JD786A

CellAdvisor™ RF Analyzer

Spectrum Analyzer: 9 kHz to 8 GHz

Cable and Antenna Analyzer: 5 MHz to 6 GHz

Power Meter: 10 MHz to 8 GHz

Specification* Conditions

The JD786A specifications apply under these conditions:

- The instrument has been turned on for at least 15 minutes
- The instrument is operating within a valid calibration period
- Data with no tolerance are considered typical values
- Cable and antenna measurements apply after calibration to the OSL standard
- Typical and nominal values are defined as:
  - Typical: expected performance of the instrument operating under 20° to 30°C after being at this temperature for 15 minutes
  - Nominal: a general, descriptive term or parameter

Spectrum Analyzer (Standard)

Frequency	
Frequency range	9 kHz to 8 GHz

Internal 10 MHz Frequency Reference	
Accuracy	±0.05 ppm + aging (0 to 50°C)
Aging	±0.5 ppm/year

Frequency Span	
Range	0 Hz (zero span) 10 Hz to 8 GHz
Resolution	1 Hz

Resolution Bandwidth (RBW)		
–3 dB bandwidth	1 Hz to 3 MHz	1-3-10 sequence
Accuracy	±10% (nominal)	

Video Bandwidth (VBW)		
–3 dB bandwidth	1 Hz to 3 MHz	1-3-10 sequence
Accuracy	±10% (nominal)	

Single Sideband (SSB) Phase Noise	
Fc 1 GHz, RBW 10 kHz, VBW 1 kHz, RMS detector	
Carrier offset:	
30 kHz	–100 dBc/Hz (–102 dBc/Hz, typical)
100 kHz	–105 dBc/Hz (–112 dBc/Hz, typical)
1 MHz	–115 dBc/Hz (–120 dBc/Hz, typical)

Measurement Range	
	DANL to +25 dBm
Input attenuator range	0 to 55 dB, 5 dB steps

Maximum Input Level	
Average continuous power	+25 dBm
DC voltage	±50 VDC

Displayed Average Noise Level (DANL)	
1 Hz RBW, 1 Hz VBW, 50 Ω termination, 0 dB attenuation, RMS detector	
Preamplifier off:	
10 MHz to 3 GHz	–140 dBm (–145 dBm, typical)
>3 GHz to 5 GHz	–138 dBm (–142 dBm, typical)
>5 GHz to 7 GHz	–135 dBm (–138 dBm, typical)
>7 GHz to 8 GHz	–132 dBm (–135 dBm, typical)
Preamplifier on:	
10 MHz to 3 GHz	–160 dBm (–165 dBm, typical)
>3 GHz to 5 GHz	–158 dBm (–162 dBm, typical)
>5 GHz to 7 GHz	–155 dBm (–158 dBm, typical)
>7 GHz to 8 GHz	–152 dBm (–155 dBm, typical)

*All specifications are subject to change without notice.

Display Range	
Log scale and units (10 divisions displayed)	1 to 20 dB/division in 1 dB steps dBm, dBV, dBmV, dBµV
Linear scale and units (10 divisions displayed)	V, mV, mW, W
Detectors	Normal, positive peak, sample, negative peak, RMS
Number of traces	6
Trace functions	Clear/write, maximum hold, minimum hold, capture, load view on/off

Total Absolute Amplitude Accuracy		
Preamplifier off, power level >–50 dBm, auto-coupled		
1 MHz to 8 GHz	±1.3 dB (±0.5 dB typical) Add ±1.0 dB	20°C to 30°C –10°C to 55°C after 60-minute warm up

Reference Level	
Setting range	–120 to +100 dBm
Setting resolution	
Log scale	0.1 dB
Linear scale	1% of reference level

Markers	
Marker types	Normal, delta, delta pair, noise, frequency count marker
Number of markers	6
Marker functions	Peak, next peak, peak left, peak right, minimum search marker to center/start/stop

RF Input VSWR		
1 MHz to 8 GHz	1.5:1 (typical)	Atten >20 dB

Second Harmonic Distortion	
Mixer level = –25 dBm	
50 MHz to 2.6 GHz	<–65 dBc (typical)
>2.6 GHz to 8 GHz	<–70 dBc (typical)

Third-Order Inter-Modulation (Third-order Intercept: TOI)	
200 MHz to 3 GHz	+10 dBm (typical)
>3 GHz to 8 GHz	+12 dBm (typical)

