

# **TPS50601-SP Neutron Displacement Damage Characterization**

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## **ABSTRACT**

This report presents the effect of neutron displacement damage (NDD) on the TPS50601-SP device. The results show that all devices are fully functional and within production test limits after having been irradiated up to  $1 \times 10^{13}$  n/cm<sup>2</sup> (1-MeV equivalent). A sample size of nine units were exposed to radiation testing per (MIL-STD-883, Method 1017 for Neutron Irradiation) and an additional unirradiated sample device was used for correlation. All devices used in the experiment were from lot date code 1752A and assembly lot 7502703. Electrical testing was performed at Texas Instruments before and after neutron irradiation using the production test program for TPS50601-SP.

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## **Trademarks**

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## 1 Overview

The TPS50601-SP is a radiation-hardened 1.6- to 6.3-VIN, 6-A synchronous step-down converter, which is optimized for small footprint designs through integrating the high- and low-side MOSFETs. Further space saving is achieved through current mode control, which reduces component count, and a high switching frequency that reduces the footprint of the inductor. Optimal packaging provides an excellent power efficiency in an ultra-small footprint.

General device information and testing conditions are listed in [Table 1](#).

**Table 1. Overview Information**

TI PART NUMBER	TPS50601-SP
Device Function	Synchronous Step-Down Converter
Die Name	RTPS50601V07C0
Technology	LBC7
A/T Lot Number / Date Code	7502703 / 1752A
Unbiased Quantity Tested	9
Exposure Facility	VPT Rad
Neutron Fluence (1-MeV equivalent)	$1.0 \times 10^{12}$ , $5.0 \times 10^{12}$ , $1.0 \times 10^{13}$ n/cm <sup>2</sup>
Irradiation Temperature	25°C
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## 2 Test Procedures

The TPS50601-SP was electrically pre-tested using the production automated test equipment program. General test procedures were IAW MIL-STD-883, Method 1017 for Neutron Irradiation of TPS50601-SP.

**Table 2. Neutron Irradiation Conditions**

GROUP	SAMPLE QUANTITY	NEUTRON FLUENCE (n/cm <sup>2</sup> )	BIAS
A	3	$1.0 \times 10^{12}$	Unbiased
B	3	$5.0 \times 10^{12}$	Unbiased
C	3	$1.0 \times 10^{13}$	Unbiased



**Figure 1. TPS50601-SP Device**

## 3 Facility

The University of Massachusetts's Fast Neutron Irradiation (FNI) facility is an experimental facility that replaces three beam ports that originally existed on the left side of the research reactor. It is designed to give a fast flux level  $\geq 10^{11}$  n/cm<sup>2</sup>-s, with relatively low thermal fluence and gamma dose rates. Samples with a cross-sectional area as large as 30 cm (12 in) × 30 cm (12 in) and up to 15-cm (6-in) thick can be irradiated. The fast neutron flux is designed to be nearly uniform over the 30-cm (12-in) × 30-cm (12-in) area facing the core, and the fast fluence variation through the sample thickness is minimized via a single 180° rotation of the sample canister at the midpoint of the irradiation period. The FNI facility offers a significantly larger sample volume than previously available within the University of Massachusetts Lowell Research Reactor (UMLRR).

The fluences are calculated based on 1-MeV equivalences.

Detailed information of the radiation facility is available at the following link:

[www.uml.edu/docs/FNI%20Brochure\\_tcm18-90375.pdf](http://www.uml.edu/docs/FNI%20Brochure_tcm18-90375.pdf)

## 4 Results

There were no functional failures at any irradiation level. All parametric measurements remained well within all of the [TPS50601-SP 1.6-V to 6.3-V Input, 6-A Synchronous Step Down SWIFT™ Converter Data Sheet](#) limits for all exposure levels. All parametric measurements remained well within the production test limits which are guard-banded from the data sheet limits. The full parameter list and graphs are found in [Appendix A](#).

Table 3 lists the TPS50601-SP specification compliance matrix.

**Table 3. TPS50601-SP Specification Compliance Matrix**

PARAMETER	TEST CONDITION	TPS50601-SP DATA SHEET (SLVSD45)				TEST #
		MIN	TYP	MAX	UNIT	
VIN internal UVLO threshold	VIN rising		2.75	3	V	810.1, 811.1
VIN internal UVLO hysteresis			50		mV	813.1
VIN shutdown supply current	VEN = 0 V		2.5	5.9	mA	37.1, 42.1
VIN operating – non-switching supply current	VSENSE = VBG		5	10	mA	33.1, 45.1
Enable threshold	Rising		1.13	1.18	V	1700.1, 2700.1
	Falling	1.05	1.09			1701.1, 2701.1
Input current	VEN = 1.1 V		3.2		μA	2703.1, 2704.1, 1703.1, 1704.1
Hysteresis current	VEN = 1.3 V		3		μA	1706.1, 2706.1
Voltage reference		0.785	0.795	0.804	V	9000.1, 9110.1, 9001.1
Error amplifier transconductance (gm)	-2 μA < ICOMP < 2 μA, V(COMP) = 1 V		1300		μS	9007.1, 9008.1
Error amplifier source/sink	V(COMP) = 1 V, 100-mV input overdrive		±125		μA	9010.1, 9011.1
High-side switch current limit threshold	VIN = 6.3 V	8	11		A	641.1
Low-side switch sourcing current limit	VIN = 6.3 V	7	10		A	721.1
Internally set frequency	RT = Open	395	500	585	kHz	2550.1, 7550.1
Externally set frequency	RT = 100 kΩ (1%)		480			7996.1
	RT = 487 kΩ (1%)		100			7993.1
	RT = 47 kΩ (1%)		1000			7994.1
SYNC out low-to-high rise time (10%/90%)	Cload = 25 pF		25	111	ns	2651.1, 7651.1
SYNC out high-to-low fall time (90%/10%)	Cload = 25 pF		3	15	ns	2650.1, 7650.1
SYNC out high level threshold	IOH = 50 μA	2			V	7652.1, 7653.1, 2652.1, 2653.1
SYNC out low level threshold	IOL = 50 μA			600	mV	
SYNC in low level threshold		800			mV	7995.1, 8003.1,
SYNC in high level threshold				1.85	V	
SYNC in frequency range		100		1000	kHz	7995.1, 8003.1,
Minimum on time	Measured at 10% to 90% of VIN, 25°C, IPH = 2 A		94	175	ns	9999.1, 7999.1
SS/TR to VSENSE matching	V(SS/TR) = 0.4 V		30	90	mV	9009.1, 9109.1
Output high leakage	VSENSE = Vref, V(PWRGD) = 5 V		30	181	nA	1105.1
Minimum VIN for valid output	V(PWRGD) < 0.5 V at 100 μA		0.6	1	V	812.1
Minimum SS/TR voltage for PWRGD				1.4	V	1705.1, 2705.1

## Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

<b>Changes from Original (February 2019) to A Revision</b>	<b>Page</b>
• Changed the unbiased quantity that was tested. ....	<b>2</b>
• Changed the sample quantity. ....	<b>3</b>

## **Test Results**

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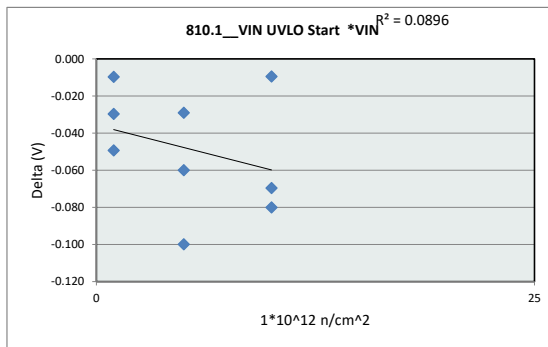
This appendix contains the detailed test results.

NDD Report  
TPS50601-SP

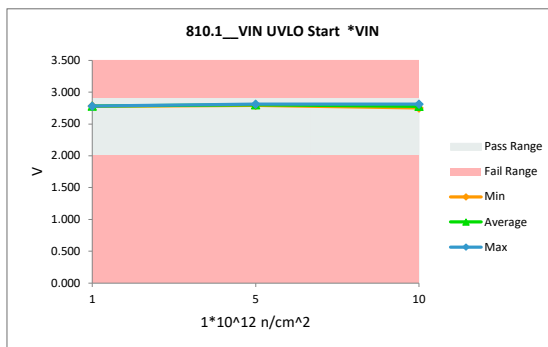
# NDD Report TPS50601-SP

810.1_VIN UVLO Start *VIN		
Test Site		
Tester		
Test Number		
Unit	V	V
Max Limit	2.9	2.9
Min Limit	2	2

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	2.750	2.779	-0.030
1	787	2.730	2.779	-0.049
1	788	2.770	2.780	-0.010
5	789	2.730	2.790	-0.060
5	791	2.710	2.810	-0.100
5	792	2.770	2.799	-0.029
10	790	2.740	2.750	-0.010
10	793	2.740	2.810	-0.070
10	794	2.690	2.770	-0.080
Max		2.770	2.810	-0.010
Average		2.737	2.785	-0.049
Min		2.690	2.750	-0.100
Std Dev		0.026	0.019	0.032



810.1_VIN UVLO Start *VIN			
Test Site			
Tester			
Test Number			
Max Limit	2.9	V	
Min Limit	2	V	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	2.000	2.000	2.000
Min	2.779	2.790	2.750
Average	2.779	2.800	2.776
Max	2.780	2.810	2.810
UL	2.900	2.900	2.900

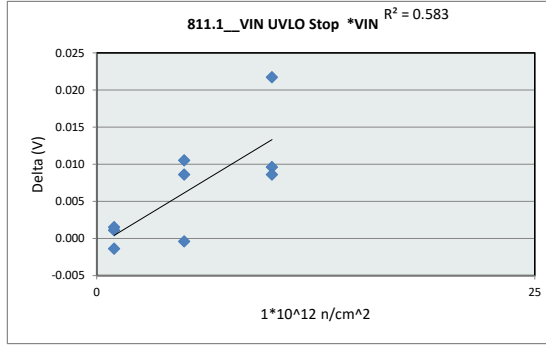




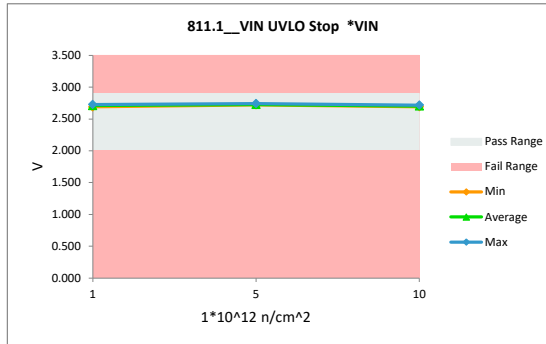
NDD Report  
TPS50601-SP

811.1_VIN UVLO Stop *VIN	
Test Site	
Tester	
Test Number	
Unit	V
Max Limit	2.9
Min Limit	2

