



Core Engine (PCS 1900) GSM Wireless Terminal

Approvals Guide

(Preliminary Draft – 7/6/2001)

Confidential

1 IMPORTANT INFORMATION

1.1 Revision History

Date	Revision	Description
3/21/01	001	Initial draft revision for internal review (preliminary).
7/6/01	002	Revised In: Customer Device Approvals Section North American Homologation Radio Approvals Section Added In: Customer Device Approvals Section North American Homologation RF Exposure – SAR Miscellaneous Approvals Section 255 Compliance E911 Compliance Leveraging Modular Approvals Section PTCRB Approval and IMEI Assignment Xircom Assistance with Approvals Section Miscellaneous Items Audio Testing Integration Testing Added Section: 4.5 Labeling and Documentation Requirements Remove all references to Dual-Band 900/1800

1.2 Disclaimer

Xircom, Inc., an Intel company (hereafter “Xircom”) shall not be liable for consequential or incidental damages, injury to any person or property, anticipated or lost profits, loss of time, or other losses incurred by Customer or any third party in connection with the implementation of the Protocol or Customer's failure to comply with the information and instructions contained herein.

The information in this document is preliminary and subject to change by Xircom.

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2 APPROVALS OVERVIEW

The responsibility for an overall compliant product, per world wide regulatory standards, rests with the *Core Engine* customer who incorporates the *Core Engine* into their device.

Currently some countries allow for a modular approval. This allows the *Core Engine* module to be used in numerous products without testing and submitting the *Core Engine* module portion again for certification. Some countries do not allow this and will require every product that the *Core Engine* is integrated into to be tested and certified on it's own.

2.1 Scope of This Document

The goal of this document is to provide a guidance note for our customers to help them better understand the process that is required to incorporate the *Core Engine* module into their custom device.

This document describes the approvals (agency, safety and emissions) that have been obtained by Xircom for the *Core Engine* module, as well as those, which must be obtained for any end user device incorporating a *Core Engine* module.

2.1.1 GSM FTA Testing

Full Type Approval (FTA) testing is not regulatory but rather a pre-requisite for market entry. It is used to indicate that a GSM terminal complies with the terminal conformance testing specification, currently known as:

- PCS 11.10 (1900 MHz)
- 3GPP TS 51.010-1 (Successor to PCS 11.10)

2.1.2 North American Homologation

Within North America (United States and Canada), *Core Engine* regulatory approvals are required in the following areas to meet the requirements of the Federal Communications Commission (FCC in the United States) and of Industry Canada (IC in Canada):

- Radio Authorization (FCC and IC Certification)
- EMC (emissions only)

In addition, product safety evaluation, approval and marking of any product incorporating the *Core Engine* are required. Such approvals can be obtained from approved agencies in the United States and Canada, including (but not limited to):

- Underwriters Laboratories
- Canadian Standards Association

2.2 References

- [1] PCS 11.10 for 1900MHz Specification
- [2] 3GPP TS 51.010-1

- [3] FCC's OET Bulletin 65 on Specific Absorption Rates (SAR)
- [4] FCC Part 15, Subpart B
- [5] FCC Part 24, Subpart E (Broadband PCS)
- [6] FCC Part 2, Subpart J (Equipment Authorization)
- [7] UL 1950
- [8] Canadian RSS-133 (PCS)
- [9] RS-122 (Radio Certification Procedure)
- [10] Safety Code 6 (RF Exposure)
- [11] Canada ICES-003

3 CORE ENGINE MODULAR APPROVALS

The following testing, authorizations and approvals are applicable to the *Core Engine* module.

3.1 GSM FTA Testing

"FTA" is used to indicate that a GSM terminal complies with the terminal conformance testing specification, currently known as PCS 11.10 (1900 MHz). The successor to this specification is 3GPP TS 51.010, which will become the single GSM/GPRS/EDGE terminal conformance specification document.

Not regulatory but rather a pre-requisite for market entry, operators and industry groups drive the FTA. The GSM NA Operators - PCS Terminal Certification Review Board (PTCRB) of GSM-North America drives the 1900 MHz band.

Since the *Core Engine* is not a complete GSM terminal (it does not have a SIM), technically, it cannot be Type Approved (i.e., pass all FTA testing requirements and grant of an IMEI). However, as much FTA testing as possible is done in a reference configuration. This leaves only a small amount of incremental testing to be performed on the end device incorporating the *Core Engine*.

