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LRM3 TECHNICAL DATASHEET Issue 2, 11 August 2026

LoRa Remote Control and Data Modem

A Peer-to-Peer (P2P) Private LoRa communication allows Direct Bidirectional Communication between any two devices without any Gateway infrastructure or uplink/downlink restrictions imposed by LoRaWAN protocol on end devices. Higher LoRa receive sensitivity extends operating range in applications where FSK transmit power cannot be increased above unlicensed band ERP limit.

Figure 1: LRM3-869-11

Features

- Point-to-Point, Point-to-Multipoint with Addressing
- Customisable 150-960MHz
- RF Power: +20dBm (100mW)
- 8 Volt Free Digital Inputs for Remote Controller
- 8 Digital Outputs for Actuator
- 4 Digital Inputs, 4 Digital Outputs for Bidirectional Remote Control
- Wakes up from sleep mode to transmit input status change
- 250-byte buffer 3.3V TTL UART Serial Data Modem
- Channel Activity Detection (CAD)
- Packet Acknowledgement
- Learn Pairing Addresses for Remote Control

Applications

- Industrial/Commercial Telemetry and Telecommand or Non-specific SRD usage
- In-building environmental monitoring and control
- Security & Alarm
- Automated Irrigation System

Technical Summary

- Size: 33 x 25 x 8mm
- 779-787MHz (China), 865-867MHz (India), 863-870MHz (EU), 902-928MHz (US)
- 32MHz TCXO Reference with ±2.0ppm frequency stability over -30˚C +85˚C
- SAW front end filter
- Supply Voltage range: 4V-16V DC
- User baud rate: 9600bps (default), 38400, 57600,115200
- Modulation Bandwidth (BW): 7, 15, 31, 62, 125, 250, 500kHz
- Spreading Factor (SF): 7, 8, 9, 10, 11, 12
- Coding Rate: 4/5, 4/6, 4/7
- 32MHz TCXO Reference with ±2.0ppm frequency stability over -30˚C +85˚C
- SAW front end filter

1. Product Features and Functional Overview

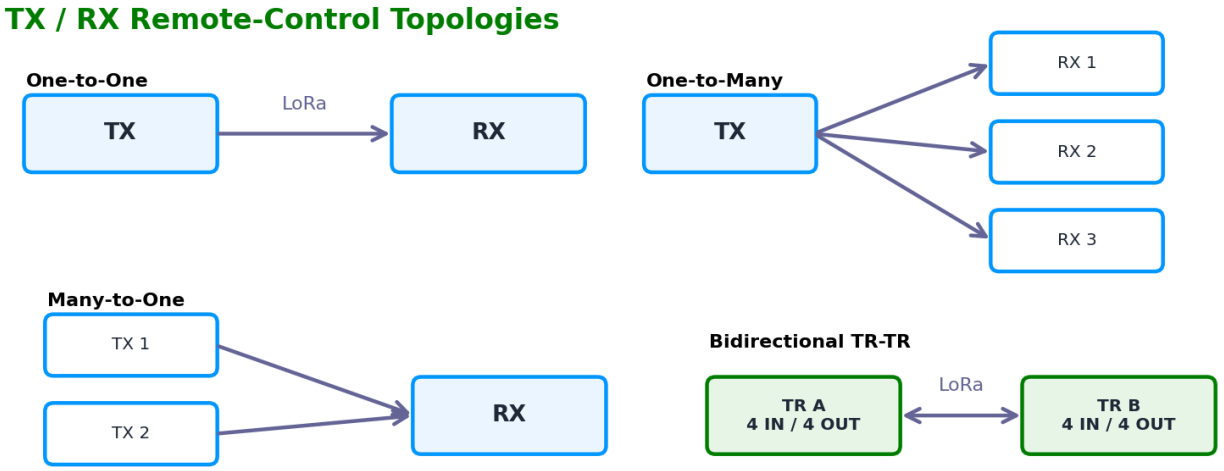
Functional Capabilities

LRM3 combines LoRa radio communication, standalone remote I/O control and host-controlled serial data communication. Devices can communicate directly using a 24-bit Site/Device logical address and learned destination list.

