



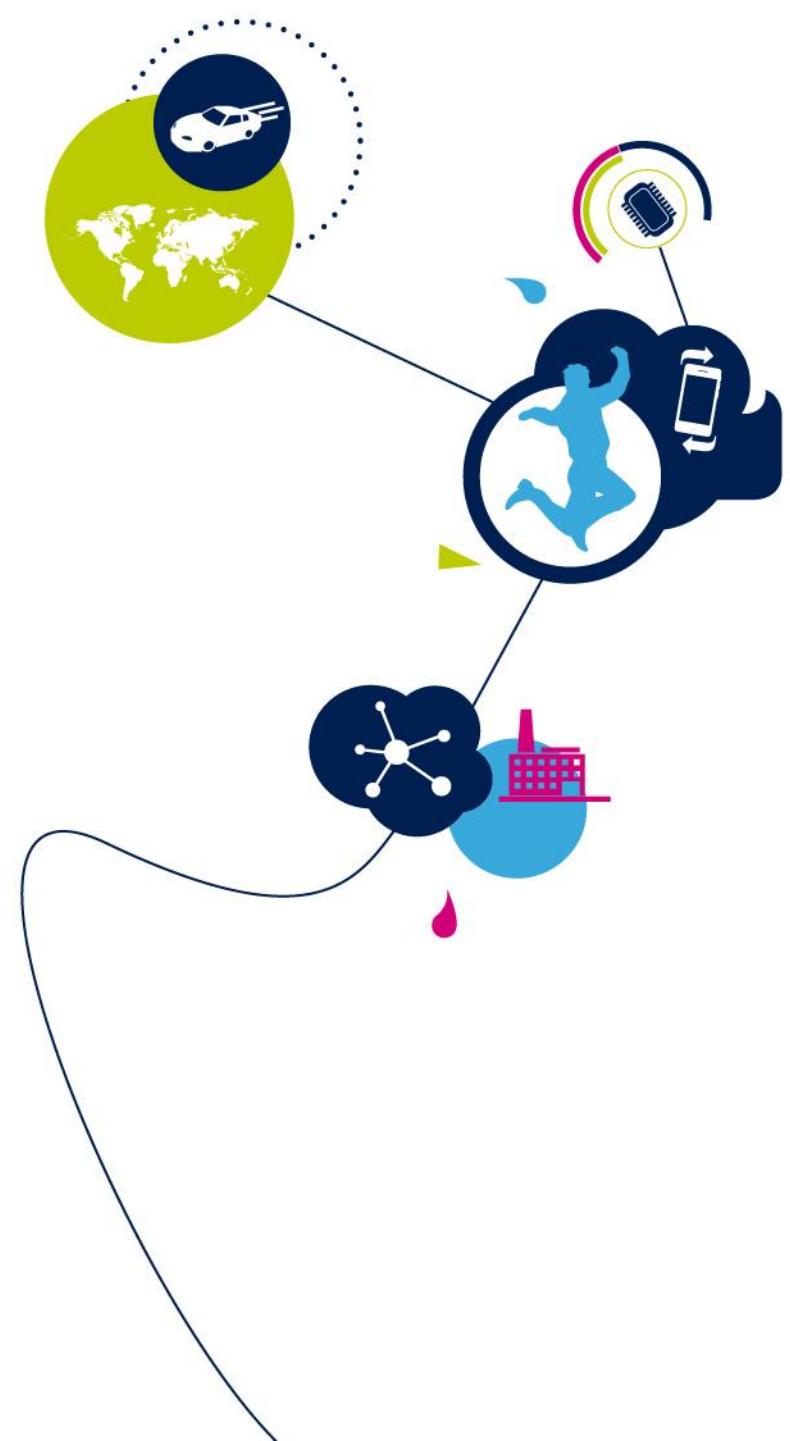
ACCEDE
COTS2019

SEVILLE - SPAIN 6-8 NOVEMBER

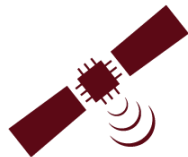
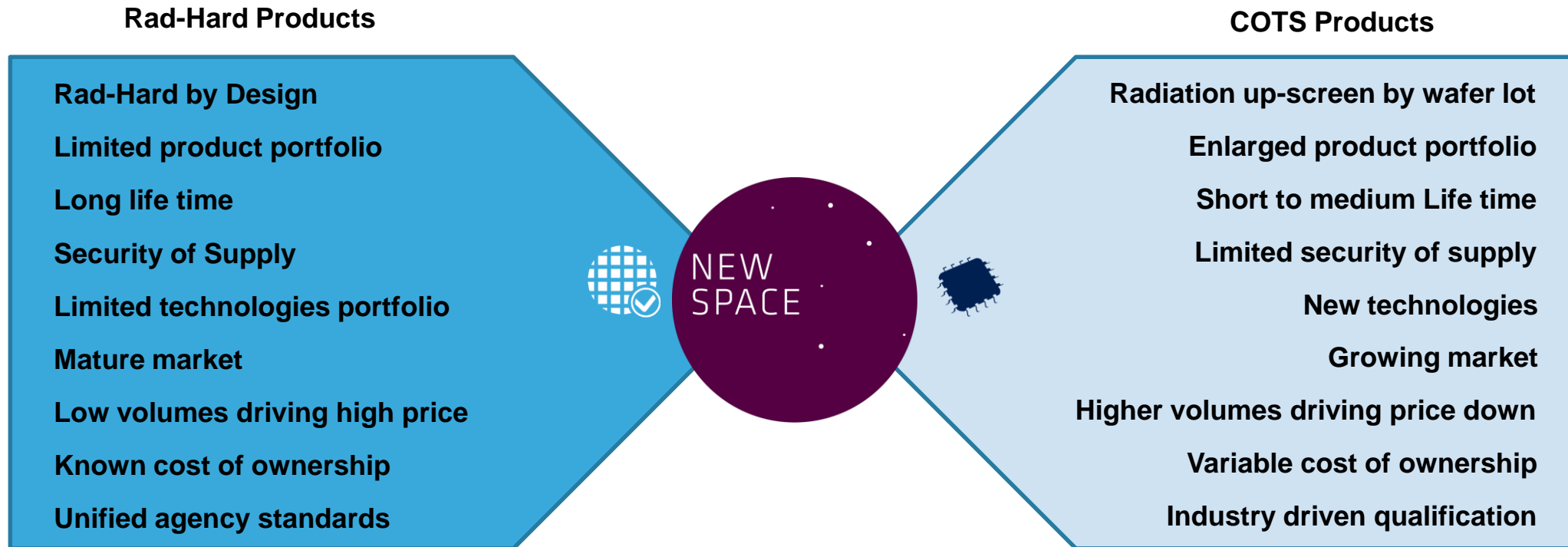
ST LEO Series Update

