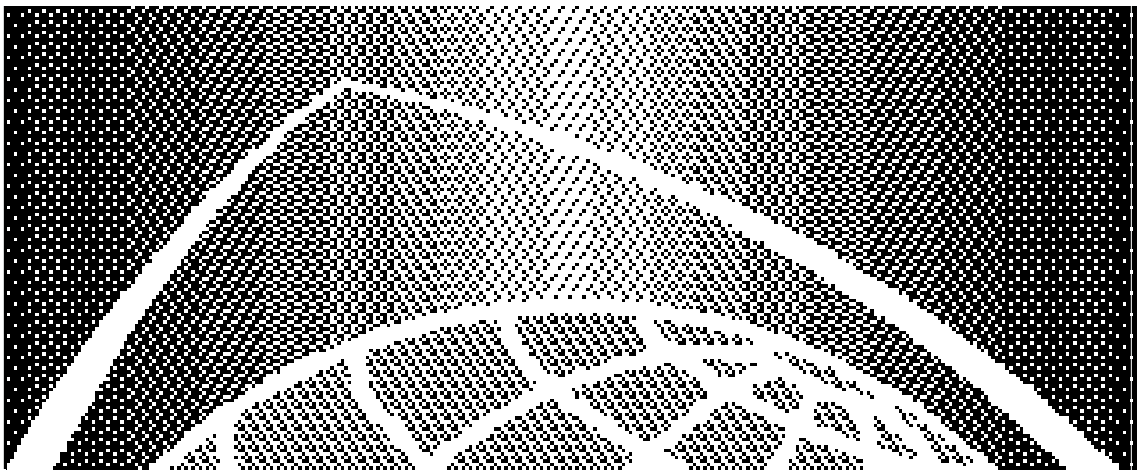
Globalstar™



Globalstar Single-Mode Portable User Terminal FCC Part 25 Certification Report FCC ID: J9CGSSM1

80-98805-1 X1

QUALCOMM®

QUALCOMM Incorporated
6455 Lusk Blvd.
San Diego, CA, 92121-2779
U.S.A.

Globalstar Single-Mode Portable User Terminal FCC Part 25 Certification Report
FCC ID: J9CGSSM1

80-98805-1 X1

June 7, 1999

MANUFACTURER

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Document Amendment Record

DATE	DETAILS OF CHANGE (affected pages, etc.)	ISSUE STATUS	MANUFACTURER APPROVAL
6/7/99	Initial Document Release	1	William Moyer

June 4, 1999

Federal Communications Commission
Office of engineering and Technology

Re: Application for Certification of Globalstar Single-Mode Portable User Terminal FCC ID No. J9CGSSM1

Gentlepeople:

Enclosed please find the following documentation for your review:

1. FCC Form 731, including the fee processing form, for the Globalstar Single-Mode Portable User Terminal.
2. A letter for Request for confidentiality.
3. Notification of separate fee payment submittal in the form of a check ($610.00) #19xxxx and accompanying executed Form 159.
4. All test data and support documentation as required for certification under Part 2 and Part 25 of Title 47 of the Code of Federal Regulations Ch. 1 (10-1-98 Edition).

If any further information is required please contact myself or Paul Guckian. You may contact me directly by phone at 619-658-3542, by fax at 619-651-1982, or by e-mail at wmoyer@qualcomm.com. You may contact Paul Guckian directly by phone at 619-651-1547, by fax at 619-651-1988, or by e-mail at pguckian@qualcomm.com.

Please inform us when the Request for Confidentiality has been accepted and also when certification has been granted.

Very truly yours,

William E. Moyer

Sr. Engineer, EMC & Regulatory

FCC Form 731 for Single-Mode Portable User Terminal

FCC Form 731 for Single-Mode Portable User Terminal (p. 2)

FCC Form 731 for Single-Mode Portable User Terminal (p. 3)

Federal Communications Commission June 4, 1999

Reference: FCC ID: J9CGSSM1

Request for Confidentiality

Pursuant to Sections 0.457 0.459 of the Commission's rules, Qualcomm Incorporated hereby requests confidentiality for certain aspects of the information accompanying this Application for Certification as specifically identified below:

1 Exhibit 3, FCC Part 25 OOBE Test Plan
(File: E.3 SMP Pt. 25 OOBE TP.pdf)

2. Exhibit 4, FCC Part 25 OOBE Test Report
(File: E.4 SMP Pt. 25 OOBE TR.pdf)

3. Exhibit 5, Globalstar SM PUT EMC Test Plan
(File: E.5 GS SMP EMC TP.pdf)

4. Exhibit 6, Globalstar SMP EMC Test Report
(File: E.6 SMP TUV EMC TR.pdf , and E.6. color photo 1.pdf, E.6 color photo 2.pdf, … , E.6 color photo 10.pdf)