Mode	Local Interface	Primary Function
TX	8 digital inputs	Transmit input-state changes to learned destinations
RX	8 digital outputs	Apply received remote-control states to outputs
TR	4 inputs + 4 outputs	Bidirectional remote control
DM	UART / AT interface	Configuration, direct LoRa data and remote I/O control
SDM	UART serial stream	Low-data-rate serial transfer over LoRa

Networking

- One-to-One, One-to-Many and Many-to-One arrangements
- 1-byte Site Address separates independent logical systems
- 2-byte Device Address identifies individual units within a site
- LEARN pairing or software destination management using AT commands



Typical addressed remote-control topologies

Product-Level Features

Feature	Current Datasheet Basis
Configurable RF capability	150-960 MHz firmware capability; regional product bands apply
Maximum stated RF power	+20 dBm (100 mW)
Module dimensions	33 x 25 x 8 mm
Supply voltage	4-16 V DC
Reference	32 MHz TCXO, +/-2.0 ppm over -30 C to +85 C
RF front end	SAW filter

2. Technical Specifications

General

Parameter	Specification
Product	Radiometrix LRM3 - LoRa Remote Control and Data Modem
Radio operation	Peer-to-Peer LoRa
Network configurations	Point-to-Point / Point-to-Multipoint
Addressing	1-byte Site + 2-byte Device
Module size	33 x 25 x 8 mm
Supply voltage	4-16 V DC
Serial interface	3.3 V TTL UART
Serial Data Modem buffer	250 bytes
Reference	32 MHz TCXO, +/-2.0 ppm over -30 C to +85 C
RF front end	SAW filter

RF CONFIGURATION

Parameter	Supported / Stated Value
Firmware configurable frequency	150.0000-960.0000 MHz
Regional product ranges	China 779-787 MHz; India 865-867 MHz; Europe 863-870 MHz; US 902-928 MHz
Maximum stated RF power	+20 dBm (100 mW)
LoRa bandwidth	7, 10, 15, 20, 31, 41, 62, 125, 250, 500 kHz
Spreading Factor	SF5-SF12
Coding Rate	4/5, 4/6, 4/7, 4/8
Preamble	8, 16 or 32 symbols
Channel Activity Detection	Supported
Packet acknowledgement	Supported

SERIAL INTERFACE

Parameter	Specification
Default baud rate	9600 bit/s
Supported baud rates	9600, 19200, 38400, 57600, 115200 bit/s
Flow control	CTS, configurable
AT configuration	Supported in Data Modem mode

CAUTION: Available operating frequency and transmitter power are subject to the supplied LRM3 hardware variant and applicable regional radio regulations.

3. Module Interface and Mechanical Information

CONFIRMED FUNCTIONAL INTERFACES

- DC power supply
- 3.3 V TTL UART serial interface
- Configurable CTS flow-control signal
- Digital I/O for telemetry and remote control
- Mode-selection signals
- LEARN functionality
- RF interface

DIGITAL I/O BY MODE

Mode	Inputs	Outputs	Behavior
TX	8	-	Input changes are transmitted to learned destinations
RX	-	8	Received remote-control states update outputs
TR	4	4	Bidirectional remote-control operation
DM	Host/UART	Remote I/O via AT	Host-controlled packet and I/O operation

OVERALL DIMENSIONS

LRM3 MODULE - 33 mm x 25 mm x 8 mm

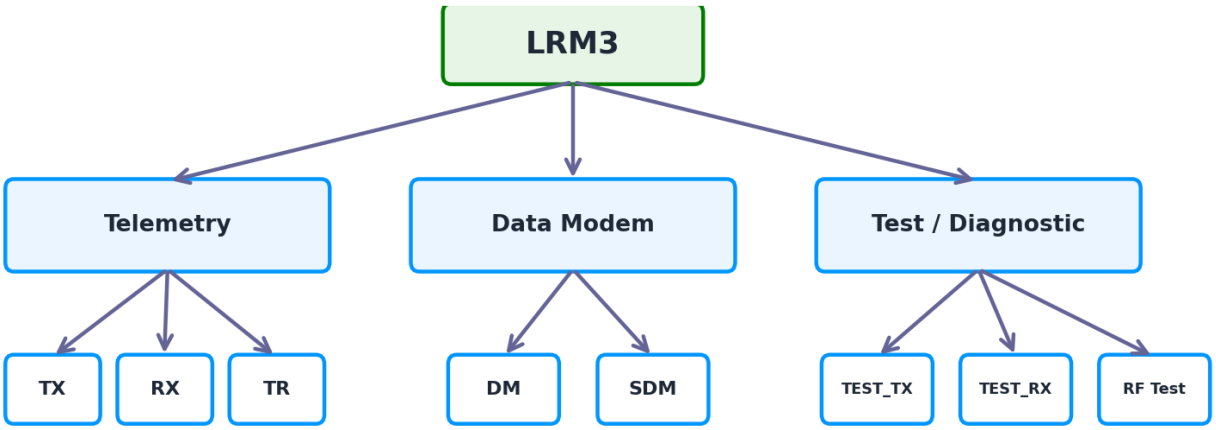
Confirmed overall dimensions only. A detailed mechanical drawing and exact module pin-number table are not established by the supplied source set.