ACCEDE 2019 - Sevilla

Thibault BRUNET



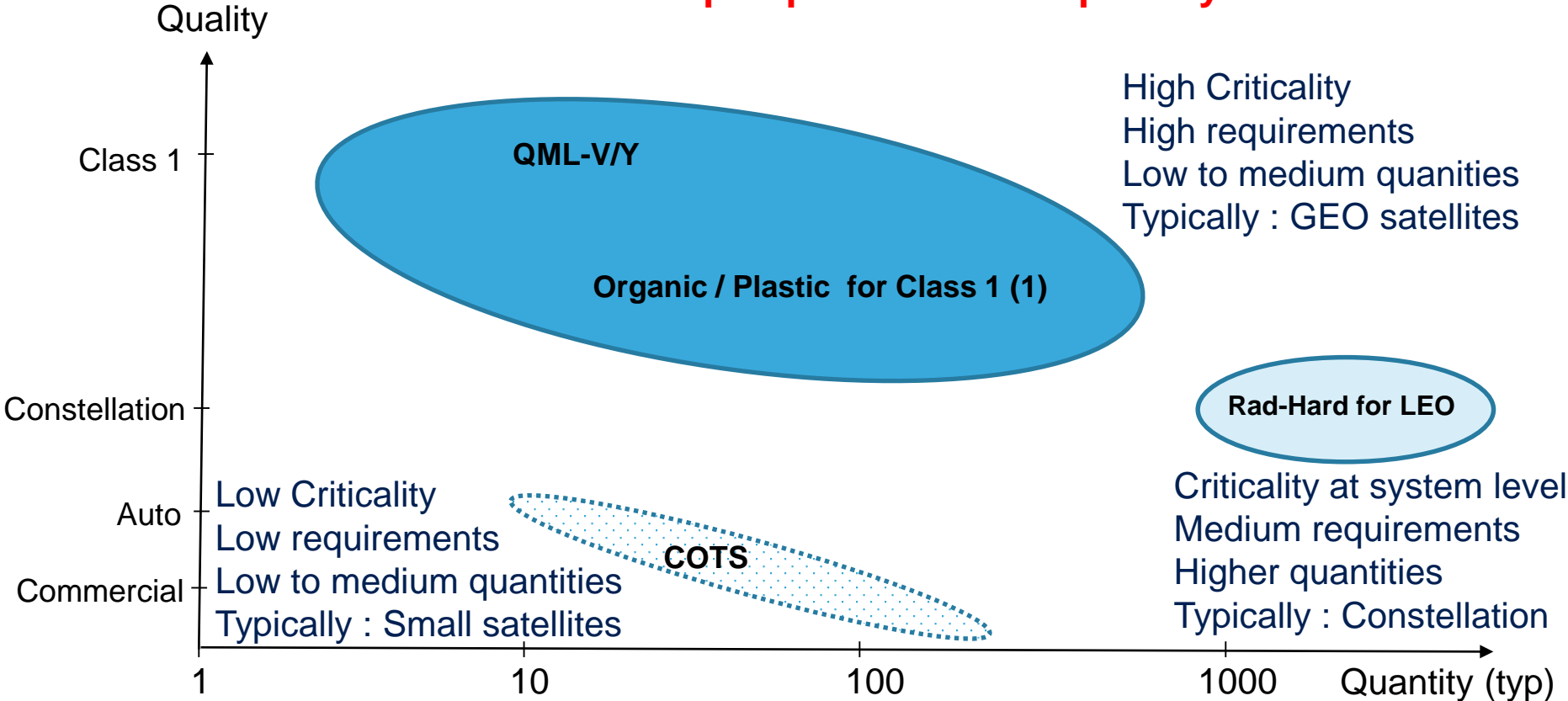
The New Space Sweet Spot



EEE Components Space Segmentation

Quality – Quantity – Price – Radiation Hardness

Price is not cost of ownership
Cost of ownership depends first on quantity



Bubble area : Part price – Bubble density : Radiation Hardness
(1) If justified by delta performance vs QML

