Category	Parameter	Units	Argotec Hawk 6U	Argotec Hawk 12U	Argotec HEO	Ball Aerospace Small	Ball Aerospace Large
Compatibility	Orbit Average Payload Power (EOL)	W (EOL)	<30 (depends on orbit)	<40 (depends on orbit)	<17	90	600
	Maximum Payload Mass	kg	3	8	6 12 (w/ modifications)	170	600
	Bus Dry mass (w/o Payload)	kg	13	25	58.3	170	1270
	Science Data Downlink	kbps	Up to 218 Mbps	Up to 218 Mbps	Up to 218 Mbps	2,000	300,000
	Science Data Storage (Capacity)	Mbit	Up to 32GB	Up to 32 GB 240 GB w/ PDP Option	Up to 128 GB 240 GB w/ PDP Option	48,000	343,000
	Pointing Knowledge	arcsec	1,1,10 (RPY) (1 sigma)	1,1,10 (RPY) (1 sigma)	1,1,10 (RPY) (1 sigma)	25	18
	Pointing Control	arcsec	< 5 (1 sigma)	< 5 (1 sigma)	< 5 (1 sigma)	25	28.8
	Pointing Stability (Jitter)	arcsec/sec	18	18	18	3	5.8
	Slew rate	deg / min	600 max	600 max	600 max	5	16
	Mission Design Life	years	5	5	5	1, 0.9 Ps	5, 0.93 Ps
	Compatible LVs	(names)	All Major Rockets	All Major Rockets	All Major Rockets (ring separation system)	Delta II, Pegsus, Falcon 9, Atlas V, ESPA-G	Delta II, Falcon 9, Atlas V, Falcon Heavy
	Nominal Orbit	Altitude, Inclination, Type, Other	LEO, Interplanetary	LEO, Interplanetary, Cislunar	SSO (560 km, 98 deg)	540 km 0 deg, equatorial	824 km, 98.7 deg, sun sync
	Types of Orbits Available	as needed	MEO, GEO, Cislunar	MEO, GEO	Compatible with a wide variety of Earth observation orbit (LEO, GEO, SSO, …), No inclination constraints.	LEO from 0 - 98 deg, up to 1,200 km	LEO from 0 - 98 deg, up tp 1200 km
	External Payload Volume	meters			Mission Dependent	1 m hex x 1 m height	1.7 m x 1.4 m x 1.5 m height
	Internal Payload Volume	meters	3.5E-3 m^3	6E-3 m^3	42.75E-3 m^3	None	None
Description	ACS	type	3-axis	3-axis Spinning mode optional	3-axis	3-axis	3-axis
	Star Trackers	# of STs	1	1 (2 if requested)	2	2	2
	GPS	# recievers	1	1	1	1	2
	Batteries	cell type/capacity (Ah)	Li-ion, 4.98 Ah	Li-ion, 4.98 Ah	Li-ion, 3 Ah	Li-ion / 24 Ah	Li-ion / 80 Ah (x2)
	Solar Arrays	cell type/Area (m2)	3G30, 0.2128 m^2	4G32C, 0.513 m^2	SPL XTE-HF, 0.57 m^2	Triple Junction GaAs, 3.2 m^2	Triple Junction GaAs, 11 m^2
	Main Bus Voltage Range	volts	Protected regulated lines: 5V, 12V Protected unregulated	Protected regulated lines: 5V, 12V Protected unregulated	Protected regulated lines: 5V, 12V Protected unregulated	22 - 34	22 - 34
	C&DH Bus Architecture	description	CPU + FPGA, with Spacewire, RS422, GPIO, SPI and CAN as interfaces. Analogic	CPU + FPGA, with Spacewire, RS422, and SPI as interfaces.	CPU + FPGA, with Spacewire, RS422, SPI and CAN as interfaces. Analogic lines are	1553	1553
	Downlink Formats	CCSDS, STDN, etc	CCSDS	CCSDS	CCSDS, DVB-S2	CCSDS, STDN	CCSDS, STDN
	Comm Up\Downlink Band	S, X, UHF, Ka, Ku, etc.	S-Band, X-Band UHF optional	S-Band, X-Band K, Ka,UHF optional	S-Band, X-Band	S-band	S-band Uplink / S-band & X-band Downlinks
	Structure	description	Al 7075 T7351	Al 7075 T7351	Al 7075	Honeycomb & Machined Al Hexagon	Al Honeycomb Hexagon
	Propulsion	type, fuel	4x Cold Gas Thrusters for attitude control, 2x	Mission Dependant (Chemical Green	4x Axial 1N Thrusters (Green Propellant)	None	Mono-prop (N2H4)
	Propellant Capacity	kg	1.3	Up to 3	2.3	None	360
