

AMC1311QDWVRQ1

Quality, reliability & packaging data download

Status: ACTIVE

Report date: 03/20/2024



Assembly site: TI MALAYSIA A/T

RoHS	Yes
REACH	Yes
Device marking	1311Q1
Lead finish/Ball material	NIPDAU
MSL rating/Peak reflow	Level-3-260C-168 HR
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	0.113066	97.585100	975851	0.030243	302
Nickel and Its Alloys	Nickel	7440-02-0	0.000001	0.000863	9	0.000000	0
Not Categorized	Proprietary Materials	—	0.000013	0.011220	112	0.000003	0
Precious Metals	Palladium	7440-05-3	0.002781	2.400228	24002	0.000744	7
Precious Metals	Silver	7440-22-4	0.000003	0.002589	26	0.000001	0
Sub-total	—	—	0.115864	100	1000000	0.030991	310
<b>Bond Wire 2</b>							
Copper and Its Alloys	Iron	7439-89-6	0.000001	0.000310	3	0.000000	0
Other Nonferrous Metals and Alloys	Calcium	7440-70-2	0.000001	0.000310	3	0.000000	0
Other Nonferrous Metals and Alloys	Yttrium	7440-65-5	0.000002	0.000620	6	0.000001	0
Precious Metals	Gold	7440-57-5	0.322752	99.997521	999975	0.086330	863
Precious Metals	Silver	7440-22-4	0.000004	0.001239	12	0.000001	0
Sub-total	—	—	0.322760	100	1000000	0.086332	863
<b>Die Attach Adhesive</b>							
Precious Metals	Silver	7440-22-4	0.382313	74.999951	750000	0.102261	1023
Thermoplastics	Epoxy	85954-11-6	0.127438	25.000049	250000	0.034087	341
Sub-total	—	—	0.509751	100	1000000	0.136348	1363
<b>Die Attach Adhesive 2</b>							
Precious Metals	Silver	7440-22-4	0.377958	75.000000	750000	0.101096	1011
Thermoplastics	Epoxy	85954-11-6	0.125986	25.000000	250000	0.033699	337
Sub-total	—	—	0.503944	100	1000000	0.134795	1348
<b>Die Attach Adhesive 3</b>							
Precious Metals	Silver	7440-22-4	0.154149	75.000000	750000	0.041232	412
Thermoplastics	Epoxy	85954-11-6	0.051383	25.000000	250000	0.013744	137
Sub-total	—	—	0.205532	100	1000000	0.054976	550
<b>Die Attach Adhesive 4</b>							
Precious Metals	Silver	7440-22-4	0.154149	75.000000	750000	0.041232	412
Thermoplastics	Epoxy	85954-11-6	0.051383	25.000000	250000	0.013744	137
Sub-total	—	—	0.205532	100	1000000	0.054976	550
<b>Lead Frame</b>							
Copper and Its Alloys	Copper	7440-50-8	154.98885	97.050000	970500	41.456404	414564
Copper and Its Alloys	Iron	7439-89-6	4.1522	2.600000	26000	1.110630	11106
Copper and Its Alloys	Phosphorus	7723-14-0	0.23955	0.150000	1500	0.064075	641
Zinc and Its Alloys	Zinc	7440-66-6	0.3194	0.200000	2000	0.085433	854
Sub-total	—	—	159.70000	100	1000000	42.716542	427165
<b>Lead Frame Plating</b>							

Nickel and Its Alloys	Nickel	7440-02-0	0.09512	95.120000	951200	0.025443	254
Precious Metals	Gold	7440-57-5	0.00078	0.780000	7800	0.000209	2
Precious Metals	Palladium	7440-05-3	0.0041	4.100000	41000	0.001097	11
Sub-total	—	—	0.10000	100	1000000	0.026748	267
<b>Mold Compound</b>							
Other Inorganic Materials	Fused Silica	60676-86-0	185.251435	89.500000	895000	49.551038	495510
Other Organic Materials	Carbon Black	1333-86-4	1.034924	0.500000	5000	0.276821	2768
Other Organic Materials	Chlorine	7782-50-5	0.00414	0.002000	20	0.001107	11
Thermoplastics	Epoxy	85954-11-6	20.694345	9.998000	99980	5.535322	55353
Sub-total	—	—	206.984844	100	1000000	55.364288	553643
<b>Semiconductor Device</b>							
Ceramics / Glass	Doped Silicon	7440-21-3	1.864619	100.000000	1000000	0.498748	4987
Sub-total	—	—	1.864619	100	1000000	0.498748	4987
<b>Semiconductor Device 2</b>							
Ceramics / Glass	Doped Silicon	7440-21-3	1.843379	100.000000	1000000	0.493067	4931
Sub-total	—	—	1.843379	100	1000000	0.493067	4931
<b>Semiconductor Device 3</b>							
Ceramics / Glass	Doped Silicon	7440-21-3	0.751813	100.000000	1000000	0.201095	2011
Sub-total	—	—	0.751813	100	1000000	0.201095	2011
<b>Semiconductor Device 4</b>							
Ceramics / Glass	Doped Silicon	7440-21-3	0.751813	100.000000	1000000	0.201095	2011
Sub-total	—	—	0.751813	100	1000000	0.201095	2011
Total	—	—	373.859851	—	—	100	1000000

