Model 2800 RF Power Analyzer Specifications

FREQUENCY RANGE: 824 - 849MHz, 880 - 915MHz, 1710 – 1785MHz, 1850 - 1980MHz

FREQUENCY SETTINGS:

Cellular Standard	Channel number, N	Center Frequency, MHz	Frequency Band, MHz
CDMAOne Cellular Band	1 – 777 1013 – 1023	825.000 + 0.030*N 825.000+0.030*(N-1023)	824.7MHz – 848.31MHz
CDMAOne PCS Band	0 – 1199	1850.000 + 0.050*N	1850.00MHz – 1909.95MHz
North American Digital Cellular (NADC) Cellular Band	1 – 799 990 – 1023	825.000+ 0.030*N 825.000+0.030*(N-1023)	824.01MHz – 848.97MHz
North American Digital Cellular (NADC) PCS Band	1 – 1999	1849.980+0.030*N	1850.01MHz – 1909.95MHz
AMPS	1 – 799 990 – 1023	825.000+0.030*N 825.000+0.030*(N-1023)	824.01MHz – 848.97MHz
GSM 850 Cellular Band	128 – 251	824.200+0.2*(N-128)	824.200MHz – 848.800MHz
GSM 900 Cellular Band	0 – 124 975 – 1023	890.0 + 0.2*N 890.0 + 0.2*(N-1024)	880.2MHz – 914.8MHz
GSM DCS 1800 Band	512 – 885	1710.2 + 0.2*(N-512)	1710.2MHz – 1784.8MHz
GSM PCS 1900 Band	512 – 810	1850.2 + 0.2*(N-512)	1850.2MHz – 1909.8MHz
CDMA2000 Band Class 0	1 – 799 991 – 1023	825.000+0.030*N 825.000+0.030*(N-1023)	824.04MHz – 848.97MHz
CDMA2000 Band Class 1	0 – 1199	1850.000+0.050*N	1850.00MHz – 1909.95MHz
CDMA2000 Band Class 4	0 – 599	1750.000+0.050*N	1750.00MHz – 1779.95MHz
CDMA2000 Band Class 6	0 – 1199	1920.000+0.050*N	1920.00MHz – 1979.95MHz
CDMA2000 Band Class 8	0 – 1499	1710.000 +0.050*N	1710.00MHz – 1784.95MHz
CDMA2000 Band Class 9	0 – 699	880.000 + 0.050*N	880.00MHz – 914.95MHz
WCDMA Operating Band 1	9612 – 9888	0.2*N	1922.4MHz – 1977.6MHz
WCDMA Operating Band 2	9262 – 9538 12, 37, 62, 87, 112, 137, 162, 187, 212, 237, 262, 287	0.2*N 1850.1+0.2*N	1852.4MHz – 1907.6MHz
WCDMA Operating Band 3	8562 – 8913	0.2*N	1712.4MHz – 1782.6MHz

INTERNAL REFERENCE OSCILLATOR REFERENCE:
Aging per year: 1ppm
Temperature Drift: (5 to 40°C): 0.5ppm

EXTERNAL FREQUENCY REFERENCE INPUT:
Frequency: 10MHz ± 5ppm
Power: ≥2dBm
Input Impedance: 50Ω, nominal

INPUT:
Connector: Type N Female
Impedance: 50Ω
Maximum Overload Value: 24dBm, continuous
VSWR: <1.2:1 with input attenuator > 4dB
<1.3:1 with input attenuator ≤ 4dB

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PRIMARY CHANNEL: MEASUREMENT RANGES

	CDMAOne	NADC	AMPS	GSM	CDMA2000 1X	CDMA2000 3X	WCDMA
Measurement Bandwidth[9]	1.23MHz	100kHz	30kHz	400kHz	1.23MHz	3.69MHz	3.84MHz
Repeatability: Mod.[3]	± 0.1dB	± 0.1dB	± 0.1dB	± 0.1dB	± 0.1dB	± 0.1dB	± 0.1dB
CW[12]	±0.05dB	±0.05dB	±0.05dB	±0.05dB	±0.05dB	±0.05dB	±0.05dB
Noise Floor[19]:					Band Class 0 ≤-77.5dBm	Band Class 0 ≤-72.7dBm	
Cellular Band	≤-77.5dBm	≤-88.6dBm		≤-82.4dBm	Band Class 1 ≤-80.0dBm	Band Class 1 ≤-75.2dBm	Operating Band 1 ≤-68.7dBm
DCS Band			≤-89.0dBm	≤-82.9dBm	Band Class 4,8 ≤-78.0dBm	Band Class 4,8 ≤-73.2dBm	Operating Band 2 ≤-75.1dBm
PCS Band	≤-80.0dBm	≤-91.0dBm		≤-84.9dBm	Band Class 6 ≤-73.6dBm	Band Class 6 ≤-68.8dBm	Operating Band 3 ≤-73.1dBm
					Band Class 9 ≤-75.0dBm	Band Class 9 ≤-70.2dBm	

