



CHEAT SHEET

WIRELESS MODULE SELECTION GUIDE

Bluetooth/BLE Module Selection

Choosing modules that work with smartphones and iOS

- [*] Never use HC-05/HC-06 (Bluetooth Classic with SPP - incompatible with iOS)
- [*] Select BLE modules built on Nordic or Silicon Labs chips
- [*] Verify the module has a valid FCC ID before designing
- [*] Avoid HM-10 and similar BLE 4.0 modules with clone issues
- [*] Check vendor lifecycle status before design-in
- [*] Use current BLE 5.x modules for new products

Wi-Fi Module Selection

Avoiding ESP8266-based modules in production

- [*] Never use ESP-01 in products (lacks RF shield required for FCC)
- [*] Select WROOM or MINI form factors with proper shielding
- [*] Use modern ESP32 variants (S3, C6, or C3)
- [*] Confirm module has actual FCC modular approval
- [*] Verify Long-Term Support commitments from vendor

Proprietary RF Protocol Selection

Why generic nRF24L01 clones cause problems

- [*] Never design with cheap nRF24L01 clones (proprietary■■■■■■■■■■)
- [*] Use standard protocols: BLE, Zigbee, or Thread instead
- [*] Avoid islands that cannot communicate with other ecosystems
- [*] Choose modules with documentation and ecosystem support
- [*] Select BLE or BLE Mesh for point-to-point applications

Antenna & Certification Traps

How antenna choices break FCC compliance

- [*] Avoid U.FL/SMA connector modules unless you check antenna grants
- [*] Stay within FCC-listed antenna types and maximum gain limits
- [*] Use modules with integrated PCB or chip antennas
- [*] Verify modular approval covers your specific antenna before design
- [*] Budget \$8K-\$15K per radio for intentional radiator testing if needed

LoRa Module Compliance

Selecting regionally compliant LoRa solutions

- [*] Never use generic uncertified LoRa modules
- [*] Verify regional frequency band compliance before production
- [*] Use pre-certified LoRa modules from major vendors
- [*] Confirm firmware includes region-specific channel plans
- [*] Check duty cycle requirements for your target region
- [*] Source from Murata, RAK Wireless, or u-blox

Cellular Network Considerations

Avoiding 2G sunset and coverage issues

- [*] Never use SIM800/SIM900 (2G networks being shutdown globally)
- [*] Use LTE-M or NB-IoT for low-data IoT applications
- [*] Select LTE Cat-1 bis for global coverage needs
- [*] Verify carrier certification for your target regions
- [*] Source from Quectel, u-blox, or Telit modules
- [*] Check regional coverage maps before selecting modules

Certification Verification Process

CRITICAL: Verifying module claims before production

- [*] Always lookup FCC ID in the official equipment authorization database
- [*] Review grant notes for full vs. limited modular approval
- [*] Verify FCC ID belongs to the actual module model
- [*] Confirm grant conditions cover your integration method
- [*] Reject any module without verifiable certification
- [*] Request documentation from manufacturers directly

Module Vendor Selection

Choosing reliable sources for production

- [*] Use reputable vendors: Fanstel, Raytac, Laird for Bluetooth
- [*] Source Wi-Fi modules from Espressif directly
- [*] Select cellular modules from Quectel, u-blox, or Telit
- [*] Verify vendor provides real certification documentation
- [*] Check vendor longevity and product lifecycle support
- [*] Avoid modules marketed primarily to hobbyists

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Meet your guide: John Teel



Hey there, I'm a former microchip design engineer at Texas Instruments and founder of a hardware startup that sold products in hundreds of retail stores. My chip designs are in devices from Apple, Intel, and more.

Now, my full-time focus is helping people like you bring new electronic products to life, without wasting time, money, or risking everything.

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