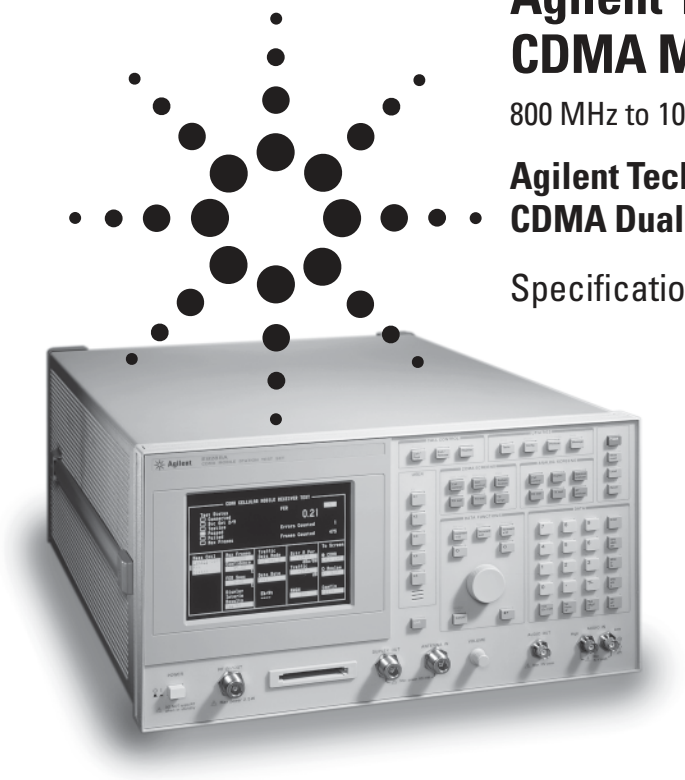
Agilent Technologies E8285A CDMA Mobile Station Test Set

800 MHz to 1000 MHz, 1700 MHz to 2000 MHz

Agilent Technologies 83217A CDMA Dual-Mode Mobile Station Test Software

Specifications



- CDMA cellular, CDMA PCS, and analog cellular coverage in one instrument
- One-button call setup
- Built in AWGN source for calibrated E_b/N_t receiver testing
- Flexible base station emulation
- Extremely fast CDMA and analog testing
- High accuracy and repeatability
- Gated power and open loop time response graphical measurements
- Simultaneous receiver and transmitter measurements
- Electronic attenuator and RF front end
- CDMA and analog authentication testing
- CDMA SMS testing
- Soft and softer handoffs
- CDMA to analog handoffs

The Agilent Technologies E8285A CDMA mobile station test set provides CDMA mobile phone manufacturers with increased measurement speed, improved accuracy, and flexibility to increase test throughput and product quality. Built from the industry-standard Agilent Technologies 8924C, the E8285A offers proven performance and reliability with increased capabilities for manufacturing all current types of TIA/EIA-95-A based CDMA mobile phones in a one-box test set. The E8285A additionally provides flexible base station emulation and a large set of capabilities which enable CDMA mobile phone designers to produce high quality designs in less time.

With the addition of the Agilent Technologies 83217A dual-mode mobile station test software, the E8285A becomes an easy-to-use automated test system capable of quickly testing dual-mode CDMA mobile phones for incoming inspection, customer-return testing, and depot-level repair applications.

Dual- and Triple-Mode Test Capability

The E8285A includes high performance cellular CDMA, PCS CDMA, and cellular AMPS, NAMPS, TACS, NTACS, and JTACS analog phone test capability.

One-Button Call Processing

With the press of a single button, the E8285A automatically handles the complex, over-the-air call processing required to make a CDMA or analog phone call. For call processing verification, the E8285A supports both mobile- and base-station initiated call connect and disconnect. Once a call is established, verifying the overall functionality of a CDMA mobile is easy, fast, and accurate using the E8285A's extensive set of functional and parametric test capabilities. The E8285A offers eight user-selectable protocol stacks: IS-95, IS-95A, TSB-74, ARIB-T53, Korean PCS, J-STD-008, and TIA/EIA-95B, as well as Multi-Mode, which allows handoffs between the CDMA PCS and CDMA cellular bands.

E8285A Analog Mode Specifications

Specifications describe the E8285A's warranted performance and apply after a 30 minute warm-up. These specifications are valid over the E8285A's entire operating environmental range unless otherwise noted. Specifications are subject to change without notice.

Supplemental Characteristics *(shown in italics) are intended to provide additional information, useful in applying the instrument by giving typical expected, but non-warranted performance.*

Signal Generator

RF Frequency

Range:
800 MHz to 1000 MHz,
1700 MHz to 2000 MHz.

Accuracy and Stability: Same as reference oscillator ±0.065 Hz

Switching Speed: *<150 ms to be within 100 Hz of carrier frequency*

Resolution: *1 Hz*

Output

RF IN/OUT Connector

Level Range: –120 dBm to –18 dBm into 50 Ω

Level Accuracy:
±1.0 dB (800 MHz to 1000 MHz), *typically ±0.7 dB.*
±1.25 dB (1.7 to 2.0 GHz), *typically ±1.0 dB.*

Reverse Power: 2.5 watts

SWR: <1.5:1

DUPLEX OUT Connector

Level Range: –120 dBm to –8 dBm into 50 Ω

Level Accuracy: ±1.0 dB

Reverse Power: 60 mW maximum

SWR: <1.7:1 (level <–7.5 dBm)

Display Resolution: *0.1 dB*

Spectral Purity

All specifications are for ≤–8 dBm output level at DUPLEX OUT or ≤–18 dBm output level at RF IN/OUT.

Harmonics: <–18 dBc

Non-Harmonic Spurious (at >5 kHz offset from carrier)**:**
<–60 dBc for 800 MHz ≤f_c ≤1000 MHz,
<–55 dBc for 1700 MHz <f_c ≤2000 MHz.

Residual FM (CCITT, rms)**:**
<7 Hz for 800 MHz <f_c ≤1000 MHz,
<14 Hz for 1700 MHz ≤f_c ≤2000 MHz.

SSB Phase Noise: *<–116 dBc/Hz (for >20 kHz offsets at a 1000 MHz carrier frequency)*

FM

FM Deviation (rates >25 Hz):
100 kHz; 800 to 1000 MHz,
100 kHz; 1700 MHz to 2000 MHz.

FM Rate (1 kHz reference):
Internal: dc to 25 kHz (1 dB BW)

External:
ac Coupled: 20 Hz to 75 kHz (typical –3 dB BW)
dc Coupled: dc to 75 kHz (typical –3 dB BW)

FM Accuracy (1 kHz rate):
≤10 kHz dev: ±3.5% of setting ±50 Hz
>10 kHz dev: ±3.5% of setting ±500 Hz

FM Distortion (THD+noise, 0.3 to 3 kHz BW):
<0.5% at >4 kHz deviation and 1 kHz rate, 800 MHz to 1000 MHz.
<1.0% at >4 kHz deviation and 1 kHz rate, 1700 MHz to 2000 MHz.

