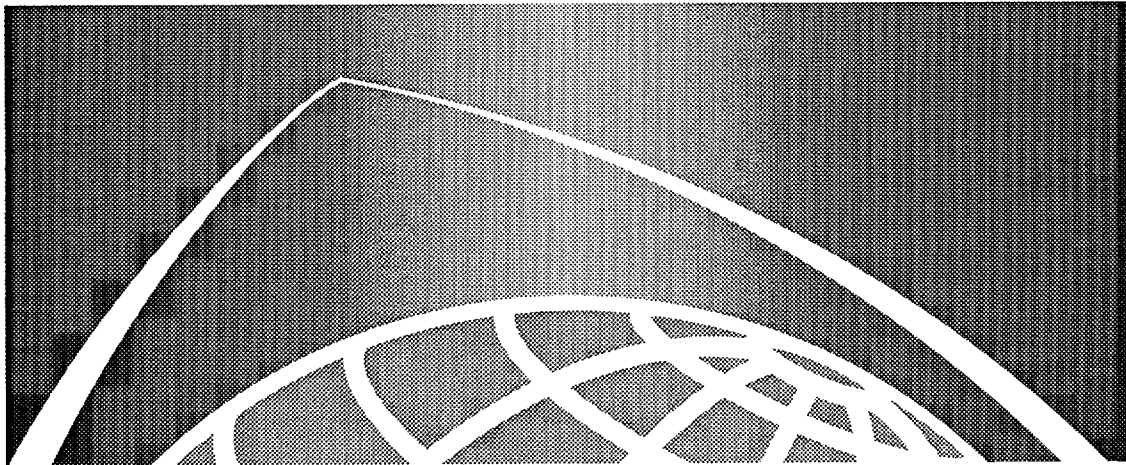


Globalstar™



**Globalstar Digital Fixed
User Terminal Type
Approval Support
Documentation
FCC ID: J9CGSDF1**

80-98460-1 X2

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Globalstar Digital Fixed User Terminal Type Approval Support Documentation

80-98460-1 X2

May 14, 1999

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May 13, 1999

Federal Communications Commission
Office of engineering and Technology

Re: Application for Certification of Globalstar Digital Fixed User Terminal,
FCC ID no. J9CGSDF1

Gentlepeople:

Enclosed please find the following documentation for your review:

1. FCC Form 731, including the fee processing form, for the Globalstar Gateway RF Subsystem.
2. A letter for Request for confidentiality.
3. Notification of separate fee payment submittal in the form of a check (\$610.00) #19xxx 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.

Verytrulyyours,

William E. Moyer
Sr. Engineer, EMC & Regulatory

Applicant: QUALCOMM

FCC ID: J9CGSDF1

FCC Form 731 for Digital Fixed User Terminal

Applicant: QUALCOMM

FCC ID: J9CGSDF1

FCC Form 731 for Digital Fixed User Terminal (p. 2)