FTA testing includes:

- Layer 1 – Transmitter, receiver and transceiver performance; spurious emissions; cell selection
- Layer 2 – Test of the Layer 2 signaling functions
- Layer 3 – General protocol, handover, location update, RLM, SIM, SMS, RLP (data), SS (supplementary services), GPRS protocol
- Audio – Currently only handset audio testing is supported by GSM 11.10

NOTE: All testing is defined in PCS 11.10 and its successor (3GPP TS 51.010-1).

3.2 North American (United States and Canada) Homologation

The *Core Engine* will be tested to and shown to comply with the applicable radio, electromagnetic compatibility and safety requirements and standards of the Federal Communications Commission (FCC), Industry Canada (IC), and Underwriters Laboratory.

3.2.1 Radio Approvals

Both the FCC and IC will authorize the *Core Engine* as a PCS transceiver. The *Core Engine* can be incorporated into a final OEM product without the need for new or additional certification, if the instructions and requirements of the *Core Engine*'s usage, regulatory requirements, testing and approvals are followed. The manufacturer of the end device incorporating the *Core Engine* must address human exposure to RF. Separate filings or approvals may be required, depending on the specifics of the final product. Regulatory standards and documents addressing radio approvals include:

- FCC Part 24, Subpart E (Broadband PCS)
- FCC Part 2, Subpart J (Equipment Authorization)
- FCC OET Bulletin 65 on RF Exposure Evaluation
- IC RSS-133 (PCS)
- IC RSP-100 (Radio Equipment Certification Procedure)
- Health Canada Safety Code 6 (RF Exposure Limits)

3.2.2 Product Safety

The *Core Engine* will be evaluated by Underwriters Laboratory and marked as a Recognized Component. This will simplify the product safety evaluation of the end device incorporating the *Core Engine*. Any NRTL (Nationally Recognized Test Laboratory), not just UL, may be selected for evaluation of the end device incorporating the *Core Engine*. The recognized component status of the *Core Engine* may be leveraged as dictated by product or market requirements.

3.2.3 Electromagnetic Compatibility (EMC)

To the extent possible, the *Core Engine* will be evaluated to demonstrate that it complies with the emissions and immunity requirements applicable to typical consumer products. This evaluation will be performed with the *Core Engine* in a stand-alone configuration or built into a simple but representative product. Only EM emissions are regulated in North America for the majority of products. However, EM immunity of the *Core Engine* will be demonstrated during EU EMC testing. Applicable standards include:

- FCC Part 15, Subpart B
- IC ICES-003

4 CUSTOMER DEVICE SYSTEM APPROVALS

The manufacturer of the end device incorporating the *Core Engine* is responsible for complying with all regulatory requirements and directives as listed in but not limited to this document and as required by the final product type. A summary of these regulatory and market approval requirements and standards follows.

4.1 Type Approval

The end device incorporating the *Core Engine* requires incremental FTA testing to address those areas that could not be tested during the initial FTA evaluation (such as SIM electrical), and to ensure that the performance of the *Core Engine* has not degraded when integrated into the end device.

Xircom, our GSM Testing Lab Partner, and the manufacturer of the end device incorporating the *Core Engine* will determine exact requirements on a case-by-case basis.

The manufacturer of the end device incorporating the *Core Engine* is responsible for completion of the terminal approval process through the GSM NA PTCRB. At the completion of the incremental FTA evaluation, the GSM testing laboratory will provide the necessary documentation to enable the manufacturer of the end device incorporating the *Core Engine* to complete this process; documentation of this process is found in:

- GSM NA PTCRB Document NAPRD.03 – Overview of PCS Type certification review board (PTCRB) Mobile Equipment Type Certification and IMEI Control
- CTIA GSM-1900 Terminal Unit Certification Program Management Document

4.2 North America (United States and Canada) Homologation

The *Core Engine* will be tested and will comply with all applicable radio, electromagnetic compatibility and safety as required by the Federal Communications Commission, and Underwriter's Laboratory.

4.2.1 Radio Approvals

The *Core Engine* will be certified by both the FCC (USA) and Industry Canada as a PCS transceiver and should not have to be re-tested by the manufacturer of the end device incorporating the *Core Engine* as a PCS transceiver. However, additional FCC/IC certification work and filings will be necessary to demonstrate and document RF exposure compliance. Labeling of the final product to satisfy RF exposure requirements may be necessary, depending on the final product.