Center Frequency Accuracy in DC FM Mode
(external source impedance <1 kΩ):
±500 Hz (after DC FM zero), *typically ±50 Hz.*

Ext. Mod Input Impedance: *600 Ω nominal*

Resolution: *50 Hz for <10 kHz deviation, 500 Hz for ≥10 kHz deviation.*

Audio Source (both internal sources)

Frequency

Range: dc to 25 kHz

Accuracy: 0.025 % of setting

Resolution: *0.1 Hz*

Output Level

Range: 0.1 mV to 4 Vrms

Maximum Output Current: 20 mA peak

Output Impedance: <1.5 Ω (at 1 kHz)

Accuracy: ±2% of setting plus resolution

Residual Distortion (THD + noise, level ≥200 mVrms): <0.125%; 20 Hz to 25 kHz in an 80 kHz BW.

Resolution:

Level ≤0.01V: ±50 µV
Level ≤0.1V: ±0.5 mV
Level ≤1V: ±5 mV
Level <10V: ±50 mV

Offset in dc Coupled Mode: *<50 mV*

RF Analyzer

RF Frequency Measurement

Measurement Range:
800 MHz to 1000 MHz,
1700 MHz to 2000 MHz.

Level Range:

RF IN/OUT: –16 dBm to +34 dBm (0.025 mW to 2.5 W)

ANT IN: –38 dBm to +15 dBm

Accuracy: ±1 Hz plus timebase accuracy

Minimum Resolution: *1 Hz*

RF Power Measurement

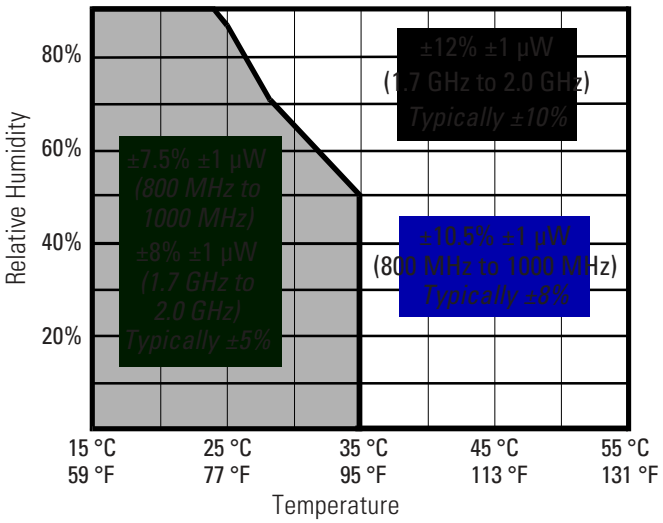
Note: To achieve the specified accuracy when measuring power at the RF IN/OUT port, the internal signal generator's level must be 40 dB below the measured power or less than –20 dBm at the DUPLEX OUT port.

Input Frequency Range:
800 MHz to 1000 MHz,
1700 MHz to 2000 MHz,
usable 10 MHz to 100 MHz.

Input Connector: RF IN/OUT

Maximum Input Level: +34 dBm (2.5 watts)

Accuracy: –10 dBm to +30 dBm (after power meter zero)



Measurement Range: –10 dBm to +34 dBm (0.1 mW to 2.5 W)

SWR: <1.5:1

Resolution:

Power <2.5 W: 1 mW
Power <100 mW: 0.1 mW
Power <10 mW: 0.01 mW

FM Measurement

Frequency Range:
800 MHz to 1000 MHz,
1700 MHz to 2000 MHz.

Deviation Range: 20 Hz to 75 kHz

Sensitivity: 4 µV (ANT IN, 15 kHz IF BW, high sensitivity mode, 0.3 to 3 kHz BW). *Typically <2 µV* (12 dB SINAD, f_c ≥10 MHz).

Accuracy (20 Hz to 25 kHz rates, deviation ≤25 kHz, 230 kHz IF BW): ±5% of reading plus residual FM and noise contribution (<20 Hz HPF, >99 kHz LPF).

Typical Additional FM Measurement Error with Audio Filters Selected:

Filter Input Freq. (kHz)	**Filters**					
	750 µs	*50 Hz HPF*	*300 Hz HPF*	*300 Hz LPF*	*3 kHz LPF*	*6 kHz BPF*
0.02	*1%*					
0.05				*1%*		
0.1				*1%*		
0.15				*2%*		
0.2		*2.8%*		*2.5%*		
0.5		*1%*			*1%*	
1.0		*1%*	*1%*		*1%*	
1.3					*1%*	
1.6					*1.5%*	
2.0			*1%*		*3%*	
6.0						*3.7%*

Filter Input Freq. (kHz)	**Filter**
	15 kHz LPF
1.0	*1%*
3.0	*1%*
5.0	*1%*
7.5	*1.2%*
8.0	*1.5%*
10.0	*2.7%*
11.0	*3.8%*
12.0	*7.5%*

Bandwidth (3 dB): 2 Hz to 70 kHz (DC FM measurements also available).

THD+Noise: <1% for ≥5 kHz deviation and 1 kHz rate in a 0.3 to 3 kHz BW, 230 kHz IF BW.

Input Level Range for Specified Accuracy:
–22 to +34 dBm at RF IN/OUT (6.3 µW to 2.5 W)
–44 to +14 dBm at ANT IN

Residual FM and Noise (0.3 to 3 kHz, rms):
<7 Hz. at 800 MHz to 1000 MHz
<14 Hz at 1700 MHz to 2000 MHz

Resolution:
Deviation <10 kHz: 1 Hz
Deviation ≥10 kHz: 10 Hz

SAT Deviation Measurement

Frequency Range: 5970 Hz, 6000 Hz, 6030 Hz

Deviation Range: 500 Hz to 3000 Hz

Input Level Range for Specified Accuracy:
–22 to +34 dBm at RF IN/OUT
–44 to +14 dBm at ANT IN

Accuracy: ±2.5%, *typically ±1%.*

Spectrum Analyzer (Option 102)

Frequency Range (center frequency coupled to RF analyzer setting)**:**
800 MHz to 1000 MHz,
1700 MHz to 2000 MHz.

Frequency Span/Resolution Bandwidth (coupled):

Span	**Bandwidth**
<50 kHz	300 Hz
<200 kHz	1 kHz
<1.5 MHz	3 kHz
<18 MHz	30 kHz
≥18 MHz	300 kHz

Plus full span capability

Display: Log with 10 dB/division, 2 dB/division, or 1 dB/division.

