

S2438 Series Microwave Power Meter

Datasheet



Saluki Technology Inc.

The document applies to following models:

- S2438PA (750GHz, 1CH, CW/peak power measurement)
- S2438PB (750GHz, 2CH, CW/peak power measurement)
- S2438CA (750GHz, 1CH, Continuous wave measurement)
- S2438CB (750GHz, 2CH, Continuous wave measurement)

Standard Pack:

- 1x Main Machine
- 1x Power Cord
- 1x U Disk (for documents)
- 1x Connection Cable (1.5m)

Ordering Information:

Main machine:

- S2438PA Power Meter
- S2438PB Power Meter
- S2438CA Power Meter
- S2438CB Power Meter

Hardware Options:

- S2438-001: S71710A Continuous Wave Power Sensor (9kHz - 12GHz)
- S2438-002: S71710D Continuous Wave Power Sensor (10MHz - 18GHz)
- S2438-003: S71710E Continuous Wave Power Sensor (50MHz - 26.5GHz)
- S2438-004: S71710F Continuous Wave Power Sensor (50MHz - 40GHz)
- S2438-005: S71710LB Continuous Wave Power Sensor (50MHz - 67GHz)
- S2438-006: S81702D Peak/CW Power Sensor (50MHz - 18GHz)
- S2438-007: S81702E Peak/CW Power Sensor (500MHz - 26.5GHz)
- S2438-008: S81702F Peak/CW Power Sensor (500MHz - 40GHz)
- S2438-009: S81702L Peak/CW Power Sensor (500MHz - 67GHz)

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- S2438-010: S81703D Peak/CW Power Sensor (50MHz - 18GHz)
 - S2438-011: S81703E Peak/CW Power Sensor (500MHz - 26.5GHz)
 - S2438-012: S81703F Peak/CW Power Sensor (500MHz - 40GHz)
 - S2438-013: S81703L Peak/CW Power Sensor (500MHz - 67GHz)
 - S2438-014: S87115NA Millimeter Wave Power Sensor (50GHz - 75GHz)
 - S2438-015: S87115P Millimeter Wave Power Sensor (75GHz - 110GHz)
 - S2438-016: S87115Q Millimeter Wave Power Sensor (110GHz - 170GHz)
 - S2438-017: S87115R Millimeter Wave Power Sensor (170GHz - 220GHz)
 - S2438-018: S87115S Millimeter Wave Power Sensor (220GHz - 325GHz)
 - S2438-019: S87115T Millimeter Wave Power Sensor (325GHz - 500GHz)
 - S2438-020: S87115N Millimeter Wave Power Sensor (60GHz - 90GHz)
 - S2438-021: S87115QA Millimeter Wave Power Sensor (90GHz - 140GHz)
 - S2438-022: S87115SA Millimeter Wave Power Sensor (170GHz - 260GHz)
 - S2438-023: S87115TA Millimeter Wave Power Sensor (260GHz - 400GHz)
 - S2438-024: S87115U Millimeter Wave Power Sensor (500GHz - 750GHz)
 - S2438-025: S87103NA Peak Power Sensor (50GHz - 75GHz)
 - S2438-026: S87103N Peak Power Sensor (60GHz - 90GHz)
 - S2438-027: S87103P Peak Power Sensor (75GHz - 110GHz)
 - S2438-028: 71523B Fixed Attenuator (Frequency range: DC-18GHz, attenuation: 30dB, power handling: 50W)
 - S2438-029: 71524C Fixed Attenuator (Frequency range: DC-18GHz, attenuation: 30dB, power handling: 100W)
 - S2438-030: 2U-213 Racking Kit
 - S2438-031: Rear Panel Output
 - S2438-032: Probe Connection Cable (1.5m)
 - S2438-033: 2438 aluminum alloy box for transportation

Note: S2438CA/CB Power Meter only can choose continuous wave and millimeter wave power sensors. S2438PA/ PB can choose all of power sensors.

Preface

Thank you for choosing Saluki Technology Products.

We devote ourselves to meeting your demands, providing you high-quality measuring instrument and the best after-sales service. We persist with “superior quality and considerate service”, and are committed to offering satisfactory products and service for our clients.

