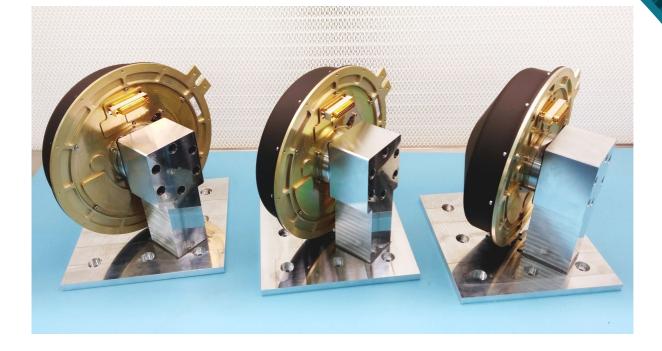


# SSTL GEO WHEEL



Surrey Satellite Technology under contract with prime contractor Airbus Defence and Space (ADS), have designed, developed, qualified in 2018 and completed delivery of SSTL's first four Geostationary flight wheels in March 2019. All reviews were held with Airbus Defence & Space and the European Space Agency.

### BENEFITS

- 15 year design life in GEO orbit
- Fully integrated radiation hard electronics
- Hermetically sealed mechanism
- ➢ Fully qualified
- > Flight units delivered

### FEATURES

- Both current and speed modes implemented
- Single connector for communications & power
- > Chassis or harness grounding
- Regenerated power returns back to spacecraft bus
- ON/OFF electrically isolated (optical)
- RS485 communications

