TEST REPORT

Dt&C Co., Ltd.
42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2511-0083

2. Customer

- Name (FCC) : Think-i Co., LTD
- Address (FCC) : 420, 37, Poeun-daero 59beon-gil, Suji-gu, Yongin-si, Gyeonggi-do, South Korea

3. Use of Report : Verification test for simultaneous transmission

4. Product Name / Model Name : IoT Safety Monitoring Device / TR100
FCC ID : 2BSC9-TR100

5. FCC Regulation(s): Part 15.247, Part 15.255
Test Method used: KDB558074 D01v05r02, KDB 364244 D01v01, ANSI C63.10-2020

6. Date of Test : 2025.10.02 ~ 2025.10.30

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

8. Testing Environment : See appended test report.

9. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KOLAS accreditation.

Affirmation	Tested by Name : SeokHo Han (Signature)	Technical Manager Name : JaeJin Lee (Signature)

2025 . 11 . 14 .

Dt&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2511-0083	Nov. 14, 2025	Initial issue	SeokHo Han	JaeJin Lee

Table of Contents

1. GENERAL INFORMATION

Product Name	IoT Safety Monitoring Device
Model Name	TR100
Add Model Name	-
Firmware Version Identification Number	Ver 1.1
EUT Serial Number	No Specified
Power Supply	DC 5 V

2. INTRODUCTION

2.1. EUT DESCRIPTION

This EUT contains the following capabilities:
60GHz mmW radar
This device is integrated two certified modules.
2.4GHz WLAN (FCC ID: 2AC7Z-ESPS3WROOM1),
900MHz band LoRa (FCC ID: XMR2024KG200Z)

2.2. SIMULTANEOUS TRANSMISSION CONFIGURATION

- 60GHz mmW radar + 2.4GHz WLAN
- 60GHz mmW radar + 900MHz band LORA

2.3. TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+22 ℃ ~ +23 ℃
▪ Relative Humidity	+40 % ~ +42 %

2.4. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.10-2020. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Radiated emission (1 GHz Below)	5.0 dB (The confidence level is about 95 %, k = 2)
Radiated emission (1 GHz ~ 18 GHz)	4.8 dB (The confidence level is about 95 %, k = 2)
Radiated emission (18 GHz Above)	5.7 dB (The confidence level is about 95 %, k = 2)

2.6. TESTING LABORATORY

Dt&C Co., Ltd.

The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.
The test site complies with the requirements of Part 2.948.

- FCC & ISED MRA Designation No. : KR0034
- FCC Test Firm Registration No. : 704742
- ISED #: 5740A

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3. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Status Note 1
15.255(d) 15.247(d) 15.209	Undesirable Emissions	Refer to the section 4	C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: Radiated test items were performed in three orthogonal EUT positions and the worst case data was reported.

Note 3: If the spurious emission caused by the simultaneous operation of both devices, the limit was applied to highest limit by either rule part.

4. UNWANTED EMISSIONS

▣ Test Procedure

The following procedure was used for measurement of the radiated spurious emissions.
1) The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements at above 1 GHz, the table height is 1.5 m
2) The table was rotated 360 degrees to determine the position of the highest radiation.
3) During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 0.5 ~ 3 meter away from the interference-receiving antenna.
4) For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.
5) The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
6) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

Frequency Range Below 1GHz
RBW = 100 or 120 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak

Frequency Range > 1GHz
Peak Measurement > 1 GHz
RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Sweep time = Auto, Trace mode = Max Hold until the trace stabilizes

For spurious emissions form the Part 15.247 device**,**
Average Measurement > 1 GHz
- **KDB558074 D01v05r02 - Section 8.6**
- **ANSI C63.10-2020 – Section 9.10 & 9.11**

If continuous transmission of the EUT (D ≥ 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than ±2%), then the following procedure shall be used:

1. RBW = 1 MHz (unless otherwise specified).
2. VBW ≥ 3 x RBW.
3. Detector = RMS (Number of points ≥ 2 x Span / RBW)
4. Averaging type = power (i.e., RMS).
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.
7. A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
   1) If power averaging (RMS) mode was used in step 4, then the applicable correction factor is 10 log(1 / D), where D is the duty cycle.
   2) If linear voltage averaging mode was used in step 4, then the applicable correction factor is 20 log(1 / D), where D is the duty cycle.
   3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

For spurious emissions form the Part 15.255 device,
Average Measurement: 1 ~ 40 GHz
RBW = 1 MHz, VBW ≥ Reduce the video bandwidth until no significant variations in the displayed signal are observed in subsequent traces, provided the video bandwidth is no less than 1 Hz.
Detector = Peak, Sweep Time = Auto, Trace Mode = Max Hold until the trace stabilizes

Average Measurement > 40 GHz
RBW = 1 MHz, VBW = 3 MHz, Detector = RMS, Sweep time = Auto, Trace mode = Max Hold until the trace stabilizes

▣ Test Requirements and limit,

Part 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of Part 15.247 the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Part 15.255(d): Limits on spurious emissions

(1) The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.
(2) Radiated emissions below 40 GHz shall not exceed the general limits in §15.209.
(3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm^2 at a distance of 3 meters.
(4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

Part 15.209: General requirement

Frequency (MHz)	FCC Limit (uV/m)	ISED Limit (μA/m)	Measurement Distance (m)
0.009 – 0.490	2 400 / F (kHz)	6.37/F (F in kHz)	300
0.490 – 1.705	24 000 / F (kHz)	63.7/F (F in kHz)	30
1.705 – 30.0	30	0.08	30

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §15.231 and 15.241.

Part 15.205(a): Restricted band of operation

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.414 25 ~ 8.414 75	108 ~ 121.94	1 300 ~ 1 427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1 435 ~ 1 626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.173 5 ~ 2.190 5	12.519 75 ~ 12.520 25	149.9 ~ 150.05	1 645.5 ~ 1 646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.576 75 ~ 12.577 25	156.524 75 ~ 156.525 25	1 660 ~ 1 710	8.025 ~ 8.5	22.01 ~ 23.12
4.177 25 ~ 4.177 75	13.36 ~ 13.41	156.7 ~ 156.9	1 718.8 ~ 1 722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.207 25 ~ 4.207 75	16.42 ~ 16.423	162.012 5 ~ 167.17	2 200 ~ 2 300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.694 75 ~ 16.695 25	167.72 ~ 173.2	2 310 ~ 2 390	10.6 ~ 12.7	36.43 ~ 36.5
6.267 75 ~ 6.268 25	16.804 25 ~ 16.804 75	240 ~ 285	2 483.5 ~ 2 500	13.25 ~ 13.4	Above 38.6
6.311 75 ~ 6.312 25	25.5 ~ 25.67	322 ~ 335.4	2 655 ~ 2 900		
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3 260 ~ 3 267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3 332 ~ 3 339		
8.376 25 ~ 8.386 75	74.8 ~ 75.2	960 ~ 1 240	3 345.8 ~ 3 358		
			3 600 ~ 4 400		

Test Result

- Test Notes

1) The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter.
Two simultaneous transmission modes(60GHz mmW + 2.4GHz WLAN, 60GHz mmW + 900MHz band LORA) were tested, and the worst results are reported.
No other spurious and harmonic emissions were reported greater than listed emissions.

