

Reliability Data Report

Report Number: R598

Report generated on: Fri Sep 13 15:09:50 PDT 2019

OPERATING LIFE TEST

PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS (+125°C) ¹	No. of FAILURES _{2, 3}
BGA 06X06	77	1544	1544	77	0
BGA 06X11	154	1145	1145	154	0
BGA 09X11	154	1052	1052	154	0
BGA 15X09	77	1533	1533	77	0
BGA 15X15	231	1120	1324	939	0
LGA 06X06	77	0717	0717	77	0
LGA 06X11	145	0749	1121	145	0
LGA 09X11	77	0733	0733	77	0
LGA 15X09	308	0809	0949	308	0
LGA 11X15	231	0945	1022	231	0
LGA 15X15	381	0821	1046	560	0
Totals	1,912	-	-	2,799	0

HIGHLY ACCELERATED STRESS TEST AT +130 DEG C / 85% RH

PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS (+85°C) ⁴	No. of FAILURES
BGA 06X06	77	1547	1547	0	0
BGA 06X11	434	1225	1748	1125	0
BGA 09X11	957	1236	1764	1218	0
BGA 15X09	1184	1302	1714	1574	0
BGA 11X15	231	1516	1516	887	0
BGA 15X15	1173	1120	1733	1605	0
LGA 06X06	250	0717	1527	868	0
LGA 06X11	157	1632	1748	153	0
LGA 09X11	274	1245	1631	378	0
LGA 15X09	1232	0739	1509	2235	0
LGA 11X15	508	1213	1521	1529	0
LGA 15X15	833	0912	1646	461	0
Totals	7,310	-	-	12,033	0

HIGHLY ACCELERATED STRESS TEST AT +130 DEG C / 85% RH

PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS (+85°C) ⁵	No. of FAILURES
BGA 06X06	77	1547	1547	0	0
BGA 06X11	434	1225	1748	1125	0
BGA 09X11	957	1236	1764	1218	0
BGA 15X09	1184	1302	1714	1574	0
BGA 11X15	231	1516	1516	887	0
BGA 15X15	1173	1120	1733	1605	0
LGA 06X06	250	0717	1527	868	0
LGA 06X11	157	1632	1748	153	0
LGA 09X11	274	1245	1631	378	0
LGA 15X09	1232	0739	1509	2235	0
LGA 11X15	508	1213	1521	1529	0
LGA 15X15	833	0912	1646	461	0
Totals	7,310	-	-	12,033	0

- (1) Assumes Activation Energy = 1.0 Electron Volts
- (2) Failure Rate Equivalent to +55 °C, 60% Confidence Level =0.65 FITS
- (3) Mean Time Between Failure in Years = 174296.81
- (4) Assumes 20X Acceleration from 85 °C to +130 °C
- (5) Assumes 20X Acceleration from 85 °C to +130 °C

Note 1: 1 FIT = 1 Failure in One Billion Hours.

Note 2: HAST, Temp Cycle & Thermal Shock are subjected to J-STD-020 MSL Preconditioning

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TEMP CYCLE FROM -65 TO 150 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES	No. of FAILURES
BGA 06X06	542	1440	1623	740	0
BGA 06X09	1421	1435	1722	2717	0
BGA 06X11	1771	1138	1632	674	0
BGA 09X11	3795	1145	1804	2538	0
BGA 15X09	3743	1035	1634	2212	0
BGA 11X15	1026	1335	1845	441	0
BGA 15X15	2550	1120	1623	1611	0
LGA 06X06	2093	0646	1618	1306	0
LGA 06X11	2043	0804	1625	1680	0
LGA 09X11	7724	0723	1636	2908	0
LGA 15X09	9857	0739	1635	5011	0
LGA 11X15	4196	0945	1632	2989	0
LGA 15X15	7574	0831	1646	3118	0
Totals	48,335	-	-	27,945	0

TEMP CYCLE FROM -55 TO 125 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES	No. of FAILURES
BGA 06X06	689	1435	1547	789	0
BGA 06X09	1251	1529	1801	2485	0
BGA 06X11	1470	1145	1748	1370	0
BGA 09X11	4786	1036	1843	4501	0
BGA 15X09	1475	1121	1710	1423	0
BGA 11X15	381	1516	1711	255	0
BGA 15X15	2432	1120	1806	1947	0
LGA 06X06	997	0717	1648	972	0
LGA 06X11	1186	0804	1748	1874	0
LGA 09X11	2570	0723	1820	1883	0
LGA 15X09	4965	0751	1714	5154	0
LGA 11X15	1310	0945	1701	1208	0
LGA 15X15	7984	0903	1806	3435	0
Totals	31,496	-	-	27,296	0

