MEASUREMENT AND TECHNICAL REPORT

ORTEL CORPORATION
2015 West Chestnut Street
Alhambra, CA 91803

DATE:
September 1998

This Report Concerns:	Original Grant: X	Class II Change:
Equipment Type:	System 5800 Next Generation (Includes Model 5821A Fiberoptic Transceiver and Model 5851A fiberoptic Antenna)	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: **Defer until:**	No: X
Company Name **agrees to notify the Commission by:**	N/A	
of the intended date of announcement of the product so that the grant can be issued on that date.		
Transition Rules Request per 15.37?	Yes:	*No:

(*) FCC Part 2, Paragraphs 2.985, 2.989, , 2.991 and 2.993; and Part 24, Paragraph 24.238

Report Prepared by:

TÜV PRODUCT SERVICE
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 619 546 3999
Fax: 619 546 0364

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1 GENERAL INFORMATION

1.1 Product Description

System 5800 Next Generation (Includes Model 5821A Fiberoptic Transceiver and Model 5851A fiberoptic Antenna)

Components of EUT			
Description	Model No.	Serial No.	FCC ID No.
Transceiver Plug-in	5821A	96020	--
RF Splitters 2x1	5832A	94148	--
RF Combiners 2x1	5842A	90149	--
Amps Antenna	5851A-510	97033	--
Chassis with 110 V Power supply	5899A		

OPERATING MODE(S):	Uplink/Downlink
EUT CONFIGURATIONS:	A hub may have 1 to 8 transceiver plug ins in a rack. The rack consists of a power supply, one RF power splitter, and one RF power combiner.
POWER INTERFACE	
FREQUENCY/AC/DC VOLTAGE:	60 Hz/120 Vac
PHASES/CURRENT:	1/--
OSCILLATOR FREQUENCIES:	66.6666 MHz on transceiver for alarm signal
POWER SUPPLY	110 W Power supply (12V), Phi Hong, Model PSA-110-112; Switching frequency 50 kHz.
POWERLINE FILTER: MODEL #:	N/A
DESCRIPTION OF ENCLOSURE:	Antenna unit: plastic radome; hub - plug in modules

CRITICAL EMI COMPONENTS:			
Description	Model #	Serial #	Quantity/Location
N/A			

INTERFACING AND/OR SIMULATORS PERIPHERAL EQUIPMENT:	See Components of EUT and Appendix H, Block Diagram of EUT.
I/O PORTS:	

Name of Line	Type of Line	Cable Length	Status of Line	Kind of Transmission
Antenna	Fiber optic			
Downlink input		0-2km	☐ Passive ■ Active	■ Analog ☐ Digital
Uplink output	Fiber optic	0-2km	☐ Passive ■ Active	■ Analog ☐ Digital
Antenna (RF)	☐Shielded ■Unshielded	N/A	■ Passive ☐ Active	■ Analog ☐ Digital
Transceiver	Fiber optic			
Downlink output		0-2km	☐ Passive ■ Active	■ Analog ☐ Digital
Uplink input	Fiber optic	0-2km	☐ Passive ■ Active	■ Analog ☐ Digital
Downlink input (RF)	■Shielded ☐Unshielded	*	■ Passive ☐ Active	■ Analog ☐ Digital
Uplink output (RF)	■Shielded ☐Unshielded	*	■ Passive ☐ Active	■ Analog ☐ Digital
Splitter/Combiner				
Input or output-splitter/combiner	■Shielded ☐Unshielded	**	■ Passive ☐ Active	■ Analog ☐ Digital

(*) N or SMA connector
(**) RF (N or SMA)

1 GENERAL INFORMATION (continued)

1.2 Related Submittal/Grant

None

1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the ANSI C63.4 setup.

Test Performed:

x 1. Conducted Emissions, FCC Part 2, Paragraphs 2.985, 2,989, 2.991 & Part 24, Paragraph 24.238
2. Radiated Emissions, EN55022: 1992 Class B limit, 30 - 1,000 MHz, 10 meters
x 3. Radiated Emission per FCC Part 2, Paragraph 2.993, 1 - 10 GHz
4. Engineering evaluations

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV PRODUCT SERVICE
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 619 546 3999
Fax: 619 546 0364

The Test Site Data and performance comply with ANSI 63.4 and are registered with the FCC, 7435 Oakland Mills Rd, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

1.6 Part 2 Requirements

Occupied Bandwidth: **160 kHz**
Production Quantity: **Antenna (5851A) - 20 units a month**
Transceiver (5821A): 10 units per month

