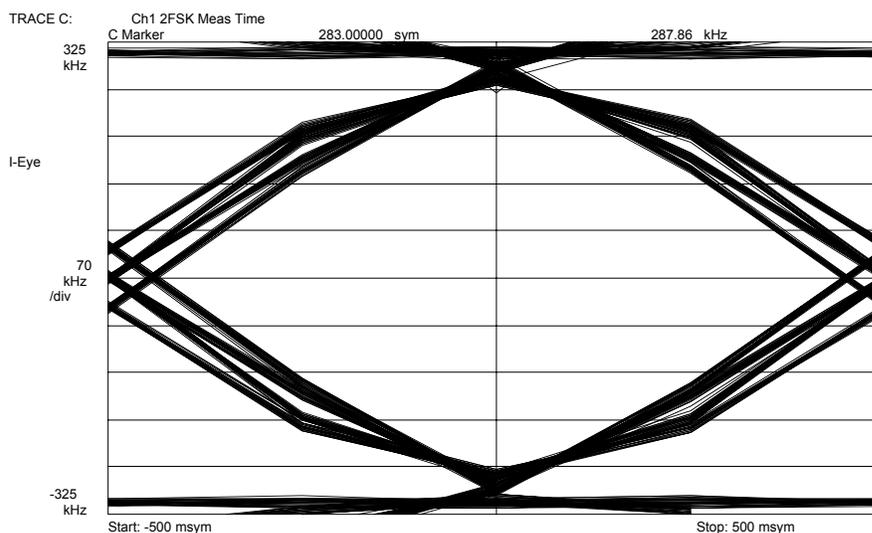


UTDMD\_C2bw3.HGL ==> Recording Date: 02-13-02 Time: 14:49



**Figure 2-11: Digital Demodulation Mode – Trace C: “Eye Diagram”**

#### 2.4.2.5 Verification of Transmitter Power Output (§2.2.2.5)

##### Purpose/Introduction:

The Time/Amplitude profile of an ADS-B Message Transmission **shall** fall within the following limits relative to a *reference time* defined as 0.48 microseconds prior to the center of the first bit of the synchronization sequence (§2.2.3.1.1) appearing at the output port of the equipment.

All power measurements for subparagraphs “a” through “f” below apply to the selected antenna port for installations that support transmitter diversity (§2.2.6.1.3). The RF power output on the non-selected antenna port **shall** be at least 20 dB below the level on the selected port.

All power measurements for subparagraphs “a” and “f” assume a 300 kHz bandwidth. All power measurements for subparagraphs “b,” “c,” “d” and “e” assume a 2 MHz bandwidth.

- a. Prior to 8 bit periods before the reference time, the average RF output power **shall** not exceed  $-80$  dBm.

**Note:** *This unwanted power requirement is necessary to ensure that the ADS-B Transmitting Subsystem does not prevent closely located UAT receiving equipment from meeting its requirements. It assumes that the isolation between transmitter and receiver equipment exceeds 20 dB.*

- b. Between 8 and 46 bit periods prior to the reference time, the RF output power **shall** remain at least 20 dB below the minimum power requirement for the appropriate equipment class per [Table 2-1](#).
- c. During the Active state, defined as beginning at the reference time and continuing for the duration of the message (276 bit periods for the Basic Message and 420 bit periods for the Long Message), the RF output power **shall** comply with [Table 2-2](#).
- d. The RF output power **shall** not exceed the maximum limits of [Table 2-2](#) at any time during the ADS-B Message Transmission, as shown in [Figure 2-1](#).
- e. Within 46 bit periods after the end of the Active state, the RF output power **shall** be at a level at least 20 dB below the minimum power requirement for the appropriate equipment class per [Table 2-1](#).
- f. Within 8 bit periods after the end of the Active state, the average RF output power **shall** fall to a level not to exceed -80 dBm.

