PRODUCT / PROCESS CHANGE NOTIFICATION
PCN-000701
Date: 01-03-2022

Semtech Corporation, 200 Flynn Road, Camarillo CA 93012

Change Details

Part Number(s) Affected:	**Customer Part Number(s) Affected:** ☒ N/A
TS13011-QFNR	

Description, Purpose and Effect of Change:

Assembly & FT transfer - For Device TS13011-QFNR
Assembly & FT transfer from Carsem Suzhou to Carsem Malaysia
Qualification and Reliability report attached

Change Classification	☒ **Major** ☐ **Minor**	**Impact to Form, Fit, Function**	☐ **Yes** ☒ **No**
Impact to Data Sheet	☐ **Yes** ☒ **No**	**New Revision or Date**	☒ **N/A**

Impact to Performance, Characteristics or Reliability:

No Impact to performance , Characteristics or Reliability

Implementation Date	**01-03-2022**	**Work Week**	**WW01**
Last Time Ship (LTS) Of unchanged product	**N/A**	**Affecting Lot No. / Serial No. (SN)**	**N/A**
Sample Availability	**-**	**Qualification Report Availability**	**Yes**

Supporting Documents for Change Validation/Attachments:

- **TS13011-QFNR – Qual Data (attached to Letter)**
- **TS13011-QFNR - Assembly Qual Data (attached to letter)**

Issuing Authority

Semtech Business Unit:	Power Management	
Semtech Contact Info:	***Carlos Sierra*** *Quality Assurance* *Semtech Corporation* 200 Flynn Road Camarillo, CA, 93012 *csierra@semtech.com*	Digital signature Carlos Sierra

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TS13011-QFNR Carsem Ipoh Qualification Report

TS13011-QFNR– Qual Data

Description	Acceptance Criteria	Remarks	Data
Test Repeatability: - 3~5 Devices loop run 30 times;	Pass or Fail 100% match	**PASS** Done. 10 Units 33X – PASS Consistently. Data as in attached file.	C:\WORK\ /FT\Suzhou Transfe

Description	Acceptance Criteria	Remarks	Data
Bin-to-Bin Correlation: - For each production test insertion, a minimum sample of 300 units must be used. - Minimum 15 reject units.	100% Bin-to-Bin correlation for all good and reject units - Pass/fail correlation; - Bin Swap/flip - Yield difference (Bin Paretos) - Wafer map;	**PASS** Done. Attached is the data and summary. All samplings are matching for Bin to Bin Summary vs Physical	TS13011-QFNR_1 2552S.1-QUAL

Description	Acceptance Criteria	Remarks	Data
QA gate validation: -Good units from 3 different wafer lots shall be tested 100% at QA gate after these lots have been processed through final production test flow.	No QA Gate failures.	**PASS** Done. Attached is the data and summary. All 100% Inline QA sampling test is PASS	QA_summary

TS13011-QFNR– Qual Data

Description	Acceptance Criteria	Remarks	Data
Tester-to-tester variation: GR&R - Perform tester to tester variation analysis for selected parameters; - Tester 1, Tester 2; - DIB1, DIB2; - Test site 1 to test site n;	Tester-to-Tester variation (GR&R) for selected parameters: - GRR<=10% Acceptable; - GRR<=33% Waiver required; - GRR >33% reject;	**PASS** Done. All within spec. Using Site 1 and Site2 from same tester.	GR&R

TS13011-QFNR– Qual Data

SPIKE CHECK

- ❑ Spike Check done ETS, while loop testing the device.
- ❑ No ripple found and no device damaged during the 1000X loop test.
- ❑ All the waveform captured within acceptable range
- ❑ Details are in the spike plot check attached.
- ❑ Spike check for both Carsem Suzhou and Carsem Ipoh are compatible

