

## GSM-20H10

### Precision DC Source Meter



## FEATURES

- \* Maximum Output  $\pm 210\text{V}/\pm 1.05\text{A}/22\text{W}$
- \* Built-in 4 Sequence Output Modes (Stair, Log, SRC-MEM, Custom), up to 2500 Points
- \* OVP /OTP Protection Function
- \* 0.012% Basic Measure Accuracy with  $6\frac{1}{2}$ -digit Resolution
- \* Variable Sampling Speed
- \* SDM (Source Delay Measure) Cycle
- \* 2-, 4-, and 6-wire Remote V-source and Measure Sensing
- \* Variable Display Digits
- \* Built-in Limit Function
- \* Built-in 5 Calculation Functions
- \* 4.3" TFT LCD, Digital Number Keyboard
- \* Built-in RTC Clock
- \* Interface: RS-232, USBTMC, LAN, GPIB (Optional)

## APPLICATIONS

- \* Semiconductor Component Characteristic Testing
- \* Energy and Efficiency Characteristic Testing
- \* Organic Material Characteristic Testing
- \* Nanomaterial Characteristic Testing

GW Instek GSM-20H10 is a precision source meter that provides highly stable DC power and instrument-grade  $6\frac{1}{2}$ -digit multimeter measurements. While operating, it can be used as a voltage source, current source, voltmeter, ammeter, and ohmmeter, which is uniquely ideal for the evaluation of component characteristics and the test applications of production, including nanomaterials and components, semiconductor architecture, organic materials, high-efficiency illumination, passive components and material characteristics analysis, etc.

GSM-20H10 provides four-quadrant operation of  $\pm 210\text{V}/\pm 1.05\text{A}/22\text{W}$ . The first and third quadrants operate as power supplies to supply power to the load. The second and fourth quadrants function as loads to consume power internally. Voltage value, current value and resistance value can be measured while operating the power supply or load function with an accuracy of 0.012% and a resolution of  $1\mu\text{V}/10\text{pA}/10\mu\Omega$ .

With respect to sampling rate, GSM-20H10 supports a sampling rate of up to 50k points/second, which can accurately analyze the characteristics of the DUT. With the large 4.3-inch screen, all measurement settings, parameters and results can be completely displayed on the screen. The SDM (Source Delay Measure) function is provided to delay sampling when the signal changes so as to prevent the unstable signal from being captured and cause misjudgment. There are four built-in sequence output modes (Stair, Log, SRC-MEM, Custom), which can support up to 2500 points of sequence variation output.

Pertaining to protection, GSM-20H10 provides OVP/OTP modes. The design of OVP allows users to self-define the range of OVP. OTP can effectively prevent errors caused by temperature drift during the test process. For interfaces, this product supports standard SCPI commands and provides RS-232, USBTMC, LAN, GPIB (optional) interfaces to meet users' different interface needs.

#### SPECIFICATIONS NOTE :

1. Speed = Normal (1 NPLC). For 0.1 PLC, add 0.005% of range to offset specifications, except 200mV, 1A ranges, add 0.05%. For 0.01 PLC, add 0.05% of range to offset specifications, except 200mV, 1A ranges, add 0.5%.
2. Required to reach 0.1% of final value after Command is processed. Resistive load.  $10\mu\text{A}$  to  $100\text{mA}$  range.
3. Overshoot into a fully resistive  $100\text{k}\Omega$  load, 10Hz to 1MHz BW, adjacent ranges :  $100\text{mV}$  typical, except 20V/200V.
4. Maximum time required for the output to begin to change following the receipt of : SOURCE : VOLTage|CURRent <nrf> Command.
5. Reading rates applicable for voltage or current measurements, autorange off, filter off, display off, trigger delay = 0, and binary reading format.
6. Purely resistive load.  $1\mu\text{A}$  and  $10\mu\text{A}$  ranges <65ms.
7. 1000 point sweep was characterized with the source on a fixed range.
8. Pass/Fail test performed using one high limit and one low math limit.
9. Includes time to re-program source to a new level before making measurement.
10. Time from falling edge of START OF TEST signal to falling edge of END OF TEST signal.
11. Command processing time of : SOURCE : VOLTage|CURRent : TRIGgered <nrf> Command not included.



SPECIFICATIONS																		
MAXIMUM RANGE	Voltage		±210V															
	Current		±1.05A															
	Power		22W															
	Voltage Resolution		1μV															
	Current Resolution		10pA															
SOURCE	DC Voltage	Output Voltage		±21V / ±1.05A, ±210V / ±105 mA														
		Current Limit		Min. 0.1% of range														
		Programming Resolution & Accuracy *1	Range		±200.000mV		±2.00000V		±20.0000V		±200.000V							
			Resolution		1μV		10μV		100μV		1mV							
			Accuracy		±(0.02%+600μV)		±(0.02%+600μV)		±(0.02%+2.4mV)		±(0.02%+24mV)							
		Load Regulation		0.01% of range + 100μV														
		Line Regulation		0.01% of range														
		Overshoot		<0.1% typical (full scale step,resistive load, 10mA range)														
		Recovery Time (1000% Load Change)		<250μs (within 0.1% plus load regulation errors, 1A and 100mA compliance.)														
		Ripple and Noise		4mVrms(20Hz~ 1MHz) / 10mVpp(20Hz~ 1MHz)														
		Temperature Coefficient		±(0.15 × accuracy specification) / °C (0°~18°C & 28°~50°C)														
	DC Current	Output Current		±1.05A / ±21V, ±105 mA / ±210V														
		Voltage Limit		Min. 0.1% of range														
		Programmed Source Resolution & Accuracy *1	Range		±1.00000μA		±10.0000μA		±100.000μA		±1.00000mA		±10.0000mA		±100.000mA		±1.00000A	
			Resolution		10pA		100pA		1nA		10nA		100nA		1μA		10μA	
			Accuracy		±(0.035%+600pA)		±(0.033%+2nA)		±(0.031%+20nA)		±(0.034%+200nA)		±(0.045%+2μA)		±(0.066%+20μA)		±(0.27%+900μA)	
		Load Regulation		0.01% of range + 100pA														
		Line Regulation		0.01% of range														
		Overshoot		<0.1% typical (1mA step, RL = 10kΩ, 20V range)														
		Temperature Coefficient		±(0.15 × accuracy specification) / °C (0°~18°C & 28°~50°C)														
		General	Output Settling Time *2		100μs typical time													
			Output Rise Time (±30%)		300μs, 200V range, 100mA compliance ; 150μs, 20V range, 100mA compliance													
	DC Floating Voltage		Output can be floated up to ±250VDC															
	Remote Sense		Up to 1V drop per load lead															
	Compliance Accuracy		Add 0.3% of range and ±0.02% of reading to base specification															
	Range Change Overshoot *3		Adjacent range changes between 200mV, 2V and 20V ranges, 100mV typical															
	Minimum Compliance Value		0.1% of range															
	Command Processing Time *4		Autorange On:10ms. Autorange Off: 7ms															
	Input Resistance		>10 GΩ															
	MEASUREMENT		Voltage	Measurement Resolution & Accuracy	Range		±200.000mV		±2.00000V		±20.0000V		±200.000V					
					Resolution		1μV		10μV		100μV		1mV					
		Accuracy			±(0.012%+300μV)		±(0.012%+300μV)		±(0.015%+1.5mV)		±(0.015%+10mV)							
		Temperature Coefficient		±(0.15 × accuracy specification) / °C (0°~18°C & 28°~50°C)														
Current		Voltage Burden (4-wire mode)		< 1mV														
		Programmed Source Resolution & Accuracy *1	Range		±1.00000μA		±10.0000μA		±100.000μA		±1.00000mA		±10.0000mA		±100.000mA		±1.00000A	
			Resolution		10pA		100pA		1nA		10nA		100nA		1μA		10μA	
			Accuracy		±(0.029%+300pA)		±(0.027%+700pA)		±(0.025%+6nA)		±(0.027%+60nA)		±(0.035%+600nA)		±(0.055%+6μA)		±(0.22%+570μA)	
		Temperature Coefficient		±(0.1 × accuracy specification) / °C (0°~18°C & 28°~50°C)														
Resistance		Range			<2.00000Ω		2.00000Ω		20.0000Ω		200.000Ω		2.00000kΩ		20.0000kΩ			
			Resolution		---		10μΩ		100μΩ		1mΩ		10mΩ		100mΩ			
			Test current		---		---		100mA		10mA		1mA		100μA			
			Accuracy		Source IACC+Meas.VACC		Source IACC+Meas.VACC		±(0.1%+0.003Ω), Normal ±(0.07%+0.001Ω), Enhanced		±(0.08%+0.03Ω), Normal ±(0.05%+0.01Ω), Enhanced		±(0.07%+0.3Ω), Normal ±(0.05%+0.1Ω), Enhanced		±(0.06%+3Ω), Normal ±(0.04%+1Ω), Enhanced			
					200.000kΩ		2.00000MΩ		20.0000MΩ		200.000MΩ		>200.000MΩ					
			Resolution		1Ω		10Ω		100Ω		1kΩ		---					
			Test current		10μA		5μA		0.5μA		100nA		---					
			Accuracy		±(0.07%+300Ω), Normal ±(0.05%+100Ω), Enhanced		±(0.11%+300Ω), Normal ±(0.05%+100Ω), Enhanced		±(0.11%+1kΩ), Normal ±(0.05%+500Ω), Enhanced		±(0.66%+10kΩ), Normal ±(0.35%+5kΩ), Enhanced		Source IACC+Meas.VACC					
			Temperature Coefficient		±(0.15 × accuracy specification) / °C (0°~18°C & 28°~50°C)													
			Source I mode, Manual OHMS		Total uncertainty = I source accuracy + V measure accuracy (4-wire remote sense)													
		Source V mode, Manual OHMS		Total uncertainty = V source accuracy + I measure accuracy (4-wire remote sense)														
		6-wire OHMS Mode		Available using active ohms guard and guard sense. Max. Guard Output Current: 50mA (except 1A range). Accuracy is load dependent														
		Guard Output Impedance		<0.1Ω in ohms mode														
		SYSTEM SPEED *5	Maximum Range Change Rate		75/second													
			Maximum Measure Auto Range Time		40ms (fixed source) *6													
			Sequence Reading Rates *7 (rdg./second) for 60Hz (50Hz)	Speed	NPLC / Trig Origin	Measure		Source-Measure *9		Source-Measure Pass/Fail test *8, *9		Measure Memory *9						
TO MEMORY						TO GPIB	TO MEMORY	TO GPIB	TO MEMORY	TO GPIB	TO MEMORY	TO GPIB						
Fast	0.01 / internal			2081 (2030)	1198 (1210)	1551 (1515)	1000 (900)	902 (900)	809 (840)	165 (162)	164 (162)							
488.2	0.01 / external			1239 (1200)	1079 (1050)	1018 (990)	916 (835)	830 (830)	756 (780)	163 (160)	162 (160)							
Medium	0.1 / internal			510 (433)	509 (433)	470 (405)	470 (410)	389 (343)	388 (343)	133 (126)	132 (126)							
488.2	0.1 / external			438 (380)	438 (380)	409 (360)	409 (365)	374 (333)	374 (333)	131 (125)	131 (125)							
Normal	1 / internal			59 (49)	59 (49)	58 (48)	58 (48)	56 (47)	56 (47)	44 (38)	44 (38)							
488.2	1 / external			57 (48)	57 (48)	57 (48)	57 (47)	56 (47)	56 (47)	44 (38)	44 (38)							
Single Reading Operation Rates (rdg./second) for 60Hz (50Hz)	Speed		NPLC / Trig Origin	Measure		Source-Measure *9		Source-Measure Pass/Fail test *8, *9										
				TO GPIB	TO GPIB	TO GPIB	TO GPIB											
	Fast(488.2)		0.01 / internal	256 (256)	79 (83)	79 (83)												
	Medium(488.2)		0.1 / internal	167 (166)	72 (70)	69 (70)												
	Normal(488.2)		1 / internal	49 (42)	34 (31)	35 (30)												
Component Interface Handler Time for 60Hz (50Hz) *8, *10	Speed		NPLC / Trig Origin	Measure		Source Pass/Fail test		Source-Measure Pass/Fail test *9, *11										
				TO GPIB	TO GPIB	TO GPIB	TO GPIB											
	Fast		0.01 / internal	1.04 ms (1.08 ms)	0.5 ms (0.5 ms)	4.82 ms (5.3 ms)												
	Medium		0.1 / internal	2.55 ms (2.9 ms)	0.5 ms (0.5 ms)	6.27 ms (7.1 ms)												
Normal	1 / internal		17.53 ms (20.9 ms)	0.5 ms (0.5 ms)	21.31 ms (25.0 ms)													
SYSTEM GENERAL	Load Impedance		Stable into 20,000pF typical															
	Differential Mode Voltage		250Vpk															
	Common Mode Voltage		250VDC															
	Common Mode Isolation		>10GΩ, <1000pF															
	Over Range		105% of range, source and measure															
	Max. Voltage Drop		5V															
	Max. Sense lead Resistance		1MΩ															
	Sense Input Impedance		>100GΩ															
	Guard Offset Voltage		<150μV, typical															
	Source Output Modes		Fixed DC level, Memory List (mixed function), Stair (linear and log)															
	Source Memory List		100 points max.															
	Memory Buffer		5,000 readings @ 5 digits (two 2,500 point buffers). Includes selected measured value(s) and time stamp. Lithium battery backup(3 yr + battery life)															
	Programmability		IEEE-488.2 (SCPI), RS-232 ; 5 user-definable power-up states plus factory default and *RST.															
	Digital I/O Connector		Active low input. Start of test, end of test; 3 category bits. ; +5V@ 300mA supply. ; 1 trigger input, 4 TTL/Relay Drive outputs (33V@500mA, diode)															
	Remote Interface		USB/GPIB/LAN/RS-232															
	Insulation		Chassis and terminal : 20MΩ or above (DC 500V) ; Chassis and AC cord : 30MΩ or above (DC 500V)															
	Operation Environment		Indoor use, Altitude: ≤ 2000m Ambient temperature: 0 ~ 40°C Relative humidity: ≤ 80%; Installation category: II, Pollution degree: 2															
	Storage Environment		Temperature: -20°C ~ 70°C; Humidity: < 80%															
	Input Power		100-240VAC, 50-60Hz															
	Power Consumption		80W															
	Dimensions & Weight		214 (W) x 86 (H) x 356.5 (D) mm, Approx. 4.8kg															

Specifications subject to change without notice. GSM-20H10\_E\_D1DH\_202205

ORDERING INFORMATION		ACCESSORIES	
GSM-20H10 with GPIB	Precision DC Source Meter	CD User manual x 1, Quick Start manual x 1, Test Lead GTL-207A x 1, Alligator Clip x 2	
GSM-20H10	Precision DC Source Meter	OPTIONAL ACCESSORIES	
		SM-01	Digital I/O Adapter, Convert DB15 to DB9 +