	Max delta V	m/s	70	120 (chemical) 2500 (electrical)	80 +/- 10% (chemical)	None	330
Programmatic	heritage mission(s)	name(s)	DART, Artemis I	DART, Artemis I (components)	IRIDE	GPIM, STPSat-2, STPSat-3	JPSS, NPP
	nominal schedule	months (ATP to ready for payload I&T)	13	13	13	22	23
	nominal schedule	months (ATP to launch)	16	16	16	29	35
Contractor-Provided Options	Option #1	description	Rad-hard for Deep Space	Rad-hard for Deep Space	Optical Payload for Earth Observation	Enhanced Data Storage	Enhanced Data Storage
	Option #2	description	Mission Operations	Mission Operations	Mission Operations	Enhanced Attitude Control: Co-locate primary attitude sensors with payload	Enhanced Attitude Control: Co-locate primary attitude sensors with payload
	Option #3	description	Ground Services	Ground Services	Ground Services	High Agility: Uses CMGs as primary actuators	High Agility: Uses CMGs as primary actuators
	Option #4	description		Payload Data Processor (PDP)	Payload Data Processor (PDP)	Higher Power: Resize and/or articulate solar array, change battery size	Higher Power: Resize solar array, Change battery size
	Option #5	description	Electrical Propulsion		Electrical Propulsion	Downlink: Add higher-rate X-band link	Downlink: Add higher rate and pointed Ka band link to playback recorded data
	Option #6	description				Propulsion: Add propulsion subsystem	Propulsion: Higher capacity propulsion for high delta-V
	Option #7	description					
	Option #8	description					
	Option #9	description					
	Option #10	description					
	Option #11	description					
	Option #12	description					
	Option #13	description					

Parameter	Blue Canyon Technologies XB-6	Blue Canyon Technologies XB-12	Blue Canyon Technologies XB-16	Blue Canyon Technologies XSAT Venus	Blue Canyon Technologies X-SAT Saturn	General Atomics GA-150
Orbit Average Payload Power (EOL)	39	39	39	60	500	85
Maximum Payload Mass	6	20	23	78	200	50
Bus Dry mass (w/o Payload)	10	12	13	64	191	130
Science Data Downlink	2000	2000	2000	2000	1000	2000
Science Data Storage (Capacity)	32000	32000	32000	40000	400000	260000
Pointing Knowledge	8, 1-sigma	4, 1-sigma	4, 1-sigma	<5	<5	80
Pointing Control	7.2arcsec	7.2arcsec	7.2arcsec	<5	<5	100
Pointing Stability (Jitter)	1 asec/1 sec, with respect to star tracker frame at zero body rate	1 asec/1 sec, with respect to star tracker frame at zero body rate	1 asec/1 sec, with respect to star tracker frame at zero body rate	2	2	14
Slew rate	360	360	360	6.4 ÷ spacecraft-MOI (kg*m2) * 180/[π] deg/s, per axis	6.4 ÷ spacecraft-MOI (kg*m2) * 180/[π] deg/s, per axis	1.5
Mission Design Life	5	5	5	5 in LEO	5 in LEO	Up to 5
Compatible LVs	Rocket Lab Electron, ISRO PSLV, ULA Atlas V, ULA Delta II, ULA Delta IV, ULA Vulcan, SpaceX Falcon Heavy, Firefly Alpha, Astra Rocket 3, ABL RS1, Space Launch System	Rocket Lab Electron, ISRO PSLV, ULA Atlas V, ULA Delta II, ULA Delta IV, ULA Vulcan, SpaceX Falcon Heavy, Firefly Alpha, Astra Rocket 3, ABL RS1, Space Launch System	Rocket Lab Electron, ISRO PSLV, ULA Atlas V, ULA Delta II, ULA Delta IV, ULA Vulcan, SpaceX Falcon Heavy, Firefly Alpha, Astra Rocket 3, ABL RS1, Space Launch System		SpaceX; others can be assessed	Falcon 9, Electron, other EELV and VADR class LVs that accept 15-inch MLB interface for primary or rideshare payloads
