

MAXIMUM PERMISSIBLE EXPOSURE EVALUATION REPORT

Applicant: Alinco Incorporated, Electronics Division

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Product Name: VHF FM TRANSCEIVER

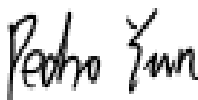
FCC ID: PH3-DR-138TMKII

Standard(s): 47 CFR §1.1310, 47 CFR §2.1091
447498 D01 General RF Exposure Guidance v06

Report Number: 2402Y66907E-RF-00E

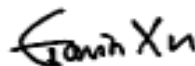
Report Date: 2024/12/24

The above device has been tested and found compliant with the requirement of the relative standards by Bay Area Compliance Laboratories Corp. (Dongguan).



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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2402Y66907E-RF-00E	Original Report	2024/12/24

1. GENERAL INFORMATION

1.1 General Description Of Equipment under Test

EUT Name:	VHF FM TRANSCEIVER
EUT Model:	DR-138TMK II
Rated Input Voltage:	DC 13.8V from vehicle system
Serial Number:	2TQW-1
EUT Received Date:	2024/10/30
EUT Received Status:	Good

2. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1 Applicable Standard

According to 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for Maximum Permissible Exposure (MPE)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
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
1500–100,000	/	/	1.0	30

f = frequency in MHz;

* = Plane-wave equivalent power density;

2.2 Calculation For Test Exclusion:

Prediction of power density at the distance of the applicable MPE limit

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

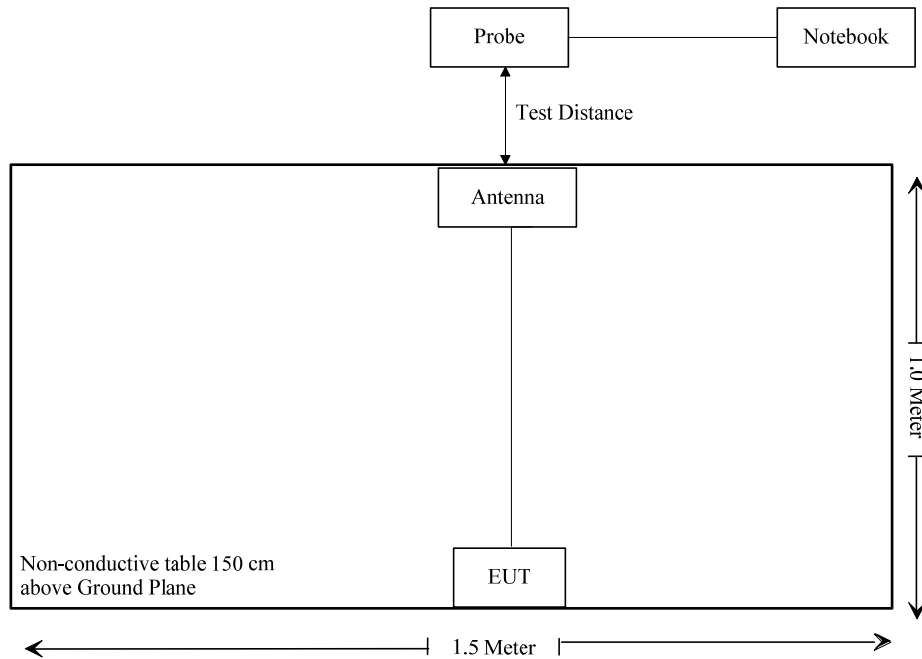
For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

2.3 MPE Test Procedure

1. Place the EUT's antenna was vertical polarization on the table.
2. The EUT was set to transmit at the frequency at maximum RF power.
3. The Distance between the test probe and the investigated EUT's antenna equal to the distance be specified as safety distance in the user manual.
4. Power density measurements were taken at different heights of the probe from the ground (0.8 to 2.8 meters) while rotating versus azimuth (from 0° to 360°) the antenna.
5. adjusted the distance between the test probe and the tested antenna to the real safe distance, R_{real} , such that the measured highest power density in the "worst case" position was the same or slightly less than the test limit.
6. The measurement results of final measurements conducted at the chosen azimuth and different heights of the probe above the ground.

