SC4812T 1X / 1X-EVDO @ 1.9 GHz CDMA BTS TEST REPORT EXHIBIT

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APPLICANT: MOTOROLA

FCC ID: IHET6EF1

Section A

Summary of RF Measurements

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Summary of Radiated RF Measurements

Worst Case Radiated RF Spur Level for SC4812T 1X-EVDO @ 1.9GHz CDMA BTS

Radiated RF Measurements				Spec	Result	
Channel	Spurious Frequency (MHz)	Antenna Polarity	Measured Radiated Field Strength (dBuV/m)	Measured Radiated Field Strength (dBm) (Note 1)	FCC Part 22/24 MAX LIMIT (dBm)	(Pass/ Fail)
1175	3978.979	Н	56.76	-38.47	-13	Pass

Worst Case Radiated RF Spur Level for SC4812T 1X @ 1.9GHz CDMA BTS

Radiated RF Measurements				Spec	Result	
Channel	Spurious Frequency (MHz)	Antenna Polarity	Measured Radiated Field Strength (dBuV/m)	Measured Radiated Field Strength (dBm) (Note 1)	FCC Part 22/24 MAX LIMIT (dBm)	(Pass/ Fail)
1175	3977.5000	Н	75.71	-19.52	-13	Pass

Notes:

Converting dBuV/M to dBm at 3 meters: 1. (dBuV/M) + 9.542 - 104.77 = dBmConverting dBuV/M to dBm at 10 meters:

(dBuV/M) + 20 - 104.77 = dBm2.

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Summary of Conducted RF Measurements SC4812T 1X-EVDO @ 1.9GHz CDMA BTS FCC Part 24

CHANNEL	FREQUENCY (MHz)	SPUR LEVEL MEASURED (dBµV)	SPUR LEVEL MEASURED (dBm)	FCC MAX LIMIT (dBm)	PASS / FAIL
1175	13781.556	87.76	-19.24	-13	Pass

SC4812T 1X @ 1.9GHz CDMA BTS

CHANNEL	FREQUENCY (MHz)	SPUR LEVEL MEASURED (dBµV)	SPUR LEVEL MEASURED (dBm)	FCC MAX LIMIT (dBm)	PASS / FAIL
25	13772.108	89.26	-17.74	-13	Pass

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Section B Summary of Modulation Characteristics

SC4812T 1X-EVDO @ 1.9 GHz CDMA BTS

CHANNEL	TUNE FREQUENCY (MHz)	RHO Measured	RHO Specifications	PASS / FAIL
25	1931.25	0.99834	> 0.970	Pass
1175	1988.75	0.99833	> 0.970	Pass

SC4812T 1X @ 1.9 GHz CDMA BTS

CHANNEL	TUNE FREQUENCY (MHz)	RHO Measured	RHO Specifications	PASS / FAIL
25	1931.25	0.9962	> 0.912	Pass
1175	1988.75	0.9957	> 0.912	Pass

The BTS was configured for maximum power out of 46.00 dBm and minimum power out of 36.5 dBm respectively. The output power was set respectively to 40.0 Watts or 4.5 Watts using an HP437B power meter

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SC4812T 1X-EVDO – Modulation Characteristics

High Power – 46.00 dBm – 8PSK

🔆 Agilent 15:56:54 Mar	31,2004 1xEV-DO	Freq/Chan
BTS Ch Freq 1.931 Mod Accuracy	Ext Ref 25 GHz Averages: 10 PASS	Center Frec 1.93125 GHz
Lenter Freq 1.9	31250000 GHZ	
Meas Ch: Pilot	I/Q Measured Polar Vector	
Rho: 0.99834 EUM: 4.14 % rms		
		CF Step 1.25000 MH: <u>Auto</u> Ma
Freq Error: -0.33 Hz		
I/Q Origin Offset: -40.67 dB		
Active Channels: 1 Pilot Offset: 1.81 μs		
Preparing calculation		

Channel 25 – 1931.25 MHz

🔆 Agilent 16:00:26 Mar	31, 2004 1xEV-DO	Freq/Chan
BTS Ch Freq 1.988 Mod Accuracy	Ext Ref 75 GHz Averages: 10 PASS	Center Freq 1.98875 GHz
Lenter Freq 1.9	88750000 GHz	
Meas Ch: Pilot	I/Q Measured Polar Vector	
Rho: 0.99838 EUM: 4.08%rms 10.33%pk		
		CF Step 1.25000 MHz <u>Auto</u> Man
Freq Error: -5.78 Hz		
I/Q Origin Offset: -42.52 dB		
Active Channels: 1 Pilot Offset: 1.78 µs		
Preparing calculation		



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SC4812T 1X-EVDO – Modulation Characteristics

High Power – 46.00 dBm – 16QAM

🔆 Agilent 10:53:54 Mar	31,2004 1xEV-DO	Meas Setup
BTS Ch Freq 1.931 Mod Accuracy	Ext Ref 25 GHz Averages: 10 PASS	Avg Numbe 1 <u>On</u> 0f
Center Freq 1.9	31250000 GHz	Avg Mode
Meas Ch: Pilot	I/Q Measured Polar Vector	<u>Exp</u> Repea
Rho: 0.99839 EUM: 4.12 % rms 9.13 % pk		Channel Type Pilot
		Data Ch Type 16QA
Freq Error: 0.46 Hz		Preamble Le chip <u>Auto</u> Ma
1/Q Urigin Uffset: -40.67 dB		Active Data Cha Auto Prede
Hctive Channels: 1 Pilot Offset: 1.81 µs		Mor 1 of
Preparing calculation		

Channel 25 – 1931.25 MHz

🔆 Agilent 10:46:54 Mar	31,2004 1×EV-DO	Meas Setup
BTS Ch Freq 1.988 Mod Accuracy	Ext Ref 75 GHz Averages: 10 PASS	Avg Number 10 <u>On</u> Off
Center Freq 1.9	88750000 GHz	Ava Mode
Meas Ch: Pilot	I/Q Measured Polar Vector	<u>Exp</u> Repeat
Rho: 0.99834 EUM: 4.20%rms 10.73%pk		Channel Type Pilot
		Data Ch Type 16QAM
Freq Error: -2.06 Hz		Preamble Ler chips Auto Mar
I/Q Origin Offset: -39.83 dB		Active Data Char Auto Predet
Active Channels: 1 Pilot Offset: 1.78 µs		More 1 of 2
Unable to save file		

Channel 1175 - 1988.75 MHz

SC4812T 1X-EVDO – Modulation Characteristics

🔆 Agilent 15:48:13 Mar	31,2004 1×EV-DO	Freq/Chan
BTS Ch Freq 1.9312 Mod Accuracy	Ext Ref 5 GHz Averages: 10 PASS 21250000 GHz	Center Freq 1.93125 GHz
Meas Ch: Pilot	I/Q Measured Polar Vector	
Rho: 0.99834 EUM: 4.07%rms 9.63%pk		
		CF Step 1.25000 MHz <u>Auto</u> Man
Freq Error: -2.01 Hz		
I/Q Origin Offset: -40.30 dB		
Active Channels:		
Pilot Offset: 1.81 μs		
Preparing calculation		

Low Power – 36.5 dBm – 8PSK

Channel 25 – 1931.25 MHz

🔆 Agilent 16:07:25 Mar	31, 2004 1×EV-DO	Meas Setup
BTS Ch Freq 1.988 Mod Accuracy	75 GHz Averages: 10 PASS	Avg Number 10 <u>On</u> Off
Center Freq 1.9	88750000 GHz	Avg Mode
Meas Ch: Pilot	I/Q Measured Polar Vector	<u>Exp</u> Repeat
Rho: 0.99836 EUM: 4.07%rms 9.06%pk		Channel Type Pilot
		Data Ch Type 160AM
Freq Error: 1.30 Hz		Preamble Len chips <u>Auto</u> Man
1/Q Origin Uttset: -38.40 dB		Active Data Chan <u>Auto</u> Predef
Active Channels: 1 Pilot Offset: 1.78 µs		More 1 of 2
Preparing calculation		



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SC4812T 1X-EVDO – Modulation Characteristics

Low Power - 36.5 dBm - 16QAM

🔆 Agilent 10:59:42 Mar	31, 2004 1×EV-DO	Freq/Chan
BTS Ch Freq 1.9312 Mod Accuracy	Ext Ref	Center Freq 1.93125 GHz
Center Freq 1.93	31250000 GHz	
Meas Ch: Pilot	I/Q Measured Polar Vector	
Rho: 0.99844 EUM: 3.97 % rms 9.76 % pk		
		CF Step 1.25000 MHz <u>Auto</u> Mar
Freq Error: -5.54 Hz		
I/Q Origin Offset: -41.86 dB		
Active Channels: 1		
Pilot Offset: 1.81 µs		
Preparing calculation	•	

Channel 25 – 1931.25 MHz

🔆 Agilent 10:51:11 Mar	31,2004 1xEV-DO	Freq/Chan
BTS Ch Freq 1.988 Mod Accuracy Center Freq 1.9	Ext Ref 75 GHz Averages: 10 PASS 88750000 GHz	Center Freq 1.98875 GHz
Meas Ch: Pilot	I/Q Measured Polar Vector	
Rho: 0.39833 EUM: 4.10 % rms 10.39 % pk Freq Error: -1.40 Hz		CF Step 1.25000 MHz <u>Auto</u> Man
-39.41 dB		
Active Channels: 1 Pilot Offset: 1.78 μs		
Preparing calculation		

Channel 1175 – 1988.75 MHz

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<u>SC4812T 1X – Modulation Characteristics</u>

High Power – 46.00 dBm



Channel 25 - 1931.25 MHz

SC4812T 1.9GHz 3G-1X 46dBn E6380R Cell Site Test Set: 07/12/01 04:09:00 PH

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Channel 1175 - 1988.75 MHz

FCC ID: IHET6EF1

<u>SC4812T 1X – Modulation Characteristics</u>

Low Power - 26.0 dBm

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Channel 25 – 1931.25 MHz

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SC40127 1.96Mz 36-1X 23dBm E63808 cell Site Test Set: 07/12/01 04/17/00 pm

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Channel 1175 – 1988.75 MHz

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Spurious and Harmonic Emissions Radiated

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Radiated RF Measurements

Worst Case Radiated RF Spur Levels for SC4812T 1X-EVDO @ 1.9 GHz CDMA BTS

		1	Radiated RF Measurements		Spec	Result
Channel	Spurious Frequency (MHz)	Antenna Polarity	Measured Radiated Field Strength (dBuV/m)	Measured Radiated Field Strength (dBm) (Note 1)	FCC Part 22/24 MAX LIMIT (dBm)	(Pass/ Fail)
25	3864.8650	Н	51.27	-43.96	-13	Pass
1175	3978.979	Н	56.76	-38.47	-13	Pass

Worst Case Radiated RF Spur Levels for SC4812T 1X @ 1.9 GHz CDMA BTS

		1	Radiated RF Measurements		Spec	Result
Channel	Spurious Frequency (MHz)	Antenna Polarity	Measured Radiated Field Strength (dBuV/m)	Measured Radiated Field Strength (dBm) (Note 1)	FCC Part 22/24 MAX LIMIT (dBm)	(Pass/ Fail)
25	3862.5053	Н	75.05	-20.17	-13	Pass
1175	3977.5000	Н	75.71	-19.52	-13	Pass

Notes:

 $\label{eq:converting dBuV/M to dBm at 3 meters: } \\ (dBuV/M) + 9.542 - 104.77 = dBm \\ Converting dBuV/M to dBm at 10 meters: \\ (dBuV/M) + 20 - 104.77 = dBm \\ \end{tabular}$

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Section C

Spurious and Harmonic Emissions Conducted



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Conducted RF Measurements

SC4812T 1X-EVDO @ 1.9 GHz CDMA BTS FCC Part 24

CHANNEL	FREQUENCY (MHz)	SPUR LEVEL MEASURED (dBµV)	SPUR LEVEL MEASURED (dBm)	FCC MAX LIMIT (dBm)	PASS / FAIL
25	13903.980	87.34	-19.66	-13	Pass
1175	13781.556	87.76	-19.24	-13	Pass

SC4812T 1X @ 1.9 GHz CDMA BTS FCC Part 24

CHANNEL	FREQUENCY (MHz)	SPUR LEVEL MEASURED (dBµV)	SPUR LEVEL MEASURED (dBm)	FCC MAX LIMIT (dBm)	PASS / FAIL
25	13772.108	89.26	-17.74	-13	Pass

FCC Maximum Limit Per 47 CFR:

- = Transmitted Power (10 $Log_{10}(P_{watt})) (43 + 10 Log_{10}(P_{watt})) dBW$ 66 "
 - = $10 \text{ Log}_{10}(P_{watt}) (43 + 10 \text{ Log}_{10}(P_{watt})) \text{ dBW}$
- " = -43 dBW "
 - = -13 dBm

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Spurious and Harmonic Emissions Conducted CDMA Channel 25 – 46.00 dBm – 8PSK





Spurious and Harmonic Emissions Conducted CDMA Channel 25 – 46.00 dBm – 16QAM





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Spurious and Harmonic Emissions Conducted CDMA Channel 25 – 36.5 dBm – 8PSK





FCC ID: IHET6EF1

Spurious and Harmonic Emissions Conducted CDMA Channel 25 – 36.5 dBm – 16QAM





FCC ID: IHET6EF1

Spurious and Harmonic Emissions Conducted CDMA Channel 1175 – 46.00 dBm – 8PSK





Spurious and Harmonic Emissions Conducted CDMA Channel 1175 – 46.00 dBm – 16QAM





FCC ID: IHET6EF1

Spurious and Harmonic Emissions Conducted CDMA Channel 1175 – 36.5 dBm – 8PSK





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SECTION E OCCUPIED BANDWIDTH

<u>NOTE</u>: The BTS was configured for maximum power out of 46.00 dBm and minimum power out of 36.5 dBm respectively. The max and min output power was set to 40.0 Watts or 4.5 Watts respectively using an HP437B power meter.

The following formula is used to obtain the correct power reference point from which the OBW of the CDMA signal is obtained. See example calculation below:

Power (measured in 30 kHz bandwidth) + 10 log (1.30 MHz / 30 kHz)

Example: 29.63 dBm + 16.37 dB = 46.00 dBm

The occupied bandwidth is measured in a 30 kHz resolution bandwidth. The summary is listed below.

CHANNEL	Power Level (dBm)	FREQUENCY (MHz)	MEASURED (MHz)	FCC LIMIT (MHz)	Pass / Fail
25	46.00	1931.25	1.2763	1.30	Pass
1175	36.5	1988.75	1.2758	1.30	Pass

SC4812T 1X-EVDO @ 1.9GHz SUMMARY OF OCCUPIED BANDWIDTH

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<u>NOTE</u>: Per FCC acceptance precedent, plots are measured in a 30kHz resolution bandwidth. The following formula is used to obtain the correct power reference point from which the OBW of the CDMA signal is obtained. See example calculation below:

Power (measured in 30 kHz bandwidth) + 10 log (1.30 MHz / 30 kHz)

Example: 29.63 dBm + 16.37 dB = 46.00 dBm

The BTS was configured for maximum power out of 46.0 dBm and minimum power out of 36.5 dBm respectively. The max and min output power was set to 40.0 Watts or 4.5 Watts respectively using an HP437B power meter. Markers are measured at +/- 1.25 MHz with respect to the method stated above.

The summary is listed below.

CHANNEL/POWER	FREQUENCY (MHz)	MEASURED (dBm)	FCC EMISSION LIMIT	Pass / Fail
25/MAX	1931.25	-26.57	-9.2dBm	Pass
1175/MAX	1931.25	-29.88	-9.2dBm	Pass
25/MIN	1931.25	-51.38	-9.2dBm	Pass
1175/MIN	1988.75	-50.44	-9.2dBm	Pass

SC4812T 1X @ 1.9GHz SUMMARY OF OCCUPIED BANDWIDTH

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SC4812T 1X-EVDO – Occupied Bandwidth – 46.00 dBm – 8PSK



Channel 25 – 1931.25 MHz



Channel 1175 – 1988.75 MHz

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SC4812T 1X-EVDO – Occupied Bandwidth – 46.00 dBm – 16QAM



Channel 25 – 1931.25 MHz



Channel 1175 - 1988.75 MHz

FCC ID: IHET6EF1

SC4812T 1X-EVDO - Occupied Bandwidth - 36.5 dBm - 8PSK



Channel 25 – 1931.25 MHz





FCC ID: IHET6EF1

SC4812T 1X-EVDO – Occupied Bandwidth – 36.5 dBm – 16QAM



Channel 25 – 1931.25 MHz



Channel 1175 - 1988.75 MHz

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SC4812T 1X – Occupied Bandwidth – 46.00 dBm





Channel 1175 – 1988.75 MHz



SC4812T 1X – Occupied Bandwidth – 26.0 dBm





Channel 11.75 – 1988.75 MHz

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SECTION F

FREQUENCY STABILITY

MODE	27V POWER	WORST CASE ∆ PPM	FCC REQUIREMENT	Pass / Fail
CSM1	85-115%	< 0.02	+/- 1.5 PPM MAX	Pass
CSM2	85-115%	<0.02	+/- 1.5 PPM MAX	Pass

MODE	TEMPERATURE	WORST CASE ∆ PPM	FCC REOUIREMENT	Pass / Fail
CSM1	-30° to +50° C	<0.2	+/- 1.5 PPM MAX	Pass
CSM2	-30° to +50° C	<0.2	+/- 1.5 PPM MAX	Pass

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Terry Schwenk

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Frequency Stability Over Temperature - CSM1





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Frequency Stability Over Temperature - CSM2

Frequency Stability with Varying Supply Voltage - CSM2