5. Exhibit 7, SMP UT SAR Test Report
(Files: E.7 SMP SAR TR.pdf, E.7 color photo 1.pdf, E.7 color photo 2.pdf, … , E.7 color photo 15.pdf; E.7 color SAR plot 1.pdf, E.7 color SAR plot 2.pdf, …. , E.7 color SAR plot 13.pdf)

6. Exhibit 8, Frequency Stability Data (File: E.8 SMP Freq. Stab.pdf)

7. Exhibit 10, Description of the Globalstar System
(File: E.10 Description of GS.pdf)

8. Exhibit 12, Assembly Drawing (File: E.12 10-70960_X1.pdf)

9. Exhibit 13, Digital CCA Drawings
(Files: E.13a 20-81403_X3.PDF, E.13b LD20-81403_X1.PDF, and E.15c PL20-81403-3X1.PDF)

10. Exhibit 14, RF CCA Drawings (Files: E.14a 20-81375_X2.PDF, E.14b LD20-81375_X1.PDF, and E.14c PL20-81375-2X2.PDF)

11. Exhibit 15, Antenna Drawings (Files: E.15a CV90-70766_X7.PDF and E.15b 80-70813-1_X4.PDF)

All items contain trade secrets and other proprietary information not customarily released to the general public. Public disclosure of this information would be harmful to Qualcomm Incorporated at this time, and would provide unjustified benefits to our competitors. These materials contain proprietary intellectual property, and Qualcomm is in the process of filing for

patent protection on many of these items. Qualcomm understands that, pursuant to Rule 0.457, disclosure of any information contained in this application will not be made before the date of grant.

Very truly yours,

William E. Moyer

Sr. EMC & Regulatory Engineer

List of Exhibits

Exhibit	Description	FCC Reference
1	General Information	2.1033 (c)
2	Certification of Test Data	2.911
3	FCC Part 25 OOBE Test Plan	2.947, 2.1051
4	FCC Part 25 OOBE Test Report	2.1051, 2.1049
5	Globalstar SMP UT EMC test Plan	2.947, 2.1053
6	Globalstar SMP UT EMC Test Report	2.1053
7	Globalstar SMP UT SAR Test Report	1.1310
8	SMP UT Frequency Stability Data	2.1055
9	Identification Label	2.1033 (c) (11)
10	Description of the Globalstar System	2.1033 (c) (6), (13)
11	SMP UT User Guide	2.1033 (c) (3)
12	Assembly Drawing	2.1033 (c) (12)
13	Digital CCA Drawings	2.1033 (c) (12)
14	RF CCA Drawings	2.1033 (c) (12)
15	Antenna Drawings	2.1033 (c) (12)

EXHIBIT 1 GENERAL INFORMATION

1.0 Introduction

This document comprises the Part 25 Certification Report for Qualcomm's Globalstar Single-Mode Portable User Terminal (SMP UT).

It provides the data required by the FCC for certification (formerly type acceptance) of intentional transmitters, to the requirements defined in 47 CFR Chapter 1 (10-1-98 Edition), Part 2, Sections 2.1033, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, and 2.1093, and Part 25, Sections 25.202 (f), 25.204, and 25.213 (b), and (per Report and Order FCC 98-338, adopted 12-17-98) Section 25.200 (c).

Measured data provided was taken using measurement procedures in accordance with Part 2 Sections 2.1041 and 2.1057. The governing regulations are those applicable in the United States of America. Much of the content of the technical description called for in the Section 2.1033 (c) rules resides in the existing, separately published, internal Qualcomm or Globalstar documents furnished in Exhibits to this application. Please note that the information provided in all Exhibits, except Exhibits 1, 2, 9, and 11, is considered proprietary, as discussed in the aforeseen Request for Confidentiality, and is not to be freely distributed.

2.0 Equipment Description

As described in Exhibit 10, the Single-Mode Portable UT is one of three types of user terminals or phones which Qualcomm is bringing to market for use by Globalstar subscribers. The SMP UT operates in Globalstar mode only, communicating directly with overhead Globalstar satellites and via those satellites to the nearest Globalstar Gateway and through the Gateway the rest of the network. The service supports voice and data communications and provides user position location information.

Physically the portable UT is a handheld cell-phone shaped unit of approx. the same size as a larger cell-phone, with an integral extensible Globalstar antenna which is manually deployed by rotating the antenna hub in the upper rear of the phone. Power is provide by a removable battery pack, or optionally through an AC power-line battery charger or an automotive cigarette lighter adapter (CLA). A separately tested and certified car kit is also available for use with the portable UT, which provides an externally mounted car kit radio unit and antenna which allows one to make Globlstar phone calls from inside an automobile.

