

Power Conditioning Unit for GEO Satellites

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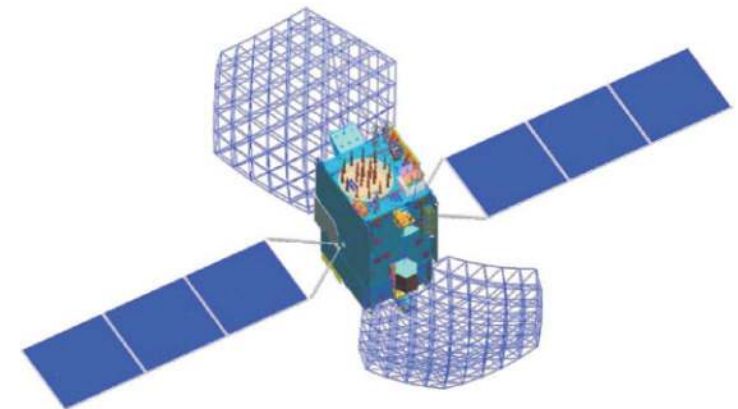
Introduction

Satellite

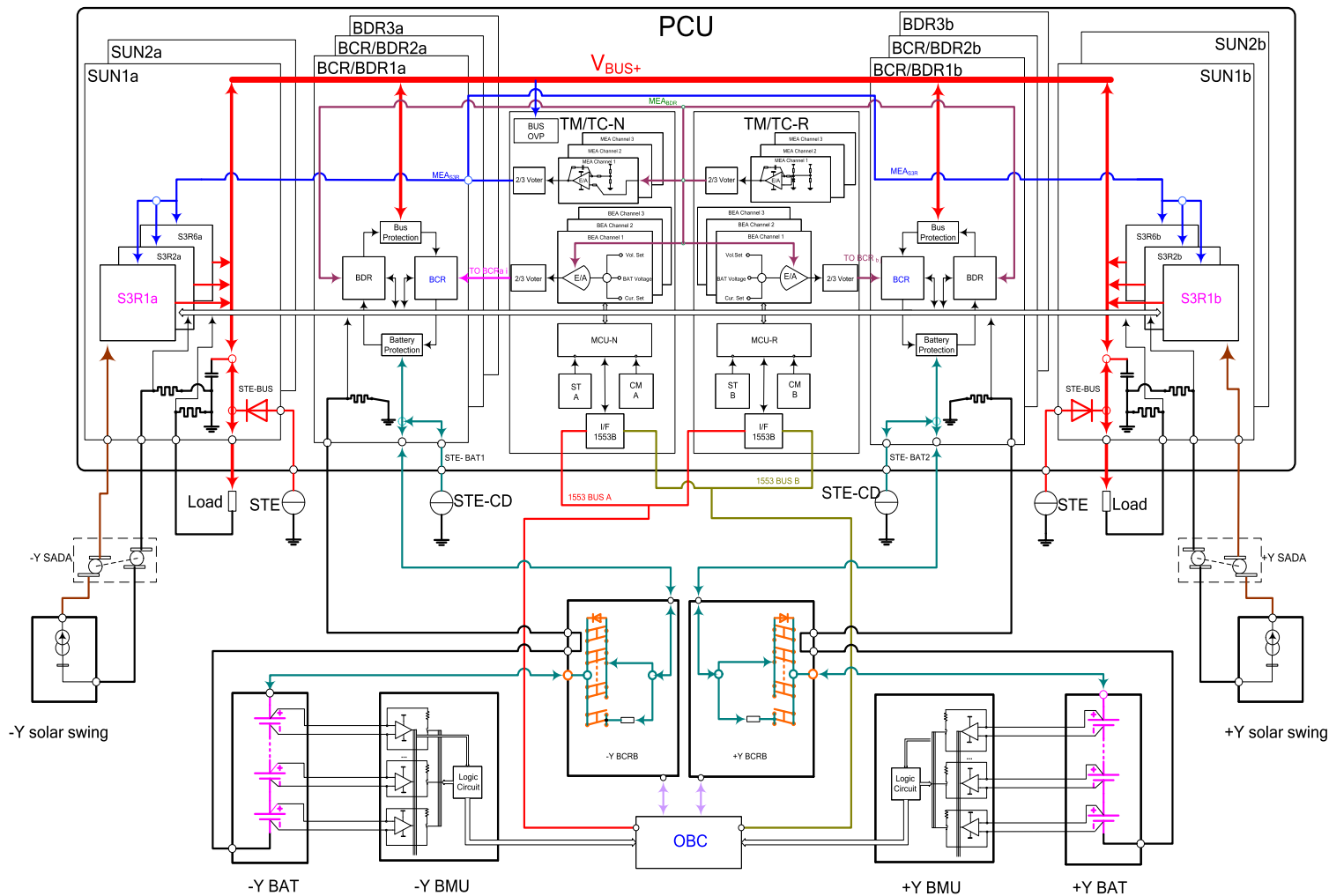
- The third generation BeiDou navigation satellite system
- 3 GEO + 3 IGSO + 24 MEO
- 2018-11-1, 2020-3-9, 2020-6-23

