RELIABILITY DATAPACK

CONTENTS
October 2012

Operating Life Test (Summary)…….……..……..... 2

HAST…….……..……. 3

Autoclave Test……..……...…… 4, 5

Temperature Cycle Test……..……...…… 6

Thermal Shock Test……...…….... 7

Moisture Sensitivity of Packages & Test Flow Chart ...…… 8

Reliability Data……...…. 9, 10, 11, 12, 13

Failure Rate……..……... 14

LINEAR TECHNOLOGY

OPERATING LIFE TEST
By Product Group
October 2012

DEVICE TYPE	PACKAGE TYPE	DATE CODES	NO. UNITS	DEVICE HRS (K) 150°C	EQUIV. DEVICE HRS (K) @ 125°C	PARA FAIL	FUNC FAIL	FAILURE %/100K hrs PARA (1&2)	RATE %/100K hrs FUNC.
OP AMP	D,G,H,J,M8,M10,N,QF,S,TSOT,W	0401 1209	14,154	3,016	13,857	1	1	0.003	0.003
HIGH SPEED OP AMP	N,TSOT	0401 0710	385	69	385	0	0	0.048	0.475
DAC / ADC	D,F,G,J,M8,M10,M12,M16,N,QF,S,TSOT,LGA	0401 1150	8,664	2,358	7,869	0	0	0.002	0.002
REFERENCE	H,M8,TSOT	0401 1142	1,943	588	2,888	0	0	0.006	0.006
FILTER	J,S,Q	0401 0902	199	57	192	0	0	0.095	0.095
SWITCH	S	0401 1123	2,775	724	2,415	0	0	0.008	0.008
COMPARATOR	M8,S,TSOT,W	0401 1116	1,246	321	1,201	0	0	0.015	0.015
INTERFACE	F,G,M8,M10,M12,N,QF,S,TSOT, LGA	0401 1207	30,157	5,222	17,663	2	0	0.004	0.001
OTHER	G,M8,M16,QF,TSOT	0401 1146	1,467	428	1,428	0	0	0.013	0.013
REGULATOR	F,G,H,J,K,M8,M10,M12,M16,N,P,QF,S,T,TSOT,LGA	0401 1212	83,675	25,056	102,106	0	1	0.000	0.000
MIXER	F,G,QF	0401 1152	3,490	655	2,973	0	0	0.014	0.014
	TOTAL		**148,155**	**38,494**	**152,977**	**3**	**2**	**5.45E-04**	**4.06E-04**

OPERATING LIFE TEST
By Technology Group
October 2012

DEVICE TYPE	PACKAGE TYPE	DATE CODES	NO. UNITS	DEVICE HRS (K) 150°C	EQUIV. DEVICE HRS (K) @ 125°C	PARA FAIL	FUNC FAIL	FAILURE %/100K hrs PARA (1&2)	RATE %/100K hrs FUNC.
CMOS 0.18µ	QF	0401 1052	773	189	632	0	0	0.029	0.029
CMOS 0.25µ	M16,QF	0401 1110	1,004	289	966	0	0	0.019	0.019
CMOS 0.35µ	M10,QF, TSOT	0401 1143	2,618	715	2,390	0	0	0.008	0.008
CMOS 0.60µ	F,G,M8,M10,M12,M16,N,QF,S,TSOT	0401 1211	21,429	5,765	19,233	0	0	0.001	0.001
CMOS 1.2µ	F,G,M8,M10,M16,QF,S,TSOT,T	0401 1212	9,356	3,006	9,867	0	0	0.002	0.002
BICMOS 0.65µ	G,F,M8,M10,QF,TSOT,LGA	0401 1151	9,627	3,270	10,908	0	0	0.002	0.002
BICMOS 1.2µ	F,G,M8,M10,M16,QF,S,TSOT,LGA	0401 1212	10,182	3,153	10,513	0	0	0.002	0.002
BIPOLAR 1.5µ	F,K,M8,M10,M12,M16,QF,S,TSOT	0401 1206	14,695	5,601	31,763	0	0	0.001	0.001
BICMOS 2µ	F,G,M10,QF,S	0401 1203	9,739	2,605	9,692	0	1	0.002	0.004
CMOS 2µ	G,M8,QF,S5	0401 1207	1,702	408	1,362	0	0	0.013	0.013
COMP BP 2µ	G,M8,N,QF,S,W	0401 1206	1,627	241	1,349	0	0	0.013	0.013
BICMOS 3µ	S	0401 1206	468	88	293	0	0	0.063	0.063
CMOS 3µ	F,G,S	0401 1141	3,222	978	3,263	0	0	0.006	0.006
CMOS 4µ	D,G,J,M8,M10,N,S	0401 1026	30,021	5,118	17,074	2	0	0.004	0.001
HS BP 4µ	F,G,M8,M10,N,W,QF,S,TSOT	0401 1207	8,062	2,119	11,808	0	0	0.002	0.002
STEPPER BP 4µ	S,QF,F,G,M10,M12	0401 0928	3,533	574	3,167	0	0	0.006	0.006
BIFET 7µ	N,S	0401 0722	856	157	879	0	0	0.021	0.021
CMOS 7µ	D,G,J,N,S	0401 1207	2,764	834	2,789	0	0	0.007	0.007
COMP BP 7µ	N,M10,S	0401 1149	809	109	609	0	0	0.030	0.030
STD BP 7µ	S,H,J,K,N,W	0401 1010	5,788	1,100	6,103	1	1	0.007	0.007
SIGE 0.18µ	QF	0401 1152	847	235	783	0	0	0.023	0.023
SIGE 0.35µ	M10,QF	0401 1137	1,688	475	1,586	0	0	0.012	0.012
BCD 0.35µ	QF	0909 1204	308	81	270	0	0	0.068	0.068
RF	F,G,QF	0401 0912	2,646	403	2,257	0	0	0.008	0.008
MODULE	LGA,BGA	0401 1145	4,391	981	4,421	0	0	0.004	0.004
	TOTAL		**148,155**	**38,494**	**153,977**	**3**	**2**	**5.45E-04**	**4.06E-04**

TO-5 = H	TO-3P = P	PDIP = N	TSOT = S3, S5, S6, TS8	SO-8/14/16/20/24/28 = S
TO-3 = K	TO-92 = Z	CERDIP = J	SOT-223 = ST	SSOP = G
TO-46 = H	TO-220 = T	Sidebraze = D	MSOP = M8, M10, M12, M16	TSSOP = F
LCC = L	DD PACK = M, Q, R	Flat Pack = W	QFN/DFN = QF	

NOTES:
(1) Equivalent failure rate calculated to a 60% confidence level assuming an activation energy of 1.0 eV for bipolar comparison purposes.
(2) Parametric failures for precision operational amplifiers are defined as a Vos drift exceeding 100mV.

