

## **RSDO CATALOG ADVISORY NOTICE**

### **NOTE THE FOLLOWING!**

**THE SET OF RAPID IV CATALOG SPACECRAFT PARAMETERS SERVE AS ONLY A STARTING POINT FOR MEETING YOUR MISSION SPACECRAFT REQUIREMENTS.**

**THIS RSDO CATALOG SPREADSHEET IDENTIFIES THE CHARACTERISTICS OF EACH CATALOG SPACECRAFT IN THE CONTRACT BASELINE CONFIGURATION.**

**THE CONTRACT BASELINE CONFIGURATION IS ONLY ONE OF MANY POSSIBLE MISSION CONFIGURATIONS.**

**EACH SPACECRAFT IS CAPABLE OF BEING MODIFIED TO HAVE OTHER MISSION SPECIFIC CAPABILITIES.**

**TO LEARN MORE ABOUT THE FULL CAPABILITY OF EACH RSDO SPACECRAFT,  
PLEASE CONTACT THE RSDO VIA EMAIL TO [RSDO@RSDO.GSFC.NASA.GOV](mailto:RSDO@RSDO.GSFC.NASA.GOV) OR BY PHONE: 301-286-1289**

THIS FILE IS INTENDED TO BE PRINTED ON THREE 11 X 17 INCH PAGES.  
ONE PAGE CONTAINING THESE NOTES AND TWO PAGES FOR THE CATALOG DATA TABLE. THE TABLE SHOULD FIT ON TWO PAGES. PLEASE ADJUST YOUR PRINTER SETTINGS AND PAGE BREAKS AS NEEDED.

ALSO NOTE: SOME SPREADSHEET CELLS HAVE IMBEDDED COMMENTS INDICATED BY RED CORNER MARKS.  
HOWEVER, COMMENTS ARE ONLY VISIBLE IN THE EXCEL VERSION AND WHEN THE FILE IS DISPLAYED ON-SCREEN.  
PLACE CURSOR ON THE CORNER MARKS TO READ.

