Nemko Test Report:	1L0263RUS1
Applicant:	ALLEN TELECOM 140 Vista Center Dr. Forest, Virginia 24551
Equipment Under Test: (E.U.T.)	DUAL BAND BRITECELL FAST SYSTEM
In Accordance With:	FCC Part 22, Subpart H Cellular Band Repeaters
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, TX 75057-3136
Authorized By:	Tom Tidwell, RF Group Manager
Date:	7/16/01
Total Number of Pages:	52

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

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FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

Section 1. Summary of Test Results

Manufacturer: ALLEN TELECOM

Model No.: DUAL BAND BRITECELL FAST SYSTEM

Serial No.: NONE

General: All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 22, Subpart H.

New Submission	Production Unit
Class II Permissive Change	Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data".

NVLAP

NVLAP LAB CODE: 100426-0

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FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

Summary Of Test Data

	PARA. NO.			
RF Power Output	22.913(a)	500W ERP	< 500W ERP	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Mask	Plot	Complies
Occupies Bandwidth (Wideband Data)	22.917(d)	Mask	Plot	Complies
Occupied Bandwidth (ST)	22.917(d)	Mask	Plot	Complies
Occupied Bandwidth (Digital)	None	None	Plot	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	< -13dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	< -13dBm	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

Footnotes: E.U.T is an F1 to F1 repeater. Frequency stability was not measured

Measurement uncertainty for each test configuration is expressed to 95% probability.

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Section 2. General Equipment Specification

Supply Voltage Input:	- 48 VDC	
Frequency Range: Downlink:	869 – 894 MHz	
Frequency Range: Uplink:	824 – 849 MHz	
		CDPD AMPS (F9W) (F8W, F1D)
Output Impedance:	50 ohms	
Downlink: RF Output (Rated):	1 Carrier 19 dBm 2 Carriers 14 dBm 3 Carriers 12 dBm 4 Carriers 11 dBm	
Frequency Translation:	F1-F1 F1-F2	N/A
	Duplexer Software Change	Fullband Coverage

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Description of Operation

BRITECELLTM FAST is a plug and play BriteCell kit, offering the most suitable solution for indoor coverage in small areas, thanks to its compactness and absolute easiness to install. The package includes up to four compact RF remote transceivers (TFAF), driven by one local distribution unit (TFLF). It is available in various frequency ranges (from 800MHz up to 2200 MHz), as a single band product. It is aimed to satisfy the requirements of 2 nd and 3 rd generation mobile networks for simple coverage needs.

The TFLF local unit has been properly designed into a stand-alone mechanical case, including all required ancillary and support functions. The kit includes also four standard TFAF Remote units and a compound fiber-copper cable to connect them to local unit. The installed units can be lately kept also in case of system expansion to a fully modular BriteCell configuration, both single band or dual band, with a minimum setting effort. Both TFL and TFA can be optionally hosted into TKA mounting kits, allowing outdoor installation if required.

System Diagram

BTS

Local
Unit

Hived 6 precupper cable
Remote
Unit

Mixed 6 precupper cable
Remote
Unit

Mixed 6 precupper cable
Remote
Unit

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Limit
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FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

Section 3. RF Power Output

NAME OF TEST: RF Power Output PARA. NO.: 2.1046

TESTED BY: Chinda Poy DATE: 6/28/01

Test Results: Complies.

Test Data:

	Modulation Type	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Uplink	AMPS	N/A	N/A
Downlink	AMPS	13.4 dBm	16.4 dBm
Uplink	CDMA	N/A	N/A
Downlink	CDMA	14.76 dBm	17.76 dBm
Uplink	NADC	N/A	N/A
Downlink	NADC	19.8 dBm	22.8 dBm

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

Temperature: 24 °C

Relative 30 %

Humidity:

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (Digital Mod.) PARA. NO.: 2.1049

TESTED BY: Chinda Poy DATE: 6/28/01

Test Results: Complies.

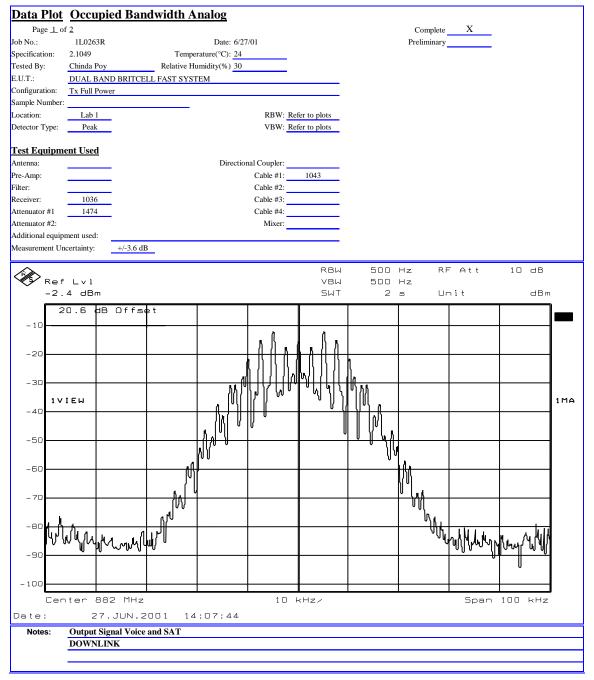
Test Data: See attached plots

Equipment Used: 1036-1474-1043

Measurement Uncertainty: +/- 1.7 dB

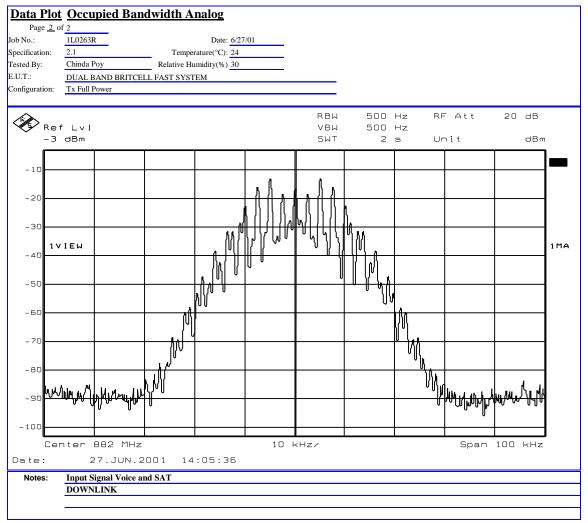
FCC ID: PROJECT NO.: 1L0263RUS1

Test Data --- Occupied Bandwidth - Voice



FCC ID: PROJECT NO.: 1L0263RUS1

Test Data --- Occupied Bandwidth - Voice

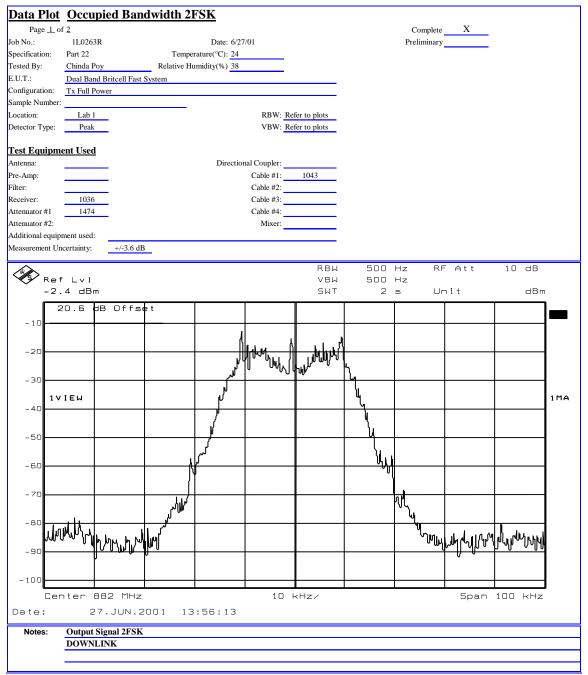


FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

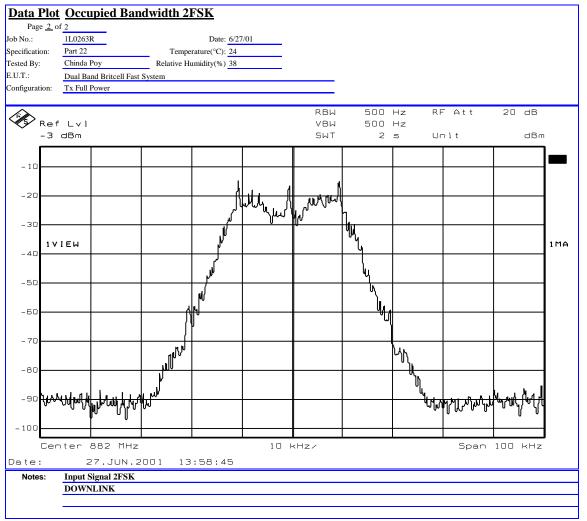
FCC ID: PROJECT NO.: 1L0263RUS1

Test Data --- Occupied Bandwidth - 2FSK



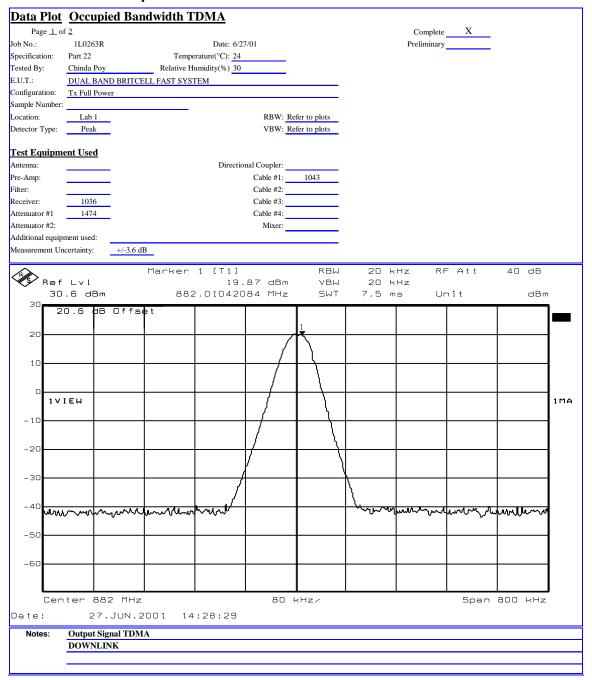
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Test Data --- Occupied Bandwidth - 2FSK



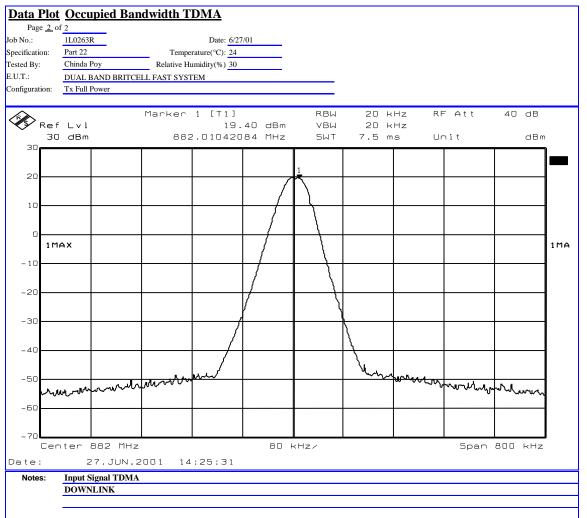
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Test Data --- Occupied Bandwidth - TDMA



