PCU & BIM

■ Power Control Unit (PCU) / Battery Interface Module (BIM)

□ Functions and Features

PCU:

- Generating main bus of fully regulated 100VDC with sequential switching shunt regulator(S3R) and battery discharge regulator(BDR)
- During sunlight, power generated on solar array is supplied directly to load by S3R while battery is charged with energy for eclipse periods by battery charge regulator(BCR)
- During eclipse, battery supplies power to the load via BDR
- No single point of failure
- DS2000 PCU has abundant flight proven heritages
- Two PCU configurations can be adapted to satellite mission of load up to 12.5kW

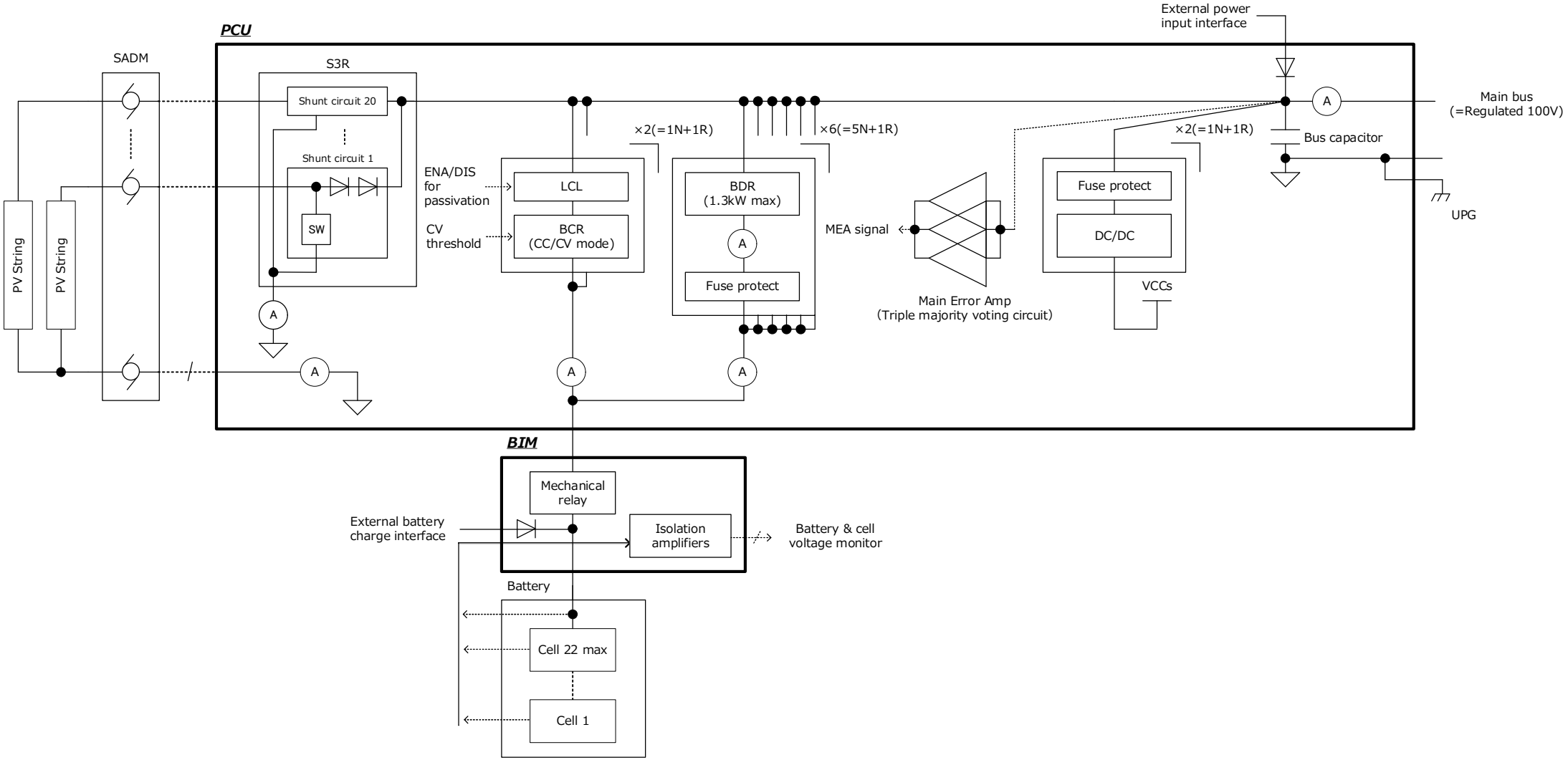
BIM:

- Providing a switch for safe handling of battery and to monitor battery (cell) voltage
- Mechanical relay used as battery switch to minimize I2R losses
- Cell voltage monitoring circuits with isolated amplifiers minimizing the discharge during battery storage
- Paired with one PCU normally

Details of DS2000 PCU and BIM are shown as follows:

PCU & BIM

■ Block diagram of the DS2000 PCU with DS2000 BIM



PCU & BIM

■ Major characteristics of DS2000 PCU

Property	Characteristics
Communication I/F	Serial(EIA422)/Discrete CMD, Active Bi-level/Active Analogue TLM
Main bus Power supply Output voltage range	 Max. 8.0kW /during sunlight Max. 6.25kW /during eclipse 100 to 103VDC /during sunlight 97 to 100VDC /during eclipse
PV Array I/F Rated voltage(=Voc) Shunt power	 Max. 250V Max. 8.9kW @20 circuits, 5.28A/shunt circuit
Battery I/F Input voltage range Charge current	 44.0 to 91.9V (for 16s to 22s of LIB cells) Max. 8.9A
Power Consumption During sunlight During eclipse	 193.9W nom.@6.0kW output 302.7W nom.@6.0kW output
Operating temperature	-15 to +60 deg C
Dimension（L×W×H）	485.8×380×240(mm)
Mass	28.8kg nom.
Random vibration Shock	9.2(in plane), 9.37(out of plane)Grms 9800m/s^{2}srs
Radiation	For GEO 15 years
EMI/EMC	MIL-STD-461C compliant
EEE Parts grade	Class 1

■ Major characteristics of DS2000 BIM

Property	Characteristics
Communication I/F	Discrete CMD, Active Bi-level/Active Analogue /Passive Bi-level TLM
Battery I/F	Max. 91.96V
Battery relay Rated current Voltage drop	 Max. 113.2A Max. 0.11V@113.2A
BAT voltage monitor Monitor range	 0 to 91.9V
Cell voltage monitor Monitor range	Max. 22ch 1.8 to 4.6V
Power Consumption	12.2W nom. @113.2A
Operating temperature	-20 to +60 deg C
Dimension （L×W×H）	128×332×215(mm)
Mass	4.6kg nom.
Random vibration Shock	10.54Grms 9800m/s^{2}srs
Radiation	For GEO 15 years
EMI/EMC	MIL-STD-461C compliant
EEE Parts grade	Class 1

PCU & BIM

■ External View of DS2000 PCU and Consisting Modules

PCU consisting of following modules
- SSU x 2
- BCR x 1
- BDR x 2 (3N+1R)
- PWR I/F x 1
- BAT I/F
- PCU CONT x 1
- CAPBANK x 1
- DC/DC x 1

Module	Function	Handling	Width	Mass
SSU	Shunt circuits	Max. 7 shunt circuits per module 5.28A max. per shunt circuit Monitor of PV array current Monitor of shunt current	24mm	1.2kg
BCR	Battery charge regulators	2 BCRs per module for stand-by redundancy Non-isolated buck converter topology CC mode/CV mode Rated charge current 8.9A per BCR	50mm	2.5kg
BDR	Battery discharge regulator	2 BDRs per module Non-isolated boost converter topology Rated output power 1.3kW Monitor of output current	56mm	3.4kg
PWR I/F	Power I/F	Output interface for load Bus capacitor Monitor of main bus output current External input interface for ground test	50mm	2.8kg
BAT I/F	Battery I/F	Input interface from battery Supply 100V bus power to battery Monitor battery charge/discharge current	22mm	0.9kg
PCU CONT	Mode controller	Mode controller with main error amplifier of triple majority voting circuit Command & Telemetry interface	22mm	0.7kg
CAPBANK	Bus capacitor	Additional bus capacitor	50mm	2.5kg
DC/DC	Auxiliary power supply	Redundant auxiliary power supply for internal circuits in PCU	22mm	1.0kg

PCU & BIM

■ External View of DS2000 BIM and Consisting Modules

BIM consisting of following modules
- BIM DRIV x 1
- BIM MON x 2

Module	Function	Handling	Width	Mass
BIM DRIV	Battery relay	Input interface from battery Output interface to PCU Battery relay Command & Telemetry interface External charge current interface	55mm	2.5kg
BIM MON	Battery cell voltage monitor	One monitor of battery voltage Max. 12 monitors of battery cell voltage	22mm	0.8kg