HAST (HIGHLY ACCELERATED STRESS TEST)
By Product Group
October 2012

Package: Plastic HAST (2) @ 131°C/85% RH, Continuous Operation at Rated Supply Voltage, Minimum Power

DEVICE TYPE	PACKAGE TYPE	DATE CODES		NO. UNITS	DEVICE HRS (K) 131°C	EQUIV. DEVICE HRS (K) @ 85°C (1)	PARA FAIL	FUNC FAIL
OP AMP	F,M,N,S	8951	1213	33,780	2,349,890	46,997,800	0	0
HIGH SPEED OP AMP	N,S	9443	0942	739	54,538	1,090,760	0	0
DAC / ADC	F,M8,N,S,TSOT,QF	9001	0917	1,513	205,837	4,116,740	0	1
REFERENCE	MSOP,N,S,TSOT,Z	9006	1119	26,068	1,922,585	38,451,700	0	1
FILTER	N,S	9019	9341	1,144	111,006	2,220,120	0	0
SWITCH	S	9236	0106	533	68,803	1,376,060	0	0
COMPARATOR	N,Z	9033	9649	320	28,801	576,020	0	0
INTERFACE	G,N,S,QF,LGA	8847	1218	21,071	1,436,110	28,722,200	0	1
REGULATOR	F,G,M,M8,M10,M16,N,P,Q,R,S,ST ,T,TSOT,Z,QF,LGA	8917	1219	32,262	3,252,828	65,056,560	0	2
MIXER	QF	0447	0704	184	17,664	353,280	0	0
OTHER	TSOT	1146	1213	231	27,720	554,400	0	0
	TOTAL			**117,845**	**9,475,782**	**189,515,640**	**0**	**5**

HAST (HIGHLY ACCELERATED STRESS TEST)
By Package Type

PACKAGE TYPE	DATE CODES	NO. UNITS	DEVICE HRS (K) 131°C	EQUIV. DEVICE HRS (K) @ 85°C (1)	PARA FAIL	FUNC FAIL
DD PAK	9147-0630	2,404	193,868	3,877,360	0	0
F-16	0702-1150	531	46,848	936,960	0	0
F-20	9232-1105	1,010	100,361	2,007,220	0	0
F-28	0946-1131	250	23,540	470,800	0	0
F-38	1010	45	4,320	86,400	0	0
F-48	0917	36	3,456	69,120	0	0
G-16	9724-1115	297	54,162	1,083,240	0	0
G-28	9232-1124	3,790	267,736	5,354,720	0	2
G-36	9602-1103	994	151,363	3,027,260	0	0
G-44	0831-1218	730	81,456	1,629,120	0	0
G-48	1206-1212	154	14,784	295,680	0	0
N-08	9010-0105	9,040	807,174	16,143,480	0	0
N-14	9033-9926	1,044	80,417	1,608,340	0	0
N-16	9107-9606	1,390	122,901	2,458,020	0	0
N-18	9038-0611	650	80,039	1,600,780	0	0
N-20	9049-9618	452	44,114	882,280	0	0
N-24	9101-9301	765	71,817	1,436,340	0	0
N-28	8847-9726	356	40,358	807,160	0	0
M-08	9726-1140	1,636	304,725	6,094,500	0	2
M-10	0801-1219	1,065	130,368	2,607,360	0	0
M-16	0743-0836	160	15,360	307,200	0	0
S-03	9644	98	24,990	499,800	0	0
S-05	9044-0013	669	150,500	3,010,000	0	0
S-06	9943-1146	958	120,836	2,416,720	0	0
S-08	8951-1122	47,465	2,991,465	59,829,300	0	1
S-14	9737-9448	273	61,208	1,224,160	0	0
S-16	9001-1141	10,314	604,376	12,087,520	0	0
S-18	9049-0634	3,803	217,838	4,356,760	0	0
S-20	9722-9818	1,629	177,755	3,555,100	0	0
S-24	9722-9818	1,170	106,330	2,126,600	0	0
S-28	9722-9818	956	100,353	2,007,060	0	0
ST	9115-9727	1,680	204,040	4,080,800	0	0
TO-220	8917-0809	5,222	552,238	11,044,760	0	0
TO-3P	9133-9913	952	97,011	1,940,220	0	0
TO-92(Z)	9006-0238	12,983	1,078,985	21,579,700	0	0
DFN-06	1152	146	20,160	403,200	0	0
DFN-08	0617-0646	231	22,176	443,520	0	0
DFN-10	0238-1136	165	24,552	491,040	0	0
DFN-14	0843-0915	48	4,800	96,000	0	0
DFN-32	0710	50	8,400	168,000	0	0
QFN-16	0112-0704	306	32,976	659,520	0	0
QFN-20	1119	153	20,488	409,760	0	0
QFN-24	0651-1142	370	70,300	1,406,000	0	0
QFN-32	0111-1053	317	29,424	588,480	0	0
QFN-38	0927-1043	109	10,464	209,280	0	0
QFN-40	1032-1130	227	19,488	389,760	0	0
QFN-64	0428-1141	288	43,216	864,320	0	0
LGA-0606	0717	46	4,278	85,560	0	0
LGA-0915	0739	45	2,160	43,200	0	0
LGA-1515	0645-1210	297	28,512	570,240	0	0
BGA-32	1015	76	7,296	145,920	0	0
	TOTAL	**117,845**	**9,475,782**	**189,515,640**	**0**	**5**

TO-3P =P	DD PACK = M, Q, R	TSOT = S3,S5,S6,TS8	SO-8/14/16/18/20/24/28 = S	LGA = Module
TO-92 = Z	PDIP = N	SOT-223 = ST	SSOP = G	
TO-220 = T	QFN/DFN = QF	MSOP = M8,M10,M12,M16	TSSOP = F	

NOTES:

(1) Assume 20X acceleration from 131C/85% RH to 85C/85% RH.

