




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

P1/9

Semtech Corporation, 200 Flynn Road, Camarillo CA 93012			
<b>Change Details</b>			
<b>Part Number(s) Affected:</b>		<b>Customer Part Number(s) Affected:</b> <input checked="" type="checkbox"/> N/A	
-TS14002-C012DFNR; -TS14002-C015DFNR; -TS14002-C018DFNR; -TS14002-C020DFNR; -TS14002-C023DFNR; -TS14002-C025DFNR; -TS14002-C033DFNR;			
<b>Description, Purpose and Effect of Change:</b>			
Add Carsem Ipoh to support production Assembly & Final Test			
<b>Change Classification</b>	<input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor	<b>Impact to Form, Fit, Function</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Impact to Data Sheet</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<b>New Revision or Date</b>	<input checked="" type="checkbox"/> N/A
<b>Impact to Performance, Characteristics or Reliability:</b>			
No Impact to performance , Characteristics or Reliability			
<b>Implementation Date</b>	<b>12/29/2021</b>	<b>Work Week</b>	<b>WW53</b>
<b>Last Time Ship (LTS)</b> Of unchanged product	<b>N/A</b>	<b>Affecting Lot No. / Serial No. (SN)</b>	<b>N/A</b>
<b>Sample Availability</b>	-	<b>Qualification Report Availability</b>	<b>Yes</b>
<b>Supporting Documents for Change Validation/Attachments:</b>			
<ul style="list-style-type: none"> <li>• TS14002-C0XXDFNR SZ to Ipoh Test qual data Transfer</li> <li>• TS14002-C0XXDFNR SZ to Ipoh Assembly qual data Transfer</li> </ul>			

<b>Issuing Authority</b>	
<b>Semtech Business Unit:</b>	Power Management
<b>Semtech Contact Info:</b>	<i>Carlos Sierra</i> Quality Assurance Semtech Corporation 200 Flynn Road Camarillo, CA, 93012 <a href="mailto:csierra@semtech.com">csierra@semtech.com</a>
	
<b>FOR FURTHER INFORMATION &amp; WORLDWIDE SALES COVERAGE:</b> <a href="http://www.semtech.com/contact/index.html#support">http://www.semtech.com/contact/index.html#support</a>	



**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
<b>Test Repeatability:</b> - 3-5 Devices loop run 30 times;	Pass or Fail 100% match	<b>PASS</b> Done. 10 Units 33X – PASS Consistently. Data as in attached file.	
<b>Bin-to-Bin Correlation:</b> - 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;	<b>PASS</b> Done. Attached is the data and summary. All samplings are matching for Bin to Bin Summary vs Physical	
<b>QA gate validation:</b> - Good units to be tested 100% at QA gate after these lots have been processed through final production test flow.	No QA Gate failures.	<b>PASS</b> Done. Attached is the data and summary. All 100% Inline QA sampling test is PASS	