DOCUMENTATION BOUNDARY

The larger development-oriented documentation shows Mini-USB, RS232, RS485, relay, mode selector, I/O and LEARN connections on a development board. Those development-board interfaces are not converted into an LRM3 module pinout in this datasheet because authoritative module pin numbers are not provided by the supplied source material.

NOTE: The 4-16 V DC value is treated as the LRM3 module supply specification from the preliminary commercial datasheet. The separate 3.3 V value in development-board material is not used as a replacement module-supply rating.

4. Operating Modes and System Architecture



LRM3 operating-mode architecture

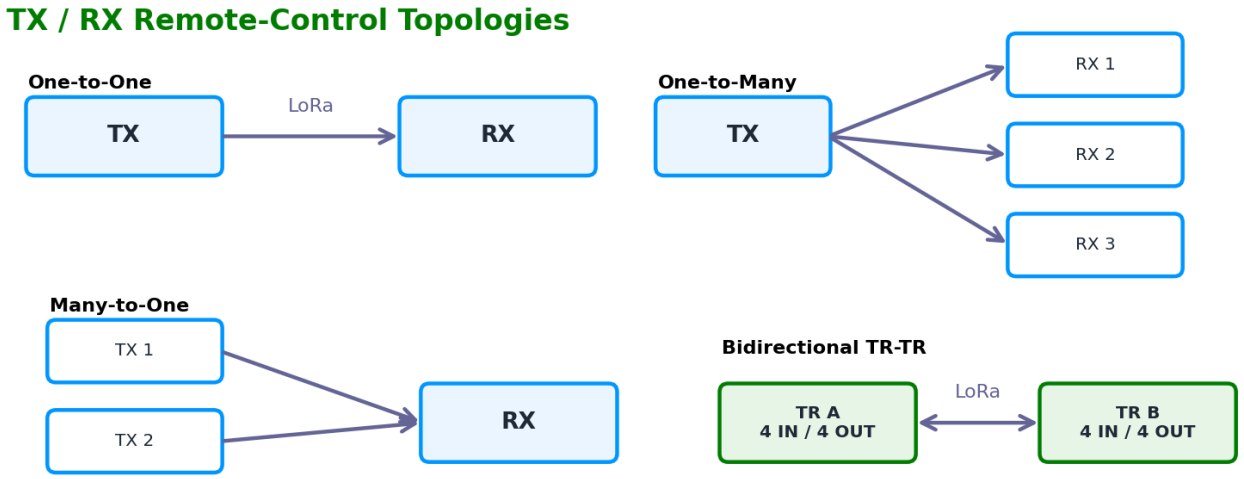
Mode	Category	Function
TX	Telemetry	8-input remote-control transmitter
RX	Telemetry	8-output remote-control receiver
TR	Telemetry	4-input / 4-output transceiver
DM	Data Modem	AT command and host-controlled communication
SDM	Data Modem	Serial data transport over LoRa
TEST_TX	Test	Range-test transmitter
TEST_RX	Test	Range-test receiver

HARDWARE MODE SELECTION

Mode	F2	F1	F0	Selector
TR	1	1	1	0
RX	1	1	0	1
TX	1	0	1	2
DM	1	0	0	3
TEST_TX	0	1	1	4
TEST_RX	0	1	0	5

NOTE: 1 indicates HIGH and 0 indicates LOW. The F2/F1/F0 truth table is used here instead of the older development-board rotary-selector notation.

