

Audit Responses to FCC correspondence related to Symbol MC9000 family

Introduction

The following response is a composite response to issues raised in the following Correspondence letters.

The rationale is that many of the issues raised against one (or several) grants are equally of concern to others. Accordingly it is considered appropriate to address the totality of concern rather than focus on individual letters and miss the opportunity to clarify other issues, which though valid have not been highlighted for that particular grant.

The following addresses issues raised in the following correspondence:

FCC id	Pt 24: GSM		DTS- 802.11		DSS - Blue	
	TC no.	Corr no	TC no.	Corr no	TC no.	Corr no
H9PMC9062A	TC790916	12997	TC996953	13002	TC173701	None
H9PMC9062C	TC144388	13004	TC691915	None	N/A	N/A
H9PMC9002A	TC797792	12646	N/A	N/A	TC995842	12644
H9PMC9002A	EA991797	26996 27397 27541	N/A	N/A	EA840631	27000 27399 27543
H9PMC9002C	TC260643	12801	N/A	N/A	N/A	N/A
H9PMC9062B	TC270723	13025	TC395364	13026	TC750077	13027
H9PMC9062D	TC276727	12492	TC502219	12490	N/A	N/A
H9PMC9062D	EA916732	27088 27557	EA785571	27097 27559	N/A	N/A
H9PMC9002B	TC156050	12700	N/A	N/A	TC619324	12702
H9PMC9002B	EA947797	27069 27545	N/A	N/A	EA584389	27071 27547
H9PMC9002D	TC538435	12803	N/A	N/A	N/A	N/A
H9PMC9060B (original/	N/A	N/A	TC283234	None	TC584062	12973
H9PMC9060B (tcb pc2)/	N/A	N/A	TC195241	12974	TC239174	None

Family Relationships

Family Building Blocks

The MC9000 family of products are all related. They use the same basic main board but vary in the radio modules included.

There are 5 Radio modules used within the product Family:

- Siemens MC46 (GSM 850 and 1900);
- Siemens MC45 (GSM 1900 only);
- Symbol 802.11 module;
- Symbol Bluetooth module;
- CDMA module.

There are also three variations in the housing as follows:

- "Short" housing with the 28 button keypad
- "Brick" housing with the 53 button keypad which is longer and includes an extended length battery
- "Gun" Housing with a handle grip.

BABT TCB

BABT as a TCB have not progressed any applications from this family of products, which include the CDMA module. However, we understand that submissions have been progressed for CDMA based family units through another TCB.

BABT have only been involved with the product family members listed below:

Products making use of the Quad band GSM transmitter

The MC9062A uses the "Short" housing with the 28 button keypad and includes the

- MC46 GSM Module,
- 802.11 module,
- Bluetooth module.

The MC9062C is the same as the MC9062A except that the Bluetooth module is omitted.

The MC9002A is the same as the MC9062A except that the 802.11 module is omitted.

The MC9002C is the same as the MC9062A except that it contains only the MC46 GSM Module

Products making use of the Tri-band GSM transmitter

The MC9062B uses the "Brick" housing with the 53 button keypad and includes the

- MC45 GSM Module,
- 802.11 module, a
- Bluetooth module.

The MC9062D is the same as the MC9062B except that the Bluetooth module is omitted.

The MC9002B is the same as the MC9062B except that the 802.11 module is omitted.

The MC9002D is the same as the MC9062B except that it contains only the MC45 GSM Module

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Products without a GSM transmitter

The MC9062B was originally approved using the "Short" housing and include the

- 802.11
- Bluetooth Modules.

A subsequent Class 2 Permissive Change added the "Brick" housing with additional keys and an alternate battery as an alternative

The RLAN 802.11 module was approved by BABT under the FCC ID H9P2164436 as a radio module. 3 subsequent class 2 Permissive changes involved the addition of the following "Hosts" to the grant

- Short Housing
- Brick Housing
- Gun Housing

(Information related to the Grant for the RLAN module is included for completeness but is not the subject of any of the correspondence finding)

The Bluetooth module was approved by another party under the FCC ID H9P2164381 as a radio module.

A subsequent class 2 Permissive change was progressed by BABT and involved the addition of the following "Hosts" to the grant

- Short Housing

(Information related to the Grant for the Bluetooth module is included for completeness but is not the subject of any of the correspondence finding).

Product Family Accessories

The product has the following declared accessories:

- A holster which is common to all the family members using a particular housing.
- A headset which is common to all the family

Test and Approval Strategy

Testing

Products including a GSM Module

For testing product which included a GSM module the client supplied the fully configured MC9062A and MC9062B variants. Both were initially capable of co-transmission. Symbol implemented a software change, which inhibited this capability.

All testing was conducted using these fully configured samples as the client declared there would be no significant differences (related to the included radios) in the sub-equipped versions.

There was a meeting between Symbol and the FCC where Symbol justified the use of the "Fully equipped" test data in support of the sub-equipped grants. While the FCC were uncomfortable they agreed in this instance but stated in future "Worst case" testing should be undertaken on the de-configured versions

MC9060B

This was tested separately from the other family members, in both the "Short" and "Brick" housings

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EMC Test Photo

In the EMC report the Headset is shown mounted on a head phantom.

This is for display purposes only and not an SAR phantom; it does not contain any liquid.

Approval Strategy

Products including a GSM Module

Symbol (via their Agent) submitted separate approvals submissions for each variant using the test data obtained using the fully configured versions; additionally many of the supporting letters covered more than one particular product.

In some of the data results related to the initial “Co-transmission” capability were still present.

