

Project 25 Compliance Assessment Program  
 Summary Test Report  
 EF Johnson 2600/3800 VHF Repeater  
 STR-EFJ-11061701  
 June 17, 2011

Test Item Description	
<b>Manufacturer</b>	EF Johnson Technologies
<b>Manufacturer Contact</b>	John Oblak (507) 837-5116
<b>Product Name</b>	2600/3800 VHF Repeater
<b>Installed Options</b>	Trunking Firmware 3.2
<b>Vocoder Identification</b>	Not Applicable – The repeater does not incorporate a vocoder

Test Description
P25-CAB-CAI_TEST_REQ – March 2010, Section 2.2.1.1 – Project 25 Phase 1 Common Air Interface Conventional Base Station/Repeater Performance
P25-CAB-CAI_TEST_REQ – March 2010, Section 2.2.1.2 – Project 25 Phase 1 Common Air Interface Trunked Base Station/Repeater Performance
P25-CAB-CAI_TEST_REQ – March 2010, Section 2.2.3.2 – Project 25 Phase 1 Common Air Interface Trunked Base station/Repeater Interoperability

Test Information	
<b>P25 CAP Laboratory Code</b>	P25CAP081010 (EF Johnson Technologies)
<b>Date(s) of Test</b>	October 28, 2009 through June 16, 2011
<b>Date of Issue</b>	June 16, 2011

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

Other Devices Tested with 2600/3800 VHF Repeater		
Manufacturer	Product Name, Definition, and Unique ID	Installed Options
Tait	TP9100	Firmware 6.09
EF Johnson	5100ES Series Portable	Firmware 6.12.1
Kenwood	TK 5210 K2	Firmware 4.30
Motorola	XTS 5000 Portable	Firmware R12.00.13
Motorola	APX 7000 Portable	Firmware R01.00.00
EF Johnson	5300ES Series Mobile	Firmware 6.12.2
RELM Wireless	KNG-P150	Firmware 1.2.16.3
Icom	IC-F9011	Firmware 2.1
Harris	Unity XP-100	Firmware R2.0

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<b>P25-CAB-CAI_TEST_REQ – March 2010, Section 2.2.1.1 – Project 25 Phase 1 Common Air Interface Conventional Base Station/Repeater Performance</b>		<b>DTR-P25CAP081010-11061601</b>	
<b>Receiver Tests</b>			
<b>Test Case</b>	<b>Description</b>	<b>Requirement</b>	<b>Results</b>
2.1.4	Reference Sensitivity	$\leq -116$ dBm (Class A)	P
2.1.5	Faded Reference Sensitivity	$\leq -108$ dBm (Class A)	P
2.1.7	Adjacent Channel Rejection	$\geq 60$ dB (Class A)	P
2.1.8	Co-Channel Rejection	$\leq 9$ dB	P
2.1.9	Spurious Response Rejection	$\geq 90$ dB (Class A)	P
2.1.10	Intermodulation Rejection	$\geq 70$ dB (Class B)	P
2.1.11	Signal Displacement Bandwidth	$\geq 1000$ Hz	P
2.1.17	Late Entry Unsquelch Delay		
	No Talk Group or Encryption	$\leq 125$ ms	N1
	Talk Group Only	$\leq 370$ ms	N1
	Encryption Only	$\leq 370$ ms	N1
	Both Talk Group and Encryption	$\leq 460$ ms	N1
2.1.18	Receiver Throughput Delay	$\leq 125$ ms	N1

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<b>Transmitter Tests</b>			
<b>Test Case</b>	<b>Description</b>	<b>Requirement</b>	<b>Results</b>
2.2.8	Unwanted Emissions: Adjacent Channel Power Ratio	$\geq 67$ dB	P
2.2.14	Transmitter Throughput Delay	$\leq 125$ ms	N2
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

