PRODUCT / PROCESS CHANGE NOTIFICATION
PCN-000790
Date: 01-11-2022

Semtech Corporation, 200 Flynn Road, Camarillo CA 93012

Change Details

Part Number(s) Affected:

- TS30111-M000QFNR
- TS30111-M033QFNR
- TS30111-M050QFNR

Customer Part Number(s) Affected: ☒ N/A

Description, Purpose and Effect of Change:

Additional Source to Support Production Assembly and Final Test from Carsem Suzhou to Carsem Malaysia

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	**01/11/2022**	**Work Week**	**WW02**
Last Time Ship (LTS) Of unchanged product	**N/A**	**Affecting Lot No. / Serial No. (SN)**	**N/A**
Sample Availability	**Yes**	**Qualification Report Availability**	**Yes**

Supporting Documents for Change Validation/Attachments:

- **TS30111-M0XXQFNR SZ to Ipoh test qual data Transfer**
- **TS30111-M0XXQFNR SZ to Ipoh assembly qual data Transfer**

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*	Carlos Sierra

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Site Transfer

P/N TS3011X-M0XXQFNR

From: Carsem Suzhou

To: Carsem Ipoh

SEMTECH

COMPARISON BETWEEN CARSEM SUZHOU & CARSEM IPOH

ITEM	CARSEM SUZHOU	CARSEM IPOH
ATE Tester	ETS364	ETS364
Handler	Manufatcurer : SRM Model : XD248 Type : Turret/Rotary # Sites : Quad	Manufatcurer : SRM Model : XD248 Type : Turret/Rotary # Sites : Quad
Load Board	TS3001X/3004X	TS3001X/3004X
Test Program	ef30011_BC_11	ef30011_BC_11

SZ vs IPOH Handler Comparison

	Carsem Ipoh	Carsem SZ
Model	S248	XD248
Manufacturer	SRM Integration (Malaysia) Sdn Bhd	SRM Integration (Malaysia) Sdn Bhd
No of Site	Quad	Quad
Top Marking & Orientation Vision	Yes	Yes
Coplanarity & Pad Smear Vision	Yes	Yes
Integrated Tape and Reel	Yes	Yes
In Pocket Vision	Yes	Yes
Socket Cleaning Frequency	1x/Shift	1x/Shift
Impact to Part Lifetime	None	None

	IPOH - S248	SZ - XD248
Handler Photo		
GUI		

Remarks: Both Carsem SZ and Carsem IPOH handlers are compatible with similar capabilities

TS3011X Series – 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.	CDRR_UNIT_LOOP33.zip

Description	Acceptance Criteria	Remarks	Data
Bin-to-Bin Correlation: - Good and rejects bins are sorted according to the Bin assignment	100% Bin-to-Bin correlation for all good and reject units - Pass/fail correlation;	**PASS** Done. Attached is the data and summary. All samplings are matching for Bin to Bin Summary vs Physical	Bin to Bin Corelation

Description	Acceptance Criteria	Remarks	Data
QA gate validation: -Good units to 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

TS3011X Series – 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 Site1 and Site 2 from same tester.	TS3001X GRNR

Test#	Test Name	Unit	Samples	Min Spec	Max Spec	Average Min	Average Max	Average Mean	Rn	AveMax-AveMin	Meas. <= Mean	Meas. > Mean	Repeatability	Reproducibility	R&R	%R&R	Remarks
190080101	ilimt_meas_val	AMPS	30	1.50	2.000	1.801	1.807	1.804		0.006	1	1	0.242	0.000	0.242	48.4%	Leakage Test. Baseline issue. Test is capable with cpk > 1.33
190020101	osc_meas_val	KHERTZ	30	960.00	1050.000	997.984	998.020	998.002		0.036	1	1	43.059	0.000	43.059	47.8%	High frequency, baseline issue. Test is capable with cpk > 1.33
101050411	int_rail	VOLTS	30	3.90	4.700	4.452	4.454	4.453		0.002	1	1	0.303	0.000	0.303	37.9%	Vout Measurement, baseline issue. Test is capable with cpk > 1.33
190070101	ovuv_meas_val	%	30	98.00	102.000	100.972	100.984	100.978		0.012	1	1	1.175	0.000	1.175	25.4%	Several factors affecting %R&R > 10% that can be attributed to ATE capability, some minor differences in loadboards, cables, sockets, interface boards, etc. These tests have historically high %R&R > 18% since day 1 in Carsem SZ. These tests do not impact FT yield since the tests are capable with cpk > 1.33. Test distribution between Carsem SZ and Carsem IPOH are comparable
201050414	en_leak_5v_delta	uAMPS	30	-3.80	3.800	-1.068	-1.858	-1.963		0.018	1	1	1.665	0.000	1.665	27.8%	
201050410	en_leak_5v	uAMPS	30	-3.60	3.600	-1.608	-1.546	-1.577		0.062	1	1	1.906	0.000	1.906	26.5%	
201050408	en_leak_5v_post	uAMPS	30	-3.80	3.800	-0.458	-0.428	-0.443		0.030	1	1	1.870	0.000	1.870	24.6%	
201050413	en_leak_0v_delta	uAMPS	30	-0.10	0.100	-0.017	-0.011	-0.014		0.007	1	1	0.043	0.008	0.043	21.6%	
190140103	vout_meas	VOLTS	30	3.25	3.346	3.299	3.308	3.303		0.001	1	1	0.018	0.000	0.018	19.6%	
190010121	bg_tc_diff	mVOLTS	30	-10.00	10.000	0.334	0.788	0.521		0.374	1	1	3.757	0.000	3.757	18.8%	
201050416	PG_unpowered_leak_delta	nAMPS	30	-30.00	30.000	0.575	2.822	1.699		2.247	1	1	10.293	3.196	10.778	18.0%	
101050412	en_resist	uAMPS	30	85.00	245.000	169.346	169.517	169.433		0.170	1	1	28.085	0.000	28.085	17.6%	
101050409	en_leak_0v	uAMPS	30	-1.80	0.800	-1.424	-1.407	-1.415		0.018	1	1	0.313	0.000	0.313	12.0%	
201050407	en_leak_0v_post	uAMPS	30	-2.00	1.000	-1.414	-1.389	-1.402		0.024	1	1	0.316	0.000	0.316	10.5%	
101040400	pg_off_lk_hi	nAMPS	30	-25.00	200.000	17.253	24.561	20.907		7.307	1	1	19.384	11.526	22.552	10.0%	