Nominal Orbit	500 km, 98 deg, Sun Synch	501 km, 98 deg, Sun Synch	502 km, 98 deg, Sun Synch	550KM LEO; mid-inc	550 km, 98 deg, Sun Synch, 6AM/PM LTAN	700 km, 98 deg, Sun Synch
Types of Orbits Available	LEO, GEO, Lunar, CisLunar	LEO, GEO, Lunar, CisLunar	LEO, GEO, Lunar, CisLunar	LEO, GEO, CisLunar	LEO	LEO from 28.5 to 98 deg, up to 1000km
External Payload Volume	mission dependent	mission dependent	mission dependent	0.41 x 0.45 x 0.68	1m x .8m	up to 0.55 x 0.55 x 0.85 or limits of LV fairing
Internal Payload Volume	4U	8U	12U	-	N/A	up to 0.51 x 0.51 x 0.37
ACS	3-axis reaction wheel control	3-axis reaction wheel control	3-axis reaction wheel control	3-axis control via reaction wheels	3-axis control via reaction wheels	3-axis
Star Trackers	1	1	1	2	2	1
GPS	1	1	1	1	1	1
Batteries	LiIon/6.8	LiIon/6.8	LiIon/6.8	LiIon/13.6	Li-Ion/54.4	LiIon/15 Ah
Solar Arrays	Triple Junction Cells/ 0.24-0.36	Triple Junction Cells/ 0.24-0.36	Triple Junction Cells/ 0.24-0.36	204x 60.26 cm^2 ZTJ-Omega cells	ZTJ-Omega, 60.26cm^2 ea cell	Triple Junction GaAs, 1 m2
Main Bus Voltage Range	12V	12V	12V	28	28-34	28 V +/- 6 Vdc
C&DH Bus Architecture	Linux OS - Base	Linux OS - Base	Linux OS - Base	Linux Based OS	Centralized	LVDS/RS422/SpaceWire
Downlink Formats	CCSDS	CCSDS	CCSDS	CCSDS	CCSDS	CCSDS
Comm Up\Downlink Band	S-Band	S-Band	S-Band	S-band	S-band	S-band
Structure	Al Panel	Al Panel	Al Panel	Al panel	Al, some decks Honeycomb Hexagon	Machined Aluminum Core
Propulsion	-	-	-	EP, Xenon	EP, Xenon	N/A
Propellant Capacity	-	-	-	10	38.8	N/A
Max delta V	-	-	-	50	760	N/A
heritage mission(s)	AMS, HaloSat, TEMPEST-D, CSIM, CubeRRT, ORCA-1, CIRiS, ORCA-8, DeMI, ORCA-6, ORCA-7, CUTE, MISR-B, GS-L, Starling1-4	ASCENT, Slingshot-1, Link XVI	None	INCUS	Blackjack	TSIS-2, GAzelle, OTB
nominal schedule (ATP to ready for payload I&T)	15	15	15	18	18	24
nominal schedule (ATP to launch)	23	23	23	24	24	36
Option #1	Mission Driven CubeSat Propulsion	Mission Driven CubeSat Propulsion	Mission Driven CubeSat Propulsion	Enhanced Data Rates with X-band Radio	Enhanced Data Rates with X-band Radio	Increased Data Storage
Option #2	Additional Payload Storage and I/O via HSDR Addition	Additional Payload Storage and I/O via HSDR Addition	Additional Payload Storage and I/O via HSDR Addition	Tighter pointing with fine-balanced reaction wheels	Tighter pointing with fine-balanced reaction wheels	Power Upgrade Package
Option #3	Enhanced ADCS with secondary star tracker	Enhanced ADCS with secondary star tracker	Enhanced ADCS with secondary star tracker	Different orbits (GEO, cislunar)	Different orbits (GEO, cislunar)	Payload Power Conversion
Option #4	Greater downlink with X-Band Radio	Greater downlink with X-Band Radio	Greater downlink with X-Band Radio			Mission Operations
Option #5	Aditional power via extra batteries	Aditional power via extra batteries	Aditional power via extra batteries			Propulsion System
Option #6						Mission specific thermal management
Option #7						
Option #8						
