

# JD746A

## 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**

### Conditions of Specifications

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 OSL Standard.
- “Typical” or “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

\*All specifications subject to change without notice.

### 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		
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	

## 2

### 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 (Second Harmonic Intercept: SHI)

Mixer level = -25 dBm

10 MHz to 1.3 GHz	< -65 dBc (typical)
1.3 to 4.0 GHz	< -70 dBc (typical)

### Third Order Inter-modulation (Third Order Intercept: TOI)

200 MHz to 2 GHz	+10 dBm (typical)
2 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	< -85 dBm at 2497.8 and 1599.0 MHz
Input related spurious	< -70 dBc (nominal)

### Dynamic Range

2/3 (TOI-DANL) in 1Hz 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

\*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	$\pm(0.3 +  20\log(1 + 10^{EP/20}) )$ (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	
<b>Reflection (VSWR)</b>	
VSWR range	1 to 65
Return loss range	0 to 60 dB
Resolution	0.01
<b>Distance to Fault (DTF)</b>	
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	$(1.5 \times 10^8) \times (V_p) / (\Delta) \times (0.95)$ $V_p$ = Propagation Velocity $\Delta$ = Stop Freq – Start Freq [Hz]
<b>Cable Loss (1-port)</b>	
Range	0 to 30 dB
Resolution	0.01 dB
<b>1-port Phase</b>	
Range	–180° to +180°
Resolution	0.01°
<b>Smith Chart</b>	
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 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	
<b>Directional power sensor JD731B</b>	
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) <sup>1,2</sup>
<b>Directional power sensor JD733A</b>	
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) <sup>1,2</sup>
<b>Terminating power sensor JD732A</b>	
Frequency range	20 MHz to 3.8 GHz
Dynamic range	–30 to +20 dBm
Connector type	Type-N male
Measurement type	Average
Accuracy	±7% <sup>1</sup>
<b>Terminating power sensor JD734A</b>	
Frequency range	20 MHz to 3.8 GHz
Dynamic range	–30 to +20 dBm
Connector type	Type-N male
Measurement type	Peak
Accuracy	±7% <sup>1</sup>
<b>Terminating power sensor JD736A</b>	
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% <sup>1</sup>

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 <b>MP-60</b>	
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 <b>MP-80</b>	
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
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	

## 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

## General Information

### Inputs and Outputs

<b>RF in</b>	Spectrum analyzer
Connector	Type-N, female
Impedance	50 $\Omega$ (nominal)
Damage level	> +40 dBm, > $\pm$ 50 VDC (nominal)

<b>Reflection/RF out</b>	Cable and antenna analyzer
Connector	Type-N, female
Impedance	50 $\Omega$ (nominal)
Damage level	> +37 dBm, > $\pm$ 50 VDC (nominal)

<b>RF in</b>	Cable and antenna analyzer
Connector	Type-N, female
Impedance	50 $\Omega$ (nominal)
Maximum level	> +25 dBm, > $\pm$ 50 VDC (nominal)

### External trigger, GPS

Connector	SMA, female
Impedance	50 $\Omega$ (nominal)

### External ref

Connector	SMA, female
Impedance	50 $\Omega$ (nominal)
Input frequency	10 MHz, 13 MHz, 15 MHz
Input range	-5 to +5 dBm

### USB

USB host <sup>1</sup>	Type A, 1 port
USB client <sup>2</sup>	Type B, 1 port

LAN	RJ45, 10/100Base-T
-----	--------------------

GPIO	RJ45 (Factory use only)
------	-------------------------

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, 7200 mA/hr (Lithium ion)
Operating time	> 3 hours (typical)
Charge time	2.5 hours (80%), 4 hours (100%)
Storage temperature <sup>3</sup>	-10 to 60°C (14 to 140°F)

### Data Storage

Internal <sup>4</sup>	Minimum 20 MB
External <sup>5</sup>	Limited by size of USB flash drive

### Environmental

Operating temperature	-10 to 55°C (14 to 131°F)
Maximum humidity	85%
Shock and vibration	MIL-PRF-28800F Class 2
Storage temperature <sup>6</sup>	-55 to 71°C (-67 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 temperature above 45°C could degrade battery performance and life
4. Up to 200 instrument states and traces
5. Supports USB 2.0 compatible memory devices
6. With the battery pack removed

## 6

## Ordering Information

**JD746A RF Analyzer**

100 kHz to 4 GHz	Spectrum Analyzer
5 MHz to 4 GHz	Cable and Antenna Analyzer <sup>1</sup>
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.*

JD746A001	2-Port Transmission Measurement <sup>2</sup>	
JD746A002	Bias-Tee	
JD746A003	CW Signal Generator	(Requires option 01)
JD746A010	GPS Receiver and Antenna	
JD746A011	Interference Analyzer <sup>3,4</sup>	
JD746A012	Channel Scanner	
JD746A013	Optical Power Meter <sup>5</sup>	

