Multimeter Selection Guide
Fluke 8508A & Agilent 3458/HFL

TECHNICAL INFORMATION

When comparing two products features and specification using sales information it is often difficult to determine which product will meet the needs of your specific application. This is mostly because each supplier will define specifications using alternate methods. This Selection Guide will help you compare the specifications and features of the Fluke 8508A Reference multimeter with the nearest equivalent digital multimeter the Agilent 3458/HFL. Both the 8508A and the special 3458/HFL multimeters are available through the Fluke sales channel.

The following pages summarize & segment the features of each meter into the following three categories.

- Accuracy
- Functionality & Versatility
- Ease of Use

The 'Comments' column found in the following table provides a brief explanation against each feature and its relevance to the intended metrology applications.

Further reference information:

1) Agilent 3458A/HFL Technical Data - 1275558 D-ENG-N

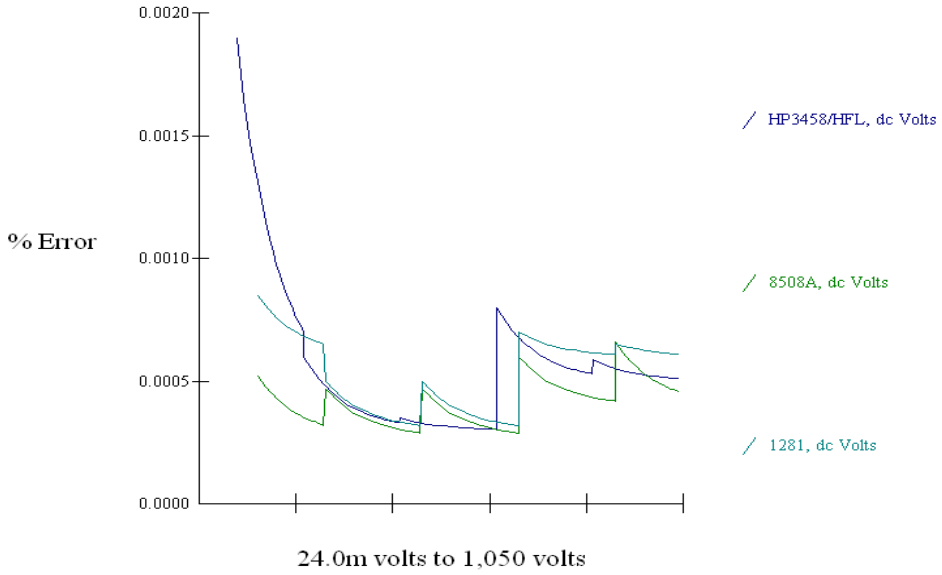
2) Fluke 8508A Extended Specifications - 1887212 D-ENG-N rev A

3) 1281Operators Handbook – 850090 issue 6

DC Voltage **±(ppm of setting + ppm of range), relative to calibration standards used.**

