

# 1. P-IVI Introduction, Specification

## ❑ P-IVI (Plugin In-Vehicle Infotainment)

- IVI device equipped in the JLR(Jaguar Land Rover) vehicles.
- In charge of wireless communications in LTE-A/LTE/WCDMA/GSM network
- Multi functional AVN such as Broadcast, Media, Phone and so on

## ❑ P-IVI Specification

1. Model Name : TM05GAJN
2. Supported band : GSM850/1900, WCDMA B2/4/5, LTE B2/4/5/7/12/26
3. Supply Voltage : 6.5~16V
4. DC Current : ~ 7A
5. Temperature Range : (-)40 ~ 75°C

<Major Functions>

# 2. P-IVI Specification

## ❑ P-IVI Specification

- RF Band Information

GSM/UMTS/LTE	Frequency		FDD/TDD	RoW (TM05GAJN)
	Band	Tx [MHz]		
B2	1,850~1,910	1,930~1,990	FDD	GSM,WCDMA,LTE
B4	1,710~1,755	2,110~2,155	FDD	WCDMA
B5	824~849	869~894	FDD	GSM, WCDMA, LTE
B7	2,500~2,570	2,620~2,690	FDD	LTE
B12	699~716	739~746	FDD	LTE
B26	814~849	859~894	FDD	LTE
2DL CA (Carrier Aggregation) band combination				CA_3C, CA_7B, CA_7C, CA_3A-3A, CA_7A-7A, CA_1A-3A, CA_1A-5A, CA_1A-7A,CA_1A-8A, CA_3A-5A, CA_3A-7A, CA_3A-8A, CA_3A-20A, CA_5A-7A,CA_7A-20A

# 3. Appendix

## RFx information

The strength of the RF field produced by the wireless module or modules embedded in the P/G-IVI is well within all international RF exposure limits known at this time. Because the wireless modules embedded in the P/G-IVI emit less than the maximum amount of energy permitted in radio frequency safety standards and recommendations, the manufacturer believes these modules are safe for use.

Regardless of the power levels, care should be taken to minimize human contact during normal operation. This module should be remain more than 20 cm (8 inches) from the body when wireless devices are on and transmitting.

This transmitter must not be collocated or operated in conjunction with any other antenna or transmitter. Operation is subject to the following two conditions: this module does not cause interference , (2) this module accepts any interference that may cause undesired operation.

## Information for the integrator

The integrator must not provide information to the end user regarding how to install or remove this RF module in the user manual of the end product. The user manual that is provided by the integrator for end users must include the following information in a prominent location. To comply with FCC RF and IC RSS-102 exposure requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operated in conjunction with any other antenna or transmitter. The label for the end product must include FCC ID: BEJTM05GAJN or A RF transmitter inside, IC: 2703H-TM05GAJN.

# 3. Appendix

## Approbation FCC

This module complies with FCC/IC rules.

FCC : Part 22, Part 24, Part 27, Part 90

ISED : RSS-130, RSS-132, RSS-133, RSS-139, RSS-199, RSS-247

Furthermore, this device complies with FCC radiation exposure limits set forth for uncontrolled environments.

This module must be installed and operated with minimum distance of 20 cm between the radiating element and the user.

This module must not be co-located with any other transmitters or antennas.

To comply with FCC regulations limiting both the maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed the values listed in the following table.

Band	Frequency Range [MHz]	Maximum Antenna Gain[dBi]
GSM850	824~849	-2.45
GSM1900	1850~1910	1.13
WCDMA(B2)	1850~1910	1.13
WCDMA(B4)	1710~1755	1.45
WCDMA(B5)	824~849	-2.45
LTE(B2)	1850~1910	1.13
LTE(B4)	1710~1755	1.45
LTE(B5)	824~849	-2.45
LTE(B7)	2500~2690	-0.63
LTE(B12)	699~716	-0.98
LTE(B26)	814~849	-2.45

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## Approbation FCC

To satisfy the FCC's exterior labeling requirements, the following text must appear on the exterior of the end product.