Electrical Power System

- a 100V fully-regulated bus, 6.4kW output power, 12 years design life
- two solar swings, high-efficiency 30% solar cell, 7kW EOL
- two sets of 75Ah Lithium-ion batteries, CC-CV control
- a power conditioning unit (PCU): three-domain control, S3R, BCR, BDR
- two battery management units
- two battery connection relay boxes



PCU Design



- 4 SUN modules (24 S3R cells)
- 4 BCDR modules
- 2 BDR modules
- 2 TM/TC modules, 1553B I/F

Regulated Bus:

Generation of a precisely and fully-regulated bus during sunlight and eclipse

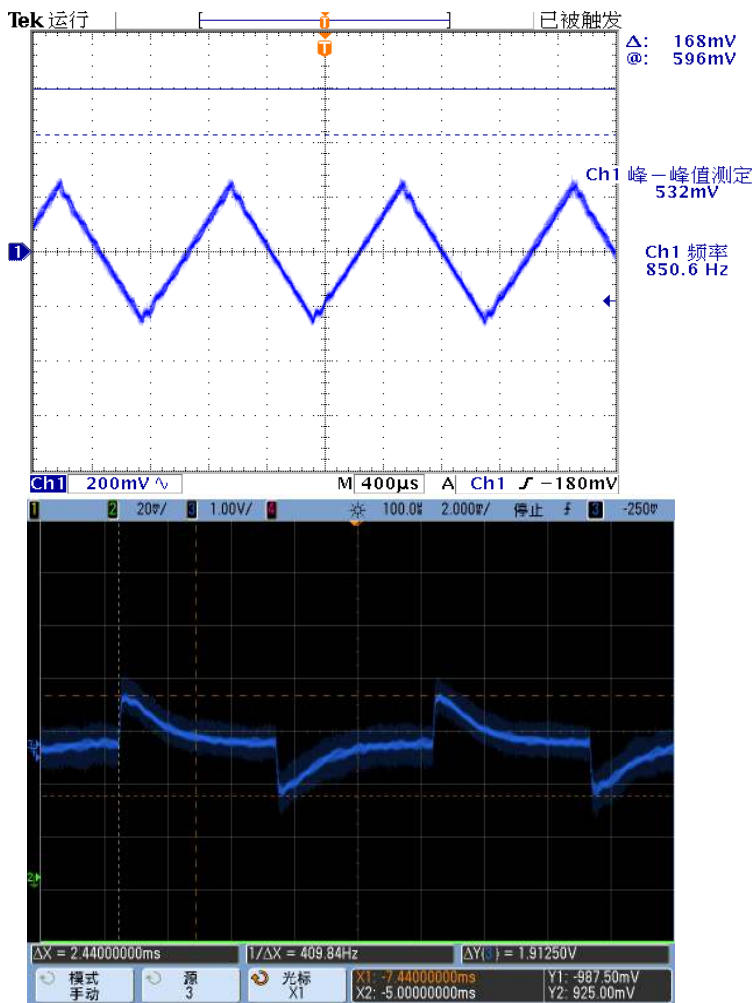
Reliability:

High reliability thanks to tolerance to any part failure

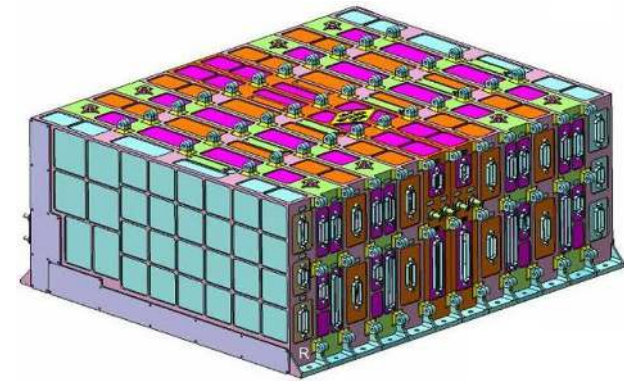
Component:

100% made by domestic

Specification and Summary



Parameter	Specification
Bus voltage	100.3V ± 0.29V
Shunt current per S3R	≤ 4.5A
Output current per BDR	≥ 16A
Efficiency of BDR	≥ 95%
Charge current per BCR	≥ 6A
Efficiency of BCR	≥ 93%
Charge method	CC-CV, 16 discrete values
Gain margin	≥ 10dB
Phase margin	≥ 60°



- The PCU is designed and developed by TIPS since 2010, all the components used are independently controllable.
- The 100V PCU can be expanded for the application of medium to very high power GEO satellites (up to 20kW), the performance and reliability is verified by the on-orbit data.