Spurious	
Inherent residual response Input terminated, 0 dB attenuation, preamplifier off, RBW at 10 kHz	–90 dBm (nominal)
Exceptions	–85 dBm @164.1 MHz, 1.95, 2.57264, 3.2, and 4.5 GHz –80 dBm @4.8 and 7.8 GHz
Input-related spurious	<–70 dBc (nominal)

Dynamic Range		
2/3 (TOI-DANL) in 1 Hz RBW	>104 dB	@ 2 GHz

Sweep Time		
Range	0.4 ms to 1000 s 24 µs to 200 s	Span = 0 Hz (zero span)
Accuracy	±2%	Span = 0 Hz (zero span)
Mode	Continuous, single	

Gated Sweep	
Trigger source	External, video, and GPS
Gate length	1 µs to 100 ms
Gate delay	0 to 100 ms

Trigger	
Trigger source	Free run, video, external
Trigger delay	
Range	0 to 200 s
Resolution	6 µs

Measurements*
Channel power
Occupied bandwidth
Spectrum emission mask
Adjacent channel power
Spurious emissions
Field strength
AM/FM audio demodulation
Route map

* CW signal generator (Option 003) can be set up simultaneously.

Cable and Antenna Analyzer (Standard)

Frequency	
Range	5 MHz to 6 GHz
Resolution	10 kHz
Accuracy	±1 ppm

Data Points
126, 251, 501, 1001, 2001

Measurement Speed	
Reflection/DTF	1.0 ms/point (typical)

Measurement Accuracy	
Corrected directivity	40 dB
Reflection uncertainty	$\pm(0.3 + \lvert 20\log(1+10^{-EP/20})\rvert)$ (typical) EP = directivity – measured return loss

Output Power	
High	5 MHz to 5.5 GHz, 0 dBm (typical) 5.5 GHz to 6 GHz, –5 dBm (typical)
Low	5 MHz to 6 GHz, –30 dBm (typical)

Dynamic Range	
Reflection	60 dB

Maximum Input Level	
Average continuous power	+25 dBm (nominal)
DC voltage	±50 VDC
Interference immunity	
On channel	+17 dBm @ >1.4 MHz from carrier frequency (nominal)
On frequency	0 dBm within ±10 kHz from the carrier frequency (nominal)

Measurements	
Reflection (VSWR)	
VSWR range	1 to 65
Return loss range	0 to 60 dB
Resolution	0.01
Distance to Fault (DTF)	
Vertical VSWR range	1 to 65
Vertical return loss range	1 to 60 dB
Vertical resolution	0.01
Horizontal range	0 to (# of data points – 1) x horizontal resolution Maximum = 1500 m (4921 ft)
Horizontal resolution	$(1.5 \times 10^8) \times (V_P)/(\text{delta})$ V_P = propagation velocity Delta = stop freq – start freq (Hz)
Cable Loss (1-port)	
Range	0 to 30 dB
Resolution	0.01 dB
1-port Phase	
Range	–180° to +180°
Resolution	0.01°
Smith Chart	
Resolution	0.01

RF Power Meter (Standard)

General Parameters	
Display range	–100 to +100 dBm
Offset range	0 to 60 dB
Resolution	0.01 dB or 0.1xW (x = m, u, p)

Internal RF Power Sensor	
Frequency range	10 MHz to 6 GHz
Span	1 kHz to 100 MHz
Dynamic range	–120 to +25 dBm
Maximum power	+25 dBm
Accuracy	Same as spectrum analyzer

External RF Power Sensors	
Directional Power Sensor	**JD731B**
Frequency range	300 MHz to 3.8 GHz
Dynamic range	0.15 to 150 W (average) 4 to 400 W (peak)
Connector type	Type-N female on both ends
Measurement type	Forward/reverse average power, forward peak power, VSWR
Accuracy	±(4% of reading + 0.05 W)[1,2]
Directional Power Sensor	**JD733A**
Frequency range	150 MHz to 3.5 GHz
Dynamic range	0.1 to 50 W (average) 0.1 to 50 W (peak)
Connector type	Type-N female on both ends
Measurement type	Forward/reverse average power, forward peak power, VSWR
Accuracy	±(4% of reading + 0.05 W)[1,2]
Terminating Power Sensor	**JD732B**
Frequency range	20 MHz to 3.8 GHz
Dynamic range	–30 to +20 dBm
Connector type	Type-N male
Measurement type	Average
Accuracy	±7%[1]
Terminating Power Sensor	**JD734B**
Frequency range	20 MHz to 3.8 GHz
Dynamic range	–30 to +20 dBm
Connector type	Type-N male
Measurement type	Peak
Accuracy	±7%[1]
Terminating Power Sensor	**JD736B**
Frequency range	20 MHz to 3.8 GHz
Dynamic range	–30 to +20 dBm
Connector type	Type-N male
Measurement type	Average and Peak
Accuracy	±7%[1]

