

RF EXPOSURE REPORT



Applicant: ALPS ALPINE CO., LTD.
6-3-36, Furukawanakazato, Osaki-city Miyagi-pref, 989-6181,
Japan

Manufacturer: ALPS ALPINE CO., LTD.
6-3-36, Furukawanakazato, Osaki-city Miyagi-pref, 989-6181,
Japan

Product Name: 5G Communication Module

Brand Name: ALPS ALPINE CO., LTD.

Model No.: UMNZ1A2

FCC ID CWTUMNZ1A2

Date of EUT Received: May 30, 2024

Issue Date: Oct. 01, 2024

Approved By

John Yeh

We hereby certify that:

The above equipment was evaluated by SGS Taiwan Ltd. The evaluation in this report is in compliance with FCC Rule Part §2.1091, KDB 447498 D01 v06.

The results of this report relate only to the sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路134號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2405000354ES	00	Original	Aug. 07, 2024	Cindy Chou	
TESA2405000354ES	01	Modify comment	Sep. 19, 2024	Cindy Chou	*
TESA2405000354ES	02	Modify allowable gain, and distance.	Sep. 27, 2024	Ruby Ou	*
TESA2405000354ES	03	Remove allowable gain.	Sep. 27, 2024	Ruby Ou	*
TESA2405000354ES	04	Modify comment	Oct. 01, 2024	Cindy Chou	*

Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

Contents

1	DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
1.1	PRODUCT DESCRIPTION	4
1.2	EVALUATION SITE	4
1.3	ANTENNA INFORMATION	5
2	FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE)	6
2.1	FCC STANDARD APPLICABLE	6
2.2	POWER DENSITY CALCULATION (STANDALONE)	7
2.3	POWER DENSITY CALCULATION (SIMULTANEOUS TRANSMISSION)	9

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	5G Communication Module
Brand Name:	ALPS ALPINE CO., LTD.
Model No.:	UMNZ1A2

1.2 Evaluation site

Laboratory	Site Address		FCC Designation number	ISED Company Number	CAB Identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	<input checked="" type="checkbox"/>	No. 134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, 24803, Taiwan.	TW0027	4620A	TW3702
	<input type="checkbox"/>	No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 333 Taiwan.	TW0028	4620E	
	<input type="checkbox"/>	1F, No. 8, Alley 15, Lane 120, Sec. 1, Nei Hu Road, Nei Hu District, Taipei City, 222 Taiwan.	TW0029	23862	

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions>, and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

1.3 Antenna Information:

The antenna information is provided by the applicant.

1.3.1 WWAN

Operating Frequency (MHz)				SIM1 Ant1 Peak Gain (dBi)	SIM1 Ant2 Peak Gain (dBi)	SIM1 Ant3 Peak Gain (dBi)	SIM1 Ant4 Peak Gain (dBi)	SIM2 Ant5 Peak Gain (dBi)	SIM2 Ant6 Peak Gain (dBi)	SIM2 Ant 7 Peak Gain (dBi)	SIM2 Ant 8 Peak Gain (dBi)
GSM / GPRS / EDGE 850	824	~	849	1.27	2.68	3.15	3.06	3.22	1.05	NA	NA
GSM / GPRS / EDGE 1900	1850	~	1910	3.04	3.09	3.30	2.68	2.64	2.98	NA	NA
WCDMA / HSPA Band II	1850	~	1910	3.04	3.09	3.30	2.68	NA	NA	NA	NA
WCDMA / HSPA Band IV	1710	~	1753	3.17	2.91	3.32	2.51	NA	NA	NA	NA
WCDMA / HSPA Band V	824	~	849	1.27	2.68	3.15	3.06	NA	NA	NA	NA
LTE-Band 2	1850	~	1910	3.04	3.09	3.30	2.68	2.64	2.98	NA	NA
LTE-Band 4	1710	~	1755	3.17	2.91	3.32	2.51	2.64	2.16	NA	NA
LTE-Band 5	824	~	849	1.27	2.68	3.15	3.06	3.22	1.05	NA	NA
LTE-Band 12	699	~	716	3.20	3.09	3.37	3.14	1.02	1.79	NA	NA
LTE-Band 13	777	~	787	3.20	3.09	3.37	3.14	1.02	1.79	NA	NA
LTE-Band 66	1710	~	1780	3.17	2.91	3.32	2.51	2.64	2.16	NA	NA
LTE-Band 71	663	~	698	3.35	2.94	3.73	3.16	3.33	4.21	NA	NA
n2	1850	~	1910	3.04	3.09	3.30	2.68	NA	NA	NA	NA
n5	824	~	849	1.27	2.68	3.15	3.06	NA	NA	NA	NA
n41	2496	~	2690	2.97	3.22	3.32	3.84	NA	NA	NA	NA
n66	1710	~	1780	3.17	2.91	3.32	2.51	NA	NA	NA	NA
n71	663	~	698	3.35	2.94	3.73	3.16	NA	NA	NA	NA
n77	3450	~	3550	3.37	3.68	3.96	3.36	NA	NA	NA	NA
n77	3700	~	3980	3.37	3.68	3.96	3.36	NA	NA	NA	NA

Note: Antenna information is provided by the applicant.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

2 FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1 FCC Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equipment power density