5. Telemetry Operation - TX, RX and TR



TX/RX and TR telemetry arrangements

TX - TRANSMITTER

In TX mode all eight telemetry channels operate as digital inputs. Input-state changes are transmitted to learned destination devices. The supplied product documentation states that the module can wake from sleep to transmit an input-status change.

RX - RECEIVER

In RX mode all eight telemetry channels operate as outputs. The module monitors the LoRa link for addressed remote-control updates and applies valid received states to the outputs according to the configured momentary/latch behavior.

TR - TRANSCEIVER

TR mode provides four digital inputs and four digital outputs. Input changes can be transmitted to learned destinations while received remote-control states are applied to the local output channels, providing bidirectional control between TR devices.

SUPPORTED PAIRING RELATIONSHIPS

- One TX to one RX
- One TX to multiple RX devices
- Multiple TX devices to one RX
- TR-to-TR bidirectional arrangements

6. Addressing and LEARN Pairing

24-bit LRM3 Logical Address

LRM3 24-bit logical addressing model

LOCAL ADDRESS CONFIGURATION

```
AT+SITEADD:<SiteAddress>
AT+DEVADD:<DeviceAddress>
```

Devices intended to communicate normally share the same Site Address, while the Device Address identifies the individual unit within that logical site.

LEARN PAIRING

- Learned destination addresses are stored persistently in EEPROM.
- Hardware LEARN can be used for TX/RX and TR arrangements.
- Software destination management is available from DM mode using AT commands.

Command	Function
AT+SENDLRN:<Site>,<Device>	Send a LEARN packet
AT+ADDDES:<Position>,<Site>,<Device>	Add a destination manually
AT+SHOWLRN	Display learned destination information
AT+DELDES:<Position>	Delete one stored destination
AT+DELDESALL	Delete all learned destinations

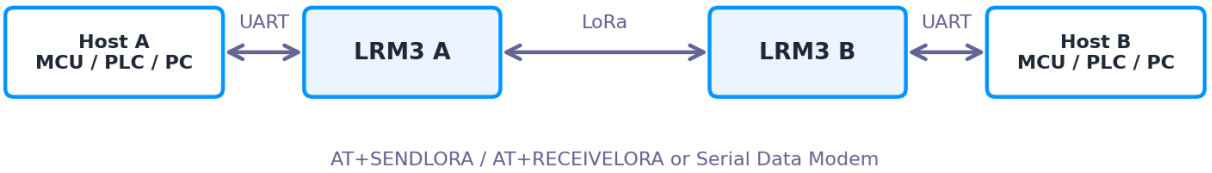
HARDWARE LEARN TIMING

For the later Radiometrix documentation, a long press of approximately 5-16 s is used for LEARN-entry behavior. A press longer than 16 s but less than 35 s is documented for clearing learned addresses where applicable.

NOTE: The older development manual contains different 4-5 s timing notes. This draft uses the later 5-16 s / 16-35 s description consistently.

7. Data Modem and Direct LoRa Communication

Host-Controlled Data Modem Operation



Host-controlled DM communication architecture

DIRECT ADDRESSED TRANSMISSION

```
AT+SENDLORA:<SiteAddress>,<DeviceAddress>,<Message>
Example: AT+SENDLORA:1,123,Hello
```

Sends a host-provided message to the specified LRM3 destination while operating in Data Modem mode.

COMMAND-CONTROLLED RECEPTION

```
AT+RECEIVELORA:<Timeout>
```

Places the module into command-controlled LoRa receive operation for the specified timeout. The supplied historical documentation does not establish a sufficiently clear complete customer-facing timeout range, so the range is not invented here.

REMOTE OUTPUT CONTROL

```
AT+PIN:<SiteAddress>,<DeviceAddress>,<Pin>,<Logic>
Example: AT+PIN:1,432,4,1
```

Allows a host connected to an LRM3 in DM mode to command a remote RX/TR output over the LoRa link.

