9.2.4 MEASUREMENT RESULT

GPRS 850:

The Worst Test Results for Channel 251/848.8 MHz				
Frequency	Emission Level	Limits	Margin	Comment
(MHz)	(dBm)	(dBm)	(dB)	
1967.60	-46.97	-13	-33.97	Horizontal
2475.17	-32.68	-13	-19.68	Horizontal
5989.25	-35.77	-13	-22.77	Horizontal
1967.60	-46.47	-13	-33.47	Vertical
3426.04	-35.32	-13	-22.32	Vertical
6534.14	-35.73	-13	-22.73	Vertical

GPRS 1900:

The Worst Test Results for Channel 810/1909.8MHz				
Frequency	Emission Level	Limits	Margin	Comment
(MHz)	(dBm)	(dBm)	(dB)	
1456.52	-46.89	-13	-33.89	Horizontal
3819.60	-33.14	-13	-20.14	Horizontal
7061.33	-37.30	-13	-24.30	Horizontal
1462.12	-47.21	-13	-34.21	Vertical
3819.60	-35.02	-13	-22.02	Vertical
7680.19	-37.31	-13	-24.31	Vertical

RESULT: PASS

Note:

1. Margin = Emission Level -Limit
2. Below 30MHZ no Spurious found and Above is the worst mode data

10. FREQUENCY STABILITY

10.1 MEASUREMENT METHOD

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1 Measure the carrier frequency at room temperature.

2 Subject the EUT to overnight soak at -10℃.

3 With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 for PCS 1900 band , channel 190 for GSM 850 band, channel 9400 for UMTS band II and channel 4175 for UMTS band V measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

4 Repeat the above measurements at 10℃ increments from -10℃ to +40℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

5 Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.

6 Subject the EUT to overnight soak at +40℃.

7 With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

8 Repeat the above measurements at 10℃ increments from +40℃ to -10℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

9 At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

10.2 PROVISIONS APPLICABLE

10.2.1 FOR HAND CARRIED BATTERY POWERED EQUIPMENT

According to the ANSI/TIA-603-E-2016, the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.15VDC and 4.2VDC, with a nominal voltage of 3.7VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

10.2.2 FOR EQUIPMENT POWERED BY PRIMARY SUPPLY VOLTAGE

According to the ANSI/TIA-603-E-2016,the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment, the normal environment temperature is 20ºC.

10.3 MEASUREMENT RESULT

Test Results

Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.(V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GSM850	GPRS	LCH	TN	VL	1.10	0.001335	±2.5	PASS
			TN	VN	2.58	0.003130	±2.5	PASS
			TN	VH	2.58	0.003130	±2.5	PASS
		MCH	TN	VL	-2.65	-0.003168	±2.5	PASS
			TN	VN	0.52	0.000622	±2.5	PASS
			TN	VH	-1.55	-0.001853	±2.5	PASS
		HCH	TN	VL	-7.49	-0.008824	±2.5	PASS
			TN	VN	-1.68	-0.001979	±2.5	PASS
			TN	VH	-7.81	-0.009201	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt. (V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Verdict
PCS 1900	GPRS	LCH	TN	VL	-8.65	-0.004675	PASS
			TN	VN	-4.78	-0.002584	PASS
			TN	VH	-11.36	-0.006140	PASS
		MCH	TN	VL	-27.83	-0.014803	PASS
			TN	VN	-21.37	-0.011367	PASS
			TN	VH	-27.31	-0.014527	PASS
		HCH	TN	VL	-17.89	-0.009367	PASS
			TN	VN	-20.73	-0.010855	PASS
			TN	VH	-22.60	-0.011834	PASS

Note: Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very samll. As such it is determined that channels at the band edge would remain in-band when the maximum measured frequency deviation noted duing the frequency stability tests is applied. Therefore the device is detemined to remain operating in band over the temperture and voltage range as tested.

Frequency Error vs. Temperature:

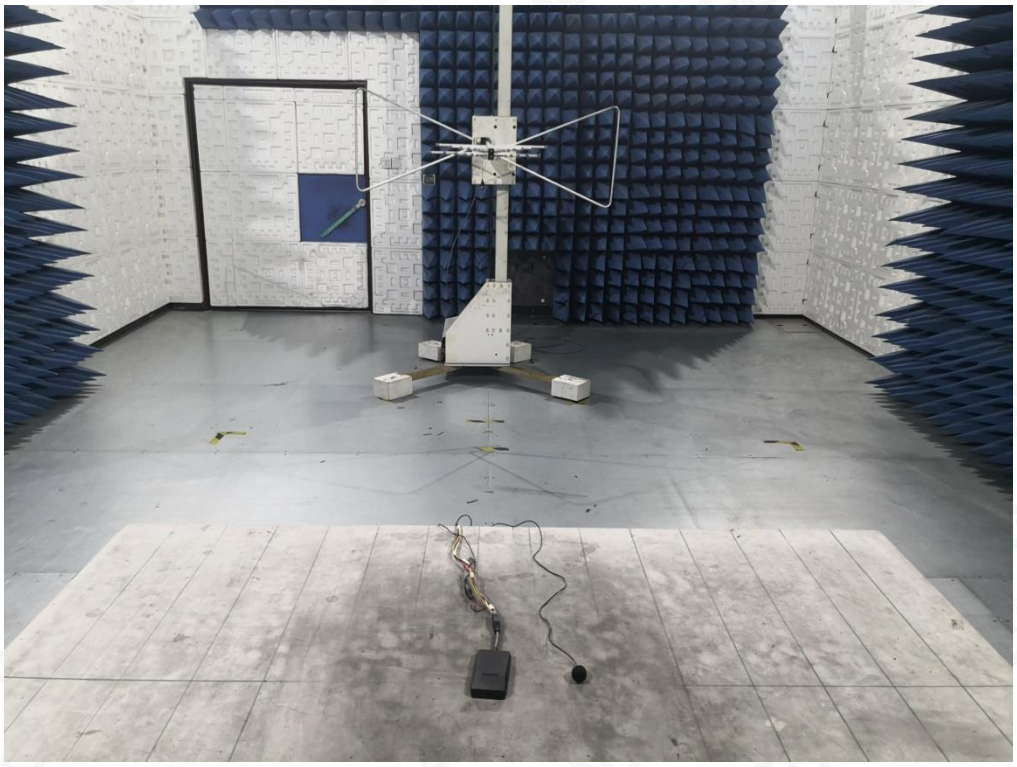
Test Band	Test Mode	Test Channel	Test Volt.	Test Tem. (℃)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GSM850	GPRS	LCH	VN	-10	1.49	0.001808	±2.5	PASS
			VN	0	-0.13	-0.000158	±2.5	PASS
			VN	10	-4.58	-0.005557	±2.5	PASS
			VN	20	0.06	0.000073	±2.5	PASS
			VN	30	1.23	0.001492	±2.5	PASS
			VN	40	1.29	0.001565	±2.5	PASS
GSM850	GPRS	MCH	VN	-10	-5.94	-0.007100	±2.5	PASS
			VN	0	-6.78	-0.008104	±2.5	PASS
			VN	10	-2.97	-0.003550	±2.5	PASS
			VN	20	-5.75	-0.006873	±2.5	PASS
			VN	30	-0.84	-0.001004	±2.5	PASS
			VN	40	-2.20	-0.002630	±2.5	PASS
GSM850	GPRS	HCH	VN	-10	-3.42	-0.004029	±2.5	PASS
			VN	0	-6.33	-0.007458	±2.5	PASS
			VN	10	-7.94	-0.009354	±2.5	PASS
			VN	20	-9.88	-0.011640	±2.5	PASS
			VN	30	-3.42	-0.004029	±2.5	PASS
			VN	40	-5.17	-0.006091	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Tem. (℃)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Verdict
PCS 1900	GPRS	LCH	VN	-10	-16.21	-0.008761	PASS
			VN	0	-17.24	-0.009318	PASS
			VN	10	-15.76	-0.008518	PASS
			VN	20	5.10	0.002756	PASS
			VN	30	10.72	0.005794	PASS
			VN	40	9.36	0.005059	PASS
PCS 1900	GPRS	MCH	VN	-10	-22.21	-0.011814	PASS
			VN	0	-20.47	-0.010888	PASS
			VN	10	-19.82	-0.010543	PASS
			VN	20	15.37	0.008176	PASS
			VN	30	-1.42	-0.000755	PASS
			VN	40	1.23	0.000654	PASS
PCS 1900	GPRS	HCH	VN	-10	-19.37	-0.010142	PASS
			VN	0	-18.60	-0.009739	PASS
			VN	10	-19.18	-0.010043	PASS
			VN	20	-18.98	-0.009938	PASS
			VN	30	-21.50	-0.011258	PASS
			VN	40	-11.17	-0.005849	PASS

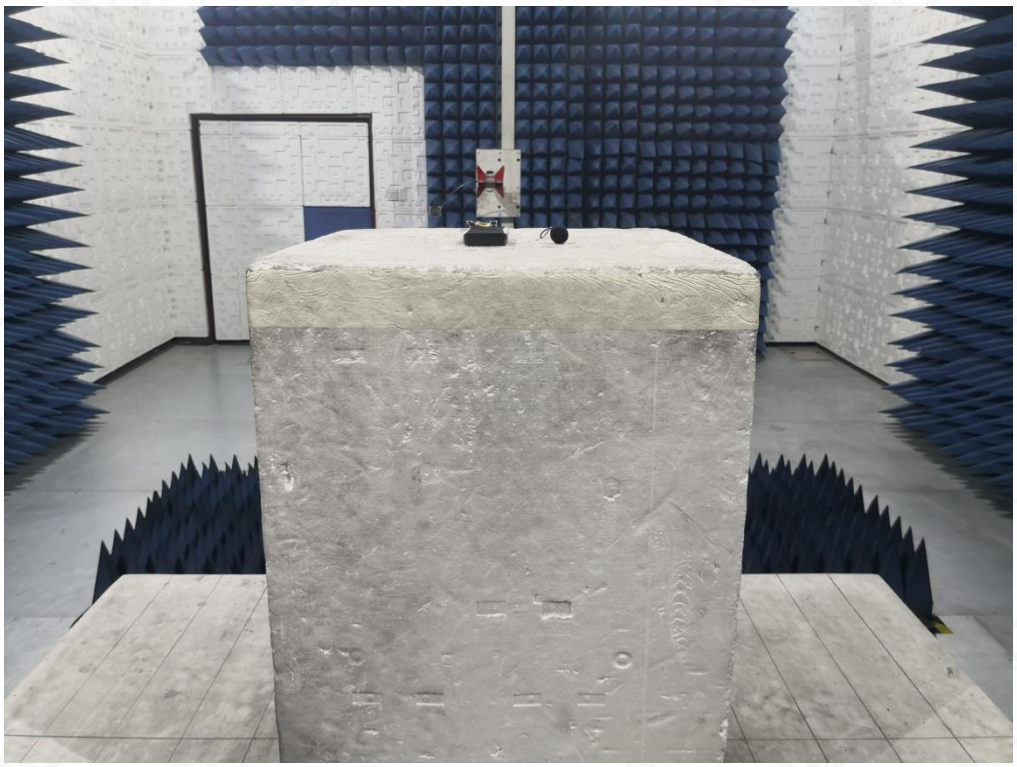
Note: Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very samll. As such it is determined that channels at the band edge would remain in-band when the maximum measured frequency deviation noted duing the frequency stability tests is applied. Therefore the device is detemined to remain operating in band over the temperture and voltage range as tested.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED SPURIOUS EMISSION