4.2.2 Product Safety

The *Core Engine* will be evaluated by Underwriters Laboratory and marked as a Recognized Component. This will simplify the product safety evaluation of the end device incorporating the *Core Engine*. Any NRTL (Nationally Recognized Test Laboratory) not just UL may be selected for evaluation of the end device incorporating the *Core Engine* for the US market; many NRTLs also can evaluate products for the Canadian market as well, in addition to CSA.

4.2.3 Electromagnetic Compatibility (EMC)

To the extent possible, the *Core Engine* will be evaluated to demonstrate that it complies with the emissions and immunity requirements applicable to typical consumer products. The end device incorporating the *Core Engine* must comply with the appropriate emissions standards for its product type and application. Emissions requirements for typical products are given in:

- FCC Part 15, Class A or B (both radiated and AC power line conducted)
- IC ICES-003 Class A or B

4.2.4 RF Exposure - SAR

The manufacturer of the end device incorporating the *Core Engine* must address human exposure to RF in consideration of the application, antenna type, etc. Regulatory standards and documents addressing human exposure to RF include:

- FCC OET Bulletin 65 on RF Exposure Evaluation
- Health Canada Safety Code 6 (RF Exposure Limits)

Preliminary RF exposure measurements should be performed as soon as feasible during development of the final OEM product. Specific Absorption Rate (SAR) is a strong function of the product form factor and position relative to the body. Preliminary testing will show if SAR is an issue in the current form factor and allow for some redesign (move the antenna as far from head as possible, antenna pattern shaping, etc.) if there are issues.

RF exposure evaluation is not the responsibility of Xircom. The *Core Engine*, as a PCS (GSM 1900) terminal is limited to 1 W output; FCC Part 24 rules limits EIRP to 2 W, thus placing a limit of 3 dB on antenna gain (for a mobile/portable device). Specific implementation details, including antenna type, gain and position relative to the user's body during usage is beyond Xircom's control.

Xircom can provide software support for preliminary SAR testing to put the EUT into the worst-case operating mode from an RF exposure perspective (2 transmit slots, maximum power, etc.).

4.3 Miscellaneous Approvals

Additional or alternate regulatory or market testing, approvals and/or documentation may be required, depending on the type of device into which the *Core Engine* is incorporated.

4.3.1 Section 255 Compliance

TDMA systems in general, and GSM specifically, may cause audible rectification (at GSM frame rate) in hearing aids. Since there may be larger issues here than just speaker HAC compliance, the manufacturer of the end device incorporating the *Core Engine* should ensure that their product provides accessible input, control, and mechanical functions, as well as accessible output, display and control functions.

4.3.2 E911 Compliance

Xircom attends GSM-NA PTCRB meetings (operator and manufacturer terminal approval forum) to stay abreast of terminal requirements, including E911. Xircom also works with operators directly. GSM-NA Operators will soon adopt a single E911 technology across the board. Thus, we recommend that all parties continue to evaluate the situation to ensure that there are no surprises in the future regarding E911.

4.4 Labeling and Documentation Requirements

The manufacturer of the end device incorporating the *Core Engine* is responsible for complying with all labeling and documentation requirements as outlined in but not limited to the following sections.

4.4.1 Instructions to Manufacturer of the End Device Incorporating the *Core Engine*

To comply with the requirements of the National Environmental Policy Act (NEPA) of 1969, operation of an FCC-regulated transmitter may not result in human exposure to radio frequency radiation in excess of the applicable health and safety guidelines established by the FCC. Further information on RF exposure issues may be found in the FCC's Office of Engineering and Technology (OET) Bulletin Number 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields" and Supplement C, "Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio Frequency Emissions." Both of these documents are available via the Internet at the OET web site: <http://www.fcc.gov/oet>.

Industry Canada (IC) standards for 2 GHz PCS transmitters are established in RSS-133 (2 GHz Personal Communications Services). This document requires that the procedures of RS-122 (Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields) must be followed concerning exposure to RF fields. RS-122 calls out Health Canada Safety Code 6 (Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz), which is available on the Internet at www.hc-sc.gc.ca/rpb. It specifies the requirements for safe use of radiation emitting devices, in general. One thing to note, the FCC and IC definitions and requirements are nearly identical.

