

Project 25 Compliance Assessment Program
 Summary Test Report
 EF Johnson TK 5230 VHF Portable Subscriber Unit
 STR-EFJ-15071401
 July 14, 2015

Test Item Description	
Manufacturer	EF Johnson Technologies
Manufacturer Contact	John Oblak (507) 382-6327
Product Name	TK 5230 VHF Portable Subscriber Unit (136 MHz to 174 MHz)
Installed Options	P25 Conventional P25 Trunking DES Encryption AES Encryption
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	P25CAP081010 (EF Johnson Technologies)
Date(s) of Test	Mar 10, 2015 to April 1, 2015
Date of Issue	May 4, 2015

Test Information	
P25 CAP Laboratory Code	P25CAP081010 (EF Johnson Technologies)
Date(s) of Test	Mar 25, 2015 to July 13, 2015
Date of Issue	July 14, 2015

Test Information	
P25 CAP Laboratory Code	P25CAP081010 (EF Johnson Technologies)
Date(s) of Test	August 7, 2014
Date of Issue	August 20, 2014

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Test Information	
P25 CAP Laboratory Code	P25CAP081017 (Harris Corporation)
Date(s) of Test	November 6, 2014
Date of Issue	November 10, 2014

Test Information	
P25 CAP Laboratory Code	P25CAP081011 (Compliance Testing, LLC)
Date(s) of Test	May 27, 2015
Date of Issue	June 2, 2015

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

Other Devices Tested with TK 5230 Portable Subscriber Unit		
Manufacturer	Product Name, Definition, and Unique ID	Installed Options
EF Johnson	ATLAS Trunked Infrastructure	Release 1.1.0-10, TSNI 1.2.0-14
Harris Corp.	VIDA Premier SR10A MASTR V	Firmware R7G13
Codan Radio	Codan MT-4E – Daniels Trunked Radio	V1.1.0.9

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P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.1 – Project 25 Phase 1 Common Air Interface Conventional Subscriber Unit Performance		DTR-P25CAP081010-15050402	
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

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P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.1.1 – Project 25 Phase 1 Common Air Interface Conventional Subscriber Unit Performance		DTR-P25CAP081010-15050402	
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	$2544 \text{ Hz} < f_{\text{dev}} \leq 3111 \text{ Hz}$	P
	Low Level Signal Deviation	$848 \text{ Hz} < f_{\text{dev}} \leq 1037 \text{ Hz}$	P
2.2.16	Modulation Fidelity	$\leq 5\%$ (Class A)	P
2.2.18	Transient Frequency Behavior		
	Time Interval $t_1 = 5$ ms	$ \Delta f \leq 12.5$ kHz	P
	Time Interval $t_2 = 20$ ms	$ \Delta f \leq 6.25$ kHz	P
	Time Interval $t_3 = 5$ ms	$ \Delta f \leq 12.5$ kHz	P

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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
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2.1.10	Intermodulation Rejection	≥ 70 dB (Class A)	P
2.1.11	Signal Displacement Bandwidth	≥ 1000 Hz	P

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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 Encoder Attack Time	≤ 50 ms ≤ 100 ms	P P
2.2.14	Transmitter Throughput Delay	≤ 125 ms	P
2.2.15	Frequency Deviation for C4FM High Level Signal Deviation Low Level Signal Deviation	$2544 \text{ Hz} < f_{\text{dev}} \leq 3111 \text{ Hz}$ $848 \text{ Hz} < f_{\text{dev}} \leq 1037 \text{ Hz}$	P P
2.2.16	Modulation Fidelity	$\leq 5\%$ (Class A)	P
2.2.18	Transient Frequency Behavior Time Interval $t_1 = 5$ ms Time Interval $t_2 = 20$ ms Time Interval $t_3 = 5$ ms	$ \Delta f \leq 12.5$ kHz $ \Delta f \leq 6.25$ kHz $ \Delta f \leq 12.5$ kHz	P P P

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Trunked Subscriber Unit Tests			
Test Case	Description	Requirement	Results
2.3.1	Trunking Control Channel Slot Times (45 ms slot) - N7 Encode Attack Time RF Power Attack Time RF Power Turn Off Time	2.00 ms ≤ t ≤ 11.65 ms 0 ms ≤ t ≤ 11.65 ms ≤ 1.57 ms	P P P
2.3.2	Trunking Request Time	≤ 167.5 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	≤ 150.0 ms	P

