

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701
 July 7, 2011

Test Item Description	
Manufacturer	EF Johnson Technologies
Manufacturer Contact	John Oblak (507) 837-5116
Product Name	5100 ES and 51SL ES Series VHF Portable Subscriber Unit
Installed Options	Limited and Full Keypad, SEM Installed
Vocoder Identification	Enhanced Full Rate

Test Description
P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.1 – Project 25 Phase 1 Common Air Interface Conventional Subscriber Unit Performance
P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Performance
P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.3.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Interoperability

Test Information	
P25 CAP Laboratory Code	P25CAP081017 (Harris)
Date(s) of Test	June 22, 2009
Date of Issue	July 1, 2009

Test Information	
P25 CAP Laboratory Code	P25CAP081012 (Motorola)
Date(s) of Test	July 20, 2009 to July 22, 2009
Date of Issue	July 22, 2009

Test Information	
P25 CAP Laboratory Code	P25CAP081010 (EF Johnson Technologies)
Date(s) of Test	October 20, 2009
Date of Issue	October 30, 2009

Test Information	
P25 CAP Laboratory Code	P25CAP081010 (EF Johnson Technologies)
Date(s) of Test	October 22, 2009 to December 4, 2009
Date of Issue	January 26, 2010

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

Test Information	
P25 CAP Laboratory Code	P25CAP081010 (EF Johnson Technologies)
Date(s) of Test	January 29, 2010 to February 2, 2010
Date of Issue	February 8, 2010

Test Information	
P25 CAP Laboratory Code	P25CAP081016 (Timco Engineering)
Date(s) of Test	June 16, 2010
Date of Issue	July 5, 2010

Test Information	
P25 CAP Laboratory Code	P25CAP081015 (TELTEST Laboratories)
Date(s) of Test	October 28, 2010
Date of Issue	November 4, 2010

Test Information	
P25 CAP Laboratory Code	P25CAP081010 (EF Johnson Technologies)
Date(s) of Test	Feb 22, 2011 to March 4, 2011
Date of Issue	March 4, 2011

Informative References	
Date	Title
Mar 2010	P25-CAB-CAI_TEST_REQ – March 2010

Other Devices Tested with 5100 ES Portable Subscriber Unit		
Manufacturer	Product Name, Definition, and Unique ID	Installed Options
Harris	P25 Trunked Infrastructure	System release 6.4.2
Motorola	ASTRO 25 Trunked Infrastructure	System Release 7.7
Tait	TaitNet P25/EADS COR P25 Network	P25V11_05.E21
EF Johnson	IP25 Trunked Infrastructure	Release 3.1-RC1
PowerTrunk	PowerTrunk 25 B800014 Infrastructure	Version 9.4.52

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.1 – Project 25 Phase 1 Common Air Interface Conventional Subscriber Unit Performance		DTR-P25CAP081010-10012601 DTR-P25CAP081010-11030401	
Receiver Tests			
Test Case	Description	Requirement	Results
2.1.4	Reference Sensitivity	≤ -116 dBm (Class A)	P1
2.1.5	Faded Reference Sensitivity	≤ -108 dBm (Class A)	P2
2.1.6	Signal Delay Spread Capability	≥ 50 μ s	P3
2.1.7	Adjacent Channel Rejection	≥ 60 dB (Class A)	P4
2.1.8	Co-Channel Rejection	≤ 9 dB	P
2.1.9	Spurious Response Rejection	≥ 70 dB (Class A)	P
2.1.10	Intermodulation Rejection	≥ 70 dB (Class A)	P
2.1.11	Signal Displacement Bandwidth	≥ 1000 Hz	P
2.1.17	Late Entry Unsquench Delay		
	No Talk Group or Encryption	≤ 125 ms	P
	Talk Group Only	≤ 370 ms	P
	Encryption Only	≤ 370 ms	P
	Both Talk Group and Encryption	≤ 460 ms	P
2.1.18	Receiver Throughput Delay	≤ 125 ms	P

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.1 – Project 25 Phase 1 Common Air Interface Conventional Subscriber Unit Performance		DTR-P25CAP081010-10012601	
Transmitter Tests			
Test Case	Description	Requirement	Results
2.2.8	Unwanted Emissions: Adjacent Channel Power Ratio	≥ 67 dB	P
2.2.12	Transmitter Power and Encoder Attack Time		
	Power Attack Time	≤ 50 ms	P
	Encoder Attack Time	≤ 100 ms	P
2.2.14	Transmitter Throughput Delay	≤ 125 ms	P
2.2.15	Frequency Deviation for C4FM		
	High Level Signal Deviation	$2544 \text{ Hz} \leq f_{\text{dev}} \leq 3111 \text{ Hz}$	P
	Low Level Signal Deviation	$848 \text{ Hz} \leq f_{\text{dev}} \leq 1037 \text{ Hz}$	P
2.2.16	Modulation Fidelity	$\leq 5\%$ (Class A)	P
2.2.18	Transient Frequency Behavior		
	Time Interval $t_1 = 5$ ms	$\leq \pm 12.5$ kHz	P
	Time Interval $t_2 = 20$ ms	$\leq \pm 6.25$ kHz	P
	Time Interval $t_3 = 5$ ms	$\leq \pm 12.5$ kHz	P

