



PRODUCT / PROCESS CHANGE NOTIFICATION
PCN-000751
Date: 12-29-2021

P1/9

Semtech Corporation, 200 Flynn Road, Camarillo CA 93012

Change Details

Part Number(s) Affected: -TS14002-C012DFNR; -TS14002-C015DFNR; -TS14002-C018DFNR; -TS14002-C020DFNR; -TS14002-C023DFNR; -TS14002-C025DFNR; -TS14002-C033DFNR;	Customer Part Number(s) Affected: <input checked="" type="checkbox"/> N/A
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Description, Purpose and Effect of Change:

 Add Carsem Ipoh to support production Assembly & Final Test

Change Classification	<input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor	Impact to Form, Fit, Function	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Impact to Data Sheet	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	New Revision or Date	<input checked="" type="checkbox"/> N/A

Impact to Performance, Characteristics or Reliability:

 No Impact to performance , Characteristics or Reliability

Implementation Date	12/29/2021	Work Week	WW53
Last Time Ship (LTS) <small>Of unchanged product</small>	N/A	Affecting Lot No. / Serial No. (SN)	N/A
Sample Availability	-	Qualification Report Availability	Yes

Supporting Documents for Change Validation/Attachments:

- TS14002-C0XXDFNR SZ to Ipoh Test qual data Transfer
- TS14002-C0XXDFNR SZ to Ipoh Assembly qual data Transfer

Issuing Authority

Semtech Business Unit:	Power Management		
Semtech Contact Info:	<i>Carlos Sierra</i> Quality Assurance Semtech Corporation 200 Flynn Road Camarillo, CA, 93012 csierra@semtech.com		

FOR FURTHER INFORMATION & WORLDWIDE SALES COVERAGE: <http://www.semtech.com/contact/index.html#support>



Site Transfer
P/N TS14002-CXXXDFNR

From: Carsem Suzhou

To: Carsem Ipoh






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	TS14002	TS14002
Test Program	ef14002_BC_02 (FTP-TS14002) ef14002_BC_02 (QTP-TS14002)	ef14002_BC_02 (FTP-TS14002) ef14002_BC_02 (QTP-TS14002)



SZ vs IPOH Handler Comparison






	Carsem Ipoh	Carsem SZ		IPOH - S248	SZ - XD248
Model	S248	XD248	Handler Photo		
Manufacturer	SRM Integration (Malaysia) Sdn Bhd	SRM Integration (Malaysia) Sdn Bhd		GUI	
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			

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


TS14002-CXXXDFNR – 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.	
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	
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	

TS14002-CXXXDFNR – 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, Site 2 & Site3 from same tester.	 TS14002 - GR&R

Test Number	Test Name	Unit	Samples	Max Spec	Min Spec	Average Min	Average Max	Average Mean	Pp(Ave/Min) - Ave/Min	Meas. Min	Meas. Max	Repeatability	Reproducibility	R&R	% R&R	Remarks
T#4 4021	error_vmin_25uA	%	30	3.888	-3.888	2.161	2.226	2.282	0.888	1	2	5.265	0.888	5.265	89.3%	
T#4 4026	load_regulation	%	30	2.888	-2.888	-0.184	-0.888	-0.888	0.816	1	2	2.806	0.888	2.888	51.9%	
T#4 4014	error_vmin_50mA	%	30	3.888	-3.888	2.884	2.954	2.928	0.878	1	2	3.680	0.888	3.688	48.4%	
T#4 4016	error_vmin_50mA	%	30	3.888	-3.888	2.836	2.189	2.682	0.873	1	2	3.579	0.888	3.579	47.1%	
T#4 4023	percent_error	%	30	3.888	-3.888	1.184	1.254	1.218	0.869	1	2	3.518	0.888	3.518	46.2%	
T#4 4025	error_vmin_100mA	%	30	3.888	-3.888	2.164	2.265	2.233	0.861	1	2	3.501	0.888	3.514	46.1%	
T#4 4025	error_vmin_150mA	%	30	3.888	-3.888	2.248	2.299	2.297	0.861	1	2	3.493	0.888	3.493	46.0%	
T#4 4018	error_vmin_50mA	V	30	3.888	-3.888	1.244	1.313	1.285	0.875	1	2	3.401	0.888	3.481	44.7%	
T#2 0003	leakv_pgm_d	uAMPS	30	175.888	125.888	150.874	150.888	150.888	0.832	2	1	16.975	0.888	16.975	34.0%	Leakage Test. Baseline Issue. Test is capable with cpk > 1.33
T#2 0002	leakv_dr_d	uAMPS	30	125.888	75.000	111.587	111.882	111.641	0.384	2	1	12.383	0.888	12.383	24.0%	Several factors affecting %R&R > 10% that can be attributed to DATE capability, some minor differences on lead boards, 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.
T#4 4007	isp_min_vs_load	uAMPS	30	5.888	-5.888	-0.816	0.172	0.888	0.188	1	2	2.065	0.888	2.065	28.7%	
T#4 4009	isp_max_vs_load	uAMPS	30	5.888	-5.888	0.872	0.184	0.216	0.232	1	2	1.986	0.118	2.888	28.0%	
T#4 4008	isp_min_vs_load	uAMPS	30	5.888	-5.888	0.873	0.272	0.169	0.164	1	2	1.831	0.888	1.831	18.2%	
T#2 2011	leakL_pgm	V	30	66.000	24.000	33.191	33.711	33.194	0.838	2	1	3.721	0.888	3.721	11.6%	Test distribution between Carsem SZ and Carsem POH are comparable
T#2 2004	leakv_pgm	uAMPS	30	400.888	88.000	206.327	206.337	206.337	0.828	2	1	38.717	0.888	38.717	11.4%	
T#1 1000	leakL_pgm	RV(U) IS	30	200.888	800.888	160.888	167.348	166.812	3.583	1	2	74.748	0.888	74.748	16.7%	