Display Range: 80 dB

Reference Level Range: +50 to –50 dBm

Residual Responses: <–70 dBm (no input signal, 0 dB attenuation).

Image Rejection: >47 dB

Supplemental Characteristics:

Non-Harmonic Spurious Responses: *>60 dB (for input signals ≤–30 dBm)*

Level Accuracy: *±3.5 dB*

Log Scale Linearity: *±2 dB* (for input levels ≤–30 dBm and/or 60 dB range)

Displayed Average Noise Level: *<–109 dBm (≤50 kHz spans)*

Other Features: *Peak hold, marker with frequency and level readout, marker to peak, marker to next peak, trace comparison A–B.*

Tracking Generator

Frequency Range:
800 MHz to 1000 MHz,
1700 MHz to 2000 MHz.

Frequency Offset: Frequency span endpoints ± frequency offset cannot be:
<800 MHz or >1000 MHz for RF analyzer tune frequency <1000 MHz.

<1700 or >2000 MHz for RF analyzer tune frequency >1700 MHz.

Output Level Range: Same as signal generator

Sweep Modes: Normal and inverted

Adjacent Channel Power

Relative Measurements

Level Range:

RF IN/OUT: –16 dBm to +34 dBm

ANT IN: –38 dBm to +15 dBm

Dynamic Range: *Typical values for channel offsets*

Offset	*Res. BW*	*Dyn. Range*
12.5 kHz	*8.5 kHz*	*–65 dBc*
20 kHz	*14 kHz*	*–68 dBc*
25 kHz	*16 kHz*	*–68 dBc*
30 kHz	*16 kHz*	*–68 dBc*
60 kHz	*30 kHz*	*–65 dBc*

Relative Accuracy: ±2.0 dB

Absolute Measurements

Level: Results of absolute power in watts or dBm are determined by adding the ACP ratio from the spectrum analyzer to the carrier power measurement obtained from the input section's RF power detector.

Level Range:

RF IN/OUT: –10 dBm to +35 dBm

ANT IN: Not available

Dynamic Range: *Typical values for channel offsets*

Offset	*Res. BW*	*Dyn. Range*
12.5 kHz	*8.5 kHz*	*–65 dBc*
20 kHz	*14 kHz*	*–68 dBc*
25 kHz	*16 kHz*	*–68 dBc*
30 kHz	*16 kHz*	*–68 dBc*
60 kHz	*30 kHz*	*–65 dBc*

Absolute Accuracy: Is the sum of the RF power measurement accuracy found in the RF analyzer section and the ACP relative accuracy of ±2.0 dB.

Audio Analyzer

Frequency Measurement

Measurement Range: 20 Hz to 400 kHz

Accuracy: ±0.02% plus resolution plus reference oscillator accuracy

External Input: 20 mV to 30 Vrms

Resolution:
f <10 kHz: 0.01 Hz
f <100 kHz: 0.1 Hz
f ≥100 kHz: 1 Hz

AC Voltage Measurement

Measurement Range: 0 to 30 Vrms

Accuracy: ±3% of reading (20 Hz to 15 kHz, ≥1 mV)

Residual Noise: 150 µV (15 kHz BW)

3 dB Bandwidth: *Typically 2 Hz to 100 kHz*

Nominal Input Impedance: *Switchable between 1 M ohms in parallel with 95 pF or 600 ohms floating.*

Resolution:
4 digits for inputs ≥100 mV
3 digits for inputs <100 mV

DC Voltage Measurement

Voltage Range: 100 mV to 42 V

Accuracy: ±1.0 % of reading ±45 mV

DC Offset: ±25 mV

Resolution: *1 mV*

Distortion Measurement

Fundamental Frequency Range: 300 Hz to 10 kHz ±5%

Input Level Range: 30 mV to 30 Vrms

Display Range: 0.1% to 100%

Accuracy: ±1 dB for frequencies from 300 to 1500 Hz, measured with the 15 kHz LPF (0.5 to 100% distortion).

±1.5 dB for frequencies from 300 Hz to 10 kHz, measured with the >99 kHz LPF (1.5 to 100% distortion).

Residual THD+Noise: –60 dB or 150 µV, whichever is greater for frequencies from 300 Hz to 1500 Hz measured with the 15 kHz LPF.

–57 dB or 450 µV, whichever is greater for frequencies from 300 Hz to 10 kHz measured with the >99 kHz LPF.

Resolution: *0.1% distortion*

SINAD Measurement

Fundamental Frequency Range: 300 Hz to 10 kHz ±5%

Input Level Range: 30 mV to 30 Vrms

Display Range: 0 to 60 dB

Accuracy:

±1 dB for frequencies from 300 to 1500 Hz, measured with the 15 kHz LPF (0 to 46 dB SINAD).

±1.5 dB for frequencies from 300 Hz to 10 kHz, measured with the >99 kHz LPF (0 to 36 dB SINAD).

Residual THD+Noise:

–60 dB or 150 µV, whichever is greater for frequencies from 300 Hz to 1500 Hz measured with the 15 kHz LPF.

–57 dB or 450 µV, whichever is greater for frequencies from 300 Hz to 10 kHz measured with the >99 kHz LPF.

Resolution: *0.01 dB*

Audio Filters

High-Pass Filters: <20 Hz, 50 Hz, and 300 Hz

Low-Pass Filters: 300 Hz, 3 kHz, 15 kHz, >99 kHz

Band-Pass Filters: 6 kHz

Optional Filters:

Option 013: C-message weighting filter

Option 011: CCITT weighting filter (for TACS phones)

Compander: None

Variable Frequency Notch Filter

Frequency Tuning Range: 300 Hz to 10 kHz

Notch Depth: >60 dB

Notch Width: *Typically ±5% of the notch center frequency*

Audio Detectors: rms, Pk+, Pk–, Pk+hold, Pk–hold, Pk±/2, Pk±/2 hold, Pk±max, Pk±max hold, rms*SQRT2.

Oscilloscope

Frequency Range (–3 dB BW)**:** 2 Hz to 50 kHz

Scale/Division: 10 mV to 10 V

Amplitude Accuracy (20 Hz to 10 kHz)**:** ±1.5% of reading ±0.1 division

Signaling

Capability for Generating and Analyzing the Following Formats: AMPS, EAMPS, NAMPS, TACS, JTACS, NTACS, ETACS.

Function Generator Waveforms: Sine, square, triangle, ramp, dc, white Gaussian and white uniform noise.

Function Generator Frequency Range and Level: Same as audio source.

E8285A CDMA Mode Specifications

Call Processing Functionality

User Settable Parameters

Protocol Stack: IS-95, IS-95A, TSB-74, ARIB T53, Korea PCS, J-STD-008, TIA/EIA-95B, and Multi-Mode (for PCS to digital cellular handoffs).

