



BHW Technologies (博泓微科技有限公司)



Advanced RF IC, Antenna, Filter, RF Front-End
and Wireless System Solutions

BHW AppNote #029

Improving Range of 2.4GHz Wireless Microphones and Audio Systems with BHWR250A AiA

Rev. 1.3

www.bhw-tech.com

Background: Enhanced Audio Experiences with 2.4GHz Wireless

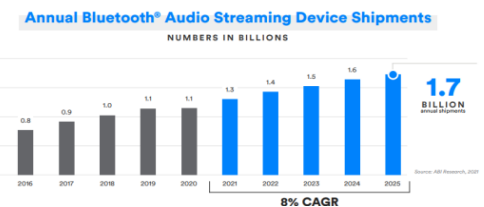


Background & Challenges:

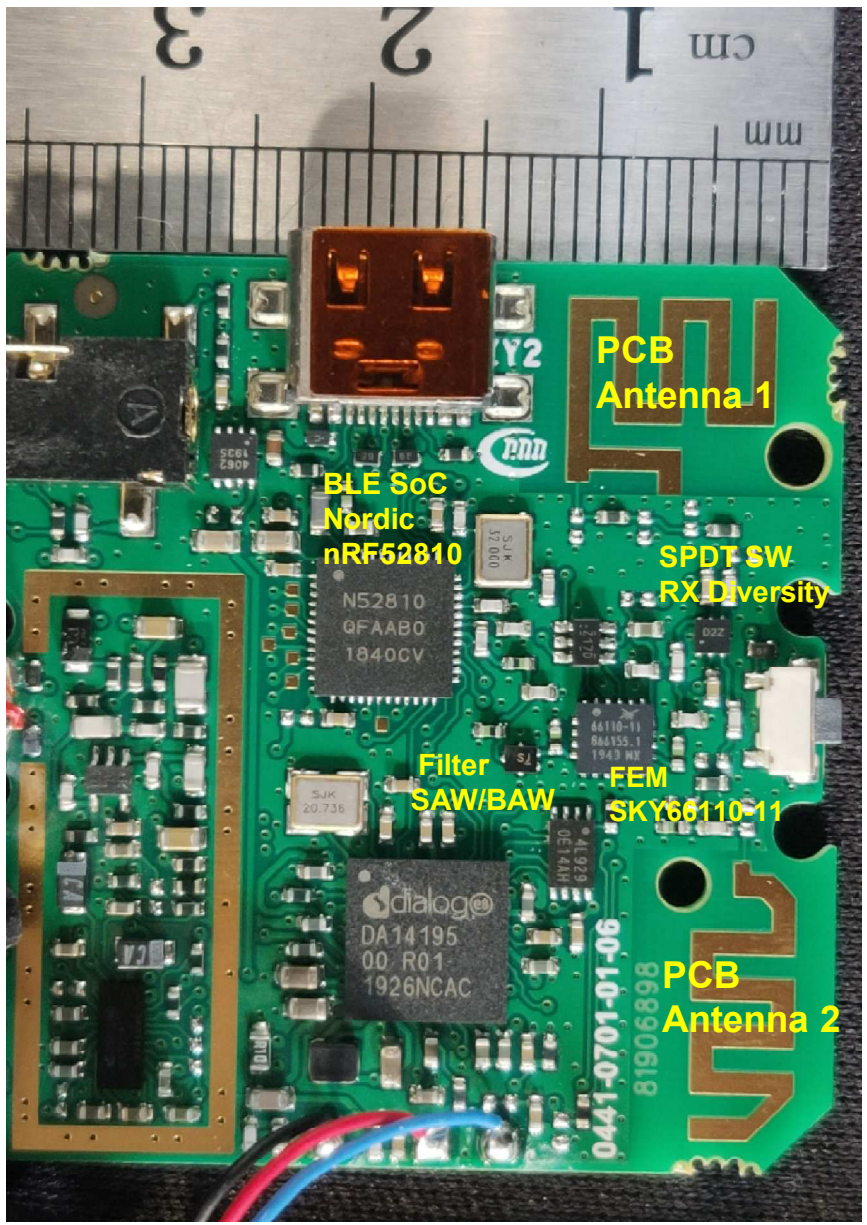
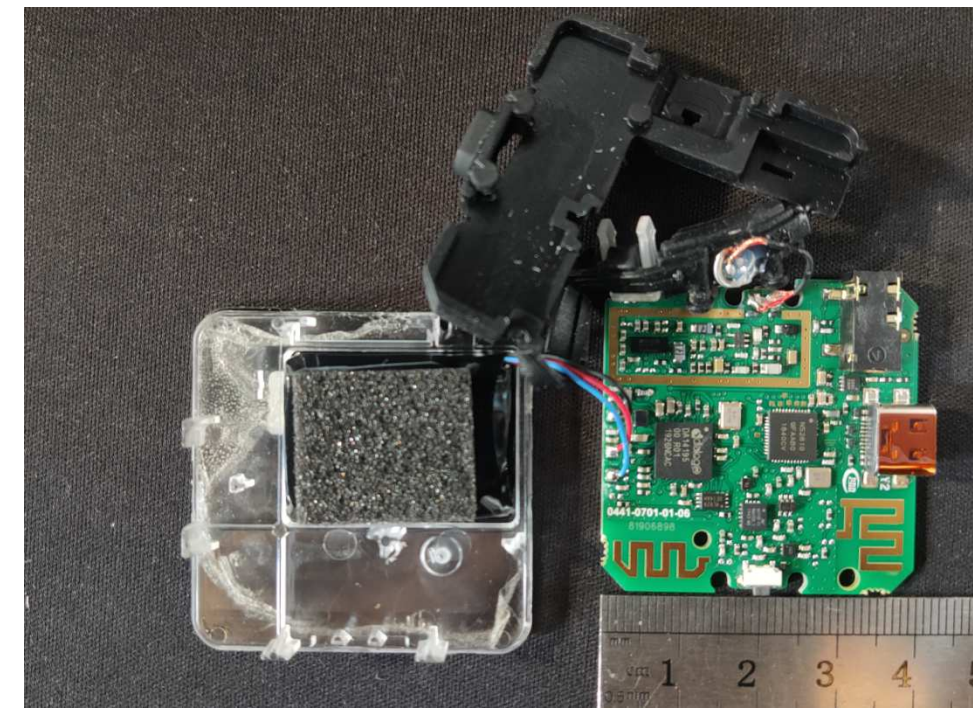
- Wireless Microphone and other Audio Systems using the 2.4GHz wireless technology is Experiencing Rapid Growth Recently, with 1.7 Billion Annual Audio Streaming Device Shipment Predicted by 2025
- 2.4GHz Systems are Replacing Traditional UHF Solutions for Wireless Audio, due to much Smaller Size, Lower Power Consumption (Longer Battery Life), and Excellent Audio Quality and Rich Functionality based on Advanced DSP
- Range and Connection Stability Pose Great Challenges for 2.4GHz Wireless Audio Product Designers, due to Inherently much Severer Multipath Effects Compared to the UHF 500~600MHz Band