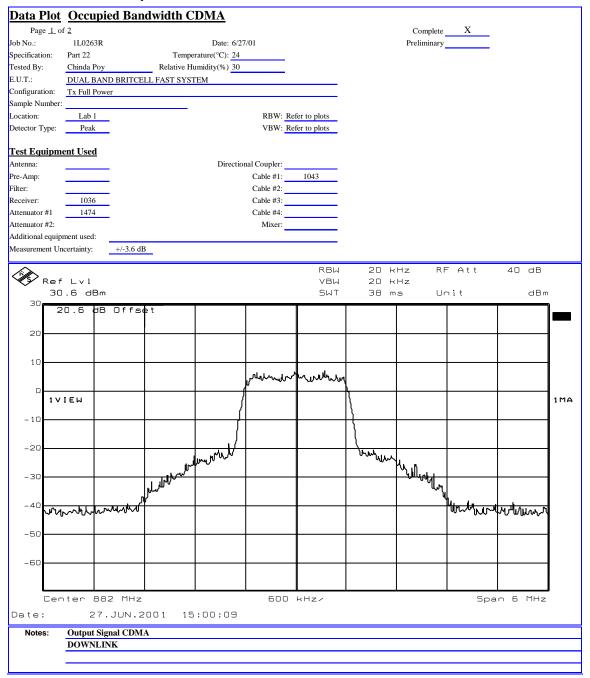
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Test Data --- Occupied Bandwidth - TDMA



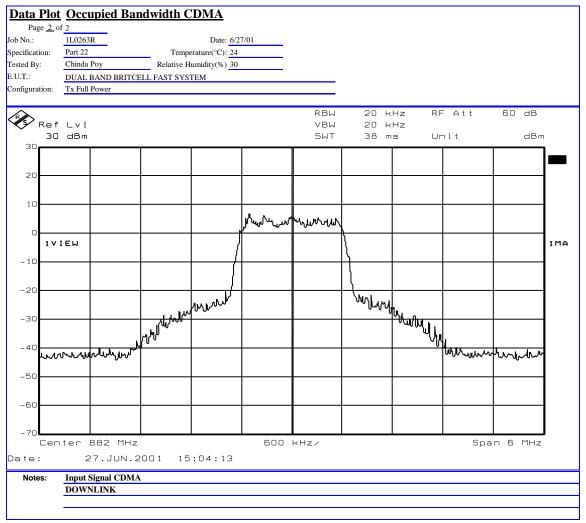
FCC ID: PROJECT NO.: 1L0263RUS1

Test Data --- Occupied Bandwidth - CDMA



FCC ID: PROJECT NO.: 1L0263RUS1

Test Data --- Occupied Bandwidth - CDMA



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CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals PARA. NO.: 2.1051

TESTED BY: Chinda Poy DATE: 6/28/01

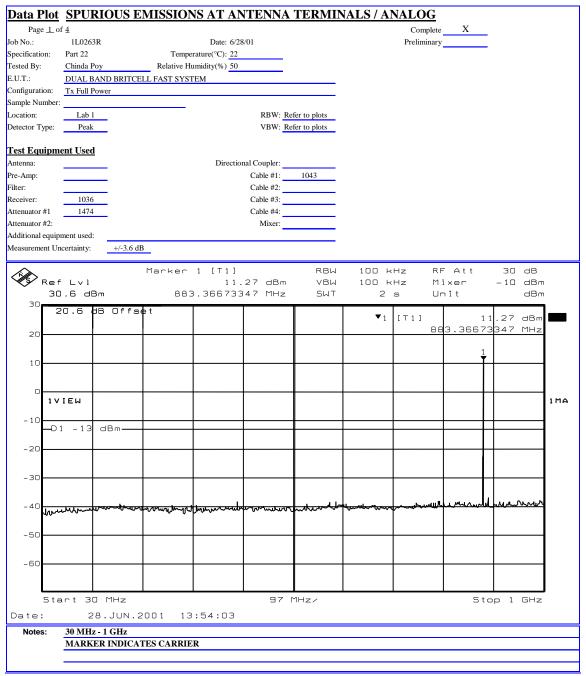
Test Results: Complies.

Test Data: See attached plots

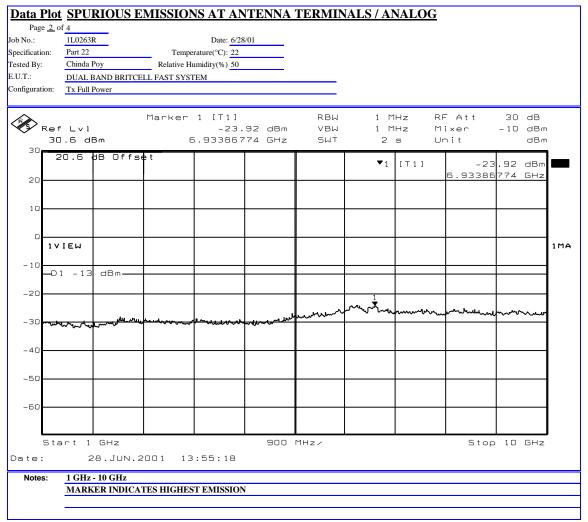
Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.6 dB

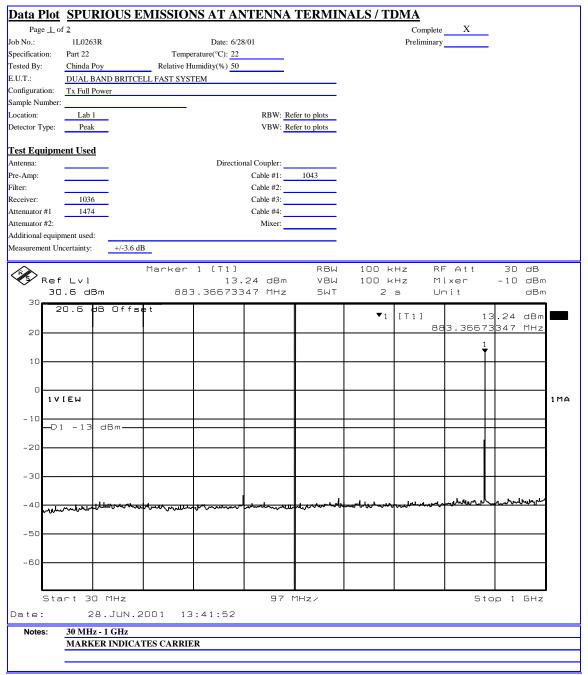
FCC ID: PROJECT NO.: 1L0263RUS1



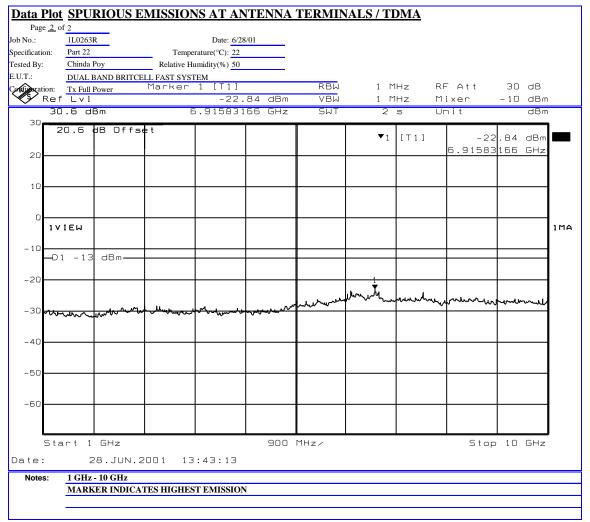
FCC ID: PROJECT NO.: 1L0263RUS1



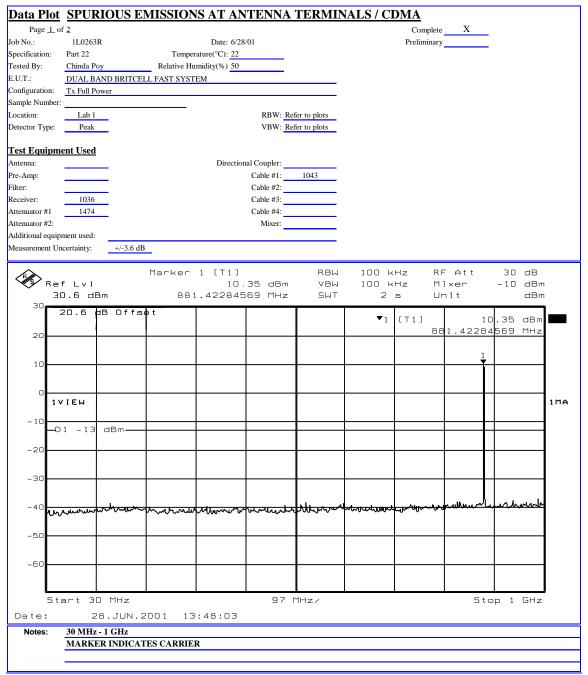
FCC ID: PROJECT NO.: 1L0263RUS1



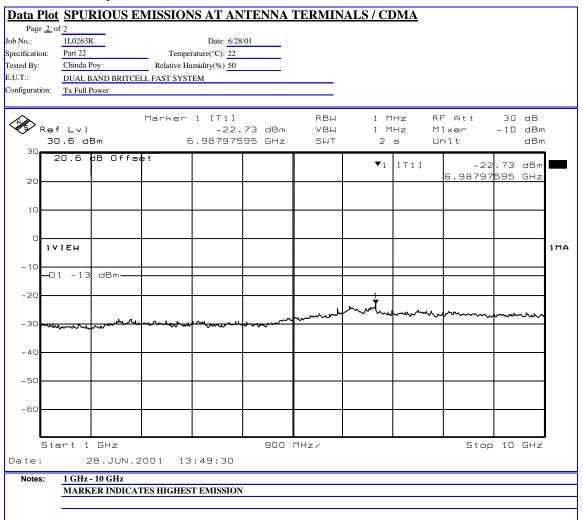
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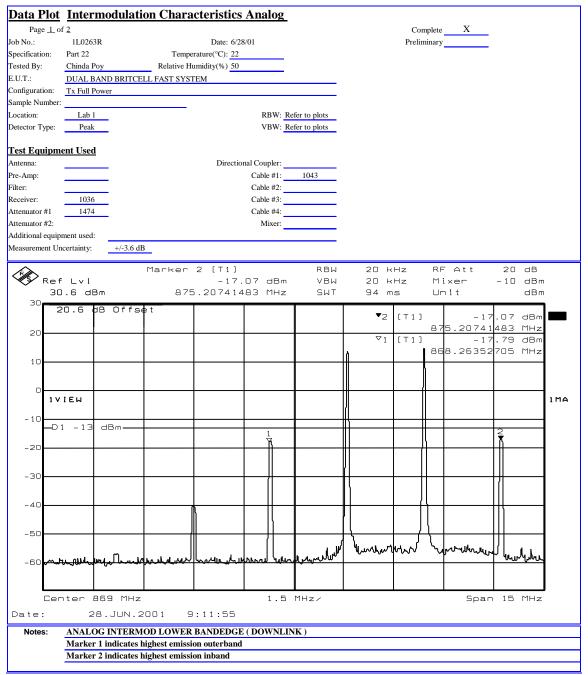
FCC ID: PROJECT NO.: 1L0263RUS1