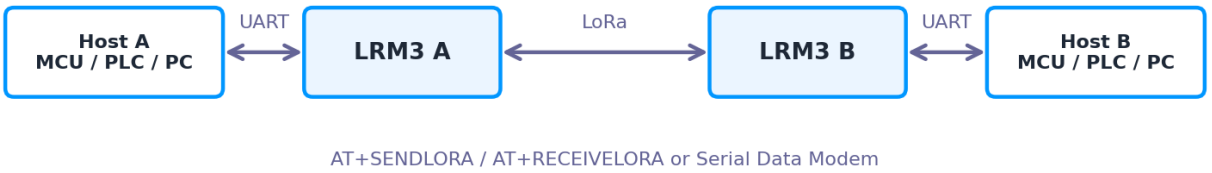
CTS FLOW CONTROL

```
AT+SETCTS:<State>
AT+SETCTS?
```

Enables or disables CTS signaling for the UART interface.

8. Serial Data Modem (SDM)

Host-Controlled Data Modem Operation



Serial Data Modem path over the LoRa link

SDM allows LRM3 units to operate as low-data-rate serial links. UART data received by one module is transferred to the configured destination over LoRa. Existing product documentation identifies a 250-byte 3.3 V TTL UART Serial Data Modem buffer.

TEMPORARY SDM

```
AT+SDMMTEM:<SiteAddress>,<DeviceAddress>
Example: AT+SDMMTEM:1,123
```

Uses a session destination and enters Serial Data Modem operation for the current operating session.

PERMANENT SDM

```
AT+SDMMDES:<SiteAddress>,<DeviceAddress>
AT+SDMMPER
```

Stores the SDM destination and enables permanent SDM operation. Existing documentation states that permanent SDM persists across power reset and can be exited using the LEARN-button mechanism.

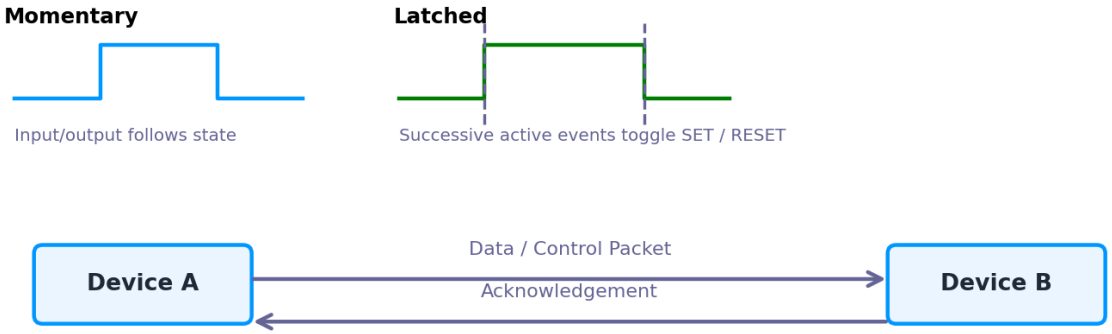
SDM ACKNOWLEDGEMENT

```
AT+ACKSDM:<0|1>
AT+ACKSDM?
```

0 = acknowledgement disabled; 1 = acknowledgement enabled.

9. Remote I/O, Latching, Acknowledgement and CAD

Output Behavior and Acknowledgement



Momentary/latch behavior and acknowledgement concept

RX LATCH COMMANDS

Command	Function
AT+RXLATCH=<PinList>	Set listed RX outputs as latched; remaining outputs become momentary
AT+RXLATCH?	Read latch-enabled RX outputs
AT+RXUNLATCH=<PinList>	Remove latch from selected RX outputs

TR LATCH COMMANDS

Command	Function
AT+TRLATCH=<PinList>	Set listed TR output channels as latched
AT+TRLATCH?	Read latch-enabled TR outputs
AT+TRUNLATCH=<PinList>	Remove latch from selected TR outputs

Intended TR output-channel range: 1-4. The datasheet does not expose a more permissive parser path as product functionality.

ACKNOWLEDGEMENT

Acknowledgement can be independently enabled for TX, RX, TR, DM and SDM. Enabling acknowledgement improves delivery confirmation at the cost of additional air time and transaction latency.

CAD

```
AT+CHECKCH
```

Performs LoRa Channel Activity Detection on the configured channel.

