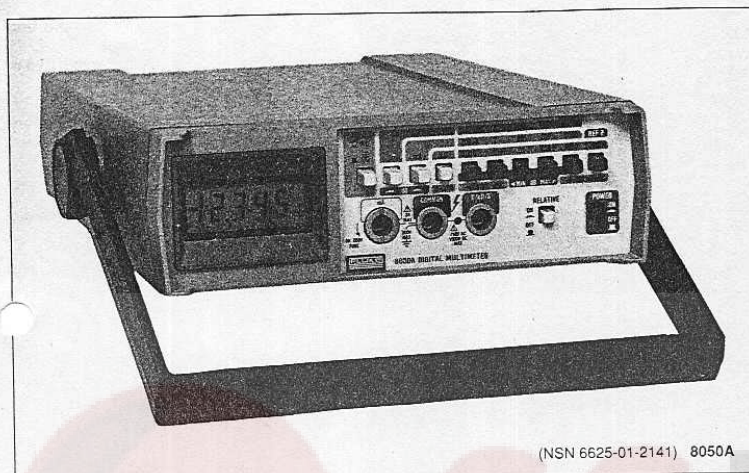


# Bench/Portable Multimeters

## 8050A



### 8050A, High Performance Value

- 4-1/2 digits (20,000 counts)
- Nine functions including-Relative reference, dB, Conductance, Diode test
- 0.03% basic dc accuracy
- True-rms from 20 Hz to 50 kHz
- Microcomputer-based
- Extensive overload protection
- Rechargeable battery version available (-01)
- Touch-hold probe available (80T-H)
- Probes for rf, high voltage, high current available
- Factory Mutual approved

The 8050A provides superior performance and measurement capabilities in a low-cost, bench-top instrument. This 4-1/2-digit DMM has the following measurement functions: Dc volts, true-rms ac volts, dc amps, true-rms ac amps, ohms, dBm (with selectable reference impedances) conductance, and diode test. It also has a relative-reference feature that works with all measurement functions.

#### Relative Reference

When the RELATIVE switch is on, the displayed value is equal to the difference between the present input value and a previously stored reference value.

One application is to null out test lead resistance. The resistance of the test leads is first measured and stored in the 8050A. Subsequently, all displayed values of resistance will be

actual values since the stored value of lead resistance will be automatically subtracted. Measurement errors are greatly reduced for low values of resistance (about 1Ω or less).

Another application is measuring the dB gain of the various stages of an audio amplifier. First, the input voltage to the amplifier is measured and stored as the zero dB reference value. Subsequent measurements will show the gain of each stage of amplification. Calculations are not needed; the 8050's microcomputer does it for you.

The relative-reference feature can be used to determine the drift of power supplies, the bandwidth or bandpass of audio devices, and lowpass filter response. This feature makes the 8050A an excellent pass-fail tester for the production line or incoming inspection.

#### dB Function

While many analog meters will indicate dBm referenced to 600 ohms, the 8050A provides digital read-out of decibels referenced to any one of sixteen impedances from 8 ohms to 1200 ohms. Now there is no need to use manual conversion tables—the internal microprocessor does the calculations for you. A front panel pushbutton and scrolling memory lets you select the reference impedance needed.

A resolution of 0.01 dB (above 1 mV) and high accuracy from 20 Hz to 50 kHz make the 8050A an extremely valuable tool for audio measurements. It can be used to determine the bandwidth of audio amplifiers, filters, audio consoles, etc. With the addition of an optional rf probe, the 8050A can be used on rf communications equipment.

#### Conductance

Two ranges of conductance extend the resistance-measuring capabilities of the 8050A to 100,000 MΩ, far beyond the capacity of ordinary multimeters. This lets you measure leakage of diodes, pcbs, cables, insulators, even measure transistor beta using a simple test adapter.

#### True-RMS AC

The 8050A uses a true-rms conversion technique to assure accurate measurement of non-sinusoidal waveforms as well as pure sinewaves. Examples: distorted or modulated sinewaves, squarewaves, sawtooths, noise, and pulse trains with a duty cycle of 10% or higher. Specified accuracy extends from 20 Hz to 50 kHz. Useful measurements go to 200 kHz, the typical -3 dB bandwidth.

#### Optional Touch-Hold Probe

The 80T-H Probe allows you to "hold" any displayed reading of voltage, resistance, or conductance as long as the control switch on the probe body is depressed. (Not for current or dB measurements.)

#### Overload Protection

The 8050A has extensive protection against overloads and operator errors. The instrument will accept up to 750V ac or 1000V dc continuously, regardless of the voltage range, or 500V dc when measuring resistance. It will also withstand short-duration transients to 6 kV.

The current input is protected against overloads by a 2A/250V fuse. For accidental connection of high voltage to the current input terminals (such as 480V ac line power) a heavy duty 3A/600V fuse backs up the first fuse.

#### Optional Accessories

Fluke offers a complete line of optional accessories that enable you to measure rf voltages to 500 MHz, temperature to 1000°C, current to 1000A, or high voltage to 40kV.