Accuracy (23°C ± 5°C)[1]:

	CDMAOne Cell	NADC Cell	AMPS	GSM Cell	CDMA2000 1x BC0	CDMA2000 1x BC1	CDMA2000 1x BC4	CDMA2000 1x BC6	CDMA2000 1x BC8	CDMA2000 1x BC9
20 dBm to -40dBm	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB
-40.01 dBm to -50dBm	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB
-50.01dBm to -60dBm	± 0.73 dB	± 0.73 dB	± 0.73 dB	± 0.73 dB	± 0.73 dB	± 0.73 dB	± 0.73 dB	± 0.73 dB	± 0.73 dB	± 0.73 dB
-60.01 dBm to -70dBm[2]	± 1.07 dB	± 0.94 dB	± 0.94 dB	± 0.94 dB	± 1.07 dB	± 0.94 dB	± 1.02 dB		± 1.02 dB	± 1.65 dB

	CDMAOne PCS	NADC PCS	GSM PCS	GSM DCS	CDMA2000 3x BC0	CDMA2000 3x BC1	CDMA2000 3x BC4	CDMA2000 3x BC6	CDMA2000 3x BC8	CDMA2000 3x BC9
20 dBm to -40dBm	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB	± 0.35 dB
-40.01 dBm to -50dBm	± 0.5 dB	± 0.4 dB	± 0.4 dB	± 0.4 dB	± 0.4 dB	± 0.4 dB	± 0.4 dB	± 0.4 dB	± 0.4 dB	± 0.4 dB
-50.01dBm to -60dBm	± 0.73 dB	± 0.6 dB	± 0.6 dB	± 0.6 dB	± 0.6 dB[2]	± 0.6 dB[2]	± 0.6 dB[2]	± 0.72 dB[2]	± 0.6 dB[2]	± 0.6 dB[2]
-60.01 dBm to -70dBm[2]	± 0.94 dB	± 0.94 dB	± 0.94 dB	± 0.94 dB						

	WCDMA OB1	WCDMA OB2	WCDMA OB3
20 dBm to -40dBm	± 0.35 dB	± 0.35 dB	± 0.35 dB
-40.01 dBm to -50dBm	± 0.4 dB	± 0.4 dB	± 0.4 dB
-50.01dBm to -60dBm[2]	± 0.73 dB	± 0.6 dB	± 0.6 dB

ADJACENT CHANNEL: (PRIMARY CHANNEL INPUT SIGNAL IN RANGE 5dBm TO 20dBm)

	CDMAOne	NADC	GSM	CDMA2000 1X	CDMA2000 3X	WCDMA
Measurement Bandwidth[9]	30kHz	25kHz	30kHz	30kHz	30kHz	3.84MHz
Offset from Center Frequency: Cellular	± 885kHz, ± 900kHz	± 30kHz	±200kHz	± 885kHz, ± 900kHz		
DCS , PCS	± 900kHz, ± 1250kHz	± 30kHz	±200kHz	± 900kHz, ± 1250kHz	± 2.65MHz	± 5MHz
Range at Specified Accuracy[15]	>55dBc	>36dBc	>40dBc	>55dBc	>55dBc	>33dBc
Accuracy (23°C ± 5°C)[1] Relative to primary channel	± 1.0dB	± 1.0dB	± 1.0dB	Band Classes 0,1,4,8,9: ± 1.0dB Band Class 6: 1.5dB	Band Classes 0,1,4,8,9: ± 1.0dB Band Class 6: 1.5dB	± 2.0dB[2]
Repeatability[3,12]: CW	± 0.5dB[4]	± 0.5dB[11]	± 0.5dB[11]	± 0.5dB[4]	± 0.5dB[4]	± 1.0dB[2]