**Note:** *This unwanted power requirement is necessary to ensure that the ADS-B Transmitting Subsystem does not prevent closely located UAT receiving equipment from meeting its requirements. It assumes that the isolation between transmitter and receiver equipment exceeds 20 dB.*

This test procedure verifies that the UAT Transmitter outputs the required power for the appropriate equipment class as stipulated in §2.2.2.5. The transmitter power requirements are verified for the Active state, the Inactive state and the defined intervals prior to and subsequent to the transmitted message.

#### Equipment Required:

The test configuration requires that data sources be provided to the appropriate UAT Transmitter interfaces to enable generation of Long ADS-B Messages. This could also be accomplished by the use of an internally generated Long ADS-B test message with randomly generated data content. Measure the power at the RF antenna port, or with attenuators, as appropriate, for the RF power measuring equipment being sure to account for the resulting loss. The RF power measurement system must be capable of measuring the average RF power of the modulated signal sampled over a defined interval indicated for each of the measurements below.

#### Measurement Procedures:

In all of the power measurements below, the power output measurement must be adjusted to take into account the loss allocated for cabling to the antenna of the aircraft. In the case of diversity transmitters, both top and bottom channel measurements must be performed. Unless specified otherwise, for the following power measurements, use a 2 MHz bandwidth filter setting.

#### Step 1: Measure Active State RF Power Output

Set up the UAT equipment to transmit a Long ADS-B Message. Measure the average RF power, over 1 microsecond intervals, of the transmitted signal during the message transmission interval, i.e., from the first bit of the synchronization pattern to the last bit of the message. Verify that the output power is at least the corresponding value in [Table 2-2](#) for the equipment class

under test. Verify that the power measurement does not exceed the maximum allowable and does not fall below the minimum allowable power level for the equipment class. Verify that the minimum and maximum power values specified in [Table 2-2](#) for the equipment class are satisfied over the entire message by measuring the power at the 1 microsecond interval yielding the maximum power measurement and the interval yielding the minimum power.

Step 2: Verify RF Transmitter Power Prior to the Active State

- a) Set up the UAT equipment to transmit a Long ADS-B Message. Measure the average RF power of the transmitted signal using 1 microsecond intervals over the interval which commences 8 bit periods (7.68 microseconds) prior to the active state, i.e., the start of the first bit of the synchronization pattern and ends ~~4-6~~ bits (~~3.845.76~~ microseconds) prior to the active state. The measured power level must be a minimum 20 dB below the corresponding minimum power value in [Table 2-2](#) for the equipment class under test. The maximum allowed power values are: Low Power = 18.5 dBm, Medium Power = 22.0 dBm, High Power = ~~2830.0~~ dBm. Verify that the power measurement does not exceed the corresponding allowable power level for the equipment class.
- b) Measure the average RF power of the transmitted signal using 1 microsecond intervals over the interval which commences ~~4-6~~ bit periods prior to the active state. The measured power level must be at or below the corresponding maximum power value in [Table 2-2](#) for the equipment class under test. The maximum allowed power values are: Low Power = 42.5 dBm, Medium Power = 46.0 dBm, High Power = ~~5254.0~~ dBm. Verify that the power measurement does not exceed the corresponding allowable power level for the equipment class.

Step 3: Verify RF Transmitter Power Post Active State

- a) Measure the average RF power of the transmitted signal using 1 microsecond intervals over the time interval which begins at the end of the Active state and ends ~~4-6~~ bit periods later. The measured power level must be at or below the corresponding maximum power value in [Table 2-2](#) for the equipment class under test. The maximum allowed power values are: Low Power = 42.5 dBm, Medium Power = 46.0 dBm, High Power = ~~5254.0~~ dBm. Verify that the power measurement does not exceed the corresponding allowable power level for the equipment class.
- b) Measure the average RF power of the transmitted signal using 1 microsecond intervals over the interval which commences ~~4-6~~ bit periods from the end of the message Active state and ends ~~4-2~~ bit periods later. The measured power level must be a minimum 20 dB below the corresponding minimum power value in [Table 2-2](#) for the equipment class under test. The maximum allowed power values are: Low Power = 18.5 dBm, Medium Power = 22.0 dBm, High Power = ~~2830.0~~ dBm. Verify that the power measurement does not exceed the corresponding allowable power level for the equipment class.