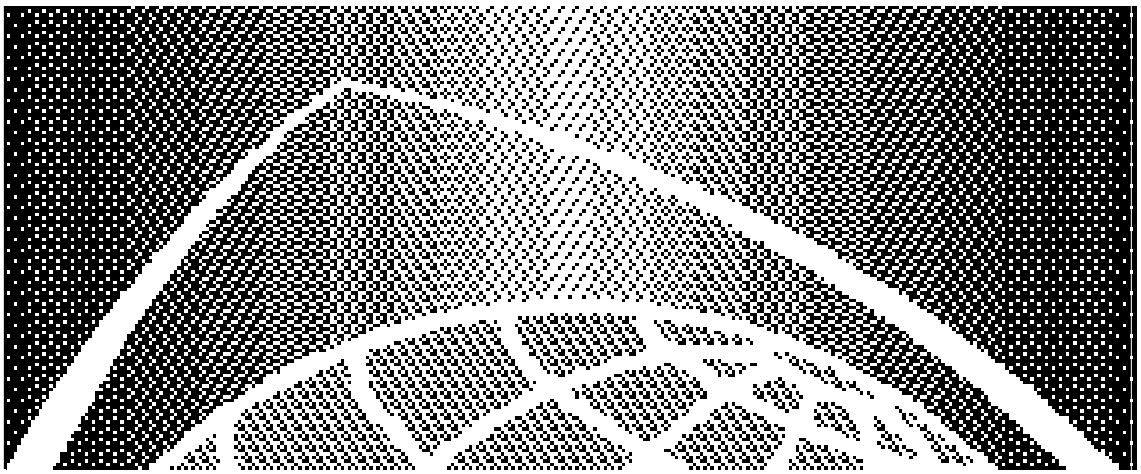
Globalstar™



Globalstar Tri-Mode Portable User Terminal FCC Part 22 and 25 Certification Report FCC ID: J9CGSTM1

80-98830-1 X1

QUALCOMM®

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

Globalstar Tri-Mode Portable User Terminal FCC Part 25 Certification Report
FCC ID: J9CGSTM1

80-98830-1 X1

July 11, 1999

MANUFACTURER

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Document Amendment Record

DATE	DETAILS OF CHANGE (affected pages, etc.)	ISSUE STATUS	MANUFACTURER APPROVAL
7/11/99	Initial Document Release	1	William Moyer

June 30, 1999

Federal Communications Commission
Office of Engineering and Technology

Re: Application for Certification of Globalstar Tri-Mode Portable User Terminal FCC ID No. J9CGSTM1

Gentlepeople:

Enclosed please find the following documentation for your review:

1. FCC Form 731, including the fee processing form, for the Globalstar Tri-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 Parts 2, 22, and 25 of Title 47 of the Code of Federal Regulations Ch. 1 (10-1-98 Edition).

The equipment, QUALCOMM model # GSP 1600, when operating in cellular mode is in full compliance with all parts of EIA/TIA/IS-98-A Mobile Station-Land Station Compatibility Specification, issue July 1996. Information concerning how the cellular phone ESN protection requirements are met is provided in Exhibit 3.

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 Tri-Mode Portable User Terminal (p. 2)

