

LM2903QPWRQ1

Quality, reliability & packaging data download

Status: ACTIVE

Report date: 03/20/2024



Assembly site: TI MALAYSIA A/T

RoHS	Yes
REACH	Yes
Device marking	2903Q1
Lead finish/Ball material	NIPDAU
MSL rating/Peak reflow	Level-1-260C-UNLIM
Rating	Automotive

# Material content

Homogeneous Material Level				Component Level			
Component	Substance	CAS Number	Amount (mg)	Percentage %	ppm	Percentage %	ppm
<b>Bond Wire</b>							
Copper and Its Alloys	Copper	7440-50-8	0.035534	97.586027	975860	0.090419	904
Not Categorized	Proprietary Materials	—	0.000004	0.010985	110	0.000010	0
Precious Metals	Palladium	7440-05-3	0.000874	2.400242	24002	0.002224	22
Precious Metals	Silver	7440-22-4	0.000001	0.002746	27	0.000003	0
Sub-total	—	—	0.036413	100	1000000	0.092656	927
<b>Die Attach Adhesive</b>							
Precious Metals	Silver	7440-22-4	0.153901	80.000104	800001	0.391613	3916
Thermoplastics	Epoxy	85954-11-6	0.038475	19.999896	199999	0.097903	979
Sub-total	—	—	0.192376	100	1000000	0.489516	4895
<b>Lead Frame</b>							
Copper and Its Alloys	Copper	7440-50-8	15.79824	97.461523	974615	40.199873	401999
Copper and Its Alloys	Iron	7439-89-6	0.3726	2.298621	22986	0.948110	9481
Copper and Its Alloys	Phosphorus	7723-14-0	0.00486	0.029982	300	0.012367	124
Other Nonferrous Metals and Alloys	Lead	7439-92-1	0.00486	0.029982	300	0.012367	124
Other Nonferrous Metals and Alloys	Tin	7440-31-5	0.00486	0.029982	300	0.012367	124
Zinc and Its Alloys	Zinc	7440-66-6	0.0243	0.149910	1499	0.061833	618
Sub-total	—	—	16.20972	100	1000000	41.246916	412469
<b>Lead Frame Plating</b>							
Nickel and Its Alloys	Nickel	7440-02-0	0.722912	95.120000	951200	1.839507	18395
Precious Metals	Gold	7440-57-5	0.005928	0.780000	7800	0.015084	151
Precious Metals	Palladium	7440-05-3	0.03116	4.100000	41000	0.079289	793
Sub-total	—	—	0.760000	100	1000000	1.933880	19339
<b>Mold Compound</b>							
Other Inorganic Materials	Fused Silica	60676-86-0	18.465147	86.000001	860000	46.986029	469860
Other Organic Materials	Carbon Black	1333-86-4	0.064413	0.299999	3000	0.163904	1639
Thermoplastics	Epoxy	85954-11-6	2.941541	13.700001	137000	7.484984	74850
Sub-total	—	—	21.471101	100	1000000	54.634917	546349
<b>Semiconductor Device</b>							
Ceramics / Glass	Doped Silicon	7440-21-3	0.629619	100.000000	1000000	1.602115	16021
Sub-total	—	—	0.629619	100	1000000	1.602115	16021
Total	—	—	39.299229	—	—	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
1.6×10 <sup>9</sup>	0.6	55	60	0.7	125	1000	41301	1	—

## Qualification summary

Type	AEC Q100 test #	Test spec	Min lot qty	SS / lot	Test name	Condition	Result	Notes
<b>Test group A - accelerated environment stress test</b>								
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	—
<b>Test group B - accelerated lifetime simulation test</b>								
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	—
<b>Test group C - package assembly integrity tests</b>								
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
<b>Test group D - die fabrication reliability tests</b>								
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	—
<b>Test group E - electrical verification</b>								
HBM	E2	AEC Q100-002	1	3	Electrostatic discharge - human body model	Per AEC Q100-002	<a href="#">See data sheet</a>	—
CDM	E3	AEC Q100-011	1	3	Electrostatic discharge -	Per AEC Q100-011	<a href="#">See data sheet</a>	—

					charged device model		<a href="#">See data sheet</a>	
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
BIPOLAR	Life test 125C, 1000 Hours or Equivalent JEDEC Condition	308	17907	Pass

### Assembly process reliability data

Package Family	Reliability Test	Rolling Year (1Q2023 - 4Q2023) Sample Size	Cumulative Sample Size	Disposition
TSSOP	Biased HAST 130C/85%RH, 96 Hours or Equivalent JEDEC Condition	3003	41384	Pass
TSSOP	High temp storage bake 150C, 1000 Hours or Equivalent JEDEC Condition	1683	31583	Pass
TSSOP	Temperature cycle -65/150C, 500 Hours or Equivalent JEDEC Condition	7546	87212	Pass
TSSOP	Unbiased HAST 130C/85% RH, 96 Hours or Equivalent JEDEC Condition	5313	70606	Pass

## Additional resources

[General quality guidelines](#)

[Certifications](#)

[Conflict minerals specialized disclosure report](#)

[Restricted chemical test report](#)

For additional component information, please visit [Material content search](#)

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