



Efficiency Through Technology

**RELIABILITY REPORT
2020**

KXOB and SM product

Jun 2020

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Temperature Cycle

Failure modes: Thermal fatigue of silicon-metal and metal-metal interfaces due to heating and cooling, causing thermal and electrical performance degradation.

Humidity Test

Failure Modes: Degradation of electrical leakage characteristics due to moisture penetration into plastic packages.

UV Test

Failure Modes: Degradation of encapsulation material integrity due to high energy UV irradiation, causing electrical performance degradation and encapsulation material delamination.

Weather Test

Failure Modes: Sequential degradation of electrical leakage characteristics and encapsulation material integrity due to the weather condition combined with sequential humidity and UV tests, causing electrical performance degradation and encapsulation material delamination.

Summary of Tables: Temperature Cycle

	Table 1 KXOB & SM discrete device
Total Lots Tested	24
Total Devices Tested	480
Total Failures	0
Total Device Cycles	241,920

Summary of Tables: Humidity Test

	Table 2 KXOB & SM discrete device
Total Lots Tested	24
Total Devices Tested	480
Total Failures	0
Total Device Hours	480,000

Summary of Tables: UV Test

	Table 3 KXOB & SM discrete device
Total Lots Tested	24
Total Devices Tested	480
Total Failures	0
Total Device Hours	72,000

Summary of Tables: Weather Test

	Table 4 KXOB & SM discrete device
Total Lots Tested	24
Total Devices Tested	480
Total Failures	0
Total Device Hours Humidity	28,800
Total Device Hours UV A+B	72,000

TEMPERATURE CYCLE

TABLE 1: KXOB & SM

#	Part Number	Test #	Low Temp. [°C]	High Temp. [°C]	Number of Cycles	Sample Size	Failures	Device Cycles	Remark
1	KXOB25-01X4F	1901	-40	90	504	20	0	10,080	
2	KXOB25-04X2F	1902	-40	90	504	20	0	10,080	
3	KXOB25-14X1F	1903	-40	90	504	20	0	10,080	
4	KXOB25-05X3F	1904	-40	90	504	20	0	10,080	
5	KXOB25-02X8F	1905	-40	90	504	20	0	10,080	
6	SM101K09L	1907	-40	90	504	20	0	10,080	
7	SM101K12L	1908	-40	90	504	20	0	10,080	
8	SM141K04LV	1909	-40	90	504	20	0	10,080	
9	SM141K06L	1910	-40	90	504	20	0	10,080	
10	SM141K08L	1911	-40	90	504	20	0	10,080	
11	SM141K09L	1912	-40	90	504	20	0	10,080	
12	SM141K10LV	1913	-40	90	504	20	0	10,080	
13	SM262K10L	1914	-40	90	504	20	0	10,080	
14	SM351K09L	1915	-40	90	504	20	0	10,080	
15	SM400K10L	1916	-40	90	504	20	0	10,080	
18	SM500K12L	1917	-40	90	504	20	0	10,080	
17	SM531K08L	1918	-40	90	504	20	0	10,080	
18	SM531K10L	1919	-40	90	504	20	0	10,080	
19	SM531K12L	1920	-40	90	504	20	0	10,080	
20	SM700K10L	1921	-40	90	504	20	0	10,080	
21	SM730K12L	1922	-40	90	504	20	0	10,080	
22	SM850K12L	1923	-40	90	504	20	0	10,080	
23	SM940K09L	1924	-40	90	504	20	0	10,080	
24	SM242K10L	1925	-40	90	504	20	0	10,080	

HUMIDITY TEST

TABLE 2: KXOB & SM

#	Part Number	Test #	Temp. [°C]	Rel. H. [%]	Time [hrs]	Sample Size	Failures	Device Hours [hrs]	Remark
1	KXOB25-01X4F	1901	85	85	1000	20	0	20000	
2	KXOB25-04X2F	1902	85	85	1000	20	0	20000	
3	KXOB25-14X1F	1903	85	85	1000	20	0	20000	
4	KXOB25-05X3F	1904	85	85	1000	20	0	20000	
5	KXOB25-02X8F	1905	85	85	1000	20	0	20000	
6	SM101K09L	1907	85	85	1000	20	0	20000	
7	SM101K12L	1908	85	85	1000	20	0	20000	
8	SM141K04LV	1909	85	85	1000	20	0	20000	
9	SM141K06L	1910	85	85	1000	20	0	20000	
10	SM141K08L	1911	85	85	1000	20	0	20000	
11	SM141K09L	1912	85	85	1000	20	0	20000	
12	SM141K10LV	1913	85	85	1000	20	0	20000	
13	SM262K10L	1914	85	85	1000	20	0	20000	
14	SM351K09L	1915	85	85	1000	20	0	20000	
15	SM400K10L	1916	85	85	1000	20	0	20000	
18	SM500K12L	1917	85	85	1000	20	0	20000	
17	SM531K08L	1918	85	85	1000	20	0	20000	
18	SM531K10L	1919	85	85	1000	20	0	20000	
19	SM531K12L	1920	85	85	1000	20	0	20000	
20	SM700K10L	1921	85	85	1000	20	0	20000	
21	SM730K12L	1922	85	85	1000	20	0	20000	
22	SM850K12L	1923	85	85	1000	20	0	20000	
23	SM940K09L	1924	85	85	1000	20	0	20000	
24	SM242K10L	1925	85	85	1000	20	0	20000	

