

# Texas Instruments Inc

## LETTER REPORT

**SCOPE OF WORK**

SMOKE DETECTOR TESTING FOR RESEARCH & DEVELOPMENT PURPOSES ONLY  
MODEL: TIDA-010941

**LETTER REPORT NUMBER**

105530792CHI-001A

**ISSUE DATE**

8/10/2023

**PAGES**

12

**DOCUMENT CONTROL NUMBER**

GFT-OP-10a (21-June-2019)  
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## FINDINGS LETTER REPORT

8/10/2023

Intertek Report No. 105530792CHI-001A  
Intertek Project No. G105530792

Boyu Shen  
Texas Instruments Inc  
8505 Forest Ln  
Dallas, TX 75243-4136  
USA  
b-shen@ti.com

Subject: Testing for research and development of model(s) TIDA-010941, to latest editions of referenced standard(s). These test results cannot be used for any future certification evaluation.

Dear Mr. Shen,

This letter report represents the results of the research evaluation of the above referenced product to the requirements contained in the following Standard(s):

*Smoke Alarms [UL 217:2020 Ed.9+R:09Feb2022]*

### **SECTION 1** **SUMMARY**

Intertek is writing this letter to inform you of results of our evaluation.

Tests performed on each sample of model(s) TIDA-010941 were conducted per the applicable standard(s).

#### **Assumptions**

- All tests were conducted for research purposes only.
- Smoke detectors were energized using client provided power supplies (USB supply hub) and LaunchPad circuit board.
- Alarm status was indicated via a client provided proprietary software application.

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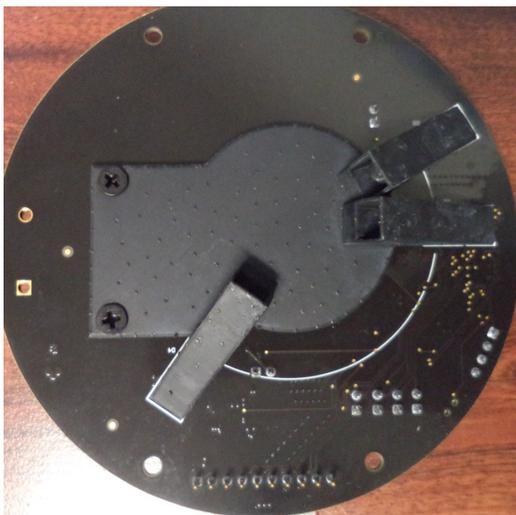
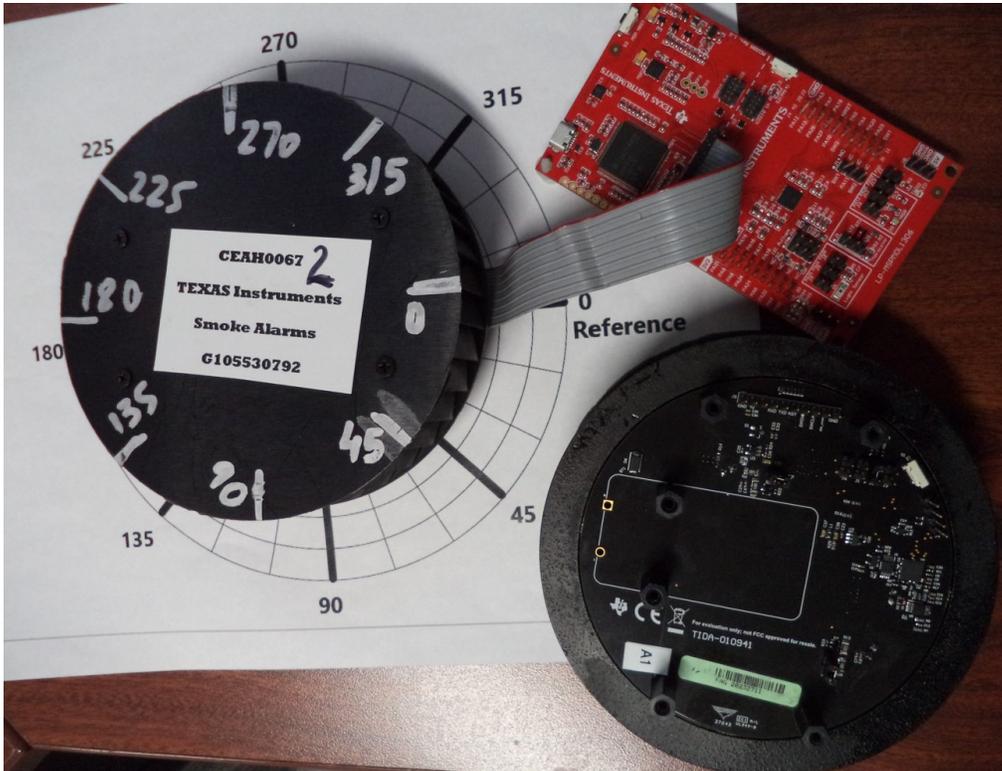
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## FINDINGS LETTER REPORT