(2) This test has replaced 85/85 testing

AUTOCLAVE TEST
By Product Group
October 2012

Package: Plastic Autoclave @ 15 PSIG, 121°C, No Bias Applied

DEVICE TYPE	PACKAGE TYPE	DATE CODES		NO. UNITS	TOTAL DEVICE HRS	CUM FAILURE
OP AMP	M,Q,R,QF,F,G,M8,M10,N,S,TSOT,ST,T,	0401	1124	100,086	6,610,058	0
HIGH SPEED OP AMP	QF,G,M8,TSOT,S	0401	1121	5,624	215,712	0
DAC / ADC	M,Q,R,QF,F,G,M8,M10,M12,M16,N,TSOT,S	0401	1123	68,890	6,676,336	0
REFERENCE	QF,M8,N,TSOT,S,ST,Z	0401	1124	82,027	4,301,432	0
FILTER	QF,G,N,S	0401	1122	6,049	341,088	0
SWITCH	G,N,S	0401	1111	2,344	212,704	0
COMPARATOR	QF,G,M8,M10,TSOT,S,ST,Z	0401	1122	10,096	859,144	0
INTERFACE	QF,F,G,M8,M10,M12,N,TSOT,S,ST	0401	1124	117,515	6,986,073	0
OTHER	QF,G,M8,M10,TSOT,S	0401	1122	12,947	654,679	0
REGULATOR	M,Q,R,QF,F,G,M8,M10,M12,M16,N,TSOT,S,ST,Z,T,P	0401	1125	1,043,638	60,325,662	0
MIXER	QF,F,G,M8,TSOT	0401	1123	5,886	1,018,550	0
	TOTAL			**1,455,102**	**88,201,438**	**0**

AUTOCLAVE TEST
By Package Type
October 2012

PACKAGE TYPE	DATE CODES	NO. UNITS	TOTAL DEVICE HRS	FUNC. FAILURE
DD PACK	0401-1122	23,482	1,179,456	0
F-14	0401-0924	277	6,648	0
F-16	0401-1125	65,295	3,422,948	0
F-20	0401-1124	17,354	1,236,485	0
F-24	0401-1122	1,329	106,368	0
F-28	0401-1124	5,268	480,135	0
F-38	0401-1035	664	135,096	0
F-48	0401-1119	3,426	750,121	0
G-16	0401-1124	43,755	2,185,288	0
G-20	0401-111	15,856	871,344	0
G-24	0401-1121	44,181	2,419,204	0
G-28	0401-1124	151,081	6,912,821	0
G-36	0401-1116	20,384	1,477,210	0
G-44	0401-1123	12,389	683,328	0
N-08	0401-1103	2,967	251,168	0
N-14	0401-1025	1,546	316,080	0
N-16	0401-1109	1,469	254,688	0
N-18	0401-0846	1,238	39,552	0
N-20	0401-0908	2,474	410,065	0
N-24	0401-1049	4,549	276,864	0
N-28	0401-1052	1,605	312,584	0
M-08	0401-1124	56,323	2,766,240	0
M-10	0401-1123	86,014	4,318,028	0
M-12	0401-1040	1,650	395,640	0
M-16	0401-1122	7,849	638,586	0
S-08	0401-1124	93,664	5,724,921	0
S-14	0401-1112	4,174	528,600	0
S-16	0401-1123	14,279	1,005,720	0
S-18	0401-1052	941	131,040	0
S-20	0401-1108	2,280	77,904	0
S-24	0401-1014	3,596	633,533	0
S-28	0401-1123	10,275	990,925	0
ST	0401-1121	71,729	4,192,728	0
S-03	0401-1124	105,178	5,291,616	0
S-05	0401-1122	76,521	4,135,493	0
S-06	0401-1123	91,949	4,685,582	0
TS8	0401-1123	70,436	3,706,982	0
TO-220	0401-1121	9,902	484,488	0
TO-3P	0401-1123	8,083	291,936	0
TO-92	0401-1117	37,688	2,554,576	0

AUTOCLAVE TEST
By Package Type
October 2012

PACKAGE TYPE	DATE CODES	NO. UNITS	TOTAL DEVICE HRS	FUNC. FAILURE
DFN-03	0401-1045	780	106,080	0
DFN-04	0401-1023	150	3,600	0
DFN-06	0401-1122	17,139	1,035,926	0
DFN-08	0401-1125	34,412	3,097,663	0
DFN-10	0401-1120	32,857	2,094,519	0
DFN-12	0401-1125	20,451	1,396,453	0
DFN-14	0401-1122	8,240	532,257	0
DFN-16	0401-1124	16,239	1,088,976	0
DFN-22	0401-1114	2,573	155,262	0
DFN-32	0401-1123	2,286	106,776	0
QFN-10	1021-1110	150	3,600	0
QFN-16	0401-1124	24,449	2,131,141	0
QFN-20	0401-1125	9,440	603,264	0
QFN-24	0401-1123	37,530	2,713,826	0
QFN-28	0401-1123	10,460	431,856	0
QFN-32	0401-1123	33,919	2,490,668	0
QFN-36	0401-1121	1,590	215,136	0
QFN-38	0401-1124	12,085	767,328	0
QFN-40	0401-1119	781	202,416	0
QFN-44	0401-1112	2,175	207,144	0
QFN-48	0401-1120	4,544	837,319	0
QFN-52	0401-1016	757	153,816	0
QFN-56	0401-1004	385	129,360	0
QFN-64	0401-1123	7,209	1,040,925	0
QFP-48	0401-1022	1,150	296,520	0
QFP-32	0401-0652	231	77,616	0
	TOTAL	**1,455,102**	**88,201,438**	0

TO-3P = P	DD PACK = M, Q, R	TSOT = S3, S4, S5, TS8	SO-8/14/16/18/20/24/28 = S
TO-92 =Z	PDIP = N	SOT-223 = ST	SSOP = G
TO-220 =T	QFN/DFN = QF	MSOP - M8,M10,M12,M16	TSSOP = F

NOTE: Approximate duration is 168 hours.

TEMPERATURE CYCLE TEST
By Package Type
October 2012

Temperature Cycle Data: Hermetic and Plastic -65°C to 150°C (Air to Air)

PACKAGE TYPE	DATE CODES	NO. UNITS	TOTAL DEVICE CYCLES	FUNC. FAILURE
HERMETIC	0401 1209	5,386	4,841,825	0
PLASTIC	0401 1219	1,172,955	308,207,302	0
TOTAL		**1,178,341**	**313,049,127**	**0**

