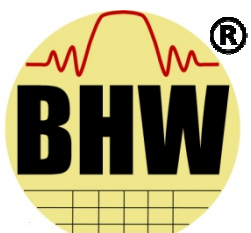




BHW Technologies (博泓微科技有限公司)



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

BHW Application Note #018

**Optimizing BHWA555 Wideband One-Watt PA for
Long-Range 5.8GHz Transmitter Applications**

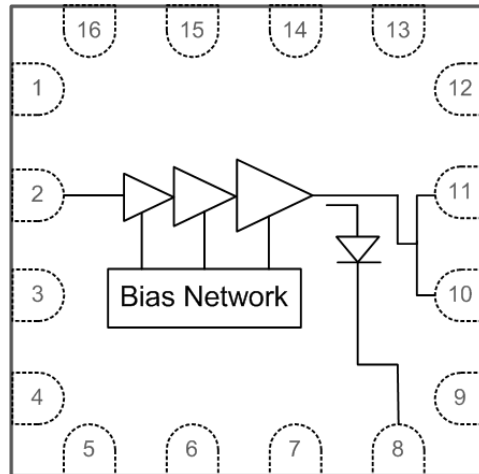
Rev. 1.5

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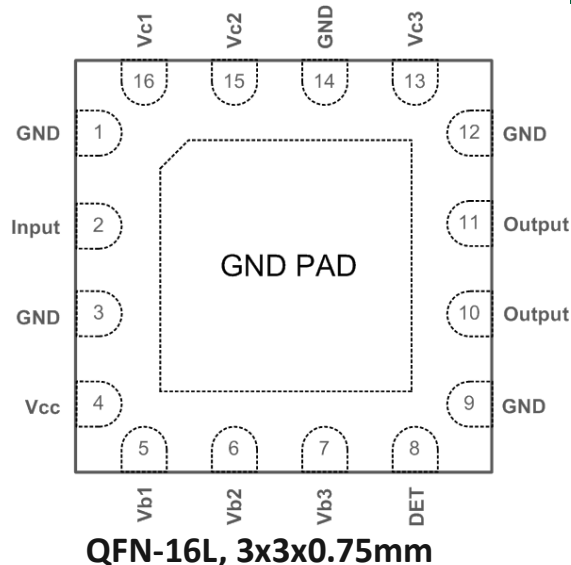
BHWA555 Wideband One-Watt Power Amplifier



Functional Block Diagram



Package Pin-Out (Top "See-Through" View)



Product Overview:

- Advanced GaAs/InGaP HBT Process
- 4-6GHz Operation Frequency Range
- Single Supply 3-5V Selectable
- Bias Current 30~200mA Adjustable
- Power Gain: Up to 28dB at 5.85GHz
- Output P1dB: Up to +28.5dBm at 5.85GHz
- Saturated Output Power: Up to +30.5dBm at 5.85GHz
- High PAE: Up to 30.5% at 5.85GHz
- Full On-Chip Match at Input Port
- Simple Output Match with 1 Capacitor Only
- Integrated ESD Protection
- Compact, Industry-Standard 3x3mm QFN Package

Applications:

- Wi-Fi IEEE 802.11 5.15-5.85GHz Products
- UWB B2/B3/B5/B7 Products
- 5G Band N79 4.4-5GHz Driver
- Remote Control for Drones/UAVs/Toys
- Wireless Audio/Video in 5-6GHz
- Generic Amplifier for 4-6GHz Radios

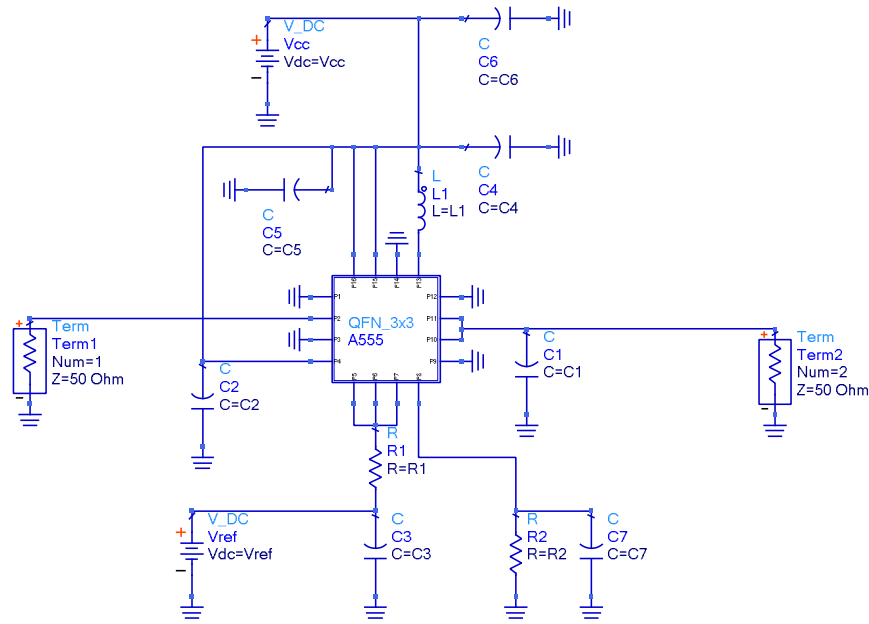
Note: BHWA555 features a flexible circuit topology and can be tuned for optimal performance in any of the sub-bands from 4 to 6GHz with simple adjustment of its bias resistor and matching capacitor. Contact BHW team for info or support.