ALTERNATE CHANNEL: (PRIMARY CHANNEL INPUT SIGNAL IN RANGE 5dBm TO 20dBm)

	CDMAOne	NADC	GSM	CDMA2000 1X	CDMA2000 3X	WCDMA
Measurement Bandwidth[9]	30kHz	25kHz	30kHz	30kHz	30kHz	3.84MHz
Offset from Center Frequency: Cellular	± 1.98MHz	± 60kHz	± 400kHz	± 1.98MHz		
DCS , PCS	± 1.98MHz	± 60kHz	± 400kHz	± 1.98MHz	± 3.10MHz	± 10MHz
Range at Specified Accuracy[15]	>55dBc	>48dBc	>60dBc	>55dBc	>55dBc	>43dBc
Accuracy (23°C ± 5°C)[1] Relative to primary channel	± 1.0dB	± 1.0dB	± 1.0dB	Band Classes 0,1,4,8,9: ± 1.0dB Band Class 6: 1.5dB	Band Classes 0,1,4,8,9: ± 1.0dB Band Class 6: 1.5dB	± 2.0dB[2]
Repeatability[3,12]: CW	± 0.5dB[4]	± 0.5dB[11]	± 0.5dB[11]	± 0.5dB[4]	± 0.5dB[4]	± 1.0dB[2]

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OTHER MEASUREMENTS

UPPER SIDEBAND POWER (AMPS STANDARD ONLY):

MEASUREMENT OF POWER RELATIVE TO CARRIER @ 10KHZ OFFSET
Frequency Range: 824 - 849MHz
Carrier Measurement Bandwidth: 1kHz
Level: 20dBm to –40dBm
Accuracy: ± 0.5dB
Dynamic Range: 28dB

FREQUENCY: RANGE[16]: 824 - 849MHz, 880 - 915MHz, 1710 – 1785MHz, 1850 - 1980MHz
Resolution: 50Hz
Displayed Value: Difference between measured frequency and entered center frequency
Measurement Window: ± 90kHz, nominal, from entered channel number or center frequency
Level: 20dBm to –35dBm
Accuracy: ±50Hz (with external reference)

PEAK FUNCTION: Computes power level and frequency of 5 highest power components in primary channel power spectrum
Range: 824 - 849MHz, 880 - 915MHz, 1710 – 1785MHz, 1850 - 1980MHz
Frequency Resolution: 5kHz
Displayed Values: Power in dBm, Frequency in MHz
Measurement Window: ±1.82MHz from entered channel number or center frequency
Level: 20dBm to –40dBm
Level Resolution: ±0.01dBm
Level Accuracy: ±0.5dBm[18]

TRIGGER METHODS:

	Latency
Level	3us
External Trigger	100us
IEEE-488 Bus Command	2.5ms

MEASUREMENT PARAMETERS

	CDMAOne	NADC	GSM	CDMA2000 1X	CDMA2000 3X	WCDMA
Trigger Delay: Range	0 – 999.999ms	0 – 12.790ms	0 – 3.990ms	0 – 999.999ms	0 – 999.999ms	0 – 999.999ms
Resolution	1µs	3µs	1µs	1µs	1µs	1µs
Acquisition Time:						
Primary Channel	200µs	100µs – 12.790ms	100µs – 3.990ms	200µs	200µs	200µs
Adjacent/Alternate Channel	100µs – 999.999ms	100µs – 12.790ms	100µs – 3.990ms	100µs – 999.999ms	100µs – 999.999ms	200µs
Resolution	4µs	3µs	1µs	4µs	4µs	
Number of Averages:	1 - 100	1 - 100	1 - 100	1 - 100	1 - 100	1 - 100

MEASUREMENT TIME (TYPICAL)[7]:

	CDMAOne	NADC[11]	AMPS	GSM[11]	CDMA2000 1X	CDMA2000 3X	WCDMA
Primary Channel Power Measurement [5]	6ms	11ms[13]	40ms	4ms[13]	6ms	7ms	7ms
Primary Channel Power Measurement, Two Adjacent Channel Power Measurements, and Two Alternate Channel Power Measurements[5]	26ms[6]	16ms[10, 13]	N/A	10ms[10, 13]	26ms[6]	26ms[6]	88ms[17]
Time to complete 10 different power measurements at a single frequency[5,8,14]	75ms	141ms[13]	450ms	81ms[13]	75ms	80ms	90ms
Time to complete 10 power measurements of a single power level at different frequencies[5,14]	190ms	371ms[13]	690ms	325ms[13]	190ms	190ms	235ms[17]

