

Thermal Test Report

for BFX-UA300 (K18X001T00)

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Revision Change History

Revision	Description of Change	Date
1.0	Initial Release	09/13/2021

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1. Purpose and Scope

The scope of this test is to measure the thermal profile of BFX-UA300 (K18X001T00). The test purpose is to demonstrate that the temperature of key components and housing when system operates in required ambient temperatures. The temperature of all measurement points should not be over the thermal specification.

1.1 Second source

1. Change T1 housing.
2. AMP board, bottom heatspreader & AMP heatspreader.

2. Test Setup

2.1 Equipment

Though any equipment with high level of accuracy can be used, it is recommended that the following be used for consistency in results. Include the model and calibration date and the following information:

Table 1: Setup Information

Item	Equipment Name	Description
1	Thermocouple	T-type
2	Thermocouple attachment	Thermal glue: LOCTITE 384 Accelerator: LOCTITE 7387
3	Data acquisition unit	Keithley K2700
4	Infrared thermal images	FLUKE Ti32
5	Environmental chamber	TERCHY Walk-in Chamber

2.2 Configuration

Table 2: Information of DUT in thermal test

	Items	HW Version	Part Number	Serial Number	Software Version
1	Main Board	04S4N	K18X001T00	YVH0JDP	v19.531.13

2.3 Environment

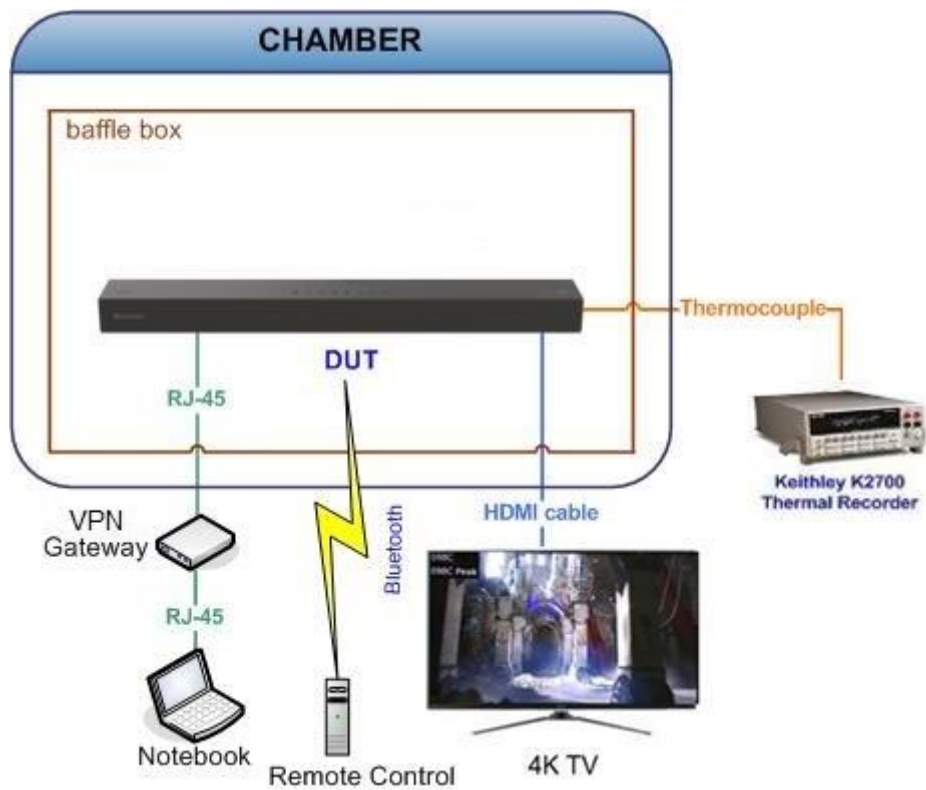
Table 3: Test environmental requirements

Ambient temp. for testing	Condition: 25°C & 50°C
Place mode	Horizontal stand
Air flow inside chamber	Put the DUT inside the baffle box to simulating actual environment at higher temperature setting in stationary air flow environment. The baffle box is to prevent chamber airflow influence.

2.4 Power Consumption Measurement

The total DC power consumption: 11 (W)

2.5 Thermal Test Setup



3. Test Condition

Condition:

- 1. Play VOP video stream via Ethernet with 70% (23) speaker output volume.
- 2. Test in chamber 25°C and 50°C for 6 hours.