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Document Authorization

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Product Quality Assurance

The warranty period of the product is 36 months from the date of delivery. The instrument manufacturer will repair or replace damaged parts according to the actual situation within the warranty period.

Product Quality Certificate

The product meets the indicator requirements of the document at the time of delivery. Calibration and measurement are completed by the measuring organization with qualifications specified by the state, and relevant data are provided for reference.

Quality/Settings Management

Research, development, manufacturing and testing of the product comply with the requirements of the quality and environmental management system.

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1 Overview

The S2438 series microwave power meter is composed of a host of microwave power meter and a series of microwave power sensors. New technologies such as broadband diode detection technology, digital signal processing technology and multi-dimensional calibration compensation technology are used in the design, making the instrument have a wide frequency band, large dynamic power range, high precision, fast measurement and analysis, serialization of sensors, and ease of use are all used to measure and measure the average power, peak power and pulse envelope power of microwave signals. It is an important measurement instrument for the research, production, acceptance and maintenance of radar, electronic countermeasures, and communications.

S2438 series microwave power meter is a good substitute of Keysight N1911A / N1912A / N1913A / N1914A.

2 Key Feature

- Wide frequency range, frequency range from 9kHz to 500GHz
- A variety of sensor options, series of continuous wave power sensor frequency to 500GHz, single sensor maximum power dynamic range 90dB. Series peak power sensor frequency to 67GHz, single sensor maximum power dynamic range 60dB;
- Has more than ten kinds of microwave millimeter wave pulse modulation signal amplitude and time domain parameter measurement analysis function;
- The series of peak power sensors uses internal calibration technology that allows calibration without leaving the DUT and zero calibration without disconnecting the signal input.
- Flexible and open frequency offset list setting, matched with high power attenuator or high power directional coupler to achieve accurate testing of signal power;
- 4.3 color LCD display, Chinese/English graphical user interface, user-friendly;
- With GPIB, LAN, USB program control function, easy to build test system.

3 Main Functions

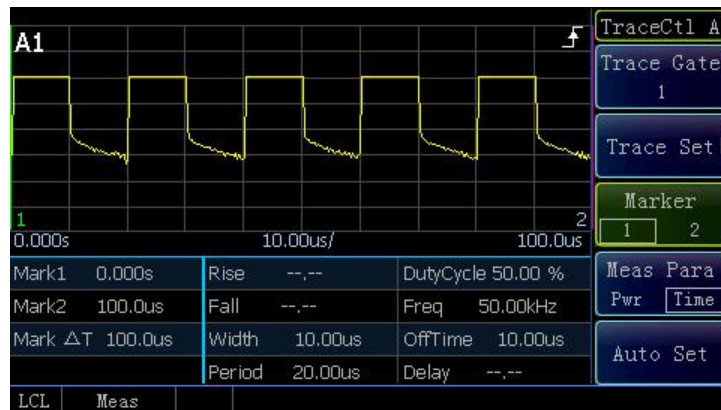
3.1 Multi-measurement mode to fit different measurement requirements

S2438 series microwave power meter has **continuous wave measurement, peak measurement, CCDF statistical measurement** three measurement modes.

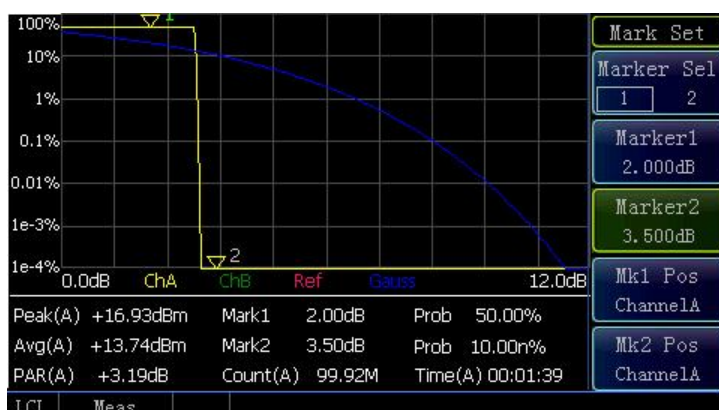
When S2438 is connected to a continuous wave power sensor, then it is a traditional continuous wave power meter capable of 9 kHz to 750 GHz accurate power measurement. The single sensor's power measurement dynamic range is up to 90dB.