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	2.710	2.711	-0.001
1	787	2.690	2.689	0.001
1	788	2.730	2.728	0.002
5	789	2.730	2.720	0.010
5	791	2.740	2.741	0.000
5	792	2.730	2.721	0.009
10	790	2.700	2.690	0.010
10	793	2.740	2.719	0.022
10	794	2.710	2.702	0.009
Max		2.740	2.741	0.022
Average		2.720	2.713	0.007
Min		2.690	2.689	-0.001
Std Dev		0.018	0.017	0.007



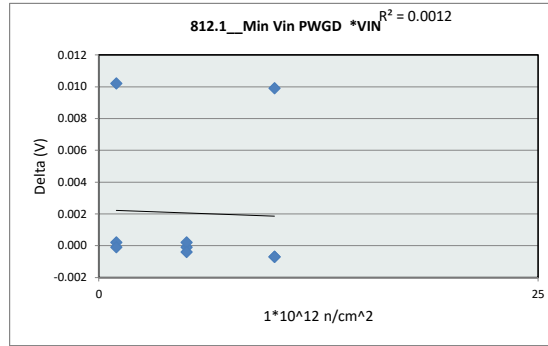
811.1_VIN UVLO Stop *VIN			
Test Site			
Tester			
Test Number			
Max Limit	2.9	V	
Min Limit	2	V	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	2.000	2.000	2.000
Min	2.689	2.720	2.690
Average	2.710	2.727	2.703
Max	2.729	2.741	2.719
UL	2.900	2.900	2.900



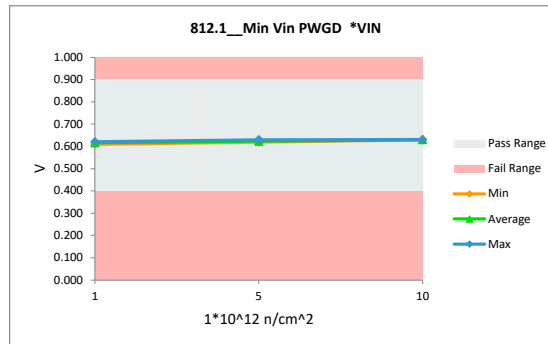
NDD Report  
TPS50601-SP

812.1__Min Vin PWGD *VIN	
Test Site	
Tester	
Test Number	
Unit	V
Max Limit	0.9
Min Limit	0.4

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	0.620	0.619	0.000
1	787	0.620	0.610	0.010
1	788	0.620	0.620	0.000
5	789	0.620	0.620	0.000
5	791	0.630	0.630	0.000
5	792	0.620	0.620	0.000
10	790	0.630	0.630	-0.001
10	793	0.629	0.630	-0.001
10	794	0.640	0.630	0.010
Max		0.640	0.630	0.010
Average		0.625	0.623	0.002
Min		0.620	0.610	-0.001
Std Dev		0.007	0.007	0.005



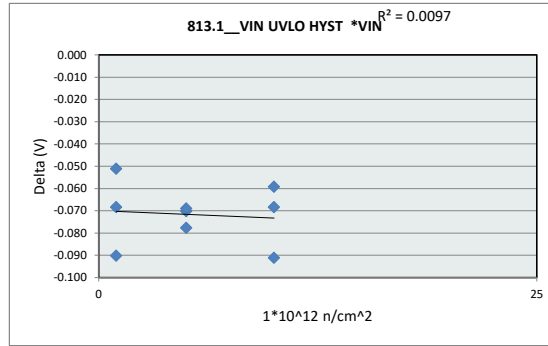
812.1__Min Vin PWGD *VIN			
Test Site			
Tester			
Test Number			
Max Limit	0.9	V	
Min Limit	0.4	V	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	0.400	0.400	0.400
Min	0.610	0.620	0.630
Average	0.617	0.623	0.630
Max	0.620	0.630	0.630
UL	0.900	0.900	0.900



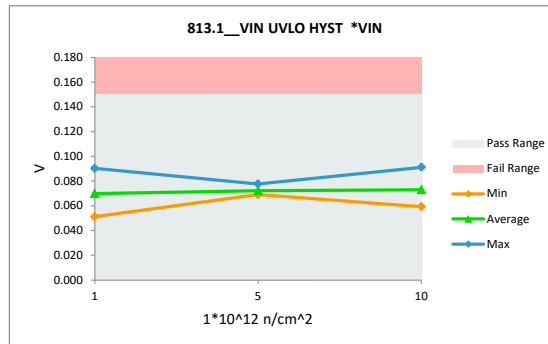
NDD Report  
TPS50601-SP

813.1_VIN UVLO HYST *VIN		
Test Site		
Tester		
Test Number		
Unit	V	V
Max Limit	0.15	0.15
Min Limit	0	0

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	0.000	0.068	-0.068
1	787	0.000	0.090	-0.090
1	788	0.000	0.051	-0.051
5	789	0.000	0.070	-0.070
5	791	0.000	0.069	-0.069
5	792	0.000	0.078	-0.078
10	790	0.000	0.059	-0.059
10	793	0.000	0.091	-0.091
10	794	0.000	0.068	-0.068
Max		0.000	0.091	-0.051
Average		0.000	0.072	-0.072
Min		0.000	0.051	-0.091
Std Dev		0.000	0.013	0.013



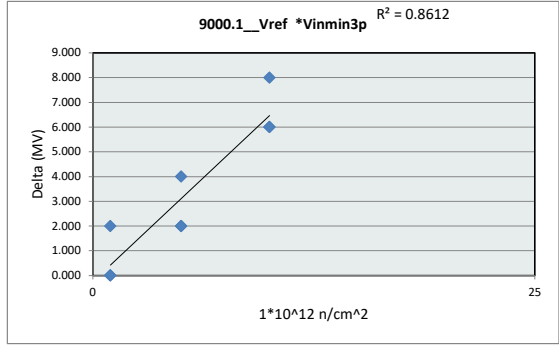
813.1_VIN UVLO HYST *VIN			
Test Site			
Tester			
Test Number			
Max Limit	0.15	V	
Min Limit	0	V	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	0.000	0.000	0.000
Min	0.051	0.069	0.059
Average	0.070	0.072	0.073
Max	0.090	0.078	0.091
UL	0.150	0.150	0.150



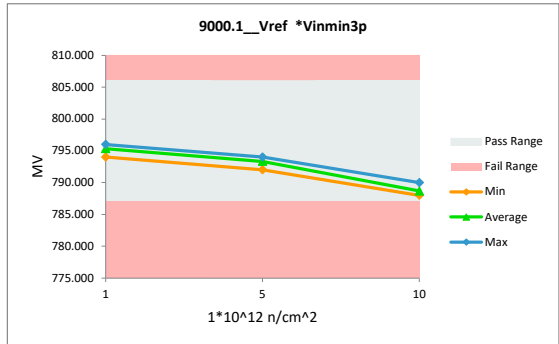
NDD Report  
TPS50601-SP

9000.1_Vref *Vinmin3p		
Test Site		
Tester		
Test Number		
Unit	mV	MV
Max Limit	806	806
Min Limit	787	787

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	796.000	794.000	2.000
1	787	796.000	796.000	0.000
1	788	796.000	796.000	0.000
5	789	794.000	792.000	2.000
5	791	798.000	794.000	4.000
5	792	796.000	794.000	2.000
10	790	794.000	788.000	6.000
10	793	798.000	790.000	8.000
10	794	794.000	788.000	6.000
Max		798.000	796.000	8.000
Average		795.778	792.444	3.333
Min		794.000	788.000	0.000
Std Dev		1.563	3.127	2.828



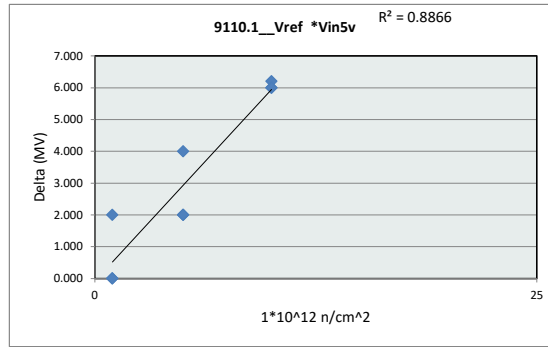
9000.1_Vref *Vinmin3p			
Test Site			
Tester			
Test Number			
Max Limit	806		MV
Min Limit	787		MV
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	787.000	787.000	787.000
Min	794.000	792.000	788.000
Average	795.333	793.333	788.667
Max	796.000	794.000	790.000
UL	806.000	806.000	806.000



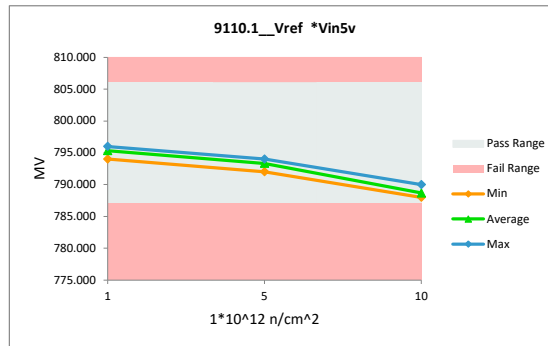
# NDD Report TPS50601-SP

9110.1_Vref *Vin5v		
Test Site		
Tester		
Test Number		
Unit	mV	MV
Max Limit	806	806
Min Limit	787	787

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	796.000	794.000	2.000
1	787	796.000	796.000	0.000
1	788	796.000	796.000	0.000
5	789	794.000	792.000	2.000
5	791	798.000	794.000	4.000
5	792	796.000	794.000	2.000
10	790	794.000	788.000	6.000
10	793	796.200	790.000	6.200
10	794	794.000	788.000	6.000
Max		798.000	796.000	6.200
Average		795.578	792.444	3.133
Min		794.000	788.000	0.000
Std Dev		1.343	3.127	2.502



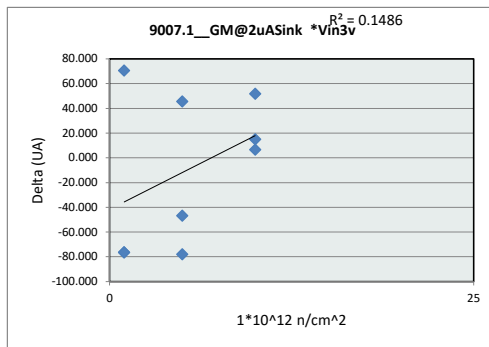
9110.1_Vref *Vin5v			
Test Site			
Tester			
Test Number			
Max Limit	806		MV
Min Limit	787		MV
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	787.000	787.000	787.000
Min	794.000	792.000	788.000
Average	795.333	793.333	788.667
Max	796.000	794.000	790.000
UL	806.000	806.000	806.000