# Bench/Portable Multimeters

8050A

## Specifications

### Technical Specifications

All accuracy specifications apply for one year after purchase or recalibration when operated in a temperature of 18°C to 28°C and a relative humidity of 90% or less.

#### DC Voltage\*

Ranges:  $\pm 200$  mV,  $\pm 2$  V,  $\pm 20$  V,  $\pm 200$  V &  $\pm 1000$  V  
Resolution: 10  $\mu$ V on lowest range, 0.1 V on 1000 V range

Accuracy:  $\pm(0.03\%$  of reading + 2 digits) all ranges

Input Impedance: 10 M $\Omega$ ,  $\leq 100$  pF, all ranges  
Normal Mode Noise Rejection:  $\geq 60$  dB at 50 Hz or 60 Hz

Common Mode Noise Rejection:  $\geq 90$  dB at dc, 50 Hz and 60 Hz with 1 k $\Omega$  unbalance

Overload Protection: 1000 V dc or peak ac, continuous, except 10 seconds maximum on the 200 mV and 2 V ranges

Response Time: 1 second maximum, to rated accuracy within a range

\* DC voltage can also be measured using the dB mode with 0.01 dB resolution between 5% of range and full range

#### AC Voltage (True-RMS, AC Coupled)

Voltage Readout: From 5% to 100% of range

Range	Resolution	Accuracy: $\pm(\%$ of Rdg + Digits)				
		20 Hz	45 Hz	1 kHz	10 kHz	20 kHz
200 mV	10 $\mu$ V					
2 V	100 $\mu$ V	1%	0.5%	1%	5%	
20 V	1 mV	+10	+10	+10	+30	
200 V	10 mV					
750 V	100 mV					Not specified

\*Typically 3 to 5 digits of "rattle" will be observed at 20 Hz at full scale

#### dB Readout: From 5% to 100% of range

Input Volt- age	dBm 600 $\Omega$ Ref	Range	Accuracy				
			20 Hz	45 Hz	1 kHz	10 kHz	20 kHz
0.77 mV	-60 to -52	200	$\pm 0.5$ dBm				
2 mV	-52 to -2V	mV**					N/S
0.1 V	-18 to -2V	2V*					
1 V	+2 to +28	20V	$\pm 0.25$ dBm	$\pm 0.15$ dBm	$\pm 0.25$ dBm	$\pm 0.75$ dBm	
10 V	+22 to +48	200V					
100 V	+42 to +60	750V					Not specified (N/S)

\* When 200 mV range is selected, 8050A autoranges for best accuracy for inputs up to 2 V

**dB Resolution:**  $\pm 0.01$  dB from 5% to 100% of range; 0.1 dB from 1% to 5% of range; 1.0 dB below 1% of range

**Decibel Reference Impedances:** Fifteen user-selectable impedance-reference levels are provided to reference a 0 dBm, 1 mW level (50 $\Omega$ , 75 $\Omega$ , 93 $\Omega$ , 110 $\Omega$ , 125 $\Omega$ , 135 $\Omega$ , 150 $\Omega$ , 250 $\Omega$ , 300 $\Omega$ , 500 $\Omega$ , 600 $\Omega$ , 800 $\Omega$ , 900 $\Omega$ , 1000 $\Omega$ , 1200 $\Omega$ ). An 8 $\Omega$  impedance reference level is provided to reference 0 dBW. (dBV = 1000 $\Omega$ )

**Input Impedance:** 10 M $\Omega$ ,  $\leq 100$  pF, all ranges  
**Extended dB Response:** Typically -72 dBm (600 $\Omega$  ref)  $\pm 1$  dB to 10 kHz

**Useful Frequency Range:** Typically -3 dB at 200 kHz

**Crest Factor:** Waveforms with peak/rms ratio of 1:1 to 3:1

**Common Mode Noise Rejection:** 90 dB at 50 Hz and 60 Hz with 1 k $\Omega$  unbalance

**Overload Protection:** 750 V rms or 1000 V peak continuous, except 10 seconds maximum on the 200 mV and 2 V ranges, not to exceed a volt-hertz product of  $10^7$  (e.g., 200 V at 50 kHz)

**Response Time:** 2 seconds max to rated accuracy within a range

#### DC Current

Range	Resolution	Accuracy: (5% to 100% of Range)	Burden Voltage
200 $\mu$ A	10 nA	$\pm(0.3\%$ of rdg + 2 digits)	0.3 V max
2 mA	100 nA		
20 mA	1 $\mu$ A		
200 mA	10 $\mu$ A		
2000 mA	100 $\mu$ A		0.9 V max

**Overload Protection:** 2A/250V and 3A/600V fuses in series

#### AC Current (True-RMS, AC Coupled)

Range	Resolution	Accuracy: $\pm(\%$ of Reading + Digits)*				
		20 Hz**	45 Hz	1 kHz	10 kHz	20 kHz
200 $\mu$ A	10 nA	2% + 10	1% + 10	2% + 10		
2 mA	100 nA					
20 mA	1 $\mu$ A					
200 mA	10 $\mu$ A					
2000 mA	100 $\mu$ A					Not spec'd