1. CW condition at 25°C ±10°C.
2. Forward power.

Optical Power Meter (Option 13)

Optical Power Meter	
Display range	–100 to +100 dBm
Offset range	0 to 60 dB
Resolution	0.01 dB or 0.1 mW

External Optical Power Sensors	
Optical Power Sensor	***MP-60***
Wavelength range	780 to 1650 nm
Max permitted input level	+10 dBm
Connector input	Universal 2.5 and 1.25 mm
Accuracy	±5%
Optical Power Sensor	***MP-80***
Wavelength range	780 to 1650 nm
Max permitted input level	+23 dBm
Connector input	Universal 2.5 and 1.25 mm
Accuracy	±5%

2-Port Transmission Measurements (Option 001)

Frequency	
Frequency range	5 MHz to 6 GHz
Frequency resolution	10 kHz

Output Power		
High	5 MHz to 5.5 GHz, 0 dBm (typical) 5.5 GHz to 6 GHz, –5 dBm (typical)	
Low	5 MHz to 6 GHz, –30 dBm (typical)	

Measurement Speed	
Vector	1.6 ms/point (typical)
Scalar	3.4 ms/point (typical)

Dynamic Range		
Vector	5 MHz to 3 GHz, 80 dB >3 GHz to 6 GHz, 75 dB	@average 5 @average 5
Scalar	5 MHz to 4.5 GHz, >110 dB 4.5 GHz to 6 GHz, >105 dB	

Measurements	
Insertion Loss/Gain	
Range	–120 to 100 dB
Resolution	0.01 dB
2-Port Phase	
Range	–180° to +180°
Resolution	0.01°

Bias-Tee (Option 002)

Voltage	
Voltage range	+12 to +32 V
Voltage resolution	0.1 V

Power
8 W Max

CW Signal Generator (Option 003)

Frequency	
Frequency range	25 MHz to 6 GHz
Frequency reference	±1 ppm maximum
Frequency resolution	10 kHz

Output Power	
Range	5 MHz to 5.5 GHz, –60 to 0 dBm >5.5 to 6 GHz, –60 to –5 dBm
Step	1 dB
Accuracy	±1.5 dB (20 to 30 °C)

GPS Receiver and Antenna (Option 010)

GPS Indicator
Latitude, longitude, altitude

High-Frequency Accuracy		
Spectrum, interference, and signal analyzer		
GPS lock	±25 ppb	
Hold over (for 3 days)	±50 ppb (0 to 50°C)	15 minutes after satellite locked
Connector	SMA, female	

Interference Analyzer (Option 011)

Measurements	
Spectrum analyzer	Sound indicator, AM/FM audio demodulation, interference ID, spectrum recorder
Spectrogram	Collects up to 72 hours of data
RSSI	Collects up to 72 hours of data
Interference finder	
Spectrum replayer	

Channel Scanner (Option 012)

Frequency Range
1 MHz to 8 GHz

Measurement Range
–110 to +25 dBm

Measurements	
Channel scanner	1 to 20 channels
Frequency scanner	1 to 20 frequencies
Custom scanner	1 to 20 channels or frequencies

General Information

Inputs and Outputs	
RF in	Spectrum analyzer
Connector	Type-N, female
Impedance	50 Ω (nominal)
Damage level	>+33 dBm, ±50 VDC (nominal), 3 min
Reflection/RF out	Cable and antenna analyzer
Connector	Type-N, female
Impedance	50 Ω (nominal)
Damage level	>+40 dBm, ±50 VDC (nominal), 3 min
RF in	Cable and antenna analyzer
Connector	Type-N, female
Impedance	50 Ω (nominal)
Maximum level	>+25 dBm, ±50 VDC (nominal)
External trigger, GPS	
Connector	SMA, female
Impedance	50 Ω (nominal)
External ref	
Connector	SMA, female
Impedance	50 Ω (nominal)
Input frequency	10 MHz, 13 MHz, 15 MHz
Input range	–5 to +5 dBm
USB	
USB host[1]	Type A, 1 port
USB client[2]	Type B, 1 port
LAN	RJ45, 10/100Base-T
GPIO	RJ45
Audio jack	3.5 mm headphone jack
External power	5.5 mm barrel connector
Speaker	Built-in speaker