### SECTION 2 SAMPLES AND DOCUMENTATION

#### Samples

12 samples of model TIDA-010941, along with LaunchPad circuit boards and connecting cables, were submitted by the manufacturer, and received at our lab on 7/31/2023. Below are representative pictures of these samples.



**FINDINGS LETTER REPORT**

**SECTION 3  
TESTING**

The below listed, represents a summary of the tests & results.

Completed Tests:

Test Location: Arlington Heights, IL

Model	Listing Report #	Sample Number
TIDA-010941	none	CEAH0067

Test Description	Standard /Clause	Result:
Sensitivity Test	UL 217/42	Pass
Directionality	UL 217/43	Pass
Fire Tests/Paper Fire	UL 217/50.2	Pass
Fire Test/Wood Fire	UL 217/50.3	Pass
Fire Test/Flaming polyurethane foam test	UL 217/50.4	Pass
Smoldering Smoke Test	UL 217/51	Pass
Smoldering Polyurethane Foam Test	UL 217/52	Pass
Cooking Nuisance Smoke Test	UL 217/53	Pass
Go/No Go Flaming Polyurethane Foam Test	UL 217/54	Pass

**TEST RESULTS SUMMARY:**

Sensitivity Test:

Test conducted in ETL Smoke Box# 3  
LFP – smoke into 270deg CW from center of ribbon connector area.

Sensitivity data was measured immediately after the in-alarm status was indicated by the data collection software.

**FINDINGS LETTER REPORT**

Sensitivity Test – Continued

SAMPLE NUMBER	CLIENT NUMBER	Direction	Trial	MIC (pA)	Beam (uA)	Obscuration (%/ft)	Time (Minutes)
CEAH0067-3	A3	LFP	1	47.82	90.5	1.98	7.70
			2	51.96	91.0	1.86	7.33
			3	49.09	90.9	1.90	7.27
			Avg	49.62	90.79	1.91	7.43
CEAH0067-4	A4	LFP	1	48.69	90.7	1.94	7.20
			2	50.65	90.9	1.88	6.50
			3	49.70	91.3	1.81	6.87
			Avg	49.68	90.97	1.88	6.86
CEAH0067-5	A5	LFP	1	48.94	90.3	2.03	6.80
			2	48.39	90.6	1.95	7.20
			3	49.23	90.3	2.01	6.70
			Avg	48.85	90.40	2.00	6.90
CEAH0067-6	A6	LFP	1	48.81	91.0	1.88	6.67
			2	49.88	90.8	1.91	7.00
			3	49.83	91.1	1.84	6.23
			Avg	49.51	90.96	1.88	6.63
CEAH0067-7	A7	LFP	1	52.22	91.5	1.75	5.97
			2	51.27	91.5	1.77	6.47
			3	49.01	91.5	1.76	6.37
			Avg	50.83	91.50	1.76	6.27
CEAH0067-08	A8	LFP	1	52.74	92.1	1.64	6.47
			2	52.27	91.9	1.67	5.90
			3	51.13	91.9	1.67	5.73
			Avg	52.05	91.98	1.66	6.03
CEAH0067-09	A9	LFP	1	50.34	91.2	1.83	6.57
			2	49.93	91.0	1.87	6.13
			3	51.86	91.1	1.84	6.13
			Avg	50.71	91.11	1.85	6.28
CEAH0067-10	A10	LFP	1	54.23	91.8	1.70	5.27
			2	52.09	91.9	1.67	5.50
			3	50.71	91.3	1.79	6.00
			Avg	52.34	91.69	1.72	5.59
CEAH0067-11	A11	LFP	1	50.86	90.8	1.92	6.63
			2	50.15	91.0	1.88	6.83
			3	51.82	91.2	1.83	6.63
			Avg	50.94	90.97	1.88	6.70
CEAH0067-12	A12	LFP	1	49.22	90.0	2.08	7.23
			2	49.24	90.1	2.06	6.83
			3	49.56	90.1	2.06	6.97
			Avg	49.34	90.09	2.07	7.01
CEAH0067-13	A13	LFP	1	50.49	91.0	1.87	6.17
			2	50.11	91.0	1.86	6.40
			3	50.50	90.7	1.93	6.33
			Avg	50.37	90.90	1.89	6.30