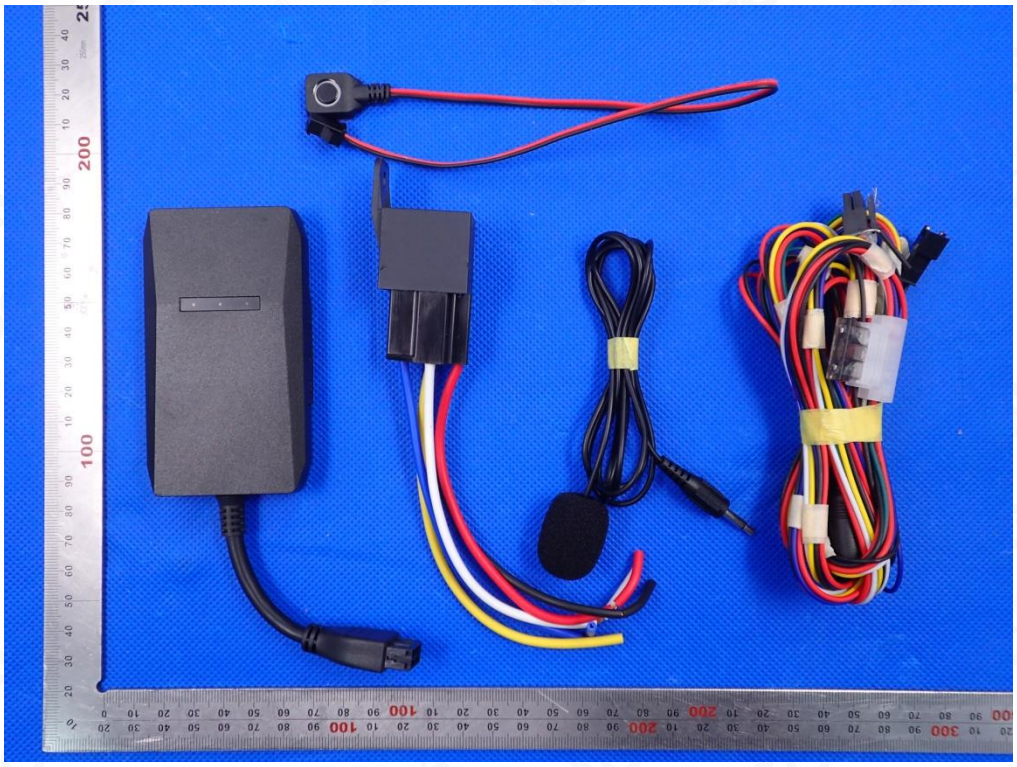


RADIATED SPURIOUS ABOVE 1G EMISSION

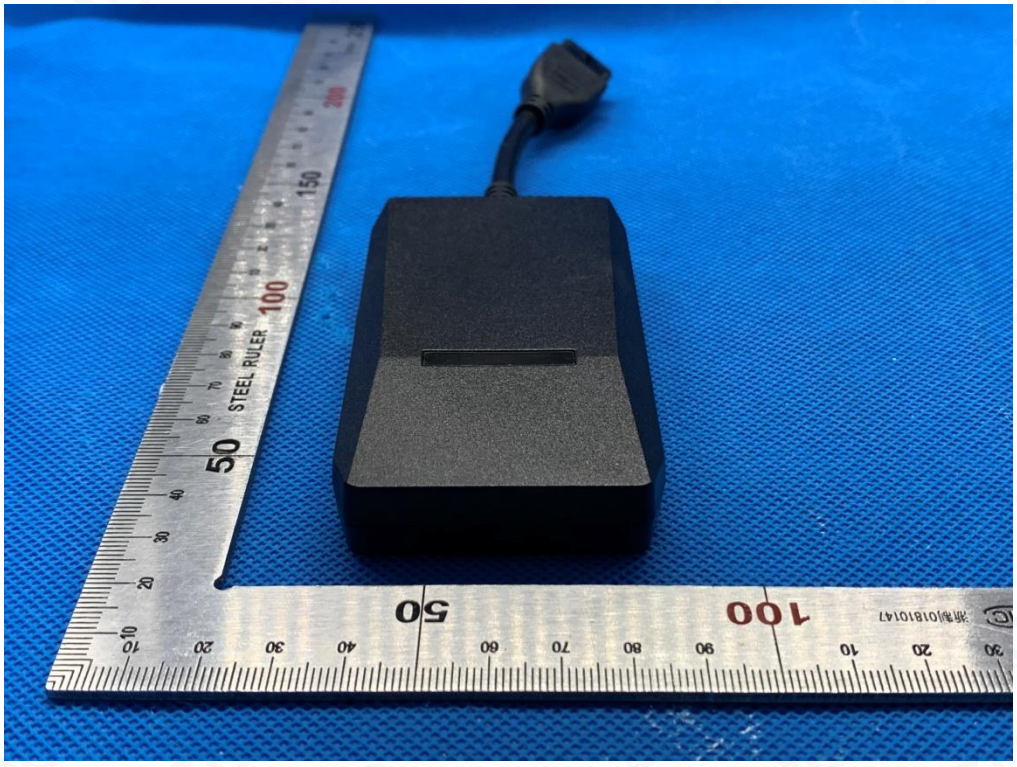


APPENDIX B. PHOTO GRAPHS OF EUT