Display	
Type	Resistive touch screen
Size	8 inch, LED backlight, transflective LCD with anti-glare coating
Resolution	800 x 600

Power		
External DC input	12 to 19 VDC	
Power consumption	37 W	49 W maximum (when charging battery)

Battery	
Type	10.8 V, 7800 mA/hr (Lithium ion)
Operating time	>3 hours (typical)
Charge time	2.5 hours (80%), 5 hours (100%)
Charging temperature	0° to 45°C (32° to 104°F) ≤85% RH
Discharging temperature	–20° to 55°C (4° to 131°F) ≤85% RH
Storage temperature[3]	0° to 25°C (32° to 77°F) ≤85% RH (non-condensing)

Data Storage	
Internal[4]	Maximum 100 MB
External[5]	Limited by size of USB flash drive

Environmental	
Operating temperature	
AC Power	0° to 40°C (32° to 104°F) with no derating
Battery	0° to 40°C (32° to 104°F) @charging –10° to 55°C (14° to 131°F) @discharging
Maximum humidity	85% RH (non-condensing)
Shock and vibration	MIL-PRF-28800F Class 2
Storage temperature[6]	–55° to 71°C (–67° to 160°F)

EMC

IEC/EN 61326-1:2006 (complies with European EMC)
CISPR11:2009 +A1:2010

ESD

IEC/EN 61000-4-2

Size and Weight (standard configuration)	
Weight (with battery)	<4.3 kg (9.5 lb)
Size (W x H x D)	295 x 195 x 82 mm (11.6 x 7.7 x 3.2 in)

Warranty

2 years

Calibration Cycle

1 year

1. Connects flash drive and power sensor.
2. Connects to PC for data transfer.
3. 20 to 85% RH, store battery pack in low-humidity environment. Extended exposure to temperature above 45°C could significantly degrade battery performance and life.
4. Up to 3800 traces.
5. Supports USB 2.0 compatible memory devices.
6. With the battery pack removed.

Ordering Information

Standard	
JD786A	9 kHz to 8 GHz Spectrum analyzer 5 MHz to 6 GHz Cable and antenna analyzer[1] 10 MHz to 8 GHz RF power meter (internal mode)

Options		
NOTE: Upgrade options for the JD786A use the designation JD786AU before the respective last three-digit option number.		
JD786A001	2-Port Transmission Measurement[2]	
JD786A002	Bias-Tee	(requires option JD786A001)
JD786A003	CW Signal Generator	
JD786A010	GPS Receiver and Antenna	
JD786A011	Interference Analyzer [3, 4]	
JD786A012	Channel Scanner	
JD786A013	Optical Power Meter[5]	

Standard Accessories	
G710550326	AC/DC power adapter[6]
G710550335	Cross LAN cable (1.5 m)[6]
GC73050515	USB A to B cable (1.8 m)[6]
GC72450518	>1 GB USB memory[6]
G710550325	Rechargeable lithium ion battery[6]
G710550323	Automotive cigarette lighter 12 VDC adapter[6]
G710550316	Stylus pen[6]
JD780A361	JD780A Series user's manual and application software — CD

1. Requires calibration kit.
2. Requires dual-port calibration kit.
3. Highly recommend adding GPS receiver JD786A010.
4. Highly recommend adding antennas G70005035x and/or G70005036x.
5. Requires MP-60 or MP-80.
6. Standard accessories can be purchased separately.

Optional Calibration Kits	
JD78050509	Y-Calibration Kit, Type-N(m), DC to 6 GHz, 50 Ω
JD78050507	Dual-port Type-N calibration kit, 50 Ω • Y-calibration kit, Type-N(m), DC to 6 GHz, 50 Ω • Two adapters Type-N(f) to Type-N(f), DC to 6 GHz, 50 Ω • Two 1 m RF test cables, Type-N(m) to Type-N(m), DC to 18 GHz, 50 Ω