**FINDINGS LETTER REPORT**

TEST CONCLUSION (Sensitivity Test): **CONFORMING** – All samples alarmed within the sensitivity range of 1.66 – 2.07 %/ft (average of three trials) which meets the standard required sensitivity limits of 0.5%/ft – 4%/ft (for a photo sensor).

Directionality Test:

Test conducted in ETL Smoke Box# 3

<MIN> Sample #	CLIENT NUMBER	Direction	Trial	MIC (pA)	Beam (uA)	Obscuration (%/ft)	Time (Minutes)
CEAH0067-1	A1	0deg	1	49.01	89.16	2.27	8.07
			2	49.84	89.28	2.24	6.57
			3	49.30	89.63	2.17	7.53
			Avg	49.38	89.36	2.23	7.39
		45deg	1	50.05	89.62	2.17	7.37
			2	48.35	89.48	2.20	8.70
			3	48.86	89.49	2.20	7.67
			Avg	49.09	89.53	2.19	7.91
		90deg	1	48.88	89.78	2.13	8.80
			2	47.82	89.41	2.21	8.47
			3	49.95	89.83	2.12	8.17
			Avg	48.88	89.67	2.16	8.48
		135deg (MFP)	1	50.12	89.70	2.15	8.40
			2	48.42	89.55	2.18	8.27
			3	48.33	89.61	2.17	7.20
			Avg	48.96	89.62	2.17	7.96
		180deg	1	51.06	89.85	2.12	7.70
			2	48.54	89.56	2.18	7.93
			3	49.52	89.83	2.12	7.37
			Avg	49.71	89.75	2.14	7.67
		225deg	1	49.14	89.00	2.30	8.00
			2	51.33	89.46	2.20	6.93
			3	48.59	89.38	2.22	8.73
			Avg	49.69	89.28	2.24	7.89
		270deg (LFP)	1	47.95	88.73	2.36	8.93
			2	49.10	89.13	2.28	8.17
			3	47.42	88.96	2.31	7.73
			Avg	48.16	88.94	2.32	8.28
		315deg	1	49.47	89.21	2.26	7.43
			2	49.56	89.31	2.24	8.17
			3	47.98	89.70	2.15	8.23
			Avg	49.00	89.41	2.21	7.94