The product incorporating the *Core Engine* is a radio transceiver, which operates under the authority of 47 CFR Part 24, Subpart E of the FCC Rules and Regulations. When installed and operated in accordance with the instructions provided, these devices comply with current FCC regulations regarding human exposure to radio frequency radiation.

For the purpose of determining compliance with current FCC and IC rules addressing human exposure to radio frequency radiation, the FCC has established the following three categories of transmitting devices:

- Portable Devices – devices where the antenna is located within 20 cm (7.87 inches) of any person, including the user, if applicable. Portable devices operating under the authority of FCC Part 24 (broadband PCS) and IC are limited to a maximum of 2 W EIRP.
- Mobile Devices – devices designed to be used in other than fixed locations and generally such that the antenna is located at a minimum of 20 cm (7.87 inches) from any person, including the user, if applicable. Mobile devices operating under the authority of Part 24 (broadband PCS) are limited to a maximum of 2 W EIRP.
- Fixed devices – devices in which the antenna, either integral to the product or remotely located, is physically secured at one location and is not able to be easily moved to another location.

The following installation and operation restrictions apply to all Core Engine products for use in both the United States and Canada:

- This device may be used in fixed, mobile, and portable applications.
- The use of this device for desktop and other applications where the antenna can easily be relocated are considered to be mobile applications.
- In FIXED applications, a separation distance of at least 20 cm (7.87 inches) between the antenna and the body of the user and other persons must be maintained at all times. The

antenna gain is limited to a maximum of 3 dBi, with a corresponding Equivalent Isotropic Radiated Power (EIRP) of 33 dBm/2 W.

- In MOBILE applications, a separation distance of at least 20 cm (7.87 inches) between the antenna and the body of the user and other persons must be maintained at all times. The *antenna gain* is limited to a maximum of 3 dBi, with a corresponding EIRP of 33 dBm/2 W.
- In PORTABLE applications, a separation distance of less than 20 cm (7.87 inches) between the antenna and the body of the user and other persons may be possible. The *antenna gain* is limited to a maximum of 3 dBi, with a corresponding EIRP of 33 dBm/2 W.
- End products must provide instructions to ensure compliance with radio frequency radiation exposure requirements.
- When using Fixed and Mobile applications a warning label visible to all persons exposed to the antenna and identical to that described in this manual must be displayed on or next to the antenna.

Antenna gain is defined as gain in dBi (dB referenced to an isotropic radiator) minus cabling loss.

Note: Additional care must be taken by the installer and/or user of the products incorporating the *Core Engine* to ensure proper antenna selection and installation. Adherence to the above conditions is necessary for safe operation regarding exposure to RF radiation. Depending upon the application and type of product into which the *Core Engine* module has been incorporated, additional actions and evaluation may be required to meet these conditions. However, in all cases the primary concern is to ensure compliance with current Federal guidelines and regulations that limit human exposure to radio frequency radiation.

4.4.2 Responsibilities of the Manufacturer of the End Device Incorporating the *Core Engine* in a Fixed or Mobile Application

In addition to any other regulatory requirements, the manufacturer of the end device incorporating the *Core Engine*, and integrators must include or provide the following information, instructions, warnings and labels with any device or product into which the *Core Engine* has been incorporated:

<u>Information</u>	<u>Description</u>	
Detailed Operating Instructions for ensuring compliance with current FCC guidelines which limit human exposure to radio frequency radiation	The manufacturer of the end device incorporating the <i>Core Engine</i> must provide an operating/installation manual with the final product which clearly indicates that these operating conditions and restrictions must be observed at all times to ensure compliance with current FCC guidelines which limit human exposure to radio frequency radiation. • 20 cm (7.87 inch) separation distance between the antenna and all persons must be maintained at all times for all fixed and mobile products and applications • Maximum antenna gain is limited to 3 dBi* in mobile and portable products and applications • Maximum antenna gain is limited to 3 dBi* in fixed products and applications. • Modifications and/or additions to the <i>Core Engine</i>, including use of antennas with higher gain than those authorized by the FCC, are prohibited *dBi = antenna gain in dB relative to an isotropic radiator minus the interconnected RF cable loss	
Antenna Avoidance Label	Attach the following warning label directly to or displayed next to the antenna. Furthermore, this label must be visible to and easily readable by all persons in the immediate vicinity of the antenna	WARNING To comply with FCC RF exposure requirements, a separation distance of 20 cm (7.87") or more must be maintained between this antenna and all persons.
Human Exposure Compliance Statement	Include the following statement in the instruction /operation manual.	Xircom, Inc. Wireless Technology Group certifies that the Core Engine Radio Module (FCC ID:XXXXXXX) complies with the RF hazard requirements applicable to broadband PCS equipment operating under the authority of 47 CFR Part 24, Subpart E of the FCC Rules and Regulations. This certification is contingent upon installation, operation and use of the Core Engine and its host product in accordance with all instructions provided to both the OEM and end user. When installed and operated in a manner consistent with the instructions provided, the Core Engine meets the maximum permissible exposure (MPE) limits for general population / uncontrolled exposure at defined in Section 1.1310 of the FCC Rules and Regulations.

