

TPS7A6650QDGNRQ1

Quality, reliability & packaging data download

Status: ACTIVE

Report date: 03/20/2024



Assembly site: Ext-Mfg

RoHS	Yes
REACH	Yes
Device marking	PA1Q
Lead finish/Ball material	NIPDAUAG
MSL rating/Peak reflow	Level-2-260C-1 YEAR
Rating	Automotive

Material content

				Homogeneous Material Level		Component Level	
Component	Substance	CAS Number	Amount (mg)	Percentage %	ppm	Percentage %	ppm
Bond Wire							
Not Categorized	Proprietary Materials	—	0.000006	0.007215	72	0.000022	0
Precious Metals	Gold	7440-57-5	0.083154	99.992785	999928	0.303276	3033
Sub-total	—	—	0.083160	100	1000000	0.303298	3033
Die Attach Adhesive							
Precious Metals	Silver	7440-22-4	0.273825	81.999982	820000	0.998683	9987
Thermoplastics	Epoxy	85954-11-6	0.060108	18.000018	180000	0.219223	2192
Sub-total	—	—	0.333933	100	1000000	1.217906	12179
Lead Frame							
Copper and Its Alloys	Copper	7440-50-8	10.7408	95.900000	959000	39.173379	391734
Magnesium and Its Alloys	Magnesium	7439-95-4	0.0196	0.175000	1750	0.071484	715
Nickel and Its Alloys	Nickel	7440-02-0	0.3584	3.200000	32000	1.307141	13071
Other Inorganic Materials	Silicon	7440-21-3	0.0812	0.725000	7250	0.296149	2961
Sub-total	—	—	11.2000	100	1000000	40.848154	408482
Lead Frame Plating							
Nickel and Its Alloys	Nickel	7440-02-0	0.196157	97.299617	972996	0.715415	7154
Precious Metals	Gold	7440-57-5	0.000605	0.300098	3001	0.002207	22
Precious Metals	Palladium	7440-05-3	0.004234	2.100188	21002	0.015442	154
Precious Metals	Silver	7440-22-4	0.000605	0.300098	3001	0.002207	22
Sub-total	—	—	0.201601	100	1000000	0.735270	7353
Mold Compound							
Other Inorganic Materials	Fused Silica	60676-86-0	13.445118	93.500002	935000	49.036450	490365
Other Organic Materials	Carbon Black	1333-86-4	0.071899	0.500000	5000	0.262227	2622
Thermoplastics	Epoxy	85954-11-6	0.862788	5.999998	60000	3.146723	31467
Sub-total	—	—	14.379805	100	1000000	52.445400	524454
Semiconductor Device							
Ceramics / Glass	Doped Silicon	7440-21-3	1.220121	100.000000	1000000	4.449972	44500
Sub-total	—	—	1.220121	100	1000000	4.449972	44500
Total	—	—	27.418620	—	—	100	1000000

MTBF/FIT estimates

MTBF / FIT		MTBF / FIT supporting data							
MTBF	FIT	Usage temp (°C)	Conf level (%)	Activation energy (eV)	Test temp (°C)	Test duration (hours)	Sample size	Fails	Additional comments

7.47×10 ⁹	0.1	55	60	0.7	125	1000	87285	0	—
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Qualification summary

Type	AEC Q100 test #	Test spec	Min lot qty	SS / lot	Test name	Condition	Result	Notes
Test group A - accelerated environment stress test								
THB/HAST	A2	JESD22-A101/JESD22-A110	3	77	Biased HAST	130C/85%RH 96 hours	Pass	Or equivalent Q100 condition
AC/UHAST	A3	JESD22-A102/JESD22-A118	3	77	Unbiased HAST	130C/85%RH for 96 hours	Pass	Or equivalent Q100 condition
TC	A4	JESD22-A104	3	77	Temperature cycle	Per grade requirements. See data sheet.	Pass	—
TC-WBP	A4	MIL-STD883 method 2011	1	30	Post temp cycle bond pull	Per requirements	Pass	As applicable per die configuration
HTSL	A6	JESD22-A103	1	45	High temp storage bake	Per grade requirements. See data sheet.	Pass	—
Test group B - accelerated lifetime simulation test								
HTOL	B1	JESD22-A108	3	77	High temperature operating life	Per grade requirements. See data sheet.	Pass	—
ELFR	B2	AEC Q100-008	3	800	Early life failure rate	Per grade requirements. See data sheet.	Pass	—
Test group C - package assembly integrity tests								
WBS	C1	AEC Q100-001	1	30	Wire bond shear	Cpk > 1.67	Pass	As applicable per die configuration
WBP	C2	MIL-STD883 method 2011	1	30	Wire bond pull	Cpk > 1.67	Pass	As applicable per die configuration
SD	C3	JEDEC J-STD-002	1	15	Solderability	>95% lead coverage	Pass	—
PD	C4	JESD22-B100 and B108	3	10	Physical dimensions	Cpk > 1.67	Pass	—
SBS	C5	AEC Q100-010	3	5 balls from 10 devices	Solder Ball Shear	Cpk > 1.67	Pass	As applicable per die configuration
Test group D - die fabrication reliability tests								
EM	D1	—	—	—	Electromigration	Per technology requirements	Pass	—
TDDDB	D2	—	—	—	Time dependent dielectric breakdown	Per technology requirements	Pass	—
HCI	D3	—	—	—	Hot carrier injection	Per technology requirements	Pass	—
BTI	D4	—	—	—	Bias temperature instability	Per technology requirements	Pass	—
Test group E - electrical verification								
HBM	E2	AEC Q100-002	1	3	Electrostatic discharge - human body model	Per AEC Q100-002	See data sheet	—
CDM	E3	AEC Q100-011	1	3	Electrostatic discharge - charged device model	Per AEC Q100-011	See data sheet	—
LU	E4	AEC Q100-004	1	3	Latch-up	Per AEC Q100-004	Pass	As applicable per Q100-004
ED	E5	AEC Q100-009	3	30	Electrical distributions	Per AEC Q100-009	Pass	—

Ongoing reliability monitoring

FAB process reliability data

Fab Process	Reliability Test	Rolling Year (1Q2023 - 4Q2023) Sample Size	Cumulative Sample Size	Disposition
Power BICMOS	Life test 125C, 1000 Hours or Equivalent JEDEC Condition	31433	391952	Pass

Assembly process reliability data

Package Family	Reliability Test	Rolling Year (1Q2023 - 4Q2023) Sample Size	Cumulative Sample Size	Disposition
HTSSOP	Biased HAST 130C/85%RH, 96 Hours or Equivalent JEDEC Condition	4053	41465	Pass
HTSSOP	High temp storage bake 150C, 1000 Hours or Equivalent JEDEC Condition	3338	29912	Pass
HTSSOP	Temperature cycle -65/150C, 500 Hours or Equivalent JEDEC Condition	10500	89197	Pass
HTSSOP	Unbiased HAST 130C/85% RH, 96 Hours or Equivalent JEDEC Condition	6607	66063	Pass

Additional resources

[General quality guidelines](#)

[Certifications](#)

[Conflict minerals specialized disclosure report](#)

[Restricted chemical test report](#)

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