

Project 25 Compliance Assessment Program

SUMMARY TEST REPORT (STR)

CODAN RADIO COMMUNICATIONS MT-4E REPEATER

STR-CODAN RADIO COMMUNICATIONS/1456UT17 MT-4E REPEATER-08132017

SUPPLIER

Supplier Info	Detail
Name:	CODAN RADIO COMMUNICATIONS
Contact:	MIKE CYR 250-382-8268 X 327

Product Info	Detail
Product Name:	CODAN MT-4E REPEATER
Installed Hardware Options:	Conventional Repeater, Encryption: 150-174 MHz; 450- 470MHz; 700, 800MHz
Installed Software Options:	P25, Conventional, Encryption
Installed Vocoder:	AMBE+2

TESTS

Description
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.1.1 – Project 25 Phase 1 Common Air Interface Conventional Base/Repeater Unit Performance
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.3.1 – Project 25 Phase 1 Common Air Interface Conventional Repeat Mode Interoperability

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LABORATORY INFORMATION

Laboratory	Details – Performance VHF
P25 CAP Laboratory Code:	P25CAP081016 TIMCO Engineering Inc.
Date(s) of Test:	Sept. 10, 2010 to Sept. 15, 2010
Detailed Test Report:	DTR:P25CAP081016-2133UT10 T17
Date of Issue:	Sept. 15, 2010

Laboratory	Details – Performance UHF
P25 CAP Laboratory Code:	P25CAP081016 TIMCO Engineering Inc.
Date(s) of Test:	June 15, 2015 to June 29, 2015
Detailed Test Report:	DTR:P25CAP081016-1111UT15
Date of Issue:	June 30, 2015

Laboratory	Details – Performance 700/800
P25 CAP Laboratory Code:	P25CAP081016
Date(s) of Test:	May 10, 2010 to Aug. 13. 2010
Detailed Test Report:	DTR-P25CAP081016-121CUT10
Date of Issue:	Aug. 13, 2010

Laboratory	Details – RMO #1
P25 CAP Laboratory Code:	P25CAP081016
Date(s) of Test:	Jun. 6 to Jun. 6, 2017
Detailed Test Report:	DTR-P25CAP081016-585CUT17
Date of Issue:	Jun. 13, 2017

Laboratory	Details – RMO #2
P25 CAP Laboratory Code:	P25CAP081016
Date(s) of Test:	Jun. 6 to Jun. 6, 2017
Detailed Test Report:	DTR-P25CAP081016-585CUT17
Date of Issue:	Jun. 13, 2017

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Laboratory	Details – RMO #3
P25 CAP Laboratory Code:	P25CAP081016
Date(s) of Test:	Aug. 11, 2017 to Aug. 11, 2017
Detailed Test Report:	DTRL-P25CAP081016-1476BUT17
Date of Issue:	Aug. 14, 2017

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NORMATIVE REFERENCES

Date	Title
August 2016	P25-CAB-CAI_TEST_REQ

RECEIVER PERFORMANCE TESTING 148-174MHZ – CONVENTIONAL

Test Identification	Detailed Test Report Identification
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.1.1 – Project 25 Phase 1 Common Air Interface Conventional Fixed Unit Performance	DTR:P25CAP081016-2133UT10

Test Case	Description	Requirement	Results
3.1.4	Reference Sensitivity – C4FM	≤ -116 dBm (Class A)	P
3.1.5	Faded Reference Sensitivity – C4FM	≤ -108 dBm (Class A)	P
3.1.7.1	Adjacent Channel Rejection – C4FM	≥ 60 dB (Class A)	P
3.1.7.2	Offset Adjacent Channel Rejection – C4FM	≥ 47 dB (Class A)	P
3.1.8	Co-Channel Rejection	≤ 9 dB	P
3.1.9	Spurious Response Rejection	≥ 70 dB (Class B)	P
3.1.10	Intermodulation Rejection	≥ 70 dB (Class B)	P
3.1.11	Signal Displacement Bandwidth	≥ 1000 Hz	P
3.1.17	Late Entry Unsilence Delay: No Talk Group or Encryption	≤ 125 ms	P
3.1.18	Receiver Throughput Delay	≤ 125 ms	P