Spike Check_CSM

TS13011-QFNR– Qual Data

CPK Carsem Ipoh VS Carsem Suzhou

			SUZHOU				IPOH			
T#	name	units	execs	mean	stddev	cpk	execs	mean	stddev	cpk
7004	SW1SSvPRESTRESS	uAMPS	7082	0.93042692	0.04635491	6.69060305	1028	0.94110667	0.04551315	6.89256218
7005	SW2SSvPRESTRESS	uAMPS	7058	1.12749653	0.04666275	8.05422245	1027	1.24195586	0.04587485	9.02423196
7006	SW1SSvPSTSTRESS	uAMPS	7039	0.86870989	0.04672094	100.820532	1027	0.86853754	0.04755987	99.0433114
7007	SW2SSvPSTSTRESS	uAMPS	7033	1.01602424	0.12541278	2.70048039	1027	1.01559084	0.12087019	2.80077566
7008	SW1SSvDELTA	uAMPS	7029	0.06170586	0.00696481	236.344926	1027	0.07308776	0.00968132	169.636297
7009	SW2SSvDELTA	uAMPS	7029	0.11367436	0.08692853	18.7369456	1027	0.22763104	0.08467993	18.7859107
9001	[VCLAMP_SW1toSW2_20mA]	VOLTS	6532	87.7277053	0.1844807	7.71950078	1019	87.66538032	0.18185155	7.9482354
9002	VCLAMP_SW2toSW1_20mA	VOLTS	6532	87.8344415	0.18603849	7.49952969	1019	87.7485141	0.18544684	7.72519135
9005	SW1_ON_LEAK_55V	uAMPS	6532	0.95165459	0.04545835	6.9782154	1019	0.96221629	0.04586013	6.99384766
9006	AVDD2_SW1_Current	uAMPS	6529	2.41915722	0.13503882	5.97151059	1019	2.340799956	0.14556048	5.38042856
9009	SW2_ON_LEAK_55V	uAMPS	6529	0.95655482	0.04568978	6.97716345	1019	0.9812284S	0.04627159	7.06861642
9010	AVDD2_SW2_Current	uAMPS	6526	2.39674987	0.13570187	5.88729269	1017	2.284302171	0.14459184	5.27338825
9013	P2P_LEAK_SUBC	nAMPS	6526	25.3419258	0.98867465	126.516269	1017	25.2533449	1.0641165	117.388982
9014	P2P_LEAK_SW1	nAMPS	6525	-4.1485789	0.57540579	403.107056	1017	-64.139565	0.92655229	232.357588
9015	P2P_LEAK_SW2	nAMPS	6525	-41.559885	0.5299688	477.054448	1017	-75.446015	1.01544116	257.84539
9016	P2P_LEAK_VDD1	nAMPS	6525	358.651918	52.0077494	2.93965852	1017	343.657875	51.3461232	2.88900255
9017	P2P_LEAK_VDD2	nAMPS	6525	187.262563	7.16877957	28.4910256	1017	228.073844	17.432024	10.9363121
9018	P2P_LEAK_CLK	nAMPS	6525	394.00001	59.6577968	8.97340092	1017	418.623429	71.8657555	7.33486835
9019	P2P_LEAK_DATA	nAMPS	6525	2.19164532	1.80025165	8.85216164	1017	-15.537698	5.00662096	4.04244558
9020	P2P_LEAK_CPP	nAMPS	6525	415.828567	82.5775921	8.43845925	1017	394.275041	58.2314068	9.19163182
9021	Delta_SW1_SW2_Curr	nAMPS	6525	-4.6054843	8.1650459	101.898013	1017	-18.8598	10.2396238	80.7892476

Critical Parameter looks good

CPK_analysis

Conclusion:
From the Cpk data all parameters are above 1.33 for both Suzhou and Carsem

TS13011-QFNR– Qual Data- Other Summary

- ❑ No changes do to the Test Program, Limits:
  FT Program: *ef1301100 (TP-001215)*
  QA Program: *ef1301100 (TP-001215)*
- ❑ Both Carsem Suzhou and Ipoh uses the same Tester Platform (ETS)
- ❑ Both Carsem Suzhou and Ipoh uses the same QC flow diagram
  100% FT and Sample QA .
- ❑ No Changes required in Control Plan and FMEA.

