Products: FSIQ, FSE-B7

EDGE Timeslot Error Measurements with FSIQ

Application Note

An FSE (or FSIQ) Spectrum Analyser equipped with the Vector Analysis option (FSE-B7) can measure a wide range of error types (EVM, Magnitude Error, Phase Error…) on continous signal. This Application Note describes how to measure these errors on a single burst between symbols.

Subject to change – Emmanuel Veslot 07.00 – 1ES48_0E

Contents

1 Overview

The modulation accuracy for TDMA modulations, such as EDGE, is defined by the error vector between the vector representing the actual transmitted signal and the vector representing the error-free modulated signal. The magnitude of the error vector is called the Error Vector Magnitude (EVM).

Calculate the EVM by measuring the difference between the vector representing the actual transmitted waveform and the vector representing the ideal wave form on the useful part of the burst (excluding tail symbols).

The latest ETSI GSM 05.05 version 8.3.0 Release 1999 specifies that the RMS EVM per burst is measured for at least 200 bursts.

2 Modulation accuracy in GSM 05.05 version 8.3.0 Release 1999

The EVM is specified in GSM 05.05 so that the measured RMS EVM over the useful part of any burst shall not exceed:

- For Mobile Stations:
  9.0% (nominal conditions)
  10.0% (extreme conditions)
- For Base Stations
  After any active element, **excluding** the effect of any passive combining equipment:
  - 7.0% (nominal conditions)
  - 8.0% (extreme conditions)

  After any active element, **including** the effect of passive combining equipment:
  - 8.0% (nominal conditions)
  - 9.0% (extreme conditions)

The RMS EVM per burst is measured for at least 200 bursts.

3 Test setup

Measurement with FSE (or FSIQ)

This example uses an SMIQ signal generator. The signal generator generates an EDGE burst from the Digital Standard Menu with sync sequence TSC0

1. Bring the FSE to the predefined state:

   PRESET

2. Before connecting the generator to the analyzer make sure that the maximum power at the analyzer's input is below 20 dBm. Use an external attenuator to reduce the power to a safe value.

3. Connect the SMIQ to the FSE

4. Set the reference level approximately 4 dB higher than the source level. For example, 4 dBm for a generator level set to 0 dBm:

   REF 4 dBm

5. Set the FSE frequency to match the source level (e.g. 935.2 MHz):

   CENTER 935.2 MHz

6. Switch on demodulation

   MODE:VECTOR ANALYZER:DIGITAL STANDARDS:EDGE

   Note: *Select split screen mode for FSE. Select FIND BURST ON and FIND SYNC ON, and edge_ts0 as the sync sequence. For FSIQ use the default settings for the EDGE standard.*

7. Select trace 1

   MODE:MEAS RESULT:MEAS SIGNAL:MAGNITUDE

8. Adjust the Reference level to the Peak Envelope Power (PEP) level

   REF:REF LEVEL: The Ref Level must be between Warnings UNLD and IFOVLD.

9. Set the result length to display the complete burst including ramp-up and ramp-down

   SWEEP: RESULT LENGTH 162 symbols

10. Adjust the sync offset to center the burst approximately on the screen:

    TRIGG: SYNC OFFSET 68 symbols

11. Select D LINES

    D LINES:TIME/SYMB LINE1 10 symbols

    D LINES:TIME/SYMB LINE2 152 symbols

    Or move the D LINES with the Roll Key to the appropriate symbols.