TS3011X – Carsem Ipoh Qual Data

CPK Carsem SZ VS Carsem Ipoh - Summary

Ipoh Sample Production Data												SZ Sample Production Data											
Test Number	Test Name	Mean	Std Dev	Min	Max	N	Spec Low	Spec High	N Bad	% Good	Yield	Pct Def Spec	Cpk	Test Number	Test Name	Mean	Std Dev	Min	Max	N	Spec Low	Spec High	N Bad	% Good	Yield	Pct Def Spec	Cpk
190010102	bg_tc_trim_val	7	0.007	0	7	887	0	7	0	887	100	0	0.618	190010102	bg_tc_trim_val	7	0.661	0	7	6149	0	7	0	6149	100	0	0.633
190070100	osc_trim_val	5	3	0	7	887	0	7	0	887	100	0	0.276	190070100	osc_trim_val	4	3	0	7	6149	0	7	0	6149	100	0	0.308
190140201	vout_trim_val	9	13	0	31	887	0	31	0	887	100	0	0.345	190140201	vout_trim_val	11	13	0	31	6149	0	31	0	6149	100	0	0.287
190050000	osc_trim	5	5	0	7	887	0	255	0	887	100	0	0.518	190050000	osc_trim	5	5	0	7	6149	0	255	0	6149	100	0	0.661
190050000	vout_trim	9	13	0	31	887	0	255	0	887	100	0	0.345	190050000	vout_trim	11	13	0	31	6149	0	255	0	6149	100	0	0.287

Critical Parameter looks good

CPK Analysis Ipoh vs SZ

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

TS3011X Series – 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

TS3011X Series – Qual Data – Other Summary

- No changes done to the Test Program and Limits:

FT Program: *ef30011_BC_11 (ef30011_BC_11) – TS30111-M0XXQFNR*
QA Program: *ef30011_BC_11 (ef30011_BC_11) – TS30111-M0XXQFNR*

- 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.

TS3011X Series – Qual Data – Other Summary

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  FT Program: *ef30011_BC_11 (ef30011_BC_11) – TS30111-M0XXQFNR*
  QA Program: *ef30011_BC_11 (ef30011_BC_11) – TS30111-M0XXQFNR*

- Both Carsem Suzhou and Ipoh uses the same Tester Platform (ETS)

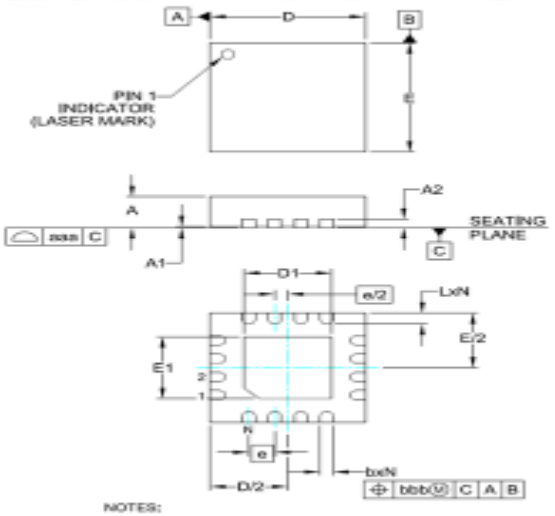
- Both Carsem Suzhou and Ipoh uses the same QC flow diagram
  100% FT and Sample QA.

