Anritsu

ML2530A

Calibration Receiver

100 kHz to 3 GHz

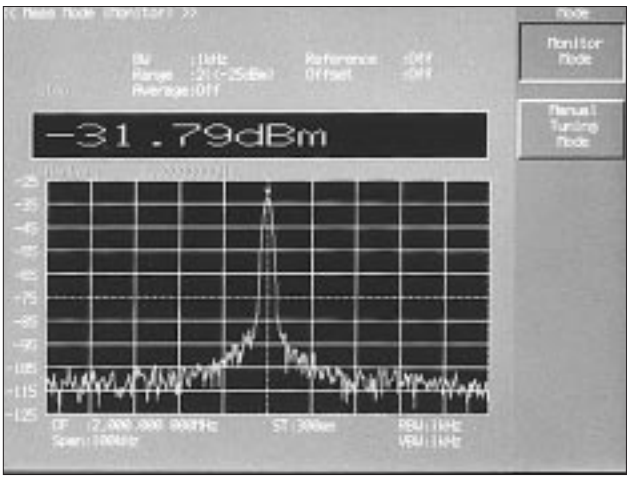
The ML2530A is a receiver for calibrating the output power level of such devices as signal generators and attenuators, covering the range of 100 kHz to 3 GHz. It is suitable for use as a reference level meter for the RF communications bands used by the world's mobile communications markets. High linearity is achieved by using a level detector that uses DSP technology. The level can be measured while observing the signal waveform to be measured by using the spectrum monitor function.

- **Supports 100 kHz to 3 GHz**
- **Wide dynamic range of –140 to +20 dBm and high linearity**
- **Provides measurement bandwidth of 1 Hz to 100 kHz, so that even signals with large residual FM can be measured using the 1 Hz bandwidth.**
- **Separate manual tuning and spectrum monitor modes**

  Manual tuning mode: High-speed measurements are available.
  Measurement result is shown on the large display.

  Monitor mode: Measured waveform can be observed.
  This function can be used to view the characteristics of signal under test.

Manual tuning mode



Monitor mode

- **Supports level units**
- **Easy to use**
- **Saves and recalls 100 measurement setups**
- **Saves and recalls 300 measurement results**

Specifications

● ML2530A (main frame)