Channel Standards: MS AMPS, US PCS, Korean PCS 0, Korean PCS 1, Japan CDMA, MS NAMPS Upper/Middle/Lower, MS TACS, MS ETACS, MS NTACS, MS JTACS, and User Defined.

Base Station Parameters: NID, SID, BASE_ID, Country Code, Network Code, SRCH_WIN_A, SRCH_WIN_N, SRCH_WIN_R, CDG Esc Mode On/Off, Register SID, Register NID, Power-On Registration On/Off, Timer Based Registration, Slot_Cycle_Index.

Access Probe Parameters: NOM_PWR, NOM_PWR_EXT, INIT_PWR, PWR_STEP, PAM_SZ, NUM_STEP, MAX_REQ_SEQ, and MAX_RSP_SEQ.

Paging Channel Parameters: Paging Data Rate (full or half rate), NUM_PAGES.

Threshold Parameters: T_ADD, T_DROP, T_COMP, and T_TDROP.

Service Option Support:
- Service Option 001 (normal voice)
- Service Option 002 (9600 bps data loopback)
- Service Option 003 (EVRC 9600 bps voice)
- Service Option 006 (SMS data burst 9600 rate)
- Service Option 009 (14.4 kbps data loopback)
- Service Option 014 (SMS data burst 14000 rate)
- Service Option 32768 (14.4 kbps voice)

Call Control: BS call originate, BS call disconnect, MS call originate, MS call disconnect.

Handoff Support:
- CDMA to CDMA Hard (intraband)
- CDMA Softer (between two sectors)
- CDMA to Analog (intraband)
- CDMA PCS to Analog Cellular
- CDMA PCS to CDMA Cellular

CDMA to Analog Handoff: Execute, System Type, Channel, SAT, and Power Level.

Call Status Indicators: Transmitting (cell active), Registering, Page Sent, Access Probe Received, Connected, Softer Handoff, Hard Handoff, Service Option 002/009. All indicators are also available over GPIB.

Speech Encoder: None

Speech Echo Mode: Three user selectable fixed delays: 0 seconds, 2 seconds, and 5 seconds.

CDMA Data Source:
- Pseudorandom data (CCITT 2^{15}–1 pattern)
- Voice Echo
- 1 kHz tone
- 400 Hz tone
- Audio Chirp (3 second sweep from 5 Hz to 3.75 kHz)

Closed Loop Power Control:
- Supports True Closed Loop Power Control
- Open Loop (Alternating 0 and 1 power control bits)
- Always Up
- Always Down
- Off (no puncturing, requires special mode in mobile)

Closed Loop Change Modes:
- Step n Up (up to 150 bits)
- Step n Down (up to 150 bits)
- Ramp of n Up followed by n Down power (max. 150)

Open Loop Power Control: Supported through varying the level of CDMA generator. CDMA analyzer autoranges to the ideal RF power level for the nominally expected open loop response.

Ideal Mobile Power Display: Reports the ideal open loop power for the mobile's transmitter based upon the forward link power set on the E8285A, the current protocol mode, and the set values of NOM_PWR, NOM_PWR_EXT (J-STD-008 mode only), and INIT_PWR.

Mobile Station FER Reporting: User selectable number of frames (from predefined list). Report by number of frames or by user defined number of errors.

Adjacent Cell Mobile Reporting: Displays status, PN offset, strength, and keep bit for all pilots found by the CDMA mobile and reported via pilot strength messages. Also displays the current user set PN offsets and strengths of Sector A and Sector B to aid in verifying mobile performance.

Neighbor List Support: Automatically generates a list of 7 neighbors based on the user entry of Sector A PN offset, Sector B PN offset and pilot increment.

Mobile Station Identification: 10 digit phone number (IS-95 mode only), MIN (IS-95 mode only with hex entry), IMSI (MCC+MNC+MSIN), or AUTO (uses power-on or user initiated registration to obtain the mobile ID).

Registration: Supports mobile power-on registration, timer based, implicit, or user initiated zone based registration (modulates SID to force the mobile to perform a zone based registration) via GPIB command or front panel button.

IMSI Support: Supports Class 0 IMSIs in the TSB-74 and J-STD-008 protocol modes. IMSI mode, Class 0, type 3 only.

Mobile Database: Upon registration, the database contains the following information:

IS-95: ESN, MIN1, MIN2, Phone Number, Dual-Mode, Slot Class, Slot Index, Protocol Revision, Power Class, Transmit Mode, and Called Number.

IS-95A, ARIB T53, and TSB74: ESN, MCC, MNC, MSIN, Dual-Mode, Slot Class, Slot Index, Protocol Revision, Power Class, Transmit Mode, and Called Number.

J-STD-008, and Korea PCS: ESN, MCC, MNC, MSIN, Slot Class, Slot Index, Protocol Revision, Band Class, EIRP Class, Operation Modes, and Called Number.

TIA/EIA-95B and Multi-Mode: ESN, MCC, MNC, MSIN, Dual-mode, Slot Class, Slot Index, Protocol Revision, Band Class, Power Class, Transmit Mode, Max EIRPs, Op Modes, Power Step, and Called Number.

Retrievable Mobile Parameters:

IS-95 / IS-95A: MUX1_REV_(1 to 8, 11 to 14), MUX1_FOR_(1 to 14), PAG_(1 to 7), ACC_(1 to 8), and LAYER2_RTC(1 to 5).

TSB-74 / J-STD-008 / TIA/EIA-95B / Multi-Mode: In addition to the above parameters, these parameters are available: MUX2_REV_(1 to 25), and MUX2_FOR_(1 to 26).

Logging: Two rear panel serial ports allow logging of paging/access channel messages and forward/ reverse traffic channel messages. Requires an external PC running terminal emulation software connected to the rear panel serial ports.

CDMA Signal Generator

CDMA Channels:

Additive White Gaussian Noise

Sector A with Selectable PN Offset:
Pilot Channel at Walsh Code 0
Sync Channel at Walsh Code 32
Paging Channel at Walsh Code 1
Traffic Channel with selectable Walsh Code
OCNS Channel with selectable Walsh Code

Sector B with selectable PN offset:
Pilot Channel at Walsh Code 0
Traffic Channel with Selectable Walsh Code
OCNS Channel with Selectable Walsh Code

Frequency

Frequency Range:
800 MHz to 1000 MHz,
1700 MHz to 2000 MHz.