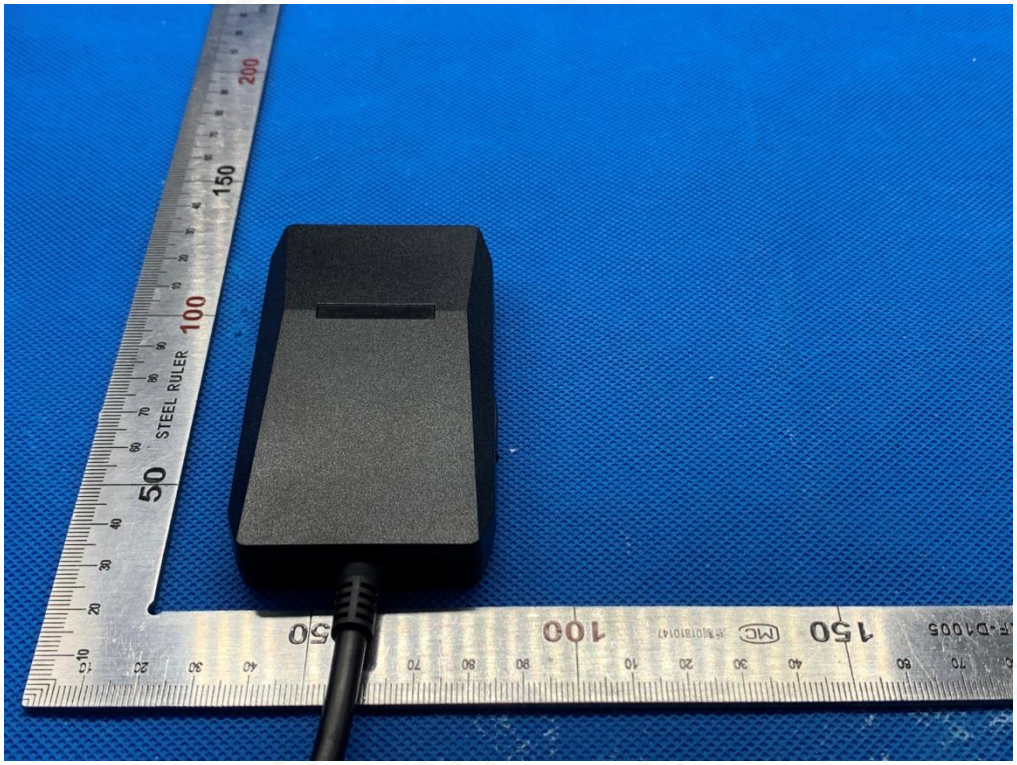
ALL VIEW OF EUT



TOP VIEW OF EUT



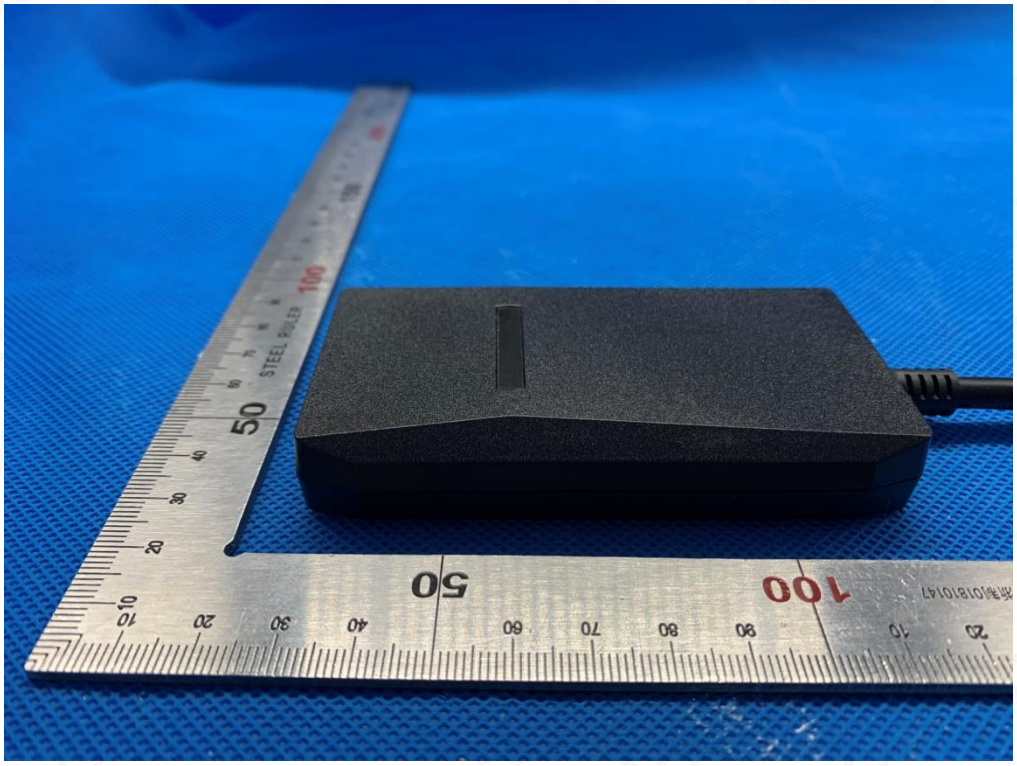
BOTTOM VIEW OF EUT



