

Purchase Order

Microsatellite SS-1—Flight Set Procurement

All entities, locations, identifiers, and contact details in this document are fictional and used solely for demonstration.

PO Number	VMS-PO-2025-1173	Revision	A
Issue Date	2025-11-08	Effective Date	2025-11-08
Currency	USD	Payment Terms	3% 15, Net 45
Incoterms 2020	DAP — Port Ember Integration Lab (Buyer facility)	Freight Terms	Prepaid and add unless otherwise noted
Confidentiality	UNCLASSIFIED // COMPANY CONFIDENTIAL	DPAS Rating	Not Rated (sample only)

Parties

Buyer	Supplier
Vermilion Moonshell Systems, PBC (dba VMS Flightworks) 4150 Amber Loop, Suite 900 Port Ember, Cascadia 98200 USA Harborhaven, New Albion 11420 USA CAGE: 9ZZZ9; DUNS: 00-123-4567 EIN: 00-0000000	Quayline Lattice Manufacturing, Ltd. Stageyard 7, Dock 12 CAGE: 7Q7Q7; DUNS: 00-765-4321 Tax ID: 99-9999999
Buyer Contacts	Supplier Contacts
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Ship To	Bill To
VMS Flightworks—Integration Lab 147 Zenith Quay, Building 3 Port Ember, Cascadia 98201 USA Attn: Inbound Receiving—Dock B, SS-1 Program 4150 Amber Loop, Suite 900 Port Ember, Cascadia 98200 USA Email: ap@vms-flightworks.example	Vermilion Moonshell Systems, PBC—Accounts Payable

Program Overview

Program Name	Stillsong-1 (SS-1) Microsatellite
Mission Class	LEO experimental—60 kg class
Mass Budget	60 kg
Bus Voltage	28 V
Objective	Procure buy-to-print structure, ADCS/C&DH subsystems, harnessing, and services for one (1) flight set with qualification and ground support.

Document Order of Precedence

- 1) This PO (line items, notes, and attachments)
- 2) VMS Stillsong-1 System Specification SS1-SPEC-0001 Rev B
- 3) VMS Drawing Package (see Drawings List in Attachments)
- 4) Supplier's accepted proposal QLM-PROP-22-581 (as modified by this PO)
- 5) Industry standards referenced herein

Attachments

ID	Title	Filename
ATT-001	Drawings List—Stillsong-1 (index only)	SS1-DWG-INDEX-RevB.pdf
ATT-002	Quality Flowdown Sheet	VMS-QF-Table-RevC.pdf
ATT-003	Packaging & Cleanliness Work Instruction	WI-PKG-0089-RevA.pdf

Contents

1 Line Item Summary	4
2 Key Program Milestones	5
3 Pricing Summary	6
4 Quality Flowdowns (Legend)	6
5 Detailed Line Items	7
6 Deliverables (CDRL)	24
7 Manufacturing Requirements	25
8 Terms & Conditions	25
9 Appendices	26
10 Signatures	27

1 Line Item Summary

Item	PN	Rev	Description	Qty	UoM	Unit Price	Ex- tended	Lead (wks)	Need By	Promise NLT	Ship-to
001	SS1-10000	B	Primary structure (CFRP panels & skeleton)	1	ea	\$132,500.00	\$132,500.00	24	2026-05-20	2026-05-05	Port Ember Bldg 3
002	SS1-21010	A	Solar array panels, deployable pair	2	ea	\$51,200.00	\$102,400.00	20	2026-04-25	2026-04-12	Port Ember Bldg 3
003	SS1-23120	A	Battery module, 28V 18Ah	3	ea	\$15,750.00	\$47,250.00	18	2026-03-28	2026-03-18	Port Ember Bldg 3
004	SS1-22000	A	Power control & distribution unit (PCDU)	1	ea	\$38,000.00	\$38,000.00	20	2026-04-30	2026-04-15	Port Ember Bldg 3
005	SS1-31000	A	Onboard computer (rad-tolerant, ECC)	1	ea	\$45,800.00	\$45,800.00	22	2026-05-02	2026-04-18	Port Ember Bldg 3
006	SS1-31990	A	OBC flight software license	1	ea	\$9,500.00	\$9,500.00	6	2026-02-15	2026-02-10	Port Ember Bldg 3
007	SS1-34010	A	Star tracker unit	2	ea	\$24,650.00	\$49,300.00	16	2026-04-15	2026-04-08	Port Ember Bldg 3
008	SS1-34030	A	Miniature IMU	2	ea	\$7,500.00	\$15,000.00	14	2026-03-30	2026-03-20	Port Ember Bldg 3
009	SS1-34200	A	Reaction wheel set (4-wheel)	1	ea	\$62,400.00	\$62,400.00	20	2026-04-18	2026-04-08	Port Ember Bldg 3
010	SS1-34600	A	Magnetorquer rods	4	ea	\$3,100.00	\$12,400.00	14	2026-03-10	2026-03-02	Port Ember Bldg 3
011	SS1-41000	A	S-band transceiver	2	ea	\$12,000.00	\$24,000.00	14	2026-03-30	2026-03-20	Port Ember Bldg 3
012	SS1-42000	A	X-band downlink transmitter	1	ea	\$19,000.00	\$19,000.00	16	2026-04-05	2026-03-28	Port Ember Bldg 3
013	SS1-43000	A	Antenna set (S-band patches + X-band horn)	1	set	\$11,500.00	\$11,500.00	12	2026-03-15	2026-03-10	Port Ember Bldg 3
014	SS1-51000	A	Thermal control kit (MLI + heaters + sensors)	1	kit	\$21,000.00	\$21,000.00	16	2026-03-30	2026-03-20	Port Ember Bldg 3
015	SS1-61000	B	Harness assembly	1	ea	\$27,500.00	\$27,500.00	20	2026-04-20	2026-04-10	Port Ember Bldg 3
016	SS1-61500	A	Connectors/back-shells/contacts kit	1	kit	\$8,600.00	\$8,600.00	10	2026-03-05	2026-02-28	Port Ember Bldg 3

Item	PN	Rev	Description	Qty	UoM	Unit Price	Ex- tended	Lead (wks)	Need By	Promise NLT	Ship-
017	SS1-61700	A	Fasteners kit	1	kit	\$3,400.00	\$3,400.00	8	2026-02-25	2026-02-20	Port Ember Bldg 3
018	SS1-71000	A	Electrical ground support equipment (EGSE)	1	ea	\$18,000.00	\$18,000.00	12	2026-03-05	2026-02-28	Port Ember Bldg 3
019	SS1-90010	A	Environmental test services (TVAC + vibe + EMI)	1	lot	\$74,000.00	\$74,000.00	24	2026-08-01	2026-07-15	Port Ember Bldg 3
020	SS1-99020	A	Shipping container & logistics	1	ea	\$6,800.00	\$6,800.00	8	2026-02-20	2026-02-15	Port Ember Bldg 3
021	SS1-98010	A	Training & technical support (hours)	96	hr	\$235.00	\$22,560.00	6	2026-02-20	2026-02-12	Port Ember Bldg 3
022	SS1-96010	A	Spares lot (5% EEE parts)	1	lot	\$12,400.00	\$12,400.00	10	2026-03-01	2026-02-25	Port Ember Bldg 3
023	SS1-97000	A	Documentation & data package (CDRL)	1	ea	\$9,800.00	\$9,800.00	6	2026-02-25	2026-02-20	Port Ember Bldg 3
024	SS1-82000	A	Monoprop thruster cluster (4 thrusters)	1	ea	\$91,800.00	\$91,800.00	24	2026-05-22	2026-05-08	Port Ember Bldg 3
025	SS1-82100	A	Propellant tank & feed system	1	ea	\$39,500.00	\$39,500.00	20	2026-04-30	2026-04-15	Port Ember Bldg 3
026	SS1-82200	A	Thruster valves & actuators	1	ea	\$14,200.00	\$14,200.00	18	2026-04-20	2026-04-10	Port Ember Bldg 3

2 Key Program Milestones

Milestone	Planned Date	Deliverables / Exit Criteria	Responsible
Kickoff (KOM)	2025-11-15	Baseline schedule, risk register, RFI list	Buyer/Supplier
Preliminary Design Review (PDR)	2025-12-20	Block diagrams, ICD drafts, parts lists	Supplier
Critical Design Review (CDR)	2026-02-10	Released drawings for build, QA plan	Supplier
First Article Inspection (FAI) start	2026-03-20	FAI plans approved, serial #'s assigned	Buyer/Supplier
Qualification complete	2026-06-10	Qual test report set approved	Supplier
Flight hardware delivery	2026-08-22	All line items + CDRLs delivered/accepted	Supplier
EGSE delivery & training	2026-09-05	Training sign-in sheet, EGSE checkout	Supplier

3 Pricing Summary

Component	Amount
Subtotal (computed from line items)	\$918,610.00
Early Pay 3%	-\$27,558.30
Shipping & Handling	\$0.00
Taxes	\$0.00
Grand Total	\$891,051.70

Taxes assumed exempt for export/integration; adjust if jurisdiction requires.

4 Quality Flowdowns (Legend)

Code	Title	Text
QF-001	QMS	Supplier maintains third-party-certified aerospace QMS (AS9100 or equivalent).
QF-002	FAI	First Article Inspection per AS9102 required for first build and on any major change.
QF-003	CofC	Certificate of Conformance required with each shipment; include PO, PN, rev, lot/serial.
QF-004	Traceability	Full lot/date code traceability for all EEE parts; retain records min. 10 years.
QF-005	ESD	ESD controls per ANSI/ESD S20.20; label and package ESD-sensitive items accordingly.
QF-006	FOD	Foreign Object Debris prevention program; inspect/certify FOD-free prior to packout.
QF-007	Cleanliness	Clean to visibly clean; packaged double bag in clean area; ISO 14644-1 Class 8 or better.
QF-008	Calibration	Measuring equipment calibrated to ISO/IEC 17025 or equivalent; certs on request.
QF-009	Counterfeit	Counterfeit part avoidance per AS5553/AS6174; use authorized channels; provide certs.
QF-010	Material Certs	Provide raw material certs for metallics, composites, adhesives, solders, and potting.
QF-011	Welding/Soldering	Workmanship per NASA-STD-8739.x series or equivalent process controls.
QF-012	Packaging	Packaging per WI-PKG-0089 Rev A; humidity control for EEE; shock/tilt indicators as req'd.
QF-013	Software SBOM	Provide Software Bill of Materials for all delivered binaries/firmware.
QF-014	Cybersecurity	Protect CUI per NIST SP 800-171; report incidents within 72 hours.
QF-015	RoHS/REACH	Declare compliance or exemptions; provide SVHC disclosure where applicable.

5 Detailed Line Items

Line Item 001 — Primary structure (CFRP panels & skeleton)

Part Number: SS1-10000 **Rev:** B

Nomenclature: Microsatellite primary chassis—CFRP/Al honeycomb sandwich panels; machined corner posts

Qty	UoM	Unit Price	Extended Price
1	ea	\$132,500.00	\$132,500.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
24	2026-05-20	2026-05-05	No

Technical Specifications

Parameter	Value	Unit	Notes
External envelope	600 x 600 x 800	mm	Stowed, excluding antenna protrusions
Panel construction	CFRP skins / Al honeycomb	—	Skins quasi-isotropic layup
Mass (structure only)	9.8	kg	±0.3 kg
CTE (effective)	0.5	ppm/°C	23–40 °C
Stiffness (1st mode)	120	Hz	Mounted to shaker fixture per spec
Surface finish	Conductive black	—	Sheet resistivity 10 ⁴ Ω/sq
Cleanliness level	ISO 14644-1 Class 8	—	Before bag & purge

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-002 — FAI
- QF-003 — CofC
- QF-004 — Traceability
- QF-006 — FOD
- QF-007 — Cleanliness
- QF-010 — Material Certs
- QF-012 — Packaging

Acceptance Criteria:

- Dimensional inspection per drawing SS1-10000; all critical features within tolerance.
- Modal survey report demonstrating 120 Hz first mode.
- Material/process certs reviewed and accepted.
- No visible FOD; cleanliness verified prior to packout.

Notes: Supplier furnishes all tooling; tooling ownership per Clause 12 (Tooling & Test Equipment).

Line Item 002 — Solar array panels, deployable pair

Part Number: SS1-21010 **Rev:** A

Nomenclature: Deployable two-wing solar generator with hinges and hold-down release hardware

Qty	UoM	Unit Price	Extended Price
2	ea	\$51,200.00	\$102,400.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
20	2026-04-25	2026-04-12	Yes

Technical Specifications

Parameter	Value	Unit	Notes
EOL power (1 AU, 45°)	160	W	Per wing; BOL 180 W
Array voltage	28	V	PCDU interface
Cell technology	Radiation-tolerant Si/III-V	—	Equivalent or better
Deployer	Dual-hinge with HDRM	—	Non-pyro hold-down/release
Mass (per wing)	1.9	kg	±0.1 kg
Thermal range (survival)	-30 to +70	°C	Non-operational limits

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-002 — FAI
- QF-003 — CofC
- QF-004 — Traceability
- QF-005 — ESD
- QF-006 — FOD
- QF-007 — Cleanliness
- QF-009 — Counterfeit
- QF-010 — Material Certs
- QF-012 — Packaging

Acceptance Criteria:

- Functional deployment test at ambient; no latch hang-ups.
- IV-curve measurement within spec; insulation resistance 10 MΩ.
- Visual inspection—no cracked cells; harness strain relief intact.

Line Item 003 — Battery module, 28V 18Ah

Part Number: SS1-23120 **Rev:** A

Nomenclature: Space-tolerant Li-ion pack with BMS and heaters

Qty	UoM	Unit Price	Extended Price
3	ea	\$15,750.00	\$47,250.00

Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
18	2026-03-28	2026-03-18	Yes

Technical Specifications

Parameter	Value	Unit	Notes
Nominal voltage	28	V	7s configuration equivalent
Capacity (EOL at 0.5C)	18	Ah	90% BOL after 2 years LEO
Max discharge current	20	A	Continuous
Mass	2.1	kg	±0.1 kg
BMS protections	OV/UV/OC/OT	—	Telemetered via CAN
Heater power	10	W	Thermostat controlled

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-004 — Traceability
- QF-005 — ESD
- QF-007 — Cleanliness
- QF-008 — Calibration
- QF-010 — Material Certs
- QF-012 — Packaging

Acceptance Criteria:

- Capacity test 18 Ah at 20 °C.
- IR drop and leakage within spec.
- Safety vent and relief paths verified.

Notes: Ship at 30–50% SOC; MSDS/handling instructions included.

Line Item 004 — Power control & distribution unit (PCDU)

Part Number: SS1-22000 **Rev:** A

Nomenclature: PCDU with MPPT inputs, battery charge, and high/low-side switching

Qty	UoM	Unit Price	Extended Price
1	ea	\$38,000.00	\$38,000.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
20	2026-04-30	2026-04-15	No

Technical Specifications

Parameter	Value	Unit	Notes
Input channels (SA)	4	qty	Independent MPPT
Battery charge	2	qty	Redundant chargers
Bus voltage	28	V	Regulated ±1 V
Switch outputs	12	qty	8 high-side, 4 low-side
Mass	1.6	kg	±0.1 kg

Parameter	Value	Unit	Notes
Comm	CAN/SpaceWire	—	Redundant ports

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-002 — FAI
- QF-003 — CofC
- QF-004 — Traceability
- QF-005 — ESD
- QF-006 — FOD
- QF-009 — Counterfeit
- QF-010 — Material Certs
- QF-012 — Packaging
- QF-013 — Software SBOM
- QF-014 — Cybersecurity

Acceptance Criteria:

- Functional test with simulated loads; line regulation within spec.
- Thermal cycling checkout -10°C to $+40^{\circ}\text{C}$ non-operational; no anomalies.
- Software/firmware SBOM delivered and scanned with no critical CVEs open.

Line Item 005 — Onboard computer (rad-tolerant, ECC)**Part Number:** SS1-31000 **Rev:** A**Nomenclature:** OBC with 32-bit rad-tolerant CPU, ECC RAM, bootloader redundancy

Qty	UoM	Unit Price	Extended Price
1	ea	\$45,800.00	\$45,800.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
22	2026-05-02	2026-04-18	No

Technical Specifications

Parameter	Value	Unit	Notes
CPU class	Rad-tolerant 32-bit	—	200 MIPS equivalent
RAM	512	MB	ECC enabled
Storage	64	GB	NAND with wear leveling
Interfaces	2x CAN, 2x SpaceWire, 2x UART	—	Isolated where applicable
Mass	0.8	kg	± 0.05 kg
Input power	7	W	Nominal OBC only

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-002 — FAI
- QF-003 — CofC
- QF-004 — Traceability
- QF-005 — ESD
- QF-006 — FOD
- QF-009 — Counterfeit
- QF-013 — Software SBOM
- QF-014 — Cybersecurity

Acceptance Criteria:

- Boot redundancy verified; watchdog functional.
 - Memory ECC counters healthy after burn-in 24 h at 35 °C.
 - EMI self-compatibility test—no emissions above limit in 10 cm harness setup.
-

Line Item 006 — OBC flight software license**Part Number:** SS1-31990 **Rev:** A**Nomenclature:** License for RTOS and middleware stack for SS-1 mission; node-locked

Qty	UoM	Unit Price	Extended Price
1	ea	\$9,500.00	\$9,500.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
6	2026-02-15	2026-02-10	No

Technical Specifications

Parameter	Value	Unit	Notes
License type	Per-vehicle perpetual	—	Includes updates for 24 months
Activation	Offline key + hardware ID	—	Stored in secure element
SBOM required	Yes	—	Per QF-013
Support tier	L2	—	Email + workweek response
Export	NLR/EAR99	—	Supplier warrants compliance

Applied Quality Flowdowns:

- QF-013 — Software SBOM
- QF-014 — Cybersecurity

Acceptance Criteria:

- Key validated on delivered OBC hardware.
 - SBOM received; no critical CVEs unmitigated.
-

Line Item 007 — Star tracker unit

Part Number: SS1-34010 **Rev:** A

Nomenclature: Autonomous star tracker with quaternion output

Qty	UoM	Unit Price	Extended Price
2	ea	\$24,650.00	\$49,300.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
16	2026-04-15	2026-04-08	Yes

Technical Specifications

Parameter	Value	Unit	Notes
Accuracy (3)	20	arcsec	Star-field dependent
Update rate	5	Hz	Configurable
FOV	20 x 20	deg	Minimum
Power	5	W	Nominal
Mass	0.9	kg	Incl. baffle

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-004 — Traceability
- QF-005 — ESD
- QF-006 — FOD
- QF-009 — Counterfeit
- QF-012 — Packaging

Acceptance Criteria:

- Functional test on star simulator with accuracy within spec.
- Boresight alignment report provided for each serial number.

Line Item 008 — Miniature IMU

Part Number: SS1-34030 **Rev:** A

Nomenclature: Gyro/accel triad IMU

Qty	UoM	Unit Price	Extended Price
2	ea	\$7,500.00	\$15,000.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
14	2026-03-30	2026-03-20	Yes

Technical Specifications

Parameter	Value	Unit	Notes
Gyro bias stability	0.5	°/hr	All axes
Accel bias stability	100	µg	All axes
Bandwidth	100	Hz	Configurable

Parameter	Value	Unit	Notes
Power	2.5	W	Nominal
Mass	0.35	kg	—

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-004 — Traceability
- QF-005 — ESD
- QF-006 — FOD
- QF-009 — Counterfeit

Acceptance Criteria:

- Calibration report per unit; noise density within spec.
-

Line Item 009 — Reaction wheel set (4-wheel)**Part Number:** SS1-34200 **Rev:** A**Nomenclature:** Skewed tetrahedral wheel set with one on-orbit spare

Qty	UoM	Unit Price	Extended Price
1	ea	\$62,400.00	\$62,400.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
20	2026-04-18	2026-04-08	No

Technical Specifications

Parameter	Value	Unit	Notes
Wheel torque	0.08	N · m	Continuous
Momentum storage	0.6	N · m · s	Per wheel
Jitter	0.5	mN · m	Mounting per drawing
Power (typical)	6	W	Per wheel
Mass (per wheel)	0.7	kg	—

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-002 — FAI
- QF-003 — CofC
- QF-006 — FOD
- QF-009 — Counterfeit
- QF-012 — Packaging

Acceptance Criteria:

- Spin test and imbalance report within spec.
 - Run-in 2 h per wheel; bearing temps stabilized.
-

Line Item 010 — Magnetorquer rods

Part Number: SS1-34600 **Rev:** A

Nomenclature: Dipole magnetorquers for momentum dumping

Qty	UoM	Unit Price	Extended Price
4	ea	\$3,100.00	\$12,400.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
14	2026-03-10	2026-03-02	Yes

Technical Specifications

Parameter	Value	Unit	Notes
Dipole moment	20	A · m ²	At rated current
Resistance	12	Ω	±10%
Mass	0.28	kg	Per unit
Thermal range (op)	-20 to +50	°C	—

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-005 — ESD
- QF-006 — FOD
- QF-012 — Packaging

Acceptance Criteria:

- Electrical resistance within tolerance; coil insulation IR 10 MΩ.
-

Line Item 011 — S-band transceiver

Part Number: SS1-41000 **Rev:** A

Nomenclature: S-band half-duplex transceiver with AES-256 link layer

Qty	UoM	Unit Price	Extended Price
2	ea	\$12,000.00	\$24,000.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
14	2026-03-30	2026-03-20	Yes

Technical Specifications

Parameter	Value	Unit	Notes
Tx power	5	W	Adjustable
Rx sensitivity	-110	dBm	At BER 10 ⁻⁵
Data rate	1	Mbps	Configurable

Parameter	Value	Unit	Notes
Mass	0.6	kg	—
Power	8	W	Tx

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-004 — Traceability
- QF-005 — ESD
- QF-006 — FOD
- QF-009 — Counterfeit
- QF-012 — Packaging
- QF-013 — Software SBOM
- QF-014 — Cybersecurity

Acceptance Criteria:

- End-to-end link test with standard test modem; BER within spec at stated Eb/N0.
 - Crypto self-test passes; key injection verified with dual control.
-

Line Item 012 — X-band downlink transmitter**Part Number:** SS1-42000 **Rev:** A**Nomenclature:** High-rate payload downlink

Qty	UoM	Unit Price	Extended Price
1	ea	\$19,000.00	\$19,000.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
16	2026-04-05	2026-03-28	No

Technical Specifications

Parameter	Value	Unit	Notes
Output power (Pout)	10	W	Nominal
Max data rate	50	Mbps	QPSK/8PSK
Linearity	-25	dBc	ACPR
Mass	0.9	kg	—

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-004 — Traceability
- QF-005 — ESD
- QF-006 — FOD
- QF-009 — Counterfeit

- QF-012 — Packaging
- QF-013 — Software SBOM
- QF-014 — Cybersecurity

Acceptance Criteria:

- Spectral mask compliance verified per test profile.
 - Thermal soak 2 h at +35 °C; no fault flags.
-

Line Item 013 — Antenna set (S-band patches + X-band horn)**Part Number:** SS1-43000 **Rev:** A**Nomenclature:** Antenna kit with harness pigtails and mounting hardware

Qty	UoM	Unit Price	Extended Price
1	set	\$11,500.00	\$11,500.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
12	2026-03-15	2026-03-10	No

Technical Specifications

Parameter	Value	Unit	Notes
S-band patch gain	7	dBi	RHCP
X-band horn gain	14	dBi	Linear
VSWR	1.5:1	—	Across band
Mass (kit)	0.8	kg	—

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-005 — ESD
- QF-006 — FOD
- QF-012 — Packaging

Acceptance Criteria:

- S-parameters within spec; connector pin gage check per drawing.
-

Line Item 014 — Thermal control kit (MLI + heaters + sensors)**Part Number:** SS1-51000 **Rev:** A**Nomenclature:** MLI blankets die-cut per pattern; Kapton heaters; 10x RTDs

Qty	UoM	Unit Price	Extended Price
1	kit	\$21,000.00	\$21,000.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
16	2026-03-30	2026-03-20	No

Technical Specifications

Parameter	Value	Unit	Notes
MLI layers	18	ply	Average; local adders per pattern
Heater density	0.4	W/cm ²	Nominal
RTD type	PT100	—	4-wire
Outgassing (TML/CVCM)	1.0/ 0.1	%/%	ASTM E595

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-006 — FOD
- QF-007 — Cleanliness
- QF-010 — Material Certs
- QF-012 — Packaging

Acceptance Criteria:

- Blanket fit-check on surrogate panel; no tears, proper venting.
- Electrical continuity/insulation tests pass.

Line Item 015 — Harness assembly**Part Number:** SS1-61000 **Rev:** B**Nomenclature:** SpaceWire/CAN mixed harness; laser-marked wires; braid shields

Qty	UoM	Unit Price	Extended Price
1	ea	\$27,500.00	\$27,500.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
20	2026-04-20	2026-04-10	No

Technical Specifications

Parameter	Value	Unit	Notes
Wire type	PTFE insulated, silver plated	—	AWG 24-30
Topology	Point-to-point + star	—	Per harness drawing
Shielding	85%	%	Overall + local shields
Continuity	100%	%	Verify per pin matrix
Hi-pot	500	VDC	No breakdown
Labeling	Laser mark	—	Per WI-HM-221

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-002 — FAI
- QF-003 — CofC

- QF-005 — ESD
- QF-006 — FOD
- QF-010 — Material Certs
- QF-011 — Welding/Soldering
- QF-012 — Packaging

Acceptance Criteria:

- Continuity and hi-pot complete; pin map report provided.
- Connector torque/braid terminations per drawing; no backshell damage.

Notes: Include mating connector dust caps and 10% spare contacts.

Line Item 016 — Connectors/backshells/contacts kit

Part Number: SS1-61500 **Rev:** A

Nomenclature: Micro-D, Nano-D, SMA set with plating certs

Qty	UoM	Unit Price	Extended Price
1	kit	\$8,600.00	\$8,600.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
10	2026-03-05	2026-02-28	No

Technical Specifications

Parameter	Value	Unit	Notes
Connector styles	Mic-	—	Per BOM
	ro-D/Nano-D/SMA		
Plating	Au over Ni	—	Thickness per spec
Outgassing	Low-outgassing	—	Certify per ASTM E595

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-004 — Traceability
- QF-006 — FOD
- QF-010 — Material Certs
- QF-012 — Packaging

Acceptance Criteria:

- Plating thickness certs; visual per IPC-A-610 class 3 equivalent.
-

Line Item 017 — Fasteners kit

Part Number: SS1-61700 **Rev:** A

Nomenclature: Assorted Ti/SS fasteners with locking features and witness paint

Qty	UoM	Unit Price	Extended Price
1	kit	\$3,400.00	\$3,400.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
8	2026-02-25	2026-02-20	No

Technical Specifications

Parameter	Value	Unit	Notes
Material	Ti-6Al-4V / 300 series SS	—	As called out
Finish	Dry film lube	—	As required
Cleanliness	Bagged by lot	—	Double bag, desiccant

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-006 — FOD
- QF-007 — Cleanliness
- QF-010 — Material Certs
- QF-012 — Packaging

Acceptance Criteria:

- Lot certs; hardness and chemistry reports provided.

Line Item 018 — Electrical ground support equipment (EGSE)

Part Number: SS1-71000 **Rev:** A

Nomenclature: Breakout box, power emulator, and test scripts

Qty	UoM	Unit Price	Extended Price
1	ea	\$18,000.00	\$18,000.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
12	2026-03-05	2026-02-28	No

Technical Specifications

Parameter	Value	Unit	Notes
Bus emulation	28	V	Ripple <50 mVpp
Telemetry links	CAN/SpaceWire	—	Loopbacks included
Safety	UL-listed supply	—	Internal interlocks

Applied Quality Flowdowns:

- QF-001 — QMS

- QF-003 — CofC
- QF-008 — Calibration
- QF-012 — Packaging
- QF-013 — Software SBOM

Acceptance Criteria:

- Self-test passes; deliver test report and operator's guide.
-

Line Item 019 — Environmental test services (TVAC + vibe + EMI)**Part Number:** SS1-90010 **Rev:** A**Nomenclature:** Qualification and protoflight test campaign including reports

Qty	UoM	Unit Price	Extended Price
1	lot	\$74,000.00	\$74,000.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
24	2026-08-01	2026-07-15	Yes

Technical Specifications

Parameter	Value	Unit	Notes
Vibration	Protodeflection levels	—	X/Y/Z per spec
TVAC cycles	4	count	-20 to +50 °C
EMI/EMC	MIL-STD-461	—	Tailored limits
	class		
Reports	PDF + raw data	—	Within 10 business days

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-008 — Calibration

Acceptance Criteria:

- All tests completed without failures; reports approved.
-

Line Item 020 — Shipping container & logistics**Part Number:** SS1-99020 **Rev:** A**Nomenclature:** Custom foam-in-place container with shock/tilt indicators

Qty	UoM	Unit Price	Extended Price
1	ea	\$6,800.00	\$6,800.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
8	2026-02-20	2026-02-15	No

Technical Specifications

Parameter	Value	Unit	Notes
Drop resistance	ISTA 2A equivalent	—	Tailored
Shock limits	<10	g	With payload mass sim

Applied Quality Flowdowns:

- QF-012 — Packaging

Acceptance Criteria:

- Fit-check with dummy mass; indicators affixed; spare desiccant packs included.
-

Line Item 021 — Training & technical support (hours)**Part Number:** SS1-98010 **Rev:** A**Nomenclature:** On-site/remote mixed; integration and EGSE training

Qty	UoM	Unit Price	Extended Price
96	hr	\$235.00	\$22,560.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
6	2026-02-20	2026-02-12	Yes

Technical Specifications

Parameter	Value	Unit	Notes
Scope	Integration + test support	—	Per task plan
Format	On-site/remote	—	Buyer facilities or virtual
Hours	96	hr	Call-off by work orders

Acceptance Criteria:

- Training completion records and attendance logs provided.
-

Line Item 022 — Spares lot (5% EEE parts)**Part Number:** SS1-96010 **Rev:** A**Nomenclature:** Common EEE spares and connectors for on-hand stock

Qty	UoM	Unit Price	Extended Price
1	lot	\$12,400.00	\$12,400.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
10	2026-03-01	2026-02-25	No

Technical Specifications

Parameter	Value	Unit	Notes
Coverage	Approx. 5%	%	By extended value
Shelf life	24	mo	From DOM
Traceability	Full	—	Per QF-004

Applied Quality Flowdowns:

- QF-003 — CofC
- QF-004 — Traceability
- QF-005 — ESD
- QF-009 — Counterfeit
- QF-012 — Packaging

Acceptance Criteria:

- Lot/date code and CofC verification complete.
-

Line Item 023 — Documentation & data package (CDRL)**Part Number:** SS1-97000 **Rev:** A**Nomenclature:** As-built, CofCs, test reports, ICDs, SBOMs

Qty	UoM	Unit Price	Extended Price
1	ea	\$9,800.00	\$9,800.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
6	2026-02-25	2026-02-20	No

Technical Specifications

Parameter	Value	Unit	Notes
Format	PDF + native	—	Per item
Retention	10	yr	Supplier retains
Security	CUI controls	—	Per clause 21

Applied Quality Flowdowns:

- QF-003 — CofC
- QF-004 — Traceability
- QF-008 — Calibration
- QF-013 — Software SBOM
- QF-014 — Cybersecurity
- QF-015 — RoHS/REACH

Acceptance Criteria:

- Document completeness and metadata pass automated checks.
-

Line Item 024 — Monoprop thruster cluster (4 thrusters)**Part Number:** SS1-82000 **Rev:** A**Nomenclature:** Green monoprop micro-thrusters in cluster block with thermal isolators

Qty	UoM	Unit Price	Extended Price
1	ea	\$91,800.00	\$91,800.00

Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
24	2026-05-22	2026-05-08	No

Technical Specifications

Parameter	Value	Unit	Notes
Thrust (per thruster)	0.5	N	Nominal
Isp	220	s	At rated conditions
Valve response	15	ms	Command to full open
Mass (cluster)	1.7	kg	—

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-002 — FAI
- QF-003 — CofC
- QF-006 — FOD
- QF-007 — Cleanliness
- QF-010 — Material Certs
- QF-012 — Packaging

Acceptance Criteria:

- Hot-fire acceptance test data; leak check $< 1 \times 10^{-5}$ sccs He.

Line Item 025 — Propellant tank & feed system

Part Number: SS1-82100 Rev: A

Nomenclature: Composite overwrapped pressure vessel (COPV) with regulators, filters, lines

Qty	UoM	Unit Price	Extended Price
1	ea	\$39,500.00	\$39,500.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
20	2026-04-30	2026-04-15	No

Technical Specifications

Parameter	Value	Unit	Notes
MEOP	2,000	psi	Proof 1.5x
Capacity	3.5	L	Usable volume
Mass (dry)	1.4	kg	—
Cleanliness	Level 200A/10	—	Particle/non-volatile residue

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-002 — FAI
- QF-003 — CofC
- QF-006 — FOD

- QF-007 — Cleanliness
- QF-010 — Material Certs
- QF-012 — Packaging

Acceptance Criteria:

- Proof test passed; helium leak rate $< 5 \times 10^{-6}$ sccs.
 - Cleanliness cert and borescope photos provided.
-

Line Item 026 — Thruster valves & actuators**Part Number:** SS1-82200 **Rev:** A**Nomenclature:** Flight valves with harness pigtails and connectors

Qty	UoM	Unit Price	Extended Price
1	ea	\$14,200.00	\$14,200.00
Lead Time (wks)	Need By	Promise NLT	Partial Ship Allowed
18	2026-04-20	2026-04-10	No

Technical Specifications

Parameter	Value	Unit	Notes
Operating ΔP	50–500	psi	Within spec
Response time	10	ms	Command to 90%
Leakage	$<1 \times 10^{-5}$	sccs He	Seat leakage
Mass (per valve)	0.12	kg	—

Applied Quality Flowdowns:

- QF-001 — QMS
- QF-003 — CofC
- QF-006 — FOD
- QF-007 — Cleanliness
- QF-010 — Material Certs
- QF-012 — Packaging

Acceptance Criteria:

- Leak and response tests passed; connectors per pinout.
-

6 Deliverables (CDRL)

CDRL ID	Title	Due	Format	Applies To
CDRL-001	As-built list & serial numbers	With shipment	CSV + PDF	All hardware
CDRL-002	Certificates of Conformance & Material Certs	With shipment	PDF	Hardware/Materials

CDRL ID	Title	Due	Format	Applies To
CDRL-003	FAI Reports	Prior to first shipment	PDF	FAI items
CDRL-004	Test Reports (ATP/ESS/TVAC/Vibe/EMI)	As completed	PDF + data	Items 004, 005, 007–015, 019
CDRL-005	Software SBOMs & licenses	With software	SPDX + PDF	Items 004, 005, 006, 011–012, 018
CDRL-006	User manuals & ICDs	At CDR + update at ship	PDF	Relevant subsystems
CDRL-007	Packaging records & photos	With shipment	PDF/JPEG	All hardware

7 Manufacturing Requirements

1. All soldering, staking, and conformal coatings executed per a documented process with qualified operators.
2. Adhesives, tapes, potting, and polymerics shall meet low-outgassing per ASTM E595 (TML 1.0%, CVCM 0.1%).
3. Sharp edges deburred; witness paint applied to torque-critical fasteners per drawing callouts.
4. ESD protection maintained from kitting through final packaging; ESD logs retained.
5. Parts susceptible to magnetic fields packaged to prevent inadvertent magnetization; keep-out zones honored.
6. Cleanroom bagging: double bag with humidity indicator, desiccant, and part/serial labels between layers.
7. Shipping orientation labels and shock/tilt indicators affixed per WI-PKG-0089.
8. Nonconformances routed through Supplier MRB but disposition requires Buyer approval prior to shipment.
9. Serial numbers laser-marked or engraved where permissible; otherwise nameplate labels per drawing.

8 Terms & Conditions

1. **Definitions.** Capitalized terms (Buyer, Supplier, Goods, Services, Data, CUI, IP, Nonconformance, etc.) have meanings given in this PO.
2. **Scope of Supply.** Supplier shall furnish the Goods and Services per line items, drawings, and specifications referenced herein.
3. **Price & Taxes.** Prices are firm-fixed. Unless stated, taxes, duties, and fees are excluded; Buyer is tax-exempt for export/integration when eligible.
4. **Payment Terms.** 3% discount for payments within 15 days of valid invoice; otherwise Net 45 from acceptance of Goods or receipt of invoice, whichever is later.
5. **Schedule & Delay.** Time is of the essence. Supplier shall promptly notify Buyer of any schedule risk and propose recovery actions at no cost to Buyer.
6. **Changes.** Buyer may issue written changes within general scope. Equitable adjustments (price/schedule) require mutual written agreement.
7. **Inspection, Test & Acceptance.** All Goods are subject to inspection and test at Supplier's and Buyer's facilities. Acceptance occurs upon Buyer's written acceptance after incoming inspection.
8. **Quality Management.** Supplier maintains and applies a certified aerospace QMS (AS9100 or equivalent) and complies with Buyer quality flowdowns (QF-Table).

9. **First Article Inspection.** FAI is required per AS9102 for first build, router revisions, major design or process changes, or lapse >24 months.
10. **Counterfeit Parts Prevention.** Supplier prevents, detects, and mitigates counterfeit parts per AS5553/AS6174; only authorized distributors; full lot/date-code traceability.
11. **Configuration & Documentation Control.** Supplier builds to the specific drawing revision on the PO; changes require Buyer ECO/CCB approval prior to implementation.
12. **Tooling & Test Equipment.** Unless otherwise stated, Supplier furnishes tooling and gauges. Buyer-furnished equipment remains Buyer's property and shall be safeguarded and returned.
13. **Warranties.** Supplier warrants Goods to be free from defects in material and workmanship for 12 months from acceptance. Remedies include repair, replace, or refund at Buyer's option.
14. **Nonconforming Goods.** Supplier shall not ship known nonconforming Goods without written concession. Buyer may reject, return, or require rework at Supplier's expense.
15. **Packaging & Marking.** Supplier packages Goods to prevent damage, contamination, and ESD/FOD per PO and WI-PKG-0089; marking includes PO, PN, Rev, SN/Lot, and C of C.
16. **Intellectual Property.** Each party retains pre-existing IP. Deliverables created specifically for Buyer are Work-for-Hire or assigned to Buyer unless otherwise agreed in writing.
17. **Data Rights & Confidentiality.** Supplier keeps Buyer data confidential and uses it solely to perform under this PO; protect CUI per NIST SP 800-171.
18. **Software & SBOM.** Where software is delivered, Supplier provides licenses and SBOMs; no malicious code; promptly remediate critical vulnerabilities.
19. **Export Compliance.** Parties comply with all applicable export/import laws (e.g., ITAR/EAR). Supplier identifies export classifications for items and data.
20. **Environmental & Materials Compliance.** Supplier declares compliance with RoHS/REACH and conflict minerals due diligence; disclose SVHCs and provide material declarations upon request.
21. **Cybersecurity & Incident Reporting.** Supplier implements reasonable safeguards for CUI and notifies Buyer within 72 hours of any suspected compromise affecting this PO.
22. **Force Majeure.** Neither party is liable for delays due to causes beyond reasonable control; notify the other party promptly; resume performance when practicable.
23. **Indemnification.** Supplier indemnifies Buyer from third-party claims arising from Supplier's negligence, willful misconduct, IP infringement, or noncompliance.
24. **Limitation of Liability.** Except for indemnities, confidentiality, and IP breaches, neither party is liable for indirect, incidental, or consequential damages.
25. **Insurance.** Supplier maintains adequate insurance (commercial general liability, products/completed operations) and furnishes certificates upon request.
26. **Termination.** Buyer may terminate for convenience with reasonable charges for work-in-process; either party may terminate for cause after notice and cure period.
27. **Audit & Record Retention.** Buyer may audit quality records; Supplier retains relevant records at least 10 years and makes them available upon reasonable notice.
28. **Governing Law & Dispute Resolution.** This PO is governed by the laws of the State of Cascadia, USA, without regard to conflicts rules. Venue: Port Ember, Cascadia. Parties will seek amicable resolution before litigation.

9 Appendices

A. Acronyms

ADCS: Attitude Determination & Control System

ATP: Acceptance Test Procedure

BMS: Battery Management System

BOL/EOL: Beginning/End of Life

BOM: Bill of Materials

CAN: Controller Area Network

CCB: Change Control Board

CDRL: Contract Data Requirements List

CFRP: Carbon Fiber Reinforced Polymer

CofC: Certificate of Conformance

COPV: Composite Overwrapped Pressure Vessel

COTS: Commercial Off-The-Shelf

CUI: Controlled Unclassified Information

DPAS: Defense Priorities & Allocations System

ECO: Engineering Change Order

EGSE: Electrical Ground Support Equipment

EMI/EMC: Electromagnetic Interference/Compatibility

ESS: Environmental Stress Screening

FAI: First Article Inspection

FOD: Foreign Object Debris

HDRM: Hold-Down & Release Mechanism

ICD: Interface Control Document

IMU: Inertial Measurement Unit

IR: Insulation Resistance

ISC: In-Spec Compliance

ISO: International Organization for Standardization

LEO: Low Earth Orbit

MEOP: Maximum Expected Operating Pressure

MLI: Multi-Layer Insulation

MPPT: Maximum Power Point Tracking

NRE: Non-Recurring Engineering

OBC: Onboard Computer

PCDU: Power Control & Distribution Unit

PDR/CDR: Preliminary/Critical Design Review

QMS: Quality Management System

SBOM: Software Bill of Materials

SN: Serial Number

TVAC: Thermal Vacuum

UoM: Unit of Measure

VSWR: Voltage Standing Wave Ratio

WIP: Work-In-Process

B. Definitions

Goods All hardware, software, documentation, and data delivered under this PO.

Services All labor, training, testing, and activities required to support delivery of the Goods.

Acceptance Buyer's written acknowledgement that Goods meet all requirements after inspection and test.

10 Signatures

For Vermilion Moonshell Systems, PBC

Name: Rhea Calder

Title: Senior Supply Officer

Date: 2025-11-08

Signature: _____

For Quayline Lattice Manufacturing, Ltd.

Name: Tamsin Hallow

Title: Contracts Manager

Date: _____

Signature: _____

Export/ITAR/EAR compliance required; no unauthorized export of technical data.