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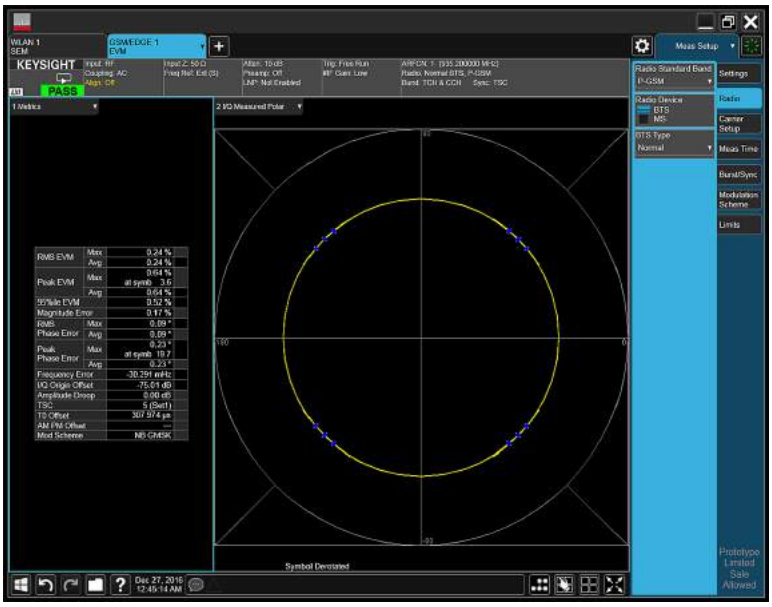
Keysight Technologies
GSM/EDGE/EVO
X-Series Measurement App, Multi-Touch
N9071C

Technical Overview



GSM/EDGE/EVO Measurement Application

- Measure GSM, EDGE, and EDGE Evolution RF transmitter performance, including multi-carrier base transceiver stations (MC-BTS)
- Test voice services over adaptive multi-user channels on one slot (VAMOS) enabled transmitters
- Perform one-button transmitter tests with pass/fail limit per 3GPP standard
- Use hardkey/softkey manual user interface or SCPI remote user interface
- Leverage built-in, context-sensitive help
- Move application between X-Series signal analyzers with transportable licensing

Figure 1. Rise & fall time measurement of GSM signal

The GSM/EDGE/EVO measurement application transforms the X-Series signal analyzers into standards-based GSM, EDGE, and EDGE-Evolution transmitter testers by adding fast one-button RF conformance measurements to help you design, evaluate, and manufacture your GSM/EDGE devices. The measurement application is further enhanced to support multicarrier (MC) BTS and voice services over adaptive multi-user channels on one slot (VAMOS)—allowing you to stay on the leading edge of your design and manufacturing challenges.

The GSM/EDGE/EVO measurement application is just one in a common library of more than 25 measurement applications in the Keysight Technlogies, Inc. X-Series, an evolutionary approach to signal analysis that spans instrumentation, measurements, and software. The X-Series analyzers, with upgradeable CPU, memory, disk drives, and I/O ports, enable you to keep your test assets current and extend instrument longevity. Proven algorithms, 100% code-compatibility, and a common UI across the X-Series create a consistent measurement framework for signal analysis that ensures repeatable results and measurement integrity so you can leverage your test system software through all phases of product development. In addition to fixed, perpetual licenses for our X-Series measurement applications, we also offer transportable licenses which can increase the value of your investment by allowing you to transport the application to multiple X-Series analyzers.

Technology Overview

The global system for mobile communications (GSM) digital cellular standard is a time division multiple access (TDMA) channel access scheme that uses Gaussian minimum shift keying (GMSK) modulation. It uses 200 kHz RF channels, time division multiplexed, to enable up to eight users to access each carrier.

Enhanced data rates for GSM evolution (EDGE) technology is an upgrade to the GSM standard, providing higher data rates in the same frequency spectrum by using higher density modulation, 3π/8 rotating 8PSK modulation. The rotation prevents symbol transitions through the origin, reducing the peak-to-average power ratio, thereby minimizing spectral re-growth and improving power efficiency. The 3π/8 rotating 8PSK is not a constant amplitude modulation; hence a standard Gaussian filter (non-linear) will distort the signal. Therefore, EDGE uses a special "linearized" version of the Gaussian filter from GSM resulting in a spectrum that is very similar to that of GSM, while minimizing non-linear distortion in the baseband signal.