Calibration Interval 365 day, ±1°C of last TCAL

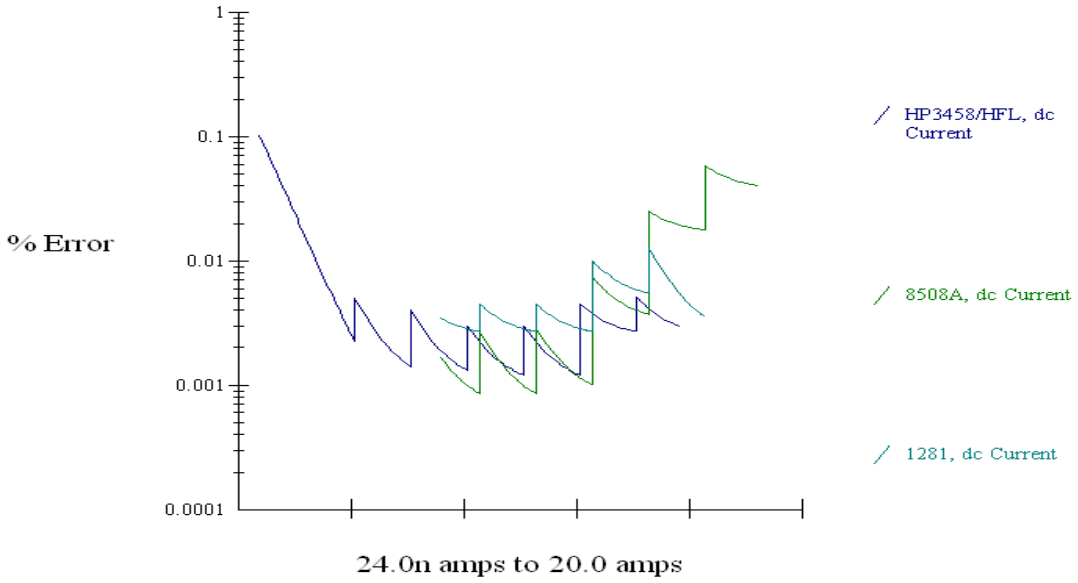
Range	1281	HP3458/HFL	8508A
120.00000mV	-	4 + 3	-
199.999999mV	6 + 0.5	-	2.7 + 0.5
1.20000000V	-	3 + 0.3	-
1.99999999V	3 + 0.2	-	2.7 + 0.2
12.000000V	-	3 + 0.05	-
19.9999999V	3 + 0.2	-	2.7 + 0.2
120.00000V	-	5 + 0.3	-
199.999999V	6 + 0.1	-	4.0 + 0.2
1050.0000V	6 + 0.1	5 + 0.1	4.0 + 0.5



DC Current ±(ppm of setting + ppm of range), relative to calibration standards used.

Calibration Interval 365 day, ±1°C of last TCAL

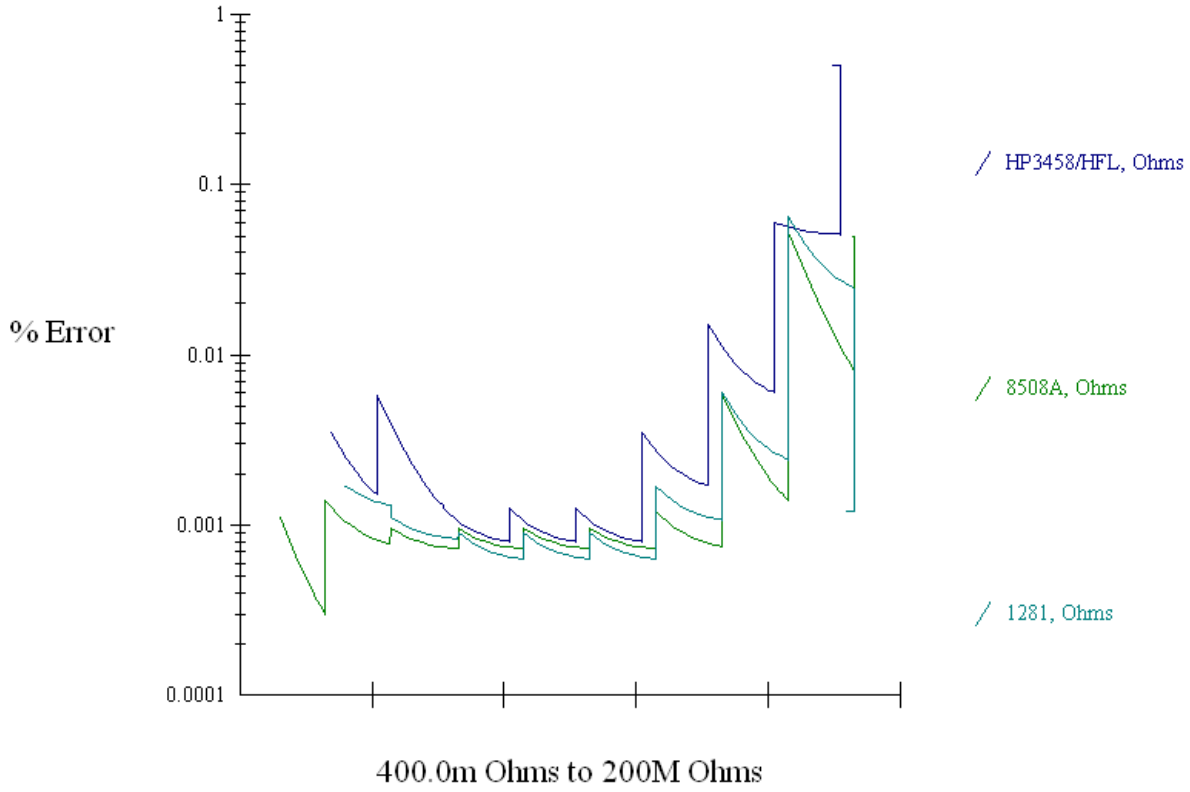
Range	1281	HP3458/HFL	8508A
120.000nA	-	30 + 400	-
1.200000µA	-	20 + 40	-
12.000000µA	-	20 + 10	-
120.00000µA 199.99999µA	- 25 + 2	20 + 8 -	- 6.5 + 2.0
1.2000000mA 1.9999999mA	- 25 + 2	20 + 5 -	- 6.5 + 2.0
12.000000mA 19.999999mA	- 25 + 2	20 + 5 -	- 8.0 + 2.0
120.00000mA 199.99999mA	- 50 + 5	35 + 5 -	- 33 + 4.0
1.0500000A 1.9999999A	- 150 + 10	110 + 10 -	- 170 + 8.0
19.999999A	-	-	380 + 20