10. AT Interface Rules and Factory Defaults

AT COMMAND CONVENTIONS

Item	Behavior
Interface	UART in Data Modem (DM) mode
Prefix	AT
Terminator	Carriage Return <CR>
Keyword case	Case-insensitive
Set form	AT+COMMAND=<value> or AT+COMMAND:<value>
Query form	AT+COMMAND?
Execute form	AT+COMMAND
Basic attention	AT -> OK

FIRMWARE IDENTIFICATION

```
AT+VERSION
Current attached firmware: V1.1.26  01/02/2026
```

FACTORY DEFAULT CONFIGURATION

Parameter	Default
Frequency	869.5250 MHz
Bandwidth	125 kHz
Spreading Factor	SF9
TX Power	20 dBm
Coding Rate	4/5
Preamble	16 symbols
Payload-length configuration	244
Header configuration	0
CRC configuration value	1
Invert IQ	0
Low Data Rate Optimization	0
Site Address	1
Device Address	123
CTS	0 / disabled
Debug	1
Active Input	0
TR No-CAD	0

RESTORE / DISPLAY

```
AT+LOADDP      Restore default radio configuration
AT+SHOWLP      Display current LoRa parameters
```

NOTE: AT+LOADDP is documented as restoring the default radio configuration; it should not be described as a complete factory reset of all persistent user/learned data.

11. RF and Serial Configuration Commands

Command	Parameters / Range	Function / Notes
AT+SETFR=<Frequency>	150.0000-960.0000 MHz	Set configured RF frequency (persistent)
AT+SETFR?	-	Read configured frequency
AT+SETBW=<BW>	7,10,15,20,31,41,62,125,250,500 kHz	Set LoRa bandwidth
AT+SETBW?	-	Read bandwidth
AT+SETSF=<SF>	5-12	Set spreading factor
AT+SETSF?	-	Read spreading factor
AT+SETCR=<CR>	5=4/5; 6=4/6; 7=4/7; 8=4/8	Set coding rate
AT+SETCR?	-	Read coding rate
AT+SETPL=<Length>	8, 16, 32	Set preamble length
AT+SETPL?	-	Read preamble length
AT+SETTXPOW=<Power>	Hardware/regulatory limits apply	Set configured TX power
AT+SETTXPOW?	-	Read configured TX power
AT+SETPA=<Length>	Current default 244	Set LoRa packet payload-length configuration
AT+SETPA?	-	Read payload configuration
AT+SETHT=<Type>	Firmware encoding 0-2	Configure packet header/length mode
AT+SETHT?	-	Read/report header mode
AT+SETCRC=<State>	See firmware note below	Configure LoRa packet CRC
AT+SETCRC?	-	Report CRC state
AT+LD?	-	Report Low Data Rate Optimization state
AT+SETBD=<Baud>	9600,19200,38400,57600,115200	Set UART baud rate
AT+SETBD?	-	Read UART baud rate
AT+SETCTS:<State>	0=disable, 1=enable	Configure CTS
AT+SETCTS?	-	Read CTS state
AT+SHOWLP	-	Display current LoRa configuration
AT+LOADDP	-	Restore default radio configuration

CURRENT FIRMWARE NOTE: CRC setter and readback encoding are inconsistent in the current attached firmware: the low-level setter and query/reporting paths do not agree. Verify CRC behavior before relying on this command in production.

CAUTION: AT+SETTXPOW currently lacks strict parser-side range validation. Do not treat arbitrary accepted values as guaranteed RF output capability; product and regulatory limits apply.

12. Addressing, LEARN, Data and SDM Commands

Command	Parameters	Function
AT+SITEADD:<Site>	1-byte decimal	Configure local Site Address
AT+DEVADD:<Device>	2-byte decimal	Configure local Device Address
AT+SENDLRN:<Site>,<Device>	Destination address	Send LEARN packet
AT+ADDDES:<Position>,<Site>,<Device>	Stored-list position + address	Add destination manually
AT+SHOWLRN	-	Display learned destination information
AT+DELDES:<Position>	Stored destination position	Delete one learned destination
AT+DELDESALL	-	Delete all learned destinations
AT+SENDLORA:<Site>,<Device>,<Message>	Destination + message	Send addressed host data in DM mode
AT+RECEIVELORA:<Timeout>	Timeout	Command-controlled LoRa reception
AT+SDMMTEM:<Site>,<Device>	Temporary destination	Enter temporary SDM
AT+SDMMDES:<Site>,<Device>	Persistent destination	Store permanent SDM destination
AT+SDMMPER	-	Enable permanent SDM

EXAMPLES

```
AT+SITEADD:1
AT+DEVADD:100
AT+SENDLORA:1,101,Hello
AT+SDMMTEM:1,101
```

NOTE: The older development manual states n <= 20 for AT+DELDES:<n>. This limit is retained as historical command guidance unless a later implementation constraint is established.