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Performance		DTR-P25CAP081010-10012601 DTR-P25CAP081010-11030401	
Receiver Tests			
Test Case	Description	Requirement	Results
2.1.4	Reference Sensitivity	≤ -116 dBm (Class A)	P1
2.1.5	Faded Reference Sensitivity	≤ -108 dBm (Class A)	P2
2.1.6	Signal Delay Spread Capability	≥ 50 μ s	P3
2.1.7	Adjacent Channel Rejection	≥ 60 dB (Class A)	P4
2.1.8	Co-Channel Rejection	≤ 9 dB	P
2.1.9	Spurious Response Rejection	≥ 70 dB (Class A)	P
2.1.10	Intermodulation Rejection	≥ 70 dB (Class A)	P
2.1.11	Signal Displacement Bandwidth	≥ 1000 Hz	P

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

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Transmitter Tests			
Test Case	Description	Requirement	Results
2.2.8	Unwanted Emissions: Adjacent Channel Power Ratio	≥ 67 dB	P
2.2.12	Transmitter Power and Encoder Attack Time		
	Power Attack Time	≤ 50 ms	P
	Encoder Attack Time	≤ 100 ms	P
2.2.14	Transmitter Throughput Delay	≤ 125 ms	P
2.2.15	Frequency Deviation for C4FM		
	High Level Signal Deviation	$2544 \text{ Hz} \leq f_{\text{dev}} \leq 3111 \text{ Hz}$	P
	Low Level Signal Deviation	$848 \text{ Hz} \leq f_{\text{dev}} \leq 1037 \text{ Hz}$	P
2.2.16	Modulation Fidelity	$\leq 5\%$ (Class A)	P
2.2.18	Transient Frequency Behavior		
	Time Interval $t_1 = 5$ ms	$\leq \pm 12.5$ kHz	P
	Time Interval $t_2 = 20$ ms	$\leq \pm 6.25$ kHz	P
	Time Interval $t_3 = 5$ ms	$\leq \pm 12.5$ kHz	P

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Performance		DTR-P25CAP081010-10020801	
Trunked Subscriber Unit Tests			
Test Case	Description	Requirement	Results
2.3.1	Trunking Control Channel Slot Times (45 ms slot) Encode Attack Time RF Power Attack Time RF Power Turn Off Time	 $2.00 \text{ ms} \leq t \leq 11.65 \text{ ms}$ $0 \text{ ms} \leq t \leq 11.65 \text{ ms}$ $\leq 1.57 \text{ ms}$	 P P P
2.3.2	Trunking Request Time	$\leq 160 \text{ ms}$	P
2.3.3	Trunking Voice Access Time	500 ms (Manufacturer Specified)	P
2.3.5	Transmitter Time to Key on a Traffic Channel Short Channel Form	$\leq 150.0 \text{ ms}$	P

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.3.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Interoperability		DTR- P25CAP081017- 1090622E01	DTR-MOT-40016- M1-MC1	DTR- P25CAP081015- 3205	DTR- P25CAP081010- 09103001	DTR-TIMCO081016- 023-5170-063	
EF Johnson 5100 ES Portable		Harris P25 Trunking Infrastructure	Motorola ASTRO 25 Trunking	TaitNet P25/EADS Core P25	EF Johnson IP25 Trunking Infrastructure	PowerTrunk B800014 Trunking	
Test Case	Description						
2.2.1	Full Registration						
2.2.1.4.1	Test Case 1 - Valid Registration						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.1.4.2	Test Case 2 – Denied or Refused						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.1.4.3	Test Case 3 - Unverified Registration						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.2	Group Voice Call						
2.2.2.4.1	Test Case 1 – Group Call Granted						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.2.4.2	Test Case 2 – Group Call Denied						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.2.4.3	Test Case 3 – Group Call Request						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

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EF Johnson 5100 ES Portable		Harris P25 Trunking Infrastructure	Motorola ASTRO25 Trunking	TaitNet P25/EADS Core P25	EF Johnson IP25 Trunking Infrastructure	PowerTrunk B800014 Trunking	
Test Case	Description						
2.2.3	Unit-To-Unit Voice Call						
2.2.3.4.1	Test Case 1 – Unit-To-Unit Call With Target Availability Check						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.3.4.2	Test Case 2 – Unit-To-Unit Call Target Availability Check Denied By Target						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.3.4.3	Test Case 3 – Unit-To-Unit Call Queued With Target Availability Check – traffic channel assignment after target availability check						
	Home Operation	P	P	N/A 1	P	N/A 3	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.3.4.4	Test Case 4 – Unit-To-Unit Call Queued With Target Availability Check – traffic channel assignment before target availability check						
	Home Operation	N/A 2	N/A 2	P	N/A 2	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.3.4.5	Test Case 5 – Unit-To-Unit Call Without Target Availability Check						
	Home Operation	N1	N2	N3	N4	N5	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

