

GSM-20H10 Specifications

The specifications apply when the GSM-20H10 is powered on for at least 30 minutes under +20°C~+30°C.



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	1μV, ±200.000mV range
			10μV, ±2.00000V range
			100μV, ±20.0000V range
			1mV, ±200.000V range
		Programming Accuracy ¹	±(0.02%+600μV), ±200.000mV range
			±(0.02%+600μV), ±2.00000V range
			±(0.02%+2.4mV), ±20.0000V range
			±(0.02%+24mV), ±200.000V range
		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	4mV rms(20Hz~ 1MHz); 10mVpp(20Hz~ 1MHz)
		Temperature Coefficient (0°~18°C & 28°~50°C)	±(0.15 × accuracy specification)/°C
	DC Current	Output Current	±1.05A /±21V, ±105 mA /±210V
		Voltage Limit	Min. 0.1% of range
		Programmed Source Resolution	10pA, ±1.00000μA range
			100pA, ±10.0000μA range
			1nA, ±100.000μA range
			10nA, ±1.00000mA range
			100nA, ±10.00000mA range
			1μA, ±100.000mA range
			10μA, ±1.00000A range
		Programmed Source Accuracy ¹	±(0.035%+600pA), ±1.00000μA range
			±(0.033%+2nA), ±10.0000μA range
			±(0.031%+20nA), ±100.000μA range
			±(0.034%+200nA), ±1.00000mA range
			±(0.045%+2μA), ±10.00000mA range
			±(0.066%+20μA), ±100.000mA range
			±(0.27%+900μA), ±1.00000A range
		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°~18°C & 28°~50°C)	±(0.15 × accuracy specification)/°C
	General	Output Settling Time ²	100μs typical Time
		Output Rise Time (±30%)	300μs, 200V range, 100mA compliance. 150V/μs, 20V range, 100mA compliance.

Measurement	Voltage	DC Floating Voltage	Output can be floated up to $\pm 250\text{VDC}$		
		Remote Sense	Up to 1V drop per load lead.		
		Compliance Accuracy	Add 0.3% of range and $\pm 0.02\%$ 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	$>10\text{ G}\Omega$		
	Current	Measurement Resolution	1 μV , $\pm 200.000\text{mV}$ range		
			10 μV , $\pm 2.00000\text{V}$ range		
			100 μV , $\pm 20.0000\text{V}$ range		
			1mV, $\pm 200.000\text{V}$ range		
		Measurement Accuracy	$\pm(0.012\%+300\mu\text{V})$, $\pm 200.000\text{mV}$ range		
			$\pm(0.012\%+300\mu\text{V})$, $\pm 2.00000\text{V}$ range		
			$\pm(0.015\%+1.5\text{mV})$, $\pm 20.0000\text{V}$ range		
			$\pm(0.015\%+10\text{mV})$, $\pm 200.000\text{V}$ range		
		Temperature Coefficient (0°–18°C & 28°–50°C)	$\pm(0.15 \times \text{accuracy specification})/^{\circ}\text{C}$		
		Voltage Burden (4-wire mode)	$<1\text{mV}$		
		Programmed Source Resolution	10pA, $\pm 1.00000\mu\text{A}$ range		
			100pA, $\pm 10.0000\mu\text{A}$ range		
			1nA, $\pm 100.000\mu\text{A}$ range		
			10nA, $\pm 1.00000\text{mA}$ range		
			100nA, $\pm 10.0000\text{mA}$ range		
			1 μA , $\pm 100.000\text{mA}$ range		
		Programmed Source Accuracy ¹	10 μA , $\pm 1.00000\text{A}$ range		
			$\pm(0.029\%+300\text{pA})$, $\pm 1.00000\mu\text{A}$ range		
			$\pm(0.027\%+700\text{pA})$, $\pm 10.0000\mu\text{A}$ range		
			$\pm(0.025\%+6\text{nA})$, $\pm 100.000\mu\text{A}$ range		
			$\pm(0.027\%+60\text{nA})$, $\pm 1.00000\text{mA}$ range		
			$\pm(0.035\%+600\text{nA})$, $\pm 10.0000\text{mA}$ range		
		Temperature Coefficient (0°–18°C & 28°–50°C)	$\pm(0.055\%+6\mu\text{A})$, $\pm 100.000\text{mA}$ range		
			$\pm(0.22\%+570\mu\text{A})$, $\pm 1.00000\text{A}$ range		
			$\pm(0.1 \times \text{accuracy specification})/^{\circ}\text{C}$		
	Resistance	Range	Resolution	Test current	Accuracy
		$<2.00000\Omega$	---	---	Source IACC+Meas.VACC
		2.00000 Ω	10 $\mu\Omega$	---	Source IACC+Meas.VACC
		20.0000 Ω	100 $\mu\Omega$	100mA	$\pm(0.1\%+0.003\Omega)$, Normal $\pm(0.07\%+0.001\Omega)$, Enhanced
		200.000 Ω	1m Ω	10mA	$\pm(0.08\%+0.03\Omega)$, Normal $\pm(0.05\%+0.01\Omega)$, Enhanced
		2.00000k Ω	10m Ω	1mA	$\pm(0.07\%+0.3\Omega)$, Normal $\pm(0.05\%+0.1\Omega)$, Enhanced
		20.0000k Ω	100m Ω	100 μA	$\pm(0.06\%+3\Omega)$, Normal $\pm(0.04\%+1\Omega)$, Enhanced
		200.000k Ω	1 Ω	10 μA	$\pm(0.07\%+30\Omega)$, Normal $\pm(0.05\%+10\Omega)$, Enhanced
		2.00000M Ω	10 Ω	5 μA	$\pm(0.11\%+300\Omega)$, Normal $\pm(0.05\%+100\Omega)$, Enhanced
		20.0000M Ω	100 Ω	0.5 μA	$\pm(0.11\%+1\text{k}\Omega)$, Normal $\pm(0.05\%+500\Omega)$, Enhanced
		200.000M Ω	1k Ω	100nA	$\pm(0.66\%+10\text{k}\Omega)$, Normal $\pm(0.35\%+5\text{k}\Omega)$, Enhanced
		$>200.000\text{M}\Omega$	---	---	Source IACC+Meas.VACC
		Temperature Coefficient (0°–18°C & 28°–50°C)	$\pm(0.15 \times \text{accuracy specification})/^{\circ}\text{C}$		
		Source I mode,	Total uncertainty = I source accuracy + V measure accuracy (4-wire remote		