TEMPERATURE CYCLE TEST
By Package Type
October 2012

PACKAGE TYPE	DATE CODES	NO. UNITS	TOTAL DEVICE CYCLES	FUNC. FAILURE
METAL CAN				
TO-3	0401 0829	578	261,200	0
TO-5, TO-39, TO-46, TO-52	0401 0834	2,130	2,473,150	0
CERDIP				
J-08 to J-28	0401 1149	1,706	1,630,250	0
FLAT PACK				
W-10, W-14	0401 0627	102	10,200	0
LEADLESS CHIP CARRIER				
L-8 to L-20	0401 1209	504	430,425	0
SIDE BRAZE				
D-08 TO D-28	0401 0814	366	36,600	0
SSOP/TSSOP				
F-14	0401 0924	248	24,800	0
F-16	0401 1150	64,553	13,207,124	0
F-20	0401 1124	18,457	5,511,259	0
F-24	0401 1122	1,328	338,900	0
F-28	0401 1124	6,173	1,660,272	0
F-38	0401 1048	873	655,900	0
F-48	0401 1119	3,116	1,740,250	0
G-16	0401 1122	38,028	6,710,401	0
G-20	0401 1114	6,695	1,402,300	0
G-24	0401 1121	8,996	2,403,441	0
G-28	0401 1142	106,986	18,598,030	0
G-36	0401 1116	22,808	6,894,371	0
G-44	0401 1146	10,190	2,610,700	0
PLASTIC DIP				
N-08	0401 1103	10,747	2,880,100	0
N-14	0401 1025	3,286	2,113,250	0
N-16	0401 1109	1,185	710,200	0
N-18	0401 0913	3,730	1,126,300	0
N-20	0401 0919	6,777	1,928,900	0
N-24	0401 1103	5,091	1,252,000	0
N-28	0401 1103	2,369	1,115,600	0
SOIC / MSOP				
M-08	0401 1152	49,200	7,819,340	0
M-10	0401 1217	76,969	13,134,830	0
M-12	0401 1040	1,802	1,236,500	0
M-16	0401 1119	8,328	2,421,400	0
S-08	0401 1124	91,554	15,700,773	0
S-14	0401 1112	4,913	1,411,442	0
S-16	0401 1119	23,321	5,416,549	0
S-18	0401 1052	2,844	1,858,500	0
S-20	0401 1108	4,159	415,900	0
S-24	0401 1014	6,452	2,269,107	0
S-28	0401 1123	9,065	2,593,200	0
POWER PACKAGE				
DD PACK	0401 1122	25,617	4,693,150	0
SOT-223	0401 1121	9,437	4,288,400	0
TO-220	0401 1121	14,951	4,760,290	0
TO-3P	0401 1123	6,991	1,460,500	0
OTHER PLASTIC				
SOT-23	0401 1121	6,902	1,815,200	0
TSOT	0401 1206	130,158	27,152,365	0
SC70	0401 1122	16,257	3,195,835	0
T0-92(Z)	0401 1117	12,250	5,248,900	0
QFN	0401 1211	152,442	42,417,685	0
DFN	0401 1152	133,769	30,134,998	
LGA*	0401 1219	59,924	52,384,643	0
BGA*	0401 1214	2,100	2,019,905	
QFP	0401 1022	1,914	1,473,792	0
TOTAL		**1,178,341**	**313,049,127**	**0**

NOTE: Approximate duration is 500 cycles.

* LGA and BGA are cycled to one of three conditions 1) -40°C to +125°C, 2) -55°C to +125°C, or 3) -65°C to +150°C

THERMAL SHOCK TEST
By Package Type
October 2012

Thermal Shock Data: Hermetic and Plastic: -65°C to 150°C (Liquid to Liquid)

PACKAGE TYPE	DATE CODES	NO. UNITS	TOTAL DEVICE CYCLES	FUNC. FAILURE
HERMETIC	0401 1209	1,228	586,380	0
PLASTIC	0401 1217	1,089,190	274,198,069	0
TOTAL		**1,090,418**	**274,784,449**	**0**

THERMAL SHOCK TEST
By Package Type
October 2012

PACKAGE TYPE	DATE CODES	NO. UNITS	TOTAL DEVICE CYCLES	FUNC. FAILURE
METAL CAN				
TO-3	0401 0638	153	2,295	0
TO-5, TO-39, TO-46, TO-52	0401 0631	238	3,570	0
CERDIP				
J-08 to J-28	0401 1143	330	232,485	0
FLAT PACK				
W-10, W-14	0401 0627	85	1,275	0
LEADLESS CHIP CARRIER				
L-8 to L-20	0401 1209	422	346,755	0
SSOP/TSSOP				
F-14	0401 0924	297	29,700	0
F-16	0401 1150	68,794	12,751,170	0
F-20	0401 1124	18,262	4,974,500	0
F-24	0401 1121	1,327	338,800	0
F-28	0401 1127	6,267	1,825,200	0
F-38	0401 1035	616	491,800	0
F-48	0401 1119	2,874	1,399,000	0
G-16	0401 1122	39,998	7,067,500	0
G-20	0401 1111	4,707	1,342,800	0
G-24	0401 1121	8,423	2,027,700	0
G-28	0401 1142	98,797	16,751,003	0
G-36	0401 1116	21,903	5,256,400	0
G-44	0401 1146	13,141	2,485,700	0
PLASTIC DIP				
N-08	0401 0945	528	415,500	0
N-14	0401 1023	861	771,000	0
N-16	0401 1022	355	195,400	0
N-18	0401 0844	384	384,000	0
N-20	0401 0844	1,121	1,037,500	0
N-24	0401 0830	990	676,800	0
N-28	0401 1103	991	780,000	0
SOIC / MSOP				
M-08	0401 1152	43,344	7,218,200	0
M-10	0401 1217	82,493	13,920,008	0
M-12	0401 1040	1,825	1,215,400	0
M-16	0401 1119	5,483	2,014,700	0
S-08	0401 1124	70,723	12,546,480	0
S-14	0401 1112	3,957	1,255,940	0
S-16	0401 1119	12,369	2,893,900	0
S-18	0401 1052	939	451,650	0
S-20	0401 1108	1,936	193,600	0
S-24	0401 1014	2,772	1,658,700	0
S-28	0401 1123	10,068	2,549,800	0
POWER PACKAGE				
DD PACK	0401 1122	20,684	3,360,291	0
SOT-223	0401 1121	8,829	3,546,164	0
TO-220	0401 1121	8,372	1,541,800	0
TO-3P	0401 1123	6,847	1,272,800	0
OTHER PLASTIC				
SOT-23	0401 1121	6,870	1,632,900	0
TSOT	0401 1206	143,624	25,975,857	0
SC70	0401 1122	17,749	4,046,432	0
T0-92(Z)	0401 1117	12,142	5,463,500	0
QFN	0401 1211	145,663	39,499,200	0
DFN	0401 1152	136,493	29,787,454	0
LGA*	0401 1217	51,869	48,301,120	0
BGA*	0401 1214	1,870	1,776,700	0
QFP	0401 1010	1,633	1,074,000	0
TOTAL		**1,090,418**	**274,784,449**	**0**

NOTE: Approximate duration is 500 cycles.
* LGA and BGA are cycled to one of three conditions 1) -40°C to +125°C, 2) -55°C to +125°C, or 3) -65°C to +150°C

MOISTURE SENSITIVITY OF PACKAGES

Moisture Sensitivity Classification testing is performed in accordance with J-STD-020. The chart below reflects the flow of Surface Mount Preconditioning. This test is designed to identify package types and molding compounds that are susceptible to "Popcorn Cracking." This phenomenon usually affects higher pin count packages during PC board soldering processes like Infrared Reflow and Vapor Phase. As the molding compound expands, it can tear the bond wires off the die survace resulting in catastrophic failure. Molding compounds with lower moisture absorption and improved adhesion have been qualified for use at LTC. The results of this testing, including extended reliability stress tests on packages exposed to the surface mount preconditioning, are detailed in the next three pages of this Data Pack. The levels, test condiditons and associated floor life expectations and summary of the actual levels are shown below.