It had been agreed between BABT and Symbol that the TCB would progress the initial grants with co-transmission inhibited and that subsequent Class 2 Permissive changes would be made to the FCC to lift this inhibition.

Exhibit 13 (Covering letters) entitled “Co-existence Statement” declares the inhibition.

Note since this letter covers the whole product family it includes references to CDMA, as stated earlier

None of the Products covered by grants referenced above includes a CDMA transmitter.

This note confirms that the Grants made by BABT covered products where the client had declared they were unable to co-transmit.

SAR Issues

Co-Transmission Results

As stated earlier the client declared during test that a software inhibition to co-transmission would be included in the initial product. The uploaded SAR reports included such data.

The SAR report will be amended to include only results related to single transmission cases.

Headset

The headset is connect via a wire and does not have a transmitter

It is noted that TUV test practice was to conduct Head SAR tests with a headset in place. It is recognised these test results are not required

The test results related to the Headset placed on the Head phantom will be deleted from the SAR Reports

The Body testing was conducted with the Headset connected.

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Holster

The PCT transmitters were tested in the holster initially with the device in the “intended “ orientation. However the worst-case frequency was used to test with the device 180 degrees turned facing the opposite direction. Initially this data was “For advice” only.

After discussion between Symbol, the FCC, and both interested TCB’s Symbol have agreed that the worst case was the “incorrect” orientation; these results will be used for the SAR levels cited on their grants.

The DTS and DSS transmitters were tested at 1 cm separation and outside the holster. This was based upon the declared separation distance in the User Manual since no “orientation could be guaranteed in third party holsters the orientation with the active Antenna nearest the phantom was used.

The separation distance for the holster was much greater. Accordingly it was viewed that the 1 cm distance was the worst case.

Since we cannot use different minimum distance criteria for co-located transmitters where the transmitter position is not visible the 4 cm separation distance will be used for the DTS and DSS grants.

Symbol wished that other holsters be permitted for use. It was determined that the existing holster provides for a 4 cm separation. In the absence of any “Out of Holster” data for the PCT Symbol have agreed to a 4 cm distance stipulation. The Symbol supplied holster contains metal parts and the primary SAR testing took place using the Holster.

The User manual will be updated to provide advice on device orientation; holster positioning; and the minimum distance to be used for 3rd party holsters

This is not significant as the primary SAR testing took place using the Holster.

The Use of Phantom

Although the device is almost as large as the flat phantom it was assessed against, the phantom size was sufficient to cover the whole area of the device tested and the device's active area was measured to be significantly smaller due to the nature of the frequencies being employed in the transmitter modules.

The device was positioned so that the central location of the maximum RF energy location was centrally positioned against the 2mm side of the flat phantom. The actual RF distribution, recorded during the SAR scan showed that there was no potential secondary peak and that there were no significant boundary effects caused by the phantom size.

It is believed that the process described above adequately covers the requirements for assessing localised SAR distributions on large devices.

Please refer to a previously provided paper 'Flat Phantom Set-up for the performance Check and System Validation of measurement systems according to IEEE1528 and IEC62209 - Andreas Christ and Niels Kuster May 13, 2002' which suggests that the size of phantom used is quite adequate for the transmit frequency of the device under test since our procedure additionally checked that the SAR field distribution was well-contained within the volume of the phantom.

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Grant Issues

PCT Grants

The following aspects have been clarified/amended on the original GSM grants

- Amend SAR value to represent SAR value for “incorrect/worst case” orientation
- Add reference to listed holster
- Add reference to 4 cm separation
- Check/clarify co-location statement in Grant
- Add statement that Grant only relates to 1900 (and as applicable 950) MHz “i.e. not EU bands”

802.11 transmitter grants

The following aspects have been clarified/amended on the original 802.11 transmitter grants

- Amend EAC from DSS to be DTS
- Clarify Frequency bands (to match modular approvals)
- Revise Power to be “Conducted power”
- Add Radiated Power as a grant note
- Add reference to listed holster
- Add reference to 4 cm separation
- Check/clarify co-location statement in Grant
- Add “CC” note where Bluetooth also present

Bluetooth (DSS) transmitter grants

The following aspects have been clarified/amended on the original Bluetooth transmitter grants

- Clarify Frequency bands (to match modular approvals)
- Revise Power to be “Conducted power”
- Add Radiated Power as a grant note
- Add reference to listed holster
- Add reference to 4 cm separation
- Check/clarify co-location statement in Grant
- Add “CC” note where Bluetooth also present

Changed Exhibits

Changed Exhibits

The following exhibits have been uploaded or superseded in the original grant

- **Exhibit 8 (User Manual): A new version (Regulatory Guide) has been uploaded (as non-confidential).**
- **Exhibit 9 (Internal Photos) : For all sub-equipped variants additional exhibits have been uploaded**
- **Exhibit 11 (SAR Report) : The existing report will be superseded; An updated version with appropriate changes from above responses has been uploaded**
- **Exhibit 11 (SAR Assessment): The existing SAR evaluation letters will be superseded; New versions based upon the updated SAR reports have been uploaded**
- **Exhibit 12 (Antenna Placement) For all sub-equipped variants Additional photograph exhibits have been uploaded**
- **Exhibit 13: (Cover Letters) A new “Family Tree” description has been uploaded to define the product interrelationships**
- **Exhibit 13: (Cover Letters): The exhibit entitled “Sub-equipped Models letter” has been superseded**

Special Changes

In H9PMC9002C TC260643 Exhibit 6 (Test Report). MC45 Report has been superseded