TRANSMITTER PERFORMANCE TESTING 148-174 MHZ – CONVENTIONAL

Test Identification	Detailed Test Report Identification
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.1.1 – Project 25 Phase 1 Common Air Interface Conventional Repeater Unit Performance	DTR:P25CAP081016-2133UT10

Test Case	Description	Requirement	Results
3.2.8.1	Unwanted Emissions: Adjacent Channel Power Ratio	≥ 67 dB	P
3.2.12	Transmitter Attack Time	≤ 50 ms	P
3.2.12	Encoder Attack Time	≤ 100 ms	P

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STR-CODAN RADIO COMMUNICATIONS/1456UT17 MT-4E REPEATER-08132017

Test Case	Description	Requirement	Results
3.2.14	Transmitter Throughput Delay	≤ 125 ms	P
3.2.15	Frequency Deviation for C4FM: High-Level Signal Deviation	$2544 < f_{dev} \leq 3111$ Hz	P
3.2.15	Frequency Deviation for C4FM: Low-Level Signal Deviation	$848 < f_{dev} \leq 1037$ Hz	P
3.2.16	Modulation Fidelity – C4FM	$\leq 5\%$ (Class A)	P
3.2.16	Modulation Fidelity – Standard Simulcast	$\leq 5\%$ (Class A)	P
3.2.18	Transient Frequency Behavior: Time Interval $t_1 = 10$ ms	$ \Delta f \leq 12.5$ kHz	P
3.2.18	Transient Frequency Behavior: Time Interval $t_2 = 25$ ms	$ \Delta f \leq 6.25$ kHz	P
3.2.18	Transient Frequency Behavior: Time Interval $t_3 = 10$ ms	$ \Delta f \leq 12.5$ kHz	P

RECEIVER PERFORMANCE TESTING 403 – 470 MHZ – CONVENTIONAL

Test Identification	Detailed Test Report Identification
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.1.1 – Project 25 Phase 1 Common Air Interface Conventional Repeater Unit Performance	DTR:P25CAP081016-1111UT15

Test Case	Description	Requirement	Results
3.1.4	Reference Sensitivity – C4FM	≤ -116 dBm (Class A)	P
3.1.5	Faded Reference Sensitivity – C4FM	≤ -108 dBm (Class A)	P
3.1.7.1	Adjacent Channel Rejection – C4FM	≥ 60 dB (Class A)	P
3.1.7.2	Offset Adjacent Channel Rejection – C4FM	≥ 47 dB (Class A)	P
3.1.8	Co-Channel Rejection	≤ 9 dB	P
3.1.9	Spurious Response Rejection	≥ 70 dB (Class B)	P
3.1.10	Intermodulation Rejection	≥ 70 dB (Class B)	P
3.1.11	Signal Displacement Bandwidth	≥ 1000 Hz	P
3.1.17	Late Entry Unsilence Delay: No Talk Group or Encryption	≤ 125 ms	P
3.1.18	Receiver Throughput Delay	≤ 125 ms	P

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TRANSMITTER PERFORMANCE TESTING 403-470 MHZ – CONVENTIONAL

Test Identification	Detailed Test Report Identification
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.1.1 – Project 25 Phase 1 Common Air Interface Conventional Repeater Unit Performance	DTR:P25CAP081016-1111UT15

Test Case	Description	Requirement	Results
3.2.8.1	Unwanted Emissions: Adjacent Channel Power Ratio	≥ 67 dB	P
3.2.12	Transmitter Attack Time	≤ 50 ms	P
3.2.12	Encoder Attack Time	≤ 100 ms	P
3.2.14	Transmitter Throughput Delay	≤ 125 ms	P
3.2.15	Frequency Deviation for C4FM: High-Level Signal Deviation	$2544 < f_{dev} \leq 3111$ Hz	P
3.2.15	Frequency Deviation for C4FM: Low-Level Signal Deviation	$848 < f_{dev} \leq 1037$ Hz	P
3.2.16	Modulation Fidelity – C4FM	$\leq 5\%$ (Class A)	P
3.2.16	Modulation Fidelity – Standard Simulcast	$\leq 5\%$ (Class A)	P
3.2.18	Transient Frequency Behavior: Time Interval $t_1 = 20$ ms	$ \Delta f \leq 12.5$ kHz	P
3.2.18	Transient Frequency Behavior: Time Interval $t_2 = 50$ ms	$ \Delta f \leq 6.25$ kHz	P
3.2.18	Transient Frequency Behavior: Time Interval $t_3 = 10$ ms	$ \Delta f \leq 12.5$ kHz	P

