

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			
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		
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.	

		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.			
Measurement	Voltage	Input Resistance	$>10\text{ G}\Omega$			
		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			
		Measurement Accuracy	1mV, $\pm 200.000\text{V}$ range			
	$\pm(0.012\%+300\mu\text{V})$, $\pm 200.000\text{mV}$ range					
	$\pm(0.012\%+300\mu\text{V})$, $\pm 2.00000\text{V}$ range					
	Temperature Coefficient (0°–18°C & 28°–50°C)	$\pm(0.015\%+1.5\text{mV})$, $\pm 20.0000\text{V}$ range				
		$\pm(0.015\%+10\text{mV})$, $\pm 200.000\text{V}$ range				
		$\pm(0.15 \times \text{accuracy specification}) / ^\circ\text{C}$				
	Current	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					
	Temperature Coefficient (0°–18°C & 28°–50°C)	$\pm(0.027\%+60\text{nA})$, $\pm 1.00000\text{mA}$ range				
		$\pm(0.035\%+600\text{nA})$, $\pm 10.0000\text{mA}$ range				
		$\pm(0.055\%+6\mu\text{A})$, $\pm 100.000\text{mA}$ range				
		$\pm(0.22\%+570\mu\text{A})$, $\pm 1.00000\text{A}$ range				
	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		
		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		
		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}	
		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}	
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 (Optinal)					
	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

1. 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%.
2. Required to reach 0.1% of final value after Command is processed. Resistive load. 10 μ A to 100mA range.
3. Overshoot into a fully resistive 100k Ω 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 forma.
6. Purely resistive load. 1 μ A and 10 μ A ranges <65ms.
7. 1000 point sweep was characterized with the source on a fixed rang.
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.