JD746A

CellAdvisor™ RF Analyzer

Spectrum Analyzer: 100 kHz to 4 GHz

Cable and Antenna Analyzer: 5 MHz to 4 GHz

Power Meter: 10 MHz to 4 GHz

Specification Conditions

The JD746A 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	100 kHz to 4 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 4 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	<–90 dBc/Hz (typical)
100 kHz	<–95 dBc/Hz (typical)
1 MHz	<–102 dBc/Hz (typical)

Measurement Range	
	DANL to +20 dBm
Input attenuator range	0 to 50 dB, 5 dB steps

Maximum Input Level	
Average continuous power	+20 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 2.3 GHz	–140 dBm (–146 dBm, typical)
>2.3 GHz to 3 GHz	–138 dBm (–144 dBm, typical)
>3 GHz to 4 GHz	–135 dBm (–140 dBm, typical)
Preamplifier On:	
10 MHz to 2.3 GHz	–155 dBm (–160 dBm, typical)
>2.3 GHz to 3 GHz	–153 dBm (–158 dBm, typical)
>3 GHz to 4 GHz	–150 dBm (–156 dBm, typical)

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 (20 to 30°C)

5 MHz to 4 GHz	±1.25 dB, ±0.5 dB (typical)	Attenuation <40 dB
	±1.55 dB, ±1.0 dB (typical)	Attenuation ≥40 dB

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

20 MHz to 4 GHz	1.5:1 (typical)

Second Harmonic Distortion

Mixer level = –25 dBm

10 MHz to 1.3 GHz	<–65 dBc (typical)
>1.3 GHz to 4 GHz	<–70 dBc (typical)

Third-order Inter-modulation (Third-order Intercept: TOI)

200 MHz to 2 GHz	+10 dBm (typical)
>2 GHz to 4 GHz	+12 dBm (typical)

Spurious

Inherent residual response

Input terminated, 0 dB attenuation, preamplifier off, RBW at 10 kHz

20 MHz to 3 GHz	–90 dBm (nominal)
>3 GHz to 4 GHz	–85 dBm (nominal)
Exceptions	<–80 dBm @ 311.94 MHz <–84 dBm @ 415.92 MHz <–85 dBm @ 519.90, 1599.00, and 2497.80 MHz
Input related spurious	<–70 dBc (nominal)

Dynamic Range

2/3 (TOI-DANL) in 1 Hz RBW	>95 dB

Sweep Time

Range	80 ms to 1000 s	
	24 µs to 200 s	Span = 0 Hz (zero span)
Sweep 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
PIM detect
Dual spectrum

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

Cable and Antenna Analyzer (Standard)

Frequency

Range	5 MHz to 4 GHz
Resolution	10 kHz
Accuracy	±25 ppm

Data Points

	126, 251, 501, 1001
Measurement speed	1.65 ms/point (nominal)

Measurement Accuracy

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

Output Power

High	0 dBm (typical)
Low	–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	$(1.5x10^8)$ x (V_p) / (delta) x (0.95) 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 4 GHz
Span	100 kHz to 100 MHz
Dynamic range	–120 to +20 dBm
Maximum power	+20 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 4 GHz
Frequency resolution	10 kHz

Output Power	
High	0 dBm (typical)
Low	–30 dBm (typical)

Measurement Speed	
Vector	2.2 ms/point (nominal)

Dynamic Range	
Vector	5 MHz to 3 GHz, 80 dB >3 GHz to 4 GHz, 75 dB
Scalar	5 MHz to 4 GHz, >100 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 4 GHz
Frequency reference	±25 ppm Maximum
Frequency resolution	10 kHz

Output Power	
Range	0 dBm, –30 to –80 dBm
Step	1 dB
Accuracy	±1.5 dB (15 to 35°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	Collect up to 72 hours of data
RSSI	Collect up to 72 hours of data
Interference finder	
Spectrum replayer	
Dual spectrogram	

Channel Scanner (Option 012)

Frequency Range	
	10 MHz to 4 GHz

Measurement Range	
	–110 to +20 dBm

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

Wireless Connectivity (Option 006)

Bluetooth Connectivity
Personal Area Networking (PAN)
File Transfer Profile (FTP)

General Information

Inputs and Outputs	
RF in	Spectrum analyzer
Connector	Type-N, female
Impedance	50 Ω (nominal)
Damage level	>+40 dBm, ±50 VDC (nominal)
Reflection/RF out	Cable and antenna analyzer
Connector	Type-N, female
Impedance	50 Ω (nominal)
Damage level	>+37 dBm, ±50 VDC (nominal)
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 (as of serial number BEK11791)
Size	8 inch, LED backlight
Resolution	800 x 600

Power		
External DC input	12 to 19 VDC	
Power consumption	32.5 W	45 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%), 4 hours (100%)
Charging temperature	0 to 45°C (32 to 113°F) ≤85% RH
Discharging temperature	–10 to 60°C (14 to 140°F) ≤85% RH
Storage temperature[3]	–20 to 50°C (–4 to 122°F) ≤85% RH (noncondensing)