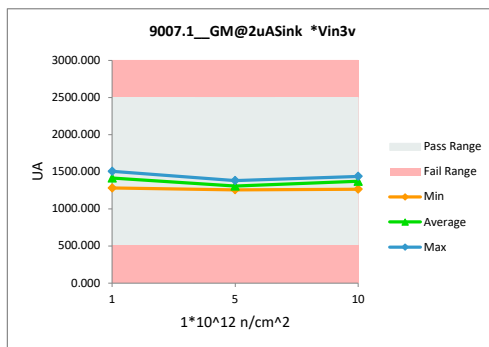
# NDD Report TPS50601-SP

9007.1_GM@2uASink *Vin3v		
Test Site		
Tester		
Test Number		
Unit	µA	UA
Max Limit	2500	2500
Min Limit	500	500

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	1349.984	1279.501	70.482
1	787	1378.864	1455.345	-76.481
1	788	1428.318	1504.904	-76.586
5	789	1231.853	1278.646	-46.794
5	791	1425.078	1379.546	45.532
5	792	1178.904	1256.923	-78.019
10	790	1443.968	1437.370	6.598
10	793	1459.785	1408.045	51.740
10	794	1277.901	1262.932	14.969
Max		1459.785	1504.904	70.482
Average		1352.739	1362.579	-9.840
Min		1178.904	1256.923	-78.019
Std Dev		101.149	94.769	60.317



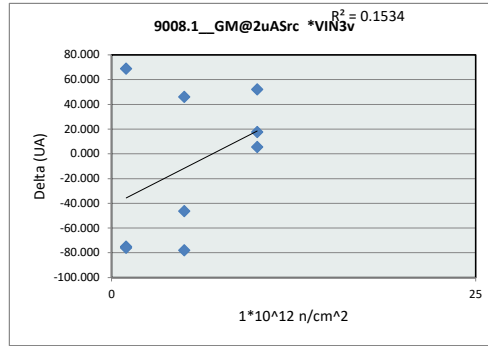
9007.1_GM@2uASink *Vin3v			
Test Site			
Tester			
Test Number			
Max Limit	2500	UA	
Min Limit	500	UA	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	500.000	500.000	500.000
Min	1279.501	1256.923	1262.932
Average	1413.250	1305.039	1369.449
Max	1504.904	1379.546	1437.370
UL	2500.000	2500.000	2500.000



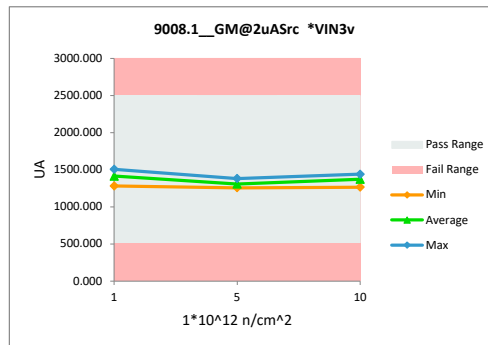
# NDD Report TPS50601-SP

9008.1_GM@2uASrc *VIN3v		
Test Site		
Tester		
Test Number		
Unit	µA	UA
Max Limit	2500	2500
Min Limit	500	500

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	1347.434	1278.701	68.733
1	787	1378.947	1454.044	-75.097
1	788	1428.754	1504.733	-75.979
5	789	1231.460	1277.889	-46.429
5	791	1425.090	1379.077	46.012
5	792	1178.605	1256.736	-78.131
10	790	1443.639	1438.149	5.490
10	793	1462.212	1410.134	52.078
10	794	1281.184	1263.650	17.534
Max		1462.212	1504.733	68.733
Average		1353.036	1362.568	-9.532
Min		1178.605	1256.736	-78.131
Std Dev		101.320	94.879	59.944



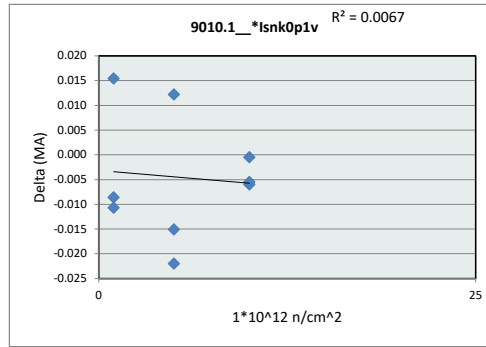
9008.1_GM@2uASrc *VIN3v			
Test Site			
Tester			
Test Number			
Max Limit	2500	UA	
Min Limit	500	UA	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	500.000	500.000	500.000
Min	1278.701	1256.736	1263.650
Average	1412.492	1304.568	1370.644
Max	1504.733	1379.077	1438.149
UL	2500.000	2500.000	2500.000



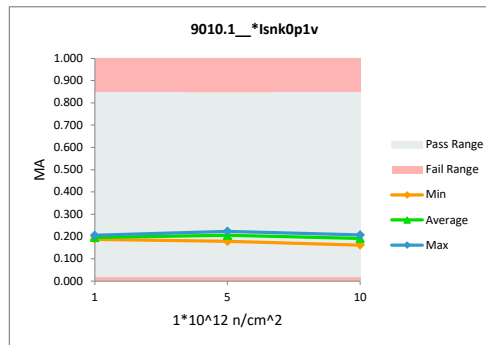
NDD Report  
TPS50601-SP

9010.1_*Isnk0p1v	
Test Site	
Tester	
Test Number	
Unit	mA MA
Max Limit	0.8457 0.8457
Min Limit	0.0148 0.0148

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	0.208	0.193	0.015
1	787	0.179	0.187	-0.009
1	788	0.194	0.205	-0.011
5	789	0.163	0.178	-0.015
5	791	0.227	0.214	0.012
5	792	0.201	0.223	-0.022
10	790	0.201	0.207	-0.006
10	793	0.199	0.204	-0.006
10	794	0.161	0.162	-0.001
Max		0.227	0.223	0.015
Average		0.192	0.197	-0.005
Min		0.161	0.162	-0.022
Std Dev		0.021	0.019	0.012



9010.1_*Isnk0p1v		1	5	10
Test Site				
Tester				
Test Number				
Max Limit	0.8457	MA		
Min Limit	0.0148	MA		
LL	0.015	0.015	0.015	
Min	0.187	0.178	0.162	
Average	0.195	0.205	0.191	
Max	0.205	0.223	0.207	
UL	0.846	0.846	0.846	

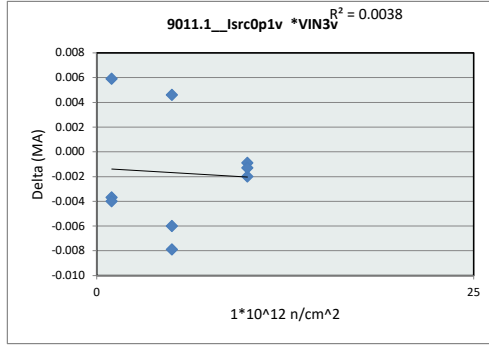




NDD Report  
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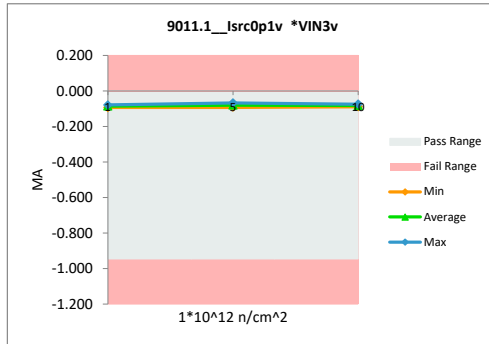
9011.1_Isrc0p1v *VIN3v		
Test Site		
Tester		
Test Number		
Unit	mA	MA
Max Limit	-0.0062	-0.0062
Min Limit	-0.9456	-0.9456

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	-0.073	-0.079	0.006
1	787	-0.087	-0.083	-0.004
1	788	-0.097	-0.093	-0.004
5	789	-0.086	-0.079	-0.008
5	791	-0.087	-0.091	0.005
5	792	-0.073	-0.067	-0.006
10	790	-0.076	-0.074	-0.002
10	793	-0.090	-0.089	-0.001
10	794	-0.084	-0.083	-0.001
Max		-0.073	-0.067	0.006
Average		-0.084	-0.082	-0.002
Min		-0.097	-0.093	-0.008
Std Dev		0.008	0.009	0.005



9011.1_Isrc0p1v *VIN3v		
Test Site		
Tester		
Test Number		
Max Limit	-0.0062	MA
Min Limit	-0.9456	MA

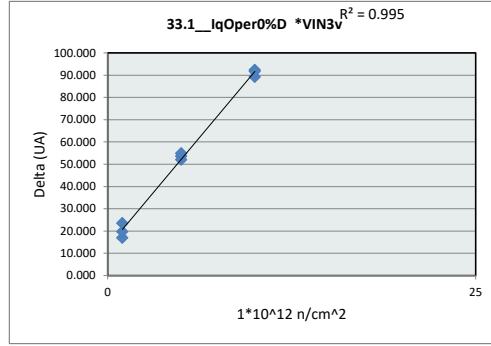
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	-0.946	-0.946	-0.946
Min	-0.093	-0.092	-0.089
Average	-0.085	-0.079	-0.082
Max	-0.079	-0.067	-0.074
UL	-0.006	-0.006	-0.006



NDD Report  
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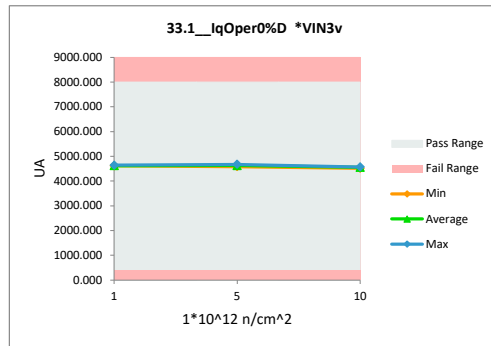
33.1_IqOper0%D *VIN3v	
Test Site	
Tester	
Test Number	
Unit	μA      UA
Max Limit	8000      8000
Min Limit	400      400

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	4631.718	4614.793	16.925
1	787	4638.448	4614.980	23.468
1	788	4659.012	4639.332	19.680
5	789	4672.907	4619.314	53.593
5	791	4635.333	4583.333	51.999
5	792	4729.114	4674.222	54.892
10	790	4657.641	4565.343	92.298
10	793	4660.507	4571.298	89.208
10	794	4603.335	4511.621	91.714
Max		4729.114	4674.222	92.298
Average		4654.224	4599.360	54.864
Min		4603.335	4511.621	16.925
Std Dev		34.881	47.410	30.846



33.1_IqOper0%D *VIN3v	
Test Site	
Tester	
Test Number	
Max Limit	8000      UA
Min Limit	400      UA

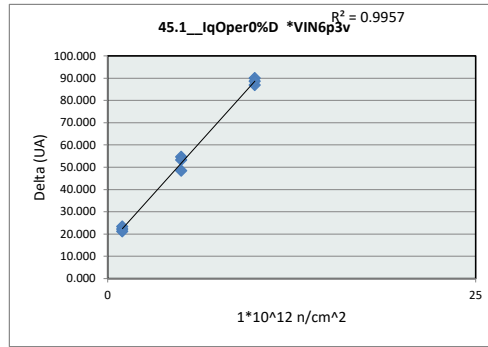
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	400.000	400.000	400.000
Min	4614.794	4583.334	4511.621
Average	4623.035	4625.623	4549.421
Max	4639.332	4674.222	4571.298
UL	8000.000	8000.000	8000.000



