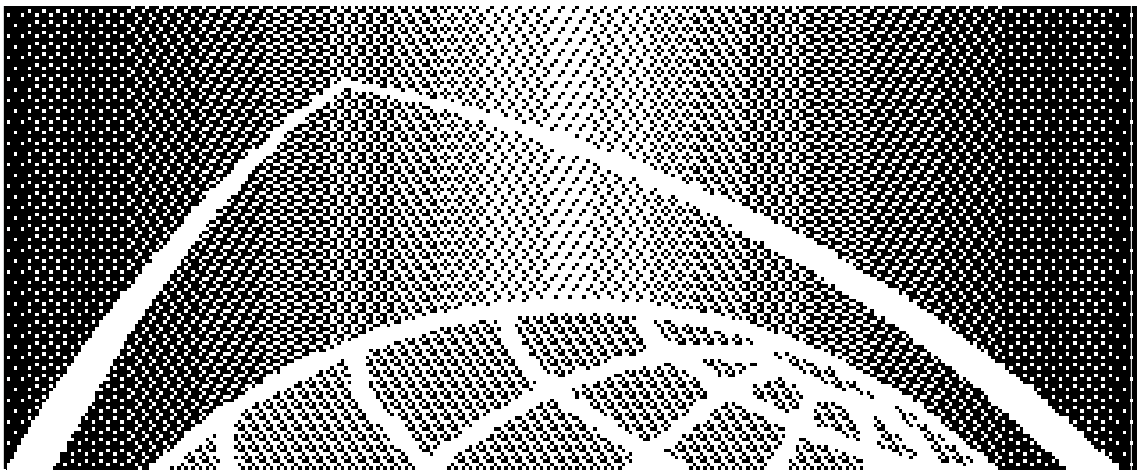
Globalstar™



Globalstar Portable User Terminal Car Kit FCC Part 25 Certification Report FCC ID: J9CGSCK1

80-98832-1 X1

QUALCOMM®

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

Globalstar Portable User Terminal Car Kit FCC Part 25 Certification Report
FCC ID: J9CGSCK1

80-98832-1 X1

July 16, 1999

MANUFACTURER

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Document Amendment Record

DATE	DETAILS OF CHANGE (affected pages, etc.)	ISSUE STATUS	MANUFACTURER APPROVAL
7/15/99	Initial Document Release	1	William Moyer

July 7, 1999

Federal Communications Commission
Office of engineering and Technology

Re: Application for Certification of Globalstar Portable User Terminal Car Kit,

FCC ID No. J9CGSCK1

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) #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 Portable User Terminal Car Kit

FCC Form 731 for Portable User Terminal Portable User Terminal Car Kit (p. 2)

FCC Form 731 for Portable User Terminal Car Kit (p. 3)

Federal Communications Commission

Reference: FCC ID: J9CGSCK1

Request for Confidentiality

Pursuant to Sections 0.457 and 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, Globalstar Compliance Lab Reverse Link Test Procedure (File: E.3 80-98735-1_x1.pdf)

2. Exhibit 4, Globalstar Compliance Lab Out-of-Band and In-Band Noise and Spurious Emissions Test Data (Files: E.4a CK obn&s data.pdf, E.4b CK ibn&s data.pdf, and E.4c GS Ant Gain.pdf)

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

4. Exhibit 6, Globalstar CK EMC Test Report (Files: E.6 CK c photo-001 ext.pdf, E.6 EMC Lab c photo-002.pdf, … E.6 EMC Lab c photo-010.pdf and E.6. TUV CK EMC TR.pdf)

5. Exhibit 7, CAR KIT Maximum Permissible Exposure Analysis (File: E.7 CK MPE Analysis.pdf)

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

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

8. Exhibit 12, GS Car Kit Outdoor Unit Drawings (Files: E.12a 20-81130_X8.pdf, E.12b LD20-81130_X8.pdf, E.12c PL20-81130-1X14.pdf, E.12d CK RF TX Block.pdf, and E.12e CK ODU Cover.pdf)