4.4.3 Specific Responsibilities for Portable Products and Applications

The FCC/IC must separately authorize each device or product, into which the *Core Engine* has been incorporated, and which are intended for use in an application that meets the definition of "portable" for the purposes of determining compliance with current FCC/IC guidelines limiting human exposure to radio frequency radiation. Portable devices must be evaluated for RF exposure based on Specific Absorption Rate (SAR) limits; further information on such evaluations is available from the FCC/IC via the Internet.

4.4.4 Specific Responsibilities for Mobile Products and Applications

Separate or additional FCC approvals are not required for devices or products, into which the *Core Engine* has been incorporated, that are used in applications that meet the definition of "mobile." For all end products, the manufacturer of the end device incorporating the *Core Engine* must provide instructions, warnings and labels to ensure that the product complies with current FCC guidelines limiting human exposure to radio frequency radiation. Current FCC and IC regulations limit the EIRP

of mobile devices to 2 W. Because the nominal RF output power of the *Core Engine* GSM transceiver is 1.0 W (30 dBm), antenna gain for mobile products and applications cannot exceed 3 dBi.

4.4.5 Specific Responsibilities for Fixed Products and Applications

Separate or additional FCC approvals are not required for devices or products, into which the *Core Engine* has been incorporated, that are used in applications, which meet the definition of "fixed." For all end products, the manufacturer of the end device incorporating the *Core Engine* must provide the instructions, warnings and labels to ensure that the product complies with current FCC guidelines limiting human exposure to radio frequency radiation. Current FCC and IC regulations limit the EIRP of fixed devices to 2 W. Because the nominal RF output power of the *Core Engine* GSM transceiver is 1.0 W (30 dBm), antenna gain for mobile products and applications cannot exceed 3 dBi.

4.4.6 Labeling the Product

The label on the device should contain the following:

FCC ID:AAABBBBBB

Contains Transmitter FCC ID: XXXYYYYYY

CANADA: ZZZZZZZZZ

AAA is the Grantee code of the manufacturer of the end device; BBBBBB is the product code for the end device. XXX is the Xircom Grantee Code and YYYYYY is the *Core Engine* product code. ZZZZZZZZZ is the Canadian Certification ICES-003 number.

IMEI - Barcode and numeric text to match that of the *Core Engine* inside. This information must be on the outside of the product.

There will be a FCC DoC (Declaration of Conformity) mark with text ("Tested to Comply with FCC Standards; FOR HOME OR OFFICE USE"). For Canada, there should also be a statement to the effect "Complies with Canadian ICES-003 Class B" or "ICES-003 Class B".

In addition, there will be the "normal" label text, marks and information for a product of this type. This will include the manufacturer, model, and perhaps serial number (in addition to the IMEI) and safety labeling requirements, ratings, NRTL, UL, others that may apply to the end device.

5 LEVERAGING MODULAR APPROVALS

The end device incorporating the *Core Engine* module may leverage some of the modular approvals, which have already been obtained for the *Core Engine*, and in doing so the customer producing the end device may save much time, effort and expense.

5.1 Type Approval

Xircom will leverage its previous FTA testing. Xircom, our GSM Testing Lab Partner, and the manufacturer of the end device incorporating the *Core Engine* will determine exact requirements on a case-by-case basis.

5.2 North American (United States and Canada) Homologation

The *Core Engine* will be certified by both the FCC (USA) and Industry Canada as a PCS transceiver and should not have to be re-tested by the manufacturer of the end device incorporating the *Core Engine* as a PCS transceiver.

