PURCHASED ITEM

PACKAGE 82

PART NUMBER SPEC. 82

SIMULTANEOUS CV PACKAGE

ANALYSIS CAPABILITIES

CONSTANTS: Flatband C and V
Threshold Voltage
Bulk Doping
Effective Oxide Charge
Work Function
Doping Type
"Best Depth"

GRAPHICS:

Measured: Simultaneous C vs. Gate Voltage
High Frequency C vs. Gate Voltage
Quasistatic C vs. Gate Voltage
Conductance vs. Gate Voltage
Q/t Current vs. Gate Voltage
Quasistatic C and Q/t Current vs. Delay Time

Calculated: Interface Trap Density vs. Trap Energy
Doping vs. Depletion Depth
Depletion Depth vs. Gate Voltage
High Frequency $1/C^2$ vs. Gate Voltage
Band Bending vs. Gate Voltage
High Frequency C vs. Band Bending
Quasistatic C vs. Band Bending

VOLTAGE MEASUREMENT

ACCURACY (1 Year, 18°-28°C): ±(0.05% rdg + 50mV).
RESOLUTION: 10mV.
TEMPERATURE COEFFICIENT (0°-18° & 28°-40°C): ±(0.005% + 1mV)/°C.

VOLTAGE SOURCE

VOLTAGE	P-P NOISE[1] (0.1 Hz to 10 Hz)	RESOLUTION
≤ 20 V	150 μV	10 mV
> 20 V to 120 V	250 μV	100 mV

[1]Typically 3 mV up to 75 MHz.

MAXIMUM SWEEP SPAN, $|V_{START} - V_{STOP}|$: 40V.
MAXIMUM OUTPUT CURRENT: ±2mA (−0%, +20%).
SWEEP STEP VOLTAGE SELECTIONS: 10mV, 20mV, 50mV, 100mV.
DC OUTPUT RESISTANCE: <10Ω.

HIGH FREQUENCY CAPACITANCE*

100 kHz:

RANGE	RESOLUTION	ACCURACY (1 Year, 18°-28°C) ±(% rdg + pF)	TEMPERATURE COEFFICIENT (0°-18° & 28°-40°C) ±(% rdg)/°C	NOISE P-P
200 pF	10 fF	0.7 + 0.05	0.03	180 fF
2 nF	100 fF	0.9 + 0.5	0.08	1800 fF

1MHz:

RANGE	RESOLUTION	ACCURACY (1 Year, 18°-28°C) ±(% rdg + pF)	TEMPERATURE COEFFICIENT (0°-18° & 28°-40°C) ±(% rdg)/°C	NOISE P-P
200 pF	10 fF	0.9 + 0.05	0.03	200 fF
2 nF	100 fF	1.4 + 0.5	0.14	400 fF

SHUNT CAPACITANCE LOADING EFFECT: 0.1% of reading additional error per 100pF load with equal shunt load on input and output.
TEST VOLTAGE: 15mV rms ± 10%.
TEST FREQUENCY TOLERANCE: ±0.1%.

QUASISTATIC CAPACITANCE*

RANGE	RESOLUTION	ACCURACY (1 Year, 18°-28°C) ±(%rdg + pF)	NOISE P-P (typical)
200 pF	10 fF	1.0 + 0.1	(0.12% rdg + 0.13 pF) × (100 mV/STEP V) + 0.01 pF
2 nF	100 fF	0.8 + 0.2	(0.09% rdg + 0.13 pF) × (100 mV/STEP V) + 0.1 pF

TEMPERATURE COEFFICIENT (0°-18° & 28°-40°C): ±(0.02% rdg + 0.1 pF)/°C.

***NOTES**

Specifications are based on parallel RC model and Quality Factor ≥ 20.

Assumes proper cable correction and open circuit suppression.

Quasistatic capacitance accuracy is exclusive of noise, for STEP V ≥ 0.05V and DELAY TIME ≤ 1 second. For other parameters, derate by (5mV/STEP V) × (DELAY TIME/1 second) in pF at 23°C. Double the derating for every 10°C rise in ambient temperature above 23°C.

Typical allowable non-equilibrium current plus leakage current: <20pA on 200pF range; <200pA on 2nF range during capacitance measurements.