Optional RF Cables	
G710050530	1.0 m (3.28 ft) RF cable, DC to 18 GHz, Type-N(m) to Type-N(m), 50 Ω
G710050531	1.5 m (4.92 ft) RF cable, DC to 18 GHz, Type-N(m) to Type-N(f), 50 Ω
G710050532	3.0 m (9.84 ft) RF cable, DC to 18 GHz, Type-N(m) to Type-N(f), 50 Ω
G710050533	1.5 m (4.92 ft) RF cable, DC to 18 GHz, Type-N(m) to SMA(m), 50 Ω
G710050534	1.5 m (4.92 ft) RF cable, DC to 18 GHz, Type-N(m) to QMA(m), 50 Ω
G710050535	1.5 m (4.92 ft) RF cable, DC to 18 GHz, Type-N(m) to SMB(m), 50 Ω

Optional Omni Antennas	
G700050351	RF omni antenna Type-N(m), 400 MHz to 450 MHz
G700050352	RF omni antenna Type-N(m), 450 MHz to 500 MHz
G700050353	RF omni antenna Type-N(m), 806 MHz to 896 MHz
G700050354	RF omni antenna Type-N(m), 870 MHz to 960 MHz
G700050355	RF omni antenna Type-N(m), 1.71 GHz to 2.17 GHz
G700050356	RF omni antenna Type-N(m), 720 MHz to 800 MHz
G700050357	RF omni antenna Type-N(m), 2.3 GHz to 2.7 GHz

Optional Yagi Antennas	
G700050364	RF Yagi antenna Type-N(f), 806 MHz to 896 MHz, 10.2 dBd
G700050365	RF Yagi antenna Type-N(f), 866 MHz to 960 MHz, 10.2 dBd
G700050363	RF Yagi antenna Type-N(f), 1.75 GHz to 2.39 GHz, 9.8 dBd
G700050366	RF Yagi antenna Type-SMA(f), 700 MHz to 4 GHz, 1.85 dBd

7

Ordering Information

Optional RF Power Sensors	
JD731B	Directional Power Sensor (peak and average power) Frequency: 300 MHz to 3.8 GHz Power: average 0.15 to 150 W, peak 4 to 400 W
JD733A	Directional Power Sensor (peak and average power) Frequency: 150 MHz to 3.5 GHz Power: average/peak 0.1 to 50 W
JD732B	Terminating Power Sensor (average power) Frequency: 20 MHz to 3.8 GHz Power: –30 to +20 dBm
JD734B	Terminating Power Sensor (peak power) Frequency: 20 MHz to 3.8 GHz Power: –30 to +20 dBm
JD736B	Terminating Power Sensor (peak and average power) Frequency: 20 MHz to 3.8 GHz Power: –30 to +20 dBm

Optional Optical Power Sensors	
MP-60	Miniature USB 2.0 Optical Power Sensor Wavelength Range: 780 to 1650 nm 1300, 1310, 1490, 1550 nm: –50 to +10 dBm 850 nm: –45 to +10 dBm
MP-80	Miniature USB 2.0 Optical Power Sensor Wavelength range: 780 to 1650 nm 1300, 1550 nm: –35 to +23 dBm 850 nm: –30 to +23 dBm

Optional RF Adapters	
G710050570	Adapter Type-N(f) to Type-N(f), DC to 6 GHz, 50 Ω
G710050571	Adapter Type-N(m) to DIN(f), DC to 4 GHz, 50 Ω
G710050572	Adapter DIN(m) to DIN(m), DC to 4 GHz, 50 Ω
G710050573	Adapter Type-N(m) to SMA(f), DC to 18 GHz, 50 Ω
G710050574	Adapter Type-N(m) to BNC(f), DC to 1.5 GHz, 50 Ω
G710050576	Adapter Type-N(m) to DIN(m), DC to 4 GHz, 50 Ω
G710050577	Adapter Type-N(f) to DIN(f), DC to 4 GHz, 50 Ω
G710050578	Adapter Type-N(f) to DIN(m), DC to 4 GHz, 50 Ω
G710050579	Adapter DIN(f) to DIN(f), DC to 4 GHz, 50 Ω

Optional Miscellaneous	
G710050581	Attenuator 40 dB, 100 W, DC to 4 GHz (unidirectional)
JD74050341	Soft carrying case
JD71050342	Hard carrying case
JD74050343	Backpack carrying case
G710050585	RF directional coupler, 700 MHz to 4 GHz, 30 dB, input/output; Type-N(m) to Type-N(f), tap off; Type-N(f)[7]
G710050586	RF Combiner, 700 MHz to 4 GHz, Type-N(f) to Type-N(m)[7]
G710550324	External battery charger
JD780A362	JD780A series user's manual – printed version

7. Highly recommended for LTE testing.

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