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

Federal Communications Commission July 2, 1999

Reference: FCC ID: J9CGSTM1

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 5, TMP UT GS-Mode Frequency Stability Data
   (File: E.5 TMP GS Freq. Stab.pdf)
2. Exhibit 6, Globalstar Compliance Lab Reverse Link Test Procedure
   (File: E.6 TMP Comp. Lab TP.pdf)
3. Exhibit 7, Globalstar Compliance Lab Globalstar-Mode Out-of-Band Noise and Spurious Emissions Test Data
   (Files: E.7 TMP Noise & Spur TR.pdf, E.7b Max GS Antenna Gain.pdf)
4. Exhibit 8, FCC Part 22 FM AMPS Mode Test Data
   (File: E.8 TMP Cellular Test Proc.pdf)
5. Exhibit 9, FCC Part 22 CDMA Cellular Mode Test Data
   (Files: E.9a TMP Cellular TR.pdf, E.9b TMP AMPS Oc BW.pdf, E.9b TMP CDMA Oc BW.pdf, and E.9d TMP TOLR.pdf)
6. Exhibit 10, Globalstar TMP UT EMC Test Plan
   (File: E.10 GS TMP EMC TP.pdf)
7. Exhibit 11, Globalstar TMP EMC Test Report
   (File: E.11 TMP TUV EMC TR.pdf , and E.11. color photo 1.pdf, E.11 color photo 2.pdf, … , E.11 color photo 12.pdf)
8. Exhibit 12, Radiated Spurious Emissions Test Data for Globalstar, FM AMPS, and CDMA Cellular Modes
   (File: E.12 GS TMP Rad Em TR.pdf)
9. Exhibit 13, TMP UT SAR Test Report
   (Files: E.13 TMP SAR TR.pdf, E.13 SAR figure 1.pdf, E.13 color photo 1.pdf, E.13 color photo 2.pdf, … , E.13 color photo 5.pdf; E.13 color SAR CDMA Mode.pdf, E.13 c SAR AMPS Mode-Left.pdf, E.13 c SAR AMPS Mode-Right.pdf, and E.13 color SAR GS Mode.pdf)
10. Exhibit 14, Description of the Globalstar System
    (File: E.14 Description of GS.pdf)
11. Exhibit 16, Assembly Drawings (File: E.16a 10-70960_X1.pdf, E.16b Supp Assy. Dwgs.pdf, E.16c PL10-70960-3X1.PDF)

12. Exhibit 17, Digital CCA Drawings
    (Files: E.17a 20-81403_X3.PDF, E.17b LD20-81403_X1.PDF, and E.17c PL20-81403-3X1.PDF)
13. Exhibit 18, RF CCA Drawings (Files: E.18a 20-81375_X2.PDF, E.18b LD20-81375_X1.PDF, and E.18c PL20-81375-2X2.PDF)
14. Exhibit 19, Antenna Drawings (Files: E.19a CV90-70766_X7.PDF and E.19b 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	Globalstar TMP UT Electronic Serial Number	22.919
4	FCC Identification Label	2.1033 (c) (11)
5	TMP UT Frequency Stability Data	2.1055
6	Globalstar Compliance Lab Reverse Link Test Procedures	2.947, 2.1051
7	Globalstar Compliance Lab Out-of-Band Noise and Spurious Emissions Test Data	2.1051, 2.1049
8	TMP Terrestrial/Cellular Mode Measurement Procedures and Techniques	2.947, 2.1046-2.1051
9	TMP Part 22 Cellular Mode Test Data	2.947, 2.1046-2.1051, 2.1055
10	Globalstar TMP UT EMC Test Plan	2.947, 2.1053
11	Globalstar TMP UT EMC Test Report	2.1033(c)(12), 2.1053
12	Radiated Spurious Emissions Test Data for AMPS and CDMA Cellular Modes	2.1053
13	Globalstar TMP UT SAR Test Report	1.1310, 2.1093
14	Description of the Globalstar System	2.1033 (c) (6), (13)
15	TMP UT User Guide	2.1033 (c) (3)
16	Assembly Drawing	2.1033 (c) (12)
17	Digital CCA Drawings	2.1033 (c) (12)
18	RF CCA Drawings	2.1033 (c) (12)
19	Antenna Drawings	2.1033 (c) (12)

EXHIBIT 1 GENERAL INFORMATION

1.0 Introduction

This document comprises the FCC Part 22 and 25 Certification Report for Qualcomm's Globalstar Tri-Mode Portable User Terminal (TMP 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; Part 22, Sections 22..917, 22.919, and 22.913; 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 FCC 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, 3, 4, and 15, 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 14, the Tri-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 TMP UT operates in Globalstar satellite mode and in 2 terrestrial cellular modes: FM AMPS and CDMA Cellular. In Globalstar Mode, the UT communicates directly with overhead Globalstar satellites and via those satellites to the nearest Globalstar Gateway and through the Gateway the rest of the network. In terrestrial modes it operates as a typical cellular phone, communicating with the local cellular network base station. The phone can be set to initially scan for cellular service in CDMA or FM AMPS, and then to scan for Globalstar service, or vice versa at the users command. 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 Globalstar phone calls from inside an automobile.

The phone and charger are depicted and described in detail in Exhibit 15 and in the test setup drawings and photographs in Exhibits 10 and 11.