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EF Johnson 5100 ES Portable		Harris P25 Trunking Infrastructure	Motorola ASTRO25 Trunking	TaitNet P25/EADS Core P25	EF Johnson IP25 Trunking Infrastructure	PowerTrunk B800014 Trunking	
Test Case	Description						
2.2.3	Unit-To-Unit Voice Call						
2.2.3.4.6	Test Case 6 – Unit-To-Unit Call Queued Without Target Availability Check						
	Home Operation	N1	N2	N3	N4	N5	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.3.4.7	Test Case 7 – Unit-To-Unit Call Denied						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

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EF Johnson 5100 ES Portable		Harris P25 Trunking Infrastructure	Motorola ASTRO25 Trunking	TaitNet P25/EADS Core P25	EF Johnson IP25 Trunking Infrastructure	PowerTrunk B800014 Trunking	
Test Case	Description						
2.2.4	Broadcast Voice Call						
2.2.4.4.1	Test Case 1 – Broadcast Voice Call						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.5	Affiliation						
2.2.5.4.1	<i>Test Case 1 - Radio Permitted To Affiliate With New Group</i>						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.5.4.2	<i>Test Case 2 - Radio Denied Affiliation To New Group</i>						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.6	Announcement Group Call						
2.2.6.4.1	Test Case 1 - Collection Of Talk Groups Receive Call						
	Home Operation	P	P	P	P	N6	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.7	Emergency Alarm						
2.2.7.4.1	Test Case 1 - Emergency Alarm						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

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EF Johnson 5100 ES Portable		Harris P25 Trunking Infrastructure	Motorola ASTRO25 Trunking	TaitNet P25/EADS Core P25	EF Johnson IP25 Trunking Infrastructure	PowerTrunk B800014 Trunking	
Test Case	Description						
2.2.8	Emergency Group Call						
2.2.8.4.1	Test Case 1 - Emergency Call						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.10	Encryption						
2.2.10.4.1	Test Case 1 - Call Privacy For Encrypted Call						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	
2.2.11	Intra-Location Registration Area Roaming						
2.2.11.4.1	Test Case 1 – Idle Radio						
	Home Operation	P	P	P	P	P	
	Inter-System Operation	N1	N1	N1	N1	N1	
	Inter-WACN Operation	N1	N1	N1	N1	N1	

Project 25 Compliance Assessment Program
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 EF Johnson 5100 ES VHF Portable Subscriber Unit
 STR-EFJ-11070701

Model Class Definition		Applied to P25-CAB-CAI_Test_Req Mar 2010, 2.1.3.2
Model Class Name	Product Name, Definition, and Unique ID	Installed Options
5100 ES Series Portable	5100 ES Series Portable	Firmware: 6.10.4
	5100 ES Series Portable	Firmware: 6.12.1

Test Case Result Definitions	
No Test Performed	---
Test Does Not Apply to the Test Object	N/A
Test Object Meets Requirements	P (Pass)
Test Object Does Not Meet Requirements	F (Fail)
Test Object is Not Conclusive	I (Inconclusive)

Comments
N/A 1: Test case 2.2.3.4.3 is not applicable for Taitnet/EADS COR P25 Infrastructure; see results of test case 2.2.3.4.4
N/A 2: Test case 2.2.3.4.4 is not applicable for these infrastructures; see results of test 2.2.3.4.3
N/A 3: Test case 2.2.3.4.3 is not applicable for PowerTrunk 25 infrastructure; see results of test case 2.2.3.4.4
N1: EF Johnson 5100 ES subscriber does not support these features
N2: Motorola trunking system release 7.7 and EF Johnson 5100 ES subscriber do not support these features
N3: TaitNet P25 / EADS COR P25 and EF Johnson 5100 ES subscriber do not support these features
N4: EF Johnson trunking system release 3.1-RC1 and EF Johnson 5100 ES subscriber do not support these features
N5: PowerTrunk 25 infrastructure and EF Johnson 5100ES Subscriber do not support these features
N6: PowerTrunk 25 infrastructure does not support these features
P1: EF Johnson 5100 ES VHF subscriber passes Reference Sensitivity (≤ -116 dBm) specification for C4FM (Non-Simulcast) and Simulcast modulations.
P2: EF Johnson 5100 ES VHF subscriber passes Faded Reference Sensitivity (≤ -108 dBm) specification for C4FM (Non-Simulcast) and Simulcast modulations.
P3: EF Johnson 5100 ES VHF subscriber passes Signal Delay Spread Capability specification for C4FM (Non-Simulcast) (≥ 50 μ s) and Simulcast modulations (≥ 80 μ s).
P4: EF Johnson 5100 ES VHF subscriber passes Adjacent Channel Rejection (≥ 60 dB) specification for C4FM (Non-Simulcast) and Simulcast modulations.

Project 25 Compliance Assessment Program
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STR-EFJ-11070701

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EXPIRATION DATE: 04/30/2012

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