Frequency Resolution: 1 Hz

Frequency Accuracy: Same as reference oscillator accuracy ±0.065 Hz

AWGN Bandwidth: *Nominal bandwidth of 1.8 MHz*

Amplitude

Composite Signal Output Level Range: (Default CDMA code channel configuration)

RF IN/OUT: –120 dBm/1.23 MHz to –20 dBm/1.23 MHz, *usable to –15 dBm.*

DUPLEX OUT: –120 dBm/1.23 MHz to –10 dBm/1.23 MHz, *usable to –5 dBm.*

Composite Signal Output Level Accuracy: (Using IS-98A sensitivity configuration)

AWGN Off:
±1.25 dB –800 MHz to 1000 MHz,
±1.35 dB –1700 MHz to 2000 MHz,
typically ±1 dB.

AWGN On:
±1.75 dB –800 MHz to 1000 MHz,
±1.85 dB –1700 MHz to 2000 MHz,
typically ±1 dB.

Composite Signal Output Power: Equal to the sum of the individually settable power levels for AWGN, Sector A, and Sector B.

Maximum Individual Signal Dynamic Range: The maximum dynamic range of any CDMA channel (AWGN, Sector A: Pilot, Sync, Paging, Traffic, or OCNS, Sector B: Pilot, Traffic, or OCNS) is from 0 dB to –30 dB relative to the total composite output power. Paging and traffic channels may have more or less dynamic range depending on the data rate in use.

AWGN Bandwidth: *Typically >1.8 MHz bandwidth. The reported total composite power and AWGN power is in terms of dBm in a 1.23 MHz bandwidth, the actual broadband output power as seen by a power meter on the front panel will be higher than indicated on the front panel.*

Sector A OCNS Channel Relative Level Range: Automatically calculated from other Sector A channel relative levels to provide the set Sector A power.

Sector B OCNS Channel Relative Level Range: Automatically calculated from other Sector B channel relative levels to provide the set Sector B power.

Individual Channel Amplitude Resolution: 0.01 dB

Relative CDMA Channel Level Accuracy:

AWGN to Traffic Channel: <0.2 dB, ±5 °C from the last temperature at which PCB_CAL was run for values of E_b/N_t from 1 dB to 10 dB.

Between Any Two CDMA Channels: <0.2 dB ±5 °C from the last temperature at which PCB_CAL was run.

CDMA Modulation

Modulation Type: QPSK per TIA/EIA 95-A/ANSI J-STD-008

Residual ρ : Better than 0.97, *typically >0.98.*

Rate Set Support:
Rate Set 1: 9600 bps traffic (8 kbps voice)
Rate Set 2: 14.4 kbps traffic (13 kbps voice)

Data Rate Transmission Modes: TIA/EIA IS-95A/ ANSI J-STD-008 defined base station modes including full rate, half rate, quarter rate, one-eighth rate data transmission, and variable rate with equally weighted, randomly spaced occurrences of each rate.

Data Generator Patterns: Pseudorandom data (CCITT 2^{15}–1 pattern), 1 kHz tone, 400 Hz tone, and audio chirp (3 second sweep from 5 Hz to 3.75 kHz, tones and chirp conform to IS-96-A, IS-127, and CDG-27).

CDMA Analyzer

CDMA Average Power Measurement

Note: To achieve the specified accuracy when measuring power at the RF IN/OUT port of the E8285A, the internal signal generator level must be 40 dB below the measured power or less than –20 dBm at the E8285A's DUPLEX OUT.

Input Frequency Range:
800 MHz to 1000 MHz,
1700 MHz to 2000 MHz.

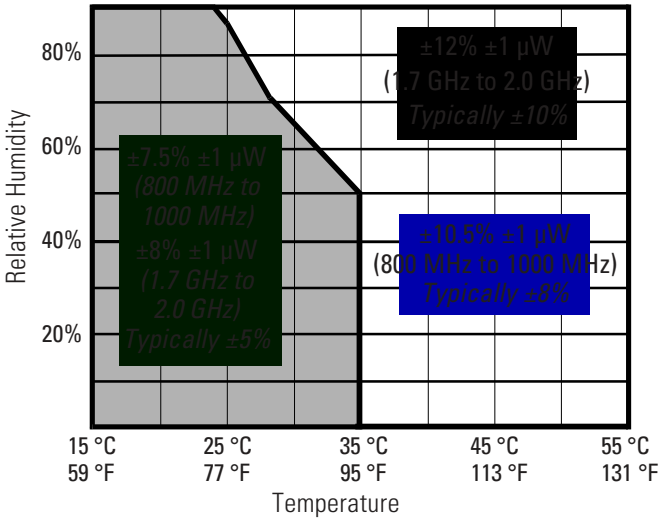
Input Connector: RF IN/OUT

Measurement Bandwidth: Provides an accurate measure of the total power for all present signals within ±2 MHz of the specified operating frequency. If other signals are present outside of this frequency range, reduced measurement accuracy will result.

Maximum Input Level: +34 dBm (2.5 watts continuous)

Measurement Range: –10 dBm to +34 dBm, *usable to –20 dBm with degraded accuracy.*

Accuracy: –10 dBm to +30 dBm



Measurement Method: Reports the overall average power for all active power control groups captured.

Measurement Period: Measures over 1/2 of a CDMA frame (8 power control groups) in full, half, quarter or one-eighth rate modes.

Measurement Update Rate: *Typically 2 readings per second.*

CDMA Tuned Channel and Access Probe Power Measurements

Input Frequency Range:
800 MHz to 1000 MHz,
1700 MHz to 2000 MHz.

Input Connector: RF IN/OUT, *ANT IN.*

Measurement Bandwidth: Measures the total power in a 1.23 MHz bandwidth centered on the active reverse channel center frequency.

Maximum Input Level:
RF IN/OUT: +34 dBm (2.5 watts continuous)
ANT IN: *+15 dBm*

Measurement Range:
RF IN/OUT: –50 dBm to +30 dBm, *usable to <–55 dBm with degraded accuracy*
ANT IN: *–70 dBm to +15 dBm*

Measurement Update Rate: *Typically 5 readings per second*

Measurement Accuracy:

Relative Mode: RF IN/OUT and ANT IN (uncalibrated against average power relative to –10 dBm):

0 to –10 dB relative level: ±0.1 dB
–10 to –20 dB relative level: ±0.2 dB
–20 to –40 dB relative level: ±0.5 dB

Calibrated Mode:

RF IN/OUT (Calibrated against average power): *Typically ±1.2 dB at ±10 °C from the calibration temperature.*

Temperature Drift: *Typically 0.2 dB per 10 °C temperature change, 800 MHz to 1000 MHz.*

Typically 0.4 dB per 10 °C temperature change, 1700 MHz to 2000 MHz.

Measurement Period: Measures power in a 1.23 MHz bandwidth over 1/2 of a CDMA frame (8 power control groups) in full, half, quarter, or one-eighth rate modes.

