

# Keysight Technologies

## E6701J GSM/GPRS and E6704A EGPRS Lab Applications

### For the 8960 (E5515C/E) Wireless Communications Test Set

## Technical Overview

The image shows a Keysight 8960 Series 10 Wireless Communications Test Set. The main screen displays a 'Reassembly/Instrument Screen' with a 'Power vs Time Graph' showing a burst of power. Overlaid on the screen are several software windows:

- Authentication Parameters:** Shows GSM/GPRS authentication settings, including Ciphering Parameters (Ciphering: Off, GSM Ciphering: Off, GPRS Ciphering: Off) and Authentication Parameters (Authentication: Off, RAND: 00000000:00000000:00000000:00000000, XRES: 00000000).
- Security Settings:** Shows Security Settings (Authentication: Off, GSM Ciphering: Off, GPRS Ciphering: Off) and Authentication Parameters (Authentication State: Off, random (RAND) Value, Upper (Hex): 00000000, random (RAND) Value, Upper (Hex): 00000000, random (RAND) Value, Lower (Hex): 00000000, random (RAND) Value, Lower (Hex): 00000000, expected Response (XRES): 00000000).
- GSM/GPRS Controller:** Shows GSM/GPRS Controller settings, including IP Address (10.10.10.10), IP Address/Port Name, GSM/GPRS Version (GSM 1.0.1), P-GSM IP Address (10.10.10.10), P-GSM Port (1000), and GSM Status (Started).
- DRI Control:** Shows DRI Control settings, including IP Address (10.10.10.10), GSM/GPRS Status, and GSM/GPRS Port (1000).
- Digital Audio Interface:** Shows Digital Audio Interface settings, including Play Status (Playing), Progress (17%), Record Status (Done), and Record Buffer Usage (36%).

Combining the benefits of GSM/GPRS/EGPRS network emulation with the Keysight Technologies, Inc. global leadership in analysis technologies, the E5515C/E test set and the E6701J lab application provide mobile development engineers with a single desktop instrument – helping you get better devices to market sooner.

Develop, integrate, and validate high data rate EGPRS UEs

With the E6701J/E6704A GSM/GPRS/EGPRS lab application, developers have the only instrument available providing a systematic approach to root-cause analysis of high throughput issues in the mobile protocol stack; from decoded L1 to IP.

QoS Profile 1 Setup		Value
Override Request	Off	Off
Override Request	Traffic Class	011
Subscribed Relia	Conversational	011
Traffic Class	Streaming	Interactive
Traffic Handling	Interactive	2
	Background	

GPRS Block Error			
Block Error Ratio			
1.93%			
Burst	BLER	Power	Block Error Count: 10
1:	0.57%	-85.00 dBm	Block Delay: ----
2:	4.71%	-90.00 dBm	
3:	0.57%	-85.00 dBm	
4:	----%	---- dBm	

Test all the critical RF parameters

The E6701J provides flexible measurements including:

- Transmit power (TxP)
- Power vs time (PvT)
- Phase and amplitude vs time (PAvT)
- RF output spectrum (ORFS)
- Error vector magnitude (EVM)
- Bad frame indicator (BFI)
- FACCH frame erasure rate (FER)
- All the connections types required to fully analyze and debug your mobile device RF characteristics

Marker	Symbol Pos	Demod	EVN1 (%)	Mag Err (%)	Ph Err (°)
1	80	111	4.64	-2.82	-0.68
2	106	100	3.23	-2.52	0.81

Quick-turn just about any design change

With support for voice, video, short message service (SMS), multi-media messaging service (MMS), cell broadcast SMS (CBSMS), circuit-switched data, packet data call connections, DTM, multiple and secondary PDP contexts, design changes in anything from RF to TCP can be quickly validated with a complete regression test of mobile functions right at your desk.