BHWA555 Application Schematic and EVB

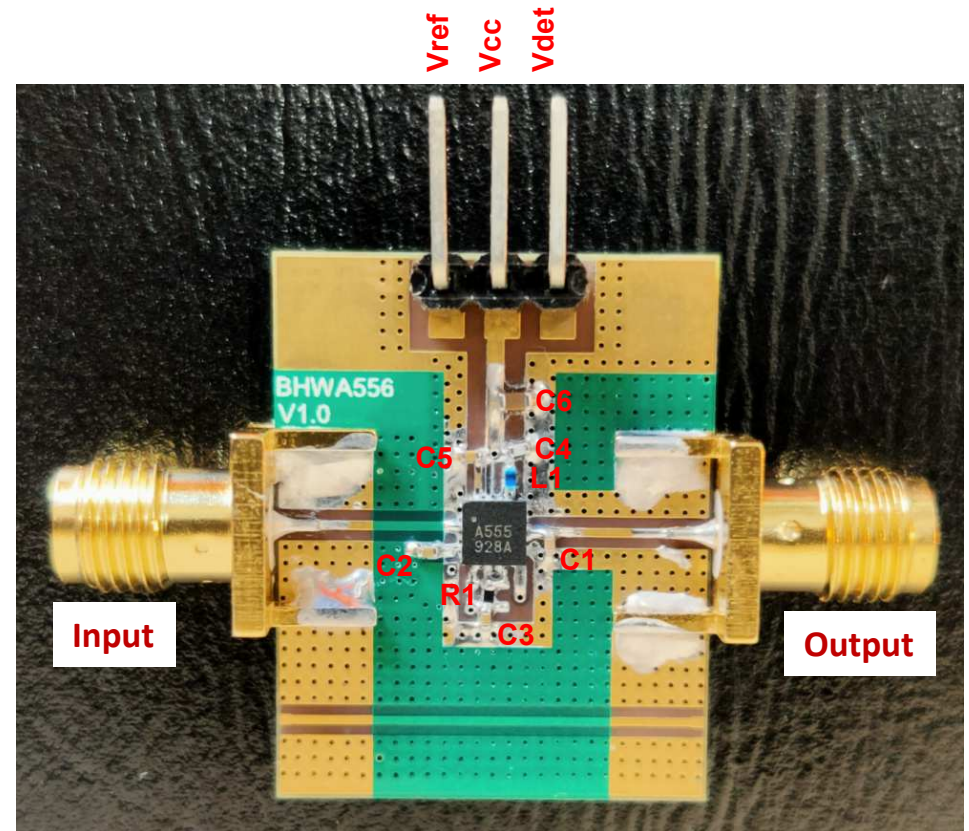


BHWA555 EVB Tuned for 5.8GHz Applications

Application Schematic



Note: R2 and C7 are optional for output power detection and not implemented on nominal EVB. Contact support@bhwtechnologies.com for details.