13. Acknowledgement, Remote I/O and Latch Commands

ACKNOWLEDGEMENT

Context	Set	Query
RX	AT+ACKRX:<0|1>	AT+ACKRX?
TX	AT+ACKTX:<0|1>	AT+ACKTX?
TR	AT+ACKTR:<0|1>	AT+ACKTR?
DM	AT+ACKDM:<0|1>	AT+ACKDM?
SDM	AT+ACKSDM:<0|1>	AT+ACKSDM?
All	AT+SHOWACK	Display consolidated ACK status

Acknowledgement setter semantics: 0 = disabled; 1 = enabled.

REMOTE I/O

```
AT+PIN:<Site>,<Device>,<Pin>,<Logic>
Example: AT+PIN:1,432,4,1
```

ACTIVE INPUT

```
AT+ACTIVEIN=<State>
AT+ACTIVEIN?
```

Current firmware addition. Configures the digital logic state interpreted as an active telemetry input. The setting is persistent; intended use is binary 0/1.

LATCH COMMANDS

Command	Function
AT+RXLATCH=<PinList>	Set RX latch channels; other RX outputs become momentary
AT+RXLATCH?	Read RX latch channels
AT+RXUNLATCH=<PinList>	Remove latch from selected RX channels
AT+TRLATCH=<PinList>	Set TR output latch channels (intended 1-4)
AT+TRLATCH?	Read TR latch channels
AT+TRUNLATCH=<PinList>	Remove latch from selected TR channels

14. Advanced Operation and Diagnostics

Command	Classification	Function / Notes
AT+VERSION	Customer / Diagnostic	Report firmware version and date
AT+CHECKCH	Customer / Advanced	Perform LoRa Channel Activity Detection
AT+ACTIVEIN=<State>	Advanced I/O	Select active telemetry input state; persistent
AT+ACTIVEIN?	Advanced I/O	Read active input setting
AT+NOCADTR=<State>	Advanced	Configure TR-mode CAD-related behavior; persistent
AT+NOCADTR?	Advanced	Read TR CAD setting
AT+ENCONT=<0|1>	Advanced Telemetry	0 disable; 1 enable continuous sending
AT+ENCONT?	Advanced Telemetry	Read continuous-sending state
AT+SETDEBUG=<State>	Diagnostic / Service	Configure persistent debug-output setting
AT+SETDEBUG?	Diagnostic / Service	Read debug setting

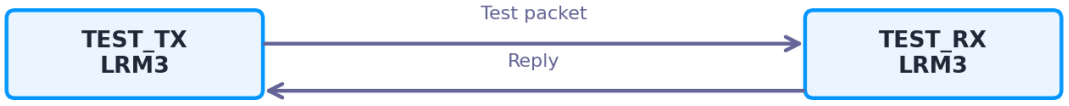
ADVANCED-COMMAND PUBLICATION NOTES

- AT+ACTIVEIN and AT+NOCADTR are absent from the historical manuals but are implemented in the current attached firmware.
- The current ACTIVEIN and NOCADTR setters do not strictly validate the numeric argument; the datasheet describes intended use rather than arbitrary parser acceptance.
- AT+ENCONT explicitly validates 0/1 and reports enabled/disabled status.
- Debug configuration is classified as diagnostic/service rather than basic customer setup.

NOTE: The command name NOCADTR is implementation-oriented. This datasheet intentionally uses a concise description instead of inventing undocumented protocol semantics.

15. RF Test, Factory and Service Commands

Range / RF Test Operation



Dedicated RF test commands are intended for engineering / production test environments.