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P25-CAB-CAI_TEST_REQ – March 2010, Section 2.1.3.2 – Project 25 Phase 1 Common Air Interface Trunked Subscriber Unit Interoperability		DTR- P25CAP081010- 14082001	DTR- P25CAP081017- 1141104K	DTR- P25CAP081011
EF Johnson TK 5230 Portable		EF Johnson IP25 Trunking Infrastructure	Harris VIDA Trunked Infrastructure	Codan
Test Case	Description			
2.2.1	Full Registration			
2.2.1.4.1	Test Case 1 - Valid Registration			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.1.4.2	Test Case 2 – Denied or Refused			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.1.4.3	Test Case 3 - Unverified Registration			
	Home Operation	P	P	N5
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.2	Group Voice Call			
2.2.2.4.1	Test Case 1 – Group Call Granted			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.2.4.2	Test Case 2 – Group Call Denied			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.2.4.3	Test Case 3 – Group Call Request			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4

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EF Johnson TK 5230 Portable		EF Johnson IP25 Trunking Infrastructure	Harris VIDA Trunked Infrastructure	Codan
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
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.3.4.2	Test Case 2 – Unit-To-Unit Call Target Availability Check Denied By Target			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
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	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
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 1	N/A 1	N/A 1
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.3.4.5	Test Case 5 – Unit-To-Unit Call Without Target Availability Check			
	Home Operation	N2	P	N2
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4

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EF Johnson TK 5230 Portable		EF Johnson IP25 Trunking Infrastructure	Harris VIDA Trunked Infrastructure	Codan
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	N2	P	N2
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.3.4.7	Test Case 7 – Unit-To-Unit Call Denied			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4

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EF Johnson TK 5230 Portable		EF Johnson IP25 Trunking Infrastructure	Harris VIDA Trunked Infrastructure	Codan
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
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
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
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.5.4.2	<i>Test Case 2 - Radio Denied Affiliation To New Group</i>			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
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
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.7	Emergency Alarm			
2.2.7.4.1	Test Case 1 - Emergency Alarm			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4

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EF Johnson TK 5230 Portable		EF Johnson IP25 Trunking Infrastructure	Harris VIDA Trunked Infrastructure	Codan
Test Case	Description			
2.2.8	Emergency Group Call			
2.2.8.4.1	Test Case 1 - Emergency Call			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.10	Encryption			
2.2.10.4.1	Test Case 1 - Call Privacy For Encrypted Call			
	Home Operation	P	P	P
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4
2.2.11	Intra-Location Registration Area Roaming			
2.2.11.4.1	Test Case 1 – Idle Radio			
	Home Operation	P	P	N6
	Inter-System Operation	N1	N3	N4
	Inter-WACN Operation	N1	N3	N4

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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
TK 5230 Series Portable	TK 5230 Portable	Firmware: K 1.11.01; Trunking, Encryption
		Firmware:

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 2.2.3.4.4 is not applicable for these infrastructures; see results of test 2.2.3.4.3.
N1: EF Johnson infrastructure does not support Inter-System or Inter-WACN roaming.
N2: Test Cases 2.2.3.4.5 and 2.2.3.4.6 are not supported by EF Johnson and Codan FNE.
N3: Harris infrastructure does not support Inter-System or Inter-WACN roaming.
N4: Codan infrastructure does not support Inter-System or Inter-WACN roaming.
N5: Codan infrastructure does not support Test Case 3, Section 2.2.1.4.3 Unverified Registration
N6: Codan infrastructure does not support Intra-Location Registration Area Roaming, Test Case 1 Section 2.2.11.4.1
N7: TK 5230 meets timing requirements in the 45 ms slot timing mode.
P1: EF Johnson TK 5230 VHF subscriber passes Reference Sensitivity (≤ -116 dBm) specification for C4FM (Non-Simulcast) and Simulcast modulations.
P2: EF Johnson TK 5230 VHF subscriber passes Faded Reference Sensitivity (≤ -108 dBm) specification for C4FM (Non-Simulcast) and Simulcast modulations.
P3: EF Johnson TK 5230 VHF subscriber passes Signal Delay Spread Capability specification for C4FM (Non-Simulcast) (≥ 50 μ s) and Simulcast modulations (≥ 80 μ s).
P4: EF Johnson TK 5230 VHF subscriber passes Adjacent Channel Rejection (≥ 60 dB) specification for C4FM (Non-Simulcast) and Simulcast modulations.

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