When the peak power sensor is connected, it is a high performance peak power meter. It can measure and analyze amplitude and time domain parameters of pulse modulated signals in the frequency range from 50MHz to 67GHz.



In the statistical measurement mode, the instrument does not need to trigger an event to measure, but instead continuously samples the signal. The CCDF indicates the percentage of the sample in a specific sample whose power level is greater than or equal to a specific value, and it can also be expressed as 1-CDF (1 minus CDF).



3.2 Set frequency response offset for accurate measurement of high power

This function stores the frequency response of high power directional couplers or high power attenuators for high power signal measurements offset is very useful. After the frequency response bias function is activated, the power meter automatically roots the system during automatic calibration and power measurement. According to the sensor calibration table and frequency offset table, calibration factors are set to correct the measurement results to ensure the measurement accuracy.

FDO1 Name : User1		FDO
Frequency	Offset	Edit
1.000GHz	3.01dB	Insert
2.000GHz	2.50dB	
3.000GHz	1.80dB	Delete
4.000GHz	1.90dB	
5.000GHz	2.00dB	Edit Unit
6.000GHz	2.10dB	
7.000GHz	1.80dB	Log Lin
8.000GHz	2.00dB	
9.000GHz	1.60dB	

3.3 Quick calibration peak power sensor

The peak power sensor uses an internal zero calibration technique that makes the peak power sensor's auto-calibration extremely fast. In addition, calibration can be performed without leaving the device under test, and zero calibration can be performed without disconnecting the signal input.

3.4 User statuses save/load

In order to reduce the repetitive setting process, the user can store configuration information for up to 10 statuses. These configuration parameters are saved in the system and can be easily invoked when the user makes similar measurements.

3.5 Remote control mode

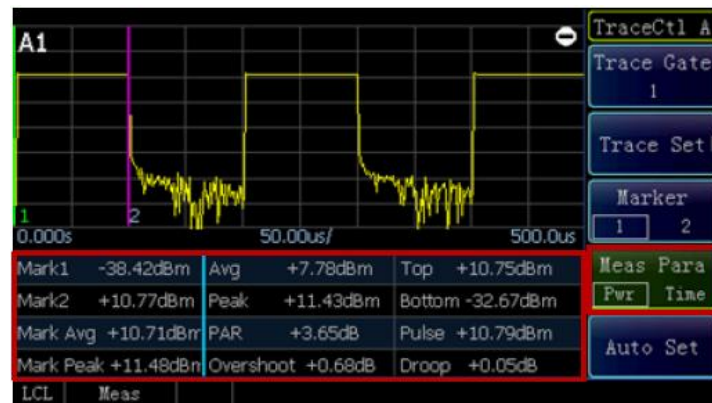
S2438 series microwave power meter supports remote control via GPIB, LAN and USB. Very convenient for user to build the measurement system.

4 Typical Applications

S2438 series Microwave Power Meter is a high-performance, general-purpose average/peak microwave power measurement instrument designed to measure average power, peak power, and pulse envelope power of microwave signals.

In the continuous wave mode, it is a universal conventional microwave power meter. In the peak measurement mode, the instrument can automatically measure microwave millimeter wave pulse modulation through different time base settings.

Peak power, pulse power, average power, overshoot, rise time, fall time, top amplitude, bottom amplitude, pulse width, pulse period, duty cycle, off-time, pulse repetition frequency and more than ten kinds of pulse envelope parameters.