PDP Setup	DUT PDP Context Status				Call Parms
DUT PDP Setup	IP Address	Context	NSAPI	QoS	BCH Parameters
	10.10.10.20	Primary	----	Profile 1	TCH Parameters
		Secondary 1	----	Profile 2	
		Secondary 2	----	Profile 3	
		Secondary 3	----	Profile 4	
QoS Profile 1 Setup		Primary	----	Profile 1	PDTCH Parameters
		Secondary 1	----	Profile 2	
		Secondary 2	----	Profile 3	
		Secondary 3	----	Profile 4	
QoS Profile 2 Setup		Primary	----	Profile 1	Handover Parameters
		Secondary 1	----	Profile 2	
		Secondary 2	----	Profile 3	
		Secondary 3	----	Profile 4	
QoS Profile 3 Setup		Primary	----	Profile 1	Receiver Control
		Secondary 1	----	Profile 2	
		Secondary 2	----	Profile 3	
		Secondary 3	----	Profile 4	

QoS Profile 4 Setup		Value
Override Request	Off	Off
Override Request	Traffic Class	100
Subscribed Relia	Conversational	100
Traffic Class	Streaming	Interactive
Traffic Handling	Interactive	2
Packet Flow Ident	Background	0

## Helping You Get Your Job Done Faster

Fast and flexible signaling – with you in control of network operations

Our network emulation is designed to make connecting calls fast and simple – and give you choices. We have pulled some of the most commonly requested parameters up from the protocol stack, providing many different connection scenarios without requiring you to fully understand the 3GPP stack and a complex scripting language. The E6701J delivers the control you need to get your job done faster.

The world's wireless applications brought right to your fingertips

Keysight Technologies, Inc. lab applications bring testing and tuning end-user applications right to your desk – without limiting how far your device may search when looking for real content. With our industry-leading SMS/MMS/cell broadcast messaging capabilities, push-to-talk over cellular, and blazing fast packet connections to the Internet over RF, you have the capability to test most mobile applications fully without leaving your office.

Developing more than just GSM/GPRS/EGPRS devices? Just hook it up and go!

If your development needs go beyond GSM/GPRS/EGPRS, with additional firmware that same box on your desk can connect calls from AMPS to HSPA+ and everything in between. What's more, Keysight leads the industry in support of 2G and 3G solutions for 1xEV-DO and W-CDMA/HSPA. Contact your Keysight sales engineer to learn how the E5515C/E test set gives you the flexibility to adapt quickly to emerging standards and technologies.

Get started with the GSM/GPRS/EGPRS lab applications today at: [www.keysight.com/find/8960manuals](http://www.keysight.com/find/8960manuals)

NCC (Network Colour Code)	1
BCC (Base Station Colour Code)	5
Get INEI at Call Setup	On
Mobile DTX State	Off
Paging Mode	Normal
Paging Multiframe	2
Repeat Paging	Off
Tx Level FACCH Signaling	On
Uplink Frame Segmentation	Asymmetric

IMSI Attach State	Off
Call Originate Timeout	10 s
Persistent Attach State	Off
Dual Transfer Mode	On
Extended Uplink TBF State	Off
Cell Identity	0
CS Paging Identity Type	IMSI
IMSI	21430000



Cell Broadcast Message 3 Setup		Value
Geographical Scope	Content	Cell / Normal
Message Code	Text1	0
Update Number	Text2	0
Message Identifier	Custom Text	0
Data Coding Scheme	Custom Data	Language
Data Coding Scheme		English
Data Coding Scheme		1
Content		Text1



MMS



Voice

	CD-HSDPA	DB-DC-HSDPA	HSDPA-MIMO	
HSPA+				1xEV-DO
HSUPA				cdma2000®
HSDPA				IS-95
W-CDMA				EDGE Evolution
TD-HSUPA				EGPRS
TD-HSDPA				GPRS
TD-SCDMA				GSM
				EGPRS