TS14002-CXXXDFNR – Qual Data

CPK Carsem Ipoh VS Carsem Suzhou



Carsem Suzhou Data														Carsem Ipoh Data													
Test Name	Unit	Min	Max	Target	Stdev	CPK	CP	CPK	CP	Test Name	Unit	Min	Max	Target	Stdev	CPK	CP	CPK	CP								
error_vmin_25uA	%	2.161	2.226	2.282	0.888	1.00	1.00	1.00	1.00	error_vmin_25uA	%	2.161	2.226	2.282	0.888	1.00	1.00	1.00	1.00								
error_vmin_50mA	%	2.836	2.189	2.682	0.873	1.00	1.00	1.00	1.00	error_vmin_50mA	%	2.836	2.189	2.682	0.873	1.00	1.00	1.00	1.00								
error_vmin_100mA	%	2.164	2.265	2.233	0.861	1.00	1.00	1.00	1.00	error_vmin_100mA	%	2.164	2.265	2.233	0.861	1.00	1.00	1.00	1.00								
error_vmin_150mA	%	2.248	2.299	2.297	0.861	1.00	1.00	1.00	1.00	error_vmin_150mA	%	2.248	2.299	2.297	0.861	1.00	1.00	1.00	1.00								
error_vmin_50mA	V	1.244	1.313	1.285	0.875	1.00	1.00	1.00	1.00	error_vmin_50mA	V	1.244	1.313	1.285	0.875	1.00	1.00	1.00	1.00								
isp_min_vs_load	uAMPS	-0.816	0.172	0.888	0.188	1.00	1.00	1.00	1.00	isp_min_vs_load	uAMPS	-0.816	0.172	0.888	0.188	1.00	1.00	1.00	1.00								
isp_max_vs_load	uAMPS	0.872	0.184	0.216	0.232	1.00	1.00	1.00	1.00	isp_max_vs_load	uAMPS	0.872	0.184	0.216	0.232	1.00	1.00	1.00	1.00								
isp_min_vs_load	uAMPS	0.873	0.272	0.169	0.164	1.00	1.00	1.00	1.00	isp_min_vs_load	uAMPS	0.873	0.272	0.169	0.164	1.00	1.00	1.00	1.00								
leakL_pgm	V	33.191	33.711	33.194	0.838	1.00	1.00	1.00	1.00	leakL_pgm	V	33.191	33.711	33.194	0.838	1.00	1.00	1.00	1.00								
leakv_pgm	uAMPS	206.327	206.337	206.337	0.828	1.00	1.00	1.00	1.00	leakv_pgm	uAMPS	206.327	206.337	206.337	0.828	1.00	1.00	1.00	1.00								

Critical Parameter looks good

Conclusion:

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



TS14002-CXXXDFNR – 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



TS14002-CXXXDFNR – Qual Data- Other Summary



- No changes do to the Test Program, Limits:
 - FT Program:** *ef14002_BC_02 (FTP-TS14002)*
 - QA Program:** *ef14002_BC_02 (QTP-TS14002)*
- 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. 000751
Qualification of Carsem Ipoh for TS14002-C0XXDFNR products

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Introduction

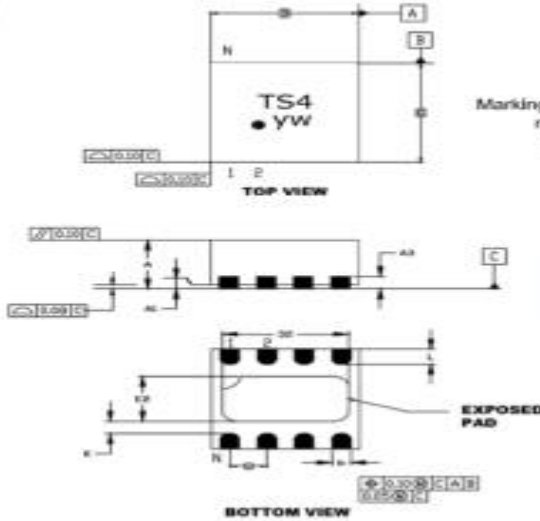


- TS14002-C0XXDFNR Series have been qualified in Carsem Ipoh, Malaysia as a site for assembly. Current Assembly is performed in Carsem SuZhou, China.
- The change affect applicable to products:
TS14002-C0XXDFNR
- Qualification Vehicles selected are TS14002/ TS30042-M033QFNR/ TS61002
- Schedule for Implementation
Passing REL qualification MSL 1 under Rel job# 7198.