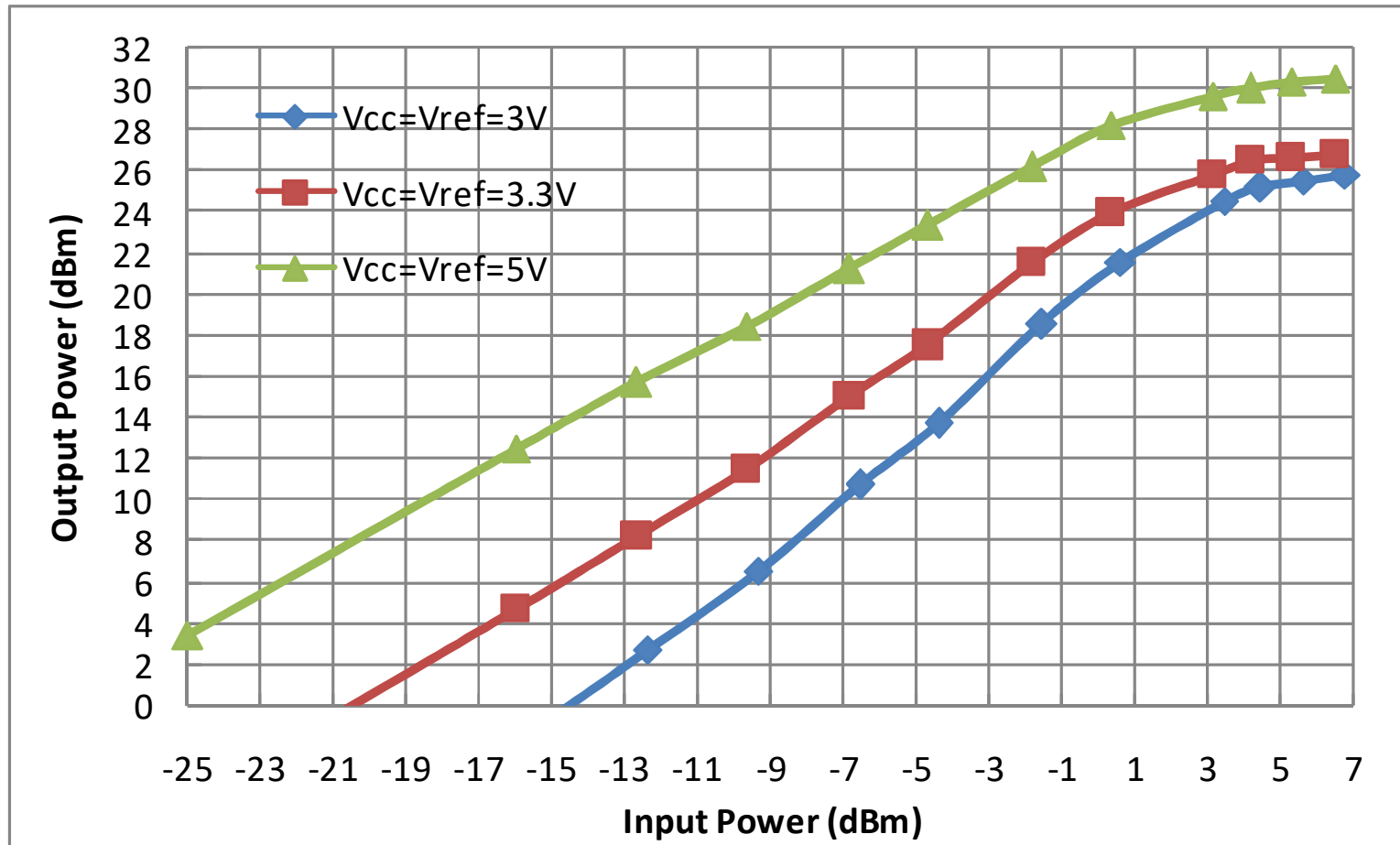
Recommended BOM for 5.8GHz ISM Band Application:

- Capacitors: C1=0.75pF, C2=C3=1nF, C4=220pF, C5=0.1uF, C6=1uF; Place C1 at ~1mm from Package Output Edge
- Inductor: L1=3.9nH (Murata LQW15A Recommended)
- Resistor: R1=750 Ohm for $I_{cq} \sim 150\text{mA}$ at $V_{cc}=V_{ref}=5\text{V}$; Other bias settings available upon request. See next page for details.
- R2 & C7 are for power detection implementation. Information available upon request.
- For application in other frequencies from 4-6GHz, the output matching capacitor C1 needs to be tuned. Contact BHW team for further information or technical support.