EDGE Evolution or EGPRS2 is a technology to offer near-UMTS (universal mobile telecommunications system) level data throughput with more than double the spectrum efficiency. For a higher data rate, the EDGE Evolution signal configuration has normal burst (NB) and higher symbol rate (HSR) burst including new modulation formats such as QPSK, 16QAM, and 32QAM. New pulse shaping filters are defined as narrow and wide filters for HSR. This is necessary to adjust the HSR spectrum with normal EDGE mask tests because GSM, EDGE, and EDGE Evolution will coexist in commercial services.

Now included in 3GPP Release 9 is voice services over adaptive multi-user channels on one slot (VAMOS). VAMOS can double the channel number assignment capacity of existing GSM networks by sending two sub channels on one slot. It utilizes adaptive QPSK (AQPSK), which is PSK with four state points whose positions are adjustable via a parameter Alpha.

Table 1. Key differences in GSM, EDGE, and EDGE Evolution standards

	GSM	EDGE	EDGE Evolution (EGPRS2)	
			Level A (EGPRS2-A)	Level B (EGPRS2-B)
Modulation	GMSK	3π/8 shift 8PSK	GMSK 3π/8 shift 8PSK, +π/4 shift 16QAM, –π/4 shift 32QAM	3π/8 shift QPSK, +π/4 shift 16QAM, –π/4 shift 32QAM
Bits per symbol	1	3	1, 3, 4, 5	2, 4, 5
Payload per timeslot	114 bits (57+57)	348 bits (174+174)	114 bits (57+57) 348 bits (174+174) 464 bits (232+232) 580 bits (290+290)	276 bits (138+138) 552 bits (276+276) 690 bits (345+345)
Symbol rate	270.833 ksps	270.833 ksps	270.833 ksps	325 ksps
Amplitude modulation	No	Yes	Yes	Yes
Filter	Gaussian	Linearlized Gaussian (EDGE)	Linearlized Gaussian (EDGE)	Narrow or wide pulse shaping filter
BT	0.3	0.3	0.3	–

RF Transmitter Tests

With the X-Series signal analyzers and the GSM/EDGE/EVO measurement application, you can perform RF transmitter measurements on BTS and mobile devices in time, frequency, and modulation domains. Measure basic GSM and EDGE signals as well as EDGE Evolution signals with Level A (normal burst) and Level B (high symbol rate) with all modulation formats and transmit filters. In addition, MC-BTS and VAMOS transmitter measurements according to Release 9 of the 3GPP standard is supported.

For mobile station (MS) high-speed manufacturing, a single acquisition combined GSM/EDGE measurement is available where the speed is up to 20 times faster than traditional one-button measurements (for details refer to Ordering Information).

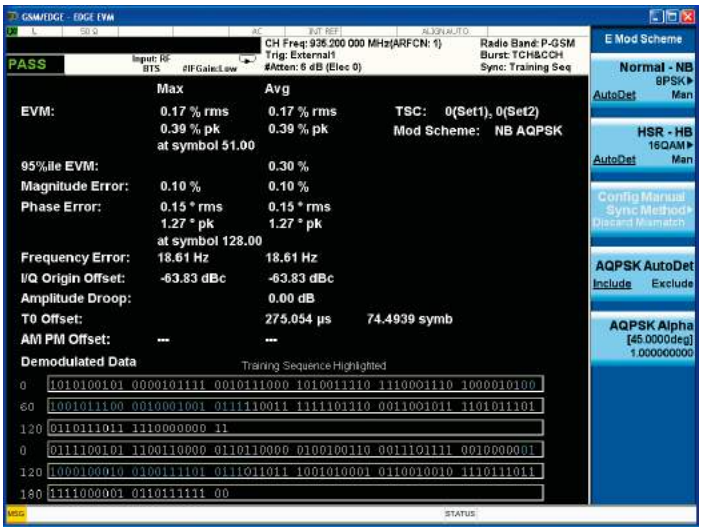


Figure 2. EVM and demodulated bits for VAMOS (AQPSK modulation) signals. Training sequences for both VAMOS sub channels are highlighted.

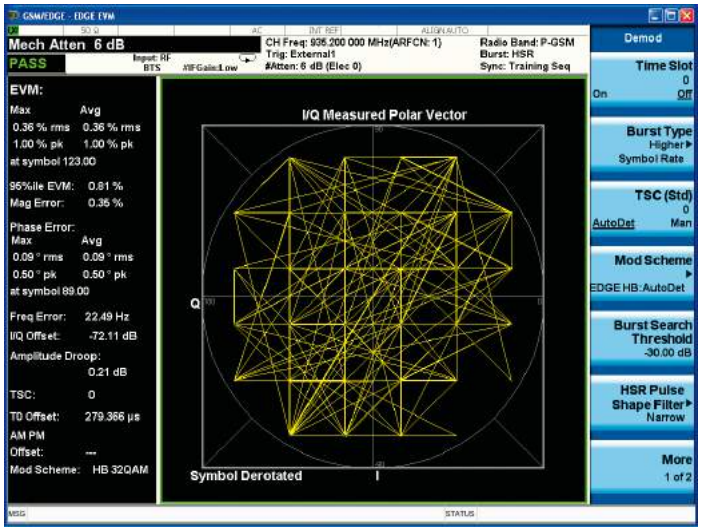


Figure 3. Constellation diagram and error summary of an HSR 32QAM EDGE Evolution signal.

