

SWR and Antenna Analyzers

SWR (Standing Wave Ratio) measures how well your antenna is matched to the 50-ohm feedline impedance. A well-matched antenna transfers all power to the air; a mismatched antenna reflects some power back.

SWR values

SWR	Reflected Power	Assessment
1.0:1	0%	Perfect (theoretical)
1.5:1	4%	Excellent
2.0:1	11%	Acceptable
3.0:1	25%	Poor - investigate

Common causes of high SWR

- Connector not fully tightened (most common)
- Water ingress into connector or cable
- Damaged or kinked coax
- Wrong-band antenna (e.g. 868 MHz antenna on a 915 MHz system)

NanoVNA for measurement

The common low-cost NanoVNA-H covers roughly 50 kHz to 1.5 GHz (the original NanoVNA / NanoVNA-H tops out near 1.5 GHz via harmonics, with best accuracy below ~900 MHz). Only some variants such as the NanoVNA-F V2 / V2 series reach 3 GHz. Any of these easily covers the 915 MHz band and is ideal for checking LoRa antenna systems. Check your specific model's published spec before buying. Connect to the antenna feedpoint, sweep 850-950 MHz, and look for the SWR minimum. A good 915 MHz antenna shows SWR below 1.5:1 across the 902-928 MHz band.

Important: A NanoVNA is a measurement instrument, not a transmitter port. Never key up your radio into the analyzer, and never transmit without an antenna connected - doing either can damage the analyzer or the radio's final stage.

Most commercial LoRa antennas are pre-tuned and work fine out of the box. Measure when troubleshooting performance problems, building DIY antennas, or verifying a new cable run.

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