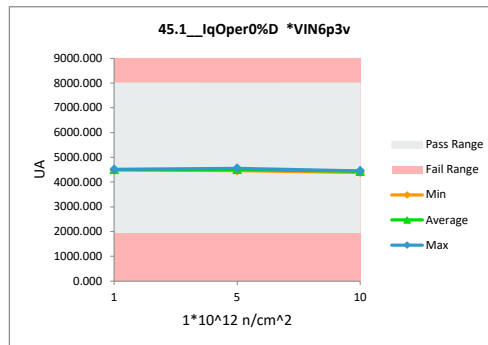
NDD Report  
TPS50601-SP

45.1_IqOper0%D *VIN6p3v	
Test Site	
Tester	
Test Number	
Unit	μA UA
Max Limit	8000 8000
Min Limit	1931.9 1931.9

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	4514.435	4492.283	22.152
1	787	4527.151	4503.814	23.336
1	788	4536.826	4515.671	21.154
5	789	4551.405	4496.827	54.578
5	791	4509.883	4461.447	48.436
5	792	4609.674	4556.442	53.232
10	790	4538.333	4448.313	90.021
10	793	4542.577	4455.725	86.852
10	794	4480.024	4391.409	88.615
Max		4609.674	4556.442	90.021
Average		4534.479	4480.215	54.264
Min		4480.024	4391.409	21.154
Std Dev		35.448	47.306	28.809



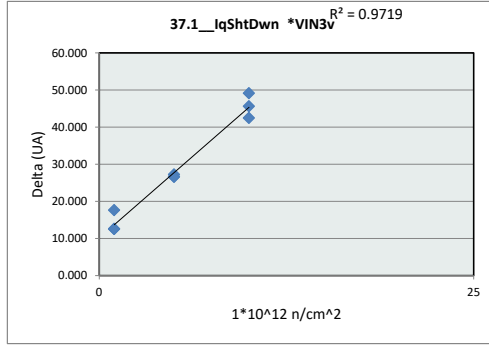
45.1_IqOper0%D *VIN6p3v			
Test Site			
Tester			
Test Number			
Max Limit	8000	UA	
Min Limit	1931.9	UA	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	1931.900	1931.900	1931.900
Min	4492.283	4461.447	4391.409
Average	4503.923	4504.906	4431.816
Max	4515.672	4556.443	4455.725
UL	8000.000	8000.000	8000.000



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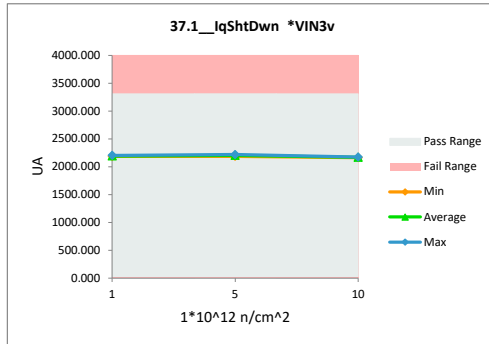
37.1_IqShtDwn *VIN3v		
Test Site		
Tester		
Test Number		
Unit	µA	UA
Max Limit	3310	3310
Min Limit	0.1	0.1

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	2205.249	2187.630	17.619
1	787	2198.706	2186.165	12.542
1	788	2216.092	2203.531	12.560
5	789	2231.950	2204.716	27.234
5	791	2212.914	2186.227	26.687
5	792	2242.980	2216.440	26.540
10	790	2217.276	2168.174	49.102
10	793	2217.276	2171.666	45.609
10	794	2204.688	2162.219	42.470
Max		2242.980	2216.440	49.102
Average		2216.348	2187.419	28.929
Min		2198.706	2162.219	12.542
Std Dev		13.859	18.226	13.904



37.1_IqShtDwn *VIN3v		
Test Site		
Tester		
Test Number		
Max Limit	3310	UA
Min Limit	0.1	UA

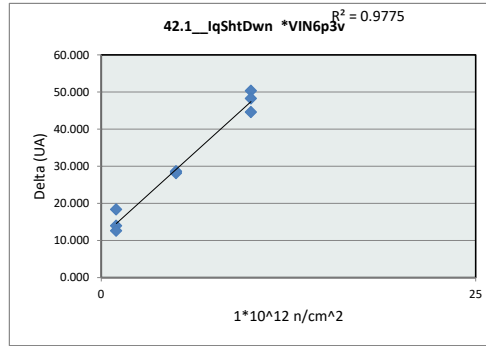
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	0.100	0.100	0.100
Min	2186.165	2186.227	2162.219
Average	2192.442	2202.461	2167.353
Max	2203.532	2216.440	2171.666
UL	3310.000	3310.000	3310.000



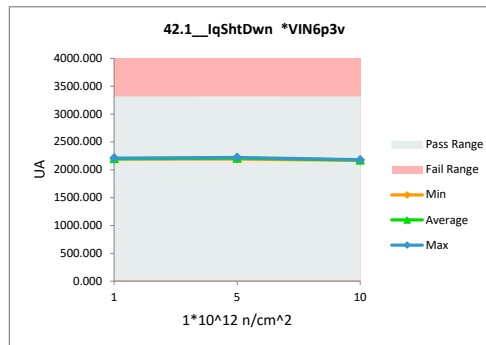
NDD Report  
TPS50601-SP

42.1_IqShtDwn *VIN6p3v		
Test Site		
Tester		
Test Number		
Unit	µA	UA
Max Limit	3310	3310
Min Limit	0.3	0.3

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	2212.083	2193.726	18.357
1	787	2205.665	2191.708	13.956
1	788	2222.380	2209.806	12.573
5	789	2238.995	2210.406	28.589
5	791	2219.376	2191.240	28.136
5	792	2249.903	2221.363	28.540
10	790	2223.672	2173.380	50.292
10	793	2224.952	2176.728	48.224
10	794	2211.802	2167.208	44.595
Max		2249.903	2221.363	50.292
Average		2223.203	2192.841	30.363
Min		2205.665	2167.208	12.573
Std Dev		13.884	18.405	14.405



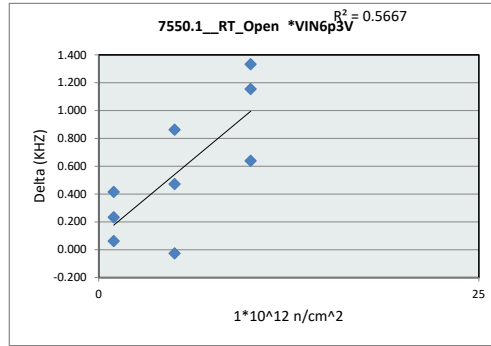
42.1_IqShtDwn *VIN6p3v			
Test Site			
Tester			
Test Number			
Max Limit	3310	UA	
Min Limit	0.3	UA	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	0.300	0.300	0.300
Min	2191.709	2191.240	2167.208
Average	2198.414	2207.670	2172.438
Max	2209.806	2221.363	2176.728
UL	3310.000	3310.000	3310.000



NDD Report  
TPS50601-SP

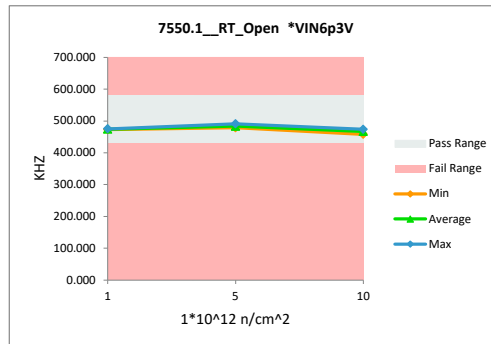
7550.1_RT_Open *VIN6p3V	
Test Site	
Tester	
Test Number	
Unit	KHZ
Max Limit	580
Min Limit	430

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	475.700	475.285	0.415
1	787	473.089	473.028	0.061
1	788	474.596	474.364	0.232
5	789	481.046	480.574	0.472
5	791	478.644	478.671	-0.027
5	792	492.087	491.226	0.861
10	790	459.228	457.897	1.332
10	793	474.875	473.720	1.155
10	794	470.146	469.509	0.638
Max		492.087	491.226	1.332
Average		475.490	474.919	0.571
Min		459.228	457.897	-0.027
Std Dev		8.777	8.920	0.471



7550.1_RT_Open *VIN6p3V	
Test Site	
Tester	
Test Number	
Max Limit	580 KHZ
Min Limit	430 KHZ

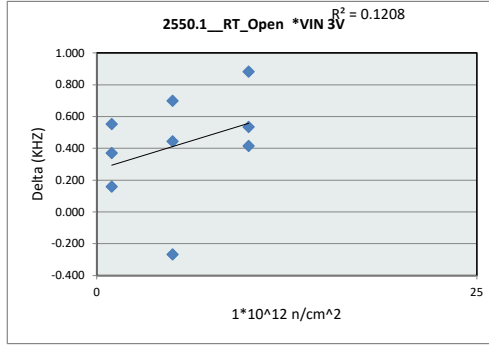
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	430.000	430.000	430.000
Min	473.028	478.671	457.897
Average	474.226	483.490	467.042
Max	475.285	491.226	473.720
UL	580.000	580.000	580.000



NDD Report  
TPS50601-SP

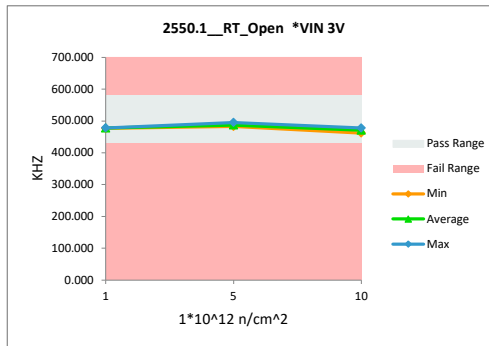
		2550.1_RT_Open *VIN 3V	
Test Site			
Tester			
Test Number			
Unit		KHZ	
Max Limit		580	580
Min Limit		430	430

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	478.738	478.186	0.551
1	787	476.770	476.611	0.158
1	788	478.467	478.099	0.369
5	789	484.085	483.387	0.698
5	791	482.504	482.772	-0.268
5	792	495.800	495.358	0.443
10	790	462.771	461.890	0.881
10	793	478.316	477.902	0.414
10	794	474.222	473.689	0.534
Max		495.800	495.358	0.881
Average		479.075	478.655	0.420
Min		462.771	461.890	-0.268
Std Dev		8.749	8.869	0.329