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<b>Receiver Tests</b>			
<b>Test Case</b>	<b>Description</b>	<b>Requirement</b>	<b>Results</b>
2.1.4	Reference Sensitivity	≤ -116 dBm (Class A)	P
2.1.5	Faded Reference Sensitivity	≤ -108 dBm (Class A)	P
2.1.7	Adjacent Channel Rejection	≥ 60 dB (Class A)	P
2.1.8	Co-Channel Rejection	≤ 9 dB	P
2.1.9	Spurious Response Rejection	≥ 90 dB (Class A)	P
2.1.10	Intermodulation Rejection	≥ 70 dB (Class B)	P
2.1.11	Signal Displacement Bandwidth	≥ 1000 Hz	P

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<b>Transmitter Tests</b>			
<b>Test Case</b>	<b>Description</b>	<b>Requirement</b>	<b>Results</b>
2.2.8	Unwanted Emissions: Adjacent Channel Power Ratio	$\geq 67$ dB	P
2.2.14	Transmitter Throughput Delay	$\leq 125$ ms	N2
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

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<b>Trunking Infrastructure Tests</b>			
Test Case	Description	Requirement	Results
2.3.3	Trunking Voice Access Time	500 ms (Manufacturer Specified)	P
2.3.4	Time to Grant		
	Non-Simulcast 37.5 ms ISP	Single TSBK < 337.5 ms	P
		Double TSBK < 354.0 ms	N3
		Triple TSBK < 366.5 ms	N3
	Non-Simulcast 45 ms ISP	Single TSBK < 345.0 ms	P
		Double TSBK < 361.5 ms	N3
		Triple TSBK < 374.0 ms	N3
	Simulcast 37.5 ms ISP	Single TSBK < 487.5 ms	N3
		Double TSBK < 504.0 ms	N3
		Triple TSBK < 516.5 ms	N3
	Simulcast 45 ms ISP	Single TSBK < 495.0 ms	N3
		Double TSBK < 511.5 ms	N3
		Triple TSBK < 524.0 ms	N3

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<b>P25-CAB-CAI_TEST_REQ – March 2010, Section 2.2.3.2 – Project 25 Phase 1 Common Air Interface Trunked Base Station/Repeater Interoperability</b>		DTR-P25CAP081010- 09102801	DTR-P25CAP081010- 09103001	DTR-P25CAP081010- 09110401	DTR-P25CAP081010- 09111601	DTR-P25CAP081010- 09113001	DTR-P25CAP081010- 10082301	DTR-P25CAP081010- 11042501	DTR-P25CAP081010- 11050401
<b>EF Johnson 3800 Trunked Repeater</b>		Tait TP9100	EF Johnson 5100ES	Kenwood TK 5210 K2	Motorola XTS 5000 Motorola APX 7000	EF Johnson 5300ES	RELM KNG-P150	Icom IC-F9011	Harris XP-100
Test Case	Description								
<b>2.2.1</b>	<b>Full Registration</b>								
<b>2.2.1.4.1</b>	Test Case 1 - Valid Registration								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.1.4.2</b>	Test Case 2 – Denied or Refused Registration								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.1.4.3</b>	Test Case 3 - Unverified Registration								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.2</b>	<b>Group Voice Call</b>								
<b>2.2.2.4.1</b>	Test Case 1 – Group Call Granted								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.2.4.2</b>	Test Case 2 – Group Call Denied								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.2.4.3</b>	Test Case 3 – Group Call Request Queued								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4

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		Tait TP9100	EF Johnson 5100ES	Kenwood TK 5210 K2	Motorola XTS 5000 Motorola APX 7000	EF Johnson 5300ES	RELM KNG-P150	Icom IC-F9011	Harris XP-100
<b>Test Case</b>	<b>Description</b>								
<b>2.2.3</b>	<b>Unit-to-Unit Voice Call</b>								
<b>2.2.3.4.1</b>	Test Case 1 – Unit-To-Unit Call With Target Availability Check								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.3.4.2</b>	Test Case 2 – Unit-To-Unit Call Target Availability Check Denied By Target								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.3.4.3</b>	Test Case 3 – Unit-To-Unit Call Queued With Target Availability Check – traffic channel assignment after target availability check								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.3.4.4</b>	Test Case 4 – Unit-To-Unit Call Queued With Target Availability Check – traffic channel assignment before target availability check								
	Home Operation	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1
	Inter-System Operation	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1
	Inter-WACN Operation	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1	N/A 1

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<b>EF Johnson 3800 Trunked Repeater</b>		Tait TP9100	EF Johnson 5100ES	Kenwood TK 5210 K2	Motorola XTS 5000 Motorola APX 7000	EF Johnson 5300ES	RELM KING-P150	Icom IC-F9011	Harris XP-100
<b>Test Case</b>	<b>Description</b>								
<b>2.2.3</b>	<b>Unit-to-Unit Voice Call</b>								
<b>2.2.3.4.5</b>	Test Case 5 – Unit-To-Unit Call Without Target Availability Check								
	Home Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.3.4.6</b>	Test Case 6 – Unit-To-Unit Call Queued Without Target Availability Check								
	Home Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.3.4.7</b>	Test Case 7 – Unit-To-Unit Call Denied								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4

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		Tait TP9100	EF Johnson 5100ES	Kenwood TK 5210 K2	Motorola XTS 5000 Motorola APX 7000	EF Johnson 5300ES	RELM KNG-P150	Icom IC-F9011	Harris XP-100
<b>Test Case</b>	<b>Description</b>								
<b>2.2.4</b>	<b>Broadcast Voice Call</b>								
<b>2.2.4.4.1</b>	Test Case 1 – Broadcast Voice Call								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.5</b>	<b>Affiliation</b>								
<b>2.2.5.4.1</b>	Test Case 1 - Radio Permitted To Affiliate With New Group								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.5.4.2</b>	Test Case 2 - Radio Denied Affiliation To New Group								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.6</b>	<b>Announcement Group Call</b>								
<b>2.2.6.4.1</b>	Test Case 1 - Collection Of Talk Groups Receive Call								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.7</b>	<b>Emergency Alarm</b>								
<b>2.2.7.4.1</b>	Test Case 1 - Emergency Alarm								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4

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		Tait TP9100	EF Johnson 5100ES	Kenwood TK 5210 K2	Motorola XTS 5000 Motorola APX 7000	EF Johnson 5300ES	RELM KING-P150	Icom IC-F9011	Harris XP-100
<b>Test Case</b>	<b>Description</b>								
<b>2.2.8</b>	<b>Emergency Group Call</b>								
<b>2.2.8.4.1</b>	Test Case 1 - Emergency Call								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.10</b>	<b>Encryption</b>								
<b>2.2.10.4.1</b>	Test Case 1 - Call Privacy For Encrypted Call								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4
<b>2.2.11</b>	<b>Intra-Location Registration Area Roaming</b>								
<b>2.2.11.4.1</b>	Test Case 1 – Idle Radio								
	Home Operation	P	P	P	P	P	P	P	P
	Inter-System Operation	N4	N4	N4	N4	N4	N4	N4	N4
	Inter-WACN Operation	N4	N4	N4	N4	N4	N4	N4	N4

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<b>Model Class Definition</b>		<b>Applied to P25-CAB-CAI_Test_Req March 2010, 2.2.3.2</b>
<b>Model Class Name</b>	<b>Product Name, Definition, and Unique ID</b>	<b>Installed Options</b>
3800 VHF Repeater	3800 Trunked Repeater	<b>Firmware:</b> 3.1
		<b>Firmware:</b> 3.2

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

<b>Comments</b>
N/A 1: Test cases 2.2.3.4.4 is not applicable for this base station/repeater; see results of test 2.2.3.4.3
N1: The receiver does not incorporate a vocoder.
N2: The transmitter does not incorporate a vocoder.
N3: The base station/repeater does not support this feature.
N4: The base station/repeater does not support this feature.

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**OMB NO:** 1640-0015

**EXPIRATION DATE:** 04/30/2012

**Burden Statement**

An agency may not consider or sponsor information collection and a person is not required to respond to this information collection unless it displays a current valid Office of Management and Budget control number and expiration date. The control number for this collection is 1640-0015 and this form will expire on 04/30/2012. The estimated average time to complete this form is 60 minutes per respondent. If you have any comments regarding the burden estimate you can write to Department of Homeland Security, Science and Technology Directorate, Washington, DC 20528.

DHS FORM 10044 – June 2009