4. Pass/Fail Criteria

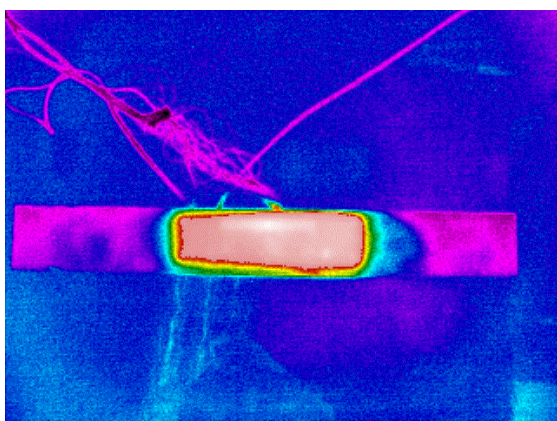
Table 4: Pass/Fail Criteria

Ambient Temp.		Criteria
Condition	25°C & 50°C	1. The component surface temperature should meet component specification. 2. AL capacitor's lifetime > MTBF or product lifetime. 3. IC chip's Temp.: Follow IC formula ($T_j = T_c + (\theta_{jc} \text{ or } \Psi_{JT}) * P$) and T_j has 90% de-rating for judgment. 4. Housing Top < Reference Box + 20°C 5. Housing Bottom < Reference Box + 25°C

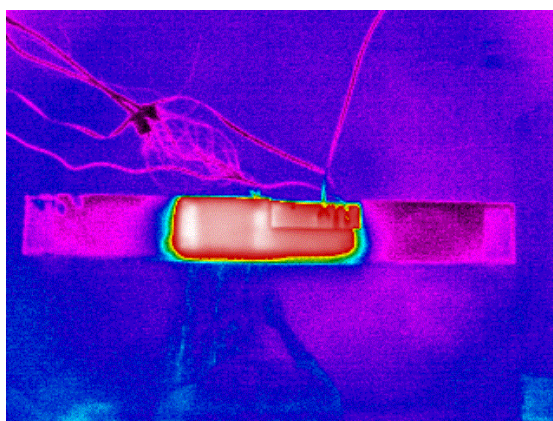
5. Test Results

5.1 IR image report

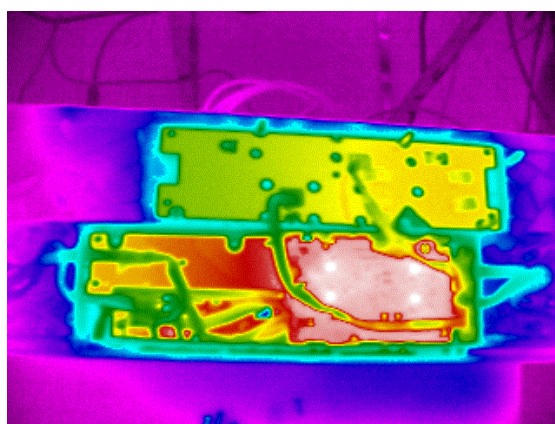
Housing Top



Housing Bottom



PCB



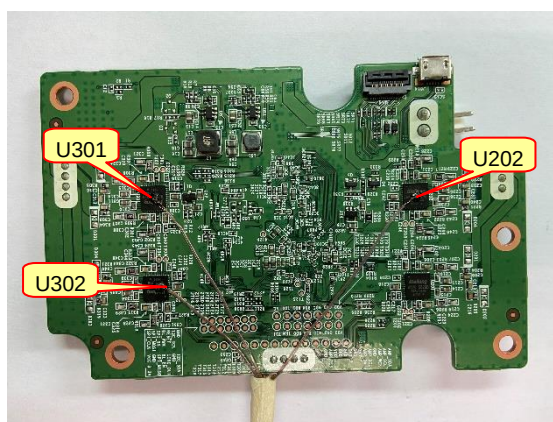
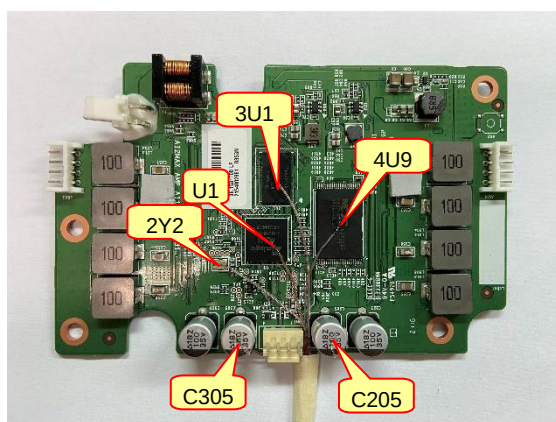
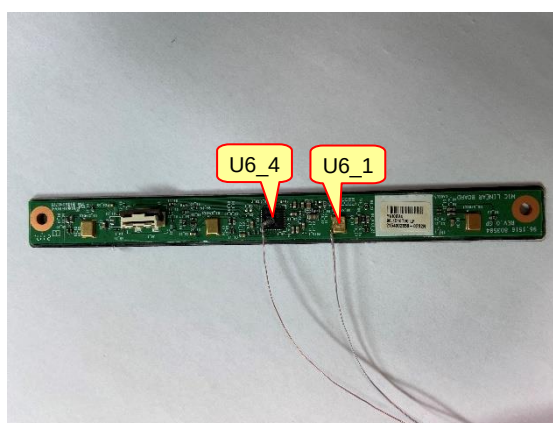
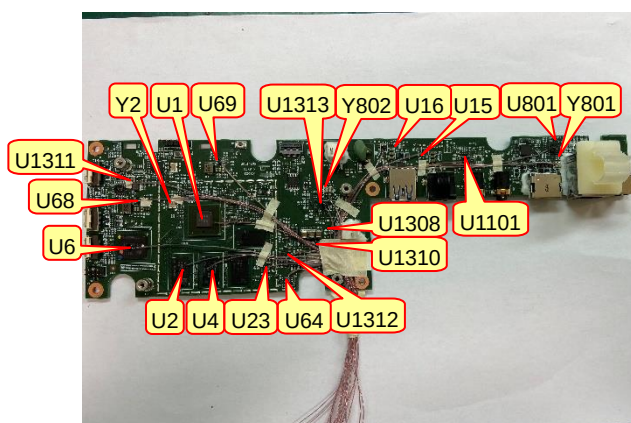
5.2 Thermal profile measurement

