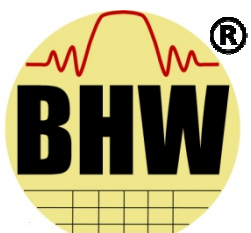




**BHW Technologies (博泓微科技有限公司)**



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

**BHW Application Note #007**

**UWB RF Front-End Solution Using BHWA350 and  
BHWM552**

**Rev. 1.3, 11/17/2020**

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# Background: UWB for High-Precision RTLS



## Background & Challenges:

- Based on IEEE 802.15.4z Standard, Ultra Wideband (UWB) Technology Provides Decimeter-Level Precision Positioning Capabilities, both Indoor and Outdoor, Enabling Key Applications such as Real Time Location Services (RTLS)
- UWB Operates in Several 500MHz/1GHz Channels in the 3~7GHz Frequencies Bands, Providing Four Data Rates from 110 kbps to 27 Mbps
- Both Antennas and RF Front-Ends (PA/LNA/Switch) Capable of Wideband Operation over 500MHz~1GHz Bandwidth are Critical for Successful Deployment of UWB Systems

### UWB Frequency Channels

UWB Channel Number	Centre Frequency (MHz)	Band (MHz)	Bandwidth (MHz)
1	3494.4	3244.8 – 3744	499.2
2	3993.6	3744 – 4243.2	499.2
3	4492.8	4243.2 – 4742.4	499.2
4	3993.6	3328 – 4659.2	1331.2*
5	6489.6	6240 – 6739.2	499.2
7	6489.6	5980.3 – 6998.9	1081.6*

Source: Decawave DW1000.

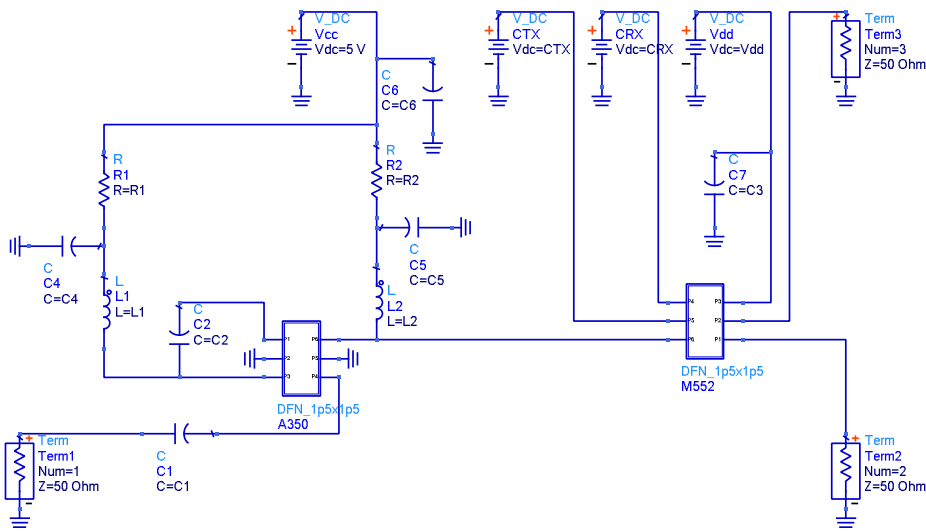
**This AppNote Introduces a Complete UWB RF Front-End Solution Based on BHWA350 PA and BHWM552 Rx Front-End IC, which Delivers up to ~17dBm Tx Power and 1.6dB NF in the UWB B2 Band. Support to Other UWB Bands is Available Upon Request.**