**Standard Accessories**

G710550326	AC/DC Power Adapter <sup>6</sup>
G710550335	Cross LAN Cable (1.5 m) <sup>6</sup>
GC73050515	USB A to B Cable (1.8 m) <sup>6</sup>
GC72450518	> 1 G Byte USB Memory <sup>6</sup>
G710550325	Rechargeable Lithium ion Battery <sup>6</sup>
G710550323	Automotive Cigarette Lighter 12 VDC Adapter <sup>6</sup>
G710550316	Stylus Pen <sup>6</sup>
JD740A361	JD740A Series User's Manual and Application Software – CD

1. Requires calibration kit
2. Requires dual-port calibration kit
3. Highly recommend adding JD746A010
4. Highly recommend adding G70005035x and/or G70005036x
5. Requires MP-60 or MP-80
6. Standard accessories can be purchased separately

**Optional Calibration Kits**

JD72450509	Y-Calibration Kit, Type-N(m), DC to 4 GHz, 50 Ω
JD72450510	Y-Calibration Kit DIN(m), DC to 4 GHz, 50 Ω
JD71050507	Dual-Port Type-N Calibration Kit, 50 Ω <ul style="list-style-type: none"> <li>• Y-Calibration Kit, Type-N(m), DC to 4 GHz, 50 Ω</li> <li>• Two Adapters Type-N(f) to Type-N(f), DC to 4 GHz, 50 Ω</li> <li>• Two 1 m RF Test Cables, Type-N(m) to Type-N(m), DC to 18 GHz, 50 Ω</li> </ul>
JD71050508	Dual-Port DIN Calibration Kit, 50 Ω <ul style="list-style-type: none"> <li>• Y-Calibration Kit DIN(m), DC to 4 GHz, 50 Ω</li> <li>• Two 1 m RF Test Cables, Type-N(m) to Type-N(m), DC to 18 GHz, 50 Ω</li> <li>• Adapter Type-N(f) to DIN(f), DC to 4 GHz, 50 Ω</li> <li>• Adapter Type-N(f) to DIN(m), DC to 4 GHz, 50 Ω</li> <li>• Adapter DIN(f) to DIN(f), DC to 4 GHz, 50 Ω</li> <li>• Adapter DIN(m) to DIN(m), DC to 4 GHz, 50 Ω</li> </ul>

**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

**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

**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

## Ordering Information (Cont'd)

**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
JD732A	Terminating Power Sensor (average power) Frequency: 20 MHz to 3.8 GHz Power: -30 to +20 dBm
JD734A	Terminating Power Sensor (peak power) Frequency: 20 MHz to 3.8 GHz Power: -30 to +20 dBm
JD736A	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**

G710050571	Adapter Type-N(m) to DIN(f), DC to 4 GHz, 50 $\Omega$
G710050572	Adapter DIN(m) to DIN(m), DC to 4 GHz, 50 $\Omega$
G710050573	Adapter Type-N(m) to SMA(f), DC to 18 GHz, 50 $\Omega$
G710050574	Adapter Type-N(m) to BNC(f), DC to 1.5 GHz, 50 $\Omega$
G710050575	Adapter Type-N(f) to Type-N(f), DC to 4 GHz, 50 $\Omega$
G710050576	Adapter Type-N(m) to DIN(m), DC to 4 GHz, 50 $\Omega$
G710050577	Adapter Type-N(f) to DIN(f), DC to 4 GHz, 50 $\Omega$
G710050578	Adapter Type-N(f) to DIN(m), DC to 4 GHz, 50 $\Omega$
G710050579	Adapter DIN(f) to DIN(f), DC to 4 GHz, 50 $\Omega$

**Optional Miscellaneous**

G710050581	Attenuator 40 dB, 100 W, DC to 4 GHz (Unidirectional)
JD74050341	JD740 Soft Carrying Case
JD71050342	JD7100/JD740 Hard Carrying Case
JD74050343	JD740 Backpack Carrying Case
G710550324	External Battery Charger
JD740A362	JD740A Series User's Manual – Printed Version

**Test & Measurement Regional Sales**

<b>NORTH AMERICA</b> TOLL FREE: 1 855 ASK-JDSU 1 855 275-5378	<b>LATIN AMERICA</b> TEL: +1 954 688-5660 FAX: +1 954 3454668	<b>ASIA PACIFIC</b> TEL:+852 2892 0990 FAX:+852 2892 0770	<b>EMEA</b> TEL:+49 7121 86 2222 FAX:+49 7121 86 1222	<b><a href="http://www.jdsu.com/test">www.jdsu.com/test</a></b>
---	---	---	---	---