

Spyder RF Duty Cycle

By

Tom Balph

Frank Latona

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The Spyder RF protocol is based on a TDMA structure. A central node broadcasts to multiple (from 1 to 4) peripheral nodes which, in turn, reply to the central node. The WORST CASE for RF duty cycle occurs with the central node.

The central node can transmit at a maximum rate of once every frame of 2.78 milliseconds. Note for future reference, the central node will not always transmit at the beginning of the frame and that it can transmit at different time slots within the frame. The maximum of data bits for one transmission is 179 bytes x 8 bits/byte = 1432 bits. With a data rate of 4.798 MHz, the transmit duration is 1432 bits x (1/4.798 MHz) = 298.46 microseconds. Figure 1 below shows a trace from the RF signal analyzer (Rohde & Schwartz DSIQ 3) that illustrates a single TX duration.

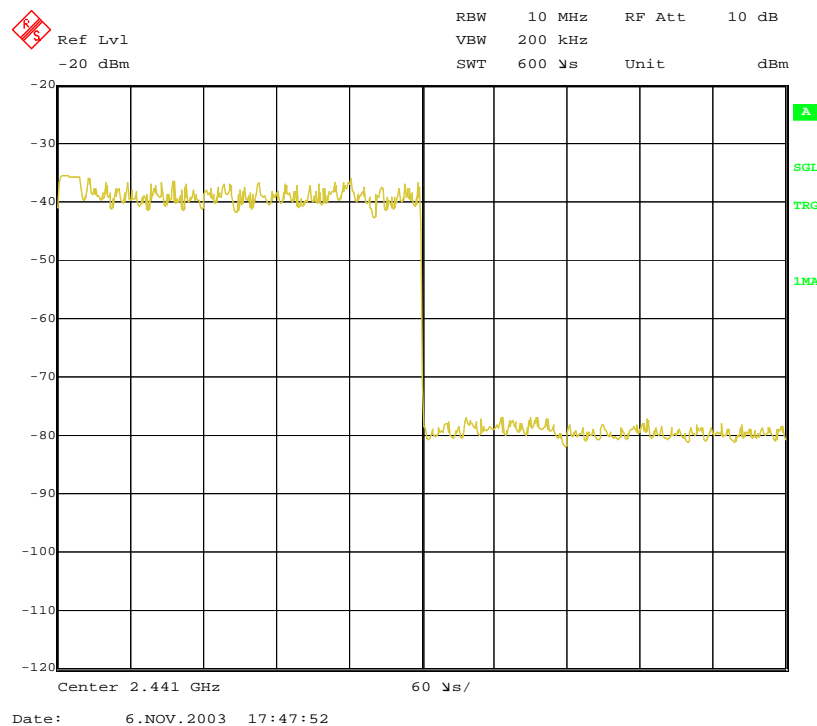


Figure 1: Maximum TX duration of 298.46 microseconds (horizontal scale is 60 microseconds/division)

The maximum worst case can be implemented through use of special software in the test platform. As stated above, there will be a 298.46 microsecond TX that occurs on average of every 2.78 milliseconds. Figure 2 below shows this repetition rate with a horizontal time scale of 2.8 milliseconds/division and a total span of 28 milliseconds. Note the average occurrence of one TX per timescale division. THIS TRANSLATES TO A

WORST CASE DUTY CYCLE of 298.46 microsec / 2780 microsec = 0.1073 or **10.7%**.