UV TEST

TABLE 3: KXOB & SM

#	Part Number	Test #	Temp. [°C]	UV A+B [mW/cm ²]	Time [hrs]	Sample Size	Failures	Device Hours [hrs]	Remark
1	KXOB25-01X4F	1901	85	60	150	20	0	3000	
2	KXOB25-04X2F	1902	85	60	150	20	0	3000	
3	KXOB25-14X1F	1903	85	60	150	20	0	3000	
4	KXOB25-05X3F	1904	85	60	150	20	0	3000	
5	KXOB25-02X8F	1905	85	60	150	20	0	3000	
6	SM101K09L	1907	85	60	150	20	0	3000	
7	SM101K12L	1908	85	60	150	20	0	3000	
8	SM141K04LV	1909	85	60	150	20	0	3000	
9	SM141K06L	1910	85	60	150	20	0	3000	
10	SM141K08L	1911	85	60	150	20	0	3000	
11	SM141K09L	1912	85	60	150	20	0	3000	
12	SM141K10LV	1913	85	60	150	20	0	3000	
13	SM262K10L	1914	85	60	150	20	0	3000	
14	SM351K09L	1915	85	60	150	20	0	3000	
15	SM400K10L	1916	85	60	150	20	0	3000	
18	SM500K12L	1917	85	60	150	20	0	3000	
17	SM531K08L	1918	85	60	150	20	0	3000	
18	SM531K10L	1919	85	60	150	20	0	3000	
19	SM531K12L	1920	85	60	150	20	0	3000	
20	SM700K10L	1921	85	60	150	20	0	3000	
21	SM730K12L	1922	85	60	150	20	0	3000	
22	SM850K12L	1923	85	60	150	20	0	3000	
23	SM940K09L	1924	85	60	150	20	0	3000	
24	SM242K10L	1925	85	60	150	20	0	3000	

Weather TEST

TABLE 4: KXOB & SM

#	Part Number	Test #	Temp. [°C]	Rel. H. [%]	Humidity Time [hrs]	UV A+B [mW/cm ²]	UV A+B Time [hrs]	Sample Size	Failures	Humidity D.Hs [hrs]	UV A+B D.Hs [hrs]	Remark
1	KXOB25-01X4F	1901	85	85	60	60	150	20	0	1200	3000	
2	KXOB25-04X2F	1902	85	85	60	60	150	20	0	1200	3000	
3	KXOB25-14X1F	1903	85	85	60	60	150	20	0	1200	3000	
4	KXOB25-05X3F	1904	85	85	60	60	150	20	0	1200	3000	
5	KXOB25-02X8F	1905	85	85	60	60	150	20	0	1200	3000	
6	SM101K09L	1907	85	85	60	60	150	20	0	1200	3000	
7	SM101K12L	1908	85	85	60	60	150	20	0	1200	3000	
8	SM141K04LV	1909	85	85	60	60	150	20	0	1200	3000	
9	SM141K06L	1910	85	85	60	60	150	20	0	1200	3000	
10	SM141K08L	1911	85	85	60	60	150	20	0	1200	3000	
11	SM141K09L	1912	85	85	60	60	150	20	0	1200	3000	
12	SM141K10LV	1913	85	85	60	60	150	20	0	1200	3000	
13	SM262K10L	1914	85	85	60	60	150	20	0	1200	3000	
14	SM351K09L	1915	85	85	60	60	150	20	0	1200	3000	
15	SM400K10L	1916	85	85	60	60	150	20	0	1200	3000	
18	SM500K12L	1917	85	85	60	60	150	20	0	1200	3000	
17	SM531K08L	1918	85	85	60	60	150	20	0	1200	3000	
18	SM531K10L	1919	85	85	60	60	150	20	0	1200	3000	
19	SM531K12L	1920	85	85	60	60	150	20	0	1200	3000	
20	SM700K10L	1921	85	85	60	60	150	20	0	1200	3000	
21	SM730K12L	1922	85	85	60	60	150	20	0	1200	3000	
22	SM850K12L	1923	85	85	60	60	150	20	0	1200	3000	
23	SM940K09L	1924	85	85	60	60	150	20	0	1200	3000	
24	SM242K10L	1925	85	85	60	60	150	20	0	1200	3000	