# Find Design Issues Earlier, Resolve Them Faster

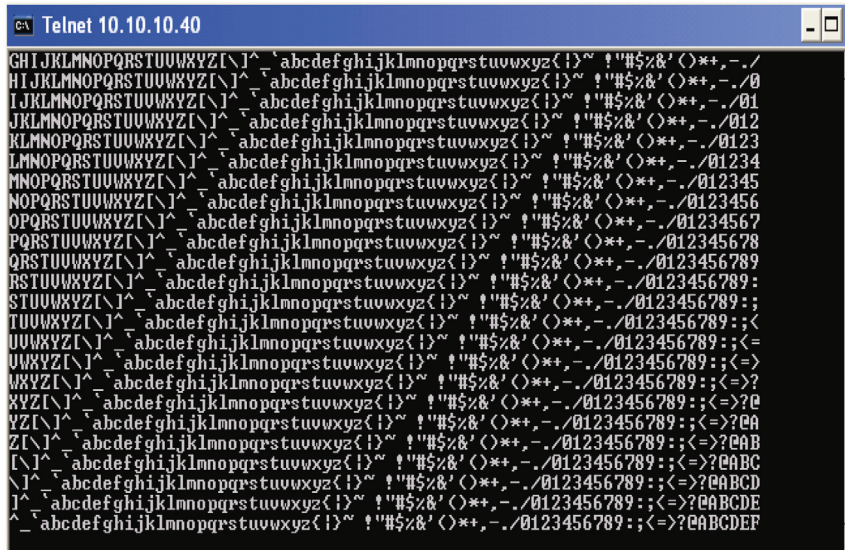
## Functional test analysis

Reduce development and verification cycle time by systematically engaging mobile device layers “up the stack” to find design problems early — before they are found by your customers.

Validate a phone’s data throughput capability while using SMS, MMS, data transfer, video, PoC, WAP, email, or other services.

Drive down defect resolution cost by finding complex hardware, protocol, and application related issues that are specific to how the phone will function on the network, early in the design cycle.

All this for a price that is significantly less than traditional script-based test equipment.



## Base station emulation

From basic network settings like country code and cell ID, lab application variables for network emulation extend into such things as network operating mode, TMSI assignment, authentication, neighbor list management, and PDP context rejection, giving you the flexibility you need.

Call Setup Screen			
Cell Info	Cell Info		Call Parms
Cell Operation	Cell Parameters		BCH Parameters
Serving Cell: GPRS	GSM NS Tx Max CCH:	39 dBm	TCH Parameters
PBCCCH: Off	GPRS NS Tx Max CCH:	39 dBm	
PRACH Length: 8	Rx Lev Access Min:	< -110 dBm	PDTCCH Parameters
NISC/SBSN Rev: R99+	C2 Penalty Time:	20 s	
Repeat FACCH: Off	C2 Temp Offset:	0 dB	Handover Parameters
Dual Transfer: On	Reselect Offset:	6 dB	
Persist Attach: Off	Reselect Hyst:	6 dB	Receiver Control
Mobile DTX: Off	DRX Timer Max:	0 s	
Cell Operation		Value	
Cell Lists	BCH Type	Combined	
External Trigger Setup	Dual Transfer Mode	On	
	Extended Uplink TBF State	Off	
Close Menu	NISC/SBSN Revision	R99 onwards	
	Mobile DTX State	Off	
	Packet Control Ack Type	RLC/MAC Ctrl	
	Persistent Attach State	Off	
	PBCCCH	Off	
	Cell Off	Sys Type: GPRS	
		Logging: No Conn.	
	IntRef	Offset	

## The pulse of mobile/network interactions

Wireless protocol advisor software gives you all messages for the mobile and network from MAC layer all the way to IP. Triggering and filtering functionality lets you set up troublesome scenarios, such as intermittent failures. That means you can begin the scenario on Friday and come back Monday morning to a bounded and focused protocol log of exactly what happened surrounding the particular issue.