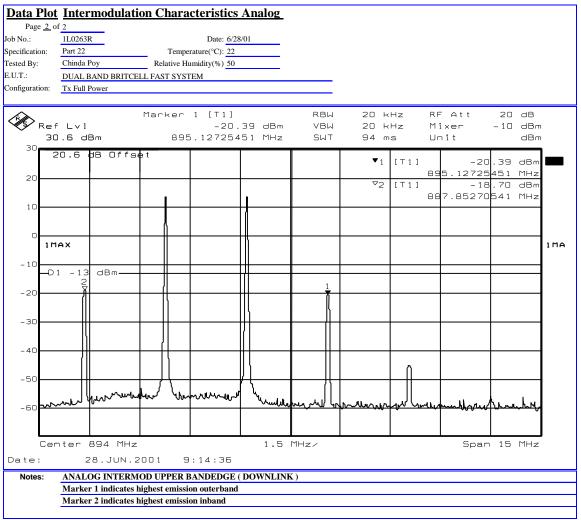
FCC ID: PROJECT NO.: 1L0263RUS1



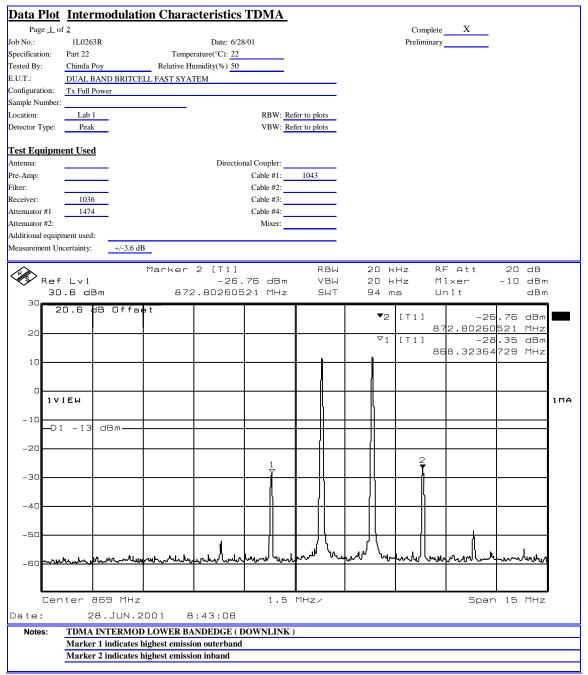
FCC ID: PROJECT NO.: 1L0263RUS1



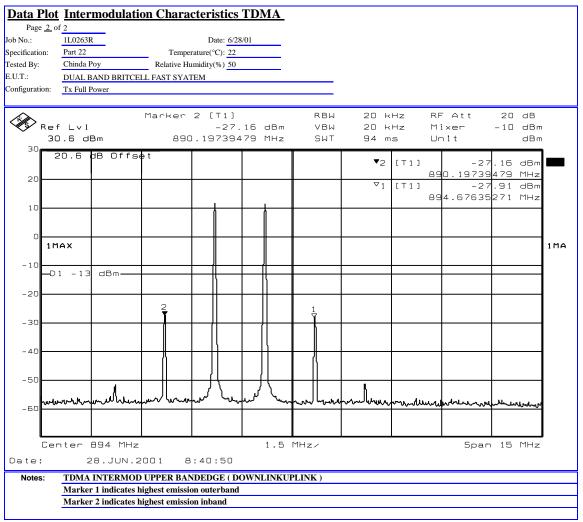
FCC ID: PROJECT NO.: 1L0263RUS1



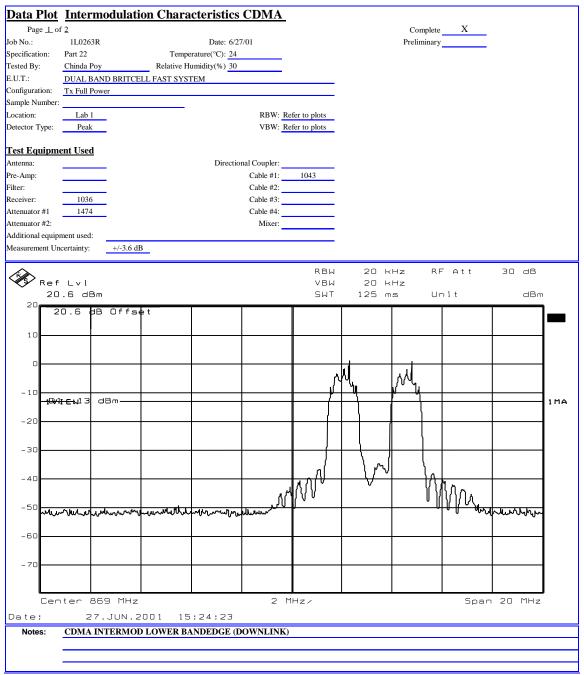
FCC ID: PROJECT NO.: 1L0263RUS1



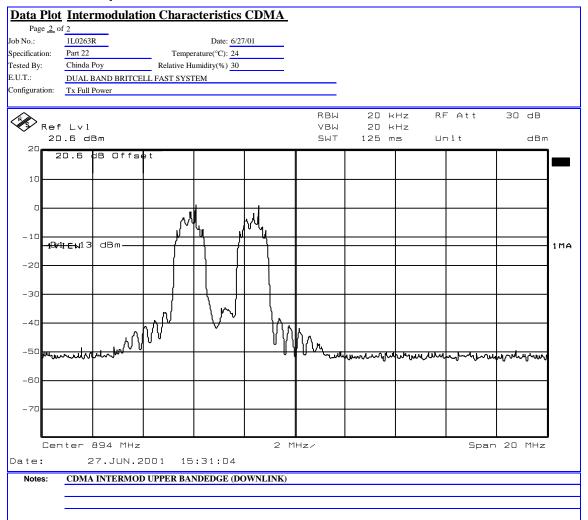
FCC ID: PROJECT NO.: 1L0263RUS1



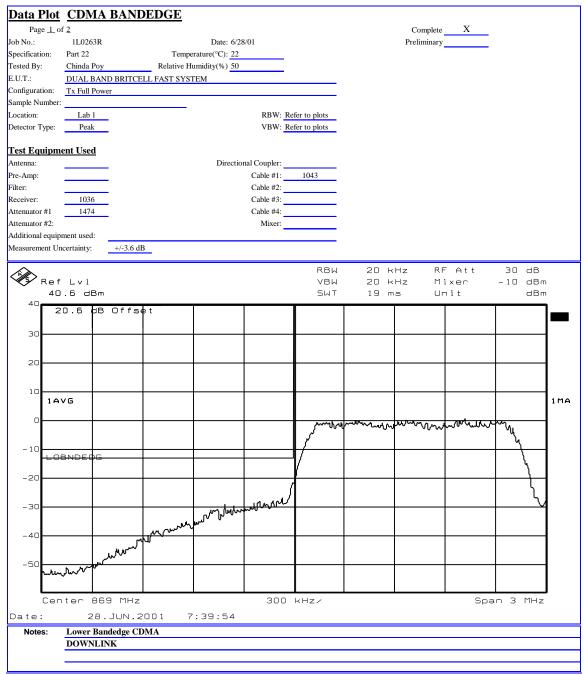
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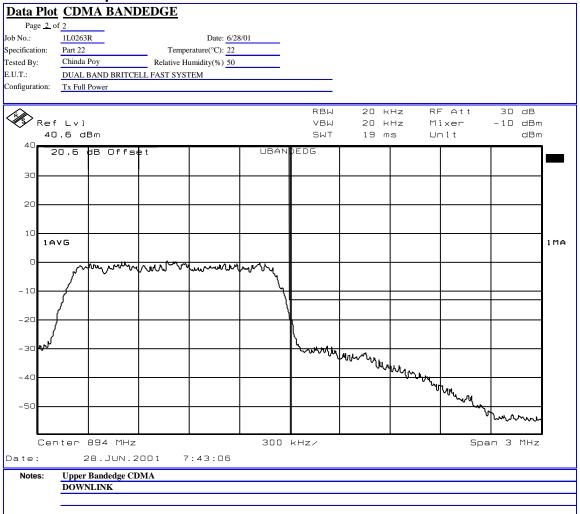
FCC ID: PROJECT NO.: 1L0263RUS1



FCC ID: PROJECT NO.: 1L0263RUS1



FCC ID: PROJECT NO.: 1L0263RUS1



FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious PARA. NO.: 2.1053

TESTED BY: Chinda Poy DATE: 6/28/01

Test Results: Complies.

Test Data: See attached table.

Equipment Used: 1464-1046-1484-1485

Measurement Uncertainty: +/- 3.6 dB

FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

Test Data -- Field Strength of Spurious Emissions



Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057

Tel: (972) 436-9600 Fax: (972) 436-2667

Nemko Dallas, Inc.