PCN No. 000701
Qualification of Carsem Ipoh for TS13011-QFNR products

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Introduction

- TS13011-QFNR is been qualified in carsem Ipoh, Malaysia as a site for assembly. Current Assembly is performed in Carsem SuZhou, China.
- The change affect applicable to products:
  TS13011-QFNR
- Qualification Vehicles selected are 21-01-0014-A2
- Schedule for Implementation
  Passing REL qualification MSL 1 under Rel job# 7196.

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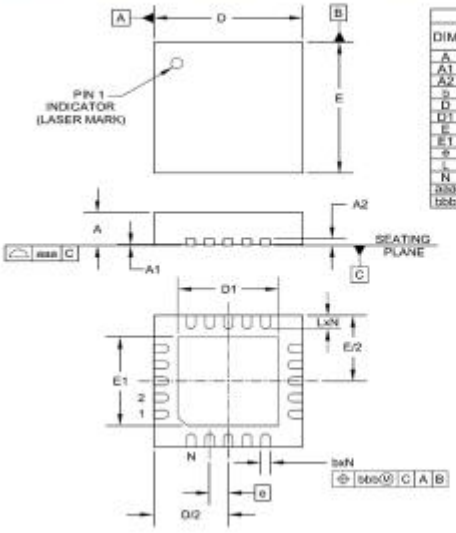
SEMTECH Package Outline on TS13011-QFNR CarsemSZ (Old) and CarsemIPH (New)



DIM	DIMENSIONS INCHES MIN	NOM	MAX	MILLIMETERS MIN	NOM	MAX
A	.031	.035	.039	0.80	0.90	1.00
A1	.000	.001	.002	0.00	0.02	0.05
A2	-	(.008)	-	-	(0.20)	-
b	.007	.010	.012	0.18	0.25	0.30
D	.154	.157	.161	3.90	4.00	4.10
D1	.100	.106	.110	2.55	2.70	2.80
E	.154	.157	.161	3.90	4.00	4.10
E1	.100	.106	.110	2.55	2.70	2.80
e		.020 BSC			0.50 BSC	
L	.012	.016	.020	0.30	0.40	0.50
N		20			20	
aaa		.004			0.10	
bbb		.004			0.10	

No Change in Package Outline.

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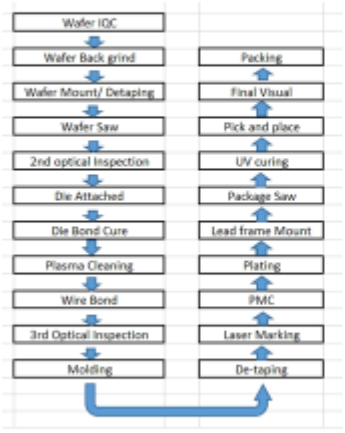
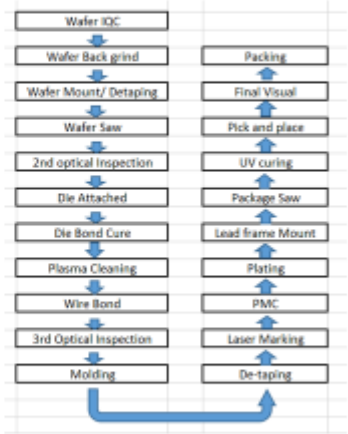
Assembly Process Flow Comparison for CarsemSZ (Old) vs. CarsemIPH (New)

Assembly Process Flow:

CARSEMSZ (Old)



CARSEMIPH (New)



- No Change in manufacturing Flow for both Assembly site CarsemSZ versus CarsemIPH.