3.0 Summary Technical Description

Table 1 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 Tri-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 in Globalstar mode on any one of the frequency channels defined between 1610 and 1626.5 MHz, as described in Section 3 of Exhibit 14. 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 16, operating in the frequency range from 1610 to 1621.35 MHz.

Note that in Exhibits 7 and 13, the more precise channel index numbers (which are the numbers used in the frequency tuning algorithm and which support a 30 kHz channel frequency resolution) are what are listed for the noise and spurious emissions test data and the SAR test data. Channel index 4 is Channel No. 1 (1610.73 MHz), channel index 250 is Channel No. 7 (1618.11 MHz), channel index 332 is Channel No. 9 (1620.57 MHz), and channel index 496 is Channel No. 13 (1625.49 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.

In terrestrial cellular phone modes (AMPS and CDMA), the UT is capable of transmitting on any of the myriad cellular phone channels between 824 and 849 MHz as defined in TIA/EIA Interim Standard 95 (IS-95), as summarized in Table 2, following.

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:** J9CGSTM1 GLobalstar Tri-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 (Globalstar)	Tx: 1610-1621.35 MHz LHCP Rx: 2483.5-2500 MHz LHCP	-1.1 / -6.0	-23.9	- See Waveform -	Exhibits 1 and 9
	1M25F9W (CDMA Cellular)	Tx: 824.02-848.98 MHz Rx: 869.01-893.97 MHz	-2.2 / -7.0	-25.0	- See Waveform -	
	40K0F8W (FM AMPS) 40K0F1D	Tx: 824.02-848.98 MHz Rx: 869.01-893.97 MHz	-2.2 / -4.0	-10.1	F3E audio modulation via DSP	
25.xxx	**Maximum EIRP toward Horizon:** -29 dBW/4 kHz					Exhibits 1 and 19
2.1033 (c) (13)	**Waveform:**					Exhibits 9 and 14, 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, 17, and 18
	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, 9, and 15
	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, 9, 14, 15, 18, and 19
	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 1, 14, 18, and 19
	System utilizes extensive filtering and open and closed loop power control.					
2.1033 (c) (11)	**Drawing of Equipment Identification Label**					Exhibit 4
	Located on Back of Phone under the battery housing.					
2.1033 (c) (12)	**Photographs of Equipment showing Equipment Construction and Layout**					Exhibit 11
	Included in EMC Test Report, Exhibit 11					

Table 2. Tri-Mode Cellular TX Frequencies

UT Transmit and Receive Channel Frequency Algorithms (30 kHz tuning resolution)

UT Transmit Channel Frequency in MHz:	f.t	= 825.0 + 0.03* N	1 ≤ N ≤ 799	824.01 - 848.97 MHz
		= 825.0 + 0.03* (N - 1023)	990 ≤ N ≤ 1023	

Tri-Mode Portable User Terminal Performance Specification Frequency Channel Assignments

Cellular IS-95 Channels Supported:	1013 - 1023	1 - 311	356 - 644	689 - 694	739 - 777
AMPS Channels Supported:	990 - 1023	1 - 799			