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GENERAL

PROGRAMMABILITY: IEEE-488.2 (SCPI – 1995.0), 3 user-definable power-up states plus factory default and *RST

MEMORY BUFFER: 2500 SETS OF 5 READINGS – primary channel power, upper and lower adjacent channel power, upper and lower alternate channel power, with time stamp, peak reading, average reading, and standard deviation

DIGITAL INTERFACE:
Digital I/O: 1 – TTL digital input, 4 – digital outputs with 250mA sink capability, maximum clamp voltage: $30V_{DC}$, 5V@100mA DC Source

REAR CONNECTIONS: RF Input – Type N connector, External Trigger, Meter Complete, External Reference In, Cal Output – BNC connector, Digital I/O – DB9 connector, IEEE-488 – 24-Pin EMI-shielded receptacle, Power – Power Switch/Line Entry Module with DPDT switch, 2 fuses, and IEC 320 plug

POWER SUPPLY: 100V/120V/220V/240V

LINE FREQUENCY: 50Hz to 60Hz

POWER CONSUMPTION: 100VA

ENVIRONMENT:
Operating: 5° to 40°C, 70%R.H., non-condensing, up to 35° C
Storage: 0° to 50°C

WARRANTY: 1year

SAFETY: Complies with European Union Directive 73/23/EEC, EN61010-1

EMC: Complies with European Union Directive 89/336/EEC, EN61326-1

VIBRATION: MIL-PRF-28800F Class 3 Random

WARM-UP: 1-hour to rated accuracy

DIMENSIONS:
Bench configuration (with handle and feet): 104mm highx485mm widex478mm deep (4.125in x19in x18.75in)
Rack Mounting: 89mm highx485mm widex478mm deep (3.5in x19in x18.75in)

WEIGHT:
Net Weight: 13.14 kg (28.9 lbs)
Shipping Weight: 14.5kg (32lbs)

ACCESSORIES SUPPLIED: Hardcopy User's manual, RF Product Information CD-ROM, rack mount kit, bench assembly kit.

Notes:

1. Based on measurements of NIST traceable CW signals, and locked to the source reference. Exclusive of input mismatch. Derate by ± 0.05dB/°C beyond 23°C ± 5°C.
2. Based on an average of 6 measurements.
3. Defined as 2 standard deviations of 100 consecutive readings while measuring a modulated signal.
4. Measurement acquisition time: 10ms.
5. Range: 20dBm to –60dBm (except CDMA2000 3X and WCDMA which are for 20dBm to –50dBm), averaging off, display off, input protection off, temperature compensation off, binary transfer, and 488.1 protocol. For measurements of only the primary channel, the adjacent channel measurements and the alternate channel measurements are disabled.
6. Adjacent channel power and alternate channel power acquisition time: 10ms.
7. Times are defined at specified repeatability and include IEEE-488 transfer times.
8. Includes time required to make two attenuator changes.
9. Bandwidths are designed to conform to definitions in cellular standards.
10. Measurement times include 3 measurements: primary channel power measurements and upper and lower adjacent channel power measurements.
11. Acquisition time is one time slot: NADC = 6.67ms, GSM = 577us. Level trigger is used.
12. Defined as 2 standard deviations of 100 consecutive measurements spaced evenly over an 8 hour period with ambient temperature of 23±1°C.
13. Pulse measurement times are defined from the time the rising edge of each power pulse is detected to the completion of the data transfer.
14. Times are exclusive of DUT settling times.
15. The range is defined as the maximum detectable difference between the primary channel power and the adjacent (or alternate) channel power for the specified accuracy and specified measurement bandwidth.
16. Defined for measurements on un-modulated carrier waveforms.
17. Times are based on measurements in Operating Band One.
18. Defined for signals whose carrier is at the programmed center frequency or offset by an integer multiple of 5kHz.
19. Defined with 0dB programmed attenuation, 23°C ± 5°C, input terminated with 50Ω, and 100 readings averaged.