Power Rating 2.983(d)(4)	**See next page**
Function of Active Circuit Devices 2.983(d)(6)	**“**
Schematics 2.983(d)(7)	**Attached**
User Manual 2.983(d)(8)	**“**
Photograph, Internal 2.983(g)	**“**
Photograph, External 2.983(g)	**“**
BOM	**“**
Product Specifications	**“**

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FCC Type Acceptance
FCC Part 2, Paragraph 2.983

1. Name of applicant: Ortel Corporation
2. Identification of equipment:
   Series 5800 Next-Generation Cellular
   Model 5821A Fiberoptic Transceiver
   Model 5851A Fiberoptic Antenna
3. FCC identifier: LB45800NG
4. 1 fiberoptic link consists of 1 transceiver and 1 receiver
5. A sample FCC ID label: see attached
6. Technical description
   a. Types of emission: RF
   b. Frequency range:
      Up Link: 824 MHz to 849 MHz
      Down Link: 869 Mhz to 894 MHz
   c. Range of Operating Power values: RF: 5 – 7 dBm
   d. Maximum power rating:
      DC: 9 W
      RF: +7dBm composite
   e. DC voltages: +9V
      DC currents: 95 mA
   f. Function of each electron tube or semiconductor or other active circuit device
      - Voltage Current Regulator
      - RF Amplification
      - Oscillator at 66.666MHz
      - Noise Circuit
      - Laser 1310nm wavelength
      - Photodiode
   g. Circuit diagrams and schematic: see attached
   h. Operating manual: provided
   i. Tune-up procedure over the power range
      No tuning required
   j. Description of all circuitry and devices provided for determining and stabilizing frequency
      - Diplexer
      - Band Pass Filter
   k. Description of circuits or devices employed for suppressions of spurious radiation, for limiting modulation, and for limiting power
      - Diplexer
      - Band Pass Filter
      - RF Shielding
   l. For equipment employed digital modulation techniques:
      Description of the modulation system used, including the response characteristics (frequency, phase and amplitude) of any filters provided
      Description of the modulating wavetrain, shall be submitted for the maximum rated conditions under which the equipment will be operated.
      Model 5800 does not add any modulation to the original signal.

2 PRODUCT LABELING

Attached

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The System 5800 Next Generation (Includes Model 5821A Fiberoptic Transceiver and Model 5851A fiberoptic Antenna) was initially tested for FCC emission in the following configuration:

See Block Diagram, attached.

3.2 EUT Exercise Software

None

3.3 Special Accessories

None

3.4 Modification

None

3.5 Configuration of Tested System

See Block Diagram, attached.

4 BLOCK DIAGRAM of System 5800 Next Generation (Includes Model 5821A Fiberoptic Transceiver and Model 5851A fiberoptic Antenna)

4.1 Block Diagram Description

System 5800 Next Generation (Includes Model 5821A Fiberoptic Transceiver and Model 5851A fiberoptic Antenna)

See attached.

5 CONDUCTED MEASUREMENT PHOTOS, DATA, EQUIPMENT LIST, etc.

Attached.

6 RADIATED MEASUREMENT PHOTOS, DATA, EQUIPMENT LIST, etc.

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REPORT No: S-7468 SPEC: Part 2, Paragraph 2.993

CUSTOMER: Ortel TEST DIST: 3m

E U T: System 5800 Next Generation * TEST SITE: Site 3

EUT MODE: Normal operation ANTENNA: EMCO 3115 #251

DATE: Dec 4 97 OPERATOR: dm

NOTES: EUT high, mid and low frequency. Fundamentals: 869MHz, 881.48MHz and 894 MHz
peak measurements with: RBW=100MHz VBW=100MHz
Power input 120V 60 Hz
No measurable emissions above 4th harmonic at 3 meter distance.
(*) Includes Model 5821A Fiberoptic Transceiver and Model 5851A Fiberoptic Antenna.

FREQ (MHz)	VERTICAL (dBuv) pk	av	HORIZONTAL (dBuv) pk	av	ANT FACTOR (dB/m)	COAX 1 LOSS (dB)	COAX 2 LOSS (dB)	TOTAL CORRECTION (dB/m)	MAX LEVEL (dBuV/m) pk	av	SPEC LIMIT pk	av	EUT MARGIN pk	av
869	76.3		67.8											
1737.7	30.2		9.5		28	1.9	3.2	33.1	63.3		84	64	-21	
2606.98	2.7		0.6		31.5	2.2	3.9	37.6	40.3		84	64	-44	
3475.96	-6		-5.8		33	2.7	4.6	40.3	34.5		84	64	-50	
4344.9														
881.48	77.3		66.8											
1762.9	30.1		10.1		28	1.9	3.2	33.1	63.2		84	64	-21	
2644.5	3.7		1.3		31.5	2.2	3.9	37.6	41.3		84	64	-43	
3525.9	-7.6		-8.5		33	2.7	4.6	40.3	32.7		84	64	-51	
4407.4														
894	77.9		69.5											
1787.9	31.7		11.1		28		3.2	31.2	62.9		84	64	-21	
2681.9	2.9		3.2		31.5		3.9	35.4	38.6		84	64	-45	
3575.9	-3.8		-6.6		33		4.6	37.6	33.8		84	64	-50	
4469.9														