**FINDINGS LETTER REPORT**

Directionality Test - Continued

(MAX) Sample #	CLIENT NUMBER	Direction	Trial	MIC (pA)	Beam (uA)	Obscuration (%/ft)	Time (Minutes)
CEAH0067-2	A2	0deg	1	55.30	91.88	1.68	6.97
			2	53.79	91.62	1.74	6.53
			3	55.59	92.13	1.63	5.93
			Avg	54.89	91.88	1.68	6.48
		45deg	1	54.76	91.46	1.77	6.53
			2	52.71	91.58	1.74	6.77
			3	52.66	91.33	1.80	5.93
			Avg	53.38	91.45	1.77	6.41
		90deg	1	51.67	91.18	1.83	6.97
			2	52.53	91.83	1.69	6.10
			3	51.59	91.67	1.72	6.80
			Avg	51.93	91.56	1.75	6.62
		135deg (MFP)	1	52.98	91.86	1.68	6.33
			2	53.69	91.94	1.67	6.10
			3	54.48	91.58	1.74	6.23
			Avg	53.72	91.79	1.70	6.22
		180deg	1	53.56	91.74	1.71	6.43
			2	54.26	91.84	1.69	6.33
			3	52.30	91.99	1.66	6.23
			Avg	53.37	91.86	1.68	6.33
		225deg	1	54.62	91.82	1.69	6.67
			2	54.94	92.01	1.65	6.07
			3	55.02	91.68	1.72	6.40
			Avg	54.86	91.84	1.69	6.38
		270deg (LFP)	1	53.36	91.85	1.68	7.10
			2	52.81	91.47	1.77	6.90
			3	50.98	91.80	1.70	6.87
			Avg	52.38	91.71	1.72	6.96
		315deg	1	54.77	91.74	1.71	5.93
			2	51.09	91.71	1.72	6.77
			3	55.46	92.11	1.63	5.63
			Avg	53.77	91.85	1.69	6.11

TEST CONCLUSION (Directionality Test): **CONFORMING** – Sensitivity measured on each angle orientation was within the standard required range of 0.5%/ft - 4%/ft (photo sensor). All sensitivity values are within the margin of tolerance (0.2%/ft) from the average measurement of all measurements per each sample (less than 50% of average).

Based on the measured sensitivities the following orientations were determined:

LFP = 270° CW from center of ribbon connector area. See pictures.  
MFP =180° CW from center of ribbon connector area. See pictures.

Fire Tests:

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**Method:**

During the fire tests, the center ceiling unit was oriented such that least favorable position (LFP) was facing the fire source and the other two samples were oriented clockwise (CW) and counterclockwise (CCW) by an angle of 120° with respect to the center sample. The last two samples were mounted on each side wall with the LFP facing the fire source. The test was conducted in an ambient temperature between 20°C and 25.5°C and a relative humidity of 50 ±10%. For fire profiles, refer to the folder.

Sample Number Model: TIDA-010941	Type of Fire	Trials	Position	Response Time (Min:Sec)	Response Obscuration (%/Ft)
CEAH0067-13	Paper	4	North Wall	2:21	07.32%/ft
CEAH0067-5			North Ceiling	2:37	15.54%/ft
CEAH0067-4			Center Ceiling	2:30	19.34%/ft
CEAH0067-3			South Ceiling	2:36	19.33%/ft
CEAH0067-11			South Wall	2:58	02.91%/ft

**Test Conclusion: Conforming** - Samples responded before the 240 seconds time requirement.

Sample Number Model: TIDA-010941	Type of Fire	Trial	Position	Response Time (Min:Sec)	Response Obscuration (%/Ft)
CEAH0067-13	Wood crib	1	North Wall	3:13	5.62%/ft
CEAH0067-5			North Ceiling	2:12	3.72%/ft
CEAH0067-4			Center Ceiling	2:16	3.70%/ft
CEAH0067-3			South Ceiling	2:25	4.48%/ft
CEAH0067-11			South Wall	3:11	4.13%/ft

**Test Conclusion: Conforming** - Samples responded before the 240 second time requirement.

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Sample Number Model: TIDA-010941	Type of Fire	Trial	Position	Response Time (Min:Sec)	Response Obscuration (%/ft)
CEAH0067-13	Smoldering Smoke-10%	1	North Wall	45:57	2.81%/ft
CEAH0067-5			North Ceiling	45:51	2.08%/ft
CEAH0067-4			Center Ceiling	34:50	0.63%/ft
CEAH0067-3			South Ceiling	46:04	2.27%/ft
CEAH0067-11			South Wall	34:52	0.64%/ft

