

Description of all circuitry and devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation, and for limiting power.

1. Determining and stabilizing frequency

- 1.1. The base frequency is determined by the crystal oscillator employing a 32MHz crystal, P/N ECS-320-8-37B-CKY-TR, manufacturer ESC Inc. This crystal provides stability of at least ± 10 ppm.
- 1.2. The base frequency is multiplied by the Phase Locked Loop (PLL) circuit built in the main component, System on the Chip (SOC) nRF52832-QFAA-R, manufacturer Nordic Semiconductor ASA. The PLL multiplication factor is calculated based on the Bluetooth channel use. The SOC data sheet states that the transmitter worst-case frequency deviation varies between ± 250 and ± 500 kHz depending on the data rate and crystal stability. Since the crystal used in this design has five times better accuracy than required, it is assumed that the worst-case frequency deviation for this device would be ± 100 kHz.

2. Suppression of spurious radiation

The transmitter built into SOC provides has transmit power of -20 dBc for the 1-st adjacent channel and -50 dBc for the 2nd adjacent channel. In addition, harmonics suppression is provided by the matching LC circuitry (4.3nH inductor and 1.5pF capacitor) and by the antenna tuned for the Bluetooth frequency band (P/N ACAG0801-2450-T, manufacturer Abracon LLC)

3. Limiting modulation

The modulation depth is guaranteed by the SOC design.

4. Limiting power

Per the datasheet, the SOC maximum output power setting is +4dBm, and the highest achievable power output at that setting is +6dBm; both are guaranteed by the SOC design.