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RECEIVER PERFORMANCE TESTING 700 MHZ, 800 MHZ – CONVENTIONAL

Test Identification	Detailed Test Report Identification
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.1.1 – Project 25 Phase 1 Common Air Interface Conventional Repeater Unit Performance	DTR-P25CAP081016-121CUT10

Test Case	Description	Requirement	Results
3.1.4	Reference Sensitivity – C4FM	≤ -116 dBm (Class A)	P
3.1.5	Faded Reference Sensitivity – C4FM	≤ -108 dBm (Class A)	P
3.1.7.1	Adjacent Channel Rejection – C4FM	≥ 60 dB (Class A)	P
3.1.7.2	Offset Adjacent Channel Rejection – C4FM	≥ 47 dB (Class A)	P
3.1.8	Co-Channel Rejection	≤ 9 dB	P
3.1.9	Spurious Response Rejection	≥ 70 dB (Class B)	P
3.1.10	Intermodulation Rejection	≥ 70 dB (Class B)	P
3.1.11	Signal Displacement Bandwidth	≥ 1000 Hz	P

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TRANSMITTER PERFORMANCE TESTING (700 MHZ, 800 MHZ) – CONVENTIONAL

Test Identification	Detailed Test Report Identification
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.1.1 – Project 25 Phase 1 Common Air Interface Conventional Repeater Unit Performance	DTR-P25CAP081016-121CUT10

Test Case 2.2.8 – Unwanted Emissions: Adjacent Channel Power Ratio

Test Case	Offset from Center Frequency (KHz)	Measurement Bandwidth (KHz)	ACPR (dB)	Results
3.2.8.2	9.375	6.25	≥ 40	P
3.2.8.2	15.625	6.25	≥ 60	P
3.2.8.2	21.875	6.25	≥ 60	P
3.2.8.2	37.5	25	≥ 60	P
3.2.8.2	62.5	25	≥ 65	P
3.2.8.2	87.5	25	≥ 65	P
3.2.8.2	150	100	≥ 65	P
3.2.8.2	250	100	≥ 65	P
3.2.8.2	350	100	≥ 65	P
3.2.8.2	> 400 KHz to 12 MHz	30 (s)	≥ 75	P
3.2.8.2	12 MHz to paired receive band	30 (s)	≥ 75	P
3.2.8.2	In paired receive band	30 (s)	≥ 100	P

TRANSMITTER PERFORMANCE TESTING (700 MHZ, 800 MHZ)

Test Case	Description	Requirement	Results
3.2.8.1	Unwanted Emissions: Adjacent Channel Power Ratio	≥ 67 dB	P
3.2.12	Transmitter Attack Time	≤ 50 ms	P
3.2.12	Encoder Attack Time	≤ 100 ms	P
3.2.14	Transmitter Throughput Delay	≤ 125 ms	P
3.2.15	Frequency Deviation for C4FM: High-Level Signal Deviation	$2544 < f_{dev} \leq 3111$ Hz	P
3.2.15	Frequency Deviation for C4FM: Low-Level Signal Deviation	$848 < f_{dev} \leq 1037$ Hz	P
3.2.16	Modulation Fidelity – C4FM	≤ 5% (Class A)	P

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Test Case	Description	Requirement	Results
3.2.16	Modulation Fidelity – Standard Simulcast	$\leq 5\%$ (Class A)	P
3.2.18	Transient Frequency Behavior: Time Interval $t_1 = 20$ ms	$ \Delta f \leq 12.5$ kHz	P
3.2.18	Transient Frequency Behavior: Time Interval $t_2 = 50$ ms	$ \Delta f \leq 6.25$ kHz	P
3.2.18	Transient Frequency Behavior: Time Interval $t_3 = 10$ m	$ \Delta f \leq 12.5$ kHz	P

