SPVS™

Space

SPACE PHOTOVOLTAIC SHEET – PLUG & PLAY SOLAR GENERATORS FOR SMALL SATELLITE APPLICATIONS

SPVS™ is a modular solar generator which is made up of building blocks that can form solar cell strings of different lengths. The resulting networks are dedicated to small satellite applications.

SPVS™ has been optimised so it can be adapted to different structures and mechanical constraints, without losing a good balance between performance and cost. SPVS™ uses a GaAs TJ cell on an Al substrate based solar generator instead of the traditional one integrated onto composite CFRP+Al substrate.

Each module is autonomous in terms of the supporting structure and connection terminals, as a blocking diode can be directly mounted at the end of the last module for each string. Furthermore the electrical connection between modules and cell strings to the spacecraft (S/C) is simplified by the use of small terminal blocks.

SPVS™ weights between 90g and up to 140g for the largest configuration. Three standard module sizes are currently available; made up of five, seven and nine series cells. This provides a total module area from around 26cm by 9cm and up to 45cm by 9cm for the largest (excluding fixation winglets). In addition, another small module of 2cm by 9cm can be installed at the end of each string on the blocking diode function.

The core of the SPVS™ is the state of the art European triple junction GaAs on Ge solar cell, manufactured by AZUR Space GmbH. This has an average conversion efficiency of more than 28% (AM0, 28°C).

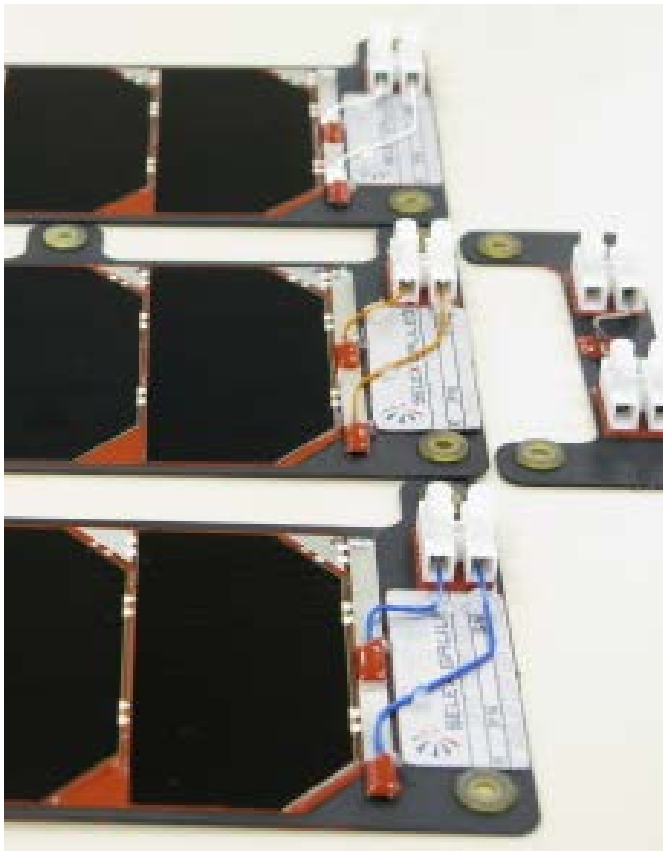
The system is low cost but is still capable of wide Low Earth Orbit (LEO) application scenarios (e.g. atomic Oxygen resistance, demanding vibration and fatigue constraints and very low outgassing) guaranteed by an ad hoc materials and processes selection.

SPVS™

An ongoing qualification campaign allows the solar generator to be suitable for a generic LEO application. The verification includes sine and random vibes, pyro-shock test, thermal vacuum and shock cycles and all the necessary intermediate electrical and mechanical checks.

We are a key player in Photovoltaic Assembly (PVA) design and production, with a proven capability to supply state-of-the-art fixed solar array. In 2006, the company increased its PVA production area to approximately 600m^2, with a manufacturing capability of up to 60,000/80,000 solar cells per year.

Solar panels are installed on most of the latest ESA, ASI and CCNES programmes: Rosetta, ATV, PROBA, Herschel and Planck, ADM Aeolus, GIOVE A, Lisa Pathfinder, GAIA, Sentinel-3 and the LEO constellations such as Cosmo SkyMed and Pleiades.



TECHNICAL CHARACTERISTICS

BASIC CHARACTERISTICS		
Module size (series cells)		5 – 7 – 9
Mass vs Power ratio		14 [g / Watt]
Solar cell average efficiency		28% (27% module efficiency)
Electrical performances		PMP = 1.1 W/cell
Mission life time		Up to 10 years (40,000 equivalent LEO fatigue cycles)
Operations		Low Earth Orbit (400-1000Km) ATOX resistant design
MATERIALS AND COMPONENTS		
Substrate		Al 6082 alloy 1 mm thickness black hard anodised
Solar cell assembly		(SCA) AZUR 3G 28% GaInP2/GaAs/Ge TJ solar Cells CMG AR 100µm Coverglasses Ag plated Invar Interconnectors
Silicon Diode Assembly (SDA)		AZUR BPD external silicon diode CMG 100µm uncoated glasses Ag plated Invar Interconnectors
Blocking diodes		1N5811 JANTXV
Wires		acc. ESCC 3901020-3901012
Terminal box		High reliable plastic component capable to survive more than +120°C continuous operation and up to +150°C for short duration
DELIVERY SCHEDULE		
3 months from acknowledge of receipt of order		
COMPANY HERITAGE		
More than 100,000 solar cell assemblies operating in orbit since mid 90's		
QUALIFICATION PLAN		
Insulation, Electrical Performance measurement and Electrical Health Checks		
Vibration Test (Resonance search, Sinusoidal, Random)		
Shock Test		
Thermal Vacuum Test		
20000 Ambient Pressure Cycles		
Thermal Vacuum Cycles		
RESONANCE SEARCH		
Test frequency range		From 5Hz to 2000Hz
Test time		1 sweep; 2 octave/minute
Test level		0.5g
SINUSOIDAL VIBRATION		
Test frequency range		From 5Hz to 100Hz
Test time		2 sweep UP and DOWN 2 octave/minute
Test level	From 5 to 21Hz	11mm (0-peak)
	From 21 to 60Hz	20g
	From 60 to 100Hz	6g
RANDOM VIBRATION		
Test frequency range		From 20 to 2000Hz
Test duration		2 minutes
Test level	20 Hz	0.013 g^2/Hz
	from 50Hz to 800 Hz	0.08 g^2/Hz
	2000 Hz	0.013 g^2/Hz
Global RMS		10grms
SHOCK LEVELS		
100Hz		20g
1500Hz		2000g
10000Hz		2000g

LEONARDO
AIRBORNE & SPACE SYSTEMS

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