The manufacturer of the end device incorporating the *Core Engine* is responsible for addressing human exposure to RF (SAR) in consideration of the application, antenna type, etc. Regulatory standards and documents addressing human exposure to RF include:

- FCC's OET Bulletin 65 on Specific Absorption Rates (SAR)
- Safety Code 6 (RF Exposure)

The *Core Engine* will be evaluated by Underwriters Laboratory and marked as a Recognized Component. This will simplify the product safety evaluation of the end device incorporating the *Core Engine*. Any NRTL (Nationally Recognized Test Laboratory), not just UL, may be selected for evaluation of the end device incorporating the *Core Engine*.

To the extent possible, the *Core Engine* will be evaluated to demonstrate that it complies with the emissions and immunity requirements applicable to typical consumer products. The end device incorporating the *Core Engine* must comply with the appropriate emissions standards for the type and application of the end product.

5.3 PTCRB Approval and IMEI Assignment

Xircom can provide the manufacturer of the end device incorporating the *Core Engine* with assistance in obtaining IMEI assignments, IMEI allocation; and solving IMEI issues like uniqueness, security and integrity for the final product. Since the *Core Engine* cannot be FTA approved on its own (primarily because of the lack of a SIM), final GSM NA/PTCRB approval will be up to the manufacturer of the end device incorporating the *Core Engine*. This involves submission of the FTA report (both the results of initial and the "delta" testing) to the PTCRB/CTIA by the lab, some additional paperwork (typically declarations provided by Xircom), and a fee. The GSM-NA administrator will then assign the IMEI to the manufacturer of the end device incorporating the *Core Engine* for the final product.

6 XIRCOM ASSISTANCE WITH APPROVALS

Xircom has access to both in-house and third party test facilities, equipment and personnel to assist the customer with the process of obtaining approvals for their end device incorporating the *Core Engine* module. Depending on the level of approval and the type of assistance required, a fee may be charged for some of the services.

6.1 Type Approval

Xircom has invested in industry-accepted and validated GSM FTA test solutions from Anite Telecommunications and other equipment providers. In addition, Xircom has partnered with a recognized GSM test laboratory to provide the benefits of third party testing using its in-house testing platforms. GSM test laboratory personnel using Xircom's in-house test equipment will perform accredited testing when required.

6.1.1 GSM Testing

Xircom's in-house FTA testing lab provides for validated GSM/GPRS FTA testing. Additional capabilities provide tools to simulate and debug network interoperability problems.

Test capabilities include:

- GSM/GPRS RF (transmitter and receiver performance) testing on the Anite RAMS+. The RAMS+ provides complete coverage across all bands (GSM, DCS and PCS) for all mandatory RF test cases. Certain test cases (radiated emissions, vibration testing) where specialized facilities or equipment is required are performed at Xircom's partnered GSM testing laboratory.
- GSM / GPRS Protocol testing on the Anite SAT system. The GSM SAT provides complete test case coverage across all bands for all mandatory tests, with the some limited exceptions (i.e. audio test cases). The Anite SAT also provides GPRS test case coverage. Test case coverage not provided on Xircom's SAT system is provided by Xircom's partnered GSM testing laboratory.
- SIM testing is accomplished using an ORGA Subscriber Identity Module (SIM) simulator, in a stand-alone mode for SIM electrical tests and in combination with the SAT for SIM protocol tests.

6.1.2 Materials

The customer must provide the following material to Xircom in order to support Xircom's testing of the end device:

- Hardware - Sufficient samples (3 to 6) to support simultaneous RAMS (RF), SAT (protocol) and ORGA (Subscriber Identity Module) testing. Modifications to the hardware may be required (addition of RF cable or connector for connection to RAMS+ or addition of a pigtail to the SIM connector for SIM electrical testing, for example).
- RS232 or USB pass thru capability to allow direct access to the *Core Engine* for automated testing and issuing manual AT commands.

- Software - All application level software required to perform basic call functions (i.e. answer, dial, power unit off and on, etc.).
- Documentation - A complete documentation package, including schematics, theory of operation, and all other applicable documents is required in order to connect, operate, and test the device.

6.1.3 Schedule

Assuming no problems are uncovered, incremental SIM electrical testing can take from one to two days. Time required for FTA regression testing depends on several factors including the amount of testing deemed necessary by Xircom and its partnered GSM testing laboratory, laboratory availability, and so forth.