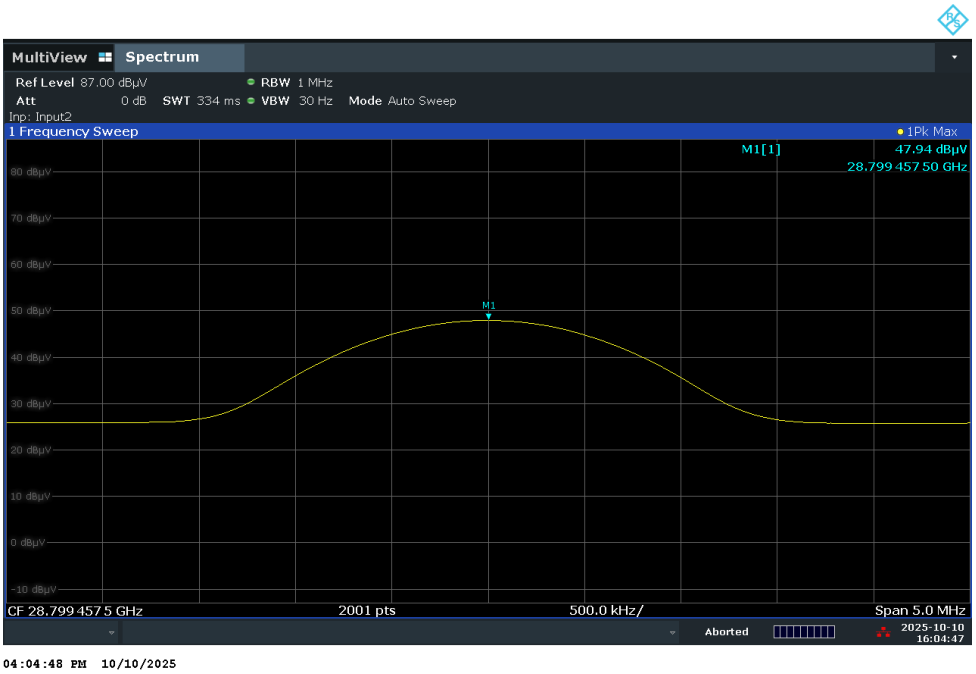
2) Sample Calculation.
Below 40GHz
Margin = Limit – Result / Result = Measured Level + TF + DCF + DCCF + / TF = AF + CL – AG
Where, TF = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain
DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
Above 40GHz
E(dBuV/m) = Measured level (dBm) + 107 + TF(dB/m)
where, E=field strength / TF(Total Factor) = Antenna Factor(dB/m) + Cable Loss(dB/m) + Attenuator Loss(dB) – Amplifier Gain(dB)
EIRP(dBm) = E(dBuV/m) + 20log(D) - 104.7; where, D is measurement distance (in the far field region) in m.
$PD = EIRP_{Linear} / 4\pi d^2$
Where, PD = the power density at the distance specified by the limit, in W/m^2
$EIRP_{Linear}$ = EIRP, in watts
D = is the distance at which the power density limit is specified, in m
If the mixer is used, mixer loss was applied to the measured level by SA correction factor.

3) * = Noise floor

Below 40GHz: 60GHz mmW + 2.4GHz WLAN

Freq. (MHz)	ANT Pol	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.29	V	QP	47.00	-9.63	N/A	N/A	37.37	40.00	2.63
53.04	V	QP	40.50	-8.38	N/A	N/A	32.12	40.00	7.88
82.39	V	QP	38.00	-12.32	N/A	N/A	25.68	40.00	14.32
2 488.05	V	PK	45.71	8.95	N/A	N/A	54.66	74.00	19.34
2 488.16	V	AV	33.42	8.96	0.82	N/A	43.20	54.00	10.80
4 923.87	H	PK	49.84	12.03	N/A	N/A	61.87	74.00	12.13
4 923.87	H	AV	40.08	12.03	0.82	N/A	52.93	54.00	1.07
28 799.43	H	PK	50.51	10.31	N/A	-4.93	55.89	74.00	18.11
28 799.46	H	AV	47.94	10.31	N/A	-4.93	53.32	54.00	0.68