LTC solved the popcorn cracking phenomena per the previous version of J-STD-020, we have re-revaluated all surface package types to the latest revision of J-STD-020. Newer, environmentally friendly, state-of-the-art molding compounds and die attach epoxies are always being evaluated. These solutions deliver Moisture Sensitivity Level One at +260°C peak body temperature performance for most lead-frame based packages. An updated cross-reference of package type, pin count, and Moisture Sensitivity Level (MSL) can be found on the LTC website at: http://cds.linear.com/docs/Quality/MSL_By_Package_Type.pdf

Through Hole Package Technology –

No moisture sensitivity classification testing required because these packages are not normally subjected to surface mount assembly conditions and are not prone to board level mounting induced popcorn problems. Through hole packages include:

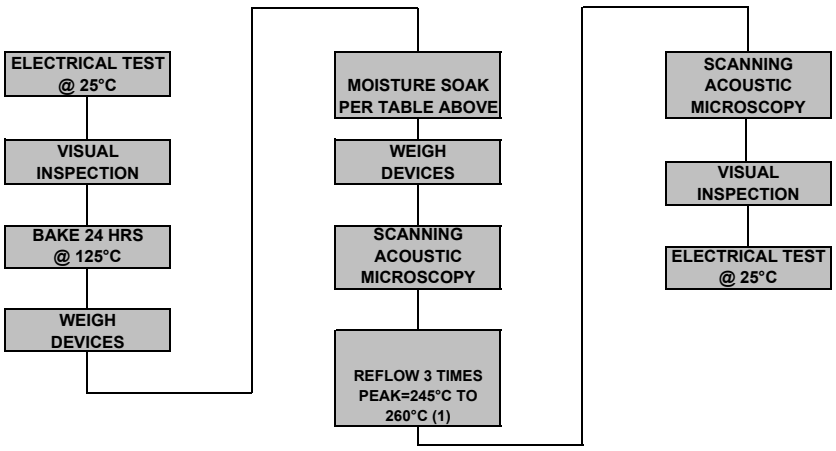
- Plastic Dual-In-Line Packages (PDIP)
- TO-92
- TO-220
- TO-3P

MOISTURE SENSITIVITY CLASSIFICATION TESTING

LEVEL	TEST CONDITIONS	SOAK TIME	FLOOR LIFE	FLOOR CONDITIONS
1	85°C / 85%RH	168 HOURS	UNLIMITED	≤30°C / 85%RH
2	85°C / 60%RH	168 HOURS	1 YEAR	≤30°C / 60%RH
2A	30°C / 60%RH	696 HOURS	4 WEEKS	≤30°C / 60%RH
3	30°C / 60%RH	192 HOURS	168 HOURS	≤30°C / 60%RH
4	30°C / 60%RH	96 HOURS	72 HOURS	≤30°C / 60%RH
5	30°C / 60%RH	72 HOURS	24 HOURS	≤30°C / 60%RH
5A	30°C / 60%RH	48 HOURS	24 HOURS	≤30°C / 60%RH
6	30°C / 60%RH	TOL	TOL	≤30°C / 60%RH

NOTE:
TOL = Time on Label

J-STD-020 FLOW CHART



NOTE: (1) µModule packages guaranteed to 245°C peak body temperature. Testing per Pb-free profile can be obtained on the LTC website at: http://cds.linear.com/docs/Packaging/Linear_Technology_Surface_Mount_Products.pdf

RELIABILITY DATA
SURFACE MOUNT PRECONDITIONING per J-STD-020
October 2012

PACKAGE TYPE	DATE CODES	SAMPLE SIZE	# FAILURE
DD PACK	0401 1122	72,187	0
F-14	0401 0924	822	0
F-16	0401 1150	199,173	0
F-20	0401 1124	55,083	0
F-24	0401 1122	3,984	0
F-28	0401 1131	17,958	0
F-38	0401 1035	2,198	0
F-48	0401 1119	9,452	0
G-16	0401 1124	122,078	0
G-20	0401 1114	27,258	0
G-24	0401 1121	61,600	0
G-28	0401 1142	360,654	0
G-36	0401 1116	66,089	0
G-44	0401 1218	36,450	0
G-48	0401 1212	154	0
N-08	0401 1103	23,282	0
N-14	0401 1025	6,737	0
N-16	0401 1109	4,399	0
N-18	0401 0913	6,002	0
N-20	0401 0919	10,824	0
N-24	0401 1103	11,395	0
N-28	0401 1103	5,321	0
M-08	0401 1152	150,503	0
M-10	0401 1219	246,541	0
M-12	0401 1040	5,277	0
M-16	0401 1122	21,820	0
S-08	0401 1124	303,406	0
S-14	0401 1112	13,317	0
S-16	0401 1141	60,283	0
S-18	0401 1052	8,527	0
S-20	0401 1108	10,004	0
S-24	0401 1014	13,990	0
S-28	0401 1123	30,364	0
ST	0401 1121	91,675	0
S-03	0401 1124	119,048	0
S-05	0401 1206	193,120	0
S-06	0401 1146	228,158	0
TS8	0401 1123	93,037	0
SC6	0401 1122	25,901	0
SC8	0401 1122	8,105	0
TO-220	0401 1121	38,447	0
TO-3P	0401 1123	22,873	0
TO-92(Z)	0401 1117	75,063	0
DFN-03	0401 1045	2,065	0
DFN-04	0401 1023	398	0
DFN-06	0401 1152	49,532	0
DFN-08	0401 1125	102,573	0
DFN-10	0401 1136	101,702	0
DFN-12	0401 1125	61,202	0
DFN-14	0401 1122	23,131	0
DFN-16	0401 1124	51,297	0
DFN-22	0401 1114	6,935	0
DFN-24	0401 1114	308	0
DFN-32	0401 1123	6,555	0
DFN-48	0401 1022	331	0
QFN-10	0401 1110	904	0
QFN-12	0401 0640	50	0
QFN-16	0401 1124	72,603	0
QFN-20	0401 1125	27,830	0
QFN-24	0401 1142	109,852	0
QFN-26	0401 1210	1,489	0
QFN-28	0401 1211	32,894	0
QFN-32	0401 1150	108,076	0
QFN-34	0401 0818	508	0
QFN-36	0401 1121	4,672	0
QFN-38	0401 1129	35,488	0
QFN-40	0401 1130	3,718	0
QFN-42	0401 1050	152	0
QFN-44	0401 1112	6,820	0
QFN-48	0401 1120	13,332	0
QFN-52	0401 1043	3,006	0
QFN-56	0401 1132	1,869	0
QFN-64	0401 1141	22,086	0
BGA-0611	0401 1138	154	0
BGA-0911	0401 1145	1,807	0
BGA-1115	0401 1114	1,491	0
BGA-1515	0401 1214	594	0
LGA-0606	0401 1129	3,543	0
LGA-0611	0401 1115	1,696	0
LGA-0911	0401 1112	7,311	0
LGA-0915	0401 1213	20,493	0
LGA-1111	0401 1128	2,314	0
LGA-1115	0401 1148	11,871	0
LGA-1515	0401 1219	64,807	0
LGA-1522	0401 1022	146	0
QFP-48	0401 1022	4,697	0
QFP-32	0401 0652	231	0
TOTAL		**3,835,092**	

