

**QwkSep 15 Low-Profile Separation System (LPSS)**

**Design Description**

Sierra Nevada Corporation’s (SNC) Space Systems QwkSep 15 Low-Profile Separation System (LPSS) provides a low-shock solution to small satellite separation in an extremely low profile. The system is designed for standard ESPA (EELV Secondary Payload Adapter) with a 15-inch satellite interface launch configuration (orthogonal to thrust axis). The interface rings have integrated adjustable kick off springs, pass-through separation connectors and redundant telemetry indication of positive separation. The system is released with a mini, low-shock Clamp Band Opening Device (CBOD). This design configuration has heritage in more than 100 successful flight releases.

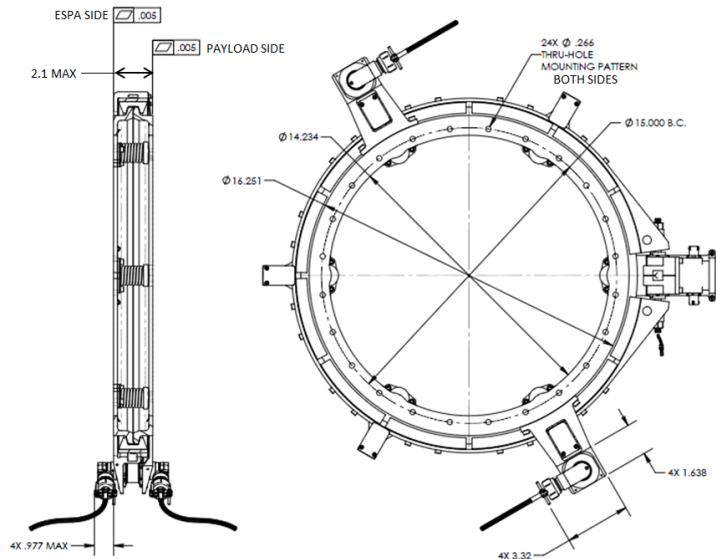


**QwkSep 15 Low-Shock Clamp Band.** The QwkSep 15 clamp band system provides a small satellite separation solution.

The CBOD features redundant circuits driven by a typical pyrotechnic firing pulse. Based on our space-qualified Fast-Acting Shockless Separation Nut (FASSN) technology, the CBOD restrains the band tension bolts with a double helix, flywheel nut. The back drive torque of the high lead, band tension bolts is reacted through the CBOD by the latched flywheel nut. A pyro-compatible pulse releases the flywheel nut, which spins up and ejects the tension bolts. The strain energy in the band is converted to rotational energy in the flywheel nut allowing the two mating halves to separate with extremely low shock.

| Features  |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Ultra-high reliability payload separation</li> </ul>   | <ul style="list-style-type: none"> <li>• Redundant electrical trigger circuits</li> </ul>   |
| <ul style="list-style-type: none"> <li>• &gt;25% stiffer and &gt;40% more load capability than comparable, alternative solutions</li> </ul> | <ul style="list-style-type: none"> <li>• Utilizes heritage release technology of CBOD with redundant NASA standard initiator-driven pin puller</li> </ul> |
| <ul style="list-style-type: none"> <li>• Low-shock operation</li> </ul>   | <ul style="list-style-type: none"> <li>• Scalable between 12-inch and 24-inch sizes</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Designed for full ESPA payload weight and ESPA dynamic environments</li> </ul>                     | <ul style="list-style-type: none"> <li>• Optional nonpyrotechnic mini-CBOD release mechanism available for extremely low-shock release</li> </ul>         |
| <ul style="list-style-type: none"> <li>• Straightforward integration and operation</li> </ul>   | <ul style="list-style-type: none"> <li>• No generated debris</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Resettable for multiple ground operations</li> </ul>   | <ul style="list-style-type: none"> <li>• Based on extensive clamp band heritage</li> </ul>  |

**Dimensions**



**Note:** All dimensions above are in inches.

| Applications   |   |
|--|---|
| <ul style="list-style-type: none"> <li>Auxiliary payload separation</li> </ul> | <ul style="list-style-type: none"> <li>ESPA-compatible integration and operation</li> </ul> |

| Heritage Programs  |   |
|--|---|
| <ul style="list-style-type: none"> <li>Nanosat</li> </ul>  | <ul style="list-style-type: none"> <li>Orbital Express</li> </ul> |
| <ul style="list-style-type: none"> <li>Atlas V*</li> </ul> | <ul style="list-style-type: none"> <li>Delta IV*</li> </ul>       |
| <ul style="list-style-type: none"> <li>Ariane*</li> </ul>  | <ul style="list-style-type: none"> <li>Sea Launch*</li> </ul>     |
| <ul style="list-style-type: none"> <li>Proton*</li> </ul>  | <ul style="list-style-type: none"> <li>Falcon 9*</li> </ul>       |

\*Note: Larger diameter version (primarily 47-inch and 66-inch systems); have more than 100 combined flight releases on these LVs.

| Product Specifications                               |  |                              |
|--|--|------------------------------|
|  | U.S.   | SI                           |
| <b>Mechanical</b>                                    |  |                              |
| Payload capability                                   | 400 lbm with 20-inch center of gravity (CG)<br>Offset height above ESPA interface  | 181 kg (508 mm CG height)    |
| Quasi-static environment                             | 8.5 g axial and lateral dynamic loading simultaneously   |                              |
| Random vibration environment                         | Qualified to NASA General Environmental Verification Specification (GEVS) levels for large (400+lbm) payloads (5.6 grms) |                              |
| Stiffness  | Axial: 2.15E6 lb/in<br>Moment: 9.62E7 in*lb/rad  | 3.76E4 N/m<br>1.09E7 N*m/rad |
| Envelope dimensions                                  | Ø15 BCD x 2.1-inch max. stack height   | Ø381 BCD x 53.3 mm           |
| Mass, full system (not including fasteners, harness) | 15 lbm max.  | 6.8 kg max.                  |
| Mass, flyaway  | 4.0 lbm max.   | 1.8 kg max.                  |
| Life (as-delivered)                                  | 12 full-load release cycles  |                              |
| Redundancy   | Full electrical  |                              |
| Source shock   | Pyro: 1,000 g from 1 kHz to 2 kHz near actuator<br>Non-pyro option: 100 g max. from 10 Hz to 10 kHz                      |                              |
| Tip-off rate   | 0.5 °/s max.   |                              |
| Kick-off rate (separation velocity)                  | 1 ft/s min.  | 0.3 m/s min.                 |
| <b>Electrical</b>                                    |  |                              |
| Release signal                                       | Pyro: NASA Standard Initiator (NSI)-firing pulse<br>Non-pyro option: 3.5 amps for 50 ms (typical)                        |                              |
| Separation telemetry                                 | Redundant loop-back circuits indicate positive separation  |                              |
| Release time   | 50 ms max.   |                              |
| <b>Thermal</b>                                       |  |                              |
| Operating temperature range                          | Pyro: -90 °F to +219 °F<br>Non-pyro option: -85 °F to +167 °F  |                              |
| <b>Reset</b>   |  |                              |
| Refurbishment  | Replace standard NSI-Pin Puller trigger  |                              |
| Special tools  | SNC band loading tool; SNC spring compression tools  |                              |
| Time required for reset                              | ~ 2 hours  |                              |

**Note:** This data is for information only and subject to change. Contact SNC's Space Systems, Space Technologies for design data.