**PLEASE ADVANCE TO PAGE 2 AND 3, TO REVIEW THE CHARACTERISTICS OF RSDO RAPID IV CATALOG SPACECRAFT.**

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Contractor >> Spacecraft Name >>	Ball Aerospace		MAXAR		Northrop Grumman		Southwest Research Institute		
	Parameter	Units	Small	Large	1300	ESPASat-Ex	LEOSTar-3	SwSP-35	
Compatibility	Orbit Average Payload Power (EOL)	W (EOL)	90	600	4000 - 16,000	100	580	22	
	Maximum Payload Mass	kg	170	600	500 - up to 1200	50	850	11	
	Bus Dry mass (w/o Payload)	kg	170	1270	939, up to 3000	88	1718	24	
	Science Data Downlink	kbits	2,000	300,000	up to 2,000,000	4000 S-Band	384000 X-Band	4,000	
	Science Data Storage (Capacity)	Mbit	48,000	343,000	400 MB	16000	4000000	16,000	
	Pointing Knowledge	arcsec	25	18	22 arc sec	29	5	116 (3sigma)	
	Pointing Control	arcsec	25	28.8	10.8 to 36 arc sec	63 pitch 39 roll/yaw	21	264 (3sigma)	
	Pointing Stability (jitter)	arcsec/sec	3	5.8	0.001 deg 3 sigma	12	1.2 arc sec 3 sigma below 500 Hz	20	
	Slew rate	deg / min	5	16	None	90	19	3 (pitch and yaw), 1.5 (roll)	
	Mission Design Life	years	1, 0.9 Ps	5, 0.93 Ps	15, 0.85 Ps	2	5	2	
	Compatible LVs	(names)	Delta II, Pegasus, Falcon 9, Atlas V, ESPA-G	Delta II, Falcon 9, Atlas V, Falcon Heavy	Falcon 9, Atlas V, Delta V, H2A, Ariane 5, New Glenn, Vulcan	All EELV ESPA Compatible Launch Vehicles	Atlas V, Falcon 9	GEVS, ESPA, NG-Pegasus, NG-Minotaur, RL-Electron, VO-L1, FF-Alpha	
	Nominal Orbit	Altitude, Inclination, Type, Other	540 km 0 deg, equatorial	824 km, 98.7 deg, sun sync	GEO at 35,786 km, 0 deg	600 km, 98 deg, Sun Synch 12 pm LTAN	705 km, 98 deg, Sun Synch	Alt: 510 km Inclination: 35deg	
	Types of Orbits Available	as needed	LEO from 0 - 98 deg, up to 1,200 km	LEO from 0 - 98 deg, up to 1200 km	HEO(GEO), MEO, LEO	All Low Earth Orbits, Earth-Trailing, Geosynchronous, Cis-Lunar, Libration Points	All Low Earth Orbits, Earth-Trailing, Geosynchronous, Cis-Lunar, Libration Points	Alt: 450-750 km Inclination: 28-98deg SSO	
	External Payload Volume	meters	1 m hex x 1 m height	1.7 m x 1.4 m x 1.5 m height	2 m x 2 m x 4 m	.56 m x .56 x 21 h	3.55 m dia x 1.78 m h	Optional	
	Internal Payload Volume	meters	None	None	4 sections, each approx. 3.0 x 1.2 x 0.3 m	None	None	465 x 190 x 122	
Description	ACS	type	3-axis	3-axis	3 axis stabilized	3-axis	3-axis	3-axis	
	Star Trackers	# of STs	2	2	2	1	2	2	
	GPS	# receivers	1	2	2	1	1 (Internally redundant)	1	
	Batteries	cell type/capacity (Ah)	Li-ion / 24 Ah	Li-ion / 80 Ah (x2)	Li-ion, 144 Ah	Li ion/24 Ah	Two, Li ion/268 Ah	Li-ion/8.4 Ah	
	Solar Arrays	cell type/Area (m2)	Triple Junction GaAs, 3.2 m <sup>2</sup>	Triple Junction GaAs, 11 m <sup>2</sup>	Triple Junction GaAs, 22.4 m <sup>2</sup>	Triple Junction GaAs, 2.13 m <sup>2</sup>	Triple Junction GaAs, 15.65 m <sup>2</sup>	Triple Junction GaAs with ARC/3.5 m <sup>2</sup>	
	Main Bus Voltage Range	volts	22 - 34	22 - 34	31-100	28-33	25-34	26-32	
	C&DH Bus Architecture	description	1553	1553	1553, RS-485, Compact PCI serial data bus	Single Master Avionics Unit for all spacecraft C&DH and power control functions, .	Fully redundant. IEM for spacecraft interfaces and instrument SOH. Separate	RS-422/SpW	
	Downlink Formats	CCSDS, STDN, etc	CCSDS, STDN	CCSDS, STDN	AI Honeycomb/Graphite Epoxy composite	CCSDS, NEN (STDN), SN (TDRSS) and DSN	CCSDS, NEN (STDN), SN (TDRSS) and DSN	CCSDS, STDN, SGLS	
	Comm Up/Downlink Band	S, X, UHF, Ka, Ku, etc.	S-band	S-band Uplink / S-band & X-band Downlinks	S, X, C, Ku, Ka	S-band	S-band	S-band	
	Structure	description	Honeycomb & Machined Al Hexagon	Al Honeycomb Hexagon	AI Honeycomb/Graphite Epoxy composite	AI Honeycomb cuboid	AI Honeycomb Octagonal cuboid	AI	
	Propulsion	type, fuel	None	Mono-prop (N2H4)	Bi Prop (MMH/N2O4) Electric available	Mono-prop (N2H4)	Mono-prop (N2H4)	Optional	
	Propellant Capacity	kg	None	360	2272,2820, 3140 & 3800	21	458	Optional	
	Max delta V	m/s	None	330	>200	175	322	Optional	
	Programmatic	heritage mission(s)	name(s)	GPIM, STPSat-2, STPSat-3	JPSS, NPP	MTSAT-1/1R	ICON, TESS, ANGELS, Mycroft	Landsat 8, Fermi, GeoEye-1	CYGNSS
		nominal schedule	months (ATP to ready for payload (BT) months (ATP to launch)	22	23	24	33	37	16
nominal schedule		months (ATP to launch)	29	35	28 - 36	44	50	26	
Contractor-Provided Options	Option #1	description	Enhanced Data Storage	Enhanced Data Storage	Enhanced Data Storage	Mission Operations	Mission Operations	External Payload	
	Option #2	description	Enhanced Attitude Control: Co-locate primary attitude sensors with payload	Enhanced Attitude Control: Co-locate primary attitude sensors with payload	Mission Data Link	Higher Payload Power	Higher Payload Power	S/C Structure Size Expansion	
	Option #3	description	High Agility: Uses CMGs as primary actuators	High Agility: Uses CMGs as primary actuators	Hosted Payload Capability	X- or Ka-band communications	Ka-band communications	Solar Array Capability Increase	
	Option #4	description	Higher Power: Resize and/or articulate solar array, change battery size	Higher Power: Resize solar array, Change battery size		Instrument in the loop pointing	Instrument in the loop pointing	Battery Capacity Increase	
	Option #5	description	Downlink: Add higher-rate X-band link	Downlink: Add higher rate and pointed Ka band link to playback recorded data		Larger payload volume and higher payload mass (launch vehicle dependent)	Larger payload volume and higher payload mass (launch vehicle dependent)	Payload Data Processing	
	Option #6	description	Propulsion: Add propulsion subsystem	Propulsion: Higher capacity propulsion for high delta-V				Data Storage Increase	
	Option #7	description						Downlink Capacity Increase; X-band or Ka-band	
	Option #8	description						Encrypted Communications	
	Option #9	description						High Performance Pointing	
	Option #10	description						Pointing Agility Increase	
	Option #11	description						Propulsion Package	
	Option #12	description						Access to space; Rideshare or Primary payload	
	Option #13	description						Mission Operations	