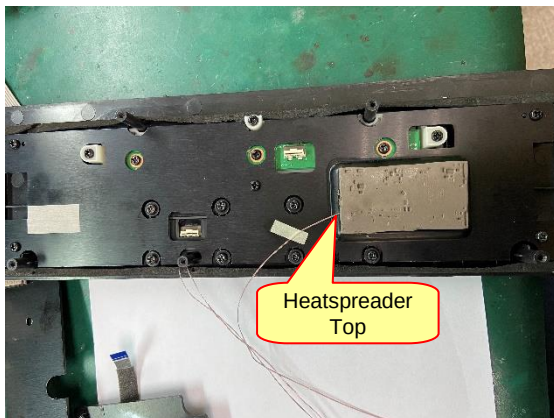
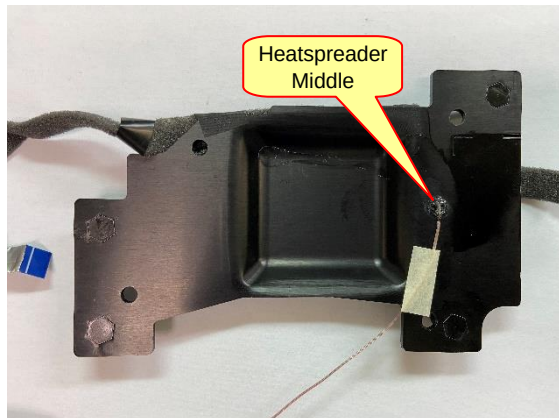
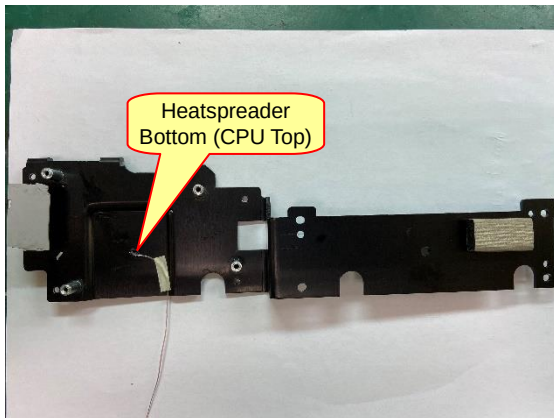
No.	Location	Description	25°C	50°C	Pass Criterion	Result
1	U1	CPU VS 550	68.9	96.9	$T_j < 100^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 96.9 + 0.037 \cdot 2.6$ $= 96.99 < 100$ $(T_j \cdot 90\%, 111.1 \cdot 90\%)$
2	U6	KLM8G1GETF-B041	52.9	77.5	$T_c < 92.7^{\circ}\text{C}$	Pass
3	U801	RTL8211F-CG	49.9	75.1	$T_j < 112.5^{\circ}\text{C}$	Pass
4	Y801	25MHz	48.0	71.3	$T_c < 105^{\circ}\text{C}$	Pass
5	U68	SY8824CAIC	55.5	83.1	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 83.1 + 5.5 \cdot 0.177$ $= 84.07 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
6	U69	SY8824CAIC	55.8	80.8	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 80.8 + 5.5 \cdot 0.251$ $= 82.18 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
7	U1313	RTL8761BTV	52.7	76.9	$T_j < 112.5^{\circ}\text{C}$	Pass
8	Y802	40MHz	51.8	76.1	$T_c < 100^{\circ}\text{C}$	Pass