Calibrate: Calibrates the channel power measurement over the entire operating frequency range of the currently selected RF channel standard.

Alternate Channel Standard: Allows the selection of a second channel standard, all bands, PCS band or cellular band to be calibrated when the channel power calibration is performed. This allows switching between two or more standards without having to re-calibrate after each RF channel standard change.

Un-Calibrated Flag: Displays "Uncal" under the channel power measurement whenever the unit detects that the channel power calibration has not been run for the currently set RF channel standard or when the temperature has drifted by more than ±10 °C from temperature at last calibration.

Access Probe Power Trigger Level: Automatically triggers when input level increases to greater than –55 dBm.

CDMA Modulation Measurement

Input Frequency Range:

800 MHz to 1000 MHz
1700 MHz to 2000 MHz

Modulation Measurement Format: OQPSK per TIA IS-95A/J-STD-008

ρ Measurement Input Level Range: –20 dBm to +34 dBm, *usable to –25 dBm with degraded accuracy.*

Range of ρ Measurement for specified accuracy: 0.45 to 1.00

ρ Measurement Interval:

Traffic Channel ρ: 1.042 ms (5 Walsh symbols)

Test Mode ρ: 1.25 ms (6 Walsh symbols)

Measurement Update Rate: *Typically 1.5 readings per second*

ρ Measurement Accuracy: ρ ±0.003

Frequency Error Measurement Range: ±1 kHz

Frequency Error Measurement Accuracy: ±30 Hz ± timebase accuracy

Other Reported Parameters with ρ Measurement: Transmit time error (τ, time offset), carrier feedthrough, amplitude error, and phase error.

CDMA Frame Error Rate Measurement

FER Measurement Method: Data loopback per Service Option 002 or Service Option 009 supporting Confidence limits as outlined in TIA/EIA-98-B.

Supported Data Rates for FER Measurement: Full, half, quarter, or one-eight rate.

Confidence Limit Range: User definable from 80.0% to 99.9% and Off.

Confidence Limit Statistical Model: Meets TIA/EIA-98-B (20 Hz to 10 kHz) statistical model parameters.

FER Reported Parameters: Measured FER, Number of errors, number of frames tested, and one of the following: passed confidence limit, failed confidence limit, or max. frames (test indeterminate).

Conditions for Terminating FER Test (with confidence limits on):

Max Frames: Maximum number of frames to test completed—indicative of an indeterminate test result.

Failed: Measured FER failed the specified FER limit with specified confidence.

Passed: Measured FER passed the specified FER limit with specified confidence.

FER Measurement Indicators: Testing, Passed, Failed, and Max. Frames. All indicators are available over GPIB.

One Button Min/Max Power Measurement

Measurement Method: Automatically sets the E8285A to the nominal TIA/EIA-98-B/ANSI J-STD-018 test conditions for the minimum power measurement and then maximum power measurement. Restores the E8285A to the instrument state active before the measurement was initiated.

Measurement Output: Maximum TX power and minimum TX power measured

CDMA Graphical Measurements

Gated Power

Measurement Speed: 7 seconds for 100 averages

Marker Level Accuracy: 0.5 dB

Marker Time Accuracy: 0.5 µs

Horizontal Range/Display Time Range: –20 µs to 1269.692 µs

Vertical Range/Display Level Range: –35 dB to 7.5 dB

D**isplay Resolution:**

–20 µs to 10.13313 µs: 203.45 nsec/pixel
10.13313 µs to 1237.34353 µs: 11.8001 µs/pixel
1238.1 to 1269.69208: 203.45 nsec/pixel

Open Loop Time Response

Step Sizes: ±25 dB, ±20 dB, ±15 dB, ±10 dB

Measurement Speed: 1 sec

Marker Level Accuracy: 0.5 dB

Marker Time Accuracy: 1 %

Horizontal Range/Display Time Range: 100 ms

Vertical Range/Display Level Range:

Note: These values are calculated and changed automatically when the step size value is changed.

Step Size	Vertical Range/ Display Level Range [dB]
±25	–7.50 to 40.0
±20	–6.00 to 32.0
±15	–4.61 to 24.6
±10	–3.19 to 17.0

Display Resolution:

Time: 24 µs/pixel

Level: Note: These values are calculated and changed automatically when the step size value is changed.

Step Size	Vertical/Level Resolution Pixel/dB	(dB/pix)
±25	4.00	(0.2500)
±20	5.00	(0.2000)
±15	6.50	(0.1538)
±10	9.40	(0.1064)

CDMA Reverse Channel Spectrum

Display (Requires Option 102)

Frequency Range: Fixed to the active CDMA reverse channel setting. Not independently adjustable.

Frequency Span/Resolution Bandwidth (coupled, maximum span of 5 MHz):

Span	Bandwidth
<50 kHz	300 Hz
<200 kHz	1 kHz
<1.5 MHz	3 kHz
<5 MHz	30 kHz

Display: Log with 10 dB/division

Display Range: 80 dB

Reference Level Range: +50 to –50 dBm

CDMA Signals

Available on the Rear Panel Cell Site/Triggers Connector: I/Q baseband output, power control bit sent triggers.

E8285A Common Specifications

Remote Programming

GPIB: Agilent Technologies implementation of IEEE Standard 488.2.

Remote Front-Panel Lockout: Allows remote user to disable the front-panel display to improve GPIB measurement speed.

Functions Implemented: SH1, AH1, T6, L4, SR1, RL1, LE0, TE0, PP0, DC1, DT1, C4, C11, E2.

RS-232: 2 each 9-wire DB-9 connectors used for serial data in and out

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 selectable.

Centronics Port: Industry standard parallel printer port for hardcopies of test results or screen dumps

Timebase Subsystem

Locking Range: ±10 ppm

Input: Rear panel coaxial BNC, >0.15 Vrms

Accepted Input Frequencies: 10 MHz, 5 MHz, 2 MHz, and 1 MHz

Outputs (all on rear panel)**:**

Coaxial BNCs: 19.6608 MHz (16x Chip), 10 MHz

CDMA Clock Mux BNC Output: User selectable output of one of the following clocks via this BNC:
1.25 ms
20 ms frame clock
26.67 ms short sequence clock
80 ms clock
Every even second

Ovenized Reference

Aging Rate: <±0.1 ppm per year (±85 Hz at 850 MHz in one year)

Warm-up: ±0.1 ppm in <15 minutes

Temperature: <0.05 ppm (0 to +55 °C)

Supply Voltage: *10×10^{-9} (±3%)*

Rear Panel BNC connectors:

Output Frequency: *10 MHz*
Output Level: *>0.5 Vrms into 50 ohms*

Store/Recall

Available RAM: *Approximately 928 KB of user available RAM*

Memory Card

Card Compatibility: Single industry standard PC card slot that accepts type I and type II SRAM and ROM cards.