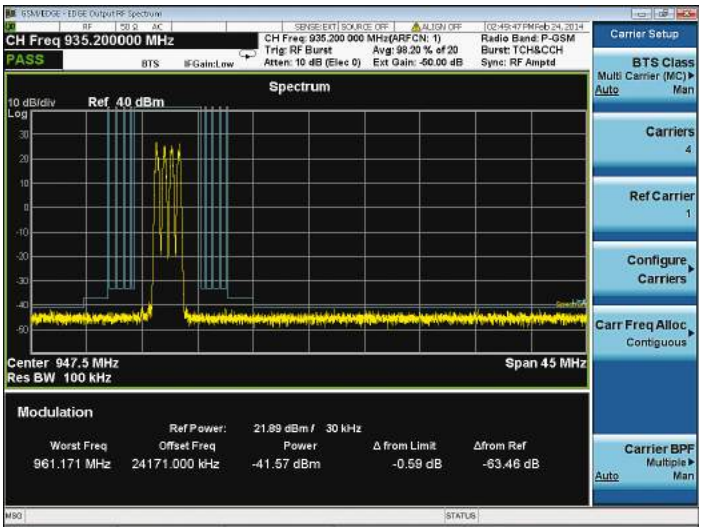


Figure 4. Multi-carrier BTS (MC-BTS) ORFS with limit mask for ORFS and up to 5th order intermodulation products. MC-BTS ORFS can also be configured for non-contiguous frequency allocation.

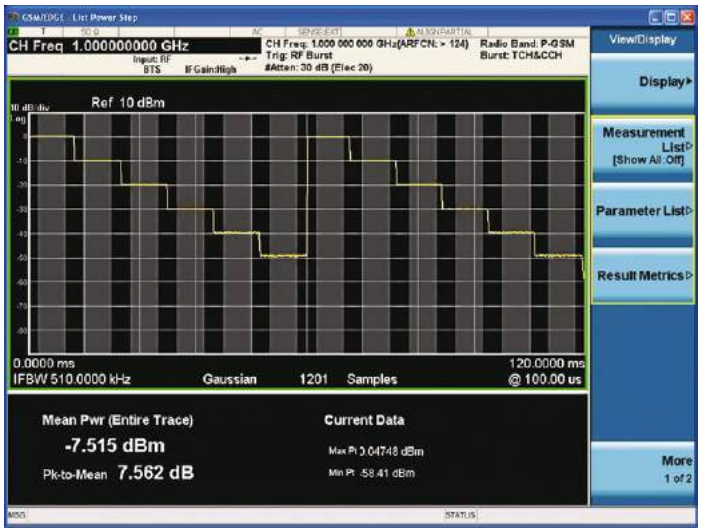


Figure 5. GSM list power step measurement for signal calibration using single acquisition combined measurement mode.

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Standards-based RF transmitter test

The RF transmitter test requirements for GSM/EDGE/EDGE Evolution are defined in TS 45 and 51 series of the 3GPP standard. Table 2 shows the required base station RF transmitter tests along with the corresponding measurement applications.

Table 2. Required BTS RF transmitter measurements and the corresponding measurements in N9071C and 89600 VSA software

3GPP TS.51.021 subclause	Transmitter test	N9071C X-Series measurement application	89600 VSA software Option AYA
6.2	Modulation accuracy	EVM	EVM
6.3	Mean transmitted RF carrier power	Transmit power	Can be performed using band power marker
6.4	Transmitted RF carrier power versus time	Power vs. time	89600 VSA offers modulation quality measurements. For one button, non-demodulation, measurements such as ORFS and PvT, use the N/W9071A embedded application.
6.5.1	Spectrum due to modulation and wideband noise	Output RF spectrum (ORFS) due to modulation and wideband noise	
6.5.2	Switching transients spectrum	Output RF spectrum (ORFS) due to switching	
6.6.1	Conducted spurious emissions from the transmitter antenna connector, inside the BTS transmit band	Tx band spur	
6.6.2		Spectrum analyzer mode – Spurious emissions	
6.7	Intermodulation attenuation	Spectrum analyzer mode - Spurious emissions	
6.8	Intra base station system intermodulation attenuation	Spectrum analyzer mode - Spurious emissions	
6.9	Intra base station system intermodulation attenuation, MXM 850 and MXM 1900	Spectrum analyzer mode - Spurious emissions	
6.10	Intra base station system intermodulation attenuation, PCS 1900, GSM 850, GSM 700	Spectrum analyzer mode - Spurious emissions	
6.11	Intermodulation attenuation (GSM 700, GSM 850, MXM 850, PCS 1900, and MXM 1900)	Spectrum analyzer mode - Spurious emissions	
6.12	Wideband noise and intra-BSS intermodulation attenuation in multicarrier operation	MCBTS ORFS due to modulation and wideband noise. Available for both contiguous and non-contiguous frequency allocation.	