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OTHER DEVICES TESTED FOR INTEROPERABILITY

Other devices tested with CODAN MT-4E REPEATER for Conventional Repeat Interoperability testing

Supplier and Contact	Product Name, Definition, Unique ID	Installed Software Options	Subscriber Number
UNIFICATION CO., LTD. Robert Machatto	U3	P25, Conventional, Encryption	SU#1
HARRIS CORP. David Prather	XG-25P	P25, Conventional, Encryption	SU#2
Tait Ltd. David Jackson	TP-9400	P25, Conventional, Encryption	SU#3

INTEROPERABILITY - TESTING – CONVENTIONAL: REPEAT MODE (SU-TO-FNE-TO-SU)

Test Identification	Product
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.3.1 – Project 25 Phase 1 Common Air Interface Conventional Repeat Unit Interoperability	CODAN MT-4E REPEATER

INTEROPERABILITY TESTING (148-174 MHZ) – CONVENTIONAL: REPEAT MODE (SU-TO-FNE-TO-SU)

Test Case	Description	SU #1	SU #2	SU #3
2.4.1	Matching NAC Operation and SU Unaddressed Voice Call			
2.4.1.4.1	Test Case 1 – Matching NAC operation – Unaddressed Voice Call	P	P	P
2.4.2	Matching NAC Operation – SU Routine Group Call Mode			
2.4.2.4.1	Test Case 1 – Matching NAC – SU Routine Group Call Mode	P	P	P
2.4.3	Transmit NAC Independent of Receive NAC – SU Unaddressed Voice Call			
2.4.3.4.1	Test Case 1 – Independent NAC Operation – SU Unaddressed Voice Call	P	P	P
2.4.4	Transmit NAC Independent of Receive NAC – SU Routine Group Call			
2.4.4.4.1	Test Case 1 – Independent NAC Operation – SU Routine Group Call	P	P	P

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Test Case	Description	SU #1	SU #2	SU #3
2.4.5	Any NAC (\$F7F) Operation – SU Unaddressed Voice Call			
2.4.5.4.1	Test Case 1 – NAC \$F7F Operation – SU Unaddressed Voice Call	P	P	P
2.4.6	Any NAC (\$F7F) Operation – SU Routine Group Call			
2.4.6.4.1	Test Case 1 – NAC \$F7F Operation – SU Routine Group Call	P	P	P
2.4.7	Any NAC (\$F7F) Operation with Fixed Transmit NAC – SU Group Call			
2.4.7.4.1	Test Case 1 – NAC \$F7F Operation – SU Group Call	P	P	P
2.4.8	Emergency Call			
2.4.8.4.1	Test Case 1 – Emergency Call	P	P	P
2.4.9	Monitor Mode – SU Group Call			
2.4.9.4.1	Test Case 1 – Monitor Mode – Receiving Group Call	P	P	P
2.4.10	Unit-to-Unit Voice Call			
2.4.10.4.1	Test Case 1 – Initiate Unit-to-Unit Call from SU 1	P	P	P
2.4.10.4.2	Test Case 2 – Initiate Unit-to-Unit Call from SU 5	P	P	P
2.4.10.4.3	Test Case 3 – Initiate Unit-to-Unit Call from SU 1, No Co-Channel Interference Suppression	P	P	P
2.4.10.4.4	Test Case 4 – Initiate Unit-to-Unit Call from SU 5, No Co-Channel Interference Suppression	P	P	P
2.4.11	Unit-to-Unit Voice Call Co-Channel Interference Suppression by FNE			
2.4.11.4.1	Test Case 1 – Initiate Unit-to-Unit Call from SU 1	P	P	P
2.4.11.4.2	Test Case 2 – Initiate Unit-to-Unit Call from SU 5	P	P	P
2.4.12	Unit-to-Unit Voice Call – Receiving Units Also in Monitor Mode			
2.4.12.4.1	Test Case 1 – Initiate Unit-to-Unit Call from SU 1	P	P	P
2.4.12.4.2	Test Case 2 – Initiate Unit-to-Unit Call from SU 5	P	P	P
2.4.13	Encryption			
2.4.13.4.1	Test Case 1 – Call Privacy for Encrypted Call	P	P	P
2.4.14	Accept Any NAC in Normal & Selective Squelch Mode – SU Group Call			
2.4.14.4.1	Test Case 1 – Receiving group Call with receive NAC \$F7F under Normal and Selective Squelch Modes	P	P	P