- High-Performance RF Front-end (FEMs) and Antennas Play a Critical Role in Successful Deployment of BLE Audio Systems, Especially for Wireless Microphones as their Attachment Position and Orientation are Unpredictable during Typical Use Cases

BHW Solutions & Benefits:

- Using Advanced GaAs HBT & ED-PHEMT Processes and Innovative, Patented RF Active integrated Antenna (RFAiA™) Technology, BHW has Developed a Broad Portfolio of High-Performance, Cost-Effect RF Front-End ICs and Antennas for Various Wireless Applications Including the 2.4GHz Band
- BHWR250L is an AiA that Integrates an LNA with Low 1.7dB Noise Figure, a Switch Path for Single-Port Interface with any SoC, and an Antenna with High Efficiency, all into a Compact 16x12mm, Surface-Mount-Ready Design
- BHWR250M is an AiA that Integrates an LNA with 1.6dB NF, an SPDT Switch for Optional Insertion of High-Power Amplifiers, and an Antenna with High Efficiency, all into a Compact 16x12mm, Surface-Mount-Ready Design
- BHWR250A is an AiA that Integrates a PA with 13dBm Power at Very Low Current, Switch Path for Single-Port SoC Interface, Harmonic Filters for FCC Compliance, and Compact Antenna, all into a 12x18mm, SMT-Ready Design