Choosing Between X-Series Applications and 89600 VSA Software

X-Series measurement applications provide embedded format-specific, one-button measurements for X-Series analyzers. With fast measurement speed, SCPI programmability, pass/fail testing and simplicity of operation, these applications are ideally suited for design verification and manufacturing. 89600 VSA software is a comprehensive set of tools for demodulation and vector signal analysis. These tools enable you to explore virtually every facet of a signal and optimize your most advanced designs. Use the 89600 VSA software with a variety of Keysight hardware platforms to pinpoint the answers to signal problems in R&D.

Measurement details

All of the RF transmitter measurements as defined by the 3GPP standard, as well as a wide range of additional measurements and analysis tools, are available with a press of a button (Table 3). These measurements are fully remote controllable via the IEC/IEEE bus or LAN, using SCPI commands.

Analog baseband measurements are available on the PXA or MXA signal analyzer equipped with BBIQ hardware. Supported baseband measurements include all of the modulation quality plus I/Q waveform measurements.

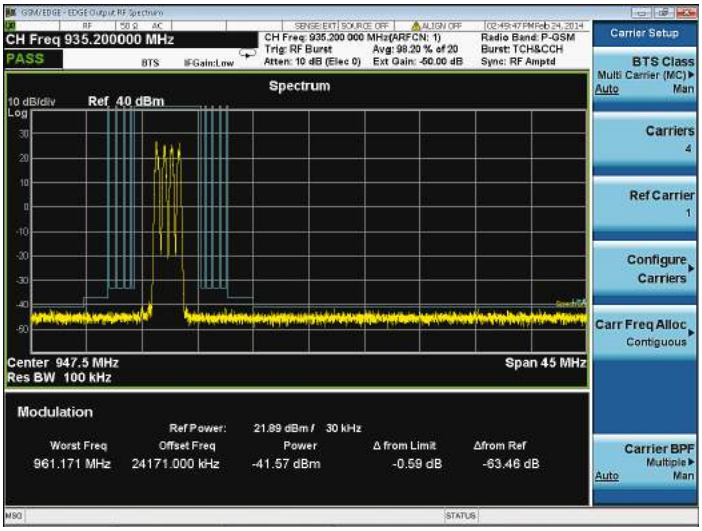

Figure 6. GSM signal view in power vs. time, real-time spectrum with frequency mask trigger and spectrogram display using RTSA option on the PXA or MXA signal analyzers.

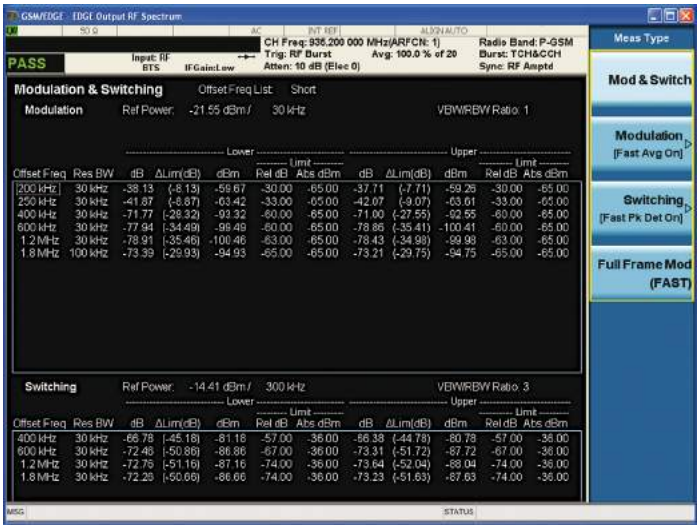

Figure 7. Combined view of ORFS due to modulation and switching transients.