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Test Case	Description	SU #1	SU #2	SU #3
2.5.1	Call Alert			
2.5.1.4.1	Test Case 1 – Initiate Call Alert Request from SU 1	U	U	U
2.5.1.4.2	Test Case 2 – Initiate Call Alert Request from SU 5	U	U	U
2.5.2	Radio Check			
2.5.2.4.1	Test Case 1 – Initiate Radio Check from SU 1	U	U	U
2.5.2.4.2	Test Case 2 – Initiate Radio Check from SU 5	U	U	U
2.5.3	Message Update			
2.5.3.4.1	Test Case 1 – Message Update Initiated by SU 1	U	U	U
2.5.3.4.2	Test Case 2 – Message Update Initiated by SU 5	U	U	U
2.5.3.4.3	Test Case 3 – SU 1 to Group Message Update	U	U	U
2.5.3.4.4	Test Case 4 – SU 5 to Group Message Update	U	U	U
2.5.4	Status Update			
2.5.4.4.1	Test Case 1 – Status Update Initiated by SU 1	U	U	U
2.5.4.4.2	Test Case 2 – Status Update Initiated by SU 5	U	U	U
2.5.4.4.3	Test Case 3 – SU to Talk Group Status Update Initiated by SU 1	U	U	U
2.5.4.4.4	Test Case 4 – SU to Talk Group Status Update Initiated by SU 5	U	U	U
2.5.5	Status Query			
2.5.5.4.1	Test Case 1 – Status Query Initiated by SU 1	U	U	U
2.5.5.4.2	Test Case 2 – Status Query Initiated by SU 5	U	U	U
2.5.6	Radio Unit Monitor			
2.5.6.4.1	Test Case 1 – Radio Unit Monitor Initiated by SU 1 – Group Call	U	U	U
2.5.6.4.2	Test Case 2 – Radio Unit Monitor Initiated by SU 5 – Group Call	U	U	U
2.5.6.4.3	Test Case 3 – Radio Unit Monitor Initiated by SU 1 – Unit-to-Unit Call	U	U	U
2.5.6.4.4	Test Case 4 – Radio Unit Monitor Initiated by SU 5 – Unit-to-Unit Call	U	U	U

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INTEROPERABILITY TESTING – CONVENTIONAL FNE INCLUDES DISPATCH AND OTHER MONITORING CONSOLES (REPEAT MODE (SU-TO-FNE-TO-SU) OR DIRECT MODE)

Test Identification	Product
P25-CAB-CAI_TEST_REQ – August 2016, Section 2.2.3.1 – Project 25 Phase 1 Common Air Interface Conventional Repeater Unit Interoperability	CODAN MT-4E REPEATER

Product	Detailed Test Report Identification
PRODUCT NOT CAPABLE OF INTERFACE TO MONITORING CONSOLE	

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INTEROPERABILITY TESTING – CONVENTIONAL FNE INCLUDES DISPATCH AND OTHER MONITORING CONSOLES (REPEAT MODE (SU-TO-FNE-TO-SU) OR DIRECT MODE)