9. Exhibit 13, GS Car Kit Electronic Module (GEM) Drawings (Files: E.13a 20-81527_X2.pdf, E.13b LD20-81527_X2.pdf, E.13c PL20-81527-1x7.pdf, and E.13d 10-81100_X2.pdf)

10. Exhibit 14, GS Car Kit Cradle Drawings (Files: E.14a 20-81525_X3.pdf, E.14b LD20-81525_X3.pdf, and E.14c PL20-81525-1X3.pdf)

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

12. Exhibit 16, Car Kit Accessories Drawings (Files: E.16a CV90-81218_X1.pdf, E.16b CV90-46361_B.pdf, E.16c CV90-46349.pdf, E.16d PL65-66369-1X1.pdf, and E.16e CK Access Dwgs.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	Globalstar Compliance Lab Reverse Link Test Procedures	2.947, 2.1051
4	Globalstar Compliance Lab Out-of-Band and In-Band Noise and Spurious Emissions Test Data	2.1051, 2.1049
5	Globalstar CK EMC Test Plan	2.947, 2.1053
6	Globalstar CK EMC Test Report & EMC Test Lab Color Photos	2.1053
7	Fixed UT Maximum Permissible Exposure Analysis	1.1310, 2.1091
8	CK Frequency Stability Data	2.1055
9	CK Identification Label	2.1033 (c) (11)
10	Description of the Globalstar System	2.1033 (c) (6), (13)
11	GS Hands-Free Car Kit Installation/User Guide	2.1033 (c) (3)
12	Car Kit Outdoor Unit (ODU) Drawings	2.1033 (c) (12)
13	GS Car Kit Electronic Module (GEM) Drawings	2.1033 (c) (10), (12)
14	GS Car Kit Cradle Drawings	2.1033 (c) (12)
15	Portable Antenna Assembly Drawings	2.1033 (c) (12)
16	CK Accessories 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 (GS) Portable User Terminal (UT) Car Kit (CK).

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 aforeseen Request for Confidentiality, and is not to be freely distributed.

2.0 Equipment Description

As described in Exhibits 10 and 11, the Car Kit provides the ability for a portable UT to operate within a closed vehicle, operating in a hands-free mode when installed in the dashboard-mounted Car Kit Cradle, and utilizing external antennas mounted on the vehicle exterior. In Globalstar mode, the RF signal from the UT is amplified in the Car Kit Outdoor Unit (ODU) and transmitted to overhead Globalstar satellites by the ODU's antenna. The UT communicates with overhead Globalstar satellites through the ODU and via those satellites to the nearest Globalstar Gateway and through the Gateway to the rest of the network. For terrestrial cellular mode communications using a Tri-Mode UT in a Car Kit, the Car Kit provides a passive coaxial cable interconnect to a 3rd party vehicle mounted cellular phone antenna.

Physically the Car kit is comprised of an externally-mounted Outdoor Unit (ODU), a Globalstar CK Electronic Module (GEM), the CK Cradle, and the Car kit I/O interconnect cables which tie the system together. The ODU contains an RF power amplifier (PA), a DC power regulator, digital control circuitry. The GEM provides the primary power interface and regulated power for the Car kit and UT, the optional hands-free microphone and loudspeaker interfaces, the optional privacy handset interface, and the main digital control circuitry for the Car kit. The Cradle physically holds the UT in and provides the electrical power, signal, and control interfaces to the UT. (See Exhibit 12 and the test setup drawing 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 Analog 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					
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: J9CGSCK1 GLobalstar Portable User Terminal Car Kit					
	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 1M25G1W	Tx: 1610-1621.35 MHz LHCP Rx: 2483.5-2500 MHz LHCP	4 / 1	-18.9	- See Waveform - - See Waveform -	Exhibits 1 and 10
25.xxx	Maximum EIRP toward Horizon:	-29 dBW/4 kHz				Exhibits 1 and 15
2.1033 (c) (13)	Waveform:					Exhibit 10, Section 4
	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.					
2.1033 (c) (8)	DC Voltages and Currents into Final RF Amplifier					Exhibits 1 and 12
	7.3 VDC nominal, 1.5 A into ODU, stepped down from 12 VDC vehicle battery voltage. PA is 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, 8, and 12
	Frequency stability of 10 ppm is completely determined by characteristics of portable UT. Cark kit contains no synthesizer or LO's and provides only amplification of modulated RF signal from UT.					
2.1033 (c) (10)	Description of Circuits/Devices used to Suppress Spurious Radiation, Limit Modulation, or Limit Power					Exhibits 1 and 12
	System utilizes extensive filtering and open and closed loop power control.					
2.1033 (c) (11)	Drawing of Equipment Identification Labels					Exhibit 9
	3 Labels: Located on Bottom of ODU Chassis, Back of GEM box, and Back of Cradle					
2.1033 (c) (12)	Photographs of Equipment showing Equipment Construction and Layout					Exhibit 6
	Included in EMC Test Report, Exhibit 6					

