SPD 1001

SIGMA (KHUSAT-03) Function Test Procedure

School of Space Research

Kyung Hee University

(SSR/KHU)

Date

11 APR 2016

Location

ISL, Delft, NL

Responsible Engineer(s):

System Engineer

Seongwhan Lee swhan@khu.ac.kr

Electrical Engineer

Hyojeong Lee hjeong@khu.ac.kr

Electrical Engineer

Seonyeong Jeong jeongsy@khu.ac.kr

List of Abbreviations and Acronyms

SIGMA – Scientific cubesat with Instruments for Global Magnetic field and rAdiation

KHUSAT – Kyung Hee University SATellite

SSR/KHU – School of Space Research / Kyung Hee University

ISL – Innovative Space Logistics B.V.

T-POD - Test Picosatellite Orbital Deployer

VISJ – Vertical Integration Support Jig

HSK – HouSeKeeping

TEPC – Tissue Equivalent Proportional Counter

MAG – miniaturized fluxgate MAGnetometer

IIB – Instrument Interface Board

OBC – On Board Computer

RBF – Remove Before Flight

FSW – Flight SoftWare

FM – Flight Model

Special Notes

CAUTION

Note: CAUTION notes identify situations where flight hardware may be damaged without proper attention.

DANGER

Note: DANGER notes identify situations where bodily harm may occur without proper attention.

1. Purpose

This document is written for checking the simple operation and all HSK of KHUSAT-03 before the ISL Integration at Delft. KHU team has to follow the test through this document.

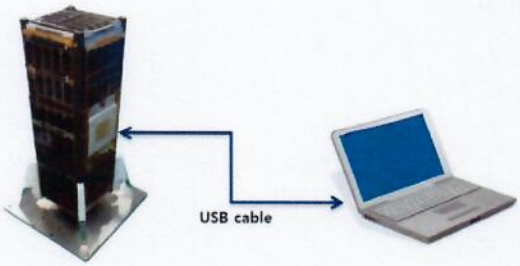
2. Schedule

The KHUSAT-03 activities are planned on 11th to 12th Apr.

- 11 Morning: 3U meeting
- 11 Afternoon: N/A
- **12 Morning: KHU activities**
- 12 Afternoon: 3Us integration
- 13 Morning~: Buffer

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week 14	4-Apr	5-Apr	6-Apr	7-Apr	8-Apr	9-Apr	10-Apr
	Delivery of satellite, GSE to ISL-facility in Delft, Netherlands (for Week 15 participants)						
Week 15	11-Apr	12-Apr	13-Apr	14-Apr	15-Apr	16-Apr	17-Apr
Morning	[KARI] 3U meeting	[KARI] CNU activities [KARI] KHU activities	Buffer [KARI] 1U meeting	[Suc] 1U activities	[JSU,Suc,Na1] 1Us integration		
Afternoon	[KARI] KAU activities [KARI] YSU activities	[KARI] 3Us integration	[KARI] JSU activities	[Na1] 1U activities	Buffer		

4. Configuration



- FM KHUSAT-03
- Vertical Integration Support Jig (VISJ)
- Personal Laptop
- UBS 3.0 Cable
- Power Cable

5. Process

Progress to check HSK follow this sequence and it needs personal laptop and USB cable only.

CAUTION

Note: Connect and enter console mode within FIVE MINUTES after SIGMA system ON.

✓ ① To take out of the KHUSAT-03 from the T-POD and it is mounted on the VISJ.

✓ ② KHUSAT-03 system ON to Remove the RBF pin and Kill switch off.

CAUTION

Note: RBF pin MUST BE REMOVED from OBC L-bracket before the QuadPack Integration.