The phone and charger are depicted and described in detail in Exhibit 11 and in the test setup drawings and photographs in Exhibit 5 .

3.0 Summary Technical Description

The following table provides a quick summary of the technical information included in the executed FCC form 731 and discussed further in the following Sections of this Exhibit, and provides a roadmap to the more detailed descriptions of the Single-Mode Portable UT and the specific test data which are discussed or presented in this and subsequent Exhibits.

3.1 Operational Frequencies

Each Globalstar UT is capable of transmitting on any one of the frequency channels defined between 1610 and 1626.5 MHz, as described in Section 3 of Exhibit 10. In the US and other countries where one or more TDMA mobile satellite service (MSS) low earth orbit (LEO) systems are authorized to operate, Globalstar UT's transmit (and are authorized to transmit) in only the lower 9 of the 13 channels listed in Exhibit 10, operating in the frequency range from 1610 to 1621.35 MHz. Depending on local Globalstar traffic conditions, a given UT may be assigned to operate on any of the authorized channels for a given call. Multiple access and efficient frequency re-use is provided by means of code division multiple access (CDMA) technology.

3.2 CDMA Modulation Technology

The Globalstar Air Interface uses a modified form of IS-95 to support Code Division Multiple Access. CDMA was selected for Globalstar because it represents a proven technology that can provide efficient modulation scheme for satellite communications. It is relatively interference tolerant, both from a standpoint of generation of interference to other services and tolerating outside interference. As a bonus, there is a level of security inherent in the modulation scheme. It is difficult to listen into conversations or to pirate services from the system. CDMA is able to provide good voice quality while operating at relatively low RF power levels. The Globalstar CDMA is based on the existing QUALCOMM CDMA product line used for terrestrial cellular communications.

For a detailed description of the CDMA technology, see Section 4 of Exhibit 10, Description Of The Globalstar System.

3.3 Operating Power Levels

Active power control is employed in the Globalstar system to minimize collateral interference between proximate Globalstar subscribers, since as is true of any multiple access spread spectrum system, other users signals represent noise to a given users signal. Thus all signals are automatically reduced to minimum power levels by the system, transparently to the user.

Table 1. General Information Required for Certification

In Accordance with FCC Rules and Regulations, 47 CFR Ch. 1 (10-01-98 Edition)
Part2, Sections 2.1046 - 2.1055, Test measurements per Sections 2.1041 and 2.1057

Section	Information Category					
2.1033 (c) (1)	**Name and Address of Applicant:** Qualcomm Incorporated 6455 Lusk Boulevard San Diego, CA 92064					
2.1033 (c) (2)	**FCC Identification Number:** J9CGSSM1 GLobalstar Single-Mode Portable User Terminal					
	Planned Production Quantity: Multiple					
	Technical Description					
2.1033 (c) (4), (5), (6), and (7)	**Emission Type**	**Frequency Range and Polarization**	**Maximum / Nominal Power ERP (dBW)**	**Maximum EIRP Density (dBW/4kHz)**	**Description of Modulation**	**Referenced Exhibits**
	1M25G1W	Tx: 1610-1621.35 MHz LHCP	-4 / 0	-24.9	- See Waveform -	Exhibits 1 and 10
	1M25G1W	Rx: 2483.5-2500 MHz LHCP			- See Waveform -	
25.xxx	**Maximum EIRP toward Horizon:** -29 dBW/4 kHz					Exhibits 1 and 13
2.1033 (c) (13)	**Waveform:**					Exhibit 10, Section 4
	Waveform consists of a direct-sequence spread-spectrum QPSK signal. The CDMA channel is 1.23 MHz wide.					
2.1033 (c) (8)	**DC Voltages and Currents into Final RF Amplifier**					Exhibits 1, 13, and 14
	7 VDC nominal, 200-1000 mA into phone Dc power terminals, PA isolated by multiple regulator stages from power input fluctuations					
2.1033 (c) (3) and (9)	**Instruction Books and Tune Up Procedure**					Exhibits 1 and 11
	System is self regulating, no user tune up procedures are necessary or possible.					
2.1033 (c) (10)	**Description of all Circuitry and Devices which Determine and Stabilize Frequency**					Exhibits 1, 10, 13, 14, and 15
	All RF circuit clocks and oscillators are phase lock loop locked to voltage controlled temperature compensated crystal oscillator (TCXO), the master system oscillator which provides frequency accuracy stability to 10 ppm.					
2.1033 (c) (10)	**Description of Circuits/Devices used to Suppress Spurious Radiation, Limit Modulation, or Limit Power**					Exhibits 10, 13, and 16
	System utilizes extensive filtering and open and closed loop power control.					
2.1033 (c) (11)	**Drawing of Equipment Identification Label**					Exhibit 9
	Located on Back of Phone under the battery housing.					
2.1033 (c) (12)	**Photographs of Equipment showing Equipment Construction and Layout**					Exhibit 6
	Included in EMC Test Report, Exhibit 6					

As defined in the Globalstar Air Interface (GAI) Specification (80-25118-1), the effective isotropic radiated power (EIRP) of a portable UT operating at maximum power output ranges from 0.2 to 1.0 Watts, with 0.4 Watts being typical.