Resistance **±(ppm of setting + ppm of range), relative to calibration standards used.**

Calibration Interval 365 day, ±1°C of last TCAL

Range	1281	HP3458/HFL	8508A
1.99999999 Ohm	-	-	10 + 2.0
12.00000 Ohm 19.9999999 Ohm	- 12 + 1.0	10 + 5 -	- 7.0 + 0.7
120.00000 Ohm 199.999999 Ohm	- 8 + 0.3	8 + 5	- 7.0 + 0.25
1.2000000 kOhm 1.99999999 kOhm	- 6 + 0.3	7.5 + 0.5 -	- 7.0 + 0.25
12.000000 kOhm 19.9999999 kOhm	- 6 + 0.3	7.5 + 0.5 -	- 7.0 + 0.25
120.00000 kOhm 199.999999 kOhm	- 6 + 0.3	7.5 + 0.5 -	- 7.0 + 0.25
1.2000000 MOhm 1.99999999 MOhm	- 10 + 0.7	15 + 2 -	- 7.0 + 0.5
12.000000 MOhm 19.9999999 MOhm	- 20 + 4.0	50 + 10 -	- 9.0 + 5.0
120.00000 MOhm 199.999999 MOhm	- 200 + 45	500 + 10 -	- 30 + 50
1.2000000 GOhm 1.99999999 GOhm	- 2000 + 450	5000 + 10 -	- 500 + 500



400.0m Ohms to 200M Ohms

AC Current **±(ppm of setting + ppm of range), relative to calibration standards used.**