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BOM Comparison CarsemSZ (Old) vs CarsemIPH (New)

CarsemSZ (Old)				CarsemIPH (New)			
Epoxy	Leadframe	Wire Type	Mold compound	Epoxy	Leadframe	Wire Type	Mold compound
Henkel QMI-519 Conductive epoxy	ASM Spore AgCu LDF	1.2 mils PdCu wire	Sumitomo G770HCD	Henkel QMI-519 Conductive epoxy	ASM Msia AgCu LDF	1.2 mils PdCu wire	Sumitomo G770HCD

- BOM for both supplier CarsemSZ and CarsemIPH are no difference.
- Lead frame base material and finishing is identical for both supplier. Both ASM Spore and ASM Msia are using the same lead frame mask set and equipment.

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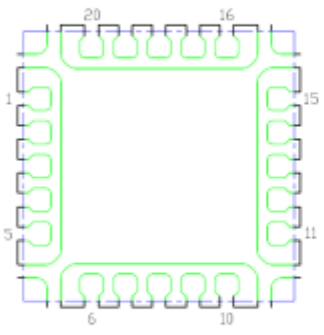
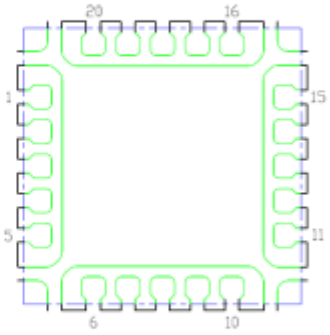
Lead frame outline Comparison ASM Spore (OLD) Vs ASM Msia (NEW)

OLD Lead frame (ASM Spore)



Die Pad :2.9 x 2.9mm
Exposed Pad : 2.7 x 2.7mm

NEW Lead frame (ASM Msia)



Die Pad :2.9 x 2.9mm
Exposed Pad : 2.7 x 2.7mm

No Difference on lead frame outline for ASM Spore and ASM Malaysia

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Lead frame outline Comparison ASM Spore (OLD) Vs ASM Msia (NEW)

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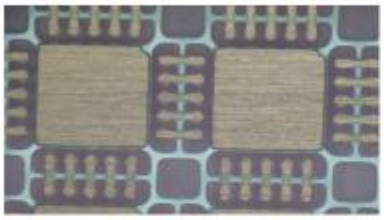
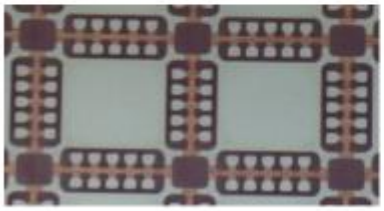
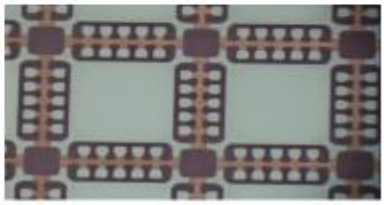
OLD Lead frame (ASM Spore)





NEW Lead frame (ASM Msia)



No Difference on lead frame outline for ASM Spore and ASM Malaysia

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Bonding Layout (CarsemSZ vs CarsemIPH)

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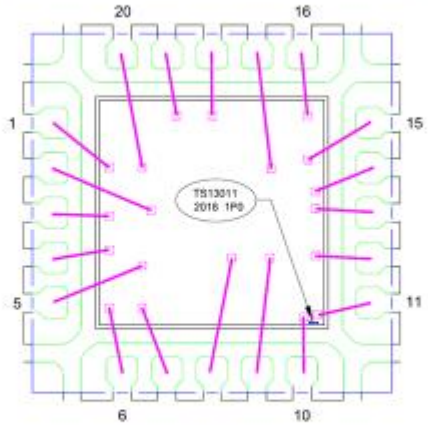

No Change in Bonding Layout.

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Solder ability test Comparison CarsemSZ (Old) vs CarsemIPH (New)

	Carsem - IPH	Carsem -SZ
a.) Without Steam Aging (0hr)	Passed	Passed
b.) With Steam Aging (8hr)	Passed	Passed

Solderability	Carsem- IPH	Carsem SZ
Without Steam aging (0 hrs)		
	Passed	Passed
With Steam aging (8 hrs)		
	Passed	Passed

Solder ability test for both supplier is passed.

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