Cellular TX and RX Channel Frequencies and Harmonics

Channel No.	AMPS	CDMA	**Frequency** Fundamental		**Digital/Switching Harmonics** 2nd Harmonic	3rd Harmonic	4th Harmonic	5th Harmonic	**Signal**
			85.38	MHz	170.76	256.14	341.52	426.9	Cellular RX IF
			130.38	MHz	260.76	391.14	521.52	651.9	**TX IF**
			170.76	MHz	341.52	512.28	683.04	853.8	**Cellular RX IF LO**
			260.76	MHz	521.52	782.28	1043.04	1303.8	**TX-IF LO**
990	•		824.01	MHz	1648.02	2472.03	3296.04	4120.05	Cellular TX Ch. 990
	•								
1012	•		824.67	MHz	1649.34	2474.01	3298.68	4123.35	Cellular TX Ch. 1012
1013	•	•	824.7	MHz	1649.4	2474.1	3298.8	4123.5	Cellular TX Ch. 1013
	•	•							
1023	•	•	825	MHz	1650	2475	3300	4125	Cellular TX Ch. 1023
1	•	•	825.03	MHz	1650.06	2475.09	3300.12	4125.15	Cellular TX Ch. 1
	•	•							
311	•	•	834.33	MHz	1668.66	2502.99	3337.32	4171.65	Cellular TX Ch. 311
312	•		834.36	MHz	1668.72	2503.08	3337.44	4171.8	Cellular TX Ch. 312
	•								
355	•		835.65	MHz	1671.3	2506.95	3342.6	4178.25	Cellular TX Ch. 355
356	•	•	835.68	MHz	1671.36	2507.04	3342.72	4178.4	Cellular TX Ch. 356
	•	•							
644	•	•	844.32	MHz	1688.64	2532.96	3377.28	4221.6	Cellular TX Ch. 644
645	•		844.35	MHz	1688.7	2533.05	3377.4	4221.75	Cellular TX Ch. 645
	•								
688	•		845.64	MHz	1691.28	2536.92	3382.56	4228.2	Cellular TX Ch. 688
689	•	•	845.67	MHz	1691.34	2537.01	3382.68	4228.35	Cellular TX Ch. 689
	•	•							
694	•	•	845.82	MHz	1691.64	2537.46	3383.28	4229.1	Cellular TX Ch. 694
695	•		845.85	MHz	1691.7	2537.55	3383.4	4229.25	Cellular TX Ch. 695
	•								
738	•		847.14	MHz	1694.28	2541.42	3388.56	4235.7	Cellular TX Ch. 738
739	•	•	847.17	MHz	1694.34	2541.51	3388.68	4235.85	Cellular TX Ch. 739
	•	•							
777	•	•	848.31	MHz	1696.62	2544.93	3393.24	4241.55	Cellular TX Ch. 777
778	•		848.34	MHz	1696.68	2545.02	3393.36	4241.7	Cellular TX Ch. 778
	•								
799	•		848.97	MHz	1697.94	2546.91	3395.88	4244.85	Cellular TX Ch. 799
			824.01 - 848.97	MHz	Range				Cellular TX Range

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 Globalstar CDMA technology, see Section 4 of Exhibit 14, Description Of The Globalstar System.

3.3 FM AMPS Mode Modulation Techniques

The F3E audio modulation is accomplished using a Digital Signal Processor (DSP. The audio signal is converted to digital samples at an 8 kHz sample rate. The samples are filtered, integrated, interpolated, and phase modulated at a 40 kHz rate. The resulting signal is then decomposed into I and Q signals, oversampled at a 160 kHz rate, and then sent to the digital-to-analog converter after proper filtering. The transmit audio modulation limiting function is performed digitally in the DSP. Pre-emphasis filtering is performed through an infinite impulse response (IIR filter) and the filtering of audio frequencies is performed through a finite impulse response (FIR) filter in the DSP. The combined performance of these filters is shown in Exhibit 9d, in the transmit objective loudness ration (TOLR) data plots depicting the audio frequency response data for the modulated carrier signal. The DSP clocks are phase locked to the reference voltage-controlled TCXO output signal and maintained within a ±2.5 ppm tolerance.

3.4 CDMA Cellular Modulation

The CDMA cellular mode is as defined in the TIA/EIA IS-95 standard. The justification for the 1.25 MHz CDMA channel bandwidth is that the chip rate is 1.228 MHz (refer to page 6-10 of IS-95), and when one looks 3 dB down from the signal one finds that the occupied bandwidth of the channel is 1.25 MHz. CDMA channel spacing is normally set at this 1.25 MHz. Also one can reference baseband filtering requirements (refer to page 6-27 of IS-95, excerpts of which are presented in exhibit 9) for filtering frequency response limits. The effects of the filtering is shown in the TOLR data plot in Exhibit 9. (Note please, that the salient TOLR mask frequency range is from 300 to 3400 Hz and that the apparent low frequency failure is a test artifact of the EEBS test system employed.)

3.5 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 user's signals represent noise to a given user's 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 portable UT operating at maximum power output ranges from 0.2 to 1.0 Watts, with 0.4 Watts being typical.

In FM AMPS and CDMA cellular modes, the maximum nominal effective radiated power (relative to a half-wave dipole) is 27.8 dBm (-2.2 dBW); +2 dB, -4 dB. Under power control, the radiated power increases and decreases in 4 dB steps, with the power ranging from -2 dBW to -22 dBW, and with the above power deviation tolerance maintained at each power step over the operating temperature range, in accordance with the requirements of IS-95.