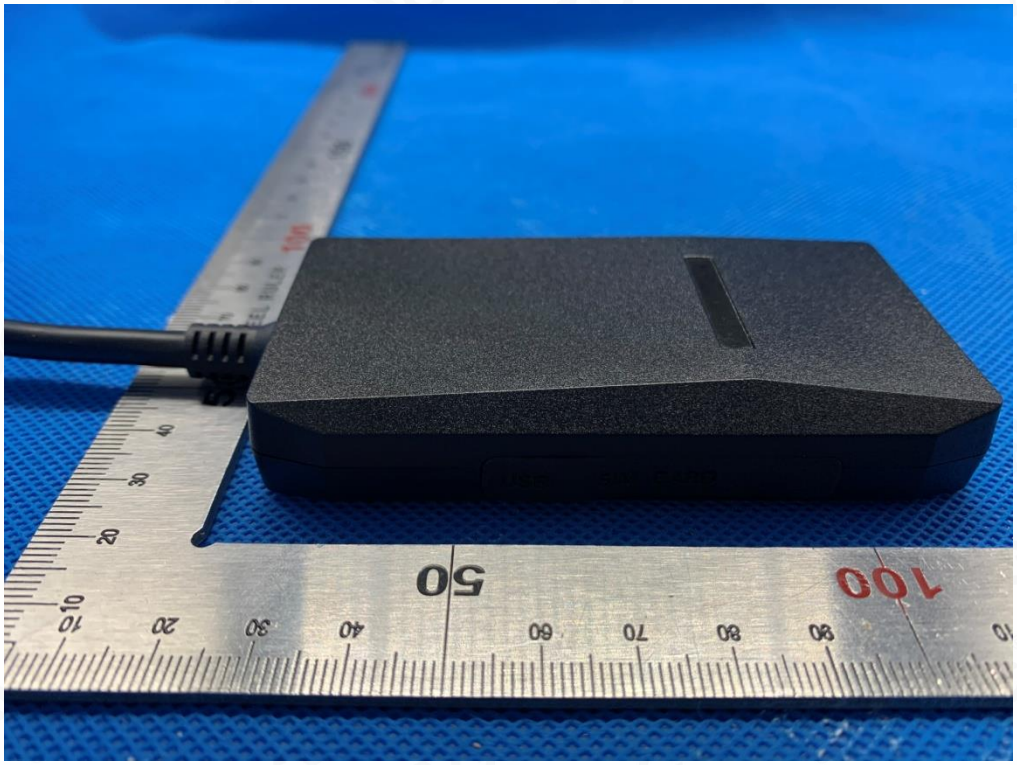
FRONT VIEW OF EUT

BACK VIEW OF EUT

LEFT VIEW OF EUT



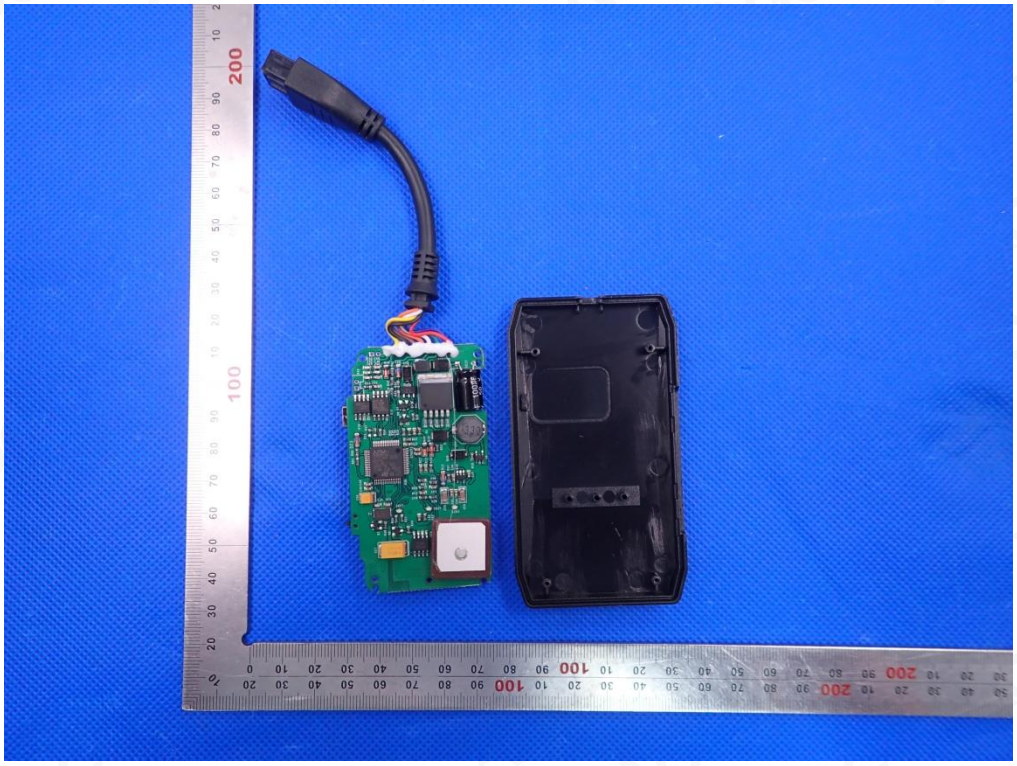
RIGHT VIEW OF EUT



