

865 MHz LoRa Antenna

Wavelet_LoRa865_20_52_V00

A compact PCB antenna tuned for the 865–867 MHz licence-free ISM band used for LoRaWAN in India. Across the allocation it holds better than 1.42:1 VSWR, 74–75% total efficiency and 2.2 dBi realized gain, with a clean dipole pattern — an embedded radiator for LoRa nodes, gateways and LPWAN sensors.

FREQUENCY	PEAK GAIN	EFFICIENCY	FOOTPRINT
865–868 MHz	2.20 dBi	74–75%	52 × 20 mm

FEATURES

- Tuned for the 865–867 MHz IN865 LoRaWAN / ISM allocation
- VSWR better than 1.42:1 across the band
- Total efficiency of 74–75%
- Realized gain of 2.11 to 2.20 dBi
- Clean dipole pattern in both principal planes
- Return loss to –18.9 dB at 865 MHz
- Compact 20 × 52 mm footprint, 1 mm profile
- RoHS compliant

1. DESCRIPTION

Wavelet_LoRa865_20_52_V00 is a printed circuit antenna tuned for the 865–867 MHz licence-free ISM band — the allocation India's LoRaWAN deployments use, defined as the IN865 regional plan. Because the allocation is only a few megahertz wide, the element can be matched far more tightly than a wideband cellular antenna: VSWR stays below 1.42:1 and efficiency above 74% across the whole band. It is intended for embedded use in LoRa end-nodes, gateways and LPWAN sensors where the antenna sits inside the product rather than on a bulkhead connector.

2. APPLICATIONS

- LoRaWAN end-nodes and sensor nodes
- LoRa gateways and concentrators
- Smart metering — water, gas, electricity
- Agricultural and environmental telemetry
- Long-range asset tracking over LPWAN
- Industrial process and tool tracking

3. GENERAL DATA

Frequency range	865 – 867 MHz
Allocation	Licence-free ISM — India (IN865 LoRaWAN)
Polarization	Linear
Impedance	50 Ω
Operating temperature	-40 °C to +85 °C
Antenna type	Rigid FR-4 printed circuit antenna
Dimensions (W × L × H)	20 × 52 × 1 mm
Mounting	3M adhesive tape, or mechanical fixing to the host enclosure

4. PART NUMBER

The part code gives the band and the footprint in millimetres: Wavelet_LoRa865_20_52_V00 is the 865 MHz part in a 20 × 52 mm footprint. Contact sales for connector and cable options.

Part number	Band	Description
Wavelet_LoRa865_20_52_V00	865-867 MHz	India ISM / LoRa

5. MECHANICAL DIMENSIONS

Width (W)	Length (L)	Height (H)	Tolerance
20.0 mm	52.0 mm	1.0 mm	± 0.2 mm

All dimensions in millimetres. Feed and connector arrangement to order — contact sales@wavelet.in.

6. RF CHARACTERISTICS

Frequency band	Min. gain	Max. gain	Min. eff.	Max. eff.	Return loss	VSWR
865 – 868 MHz	2.11 dBi	2.20 dBi	74 %	75 %	-15.3 dB	1.42:1

Test conditions. Characterised in free space on the Wavelet reference layout. Gain figures are realized gain, which includes mismatch loss; efficiency is total radiated efficiency. Return loss and VSWR are the worst case across the stated band, not the value at resonance.