RODE Wireless GO 2.4GHz Wireless MIC Teardown

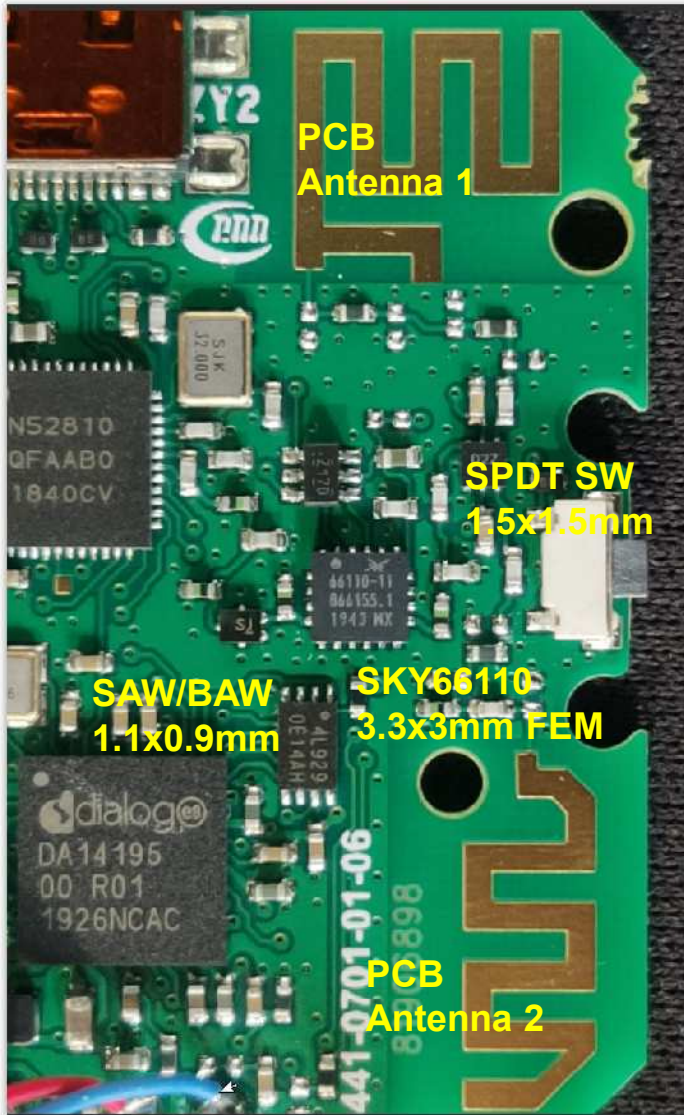


Replacing RF FEM and Antenna with BHWR250A AiA



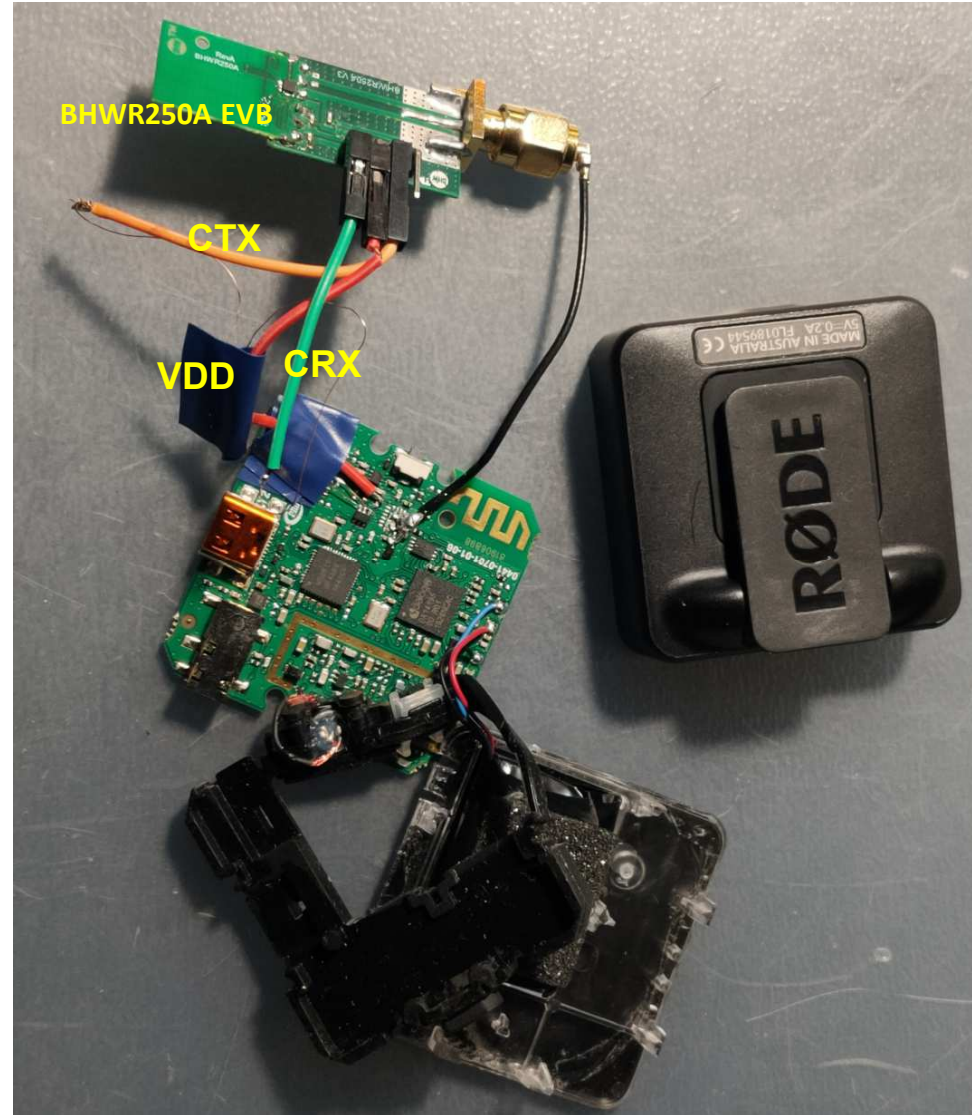
Original

SKY66110 FEM + SPDT SW + 2 Antennas



