




**BABT TCB**

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Karlsbad, March 21st, 2013

**Subject:** RF exposure analysis for the equipment NTG5 HU (FCC ID: T8G9099; IC: 6434A-9099)

The device NTG5 HU (FCC ID: T8G9099; IC: 6434A-9099) 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 <sup>2</sup> )	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 <sup>2</sup> )	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/cm<sup>2</sup>.

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/cm<sup>2</sup>)
  - 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	
WLAN:	6.07 dBm	Type of antenna:	External OEM antenna
Bluetooth:	-5.94 dBm	Antenna model:	WISI AG200
Kleer:	0.25 dBm	Gain (without cable):	4 dBi
		Min. cable length in car:	1,78m (for BT/WLAN) 2,98m (for Kleer)
		Cable attenuation:	0,8 dB/m (@ 2.5 GHz)
		Connector loss:	0,15 dB
		Effective Antenna gain:	2,4 dBi (worst case for BT/WLAN) 1,5dBi (worst case for Kleer)

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 <sup>2</sup> )	FCC/IC MPE limit (mW/cm <sup>2</sup> )	MPE RATIO
2400-2483,5	WLAN	2412-2462	6,07	4,043	2,4	1,74	100%	20	0,0014	1,0000	0,0014
	Bluetooth	2402-2480	-5,94	0,255	2,4	1,74	100%	20	0,0001	1,0000	0,0001
	Kleer	2403-2478	0,25	1,059	1,5	1,41	100%	20	0,0003	1,0000	0,0003

Σ of MPE ratios: 0.0018 < 1

Sincerely,

**Declared by:**  
**Harman Becker Automotive Systems GmbH**

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**Mr. Roland Kohlmeier, Director Preventive Quality**

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