## Assembly site: **TI TAIWAN A/T**

<b>RoHS</b>	Yes
<b>REACH</b>	Yes
<b>Device marking</b>	1311Q1
<b>Lead finish/Ball material</b>	NIPDAU
<b>MSL rating/Peak reflow</b>	Level-3-260C-168 HR
<b>Rating</b>	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	Iron	7439-89-6	0.000001	0.000333	3	0.000000	0
Other Nonferrous Metals and Alloys	Calcium	7440-70-2	0.000001	0.000333	3	0.000000	0
Other Nonferrous Metals and Alloys	Yttrium	7440-65-5	0.000002	0.000665	7	0.000001	0
Precious Metals	Gold	7440-57-5	0.300641	99.997672	999977	0.094510	945
Precious Metals	Silver	7440-22-4	0.000003	0.000998	10	0.000001	0
Sub-total	—	—	0.300648	100	1000000	0.094512	945
<b>Die Attach Adhesive</b>							
Precious Metals	Silver	7440-22-4	0.382313	74.999951	750000	0.120184	1202
Thermoplastics	Epoxy	85954-11-6	0.127438	25.000049	250000	0.040062	401
Sub-total	—	—	0.509751	100	1000000	0.160246	1602
<b>Die Attach Adhesive 2</b>							
Precious Metals	Silver	7440-22-4	0.377958	75.000000	750000	0.118815	1188
Thermoplastics	Epoxy	85954-11-6	0.125986	25.000000	250000	0.039605	396
Sub-total	—	—	0.503944	100	1000000	0.158420	1584
<b>Die Attach Adhesive 3</b>							
Precious Metals	Silver	7440-22-4	0.154149	75.000000	750000	0.048458	485
Thermoplastics	Epoxy	85954-11-6	0.051383	25.000000	250000	0.016153	162
Sub-total	—	—	0.205532	100	1000000	0.064611	646
<b>Die Attach Adhesive 4</b>							
Precious Metals	Silver	7440-22-4	0.154149	75.000000	750000	0.048458	485
Thermoplastics	Epoxy	85954-11-6	0.051383	25.000000	250000	0.016153	162
Sub-total	—	—	0.205532	100	1000000	0.064611	646
<b>Lead Frame</b>							
Copper and Its Alloys	Copper	7440-50-8	99.270484	97.519999	975200	31.206743	312067
Copper and Its Alloys	Iron	7439-89-6	2.341285	2.300000	23000	0.736008	7360
Copper and Its Alloys	Phosphorus	7723-14-0	0.030539	0.030000	300	0.009600	96
Zinc and Its Alloys	Zinc	7440-66-6	0.152693	0.150000	1500	0.048001	480
Sub-total	—	—	101.795001	100	1000000	32.000352	320004
<b>Lead Frame Plating</b>							
Nickel and Its Alloys	Nickel	7440-02-0	2.272417	95.120008	951200	0.714359	7144
Precious Metals	Gold	7440-57-5	0.018634	0.779992	7800	0.005858	59
Precious Metals	Palladium	7440-05-3	0.097949	4.100000	41000	0.030791	308
Sub-total	—	—	2.389000	100	1000000	0.751008	7510
<b>Mold Compound</b>							
Other Inorganic Materials	Fused Silica	60676-86-0	185.251435	89.500000	895000	58.235779	582358
Other Organic Materials	Carbon Black	1333-86-4	1.034924	0.500000	5000	0.325339	3253

Other Organic Materials	Chlorine	7782-50-5	0.00414	0.002000	20	0.001301	13
Thermoplastics	Epoxy	85954-11-6	20.694345	9.998000	99980	6.505490	65055
Sub-total	—	—	206.984844	100	1000000	65.067910	650679
<b>Semiconductor Device</b>							
Ceramics / Glass	Doped Silicon	7440-21-3	1.864619	100.000000	1000000	0.586163	5862
Sub-total	—	—	1.864619	100	1000000	0.586163	5862
<b>Semiconductor Device 2</b>							
Ceramics / Glass	Doped Silicon	7440-21-3	1.843379	100.000000	1000000	0.579486	5795
Sub-total	—	—	1.843379	100	1000000	0.579486	5795
<b>Semiconductor Device 3</b>							
Ceramics / Glass	Doped Silicon	7440-21-3	0.751813	100.000000	1000000	0.236340	2363
Sub-total	—	—	0.751813	100	1000000	0.236340	2363
<b>Semiconductor Device 4</b>							
Ceramics / Glass	Doped Silicon	7440-21-3	0.751813	100.000000	1000000	0.236340	2363
Sub-total	—	—	0.751813	100	1000000	0.236340	2363
Total	—	—	318.105876	—	—	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
$1.666666667 \times 10^9$	.6	55	60	0.7	125	1000	71906	0	—

## 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	—

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	—
Tddb	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	<a href="#">See data sheet</a>	—
CDM	E3	AEC Q100-011	1	3	Electrostatic discharge - charged device model	Per AEC Q100-011	<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
High-Precision CMOS	Life test 125C, 1000 Hours or Equivalent JEDEC Condition	2310	57337	Pass

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
SOIC	Biased HAST 130C/85%RH, 96 Hours or Equivalent JEDEC Condition	7851	71252	Pass
SOIC	High temp storage bake 150C, 1000 Hours or Equivalent JEDEC Condition	6939	60854	Pass

SOIC	Temperature cycle -65/150C, 500 Hours or Equivalent JEDEC Condition	14472	158420	Pass
SOIC	Unbiased HAST 130C/85% RH, 96 Hours or Equivalent JEDEC Condition	9720	118431	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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