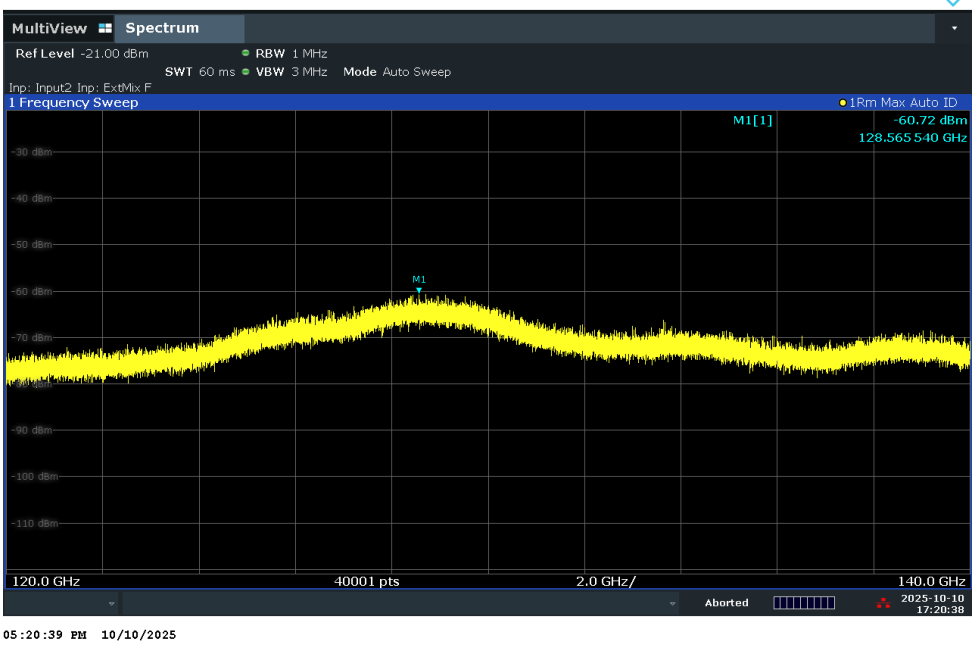
Worst data plot(Reading Value) Detector Mode : AV Y & Hor



Above 40GHz: 60GHz mmW + 2.4GHz WLAN

Measurement distance(D)	Frequency (MHz)	ANT Pol	Measured Level(dBm)	TF (dB/m)	E (dBuV/m)	EIRP (dBm)	Power Density (pW/cm^2)	Limit (pW/cm^2)
0.7 m	*128 565.54	H	-60.72	48.34	94.62	-13.18	42.52	90.00
0.5 m	*191 395.89	H	-64.29	52.21	94.92	-15.80	23.26	90.00
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

