

HARMAN AUTOMOTIVE DIVISION

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HARMAN**BABT TCB**

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Karlsbad, March 21st, 2013

Subject: RF exposure analysis for the equipment **NTG5 FU** (FCC ID: **T8G9091**; IC: **6434A-9091**)

The device **NTG5 FU** (FCC ID: **T8G9091**; IC: **6434A-9091**) is designed to be installed in and used in mobile exposure conditions.

The antennas used for this device must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

MPE exposure limits

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1,0	30

The table below is excerpted from RSS-102, Issue 4, 4.2, titled "RF Limits for Devices used by the General Public":

Frequency Range (MHz)	Power density (W/m ²)	Averaging time (minutes)
300 – 1500	f (MHz) /150	6
1500 – 100.000	10	6

As all the operating frequencies of this device are higher than 1500 MHz, the applicable maximum permissive exposure is: 1 mW/cm².

Using the equation $S = \frac{PG}{4\pi R^2}$ to calculate the exposure to electromagnetic fields

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

Compliance with FCC and IC maximum permissive exposure limits is demonstrated based on the following calculations:

Measured conducted output power (please refer to test reports)	Maximum antenna gain calculation
Bluetooth: 1.68 dBm Kleer 1: -0.21 dBm Kleer 2: -0.79 dBm	Bluetooth: Type of antenna: External OEM antenna Antenna model: WISI AG200 Gain (without cable): 4 dBi Min. cable length in car: 1,78m Cable attenuation: 0,8 dB/m (@ 2.5 GHz) Connector loss: 0,15 dB Effective Antenna gain: 2,4 dBi Kleer: Type of antenna: PCB antenna Antenna gain: 0,5 dBi Balun loss: 1 dB Effective antenna gain: -0,5 dBi

Frequency band (MHz)	Mode	Frequency Range (MHz)	CONDUCTED OUTPUT POWER (dBm)	CONDUCTED OUTPUT POWER (mW)	Antenna gain (dBi)	Antenna gain (numerical)	Duty cycle (%)	Evaluation distance (cm)	Power density (mW/cm ²)	FCC/IC MPE limit (mW/cm ²)	MPE RATIO
2400-2483,5	Bluetooth	2402-2480	1,68	1,472	2,4	1,74	100%	20	0,0005	1,0000	0,0005
	Kleer 1	2403-2478	-0,21	0,953	-0,5	0,89	100%	20	0,0002	1,0000	0,0002
	Kleer 2	2403-2478	-0,79	0,834	-0,5	0,89	100%	20	0,0001	1,0000	0,0001

Σ of MPE ratios: 0,0008 < 1

Sincerely,

Declared by:
Harman Becker Automotive Systems GmbH

Mr. Frank Weikermann, Director Qualification Europe

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21.03.2013
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Mr. Roland Kohlmeier, Director Preventive Quality

Karlsbad
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21.03.2013
(Date)

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