5 Specifications

Main Machine

	S2438PA/PB	S2438CA/CB
Channel	Single/Dual	Single/Dual
Frequency Range	9kHz - 750GHz	9kHz - 750GHz
Pulse Power Range	-40dBm to +20dBm	-
CW Power Range	-70dBm to +50dBm	-70dBm to +50dBm
Resolution	Logarithmic: 0.001dB Linear: 10^{-4}	Logarithmic: 0.001dB Linear: 10^{-4}
Offset Range	± 100.00 dB	± 100.00 dB
Pulse Rise Time	≤ 13 ns	-
Video Bandwidth	≥ 30 MHz	-
Max Pulse Repetition Frequency	15MHz	-
Min Pulse Width	40ns	-
Time Base	2ns/div to 3600s/div	-
Internal Trigger Level Range	-20dBm to +20dBm	-
Calibration Source Frequency	50MHz $\pm$ 1MHz	50MHz $\pm$ 1MHz
Calibration Source Power	1.000mW(1 $\pm$ 1.0%)	1.000mW(1 $\pm$ 1.0%)
Output Port	N (f)	N(f)
Uncertainty	± 0.04 dB	± 0.04 dB
Display	4.3" color LCD	4.3" color LCD
Power	90-240VAC, 50/60Hz	90-240VAC, 50/60Hz
Consumption	50W	50W
Type	Bench top	Bench top
Dimension	212 mm x 97 mm x 344 mm	212 mm x 97 mm x 344 mm

	S2438PA/PB	S2438CA/CB
Weight	3.7kg	3.7kg
Working/Storage Temperature	0°C to 50°C/ -40°C to +70°C	0°C to 50°C/ -40°C to +70°C

Note 1: The pulse power range of the 2438PA/PB when used with the 81702D/E/F/L is -20dBm to +20dBm.

When used with the 81703D/E/F/L, the range is -40dBm to +20dBm.

Note 2: The maximum measurement power can be extended to +50dBm by using the optional fixed attenuator.

Note 3: When the 2438PA/PB is used with the 81702D/E/F/L, the rise time is $\leq 13\text{ns}$, the video bandwidth is $\geq 30\text{MHz}$, the maximum measurable pulse repetition frequency is 15MHz, the minimum measurable pulse width is 40ns, and the internal trigger level range is -10dBm to +20dBm.

When the 2438PA/PB is used with the 81703D/E/F/L, the rise time is $\leq 100\text{ns}$, the video bandwidth is $\geq 5\text{MHz}$, the maximum measurable pulse repetition frequency is 3MHz, the minimum measurable pulse width is 150ns, and the internal trigger level range is -20dBm to +20dBm.

Continuous Wave Power Sensors (Coaxial)

S71710A Continuous Wave Power Sensor	Frequency Range	9kHz - 12GHz	
	Power Range	-60dBm to +20dBm	
	SWR	100kHz - 12GHz	1.2
	Calibration Fact Uncertainty	9kHz - 12GHz	$\pm 4.0\%$
	Test Port	N (m)	
S71710D Continuous Wave Power Sensor	Frequency Range	10MHz - 18GHz	
	Power Range	-70dBm to +20dBm	
	SWR	10MHz - 50MHz	1.35
		50MHz - 2GHz	1.15
		2GHz - 12.4GHz	1.2
		12.4GHz - 18GHz	1.26
	Calibration Fact Uncertainty	10MHz - 18GHz	$\pm 4.5\%$

	Test Port	N (m)	
S71710E Continuous Wave Power Sensor	Frequency Range	50MHz - 26.5GHz	
	Power Range	-70dBm to +20dBm	
	SWR	50MHz- 2GHz	1.15
		2GHz - 12.4GHz	1.20
		12.4GHz - 18GHz	1.26
		18GHz - 26.5GHz	1.35
	Calibration Fact Uncertainty	50MHz - 18GHz	±4.5%
		18GHz - 26.5GHz	±5.9%
	Test Port	3.5mm (m)	
S71710F Continuous Wave Power Sensor	Frequency Range	50MHz - 40GHz	
	Power Range	-70dBm to +20dBm	
	SWR	50MHz- 2GHz	1.15
		2GHz - 12.4GHz	1.20
		12.4GHz - 18GHz	1.26
		18GHz - 26.5GHz	1.35
		26.5GHz - 40GHz	1.50
	Calibration Fact Uncertainty	50MHz - 18GHz	±4.5%
		18GHz - 26.5GHz	±5.9%
		26.5GHz - 40GHz	±6.9%
	Test Port	2.4mm (m)	
S71710LB Continuous Wave Power Sensor	Frequency Range	50MHz - 67GHz	
	Power Range	-50dBm to +20dBm	
	SWR	50MHz- 18GHz	1.13
		18GHz - 26.5GHz	1.25
		26.5GHz - 50GHz	1.36