Worst data plot(Reading Value) **Y & Hor**



5. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	N9020A	24/11/26	25/11/26	MY50410399
Spectrum Analyzer	Agilent	N9020A	25/05/26	26/05/26	US47360812
Spectrum Analyzer	Rohde Schwarz	FSW85	25/05/29	26/05/29	101778
Thermohygrometer	XIAOMI	MHO-C201	24/11/27	25/11/27	00089675
Thermohygrometer	BODYCOM	BJ5478	24/12/05	25/12/05	120612-2
Multimeter	FLUKE	17B+	24/11/27	25/11/27	36390701WS
Signal Generator	Rohde Schwarz	SMBV100A	24/12/10	25/12/10	255571
Signal Generator	ANRITSU	MG3695C	24/11/29	25/11/29	173501
DC Power Supply	SM techno	SDP30-5D	25/05/29	26/05/29	305DMG288
DC Power Supply	SM techno	SDP30-5D	25/05/29	26/05/29	305DMG291
Loop Antenna	ETS-Lindgren	6502	24/11/08	25/11/08	00060496
Hybrid Antenna	Schwarzbeck	VULB 9160	24/12/13	25/12/13	3362
PreAmplifier	H.P	8447D	24/12/11	25/12/11	2944A07774
HORN ANT	ETS	3117	25/05/27	26/05/27	00143278
PreAmplifier	Rohde Schwarz	SCU 18	25/04/28	26/04/28	10180
PreAmplifier	Agilent Technologies	8449B	24/11/27	25/11/27	3008A00161
HORN ANT	A.H.Systems	SAS-574	25/06/12	26/06/12	155
PreAmplifier	tsj	MLA-1840-J02-45	25/05/29	26/05/29	16966-10728
Horn Antenna	MI Wave	RX ANT-5 261U+410U	25/06/12	26/06/12	108
PreAmplifier	Norden Millimeter Inc.	NA4060G50N8P12	24/12/13	26/12/13	1003
Horn Antenna	MI Wave	RX ANT-6 261V+410V	25/06/12	26/06/12	110
PreAmplifier	ERAVABT	SBL-5037533550-151-E1-ET	24/12/13	25/12/13	10394-01
Horn Antenna	MI Wave	RX ANT-7 261E	25/06/12	26/06/12	112
PreAmplifier	Norden Millimeter Inc.	NN6090G40N5P-2	24/12/13	26/12/13	1001
Harmonic mixer	Rohde Schwarz	FS-Z90	25/06/12	26/06/12	101714
Horn Antenna	MI Wave	RX ANT-8 261F	25/06/12	26/06/12	114
Harmonic mixer	Rohde Schwarz	FS-Z140	25/06/12	26/06/12	101009
Horn Antenna	MI Wave	RX ANT-9 261G	25/06/12	26/06/12	116
Harmonic mixer	Rohde Schwarz	FS-Z220	25/06/12	26/06/12	101012
Attenuator	Hefei Shunze	SS5T2.92-10-40	25/05/26	26/05/26	16012202
Attenuator	Aeroflex/Weinschel	56-3	25/05/26	26/05/26	Y2370
Attenuator	SMAJK	SMAJK-2-3	25/05/26	26/05/26	3
Attenuator	SMAJK	SMAJK-2-3	25/05/26	26/05/26	2
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	25/06/12	26/06/12	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	25/06/12	26/06/12	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	25/06/12	26/06/12	3
Cable	DT&C	Cable	25/01/02	26/01/02	G-2
Cable	HUBER+SUHNER	SUCOFLEX 100	25/01/02	26/01/02	G-3
Cable	DT&C	Cable	25/01/02	26/01/02	G-4
Cable	OMT	YSS21S	25/01/02	26/01/02	G-5
Cable	Junkosha	MWX241	25/01/02	26/01/02	mmW-1
Cable	Junkosha	MWX241	25/01/02	26/01/02	mmW-4
Cable	HUBER+SUHNER	SUCOFLEX100	25/01/02	26/01/02	M-1
Cable	HUBER+SUHNER	SUCOFLEX100	25/01/02	26/01/02	M-2
Cable	JUNKOSHA	MWX241/B	25/01/02	26/01/02	M-3
Cable	JUNKOSHA	J12J101757-00	25/01/02	26/01/02	M-7

Cable	HUBER+SUHNER	SUCOFLEX106	25/01/02	26/01/02	M-9
Cable	DTNC	Cable	25/01/02	26/01/02	RFC-69
Cable	Junkosha	MWX261	25/01/02	26/01/02	mmW-7
Cable	Junkosha	MWX261	25/01/02	26/01/02	mmW-15
Cable	HUBER+SUHNER	SUCOFLEX 104	25/01/02	26/01/02	mmW-8
Cable	HUBER+SUHNER	SUCOFLEX 104	25/01/02	26/01/02	mmW-9
Test Software	tsj	Radiated Emission Measurement	NA	NA	Version 2.00.0185
Test Software	tsj	Noise Terminal Measurement	NA	NA	Version 2.00.0190
3m Semi Anechoic Chamber	SYC	3m-SAC	25/06/13(NSA) 25/06/19(VSWR)	26/06/13(NSA) 26/06/19(VSWR)	3m-SAC-1
3m Semi Anechoic Chamber	SYC	3m-SAC	25/01/14(NSA) 25/01/17(VSWR)	26/01/14(NSA) 26/01/17(VSWR)	3m-SAC-2

- END -