Prediction of MPE limit at a given distance

$$S=PG/4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

2.2 Power Density Calculation (Standalone)

Standalone Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. Output Power Include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (mW)	Power Density (PD) (mW/cm ²)	Limit (mW/cm ²)	Pass / Fail	Power Density / Limit
GSM / GPRS / EDGE 850	824.00	45	31.99	3.15	3265.88	0.1284	0.549	Pass	0.234
GSM / GPRS / EDGE 1900	1850.00	45	28.99	3.30	1694.34	0.067	1.000	Pass	0.067
WCDMA / HSPA Band II	1850.00	45	25.7	3.30	794.33	0.031	1.000	Pass	0.031
WCDMA / HSPA Band IV	1710.00	45	25.7	3.32	797.99	0.031	1.000	Pass	0.031
WCDMA / HSPA Band V	824.00	45	25.7	3.15	767.36	0.030	0.549	Pass	0.055
LTE-Band 2	1850.00	45	25.7	3.30	794.33	0.031	1.000	Pass	0.031
LTE-Band 4	1710.00	45	25.7	3.32	797.99	0.031	1.000	Pass	0.031
LTE-Band 5	824.00	45	25.7	3.15	767.36	0.030	0.549	Pass	0.055
LTE-Band 12	699.00	45	25.7	3.37	807.24	0.032	0.466	Pass	0.069
LTE-Band 13	777.00	45	25.7	3.37	807.24	0.032	0.518	Pass	0.062
LTE-Band 66	1710.00	45	25.7	3.32	797.99	0.031	1.000	Pass	0.031
LTE-Band 71	663.00	45	25.7	4.21	979.49	0.039	0.442	Pass	0.088
n2	1850.00	45	25.7	3.30	794.33	0.031	1.000	Pass	0.031
n5	824.00	45	25.7	3.15	767.36	0.030	0.549	Pass	0.055
n41	2496.00	45	26	3.32	855.07	0.034	1.000	Pass	0.034
n66	1710.00	45	25.7	3.32	797.99	0.031	1.000	Pass	0.031
n71	663.00	45	25.7	3.73	877.00	0.034	0.442	Pass	0.077
n77	3450.00	45	26	3.96	990.83	0.039	1.000	Pass	0.039
n77	3700.00	45	26	3.96	990.83	0.039	1.000	Pass	0.039

Note:

Time slot average factor is as follows:

4 Tx slot = 3.01 dB, Frame-Average output power = Burst-Average output power – 3.01 dB

FCC MIMO mode MPE

MIMO Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. Output Power Include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (mW)	Power Density (PD) (mW/cm ²)	Limit (mW/cm ²)	Pass / Fail	Power Density / Limit
n41	2496.00	45	23	6.16	824.14	0.032	1.000	Pass	0.032
n77	3450.00	45	23	6.83	961.61	0.038	1.000	Pass	0.038
n77	3700.00	45	23	6.83	961.61	0.038	1.000	Pass	0.038

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

EN-DC Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. Output Power Include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (mW)	Power Density (PD) (mW/cm ²)	Limit (mW/cm ²)	Pass / Fail	Power Density / Limit
LTE-Band 2	1850.00	45	22.7	3.30	398.11	0.016	1.000	Pass	0.016
LTE-Band 5	824.00	45	22.7	3.15	384.59	0.015	0.549	Pass	0.027
LTE-Band 12	699.00	45	22.7	3.37	404.58	0.016	0.466	Pass	0.034
LTE-Band 13	777.00	45	22.7	3.37	404.58	0.016	0.518	Pass	0.031
LTE-Band 66	1710.00	45	22.7	3.32	399.94	0.016	1.000	Pass	0.016
LTE-Band 71	663.00	45	22.7	4.21	490.91	0.019	0.442	Pass	0.043
n2	1850.00	45	22.7	3.30	398.11	0.016	1.000	Pass	0.016
n5	824.00	45	22.7	3.15	384.59	0.015	0.549	Pass	0.027
n41	2496.00	45	23	3.32	428.55	0.017	1.000	Pass	0.017
n66	1710.00	45	22.7	3.32	399.94	0.016	1.000	Pass	0.016
n71	663.00	45	22.7	3.73	439.54	0.017	0.442	Pass	0.038
n77	3450.00	45	23	3.96	496.59	0.020	1.000	Pass	0.020
n77	3700.00	45	23	3.96	496.59	0.020	1.000	Pass	0.020

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.sgs.com.tw

Member of SGS Group

2.3 Power Density Calculation (Simultaneous transmission)

Operation Mode	Σ (Power Density / Limit)
SIM1+SIM2	0.468

ENDC	NR Band	n2	n5	n41	n66	n71	n77
LTE Band	Power Density / Limit	0.016	0.027	0.017	0.016	0.038	0.020
LTE-Band 2	0.016	-	0.043	0.033	0.032	0.054	0.036
LTE-Band 5	0.027	0.043	-	0.044	0.043	-	0.047
LTE-Band 12	0.034	0.050	-	-	0.050	-	0.054
LTE-Band 13	0.031	0.047	-	-	0.047	-	0.051
LTE-Band 66	0.016	0.032	0.043	0.033	-	0.054	0.036
LTE-Band 71	0.043	0.059	-	0.060	0.059	-	-

Note:

1. Σ (Power Density / Limit): This is a summation of [(Power Density for each transmitter/antenna included in the simultaneous transmission) / (corresponding MPE limit)].
2. Considering the collocated transmitters, the aggregated (Power Density /limit) is smaller than 1, and MPE of collocated transmitters is compliant

~ End of Report ~

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.