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RAPPORTO DI PROVA / TEST REPORT

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Scopo delle prove / Test object :	Prove di tipo in accordo a / Type test according to FCC Cfr 47 part 2 - §2.1091, part 1 - §1.1310 IC RSS-102 Issue 5	
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Marchio commerciale / Trade mark :		
Fabbricante / Manufacturer :	RADIO ACTIVITY S.R.L.	
Prodotto / Product :	Base station / Repeater	
Modello / Model :	KA-160	
Data ricevimento campioni / Date of test samples receipt.	22/10/2014	
Campioni verificati / No. of tested samples	1	
Data verifiche / Testing date :	22-23-24/10/2014	
Sito di prova / Testing site :	Prima Ricerca & Sviluppo Via Campagna - 92 I - 22020 FALOPPIO CO	
Esito delle valutazioni / Assessment results :	CONFORME / COMPLIANT	
Verifiche effettuate da / Verifications carried out by :	Giacomo ARMELLINI Responsabile Laboratorio EMC e RADIO/ EMC and RADIO Laboratory Manager	
Approvato / Approved by :	Vincenzo LA FRAGOLA Direttore generale / Managing director	

I risultati delle prove riportati nel presente rapporto di prova si riferiscono solo ai campioni esaminati./
The test results reported in this test report shall refer only to the samples tested

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0 RELEASE CONTROL RECORD

TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
MPETR_141206-0	Original Release	12/03/2015
MPETR_141206-1	Editorial Change	24/04/2015

1 TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 EUT Identification

DESCRIPTION	Base station / Repeater
MODEL NAME OR NO.	KA-160
PART NUMBER / SERIAL NO.	Not present (prototype)
BRAND NAME	 Radio Activity
MANUFACTURER	RADIO ACTIVITY S.R.L.
SINGLE UNIT OR SYSTEM	Single unit
COUNTRY OF MANUFACTURER	Italy

1.2 EUT Technical Data

Power source	External Power Supply		
Power supply nominal voltage	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>
	11Vdc	13.8Vdc	15Vdc
Nominal power or absorbing current	TX: 60 W @25W RF / RX: 5 W @Main+Div enabled		
Dimensions	160x200x45mm / 3.2kg		
Typical usage :	Radio equipment		
Type:	Private Land Mobile Radio Services		
Frequency range of Operation	150-174MHz		
Output Power	1-25 W / 100% duty cycle / selectable per channel		
Channelization	12,5kHz		
Frequency stability	0,5 p.p.m. (without GPS)		
Data rate	9600 bps		
Type of antenna	Not provided by the customer		

1.3 EUT modification

- None

1.4 Auxiliary equipment

- None

2 REFERENCE STANDARDS

FCC CFR Title 47 Part 1 Subpart I § 1.1310	Procedures Implementing the National Environmental Policy Act of 1969. Radiofrequency radiation exposure limits.
FCC CFR Title 47 Part 2 Subpart J § 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.
ANSI C63.4	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
IC RSS-102 Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

3 MEASUREMENTS AND CALCULATION RESULTS

3.1 Calculation Method

Far Field Power flux Calculation model.

This model is applicable in the far-field region and over-estimates in the radiating near-field region. The far-field calculations are accurate when the distance, r , from an antenna of length D to a point of investigation is greater than

$$r = \frac{2D^2}{\lambda}$$

The Power Flux is

$$S = \frac{PG}{4\pi r^2} \quad \text{or equivalent} \quad S = \frac{EIRP}{4\pi r^2}$$

where

P = input power of the antenna

G = antenna gain relative to an isotropic antenna

r = distance from the antenna to the point of investigation.

EIRP = Effective Isotropic Radiated Power

3.2 Limits

Tab. 1 of CFR Title 47 Part 1 Subpart I § 1.1310

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)
(B) Limits for General Population/Uncontrolled Exposure				
.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

Note to Table 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC – RSS-102 Issue 5 par. 4 RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (W/m ²)	Averaging time (minutes)
0.003-10	83	90	-	Instantaneous
0.1-10	-	0.73/ f	-	6
1.1-10	87/ f ^{0.5}	-	-	6
10-20	27.46	0.0728	-2	6
20-48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619 f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/f ^{1.2}

Note: f is frequency in MHz.

* Power density limit is applicable at frequencies greater than 100 MHz

3.3 Measurements and Calculation Results

WORST CASE MEASUREMENT:

DMR REPEATER ANALOGIC, MODULATION: FM, BANDWIDTH: 11kHz

Ch freq: 150MHz

Measured Peak power at antenna connector: 43.8dBm (23.99W)

Maximum possible power at antenna connector: 25W

The calculation has been performed using the maximum possible power at antenna connector 25W as worst case

TX Frequency (MHz)	Peak Power at Antenna Connector (dBm)	Duty Cycle correction (dB)	Average Power at Antenna Connector (dBm)	Average Power at Antenna Connector (W)	Antenna Gain (dBi)
150	44	-	44	25	NA ⁽¹⁾
MAXIMUM PERMISSIBLE EXPOSURE (MPE)					
Evaluation Distance (m)			2 ⁽²⁾		
Power density at evaluation distance (W/m²)			DEPENDS ON ANTENNA ASSEMBLY GAIN ⁽¹⁾		
Power density Limit (W/m²)			2 (acc to CFR Title 47 Part 1 Subpart I § 1.1310) 1.291 (acc to RSS-102 Issue 5 par. 4)		
Antenna Assembly Gain ⁽¹⁾ (dBm)		Power density at evaluation distance (W/m²)		Power density Limit (W/m²)	
0dBm		0.497		1.291 (worst case)	
RESULT: WITHIN THE LIMITS					
Antenna Assembly Gain ⁽¹⁾ (dBm)		Minimum safe distance (m)		---	
0dBm		1.24		---	

⁽¹⁾ External Antenna is not provided by the manufacturer.

⁽²⁾ Minimum installation distance from human body declared by the manufacturer