Modification

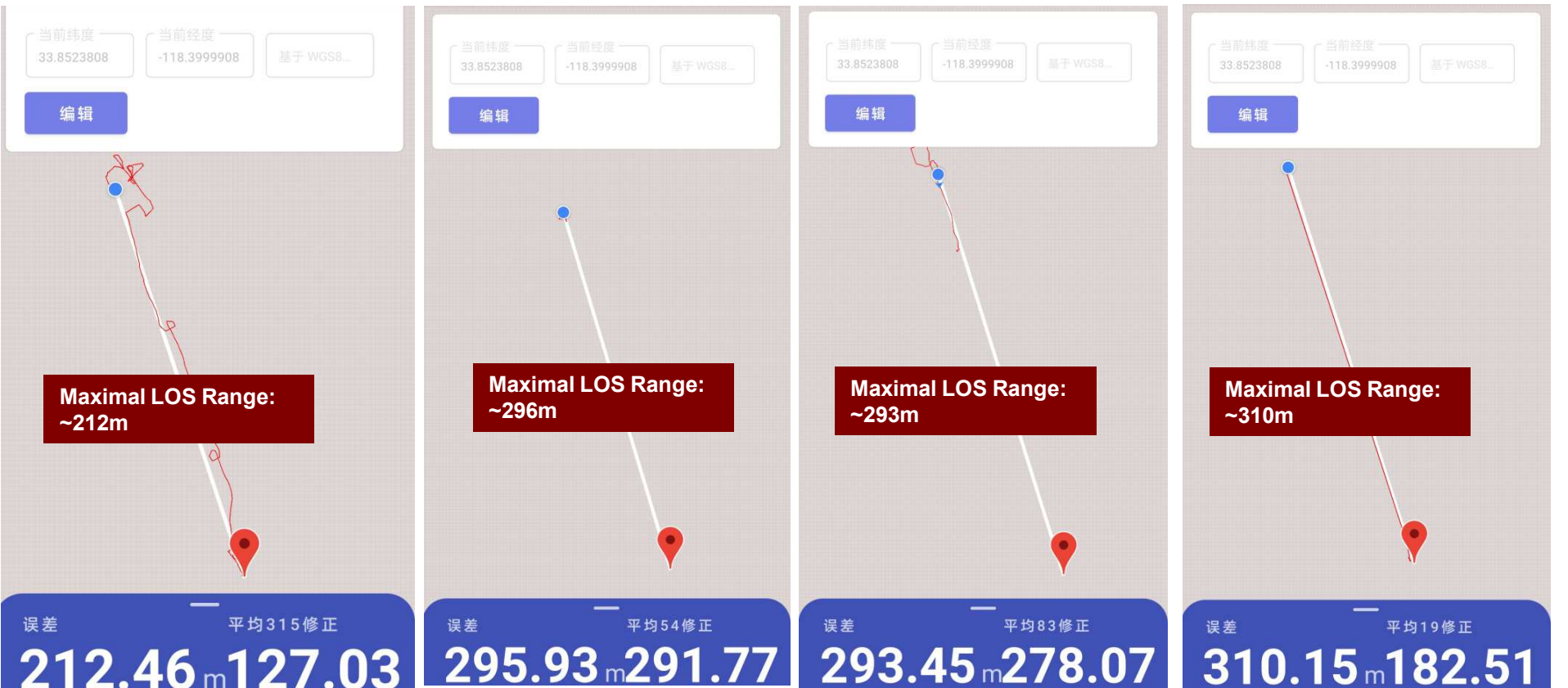
Remove FEM/SW/Antenna, Connect SoC to BHWR250A



Rode Wireless GO LOS Range Test: Before Modification

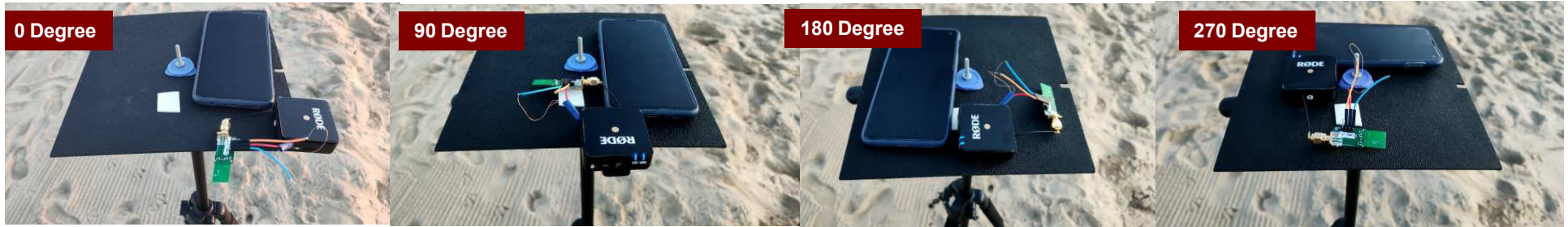


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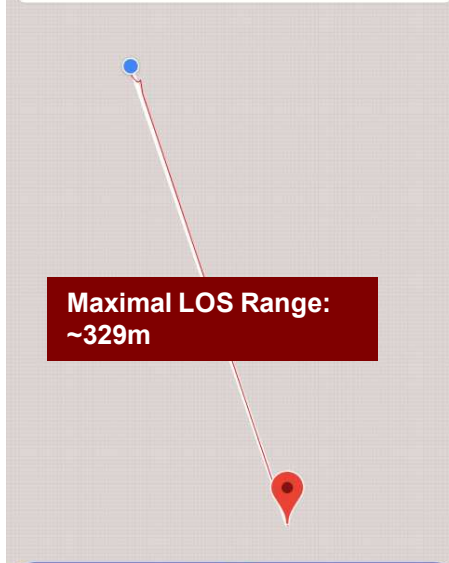
Maximal range is recorded when music streaming started to break down. Average value for Max Range from 4 different Tx antenna angles is 277.8m.