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	Contractor >> Spacecraft Name >>		Tyvak	Tyvak			
	Parameter	Units	Trestles-6U	Trestles-12U			
Compatibility	Orbit Average Payload Power (EOL)	W (EOL)	35	60			
	Maximum Payload Mass	kg	7.31	15.5			
	Bus Dry mass (w/o Payload)	kg	7.69	9.5			
	Science Data Downlink	kbps	2,048	2,048			
	Science Data Storage (Capacity)	Mbit	49,152	49,152			
	Pointing Knowledge	arcsec	25	25			
	Pointing Control	arcsec	50	50			
	Pointing Stability (Jitter)	arcsec/sec	10	10			
	Slew rate	deg / min	180	120			
	Mission Design Life	years	2	2+			
	Compatible LVs	(names)	All Major Rockets (Vega, PSLV, RocketLab, Virgin, Falcon 9, Soyuz, VOX, etc.)	All Major Rockets (Vega, PSLV, RocketLab, Virgin, Falcon 9, Soyuz, VOX, etc.)			
	Nominal Orbit	Altitude, Inclination, Type, Other	500 km, 98 deg, Sun Synch	500 km, 98 deg, Sun Synch			
	Types of Orbits Available	as needed	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).			
External Payload Volume	meters	N/A	N/A				
Internal Payload Volume	meters	3.33E-3 m³	14.40E-3 m³				
Description	ACS	type	3-axis	3-axis			
	Star Trackers	# of STs	2	2			
	GPS	# receivers	1	1			
	Batteries	cell type/capacity (Ah)	Li-Ion, 12.5 Ah	Li-Ion, 12.5 Ah			
	Solar Arrays	cell type/Area (m2)	Two-terminal triple junction GaInP2/GaAs/Ge, 0.319 m²	Two-terminal triple junction GaInP2/GaAs/Ge, 0.319 m²			
	Main Bus Voltage Range	volts	9.0-12.6	9.0-12.6			
	CBDH Bus Architecture	description	RS-422/485, Ethernet, USB 2.0	RS-422/485, Ethernet, USB 2.0			
	Downlink Formats	CCSDS, STDN, etc	AX.25, CCSDS	AX.25, CCSDS			
	Comm Up/Downlink Band	S, X, UHF, Ka, Ku, etc.	UHF-band, S-band	UHF-band, S-band			
	Structure	description	Al 7075 6U	Al 7075 12U			
	Propulsion	type, fuel	N/A	N/A			
	Propellant Capacity	kg	N/A	N/A			
	Max delta V	m/s	N/A	N/A			
Programmatic	heritage mission(s)	name(s)	Tyvak-0129	Tyvak-0129			
	nominal schedule	months (ATP to ready for payload I&T)	14	14			
	nominal schedule	months (ATP to launch)	18	18			
Contractor-Provided Options	Option #1	description		Fully Redundant Avionics			
	Option #2	description		High-data rate (340 Mbps) X-band radio and antennas			
	Option #3	description		Electric Propulsion (0.22 kg, up to 500 m/s)			
	Option #4	description	Custom Payload Interface Board	Custom Payload Interface Board			
	Option #4	description	Mission Operations	Mission Operations			
	Option #5	description	Ground Services	Ground Services			
	Option #6	description					
	Option #7	description					
	Option #8	description					
	Option #9	description					
	Option #10	description					
	Option #11	description					
Option #12	description						