BHWA555 CW Power Sweep Data at 5.85GHz



Output Power vs Input Power at Various Vcc/Vref Voltages



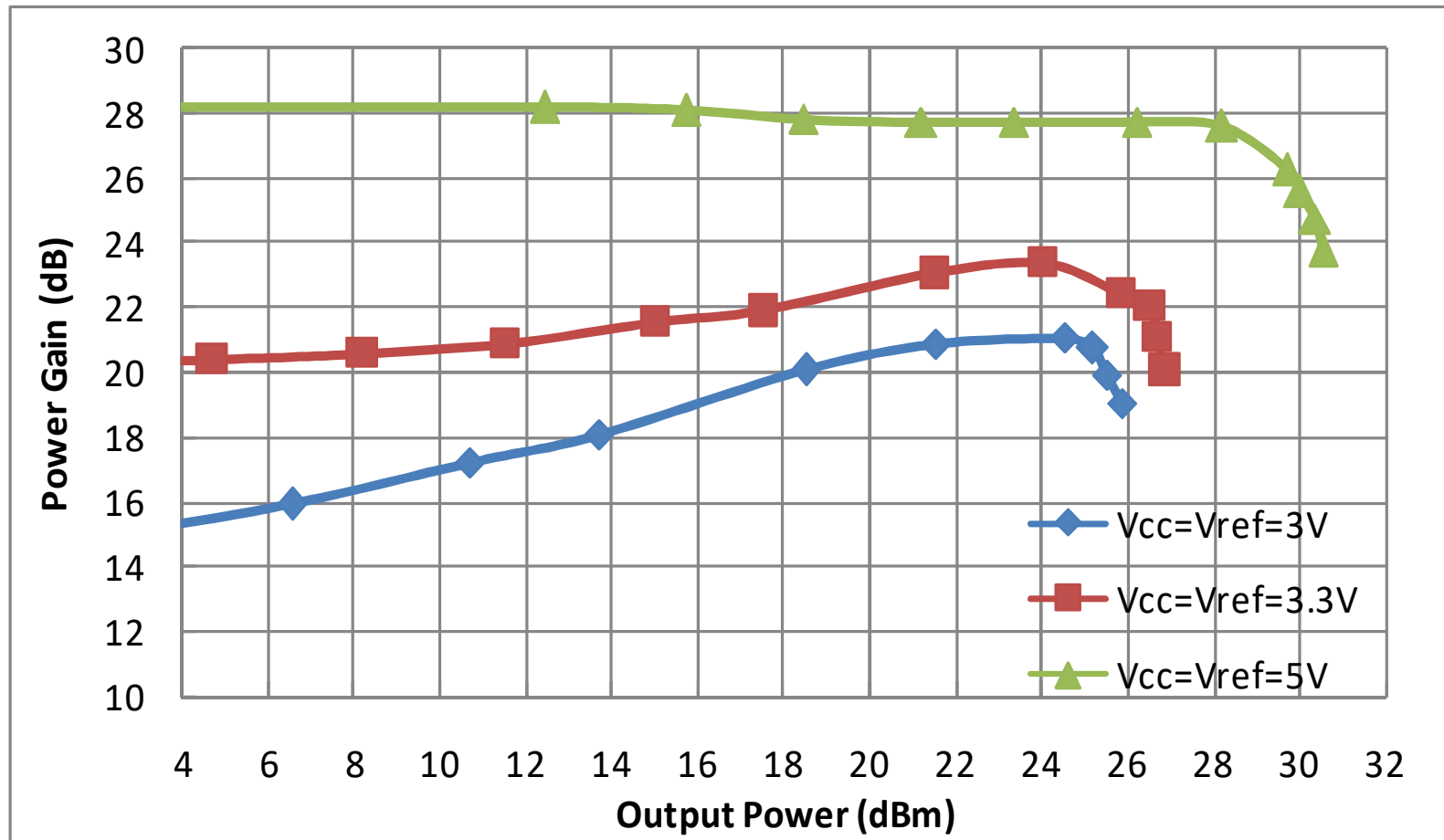
Notes:

- DC Bias Resistor: R1=750 Ohm; Output Matching: 0.75pF at ~1mm from the PA package
- Feedline and SMA connector losses of 0.2dB was added to the raw output power data from measurement
- Test was done at room temperature, CW (100% duty-cycle), on a 20x25.3x1.6mm 4-layer EVB without heat sink
- Expect slightly better results on larger-size PCB, or with good heat sink provision