RELIABILITY DATA
TEST RESULT POST J-STD-020 PRECONDITIONING
October 2012

HAST 131°C/85%RH AFTER JEDEC PRECONDITIONING

PACKAGE TYPE	SAMPLE SIZE	DATE CODES		# OF DEVICE HRS @ 85°C (1)	# FAILURE
DD PAK	2,404	9147	0630	3,877,360	0
F-16	531	0702	1150	936,960	0
F-20	1,010	9232	1105	2,007,220	0
F-28	250	0127	1131	470,800	0
F-38	45	1010	1010	86,400	0
F-48	36	0917	0917	69,120	0
G-16	297	9724	1115	1,083,240	0
G-28	3,790	9232	1124	5,354,720	2
G-36	994	9602	1103	3,027,260	0
G-44	730	0831	1218	1,629,120	0
G-48	154	1206	1212	295,680	0
N-08	9,040	9010	0105	16,143,480	0
N-14	1,044	9033	9926	1,608,340	0
N-16	1,390	9107	9606	2,458,020	0
N-18	650	9038	0611	1,600,780	0
N-20	452	9049	9618	882,280	0
N-24	765	9101	9301	1,436,340	0
N-28	356	8847	9726	807,160	0
M-08	1,636	9726	1140	6,094,500	2
M-10	1,065	0801	1219	2,607,360	0
M-16	160	0743	0836	307,200	0
S-03	98	9644	9644	499,800	0
S-05	669	9715	0013	3,010,000	0
S-06	958	9943	1146	2,416,720	0
S-08	47,465	8951	1122	59,829,300	1
S-14	273	9448	9448	1,224,160	0
S-16	10,314	9001	1141	12,087,520	0
S-18	3,803	9049	0634	4,356,760	0
S-20	1,629	9001	9818	3,555,100	0
S-24	1,170	9019	9818	2,126,600	0
S-28	956	8948	9818	2,007,060	0
ST	1,680	9115	9727	4,080,800	0
TO-220	5,222	8917	0809	11,044,760	0
TO-3P	952	9133	9913	1,940,220	0
TO-92(Z)	12,983	9006	0238	21,579,700	0
DFN-06	146	1152	1152	403,200	0
DFN-08	231	0617	0646	443,520	0
DFN-10	165	0238	1136	491,040	0
DFN-14	48	0817	0915	96,000	0
DFN-32	50	0710	0710	168,000	0
QFN-16	306	0112	0704	659,520	0
QFN-20	153	1119	1119	409,760	0
QFN-24	370	0651	1142	1,406,000	0
QFN-32	317	0111	1053	588,480	0
QFN-38	109	0927	1043	209,280	0
QFN-40	227	1032	1130	389,760	0
QFN-64	288	0420	1141	864,320	0
LGA-0606	46	0717	0717	85,560	0
LGA-0915	45	0739	0739	43,200	0
LGA-1515	297	0645	1210	570,240	0
BGA-32	76	1015	1015	145,920	0
TOTAL	**117,845**			**189,515,640**	**5**

TO-5 = H	TO-3P = P	PDIP = N	TSOT = S3, S5, S6, TS8	SO-8/14/16/18/20/24/28 = S
TO-3 = K	TO-92 = Z	CERDIP = J	SOT-223 = ST	SSOP = G
TO-46 = H	TO-220 = T	Sidebraze = D	MSOP = M8,M10,M12,M16	TSSOP = F
LCC = L	DD PACK = M, Q, R	Flat Pack = W	QFN/DFN	LGA = Module

NOTE: (1) Assumes 20X acceleration from 131°C to 85°
NOTE: Approximate duration is 96 hours.

RELIABILITY DATA
TEST RESULT POST J-STD-020 PRECONDITIONING
October 2012

AUTOCLAVE 15 PSIG 121C AFTER JEDEC PRECONDITIONING

PACKAGE TYPE	SAMPLE SIZE	DATE CODES	TOTAL # OF DEVICE HRS	# FAILURE
DD PACK	23,482	0401 1122	1,179,456	0
F-14	277	0401 0924	6,648	0
F-16	65,295	0401 1125	3,422,948	0
F-20	17,354	0401 1124	1,236,485	0
F-24	1,329	0401 1122	106,368	0
F-28	5,268	0401 1124	480,135	0
F-38	664	0401 1035	135,096	0
F-48	3,426	0401 1119	750,121	0
G-16	43,755	0401 1124	2,185,288	0
G-20	15,856	0401 1111	871,344	0
G-24	44,181	0401 1121	2,419,204	0
G-28	151,081	0401 1124	6,912,821	0
G-36	20,384	0401 1116	1,477,210	0
G-44	12,389	0401 1123	683,328	0
N-08	2,967	0401 1103	251,168	0
N-14	1,546	0401 1025	316,080	0
N-16	1,469	0401 1109	254,688	0
N-18	1,238	0401 0846	39,552	0
N-20	2,474	0401 0908	410,065	0
N-24	4,549	0401 1049	276,864	0
N-28	1,605	0401 1052	312,584	0
M-08	56,323	0401 1124	2,766,240	0
M-10	86,014	0401 1123	4,318,028	0
M-12	1,650	0401 1040	395,640	0
M-16	7,849	0401 1122	638,586	0
S-08	93,664	0401 1124	5,724,921	0
S-14	4,174	0401 1112	528,600	0
S-16	14,279	0401 1123	1,005,720	0
S-18	941	0401 1052	131,040	0
S-20	2,280	0401 1108	77,904	0
S-24	3,596	0401 1014	633,533	0
S-28	10,275	0401 1123	990,925	0
ST	71,729	0401 1121	4,192,728	0
S-03	105,178	0401 1124	5,291,616	0
S-05	76,521	0401 1122	4,135,493	0
S-06	91,949	0401 1123	4,685,582	0
TS8	70,436	0401 1123	3,706,982	0
TO-220	9,902	0401 1121	484,488	0
TO-3P	8,083	0401 1123	291,936	0
TO-92	37,688	0401 1117	2,554,576	0
DFN-03	780	0401 1045	106,080	0
DFN-04	150	0401 1023	3,600	0
DFN-06	17,139	0401 1122	1,035,926	0
DFN-08	34,412	0401 1125	3,097,663	0
DFN-10	32,857	0401 1120	2,094,519	0
DFN-12	20,451	0401 1125	1,396,453	0
DFN-14	8,240	0401 1122	532,257	0
DFN-16	16,239	0401 1124	1,088,976	0
DFN-22	2,573	0401 1114	155,262	0
DFN-32	2,286	0401 1123	106,776	0
QFN-10	150	0401 1110	3,600	0
QFN-16	24,449	0401 1124	2,131,141	0
QFN-20	9,440	0401 1125	603,264	0
QFN-24	37,530	0401 1123	2,713,826	0
QFN-28	10,460	0401 1123	431,856	0
QFN-32	33,919	0401 1123	2,490,668	0
QFN-36	1,590	0401 1121	215,136	0
QFN-38	12,085	0401 1124	767,328	0
QFN-40	781	0401 1119	202,416	0
QFN-44	2,175	0401 1112	207,144	0
QFN-48	4,544	0401 1120	837,319	0
QFN-52	757	0401 1016	153,816	0
QFN-56	385	0401 1004	129,360	0
QFN-64	7,209	0401 1123	1,040,925	0
QFP-48	1,150	0401 1022	296,520	0
QFP-32	231	0401 0652	77,616	0
TOTAL	**1,455,102**		**88,201,438**	**0**