2.4 Block Diagram of Test Setup



2.5 Test Data:

Test Information:

Serial No.:	2TQW-1	Test Date:	2024/12/16
Test Site:	Chamber B	Test Mode:	Transmitting
Tester:	Leo Xiao	Test Result:	Pass

Environmental Conditions:

Temperature: (°C):	20.2	Relative Humidity: (%)	31	ATM Pressure: (kPa)	102.5
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Narda	Electric and Magnetic Field Probe-Analyzer	EHP- 200AC	180ZX10204	2023/9/1	2026/8/31

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:
147.9875MHz

Measuring Probe Height(cm)	Power Density(mW/cm ²)					
	40cm	50cm	55cm	60cm	70cm	80cm
80	0.01	0.008	0.007	0.006	0.004	0.003
90	0.014	0.012	0.01	0.008	0.008	0.007
100	0.021	0.018	0.014	0.011	0.011	0.009
110	0.031	0.027	0.022	0.015	0.014	0.011
120	0.045	0.039	0.03	0.021	0.018	0.014
130	0.073	0.058	0.043	0.031	0.023	0.018
140	0.121	0.085	0.069	0.044	0.031	0.023
150	0.192	0.115	0.086	0.062	0.037	0.029
160	0.253	0.14	0.116	0.075	0.044	0.035
170	0.265	0.143	0.128	0.082	0.049	0.038
180	0.203	0.124	0.105	0.075	0.049	0.041
190	0.131	0.101	0.091	0.076	0.047	0.042
200	0.103	0.094	0.087	0.078	0.046	0.042
210	0.153	0.105	0.098	0.083	0.046	0.042
220	0.207	0.124	0.112	0.089	0.055	0.042
230	0.243	0.14	0.126	0.093	0.057	0.04
240	0.251	0.139	0.132	0.091	0.055	0.039
250	0.214	0.135	0.111	0.083	0.052	0.038
260	0.146	0.107	0.085	0.071	0.042	0.033
270	0.0912	0.074	0.063	0.056	0.033	0.027
280	0.059	0.052	0.047	0.033	0.025	0.021
290	0.039	0.036	0.034	0.025	0.018	0.016
300	0.024	0.026	0.024	0.023	0.014	0.012

Test Result Summary:

Maximum Power Density (mW/cm ²)	0.265
Measured Conducted Output Power (W)	69.7
Maximum Rated Power Including Tolerance (W)	70
Scaled Maximum Power Density(50% duty Cycle) (mW/cm ²)	0.13
Limit (mW/cm ²)	0.20
Safety Distance (cm)	40.00
Result	Compliance

144.0125MHz

Measuring Probe Height(cm)	Power Density(mW/cm ²)					
	40cm	50cm	55cm	60cm	70cm	80cm
80	0.042	0.026	0.021	0.018	0.016	0.021
90	0.047	0.034	0.024	0.022	0.021	0.026
100	0.055	0.044	0.033	0.029	0.026	0.028
110	0.071	0.055	0.047	0.042	0.037	0.033
120	0.091	0.071	0.068	0.059	0.049	0.038
130	0.138	0.097	0.097	0.083	0.065	0.046
140	0.236	0.121	0.132	0.109	0.086	0.061
150	0.371	0.172	0.165	0.134	0.095	0.052
160	0.395	0.211	0.185	0.149	0.106	0.072
170	0.366	0.216	0.181	0.148	0.105	0.09
180	0.254	0.196	0.161	0.136	0.101	0.094
190	0.179	0.161	0.139	0.123	0.097	0.095
200	0.169	0.153	0.131	0.188	0.096	0.094
210	0.228	0.158	0.144	0.124	0.095	0.091
220	0.299	0.179	0.162	0.135	0.104	0.099
230	0.295	0.183	0.169	0.139	0.106	0.087
240	0.251	0.181	0.158	0.131	0.098	0.084
250	0.188	0.146	0.128	0.107	0.088	0.076
260	0.129	0.111	0.098	0.084	0.075	0.058
270	0.094	0.078	0.073	0.064	0.061	0.049
280	0.069	0.061	0.058	0.049	0.047	0.042
290	0.051	0.045	0.041	0.036	0.031	0.035
300	0.034	0.031	0.029	0.029	0.028	0.026

Test Result Summary:

Maximum Power Density (mW/cm ²)	0.395
Measured Conducted Output Power (W)	69.4
Maximum Rated Power Including Tolerance (W)	70
Scaled Maximum Power Density(50% duty Cycle) (mW/cm ²)	0.196
Limit (mW/cm ²)	0.20
Safety Distance (cm)	40.00
Result	Compliant

For Bluetooth/BLE:

Operation Modes	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
BDR/EDR	2402-2480	3.24	2.11	2.0	1.58	20.00	0.0008	1.0
BLE	2402-2480	3.24	2.11	1.0	1.26	20.00	0.0005	1.0

Result: **Compliant**, the Stand-alone Maximum Permissible Exposure was compliant at the distance more than 20cm.

BT/BLE can't transmit simultaneously.

For Simultaneous transmission:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

$$= S_{UHF}/S_{limit-UHF} + S_{BT}/S_{limit-BT}$$

$$= 0.196/0.2 + 0.0008/1.0$$

$$= 0.98$$

Result: The device meet FCC MPE at 40 cm distance for General Population/Uncontrolled use.

******* END OF REPORT *******