**Test Conclusion: Conforming** - Samples responded before the smoke density at all test locations exceeded 10.0%/ft.

Fire Tests – Continued

Sample Number Model: TIDA-010941	Type of Fire	Trials	Position	Response Time (Min:Sec)	Response before 5%/ft
CEAH0067-13	Flaming Polyurethane	2	North Wall	3:09	3.86%/ft
CEAH0067-5			North Ceiling	3:07	3.36%/ft
CEAH0067-4			Center Ceiling	3:05	3.26%/ft
CEAH0067-3			South Ceiling	3:11	3.88%/ft
CEAH0067-11			South Wall	3:10	3.72%/ft

**Test Conclusion: Conforming** - All samples alarmed before the 5%/ft limit was reached and within the 6 min time limit.

Sample Number Model: TIDA-010941	Type of Fire	Trial	Position	Response Time (Min:Sec)	Response before 12%/ft
CEAH0067-13	Smoldering Polyurethane	1	North Wall	21:59	0.63%/ft
CEAH0067-5			North Ceiling	21:01	0.52%/ft
CEAH0067-4			Center Ceiling	21:48	0.57%/ft
CEAH0067-3			South Ceiling	21:47	0.61%/ft
CEAH0067-11			South Wall	22:03	0.56%/ft

**Test Conclusion: Conforming** - All samples alarmed before the 12%/ft OBS limit requirement was reached.

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Sample Number Model: TIDA-010941	Sensitivity expressed as Obscuration [%/ft] (Smoke Box # 3)
CEAH0067-13	1.89
CEAH0067-5	2.00
CEAH0067-4	1.88
CEAH0067-3	1.91
CEAH0067-11	1.88

**Method: Cooking Test**

During the fire test, all units were oriented such that most favorable position (MFP) was facing the fire source. The test was conducted in an ambient temperature between 20°C and 25.5°C and a relative humidity of 50 ±10%. For fire profiles, refer to the folder.

Sample Number Model: TIDA-010941	Type of Fire	Trial	Position	Response Time (Min:Sec)	Alarm Response threshold (%/ft)
CEAH0067-7	Cooking Nuisance Smoke Test	2	North Ceiling	No Alarm	No Alarm
CEAH0067-8			North Center Ceiling	No Alarm	No Alarm
CEAH0067-9			South Center Ceiling	No Alarm	No Alarm
CEAH0067-10			South Ceiling	No Alarm	No Alarm

**Test Conclusion: Conforming** - All samples did NOT alarm **before** the 1.5%/ft obscuration requirement.

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Sample Number Model: TIDA-010941	Type of Fire	Trial	Position	Response Time (Min:Sec)	Alarm Response threshold (%/ft) @ 17 ft
CEAH0067-7	Go/No Go Flaming Polyurethane Foam Test	1	North Ceiling	17:59	3.27%/ft
CEAH0067-8			North Center Ceiling	16:42	1.02%/ft
CEAH0067-9			South Center Ceiling	17:57	3.72%/ft
CEAH0067-10			South Ceiling	16:40	0.99%/ft

**Test Conclusion: Conforming** - All samples alarmed before 5%/ft obscuration following the nuisance fire test.

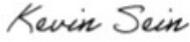
Sample Number Model: TIDA-010941	Sensitivity expressed as Obscuration [%/ft] (Smoke Box # 3)
CEAH0067-7	1.76
CEAH0067-8	1.66
CEAH0067-9	1.85
CEAH0067-10	1.72

**Fire tests conclusion:** Passing range is 1.66 – 1.88 %/ft (reference only).

**FINDINGS LETTER REPORT****SECTION 4****PROJECT STATUS & ACTION**

This Letter Report concludes the research and development testing conducted on model(s) TIDA-010941, covered by Intertek Project No. G105530792.

If there are any questions regarding the results contained in this letter report, or you are in need of any of our other services offered by Intertek, please do not hesitate to contact your dedicated Intertek Project Manager.

Completed by:	Carmen Teodora	Reviewed by:	Kevin Sein
Title:	Engineer	Title:	Staff Engineer
Signature:		Signature	
Date	8/10/2023	Date:	8/11/2023

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