TO-5 = H	TO-3P = P	PDIP = N	TSOT = S3, S5, S6, TS8	SO-8/14/16/18/20/24/28 = S
TO-3 = K	TO-92 = Z	CERDIP = J	SOT-223 = ST	SSOP = G
TO-46 = H	TO-220 = T	Sidebraze = D	MSOP = M8,M10,M12,M16	TSSOP = F
LCC = L	DD PACK = M, Q, R	Flat Pack = W	QFN/DFN	QFP

RELIABILITY DATA
TEMPERATURE CYCLE (AIR TO AIR) -65°C TO 150°C AFTER JEDEC PRECONDITION
October 2012

PACKAGE TYPE	SAMPLE SIZE	DATE CODES		TOTAL # OF DEVICE CYCLES	# FAILURE
DD PACK	25,617	0401	1122	4,693,150	0
F-14	248	0401	0924	24,800	0
F-16	64,553	0401	1150	13,207,124	0
F-20	18,457	0401	1124	5,511,259	0
F-24	1,328	0401	1122	338,900	0
F-28	6,173	0401	1124	1,660,272	0
F-38	873	0401	1035	655,900	0
F-48	3,116	0401	1119	1,740,250	0
G-16	38,028	0401	1122	6,710,401	0
G-20	6,695	0401	1114	1,402,300	0
G-24	8,996	0401	1121	2,403,441	0
G-28	106,986	0401	1142	18,598,030	0
G-36	22,808	0401	1116	6,894,371	0
G-44	10,190	0401	1146	2,610,700	0
N-08	10,747	0401	1103	2,880,100	0
N-14	3,286	0401	1025	2,113,250	0
N-16	1,185	0401	1109	710,200	0
N-18	3,730	0401	0913	1,126,300	0
N-20	6,777	0401	0919	1,928,900	0
N-24	5,091	0401	1103	1,252,000	0
N-28	2,369	0401	1103	1,115,600	0
M-08	49,200	0401	1152	7,819,340	0
M-10	76,969	0401	1217	13,134,830	0
M-12	1,802	0401	1040	1,236,500	0
M-16	8,328	0401	1119	2,421,400	0
S-08	91,554	0401	1124	15,700,773	0
S-14	4,913	0401	1112	1,411,442	0
S-16	23,321	0401	1119	5,416,549	0
S-18	2,844	0401	1052	1,858,500	0
S-20	4,159	0401	1108	415,900	0
S-24	6,452	0401	1014	2,269,107	0
S-28	9,065	0401	1123	2,593,200	0
ST	9,437	0401	1121	4,288,400	0
S-03	6,902	0401	1121	1,815,200	0
S-05	54,510	0401	1206	11,712,819	0
S-06	64,299	0401	1127	11,872,450	0
TS8	11,349	0401	1123	3,567,096	0
SC6	12,579	0401	1122	2,334,435	0
SC8	3,678	0401	1122	861,400	0
TO-220	14,951	0401	1121	4,760,290	0
TO-3P	6,991	0401	1123	1,460,500	0
TO-92(Z)	12,250	0401	1117	5,248,900	0
DFN-03	595	0401	1045	59,500	0
DFN-04	100	0401	0722	10,000	0
DFN-06	15,187	0401	1152	2,989,677	0
DFN-08	34,362	0401	1123	10,020,345	0
DFN-10	34,534	0401	1120	6,335,130	0
DFN-12	19,801	0401	1125	4,460,900	0
DFN-14	7,146	0401	1122	1,590,019	0
DFN-16	17,484	0401	1124	3,731,102	0
DFN-22	2,316	0401	1114	436,725	0
DFN-24	154	0401	1114	154,000	0
DFN-32	2,040	0401	1123	342,600	0
DFN-48	50	0401	0906	5,000	0
QFN-10	377	0401	1110	242,000	0
QFN-12	50	0401	0640	5,000	0
QFN-16	24,158	0401	1124	6,959,785	0
QFN-20	8,774	0401	1123	1,997,900	0
QFN-24	34,259	0401	1142	8,749,923	0
QFN-26	666	0401	1210	467,000	0
QFN-28	11,875	0401	1121	1,810,300	0
QFN-32	40,225	0401	1123	9,395,442	0
QFN-34	254	0401	0818	164,000	0
QFN-36	1,574	0401	1121	655,300	0
QFN-38	11,821	0401	1129	3,107,790	0
QFN-40	1,476	0401	1123	920,450	0
QFN-42	76	0401	1050	76,000	0
QFN-44	2,447	0401	1112	930,500	0
QFN-48	4,727	0401	1120	2,189,718	0
QFN-52	1,230	0401	1043	700,600	0
QFN-56	718	0401	1132	861,000	0
QFN-64	7,735	0401	1123	3,184,977	0
BGA-0611*	77	0401	1138	77,000	0
BGA-0911*	1,041	0401	1145	1,195,877	0
BGA-1115*	597	0401	1114	552,526	0
BGA-1515*	385	0401	1214	194,502	0
LGA-0606*	1,877	0401	1129	1,771,965	0
LGA-0611*	835	0401	1115	1,220,165	0
LGA-0911*	3,602	0401	1112	2,873,970	0
LGA-0915*	10,561	0401	1213	10,966,580	0
LGA-1111*	1,233	0401	1128	1,389,352	0
LGA-1115*	6,296	0401	1148	6,948,926	0
LGA-1515*	35,520	0401	1219	27,213,685	0
QFP-48	1,914	0401	1022	1,473,792	0
TOTAL	**1,172,955**			**308,207,302**	**0**