Rode Wireless GO LOS Range Test: After Modification



当前纬度: 33.8525776
当前经度: -118.3998547
基于 WGS84...

编辑



误差 平均 32 修正
329.09 m 251.38

当前纬度: 33.8525776
当前经度: -118.3998547
基于 WGS84...

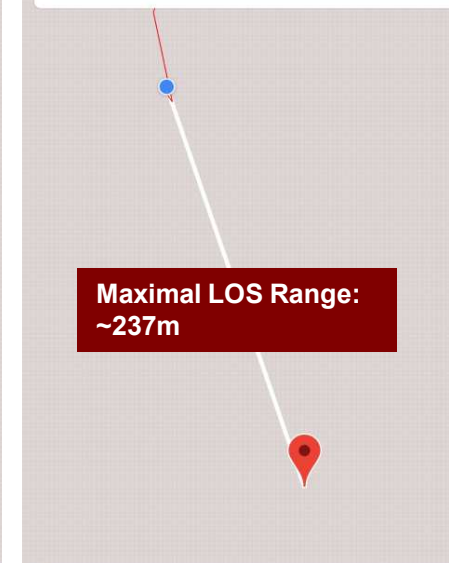
编辑



误差 平均 13 修正
306.96 m 302.24

当前纬度: 33.8525776
当前经度: -118.3998547
基于 WGS84...

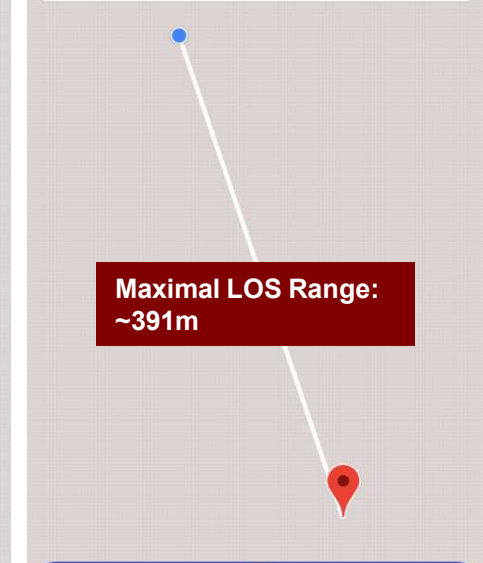
编辑



误差 平均 40 修正
237.13 m 267.68

当前纬度: 33.8525776
当前经度: -118.3998547
基于 WGS84...

编辑



误差 平均 11 修正
390.75 m 392.86

Maximal range is recorded when music streaming started to break down. Average value for Max Range from 4 different Tx antenna angles is 316.0m. Expect even longer range if RX unit is also replaced with BHWR250A.

BHW RF Front-End AppNote Library



This is an abridged version of BHW AppNote #029. Please contact BHW Support or your local sales rep/distributor for a complete copy of the document and other related information.