GENERAL

READING RATES: 4½ readings per second to one reading every 400 seconds.
DATA BUFFER: 1000 points maximum.
GRAPHICAL OUTPUTS: Computer display or digital plotter supporting HPGL with IEEE-488 interface; also "screen copy" to compatible printer.
DIGITAL I/O: Consists of one output, four inputs, +5V (series limited with 33Ω), and COMMON referenced to IEEE-488 COMMON. Output will drive one TTL load. Inputs represent one TTL load.
MAXIMUM INPUT: 30V peak, dc to 60Hz sine wave.
MAXIMUM COMMON MODE VOLTAGE: 30V maximum, dc to 60Hz sine wave.
OPERATING ENVIRONMENT: 0° to 40°C, 70% non-condensing RH up to 35°C.
STORAGE ENVIRONMENT: −25° to +65°C.
WARMUP: 2 hours to rated accuracy.
SYSTEM CONFIGURATION: Models 230-1, 590, 595, and 5951 connected as shown in manual. Controller is HP Series 200 or 300 with BASIC 4.0. (requires 1 Mbyte of memory) or HP BASIC Language Processor Card in AT compatible computer.
PACKAGE 82 COMPONENTS:

Model 230-1: Programmable Voltage Source
Model 595: Quasistatic CV Meter
Model 590: 100k/1M CV Analyzer
Model 5909: Calibration Sources
Model 5956: Package 82 CV Software and Manual
Model 5951: Remote Input Coupler—Includes Models:
4801: Low Noise BNC Cable, 1.2m (4 ft.) (5 supplied)
7007-1: Shielded IEEE-488 Cable, 1m (3.3 ft.) (2 supplied)
7007-2: Shielded IEEE-488 Cable, 2m (6.6 ft.) (1 supplied)
7051-2: RG-58C BNC to BNC Cable, 0.6m (2 ft.) (3 supplied)

Prices and specifications subject to change without notice.

LTR	REVISIONS	APP.	DATE
B	REDRAWN #12892		7-14-88

DRN. D.H. DATE 7-14-88
CKD. DATE
APP. DATE

KEITHLEY Keithley Instruments Inc. Cleveland, Ohio 44139

SPECIFICATIONS

PART NUMBER SPEC. 82

BRUNING 40-21 62198

FORM 28777A

PACKAGE 82

SIMULTANEOUS CV PACKAGE

ANALYSIS CAPABILITIES

CONSTANTS: Flatband C and V
Threshold Voltage
Bulk Doping
Effective Oxide Charge
Work Function
Doping Type
'Best Depth'

GRAPHICS:

Measured: Simultaneous C vs. Gate Voltage
High Frequency C vs. Gate Voltage
Quasistatic C vs. Gate Voltage
Conductance vs. Gate Voltage
Q/t Current vs. Gate Voltage
Quasistatic C and Q/t Current vs. Delay Time

Calculated: Interface Trap Density vs. Trap Energy
Doping vs. Depletion Depth
Depletion Depth vs. Gate Voltage
High Frequency $1/C^2$ vs. Gate Voltage
Band Bending vs. Gate Voltage
High Frequency C vs. Band Bending
Quasistatic C vs. Band Bending

VOLTAGE MEASUREMENT

ACCURACY (1 Year, 18°-28°C): ±(0.05% rdg + 50mV).

RESOLUTION: 10mV.

TEMPERATURE COEFFICIENT (0°-18° & 28°-40°C): ±(0.005% + 1mV)/°C.

VOLTAGE SOURCE

VOLTAGE	P-P NOISE[1] (0.1 Hz to 10 Hz)	RESOLUTION
≤ 20 V	150 μV	10 mV
> 20 V to 120 V	250 μV	100 mV

[1]Typically 3 mV up to 75 MHz.

MAXIMUM SWEEP SPAN, $|V_{START} - V_{STOP}|$: 40V.

MAXIMUM OUTPUT CURRENT: ±2mA (−0%, +20%).

SWEEP STEP VOLTAGE SELECTIONS: 10mV, 20mV, 50mV, 100mV.

DC OUTPUT RESISTANCE: <100Ω.

HIGH FREQUENCY CAPACITANCE*

100 kHz:

RANGE	RESOLUTION	ACCURACY (1 Year, 18°-28°C) ±(% rdg + pF)	TEMPERATURE COEFFICIENT (0°-18° & 28°-40°C) ±(% rdg)/°C	NOISE P-P
200 pF	10 fF	0.7 + 0.05	0.03	180 fF
2 nF	100 fF	0.9 + 0.5	0.08	1800 fF

1MHz:

RANGE	RESOLUTION	ACCURACY (1 Year, 18°-28°C) ±(% rdg + pF)	TEMPERATURE COEFFICIENT (0°-18° & 28°-40°C) ±(% rdg)/°C	NOISE P-P
200 pF	10 fF	0.9 + 0.05	0.03	200 fF
2 nF	100 fF	1.4 + 0.5	0.14	400 fF

SHUNT CAPACITANCE LOADING EFFECT: 0.1% of reading additional error per 100pF load with equal shunt load on input and output.

TEST VOLTAGE: 15mV rms ± 10%.

TEST FREQUENCY TOLERANCE: ±0.1%.

QUASISTATIC CAPACITANCE*

RANGE	RESOLUTION	ACCURACY (1 Year, 18°-28°C) ±(%rdg + pF)	NOISE P-P (typical)
200 pF	10 fF	1.0 + 0.1	(0.12% rdg + 0.13 pF) × (100 mV/STEP V) + 0.01 pF
2 nF	100 fF	0.8 + 0.2	(0.09% rdg + 0.13 pF) × (100 mV/STEP V) + 0.1 pF

TEMPERATURE COEFFICIENT (0°-18° & 28°-40°C): ±(0.02% rdg + 0.1 pF)/°C.

***NOTES**

Specifications are based on parallel RC model and Quality Factor ≥ 20.

Assumes proper cable correction and open circuit suppression.

Quasistatic capacitance accuracy is exclusive of noise, for STEP V ≥ 0.05V and DELAY TIME ≤ 1 second. For other parameters, derate by (5mV/STEP V) × (DELAY TIME/1 second) in pF at 23°C. Double the derating for every 10°C rise in ambient temperature above 23°C.

Typical allowable non-equilibrium current plus leakage current: <20pA on 200pF range; <200pA on 2nF range during capacitance measurements.

GENERAL

READING RATES: 4½ readings per second to one reading every 400 seconds.

DATA BUFFER: 1000 points maximum.

GRAPHICAL OUTPUTS: Computer display or digital plotter supporting HPGL with IEEE-488 interface; also "screen copy" to compatible printer.

DIGITAL I/O: Consists of one output, four inputs, +5V (series limited with 330), and COMMON referenced to IEEE-488 COMMON. Output will drive one TTL load. Inputs represent one TTL load.

MAXIMUM INPUT: 30V peak, dc to 60Hz sine wave.

MAXIMUM COMMON MODE VOLTAGE: 30V maximum, dc to 60Hz sine wave.

OPERATING ENVIRONMENT: 0° to 40°C, 70% non-condensing RH up to 35°C.

STORAGE ENVIRONMENT: −25° to +65°C.

WARMUP: 2 hours to rated accuracy.

SYSTEM CONFIGURATION: Models 230-1, 590, 595, and 5951 connected as shown in manual. Controller is HP Series 200 or 300 with BASIC 4.0. Requires 1 Mbyte of memory.

PACKAGE 82 COMPONENTS:

Model 230-1: Programmable Voltage Source
Model 595: Quasistatic CV Meter
Model 590: 100k/1M CV Analyzer
Model 5909: Calibration Sources
Model 5956: Package 82 CV Software and Manual
Model 5951: Remote Input Coupler—Includes Models:
4801: Low Noise BNC Cable, 1.2m (4 ft.) (5 supplied)
7007-1: Shielded IEEE-488 Cable, 1m (3.3 ft.) (2 supplied)
7007-2: Shielded IEEE-488 Cable, 2m (6.6 ft.) (1 supplied)
7051-2: RG-58C BNC to BNC Cable, 0.6m (2 ft.) (3 supplied)

Prices and specifications subject to change without notice.