General	Frequency range	0.1 to 3000 MHz
	Level range	–140 to +20 dBm
	RF input connector	Connector: N-J Impedance: 50 Ω VSWR: ≤1.25 (Range 1), ≤1.40 (Range 2), ≤1.50 (Range 3) Max. input level: +20 dBm, 0 Vdc
	CAL output*1	Connector: N-J Impedance: 50 Ω Frequency: 50 MHz ±500 kHz Level: 1.000 mW Level accuracy: ±1.2% (RSS: ±0.9%) Harmonic frequency: ≤–50 dBc
	Reference oscillator	Frequency: 10 MHz Start-up characteristics: ≤±5.1 x 10^{-8}/day (10 minutes after power on, with reference to frequency at 24 hours after power on) Aging rate: ≤±2.1 x 10^{-8}/day, ≤±10.1 x 10^{-8}/year (with reference to frequency at 24 hours after power on) Temperature characteristics: ≤±5.1 x 10^{-8} (with reference to frequency at 25˚C in 0˚ to 50˚C temperature range) Accuracy: ≤±15.1 x 10^{-8} (24 hours after power on, within 6 months of calibration)
	External reference input	Connector: BNC-J Impedance: 50 Ω Frequency: 10 MHz ±10 Hz Level: 0.5 to 5.0 Vp-p
	Internal reference output	Connector: BNC-J Impedance: 50 Ω Frequency: 10 MHz Frequency accuracy: Same as reference oscillator Level: 2.1 V ±0.6 Vp-p (when 2 m coaxial cable terminated with 50 Ω)
Level measurement	Measurement modes	Manual tuning: Measures level of frequency input directly by ten keys and encoder Monitor: Measures level of frequency specified by marker on spectrum monitor
	Measured frequencies	Range: 100 kHz to 3000 MHz, Resolution: 1 Hz
	Measurement bandwidth	Range: 1 Hz to 100 kHz (1-10 sequence) Filter: Gaussian type Accuracy (3 dB width): ±20% (BW: 1 Hz), ±5% (BW: 10 Hz to 100 kHz)
	Measured level	Range: –140 to +20 dBm Resolution: 0.1, 0.01, 0.001 dB
	Range	Range 1: –35 to +20 dBm, Range 2: –80 to –25 dBm, Range 3: –140 to –70 dBm
	Error*2	Total relative error: In-range linearity + range switching error + noise floor error +1 digit error Total absolute error: Total relative error + CAL output level accuracy + mismatch error at CAL + sensor module calibration factor uncertainty + calibration receiver linearity + sensor module insertion loss reproducibility + mismatch error In-range linearity: ±0.05 dB/55 dB (BW: 1/10/100 Hz, RSS: ±0.03 dB/55 dB) ±0.09 dB/55 dB (BW: 1/10 kHz, RSS: ±0.07 dB/55 dB) ±0.22 dB/55 dB (BW: 100 kHz, RSS: ±0.20 dB/55 dB) *In same range, BW: 100 kHz, frequency: ≥1 MHz Range switching error: ±0.01 dB (at range switch point: –30, –75 dBm) Noise floor (BW: at 100 Hz): ≤–70 dBm (Range 1, ≤11 MHz), ≤–80 dBm (Range 1, >11 MHz), ≤–115 dBm (Range 2, ≤11 MHz), ≤–120 dBm (Range 2, >11 MHz), ≤–125 dBm (Range 3, ≤11 MHz), ≤–135 dBm (Range 3, >11 MHz), Noise floor error: ±0.05 dB (S/N: ≤35 dB), ±0.04 dB (S/N: ≤25 dB), not specified (S/N: ≤10 dB) Frequency drift error: ±0.007 dB (1% of BW frequency drift relative to set signal frequency) BW switching error: ±0.01 dB (BW: 1 Hz to 10 kHz), ±0.05 dB (BW: 1 Hz to 100 kHz, frequency: ≥1 MHz) *Excluding effect of measured signal residual FM
	Average	Measurement times: 1 to 256
	Display units	dBm, dB, dBμ, dBμ (emf) W, mW, μW, pW, fW, aW (automatically chosen best unit for measured value) V, mV, μV, nV, pV (automatically chosen best unit for measured value)

Level measurement	Display digits	dB units: 0.1, 0.01, 0.001 dB W/V units: 3, 4, 5 digits
	Reference	Set any value: –180 to +60 dBm Meas → Ref: Obtain current measured value
	Offset	Setting range: –100 to +100 dB
	Calibration	Calibration frequency count: 300 Calibration level: 0 dBm +3/–4 dB (relative level calibration at Range 1, using MA2540A) –30 dBm +3/–4 dB (calibration between Range 1 and Range 2) –75 dBm +3/–4 dB (calibration between Range 2 and Range 3)
Spectrum monitor	Center frequency	100 kHz to 3000 MHz, Min. setting resolution: 1 Hz
	Frequency span	10 kHz to 1 MHz, Setting resolution: 1 Hz
	Resolution bandwidth	300 Hz to 100 kHz (1-3 sequence)
	Video bandwidth	10 Hz to 100 kHz (1-3 sequence)
	Sweep time	100 ms to 1000 s
	Reference level	Range 1: +20 dBm, Range 2: –25 dBm, Range 3: –70 dBm
	Markers	Functions MKR → PEAK: Moves marker to max. level in monitored range MKR → CNTR: Sets marker frequency to center frequency of monitored range PEAK → CNTR: Sets max. level frequency to center frequency of monitored range Frequency readout level Range 1: ≥–35 dBm, Range 2: ≥–80 dBm, Range 3: ≥–100 dBm Zone marker width: Spot, 1, 5, 10 div.
	Auto-tune	Signal detection frequency range: 30 to 3000 MHz Signal detection level: ≥–30 dBm
Others	Save/recall	Save count: 100
	Panel lock	Function: Disables all key and encoder functions except power switch and panel lock key
	GPIB	Function: Used to control ML2530A as device from controller Interface functions: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2
	Power	100 to 120 V/200 to 240 V (auto-switching), 47.5 to 63 Hz, ≤120 VA
	Dimensions and mass	426 (W) x 221.5 (H) x 451 (D) mm, ≤17.9 kg
	Environmental conditions	Operating temperature range: 0˚ to 50˚C Storage temperature range: –20˚ to +60˚C