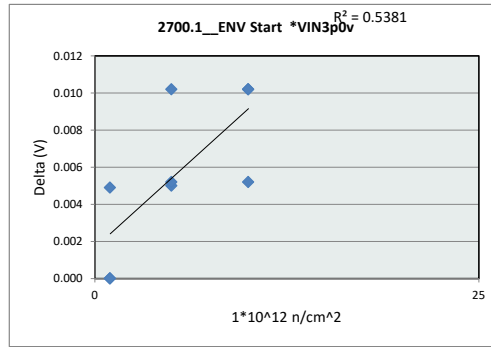
		2550.1_RT_Open *VIN 3V	
Test Site			
Tester			
Test Number			
Max Limit		580	KHZ
Min Limit		430	KHZ

1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	430.000	430.000	430.000
Min	476.611	482.772	461.890
Average	477.632	487.172	471.160
Max	478.186	495.358	477.902
UL	580.000	580.000	580.000

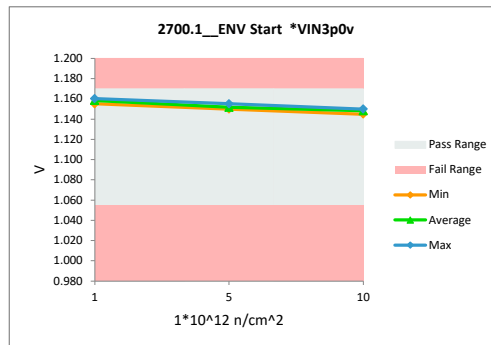


# NDD Report TPS50601-SP

2700.1_ENV Start *VIN3p0v				
Test Site				
Tester				
Test Number				
Unit	V	V		
Max Limit	1.17	1.17		
Min Limit	1.055	1.055		
1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	1.160	1.160	0.000
1	787	1.155	1.155	0.000
1	788	1.165	1.160	0.005
5	789	1.160	1.155	0.005
5	791	1.155	1.150	0.005
5	792	1.160	1.150	0.010
10	790	1.155	1.150	0.005
10	793	1.160	1.150	0.010
10	794	1.155	1.145	0.010
Max		1.165	1.160	0.010
Average		1.158	1.153	0.006
Min		1.155	1.145	0.000
Std Dev		0.004	0.005	0.004



2700.1_ENV Start *VIN3p0v			
Test Site			
Tester			
Test Number			
Max Limit	1.17	V	
Min Limit	1.055	V	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	1.055	1.055	1.055
Min	1.155	1.150	1.145
Average	1.158	1.152	1.148
Max	1.160	1.155	1.150
UL	1.170	1.170	1.170

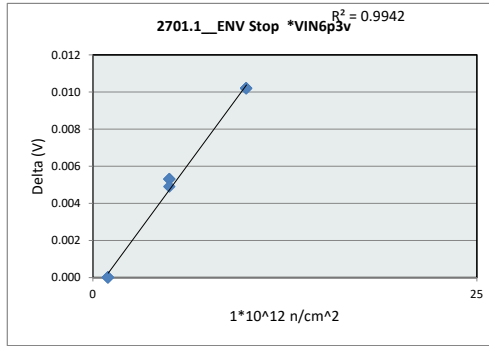




NDD Report  
TPS50601-SP

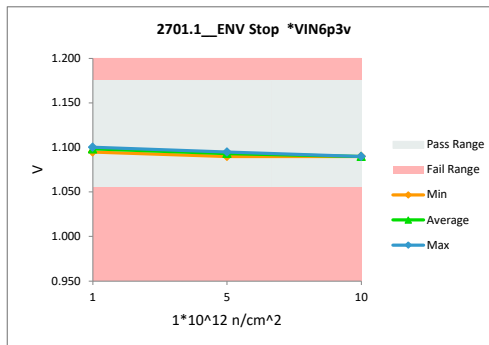
2701.1_ENV Stop *VIN6p3v	
Test Site	
Tester	
Test Number	
Unit	V
Max Limit	1.175
Min Limit	1.055

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	1.100	1.100	0.000
1	787	1.095	1.095	0.000
1	788	1.100	1.100	0.000
5	789	1.100	1.095	0.005
5	791	1.100	1.095	0.005
5	792	1.095	1.090	0.005
10	790	1.100	1.090	0.010
10	793	1.100	1.090	0.010
10	794	1.100	1.090	0.010
Max		1.100	1.100	0.010
Average		1.099	1.094	0.005
Min		1.095	1.090	0.000
Std Dev		0.002	0.004	0.004



2701.1_ENV Stop *VIN6p3v	
Test Site	
Tester	
Test Number	
Max Limit	1.175 V
Min Limit	1.055 V

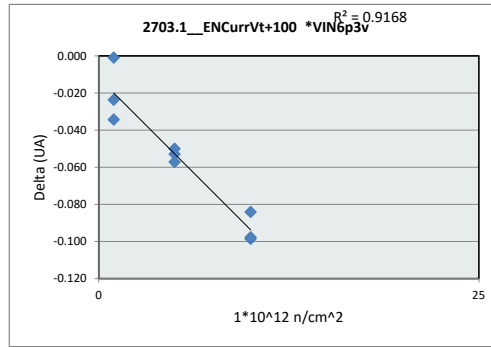
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	1.055	1.055	1.055
Min	1.095	1.090	1.090
Average	1.098	1.093	1.090
Max	1.100	1.095	1.090
UL	1.175	1.175	1.175



# NDD Report TPS50601-SP

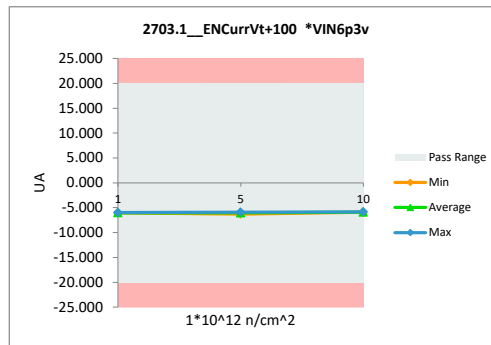
2703.1_ENCrrVt+100 *VIN6p3v	
Test Site	
Tester	
Test Number	
Unit	μA UA
Max Limit	20 20
Min Limit	-20 -20

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	-6.026	-5.992	-0.034
1	787	-6.006	-5.983	-0.024
1	788	-6.029	-6.028	-0.001
5	789	-6.025	-5.975	-0.050
5	791	-5.938	-5.885	-0.053
5	792	-6.329	-6.272	-0.057
10	790	-5.997	-5.898	-0.099
10	793	-6.031	-5.934	-0.098
10	794	-5.894	-5.810	-0.084
Max		-5.894	-5.810	-0.001
Average		-6.031	-5.975	-0.056
Min		-6.329	-6.272	-0.099
Std Dev		0.121	0.129	0.033



2703.1_ENCrrVt+100 *VIN6p3v	
Test Site	
Tester	
Test Number	
Max Limit	20 UA
Min Limit	-20 UA

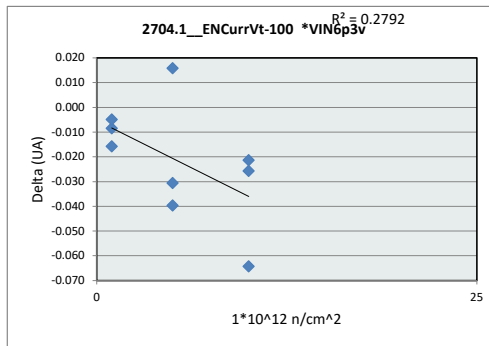
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	-20.000	-20.000	-20.000
Min	-6.028	-6.272	-5.934
Average	-6.001	-6.044	-5.881
Max	-5.983	-5.885	-5.810
UL	20.000	20.000	20.000



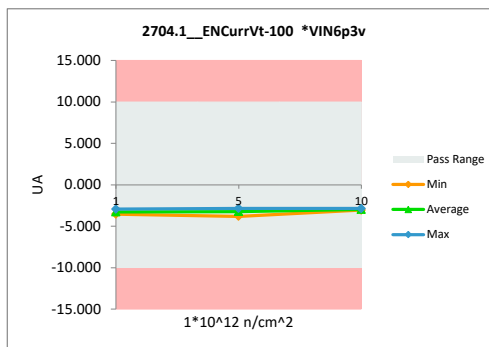
# NDD Report TPS50601-SP

2704.1_ENCurrVt-100 *VIN6p3v	
Test Site	
Tester	
Test Number	
Unit	μA UA
Max Limit	10 10
Min Limit	-10 -10

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	-3.310	-3.302	-0.008
1	787	-2.956	-2.940	-0.016
1	788	-3.541	-3.536	-0.005
5	789	-3.047	-3.016	-0.031
5	791	-2.875	-2.836	-0.040
5	792	-3.781	-3.797	0.016
10	790	-3.065	-3.044	-0.021
10	793	-3.013	-2.987	-0.026
10	794	-2.925	-2.861	-0.064
Max		-2.875	-2.836	0.016
Average		-3.168	-3.147	-0.022
Min		-3.781	-3.797	-0.064
Std Dev		0.311	0.330	0.023



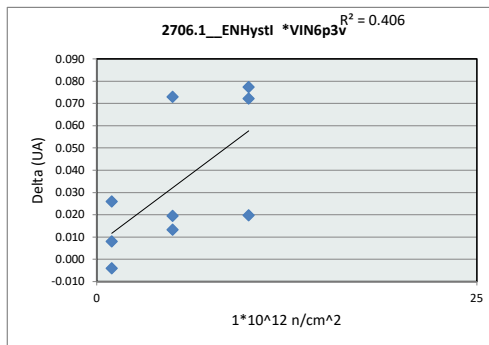
2704.1_ENCurrVt-100 *VIN6			
Test Site			
Tester			
Test Number			
Max Limit	10	UA	
Min Limit	-10	UA	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	-10.000	-10.000	-10.000
Min	-3.536	-3.797	-3.044
Average	-3.259	-3.216	-2.964
Max	-2.940	-2.836	-2.861
UL	10.000	10.000	10.000



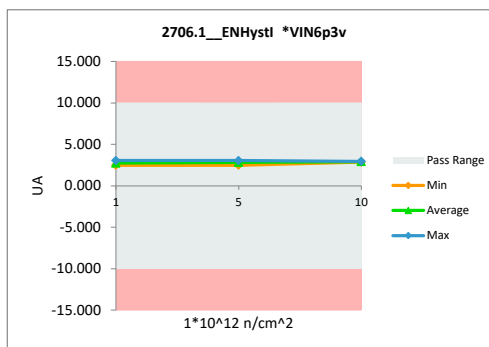
# NDD Report TPS50601-SP

2706.1_ENHystI *VIN6p3v	
Test Site	
Tester	
Test Number	
Unit	μA      UA
Max Limit	10      10
Min Limit	-10      -10