		50GHz - 67GHz	1.30
	Calibration Fact Uncertainty	50MHz - 18GHz	±4.5%
		18GHz - 26.5GHz	±5.9%
		26.5GHz - 40GHz	±6.9%
		40GHz - 67GHz	±7.9%
	Test Port	1.85mm (m)	

Peak/CW Power Sensors (Coaxial)

81702D Peak/CW Power Sensor	Frequency Range	50MHz - 18GHz	
	Pulse Power Range	-20dBm to +20dBm	
	Pulse Rise Time	≤10ns	
	SWR	50MHz - 2GHz	1.15
		2GHz - 18GHz	1.26
	Calibration Fact Uncertainty	50MHz - 18GHz	±5%
	Test Port	N (m)	
81702E Peak/CW Power Sensor	Frequency Range	500MHz - 26.5GHz	
	Pulse Power Range	-20dBm to +20dBm	
	Pulse Rise Time	≤10ns	
	SWR	500MHz - 2GHz	1.15
		2GHz - 18GHz	1.26
		18GHz - 26.5GHz	1.35
	Calibration Fact Uncertainty	50MHz - 18GHz	±5%
		18GHz - 26.5GHz	±6%
	Test Port	3.5mm (m)	
81702F Peak/CW Power Sensor	Frequency Range	500MHz - 40GHz	
	Pulse Power Range	-20dBm to +20dBm	

	Pulse Rise Time	$\leq 10\text{ns}$	
	SWR	500MHz - 2GHz	1.15
		2GHz - 18GHz	1.26
		18GHz - 26.5GHz	1.35
		26.5GHz - 40GHz	1.50
	Calibration Fact Uncertainty	50MHz - 18GHz	$\pm 5\%$
		18GHz - 26.5GHz	$\pm 6\%$
		26.5GHz - 40GHz	$\pm 7.5\%$
	Test Port	2.4mm (m)	
81702L Peak/CW Power Sensor	Frequency Range	500MHz - 67GHz	
	Pulse Power Range	-20dBm to +20dBm	
	Pulse Rise Time	$\leq 10\text{ns}$	
	SWR	500MHz - 2GHz	1.15
		2GHz - 18GHz	1.26
		18GHz - 26.5GHz	1.35
		26.5GHz - 40GHz	1.50
		40GHz - 67GHz	1.78
	Calibration Fact Uncertainty	50MHz - 18GHz	$\pm 5\%$
		18GHz - 26.5GHz	$\pm 6\%$
		26.5GHz - 40GHz	$\pm 7.5\%$
		40GHz - 67GHz	$\pm 8.5\%$
	Test Port	1.85mm (m)	
81703D Peak/CW Power Sensor	Frequency Range	50MHz - 18GHz	
	Pulse Power Range	-40dBm to +20dBm	
	Pulse Rise Time	$\leq 100\text{ns}$	
	SWR	50MHz - 2GHz	1.15

		2GHz - 18GHz	1.26
	Calibration Fact Uncertainty	50MHz - 18GHz	±5%
	Test Port	N (m)	
81703E Peak/CW Power Sensor	Frequency Range	500MHz - 26.5GHz	
	Pulse Power Range	-40dBm to +20dBm	
	Pulse Rise Time	≤100ns	
	SWR	500MHz - 2GHz	1.15
		2GHz - 18GHz	1.26
		18GHz - 26.5GHz	1.35
	Calibration Fact Uncertainty	50MHz - 18GHz	±5%
		18GHz - 26.5GHz	±6%
	Test Port	3.5mm (m)	
81703F Peak Power Sensor	Frequency Range	500MHz - 40GHz	
	Pulse Power Range	-40dBm to +20dBm	
	Pulse Rise Time	≤100ns	
	SWR	500MHz - 2GHz	1.15
		2GHz - 18GHz	1.26
		18GHz - 26.5GHz	1.35
		26.5GHz - 40GHz	1.50
	Calibration Fact Uncertainty	50MHz - 18GHz	±5%
		18GHz - 26.5GHz	±6%
		26.5GHz - 40GHz	±7.5%
	Test Port	2.4mm (m)	
81703L Peak Power Sensor	Frequency Range	500MHz - 67GHz	
	Pulse Power Range	-40dBm to +20dBm	

