

GSM-20H10

Source Measure Unit



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 Source Measure Unit 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 100mA range.
3. Overshoot into a fully resistive $100\text{k}\Omega$ load, 10Hz to 1MHz BW, adjacent ranges : 100mV 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.



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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			
			Resolution	10pA		100pA		1nA		10nA			
			Accuracy	±(0.035%+600pA)		±(0.033%+2nA)		±(0.031%+20nA)		±(0.034%+200nA)			
		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)										
Voltage Burden (4-wire mode)			< 1mV										
Current		Programmed Source Resolution & Accuracy *1	Range	±1.00000μA		±10.0000μA		±100.000μA		±1.00000mA			
			Resolution	10pA		100pA		1nA		10nA			
			Accuracy	±(0.029%+300pA)		±(0.027%+700pA)		±(0.025%+6nA)		±(0.027%+60nA)			
		Temperature Coefficient		±(0.1 × accuracy specification) / °C (0°~18°C & 28°~50°C)									
		Resistance	Range	Resolution	<2.00000Ω		2.00000Ω		20.0000Ω		200.000Ω		
---					10μΩ		100μΩ		1mΩ				
---					---		100mA		10mA				
Accuracy					Source IACC+Meas.VACC	Source IACC+Meas.VACC	±(0.1%+0.003Ω), Normal		±(0.08%+0.03Ω), Normal		±(0.07%+0.3Ω), Normal		
					---		20.0000MΩ		200.000MΩ		>200.000M Ω		
Test current				1Ω		10Ω		100Ω		1kΩ			
				10μA		5μA		0.5μA		100nA			
				Accuracy	±(0.07%+30Ω), Normal	±(0.11%+300Ω), Normal	±(0.11%+1kΩ), Normal		±(0.66%+10kΩ), Normal		Source IACC+Meas.VACC		
					±(0.05%+10Ω), Enhanced		±(0.05%+100Ω), Enhanced		±(0.05%+500Ω), Enhanced		±(0.35%+5kΩ), Enhanced		
				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)		
				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)		
				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)		
				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				
	Fast(488.2)				0.01 / internal	256 (256)		79 (83)		79 (83)		79 (83)	
						167 (166)		72 (70)		69 (70)		69 (70)	
	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					
				Fast	0.01 / internal	1.04 ms (1.08 ms)		0.5 ms (0.5 ms)		4.82 ms (5.3 ms)		4.82 ms (5.3 ms)	
2.55 ms (2.9 ms)						0.5 ms (0.5 ms)		6.27 ms (7.1 ms)		6.27 ms (7.1 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_D2DH

ORDERING INFORMATION		ACCESSORIES	
GSM-20H10 with GPIB	Source Measure Unit	CD User manual x 1, Quick Start manual x 1, Test Lead GTL-207A x 1, Alligator Clip x 2	
	Source Measure Unit	OPTIONAL ACCESSORIES	
GSM-20H10		SM-01 Digital I/O Adapter, Convert DB15 to DB9 + 8-pin micro-DIN	GTL-248 GPIB Cable, 2000mm
		SM-02 Digital I/O Adapter, Convert DB15 to DB37 + 8-pin micro-DIN	
		GTL-246 USB Cable (USB 2.0 A-B Type, approx.. 1200mm)	

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