# BHWA350 & M552 Combo Breadboard

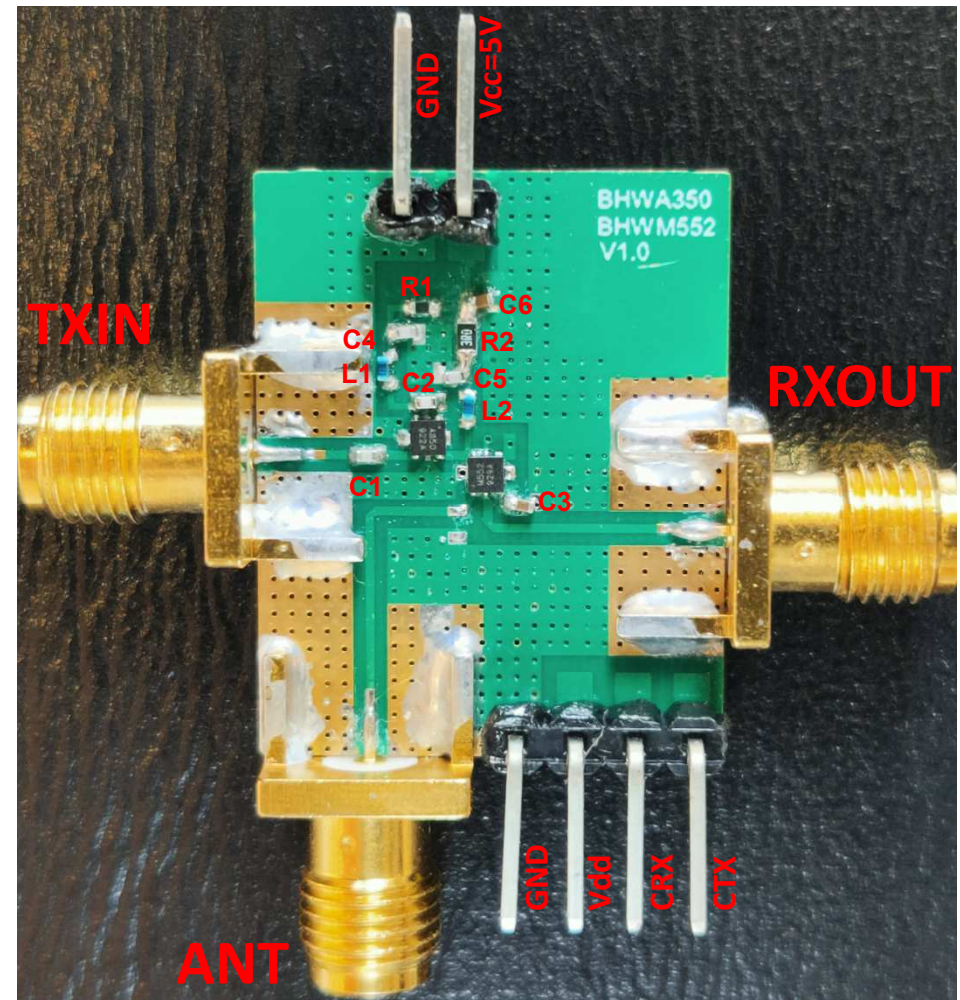


## Application Schematic



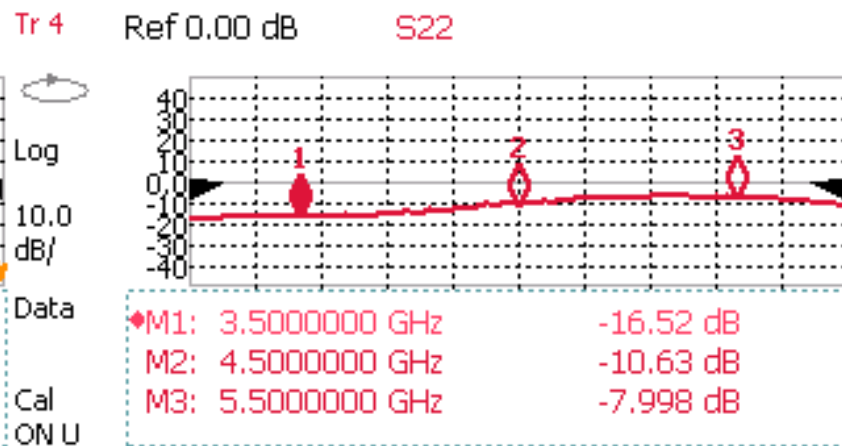
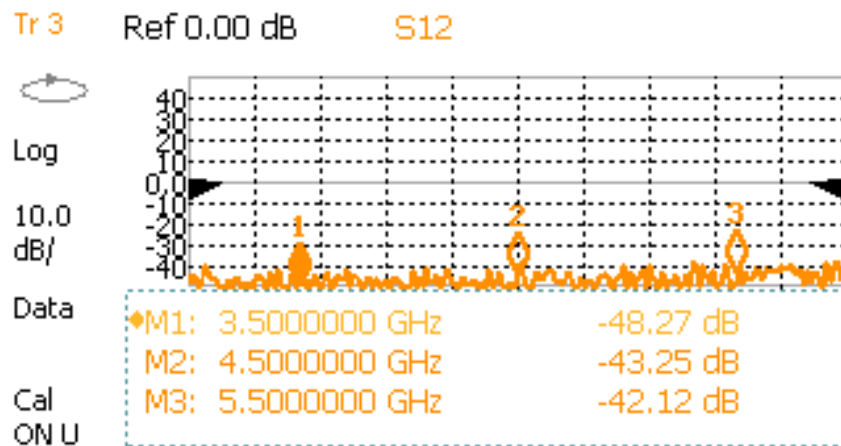
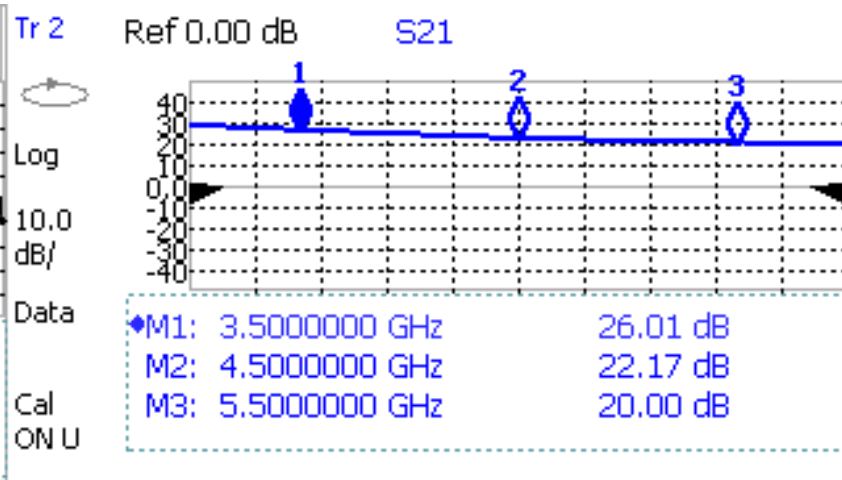
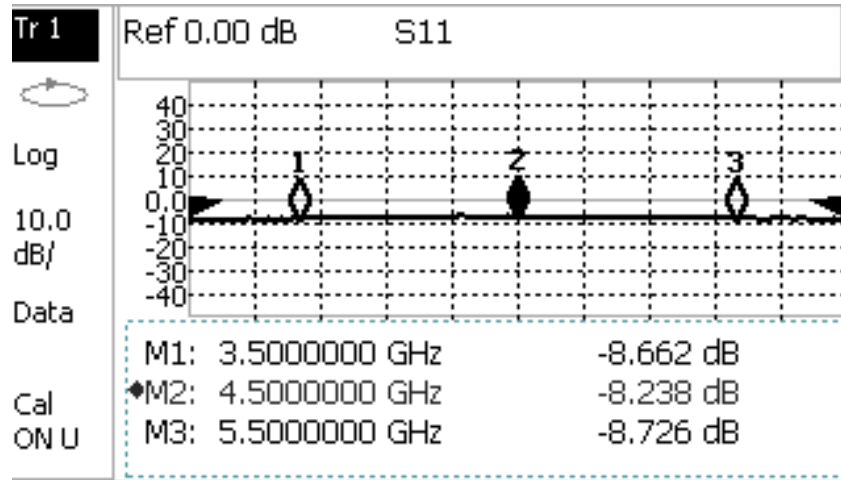
### Recommended BOM for UWB B2 (3744-4243.2MHz):

- C1=C2=10pF, C3=1uF, C4=C5=100pF, C6=1uF
- L1=L2=8.2nH
- R1=68 Ohm, R2=3 Ohm



- BHWA350 cascade provides ~18dBm maximum power and ~20dB gain at 5.8GHz at Vcc=5V
- BHW M552 provides ~0.8dB insert loss in Tx mode, resulting in ~17dBm Tx power at antenna
- BHW M552 provides ~1.6dB noise figure at antenna, with ~10dB Rx gain in the 5-6GHz band

# BHWA350 & M552 Combo: Tx S-Parameters



Start 3.000 GHz	IF BW 10 kHz	Stop 6.000 GHz
Points 201	Avg 1	Output Power -30.0 dBm
		Swp 227 ms

**Notes:**

- BHWA350 DC Bias: Vcc=5V, Icq~76mA
- BHWM552 DC Bias: Vdd=CTX=3.3V, CRX=0
- Measured data includes SMA connector/adaptor and PCB feedline losses (estimated total ~0.4dB at 5.8GHz)



# BHW RF Front-End AppNote Library



***For further information, please email to [support@bhwtechnologies.com](mailto:support@bhwtechnologies.com), or contact your local BHW Sales Rep or Distributor. We will send you the complete AppNote as well as additional related information.***

**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 BLE and 2.4GHz IoT
- BHW AppNote #002 - Accurate Benchmark of GNSS CN0 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 BLE, RC and IoT
- BHW AppNote #012 - Enabling Cost-Effective High-Precision GNSS Using BHWL160 and Linear-Polarization PCB Antenna
- BHW AppNote #013 - Enabling Long-Range BLE AoA&AoD for High-Precision Indoor Positioning with BHW GaAs RF Front-End ICs
- 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 BLE & 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 - Doubling the Range for BLE Music Streaming with BHW250L Active Integrated Antenna (AIA)