Calibration Interval 365 day, ±1°C of last TCAL

Range	Frequency	1281	HP3458/HFL	8508A
120.0000µA	10Hz - 20Hz	-	4000 + 200	-
	20Hz - 45Hz	-	1500 + 200	-
	45Hz - 100Hz	-	600 + 200	-
	100Hz - 5kHz	-	600 + 200	-
199.9999µA	1Hz - 10Hz	-	-	250 + 100
	10Hz - 5kHz	200 + 200	-	-
	10Hz - 10kHz	-	-	250 + 100
	10kHz - 30kHz	-	-	600 + 100
	30kHz - 100kHz	-	-	4000 + 100
1.2000000mA	10Hz - 20Hz	-	4000 + 200	-
	20Hz - 45Hz	-	1500 + 200	-
	45Hz - 100Hz	-	600 + 200	-
	100Hz - 5kHz	-	300 + 200	-
	5kHz - 20kHz	-	600 + 200	-
	20kHz - 50kHz	-	4000 + 400	-
	50kHz - 100kHz	-	5500 + 1500	-
1.999999mA	1Hz - 10Hz	-	-	250 + 100
	10Hz - 5kHz	200 + 100	-	-
	10Hz - 10kHz	-	-	250 + 100
	10kHz - 30kHz	-	-	600 + 100
	30kHz - 100kHz	-	-	4000 + 100
12.00000mA	10Hz - 20Hz	-	4000 + 200	-
	20Hz - 45Hz	-	1500 + 200	-
	45Hz - 100Hz	-	600 + 200	-
	100Hz - 5kHz	-	300 + 200	-
	5kHz - 20kHz	-	600 + 200	-
	20kHz - 50kHz	-	4000 + 400	-
	50kHz - 100kHz	-	5500 + 1500	-
19.99999mA	1Hz - 10Hz	-	-	250 + 100
	10Hz - 5kHz	200 + 100	-	-
	10Hz - 10kHz	-	-	250 + 100
	10kHz - 30kHz	-	-	600 + 100
	30kHz - 100kHz	-	-	4000 + 100
120.0000mA	10Hz - 20Hz	-	4000 + 200	-
	20Hz - 45Hz	-	1500 + 200	-
	45Hz - 100Hz	-	600 + 200	-
	100Hz - 5kHz	-	300 + 200	-
	5kHz - 20kHz	-	600 + 200	-
	20kHz - 50kHz	-	4000 + 400	-
	50kHz - 100kHz	-	5500 + 1500	-
199.9999mA	1Hz - 10Hz	-	-	250 + 100
	10Hz - 5kHz	200 + 100	-	-
	10Hz - 10kHz	-	-	250 + 100
	10kHz - 30kHz	-	-	600 + 100
1.050000A	10Hz - 20Hz	-	4000 + 200	-
	20Hz - 45Hz	-	1600 + 200	-
	45Hz - 100Hz	-	800 + 200	-
	100Hz - 5kHz	-	1000 + 200	-
	5kHz - 20kHz	-	3000 + 200	-
	20kHz - 50kHz	-	10000 + 400	-
1.999999A	10Hz - 1kHz	500 + 200	-	-
	10Hz - 2kHz	-	-	600 + 100
	1kHz - 5kHz	1500 + 400	-	-
	2kHz - 10kHz	-	-	700 + 100
	10kHz - 30kHz	-	-	3000 + 100
19.99999A	10Hz - 2kHz	-	-	800 + 100
	2kHz - 10kHz	-	-	2500 + 100

AC Voltage ±(ppm of setting + ppm of range), relative to calibration standards used.