THERMAL SHOCK FROM -55 TO 125 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES	No. of FAILURES
BGA 06X06	761	1440	1623	1015	0
BGA 06X09	984	1529	1801	1852	0
BGA 06X11	691	1141	1748	883	0
BGA 09X11	2648	1052	1843	3869	0
BGA 15X09	921	1121	1625	1383	0
BGA 11X15	231	1516	1516	231	0
BGA 15X15	1396	1120	1806	1812	0
LGA 06X06	680	0717	1527	872	0
LGA 06X11	1099	0804	1748	1891	0
LGA 09X11	1189	0723	1820	1868	0
LGA 15X09	3525	0751	1509	5059	0
LGA 11X15	766	0945	1245	1109	0
LGA 15X15	1912	0903	1806	2794	0
Totals	16,803	-	-	24,638	0

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THERMAL SHOCK FROM -65 TO 150 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES	No. of FAILURES
BGA 06X06	864	1440	1623	1233	0
BGA 06X09	1426	1435	1722	2539	0
BGA 06X11	457	1138	1437	458	0
BGA 09X11	1775	1145	1804	1883	0
BGA 15X09	1658	1121	1714	1773	0
BGA 11X15	462	1516	1845	462	0
BGA 15X15	1337	1120	1734	1790	0
LGA 06X06	1723	0717	1527	1103	0
LGA 06X11	1088	0804	1411	1578	0
LGA 09X11	6039	0723	1631	2839	0
LGA 15X09	6250	0751	1513	4601	0
LGA 11X15	2887	0945	1632	2576	0
LGA 15X15	4955	0932	1646	2476	0
Totals	30,921	-	-	25,311	0
POWER CYCLE FROM 50 TO 100 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES	No. of FAILURES
LGA 09X11	36	0732	0732	1800	0
Totals	36	-	-	1,800	0
HIGH TEMPERATURE BAKE AT 175 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS	No. of FAILURES
BGA 15X09	91	1036	1036	91	0
LGA 06X11	231	0916	0916	462	0
LGA 09X11	50	1245	1245	50	0
LGA 11X15	154	1041	1041	77	0
LGA 15X15	844	1006	1045	847	0
Totals	1,370	-	-	1,527	0
HIGH TEMPERATURE BAKE AT 150 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS	No. of FAILURES
BGA 06X06	462	1440	1547	462	0
BGA 06X09	1496	1529	1801	2092	0
BGA 06X11	485	1145	1437	485	0
BGA 09X11	2838	1036	1843	2748	0
BGA 15X09	1470	1035	1634	1836	0
BGA 11X15	859	1424	1845	859	0
BGA 15X15	1735	1120	1806	2328	0
LGA 06X06	856	0717	1527	938	0
LGA 06X11	803	0804	1632	1112	0
LGA 09X11	3337	0723	1631	3332	0
LGA 15X09	5026	0751	1531	5601	0
LGA 11X15	2004	0809	1632	2605	0
LGA 15X15	2411	0816	1806	2569	0
Totals	23,782	-	-	26,967	0

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HIGH TEMPERATURE BAKE AT 125 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS	No. of FAILURES
BGA 06X09	50	1652	1652	50	0
BGA 06X11	546	1443	1626	546	0
BGA 09X11	1234	1245	1642	1234	0
BGA 15X09	846	1406	1621	846	0
BGA 15X15	100	1533	1604	100	0
LGA 06X06	238	1327	1537	213	0
LGA 06X11	250	1347	1625	225	0
LGA 09X11	2780	1313	1704	2705	0
LGA 15X09	2355	1333	1645	2206	0
LGA 11X15	598	1326	1631	523	0
LGA 15X15	4469	1326	1649	4219	0
Totals	13,466	-	-	12,867	0

BOARD MOUNTED TEMP CYCLE FROM -55 TO 125 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES ^{6,7,8}	No. of FAILURES
BGA 15X09	82	1036	1036	247	0
LGA 09X11	37	0806	0806	74	0
LGA 15X09	90	0821	0821	132	0
Totals	209	-	-	453	0

BOARD MOUNTED TEMP CYCLE FROM -40 TO 125 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES ^{6,7,8}	No. of FAILURES
LGA 09X11	221	0723	0723	444	0
LGA 15X15	313	0749	1210	623	0
Totals	534	-	-	1,067	0

MECHANICAL SHOCK (JESD22-B104 CONDITION B - PEAK = 1500G)					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE		No. of FAILURES
LGA 06X11	45	0804	0804		0
LGA 09X11	43	0723	0723		0
LGA 15X09	60	0827	0834		0
LGA 15X15	87	0816	1210		0
Totals	235	-	-		0

(6) Board Mount Temp Cycle Meets IPC-9701 / JESD22-A104.

(7) Board Mount Temp Cycle Includes Full Electrical Characterization, XRAY & Cross-sections.

(8) Each Board Mounted Vehicle is Cycled up to 2000 Times or More.

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VIBRATION VARIABLE FREQUENCY (JESD22-B103 CONDITION A - PEAK = 20G)					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE		No. of FAILURES
LGA 06X11	45	0804	0804		0
LGA 09X11	45	0723	0723		0
LGA 15X09	60	0827	0834		0
LGA 15X15	199	0816	1210		0
Totals	349	-	-		0