GW INSTEK
Simply Reliable

# GSM-20H10

## Source Measure Unit

CE | RS-232 | USB Host | USB Device | LAN | Digit I/O | GPIB


GW Instek GSM-20H10 is a Source Measure Unit that provides highly stable DC power and instrument-grade 6½-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 ±210V/±1.05A/22W. 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 1μV/10pA/10μΩ.

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.

## FEATURES

* Maximum Output ±210V/±1.05A/22W
* 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 6½-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

**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. 10μA to 100mA range.
3. Overshoot into a fully resistive 100kΩ 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 lead. 1μA and 10μA 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.

## 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<br>Resolution: 1µV / 10µV / 100µV / 1mV<br>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 / ±10.00000mA / ±100.000mA / ±1.00000A<br>Resolution: 10pA / 100pA / 1nA / 10nA / 100nA / 1µA / 10µA<br>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 |
| MEASUREMENT | Voltage | Input Resistance | >10 GΩ |
| | | Measurement Resolution & Accuracy | Range: ±200.000mV / ±2.00000V / ±20.0000V / ±200.000V<br>Resolution: 1µV / 10µV / 100µV / 1mV<br>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 / ±10.00000mA / ±100.000mA / ±1.00000A<br>Resolution: 10pA / 100pA / 1nA / 10nA / 100nA / 1µA / 10µA<br>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<br>Resolution: --- / 10µΩ / 100µΩ / 1mΩ / 10mΩ / 100mΩ<br>Test current: --- / --- / 100mA / 10mA / 1mA / 100µA<br>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%+0.01 Ω), Enhanced / ±(0.07%+0.3Ω), Normal; ±(0.05%+0.1Ω), Enhanced / ±(0.06%+3Ω), Normal; ±(0.04%+1Ω), Enhanced<br>200.000kΩ / 2.00000MΩ / 20.0000MΩ / 200.000MΩ / >200.000M Ω<br>Resolution: 1Ω / 10Ω / 100Ω / 1kΩ / ---<br>Test current: 10µA / 5µA / 0.5µA / 100nA / ---<br>Accuracy: ±(0.07%+30Ω), Normal; ±(0.05%+10Ω), 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) | NPLC / Trig Origin | Measure TO MEMORY | Measure TO GPIB | Source-Measure *9 TO MEMORY | Source-Measure *9 TO GPIB | Source-Measure Pass/Fail test *8, *9 TO MEMORY | Source-Measure Pass/Fail test *8, *9 TO GPIB | Measure Memory *9 TO MEMORY | Measure Memory *9 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) | NPLC/ Trig Origin | Measure TO GPIB | Source-Measure *9 TO GPIB | Source-Measure Pass/Fail test *8, *9 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 | NPLC / Trig Origin | Measure TO GPIB | Source Pass/Fail test TO GPIB | Source-Measure Pass/Fail test *9, *11 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 : 30M Ω 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

**GSM-20H10** with GPIB **Source Measure Unit**
**GSM-20H10** **Source Measure Unit**

## ACCESSORIES

CD User manual x 1, Quick Start manual x 1, Test Lead GTL-207A x 1, Alligator Clip x 2

## OPTIONAL ACCESSORIES

**SM-01** Digital I/O Adapter, Convert DB15 to DB9 + 8-pin micro-DIN
**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)
**GTL-248** GPIB Cable, 2000mm

GW INSTEK
Simply Reliable