*1: At constant temperature in operating range of 15˚ to 35˚C
*2: At fixed temperature in ambient temperature range of 15˚ to 35˚C, and level calibration after 1 hour warm-up

MA2450A Sensor Module

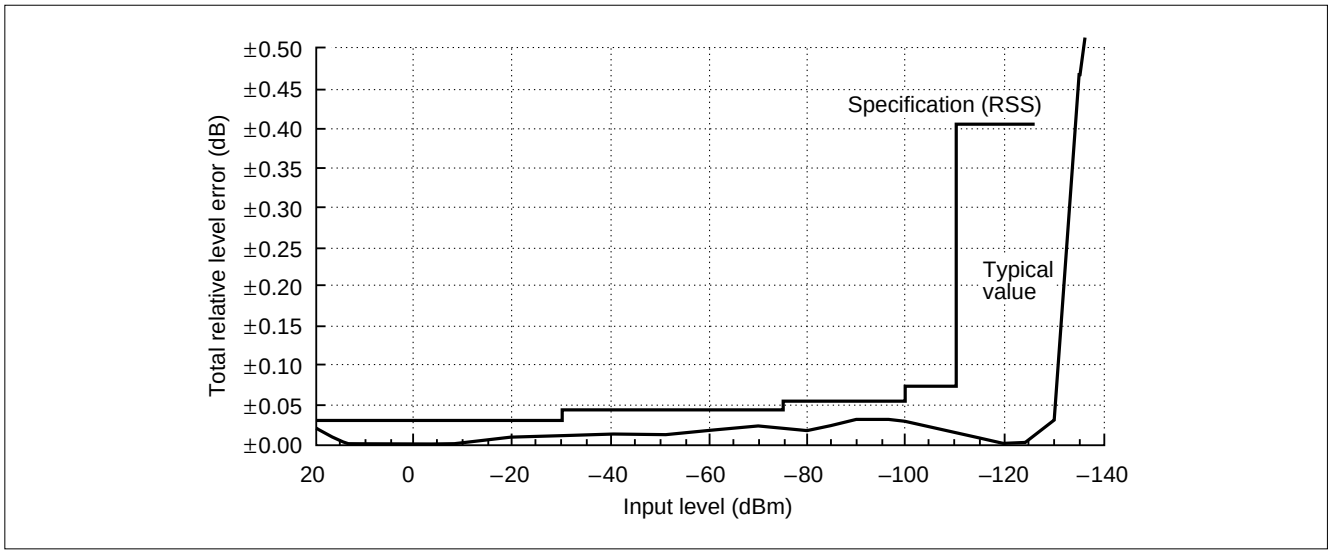
Frequency range	100 kHz to 3000 MHz
Level	Level range: –140 to +20 dBm, Max. input level: +20 dBm
RF input connector	Type: N-J Nominal impedance: 50 Ω VSWR (power sensor side): ≤1.30 (100 to 300 kHz), ≤1.20 (0.3 to 1 MHz), ≤1.36 (1 to 3000 MHz) VSWR (through side): ≤1.12 (0.1 to 100 MHz), ≤1.35 (100 to 3000 MHz)
RF output connector	Type: N-J, Nominal impedance: 50 Ω
RF input/output characteristics	Through side insertion loss: ≤0.7 dB Through side insertion loss reproducibility: ±0.006 dB
Dimensions and mass	63 (W) x 54 (H) x 206 (D) mm, ≤1 kg
Environmental conditions	Same as the ML2530A