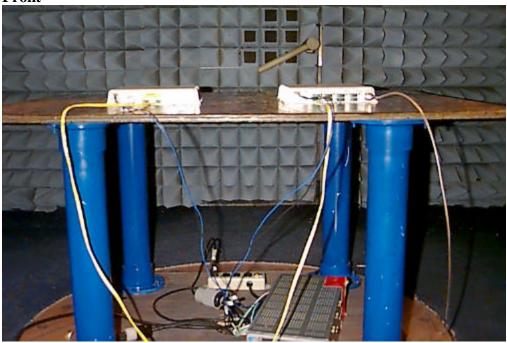
		Field Strength of Spurious E	missions	
Page <u>1</u> of	1		Complete X	
Job No.:	1L0263R	Date: 6/29/01	Preliminary	
Specification:	PART 22	Temperature(°C): 24		
Tested By:	Chinda Poy	Relative Humidity(%) 48		
E.U.T.:	DUAL BAN	ND BRITCELL FAST SYSTEM		
Configuration:	TX FULL P	OWER		
Sample Number:				
Location:	AC 2	RBW: 1 MHz	Measurement	
Detector Type:	Peak	VBW: 1 MHz	Distance 3	
		Test Equipment Used		
Antenna:	993	Directional Coupler: #N/A		
Pre-Amp:	1016	Cable #1: 1046		
Filter:	#N/A	Cable #2:1484		
Receiver:	1036	Cable #3:1485		
Attenuator #1	#N/A	Cable #4: #N/A		
Attenuator #2:	#N/A	Mixer: #N/A		
Additional				
equipment used:				
Measurement				
Uncertainty:	+/7 dB			

Frequency (GHz)	Meter Reading (dBm)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Conversion Factor	Corrected Reading (dBuV/m)	ERP (mW)	EIRP (dBm)	Polarity	Comments
1764.00	-60.67	24.3	3	33.3		-67	0.000000	-161.90	Н	Noise Floor
2646.00	-59.17	29	3.3	33.8		-61	0.000000	-155.90	Н	Noise Floor
3528.00	-61.33	29.9	3.8	33.6		-61	0.000000	-156.46	Н	Noise Floor
4410.00	-60.83	32	4.4	33.8		-58	0.000000	-153.46	Н	Noise Floor
5292.00	-62.33	33.8	4.7	33.3		-57	0.000000	-152.36	Н	Noise Floor
6174.00	-62.67	34.4	5.3	32.7		-56	0.000000	-150.90	Н	Noise Floor
7056.00	-62	35.7	5.8	32.8		-53	0.000000	-148.53	Н	Noise Floor
7938.00	-61.5	37.8	6.5	33.7		-51	0.000000	-146.13	Н	Noise Floor
8820.00	-61	37	6.9	34.3		-51	0.000000	-146.63	Н	Noise Floor
1764.00	-60.5	24.3	3	33		-66	0.000000	-161.43	V	Noise Floor
2646.00	-61	29	3.3	33.8		-63	0.000000	-157.73	V	Noise Floor
3528.00	-60.3	29.9	3.8	33.6		-60	0.000000	-155.43	V	Noise Floor
4410.00	-62.5	32	4.4	33.8		-60	0.000000	-155.13	V	Noise Floor
5292.00	-62.67	33.8	4.7	33.3		-57	0.000000	-152.70	V	Noise Floor
6174.00	-63.17	34.4	5.3	32.7		-56	0.000000	-151.40	V	Noise Floor
7056.00	-61.5	35.7	5.8	32.8		-53	0.000000	-148.03	V	Noise Floor
7938.00	-62	37.8	6.5	33.7		-51	0.000000	-146.63	V	Noise Floor
8820.00	-61.67	37	6.9	34.3		-52	0.000000	-147.30	V	Noise Floor
Notes:				8	882 MHz / SCA	NNED TO T	HE 10TH HAI	RMONIC		

FCC ID: PROJECT NO.: 1L0263RUS1

Photos – Field Strength of Spurious Emissions

Front



Rear



FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

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Section 7. Frequency Stability

Test Data: See attached table.

Standard Test Frequency: MHz

Standard Test Voltage:

Equipment Used:

Measurement Uncertainty: +/- 1 x 10⁻⁷ ppm

Temperature: °C

Relative %

Humidity:

FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

Section 8. Test Equipment List

ASSET	Description	Manufacturer Model Number	Serial Number	Cal. Date	Cal. Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99	06/14/01
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/02/02
1474	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W2	NONE	CBU	N/A
1043	Flexable cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	01/29/01	01/29/02
1046	Flex cable 1m	Astrolab Inc. 32022-2-29094K-1M	N/A	01/29/01	01/29/02
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	05/25/00	05/25/01
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	06/01/01	06/01/02

Nemko Dallas FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

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ANNEX A - TEST DETAILS

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FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

NAME OF TEST: RF Power Output PARA. NO.: 2.1046

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP)

of base transmitters and cellular repeaters must not exceed 500

watts.

Method Of Measurement:

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi$ $R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E =the maximum measured field strength in V/m

R =the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

NAME OF TEST: Occupied Bandwidth (Voice & SAT) PARA. NO.: 2.1049

Minimum Standard: 22.917(c) The mean power of any emission removed from the

carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as

follows:

(i) On any frequency removed from the carrier frequency by more than 12 kHz but not more than 20 kHz:

at least 117 $\log (f_d/12)$

(ii) On any frequency removed from the carrier frequency by more than 20 kHz, up to the first multiple of the carrier frequency:

at least 100 log ($f_d/11$) dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz VBW: ≥ RBW Span: 100 kHz Sweep: Auto

Input Signal Characteristics (F3E/F3D):

RF level: Maximum recommended by manufacturer

AF1 frequency: 6 kHz

AF1 level: sufficient to produce 2 kHz deviation

AF2 frequency: 2.5 kHz

AF2 level: sufficient to produce 12 kHz deviation.

FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

NAME OF TEST: Occupied Bandwidth (WB Data) PARA. NO.: 2.1049

Minimum Standard: 22.917(c) The mean power of any emission removed from the

carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as

follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz VBW: ≥ RBW Span: 200 kHz Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer AF1 frequency: 10 kHz, random bit sequence AF1 level: sufficient to produce 8 kHz deviation

FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

NAME OF TEST: Occupied Bandwidth (ST) PARA. NO.: 2.1049

Minimum Standard: 22.917(c) The mean power of any emission removed from the

carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as

follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz VBW: ≥ RBW Span: 200 kHz Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

AF1 frequency: 10 kHz tone

AF1 level: sufficient to produce 8 kHz deviation

FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

NAME OF TEST: Occupied Bandwidth (Digital Modulation) PARA. NO.: 2.1049

Minimum Standard: Not defined by FCC. Input vs. Output.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: CDMA (30 kHz), GSM (30 kHz), NADC (1 kHz) and CDPD (1 kHz)

VBW: ≥ RBW Span: As required Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

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FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 2.1051

Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be

attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute

power.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 30 kHz (AMPS). As required for digital modulations.

VBW: ≥ RBW

Start Frequency: 0 MHz Stop Frequency: 10 GHz

Sweep: Auto

FCC ID: PROJECT NO.: 1L0263RUS1

NAME OF TEST: Field Strength of Spurious Radiation PARA. NO.: 2.1053

Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be

attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43+10\log P$. This is equivalent to -13 dBm absolute

power.

Calculation Of Field Strength Limit:

An example of attenuation requirement of 43 + 10 Log P is equivalent to -13 dBm (5 x 10^{-5} Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions ≤ 1 GHz:

G = 1.64 (Dipole Gain)

P = 10⁻⁵ Watts (Maximum spurious output power)

R = 3m (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R}$$

$$E = \frac{\sqrt{30 \times 1.64 \times 5 \times 10^{-5}}}{3} = 0.016533 \text{ V/m} = 84.4 \text{ dB} \text{mV/m}$$

For emissions > 1 GHz:

G = 1 (Isotropic Gain)

 $P = 1 \times 10^{-5}$ Watts (Maximum spurious output power)

R = 3m (Measurement Distance)

$$E = 84.4 - 20 Log \sqrt{1.64} = 82.3 dB \, \text{mV} / m@3m$$

The spectrum is searched to 10 GHz.

FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

NAME OF TEST: Frequency Stability PARA. NO.: 2.1055

Minimum Standard: Para. No. 22.355. The transmitter carrier frequency shall remain

within the tolerances given in Table C-1.

Table C-1

Freq. Range (MHz)	Base, fixed	Mobile > 3 W	Mobile £3 W
821 to 896	1.5	2.5	2.5

Method Of Measurement:

Frequency Stability With Voltage Variation:

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:

The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

Nemko Dallas FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS

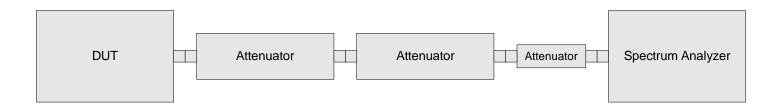
EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS1