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Table 3. One-button measurements provided by the N9071C measurement application

Technology	GSM/ EDGE	EDGE Evolution Level A (EGPRS2-A) Level B (EGPRS2-B)	VAMOS (AQPSK)	Single Carrier BTS	MC BTS Single Carrier active	MC BTS Multicarrier active for contiguous and non-contiguous frequency allocation	MS
Measurements							
EVM	●	●	●	●	●	○	●
RMS EVM	●	●	●	●	●	○	●
Peak EVM	●	●	●	●	●	○	●
95% EVM	●	●	●	●	●	○	●
Frequency error	●	●	●	●	●	○	●
Phase error	●	●	●	●	●	○	●
Magnitude error	●	●	●	●	●	○	●
I/Q origin offset	●	●	●	●	●	○	●
TO offset	●	●	●	●	●	○	●
AM PM offset	●	●	●	●	●	○	●
Transmit power	●	●	●	●	●	○	●
Power vs. time	●	●	●	●	●	○	●
Output RF spectrum Due to modulation and wideband noise	●	●	●	●	●	●	●
Due to switching transients	●	●	●	●	●	●	●
In-band Tx band spur	●	●	●	●	(*1)	(*2)	n/a

Notes: ○ Supported, but focused on one carrier measurement at a time
(*1) Use output RF spectrum in single carrier operation
(*2) Use output RF spectrum in multicarrier operation

Single acquisition combined measurements

The N9071C-XFP single acquisition combined GSM/EDGE measurement application is for high-speed manufacturing of GSM/EDGE mobile phone transmitters, wireless components, such as power amplifiers, and low-cost pico/femtocell base stations. Used with X-Series multi-touch signal analyzers, it provides up to 20 times speed improvement compared to traditional one-button measurements for list power step, phase and frequency error (PFER), EDGE EVM, PvT, ORFS, marker measurements, and harmonics.

Single Acquisition

Contains one continuous block of captured data collected using predefined capture settings. The capture period can be defined by test engineers to suit the requirements for specific device tests, for example, the number of GSM bursts required to provide the engineer with enough data to ensure a good measurement on the DUT.

Combined Measurements

Implies that the measurement sequence performed by the analyzer can accommodate any mix of transmitter power measurements and modulation quality measurements performed on the data collected within the capture period.

Key Specifications

Definitions

- Specifications describe the performance of parameters covered by the product warranty.
- 95th percentile values indicate the breadth of the population (≈2σ) of performance tolerances expected to be met in 95% of cases with a 95% confidence. These values are not covered by the product warranty.
- Typical values are designated with the abbreviation "typ." These are performance beyond specification that 80% of the units exhibit with a 95% confidence. These values are not covered by the product warranty.
- Nominal values are designated with the abbreviation "nom." These values indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

Note: Data subject to change

Supported devices and standards

Device type	BTS, MS
Standard version	Mobile station: 3GPP TS 51.010-1 v.10.0.0 (2012-03) Base station: 3GPP TS51.021 v.10.7.0 (2012-11)
BTS type	Normal, Micro1, Micro2, Micro3, Pico
Radio band	P-GSM 900, E-GSM 900, R-GSM 900, DCS1800, PCS1900, GSM 850, T-GSM 810, GSM 700, GSM 480, GSM 450

For a complete list of specifications refer to the appropriate specifications guide.

Performance specifications

Description	PXA	MXA	EXA	CXA[1]
EDGE error vector magnitude (EVM)[2, 3]				
Carrier power range at RF input	+24 to –45 dBm (nom)	+24 to –45 dBm (nom)	+24 to –45 dBm (nom)	+24 to –45 dBm (nom)
EVM, rms				
Operating range	0 to 20% (nom)	0 to 20% (nom)	0 to 20% (nom)	0 to 20% (nom)
Floor	0.6 (0.4% nom)	0.6 (0.5% nom)	0.7 (0.5% nom)	0.7 (0.5% nom)
Floor (Baseband IQ Input)	0.5% (nom)	0.5% (nom)	n/a	n/a
Accuracy conditions: EVM range 1 to 10% (NSR 8 PSK); EVM range 1 to 6% (NSR 16QAM/32QAM); EVM range 1 to 8% (HSR QPSK); EVM range 1 to 5% (HSR 16QAM/32QAM)	± 0.5%	± 0.5%	± 0.5%	± 0.5%
Frequency error				
Initial frequency error range	± 80 kHz (nom)	± 80 kHz (nom)	± 80 kHz (nom)	± 80 kHz (nom)
Accuracy	± 5 Hz + tfa[4]	± 5 Hz + tfa[4]	± 5 Hz + tfa[4]	± 5 Hz + tfa[4]

1. When the margin between this performance level and 3GPP requirements is not adequate, it may not test against the 3GPP test limits.
2. Specifications based on 200 bursts.
3. 3π/8 shifted 8PSK, 3π/8 shifted QPSK, π/4 shifted 16QAM, –π/4 shifted 32QAM modulation in NSR/HSR with pulse shaping filter
4. tfa = transmitter frequency x frequency reference accuracy