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

Conducted antenna port occupied bandwidth and out of band emissions measurements for low, mid, and high frequency transmit channels are presented in Exhibit 4, which consists of the Compliance Lab Out-of-Band Noise and Spurious Emissions Test Data, the Compliance Lab In-Band Noise and Spurious Emissions Test Data, and also the Maximum antenna gain data. The latter provides the means to estimate an upper bound on antenna radiated emissions levels using the conducted antenna port data. Direct 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 Car Kit.

3.5 DC Supply Voltage and Current

The Car Kit is powered by the vehicle's DC (battery) power distribution, which provides a nominal 12 VDC (10-18 VDC range) at 0.3 to 3 Amperes current draw, 30 Watts maximum load . The Vehicle DC power is stepped down by the GEM power supply to a nominal 8.4 VDC and that DC voltage is routed to the Cradle and UT, and over the special interconnecting coaxial cable to the ODU, which draws up to 1.5 Amperes when transmitting at full power. The power to the ODU power amplifier (PA) passes through multiple switching and analog power regulator stages, and the PA never "sees" any changes in the Car Kit supply voltage. It is thus virtually immune to any effects of voltage fluctuation within the defined DC power voltage input range of the Car kit. Outside that range the Car Kit 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

The Car Kit contains no synthesizer or local oscillators and cannot directly affect the frequency stability of the transmitted RF signal; it only provides amplification of the modulated RF signal from the UT. The frequency stability of the ODU transmit signal is thus determined by the frequency stability of the UT to which it is connected.

All UT 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.

The UT's frequency stability could in-principle be adversely affected by variations in the supply voltage provided to the UT by the Car Kit. But as discussed in Exhibit 8, the voltage variation of the Car Kit power supply output with temperature and input Car Kit voltage variations is within the range required by the UT to maintain its inherent frequency stability.

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 ODU RF Board schematic, block diagram, and parts list in Exhibit 12. Multiple SAW filters are employed in the transmitter (TX) IF and Upconverter stages.

3.9 Maximum Permissible Electromagnetic Field Exposure

Since the Analog 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 ODU 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: CK RAU model GSP2400P, S/N: N1065T4DR

Dates of Test: June 7, 1999

Test Performed by:

Lab. Tech. Donald Gosnell
Engineer: Vince Butsumyo

_____

Exhibit 3 Globalstar Compliance Lab Reverse Link Test Procedures

Exhibit 4 Globalstar Compliance Lab Out-of-Band and In-Band Noise and Spurious Emissions Test Data

Exhibit 5 Globalstar Car Kit EMC Test Plan

Exhibit 6 Globalstar Car Kit EMC Test Report and EMC Lab Color Photos (Internal and External)

Exhibit 7 Car Kit Maximum Permissible Exposure Analysis

Exhibit 8 Car Kit Frequency Stability Data

Exhibit 9 Car Kit FCC Identification Labels

Exhibit 10 Description of the Globalstar System

Exhibit 11 Hands-Free Car Kit Installation/User Guide

Exhibit 12 Car Kit Outdoor Unit (ODU) Drawings

Exhibit 13 GS Car Kit Electronic Module (GEM) Drawings

Exhibit 14 Car Kit Cradle Drawings

Exhibit 15 Portable Antenna Assembly Drawings

Exhibit 16 Car Kit Accessories Drawings