Option #9						
Option #10						
Option #11						
Option #12						
Option #13						

Parameter	Lockheed Martin LM4XX	Lockheed Martin LM2100	MAXAR 1300	NanoAvionics M12P	Northrop Grumman ESPASat-Ex	Northrop Grumman ESPAStar-D	Northrop Grumman LEOStar-3
Orbit Average Payload Power (EOL)	409	1,400 to 16,000 W	4000 - 16,000	25.5-33	100	800	580
Maximum Payload Mass	75	300 to 1,275+	500 , up to 1200	16.5-18	50	1960	850
Bus Dry mass (w/o Payload)	186	900 to 2,645	939, up to 3000	32	88	493	1718
Science Data Downlink	mission-specific	120,000	up to 2,000,000		4000 S-Band	1600	384000 X-Band
Science Data Storage (Capacity)	mission-specific	32MB	400 MB	80	16000	24000	4000000
Pointing Knowledge	413 (3σ)	<60	32 arc sec	0.04° (1σ)*	29	142	5
Pointing Control	462 (3σ)	<40	10.8 to 36 arc sec	0.08° (1σ)*	63 pitch 39 roll/yaw	144	21
Pointing Stability (Jitter)	5 (3σ)	<46	0.001 deg 3 sigma	TBD	12	5	1.2 arc sec 3 sigma below 500 Hz
Slew rate	44	36	None	X - 2 deg/s, Y - 1.6 deg/s, Z - 2.5 deg/s	90	Mission Specific, nominal range from 15-45 deg/min	19
Mission Design Life	1-3	15	15, 0.85 Ps	5-Jan	2	2	5
Compatible LVs	Pegasus XL, Minotaur I, Minotaur IV, Minotaur-C, Antares, Falcon 9, Electron, Launcher One, Alpha, RS-1, Alpha, Epsilon, Vega	Falcon 9 / Ariane / Atlas V / Vulcan	Falcon 9, Atlas V, Delta V, H2A, Ariane 5, New Glenn, Vulcan	SpaceX Falcon 9 Ariane Space Vega-C Rocket Lab Electron PSLV	All EELV ESPA Compatible Launch Vehicles	SpaceX Falcon 9, Falcon Heavy, ULA Atlas V, Vulcan	Altlas V, Falcon 9
Nominal Orbit	LEO 400-1000 km, 0° to Sun Synch, Lunar	35,786, 0.0, GEO	GEO at 35,786 km, 0 deg	Nominal orbit - up to 600 km SSO	600 km, 98 deg, Sun Synch 12 pm LTAN	35,786 km ± 300 km, 0 deg ± 2 deg, Geosynchronous	705 km, 98 deg, Sun Synch
Types of Orbits Available	LEO 400-1000 km 0° to Sun Synch, Lunar	GEO, MEO	HEO(GEO), MEO, LEO	LEO, SSO	All Low Earth Orbits, Earth-Trailing, Geosynchronous, Cis-Lunar, Libration Points	GEO	All Low Earth Orbits, Earth-Trailing , Geosynchronous, Cis-Lunar , Libration Points
External Payload Volume	0.6 x 0.66 x 0.3 h 0.38 x 0.7 x 0.4 h	Earth deck: ~3.7 m2	2 m x 2 m x 4 m	8U	.56 m x .56 x 21 h	1/4: 0.88 m3, 2/5: 0.40 m3, 3/6: 0.42 m3	3.55 m dia x 1.78 m h
Internal Payload Volume	0.07 m^3	Multiple areas each approx 10 sq meters; height varies	4 sections, each approx. 3.0 x 1.2 x 0.3 m		None	N/A	None
ACS	Zero momentum, 3-axis stabilized	3-axis	3 axis stabilized	3 axis stabilized	3-axis	3-axis stabilized, zero momentum	3-axis
Star Trackers	1	2	2		1	2 is standard, can accommodate up to 4	2
GPS	mission-specific	2	2		1		1 (internally redundant)
Batteries	Li-ion, 30 Ah	Li-Ion, up to 280 Ahr	Li-Ion, 144 Ahr	Li-Ion 161 Wh	Li ion/24 Ah	18650 Sony HCM/24Ah x 4 batteries (96Ah total)	Two, Li ion/268 Ah
Solar Arrays	Triple Junction GaAs, 3.87 m^2	Triple junction GaAs 24 - 60	Triple Junction GaAs 22.4 m^2		Triple Junction GaAs, 2.13 m^2	XTE-SF cells	Triple Junction GaAs, 15.65 m^2
Main Bus Voltage Range	23-33 (28V nominal)	70V +/- 1.0V	31-100		28-33	24-33.6	25-34