\*Accuracy applies from 5% to 100% of range

\*\*Typically 3 to 5 digits of "rattle" will be observed at 20 Hz at full range

**Burden Voltage:** 0.3 V rms max, 200  $\mu$ A through 200 mA range; 0.9 V max on 2000 mA range

**Crest Factor:** Waveforms with peak/rms ratio of 1:1 to 3:1

**Overload Protection:** 2A/250V and 3A/600V fuse in series

#### Resistance

Range	Resolution	Accuracy	Full Scale* Voltage
200 $\Omega$	0.01 $\Omega$	$\pm(0.1\%$ reading + 2 digits + 0.02 $\Omega$ )	0.19 V
2 k $\Omega$ *	0.1 $\Omega$	$\pm(0.05\%$ reading + 2 digits)	1.2 V
20 k $\Omega$	1 $\Omega$	$\pm(0.05\%$ reading + 2 digits)	0.2 V
200 k $\Omega$ *	10 $\Omega$	$\pm(0.25\%$ reading + 3 digits)	2 V
2000 k $\Omega$	199 $\Omega$	$\pm(0.25\%$ reading + 3 digits)	0.2 V
20 M $\Omega$ *	1 k $\Omega$	$\pm(0.25\%$ reading + 3 digits)	2 V

\*Diode Test ranges

**Diode Test:** The three diode test ranges are marked with a diode symbol and have enough open circuit voltage to turn on silicon junctions allowing a diode test. The 2 k $\Omega$  range is preferred and is marked with the larger diode symbol. The three non-diode test ranges will not turn on silicon junctions when making in-circuit resistance measurements

**Open Circuit Voltage:** Less than 3.5 V on all ranges

**Input Protection:** 500 V dc or rms ac on all ranges

**Response Time:** (To rated accuracy) 10 seconds maximum on 20 M $\Omega$  range, 2 seconds maximum on all other ranges

#### Conductance

Range	Resolution	Accuracy
2 mS	0.1 $\mu$ S	$\pm(0.1\%$ of reading + 5 digits)
200 nS	0.01 nS	$\pm(0.5\%$ of reading + 20 digits)

#### Equivalent Resistance

2 mS Range: 500 $\Omega$  to 10 M $\Omega$

200 nS Range: 5 M $\Omega$  to 100,000 M $\Omega$

**Open Circuit Voltage:** Less than 3.5 V on both ranges

**Input Protection:** 500 V dc or rms ac on all ranges

#### Relative Reference

An input applied when the RELATIVE button is depressed is held as "0" reference point. Subsequent readings indicate deviations  $\pm$  from this point.

**Accuracy:** Error will not exceed the sum of the errors for the two measurements.



# Bench/Portable Multimeters

3050A

## General Specifications

**Common Mode Voltage:** 500V dc or peak ac max

**Temperature:** 0°C to 50°C, operating; -40°C to +70°C non-operating, except -40°C to +50°C with batteries

**Temperature Coefficient:**  $\leq 0.1$  times the applicable accuracy specification per °C from 18°C to 0°C and from 28°C to 50°C

**Relative Humidity:**  $\leq 70\%$  to 50°C or  $\leq 90\%$  to 35°C, except 2000 k $\Omega$ , 20M $\Omega$ , and 200 nS ranges where it is  $\leq 80\%$  to 35°C

**Safety:** IEC 348, Protection Class I when operated from supply mains or Protection Class II when operated from internal batteries. Factory Mutual 3820 Approved. CSA 556A Certified.

**Power:** 90 to 110V ac, 105 or 132V ac, or 200 to 264V ac, 47 to 440 Hz, factory-configured for customer-specified voltage. With rechargeable battery version (-01), the line voltage range is field-changeable. 4W max, 6W with -01 version.

**Batteries:** NiCd batteries are installed in version -01. They provide 10 hours of typical operation on a full charge. Recharge takes 14 hours. Can run on ac line while charging

**Size:** 22 cm W x 6 cm H x 25 cm L (8.5 in W x 2.5 in H x 10 in L)

**Weight:** 1.08 kg (2.38 lb) for standard model

**Included:** Manual, line cord, test leads (TL70) and statement of calibration practice

## Ordering Information

### Models

8050A DMM

8050-01 DMM w/rechargeable batteries

### Accessories (Also see page 141)

TL20 Test Lead Set

TL70 Test Lead Set

Y8132 Replacement Test Leads

Y8134 Deluxe Test Lead Set

Y8140 Slim Test Leads, w/needle points

C86 Ruggedized Carrying Case

Y8205 Carrying Case w/shoulder strap

80T-H Touch Hold Probe

83RF 100 MHz RF Probe

85RF 500 MHz RF Probe

80TK Thermocouple Module

80T-150U Temperature Probe

80K-6 High Voltage Probe

80K-40 High Voltage Probe

80J-10 Current Shunt

Y8100 DC/AC Current Probe

Y8101 AC Current Probe

80i-400 AC Current Probe

80i-410 DC/AC Current Probe

80i-600 AC Current Probe

80i-1010 DC/AC Current Probe

80i-kW Current/Power Probe

M00-200-611 3-1/2" Rack Adapter, Offset

M00-200-612 3-1/2" Rack Adapter, Center