Description	PXA	MXA	EXA	CXA
IQ origin offset				
DUT maximum offset	–15 dBc (nom)	–15 dBc (nom)	–15 dBc (nom)	–15 dBc (nom)
Maximum analyzer noise floor	–50 dBc (nom)	–50 dBc (nom)	–50 dBc (nom)	–50 dBc (nom)
Trigger to T0 time offset				
Relative accuracy	± 5.0 ns (nom)	± 5.0 ns (nom)	± 5.0 ns (nom)	± 5.0 ns (nom)
Phase and frequency error (GMSK modulation)[1]				
Carrier power range at RF input	+27 to –45 dBm (nom)	+27 to –45 dBm (nom)	+27 to –45 dBm (nom)	+27 to –45 dBm (nom)
Phase error, rms				
Floor	0.5°	0.5°	0.6°	0.6°
Floor (baseband IQ input)	0.3° (nom)	0.3° (nom)	n/a	n/a
Accuracy				
Phase error range 1° to 6°	± 0.3°	± 0.3°	± 0.3°	± 0.3°
Frequency error				
Initial frequency error range	± 80 kHz (nom)	± 80 kHz (nom)	± 80 kHz (nom)	± 80 kHz (nom)
Accuracy	± 5 Hz + tfa[2]	± 5 Hz + tfa[2]	± 5 Hz + tfa[2]	± 5 Hz + tfa[2]
IQ origin offset				
DUT maximum offset	–15 dBc (nom)	–15 dBc (nom)	–15 dBc (nom)	–15 dBc (nom)
Analyzer noise floor	–50 dBc (nom)	–50 dBc (nom)	–50 dBc (nom)	–50 dBc (nom)
Trigger to T0 time offset				
Relative accuracy	± 5.0 ns (nom)	± 5.0 ns (nom)	± 5.0 ns (nom)	± 5.0 ns (nom)
Power vs. time (GSM/EDGE/EDGE Evolution)				
Minimum carrier power at RF input	–35 dBm (nom)	–35 dBm (nom)	–35 dBm (nom)	–35 dBm (nom)
Absolute power accuracy for in-band signal (exluding mismatch error)	–0.11 ± 0.19 dB (95%)	–0.11 ± 0.23 dB (95%)	–0.11 ± 0.27 dB (95%)	–0.11 ± 0.60 dB (95%)
Power ramp relative accuracy (referenced to mean transmitted power)				
Accuracy	± 0.11 dB	± 0.11 dB	± 0.16 dB	± 0.31 dB
Measurement floor	–95 dBm	–92 dBm	–89 dBm	–84 dBm
Output RF spectrum (ORFS)				
Minimum carrier power at RF input	–20 dBm (nom)	–20 dBm (nom)	–20 dBm (nom)	–20 dBm (nom)
ORFS relative RF power uncertainty				
Due to modulation				
Offsets ≤ 1.2 MHz	± 0.09 dB	± 0.16 dB	± 0.26 dB	± 0.54 dB
Offsets ≥ 1.8 MHz	± 0.11 dB	± 0.18 dB	± 0.27 dB	± 0.95 dB
Due to switching	± 0.09 dB (nom)	± 0.12 dB (nom)	± 0.17 dB (nom)	± 0.36 dB (nom)
ORFS absolute RF power accuracy	± 0.19 dB (95%)	± 0.23 dB (95%)	± 0.27 dB (95%)	± 0.62 dB (95%)
GSM (GMSK): Dynamic range, spectrum due to modulation[3]				
Offset frequency				
100 kHz	70.2 dB	63.8 dB[4]	63.7 dB[5]	53.1 dB[6]
200 kHz	77.4 dB	70.0 dB[4]	69.5 dB[5]	59.9 dB[6]
250 kHz	79.6 dB	72.0 dB[4]	71.4 dB[5]	62.1 dB[6]
400 kHz	83.6 dB	76.0 dB[4]	75.0 dB[5]	66.5 dB[6]
600 kHz	86.2 (87.4 dB typ)	79.1 dB (80.8 dB typ)[4]	77.6 dB (80.7 dB typ)[5]	70.1 dB[6] (72.2 dB typ)
1.2 MHz	88.1 (90.3 dB typ)	82.7 dB (85.0 dB typ)[4]	80.7 dB (83.7 dB typ)[5]	74.3 dB[6] (77.0 dB typ)
1.8 MHz	90.7 (91.9 dB nom)	81.8 dB (83.2 dB nom)[4]	81.3 dB (84.7 dB nom)[4]	70.1 dB[6] (73.6 dB nom)
6.0 MHz	92.5 (94.5 dB nom)	86.4 dB (88.5 dB nom)[4]	84.1 dB (88.1 dB nom)[4]	72.0 dB[6] (77.3 dB nom)