REGIONAL ALLOCATION

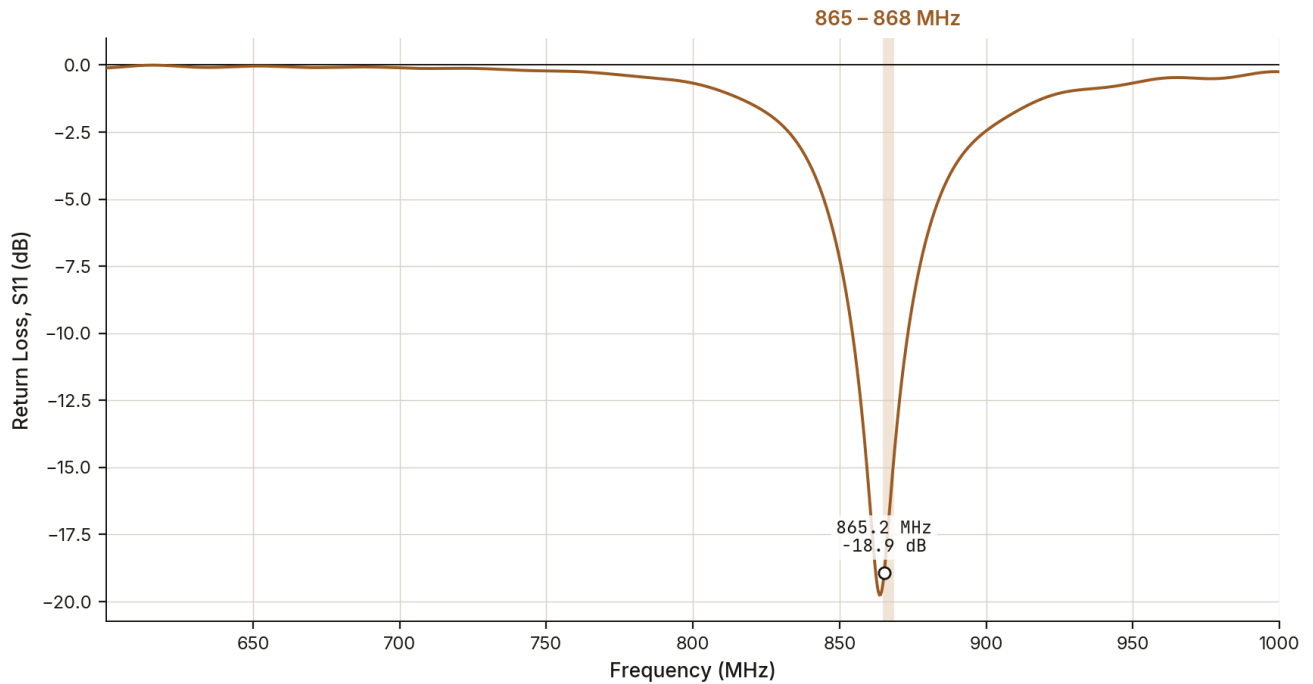
This part is tuned for 865–867 MHz, India's licence-free ISM band and the IN865 LoRaWAN regional plan. It is not a global LoRa antenna: EU868 runs 863–870 MHz and is largely covered, but US915 runs 902–928 MHz and the data above does not reach it. Deploying this part on 915 MHz would operate it well off resonance with a correspondingly degraded match. If the design has to serve multiple regional plans, ask engineering@wavelet.in — a retuned variant is a small change to this element, not a new design.

7. INTEGRATION GUIDELINES

Placement	Along an outer edge of the host PCB, as far from metal as the enclosure allows. A quarter wavelength at 866 MHz is about 87 mm, so the keep-out is large relative to a handheld enclosure
Keep-out	Clear of copper pour, ground fill and components on all layers beneath and around the radiating element
Ground plane	The host ground plane forms part of the radiating structure. A larger continuous plane improves the match directly at this frequency
Pattern orientation	The dipole null runs along the element axis. In a portal or handheld, orient the board so the null does not point at the tag population
Nearby metal	Batteries, shield cans and metal bezels detune the antenna. Verify the match in the assembled enclosure rather than on a bare board
Reader power	Confirm the transmit power and duty cycle of the reader module against local regulations — ETSI EN 302 208 in Europe, and the corresponding Indian allocation limits