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz - 18 GHz were performed in a horizontal and vertical polarization at the following test location :

☐ **- Test not applicable**

■ - Roof (Small Open Area Test Site)
☐ - Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego
☐ - Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

Testing was performed at a test distance of:

☐ - 1 meters
■ - 3 meters
☐ - 10 meters

Test Equipment Used :

	Model Number	Manufacturer	Description	Serial Number	Prop. No.
☐ -	8566B	Hewlett Packard	Spectrum Analyzer	2311A02209	407
■ -	85662B	Hewlett Packard	Spectrum Analyzer Display	2309A04682	406
☐ -	3115	EMCO	Antenna, Double Ridge Guide	9412-4363	453
■ -	3115	EMCO	Antenna, Double Ridge Guide	2495	251
☐ -	AFD3-0102-13-ST	Miteq, Inc.	Pre-Amplifier (38 dB gain), 1 to 2 GHz	16429	366
■ -	AFD3-0208-40-ST	Miteq, Inc.	Pre-Amplifier (30 dB gain), 2 to 8 GHz	155382	367
☐ -	AFS4-08001800-70-10P-4	Miteq, Inc.	Pre-Amplifier (22 dB gain), 8 to 18 GHz	167	368
☐ -	91888-2	Eaton	Horn Antenna (1 to 2 GHz)	101	252
☐ -	91889-2	Eaton	Horn Antenna (2 to 3.6 GHz)	101	253
☐ -	91892-1	Eaton	Reflector Antenna (3.6 to 18 GHz)	--	254
☐ -	94613-1	Eaton	Horn Antenna (3.6 to 7.6 GHz)	--	255
☐ -	91891-2	Eaton	Horn Antenna (7.3 to 12 GHz)	--	256
☐ -	94614-1	Eaton	Horn Antenna (12 to 18 GHz)	--	257

Remarks: Equipment for 2.993 data.

8.2 Field Strength Calculation

If a preamplifier was used during the Radiated Emission Testing, it is required that the amplifier gain must be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna , cable used and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. In the automatic measurement, these considerations are automatically presented as a part of the print out. In the case of manual measurements and for greater efficiency and convenience, instead of using these correlation factors for each meter reading, the specification limit was modified to reflect these correlation factors at each frequency value so that the meter readings can be compared directly to the modified specification limit. This modified specification limit is referred to as the "Corrected Meter Reading Limit" or simply the CMRL, which is the actual field strength present at the antenna. The quantity can be derived in the following manner:

Corrected Meter Reading Limit (CMRL) = SAR + AF + CL - AG - DC

Where, SAR = Spectrum Analyzer Reading
AF = Antenna Factor
CL = Cable Loss
AG = Amplifier Gain (if any)
DC = Distance Correction (if any)

Assume the following situation: A meter reading of 29.4 dBuV was obtained from a Class A computing device measured at 83 MHz. Assume an antenna factor of 9.2 dB, a cable loss of 1.4 dB and amplifier gain of 20.0 dB at 83 MHz. The final field strength would be determined as follows:

CMRL = 29.4 dBuV + 9.2dB = 1.4 dB - 20 dB/M - 0.0 dB

CMRL = 20.0 dBuV/M

This result is well below the FCC and CSA Class A limit of 29.5 dbuV/m at 83 MHz.

For the manual mode of measurement, a table of corrected meter reading limit was used to permit immediate comparison of the meter reading to determine if the measure emission amplitude exceeded the specification limit at that specific frequency.

9 SUMMARY:

All tests according to CFR 47, Part 2, Paragraph 2.993.

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements of CFR 47, Part 2, Paragraph 2.993.

☐ - **Does not** fulfill the general approval requirements of CFR 47, Part 2, Paragraph 2.993.

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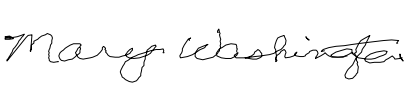
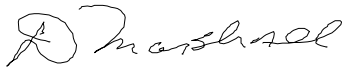
- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:



Mary Washington
(EMC Engineer)

Responsible Test Engineer:



Dave Marshall
(EMC Test Engineer)