	Pulse Rise Time	$\leq 100\text{ns}$	
	SWR	500MHz - 2GHz	1.15
		2GHz - 18GHz	1.26
		18GHz - 26.5GHz	1.35
		26.5GHz - 40GHz	1.50
		40GHz - 67GHz	1.78
	Calibration Fact Uncertainty	50MHz - 18GHz	$\pm 5\%$
		18GHz - 26.5GHz	$\pm 6\%$
		26.5GHz - 40GHz	$\pm 7.5\%$
		40GHz - 67GHz	$\pm 8.5\%$
	Test Port	1.85mm (m)	

Millimeter wave power sensor (waveguide)

S87115NA Millimeter wave power sensor	Frequency Range	50GHz - 75GHz
	Power Range	-30dBm to +20dBm
	SWR	1.35
	Test Port	WR15.0
S87115N Millimeter wave power sensor	Frequency Range	60GHz - 90GHz
	Power Range	-50dBm to +20dBm
	SWR	1.30
	Test Port	WR12.0
S87115P Millimeter wave power sensor	Frequency Range	75GHz - 110GHz
	Power Range	-30dBm to +20dBm
	SWR	1.35
	Test Port	WR10.0

S87115QA Millimeter wave power sensor	Frequency Range	90GHz - 140GHz
	Power Range	-40dBm to +20dBm
	SWR	1.45
	Test Port	WR8.0
S87115Q Millimeter wave power sensor	Frequency Range	110GHz - 170GHz
	Power Range	-30dBm to +20dBm
	SWR	1.45
	Test Port	WR6.5
S87115R Millimeter wave power sensor	Frequency Range	170GHz - 220GHz
	Power Range	-30dBm to +20dBm
	SWR	1.50
	Test Port	WR5.1
S87115SA Millimeter wave power sensor	Frequency Range	170GHz - 260GHz
	Power Range	-30dBm to +20dBm
	SWR	1.50
	Test Port	WR4.3
S87115S Millimeter wave power sensor	Frequency Range	220GHz - 325GHz
	Power Range	-30dBm to +20dBm
	SWR	1.50
	Test Port	WR3.4
S87115TA Millimeter wave power sensor	Frequency Range	260GHz - 400GHz
	Power Range	-30dBm to +20dBm
	SWR	1.7
	Test Port	WR2.8
S87115T Millimeter wave	Frequency Range	325GHz - 500GHz
	Power Range	-30dBm to +20dBm

power sensor	SWR	2.0
	Test Port	WR2.2
S87115U Millimeter wave power sensor	Frequency Range	500GHz - 750GHz
	Power Range	-30dBm to +20dBm
	SWR	2.0
	Test Port	WR1.5

Peak power sensor (waveguide)

S81703NA Peak power sensor	Frequency Range	50GHz - 75GHz
	Pulse Power Range	-20dBm to +20dBm
	Pulse Rise Time	$\leq 100\text{ns}$
	SWR	1.50
	Test Port	WR15.0
S81703N Peak power sensor	Frequency Range	60GHz - 90GHz
	Pulse Power Range	-20dBm to +20dBm
	Pulse Rise Time	$\leq 100\text{ns}$
	SWR	1.50
	Test Port	WR12.0
S81703P Peak power sensor	Frequency Range	75GHz - 110GHz
	Pulse Power Range	-20dBm to +20dBm
	Pulse Rise Time	$\leq 100\text{ns}$
	SWR	1.50
	Test Port	WR10.0

Main technical indicators of fixed attenuator

71523B	Attenuation (dB)	30
	Attenuation accuracy (dB)	± 1.7
	Frequency range (GHz)	DC to 18GHz
	SWR	1.35
	Power (W Max)	50
	Test Port	N
71524C	Attenuation (dB)	40
	Attenuation accuracy (dB)	± 2.0
	Frequency range (GHz)	DC to 18GHz
	SWR	1.5
	Power (W Max)	100
	Test Port	N

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