Engineering / production RF test concept

Command	Class	Function
AT+PUTCW	RF Test	Enter continuous-wave RF transmission
AT+OUTCW	RF Test	Exit continuous-wave operation
AT+PUTIP= ,<Fdev>	RF Test	Enter/configure GFSK infinite-preamble transmission
AT+OUTIP	RF Test	Exit infinite-preamble test and restore LoRa packet operation
AT+PUTRSSI	RF Diagnostic	Start continuous instantaneous RSSI reporting
AT+OUTRSSI	RF Diagnostic	Stop RSSI reporting
AT+TESTTX=<N>,<T>,<BW>, ,<Fdev>	Factory/RF Test	Transmit configurable GFSK test packets
AT+TESTRX=<BW>, ,<Fdev>	Factory/RF Test	Receive GFSK tests and report statistics
AT+TESTIC	Service	Test MCU-to-radio SPI communication
AT+ROMR:<Address>	Service	Raw EEPROM read
AT+ROMW:<Address>,<Data>	Service	Raw EEPROM write
AT+ROME:<Address>,<Length>	Service	Raw EEPROM erase

CAUTION: Direct EEPROM write/erase operations may modify or invalidate persistent device configuration. Use only for authorized engineering, production or service activity.

NOTE: Legacy handlers AT+PUTTESTTX... and AT+PUTTESTRX are intentionally excluded from the supported command reference; PUTTESTRX is marked deprecated in the current source.

16. Practical Configuration and Operation Examples

1 - VERIFY COMMUNICATION

```
AT
OK
AT+SHOWLP
```

2 - CONFIGURE RADIO

```
AT+SETFR=869.5250
AT+SETBW=125
AT+SETSF=9
AT+SETCR=5
AT+SETPL=16
AT+SETTXPOW=20
```

3 - CONFIGURE DEVICE IDENTITY

```
Device A: AT+SITEADD:1   /   AT+DEVADD:100
Device B: AT+SITEADD:1   /   AT+DEVADD:101
```

4 - DIRECT DATA AND REMOTE I/O

```
AT+SENDLORA:1,101,Hello
AT+PIN:1,101,4,1
```

5 - LATCHING AND ACKNOWLEDGEMENT

```
AT+RXLATCH=1,2,8
AT+ACKTX:1
AT+ACKTX?
```

6 - SERIAL DATA MODEM

```
Temporary:  AT+SDMMTEM:1,101
Permanent:  AT+SDMMDES:1,101   then   AT+SDMMPER
```

7 - SUPPORT IDENTIFICATION / CHANNEL CHECK

```
AT+VERSION
AT+CHECKCH
```

CAUTION: Examples are intended to demonstrate command composition. Frequency and power selections must remain valid for the supplied LRM3 product variant and local regulations.

17. Product Notes, Regulatory Information and Document Control

REGIONAL PRODUCT FREQUENCY RANGES

Region / Product Application	Documented Range
China	779-787 MHz
India	865-867 MHz
Europe	863-870 MHz
United States	902-928 MHz

REGULATORY NOTICE

Operation of radio equipment is subject to national and regional regulations governing operating frequency, transmitter power, duty cycle, channel access and other RF parameters. The installer or system integrator is responsible for configuring and operating the LRM3 in accordance with the applicable regulations and the specifications of the supplied product variant.

RF TEST FUNCTIONS

Continuous-wave, continuous-pattern and RF packet-test functions are intended for controlled engineering, manufacturing and RF-test environments. These functions can produce transmission behavior unsuitable for normal network operation and must only be used in accordance with applicable RF regulations.

ORDERING / PRODUCT IDENTIFICATION

Example Product Code	Description
LRM3-869-11	LRM3 LoRa Remote Control and Data Modem

A complete regional ordering-code scheme is not inferred from the supplied source set. Only identifiers established by available product documentation should be added to the final released datasheet.

DOCUMENT REVISION

Issue	Date	Description
Draft A	2026	Expanded technical datasheet aligned with supplied LRM3 documentation and current attached firmware

TRADEMARK / CONTACT

LoRa(r) is a registered trademark of Semtech Corporation or its subsidiaries. Radiometrix Ltd, Hartcran House, 231 Kenton Lane, Harrow, Middlesex, HA3 8RP, England.

NOTE: This draft intentionally omits a LoRa Alliance certification claim because the supplied source set does not establish supporting certification evidence.