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SEMTECH Package Outline on TS14002-C0XXDFNR CarsemSZ (Old) and CarsemIPH (New)



Marking for the 2.0 x 2.0 mm MLPD 8 Lead package:
 nnn = Part Number (Example: TS4) - Reference Part No. Code for small MLP
 yw = Datecode (Reference Package Marking Design Guide lines, Appendix A)

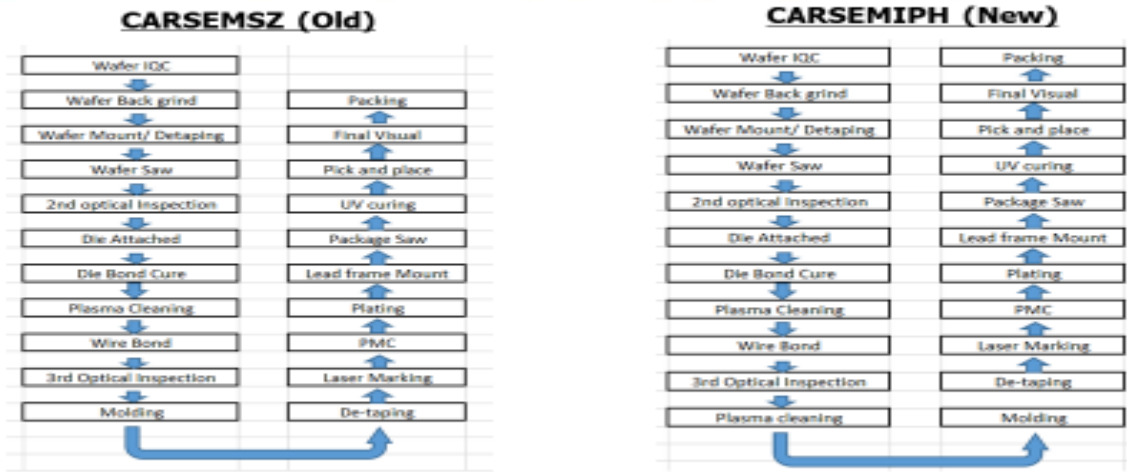
	Units	MILLIMETERS		
		Dimension Limits	MIN	NOM
Number of Pins	N		8	
Pitch	#		0.50 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.80	0.82	0.85
Contact Thickness	A3		0.28 REF	
Overall Length	D		2.00 BSC	
Exposed Pad Width	E2	0.75	0.90	1.00
Overall Width	E		2.00 BSC	
Exposed Pad Length	D2	1.55	1.70	1.80
Contact Width	h	0.18	0.25	0.30
Contact Length	L	0.20	0.30	0.40
Contact-to-Exposed Pad	K	0.20	-	-

No Change in Package Outline.

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



Assembly Process Flow:



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

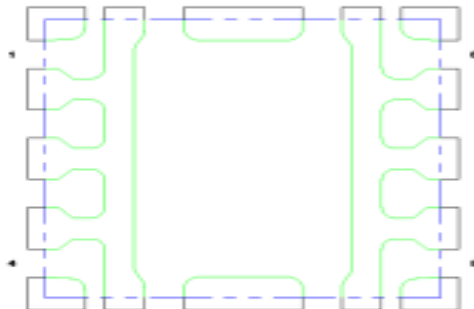
BOM Comparison CarsemSZ (Old) vs CarsemIPH (New) for TS14002-C0XXDFNR

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.

Lead frame outline Comparison CARSEMSZ (OLD) Vs CARSEMIPH(NEW) for TS14002-C0XXDFNR

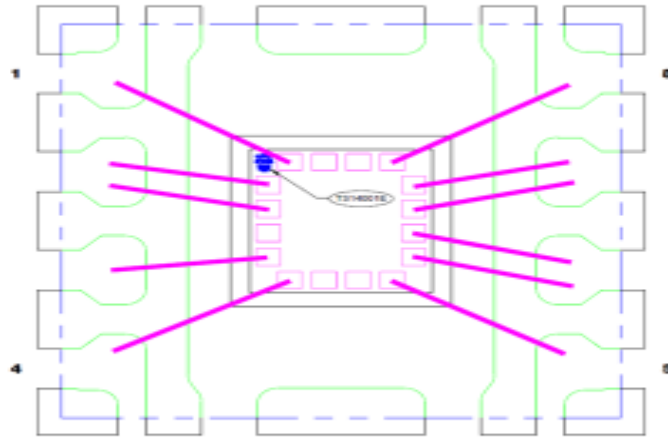
Lead frame Outline



Die Pad :1.1 x 1.7mm
Exposed Pad : 0.9 x 1.7mm

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

**Bonding Layout (CarsemSZ vs
CarsemIPH) for TS14002-C0XXDFNR**



No Change in Bonding Layout.