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	2.716	2.690	0.026
1	787	3.051	3.043	0.008
1	788	2.488	2.492	-0.004
5	789	2.978	2.958	0.019
5	791	3.062	3.049	0.013
5	792	2.548	2.475	0.073
10	790	2.932	2.855	0.077
10	793	3.018	2.946	0.072
10	794	2.969	2.949	0.020
Max		3.062	3.049	0.077
Average		2.862	2.829	0.034
Min		2.488	2.475	-0.004
Std Dev		0.221	0.223	0.031

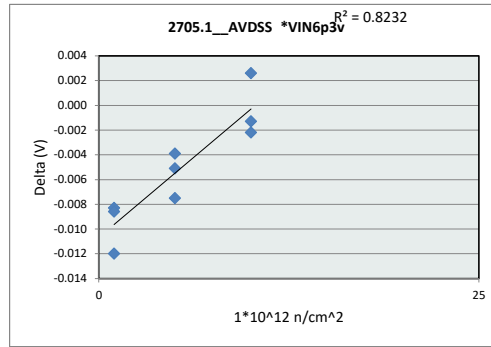


2706.1_ENHystI *VIN6p3v			
Test Site			
Tester			
Test Number			
Max Limit	10	UA	
Min Limit	-10	UA	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	-10.000	-10.000	-10.000
Min	2.492	2.475	2.855
Average	2.742	2.827	2.917
Max	3.043	3.049	2.949
UL	10.000	10.000	10.000

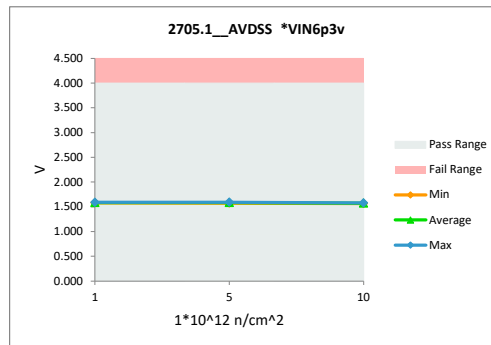


# NDD Report TPS50601-SP

2705.1_AVDSS *VIN6p3v				
Test Site				
Tester				
Test Number				
Unit	V	V		
Max Limit	4	4		
Min Limit	0	0		
1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	1.573	1.581	-0.008
1	787	1.582	1.591	-0.009
1	788	1.577	1.589	-0.012
5	789	1.579	1.584	-0.005
5	791	1.570	1.574	-0.004
5	792	1.585	1.592	-0.008
10	790	1.578	1.579	-0.001
10	793	1.574	1.576	-0.002
10	794	1.569	1.567	0.003
Max		1.585	1.592	0.003
Average		1.576	1.582	-0.005
Min		1.569	1.567	-0.012
Std Dev		0.005	0.008	0.004



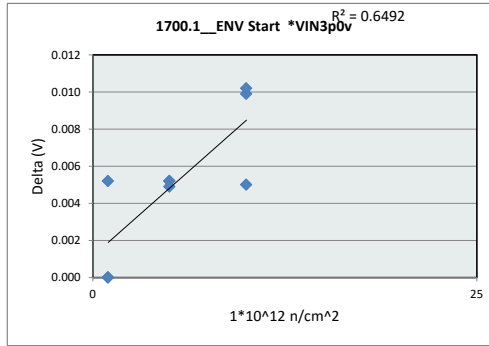
2705.1_AVDSS *VIN6p3v			
Test Site			
Tester			
Test Number			
Max Limit	4	V	
Min Limit	0	V	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	0.000	0.000	0.000
Min	1.581	1.574	1.567
Average	1.587	1.584	1.574
Max	1.591	1.592	1.579
UL	4.000	4.000	4.000



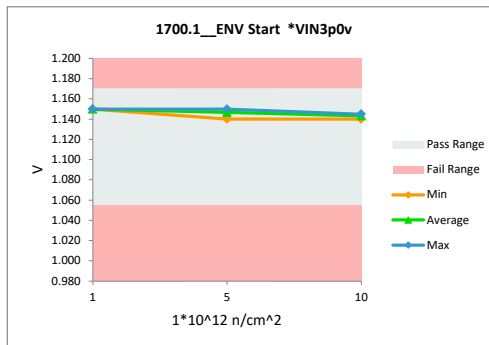
NDD Report  
TPS50601-SP

1700.1_ENV Start *VIN3p0v	
Test Site	
Tester	
Test Number	
Unit	V
Max Limit	1.17
Min Limit	1.055

1*10^12 n/cm^2	Serial #	Pre Data	Post Data	Delta
1	785	1.155	1.150	0.005
1	787	1.150	1.150	0.000
1	788	1.150	1.150	0.000
5	789	1.155	1.150	0.005
5	791	1.155	1.150	0.005
5	792	1.145	1.140	0.005
10	790	1.150	1.140	0.010
10	793	1.155	1.145	0.010
10	794	1.150	1.145	0.005
Max		1.155	1.150	0.010
Average		1.152	1.147	0.005
Min		1.145	1.140	0.000
Std Dev		0.004	0.004	0.004



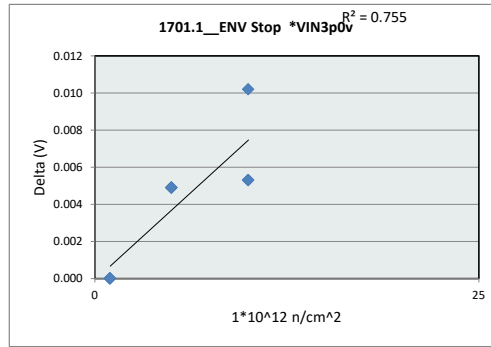
1700.1_ENV Start *VIN3p0v			
Test Site			
Tester			
Test Number			
Max Limit	1.17	V	
Min Limit	1.055	V	
1*10^12 n/cm^2	1	5	10
LL	1.055	1.055	1.055
Min	1.150	1.140	1.140
Average	1.150	1.147	1.143
Max	1.150	1.150	1.145
UL	1.170	1.170	1.170



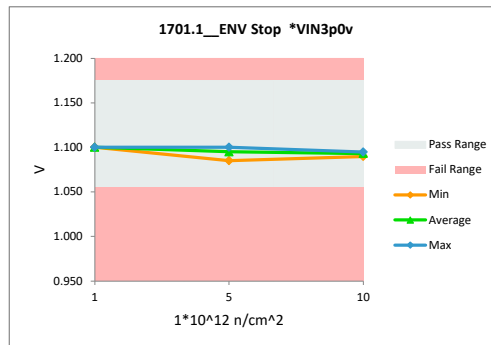
NDD Report  
TPS50601-SP

1701.1_ENV Stop *VIN3p0v	
Test Site	
Tester	
Test Number	
Unit	V
Max Limit	1.175
Min Limit	1.055

1*10^12 n/cm^2	Serial #	Pre Data	Post Data	Delta
1	785	1.100	1.100	0.000
1	787	1.100	1.100	0.000
1	788	1.100	1.100	0.000
5	789	1.105	1.100	0.005
5	791	1.105	1.100	0.005
5	792	1.090	1.085	0.005
10	790	1.100	1.090	0.010
10	793	1.100	1.095	0.005
10	794	1.100	1.095	0.005
Max		1.105	1.100	0.010
Average		1.100	1.096	0.004
Min		1.090	1.085	0.000
Std Dev		0.004	0.006	0.003



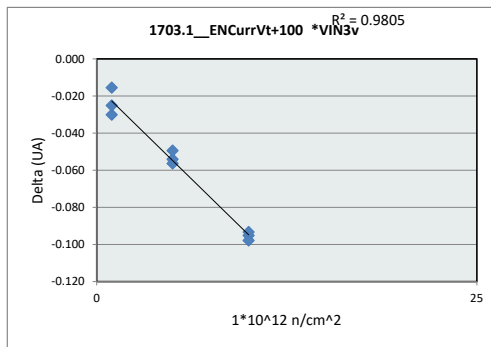
1701.1_ENV Stop *VIN3p0v			
Test Site			
Tester			
Test Number			
Max Limit	1.175	V	
Min Limit	1.055	V	
1*10^12 n/cm^2	1	5	10
LL	1.055	1.055	1.055
Min	1.100	1.085	1.090
Average	1.100	1.095	1.093
Max	1.100	1.100	1.095
UL	1.175	1.175	1.175



# NDD Report TPS50601-SP

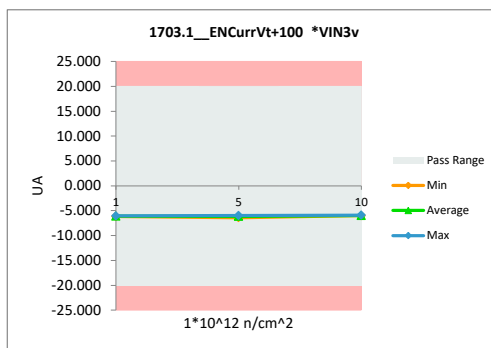
1703.1_ENCrrVt+100 *VIN3v	
Test Site	
Tester	
Test Number	
Unit	μA      UA
Max Limit	20      20
Min Limit	-20      -20

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	-6.119	-6.088	-0.030
1	787	-6.067	-6.042	-0.025
1	788	-6.198	-6.183	-0.016
5	789	-6.126	-6.072	-0.054
5	791	-6.016	-5.960	-0.056
5	792	-6.453	-6.404	-0.049
10	790	-6.065	-5.969	-0.095
10	793	-6.092	-5.994	-0.098
10	794	-5.995	-5.902	-0.093
Max		-5.995	-5.902	-0.016
Average		-6.126	-6.068	-0.057
Min		-6.453	-6.404	-0.098
Std Dev		0.137	0.151	0.032



1703.1_ENCrrVt+100 *VIN3v	
Test Site	
Tester	
Test Number	
Max Limit	20      UA
Min Limit	-20      UA

1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	-20.000	-20.000	-20.000
Min	-6.183	-6.404	-5.994
Average	-6.104	-6.145	-5.955
Max	-6.042	-5.960	-5.902
UL	20.000	20.000	20.000

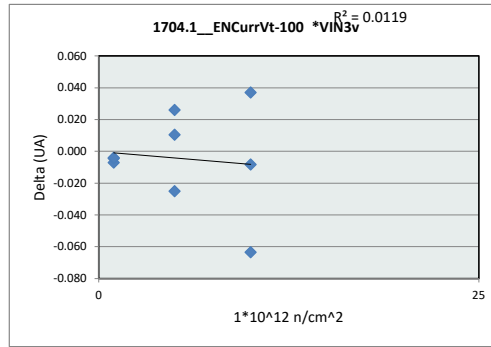




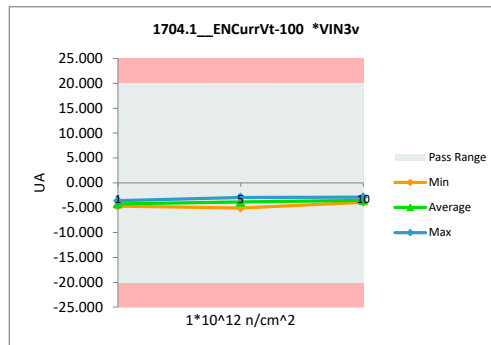
NDD Report  
TPS50601-SP

1704.1_ENCurrVt-100 *VIN3v	
Test Site	
Tester	
Test Number	
Unit	μA UA
Max Limit	20 20
Min Limit	-20 -20

