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 #015

BHWL161 GNSS Full-Band High-Performance LNA in Super-Compact 1x1mm DFN with Relaxed Pin Pitch

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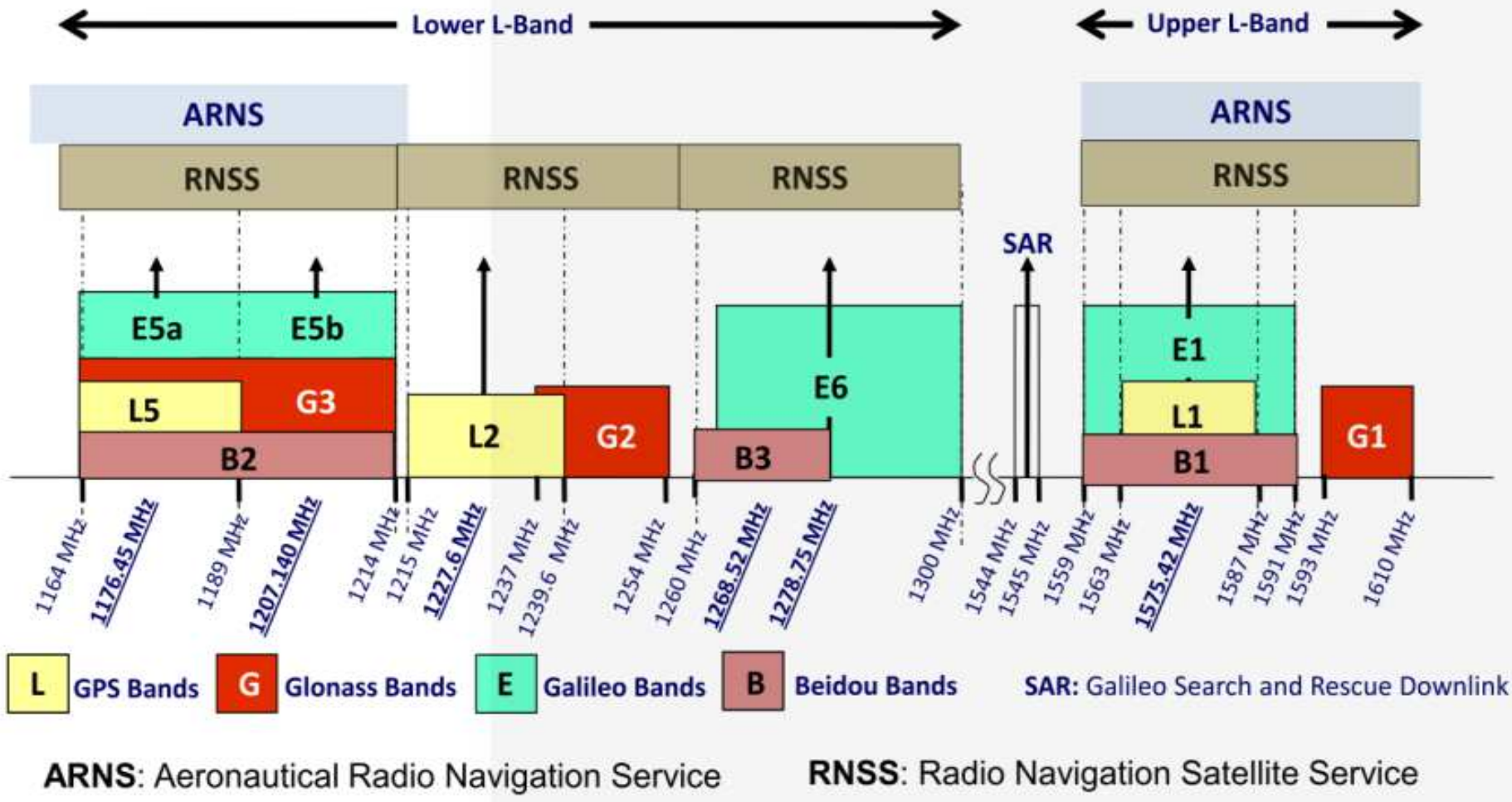
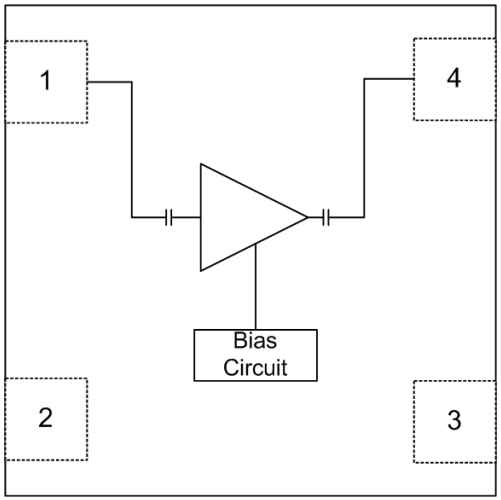
Background: Multi-Band High-Precision GNSS



BHWL161 is a wideband GNSS LNA for simultaneous coverage of all frequency bands (1165-1610MHz), all constellations with a single matching, providing lowest noise figure (NF~0.4/0.7dB) and highest-class linearity (Input P1dB~-3dBm) on the market today.

