

- 7) The EUT passed the Frequency Stability vs. Temperature and Voltage requirements for the PCS band as per 47 CFR 2.1055(a), 2.1055(d), 24.235 and RSS-133. The maximum frequency error measured was less than 0.1 ppm. The temperature range was from -30°C to +60°C in 10 degree temperature steps. The EUT was measured on low, middle and high channels at each temperature step. The EUT was measured at low (3.5 volts), nominal (3.8 volts) and high (4.1 volts) dc input voltage at each temperature step and channel at maximum output power. See APPENDIX 3 for the test data.
- 8) The radiated spurious emissions/harmonics and ERP/EIRP were measured for both GSM850 and PCS bands. The results are within the limits. The EUT was placed on a nonconductive wooden table, 100 cm high that was positioned on a remotely rotatable turntable. The test distance used between the EUT and the receiving antenna was three metres. At this point the emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The turntable was rotated to determine the azimuth of the peak emissions. Both the horizontal and vertical polarisations of the emissions were measured.

The maximum emissions level was recorded. The EUT was then substituted with a substitution antenna placed in the same location as the EUT. A Dipole antenna was used for the ERP measurements and a Horn antenna was used for EIRP measurements. After the final maximum reading was obtained the Handheld was substituted with a dipole or horn antenna, which was placed in the same location as the Handheld. The substitution antenna was connected into a signal generator that was set to the test frequency. The emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The signal generator output was then adjusted to match the Handheld output reading. The signal generator output was recorded. Both the horizontal and vertical polarisations of the emissions were measured.

The measurements were performed in a semi-anechoic chamber. The semi-anechoic chamber FCC registration number is **778487** and the Industry Canada file number is **IC4240**. The EUT was measured on the low, middle and high channels.

The highest ERP in the GSM850 band measured was 27.3 dBm at 837.6 MHz (channel 195). The highest EIRP in the PCS band measured was 31.9 dBm at 1880 MHz (channel 661).

The radiated carrier harmonics were measured up to the 10th harmonic for low, middle and high channels in the GSM850 band and PCS band.

The worst test margin for GSM850 band measured was 26.1 dB below the limit at 1648.4 MHz.

The worst test margin for PCS band measured was 25.3 dB below the limit at 3819.6 MHz.

The EUT's RF local oscillator (LO) emissions (transmit mode) were measured in the GSM850 band and PCS band in the standalone configuration in the upright position on the low and high channels. Both the horizontal and vertical polarizations were measured. The RF LO emissions were in the noise floor (NF).



The EUT's IF LO emissions were measured in the GSM band in the standalone configuration in the upright position on middle channel. Both the horizontal and vertical polarizations were measured. The highest emissions measured had a test margin of 8.6 dB at 896.0 MHz.

The EUT's IF local oscillator emissions were measured in the PCS band in the standalone configuration in the upright position on the middle channel. Both the horizontal and vertical polarizations of the emissions were measured. The IF LO was in the NF.

The radiated carrier harmonics were measured up to the 10th harmonic for low, middle and high channels in the GSM850 band and PCS band with Bluetooth transmitting.

The worst test margin for GSM850 band measured was 30.3 dB below the limit at 3296.8 MHz.

The worst test margin for PCS band measured was 16.2 dB below the limit at 5640 MHz.

The radiated harmonics for Bluetooth in frequency hopping mode were measured in simultaneous transmission with the GSM850 and then the PCS band up to the 10^{th} harmonics. Both the horizontal and vertical polarizations were measured. The harmonics emissions above the 4^{th} harmonics were in the NF for the GSM850 band and above the 3^{rd} harmonics for the PCS band.

Sample Calculation:

Field Strength ($dB\mu V/M$) is calculated as follows: FS = Measured Level ($dB\mu V$) + A.F. (dB/m) + Cable Loss (dB) - Preamp (dB) + Filter Loss (dB)

Measurement Uncertainty ±4.0 dB

To view the test data see APPENDIX 4.



Test Date: April 20 to June 25, 2004

APPENDIX 4

RADIATED EMISSIONS TEST DATA



Test Date: April 20 to June 25, 2004

Radiated Emissions Test Data Results

Test distance is 3.0 metres

								Su	bstitution	Method		
		EUT		Rx Ante	enna	Spec Anal	trum yzer	Т	racking Gei	nerator		
Туре	Ch	Frequency	Band	Туре	Pol.	Reading	Max (V,H) (dBuV/)	Pol. Tx-Rx	Reading	Corrected Reading (relative to	Limit (dBm)	Diff to Limit
		(1011 12)	(dBuV) (dBuV) (dBm) dipole								(ubiii)	(uD)
GSN	1850 B	and (ERP)										
Han	dheld	Standalone	, on it	s side								
F0	128	824.20	850	Dipole	V	78.0	86.4	VV	7.7	24.05	27 78	-3 73
F0	128	824.20	850	Dipole	Н	86.4	00.4	нн	6.1	24.00	21.10	0.70
F0	195	837.60	850	Dipole	V	78.6	87.7	VV	10.9	27.25	27 78	-0 53
F0	195	837.60	850	Dipole	Н	87.7	07.7	нн	8.8	27.20	21.10	-0.55
F0	251	848.80	850	Dipole	V	80.6	88.7	VV	9.9	26.25	27 78	-1 53
F0	251	848.80	850	Dipole	н	88.7	00.7	нн	7.8	20.23	21.10	-1.55

ERP = Tracking Generator Level + Antenna Gain – Cable Loss + Preamp

Example: 824.20 MHz = 7.7 (Tracking Generator Level) - 7.7 (Antenna Loss) - 2.15 (Dipole Factor) – 3.8 (Cable Loss) + 30.0 (Preamp Gain) = 24.05 dBm (Reading Relative to Dipole)



 4^{th}

195

3350.40

Report No. RIM-0086-0404-01

Test Date: April 20 to June 25, 2004

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres

Substitution Method Spectrum EUT **Rx** Antenna **Tracking Generator** Analyzer Corrected Diff to Max Reading Frequency Pol. Reading (V,H) Type Ch Band Type Reading Limit Limit Pol. (relative to (MHz) (dBuV) (dBuV) Tx-Rx (dBm) dipole) (dBm) (dB) GSM850 Band (Harmonics) Handheld Standalone, upright position Low Channel - 824.2 MHz 2nd 128 1648.40 Horn V 60.8 V-V -41.8 850 60.8 -39.1 -13 -26.1 2nd 128 1648.40 850 Horn Н 58.9 H-H -42.1 3rd 128 2472.60 850 V NF V-V Horn NF 3rd 850 128 2472.60 Horn Н NF H-H 4th 850 128 3296.80 Horn V 43.2 V-V -51.0 43.2 -47.5 -13 -34.5 $\mathbf{4}^{\mathsf{th}}$ 850 128 3296.80 Horn Н 43.1 H-H -51.4 The harmonics were investigated up to the 10th harmonic. Emissions above the 4th harmonic were in the noise floor (NF) Middle Channel - 837.6 MHz 2nd 195 1675.20 V V-V 850 Horn 55.7 -47.3 55.7 -44.6 -13 -31.6 2nd 195 1675.20 850 Horn Н 54.4 H-H -47.7 3rd 195 2512.80 850 Horn V NF V-V NF 3rd 195 2512.80 850 Н NF H-H Horn 4^{th} V-V 195 3350.40 850 Horn V 44.4 -49.3 45.0 -45.7 -13 -32.7

The harmonics were investigated up to the 10^{th} harmonic. Emissions above the 4^{th} harmonic were in the NF

Horn

V

45.0

H-H

-49.2

850



Test distance is 3.0 metres

Test Date: April 20 to June 25, 2004

Radiated Emissions Test Data Results cont'd

June 25, 2004 Substitution Method

								Subs	stitution M	lethod		
		EUT		Rx Ante	enna	Spec Anal	trum yzer	Trac	king Gen	erator		
Туре	Ch	Frequency	Band	Туре	Pol.	Reading	Max (V,H)	Pol.	Reading	Corrected Reading (relative to	Limit	Diff to Limit
		(MHz)				(dBuV)	(dBuV)	Tx-Rx	(dBm)	dipole)	(dBm)	(dB)
Hig	h Cha	nnel – 848.8	MHz		-							
2 nd	251	1697.60	850	Horn	V	51.4	51 /	V-V	-52.9	-50.2	-13	-37.2
2 nd	251	1697.60	850	Horn	н	48.0	51.4	H-H	-53.1	-30.2	-15	-51.2
3 rd	251	2546.40	850	Horn	V	NF	NE	V-V				
3 rd	251	2546.40	850	Horn	н	NF		H-H				
4 th	251	3395.20	850	Horn	V	46.3	46.2	V-V	-45.8	40.0	10	20.2
4 th	251	3395.20	850	Horn	Н	45.8	40.5	H-H	-46.3	-42.3	-13	-29.3
The	e harn	nonics were	investi	gated u	ip to	the 10 th	harmonio	C.				
Em	ission	s above the	4 th har	monic	were	in the no	oise floor	(NF)				



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Report No. RIM-0086-0404-01

Test Date: April 20 to June 25, 2004

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres

									Sub	stitution	Method		
		EUT		Rx Ant	enna	Spect	trum Anal	yzer	Trac	cking Ge	enerator		
Туре	Ch	Frequency (MHz)	Band	Туре	Pol.	Reading (dBuV)	Corrected Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm))	Corrected Reading (relative to dipole) (dBm))	Limit (dBm)	Diff to Limit (dB)
GSM RF L	BANE ocal O Chanr) scillator 1 (L	_O ₁)	<u> </u>	<u>.</u>	<u></u>		<u> </u>					
<u></u>	100	1070.00	950	Horn	V				<u> </u>				
	120	1272.20	850	Horn	V L		NF	-	V-V			-13	
FU	128	1272.20	850	Horn	П	INF			п-п				
High	<u>Chan</u>	nel		ı. T									
F0	251	1296.80	850	Horn	V	NF	NF	-	V-V			-13	
F0	251	1296.80	850	Horn	Н	NF			H-H				
No Er RF L Low	nissior .O ₂ <u>Chanr</u>	ns could be s nel	seen.										
F0	128	1738.20	850	Horn	V	NF	NF		V-V			-13	
F0	128	1738.20	850	Horn	Н	NF			H-H				
No <u>High</u>	Emissi Chan	ons could b nel	e seer	1.						<u> </u>			
F0	251	1787.40	850	Horn	V	NF	NF		V-V			-13	
F0	251	1787.40	850	Horn	Н	NF		F	H-H			-	
No	Emissi	ons could b	e seer	۱.						, L			



Test Date: April 20 to June 25, 2004

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres

The measurements were performed with the handheld in standalone upright position.

									Sub	ostitution	Method			
		EUT		Rx Ant	enna	Spect	trum Anal	yzer	TI	acking Ge	enerator			
Туре	Ch	Frequency (MHz)	Band	Туре	Pol.	Reading (dBuV)	Corrected Reading (dBuV)	Max (V,H)	Pol. Tx- Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)	
IF (LO)														
IF LU	Chani	iei 195, (83		1Z)	1			1		1				
FO	195	896.00	850	HLP	V	52.1	51.56	51 56	VV	-37.1	-21.65	-13	-8 65	
FO	195	896.00	850	HLP	Н	47.8	47.26	51.50	нн	-37.3	-21.05	-15	-0.05	



Test Date: April 20 to June 25, 2004

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres

	FIIT							Sub	stitution M	lethod		
		EUT		Rx Ante	enna	Spec Ana	ctrum lyzer	Trac	cking Gen	erator		
Туре	Ch	Frequency	Band	Туре	Pol.	Reading	Max (V,H)	Pol.	Reading	Corrected Reading (relative to	Limit	Diff to Limit
		(MHz)				(dBuV)	(dBuV)	Tx-Rx	(dBm)	`dipole)	(dBm)	(dB)
GSI Har	M850 a ndheld	and Bluetoot Standalone	t h trans e, uprigl	mitting nt positi	in fre ion	equency l	hopping	mode				
Low	Chan	nel – 824.2 M	ИНz									
2 nd	128	1648.40	850	Horn	V	51.3	513	V-V	-52.5	-19.8	-13	-36.8
2^{nd}	128	1648.40	850	Horn	Н	47.8	51.5	H-H	-53.2	-43.0	-15	-30.0
3 rd	128	2472.60	850	Horn	V	NF		V-V				
3 rd	128	2472.60	850	Horn	Н	NF	INF	H-H				
4 th	128	3296.80	850	Horn	V	45.1	46.2	V-V	-46.8	40.0	10	20.2
4 th	128	3296.80	850	Horn	Н	46.2	40.Z	H-H	-47.0	-43.3	-13	-30.3
The	e harm	nonics were	investi	gated u	o to	the 10 th I	narmonio).				
Em	issions	s above the	4 th hari	monic w	vere	in the no	ise floor	(NF)				
Mid	Idle Cl	n annel – 837	.6 MHz									
2 nd	195	1675.20	850	Horn	V	56.3	56.3	V-V	-46.4	-43.7	-13	-30.7
2 nd	195	1675.20	850	Horn	Н	52.3		H-H	-46.7	_	_	
3 rd	195	2512.80	850	Horn	V	NF	NF	V-V				
3 rd	195	2512.80	850	Horn	Н	NF		H-H				
4^{th}	195	3350.40	850	Horn	V	42.3	12.6	V-V	-52.3	-18.8	-13	-35.8
4^{th}	195	3350.40	850	Horn	V	42.6	42.0	H-H	-53.1	-40.0	-15	-33.0
The	e harm	nonics were	investi	gated u	o to	the 10 th ł	narmonic					
Em	issions	s above the	4 th hari	monic w	vere	in the NF	-					



Test Date: April 20 to June 25, 2004

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres

Substitution Method Spectrum EUT Rx Antenna **Tracking Generator** Analyzer Corrected Diff to Max Reading Reading Limit Frequency Pol. Reading Limit Type Ch Band Type (V,H) Pol. (relative to (dBuV) (dBuV) Tx-Rx (dBm) dipole) (dBm) (dB) (MHz) High Channel - 848.8 MHz 2nd V-V 251 1697.60 850 Horn V 49.2 -55.4 49.2 -52.5 -13 -39.5 2nd 251 1697.60 850 Horn Н 47.8 H-H -55.2 3rd V NF V-V 251 2546.40 850 Horn NF 850 3rd 251 2546.40 Horn Н NF H-H 4th 850 V-V 251 3395.20 Horn V 44.7 -48.2 44.7 -44.7 -13 -31.7 4th 850 251 3395.20 Horn Н 44.0 H-H -49.0 The harmonics were investigated up to the 10th harmonic. Emissions above the 4th harmonic were in the noise floor (NF)



F0

810

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Test Date: April 20 to June 25, 2004

Radiated Emissions Test Data Results cont'd

Test Distance was 3.0 metres.

PCS Band

								S	Substituti	ion Method		
		EUT		Recei Anten	ve na	Spectrum	Analyzer	Т	racking	Generator		
Туре	Ch	Frequency (MHz)	Band	Туре	Pol.	Reading (dBuV)	Max (V,H) dBuV	Pol. Tx-Rx	Reading	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit (dBm)	Diff to Limit
PCS I Han	<u> </u>											
F0	512	1850.20	1900	Horn	V	94.4	04.4	V-V	-5.9	20.0	22	2.4
F0	512	1850.20	1900	Horn	Н	83.3	94.4	H-H	-4.8	29.9	33	-3.1
F0	661	1880.00	1900	Horn	V	95.3	05.3	V-V	-3.8	31.0	33	_1 1
F0	661	1880.00	1900	Horn	н	85.8	90.0	H-H	-2.8	51.8	33	-1.1
F0	810	1909.80	1900	Horn	V	95.0	05.0	V-V	-4.4	21.0	22	10
	1					1	90.0			31.2	33	-1.0

EIRP = Tracking Generator Level + Antenna Factor – Cable Loss + Preamp Gain

н

Horn

1900

1909.80

<u>Example</u>: 1850.20 MHz = -4.8 (Tracking Generator Level) + 7.7 (Antenna Factor) – 5.6 (Cable Loss) + 32.6 (Preamp Gain) = 29.9 dBm (Reading Relative to Isotropic Radiator)

87.1

June 25, 2004

H-H

-3.5



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Report No. RIM-0086-0404-01

Test Date: April 20 to June 25, 2004

Radiated Emissions Test Data Results cont'd

Test Distance was 3.0 metres.

and	B	CS	P
-----	---	----	---

								Su	hstitution	Method					
										rivietriou					
		EUT		Receive Ante	enna	Spectrum	n Analyzer	Tra	acking G	enerator					
Туре	Ch	Frequency (MH ₂)	Band	Pol. Type	Pol.	Reading	Max (V,H)	Pol.	Reading	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit	Diff to Limit			
PCS Han Low	BAN Idhelo	ID (Harmon d Standalon <u>nnel</u> 1850.2	ics) ie, upr 20 MH	ight positio z	on	(ubu v)		11.4-11.4		(dbh)		(0.0)			
2 nd	2 nd 512 3700.40 1900 Horn V 43.3 43.3 V-V -44.8 -41.3 -13 -28.3														
2 nd 512 3700.40 1900 Horn H 41.0 43.3 H-H -44.6 -41.3 -13 -28															
The l	The harmonics were investigated up to the 10th harmonic.														
Mide	Imissions above the 2 nd harmonic were in the NF Middle Channel 1880.00 MHz Imissions above the second s														
2 nd	661	3760.00	1900	Horn	V	42.6	42.6	V-V	-44.5	-40.6	-13	-27.6			
2 nd	661	3760.00	1900	Horn	Н	40.6	42.0	H-H	-43.9						
The l	narmo	nics were in	vestiga	ted up to th	e 10t	th harmoi	nic.								
Emis <u>Hig</u> ł	ssion: <u>n Cha</u>	s above the <u>nnel</u> 1909.	2 nd ha 8 MHz	rmonic we	ere ir	n the NF									
2 nd	810	3819.60	1900	Horn	V	45.1	45.4	V-V	-41.6	20.0	40	05.0			
2 nd	810	3819.60	1900	Horn	н	43.8	45.1	H-H	-42.0	-38.3	-13	-25.3			
The h Emis	harmo ssion:	onics were in s above the	vestiga 2 nd ha	ted up to th rmonic we	e 10t ere ir	th harmoi n the NF	nic.	•	·						



Appendix 4

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Report No. RIM-0086-0404-01

Test Date: April 20 to June 25, 2004

Radiated Emissions Test Results cont'd

Test Distance was 3.0 metres.PCS BandJune 25, 2004The measurements were performed in transmit mode with the handheld in standalone upright
position.June 25, 2004

	FUT								Sul	ostitution	Method		
		EUT		Rx Ant	enna	Spect	trum Anal	yzer	Tra	cking G	enerator		
Туре	Ch	Frequency	Band	Туре	Pol.	Reading	Corrected	Max (V,H)	Pol.	Reading	Corrected Reading (relative to Isotropic	Limit	Diff to Limit
		(MHz)				(dBuV)	Reading (dBuV)	(dBuV)	Tx- Rx	(dBm)	Radiator) (dBm)	(dBm)	(dB)

RF LO₁

Low Channel

F0	512	1423.20	1900	Horn	V	NF	NF	V-V		-13	
F0	512	1423.20	1900	Horn	Н	NF		H-H		-15	

No Emissions could be seen.

<u>High</u> Channel

F0	810	1482.80	1900	Horn	V	NF	NF	V-V		12	
F0	810	1482.80	1900	Horn	Н	NF		H-H		-13	

No Emissions could be seen.

RF LO₂

Low Channel

F0	512	1930.10	1900	Horn	V	NF	NF	V-V		-13	
F0	512	1930.10	1900	Horn	Н	NF		H-H		-15	

No Emissions could be seen.

High Channel

F0	810	1989.70	1900	Horn	V	NF	NF		V-V			-13	
F0	810	1989.70	1900	Horn	Н	NF			H-H			10	
No Emissions could be seen.													



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Report No. RIM-0086-0404-01

Test Date: April 20 to June 25, 2004

Radiated Emissions Test Results cont'd

Test Distance was 3.0 metres.PCS BandJune 25, 2004

The measurements were performed in transmit mode with the handheld in standalone upright position.

									Sub	stitution	Method		
EUT			Rx Antenna		Spectrum Analyzer			Tracking Generator					
Туре	Ch	Frequency	Band	Туре	Pol.	Reading	Corrected	Max (V,H)	Pol.	Reading	Corrected Reading (relative to Isotropic	Limit	Diff to Limit
		(MHz)				(dBuV)	Reading (dBuV)	(dBuV)	Tx-Rx	(dBm)	Radiator) (dBm)	(dBm)	(dB)
IF (LO)													
F0	661	854.00	1900	HLP	V	NF	NF		V-V			10	
F0	661	854.00	1900	HLP	Н	NF			H-H			-13	
No E	missio	ons could be	e seen										

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Test Date: April 20 to June 25, 2004

Substitution Method

Radiated Emissions Test Results cont'd

Test Distance was 3.0 metres.

June 25, 2004

EUT				Receive Antenna		Spectrum Analyzer		Tra	acking G				
Туре	Ch	Frequency	Band	Pol. Type	Pol.	Reading	Max (V,H)	Pol.	Reading	Corrected Reading (relative to Isotropic Radiator)	Limit	Diff to Limit	
DCG	Cond	(MHz)	ronom	itting in fra		(dBuV)	(dBuV)	Tx-Rx	(dBm)	(dBm)	(dBm)	(dB)	
Handheld Standalone, upright position													
Low Channel 1850.20 MHz													
2 nd	512	3700.40	1900	Horn	V	42.2	40.4	V-V	-45.8	40 5	10	00 F	
2 nd	512	3700.40	1900	Horn	Н	42.4	42.4	H-H	-46.1	-42.5	-13	-29.5	
3 rd	512	5550.6	1900	Horn	V	42.5	12.5	V-V	-37.1	24.0	-13	21.0	
3 rd	512	5550.6	1900	Horn	Н	NF	42.5	H-H	-36.3	-34.9		-21.9	
Emissions above the 3 rd harmonic were in the NF <u>Middle Channel</u> 1880.00 MHz													
2 nd	661	3760.00	1900	Horn	V	41.5	11 E	V-V	-46.4	10 5	12	20.5	
2 nd	661	3760.00	1900	Horn	Н	40.9	41.5	H-H	-45.8	-42.5	-13	-29.5	
3 rd	661	5640.00	1900	Horn	V	46.0	46.0	V-V	-32.1	-20.2	-13	-16.2	
3 rd	661	5640.00	1900	Horn	Н	42.3	40.0	H-H	-30.6	-23.2			
The harmonics were investigated up to the 10th harmonic. Emissions above the 3 rd harmonic were in the NF													
High Channel 1909.8 MHz													
2 nd	810	38.19.60	1900	Horn	V	43.4	43.4	V-V	-44.4	-41.1	-13	-28.1	
2 nd	810	3819.60	1900	Horn	Н	42.6	_	H-H	-44.8				
3 rd	810	5729.40	1900	Horn	V	42.1	42.1	V-V	-36.5	-34.2	-13	-21.2	
3 ^{ra}	810	5729.40	1900	Horn	Н	NF		H-H	-35.6				
The harmonics were investigated up to the 10th harmonic. Emissions above the 3 rd harmonic were in the NF													

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