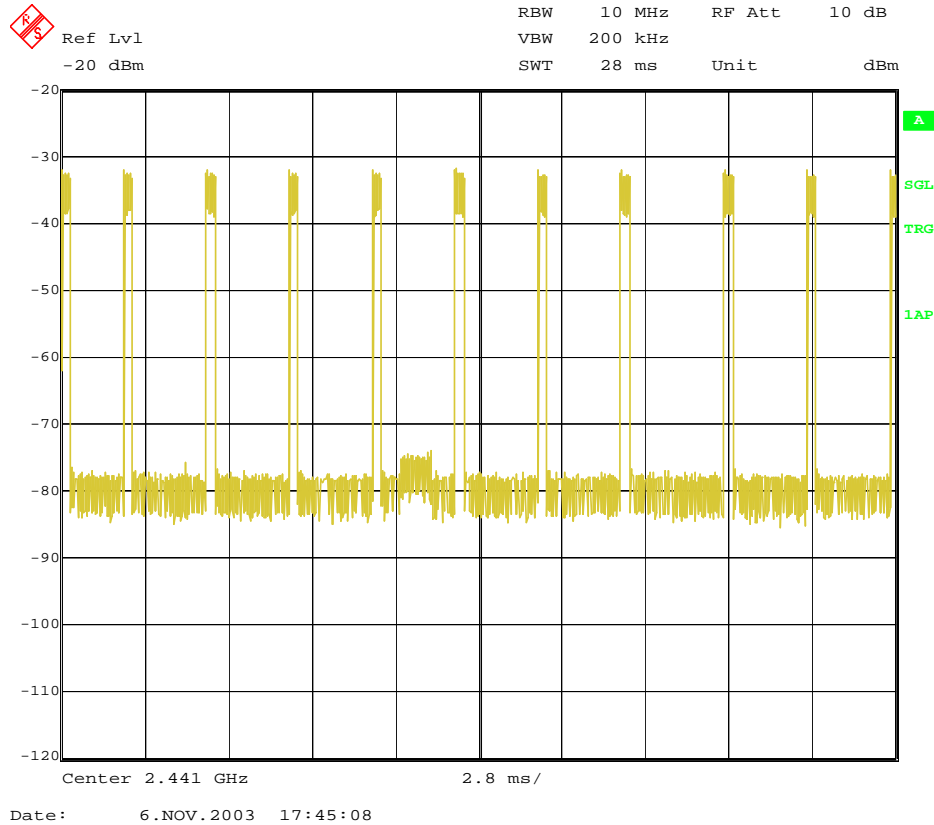


Figure 2: Worst case maximum TX rate of 298.46 microsecond pulses every 2.78 millisecond frame (horizontal scale is 2.8 milliseconds/division)

The worst case duty would not occur except under very unusual conditions. Under normal operation, the platform only requires the RF link to communicate on average every 16.7 milliseconds. Note that this communication rate is unrelated to the RF link frame rate. Figure 3 illustrates a **NORMAL DUTY CYCLE** of 298.46 microsec / 16700 microsec = 0.0178 or **1.8%**, even with a maximum TX burst width (data load).

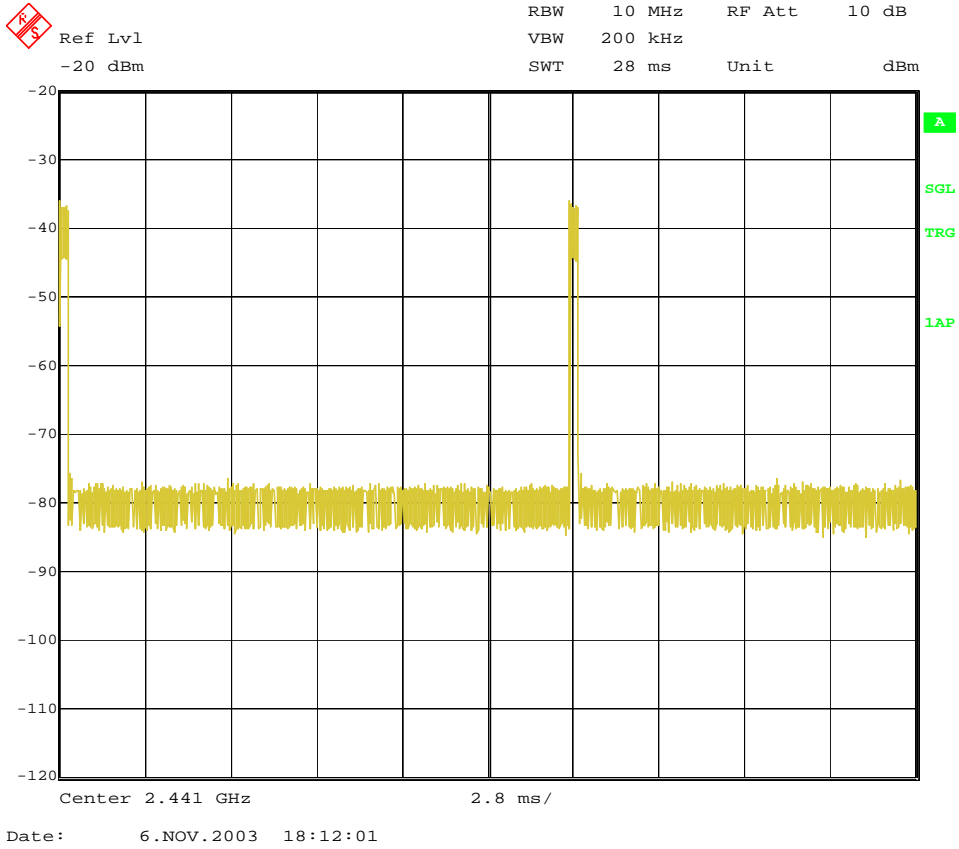


Figure 3: Normal TX rate of 298.46 microsecond pulses every 16.7 millisecond frame (horizontal scale is 2.8 milliseconds/division)