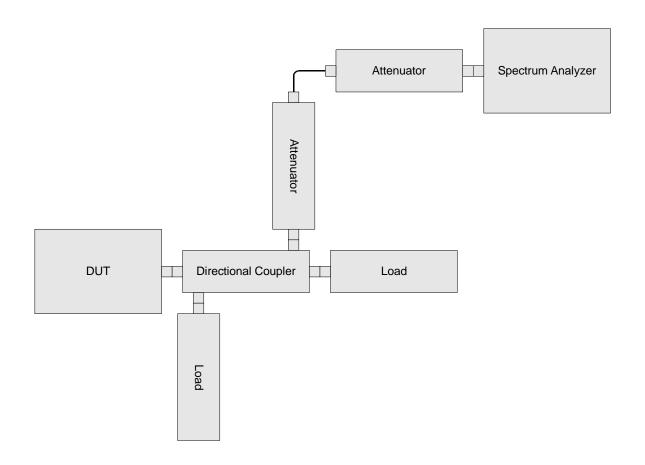
ANNEX B - TEST DIAGRAMS

Page 46 of 52

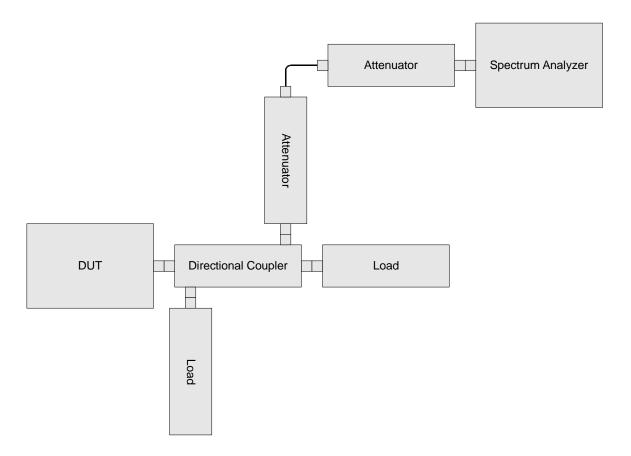
Para. No. 2.1046 - R.F. Power Output



Para. No. 2.1049 - Occupied Bandwidth

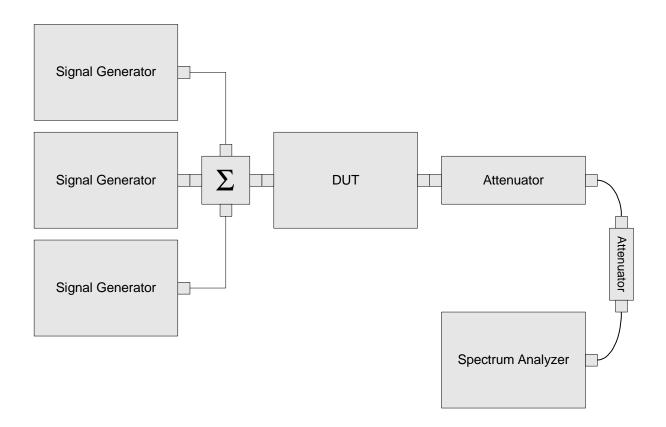


Para. No. 2.1051 Spurious Emissions at Antenna Terminals

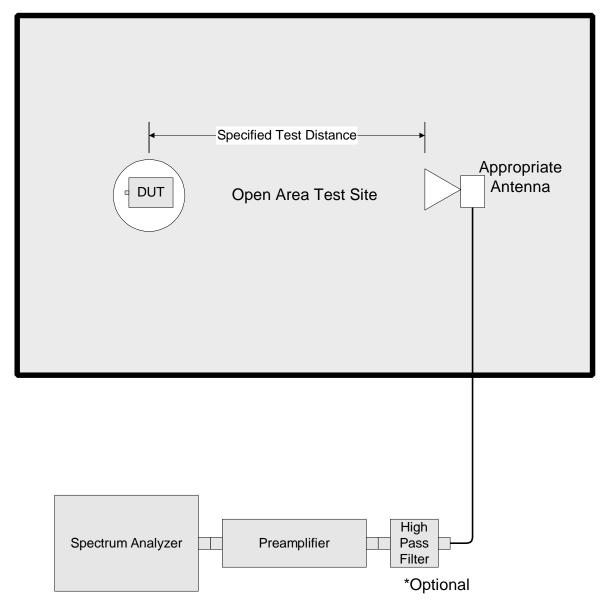


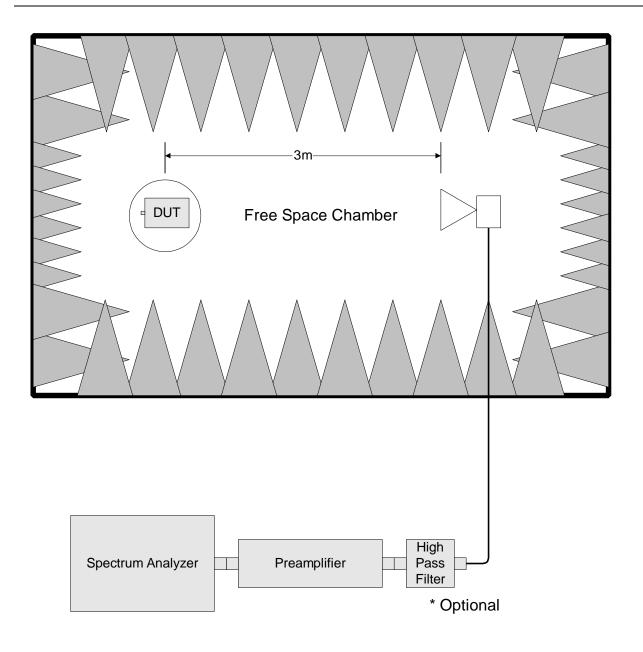
FCC PART 22, SUBPART H CELLULAR BAND REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

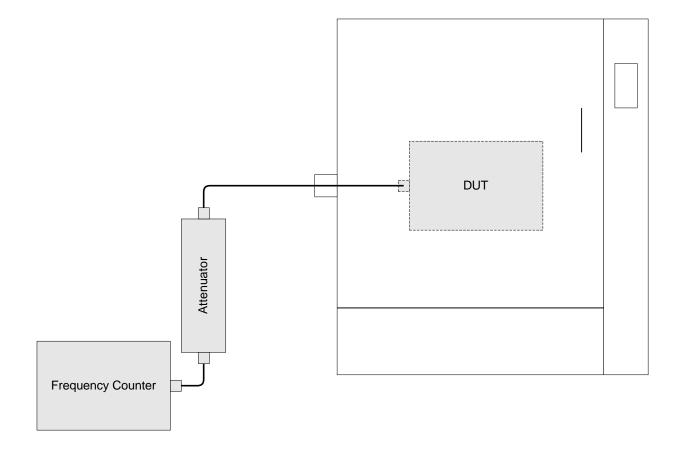


Para. No. 2.1053 - Field Strength of Spurious Radiation





Para. No. 2.1055 - Frequency Stability



Nemko Test Report No.:	1L0263RUS2
Applicant:	ALLEN TELECOM 140 Vista Center Drive Forest, Virginia 24551
Equipment Under Test:	DUAL BAND BRITECELL FAST SYSTEM
In Accordance With:	FCC Part 24, Subpart E Broadband PCS Repeaters
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136
	Jom Jidevell
Authorized By:	Tom Tidwell, RF Group Manager
Date:	7/16/01
Total Number of Pages:	50

1L0263RUS2

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.:

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FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Section 1. Summary of Test Results

Manufacturer: ALLEN TELECOM

Model No.: DUAL BAND BRITECELL FAST SYSTEM

Serial No.: NONE

General: All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24, Subpart E.

New Submission	Production Unit
Class II Permissive Change	Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data".

NVLAP

NVLAP LAB CODE: 100426-0

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FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Summary Of Test Data

	PARA.			
NAME OF TEST	NO.	SPEC.	MEAS.	RESULT
RF Power Output	24.232	100W	< 100W	Complies
Occupied Bandwidth (CDMA)	24.238	Input/Output	Plot	Complies
Occupied Bandwidth (GSM)	24.238	Input/Output	Plot	Complies
Occupied Bandwidth (NADC)	24.238	Input/Output	Plot	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	< -13 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	<-13 dBm	Complies
Frequency Stability	24.235		N/A	N/A

Footnotes:

(1) Modulation characteristics were not tested since the E.U.T. processes but does not produce a modulated waveform.

Measurement uncertainty for each test configuration is expressed to 95% probability.

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Section 2. General Equipment Specification

Supply Voltage Input:	Supply Voltage Input:			
Frequency Bands:	Downlink:	Block B:	1930 – 1945 MHz 1945 – 1950 MHz 1950 – 1965 MHz 1965 – 1970 MHz 1970 – 1975 MHz 1975 – 1990 MHz	
Frequency Bands:	Uplink:	Block A: Block B: Block C: Block D: Block E: Block F:	1850 – 1865 MHz 1865 – 1870 MHz 1870 – 1885 MHz 1885 – 1890 MHz 1890 – 1895 MHz 1895 – 1910 MHz GSM (GXW)	NADC (DXW)
System Gain:		0 dB		
Output Impedance:		50 ohms		
		1 Carrier 2 Carrier 3 Carrier 4 Carrier	14.5 dBm 10.0 dBm 5.0 dBm 3.5 dBm	
		F1-F1	F1-F2	N/A
		Software	Duplexer	Fullband

1L0263RUS2

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.:

Description of Modifications For Class II Permissive Change

Not Applicable

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

1L0263RUS2

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.:

Modifications Made During Testing

Not Applicable

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

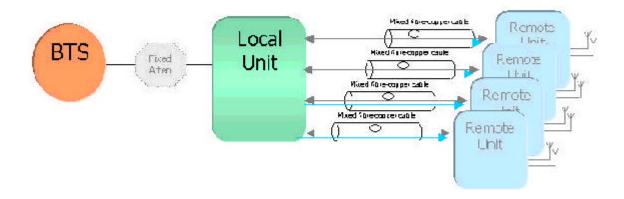
Description of Operation

*BRITECELL*TM *FAST* is a plug and play BriteCell kit, offering the most suitable solution for indoor coverage in small areas, thanks to its compactness and absolute easiness to install. The package includes up to four compact RF remote transceivers (TFAF), driven by one local distribution unit (TFLF). It is available in various frequency ranges (from 800MHz up to 2200 MHz), as a single band product. It is aimed to satisfy the requirements of 2 nd and 3 rd generation mobile networks for simple coverage needs.

The TFLF local unit has been properly designed into a stand-alone mechanical case, including all required ancillary and support functions. The kit includes also four standard TFAF Remote units and a compound fiber-copper cable to connect them to local unit. The installed units can be lately kept also in case of system expansion to a fully modular BriteCell configuration, both single band or dual band, with a minimum setting effort. Both TFL and TFA can be optionally hosted into TKA mounting kits, allowing outdoor installation if required.

System Diagram

.



FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Section 3. RF Power Output

NAME OF TEST: RF Power Output PARA. NO.: 2.1046

TESTED BY: Chinda Poy DATE: 6/28/01

Test Results: Complies.

Measurement Data:

	Modulation Type	Per Channel Output Power (dBm)	Composite Output Power (dBm)
Uplink	CDMA	N/A	N/A
Downlink	CDMA	14.8 dBm	17.8 dBm
Uplink	GSM	N/A	N/A
Downlink	GSM	18.6 dBm	21.6 dBm
Uplink	NADC	N/A	N/A
Downlink	NADC	17.8 dBm	20.8 dBm

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

Temperature: 24 °C

Relative 35 %

Humidity:

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (CDMA) PARA. NO.: 2.1049

TESTED BY: Chinda Poy DATE: 6/28/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1043-1474

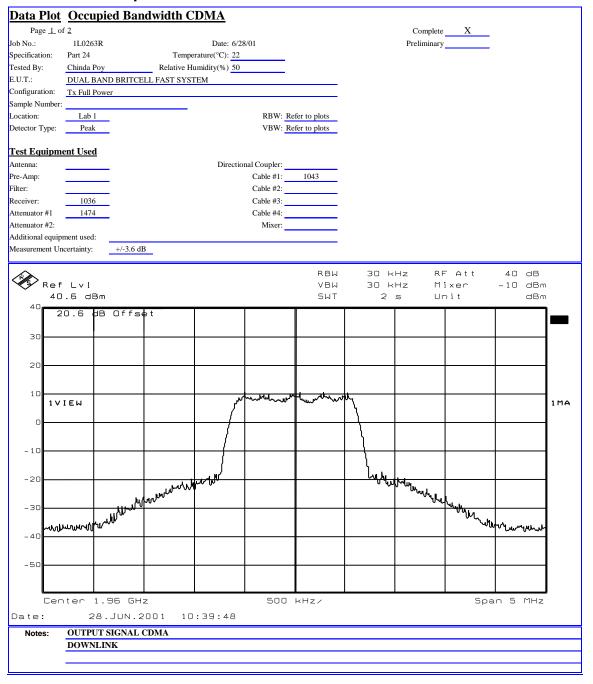
Measurement Uncertainty: +/- 1.7 dB

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Test Data - Occupied Bandwidth -- CDMA

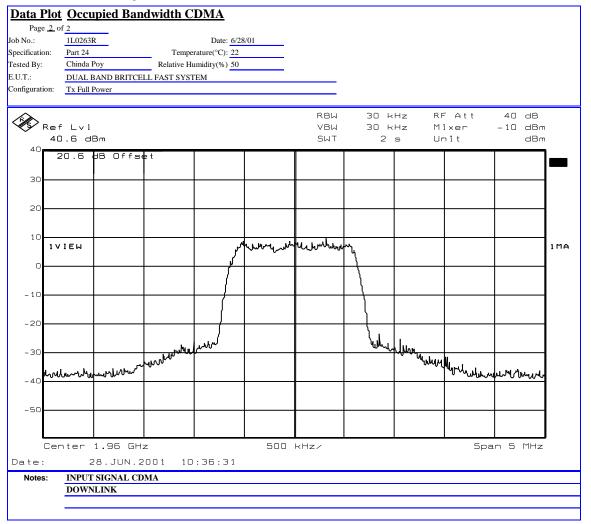


EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Test Data - Occupied Bandwidth -- CDMA



FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

NAME OF TEST: Occupied Bandwidth (GSM) PARA. NO.: 2.1049

TESTED BY: Chinda Poy DATE: 6/28/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Test Data - Occupied Bandwidth - GSM

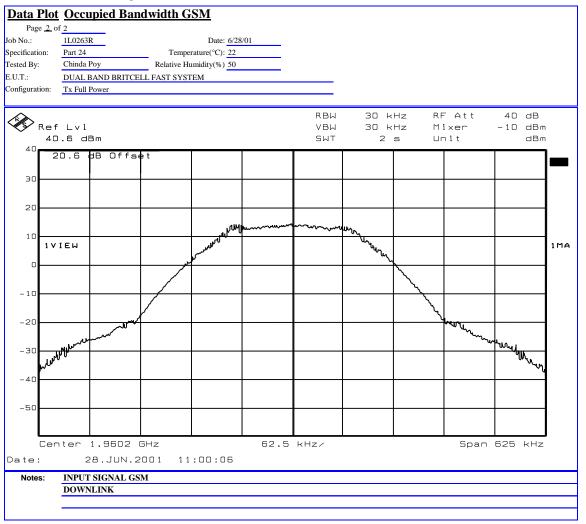
Data Plot	Occup	oied Ban	dwidth G	<u>SM</u>							
Page 1 of				<u></u>				Comple	ete X		
Job No.:	1L0263I	₹		Date: 6/28	3/01			Prelimina			
Specification:	Part 24		Temper	rature(°C): 22							
Tested By:	Chinda Po	y	Relative Hu	midity(%) 50							
E.U.T.:	DUAL BA	ND BRITCEI	LL FAST SYST	EM							
Configuration:	Tx Full Po	wer									
Sample Number:											
Location:	Lab 1	_				Refer to plots					
Detector Type:	Peak	_			VBW:	Refer to plots					
Test Equipme	ent Used										
Antenna:		_		Direction	nal Coupler:						
Pre-Amp:						1043					
Filter:		_			Cable #2:						
Receiver:	1036										
Attenuator #1	1474	_									
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Notes:	DOWNL	F SIGNAL G	1/1Ci								
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EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Test Data - Occupied Bandwidth - GSM



FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT: DUAL BAND B

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

NAME OF TEST: Occupied Bandwidth (NADC) PARA. NO.: 2.1049

TESTED BY: Chinda Poy DATE: 6/28/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1043-1474

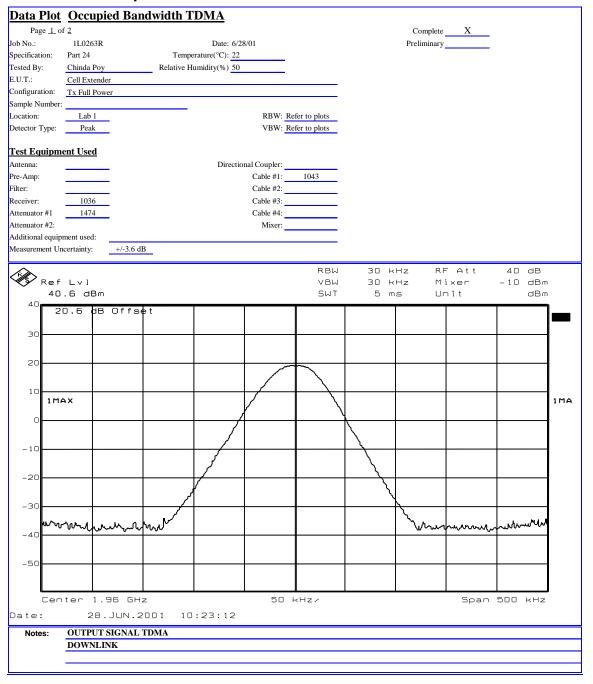
Measurement Uncertainty: +/- 1.7 dB

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Test Data - Occupied Bandwidth - NADC

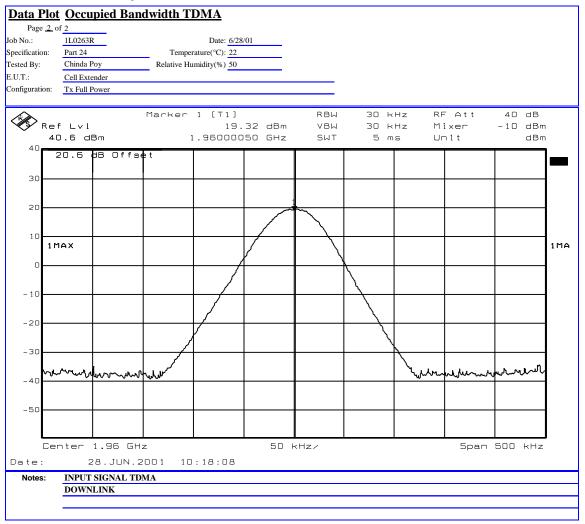


EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Test Data - Occupied Bandwidth - NADC



FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals PARA. NO.: 2.1051

TESTED BY: Chinda Poy DATE: 6/2/8/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

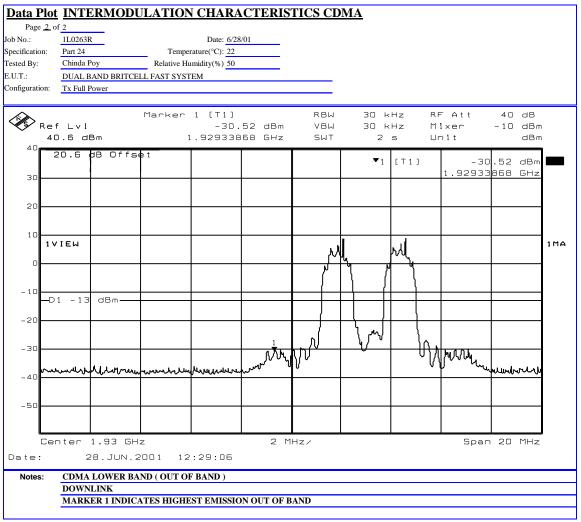
Test Data – Spurious Emission at Antenna Terminals

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Page <u>1</u> o	f <u>2</u>						<u></u>	Complete	X		
Job No.:	1L0263	R	Date: 6/28/01					Preliminary			
Specification:	Part 24		Temperature(°C): 22								
Tested By:	Chinda P	oy	Relative Humidity(%) 50								
E.U.T.:	DUAL B.	AND BRITCEI	LL FAST SYS	STEM							
Configuration:	Tx Full P	ower									
Sample Number:											
Location:	Lab 1					fer to plots					
Detector Type:	Peak	_			VBW: Re	fer to plots					
Test Equipm	ent Used										
Antenna:				Directio	onal Coupler:						
Pre-Amp:					Cable #1:	1043					
Filter:					Cable #2:						
Receiver:	1036				Cable #3:						
Attenuator #1	1474	_			Cable #4:						
Attenuator #2:					Mixer:						
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EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

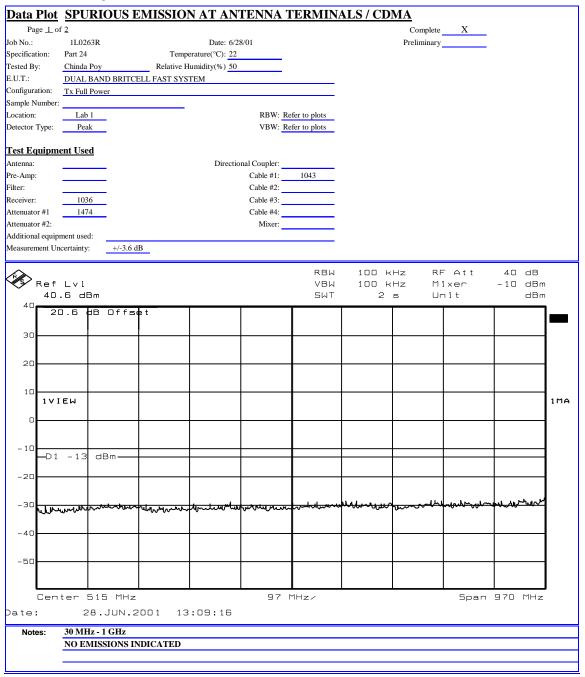
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EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

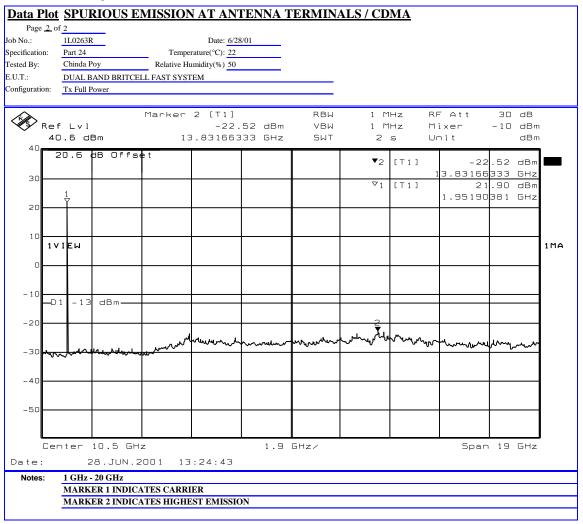
FCC ID: PROJECT NO.: 1L0263RUS2



EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2



EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

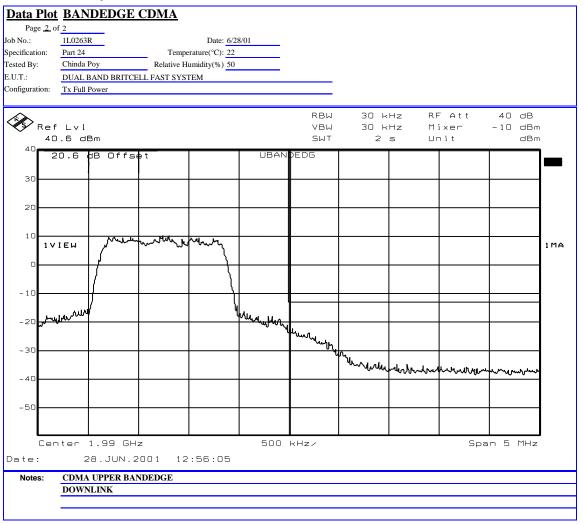
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Job No.:	1L026	3R			Date: 6/28	3/01			Preliminary			
Specification:	Part 24			Temp	erature(°C): 22							
Tested By:	Chinda I	Poy		Relative H	Iumidity(%) 50							
E.U.T.:	DUAL E	BAND B	RITCEL	L FAST SYS	TEM							
Configuration:	Tx Full I	Power										
Sample Number:	:											
Location:	Lab 1	1				RBW:	Refer to plots					
Detector Type:	Peak	c				VBW:	Refer to plots					
Test Equipm	ent Used	<u>1</u>										
Antenna:					Direction	nal Coupler:						
Pre-Amp:						Cable #1:	1043					
Filter:						Cable #2:						
Receiver:	1036	5				Cable #3:						
Attenuator #1	1474	1				Cable #4:						
Attenuator #2:						Mixer:						
Additional equip	ment used	:										
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EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2



EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

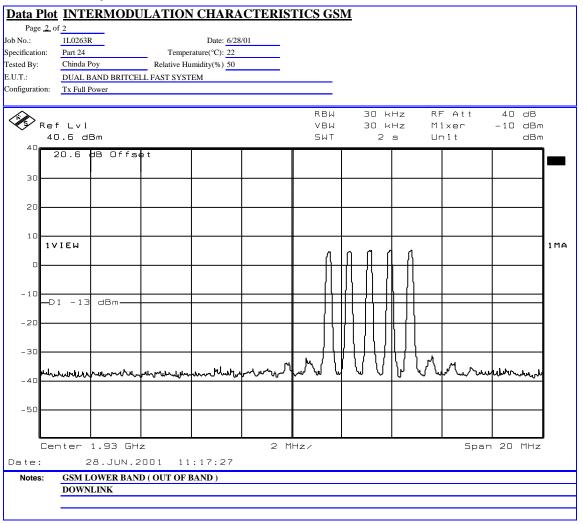
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Data Plot	INTI	ERMODU	JLATION	N CHARA	CTER	ISTICS GS	<u>SM</u>				
Page 1 of	of <u>2</u>							Complete	X		
Job No.:	1L026	3R		Date: 6/28	3/01			Preliminary	,		
Specification:	Part 24		Tempe	rature(°C): 22							
Tested By:	Chinda F	Poy	Relative H	umidity(%) 50							
E.U.T.:	DUAL B	BAND BRITCE	LL FAST SYST								
Configuration:	Tx Full I	Power									
Sample Number:											
Location:	Lab 1	I			RBW:	Refer to plots					
Detector Type:	Peak	:			VBW:	Refer to plots					
					•						
Test Equipme	ent Used	<u>l</u>									
Antenna:				Direction	nal Coupler:						
Pre-Amp:					Cable #1:	1043					
Filter:					Cable #2:						
Receiver:	1036				Cable #3:						
Attenuator #1	1474	<u> </u>			Cable #4:						
Attenuator #2:					Mixer:						
Additional equipi											
Measurement Un	certainty:	+/-3.6 dI	3								
\triangle						RB₩	30 k	Hz RI	F Att	40 dB	
Ref	∟∨l					VBW	30 k		ixer	-10 dBm	ı
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EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2



EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

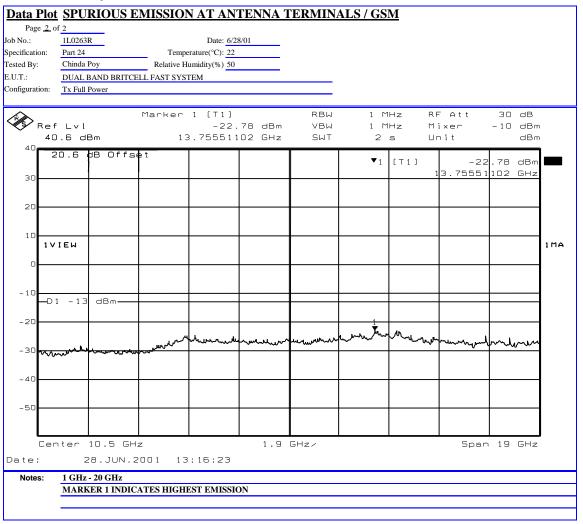
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Job No.:	1L026	3R		Date: 6/28	/01			Preliminary			
Specification:	Part 24		Tempe	erature(°C): 22							
Tested By:	Chinda l	Poy	Relative H	umidity(%) 50							
E.U.T.:	DUAL E	BAND BRITCE	ELL FAST SYS								
Configuration:	Tx Full l	Power									
Sample Number:											
Location:	Lab	1			RBW:	Refer to plots					
Detector Type:	Peak					Refer to plots					
51						,					
Test Equipm	ent Used	<u>d</u>									
Antenna:				Direction	al Coupler:						
Pre-Amp:					Cable #1:	1043					
Filter:					Cable #2:						
Receiver:	103€	5			Cable #3:						
Attenuator #1	1474	1			Cable #4:						
Attenuator #2:					Mixer:						
Additional equip	ment used	:									
Measurement Un	certainty:	+/-3.6 d	В								
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Notes:	30 MH	z - 1 GHz									
	NO EM	IISSIONS IN	DICATED								
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EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

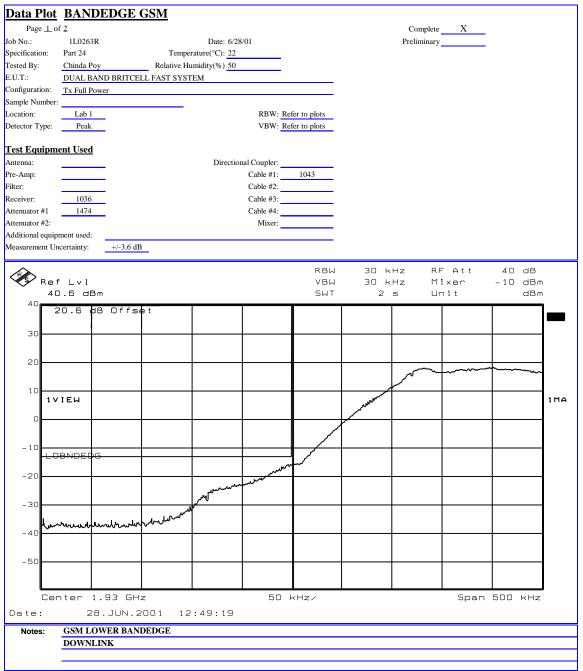
FCC ID: PROJECT NO.: 1L0263RUS2



EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

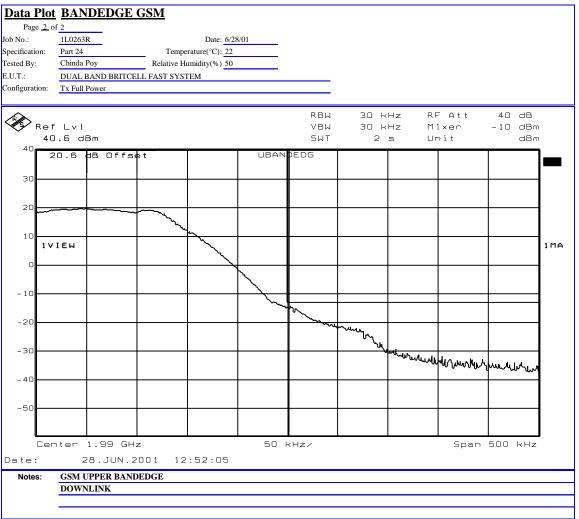
FCC ID: PROJECT NO.: 1L0263RUS2



EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2



EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

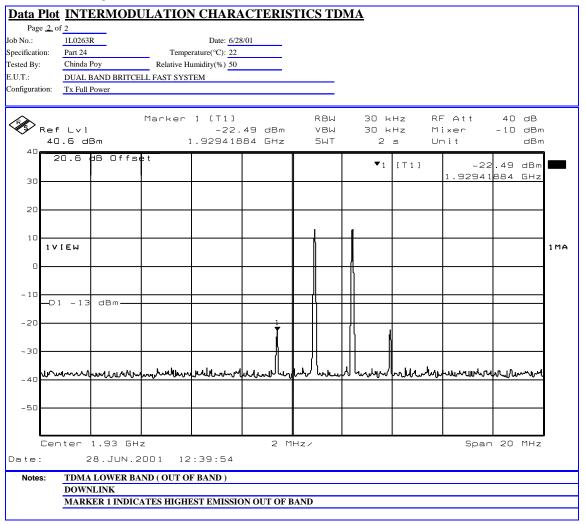
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Page 1	of <u>2</u>							Complet	te X		
ob No.:	1L0263	R		Date: 6/2	8/01			Prelimina	у		
pecification:	Part 24		Tempe	erature(°C): 22							
ested By:	Chinda Po	ру	Relative H	umidity(%) 50		•					
.U.T.:	DUAL B	AND BRITCE	LL FAST SYS	ТЕМ		•					
Configuration:	Tx Full P	ower									
ample Number											
ocation:	Lab 1				RBW:	Refer to plots					
Detector Type:	Peak				VBW:	Refer to plots					
Test Equipm	ent Used										
Antenna:				Directio	nal Coupler:						
re-Amp:					Cable #1:	1043					
ilter:					Cable #2:						
teceiver:	1036				Cable #3:						
ttenuator #1	1474	_			Cable #4:						
Attenuator #2:					Mixer:						
Additional equip	oment used:										
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EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2



EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

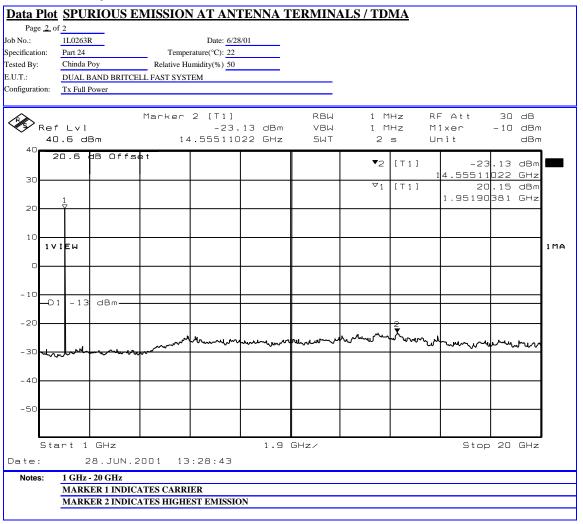
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Page 1	of <u>2</u>							Complete	X		
Job No.:	1L026	3R		Date: 6/28	3/01			Preliminary			
Specification:	Part 24		Tempe	rature(°C): 22							
Tested By:	Chinda l	Poy	Relative Hu	ımidity(%) 50							
E.U.T.:	DUAL I	BAND BRITCE	LL FAST SYST	ΈM							
Configuration:	Tx Full	Power									
Sample Numbe											
Location:	Lab					fer to plots					
Detector Type:	Peal	C.			VBW: Re	efer to plots					
Test Equipr	nent Use	d									
Antenna:				Direction	nal Coupler:						
Pre-Amp:					Cable #1:	1043					
Filter:					Cable #2:						
Receiver:	1036	5			Cable #3:						
Attenuator #1	1474	4			Cable #4:						
Attenuator #2:					Mixer:						
Additional equi	-	-	~								
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Notes:		z - 1 GHz									
	NO EM	IISSIONS IN	DICATED								

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2



FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions PARA. NO.: 2.1051

TESTED BY: Chinda Poy DATE: 6/28/01

Test Results: Complies.

Test Data: See attached table.