✓ ③ Connect to the laptop using USB cable

✓ ④ Run 'Serial works' program and connect the KHUSAT-03 system to this program

✓ ⑤ Enter into Console mode (cmd: **c**)

CAUTION

Note: Do not run any payload (TEPC, MAG). ✓

DANGER

Note: Do not deploy antenna and magnetometer boom. ✓

✓ ⑥ Check the FSW version (cmd: **ver**)

✓ ⑦ Get the HSK data (cmd: **hsk**) (3times , write 3rd values .)

✓ ⑧ Write down the HSK data in the below 'Check List' and compare with last HSK

CAUTION

Note: Check the each value of HSK data whether they are in effective range. ✓

✓ ⑨ Check the battery voltage. (8.20V) , (No Need to Change).

A. If the KHUSAT-03 need to battery charge, remove the RBF pin and close the Kill switch.

B. Connect the 5 V adapter in charge.

CAUTION

Note: Charge the battery if the battery voltage value is lower than 8.20 V.

Note: Check the battery voltage of HSK every 30 min until its value reaches in 8.20 V

✓ ⑩ Format SD card (cmd: **ssr format**) and check the block count (cmd: **ssr**)

⑪ KHUSAT-03 system OFF if all process are finished

6. Check List Ver: 01. 160331. 0f

Part	List	Reference Value (Generally Hexadecimal value)	Check
OBC	RTC	2016.05.31 00:00:00 (Default)	2016.05.31 00:02:45
	System tick	00 00 00 00 (Default)	00 00 01 4C
	OBC MCU temperature	03 33 (-22℃) ~ 03 9A (20℃) ~ 03 DB (36℃)	03 9D
	Operation mode	I: 00(Default)/ St: 01 / N: 02 / Sc: 03 / ScA: 04 / R: 05	00
EPS	SA1 vol	03 F3	03 F3
	SA1+ cur	03 FF	03 FF
	SA1+ temp	01 B4 (45℃) ~ 02 47 (20℃) ~ 03 88 (-24℃)	02 45
	SA1- cur	03 FF	03 FF
	SA1- temp	01 BE (4℃) ~ 02 40 (20℃) ~ 03 69 (-21℃)	02 40
	SA2 vol	03 FF	03 F2
	SA2+ cur	03 FF	03 FF
	SA2+ temp	01 B1 (46℃) ~ 02 4E (20℃) ~ 03 94 (-25℃)	02 43
	SA2- cur	03 FF	03 FF
	SA2- temp	01 B9 (44℃) ~ 02 4A (20℃) ~ 03 80 (-24℃)	02 47
	SA3 vol	02 2E	02 2D
	SA3+ cur	Not use	03 FF
	SA3+ temp	Not use	03 FF
	SA3- cur	03 FF	03 FF
	SA3- temp	01 C0 (41℃) ~ 02 46 (20℃) ~ 03 65 (-22℃) / 03 FF	03 FF
	Batt bus cur	03 B4 (100.11 mA, normal)	03 B5
	5V bus cur	03 80 (194.10 mA, normal)	03 80
	3.3V bus cur	03 80 (126.96 mA, normal)	03 80
	Status	C0 00	C0 00
BATT	Batt 1 cur	03 80	03 80
	Cell 1 vol	02 83	02 83
	Batt 1 vol	00 A3 (8.26 V) ~ 01 63 (6.46 V)	00 A8
	Batt 1 temp	01 25(36.70℃) ~ 01 63(53℃) ~ 01 C6 (62.93℃)	01 68
	Batt 2 cur	03 81	03 81
	Cell 2 vol	02 82	02 83
	Batt 2 vol	00 A3 (8.26 V) ~ 01 63 (6.46 V)	00 A9
	Batt 2 temp	01 24 (37.35℃) ~ 01 62 (53℃) ~ 01 C2 (63.10℃)	01 68
	Batt 3 cur	03 83	03 83
	Cell 3 vol	02 82	02 83

