

# RELIABILITY REPORT





NOW PART OF



## Reliability Data Report Product Family R504

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LTM4600 / LTM4601 / LTM4602 / LTM4603 / LTM4604 /  
LTM4605 / LTM4606 / LTM4607 / LTM4608 / LTM4609 /  
LTM4611 / LTM4612 / LTM4613 / LTM4614 / LTM4615 /  
LTM4616 / LTM4617 / LTM4618 / LTM4619 / LTM4620 /  
LTM4622 / LTM4623 / LTM4624 / LTM4625 / LTM4627 /  
LTM4628 / LTM4630 / LTM4631 / LTM4632 / LTM4633 /  
LTM4634 / LTM4637 / LTM4639 / LTM4641 / LTM4642 /  
LTM4643 / LTM4644 / LTM4645 / LTM4646 / LTM4647 /  
LTM4648 / LTM4649 / LTM4650 / LTM4650A /  
LTM4651 / LTM4653 / LTM4661 / LTM4662 / LTM4668 /  
LTM4668A / LTM4671 / LTM4675 / LTM4676 / LTM4677

# Reliability Data Report

## Report Number: R504

Report generated on: Tue Mar 03 12:50:40 PST 2020

OPERATING LIFE TEST					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS (+125°C) <sup>1</sup>	No. of FAILURES <sub>2,3</sub>
BGA 06X06	462	1301	1622	462	0
BGA 15X09	2458	1228	1739	2381	0
BGA 11X15	770	1621	1713	770	0
BGA 15X15	1668	1141	1428	1591	0
BGA 16X16	920	1324	1641	920	0
LGA 06X06	770	1430	1637	770	0
LGA 15X09	1884	0634	1532	1884	0
LGA 15X15	4450	0452	1223	4149	0
LGA 16X16	612	1233	1551	536	0
Totals	13,994	-	-	13,463	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) <sup>4</sup>	No. of FAILURES
BGA 06X06	2304	1337	1714	6977	0
BGA 09X11	1226	1414	1748	3992	0
BGA 15X09	4958	1306	1836	16060	0
BGA 11X15	1190	1621	1724	3590	0
BGA 12x16	154	1425	1425	295	0
BGA 15X15	3004	1049	1825	7522	0
BGA 16X16	6074	1334	1809	16584	0
LGA 06X06	1378	1338	1524	4995	0
LGA 15X09	612	1502	1632	1766	0
LGA 15X15	9904	0645	1807	27318	0
LGA 16X16	1330	1248	1749	3600	0
Totals	32,134	-	-	92,699	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) <sup>5</sup>	No. of FAILURES
BGA 06X06	2304	1337	1714	6977	0
BGA 09X11	1226	1414	1748	3992	0
BGA 15X09	4958	1306	1836	16060	0
BGA 11X15	1190	1621	1724	3590	0
BGA 12x16	154	1425	1425	295	0
BGA 15X15	3004	1049	1825	7522	0
BGA 16X16	6074	1334	1809	16584	0
LGA 06X06	1378	1338	1524	4995	0
LGA 15X09	612	1502	1632	1766	0
LGA 15X15	9904	0645	1807	27318	0
LGA 16X16	1330	1248	1749	3600	0
Totals	32,134	-	-	92,699	0

(1) Assumes Activation Energy = 1.0 Electron Volts  
(2) Failure Rate Equivalent to +55 °C, 60% Confidence Level = 0.14 FITS  
(3) Mean Time Between Failure in Years = 838355.81  
(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

# Reliability Data Report

## Report Number: R504

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<b>TEMP CYCLE FROM -55 TO 125 DEG C</b>					
<b>PACKAGE TYPE</b>	<b>SAMPLE SIZE</b>	<b>OLDEST DATE CODE</b>	<b>NEWEST DATE CODE</b>	<b>K DEVICE CYCLES</b>	<b>No. of FAILURES</b>
BGA 06X06	4766	1245	1742	2696	0
BGA 09X11	1324	1414	1708	1337	0
BGA 15X09	8394	1150	1811	5960	0
BGA 11X15	1068	1304	1745	1520	0
BGA 12x16	462	1324	1443	467	0
BGA 15X15	10034	1148	1825	6374	0
BGA 16X16	8248	1216	1809	6556	0
LGA 06X06	2072	1138	1710	1792	0
LGA 15X09	4944	0634	1712	3564	0
LGA 11X15	152	1304	1304	152	0
LGA 15X15	33814	0643	1807	29152	0
LGA 16X16	3234	1147	1652	2808	0
Totals	78,512	-	-	62,378	0

<b>TEMP CYCLE FROM -65 TO 150 DEG C</b>					
<b>PACKAGE TYPE</b>	<b>SAMPLE SIZE</b>	<b>OLDEST DATE CODE</b>	<b>NEWEST DATE CODE</b>	<b>K DEVICE CYCLES</b>	<b>No. of FAILURES</b>
BGA 06X06	7682	1439	1625	1034	0
BGA 09X11	304	1546	1622	169	0
BGA 15X09	7836	1213	1836	1478	0
BGA 15X15	19268	1141	1708	5171	0
BGA 16X16	3986	1412	1809	573	0
LGA 06X06	1432	1452	1624	143	0
LGA 15X09	20004	0634	1632	7248	0
LGA 15X15	138764	0513	1714	45569	0
LGA 16X16	2494	1449	1749	524	0
Totals	201,770	-	-	61,909	0

<b>TEMP CYCLE FROM -40 TO 125 DEG C</b>					
<b>PACKAGE TYPE</b>	<b>SAMPLE SIZE</b>	<b>OLDEST DATE CODE</b>	<b>NEWEST DATE CODE</b>	<b>K DEVICE CYCLES</b>	<b>No. of FAILURES</b>
LGA 15X09	152	0710	0710	152	0
LGA 15X15	460	0632	0642	460	0
Totals	612	-	-	612	0