Federal Communications Commission

Reference: FCC ID: J9CGSDF1

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 OOB Test Plan (File: E.3 Pt. 25 OOB TP.pdf)
2. Exhibit 4, FCC Part 25 OOB Test Report (File: E.4 Pt. 25 OOB TR.pdf)
3. Exhibit 5, Globalstar DFUT EMC Test Plan (File: E.5 GS DFUT EMC TP.pdf)
4. Exhibit 6, Globalstar DFUT EMC Test Report (File: E.6 TUV EMC TR color.pdf and E.6.alt TUV EMC TR.pdf)
5. Exhibit 7, DFUT Maximum Permissible Exposure Analysis (File: E.7 DFUT MPE Analysis.pdf)
6. Exhibit 8, Frequency Stability Data (File: E.8 DFUT Freq. Stab.pdf)
7. Exhibit 10, Description of the Globalstar System (File: E.10 Description of GS.pdf)
8. Exhibit 12, DFUT Installation Guide (File: E.12 80-25811-1X2.pdf)
9. Exhibit 13, Antenna Assembly Drawings (Files: E.13a CV90-70842_X5.PDF, E.13b TelexCom. Antenna.pdf, and E.13c 80-81099-1_X4.PDF)
10. Exhibit 14, RAU Interface Board Drawings (Files: E.14a 20-70707_X1.PDF, E.14b LD20-70707_X4.PDF, and E.14c PL20-70707-1X3.pdf)
11. Exhibit 15, RAU Digital board Drawings (Files: E.15a 20-70820_X4.PDF, E.15b LD20-70820_X6.PDF, and E.15c PL20-70820-2X4.pdf)
12. Exhibit 16, RAU RF Board Drawings (Files: E.16a 20-70971_X2.PDF, E.16b LD20-70971_X4.PDF, and E.16c PL20-70971-1X6.pdf)
13. Exhibit 17, Junction Box Drawings (Files: E.17 CV90-25686_X5.PDF)
14. Exhibit 18, Digital Deskset Drawings (Files: E.18a 20-25690_X5.PDF, E.18b LD20-25690_X4.PDF, and E.18c PL20-25690-1X10.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

<u>Exhibit</u>	<u>Description</u>	<u>FCC Reference</u>
1	General Information	2.1033 (c)
2	Certification of Test Data	2.911
3	FCC Part 25 OOB E Test Plan	2.947, 2.1051
4	FCC Part 25 OOB E Test Report	2.1051, 2.1049
5	Globalstar DFUT EMC test Plan	2.947, 2.1053
6	Globalstar DFUT EMC Test Report	2.1053
7	DFUT Maximum Permissible Exposure Analysis	1.1310
8	Frequency Stability Data	2.1055
9	Identification Label	2.1033 (c) (11)
10	Description of the Globalstar System	2.1033 (c) (6), (13)
11	DFUT Deskset User Guide	2.1033 (c) (3)
12	DFUT Installation Guide	2.1033 (c) (3)
13	Antenna Assembly Drawings	2.1033 (c) (12)
14	RAU Interface Board Drawings	2.1033 (c) (12)
15	RAU Digital Board Drawings	2.1033 (c) (12)
16	RAU RF Board Drawings	2.1033 (c) (10), (12)
17	Junction Box Drawings	2.1033 (c) (12)
18	Digital Deskset Drawings	2.1033 (c) (12)

EXHIBIT 1 GENERAL INFORMATION

1.0 Introduction

This document comprises the Type Approval Support Documentation for Certification of Qualcomm's Globalstar Digital Fixed User Terminal (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, and 2.1055 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 aforementioned Request for Confidentiality, and is not to be freely distributed.

2.0 EquipmentDescription

As described in Exhibit 10, the Digital Fixed UT (DFUT) is one of three types of user terminals or phones which Qualcomm is bringing to market for use by Globalstar subscribers. The DFUT 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 DFUT is comprised of an externally-mounted Remote Antenna Unit (RAU) containing the radio and digital control circuitry, a Junction Box which provides surge protection at the entry point to the dwelling or facility where the DFUT is installed, a Deskset (phone) which provides the telephone user interface, and the interconnecting cables and ground wires which tie the DFUT elements together, as depicted and described in detail in Exhibit 12 and in the test setup drawings in Exhibits 3 and 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 Digital Fixed 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. As defined in the Globalstar Air Interface (GAI) Specification (80-25118-1), the effective isotropic radiated power (EIRP) of a fixed UT operating at maximum power output ranges from 1 to 4 Watts, with 3 Watts being typical.