Part	List	Reference Value (Generally Hexadecimal value)	Check
	Batt 3 vol	00 A3 (8.26 V) ~ 01 63 (6.46 V)	00 AB
	Batt 3 temp	01 23 (37.68℃) ~ 01 60 (53℃) ~ 01 C0 (63.27℃)	01 67
	Status	00 00	00 00
IIB	RADFET 1 data	** ** (2 byte)	0D 34
	RADFET 1 temp	** ** (2 byte)	20 80
	RADFET 2 data	** ** (2 byte)	4D 34
	RADFET 2 temp	** ** (2 byte)	60 AC
	Board temp	74 00 (-16℃) ~ 74 70 (20℃) ~ 74 BC (38℃)	74 68
TRANS	RX Transmitter current consumption	00 00	00 04
	RX Doppler offset at receiver	** ** (2 byte)	03 91
	RX Receiver current consumption	06 51 (49.32mA, normal)	05 E9
	RX Power bus voltage	06 7A (8.09 V, normal)	06 83
	RX Board temperature	0A 29 (38℃) ~ 0B BA (20℃) ~ 0D DC (-20℃)	0B EB
	RX Power amplifier temperature	0A 2F (38℃) ~ 0B B9 (20℃) ~ 0D BB (-20℃)	0B F3
	RX Signal strength at receiver	05 CA (-107.54 dBm, normal)	03 FE
	RX Receiver controller internal temperature	** ** (2 byte)	00 00
	RX Last frame Doppler offset	** ** (2 byte)	00 00
	RX Last frame signal strength	00 00	00 00
	TX RF reflected power	00 00	00 01
	TX Power amplifier temperature	0A 2D (38℃) ~ 0B B8 (20℃) ~ 0D E3 (-20℃)	0B F2
	TX RF forward power	00 00	00 01
	TX Transmitter controller internal temperature	** ** (2 byte)	00 03
	TX Transmitter current consumption	00 00	00 00
	TX Last frame RF reflected power	00 00	00 00
	TX Last frame RF forward power	00 00	00 00
	TX Status	0C (Default)	0C
ACS	Time	FF FF 00 00 00 00 (Default)	FF FF 00 02 76 D5
	Quaternions	FF FF FF FF FF FF FF FF (8 byte)	FF ~FF
	Body Rates	80 00 80 00 80 00 (6 byte)	80 00 80 00 80 00
	Magnetometer	** ** ** ** ** ** (6 byte)	FE E4 FB 8C FC 5D
	Rate Sensor	** ** ** ** ** ** (6 byte)	00 16 00 1D 00 21
	Temperature	** (1 byte)	17
	Photodiodes	** ** ** ** **(5 byte)	00 FF 02 FF FF
	Magnetorquers	00 00 00 00 00 00 (6 byte)	00 ~ 00

Part	List	Reference Value (Generally Hexadecimal value)	Check
	Orbit Position & Velocity	FF ~ FF (12 byte)	FF ~FF
	Operation Mode	Sv: 01 / Id: 02 (Default) / D: 03 / P: 04	02
	Need Detumble	NO: 00 / YES: 01	00
ANT	Status	** ** (2 byte) – Deploy: *=0 / Not Deploy: *=8	88 88
	Temperature	02 14 (37℃) ~ 02 49 (20℃) ~ 02 D8 (-20℃)	02 49
SSR	Init mode count	0 (Dec. Default)	0
	Reset count	0 (Dec. Default)	0
	HSK front	1 (Dec. Default)	1
	HSK rear	1 (Dec. Default)	2
	MAG front	1000001 (Dec. Default)	1000001
	MAG rear	1000001 (Dec. Default)	1000001
	TEPC front	2800001 (Dec. Default)	2800001
	TEPC rear	2800001 (Dec. Default)	2800001
MAG	MAG Status	ON: 01 / OFF: 00 (Default)	00
	Boom Status	Deploy: 01 / Not Deploy: 00 (Default)	00
TEPC	TEPC Status	ON: 01 / OFF: 00 (Default)	00

[End of Function Test]

Responsible Engineer(s)