12. Select trace 2

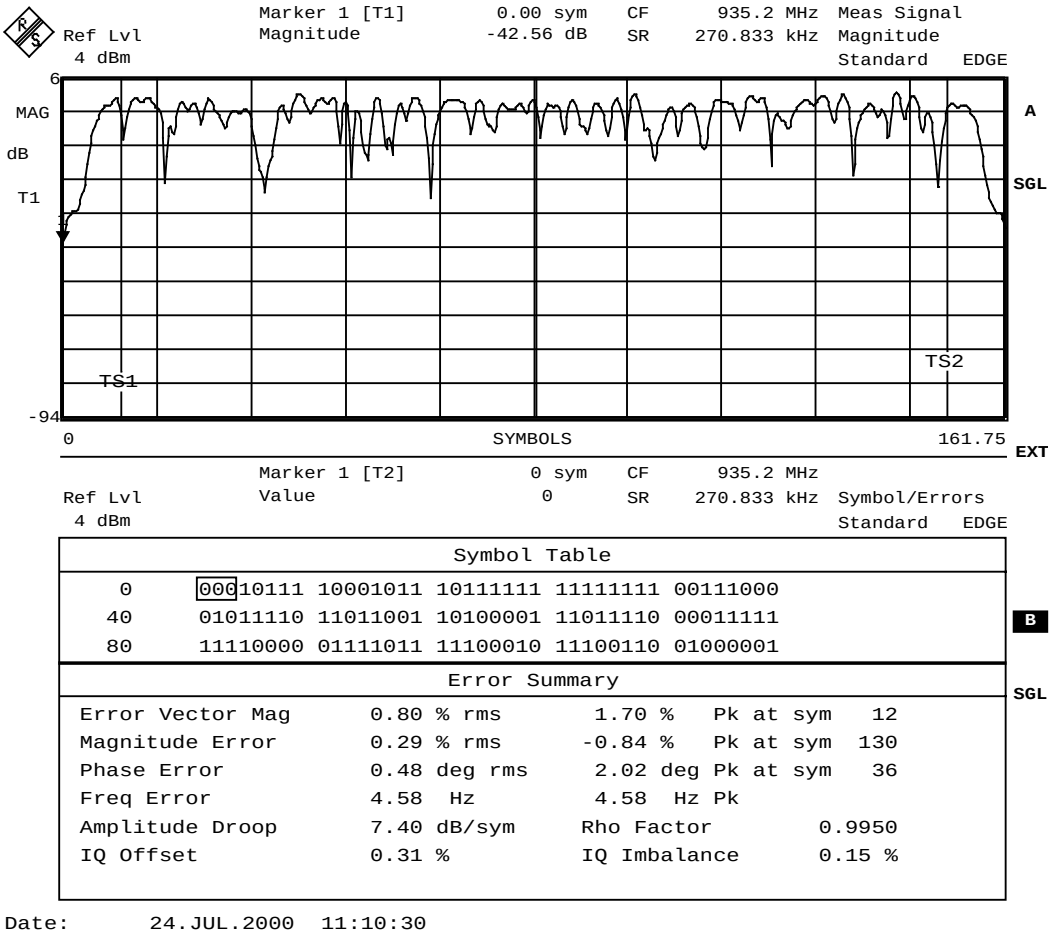
    MODE:MEAS RESULT:SYMB TABLE / ERRORS

13. Select trace 4 for Search range function

MARKER:SEARCH:SEARCH LIMit ON

Note: *The Error summary table in trace 2/4 is correlated with the D LINES. If you move a D LINE into the noise the EVM measurement increases automatically.*

The EVM test results are shown below. The upper screen shows the burst with the timelines TS1 and TS2 which limit the evaluation range for the EVM measurement. The EVM measurement result (Error Vector Mag) can be seen in the lower screen as RMS and Peak value.



4 Ordering information

Signal Analyzer

FSEA20	9kHz to 3.5GHz	1065.6000.25
FSEA30	20Hz to 3.5GHz	1065.6000.35
FSEB20	9kHz to 7.0GHz	1066.3010.25
FSEB30	20Hz to 7.0GHz	1066.3010.35
FSEM20	9kHz to 26.5GHz	1080.1505.25
FSEM30	20Hz to 26.5GHz	1079.8500.35
FSEK20	9kHz to 40GHz	1088.1491.20
FSEK30	20Hz to 40GHz	1088.3494.30
FSIQ3	20Hz to 3.5GHz	1119.5005.13
FSIQ7	20Hz to 7.0GHz	1119.5005.17
FSIQ26	20Hz to 26.5GHz	1119.6001.27
FSIQ40	20Hz to 40GHz	1119.6001.40

Options required for FSE:

FSE-B7	Vector Signal Analyzer	1066.4317.02

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