Calibration Interval 365 day, ±1°C of last TCAL

Range	Frequency	1281	HP3458/HFL	8508A
12.00000mV	1Hz - 40Hz	-	300 + 300	-
	40Hz - 1kHz	-	200 + 110	-
	1kHz - 20kHz	-	300 + 110	-
	20kHz - 50kHz	-	1000 + 110	-
	50kHz - 100kHz	-	5000 + 110	-
	100kHz - 300kHz	-	40000 + 200	-
120.0000mV	1Hz - 40Hz	-	70 + 40	-
	40Hz - 1kHz	-	70 + 20	-
	1kHz - 20kHz	-	140 + 20	-
	20kHz - 50kHz	-	300 + 20	-
	50kHz - 100kHz	-	800 + 20	-
	100kHz - 300kHz	-	3000 + 100	-
	300kHz - 1MHz	-	10000 + 100	-
	1MHz - 2MHz	-	15000 + 100	-
199.9999mV	1Hz - 10Hz	-	-	120 + 70
	10Hz - 40Hz	-	-	120 + 70
	40Hz - 100Hz	100 + 20	-	100 + 20
	100Hz - 2kHz	100 + 20	-	100 + 10
	2kHz - 10kHz	100 + 20	-	100 + 20
	10kHz - 30kHz	300 + 40	-	300 + 40
	30kHz - 100kHz	700 + 100	-	700 + 100
1.2000000V	1Hz - 40Hz	-	70 + 40	-
	40Hz - 1kHz	-	70 + 20	-
	1kHz - 20kHz	-	140 + 20	-
	20kHz - 50kHz	-	300 + 20	-
	50kHz - 100kHz	-	800 + 20	-
	100kHz - 300kHz	-	3000 + 100	-
	300kHz - 1MHz	-	10000 + 100	-
	1MHz - 2MHz	-	15000 + 100	-
1.999999V	1Hz - 10Hz	-	-	100 + 60
	10Hz - 40Hz	-	-	100 + 10
	40Hz - 100Hz	80 + 10	-	80 + 10
	100Hz - 2kHz	60 + 10	-	60 + 10
	2kHz - 10kHz	80 + 10	-	80 + 10
	10kHz - 30kHz	200 + 20	-	200 + 20
	30kHz - 100kHz	500 + 100	-	500 + 100
	100kHz - 300kHz	3000 + 1000	-	3000 + 1000
	300kHz - 1MHz	10000 + 10000	-	10000 + 10000
12.00000V	1Hz - 40Hz	-	70 + 40	-
	40Hz - 1kHz	-	70 + 20	-
	1kHz - 20kHz	-	140 + 20	-
	20kHz - 50kHz	-	300 + 20	-
	50kHz - 100kHz	-	800 + 20	-
	100kHz - 300kHz	-	3000 + 100	-
	300kHz - 1MHz	-	10000 + 100	-
	1MHz - 2MHz	-	15000 + 100	-

AC Voltage ±(ppm of setting + ppm of range), relative to calibration standards used.

Calibration Interval 365 day, ±1°C of last TCAL

Range	Frequency	1281	HP3458/HFL	8508A
19.99999V	1Hz - 10Hz	-	-	100 + 60
	10Hz - 40Hz	-	-	100 + 10
	40Hz - 100Hz	80 + 10	-	80 + 10
	100Hz - 2kHz	60 + 10	-	60 + 10
	2kHz - 10kHz	80 + 10	-	80 + 10
	10kHz - 30kHz	200 + 20	-	200 + 20
	30kHz - 100kHz	500 + 100	-	500 + 100
	100kHz - 300kHz	3000 + 1000	-	3000 + 1000
	300kHz - 1MHz	10000 + 10000	-	10000 + 10000
120.0000V	1Hz - 40Hz	-	200 + 40	-
	40Hz - 1kHz	-	200 + 20	-
	1kHz - 20kHz	-	200 + 20	-
	20kHz - 50kHz	-	350 + 20	-
	50kHz - 100kHz	-	1200 + 20	-
	100kHz - 300kHz	-	4000 + 100	-
	300kHz - 1MHz	-	15000 + 100	-
199.9999V	1Hz - 10Hz	-	-	100 + 60
	10Hz - 40Hz	-	-	100 + 10
	40Hz - 100Hz	80 + 10	-	80 + 10
	100Hz - 2kHz	60 + 10	-	60 + 10
	2kHz - 10kHz	80 + 10	-	80 + 10
	10kHz - 30kHz	200 + 20	-	200 + 20
	30kHz - 100kHz	500 + 100	-	500 + 100
	100kHz - 300kHz	3000 + 1000	-	3000 + 1000
	300kHz - 1MHz	10000 + 10000	-	10000 + 10000
1050.000V	1Hz - 10Hz	-	400 + 40	100 + 70
	10Hz - 40Hz	-	400 + 40	100 + 20
	40Hz - 1kHz	-	400 + 20	-
	40Hz - 10kHz	80 + 10	-	80 + 20
	1kHz - 20kHz	-	600 + 20	-
	10kHz - 30kHz	200 + 20	-	200 + 40
	20kHz - 50kHz	-	1200 + 20	-
	30kHz - 100kHz	500 + 100	-	500 + 200
	50kHz - 100kHz	-	3000 + 20	-