C&DH Bus Architecture	Centralized processor control, Discrete I/O, 1553B and RS-422 connections	Bus, 1553	1553, RS-485, Compact PCI serial data bus		Single Master Avionics Unit for all spacecraft C&DH and power control functions, .	Single Integrated Avionics Unit (IAU)	Fully redundant. IEM for spacecraft interfaces and instrument SOH.. Separate Payload Interface
Downlink Formats	CCSDS or JPL type, STDN, DSN, SGLS, TDRSS	LM2100 BPSK; Optional: CCSDS, QPSK, SGLS, USB, TDRSS, User	Al Honeycomb/Graphite Epoxy composite		CCSDS, NEN (STDN), SN (TDRSS) and DSN	SGLS	CCSDS, NEN (STDN), SN (TDRSS) and DSN
Comm Up\Downlink Band	Cmd/Tlm: S-band Data: Mission-specific	Ku, Ka, C or S-band	S, X, C, Ku, Ka	UHF, S, X	S-band	L, S	S-band
Structure	6 panel rect. box, CFRP facesheets w/ Al honeycomb core	Composite core cylinder; cruciform + earth and mid-deck panels for component mounting; Al panels with honeycomb core	Al Honeycomb/Graphite Epoxy composite	AL	Al Honeycomb cuboid	Aluminum Forged Ring; Aluminum Honeycomb forward and aft decks and internal bulkhead	Al Honeycomb Octagonal cuboid
Propulsion	Blowdown, Mono-prop (N_2H_4)	Chemical (Hydrazine), Electric (Xenon)	Bi Prop (MMH/N2O4) Electric available		Mono-prop (N2H4)	Monopropellant blowdown system with twelve (12x) 0.2 lbf	Mono-prop (N2H4)
Propellant Capacity	106 (LM400 baseline propellant load 49 kg)	Up to 2100kg of Hydrazine and 1500kg of Oxidizer	2272,2820, 3140 & 3800		21	310	458
Max delta V	350	1500 +	>200		175	360	322
heritage mission(s)	GRAIL, XSS-11	Arabsat-6A, HellasSat-4, JCSAT-17, SBIRS	MTSAT-1/1R		ICON, TESS, ANGELS, Mycroft	ASFPC-11, STP-3, USSF-12, USSF-44, USSF-67	Landsat 8, Fermi, GeoEye-1
nominal schedule (ATP to ready for payload I&T)	18	36	24		33	16	37
nominal schedule (ATP to launch)	31	54	28 - 36		44	24	50
Option #1		Enhanced Data Storage	Enhanced Data Storage		Mission Operations	ESPAStar-HP	Mission Operations
Option #2		Power Upgrade Package	Mission Data Link		Higher Payload Power	Larger battery: 252 Ah battery. MJ1 cells in an 8s72p configuration	Higher Payload Power
Option #3		High accuracy pointing and stability	Hosted Payload Capability		X- or Ka-band communications	On-Orbit refueling capability: Propulsion manifold extends to all six payload ports and allows connection with auxillary	Ka-band communications
Option #4		Hybrid propulsion subsystem			Instrument in the loop pointing		Instrument in the loop pointing
Option #5					Larger payload volume and higher payload mass (launch vehicle dependent)		Larger payload volume and higher payload mass (launch vehicle dependent)
Option #6							
Option #7							
Option #8							
Option #9							
Option #10							
Option #11							
Option #12							
Option #13							

Parameter	QinetiQ Space P200	Space Flight Laboratory (SFL) DEFIANT	Space Flight Laboratory (SFL) DAUNTLESS	Southwest Research Institute SwSP-35	Southwest Research Institute SwSP-100
Orbit Average Payload Power (EOL)	70	20 to 50	30 to 173	22	50
Maximum Payload Mass	100	7 to 30	30 to 300	11	30
Bus Dry mass (w/o Payload)	163	11 to 41	60 to 180	24	56.93
Science Data Downlink	100000	up to 2Mbps (or 50 to 400 Mbps with Option 2)	up to 2Mbps (or 50 to 400 Mbps with Option 2)	4,000	7530
Science Data Storage (Capacity)	512	up to 2 GB (or 32 to 256 GB with Option 1)	up to 2 GB (or 32 to 256 GB with Option 1)	16,000	16000
Pointing Knowledge	2	5.5	5.5	116 (3sigma)	1.5 (pitch/roll/yaw)
Pointing Control	6	10	10	264 (3sigma)	35 (pitch/roll/yaw)
Pointing Stability (Jitter)	1.5	< 1	< 1	20	20
Slew rate	60	1 to 5	1 to 5	3 (pitch and yaw), 1.5 (roll)	3 (pitch and yaw)
Mission Design Life	5	1 to 3	1 to 3	2	3
Compatible LVs	Falcon-9, Soyuz, PSLV, Ariane 5 & 6, Firefly Alpha.	Any	Any	GEVS, ESPA, NG-Pegasus, NG-Minotaur, RL-Electron, VO-L1, FF-Alpha	GSFC-STD-7000A (GEVS), ESPA, RocketLab, and Virgin Orbit LauncherOne
Nominal Orbit	650 km, 98 deg, sun-synchronous	400-1000 km, 0-98 deg inclination (any LEO)	400-1000 km, 0-98 deg inclination (any LEO)	Alt: 510 km Inclination: 35deg	Alt: 600km Inclination: 35deg
Types of Orbits Available	Leo form 28.5 to 98 deg, up to 1000km	400-1000 km, 0-98 deg inclination (any LEO)	400-1000 km, 0-98 deg inclination (any LEO)	Alt: 450-750 km Inclination: 28-98deg SSO	Alt: 450-750km Inclination:0-98deg SSO
External Payload Volume	650 mm x 770 mm (footprint) x490 - 1872 mm (height) depending on launcher	up to 0.48 x 0.48 x 0.20	up to 1.1 x 1.2 x 0.71	Optional	0.46 x 0.48 x 0.86 (x/y/z)
Internal Payload Volume	180 mm x 290 mm (footprint) x 160 mm (height)	up to 80% of external	up to 80% of external	465 x 190 x 122	Optional
ACS	3-axis stabilized	tracking, sun pointing, limb pointing, all possible)	tracking, sun pointing, limb pointing, all possible)	3-axis	3-axis
Star Trackers	3	1 or 2	1 or 2	2	2
GPS	2	1 or 2	1 or 2	1	1
Batteries	P20/18	Li-ion / 13-19 Ah	Li-ion / 20-91 Ah	Li-ion/8.4 Ahr	Li-ion/12.5Ahr
Solar Arrays	Four Deployable panels with 640 GaAs cells 30%	Triple Junction / 0.23-1.73 (customizable), wings only, not including body mounted cells for safe hold power	Triple-Junction / 1-3.2 (customizable), wings only, not including body mounted cells for safe hold power	Triple Junction GaAs with ARC/3.5 m^2	Triple Junction GaAs with ARC/0.7m2
Main Bus Voltage Range	24 - 33.6	10 to 13	24 to 32	26-32	26-32
C&DH Bus Architecture	1553	BASELINE: Dual ARM7 computers with synchronous and asynchronous serial, I2C, SPI, CAN, GPIO, discrete I/O	BASELINE: Dual ARM7 computers with synchronous and asynchronous serial, I2C, SPI, CAN, GPIO, discrete I/O	RS-422/SpW	RS-422/SpW
Downlink Formats	CCSDS compatible	NSP, commercial networks (KSAT-Lite, AWS, Leaf Space, others -	NSP, commercial networks (KSAT-Lite, AWS, Leaf Space, others -	CCSDS, STDN, SGLS	CCSDS, STDN, SGLS
Comm Up\Downlink Band	S-band	S (X, Ku, Ka possible with converters)	S (X, Ku, Ka possible with converters)	S-band	S-band
Structure	Al honecomb panels	Aluminum	Aluminum, honeycomb	Al	Al, Al Honeycomb
Propulsion	Monoprop (N2H4)	FEEP or Resistojet or Monopropulsion	FEEP, Resistojet, Monopropellant, Bipropellant, or Hall Thruster	Optional	Optional
Propellant Capacity	12.5	5	5 to 36	Optional	Optional
Max delta V	84	up to 300 m/s	up to 1000 m/s	Optional	Optional
heritage mission(s)	PROBA1, PROBA2, PROBA V	HawkEye 360 Constellation, NorSat-4, NorSat-TD, Gray Jay, LEO 3, Aspera	LEO 2, StarBurst, NEMO-HD	CYGNSS	SensorSat
nominal schedule (ATP to ready for payload I&T)	20	12 to 24 (repetitive builds faster than this range)	18 to 30 (repetitive builds faster than this range)	16	16
nominal schedule (ATP to launch)	32	18 to 30 (repetitive builds faster than this range)	24 to 36 (repetitive builds faster than this range)	26	26 (with NASA GSFC GPR 7120.7 reserves)
Option #1	Option for up to 768 Gbit of storage	Above science downlink and storage are based on this payload computer.	Above science downlink and storage are based on this payload computer.	External Payload	Internal Payload
Option #2	Option for up to 200Mbps Downlink	X-band transmitter can be added. Different options available: 50Mbps to 400Mbps (above science downlink based on this option)	X-band transmitter can be added. Different options available: 50Mbps to 400Mbps (above science downlink based on this option)	S/C Structure Size Expansion	S/C Structure Size Expansion
Option #3	Change of baseline propellant to HPGP-LMP-103S as option.	Custom station retrofit or commercial ground network (Ksat-Lite, AWS, Leaf Space, others)	Custom station retrofit or commercial ground network (Ksat-Lite, AWS, Leaf Space, others)	Solar Array Capability Increase	Solar Array Capability Increase
Option #4		AES-256 Commercial Encryption	AES-256 Commercial Encryption	Battery Capacity Increase	Battery Capacity Increase
Option #5				Payload Data Processing	Payload Data Processing
Option #6				Data Storage Increase	Data Storage Increase
Option #7				Downlink Capacity Increase; X-band or Ka-band	Downlink Capacity Increase; X-band or Ka-band
Option #8				Encrypted Communications	High Performance Pointing
Option #9				High Performance Pointing	Pointing Agility Increase
Option #10				Pointing Agility Increase	Propulsion Package
Option #11				Propulsion Package	Access to space; Rideshare or Primary payload
Option #12				Access to space; Rideshare or Primary payload	Mission Operations
Option #13				Mission Operations	

Parameter	Thales Alenia Italy Prima	Thales Alenia France ELiTeBUS 1000	Tyvak Trestles-6U	Tyvak Trestles-12U	Tyvak Renegade
Orbit Average Payload Power (EOL)	2200	955	35	60	40-50 orbit dependent
Maximum Payload Mass	<1200	350	7.31	15.5	up to 10
Bus Dry mass (w/o Payload)	945	342	7.69	9.5	15
Science Data Downlink	16 / 128 / 512 / 2048	option	2,048	2,048	S-band: 125 Kbps U/L, 2 Mbps D/L
Science Data Storage (Capacity)	1530 Gbits (EOL)	option	49,152	25	redundant)
Pointing Knowledge	< 0.015°, < 5 arcsec or better using additional, Star Tracker	90	25		Mission/CONOPS dependent
Pointing Control		432	50	50	Mission/CONOPS dependent
Pointing Stability (Jitter)	0.0025°(peak-peak) in 2 s	43	10	10	Mission/CONOPS dependent
Slew rate	< 1°/sec	n/a	180	120	Mission/CONOPS dependent
Mission Design Life	7	12.5	2	2+	2 to 7
Compatible LVs	Falcon9, Soyuz, Vega-C	Falcon 9, Soyuz	All Major Rockets (Vega, PSLV, RocketLab, Virgin, Falcon 9, Soyuz, VOX, etc.)	All Major Rockets (Vega, PSLV, RocketLab, Virgin, Falcon 9, Soyuz, VOX, etc.)	Mission/CONOPS dependent
Nominal Orbit	Apogee altitude: 450-1500, Perigee altitude: 450-1500 km km, Orbit plane type: Dawn-dusk, Orbit type: Inclined or Sun-synchronous	780 km, 86.4°	500 km, 98 deg, Sun Synch	500 km, 98 deg, Sun Synch	LEO (400 - 2000 km), GEO, Interplanetary