1. Specifications based on 200 bursts.
2. tfa = transmitter frequency x frequency reference accuracy
3. 5-pole sync-tuned filters; methods: direct time and FFT
4. ORFS dynamic range specification for MXA is for instruments with serial number prefix ≥ MY/SG/US5233 (those instruments ship standard with N9020A-EP2 as the identifier), Refer to the GSM/EDGE chapter for the MXA specification guide for specification on the other MXA: www.keysight.com/find/mxa_specifications. For MXA, phase noise optimization is set to Best Wide offset (offset > 100 kHz)
5. ORFS dynamic range specification for EXA is for instruments with serial number prefix ≥ MY/SG/US5340 (those instruments ship standard with N9010A-EP3 as the identifier). Refer to the GSM/EDGE chapter for the EXA specification guide for specification on the other EXA: www.keysight.com/find/exa_specifications. For EXA, phase noise optimization is set to Best Wide offset (offset > 100 kHz)
6. ORFS dynamic range specification for CXA is for instruments with serial number prefix >= MY/SG/US5423 (those instruments ship standard with N9000A-EP4 as the identifier). Refer to the GSM/EDGE chapter for the CXA specification guide for specification on the other CXA: www.keysight.com/find/cxa_specifications. For CXA, phase noise optimization is set to Best Wide offset (offset > 100 kHz)

Description	PXA	MXA	EXA	CXA
GSM (GMSK): Dynamic range, spectrum due to switching[1]				
Offset frequency				
400 kHz	80.7 dB	73.7 dB[2]	72.5 dB[3]	64.4 dB[5]
600 kHz	82.4 dB	76.4 dB[2]	74.6 dB[3]	67.6 dB[5]
1.2 MHz	83.5 dB	79.1 dB[2]	76.6 dB[3]	70.9 dB[5]
1.8 MHz	92.3 dB	84.7 dB[2]	83.7 dB[3]	71.6 dB[5]
EDGE (NSR 8PSK and narrow QPSK): Dynamic range, spectrum due to modulation[4]				
Offset frequency				
100 kHz	70.2 dB	63.8 dB[2]	63.9 dB[3]	53.1 dB[5]
200 kHz	77.1 dB	69.9 dB[2]	69.3 dB[3]	59.8 dB[5]
250 kHz	79.1 dB	71.8 dB[2]	71.0 dB[3]	62.0 dB[5]
400 kHz	82.4 dB	75.5 dB[2]	74.2 dB[3]	66.2 dB[5]
600 kHz	84.2 (85.9 dB typ)	78.2 dB (80.3 dB typ)[2]	76.4 dB (79.5 dB typ)[3]	69.4 dB[5] (71.9 dB typ)
1.2 MHz	85.3 (87.7 dB typ)	80.9 dB (83.7 dB typ)[2]	78.4 dB (81.5 dB typ)[3]	72.7 dB[5] (76.2 dB typ)
1.8 MHz	88.8 (90.5 dB nom)	81.3 dB (82.9 dB nom)[2]	80.3 dB (83.7 dB nom)[3]	68.1 dB[5] (72.4 dB nom)
6.0 MHz	89.9 (92.3 dB nom)	84.9 dB (87.5 dB nom)[2]	82.3 dB (86.2 dB nom)[3]	69.2 dB[5] (74.8 dB nom)
EDGE (NSR 8PSK and narrow QPSK): Dynamic range, spectrum due to switching[1]				
Offset frequency				
400 kHz	80.7 dB	73.7 dB[2]	72.5 dB[3]	64.4 dB[5]
600 kHz	82.4 dB	76.4 dB[2]	74.6 dB[3]	67.6 dB[5]
1.2 MHz	83.5 dB	79.1 dB[2]	76.6 dB[3]	70.9 dB[5]
1.8 MHz	92.3 dB	84.7 dB[2]	83.7 dB[3]	71.6 dB[5]
EDGE (NSR 16/32QAM; HSR QPSK/16QAM/32QAM) Dynamic range, spectrum due to modulation[4]				
Offset frequency				
100 kHz	70.0 dB	63.7 dB[2]	63.5 dB[3]	53.1 dB[5]
200 kHz	76.4 dB	69.6 dB[2]	68.8 dB[3]	59.7 dB[5]
250 kHz	78.1 dB	71.4 dB[2]	70.3 dB[3]	61.7 dB[5]
400 kHz	80.5 dB	74.6 dB[2]	72.9 dB[3]	65.5 dB[5]
600 kHz	81.5 (83.6 dB typ)	76.6 dB (79.8 dB typ)[2]	74.3 dB (77.5 dB typ)[3]	68.1 dB[5] (71.3 dB typ)
1.2 MHz	82.1 (84.6 dB typ)	78.3 dB (82.1 dB typ)[2]	75.5 dB (78.7 dB typ)[3]	70.3 dB[5] (74.4 dB typ)
1.8 MHz	86.2 (88.4 dB nom)	80.1 dB (84.0 dB nom)[2]	78.6 dB (82.1 dB nom)[3]	65.5 dB[5] (70.4 dB nom)
6.0 MHz	86.8 (89.4 dB nom)	82.6 dB (86.7 dB nom)[2]	79.8 dB (83.6 dB nom)[3]	66.0 dB[5] (71.8 dB nom)
EDGE (NSR 16/32QAM; HSR QPSK/16QAM/32QAM) Dynamic range, spectrum due to switching[1]				
Offset frequency				
400 kHz	79.7 dB	73.3 dB[2]	71.8 dB[3]	64.1 dB[5]
600 kHz	81.1 dB	75.7 dB[2]	73.6 dB[3]	67.0 dB[5]
1.2 MHz	81.9 dB	77.8 dB[2]	75.1 dB[3]	69.8 dB[5]
1.8 MHz	91.0 dB	84.2 dB[2]	82.9 dB[3]	70.3 dB[5]