## SSTL GEO WHEEL

#### SPECIFICATIONS:

Index Code     SSW-200-OGS-12000       Reaction Torque     200mNm to +/-3900rpm at 48.5V DC       Momentum     12Nms @ +/-5000rpm       Speed range     +/-5000rpm       Operational     <20.1 billion       revolutions (orbit)     Speed accuracy       Speed jitter     2 x 0.4166rpm (720PPR) - Encoder       Speed jitter     2 x 0.4166rpm       Unbalance     Static <2gcm       Dynamic <14gcm^2       Lifetime (orbit)     15.25 years       Environment     Designed for Geostationary Orbit       Vibration     15 Grms X/Y, 16 Grms Z       (qualification)     100Hz 20g, 1400Hz 1000g, 10000Hz 1000g       Thermal (qualification)     -35°C to +70°C (survival)       -30°C to +60°C (operating)     Electrical Interface       Single male socket (D-type) 25 way     Nominal Regulated       range Voltage     23.5V DC min (reduced performance)       range Voltage     23.5V DC min (reduced performance)       Idle power     <5 Watts       consumption     Speed demand, current demand (torque), control gains, coast       Teleeommands     Speed demand, current demand (torque), control gains, coast	Madal Orda	0014 000 000 10000
Momentum   12Nms @ +/-5000rpm     Speed range   +/-5000rpm     Operational   <20.1 billion	Model Code	SSW-200-OGS-12000
Speed range+/-5000rpmOperational revolutions (orbit)<20.1 billion		· · · · · · · · · · · · · · · · · · ·
Operational revolutions (orbit)   <20.1 billion		
revolutions (orbit) Speed accuracy Speed jitter 2 x 0.4166rpm (720PPR) - Encoder Speed jitter 2 x 0.416rpm Unbalance Dynamic <14gcm^2 Lifetime (orbit) 15.25 years Environment Designed for Geostationary Orbit Vibration (qualification) Shock (qualification) Shock (qualification) -35°C to +70°C (survival) -30°C to +60°C (operating) Electrical Interface Single male socket (D-type) 25 way Nominal Regulated range Voltage 23.5V DC min (reduced performance) 23.5V DC min (reduced performance) Idle power consumption Maximum power consumption Maximum power Communications RS485 Internal speed Communications RS485 Internal speed Communications RS485 Internal speed Communications RS485 Internal speed Maximum external telemetry update rate Wheel volume Diameter 240 x 95mm Wheel mechanical 6 off M6 on 38mm PCD interface		
Speed accuracy0.4166rpm (720PPR) - EncoderSpeed jitter2 x 0.416rpmUnbalanceStatic <2gcm Dynamic <14gcm^2	-	<20.1 billion
Speed jitter2 x 0.416rpmUnbalanceStatic <2gcm Dynamic <14gcm^2		
UnbalanceStatic <2gcm Dynamic <14gcm^2Lifetime (orbit)15.25 yearsEnvironmentDesigned for Geostationary OrbitVibration (qualification)15 Grms X/Y, 16 Grms Z (qualification)Shock (qualification)100Hz 20g, 1400Hz 1000g, 10000Hz 1000gThermal (qualification)-35°C to +70°C (survival) -30°C to +60°C (operating)Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance)Idle power consumption<5 Watts		
Dynamic <14gcm^2Lifetime (orbit)15.25 yearsEnvironmentDesigned for Geostationary OrbitVibration (qualification)15 Grms X/Y, 16 Grms ZShock (qualification)100Hz 20g, 1400Hz 1000g, 10000Hz 1000gThermal (qualification)-35°C to +70°C (survival) -30°C to +60°C (operating)Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance)Idle power consumption<5 Watts		
Lifetime (orbit)15.25 yearsEnvironmentDesigned for Geostationary OrbitVibration (qualification)15 Grms X/Y, 16 Grms ZShock (qualification)100Hz 20g, 1400Hz 1000g, 10000Hz 1000gThermal (qualification)-35°C to +70°C (survival) -30°C to +60°C (operating)Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance)Idle power consumption<5 Watts	Unbalance	, , , , , , , , , , , , , , , , , , ,
EnvironmentDesigned for Geostationary OrbitVibration (qualification)15 Grms X/Y, 16 Grms ZShock (qualification)100Hz 20g, 1400Hz 1000g, 10000Hz 1000gThermal (qualification)-35°C to +70°C (survival) -30°C to +60°C (operating)Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance) 23.5V DC min (reduced performance)Idle power consumption<5 Watts		
Vibration (qualification)15 Grms X/Y, 16 Grms Z (qualification)Shock (qualification)100Hz 20g, 1400Hz 1000g, 10000Hz 1000gThermal (qualification)-35°C to +70°C (survival) -30°C to +60°C (operating)Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance) 23.5V DC min (reduced performance)Idle power consumption<5 Watts		
(qualification)Shock (qualification)100Hz 20g, 1400Hz 1000g, 10000Hz 1000gThermal (qualification)-35°C to +70°C (survival) -30°C to +60°C (operating)Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance)Idle power consumption<5 Watts	Environment	Designed for Geostationary Orbit
Shock (qualification)100Hz 20g, 1400Hz 1000g, 10000Hz 1000gThermal (qualification)-35°C to +70°C (survival) -30°C to +60°C (operating)Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance)Idle power consumption<5 Watts	Vibration	15 Grms X/Y, 16 Grms Z
Thermal (qualification)-35°C to +70°C (survival) -30°C to +60°C (operating)Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance)Idle power consumption23.5V DC min (reduced performance)Idle power consumption<5 Watts		
-30°C to +60°C (operating)Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance) 23.5V DC min (reduced performance)Idle power consumption<5 Watts	Shock (qualification)	100Hz 20g, 1400Hz 1000g, 10000Hz 1000g
Electrical InterfaceSingle male socket (D-type) 25 wayNominal Regulated range Voltage48.5 to 52.5V DC (full performance) 23.5V DC min (reduced performance)Idle power consumption<5 Watts	Thermal (qualification)	-35°C to +70°C (survival)
Nominal Regulated range Voltage48.5 to 52.5V DC (full performance) 23.5V DC min (reduced performance)Idle power consumption<5 Watts		-30°C to +60°C (operating)
range Voltage23.5V DC min (reduced performance)Idle power consumption<5 Watts	Electrical Interface	Single male socket (D-type) 25 way
range Voltage23.5V DC min (reduced performance)Idle power consumption<5 Watts	Nominal Regulated	48.5 to 52.5V DC (full performance)
consumption Maximum power consumption<180 WattsON/OFF operationsUnlimitedTelecommandsSpeed demand, current demand (torque), control gains, coastTelemetrySpeed, control loop, control current, motor current internal temperatures, internal rail voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD		
consumption Maximum power consumption<180 WattsON/OFF operationsUnlimitedTelecommandsSpeed demand, current demand (torque), control gains, coastTelemetrySpeed, control loop, control current, motor current internal temperatures, internal rail voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD	Idle power	<5 Watts
consumptionON/OFF operationsUnlimitedTelecommandsSpeed demand, current demand (torque), control gains, coastTelemetrySpeed, control loop, control current, motor current internal temperatures, internal rail voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD	consumption	
ON/OFF operationsUnlimitedTelecommandsSpeed demand, current demand (torque), control gains, coastTelemetrySpeed, control loop, control current, motor current internal temperatures, internal rail voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD	Maximum power	<180 Watts
ON/OFF operationsUnlimitedTelecommandsSpeed demand, current demand (torque), control gains, coastTelemetrySpeed, control loop, control current, motor current internal temperatures, internal rail voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD	consumption	
control gains, coastTelemetrySpeed, control loop, control current, motor current internal temperatures, internal rail voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD		Unlimited
control gains, coastTelemetrySpeed, control loop, control current, motor current internal temperatures, internal rail voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD	Telecommands	Speed demand, current demand (torque),
TelemetrySpeed, control loop, control current, motor current internal temperatures, internal rail voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD		,
current internal temperatures, internal rail voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD	Telemetry	
voltages, gainsCommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD		
CommunicationsRS485Internal speed controller update rate5HzMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD		• •
controller update rateMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD	Communications	
controller update rateMaximum external telemetry update rate5HzWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD	Internal speed	5Hz
telemetry update rateWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD		
telemetry update rateWheel volumeDiameter 240 x 95mmWheel mechanical interface6 off M6 on 38mm PCD	Maximum external	5Hz
Wheel mechanical 6 off M6 on 38mm PCD   interface	telemetry update rate	
interface	Wheel volume	Diameter 240 x 95mm
	Wheel mechanical	6 off M6 on 38mm PCD
Mass <5.6kg	interface	
	Mass	<5.6kg

Specifications may be subject to change

SSTL designs, manufactures and operates high performance satellites, subsystems and ground systems for space agencies, international governments, and commercial customers worldwide. Our satellite platforms are designed to fly remote sensing, navigation and communication payloads in LEO, MEO and GEO orbits and beyond. Our innovative approach to low cost spacecraft engineering is changing the economics of space.





W: sstl.co.uk E: <u>info@sstl.co.uk</u> T: +44 (0)1483 803803