Types of Orbits Available	Inclined or Sun-synchronous	LEO from 40 to 98 deg, up to 800km	Compatible with a vast range of orbits (LEO, GEO, Interplanetary). Any inclination for Earth orbits is supported	Compatible with a vast range of orbits (LEO, GEO, Interplanetary).	LEO (400 - 2000 km), GEO, Interplanetary
External Payload Volume	3.6 m (max value)	Depends on launcher. Payload panel size =	N/A	N/A	Mission/CONOPS dependent
Internal Payload Volume	ranges	Same panel, max height = 380mm	3.33E-3 m^3	14.40E-3 m^3	Mission/CONOPS dependent
ACS	3 axis stabilized	3-axis	3-axis	3-axis	3-axes stabilized
Star Trackers	2	3	2	2	2
GPS	2	Option	1	1	1
Batteries	Li-Ion /< 340	Li-ion / 252 cells 4.5 Ah@4.1V	Li-ion, 12.5 Ah	Li-ion, 12.5 Ah	12V Battery Modules (3)
Solar Arrays	GaAs/Ge Triple Junction Cells/ 18,3	Triple junction GaAs, 9m²	Two-terminal triple junction GaInP2/GaAs/Ge, 0.319 m^2	Two-terminal triple junction GaInP2/GaAs/Ge, 0.319 m^2	Mission/CONOPS dependent
Main Bus Voltage Range	Regulated 28 V to the Bus, Unregulated 47 – 65 V to feed the Payload	28-38	9.0–12.6	9.0–12.6	12V Unreg, 3.3V, 5V rails available
C&DH Bus Architecture	1553	1553	RS-422/485, Ethernet, USB 2.0	RS-422/485, Ethernet, USB 2.0	Single Flight Computer
Downlink Formats	CCSDS standard	CCSDS	AX.25, CCSDS	AX.25, CCSDS	Mission/CONOPS dependent
Comm Up\Downlink Band	X-band	Ka	UHF-band, S-band	UHF-band, S-band	S, X, UHF
Structure	Al alloys Honeycomb	Al honeycomb (lateral panels) and Al (bottom frame and chassis)	Al 7075 6U	Al 7075 12U	12U Cubesat, Aluminum
Propulsion	Monopropellant system, Hydrazine	Mono-prop (N2H4)	N/A	N/A	Mission/CONOPS dependent
Propellant Capacity	154	164	N/A	N/A	Mission/CONOPS dependent
Max delta V	155 m/s (ref. CSG)	340	N/A	N/A	Mission/CONOPS dependent
heritage mission(s)	RADARSAT-2, S1, CSK, CSG	Iridium Next	Tyvak-0129	Tyvak-0129	LINUS-S
nominal schedule (ATP to ready for payload I&T)	ATP+26 (It depends on the mission)	20	14	14	Available upon request - please contact Terran Orbital.
nominal schedule (ATP to launch)	ATP+36	30	18	18	Available upon request - please contact Terran Orbital.
Option #1	Protoflight, based on Sentinel-1 program			Fully Redundant Avionics	Available upon request - please contact Terran Orbital.
Option #2	Protoflight, based on Cosmo Second Generation program			High-data rate (340 Mbps) X-band radio and antennas	
Option #3	Protoflight, based on Sentinel-1 program	Electrical propulsion		Electric Propulsion (0.22 kg, up to 500 m/s)	
Option #4	Battery Capacity Increase	Power upgrade	Custom Payload Interface Board	Custom Payload Interface Board	
Option #5	Payload Data Processing	Science data downlink	Mission Operations	Mission Operations	
Option #6	Data Storage Increase	Ground Services	Ground Services	Ground Services	
Option #7	Downlink Capacity Increase; X-band or Ka-band				
Option #8	High Performance Pointing				
Option #9	Pointing Agility Increase				
Option #10	Propulsion Package				
Option #11	Access to space; Rideshare or Primary payload				
Option #12	Mission Operations				
Option #13					