Sensor module calibration factor uncertainty

Frequency	Simple total	RSS total
0.1 MHz	±3.0%	±1.4%
10 MHz	±2.4%	±1.1%
100 MHz	±2.4%	±1.1%
1000 MHz	±3.0%	±1.4%
2000 MHz	±3.0%	±1.4%
3000 MHz	±3.2%	±1.5%

Total level error

The total level error is the total of each error source. For example, the total relative level error at a frequency of 1 GHz and a BW of 100 Hz is as shown below.



The absolute level error for a measured signal at a frequency of 1 GHz, measurement bandwidth of 100 Hz, device under test VSWR of 1.5, and signal level of –100 dBm is as follows.

Source of uncertainty	NIST traceable uncertainty
Relative level error at –100 dBm	1.6% (±0.07 dB)
CAL output level error	±0.93%
Mismatch error at calibration	±0.23%
Sensor module calibration factor error at measured frequency	±1.4%
Linearity error of the ML2530A power measurement section	±1.0%
Sensor module relay repeatability	±0.14% (±0.006 dB)
DUT mismatch error sensor module + calibration receiver VSWR: 1.2 (typ.)	±3.7%
Total (RSS)	±4.5 (±0.19 dB)

Ordering Information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name		Remarks
	Main frame		
ML2530A	Calibration Receiver		
	Standard accessories		
J0017	Power cord, 2.6 m:	1 pc	
F0012	Fuse, 3.15 A:	2 pcs	
W1492AE	ML2530A operation manual:	1 copy	
	Optional accessories		
MP721A	Fixed Attenuator		3 dB, 2 W
MP721B	Fixed Attenuator		6 dB, 2 W
MP721C	Fixed Attenuator		10 dB, 2 W
MP721D	Fixed Attenuator		20 dB, 2 W
MP721E	Fixed Attenuator		30 dB, 2 W
MP721F	Fixed attenuator		40 dB, 2 W
MP721G	Fixed attenuator		50 dB, 2 W
MP721H	Fixed attenuator		60 dB, 2 W
J0078	High power fixed attenuator		20 dB, 10 W
J0063	High power fixed attenuator		30 dB, 10 W
J0395	High power fixed attenuator		30 dB, 30 W
J0007	GPIB cable, 1 m		
J0008	GPIB cable, 2 m		
J0431F	Coaxial cable (BNC-P • RG55A/U • BNC-P), 1 m		
J0431G	Coaxial cable (BNC-P • RG55A/U • BNC-P), 2 m		
J0903A	Coaxial cable (NP • RG-142B/U • N-P), 1.5 m		
J0904A	Sensor module cable, 1.5 m		For MA2540A control
B0333D	Rack mount kit		
B0329D	Front cover		
B0331D	Front handle		2 pcs/set
B0332	Joint plate		4 pcs/set
B0334D	Carrying case		Hard type, with protective cover and casters
	Peripheral instruments		
MS616B	Modulation Analyzer		150 kHz to 3000 MHz
MG3633A	Synthesized Signal Generator		10 kHz to 2700 MHz
	Sensor module		
MA2540A	Sensor Module		
	Standard accessories		
J0903A	Coaxial cable (N-P • RG-142B/U • N-P), 1.5 m:	1 pc	
J0904A	Sensor module cable, 1.5 m:	1 pc	For MA2540A control
W1491AE	MA2540A operation manual:	1 copy	

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Specifications are subject to change without notice.

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