Table 1. General Information Required for Type Acceptance

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	Technical Description	Maximum / Nominal Power ERP (dBW)	Maximum ERP Density (dBW/KHz)	Description of Modulation	Referenced Exhibits
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: J9CGSDF1 Planned Production Quantity Multiple	Globalstar Digital Fixed User Terminal				
2.1033 (c) (4), (5), (6), and (7)	Emission Type 1M25G1W 1M25G1W	Frequency Range and Polarization Tx: 1610-1621.35 MHz LHCP Rx: 2483.5-2500 MHz LHCP	4 / 1	-18.9	- See Waveform - - See Waveform -	Referenced Exhibits Exhibits 1 and 10
2.1033 (c) (13)	Waveform:	Maximum EIRP toward Horizon: -29 dBW/4 KHz				Exhibits 1 and 13
2.1033 (c) (8)	DC Voltages and Currents into Final RF Amplifier	Waveform consists of multiple direct-sequence spread-spectrum channels whose carriers are uniformly spaced. Each CDMA channel is 1.23 MHz. Each CDMA RF waveform is QPSK.				Exhibits 1, 15, and 16
2.1033 (c) (3)	Instruction Books and Tune Up Procedure	12 VDC nominal, 0.3-30 A into RAU. PA isolated by multiple regulator stages from power input fluctuations				Exhibits 1, 11, and 12
2.1033 (c) (10)	Description of all Circuitry and Devices which Determine and Stabilize Frequency	System is self regulating, no user tune up procedures are necessary or possible.				Exhibits 1, 10, 15, and 16
2.1033 (c) (10)	Description of Circuits/Devices used to Suppress Spurious Radiation, Limit Modulation, or Limit Power	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.				Exhibits 10, 13, and 16
2.1033 (c) (11)	Drawing of Equipment Identification Label	System utilizes extensive filtering and open and closed loop power control.				Exhibit 9
2.1033 (c) (12)	Photographs of Equipment showing Construction and Layout	located on Back of RAU Chassis				Exhibit 6
		Included in EMC Test Report, Exhibit 6				

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 DFUT.

3.5 DC Supply Voltage and Current

The DFUT is powered by an external DC power supply, which provides a nominal 12 VDC (10-18 VDC range) at 0.3 to 3 Amperes current draw, 30 Watts maximum load. Power to the transmitter power amplifier (PA) located on the RAU 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 RAU supply voltage. It is thus virtually immune to any effects of voltage fluctuation within the defined DC power voltage input range of the RAU. Outside that range the RAU simply shuts down.

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 Maximum Permissible Electromagnetic Field Exposure

Since the Digital Fixed UT transmitting antenna is used at distances greater than 20 cm (8 inches) from the user's body (generally at much greater distances) specific absorption rate (SAR) testing is not required. An analysis of RAU antenna EM emissions levels, to conservatively determine the minimum safe approach distance with respect to the FCC uncontrolled environment exposure limits specified in 47 CFR Ch.1 (10-01-98 Edition) Section 1.1310, is presented in Exhibit 7.

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: DFUT RAU model GSP2401P, S/N: N105W8L04

Dates of Test: March 4, 5, and 8, 1999

Test Performed by:

Engineer: William Moyer

**Exhibit 3 Digital Fixed UT FCC Part 25 Out-of-Band
Emissions (OOBE) Test Plan**

**Exhibit 4 Digital Fixed UT FCC Part 25 Out-of-Band
Emissions (OOBE) Test Report**

Exhibit 5 Globalstar DFUT EMC Test Plan

Exhibit 6 Globalstar DFUT EMC Test Report

Exhibit 7 DFUT Maximum Permissible Exposure Analysis

Exhibit 8 Frequency Stability Data

Exhibit 9 FCC Identification Label

Exhibit 10 Description of the Globalstar System

Exhibit 11 DFUT Deskset User Guide

Exhibit 12 DFUT Installation Guide

Exhibit 13 Antenna Assembly Drawings

Exhibit 14 RAU Interface Board Drawings

Exhibit 15 RAU Digital Board Drawings

Exhibit 16 RAU RF Board Drawings

Exhibit 17 Junction Box Drawings

Exhibit 18 Digital Deskset Drawings