3.4 Occupied Bandwidth and Out-of-Band Emissions (OOBE)

Occupied bandwidth measurements for low, mid, and high frequency transmit channels are presented in Exhibit 4, the Part 25 OOBE Test Report. Conducted antenna port out-of-band and spurious emissions test results are presented in Exhibit 4. Radiated out-of-band and spurious emissions test results are presented in Exhibit 6, where the emissions were compared against and show compliance with the more stringent Part 15 radiated emissions limits, which apply to the digital control and receiver functions of the portable UT.

3.5 DC Supply Voltage and Current

The portable UT is powered by a removable rechargable battery. Power to the transmitter power amplifier (PA) located on the RF board is routed from the Digital board, passing through multiple switching and analog power regulator stages, and the PA never “sees” any changes in the phone’s supply voltage. It is thus virtually immune to any effects of voltage fluctuation over the defined 5.0-8.4 VDC power input range of the phone, as can be seen in the frequency stability data presented in Exhibit 8.

3.6 Transmitter Adjustment and Tune-Up Procedure.

All frequency adjustments are made at the factory and no frequency adjustments are made by the user.

3.7 Frequency Stability

All RF oscillators are phase-lock loop locked to the output signal of a voltage controlled temperature compensated crystal oscillator (TCXO), the master oscillator of the system. It is specified to provide frequency accuracy to better than 10 parts per million over the UT’s 5 year design life, with 5 ppm allocated to TCXO aging. Exhibit 8 summarizes the temperature variation frequency stability test results which have been obtained. Due to the relatively large Doppler error inherent to an LEO communications system, transmit frequencies are locked to the TCXO signal and are not adjusted based on frequency differences with respect to Gateway transmitted signals.

3.8 Circuitry for Suppression of Spurious Radiation

Multiple stages of filtering are employed in the transmit chain from baseband through intermediate frequency (IF) to the RF transmitter output to the antenna, as can be seen in the RF Board schematic and parts list in Exhibit 16. Multiple SAW filters are employed in the transmitter (TX) IF and Upconverter stages. A discrete ceramic filter and pi LC filter are applied to the output of the transmitter HPA.

3.9 Specific Absorption Rate Measurements

The portable UT is subject to the specific absorption rate (SAR) limits defined in 47 CFR Ch.1 (10-01-98 Edition) Sections 1.1310 and 2.1093. A copy of the SAR test report for the Single-Mode Portable UT is presented in Exhibit 7. Because the Globalstar antenna is located above the back of the phone body and away from the head of the user, the SAR levels are markedly low, in comparison with typical physically-smaller cellular phones.

Exhibit 2 Certification of Test Data

The data, data evaluation, and equipment configuration presented herein are a true and accurate representation of the measurements of the sample's radio frequency interference emissions characteristics as of the dates and at the times of the tests under the test conditions specified herein. This applies to all tests that were performed that did not require an Open Area Test /Site (OATS). Tests that required an OATS were performed by TUV Product Services, a Competent Body Laboratory located in the United Kingdom, as indicated in Exhibit 6.

Equipment Tested: SMP UT, Model GSP-1610, S/N: N1062VD54

Dates of Test: April 20-22, 1999

Test Performed by:

Engineer: William Moyer

_____

Exhibit 3 Single-Mode Portable UT FCC Part 25 Out-of-Band Emissions (OOBE) Test Plan

Exhibit 4 Single-Mode Portable UT FCC Part 25 Out-of-Band Emissions (OOBE) Test Report

Exhibit 5 Globalstar SMP UT EMC Test Plan

Exhibit 6 Globalstar SMP UT EMC Test Report

Exhibit 7 SMP UT SAR Test Report

Exhibit 8 SMP UT Frequency Stability Data

Exhibit 9 FCC Identification Label

Exhibit 10 Description of the Globalstar System

Exhibit 11 SMP UT Deskset User Guide

Exhibit 12 Assembly Drawing

Exhibit 13 Digital CCA Drawings

Exhibit 14 RF CCA Drawings

Exhibit 15 Antenna Drawings