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Test Report

Sample Name: Waterproof Scissor Switch Keyboard

Sample Model: K-TEK-V285-FN-BL-FC-SC
-NV-151B-DWP+TP65-DML+2K

Test Category: Commission Test

Manufacturer: Key Technology China Limited

Client: Key Technology China Limited



Shenzhen Ancheshenghui Test Technology Co., Ltd.

1. Prediction Purpose

By conducting reliability prediction for K-TEK-V285-FN-BL-FC-SC-NV-151B-DWP+TP65 -DML+2K Waterproof Scissor Switch Keyboard produced by Key Technology China Limited, the product reliability prediction result is obtained under the typical service environment.

2. Prediction Basis

GJB/Z 299C-2006 Reliability Prediction Manual For Electronic Equipment.

3. Prediction Method Description

Considering the Waterproof Scissor Switch Keyboard detained design is finished, the specification, quantity, working stress and environment of each component of the prototype is determined. Therefore, the component stress analysis method is employed to conduct reliability prediction.

The components failure rate model is according to the corresponding categories in GJB/Z 299C-2006.

4. Product State Description

The Waterproof Scissor Switch Keyboard appearance is as Fig.1.



Fig.1 Waterproof Scissor Switch Keyboard

5. Reliability Modeling

According to the procedures and methods in GJB/Z 299C-2006, the reliability modeling for Waterproof Scissor Switch Keyboard is established, as Fig.2.

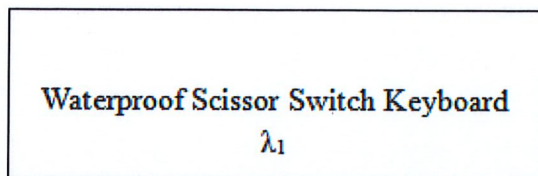


Fig.2 Waterproof Scissor Switch Keyboard Reliability Modeling

Product failure rate: $\lambda_s = \lambda_1$

Product MTBF: $MTBF = 1/\lambda_s$

6. Prediction Precondition

6.1 The components only have two states: fault and normal, and there is no third state;

6.2 All input is within the prescribed limits for product, without regard to the failure caused by error input;

6.3 Without regard to the simple structural elements in reliability modeling;

6.4 Assuming the personnel are completely reliable, no interaction problem between the personnel and the product;

6.5 The product failure is in compliance with exponential distribution;

6.6 The product failure is mutually independent.

7. Prediction Relevant Factors Determination

7.1 Determination of Ambient Temperature

Based on the product's usage environment, 40 °C is uniformly selected as the reference ambient temperature and the junction temperature for various components in this reliability prediction.

7.2 Selection of Electrical Stress Factors

Considering the derating design of the components, the electrical stress factors (current, voltage) for this reliability prediction are taken as $U/U_{max} = 0.7$ and $I/I_{MAX} = 0.7$.

8.Prediction Calculation

The failure rates of each unit, calculated according to the component failure rate model, are shown in Table 1. For the detailed prediction results, refer to Annex 1.

Table1 Unit Failure Rate

No.	Unit	Unit Failure Rate (10-6/h)	Remark
1	Control board section	2.3477	The declaration/document referenced for the calculation data was provided by the client.
2	Key section	0.3168	
3	Keyboard section	6.4748	
4	Touchpad section	0.4215	
Summary	Product total failure rate λ_{product}	9.5608	

Calculated: $\lambda_{\text{product}} = 9.5608 (10^{-6}/\text{h})$

Converting to the Mean Time Between Failures (MTBF) of the product: $\text{MTBF} = 1/\lambda_{\text{product}} = 104594 \text{ h}$

The predicted Mean Time Between Failures (MTBF) for the Waterproof Scissor switch Keyboard is 104594 hours (refer to Annex 1 for details).

9.Prediction Result

Under the condition of referring environment temperature of 40 °C and electric stress coefficient of 0.7, reliability prediction for K-TEK-V285-FN-BL-FC-SC-NV-151B-DWP+TP65-+2K Waterproof Scissor Switch Keyboard shows mean time between failures (MTBF) prediction value is 104594 (h).

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Annex 1 Failure Rate of Each Unit

No.	name	Model Number	N	λ_b (C_p)	π_E	π_Q	π_R	π_T	π_{TAPS}	π_K	π_{CV}	π_{SR}	π_{db}	π_A	π_C	π_r	π_S	π_{S2}	π_L	π_P	Π_{L2}	Π_{Se}	C1	C2	C3	N_{sp} ($\times 10^{-6}$)	
Control board																											
1	8-bit Enhanced USB MCU	CH549L	1		1	0.5		0.27												1			0.2643	0.0342	0.0855	0.0001	
2	Diode	B5819W	1	0.072	1	0.4								1	1	0.6			0.2							0.0035	
3	100 UF Capacitor	MBK1206X5R107K1 00NT	9	0.1365	1	0.5					1		1													0.6143	
4	104 UF Capacitor	MBK0603X7R104K5 00NT	12	0.0253	1	0.5					1.6	1	1													0.2429	
5	ESD and Surge Protection (TVS/ESD)	LSQY65CAT1G	39	0.072	1	0.4								1	1	0.6			0.2							0.1348	
6	ESD and Surge Protection (TVS/ESD)	LT-BV05C	2	0.072	1	0.4								1	1	0.6			0.2							0.0069	
7	Ferrite Bead 600R	MBKPB2012L601T-2 A	3	0.06	1	0.5																				0.0900	
8	22R Resistor	MBKRS03K220JT	5	0.054	1	0.6	1																			0.1620	
9	1K Resistor Array	MBKRCML08W102J T	1	0.054	1	0.6	1																			0.0324	
10	1K Resistor	MBKRS03K1001FT	1	0.054	1	0.6	1																			0.0324	
11	30R Resistor Array	MBKRCML08W30R 0JT	7	0.054	1	0.6	1																			0.2268	
12	5.6V Varistor	MBKSMV0805G5R6 NXT	6	0.04	1	0.6		1																		0.1440	

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