9	U1101	TLV320ADC3100IRGET	48.7	72.6	$T_j < 94.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 72.6 + 0.4 \cdot 0.032$ $= 72.67 < 94.5$ $(T_j \cdot 90\%, 105 \cdot 90\%)$
10	U16	AP2553W6-7	49.8	73.7	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 73.7 + 55 \cdot 0.101$ $= 79.26 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
11	U15	AP2553W6-7	48.7	72.5	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 72.5 + 55 \cdot 0.022$ $= 73.71 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
12	Y2	25MHz	55.0	80.5	$T_c < 110^{\circ}\text{C}$	Pass
13	U2	DDR4-4Gb IC	54.5	79.0	$T_c < 95^{\circ}\text{C}$	Pass
14	U4	DDR4-4Gb IC	53.2	77.5	$T_c < 95^{\circ}\text{C}$	Pass
15	U1310	MP1605GTF-Z	55.1	79.6	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 79.6 + 60 \cdot 0.048$ $= 82.48 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
16	U1311	MP1605GTF-Z	54.0	78.6	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 78.6 + 60 \cdot 0.02$ $= 79.80 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
17	U1312	MP1605GTF-Z	55.7	79.7	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 79.7 + 60 \cdot 0.137$ $= 87.92 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
18	U1308	MP2491CGQB	55.6	80.4	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 80.4 + 8 \cdot 1.633$ $= 93.46 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
19	U64	TLV75525PDBVR	54.9	79.5	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 79.5 + 28.4 \cdot 0.008$ $= 79.73 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
20	U23	TPS51206DSQR	54.5	78.8	$T_j < 112.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 78.8 + 2.9 \cdot 0.002$ $= 78.80 < 112.5$ $(T_j \cdot 90\%, 125 \cdot 90\%)$
21	U1	A113X	54.3	77.9	$T_j < 94.5^{\circ}\text{C}$	Pass $T_j = T_c + \theta_{jc} \cdot P$ $= 77.9 + 10.88 \cdot 0.496$ $= 83.30 < 94.5$ $(T_j \cdot 90\%, 105 \cdot 90\%)$
22	2Y2	24MHz	51.9	77.1	$T_c < 105^{\circ}\text{C}$	Pass
23	4U9	S40FC004C181C	53.7	77.4	$T_c < 95^{\circ}\text{C}$	Pass
24	U202	WA20-6829B	58.4	81.9	$T_a < 85^{\circ}\text{C}$	Pass
25	U302	WA20-6829B	53.3	77.2	$T_a < 85^{\circ}\text{C}$	Pass
26	U301	WA20-6829B	54.5	78.1	$T_a < 85^{\circ}\text{C}$	Pass

27	C205	100uF/35V	52.3	75.8	MTBF > 10,000Hrs	Pass MTBF = 74,062.84658 Hrs@50°C
28	C305	100uF/35V	52.4	76.0	MTBF > 10,000Hrs	Pass MTBF = 73,043.20148 Hrs@50°C
29	3U1	H5TC4G63EFR-RDA	53.8	77.5	Tc < 95°C	Pass
30	U6_1	CX20810-11Z	45.1	68.4	Tj < 112.5°C	Pass Tj = Tc+θjc*P = 68.4+11.6*0.012 = 68.54 < 112.5 (Tj *90%, 125*90%)
31	U6_4	SPM0687LR5H-1	42.3	66.8	Tc < 100°C	Pass
32	Housing Top	NA	40.0	63.3	< 65°C@50°C Δt 15°C	Pass
33	Housing Bottom	NA	44.3	68.3	< 65°C@50°C Δt 15°C	Fail
34	Heatspreader	Bottom (CPU Top)	52.2	77.8	NA	NA
35	Heatspreader	Middle	53.2	77.2	NA	NA
36	Heatspreader	Top	51.3	74.6	NA	NA
37	Reference Box	NA	25.0	50.0	NA	NA

5.3 Test photographs





6. Test Result Conclusions

The thermal test result was **Fail**.

a). Housing Bottom, $T_c = 68.3^{\circ}\text{C} > 65^{\circ}\text{C} @ 50^{\circ}\text{C} (\Delta t 15^{\circ}\text{C})$