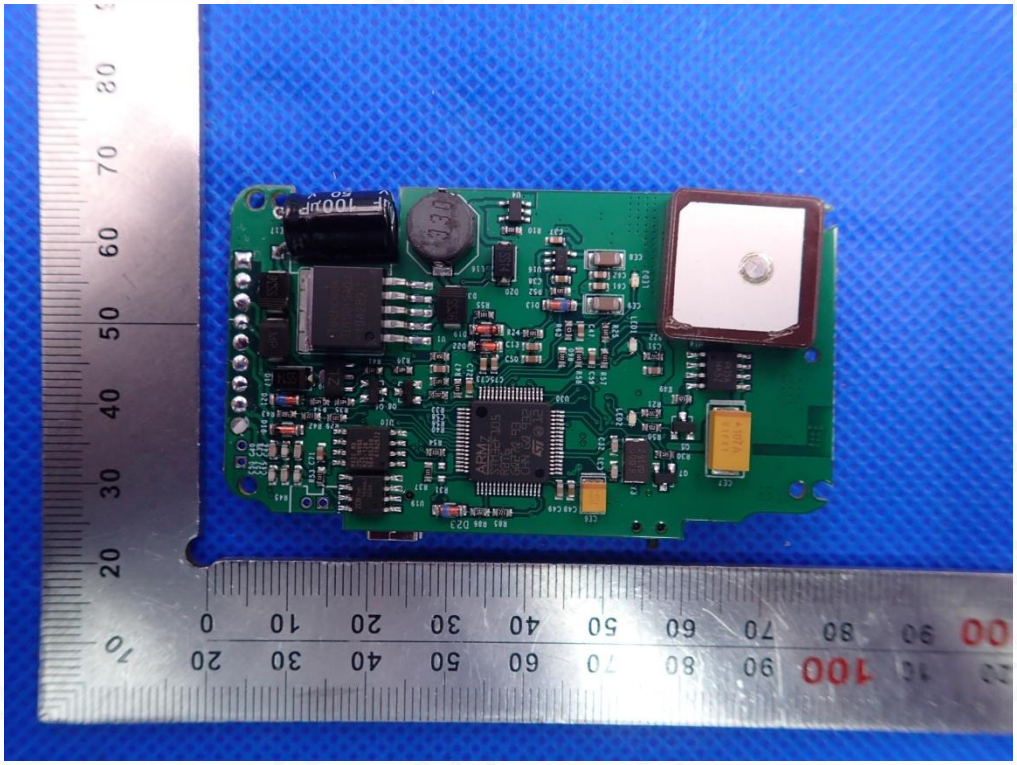
OPEN VIEW OF EUT(FIGURE 1)

GSM ANTENNA

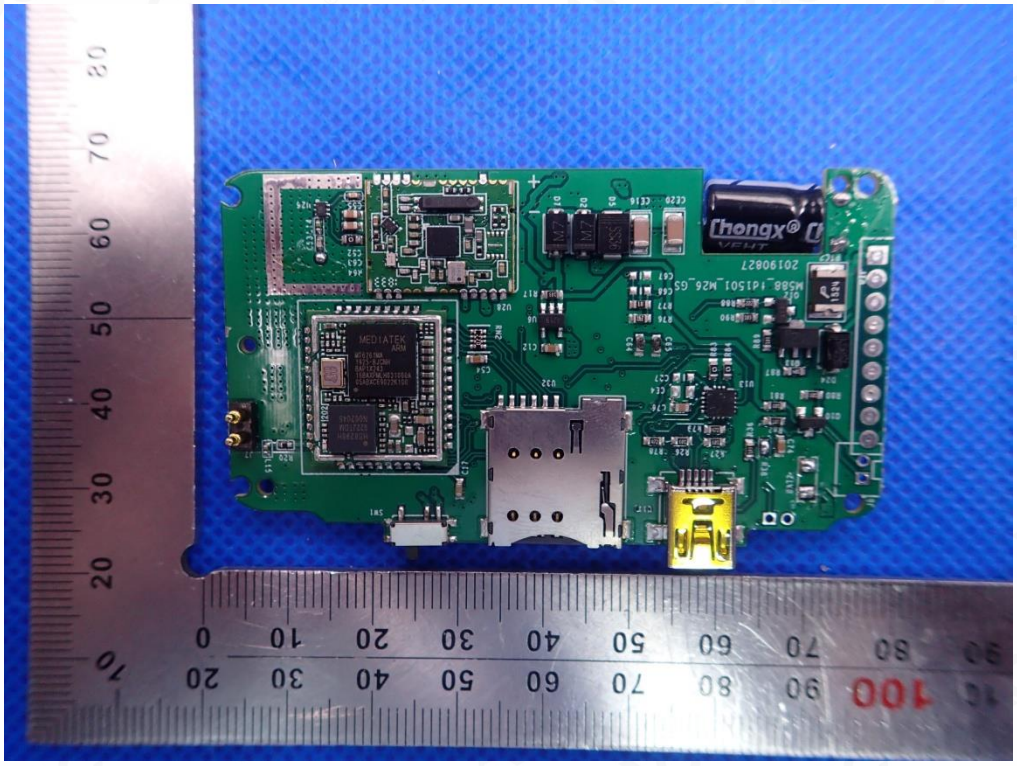
OPEN VIEW OF EUT(FIGURE 2)