Contains transmitter module FCC ID: BEJTM05GAJN

Contains transmitter module IC: 2703H-TM05GAJN

Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. Users may lose the authority to operate this equipment if an unauthorized change or codification is made.

Note: If this module is intended for use in a portable device, additional testing will be required to satisfy the RF exposure and SAR requirements of FCC Part 2.1093 and RSS-102.

# 3. Appendix

## Approbation FCC

Note: The OEM integrator is responsible for ensuring that the host product which is installed and operating with the module is in compliant with Part 15B unintentional Radiator requirements, please note that For a Class B digital device or peripheral, the instructions furnished the user manual of the end-user product shall include the following or similar statement, placed in a prominent location in the text of the host product manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) L'appareil ne doit pas produire de brouillage; (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps. En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada, précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit :

Contient IC : 2703H-TM05GAJN est le numéro d'homologation du module.

Cet équipement est conforme aux limites d'exposition aux radiations IC CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

# 3. Appendix

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## **RF Exposure (MPE)**

This equipment complies with FCC and IC RF Radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Cet équipement est conforme à l'exposition de FCC et IC rayonnements RF limites é-tablies pour un environnement non contrôlé. L'antenne pour ce transmetteur ne doit pas être même endroit avec d'autres émetteur sauf conformément à FCC et IC procédures de produits Multi-émetteur. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

## 4. Regulatory notice to host manufacturer (KDB 996369 D03)

### 2.2 List of applicable FCC rules

This module has been granted modular approval as below listed FCC rule parts.

- FCC Rule parts 22, 24, 27, 90

### 2.3 Summarize the specific operational use conditions

- The OEM integrator should use equivalent antennas which is the same type and equal or less gain than an antenna listed in 2.7 in this instruction manual.

### 2.4 Limited module procedures

- This limited module is directly on PCB and it is defined the area on the PCB. Therefore any extra instructions are not needed. This limited module is compatible with P/G-IVI host device. Basically, all the power source is from the host device such as 0.8V~ 3.075V for MSM Part and 1V~3.9V for RF Part(Main RF Transmitter part and other RF Ics). This limited module including MSM Part and RF Part such as lines and ICS is in the shield can on the host PCB, but the detailed test data such as FCC data is reviewed. If the power from the Host is applied, the limited module is powered on the MSM8996AU and it controls WTR and the installed NVs to be maintained the limitations.

### 2.5 Trace antenna designs

- N/A

### 2.6 RF exposure considerations

The module has been certified for integration into products only by OEM integrators under the following condition:

- The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times.
- The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

As long as the three conditions above are met, further transmitter testing will not be required.

OEM integrators should provide the minimum separation distance to end users in their end product manuals.



## 4. Regulatory notice to host manufacturer (KDB 996369 D03)

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### 2.7 Antennas list

This module is certified with the following integrated antenna.

- Type: Shark Antenna Peak gain (dBi)

Any new antenna type, higher gain than listed antenna should be met the requirements of FCC rule 15.203 and 2.1043 as permissive change procedure.

### 2.8 Label and compliance information

The module is labeled with its own FCC ID and IC Certification Number.

If the FCC ID and IC

Certification Number are not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

“Contains FCC ID: BEJTM05GAJN”

“Contains IC: 2703H-TM05GAJN”

## 4. Regulatory notice to host manufacturer (KDB 996369 D03)

### 2.9 Information on test modes and additional testing requirements

- OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, additional transmitter in the host, etc.).
- Tools to control the product into RF test mode in high/mid/low channels, hopping or non-hopping mode : Mobile test unit\_CMW500 (R&S)
- What power level is used
  - : GSM 850 Max power : 32 dBm (tolerance : +/-2 dBm)
  - : GSM 1900 Max power : 28.5 dBm (tolerance : +/-2 dBm)
  - : WCDMA B2/B4/B5 Max power: 23 dBm (tolerance: +/-2 dBm)
  - : LTE B2, B4, B5, B7, B12, B26 Max power : 23 dBm (tolerance : +/- 2dBm)

### 2.10 Additional testing, Part 15 Subpart B disclaimer

- The final host product also requires Part 15 subpart B compliance testing with the modular transmitter installed to be properly authorized for operation