### TS14002-CXXXDFNR – Qual Data



Description	Acceptance Criteria	Remarks	Data
<b>Tester-to-tester variation: GR&amp;R</b> - 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;	<b>PASS</b> 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(AveMin - AveMax)	Meas. Min	Meas. Max	Repeatability	Reproducibility	R&R	% R&R	Remarks
T24 4021	error_vmin_20uA	%	30	3.888	-3.888	2.181	2.226	2.203	0.888	1	2	4.265	0.888	5.385	89.3%	
T24 4026	load_regulation	%	30	2.888	-2.888	-0.164	-0.888	-0.595	0.816	1	2	2.806	0.888	2.995	51.9%	
T24 4014	error_vmin_50mA	%	30	3.888	-3.888	2.884	2.954	2.929	0.878	1	2	3.690	0.888	3.888	48.4%	
T24 4016	error_vmin_50mA	%	30	3.888	-3.888	2.836	2.189	2.582	0.871	1	2	3.579	0.888	3.579	47.1%	
T24 4003	percent_error	sMPPS	30	3.888	-3.888	1.164	1.254	1.218	0.868	1	2	3.518	0.888	3.518	46.3%	
T24 4022	error_vmin_100mA	%	30	3.888	-3.888	2.164	2.266	2.233	0.861	1	2	3.501	0.888	3.501	45.1%	
T24 4025	error_vmin_150mA	%	30	3.888	-3.888	2.246	2.239	2.297	0.861	1	2	3.493	0.888	3.493	45.0%	
T24 4018	error_vmin_50mA	V	30	3.888	-3.888	1.244	1.313	1.288	0.876	1	2	3.401	0.888	3.401	44.7%	
T2 2000	leakv_pgm_0	sMPPS	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
T2 2002	leakv_dr_0	sMPPS	30	125.888	75.000	111.587	111.882	111.841	0.384	2	1	12.383	0.888	12.383	24.0%	Several factors affecting %R&R > 10% that can be attributed to
T24 4007	reg_min_vs_load	sMPPS	30	5.888	-5.888	-0.816	0.122	0.896	0.188	1	2	2.065	0.888	2.888	28.7%	ATE capability, some minor differences in load boards, cables,
T24 4009	reg_max_vs_load	sMPPS	30	5.888	-5.888	0.872	0.184	0.216	0.232	1	2	1.996	0.116	2.888	28.0%	socket, interface boards, etc. These tests have historically
T24 4008	reg_min_vs_load	sMPPS	30	5.888	-5.888	0.873	0.227	0.169	-0.164	1	2	1.931	0.888	1.931	18.2%	high %R&R > 18% since day 1 in Carsen SZ. These tests do
T2 2011	leak1_pgm	V	30	58.000	34.000	33.181	33.211	33.194	-0.818	2	1	3.721	0.888	3.721	11.0%	just impact FT yield since the tests are capable with cpk > 1.33
T2 2004	leakv_vorg	sMPPS	30	400.888	44.000	206.327	206.356	206.337	0.829	2	1	39.717	0.888	38.717	11.4%	Test distribution between Carsen SZ and Carsen POH are
T1 1000	leak1_vorg	RV(U)TS	30	200.888	900.888	1500.888	1507.344	1506.812	3.583	1	2	74.748	0.888	74.748	18.7%	acceptable

### TS14002-CXXXDFNR – Qual Data

CPK Carsen Ipoh VS Carsen Suzhou



Carsen Suzhou													Carsen Ipoh												
Test Name	Unit	Min	Max	Target	Stdev	Cpk	Cpk1.5	Cpk1.67	Cpk1.93	Cpk2.0	Cpk2.33	Cpk2.58	Test Name	Unit	Min	Max	Target	Stdev	Cpk	Cpk1.5	Cpk1.67	Cpk1.93	Cpk2.0	Cpk2.33	Cpk2.58
error_vmin_20uA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000	error_vmin_20uA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
error_vmin_50mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000	error_vmin_50mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
error_vmin_100mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000	error_vmin_100mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
error_vmin_150mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000	error_vmin_150mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
error_vmin_50mA	V	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000	error_vmin_50mA	V	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
percent_error	sMPPS	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000	percent_error	sMPPS	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
error_vmin_100mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000	error_vmin_100mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
error_vmin_150mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000	error_vmin_150mA	%	3.888	-3.888	0	0.122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
leak1_pgm	V	33.181	33.211	33.194	0.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	leak1_pgm	V	33.181	33.211	33.194	0.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000
leakv_vorg	sMPPS	206.327	206.356	206.337	0.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	leakv_vorg	sMPPS	206.327	206.356	206.337	0.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000
leak1_vorg	RV(U)TS	1500.888	1507.344	1506.812	0.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	leak1_vorg	RV(U)TS	1500.888	1507.344	1506.812	0.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Critical Parameter looks good

Conclusion:

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



TS14002 Data

## 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

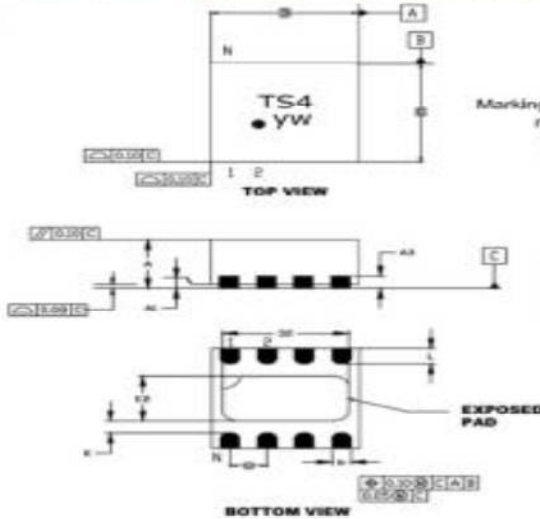


- TS14002-C0XXDFNR Series have been qualified in Carsem Ipoh, Malaysia as a site for assembly. Current Assembly is performed in Carsem SuZhou, China.
- The change affect applicable to products:  
TS14002-C0XXDFNR
- Qualification Vehicles selected are TS14002/ TS30042-M033QFNR/ TS61002
- Schedule for 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)

Dimension Limits	MILLIMETERS			
	MIN	NOM	MAX	
Number of Pins	N	8		
Pitch	p	0.50 69C		
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.90	0.92	0.95
Contact Thickness	A3	0.28 REF		
Overall Length	D	2.00 69C		
Exposed Pad Width	E2	0.75	0.90	1.00
Overall Width	E	2.00 69C		
Exposed Pad Length	D2	1.55	1.70	1.80
Contact Width	b	0.16	0.25	0.30
Contact Length	L	0.20	0.30	0.40
Contact-to-Exposed Pad	K	0.20	-	-

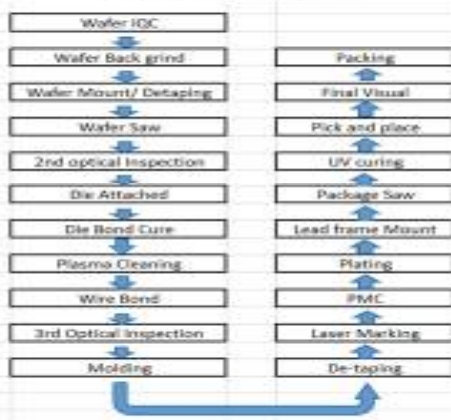
**No Change in Package Outline.**

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



Assembly Process Flow:

#### 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 Iph.

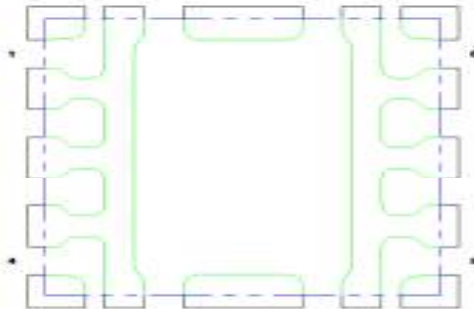
**BOM Comparison CarsemSZ (Old) vs CarsemIPH (New) for TS14002-C0XXDFNR**

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**

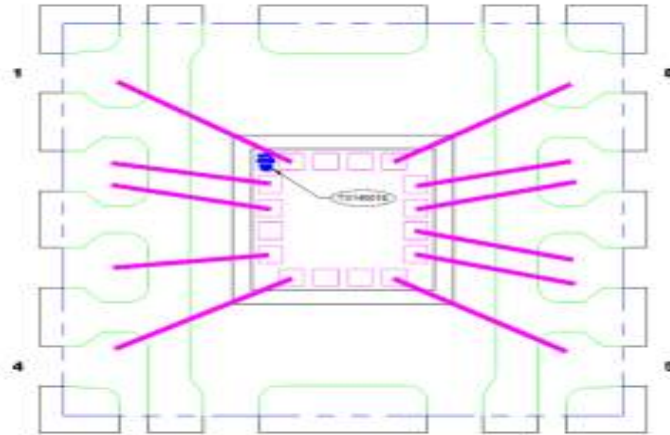


**Die Pad : 1.1 x 1.7mm**  
**Exposed Pad : 0.9 x 1.7mm**

**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.**