Octet	MSB	Bin	LSB	Hex	Description
7	0000	1110		2b	RR Skip Indicator= 0(hex)
8	0010	1011		0d	RR Message Type=Handover Command
9	0000	1101		1f	BS Colour Code= 5
10	0000	1101		0c	PLMN Colour Code= 1
11	1010	0000		a0	BCCH ARFCN= 31
12	0000	1111		1e	Channel Type and TDMA Offset=TCH/F + FACCH/F + SACCH/F

95	<- Rev/Up	GSM L3	Setup
96	For/Dow...	GSM L3	Call Proceeding
97	For/Dow...	GSM L3	Alerting
98	For/Dow...	GSM L3	Connect
99	<- Rev/Up	GSM L3	Connect Ack
100	For/Dow...	GSM L3	Handover Command
101	For/Dow...	GSM L3	Physical Information
102	<- Rev/Up	GSM L3	Handover Complete
103	For/Dow...	GSM L3	DTM Information
104	For/Dow...	GSM L3	SystemInfo Type 5

## E6701 Family of Lab Applications

E6701J is our latest application release for the industry leading call box and the right choice for R&D engineers needing world-class functionality in a single instrument. E6701J has several new capabilities including VAMOS type II, and LTE/2G interRAT capabilities such as SRVCC voice capability, SMS over SGs, and LTE neighbors and measurement reports.

E6701J with E6720A-001 is our emerging high-performance application. This is designed for engineers who need early access to leading-edge technologies.

This application also supports baseband fading with the N5106A PXB baseband generator and channel emulator. This functionality requires hardware options E5515E-004, or E5515C-003 and 004.

For a complete comparison of our 8960 GSM/GPRS/EGPRS products please see [http://www.home.keysight.com/upload/cmc\\_upload/All/E1968A\\_E6701x\\_FeatureComparison.pdf](http://www.home.keysight.com/upload/cmc_upload/All/E1968A_E6701x_FeatureComparison.pdf)

## Technical Specifications

These specifications apply to an E5515C/E mainframe with Option 002 installed when used with the latest shipping version of the E6701J lab application.

The above application also includes functionality described within the latest shipping version of E1968A GSM/GPRS/EGPRS test application with firmware. Please refer to the E1968A data sheet for details and specifications for all functionality covered within the E1968A at <http://literature.cdn.keysight.com/litweb/pdf/5990-5708EN.pdf>

Specifications describe the test set's warranted performance and are valid for the unit's operation within the stated environmental ranges unless otherwise noted.

Supplemental characteristics are intended to provide typical, but non-warranted, performance parameters that may be useful in applying the instrument. These characteristics are shown in italics and labeled as "typical". All units shipped from the factory meet these typical numbers at +25 °C ambient temperature without including measurement uncertainty.

**myKeysight**

myKeysight

[www.keysight.com/find/mykeysight](http://www.keysight.com/find/mykeysight)

A personalized view into the information most relevant to you.

**Three-Year Warranty**

[www.keysight.com/find/ThreeYearWarranty](http://www.keysight.com/find/ThreeYearWarranty)

Keysight's commitment to superior product quality and lower total cost of ownership. The only test and measurement company with three-year warranty standard on all instruments, worldwide.



**Keysight Assurance Plans**

[www.keysight.com/find/AssurancePlans](http://www.keysight.com/find/AssurancePlans)

Up to five years of protection and no budgetary surprises to ensure your instruments are operating to specification so you can rely on accurate measurements.



[www.keysight.com/go/quality](http://www.keysight.com/go/quality)

Keysight Technologies, Inc.  
DEKRA Certified ISO 9001:2008  
Quality Management System



**Keysight Channel Partners**

[www.keysight.com/find/channelpartners](http://www.keysight.com/find/channelpartners)

Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

cdma2000 is a US registered certification mark of the Telecommunications Industry Association.

[www.keysight.com/find/e6701j](http://www.keysight.com/find/e6701j)

[www.keysight.com/find/e6704a](http://www.keysight.com/find/e6704a)

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)

**Americas**

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

**Asia Pacific**

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

**Europe & Middle East**

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	0800 000154
Sweden	0200 882255
Switzerland	0800 805353
	Opt. 1 (DE)
	Opt. 2 (FR)
	Opt. 3 (IT)
United Kingdom	0800 0260637

For other unlisted countries:  
[www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)  
(BP-09-04-14)