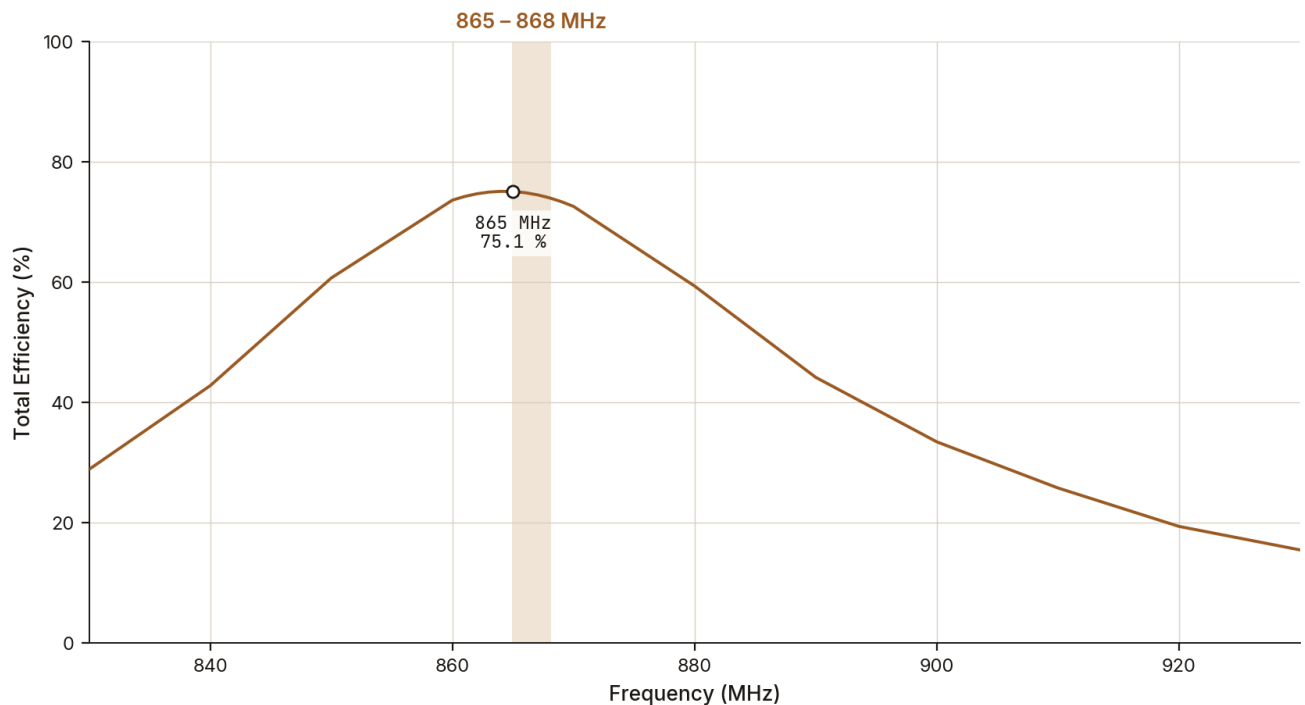
8. RF PERFORMANCE

8.1 Return Loss



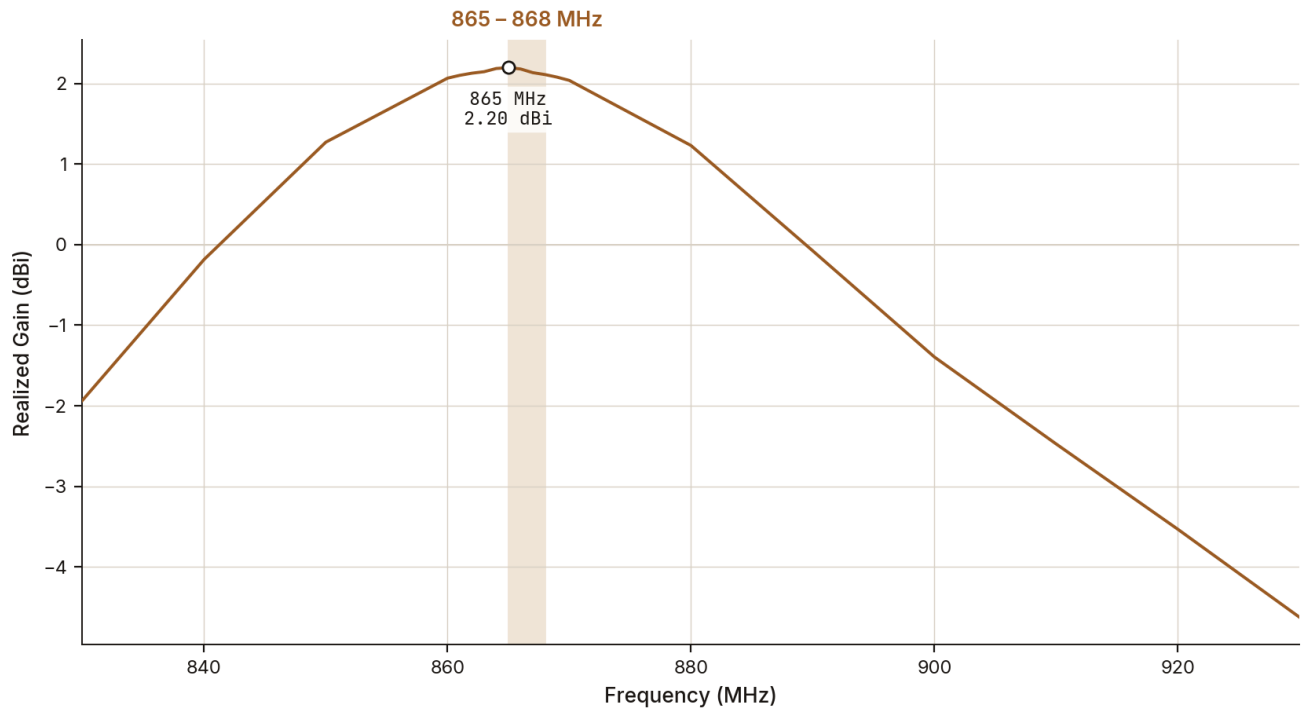
S11 from 600 to 1000 MHz; the shaded region marks the 865–868 MHz allocation. Resonance falls at 865 MHz with a return loss of -18.9 dB.