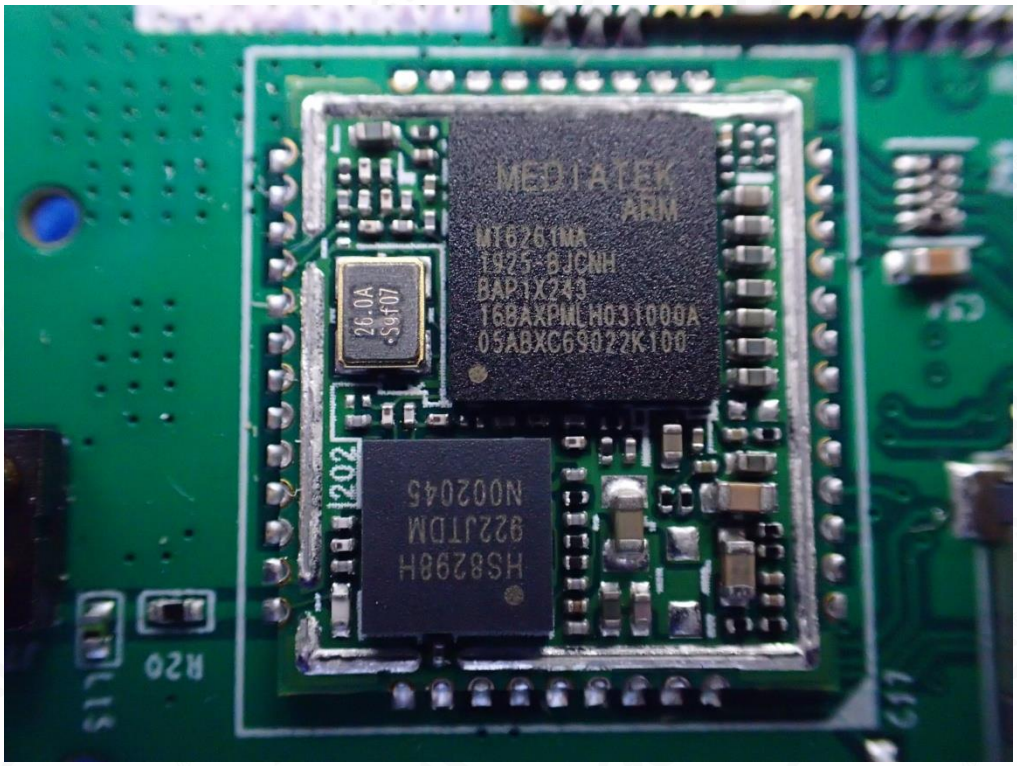
INTERNAL VIEW OF EUT(FIGURE 1)



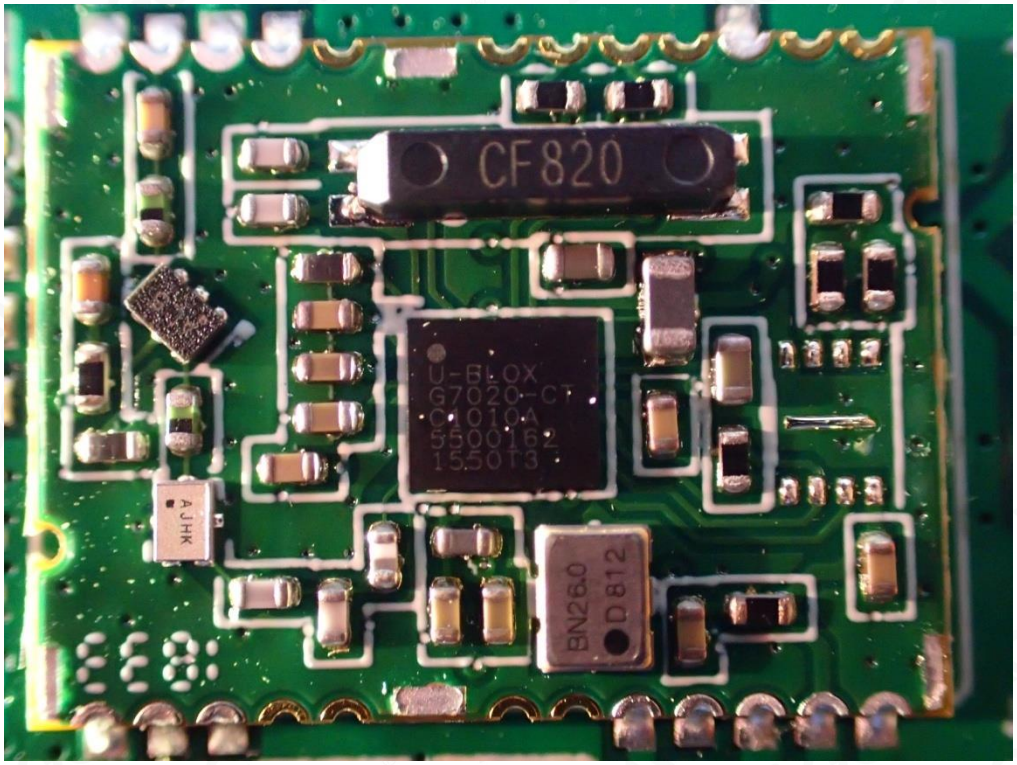
INTERNAL VIEW OF EUT(FIGURE 2)



