(FO-99/Fuji-OSCAR-99)
NEXUS
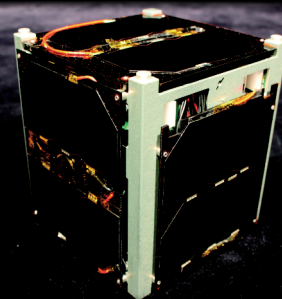## Next generation × Unique Satellite
### Amateur satellite communication technology demonstrator

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◆About NEXUS

Amateur satellite communication technology demonstrator "NEXUS/FO-99(Fuji-OSCAR-99)" has three mission communication devices , π / 4 shift QPSK transmitter (QPSK), FSK transmitter (FSK) and linear transponder (TRP), and small camera system (N-CAM).The operation of these four mission devices will be demonstrated in about one year.And we show that these are more practical than the conventional amateur radio communication equipment and a small camera system, and we aim at contributing to the society widely.The reception reports received from amateur radio operators are useful for status check of NEXUS.As of July 9, 2019, we have received more than 400 reception reports.Thank you for your cooperation.

NEXUS was launched from JAXA Uchinoura Space Center on January 18, 2019 (Fri).At present, the operation check of all installed devices were finished.Currently, we operate to evaluate the performance of each communication device. The introduction of the mission equipment is as follows.

◆π/4 shift QPSK transmitter

The π/4 shift QPSK transmitter is a high-speed and low transmission power transmitter than conventional transmitter. The commnication protocol is CCSDS including Reed-Solomon encodeing.The baud rate is 38400 bps, which enables higher-speed communication than the transmitter mounted on the conventional CubeSat.
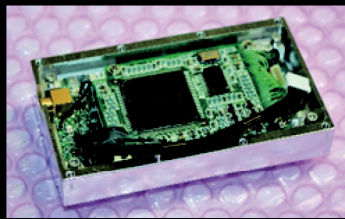
Specification		
Parameter	Value	Unit
Power	0.3	W
Frequency	435.900	MHz
Protcol	CCSDS	-
Size	80×40×10	mm

◆FSK transmitter

Baud rate of FSK transmitter is variable.Baud rate can be changed gradually between 1200 and 19200 bps.If the reception environment is bad, downlink speed is reduced and downlinking is performed reliably.If the reception environment is good, you can increase the baud rate and downlink many packets.
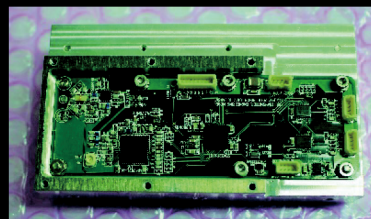
Specification		
Parameter	Value	Unit
Power	0.4	W
Frequency	435.900	MHz
Downlink Rate	600~19200	bps
Protcol	AX.25	-
Size	80×28×5	mm

◆Linear transponder

Linear transponder is transmitter that converts voice uplinked in the 145 MHz band to voice which can be downlinked in 435 MHz band.Currently, it is used by amateur radio operators around the world.In addition, this transponder has a function to measure the electric field intensity of 145 MHz band.This makes it possible to understand the 145 MHz band communication

| Specification		
Parameter	Value	Unit
Power	0.5	W
Frequency	UP:145.930~.900	MHz
Frequency	Down : 435.880~.910	MHz
Size	80×86×10	mm

◆N-CAM

N-CAM is a versatile and compact camera that was developed on the premise of being installed on CubeSat.You can set various values for resolution and image format while keeping the weight and size small.
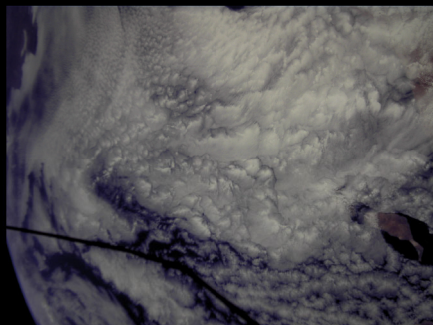
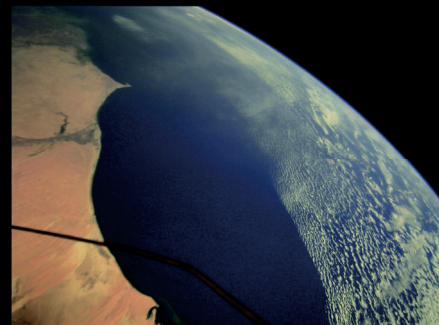| Specification		
Parameter	Value	Unit
Size(Board)	70×30×10	mm
Size(CAM)	30×30×23	mm
Power	0.05	W
RAM	16	MB
ROM	32	MB
Image Sensor	2592×1944	pixels

As of the summer of 2019,various images taken with N-CAM can be downlinked by the mision transmitter (All JPEG, 2592×1944pix).
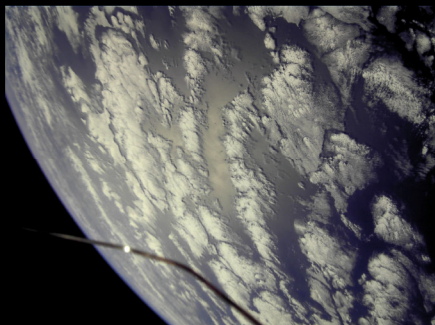
Over Japan(February 4th shot)

Over Africa(May 5th shot)

Over Africa(May 13th shot)