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

Globalstar mode occupied bandwidth measurements and conducted antenna port out-of-band and spurious emissions test results for low, mid, and high frequency transmit channels are presented in Exhibit 7, Globalstar compliance Lab Out-of-Band Noise and Spurious Emissions Test Data, along with the Globalstar out-of-band antenna gain values. The antenna gain values provide the means to estimate Globalstar mode antenna radiated out-of-band emissions from the conducted antenna port data. Direct Globalstar mode radiated emissions test results are presented in Exhibit 11, where the emissions were compared against and show compliance with the more stringent Part 15 radiated electromagnetic interference (EMI) emissions limits, which apply to the digital control and receiver functions of the portable UT.

Conducted and radiated terrestrial mode (FM AMPS and CDMA) occupied bandwidth and out-of-band emissions data is presented in Exhibits 9 and 12, respectively.

3.7 DC Supply Voltage and Current

The portable UT is powered by a removable rechargeable 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 Exhibits 5, 8, and 9.

3.8 Transmitter Adjustment and Tune-Up Procedure.

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

3.9 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 5 summarizes the Globalstar mode 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.

In AMPS and CDMA cellular modes, the UT receiver monitors the received signal and adjusts the frequency of the voltage-controlled TCXO. This corrects any errors between the UT frequency and the base station transmitter - the UT is locked to the base station.

3.10 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, block diagram, and parts list in Exhibit 18, and in Table 3 below. 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.

Table 3. Spurious Radiation Suppression Devices

Reference Designator	Part Name	Function
FL6	duplexer	Provides protection against transmitter spurious emissions and receiver local oscillator leakages.
FL4	RX SAW filter	Provides protection against receiver local oscillator leakages.
FL5	ceramic filter	Provides suppression of spurious energy and transmitter harmonics.
FL3	TX SAW filter	Provides protection against transmitter spurious emissions.

3.11 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 Tri-Mode Portable UT is presented in Exhibit 13. Because the Globalstar antenna is located above the back of the phone body and away from the head of the user, the Globalstar mode SAR levels are markedly low, in comparison with typical physically-smaller cellular phones. Exhibit 13 presents SAR test data for each of the 3 modes of TMP UT operation, with varying combinations of terrestrial and Globalstar antennas extended and retracted.

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, and by the local TUV Product Service as indicated in Exhibit 12.

Equipment Tested: TMP UT, Model GSP-1600, S/N: N1061N71C

Dates of Test: April 20-22, 1999

Part 25 Tests Performed by:

Engineer: William Moyer

_____

Dates of Test: June 28, 1999 - July 5, 1999

Part 22 Tests Performed by:

Engineer: John Forrester

_____

Exhibit 3 Globalstar TMP UT Electronic Serial Number

The Globalstar Tri-Mode UT, FCC ID: J9CGSTM1 uses an electronic serial number (ESN) in accordance with the ESN requirements of Part 22, Section 22.919. The ESN is an unique identification number assigned to each TMP UT, which is stored in the boot blocks of the UT's Flash memory, and which is transmitted to the cellular base station whenever a call is placed.

The ESN is isolated from fraudulent contact and tampering. Any attempt to change the ESN will render the TMP UT inoperative.

Exhibit 4 FCC Identification Label

Exhibit 5 Globalstar TMP UT Frequency Stability Data

Exhibit 6 Globalstar Compliance Lab Reverse Link Test Procedures

Exhibit 7 Globalstar Compliance Lab Out-of-Band Noise and Spurious Emissions Test Data

Exhibit 8 TMP Terrestrial / Cellular Mode Measurement Procedures and Techniques

Exhibit 9 TMP Part 22 Cellular-Mode Test Data

Exhibit 10 Globalstar TMP UT EMC Test Plan

Exhibit 11 Globalstar TMP UT EMC Test Report

Exhibit 12 Radiated Spurious Emissions Test Data for AMPS and CDMA Cellular Modes

Exhibit 13 Globalstar TMP UT SAR Test Report

Exhibit 14 Description of the Globalstar System

Exhibit 15 TMP UT Deskset User Guide

Exhibit 16 Assembly Drawing

Exhibit 17 Digital CCA Drawings

Exhibit 18 RF CCA Drawings

Exhibit 19 Antenna Drawings