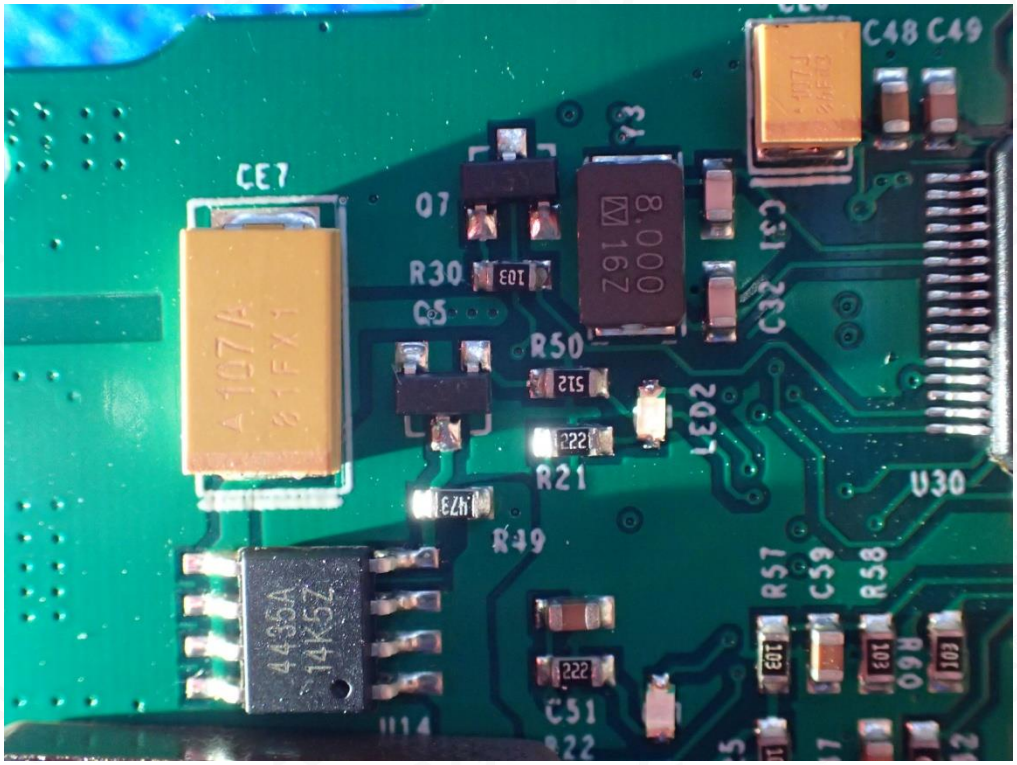
INTERNAL VIEW OF EUT(FIGURE 3)



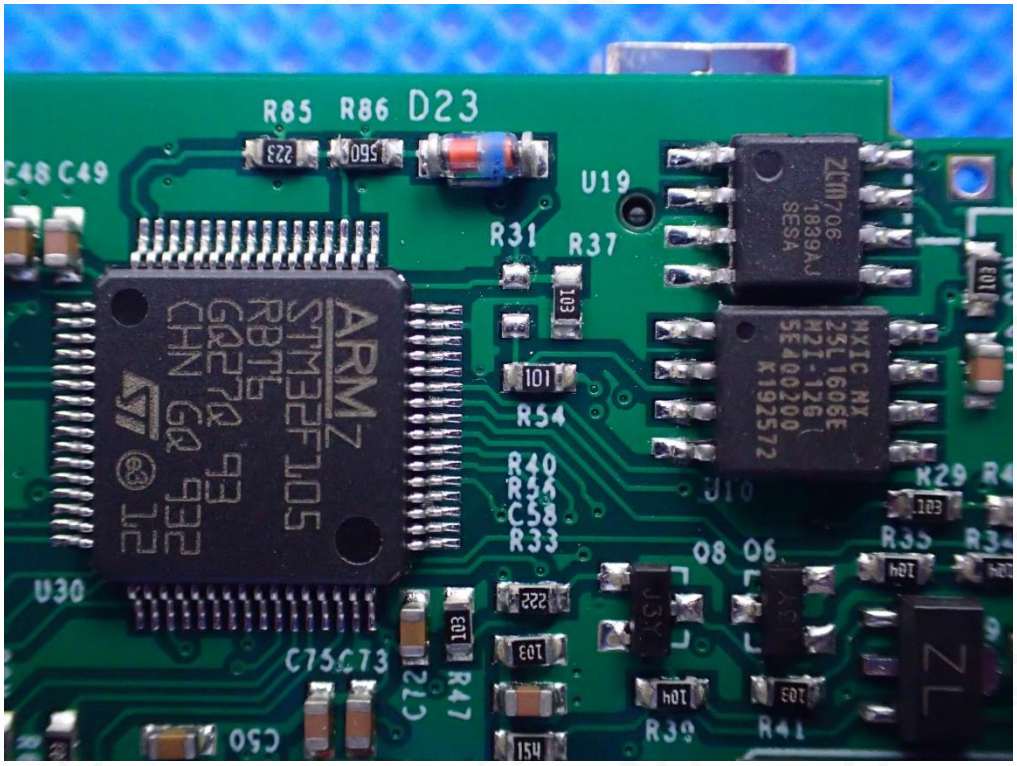
INTERNAL VIEW OF EUT(FIGURE 4)



INTERNAL VIEW OF EUT(FIGURE 5)



INTERNAL VIEW OF EUT(FIGURE 6)



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