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NI GSM/EDGE+ Toolkit Specifications

Version 1.1

This document lists specifications for the NI GSM/EDGE+ Toolkit.

Maximum specifications are derived under the following conditions:

- 30 minutes warm-up time
- Calibration cycle maintained
- Chassis fan speed set to High
- NI-RFSA version 2.3 or later used
- NI-RFSA instrument driver self-calibration performed after instrument temperature is stable
- NI 5652 locked to the PXI backplane or to the front panel REF OUT2
- NI 5601 module revision G or later

Maximum specifications describe the warranted, traceable product performance over ambient temperature ranges of 0 °C to 55 °C, unless otherwise noted.

Typical values describe useful product performance beyond specifications that are not covered by warranty and do not include guardbands for measurement uncertainty or drift. Typical values may not be verified on all units shipped from the factory. Unless otherwise noted, typical values cover the expected performance of units over ambient temperature ranges of 23 °C ±5 °C with a 90% confidence level, based on measurements taken during development or production.

These specifications are representative and cannot be guaranteed for different frame configurations. In addition, these specifications cannot be guaranteed on all units shipped from the factory.

Specifications subject to change without notice. For the most recent toolkit specifications, visit `ni.com/manuals`.

NATIONAL INSTRUMENTS™

Generation

Frequency range (NI PXIe-5673) .....10 MHz to 6.6 GHz

Absolute amplitude accuracy.....Refer to the *NI PXIe-5673 Specifications* or *NI PXIe-5673E Specifications*

Amplitude resolution .....Refer to the *NI PXIe-5673 Specifications* or *NI PXIe-5673E Specifications*

GSM

The generation specifications for GSM were derived using the following configuration:

- Burst type: Normal symbol rate burst (NB)
- Modulation format: GMSK
- Symbol rate: 270.833k symbols/second
- Training sequence: TSC0
- UUT: MS
- Band: All supported bands
- Power level: –10 dBm to –60 dBm

Specifications for the GSM signal using the above configuration:

Maximum RMS phase error .....<0.4 deg

Maximum frequency error.....<4 Hz

EDGE

The EDGE generator provides options for generating bursts for 8-PSK, QPSK, 16-QAM, and 32-QAM modulation schemes with different rates and filters. The general specifications for downlink are derived using the following configurations:

- Burst type: NB
- Modulation format: 8-PSK/16-QAM/32-QAM
- Symbol rate: 270.833k symbols/second
- Training sequence: TSC0
- UUT: MS
- Band: All supported bands
- Power level: –10 dBm to –60 dBm

Specification for the EDGE signal using the above configuration:

Maximum RMS EVM..... <0.9%

The general specifications for downlink are derived using the following configurations:

- Burst type: Higher symbol rate burst (HB)
- Modulation format: QPSK/16-QAM/32-QAM
- Symbol rate: 325k symbols/second
- Training sequence: TSC0
- UUT: MS
- Band: All supported bands
- Power level: –10 dBm to –60 dBm
- Filter: Narrow

Specification for the EDGE signal using the above configuration:

Maximum RMS EVM..... <0.9%

The general specifications for downlink are derived using the following configurations:

- Burst type: HB
- Modulation format: QPSK/16-QAM/32-QAM
- Symbol rate: 325k symbols/second
- Training sequence: TSC0
- UUT: MS
- Band: All supported bands
- Power level: –10 dBm to –60 dBm
- Filter: Wide

Specification for the EDGE signal using the above configuration:

Maximum RMS EVM..... <1.3%

Analysis

Hardware specifications.....Refer to the *NI PXIe-5663 Specifications* or *NI PXIe-5663E Specifications*

Note The most commonly employed configuration and the averaged observations for 200 bursts are used for specifying the various parameters of the specification.

EVM

EVM is an EDGE-only measurement for defining the accuracy of bursts having the 8-PSK, QPSK, 16-QAM, or 32-QAM modulation schemes with different rates and filter options.

The EVM specifications were derived using the following configurations:

- Burst type: NB
- Modulation format: 8-PSK/16-QAM/32-QAM
- Symbol rate: 270.833k symbols/second
- Training sequence: Auto
- UUT: MS
- Band: All supported bands
- Power level: –10 dBm to –30 dBm

Specifications for the EDGE signal using the above configuration:

Typical RMS EVM.....<0.4%

Maximum RMS EVM .....<0.5%

The EVM specifications were derived using the following configurations:

- Burst type: HB
- Modulation format: QPSK/16-QAM/32-QAM
- Symbol rate: 325k symbols/second
- Training sequence: Auto
- UUT: MS
- Band: All supported bands
- Power level: –10 dBm to –30 dBm
- Filter: Narrow

Specifications for the EDGE signal using the above configuration:

Typical RMS EVM ..... <0.4%

Maximum RMS EVM..... <0.5%

The EVM specifications were derived using the following configurations:

- Burst type: HB
- Modulation format: QPSK/16-QAM/32-QAM
- Symbol rate: 325k symbols/second
- Training sequence: Auto
- UUT: MS
- Band: All supported bands
- Power level: –10 dBm to –30 dBm
- Filter: Wide

Specifications for the EDGE signal using the above configuration:

Typical RMS EVM ..... <0.4%

Maximum RMS EVM..... <0.5%

ORFS

Output RF spectrum (ORFS) measures the spectral efficiency of the modulator and helps in analyzing the leakage due to modulation and switching. The GSM/EDGE+ Analysis Toolkit can be used to measure the ORFS at all the offset frequencies specified by the 3GPP TS 45.005 v8.0 specifications. You can specify a custom list of frequencies.

GSM

The ORFS specifications for GSM were derived using the following configuration:

- Burst type: NB
- Modulation format: GMSK
- Symbol rate: 270.833k symbols/second
- Training sequence: Auto
- UUT: MS
- Payload: PN sequence of order 15
- Modulation measurement filter configuration: 5-pole synchronously tuned

- Switching measurement filter configuration: 5-pole synchronously tuned
- Power Level: 0 dBm to –30 dBm
- Band: PGSM

Specifications for the modulation ORFS using the above configuration:

Frequency Offset (kHz)	RBW (kHz)	Power (dBc)
0	30	0
200	30	<–35
400	30	<–64
600	30	<–66
1200	30	<–66
>1800	100	<–63

Specifications for the switching ORFS using the above configuration:

Frequency Offset (kHz)	RBW (kHz)	Power (dBc)
0	300	0
400	30	<–62
600	30	<–64
1200	30	<–64
>1800	30	<–64

EDGE

The ORFS specifications for EDGE were derived using the following configurations:

- Burst type: NB
- Modulation format: 8-PSK/16-QAM/32-QAM
- Symbol rate: 270.833k symbols/second
- Training sequence: Auto
- UUT: MS
- Payload: PN Sequence of order 15
- Modulation measurement filter configuration: 5-pole synchronously tuned

- Switching measurement filter configuration: 5-pole synchronously tuned
- Band: PGSM

Specifications for the modulation ORFS using the above configuration:

Frequency Offset (kHz)	RBW (kHz)	Power (dBc)
0	30	0
200	30	<–37
400	30	<–63
600	30	<–64
1200	30	<–64
>1800	100	<–61

Specifications for the switching ORFS using the above configuration:

Frequency Offset (kHz)	RBW (kHz)	Power (dBc)
0	300	0
400	30	<–62
600	30	<–63
1200	30	<–63
>1800	30	<–64

The ORFS specifications for EDGE were derived using the following configurations:

- Burst type: HB
- Modulation format: 8-PSK/16-QAM/32-QAM
- Symbol rate: 325k symbols/second
- Training sequence: Auto
- UUT: MS
- Payload: PN Sequence of order 15
- Modulation measurement filter configuration: 5-pole synchronously tuned
- Switching measurement filter configuration: 5-pole synchronously tuned

- Band: PGSM
- Filter: Narrow

Specifications for the modulation ORFS using the above configuration:

Frequency Offset (kHz)	RBW (kHz)	Power (dBc)
0	30	0
200	30	<–36
400	30	<–63
600	30	<–63
1200	30	<–63
>1800	100	<–61

Specifications for the switching ORFS using the above configuration:

Frequency Offset (kHz)	RBW (kHz)	Power (dBc)
0	300	0
400	30	<–61
600	30	<–63
1200	30	<–64
>1800	30	<–64

The ORFS specifications for EDGE were derived using the following configurations:

- Burst type: HB
- Modulation format: 8-PSK/16-QAM/32-QAM
- Symbol rate: 325k symbols/second
- Training sequence: Auto
- UUT: MS
- Payload: PN Sequence of order 15
- Modulation measurement filter configuration: 5-pole synchronously tuned
- Switching measurement filter configuration: 5-pole synchronously tuned
- Band: PGSM
- Filter: Wide

Specifications for the modulation operation using the above configuration:

Frequency Offset (kHz)	RBW (kHz)	Power (dBc)
0	30	0
200	30	<–22
400	30	<–52
600	30	<–57
1200	30	<–63
>1800	100	<–59

Specifications for the switching operation using the above configuration:

Frequency Offset (kHz)	RBW (kHz)	Power (dBc)
0	300	0
400	30	<–52
600	30	<–57
1200	30	<–64
>1800	30	<–64

Phase Error

Phase error measures the quality of the GSM/EDGE transmitter. Phase error measurements are applicable only for GSM.

The phase error specifications for GSM were derived using the following configuration:

- Burst type: NB
- Modulation format: GMSK
- Symbol rate: 270.833k symbols/second
- Training sequence: Auto
- UUT: MS
- Power level: –10 dBm to –30 dBm
- Band: All supported bands

Specifications for the GSM signal using the above configuration:

Typical RMS phase error..... <0.2 deg

Maximum RMS phase error ..... <0.3 deg

Frequency Error

Frequency error measures the quality of the GSM/EDGE transmitter.

GSM

The frequency error specifications for GSM were derived using the following configuration:

- Burst type: NB
- ARFCN: 1
- Modulation format: GMSK
- Symbol rate: 270.833k symbols/second
- Training sequence: Auto
- UUT: MS
- Number of averages: 200

Specification for the GSM signal using the above configuration:

Maximum frequency error..... <4 Hz

EDGE

The frequency error specifications for EDGE were derived using the following configurations:

- Burst type: NB
- ARFCN: 1
- Modulation format: 8-PSK/16-QAM/32-QAM
- Symbol rate: 270.833k symbols/second
- Training sequence: Auto
- UUT: MS
- Number of averages: 200

Specification for the EDGE signal using the above configuration:

Maximum frequency error..... <5 Hz

The frequency error specifications for EDGE were derived using the following configurations:

- Burst type: HB
- ARFCN: 1
- Modulation format: QPSK/16-QAM/32-QAM
- Symbol rate: 325k symbols/second
- Training sequence: Auto
- UUT: MS
- Number of averages: 200
- Filter: Narrow

Specification for the EDGE signal using the above configuration:

Maximum Frequency Error .....<5 Hz

The frequency error specifications for EDGE were derived using the following configurations:

- Burst type: HB
- ARFCN: 1
- Modulation format: QPSK/16-QAM/32-QAM
- Symbol rate: 325k symbols/second
- Training sequence: Auto
- UUT: MS
- Number of averages: 200
- Filter: Wide

Specification for the EDGE signal using the above configuration:

Maximum Frequency Error .....<7 Hz

Amplitude and Frequency Measurement Characteristics

Refer to the *NI PXIe-5663 Specifications*.