**THERMAL SHOCK FROM -55 TO 125 DEG C**

<b>PACKAGE TYPE</b>	<b>SAMPLE SIZE</b>	<b>OLDEST DATE CODE</b>	<b>NEWEST DATE CODE</b>	<b>K DEVICE CYCLES</b>	<b>No. of FAILURES</b>
BGA 06X06	2520	1245	1742	2597	0
BGA 09X11	1218	1414	1625	1362	0
BGA 15X09	4660	1150	1811	5140	0
BGA 11X15	978	1304	1713	1354	0
BGA 12x16	612	1324	1535	612	0
BGA 15X15	5866	1049	1825	5809	0
BGA 16X16	6330	1242	1809	5796	0
LGA 06X06	1674	1138	1524	1674	0
LGA 15X09	2788	0634	1612	3452	0
LGA 11X15	154	1304	1304	154	0
LGA 15X15	22252	0708	1833	28146	0
LGA 16X16	2770	1147	1551	2539	0
Totals	51,822	-	-	58,635	0

# Reliability Data Report

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THERMAL SHOCK FROM -55 TO 105 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES	No. of FAILURES
BGA 06X06	2520	1245	1742	2597	0
BGA 09X11	1218	1414	1625	1362	0
BGA 15X09	4660	1150	1811	5140	0
BGA 11X15	978	1304	1713	1354	0
BGA 12x16	612	1324	1535	612	0
BGA 15X15	5866	1049	1825	5809	0
BGA 16X16	6330	1242	1809	5796	0
LGA 06X06	1674	1138	1524	1674	0
LGA 15X09	2788	0634	1612	3452	0
LGA 11X15	154	1304	1304	154	0
LGA 15X15	22252	0708	1833	28146	0
LGA 16X16	2770	1147	1551	2539	0
Totals	51,822	-	-	58,635	0

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	180	1527	1636	180	0
BGA 15X09	768	1213	1836	768	0
BGA 15X15	3734	1141	1708	2718	0
BGA 16X16	656	1412	1511	65	0
LGA 06X06	94	1550	1550	9	0
LGA 15X09	9986	0634	1632	5539	0
LGA 15X15	62810	0332	1709	27628	0
LGA 16X16	144	1525	1525	144	0
Totals	78,372	-	-	37,051	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
BGA 06X06	48	1306	1416	2	0
BGA 15X09	264	1116	1604	13	0
LGA 15X09	234	0712	0730	11700	0
LGA 15X15	1638	0000	1715	32096	0
Totals	2,184	-	-	43,811	0

HIGH TEMPERATURE BAKE AT 125 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS	No. of FAILURES
BGA 06X06	6752	1412	1615	6752	0
BGA 15X09	6954	1447	1631	6805	0
BGA 15X15	5394	1405	1650	5247	0
BGA 16X16	1586	1515	1642	1586	0
LGA 06X06	100	1452	1452	100	0
LGA 15X09	3372	1229	1643	3084	0
LGA 15X15	18820	1231	1702	18303	0
LGA 16X16	426	1552	1645	426	0
Totals	43,404	-	-	42,303	0



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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	990	1245	1624	990	0
BGA 09X11	716	1414	1546	639	0
BGA 15X09	2112	1213	1644	1969	0
BGA 11X15	154	1324	1324	154	0
BGA 12x16	100	1313	1313	100	0
BGA 15X15	4198	1141	1542	4106	0
BGA 16X16	1966	1334	1616	1892	0
LGA 06X06	1486	1338	1552	1497	0
LGA 15X09	10234	0634	1632	10978	0
LGA 11X15	100	1304	1304	100	0
LGA 15X15	60550	0441	1643	65754	0
LGA 16X16	1626	1248	1517	1618	0
Totals	84,232	-	-	89,797	0

HIGH TEMPERATURE BAKE AT 175 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS	No. of FAILURES
LGA 15X15	1156	0648	1434	706	0
Totals	1,156	-	-	706	0

BOARD MOUNTED TEMP CYCLE FROM 0 TO 100 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES <sup>6,7,8</sup>	No. of FAILURES
BGA 15X15	460	1227	1227	916	0
LGA 15X15	248	0632	1040	1188	0
Totals	708	-	-	2,104	0

BOARD MOUNTED TEMP CYCLE FROM -40 TO 125 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES <sup>6,7,8</sup>	No. of FAILURES
BGA 15X15	154	1029	1029	308	0
LGA 15X09	1566	0634	0729	1901	0
LGA 15X15	1268	0513	0941	2028	0
Totals	2,988	-	-	4,237	0

BOARD MOUNTED TEMP CYCLE FROM -55 TO 125 DEG C					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES <sup>6,7,8</sup>	No. of FAILURES
LGA 15X15	370	0624	1041	513	0
Totals	370	-	-	513	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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<b>MECHANICAL SHOCK (JESD22-B104 CONDITION B - PEAK = 1500G)</b>					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE		No. of FAILURES
LGA 15X09	50	0634	0634		0
LGA 15X15	280	0708	1039		0
Totals	330	-	-		0
<b>VIBRATION VARIABLE FREQUENCY (JESD22-B103 CONDITION A - PEAK = 20G)</b>					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE		No. of FAILURES
LGA 15X09	80	0634	0713		0
LGA 15X15	376	0708	1348		0
Totals	456	-	-		0
<b>VIBRATION VARIABLE FREQUENCY (JESD22-B103 CONDITION A - PEAK = 20G)</b>					
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE		No. of FAILURES
LGA 15X09	80	0634	0713		0
LGA 15X15	376	0708	1348		0
Totals	456	-	-		0