Storage Capability: Allows for the storage and retrieval of IBASIC programs, IBASIC program parameter and results data, input of new calibration data, and long term storage of Store/Recall information.

Firmware Upgrades: Accepts PCMCIA memory cards to allow automatic loading of new firmware for the Host CPU, Protocol CPU, DSP, and Channel Card CPU's without opening the E8285A.

General Specifications

Dimensions (HxWxD): 22.2 cm × 42.5 cm × 59.0 cm

Weight: 22 kg, 48 lbs

Display Size: 9.7 cm x 13 cm, electroluminescent (EL)

Operating Temperature: 0 °C to +55 °C

Operating Humidity: 0% to 95% relative humidity (RH)

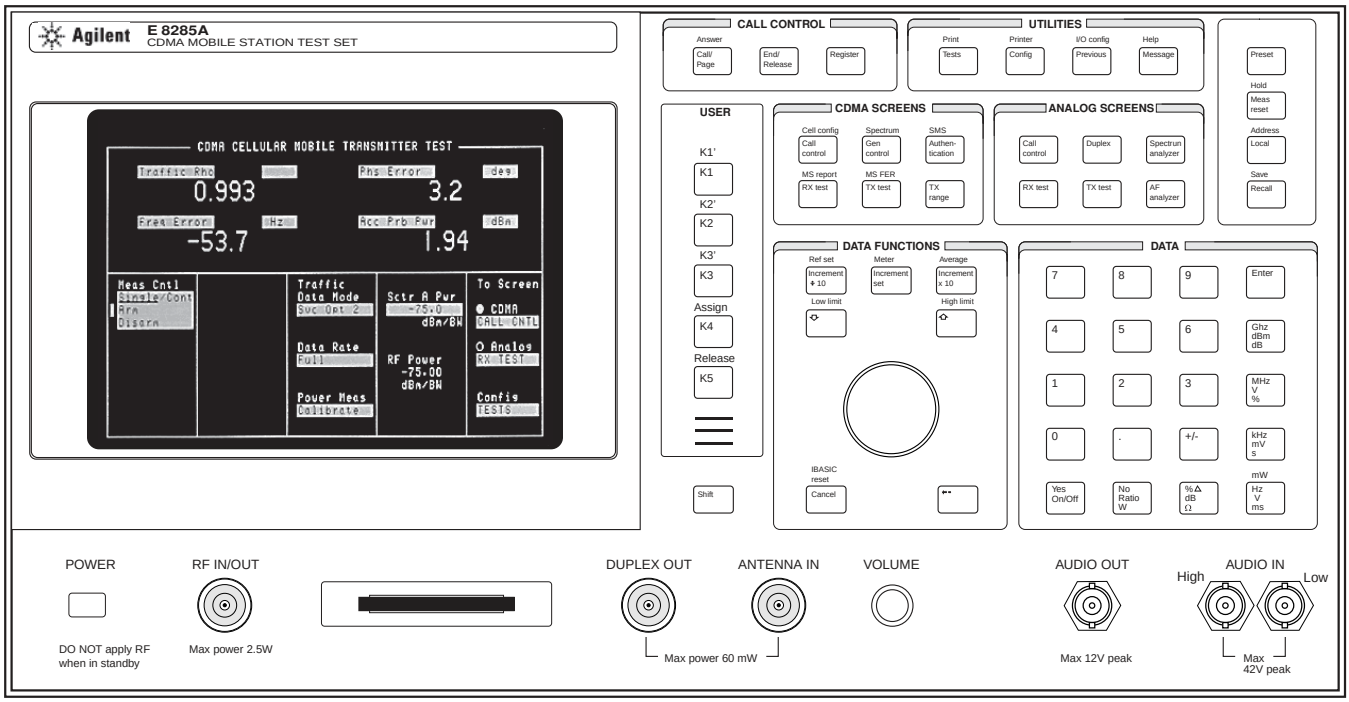
Storage Temperature: –55 °C to +75 °C

Power: 100 V to 240 V, 50/60 Hz, *nominally 250 VA.*

Calibration Interval: Two years

EMI: Conducted and Radiated interference meets CISPR-11, IEC 801-2, IEC 801-3, and IEC 801-4.

Leakage: *(800 MHz to 1000 MHz, 1700 MHz to 2000 MHz) at RF Generator output levels <–40 dBm, typical radiated leakage is <1 µV induced in a resonant dipole antenna 25.4 mm (1 inch) away from any surface except the rear panel. Spurious leakage levels are typically <5 µV in a resonant dipole antenna 25.4 mm (1 inch) away from any surface except the rear panel. Spurious leakage levels at the rear panel are typically <5 µV in a resonant dipole antenna at a distance of 254 mm (10 inches).*



Front Panel Inputs:

RF Input/Output: Type N
Antenna Input Type N
Audio Input: Dual BNC's

Front Panel Outputs:

RF Input/Output: Type N
Duplex Output: Type N
Audio Output: BNC

Rear Panel Outputs:

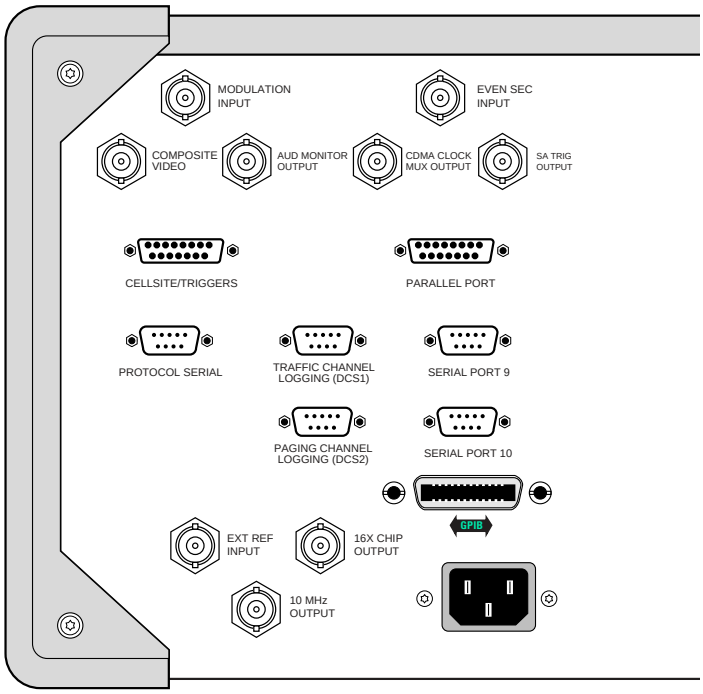
SA Trig Output: BNC
Composite Video Output: BNC
Audio Monitor Output: BNC
10 MHz Output: BNC
CDMA Clock MUX Output: BNC
16x Chip Output: BNC

Rear Panel Inputs:

Modulation Input: BNC
External Reference Input: BNC
Even Second Input: BNC

Rear Panel Digital Ports:

GPIB Port: 24 pin GP-IB
Parallel Port: DB-25
RS-232 Port (two): Serial port 9 and 10: DB-9
Protocol Serial RS-232 Port: DB-9
Traffic Channel Logging (DCS1): DB-9
Paging Channel Logging (DCS2): DB-9
Cell Site/Triggers: DB-25



Agilent Technologies 83217A Specifications

Option 001
AMPS/NAMPS/CDMA

CDMA RX/TX Quick General Test
CDMA RX/TX Voice Quality Registration
CDMA Call Processing Origination
CDMA Call Processing Page
CDMA Call Processing Release
CDMA Call Processing Digital to Analog Handoff
CDMA Call Processing Talk Time
CDMA Call Processing Check
CDMA CP Softer Handoff Add and Drop Check
CDMA RX Sensitivity and Dynamic Range
CDMA RX Traffic Channel FER with AWGN
CDMA RX Sensitivity Level Search
CDMA TX Modulation Quality
(includes frequency accuracy)
CDMA TX Open Loop Power Control Accuracy
CDMA TX Closed Loop Power Control Range
CDMA TX Maximum RF Output Power
CDMA TX Minimum Controlled Output Power
CDMA TX Spectrum Emissions
AMPS/NAMPS CP Call Processing Registration
AMPS/NAMPS CP Call Processing Page
AMPS/NAMPS CP Call Processing Release
AMPS/NAMPS CP Call Processing Origination
AMPS/NAMPS CP Call Processing Hook Flash
AMPS/NAMPS CPA Flow Chart (manual phone test)
AMPS/NAMPS TX Functional Test (no audio connections)
AMPS/NAMPS TX Frequency Error
AMPS/NAMPS TX RF Output Power
AMPS/NAMPS TX Modulation Deviation Limiting
AMPS/NAMPS TX Audio Frequency Response
AMPS/NAMPS TX Audio Distortion
AMPS/NAMPS TX Signaling Tone/DST
AMPS/NAMPS TX FM Hum and Noise
AMPS/NAMPS TX SAT/DSAT
AMPS/NAMPS TX RVC Data Deviation
AMPS/NAMPS TX Compressor Response
AMPS/NAMPS TX Current Drain
AMPS/NAMPS TX DTMF Frequency Error
AMPS/NAMPS TX Switch Channels
AMPS/NAMPS TX Quick General Test
AMPS/NAMPS RX Expandor Response
AMPS/NAMPS RX Audio Frequency Response
AMPS/NAMPS RX Audio Distortion
AMPS/NAMPS RX Hum and Noise
AMPS/NAMPS RX Sensitivity (SINAD)
AMPS/NAMPS RX FVC Order Message Error Rate
AMPS/NAMPS RX Quick General Test
NAMPS RX MRI Performance

Option 003
JTACS/NTACS/CDMA

CPA Registration
CPA Page
TXA Frequency Error
TXA Carrier Power
TXA Peak Frequency Deviation
TXA Audio Frequency Response
TXA Audio Distortion
TXA Signaling Tone / DST
TXA FM Hum and Noise
TXA SAT / DSAT
TXA RVC Data Deviation
TXA Compressor Response
TXA Current Drain
RXA Expandor
RXA Audio Frequency Response
RXA Audio Distortion
RXA Hum and Noise
RXA SINAD
RXA FVC Order Message Error Rate
CPA Release
CPA Origination
OTA No Audio Functional
TXA Quick General
RXA Quick General
CPA Flow Chart
TXA Switch Channels
CPA Hook Flash
TXA DTMF Frequency Error
CPD Registration
CPD Origination
CPD Page
TXD Waveform Quality and Freq. Acc.
TXD Open Loop Power Range
TXD Closed Loop Power Control
TXD Maximum RF Output Power
TXD Min. Controlled Output Power
RXD Traffic Channel FER
RXD Sensitivity and Dynamic Range
CPD Softer Handoff
RTD RX/TX CDMA Quick General
CPD CDMA Voice Quality
TXD Spectrum Emissions
CPD CDMA Release
CPD Digital to Analog Handoff
CPD Talk Time
RXD Sensitivity Level Search

Option 004
CDMA/PCS/AMPS/NAMPS

CPA Registration
CPA Page
TXA Frequency Error
TXA RF Power Output
TXA Modulation Deviation Limiting
TXA Audio Frequency Response
TXA Audio Distortion
TXA Signaling Tone / DST
TXA FM Hum and Noise
TXA SAT / DSAT
TXA RVC Data Deviation
TXA Compressor Response
TXA Current Drain
RXA Expandor
RXA Audio Frequency Response
RXA Audio Distortion
RXA Hum and Noise
RXA SINAD
RXA FVC Order Message Error Rate
CPA Release
CPA Origination
OTA No Audio Functional
TXA Quick General
RXA Quick General
CPA Flow Chart
TXA Switch Channels
CPA Hook Flash
TXA DTMF Frequency Error
RXA MRI
CPD Registration
CPD Origination
CPD Page
TXD Waveform Quality and Freq. Acc.
TXD Open Loop Power Range
TXD Closed Loop Power Control
TXD Maximum RF Output Power
TXD Minimum Controlled Output Power
RXD Traffic Channel FER
RXD Sensitivity and Dynamic Range
CPD Softer Handoff
RTD RX/TX CDMA Quick General
CPD CDMA Voice Quality
TXD Spectrum Emissions
CPD CDMA Release
CPD Digital to Analog Handoff
CPD Talk Time
RXD Sensitivity Level Search

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Japan:
Agilent Technologies Japan Ltd.
Call Center
9-1, Takakura-Cho, Hachioji-Shi,
Tokyo 192-8510, Japan
(tel) (81) 426 56 7832
(fax) (81) 426 56 7840

Latin America:
Agilent Technologies
Latin American Region Headquarters
5200 Blue Lagoon Drive, Suite #950
Miami, Florida 33126
U.S.A.
(tel) (305) 267 4245
(fax) (305) 267 4286

Australia/New Zealand:
Agilent Technologies Australia Pty Ltd
347 Burwood Highway
Forest Hill, Victoria 3131
(tel) 1-800 629 485 (Australia)
(fax) (61 3) 9272 0749
(tel) 0 800 738 378 (New Zealand)
(fax) (64 4) 802 6881

Asia Pacific:
Agilent Technologies
24/F, Cityplaza One, 1111 King's Road
Taikoo Shing, Hong Kong
(tel) (852) 3197 7777
(fax) (852) 2506 9284

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