BHW RF Front-End Solutions AppNote Library



In addition to standard datasheets and EVB/BOM info, BHW publishes an AppNote series that address various topics on RF front-end design and performance over a wide frequency range from 300MHz to 6GHz, as an effort to assist customers in developing cutting-edge, cost-competitive products:

- BHW AppNote #001 - Cross-Over Cascade of BHWM253 to Boost Tx Power and Rx Sensitivity of 2.4GHz Systems
- BHW AppNote #002 - Accurate Benchmark of GNSS CNO Using the Power-Splitter Method
- BHW AppNote #003 - Boosting Wi-Fi Tx Power and Rx Sensitivity with BHWA251 and BHWM252
- BHW AppNote #004 - UHF 900MHz RF Front-End Solution Using BHWA251 Half-Watt PA and BHWL160 Sub-1dB-NF LNA
- BHW AppNote #005 - Sub-1GHz Applications of BHWA350 2-in-1 Wideband Fully Matched Amplifier
- BHW AppNote #006 - Low-Noise High-IIP3 LNB Architecture for Dual-Band High-Precision GNSS Using Cascade of BHWL160
- BHW AppNote #007 - UWB RF Front-End Solution Using BHWA350 and BHWM552
- BHW AppNote #008 - High-Power 5.8GHz RF Front-End Solution Using BHWA555 and BHWM552 for ETC, V2X and Wireless Video
- BHW AppNote #009 - 5.8GHz RF Front-End Using BHWA350 and BHWM552 for Wireless Audio
- BHW AppNote #010 - Multi-Constellation GNSS Active Antenna Using BHWL161 Cascade and Single-Fed Dual-Band Antenna
- BHW AppNote #011 - BHWL161 Super-Compact Low-Power Low Noise Amplifier for Range Extension of 2.4GHz RC and IoT
- BHW AppNote #012 - Enabling Cost-Effective High-Precision GNSS Using BHWL161 and Linear-Polarization PCB Antenna
- BHW AppNote #013 - GNSS Noise Floor vs Receiver Architecture
- BHW AppNote #014 - Designing Ultra Low-Power High-Performance GNSS Products Using BHWL160 GaAs PHEMT LNA
- BHW AppNote #015 - BHWL161 GNSS Full-Band High-Performance LNA in Super-Compact 1x1mm DFN with Relaxed Pin Pitch
- BHW AppNote #016 - Improving GNSS NF Measurement Accuracy Using Broadband LNA BHWL161 as Pre-Amp
- BHW AppNote #017 - High-Efficiency, Low-NF 2.4GHz Front-End Solution for IoT Using BHWA251 and BHWM252
- BHW AppNote #018 - Optimizing BHWA555 Wideband One-Watt PA for Long-Range 5.8GHz Transmitter Applications
- BHW AppNote #019 - Miniature 2.4GHz RF Front-End with Integrated Chip Antenna and BHWM253 for TWS and IoT
- BHW AppNote #020 - Multiplying the Range for 2.4GHz Music Streaming with BHWR250L Active Integrated Antenna (AiA)
- BHW AppNote #021 - Range Extension for 2.4GHz Wireless Systems with BHWR250M Active Integrated Antenna (AiA)
- BHW AppNote #022 - Enabling Long-Range Angle-of-Arrival for High-Precision Indoor Positioning with BHWR250N RF AiA
- BHW AppNote #023 - Extend the Range for 5.8GHz Audio/Video Streaming with BHWR580M Active Integrated Antenna (AiA)
- BHW AppNote #024 - Improving 5.8GHz Radio Link Budget with BHWR580L Active Integrated Antenna (AiA)
- BHW AppNote #025 - Improving Range and Throughput of 2.4GHz Wi-Fi with BHWR250 Array Antenna
- BHW AppNote #026 - Improving Range and Throughput of 5GHz Wi-Fi with BHWR550 Array Antenna
- BHW AppNote #027 - Multi-Band High-Accuracy GNSS Solutions Using BHWP150 DFN1x1 Ultra-Compact Power Divider & Combiner
- BHW AppNote #028 - Use BHWM252 Cascade to Extend Range of 2.4GHz Wireless Systems with Single-Port SoCs
- BHW AppNote #029 - Improving Range of 2.4GHz Wireless Microphones and Audio Systems with BHWR250A Active Integrated Antenna (AiA)
- BHW AppNote #030 - Simultaneous Improvement in Range and Battery Life of 2.4GHz Wireless Systems with BHWR250M AiA

Contact support@bhwtechnologies.com or BHW distributors/representatives for your copy of the above and new up-coming documents.