BHWA555 CW Power Sweep Data at 5.85GHz



Power Gain vs Output Power at Various Vcc/Vref Voltages



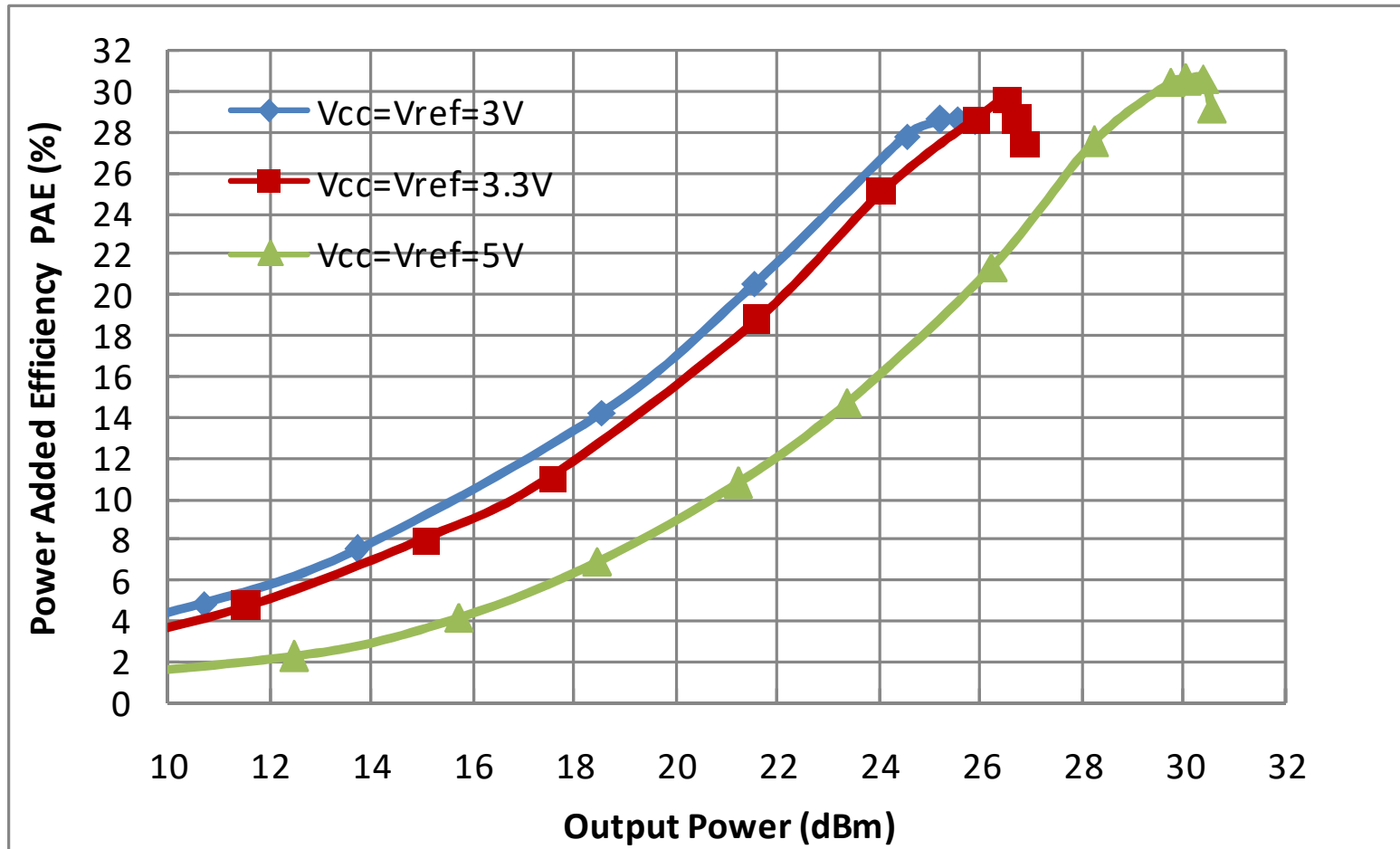
Notes:

- DC Bias Resistor: $R1=750\ \Omega$; Output Matching: 0.75pF at $\sim 1\text{mm}$ from the PA package
- Feedline and SMA connector losses of 0.2dB was added to the raw output power data from measurement
- Test was done at room temperature, CW (100% duty-cycle), on a $20\times 25.3\times 1.6\text{mm}$ 4-layer EVB without heat sink
- Expect slightly better results on larger-size PCB, or with good heat sink provision

BHWA555 CW Power Sweep Data at 5.85GHz



Power Added Efficiency vs Output Power at Various Vcc/Vref Voltages



Notes:

- DC Bias Resistor: R1=750 Ohm; Output Matching: 0.75pF at ~1mm from the PA package
- Feedline and SMA connector losses of 0.2dB was added to the raw output power data from measurement
- Test was done at room temperature, CW (100% duty-cycle), on a 20x25.3x1.6mm 4-layer EVB without heat sink
- Expect slightly better results on larger-size PCB, or with good heat sink provision

BHW RF Front-End AppNote Library



This is an abridged version of BHW AppNote #018. 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.