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	-4.357	-4.349	-0.007
1	787	-3.613	-3.608	-0.005
1	788	-4.709	-4.705	-0.004
5	789	-3.651	-3.661	0.010
5	791	-2.944	-2.919	-0.025
5	792	-5.015	-5.041	0.026
10	790	-3.893	-3.930	0.037
10	793	-3.809	-3.800	-0.008
10	794	-2.959	-2.895	-0.064
Max		-2.944	-2.895	0.037
Average		-3.883	-3.879	-0.004
Min		-5.015	-5.041	-0.064
Std Dev		0.712	0.731	0.029



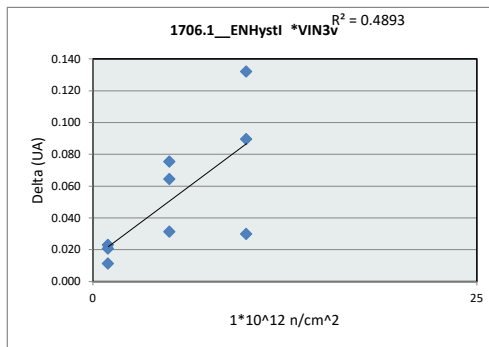
1704.1_ENCurrVt-100 *VIN3v			
Test Site			
Tester			
Test Number			
Max Limit	20	UA	
Min Limit	-20	UA	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	-20.000	-20.000	-20.000
Min	-4.705	-5.041	-3.930
Average	-4.221	-3.873	-3.542
Max	-3.608	-2.919	-2.896
UL	20.000	20.000	20.000



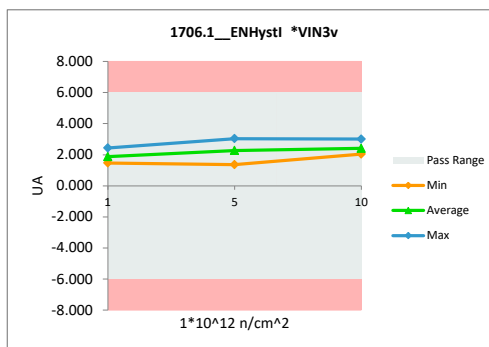
NDD Report  
TPS50601-SP

1706.1_ENHystI *VIN3v	
Test Site	
Tester	
Test Number	
Unit	μA      UA
Max Limit	6            6
Min Limit	-6           -6

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	1.762	1.739	0.023
1	787	2.454	2.433	0.021
1	788	1.489	1.477	0.011
5	789	2.476	2.411	0.064
5	791	3.072	3.041	0.031
5	792	1.438	1.363	0.075
10	790	2.172	2.040	0.132
10	793	2.283	2.194	0.089
10	794	3.036	3.006	0.030
	Max	3.072	3.041	0.132
	Average	2.242	2.189	0.053
	Min	1.438	1.363	0.011
	Std Dev	0.599	0.604	0.040



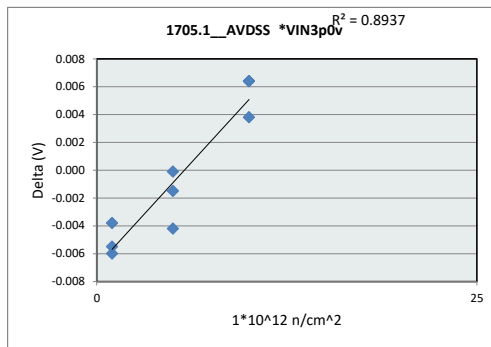
1706.1_ENHystI *VIN3v			
Test Site			
Tester			
Test Number			
Max Limit	6	UA	
Min Limit	-6	UA	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	-6.000	-6.000	-6.000
Min	1.478	1.363	2.040
Average	1.883	2.272	2.413
Max	2.433	3.041	3.006
UL	6.000	6.000	6.000



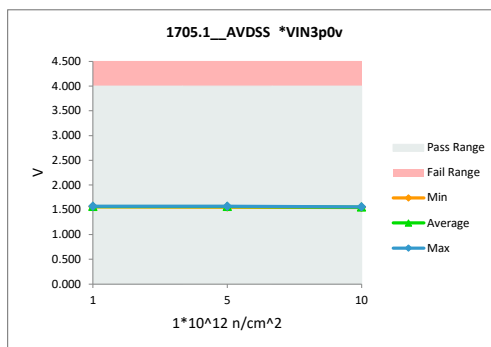
# NDD Report TPS50601-SP

1705.1_AVDSS *VIN3p0v	
Test Site	
Tester	
Test Number	
Unit	V
Max Limit	4
Min Limit	0

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	1.558	1.561	-0.004
1	787	1.565	1.571	-0.006
1	788	1.561	1.566	-0.006
5	789	1.565	1.567	-0.002
5	791	1.555	1.555	0.000
5	792	1.567	1.571	-0.004
10	790	1.564	1.558	0.006
10	793	1.560	1.556	0.004
10	794	1.552	1.546	0.006
Max		1.567	1.571	0.006
Average		1.561	1.561	-0.001
Min		1.552	1.546	-0.006
Std Dev		0.005	0.008	0.005



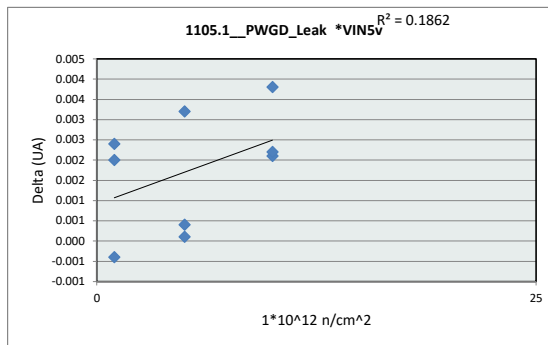
1705.1_AVDSS *VIN3p0v			
Test Site			
Tester			
Test Number			
Max Limit	4	V	
Min Limit	0	V	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	0.000	0.000	0.000
Min	1.561	1.555	1.546
Average	1.566	1.564	1.553
Max	1.571	1.571	1.558
UL	4.000	4.000	4.000



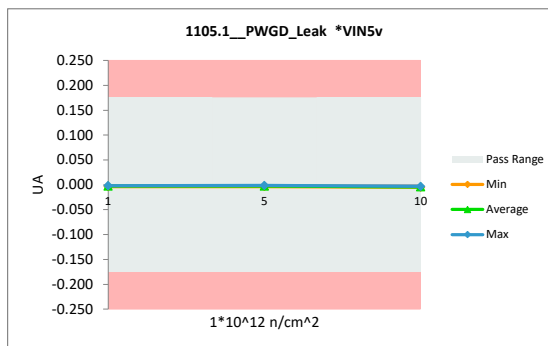
# NDD Report TPS50601-SP

1105.1_PWGD_Leak *VIN5v		
Test Site		
Tester		
Test Number		
Unit	μA	UA
Max Limit	0.175	0.175
Min Limit	-0.175	-0.175

1*10^12 n/cm^2	Serial #	Pre Data	Post Data	Delta
1	785	-0.001	-0.003	0.002
1	787	-0.002	-0.002	0.000
1	788	-0.001	-0.004	0.002
5	789	0.000	-0.003	0.003
5	791	-0.003	-0.003	0.000
5	792	-0.001	-0.001	0.000
10	790	0.001	-0.003	0.004
10	793	-0.003	-0.005	0.002
10	794	-0.002	-0.004	0.002
Max		0.001	-0.001	0.004
Average		-0.001	-0.003	0.002
Min		-0.003	-0.005	0.000
Std Dev		0.001	0.001	0.001



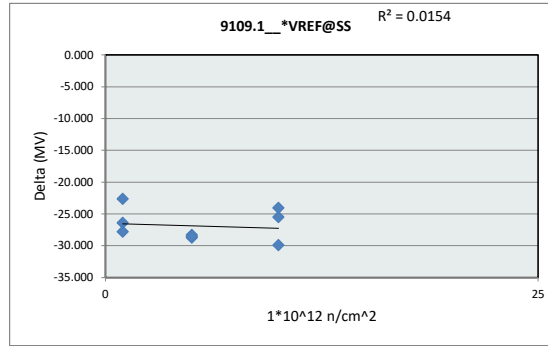
1105.1_PWGD_Leak *VIN5v			
Test Site			
Tester			
Test Number			
Max Limit	0.175	UA	
Min Limit	-0.175	UA	
1*10^12 n/cm^2	1	5	10
LL	-0.175	-0.175	-0.175
Min	-0.004	-0.003	-0.005
Average	-0.003	-0.003	-0.004
Max	-0.002	-0.001	-0.003
UL	0.175	0.175	0.175



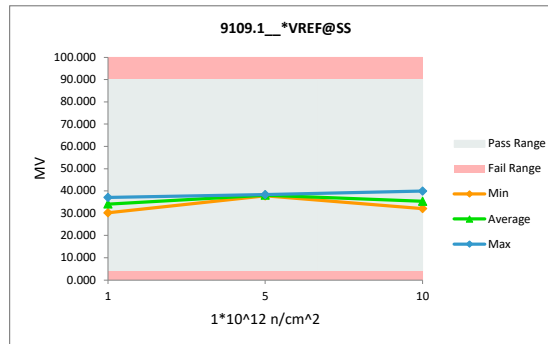
# NDD Report TPS50601-SP

9109.1_*VREF@SS	
Test Site	
Tester	
Test Number	
Unit	mV MV
Max Limit	90 90
Min Limit	4 4

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	8.769	35.192	-26.423
1	787	7.491	30.137	-22.646
1	788	9.234	37.028	-27.794
5	789	9.607	38.353	-28.746
5	791	9.443	37.750	-28.307
5	792	9.509	38.062	-28.554
10	790	8.579	34.078	-25.499
10	793	8.008	32.073	-24.065
10	794	9.998	39.918	-29.920
Max		9.998	39.918	-22.646
Average		8.960	35.843	-26.884
Min		7.491	30.137	-29.920
Std Dev		0.818	3.224	2.407



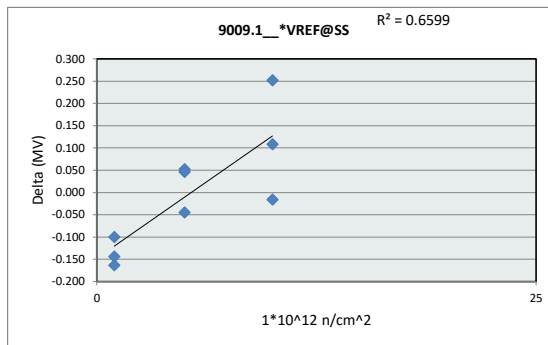
9109.1_*VREF@SS		1	5	10
Test Site				
Tester				
Test Number				
Max Limit		90	MV	
Min Limit		4	MV	
1*10 <sup>12</sup> n/cm <sup>2</sup>		1	5	10
LL		4.000	4.000	4.000
Min		30.137	37.750	32.073
Average		34.119	38.055	35.356
Max		37.028	38.353	39.918
UL		90.000	90.000	90.000