		Manual OHMS	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 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		
				TO MEM.	TO GPIB	TO MEM.	TO GPIB	
		Fast	0.01 / internal	2081 (2030)	1198 (1210)	1551 (1515)	1000 (900)	
		488.2	0.01 / external	1239 (1200)	1079 (1050)	1018 (990)	916 (835)	
		Medium	0.1 / internal	510 (433)	509 (433)	470 (405)	470 (410)	
		488.2	0.1 / external	438 (380)	438 (380)	409 (360)	409 (365)	
		Normal	1 / internal	59 (49)	59 (49)	58 (48)	58 (48)	
		488.2	1 / external	57 (48)	57 (48)	57 (48)	57 (47)	
		Speed	NPLC/ Trig Origin	Source-Measure Pass/Fail test ^{8,9}		Measure Memory ⁹		
				TO MEM.	TO GPIB	TO MEM.	TO GPIB	
		Fast	0.01 / internal	902 (900)	809 (840)	165 (162)	164 (162)	
		488.2	0.01 / external	830 (830)	756 (780)	163 (160)	162 (160)	
		Medium	0.1 / internal	389 (343)	388 (343)	133 (126)	132 (126)	
		488.2	0.1 / external	374 (333)	374 (333)	131 (125)	131 (125)	
		Normal	1 / internal	56 (47)	56 (47)	44 (38)	44 (38)	
		488.2	1 / external	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)		
		Medium(488.2)	0.1 / internal	167 (166)	72 (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)	
		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		250 VPK				
		Common mode Voltage		250 VDC				
		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		>100G Ω						
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)						
		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/LAN/RS-232/GPIB(Optional)						
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	214 (W) x 86 (H) x 356.5 (D) mm
	Weight	Approx. 4.8kg

Remarks

- Speed = Normal (1 PLC). 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%.
- Required to reach 0.1% of final value after Command is processed. Resistive load. 10 μ A to 100mA range.
- Overshoot into a fully resistive 100k Ω load, 10Hz to 1MHz BW, adjacent ranges: 100mV typical, except 20V/200V.
- Maximum time required for the output to begin to change following the receipt of :SOURce:VOLTage|CURRent <nrf> Command
- Reading rates applicable for voltage or current measurements, autorange off, filter off, display off, trigger delay = 0, and binary reading forma.
- Purely resistive load. 1 μ A and 10 μ A ranges <65ms.
- 1000 point sweep was characterized with the source on a fixed rang.
- Pass/Fail test performed using one high limit and one low math limit.
- Includes time to re-program source to a new level before making measurement.
- Time from falling edge of START OF TEST signal to falling edge of END OF TEST signal.
- Command processing time of :SOURce:VOLTage|CURRent: TRIGgered<nrf> Command not included.