6.2 Safety

Xircom maintains relationships with various product safety testing organizations. Xircom can provide the manufacturer of the end device incorporating the *Core Engine* with assistance in:

- Product safety evaluation
- Product safety approval services, including UL and other NTRL approvals
- CB Scheme reports

6.2.1 Materials

The customer must provide the following material to Xircom in order to support Xircom's testing of the end device:

- Hardware - Sufficient samples to support simultaneous UL and other NTRL approvals. Modifications to the hardware may be required.
- Software - All application level software required to perform basic call functions (i.e. answer, dial, power unit off and on, etc.).
- Documentation - A complete documentation package, including schematics, theory of operation, and all other applicable documents is required in order to connect, operate, and test the device.

6.2.2 Schedule

Approval testing duration depends on the exact tests, which are required by Xircom, our safety testing organizations, and the manufacturer of the end device incorporating the *Core Engine*. An example of an Approvals Worksheet is illustrated in Appendix A.

6.3 Emissions

Xircom works with several EMC test labs and is experienced in solving EMC issues. Xircom can provide the manufacturer of the end device incorporating the *Core Engine* with assistance in:

- Initial design consultations
- Formal testing and test execution
- EMC issues that may arise when integrating it into a final product
- Acquisition of approvals

6.3.1 Materials

The customer must provide the following material to Xircom in order to support Xircom's testing of the end device:

- Hardware - Sufficient samples to support EMC testing and approvals. Modifications to the hardware may be required.
- Software - All application level software required to perform basic call functions (i.e. answer, dial, power unit off and on, etc.).
- Documentation - A complete documentation package, including schematics, theory of operation, and all other applicable documents is required in order to connect, operate, and test the device.

6.3.2 Schedule

Approval testing duration depends on the exact tests, which are required by our EMC testing organizations, Xircom and the manufacturer of the end device incorporating the *Core Engine*.

6.4 Miscellaneous Items

Xircom can provide the manufacturer of the end device incorporating the *Core Engine* with assistance in other areas including:

- UL and other NTRL approvals, listings, and reports.
- Product labeling (i.e. FCC/IC, and UL) of the final device into which the *Core Engine* has been integrated - Xircom maintains relationships with various product safety testing organizations which provide a full range of product safety evaluation and approval services, including CB Scheme reports.
- FTA Completion and IMEI acquisition
- Operator terminal requirements, testing and approvals

6.4.1 Audio Testing

Xircom can provide the manufacturer of the end device incorporating the *Core Engine* with assistance with testing the audio functionality. If the device is more of a traditional telephone terminal than a data terminal, PCS 11.10 audio testing may be required of the built-in audio (speaker/microphone) functionality. Audio quality of terminals is important to network operators and operator requirements need to be addressed. Although audio testing of headset audio implementation is currently not supported or mandatory it should be verified whether the target operators and test lab requires testing of the device.

Because audio performance is a combination of both the *Core Engine* (baseband audio circuitry) and external speaker/microphone components, audio pre-testing is recommended as soon as feasible and is likely a joint effort between Xircom and the manufacturer of the end device incorporating the *Core Engine*.

6.4.2 Integration Testing

Some level of integration testing should be done as soon as the core is integrated into the final product. The objective is to look for any possible interaction between the core and rest of the product. This could be in either direction (i.e. radio channel desensitizing, performance degradations, immunity issues due to radiated RF, etc.). Suitable testing may be rolled into "delta" FTA testing. Since FTA

testing is conducted using coax, similar evaluation of core/product interactions in an "over the air" (antenna attached) configuration is also advisable at an early point in the integration process.

Although the test are the prime responsibility of the manufacturer of the end device incorporating the *Core Engine*, Xircom can provide assistance, participation, guidance, and test lab support either at Xircom or in another place.

APPENDIX A

Approvals Worksheet

Approval Name	FCC Part 2	FCC Part 15	FCC Part 24	SAR	UL1950	CTIA	PCS 11.10	E911	Section 255	RS-133
Test Performed By										
Test Location										
Test Duration (weeks)										
Submission Performed By										
Test Fee (US\$)										
Regulation Fee (US\$)										
Test Platform	Hardware									
Requirements	Software									
(Initial Pre-Test)	Quantity									
	Date Required									
Test Platform	Hardware									
Requirements	Software									
(Final Test &	Quantity									
Submission)	Date Required									
Test Method & Relevant Documentation										
Completion Required Date										
Estimated Start Date										
Actual Start Date										
Actual End Date										
Product Label Affected										
Product Documentation Affected										
Remarks										
Status (Open/Closed)										