8.2 Total Efficiency



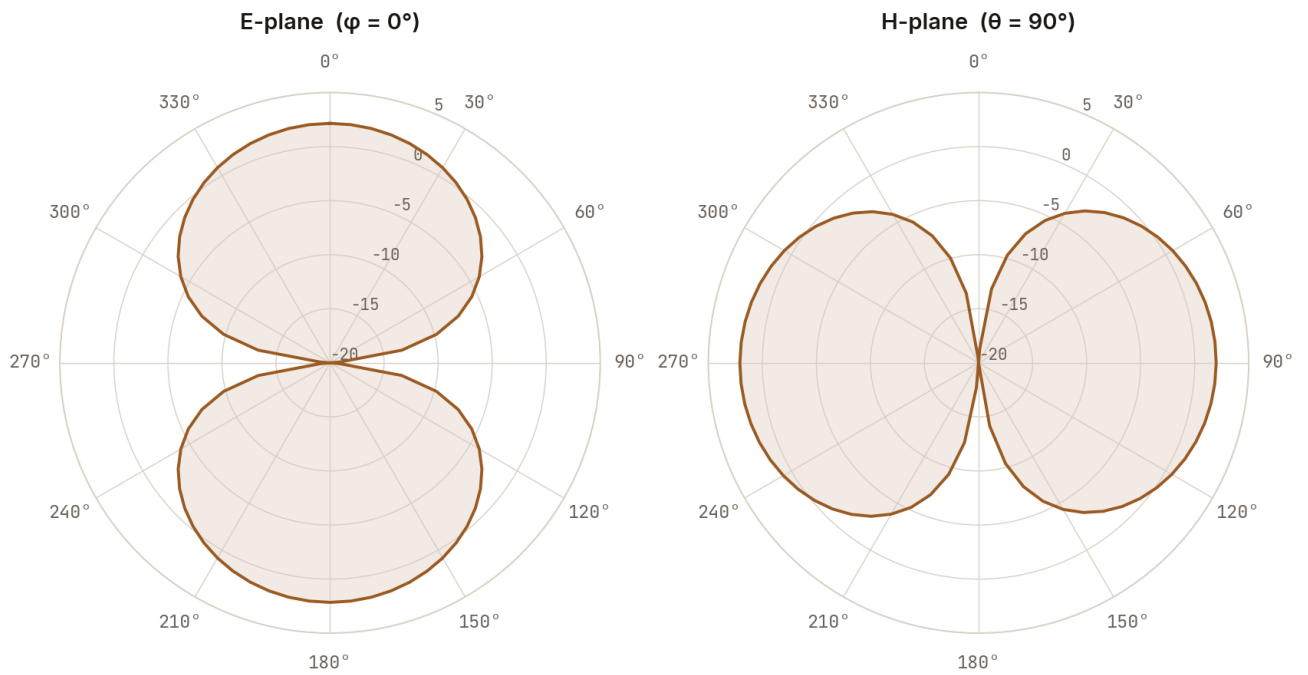
Total radiated efficiency, mismatch and material loss included. The curve holds between 74 and 75% across the allocation.

8.3 Realized Gain



Peak realized gain across the band, mismatch loss included.

8.4 Radiation Pattern at 865 MHz



E-plane and H-plane cuts at 865 MHz. Both planes show the figure-of-eight characteristic of a dipole, with the nulls along the element axis.

9. PACKAGING & STORAGE

Packaging Individual PE bag, 100 pieces per outer bag

Storage temperature $-10\text{ }^\circ\text{C}$ to $+40\text{ }^\circ\text{C}$

Humidity Below 75 % RH

Shelf life 18 months in sealed packaging

Compliance RoHS compliant

REVISION HISTORY

Rev.	Date	Description
1.0	24 Sep 2026	Initial release



CONTACT

Quote this part number when enquiring. Samples, volume pricing and lead times are issued per enquiry; an RF engineer answers technical questions directly.

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Specification notice. Performance of any embedded antenna depends on the host PCB, the ground plane it is matched against, enclosure materials and nearby metal. The figures in this document are measured under the test conditions stated in section 6 and should be verified in your own design. Wavelet reserves the right to change specifications without notice. Data is believed to be accurate at the time of release and is provided for design guidance only; it does not constitute a warranty.