Data Storage	
Internal[4]	Minimum 20 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) at charging –10 to 55°C (14 to 131°F) at discharging
Maximum humidity	≤85% RH (noncondensing)
Shock and vibration	MIL-PRF-28800F Class 2
Storage temperature[6]	–30 to 71°C (–22 to 160°F)

EMC	
EN 61326-2-1	Complies with European EMC

Size and Weight (Standard configuration)	
Weight (with battery)	<4 kg (8.8 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 temperatures above 45°C could significantly degrade battery performance and life
4. Up to 700 traces
5. Supports USB 2.0 compatible memory devices
6. With the battery pack removed

Ordering Information

Standard

Part Number	Description
JD746A	100 kHz to 4 GHz spectrum analyzer 5 MHz to 4 GHz cable and antenna analyzer[1] 10 MHz to 4 GHz RF power meter (internal mode)

Options

NOTE: Upgrade options for the JD746A use the designation JD746AU before the respective last three-digit option number.

Part Number	Description
JD746A001	2-Port Transmission Measurement[2]
JD746A002	Bias-Tee[3]
JD746A003	CW Signal Generator
JD746A006	Bluetooth connectivity[4]
JD746A010	GPS Receiver and Antenna
JD746A011	Interference Analyzer[5, 6]
JD746A012	Channel Scanner
JD746A013	Optical Power Meter[7]

Standard Accessories

Part Number	Description
G710550326	AC/DC power adapter[8]
G710550335	Cross LAN cable (1.5 m)[8]
GC73050515	USB A to B cable (1.8 m)[8]
GC72450518	>1 GB USB memory[8]
G710550325	Rechargeable lithium ion battery[8]
G710550323	Automotive cigarette lighter 12 VDC adapter[8]
G710550316	Stylus[8]
JD740A361	JD740A series user's manual and application software — CD

1. Requires calibration kit
2. Requires dual-port calibration kit
3. Requires Option 1
4. Includes a pair of Bluetooth USB dongles with 5 dBi dipole antenna (JD70050006)
5. Highly recommend adding GPS receiver JD746A010
6. Highly recommend adding antennas G70005035x and/or G70005036x
7. Requires optical power sensors MP-60 or MP-80
8. Standard accessory that can be purchased separately

Optional Calibration Kits

Part Number	Description
JD72450509	Y-calibration kit, Type-N(m), DC to 6 GHz, 50 Ω
JD72450510	Y-calibration kit DIN(m), DC to 4 GHz, 50 Ω
JD71050507	Dual-port Type-N calibration kit, 50 Ω • Y-calibration kit, Type-N(m), DC to 4 GHz, 50 Ω • Two adapters Type-N(f) to Type-N(f), DC to 4 GHz, 50 Ω • Two 1 m RF test cables, Type-N(m) to Type-N(m), DC to 18 GHz, 50 Ω
JD71050508	Dual-Port DIN calibration kit, 50 Ω • Y-calibration kit DIN(m), DC to 4 GHz, 50 Ω • Two 1 m RF test cables, Type-N(m) to Type-N(m), DC to 18 GHz, 50 Ω • Adapter Type-N(f) to DIN(f), DC to 4 GHz, 50 Ω • Adapter Type-N(f) to DIN(m), DC to 4 GHz, 50 Ω • Adapter DIN(f) to DIN(f), DC to 4 GHz, 50 Ω • Adapter DIN(m) to DIN(m), DC to 4 GHz, 50 Ω

Optional RF Cables

Part Number	Description
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

Ordering Information (cont'd)

Optional Omni Antennas

Part Number	Description
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

Part Number	Description
G700050364	RF Yagi antenna Type-N(f), 806 MHz to 896 MHz, 10.2 dBd[9]
G700050365	RF Yagi antenna Type-N(f), 866 MHz to 960 MHz, 10.2 dBd[9]
G700050363	RF Yagi antenna Type-N(f), 1.75 GHz to 2.39 GHz, 9.8 dBd[9]
G700050366	RF Yagi antenna SMA(f), 700 MHz to 4 GHz, 1.85 dBd[10]

Optional RF Power Sensors

Part Number	Description
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

Part Number	Description
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 980 nm: –30 to +23 dBm

Optional RF Adapters

Part Number	Description
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
G710050575	Adapter Type-N(f) to Type-N(f), DC to 4 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

Part Number	Description
G710050581	Attenuator 40 dB, 100 W, DC to 4 GHz (unidirectional)
JD74050341	Soft carrying case
JD71050342	Hard carrying case
JD70050342	Hard carrying case with wheels
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)[11]
G710050586	RF combiner, 700 MHz to 4 GHz, Type-N(f) to Type-N(m)[11]
G710550324	External battery charger
JD740A362	JD740A series user's manual – printed version

9. Requires RF cable G710050530
10. Requires RF cable G710050533
11. Highly recommended for LTE testing

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