GPS-2700
10 MHz GPS Disciplined Oscillator, Featuring the Quantum™ SA.45s Chip Scale Atomic Clock (CSAC)

Features
- High-performance GPS receiver
- Unparalleled holdover: typically ±2 μs over 24 hrs. at 25 ºC
- Ultra low power consumption: ≤1.4 W at 25 ºC (Vdd = 12 V)
- Fast warm-up time: <180 s at 25 ºC
- Industry leading 1PPS accuracy: ±15 ns to UTC RMS (1-sigma), GPS locked
- Small footprint and low profile: only 2.5" x 3" x 0.7"

Applications
- Unmanned aerial vehicles (UAV's)
- IED Jammers—fixed, mounted, and dismounted
- Radar systems
- Aircraft guidance systems
- Tactical radios
- Underwater systems using GPS for initialization

The Microsemi GPS-2700 is the pre-eminent solution for demanding mobile GPS applications. These include military man-pack radios that require very low-g static sensitivity, MILSATCOM terminals, avionics payloads for unmanned autonomous systems (UAS), and high acceleration applications such as jet fighters. All of these applications are increasingly expected to deliver mission critical performance even in GPS-denied environments. Other applications include network timing in stationary applications such as base-stations.

Product Description
The GPS-2700 is a 10 MHz CSAC-based GPS disciplined oscillators (GPSDOs). The GPS-2700 covers a temperature range of –10 ºC to 70 ºC. The product utilizes Microsemi’s Quantum series SA.45s Chip Scale Atomic Clock, as its frequency reference, which enables unparalleled holdover capability, an ultra low-g static sensitivity, and a fast warm up time of <180 s. The built-in high-performance GPS receiver is able to operate in a base station position-hold mode using an auto survey feature, that allows operation with just a single satellite in view, and hence improves timing stability. The unit can also be set to operate in highly-dynamic mobile environments with only a minimum loss in timing stability versus the position-hold mode.

Standard outputs, through a low-noise distribution amplifier, include four 10 MHz sine wave outputs, one 5 MHz CMOS output, and one 1PPS output. Other standard features include a 16x2 character LCD driver (display not included) and a phase noise filter. The unit can be powered from standard aircraft or vehicle power with an 8 V to 36 V operating range, with a built-in reverse polarity protection. Alternatively the unit can be powered through a 5 V mini-USB power supply.
Specifications (Typical Values)

**Frequency Characteristics**

- **Long-term oscillator aging** (without GPS) Less than 0.3 ppb per month in holdover without GPS
- **1 PPS accuracy** ±15 ns to UTC RMS (1-Sigma) GPS locked in position-hold mode
- **Frequency accuracy** Better than ±2×10⁻¹⁰ after 3 minutes of GPS disciplining (after lock)
- **Holdover stability** <±2 μs over 24 hour period at 25 °C (after 3 days GPS disciplining)

**Phase Noise**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Noise (SSB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td>-90 dBc/Hz</td>
</tr>
<tr>
<td>100 Hz</td>
<td>-125 dBc/Hz</td>
</tr>
<tr>
<td>1 kHz</td>
<td>-145 dBc/Hz</td>
</tr>
<tr>
<td>10 kHz</td>
<td>-152 dBc/Hz</td>
</tr>
<tr>
<td>100 kHz</td>
<td>-153 dBc/Hz</td>
</tr>
</tbody>
</table>

**Stability, ADEV (with GPS lock)**

<table>
<thead>
<tr>
<th>Time</th>
<th>ADEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 s</td>
<td>&lt;1×10⁻¹⁰</td>
</tr>
<tr>
<td>10 s</td>
<td>&lt;2.5×10⁻¹¹</td>
</tr>
<tr>
<td>100 s</td>
<td>&lt;2×10⁻¹¹</td>
</tr>
<tr>
<td>1000 s</td>
<td>&lt;1×10⁻¹¹</td>
</tr>
<tr>
<td>10000 s</td>
<td>&lt;2×10⁻¹²</td>
</tr>
</tbody>
</table>

**Power Supply**

- **Supply voltage (Vdd)** Aircraft and vehicle power range: 8 V to 36 VDC (or 5 V via mini-USB)
- **Power consumption** <1.4 W at 25 °C

**GPS Characteristics**

- **GPS frequency, antenna** L1 C/A 1574 MHz, passive or active antenna 5 V, MMCX connector
- **GPS receiver** 50 channels, mobile SBAS: WAAS, EGNOS, MSAS supported
- **Sensitivity** Acquisition - 144 dBm, Tracking - 160 dBm
- **GPS TTFF** Cold start - <45 sec, Warm start - 1 sec, Hot start - 1 sec
- **GPS receiver motion adaptive filter settings** Optimized depending on vehicle velocity (auto-sensing, auto-switching)

**Environmental**

- **Storage temperature** -40 °C to 85 °C
- **Operating temperature** -10 °C to 70 °C
- **Frequency stability over temperature** (<-10 °C to 70 °C)
- **g-sensitivity** <0.2 ppb per-g per-axis
- **Magnetic sensitivity** (<±2.0 Gauss) <9.0×10⁻¹¹/Gauss

**Health Monitoring and Communication**

- **RS-232 control** (Including USB port) Full SCPI-99 control commands at 9.6 K, 19.2 K, 38.4 K, 57.6 K, 115.2 K
- **RS-232 NMEA output sentences** NMEA 0183 rev. 2.3, sentences: GGA, RMC, ZDA, PASHR, and others
- **TTL alarm output** GPS unlock and event indicator
- **USB, LCD support** Optionally USB powered and controlled, supports 16x2 LCD displays

**Miscellaneous**

- **Warm-up time/stabilization time** <2 min at 25 °C to <5×10⁻¹⁰ accuracy typ. (no GPS)
- **MTBF** >100,000 hours
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<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>090-00925-000</td>
<td>10 MHz GPSDO, standard temperature range</td>
</tr>
</tbody>
</table>

**Electrical**
- 1 PPS output (CSAC flywheel generated)
- 10 MHz and 5 MHz output
- Distribution amplifier port isolation

5 V CMOS output, can be shifted in 1 ns steps relative to UTC

Four isolated 10 MHz sine wave 13 dBm ±3 dB, one 5 MHz CMOS 5 V

2 MHz: >88 dB, 10 MHz: >85 dB