DD PACK = M, Q, R	TO-3P = P	PDIP = N	TSOT = S3, S5, S6, TS8	SO-8/14/16/18/20/24/28 = S
QFN/DFN = QF	TO-92 = Z	CERDIP = J	SOT-223 = ST	SSOP = G
LGA = uModule	TO-220 = T	Sidebraze = D	MSOP = M8,M10,M12,M16	TSSOP = F

* LGA are cycled to one of three conditions 1) -40°C to +125°C, 2) -55°C to +125°C, or 3) -65°C to +150°C

RELIABILITY DATA
THERMAL SHOCK (LIQUID TO LIQUID) -65°C TO 150°C AFTER JEDEC PRECONDITION
October 2012

PACKAGE TYPE	SAMPLE SIZE	DATE CODES		TOTAL # OF DEVICE CYCLES	# FAILURE
DD PACK	20,684	0401	1122	3,360,291	0
F-14	297	0401	0924	29,700	0
F-16	68,794	0401	1150	12,751,170	0
F-20	18,262	0401	1124	4,974,500	0
F-24	1,327	0401	1122	338,800	0
F-28	6,267	0401	1127	1,825,200	0
F-38	616	0401	1035	491,800	0
F-48	2,874	0401	1119	1,399,000	0
G-16	39,998	0401	1122	7,067,500	0
G-20	4,707	0401	1111	1,342,800	0
G-24	8,423	0401	1121	2,027,700	0
G-28	98,797	0401	1142	16,751,003	0
G-36	21,903	0401	1116	5,256,400	0
G-44	13,141	0401	1146	2,485,700	0
N-08	528	0401	0945	415,500	0
N-14	861	0401	1023	771,000	0
N-16	355	0401	1022	195,400	0
N-18	384	0401	0844	384,000	0
N-20	1,121	0401	0844	1,037,500	0
N-24	990	0401	0830	676,800	0
N-28	991	0401	1103	780,000	0
M-08	43,344	0401	1152	7,218,200	0
M-10	82,493	0401	1217	13,920,008	0
M-12	1,825	0401	1040	1,215,400	0
M-16	5,483	0401	1119	2,014,700	0
S-08	70,723	0401	1124	12,546,480	0
S-14	3,957	0401	1112	1,255,940	0
S-16	12,369	0401	1119	2,893,900	0
S-18	939	0401	1052	451,650	0
S-20	1,936	0401	1108	193,600	0
S-24	2,772	0401	1014	1,658,700	0
S-28	10,068	0401	1123	2,549,800	0
ST	8,829	0401	1121	3,546,164	0
S-03	6,870	0401	1121	1,632,900	0
S-05	61,420	0401	1206	11,293,157	0
S-06	70,952	0401	1127	11,581,300	0
TS8	11,252	0401	1123	3,101,400	0
SC6	13,322	0401	1122	2,528,242	0
SC8	4,427	0401	1122	1,518,190	0
TO-220	8,372	0401	1121	1,541,800	0
TO-3P	6,847	0401	1123	1,272,800	0
T0-92(Z)	12,142	0401	1117	5,463,500	0
DFN-03	690	0401	1045	69,000	0
DFN-04	148	0401	1023	14,800	0
DFN-06	17,060	0401	1152	3,271,450	0
DFN-08	33,568	0401	1123	9,410,036	0
DFN-10	34,146	0401	1120	6,324,000	0
DFN-12	20,950	0401	1125	4,635,500	0
DFN-14	7,697	0401	1122	1,563,172	0
DFN-16	17,574	0401	1124	3,404,996	0
DFN-22	2,046	0401	1114	348,000	0
DFN-24	154	0401	1114	154,000	0
DFN-32	2,179	0401	1123	356,500	0
DFN-48	281	0401	1022	236,000	0
QFN-10	377	0401	1110	203,500	0
QFN-16	23,690	0401	1124	6,666,500	0
QFN-20	9,463	0401	1123	2,021,500	0
QFN-24	37,693	0401	1142	8,271,050	0
QFN-26	823	0401	1208	670,000	0
QFN-28	10,559	0401	1211	1,651,700	0
QFN-32	33,615	0401	1150	8,342,340	0
QFN-34	254	0401	0818	164,000	0
QFN-36	1,508	0401	1121	626,400	0
QFN-38	11,473	0401	1119	2,539,600	0
QFN-40	1,234	0401	1119	881,400	0
QFN-42	76	0401	1050	76,000	0
QFN-44	2,198	0401	1112	595,300	0
QFN-48	4,061	0401	1120	2,428,670	0
QFN-52	1,019	0401	1043	655,400	0
QFN-56	766	0401	1132	903,100	0
QFN-64	6,854	0401	1123	2,802,740	0
BGA-0611*	77	0401	1138	77,000	0
BGA-0911*	766	0401	1145	916,000	0
BGA-1115*	818	0401	1114	640,700	0
BGA-1515*	209	0401	1214	143,000	0
LGA-0606*	1,620	0401	1129	1,570,000	0
LGA-0611*	861	0401	1115	1,275,900	0
LGA-0911*	3,709	0401	1112	3,262,800	0
LGA-0915*	9,887	0401	1133	10,915,700	0
LGA-1111*	1,081	0401	1128	1,267,000	0
LGA-1115*	5,575	0401	1130	6,140,950	0
LGA-1515*	28,990	0401	1217	23,722,770	0
LGA-1522*	146	0401	1003	146,000	0
QFP-48	1,633	0401	1010	1,074,000	0
TOTAL	**1,089,190**			**274,198,069**	0

TO-5 = H	TO-3P = P	PDIP = N	TSOT = S3, S5, S6, TS8	SO-8/14/16/18/20/24/28 = S
TO-3 = K	TO-92 = Z	CERDIP = J	SOT-223 = ST	SSOP = G
TO-46 = H	TO-220 = T	Sidebraze = D	MSOP = M8,M10,M12,M16	TSSOP = F
LCC = L	DD PACK = M, Q, R	Flat Pack = W	QFN/DFN	LGA = Module

* LGA & BGA are cycled to one of three conditions 1) -40°C to +125°C, 2) -55°C to +125°C, or 3) -65°C to +150°C

ACCELERATED HIGH TEMPERATURE OPERATION LIFE (HTOL) TEST RESULT	
FIT Rate	**0.08**
Numbers of Total Failures	5
Total HTOL Sample Size from Q104 to Q212	153,977
Equivalent Device Hours at 55°C	76,896,663,593

(1) Assumes Activation Energy = 1.0 Electron Volts
(2) Failure Rate Equivalent to +55°C, 60% Confidence Level
(3)1 FIT = 1 Failure in One Billion Hours.
Note: FIT rate calculation base on JEDEC Standard JESD 85.