1. 5-pole sync-tuned filters
2. ORFS dynamic range specification for MXA is for instruments with serial number prefix ≥ MY/SG/US5233 (those instruments ship standard with N9020A-EP2 as the identifier), Refer to the GSM/EDGE chapter for the MXA specification guide for specification on the other MXA.
   For MXA, phase noise optimization is set to Best Wide offset (offset > 100 kHz)
3. ORFS dynamic range specification for EXA is for instruments with serial number prefix ≥ MY/SG/US5340 (those instruments ship standard with N9010A-EP3 as the identifier). Refer to the GSM/EDGE chapter for the EXA specification guide for specification on the other EXA.
   For EXA, phase noise optimization is set to Best Wide offset (offset > 100 kHz)
4. 5-pole sync-tuned filters; methods: direct time and FFT
5. ORFS dynamic range specification for CXA is for instruments with serial number prefix >= MY/SG/US5423 (those instruments ship standard with N9000A-EP4 as the identifier). Refer to the GSM/EDGE chapter for the CXA specification guide for specification on the other CXA.
6. For CXA, phase noise optimization is set to Best Wide offset (offset > 100 kHz)

Ordering Information

Software licensing and configuration

Choose from two license types:

- **Fixed, perpetual license:**
  This allows you to run the application in the X-Series analyzer in which it is initially installed.

- **Transportable, perpetual license:**
  This allows you to run the application in the X-Series analyzer in which it is initially installed, plus it may be transferred from one X-Series analyzer to another.

The table below contains information on our fixed, perpetual licenses. For more information, please visit the product web pages.

You Can Upgrade!

Options can be added after your initial purchase.
All of our X-Series application options are license-key upgradeable.

UPGRADE

N9071C GSM/EDGE/EVO X-Series measurement application

Description	Model-Option	Additional information
GSM/EDGE/Evo	N9071C-1FP	
Single acquisition combined GSM/EDGE	N9071C-XFP	Requires 2FP

Hardware configuration

For optimizing the GSM/Evo measurement application, Keysight recommends a minimum level of X-Series multi-touch instrument hardware functionality at each instrument performance point.

Supported instruments include:

- UXA N9040B
- PXA N9030B
- MXA N9020B
- EXA N9010B
- CXA N9000B

Capability	Instrument Option	Benefit
Analysis bandwidth	25 MHz minimum (-B25) or wider	**Required**: Up to full aggregated bandwidth for multiple carrier capture for LTE-Advanced TDD transmit on/off power measurement
Precision Frequency Reference	-PFR	**Recommended**: For enhanced frequency accuracy and repeatability for lower measurement uncertainty
Electronic Attenuator	-EA3	**Recommended**: Fast and reliable attenuation changes ideal for manufacturing without the wear associated with mechanical attenuators up to 3.6 GHz in 1 dB steps
Pre-amplifier	3.6 GHz (-P03) or higher	**Recommended**: For maximizing the measurement sensitivity
Fine Resolution Step attenuator	-FSA	**Recommended**: Useful for maximizing useable dynamic range to see signals
Analog baseband I/Q inputs	-BBA on PXA and MXA only	**Optional**: To extend measurements at baseband if required by device under test

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