Equipment Used: 1464-1016-1484-1485-1046

Measurement Uncertainty: +/- 1.7 dB

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Test Data - Radiated Emissions - Downlink



Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057

Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667

Nemko Dallas, Inc.

		Field Strength of Spuriou	<u>is Emissions</u>
Page <u>1</u> o	f <u>1</u>		Complete X
Job No.:	1L0263R	Date: 6/29/01	Preliminary
Specification:	PART 24	Temperature(°C): 24	
Tested By:	Chinda Poy	Relative Humidity(%) 48	
E.U.T.:	DUAL BAN	D BRITCELL FAST SYSTEM	_
Configuration:	TX FULL PO	OWER	_
Sample Number:			
Location:	AC 2	RBW: 1 MHz	Measurement
Detector Type:	Peak	VBW: 1 MHz	Distance 3 m
		Test Equipment Use	<u>ed</u>
Antenna:	993	Directional Coupler: #N/A	_
Pre-Amp:	1016	Cable #1: 1046	_
Filter:	#N/A	Cable #2:1484	_
Receiver:	1036	Cable #3:1485	_
Attenuator #1	#N/A	Cable #4: #N/A	_
Attenuator #2:	#N/A	Mixer: #N/A	_
A 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4			
Additional equipment used:			
Measurement			_
Uncertainty:	+/7 dB		
1			

Frequency (GHz)	Meter Reading (dBm)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Conversion Factor	Corrected Reading (dBuV/m)	ERP (mW)	EIRP (dBm)	Polarity	Comments
3920.00	-61	31.6	4.2	33.3		-59	0.000000	-153.73	V	Noise Floor
5880.00	-62.67	34.4	5.1	33.3		-56	0.000000	-151.70	V	Noise Floor
7840.00	-61.83	37.8	5.5	33.3		-52	0.000000	-147.06	V	Noise Floor
9800.00	-61.17	37.2	7.2	36		-53	0.000000	-148.00	V	Noise Floor
11760.00	-60.17	38.7	8.7	35.5		-48	0.000000	-143.50	V	Noise Floor
13720.00	-61.5	43	8.2	33.3		-44	0.000000	-138.83	V	Noise Floor
15680.00	-61	39.5	4	33.2		-51	0.000000	-145.93	V	Noise Floor
17640.00	-61.67	43	10	33.5		-42	0.000000	-137.40	V	Noise Floor
3920.00	-61.83	31.6	4.2	33.3		-59	0.000000	-154.56	Н	Noise Floor
5880.00	-63.17	34.4	5.1	33.3		-57	0.000000	-152.20	Н	Noise Floor
7840.00	-62	37.8	5.5	33.3		-52	0.000000	-147.23	Н	Noise Floor
9800.00	-61	37.2	7.2	36		-53	0.000000	-147.83	Н	Noise Floor
11760.00	-60.17	38.7	8.7	35.5		-48	0.000000	-143.50	Н	Noise Floor
13720.00	-60.67	43	8.2	33.3		-43	0.000000	-138.00	Н	Noise Floor
15680.00	-60.5	39.5	4	33.2		-50	0.000000	-145.43	Н	Noise Floor
17640.00	-61.17	43	10	33.5		-42	0.000000	-136.90	Н	Noise Floor
Notes:				1	960 MHz / SA	CNNED TO T	HE 10TH HA	RMONIC		

1L0263RUS2

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

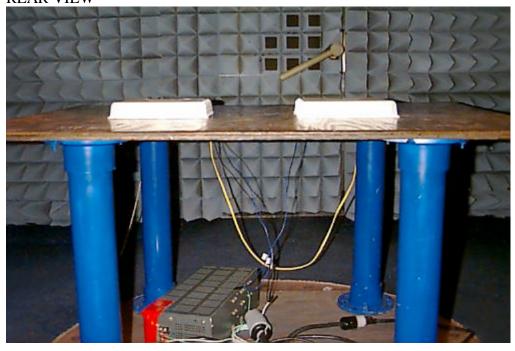
FCC ID: PROJECT NO.:

Photographs of Test Setup

FRONT VIEW



REAR VIEW



EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Section 7. **Frequency Stability**

NAME OF TEST: Frequency Stability PARA. NO.: 2.1055

TESTED BY:

Test Results:

DATE: DO DICADO.

Standar 1

Standard Test Voltage:

Equipment Used:

Measurement Uncertainty: +/- 1.6 dB

Lab Temperature: °C

Relative %

Humidity:

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Section 8. Test Equipment List

ASSET	Description	Manufacturer Model Number	Serial Number	Cal. Date	Cal. Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99	06/14/01
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/02/02
1474	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W2	NONE	CBU	N/A
1043	Flexable cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	01/29/01	01/29/02
1045	CABLE 2m	Astrolab Inc. 32027-2-29094-72TC	N/A	06/01/01	06/01/02
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	05/25/00	05/25/01
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	06/01/01	06/01/02

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

ANNEX A - TEST DETAILS

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

NAME OF TEST: RF Power Output

PARA. NO.: 2.1046

Minimum Standard: Para. No.24.232. Base stations are limited to 1640 watts peak

E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed

100 watts.

Method Of Measurement:

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi$ $R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R =the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

NAME OF TEST: Occupied Bandwidth PARA. NO.: 2.1047

Minimum Standard: Para. No. 24.238(b). The emission bandwidth is defined as the

width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of

which all emissions are attenuated at least 26 dB.

Method Of Measurement:

CDMA

Spectrum analyzer settings:

RBW: 30 kHz VBW: ≥ RBW Span: 5 MHz Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

<u>GSM</u>

RBW: 3 kHz VBW: ≥ RBW Span: 2 MHz Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

NADC

RBW: 1 kHz VBW: ≥ RBW Span: 1 MHz Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT: DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 2.1051

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's

frequency block, the power of any emission shall be attenuated below the transmitter power by at least $43 + 10 \log (P) dB$.

Method Of Measurement:

Spectrum analyzer settings:

<u>CDMA</u> <u>GSM</u>

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)

 $VBW: \ge RBW$ $VBW: \ge RBW$ Sweep: Auto Sweep: Auto

Video Avg: 6 Sweeps Video Avg: Disabled

NADC

RBW: 1 MHz (> 1 MHz from Band Edge) RBW: 3 kHz (< 1 MHz from Band Edge)

VBW: ≥ RBW Sweep: Auto

Video Avg: Disabled

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.

1L0263RUS2

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.:

NAME OF TEST: Field Strength of Spurious Radiation PARA. NO.: 2.1053

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's

> frequency block, the power of any emission shall be attenuated below the transmitter power by at least $43 + 10 \log (P) dB$.

Calculation Of Field Strength Limit

An example of attenuation requirement of 43 + 10 Log P is equivalent to -13 dBm (5 x 10⁻⁵ Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions ≤ 1 GHz:

G = 1.64 (Dipole Gain)

 $P = 10^{-5}$ Watts (Maximum spurious output power)

R = 3m (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R}$$

$$E = \frac{\sqrt{30GP}}{R}$$

$$E = \frac{\sqrt{30 \times 1.64 \times 5 \times 10^{-5}}}{3} = 0.016533 \text{ V/m} = 84.4 \text{ dB} \text{ mV/m}$$

For emissions > 1 GHz:

G = 1 (Isotropic Gain)

P = 1 x 10⁻⁵ Watts (Maximum spurious output power)

R = 3m (Measurement Distance)

$$E = 84.4 - 20 Log \sqrt{1.64} = 82.3 dB \, \text{mV} / m@3m$$

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

NAME OF TEST: Frequency Stability PARA. NO.: 2.1055

Minimum Standard: Para. No. 24.235. The frequency stability shall be sufficient to

ensure that the fundamental emission stays within the authorized

frequency block.

Method Of Measurement:

Frequency Stability With Voltage Variation

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

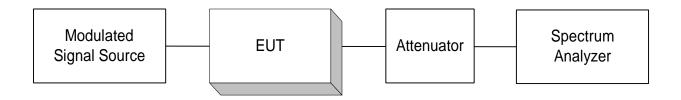
ANNEX B - TEST DIAGRAMS

EQUIPMENT:

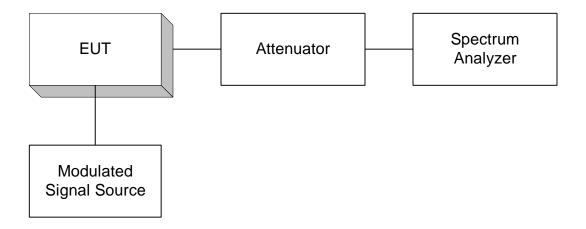
DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Para. No. 2.985 - R.F. Power Output



Para. No. 2.989 - Occupied Bandwidth

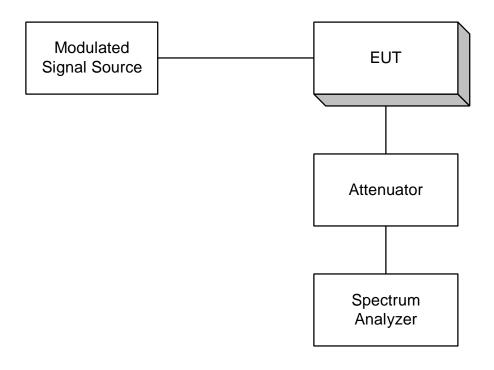


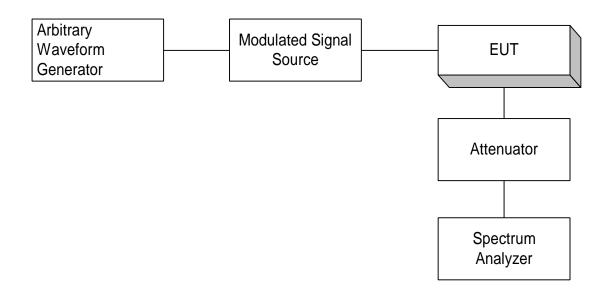
EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Para. No. 2.991 Spurious Emissions at Antenna Terminals



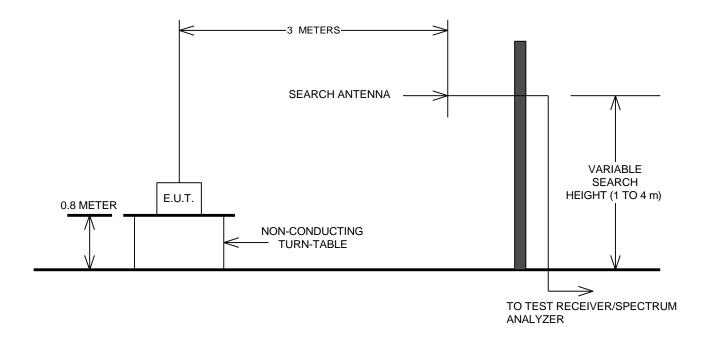


EQUIPMENT:

DUAL BAND BRITECELL FAST SYSTEM

FCC ID: PROJECT NO.: 1L0263RUS2

Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