Test Case	Description	Result
2.6.1	Unaddressed Voice Call	
2.6.1.4.1	Test Case 1 – Unaddressed Voice Call	U
2.6.2	Routine Group Call	
2.6.2.4.1	Test Case 1 – Routine Group Call	U
2.6.3	Emergency Call	
2.6.3.4.1	Test Case 1 – Emergency Call from SU	U
2.6.3.4.2	Test Case 2 – Emergency Call from DMC	U
2.6.4	All Call (System-Wide Call)	
2.6.4.4.1	Initiate System-Wide Call to Collection of Talk Groups	U
2.6.5	Unit-to-Unit Voice Call	
2.6.5.4.1	Test Case 1 – Initiate Unit-to-Unit Call from DMC	U
2.6.5.4.2	Test Case 2 – Initiate Unit-to-Unit Call from SU 1	U
2.6.6	Encryption	
2.6.6.4.1	Test Case 1 – Call Privacy for Encrypted Call	U
2.7.1	Emergency Alarm to Dispatch and/or other Monitoring Console	
2.7.1.4.1	Test Case 1 – Emergency Alarm	U
2.7.2	Call Alert	
2.7.2.4.1	Test Case 1 – Initiate Call Alert Request from DMC	U
2.7.2.4.2	Test Case 2 – Initiate Call Alert Request from SU 1	U
2.7.3	Radio Check	
2.7.3.4.1	Test Case 1 – Initiate Radio Check from DMC	U
2.7.4	Radio Unit Inhibit	
2.7.4.4.1	Test Case 1 – Radio Unit Inhibit from DMC	U
2.7.5	Radio Unit Uninhibit	
2.7.5.4.1	Test Case 1 – Radio Unit Uninhibit from DMC	U
2.7.6	Message Update	
2.7.6.4.1	Test Case 1 – Message Update from DMC	U
2.7.6.4.2	Test Case 2 – DMC to Group Message Update	U
2.7.6.4.3	Test Case 3 – SU 1 to DMC Message Update	U
2.7.6.4.4	Test Case 4 – SU 1 to Group Message Update	U

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Test Case	Description	Result
2.7.7	Status Update	
2.7.7.4.1	Test Case 1 – Status Update from SU 1 to DMC	U
2.7.7.4.2	Test Case 2 – Talk Group Status Update Initiated by SU 1	U
2.7.8	Status Query	
2.7.8.4.1	Test Case 1 – Status Query Initiated by DMC	U
2.7.9	Radio Unit Monitor	
2.7.9.4.1	Test Case 1 – Radio Unit Monitor Initiated by DMC – Group Call	U
2.7.9.4.2	Test Case 2 – Radio Unit Monitor Initiated by DMC – Unit-to-Unit Call	U

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MODEL CLASS DEFINITIONS – DEVICE UNDER TEST

Model Class: MT-4E

Model Class	Sub-Class	Installed Options
Unication U3	N/A	P25, Conventional, Trunking, Encryption
Harris XG-25P	N/A	P25, Conventional, Trunking, Encryption
TAIT Ltd. TP9400	N/A	P25, Conventional, Trunking, Encryption

REPORT KEY

Notation	Test Case Result Definition
U (Unsupported)	Test examines functionality the Test Object does not support
P (Pass)	Test Object Meets Requirements
F (Fail)	Test Object Does Not Meet Requirements
N/R (No Requirement)	Test object operates at a level for which there is no requirement.

Comments
U1: Add information here for an “Unsupported” test.
U2: Add information here for a second “Unsupported” test.
P1: Add information here for a “Pass” verdict that requires elaboration.
P2: Add information here for a second “Pass” verdict that requires elaboration.
F1: Add information here for a “Fail” verdict that requires elaboration.
F2: Add information here for a second “Fail” verdict that requires elaboration.
NR1: In accordance with the guidance given in TIA 102.CAAB-D §3.2.18, if the transmitter carrier output power rating is 6 watts or less, the mean frequency difference during t_1 and t_3 , may be greater than ± 12.5 kHz. Add information here for a “No Requirement” designation.
NR2: In accordance with the guidance given in TIA 102.CAAB-D §3.2.18, if the transmitter carrier output power rating is 6 watts or less, the mean frequency difference during t_1 and t_3 , may be greater than ± 12.5 kHz. Add information here for a second “No Requirement” designation.

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DISCLAIMER

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BURDEN STATEMENT

OMB NO: 6040-0015

EXPIRATION DATE: 6/30/2019

An agency may not conduct 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 6040-0015 and this form will expire on 6/30/2019. 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 the U.S. Department of Homeland Security, Science and Technology Directorate, Washington, DC 20528.

DHS FORM 10056 – June 2009