- No Changes required in Control Plan and FMEA.

Introduction

- TS30111-M0XXQFNR 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:
  TS30111-M0XXQFNR
- Qualification Vehicles selected are ZSPM4561CI1R
- Schedule for Implementation
  Passing REL qualification MSL 1 under Rel job# 7197.

SEMTECH Package Outline on TS30111-M0XXQFNR CarsemSZ (Old) and CarsemIPH (New)



DIM	DIMENSIONS MILLIMETERS MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0.00	0.02	0.05
A2	–	(0.20)	–
b	0.18	0.25	0.30
D	2.90	3.00	3.10
D1	1.55	1.70	1.80
E	2.90	3.00	3.10
E1	1.55	1.70	1.80
e	0.50 BSC		
L	0.20	0.30	0.40
N	16		
aaa	0.08		
bbb	0.10		

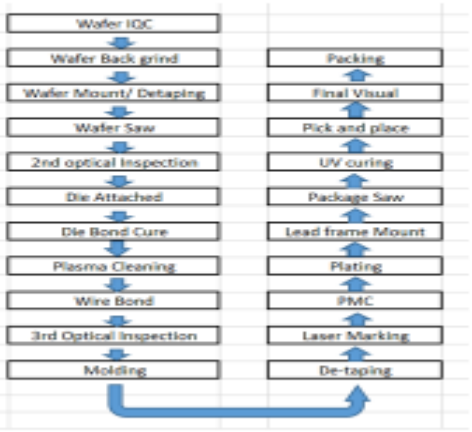
No Change in Package Outline.

NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

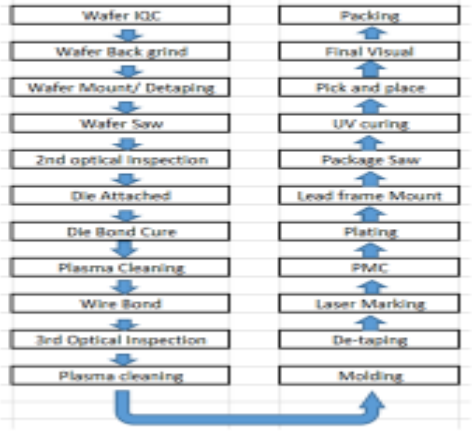
Assembly Process Flow Comparison for CarsemSZ (Old) vs. CarsemIPH (New)

Assembly Process Flow:

CARSEMSZ (Old)



CARSEMIPH (New)



- No major Change in manufacturing Flow for both Assembly site CarsemSZ versus CarsemIPH except additional process step for plasma cleaning before mold for Carsem Ipoh.

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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	DCI AgCu LDF	1.2 mils PdCu wire	Sumitomo G770HCD	Henkel QMI-519 Conductive epoxy	DCI AgCu LDF	1.2 mils PdCu wire	Sumitomo G770HCD

- BOM for both supplier CarsemSZ and CarsemIPH are no difference.

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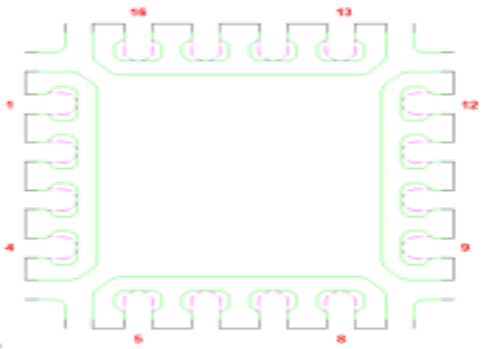
Lead frame outline Comparison CARSEMSZ (OLD) Vs CARSEMIPH(NEW)

Lead frame Outline



Die Pad :2.1 x 2.1mm
Exposed Pad : 1.7 x 1.7mm

No Difference on lead frame outline for CARSEMSZ and CARSEMIPH as both are using the same lead frame.

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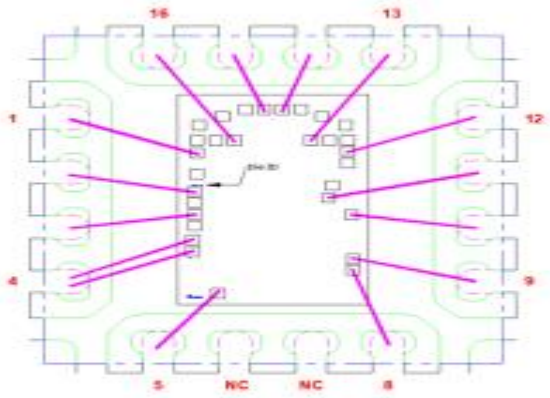
Bonding Layout (CarsemSZ vs CarsemIPH)



No Change in Bonding Layout.

Semtech Confidential 7