8508A vs 3458/HFL Functional & Versatility Parameters	Fluke 8508A 	3458/HFL 	Comments
Full Scale (dc & ac Voltage)	200mV, 2V, 20V, 200V, 1050Vrms	120mV, 1.2V, 12V, 120V, 1050Vdc (ac = 700Vrms)	8508A maintains >10Gohm input impedance to 20Vdc. This compares with 12V on 3458/HFL. The 8508A 1050Vrms measurement is often used to calibrate calibrators at 1000 Vrms output.
Full Scale (dc & ac current)	200uA, 2mA, 20mA, 200mA, 2A & 20A	100nA, 1uA, 120uA, 1.2mA, 12mA, 120mA, 1.05A	3458A/HFL has lower current ranges with a sensitivity of 1pA compared with 10pA on the 8508A – the 3458/HFL datasheet does state that lower ranges have 'typical' uncertainty only. 8508A states typical above 10kHz and 2GOhm for resistance. A 20Amp range on the 8508A improves calibration of Multi-product calibrators. This reduces the need for additional external shunts.
AC Measurement (Bandwidth)	AC Voltage - 1MHz (2%) AC Current - 100kHz (0.4%)	AC Voltage - 1MHz (1%) AC Voltage - 10MHz (15%) AC Current - 100kHz (0.7% Typical)	A DMM with 10 MOhm input impedance is generally not useful for precision ac measurement above 1MHz. A 50 Ohm termination at these frequencies is more desirable. The 8508A high frequency Current uncertainty will help maintain good TURs when calibrating Multi-Product calibrators.
Full Scale (Resistance)	2Ω, 20Ω, 200Ω, 2kΩ, 20kΩ, 200kΩ, 2MΩ, 20MΩ, 200MΩ, 2GΩ, 20GΩ (eleven ranges)	12Ω, 120Ω, 1.2kΩ, 12kΩ, 120kΩ, 1.2MΩ, 12MΩ, 120MΩ, 1.2GΩ (nine ranges)	8508A has a wide resistance measurement range. 8508A measurement resolution of 10nΩ this compares with 10uΩ on 3458/HFL
200 Ohm Resistance Range.	Selectable excitation current - 10mA & 1mA	Fixed excitation current - 10mA	Errors due to self-heating within the resistor under test are minimized when the multimeter low excitation current is maintained. Use in conjunction with RTD or low resistance measurements.

8508A vs 3458/HFL Functional & Versatility Parameters			Comments
High Resistance Measurement (compliance voltage)	Test Voltage or Full Scale stimulus = 200V	Test Voltage or Full Scale stimulus @ 1.2GΩ = 5V	Reduces errors when performing high resistance measurement (feature available 8508A - 20MΩ to 20GΩ range only)
Tru-Ohms or Offset Compensated Resistance technique.	Current Reversal	Switched Current	Current reversal reduces errors caused by thermal emfs as does switched current but reversal technique has the added benefit of reducing errors due to self heating
Store RTD temperature coefficients	Supports a wide variety of PRT & SPRT sensors	Not Available	PRT calibration coefficients are stored (max 100 probes) within the 8508As internal memory.
ACAL	Not Required	Required every 24hrs or ±1° C of last ACAL	8508A - Precision without the need for internal drift corrections. ACAL will overwrite last stored value and cannot be retrieved. This might be important for users that require 'as found data'.
Auto-zero (A-zero)	Range zero is enabled by operator	A-zero should be enabled to maintain specification	Auto-zero must be enabled on 3458A/HFL if environment exceeds ±1°C of last Input zero. Zero/nulling meters before measurement is accepted metrology practice.
Low impedance low Current measurement technology	Yes	No	8508A is less intrusive when compared with conventional meters when measuring low magnitude current sources. The 8508A input impedance on the 200uA range is 60 Ohm. This low impedance mimics technology normally found in Electrometers and picoampmeters. This compares with 5k – 10k Ohm on other DMMs.
ACV measurement technique	Analog True rms	Analog, Synchronous and Random sampled ac	Digitize sub sampled techniques are useful when measuring low frequency <1Hz input signals.