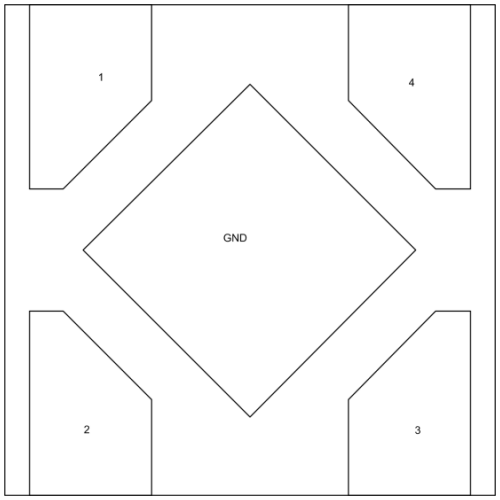
BHWL161 Wideband GaAs Low Noise Amplifier

Functional Block Diagram

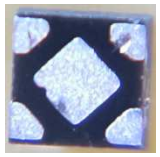


Package Pin-Out

(Top "See-Through" View)



DFN-4L 1.0x1.0x0.45mm



Product Overview:

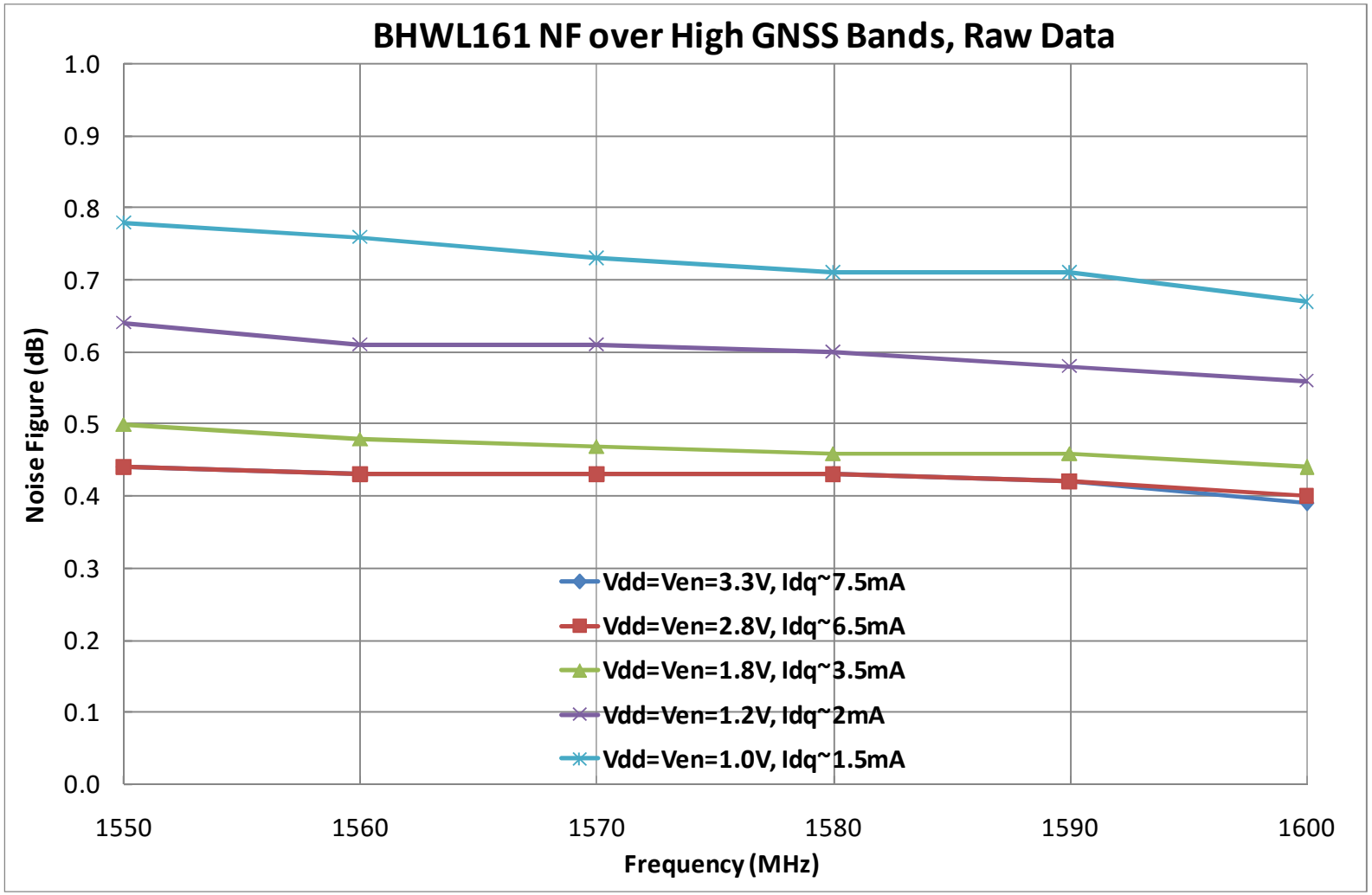
- Advanced GaAs E/D-pHEMT Process
- Ultra-Wideband 700MHz~2.5GHz Operational
- Support Full-Band GNSS 1165~1610MHz
- Ultra-Low 0.45/0.4dB EVB/De-Embedded NF at L1
- Record-Low 0.3dB NF at L1 with Optimal Matching
- NF <0.7dB at L1/L5; <0.8dB over Full GNSS Bands
- Gain: 15.5/17dB (High/Low Band)
- High Input P1dB: -3/-4dBm at 3.3/2.8V at 1575MHz
- IIP3: ~+5dBm at Vdd=3.3V at 1575MHz
- Adjustable Current: 2~9mA at 1.2~3.6V
- ESD at All I/O Ports: 1kV HBM, >2KV CDM
- Ultra-Compact 1.0x1.0mm DFN-4L Package
- Relaxed Pin Pitch 0.65mm for Easy PCB Assembly

Applications:

- GNSS for Smartphones, Smart Watches, Wearables
- GNSS for PNDs, UAVs and Drones
- GNSS for Vehicles, ADS Systems
- GNSS for Shared Rides, Asset Tracking
- Active GNSS Antennas & Modules
- UHF 600/700/868/915MHz Products
- 2.4GHz BLE AoA/AoD Systems
- 2.4GHz Remote Controls
- Other Generic Radios from Sub-GHz to 2.5GHz

BHWL161 High-Band EVB Noise Figure

Typical Noise Figure Over Different Vdd/Ven

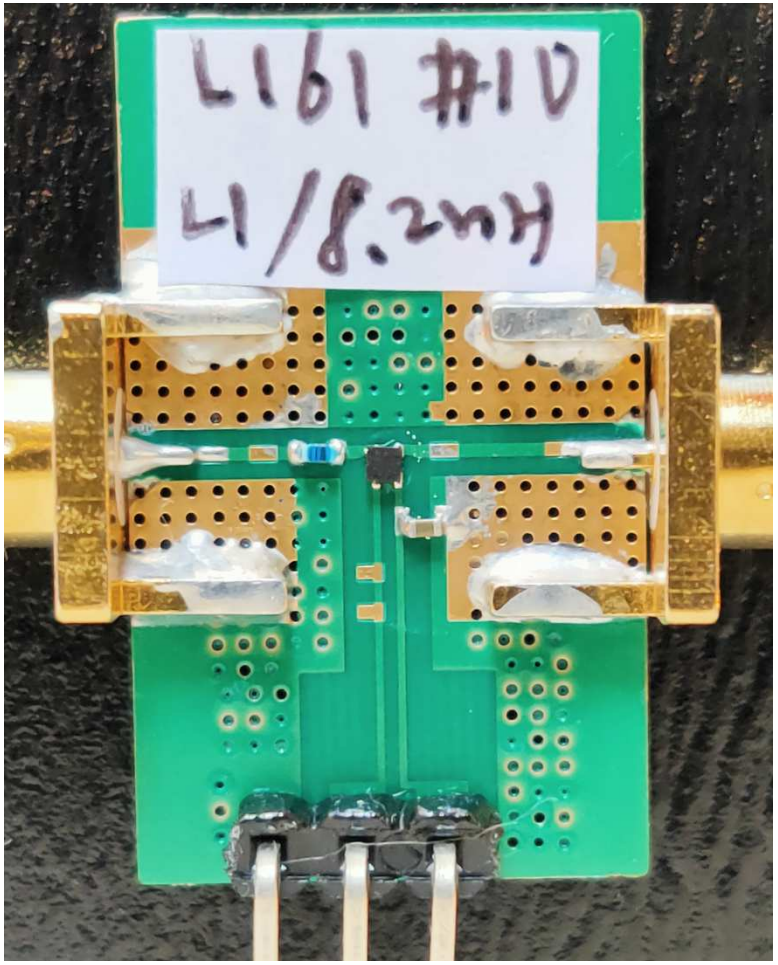


Notes:

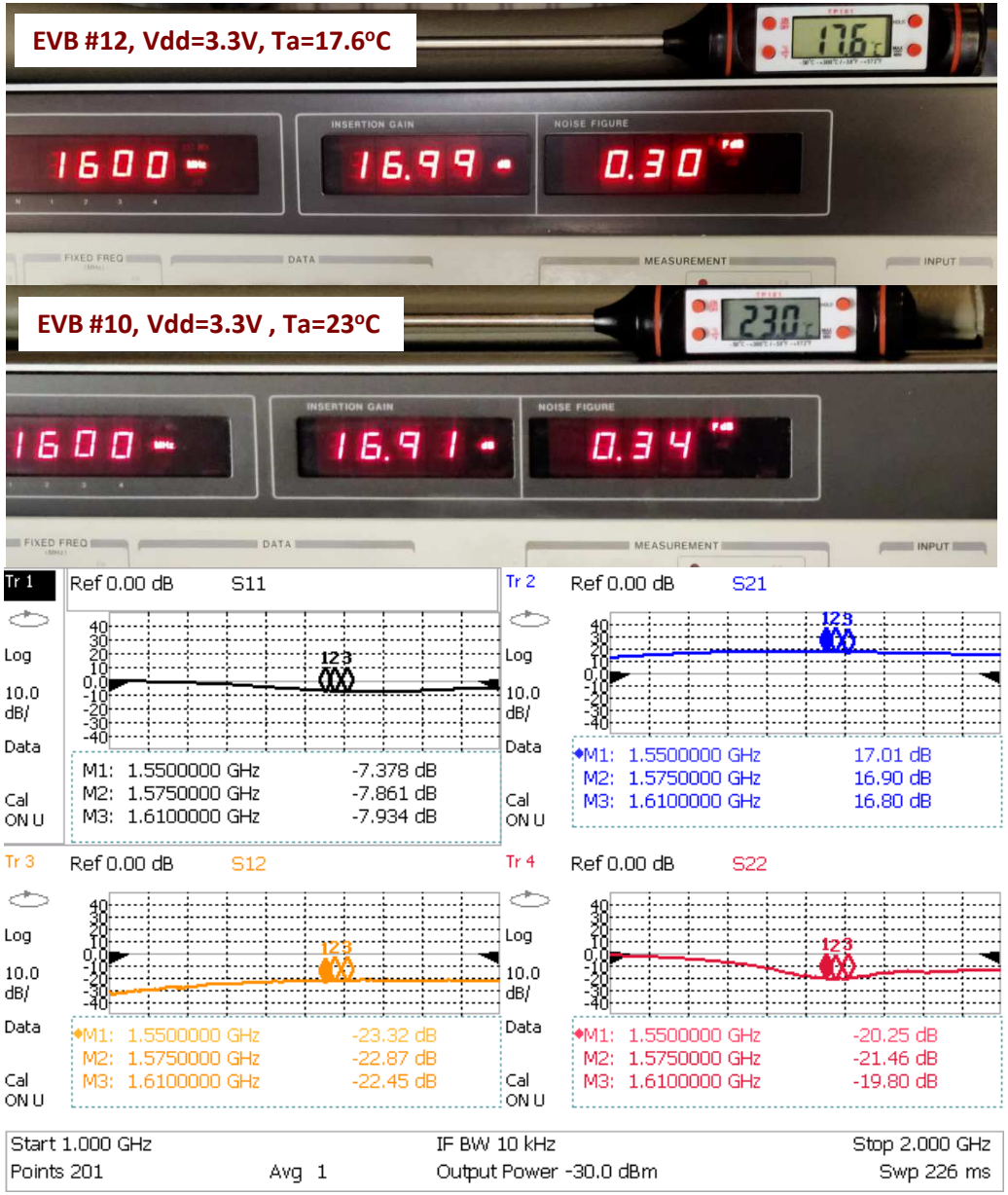
-Measured data included EVB feedline and SMA connector losses. Intrinsic LNA NF should be ~0.05dB lower

-The above data were taken from EVB optimized for Vdd=Ven=2.8V. NF and S-parameters at lower voltages can be further optimized if needed.

BHWL161 Alternative Matching for Optimal NF



BHWL161 can deliver the GNSS community's lowest NF (0.30 EVB/0.25dB De-Embedded, at ~290K) if implemented with 4-Layer PCB and matched for optimal noise figure instead of best S11.



BHW RF Front-End AppNote Library

For further information, please email to 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 BHWR250L Active Integrated Antenna (AIA)**