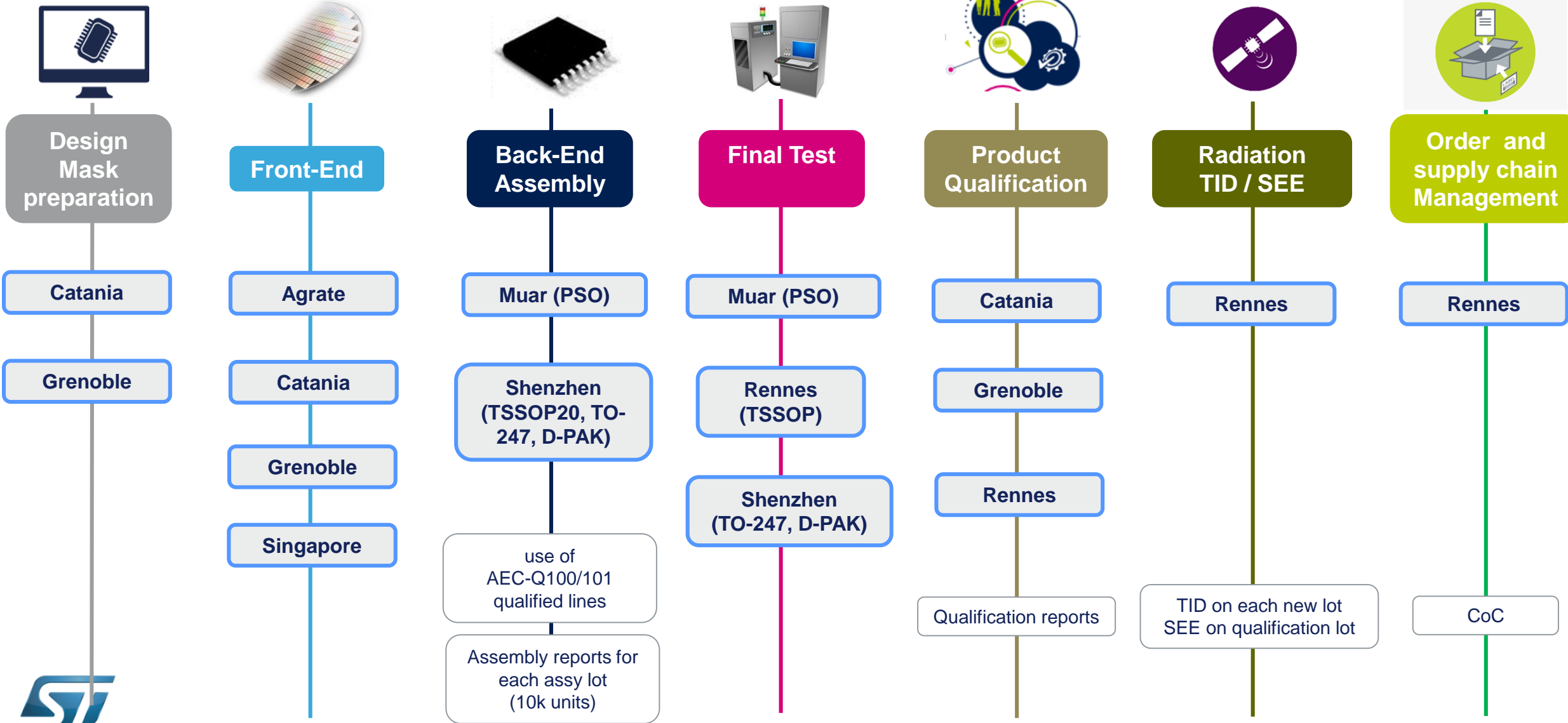


LEO Series : AEC-Q100 Based Specification

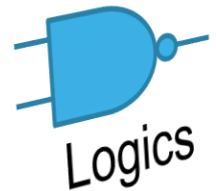
Step	Description
Specification	TID 50krad(Si) – TNID : tbd SEL free @ 43MeV.cm2/mg + characterization up to 60 MeV.cm2/mg Temperature : -40°C to 125°C No serialization – No Burn in Certificate of Conformance
Die	Front end with ST Process control Electrical Wafer Sort with PAT (1) & GPAT (2) Wafer Lot Acceptance Test : HTOL + Radiation
Package	Assembly lines of AEC-Q100 qualified products Finishing : default Ni/Pd/Au Molding compound characterization : tbd Selected packages : TSSOP20 – PowerSO20; Others under evaluation
Screening	Based on AEC-Q100 : 10 Thermal cycles @ 100% + CSAM by sampling + external visual
Logistic	Packing : Tape & reel MOQ : 1000 pieces typical Max 2 date code per shipment & 1 date code / reel – No additional traceability at order entry Max date code : 5 year



LEO design and supply-chain



LEO Series : On-Going Developments Status



CP	Function	Plastic Package	Sample	Flight Model
LEOAC14	HEX Schmitt Inveter	TSSOP20	Now	Q1'20
LEOAC244	BUS Transceiver	TSSOP20	Now	Q1'20
LEOAC00	QUAD 2-in NAND	TSSOP20	W41	Q1'20
LEOLVDSRD	LVDS Driver/Receiver	TSSOP20	Now	Q1'20
LEO3910	VREG	PSO20	W46	Q1'20
LEOAC74	DUAL D Flip / Flop	TSSOP20	Q4'19	Q2'20
LEOAC32	QUAD OR	TSSOP20	Q1'20	Q3'20
LEOAC08	QUAD 2-in AND	TSSOP20	Q1'20	Q3'20
LEOPOL1	POL	PSO20	Q1'20	Q3'20
LEO1843	PWM	TSSOP20	Q1'20	Q3'20



Rad-Hard Linear Positive Voltage Regulator

MAIN BENEFITS & FEATURES - TARGETS

- Input Voltage range: 3V – 12V DC
- Output Voltage range: 1.23V – 9V
- Output Current: 3A
- Low Drop Voltage: 0.5V @ $I_o=1A$, 1.5V @ $I_o=3A$
- Inhibit Function
- Overtemperature protection
- Overcurrent protection
- Gold bonding
- Finishing: NiPdAu
- PowerSO-20 Slug Down Package

RADIATION HARDNESS

- TID: 50 krad (Si)
- SEL free up to 43 MeV.cm²/mg
- SEL characterization up to 60 MeV.cm²/mg



PowerSO-20

Rad-hard 7 A point-of-load synchronous step-down regulator

MAIN BENEFITS & FEATURES - TARGETS

- Input operating voltage range: 3.0V to 12V
- Output voltage range: 0.8V to 0.85xVin
- Output current: up to **7A (TBC)**
- Fast load transient response and simple loop compensation based on Peak Current Mode control loop
- High Integration
 - Integrated NCH MOSFETs for synchronous step-down conversion
 - Integrated boot diode
 - Input under-voltage protection
 - over voltage protection
 - over temperature protection
- High Configurability

RADIATION HARDNESS

- TID: 50 krad (Si)
- SEL free up to 43 MeV.cm²/mg
- SEL characterization up to 60 MeV.cm²/mg



PowerSO-20

- Possible LEO series expansion
 - Discrete : Sweet Spot to be identified
 - SEB free Schottky diodes
 - 50 krad bipolar transistor
 - 50 krad / 32 MeV MOSFET
 - Logic : for selected high runners
 - HCC4051 Analog Multiplexer
 - Others : to be discussed
- Other products : to be discussed on a case by case basis

- COTS are used in New Space like they are in Traditional GEO
- ST now proposes Rad-Hard Plastic alternatives to COTS for LEO Constellations
- Expansion of the offer is primarily driven by business