ACV & DCV 4 wire input.	Selectable 2 and 4-wire measurement.	Unavailable	4-wire sense measurement support improved accuracy when calibrating calibrators with 4 wire sense output.
Remote switched GUARD Terminal	IEEE controlled	Manual Switch	IEEE control of GUARD terminal helps fully automate calibration without need for manual switching.
Read rate	High Speed - 150 readings/sec @ 5.5 digit resolution	High Speed - 100,000 reading/sec @ 4.5 digit resolution	High read rates are useful for some ATE applications where accuracy is not of high priority.
Calibration technique	Individual Function and Range calibration.	Artifact Calibration & Individual Function and Range calibration.	Both techniques have their merits. 8508A and associated calibration technique provides full results traceability. 'As found' data is difficult to determine using 3458/HFL 'artifact' calibration. Artifact calibration provides a low cost solution for adjustment.

8508A vs 3458/HFL Ease of Use Parameters			Comments
Rear input switched remotely using IEEE 488 commands	Yes	No	The 3458/HFL must be switched manually using a front panel button.
Instrument simultaneously displays Frequency as well as the AC voltage & current.	Yes	Selectable	Requires further commands or key presses to determine frequency.
Two channel Ratio reference measurement	Yes (8508A/01 only)	Yes, but limited to 12Vdc on the Reference input	8508A can accept and compare dc to dc, ac to ac, dc to ac, Resistance to Resistance & Temperature to Temperature. Auto-ranging allows inputs of different magnitude to be connected and compared. Feature supports the replacement of Kelvin Varley dividers, resistance bridge and ac/dc transfer standards
Able to load SPRT/PRT calibration linearization coefficients and display temperature and resistance simultaneously.	Yes (up to100)	No	8508As displays resistance and temperature simultaneously.
Constant energization current on Resistance Ratio function.	Yes	No (the 3458/HFL does not measure resistance ratio)	When measuring Resistance in Ratio mode not only is the current the same but it is reversed to help reduce thermal offsets.
GPIB Remote interface	IEEE-488.2	IEEE-488.1	
Self-cal or ACAL function	Not Required	Required to meet specification	8508A components are selected for minimum drift over time and temperature. Therefore does not require frequent internal calibration when conditions exceed TCAL specification.

8508A Options and Accessories:

Model	Description
8508A	8.5 digit Reference Multimeter
8508A/01	8.5 digit Reference Multimeter with Rear Input Ratio measurement
Accessories	
8508A-SPRT	Standard Platinum Resistance Thermometer
8508A-PRT	Platinum Resistance Thermometer
8508A-LEAD	Comprehensive Measurement Lead Kit
Y8508	Rack Mount Kit
Y8508S	Rack Mount Kit Slides
8508A-7000K	Calibration kit comprising 1GOhm Standard and connecting leads.
1883673	UKAS Accredited Certification
1256990	NVLAP Accredited Certification

Model	Description
3458/HFL/E	Special Lab DMM, English
3458/HFLM/E	Special Lab DMM, English, with -001 Extended Memory Option
3458/HFL/E/AC	Special Lab DMM, English, + Accredited Calibration
3458/HFLM/E/120/AC	Special Lab DMM, English, with -001 Extended Memory Option + Accredited Calibration

Notes: