

🔤 Keysight Sp	pectrum Analyzer - Sw										
L <mark>XI</mark> L	RF 50 Ω	DC C	DRREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO	TRAC	1 Jan 14, 2021 E 1 2 3 4 5 6	F	requency
			PNO: Wide ↔ FGain:Low	Trig: Free Atten: 36		• //		TYF DE			
10 dB/div Log	Ref 25.00 c	dBm					Mk	r1 824.0 -22.2	00 MHz 76 dBm		Auto Tune
15.0									A. 01. AD. 1		<b>Center Freq</b> 4.000000 MHz
-5.00						man			DL1 -13.00 dBm	82	Start Freq 2.000000 MHz
-15.0			www.cologo	moverser	1					82	Stop Freq 6.000000 MHz
-35.0	parent later and a part of the second s			U						<u>Auto</u>	<b>CF Step</b> 400.000 kHz Man
-55.0											Freq Offset 0 Hz
-65.0											Scale Type
	24.000 MHz / 100 kHz		#VBW	300 kHz			Sweep 2	Span 4 2.000 ms (	.000 MHz 1001 pts)	Log	<u>Lin</u>
MSG							STATUS	S			

Plot 7-96. Lower Band Edge Plot (LTE Band 26/5 - 5MHz QPSK – Full RB Configuration)

10 gB/div       Ref 25.00 dBm       -26.710 dBm         150	5 00 aven bernar ver hall a second and a sec	<b>CF St</b> 400.000 k <u>Auto</u> M	- 174.1		www.n		and and a second				
Odb/div         Ref 25.00 dBm        26.710 dBm           .00 <td></td> <td></td> <td></td> <td>-</td> <td>weeking me</td> <td>Monary</td> <td>mono</td> <td></td> <td></td> <td></td> <td>.0</td>				-	weeking me	Monary	mono				.0
OddB/div         Ref 25.00 dBm        26.710 dBm           Og         Cente           00         Cente	5.00 accolumny a						L'AL				
OpenSidiv         Ref 25.00 dBm        26.710 dBm           00         0	00 00 000 000 000 000 000 000 000 000	Stop Fr 851.000000 M					1				.0
Bildiv         Ref 25.00 dBm         -26.710 dBm           00	00 and many side and a second a second a second a second a	Oton Fr	DL1 -13.00 dBm								
Od B/div         Ref 25.00 dBm        26.710 dBm           5.0		Start Fr 847.000000 N									
D dB/div Ref 25.00 dBm -26.710 dBm Center	50	849.000000 #						le Ma	yan mar na	In mary and a for the for the	
0 dB/div Ref 25.00 dBm -26.710 dBm		Center Fr					Ĭ				
Mkr1 849.000 MHz		Auto Tu			Mkı					Ref 25.00 dBm	dB/div

Plot 7-97. Upper Band Edge Plot (LTE Band 26/5 - 5MHz QPSK – Full RB Configuration)

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🔤 Keysight Sp	ectrum Analyze							
LXI L	RF	50 Ω DC	CORREC	SENSE:		ALIGN AUTO	03:43:19 AM Jan 14, 2021 TRACE 1 2 3 4 5	
			PNO: Wide ↔ IFGain:Low	Trig: Free Ru Atten: 36 dE	in	•	TYPE A WWWM DET A NNNN	
10 dB/div Log	Ref 25.0	00 dBm				M	(r1 823.996 MH) -18.261 dBn	Auto Tune
15.0								Center Freq 824.000000 MHz
5.00					ponsion	Norman	mulman all more	
-5.00				/	ŕ			Start Freq 822.000000 MHz
-15.0				1			DL1 -13.00 dBr	
				a and a second				<b>Stop Freq</b> 826.000000 MHz
-35.0	www.www	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				CF Step 400.000 kHz
-45.0								<u>Auto</u> Man
-55.0								Freq Offset 0 Hz
-65.0								Scale Type
	24.000 MH	lz					Span 4.000 MH	Log <u>Lin</u>
#Res BW	100 kHz		#VBW	300 kHz		Sweep	2.000 ms (1001 pts	
mou						STAR		

Plot 7-98. Lower Band Edge Plot (LTE Band 26/5 - 3MHz QPSK – Full RB Configuration)

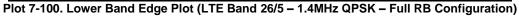
Keysight Spectrum Analyzer - Swept SA           L         RF         50 Ω         DC	CORREC	SENSE:INT	ALIGN AUTO	03:44:30 AM Jan 14, 2021	
	PNO: Wide ↔		#Avg Type: RMS	TRACE 1 2 3 4 5 6 TYPE A WWWW DET A NNNNN	Frequency
dB/div Ref 25.00 dBm			Mk	r1 849.004 MHz -19.911 dBm	Auto Tun
5.0	Aradallowapara				Center Fre 849.000000 M⊦
00					Start Fre 847.000000 MF
5.0				DL1 -13.00 dBm	Stop Fre 851.000000 MH
5.0		Moderal	Month Mangaration	mand against work	CF Ste 400.000 kH <u>Auto</u> Ma
5.0					Freq Offs 0 ⊦
5.0					Scale Typ
enter 849.000 MHz Res BW 100 kHz	#VBW	300 kHz	Sweep 2	Span 4.000 MHz .000 ms (1001 pts)	Log <u>L</u>
G			STATUS	5	

Plot 7-99. Upper Band Edge Plot (LTE Band 26/5 - 3MHz QPSK – Full RB Configuration)

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Keysight Spectrum Analyzer - Swe					
XU L RF 50 Ω	DC CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	03:46:55 AM Jan 14, 2021 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A N N N N N	Frequency
10 dB/div Ref 25.00 c	IFGain:Low	Atten: 36 dB	Mk	r1 824.000 MHz -20.239 dBm	Auto Tune
15.0		mm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	4	Center Free 824.000000 MH
5.00					Start Free 822.000000 MH
-15.0	Mananan	1		DL1 -13.00 dBm	Stop Free 826.000000 MH
35.0 45.0 Manuna Maria	h. M. M.				CF Ste 400.000 kH <u>Auto</u> Ma
55.0					Freq Offs 0 F
65.0					Scale Typ
Center 824.000 MHz #Res BW 100 kHz	#VBW	300 kHz	Sweep 2	Span 4.000 MHz .000 ms (1001 pts)	Log <u>Li</u>
ISG			STATUS		



	m Analyzer - Swept SA RF 50 Ω DC	CORREC	SEN	ISE:INT		ALIGN AUTO	03:46:08 A	M Jan 14, 2021		
		PNO: Wide ↔ IFGain:Low	. Trig: Free Atten: 36		#Avg Typ	e: RMS	TY	CE 1 2 3 4 5 6 PE A WWWWW ET A N N N N N	F	requency
dB/div R	ef 25.00 dBm					Mk	r1 849.0 -24.2	00 MHz 90 dBm		Auto Tui
5.0	, me	un way and and	mm							<b>Center Fr</b> 9.000000 M
									84	<b>Start Fr</b> 7.000000 M
.0				1				DL1 -13.00 dBm	85	<b>Stop Fr</b> 1.000000 M
5.0	hard t			Www		MMMartine	mar marker	Martin Angel	<u>Auto</u>	<b>CF Ste</b> 400.000 k M
.0										Freq Offs 0
enter 849.0							Snan	.000 MHz	Log	Scale Ty
Res BW 10		#VBW	300 kHz			Sweep 2	2.000 ms	(1001 pts)		
3						STATU	s			

Plot 7-101. Upper Band Edge Plot (LTE Band 26/5 – 1.4MHz QPSK – Full RB Configuration)

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## NR Band n5

🔤 Keysight Spectrum Analyzer - Swept SA 🛛					
LX/RLT RF 50Ω DC			ALIGN AUTO 01: Type: RMS	:40:06 AM Jan 20, 2021 TRACE 1 2 3 4 5 6	Frequency
PASS 10 dB/div Ref 25.00 dBm	PNO: Fast ↔ Trig: F IFGain:Low #Atten:	ree Run : 36 dB	Mkr1	823.55 MHz -28.87 dBm	Auto Tune
Trace 1 Pass					Center Freq 824.000000 MHz
-5.00			compromente a	~~~	Start Freq 799.000000 MHz
-15.0		1			<b>Stop Freq</b> 849.000000 MHz
-35.0	man			monto	<b>CF Step</b> 5.000000 MH: <u>Auto</u> Mar
-55.0					Freq Offse 0 H:
-65.0					Scale Type
Center 824.00 MHz #Res BW 200 kHz	#VBW 620 kF	łz	Sweep 1.000	pan 50.00 MHz ) ms (1001 pts)	Log <u>Lir</u>
MSG			STATUS		

Plot 7-102. Lower Band Edge Plot (NR Band n5 – 20.0MHz - Full RB)



Plot 7-103. Upper Band Edge Plot (NR Band n5 – 20.0MHz - Full RB)

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Keysight Spectrum Anal									- f	×
XIRLT RF		NO: Wide		SE:INT	#Avg Typ	ALIGN AUTO e: RMS		Jan 20, 2021 1 2 3 4 5 6 A WWWW	Frequency	У
PASS	5.00 dBm	NO: Wide ↔	#Atten: 36			Mkr1	DET 823.962	APNNNN	Auto T	Fune
Log Trace 1 Pas:	5								Center   824.000000	
-5.00					And the second sec		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Start   805.250000	
-15.0				1					<b>Stop I</b> 842.750000	
-45.0	form	~~~~^	A And				ۍ مړ (	w. Aug	CF \$ 3.750000 <u>Auto</u>	
55.0									Freq O	offso 0⊦
-65.0									Scale 1	Тур
Center 824.00 M Res BW 160 kH		#VBW	510 kHz			Sweep 1	Span 37 .000 ms (1	.50 MHz 001 pts)	Log	Li
ISG						STATUS				

Plot 7-104. Lower Band Edge Plot (NR Band n5 – 15.0MHz - Full RB)



Plot 7-105. Upper Band Edge Plot (NR Band n5 – 15.0MHz - Full RB)

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LXI RLT	RF 50 Ω										×
	RF   50 Ω	DC CO	RREC	SEI	NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	04:21:20 AM J TRACE	an 20, 2021 1 2 3 4 5 6	Frequency	
PASS			NO: Wide ↔ Gain:Low	Trig: Free #Atten: 3				TYPE DET	A WWWWW A P N N N N		
1 00	Ref 25.00 c	iBm					Mk	r1 824.00 -26.83	0 MHz 7 dBm	Auto Tu	Ine
15.0 Trace	1 Pass									Center F 824.000000 M	
-5.00					·····					Start F 811.500000 M	
-15.0					1					Stop F 836.500000 M	_
-35.0	~~~~~	www	- Antone -	www					~~~~~	CF S 2.500000 M Auto	
-55.0										Freq Off (	f <b>set</b> ) Hz
-65.0										Scale Ty	уре
Center 824 #Res BW 1			#VBW	300 kHz			Sweep 1	Span 25. .200 ms (10		Log	<u>Lin</u>
MSG							STATUS	;			

Plot 7-106. Lower Band Edge Plot (NR Band n5 – 10.0MHz - Full RB)



Plot 7-107. Upper Band Edge Plot (NR Band n5 – 10.0MHz - Full RB)

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Keysight Spectrum Analyzer - Swept S	A				
LXX RLT RF 50Ω D	C CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	05:10:18 AM Jan 20, 2021 TRACE 1 2 3 4 5 6	Frequency
PASS	PNO: Wide ↔ IFGain:Low	Trig: Free Run #Atten: 36 dB		DET A P N N N N	
10 dB/div Ref 25.00 dBr	n		Mkr1	824.000 0 MHz -23.529 dBm	Auto Tune
15.0					Center Freq 824.000000 MHz
-5.00					Start Freq 817.750000 MHz
-15.0		1			<b>Stop Freq</b> 830.250000 MHz
-35.0					<b>CF Step</b> 1.250000 MHz <u>Auto</u> Man
-55.0					<b>Freq Offset</b> 0 Hz
-65.0					Scale Type
Center 824.000 MHz #Res BW 100 kHz	#VBW :	300 kHz	Sweep 1	Span 12.50 MHz .000 ms (1001 pts)	Log <u>Lin</u>
MSG			STATUS		

Plot 7-108. Lower Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)



Plot 7-109. Upper Band Edge Plot (NR Band n5 – 5.0MHz - Full RB)

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# 7.5 Radiated Power (ERP)

### Test Overview

Effective Radiated Power (ERP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

### Test Procedures Used

KDB 971168 D01 v03r01 - Section 5.2.1

ANSI/TIA-603-E-2016 - Section 2.2.17

### Test Settings

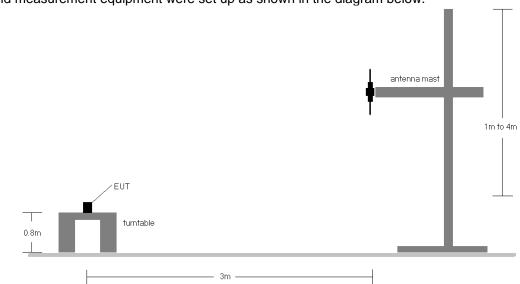
- Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW  $\geq$  3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points  $\geq 2 \times \text{span} / \text{RBW}$
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

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#### Test Setup



The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-4. Radiated Test Setup <1GHz

### Test Notes

- 1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers is reported in GPRS mode while transmitting with one slot active.
- 2) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1".
- 3) This device was tested under all RC and SO combinations and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 4) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 5) This unit was tested with its standard battery.
- 6) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 7) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

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Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
824.20	GPRS850	V	136	216	24.24	6.35	28.44	0.698	38.45	-10.01
836.60	GPRS850	V	136	215	24.83	6.38	29.06	0.805	38.45	-9.39
848.80	GPRS850	V	219	262	21.24	6.51	25.60	0.363	38.45	-12.86
836.60	GPRS850	Н	207	295	24.38	6.68	28.91	0.778	38.45	-9.54
836.60	EDGE850	V	136	215	20.65	6.38	24.88	0.308	38.45	-13.57

### Table 7-2. ERP Data (GPRS Cell)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
826.40	WCDMA850	V	136	285	14.08	6.37	18.30	0.068	38.45	-20.15
836.60	WCDMA850	V	126	238	13.36	6.38	17.59	0.057	38.45	-20.86
846.60	WCDMA850	V	146	236	13.64	6.48	17.97	0.063	38.45	-20.48
826.40	WCDMA850	Н	115	299	13.03	6.77	17.65	0.058	38.45	-20.80

### Table 7-3. ERP Data (WCDMA Cell)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
824.70	CDMA850	Н	221	302	16.26	6.76	20.87	0.122	38.45	-17.59
836.52	CDMA850	Н	203	288	15.01	6.68	19.54	0.090	38.45	-18.91
848.31	CDMA850	Н	211	301	14.86	6.70	19.41	0.087	38.45	-19.04
824.70	CDMA850	V	136	290	15.54	6.36	19.75	0.094	38.45	-18.71

### Table 7-4. ERP Data (CDMA Cell)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
		831.5	Н	221.0	292.0	6.73	1/0	16.73	21.31	0.135	38.45	-17.14	23.46	0.222	40.61	-17.15
15MHz	QPSK	836.5	Н	218.0	302.0	6.68	1/0	16.65	21.18	0.131	38.45	-17.27	23.33	0.215	40.61	-17.28
(Band 26		841.5	Н	103.0	315.0	6.63	1/0	14.92	19.40	0.087	38.45	-19.05	21.55	0.143	40.61	-19.06
only)	16-QAM	831.5	Н	221.0	292.0	6.73	1/0	15.64	20.22	0.105	38.45	-18.23	22.37	0.172	40.61	-18.24
	64-QAM	836.5	Н	218.0	302.0	6.68	1/0	15.68	20.21	0.105	38.45	-18.24	22.36	0.172	40.61	-18.25
		829.0	Н	221.0	292.0	6.80	1/0	16.78	21.43	0.139	38.45	-17.02	23.58	0.228	40.61	-17.03
	QPSK	836.5	Н	218.0	302.0	6.68	1 / 49	16.70	21.23	0.133	38.45	-17.22	23.38	0.218	40.61	-17.23
10 MHz		844.0	Н	103.0	315.0	6.66	1/0	15.03	19.54	0.090	38.45	-18.91	21.69	0.148	40.61	-18.92
	16-QAM	829.0	Н	221.0	292.0	6.80	1/0	15.54	20.19	0.104	38.45	-18.26	22.34	0.171	40.61	-18.27
	64-QAM	836.5	Н	218.0	302.0	6.68	1 / 25	15.86	20.39	0.109	38.45	-18.06	22.54	0.179	40.61	-18.07
		826.5	Н	221.0	292.0	6.77	1 / 12	16.73	21.36	0.137	38.45	-17.09	23.51	0.224	40.61	-17.10
	QPSK	836.5	Н	218.0	302.0	6.68	1/0	16.59	21.12	0.129	38.45	-17.33	23.27	0.212	40.61	-17.34
5 MHz		846.5	Н	103.0	315.0	6.68	1/0	14.97	19.50	0.089	38.45	-18.95	21.65	0.146	40.61	-18.96
	16-QAM	826.5	Н	221.0	292.0	6.77	1 / 12	15.47	20.10	0.102	38.45	-18.35	22.25	0.168	40.61	-18.36
	64-QAM	836.5	Н	218.0	302.0	6.68	1/0	15.76	20.29	0.107	38.45	-18.16	22.44	0.175	40.61	-18.17
		825.5	Н	221.0	292.0	6.76	1/0	16.77	21.39	0.138	38.45	-17.06	23.54	0.226	40.61	-17.07
	QPSK	836.5	Н	218.0	302.0	6.68	1 / 14	16.67	21.20	0.132	38.45	-17.25	23.35	0.216	40.61	-17.26
3 MHz		847.5	Н	103.0	315.0	6.69	1 / 14	15.00	19.54	0.090	38.45	-18.91	21.69	0.148	40.61	-18.92
	16-QAM	836.5	Н	218.0	302.0	6.68	1/7	15.53	20.06	0.101	38.45	-18.39	22.21	0.166	40.61	-18.40
	64-QAM	836.5	Н	218.0	302.0	6.68	1 / 14	15.72	20.25	0.106	38.45	-18.20	22.40	0.174	40.61	-18.21
		824.7	Н	221.0	292.0	6.76	1/2	16.63	21.24	0.133	38.45	-17.21	23.39	0.218	40.61	-17.22
	QPSK	836.5	Н	218.0	302.0	6.68	1/2	16.54	21.07	0.128	38.45	-17.38	23.22	0.210	40.61	-17.39
1.4 MHz		848.3	Н	103.0	315.0	6.70	1/2	14.77	19.32	0.086	38.45	-19.13	21.47	0.140	40.61	-19.14
	16-QAM	836.5	Н	218.0	302.0	6.68	1/5	15.51	20.04	0.101	38.45	-18.41	22.19	0.166	40.61	-18.42
	64-QAM	836.5	Н	218.0	302.0	6.68	1/2	15.66	20.19	0.104	38.45	-18.26	22.34	0.171	40.61	-18.27
15 MHz	Opposite Pol.	831.5	V	134.0	240.0	6.73	1/0	13.51	20.24	0.106	38.45	-18.21	22.39	0.173	40.61	-18.22

Table 7-5. ERP Data (LTE Band 26/5

FCC ID: A3LSMA426U	PCTEST* Preud to be past of @ element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
		834.0	Н	202.0	290.0	6.75	1 / 50	11.55	16.15	0.041	38.45	-22.30	18.30	0.068	40.61	-22.30
	π/2 BPSK	836.5	н	205.0	297.0	6.68	1 / 99	11.90	16.43	0.044	38.45	-22.02	18.58	0.072	40.61	-22.03
		839.0	Н	204.0	301.0	6.70	1 / 50	12.20	16.75	0.047	38.45	-21.70	18.90	0.078	40.61	-21.70
		834.0	Н	202.0	290.0	6.75	1 / 50	11.53	16.13	0.041	38.45	-22.32	18.28	0.067	40.61	-22.32
20 MHz	QPSK	836.5	Н	205.0	297.0	6.68	1 / 99	11.96	16.49	0.045	38.45	-21.96	18.64	0.073	40.61	-21.97
		839.0	Н	204.0	301.0	6.70	1 / 50	12.57	17.12	0.052	38.45	-21.33	19.27	0.085	40.61	-21.33
	16-QAM	839.0	Н	204.0	301.0	6.70	1 / 50	11.46	16.01	0.040	38.45	-22.44	18.16	0.066	40.61	-22.44
	64-QAM	839.0	Н	204.0	301.0	6.70	1 / 50	10.07	14.62	0.029	38.45	-23.83	16.77	0.048	40.61	-23.83
	256-QAM	839.0	Н	204.0	301.0	6.70	1 / 50	8.05	12.60	0.018	38.45	-25.85	14.75	0.030	40.61	-25.85
		831.5	Н	202.0	290.0	6.73	1 / 73	11.49	16.07	0.040	38.45	-22.38	18.22	0.066	40.61	-22.39
	π/2 BPSK	836.5	Н	205.0	297.0	6.68	1/1	11.95	16.48	0.044	38.45	-21.97	18.63	0.073	40.61	-21.98
		841.5	Н	204.0	301.0	6.63	1 / 73	12.40	16.88	0.049	38.45	-21.58	19.03	0.080	40.61	-21.58
		831.5	Н	202.0	290.0	6.73	1/1	11.42	15.99	0.040	38.45	-22.46	18.14	0.065	40.61	-22.46
15 MHz	QPSK	836.5	Н	205.0	297.0	6.68	1/1	11.75	16.28	0.042	38.45	-22.17	18.43	0.070	40.61	-22.18
		841.5	Н	204.0	301.0	6.63	1 / 37	12.44	16.92	0.049	38.45	-21.53	19.07	0.081	40.61	-21.54
	16-QAM	841.5	Н	204.0	301.0	6.63	1/1	11.84	16.32	0.043	38.45	-22.13	18.47	0.070	40.61	-22.13
	64-QAM	841.5	Н	204.0	301.0	6.63	1/1	10.44	14.92	0.031	38.45	-23.53	17.07	0.051	40.61	-23.53
	256-QAM	841.5	Н	204.0	301.0	6.63	75 / 0	8.19	12.67	0.018	38.45	-25.78	14.82	0.030	40.61	-25.79
		829.0	Н	202.0	290.0	6.80	1 / 48	11.66	16.31	0.043	38.45	-22.14	18.46	0.070	40.61	-22.15
	π/2 BPSK	836.5	Н	205.0	297.0	6.68	1 / 25	11.99	16.52	0.045	38.45	-21.93	18.67	0.074	40.61	-21.94
		844.0	Н	204.0	301.0	6.66	1 / 25	12.32	16.82	0.048	38.45	-21.63	18.97	0.079	40.61	-21.63
		829.0	Н	202.0	290.0	6.80	1/1	11.39	16.04	0.040	38.45	-22.41	18.19	0.066	40.61	-22.41
10 MHz	QPSK	836.5	Н	205.0	297.0	6.68	1 / 25	12.01	16.54	0.045	38.45	-21.91	18.69	0.074	40.61	-21.92
		844.0	Н	204.0	301.0	6.66	1 / 48	12.80	17.31	0.054	38.45	-21.14	19.46	0.088	40.61	-21.15
	16-QAM	844.0	Н	204.0	301.0	6.66	1 / 25	11.97	16.48	0.044	38.45	-21.97	18.63	0.073	40.61	-21.98
	64-QAM	844.0	Н	204.0	301.0	6.66	1/1	10.46	14.97	0.031	38.45	-23.48	17.12	0.051	40.61	-23.49
	256-QAM	844.0	Н	204.0	301.0	6.66	1/1	8.38	12.89	0.019	38.45	-25.57	15.04	0.032	40.61	-25.57
		829.0	Н	202.0	290.0	6.77	1 / 23	11.63	16.26	0.042	38.45	-22.19	18.41	0.069	40.61	-22.20
	π/2 BPSK	836.5	Н	205.0	297.0	6.68	1 / 23	12.27	16.80	0.048	38.45	-21.65	18.95	0.078	40.61	-21.66
		844.0	Н	204.0	301.0	6.68	1/1	12.45	16.98	0.050	38.45	-21.47	19.13	0.082	40.61	-21.48
		829.0	Н	202.0	290.0	6.77	1 / 12	11.44	16.07	0.040	38.45	-22.39	18.22	0.066	40.61	-22.39
5 MHz	QPSK	836.5	Н	205.0	297.0	6.68	1 / 23	12.13	16.66	0.046	38.45	-21.79	18.81	0.076	40.61	-21.80
		844.0	Н	204.0	301.0	6.68	1/1	12.64	17.17	0.052	38.45	-21.28	19.32	0.085	40.61	-21.29
	16-QAM	844.0	Н	204.0	301.0	6.68	1 / 23	11.80	16.33	0.043	38.45	-22.12	18.48	0.070	40.61	-22.13
	64-QAM	844.0	Н	204.0	301.0	6.68	1 / 23	10.43	14.97	0.031	38.45	-23.49	17.12	0.051	40.61	-23.49
	256-QAM	844.0	Н	204.0	301.0	6.68	1 / 12	8.26	12.80	0.019	38.45	-25.66	14.95	0.031	40.61	-25.66
20 MHz	QPSK (CP-OFDM)	839.0	Н	210.0	308.0	6.70	1 / 50	8.61	15.31	0.034	38.45	-23.14	17.46	0.056	40.61	-23.14
20MHz	QPSK (Opposite Pol.)	839.0	V	134.0	237.0	6.70	1 / 50	10.20	16.90	0.049	38.45	-21.55	19.05	0.080	40.61	-21.55

Table 7-6. ERP Data (NR Band n5)

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# 7.6 Uplink Carrier Aggregation §27.53(m)

### **Test Overview**

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

### **Test Procedure Used**

KDB 971168 D01 v03r01 - Section 6.0

### Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to at least 10 \* the fundamental frequency (separated into at least two plots per channel)
- 2. Detector = RMS
- 3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
- 4. Sweep time = auto couple
- 5. The trace was allowed to stabilize
- 6. Please see test notes below for RBW and VBW settings

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-5. Test Instrument & Measurement Setup

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### Test Notes

- 1. Conducted power and spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device. The worst case (highest) powers were found while operating with QPSK modulation with both carriers set to transmit using 1RB.
- 2. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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# **Uplink CA Configuration 5B**

_			PCC					scc				ULCA TX.					
Power State	Band	Bandwidth (PCC + SCC)	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Power [dBm]				
			20450	829.0	1	49		20549	838.9	1	0	23.78					
			QPSK	20475	831.5	1	49	QPSK	20574	841.4	1	0	23.91				
Max	LTE B5	10MHz + 10MHz	10MHz + 10MHz	10MHz + 10MHz	QFOR	20600	844.0	1	0	QFSK	20501	834.1	1	49	23.86		
									QPSK	20475	831.5	50	0	QPSK	20574	841.4	50
			16-QAM	20475	831.5	50	0	16-QAM	20574	841.4	50	0	21.33				
			64-QAM	20475	831.5	50	0	64-QAM	20574	841.4	50	0	21.29				

Table 7 7. Conducted Powers (5B)

	ysight Spe		nalyzer - Sv	vept SA									[	-
l <b>XI</b> RI	LT	RF	50 \$	2 DC	CORREC		SEN	ISE:INT	#Avg T	ALIGN AUTO		M Jan 20, 2021	Fre	quency
PAS	S				PNO: IFGain	ast ↔→ :Low	Trig: Free Atten: 30		#A¥g 1		TY D			
10 dE Log	B/div	Ref	20.00	dBm						N	1kr1 824 -56.2	.00 MHz 07 dBm		Auto Tune
10.0	Trace	e 1 Pa	SS											<b>enter Freq</b> 000000 MHz
0.00 -10.0														Start Freq 000000 MHz
-20.0 -30.0														<b>Stop Freq</b> 000000 MHz
-40.0 -50.0												1	79. <u>Auto</u>	<b>CF Step</b> 400000 MHz Man
-60.0									ang disartika di si kang sa di Kang di sa di s	te de la face de la desente			F	req Offset 0 Hz
-70.0														Scale Type
	t 30.0 s BW		Hz			#VBW	300 kHz			Sweep 3	Stop 8 8.11 ms (1	24.0 MHz  5881 pts)	Log	Lin
MSG										STATU	JS			

Plot 7-110. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)

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🔤 Keysig			- Swept SA										
L <mark>XI</mark> RLT		RF	50Ω DC	COR	REC	SE	NSE:INT	#Avg Typ	ALIGN AUTO	TRAC	1 Jan 20, 2021 E <b>1 2 3 4 5</b> 6	Fre	quency
PASS					NO: Fast ↔ Gain:Low	Trig: Fre Atten: 3				TYF DE			
10 dB/d	liv R	lef 20.0	)0 dBm						Μ	kr1 881. -61.6	05 MHz 58 dBm	,	Auto Tune
T	race 1	Pass					Ĭ						enter Freq
10.0												924.5	500000 MHz
0.00													Start Freq
-10.0												849.0	000000 MHz
-20.0													Stop Freq
-30.0												1.0000	00000 GH2
-40.0													CF Step 100000 MHz
-50.0												<u>Auto</u>	Man
-60.0	hit this take and	and a strange	م بر الم الم	hit have a second		an an index of the second second	and add in traces of a s	and a star ball bit a sector	Levi wasa kulonika	time of the Lords of the state	and a sector deal	F	req Offset 0 Hz
-70.0	an an an an b												
													cale Type
Start 0 #Res E					#VBV	V 300 kHz			Sweep	Stop 1.00 7.248 ms (	3021 pts)	LUg	<u>Lin</u>
MSG									STATU	IS			

Plot 7-111. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - PCC 1/49 SCC 1/0 - Low Channel)



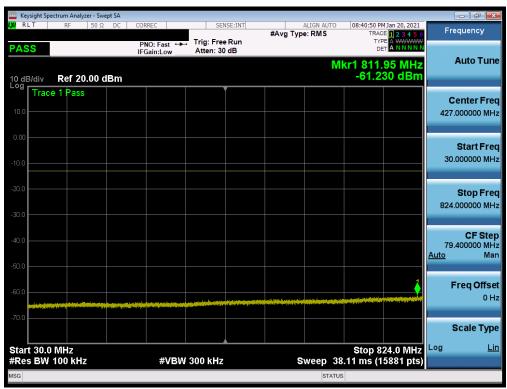
Plot 7-112. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)

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Plot 7-113. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - PCC 1/49 SCC 1/0 - Low Channel)



Plot 7-114. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)

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🔤 Keysight Spectrun		pt SA									- <b>X</b>
<b>LXI</b> RLT F	RF 50 Ω	DC CC	ORREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	MJan 20, 2021	Freque	ncy
PASS			PNO: Fast ↔↔ FGain:Low	Trig: Free Atten: 30				TYF DE			_
10 dB/div Re	ef 20.00 d	Bm					Μ	lkr1 849. -56.3	25 MHz 68 dBm	Aut	o Tune
10.0	Pass										<b>er Freq</b> 000 MHz
-10.0											<b>nt Freq</b> 000 MHz
-20.0										Sto 1.000000	o <b>p Freq</b> 000 GHz
-40.0											<b>F Step</b> 000 MHz Man
-60.0	مەر رومەنىلى بور	۱۹۹۹ میلوند ۱۹۹۹ مورموند موزم مورموند موزم موزو موزو موزو موزو موزو موزو موز	n farsan ay si ti bar ay san	ngt provinse the state of the	Marine	undungan dapat sajatan d	April of State on the Port of the	ndekstylenes <sup>te</sup> reteret forer		Fred	<b>Offset</b> 0 Hz
-70.0											іе Туре
Start 0.84900 #Res BW 100			#VBW	300 kHz			Sweep	Stop 1.00 7.248 ms (	0000 GHz 3021 pts)	Log	<u>Lin</u>
MSG							STATU	IS			

Plot 7-115. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)



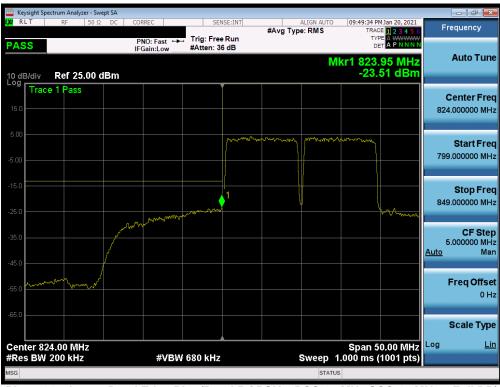
Plot 7-116. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)

FCC ID: A3LSMA426U		PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Plot 7-117. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)



Plot 7-118. Lower Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:10 MHz – Full RB)

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🔤 Keysight Spe	ctrum Analyzer - S									
IXI RLT	RF 50	ΩDC	CORREC			#Avg Typ	ALIGN AUTO	09:58:22 PM Jan 2 TRACE	3456	Frequency
PASS	Ref 25.00	dBm	PNO: Fast ++ IFGain:Low	#Atten: 3			М	kr1 849.15 -24.53	MHz dBm	Auto Tune
Log	e 1 Pass									Center Freq 849.000000 MHz
-5.00	malen	winnen	ne forman	man						Start Freq 824.000000 MHz
-15.0 -25.0	~~~				1					Stop Freq 874.000000 MHz
-35.0									A	<b>CF Step</b> 5.000000 MHz <u>uto</u> Man
-55.0						- And Market	an a	un na an	~_^~	<b>Freq Offset</b> 0 Hz
-65.0										Scale Type
Center 84 #Res BW			#VBW	680 kHz			Sweep	Span 50.00 1.000 ms (100	) MHz <sup>L(</sup> 1 pts)	og <u>Lin</u>
MSG							STATU	S		

Plot 7-119. Upper Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:10 MHz – Full RB)

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# 7.7 Radiated Spurious Emissions Measurements

### **Test Overview**

Radiated spurious emissions measurements are performed using the field strength conversion method described in KDB 971168 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

### **Test Procedures Used**

KDB 971168 D01 v03r01 - Section 5.8

### **Test Settings**

- 1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
- 2. VBW  $\geq$  3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points > 2 x span / RBW
- 5. Detector = RMS
- 6. Trace mode = Average (Max Hold for pulsed emissions)
- 7. The trace was allowed to stabilize

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### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

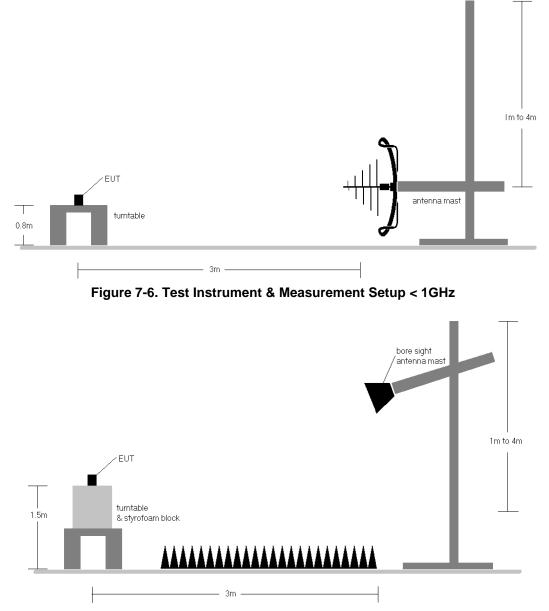


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

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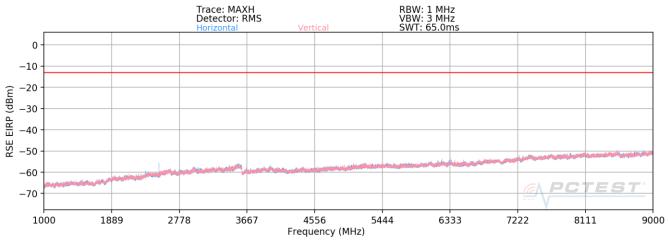
### Test Notes

- Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
   a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b) EIRP (dBm) = E(dBµV/m) + 20logD 104.8; where D is the measurement distance in meters.
- 2) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest powers is reported in GPRS mode while transmitting with one slot active.
- 3) This device employs UMTS technology with WCDMA (AMR/RMC) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1".
- 4) For CDMA, this device was tested under all RC and SO combinations and the worst case is reported with RC3/SO55 with "All Up" power control bits.
- 5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 6) This unit was tested with its standard battery.
- 7) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.
- 8) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 9) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 10) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 11) ULCA spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.
- 12) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.
- 13) Spurious emissions shown in this section are measured while operating in EN-DC mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor). Spurious emissions from the NR carrier device, is subject to the rules under which the NR carrier operates. Spurious emission caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

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# LTE Band 26/5





Bandwidth (MHz):	10
Frequency (MHz):	829
RB / Offset:	1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1658.0	Н	-	-	-76.29	-5.56	25.15	-70.11	-13.00	-57.11
2487.0	Н	135	219	-63.98	-2.46	40.56	-54.70	-13.00	-41.70
3316.0	Н	-	-	-76.62	0.64	31.02	-64.24	-13.00	-51.24
4145.0	Н	-	-	-77.52	1.92	31.40	-63.85	-13.00	-50.85

Table 7-7. Radiated Spurious Data (LTE Band 26/5 – Low Channel)

10
836.5
1 / 25

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.0	Н	-	-	-76.31	-5.27	25.42	-69.84	-13.00	-56.84
2509.5	Н	121	217	-66.57	-2.27	38.16	-57.09	-13.00	-44.09
3346.0	Н	-	-	-77.23	0.41	30.18	-65.08	-13.00	-52.08
4182.5	Н	-	-	-77.73	2.10	31.37	-63.89	-13.00	-50.89

Table 7-8. Radiated Spurious Data (LTE Band 26/5 – Mid Channel)

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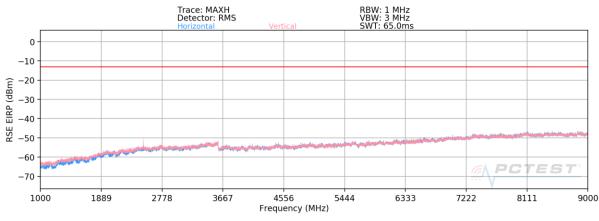
Bandwidth (MHz):	10
Frequency (MHz):	844.0
RB / Offset:	1 / 25

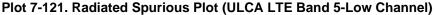
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1688.00	Н	-	-	-76.27	-4.84	25.89	-69.37	-13.00	-56.37
2532.00	Н	136	229	-76.13	-1.92	28.95	-66.31	-13.00	-53.31
3376.00	Н	-	-	-76.85	0.24	30.39	-64.86	-13.00	-51.86
4220.00	Н	-	-	-77.96	1.88	30.92	-64.33	-13.00	-51.33

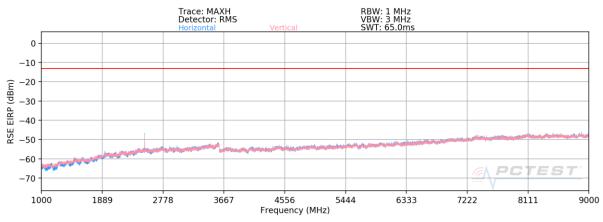
Table 7-9. Radiated Spurious Data (LTE Band 26/5 – High Channel)

FCC ID: A3LSMA426U	PCTEST* Proud to be part of @ element	PART 22 MEASUREMENT REPORT	<b>SAMSUNG</b>	Approved by: Technical Manager
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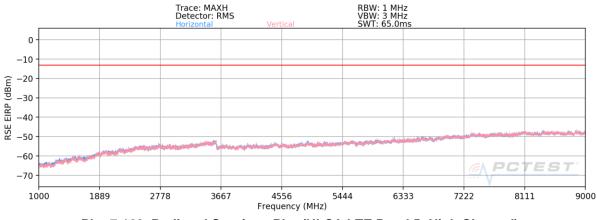


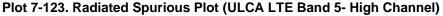






Plot 7-122. Radiated Spurious Plot (ULCA LTE Band 5-Mid Channel)





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PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	829.0
PCC RB / Offset:	1 / 49
SCC Bandwidth (MHz):	10
SCC Frequency (MHz):	838.9
SCC RB / Offset:	1/0

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1658.0	Н	-	-	-77.04	-0.53	29.43	-65.83	-13.00	-52.83
2487.0	Н	144	230	-66.32	3.45	44.13	-51.13	-13.00	-38.13
3316.0	Н	-	-	-78.06	4.77	33.71	-61.55	-13.00	-48.55
4145.0	Н	-	-	-78.83	6.17	34.34	-60.92	-13.00	-47.92
4974.0	Н	-	-	-79.28	7.16	34.88	-60.38	-13.00	-47.38

Table 7-10. Radiated Spurious Data (ULCA LTE Band 5 – Low Channel)

PCC Bandwidth (MHz):	10
PCC Frequency (MHz):	831.5
PCC RB / Offset:	1 / 49
SCC Bandwidth (MHz):	10
SCC Frequency (MHz):	841.4
SCC RB / Offset:	1/0

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1663.0	Н	-	-	-77.01	-0.44	29.55	-65.70	-13.00	-52.70
2494.5	Н	218	225	-64.72	3.49	45.77	-49.48	-13.00	-36.48
3326.0	Н	-	-	-78.07	4.91	33.84	-61.41	-13.00	-48.41
4157.5	Н	-	-	-78.61	6.01	34.40	-60.85	-13.00	-47.85
4989.0	Н	-	-	-78.98	6.84	34.86	-60.40	-13.00	-47.40

Table 7-11. Radiated Spurious Data (ULCA LTE Band 5 – Mid Channel)

FCC ID: A3LSMA426U	PCTEST Proud to be part of @ element	PART 22 MEASUREMENT REPORT	Approved by: Technical Manager
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10	PCC Bandwidth (MHz):
844.0	PCC Frequency (MHz):
1/0	PCC RB / Offset:
10	SCC Bandwidth (MHz):
834.1	SCC Frequency (MHz):
1 / 49	SCC RB / Offset:
834.1	SCC Frequency (MHz):

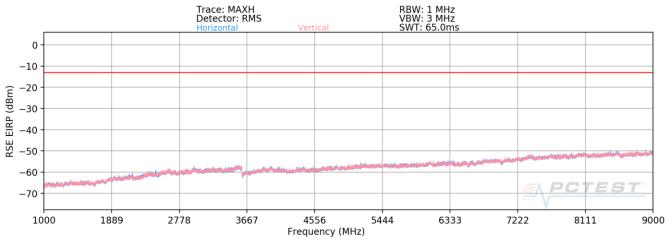
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1688.0	Н	-	-	-76.88	-0.71	29.41	-65.85	-13.00	-52.85
2532.0	Н	-	-	-77.27	3.43	33.16	-62.09	-13.00	-49.09
3376.0	Н	-	-	-78.44	5.19	33.75	-61.50	-13.00	-48.50
4220.0	Н	-	-	-78.42	5.69	34.27	-60.99	-13.00	-47.99
5064.0	Н	-	-	-79.16	7.04	34.88	-60.38	-13.00	-47.38

Table 7-12. Radiated Spurious Data (ULCA LTE Band 5 – High Channel)

FCC ID: A3LSMA426U	Prove to be part of & element	PART 22 MEASUREMENT REPORT	<b>SAMSUNG</b>	Approved by: Technical Manager
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# NR Band n5



Plot 7-124. Radiated Spurious Plot (NR Band n5)

Bandwidth (MHz):	20
Ballawiati (iiii 12).	20
Frequency (MHz):	834.0
RB / Offset:	1 / 50
Mode:	Standalone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1668.0	V	-	-	-72.80	3.59	37.79	-57.46	-13.00	-44.46
2502.0	V	-	-	-72.16	6.82	41.66	-53.60	-13.00	-40.60
3336.0	V	-	-	-71.30	9.79	45.49	-49.77	-13.00	-36.77
4170.0	V	-	-	-75.57	11.60	43.03	-52.23	-13.00	-39.23

Table 7-13. Radiated Spurious Data (NR Band n5 – Low Channel)

FCC ID: A3LSMA426U		PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Bandwidth (MHz):	20
Frequency <mark>(MHz)</mark> :	836.5
RB / Offset:	1 / 50
Mode:	Standalone
Mode:	Standalone

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.0	V	-	-	-72.15	3.67	38.52	-56.74	-13.00	-43.74
2509.5	V	-	-	-72.38	6.89	41.51	-53.75	-13.00	-40.75
3346.0	V	-	-	-73.92	9.76	42.84	-52.42	-13.00	-39.42
4182.5	V	-	-	-75.90	11.57	42.67	-52.59	-13.00	-39.59

Table 7-14. Radiated Spurious Data (NR Band n5 – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	839.0
RB / Offset:	1 / 50
Mode:	Standalone

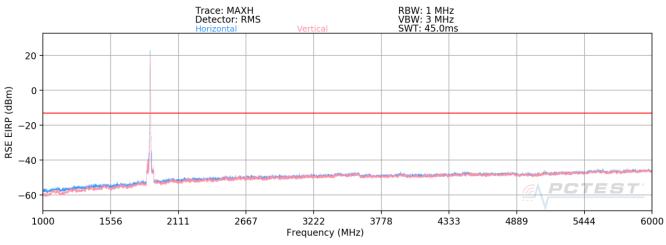
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1678.0	V	-	-	-72.72	3.74	38.02	-57.24	-13.00	-44.24
2517.0	V	-	-	-74.89	6.86	38.97	-56.28	-13.00	-43.28
3356.0	V	-	-	-74.19	9.70	42.51	-52.74	-13.00	-39.74
4195.0	V	-	-	-76.14	11.52	42.38	-52.88	-13.00	-39.88

Table 7-15. Radiated Spurious Data (NR Band n5 – High Channel)

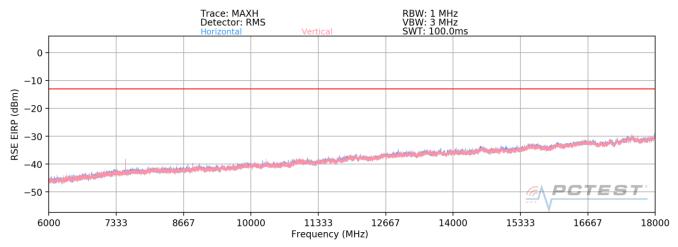
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### NR Band n5 – B2







Plot 7-126. Radiated Spurious Plot (NR Band n5 – B2 – 6-18 GHz)

20
836.5 / 1880
1 -53 / 1 / 50
EN-DC
B2

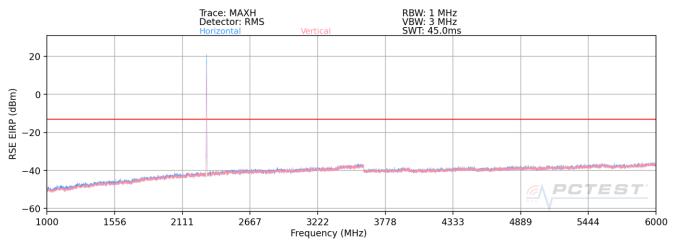
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1250.5	Н	-	-	-71.31	6.44	42.13	-53.13	-13.00	-40.13
2294.0	Н	-	-	-70.13	11.70	48.57	-46.68	-13.00	-33.68
2923.5	Н	-	-	-70.03	13.36	50.33	-44.92	-13.00	-31.92
3337.5	Н	-	-	-69.29	14.03	51.74	-43.52	-13.00	-30.52
3967.0	Н	-	-	-75.25	15.35	47.10	-48.16	-13.00	-35.16
7520.0	Н	109	58	-72.49	21.46	55.97	-39.29	-13.00	-26.29

Table 7-16. Radiated Spurious Data (NR Band n5 – B2)

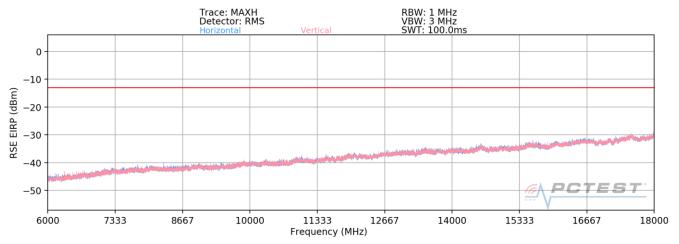
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## NR Band n5 – B30









Bandwidth (MHz):	20 / 10
Frequency (MHz):	836.5 / 2310
RB / Offset:	1 -53 / 1 / 25
Mode:	EN-DC
Anchor Band:	B30

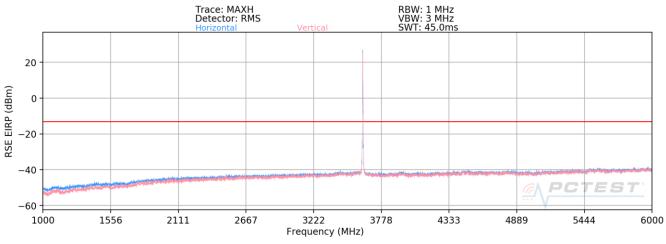
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
2110.0	V	-	-	-72.02	11.12	46.10	-49.16	-13.00	-36.16
3584.0	V	-	-	-76.58	14.59	45.01	-50.25	-13.00	-37.25
3783.0	V	-	-	-76.24	14.70	45.46	-49.80	-13.00	-36.80
5057.0	V	-	-	-77.60	16.56	45.96	-49.30	-13.00	-36.30
5257.0	V	-	-	-77.98	17.05	46.07	-49.19	-13.00	-36.19

Table 7-17. Radiated Spurious Data (NR Band n5 – B30)

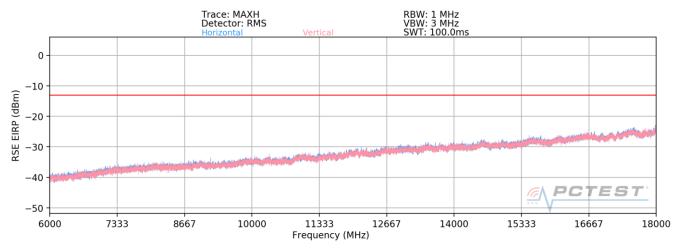
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### NR Band n5 – B48







Plot 7-130. Radiated Spurious Plot (NR Band n5 – B48 – 6-18 GHz)

20 / 20
836.5 / 3625
1 - 53 / 1 - 50
EN-DC
48

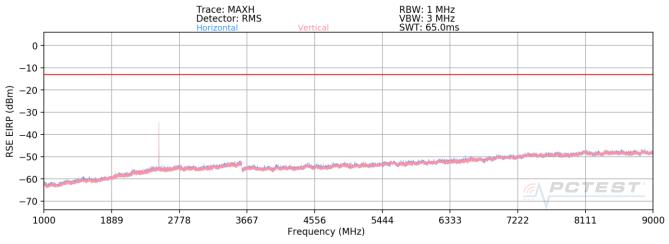
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1952.0	V	-	-	-74.16	11.97	44.81	-50.44	-13.00	-37.44
4740.5	V	-	-	-75.22	18.49	50.27	-44.99	-13.00	-31.99
6413.5	V	-	-	-75.36	22.46	54.10	-41.16	-13.00	-28.16
7529.0	V	-	-	-76.01	25.44	56.43	-38.83	-13.00	-25.83
9202.0	V	-	-	-76.21	28.11	58.90	-36.35	-13.00	-23.35

### Table 7-18. Radiated Spurious Data (NR Band n5 – B48)

FCC ID: A3LSMA426U	PCTEST* Proud to be perf of @element	PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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# **GSM/GPRS** Cell



Plot 7-131. Radiated Spurious Plot (GPRS Cell)

Mode:	GPRS 1 Tx Slot
Channel:	128
Frequency (MHz):	824.2

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1648.4	Н	270	354	-70.87	-0.71	35.42	-59.84	-13.00	-46.84
2472.6	Н	197	228	-47.61	3.39	62.78	-32.48	-13.00	-19.48
3296.8	Н	202	218	-72.08	4.46	39.38	-55.88	-13.00	-42.88
4121.0	Н	-	-	-76.30	5.78	36.48	-58.77	-13.00	-45.77
4945.2	Н	-	-	-76.65	7.29	37.64	-57.61	-13.00	-44.61

Table 7-19. Radiated Spurious Data (GPRS Cell – Low Channel)

Mode:	GPRS 1 Tx Slot
Channel:	190
Frequency (MHz):	836.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.2	Н	398	210	-72.57	-0.57	33.86	-61.39	-13.00	-48.39
2509.8	Н	107	300	-45.15	3.53	65.38	-29.87	-13.00	-16.87
3346.4	Н	-	-	-73.47	5.20	38.73	-56.52	-13.00	-43.52
4183.0	Н	-	-	-75.95	6.13	37.18	-58.08	-13.00	-45.08

Table 7-20. Radiated Spurious Data (GPRS Cell – Mid Channel)

FCC ID: A3LSMA426U		PART 22 MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Mode:	GPRS 1 Tx Slot
Channel:	251
Frequency (MHz):	848.8

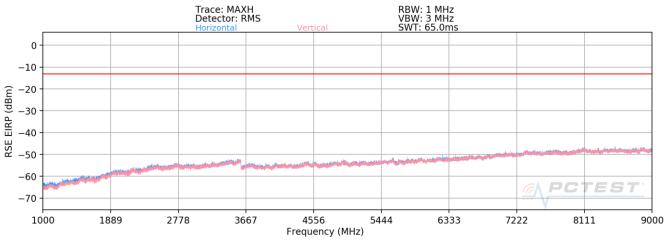
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1697.6	Н	102	19	-66.92	-0.55	39.53	-55.73	-13.00	-42.73
2546.4	Н	102	338	-45.48	3.33	64.85	-30.41	-13.00	-17.41
3395.2	Н	-	-	-72.86	4.98	39.12	-56.14	-13.00	-43.14
4244.0	Н	-	-	-75.22	5.65	37.43	-57.83	-13.00	-44.83

Table 7-21. Radiated Spurious Data (GPRS Cell – High Channel)

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# WCDMA Cell





Mode:	WCDMA RMC
Channel:	4132
Frequency (MHz):	826.4

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1652.8	Н	-	-	-77.82	-0.63	28.55	-66.71	-13.00	-53.71
2479.2	Н	-	-	-77.05	3.42	33.37	-61.89	-13.00	-48.89
3305.6	Н	-	-	-77.57	4.57	34.00	-61.26	-13.00	-48.26

Table 7-22. Radiated Spurious Data (WCDMA Cell – Low Channel)

Mode:	WCDMA RMC
Channel:	4183
Frequency (MHz):	836.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.2	Н	-	-	-76.64	-0.57	29.79	-65.46	-13.00	-52.46
2509.8	Н	-	-	-77.11	3.53	33.42	-61.83	-13.00	-48.83
3346.4	Н	-	-	-78.11	5.20	34.09	-61.16	-13.00	-48.16

Table 7-23. Radiated Spurious Data (WCDMA Cell – Mid Channel)

Mode:	WCDMA RMC
Channel:	4233
Frequency (MHz):	846.6

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1693.2	Н	-	-	-77.03	-0.62	29.35	-65.91	-13.00	-52.91
2539.8	Н	-	-	-77.39	3.38	32.99	-62.27	-13.00	-49.27
3386.4	Н	-	-	-77.59	5.08	34.49	-60.77	-13.00	-47.77

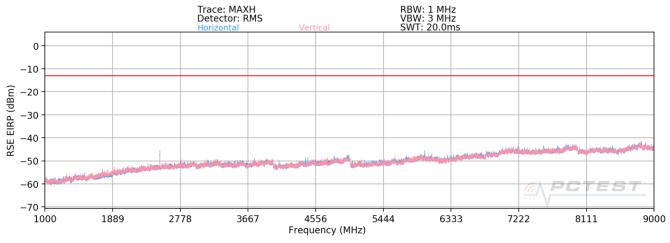
Table 7-24. Radiated Spurious Data (WCDMA Cell – High Channel)

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# CDMA Cell



### Plot 7-133. Radiated Spurious Plot (CDMA Cell)

Mode:	CDMA
Channel:	1013
Frequency (MHz):	824.7

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1649.40	Н	-	-	-73.35	0.57	34.22	-61.04	-13.00	-48.04
2474.10	Н	124	220	-65.44	5.19	46.75	-48.51	-13.00	-35.51
3298.80	Н	-	-	-73.08	6.99	40.91	-54.35	-13.00	-41.35
4123.50	Н	-	-	-73.43	8.07	41.64	-53.62	-13.00	-40.62

Table 7-25. Radiated Spurious Data (CDMA Cell – Low Channel)

Mode:	CDMA
Channel:	384
Frequency (MHz):	836.52

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1673.04	Н	-	-	-72.75	1.02	35.27	-59.99	-13.00	-46.99
2509.56	Н	131	220	-66.19	5.17	45.98	-49.27	-13.00	-36.27
3346.08	Н	-	-	-73.15	6.75	40.60	-54.66	-13.00	-41.66
4182.60	Н	-	-	-74.81	8.61	40.80	-54.45	-13.00	-41.45

Table 7-26. Radiated Spurious Data (CDMA Cell – Mid Channel)

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Mode:	CDMA
Channel:	777
Frequency (MHz):	848.31

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1696.62	Н	-	-	-70.10	1.44	38.34	-56.92	-13.00	-43.92
2544.93	Н	101	250	-69.71	5.45	42.74	-52.52	-13.00	-39.52
3393.24	Н	-	-	-74.77	7.34	39.57	-55.69	-13.00	-42.69
4241.55	Н	-	-	-74.78	8.13	40.35	-54.91	-13.00	-41.91

Table 7-27. Radiated Spurious Data (CDMA Cell – High Channel)

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## 7.8 Frequency Stability / Temperature Variation

### **Test Overview and Limit**

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22 and RSS-132, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency.

#### Test Procedure Used

ANSI/TIA-603-E-2016

#### Test Settings

- 1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

### Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

#### Test Notes

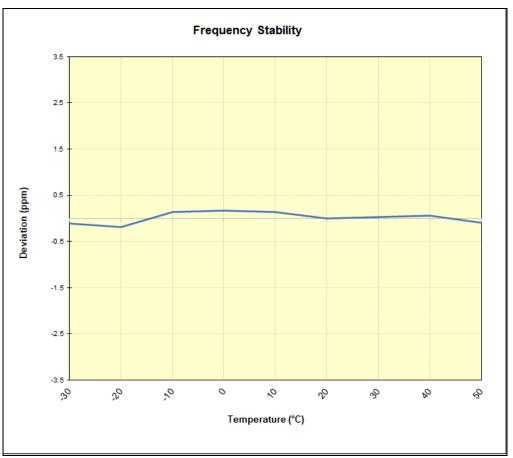
None

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GSM/GPRS Cellular						
	Operating F	requency (Hz):	836,60	00,000		
	Ref.	Voltage (VDC):	4.	31		
		Deviation Limit:	± 0.00025%	or 2.5 ppm		
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)	
		- 30	836,599,865	-93	-0.0000111	
		- 20	836,599,798	-160	-0.0000191	
		- 10	836,600,069	111	0.0000133	
		0	836,600,106	148	0.0000177	
100 %	4.31	+ 10	836,600,078	120	0.0000143	
		+ 20 (Ref)	836,599,958	0	0.0000000	
		+ 30	836,599,978	20	0.0000024	
		+ 40	836,600,016	58	0.0000069	
		+ 50	836,599,879	-79	-0.0000094	
Battery Endpoint	3.51	+ 20	836,600,050	92	0.0000110	

Table 7-28. GSM/GPRS Cell Frequency Stability Data





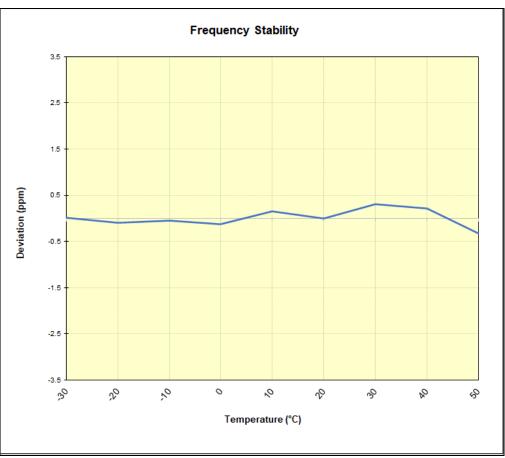
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WCDMA Cellular						
	Operating F	Frequency (Hz):	836,60	00,000		
	Ref.	Voltage (VDC):	4.	31		
		Deviation Limit:	± 0.00025%	o or 2.5 ppm		
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)	
		- 30	836,599,985	11	0.0000013	
		- 20	836,599,890	-84	-0.0000100	
		- 10	836,599,930	-44	-0.0000053	
		0	836,599,876	-98	-0.0000117	
100 %	4.31	+ 10	836,600,104	130	0.0000155	
		+ 20 (Ref)	836,599,974	0	0.0000000	
		+ 30	836,600,237	263	0.0000314	
		+ 40	836,600,151	177	0.0000212	
		+ 50	836,599,708	-266	-0.0000318	
Battery Endpoint	3.51	+ 20	836,600,056	82	0.000098	

Table 7-29. WCDMA Cell Frequency Stability Data



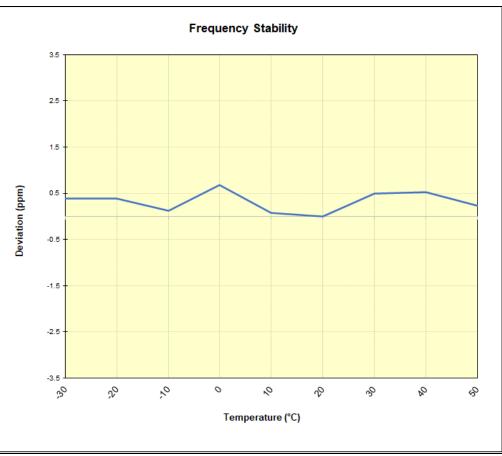
### Plot 7-135. WCDMA Cell Frequency Stability Chart

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CDMA Cellular						
	Operating F	requency (Hz):	836,52	20,000		
	Ref.	Voltage (VDC):	4.	31		
		Deviation Limit:	± 0.00025%	o or 2.5 ppm		
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)	
		- 30	836,520,049	320	0.0000383	
		- 20	836,520,059	330	0.0000394	
		- 10	836,519,834	105	0.0000126	
		0	836,520,297	568	0.0000679	
100 %	4.31	+ 10	836,519,793	64	0.0000077	
		+ 20 (Ref)	836,519,729	0	0.0000000	
		+ 30	836,520,142	413	0.0000494	
		+ 40	836,520,164	435	0.0000520	
		+ 50	836,519,917	188	0.0000225	
Battery Endpoint	3.51	+ 20	836,519,999	270	0.0000323	

Table 7-30. CDMA Cell Frequency Stability Data



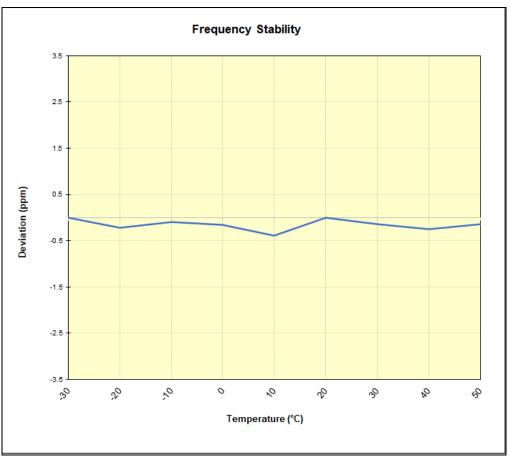
### Plot 7-136. CDMA Cell Frequency Stability Chart

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LTE Band 26/5						
	Operating F	requency (Hz):	836,50	00,000		
	Ref.	Voltage (VDC):	4.3	31		
		Deviation Limit:	± 0.00025%	o or 2.5 ppm		
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)	
		- 30	836,500,120	0	0.0000000	
		- 20	836,499,945	-175	-0.0000209	
		- 10	836,500,038	-82	-0.0000098	
		0	836,499,993	-127	-0.0000152	
100 %	4.31	+ 10	836,499,794	-326	-0.0000390	
		+ 20 (Ref)	836,500,120	0	0.0000000	
		+ 30	836,500,008	-112	-0.0000134	
		+ 40	836,499,915	-205	-0.0000245	
		+ 50	836,499,999	-121	-0.0000145	
Battery Endpoint	3.51	+ 20	836,500,090	-30	-0.0000036	

Table 7-31. LTE Band 26/5 Frequency Stability Data

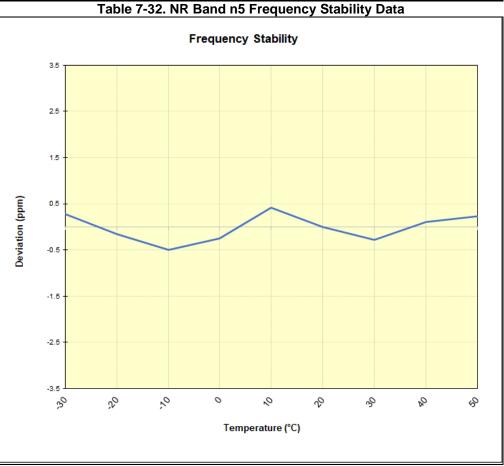


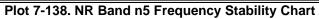


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NR Band n5								
	Operating F	requency (Hz):	836,500,000		]			
	Ref. Voltage (VDC):		4.31		1			
	Deviation Limit:		± 0.00025% or 2.5 ppm		]			
					-			
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)			
		- 30	836,500,233	228	0.0000273			
		- 20	836,499,873	-132	-0.0000158			
		- 10	836,499,591	-414	-0.0000495			
		0	836,499,804	-201	-0.0000240			
100 %	4.31	+ 10	836,500,355	350	0.0000418			
		+ 20 (Ref)	836,500,005	0	0.0000000			
		+ 30	836,499,777	-228	-0.0000273			
		+ 40	836,500,101	96	0.0000115			
		+ 50	836,500,202	197	0.0000236			
Battery Endpoint	3.51	+ 20	836,499,888	-117	-0.0000140			





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# 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the Samsung **Portable Handset FCC ID: A3LSMA426U** complies with all the requirements of Part 22 of the FCC rules.

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