DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

Test report No:
NIE: 66640RAN.001

Assessment report
RF EXPOSURE REPORT ACCORDING TO
FCC 47 CFR Part 2.1091

(*) Identification of item under evaluation	RF Transceiver / Mobile Radio
(*) Trademark	PowerTrunk
(*) Model and /or type reference	MDT-400 806-870 MHz
(*) Other identification of the product	HW version: CCP: 1.14.26.05.13 SW version: CCP: 1.14.26.05.13 FCC ID: WT7PTMDT800B IC: 8624A-PTMDT800B
(*) Features	TETRA
(*) Applicant and manufacturer	TELTRONIC S.A.U. Polígono Malpica, C/F Oeste, 50016 Zaragoza, Spain.
Test method requested, standard	FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Miguel Lacave Antennas Lab Manager  MIGUEL LACAVE GARCÍA 2021.03.03 15:57:35 +01'00'
Date of issue	2021-03-03
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Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item under evaluation", "Trademark", "Model and/or type reference" and “Other identification of the product”).
2. Maximum output power, maximum antenna gain and use distance information.
3. Features supported by the device:

   Power Supply:

   - Nominal voltage: 13.2 VDC
   - Operational voltage range: [10.8 - 15.6 VDC]

   Access scheme:

   TDMA with 4 physical channels (time slots) per RF channel.

   Modulation scheme:

   Based on TETRA:

   - π/4-DQPSK digital modulation with a rate of 18 Ksym/s, equivalent to 36 Kbits/s.
   - Modulation low-pass filter: Square-root raised cosine filter with a roll-off factor of 0.35.

   RF channel bandwidth (channel spacing):

   25 KHz

   Spectral efficiency:

   One voice & data physical channel with a rate of 9 Kbits/s is allocated a 6.25 KHz equivalent channel bandwidth.

Frequency band in TMO mode:

TX: 806-825 MHz

RX: 851-870 MHz

Frequency band in DMO mode:

TX & RX: 851-870 MHz

RF output power (nominal):

TETRA: 35 dBm ± 1 dB (3 W)

RF authorized bandwidth:

TETRA: 22 KHz

Emission designators:

TETRA: 22K0D7D, 22K0D7E, 22K0D7W

Options:

- O261000PT: GPS receiver
- O261003PT: Programmable I/O

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Identification of the client

TELTRONIC S.A.U.

Polígono Malpica, C/F Oeste, 50016 Zaragoza, Spain.

Document history

Report number	Date	Description
66640RAN.001	2021-03-03	First release

Appendix A: FCC RF Exposure assessment result

General description of the device under evaluation

The device under evaluation (MDT-400 mobile radio) consists of a TETRA digital RF transceiver that can operate in the following modes:

- TMO mode (Trunked Mode Operation), on the network infrastructure supported by a service provider.
- DMO mode (Direct Mode Operation), by communicating directly with another radio (antenna to antenna).

A GPS receiver can optionally be integrated in the radio.

The test sample operates in the 806-825 MHz and 851-870 MHz frequency subbands in TMO mode and only in the latter in DMO mode. It provides an RF output power of 3 W in both subbands. However, only the following frequency segments are subject to testing and certification, in accordance with the American and Canadian licensed bands currently in force:

- FCC: 809-824 MHz / 854-869 MHz
- ISED: 806-824 MHz / 851-869 MHz

The device is intended to be used only for occupational use, persons will be exposed as a consequence of their employment, and will be fully aware of, and can exercise control over, their exposure. It is not intended for use by members of the general public. During its normal use the separation distance between the antenna and the user will be greater than 35 cm.

The equipment specifications declared by the manufacturer for each supported technology and band are:

Technology / Mode	Frequency band (MHz)	Maximum Conducted Output Power (Incl. Tune-Up) (dBm)	Duty Cycle (4-slot TDMA, numerical) (%)	Time Averaged Conducted Power (dBm)	Antenna peak gain (dBi)	Maximum Averaged E.I.R.P. (dBm)	Maximum Averaged E.I.R.P. (mW)
TETRA	809 - 824; 854 - 869	36.00	25.00	29.98	14.10	44.08	25582.32

Table 1: Equipment specifications

RF Exposure Assessment result and verdict

Limits for Maximum Permissible Exposure (MPE) to comply with FCC 47 CFR § 2.1091 are defined in "§1.1310 Radiation Exposure limits, paragraph (e)":

Technology / Mode	Frequency band (MHz)	Use Distance (cm)	Power density (mW/cm^2)	FCC Occupational Exposure Limit (mW/cm^2)	Verdict
TETRA	809 - 824; 854 - 869	35.00	1.66	2.70	**Pass**

Table 2: Assessment result and verdict

Additional detailed information:

Maximum output power (dBm):	36.00
Maximum output power (mW):	3981
Antenna gain (dBi):	14.10
Antenna gain (numerical):	25.70
Duty cycle (4-slot TDMA, numerical):	0.25
Maximum EIRP (dBm):	44.08
Maximum EIRP (mW):	25582.3
Worst case frequency (MHz):	809.0
Minimum use distance (cm):	35

Power density at minimum use distance:

Power density (mW/cm2):	1.662
Power density limit (mW/cm2) - Occupational / controlled exposure:	2.697
Verdict for occupational / controlled exposure:	**PASS**

The power density level for TETRA transmission mode is below the occupational / controlled exposure power density limit.

Minimum compliance distance for this technology:

Minimum use distance (cm):	35
Minimum distance for occupational / controlled exposure (cm):	27.476
Verdict for occupational / controlled exposure:	**PASS**

The minimum use distance is greater than the occupational / controlled exposure minimum compliance distance.

Appendix B: FCC RF Exposure information

RF Exposure evaluation

Devices operating in standalone mobile device exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously. A minimum test separation distance ≥ 20 cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be at least 20 cm and fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated. The minimum test separation distance required for a device to comply with mobile device exposure conditions must be clearly identified in the installation and operating instructions, for all installation and exposure conditions, to enable users and installers to comply with RF exposure requirements. For mobile devices that have the potential to operate in portable device exposure conditions, similar to the configurations described in § 2.1091(d)(4), a KDB inquiry is required to determine the SAR test requirements for demonstrating compliance.

When a device qualifies for the categorical exclusion provision of § 2.1091(c), the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to §1.1310 Radiofrequency radiation exposure limits, paragraph (e), the limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields are:

TABLE 1—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 (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3–3.0	614	1.63	*100	6
3.0–30	1842/f	4.89/f	$*900/f^2$	6
30–300	61.4	0.163	1.0	6
300–1,500	.....	.....	f/300	6
1,500–100,000	.....	.....	5	6
(B) 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
300–1,500	.....	.....	f/1500	30
1,500–100,000	.....	.....	1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

MPE Evaluation

Each supported transmission technology will be evaluated to determine if it is in compliance with limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

In order to perform the assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst-case" or conservative prediction:

Power density: $S[mW/cm^2] = \frac{P_{E.I.R.P.}[mW]}{4\Pi R[cm]^2}$

Where:

S = power density

$P_{E.I.R.P.}$ = Equivalent isotropically radiated power

R = distance to the center of radiation of the antenna (evaluation distance)

$P_{E.I.R.P.}$ = P_T + G_T - L_C

Where:

P_T= transmitter output power (including tune-up tolerance)

G_T= gain of the transmitting antenna

L_C = signal attenuation in the connecting cable between the transmitter and the antenna if applicable