to disable.

confirmed: true/false to enable/disable confirmed frame.

on-join: true/false to enable/disable send on join event.

1.4.1 Examples

Configuring *dev-health* frame to be sent every 180 seconds

Command: [2,2,0,21,180,false,false] can be encoded using <https://msgpack.solder.party/> as bytes: [0x97 0x02 0x02 0x00 0x15 0xCC 0xB4 0xC2 0xC2].

1.5 LED Mode

Table 1.9: LED mode during Magnet Switch command input.

Numeric Code	Mode	Description
0	HALF_DUTY_BLINK	LED blinks with 50% duty.
1	SHORT_BLINK	LED blinks with short pulses on counter increment.
2	NO_BLINK	LED is completely disabled.

2 Revision History

Revision	Date	Changes
	23.09.2025	Preliminary version.