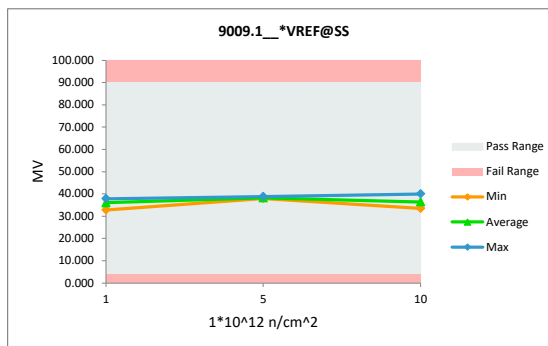
# NDD Report TPS50601-SP

9009.1_*VREF@SS	
Test Site	
Tester	
Test Number	
Unit	mV MV
Max Limit	90 90
Min Limit	4 4

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	37.267	37.411	-0.144
1	787	32.662	32.826	-0.164
1	788	37.776	37.876	-0.100
5	789	38.888	38.836	0.052
5	791	38.012	37.966	0.046
5	792	38.017	38.062	-0.045
10	790	35.914	35.662	0.252
10	793	33.533	33.549	-0.016
10	794	40.137	40.029	0.108
Max		40.137	40.029	0.252
Average		36.912	36.913	-0.001
Min		32.662	32.826	-0.164
Std Dev		2.452	2.413	0.132



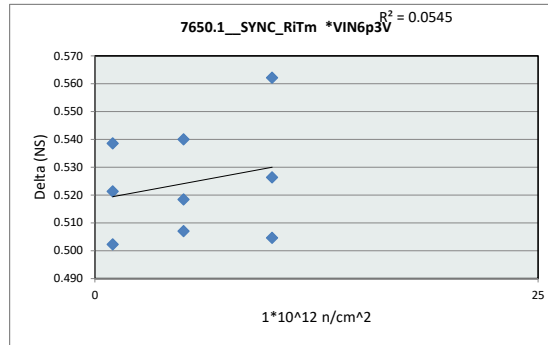
9009.1_*VREF@SS		1	5	10
Test Site				
Tester				
Test Number				
Max Limit	90 MV			
Min Limit	4 MV			
1*10 <sup>12</sup> n/cm <sup>2</sup>		1	5	10
LL		4.000	4.000	4.000
Min		32.826	37.966	33.549
Average		36.038	38.288	36.413
Max		37.876	38.836	40.029
UL		90.000	90.000	90.000



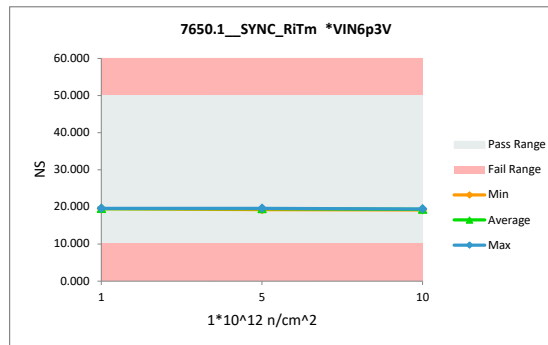
# NDD Report TPS50601-SP

7650.1_SYNC_RITm *VIN6p3V	
Test Site	
Tester	
Test Number	
Unit	nS
Max Limit	50
Min Limit	10

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	20.120	19.581	0.538
1	787	19.955	19.453	0.502
1	788	20.080	19.558	0.521
5	789	20.081	19.562	0.518
5	791	19.767	19.227	0.540
5	792	20.102	19.595	0.507
10	790	19.995	19.433	0.562
10	793	19.930	19.403	0.526
10	794	19.688	19.184	0.505
Max		20.120	19.595	0.562
Average		19.969	19.444	0.524
Min		19.688	19.184	0.502
Std Dev		0.153	0.152	0.020



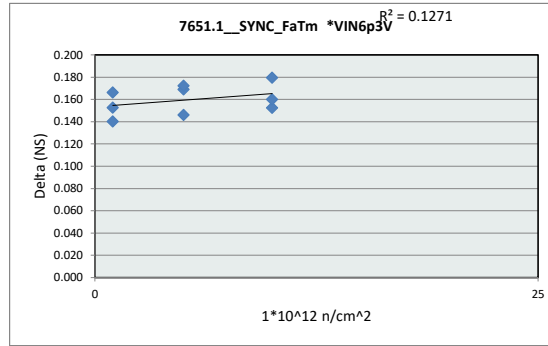
7650.1_SYNC_RITm *VIN6p3V			
Test Site			
Tester			
Test Number			
Max Limit	50	NS	
Min Limit	10	NS	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	10.000	10.000	10.000
Min	19.453	19.227	19.184
Average	19.531	19.461	19.340
Max	19.581	19.595	19.433
UL	50.000	50.000	50.000



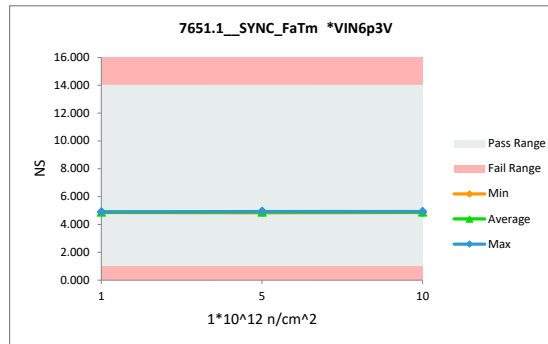
# NDD Report TPS50601-SP

7651.1_SYNC_FaTm *VIN6p3V	
Test Site	
Tester	
Test Number	
Unit	nS
Max Limit	14
Min Limit	1

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	5.027	4.861	0.166
1	787	5.035	4.895	0.140
1	788	5.048	4.895	0.153
5	789	5.023	4.877	0.146
5	791	5.096	4.927	0.169
5	792	5.006	4.834	0.172
10	790	5.012	4.860	0.152
10	793	5.037	4.857	0.179
10	794	5.079	4.919	0.160
Max		5.096	4.927	0.179
Average		5.040	4.880	0.160
Min		5.006	4.834	0.140
Std Dev		0.030	0.031	0.013



7651.1_SYNC_FaTm *VIN6p3V			
Test Site			
Tester			
Test Number			
Max Limit	14	NS	
Min Limit	1	NS	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	1.000	1.000	1.000
Min	4.861	4.834	4.857
Average	4.883	4.879	4.879
Max	4.895	4.927	4.919
UL	14.000	14.000	14.000

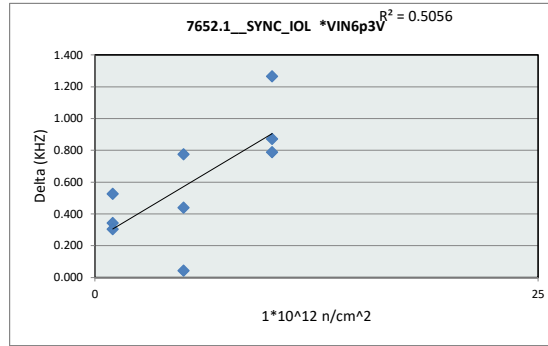




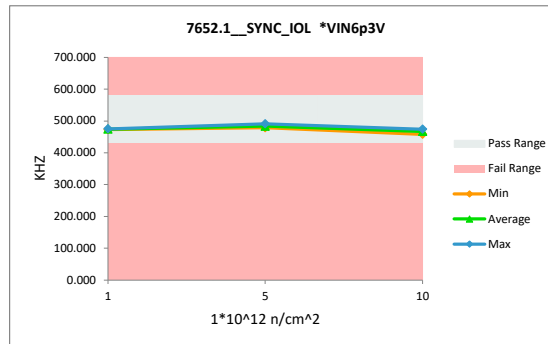
# NDD Report TPS50601-SP

7652.1_SYNC_IOL *VIN6p3V		
Test Site		
Tester		
Test Number		
Unit		KHZ
Max Limit	580	580
Min Limit	430	430

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	475.787	475.262	0.525
1	787	473.279	472.937	0.342
1	788	474.636	474.332	0.304
5	789	481.041	480.602	0.439
5	791	478.563	478.520	0.043
5	792	492.093	491.319	0.774
10	790	459.319	458.055	1.264
10	793	474.764	473.893	0.871
10	794	470.129	469.341	0.787
Max		492.093	491.319	1.264
Average		475.512	474.918	0.594
Min		459.319	458.055	0.043
Std Dev		8.749	8.910	0.367



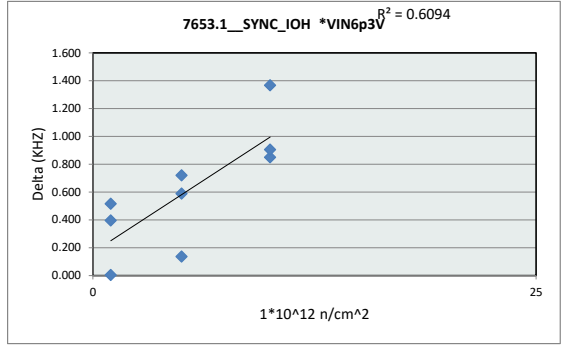
7652.1_SYNC_IOL *VIN6p3V			
Test Site			
Tester			
Test Number			
Max Limit	580		KHZ
Min Limit	430		KHZ
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	430.000	430.000	430.000
Min	472.937	478.520	458.055
Average	474.177	483.480	467.097
Max	475.262	491.319	473.893
UL	580.000	580.000	580.000



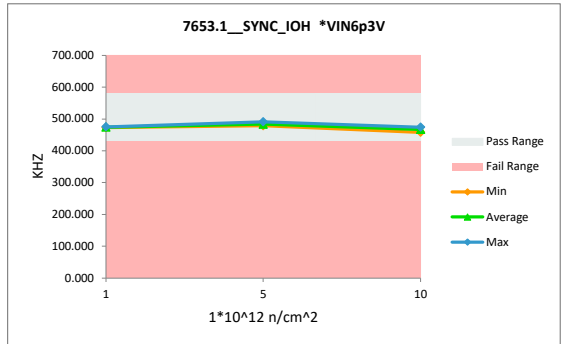
NDD Report  
TPS50601-SP

7653.1_SYNC_IOH *VIN6p3V		
Test Site		
Tester		
Test Number		
Unit		KHZ
Max Limit	580	580
Min Limit	430	430

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	475.787	475.272	0.515
1	787	473.039	473.036	0.003
1	788	474.672	474.277	0.396
5	789	481.108	480.519	0.589
5	791	478.599	478.464	0.135
5	792	492.057	491.337	0.720
10	790	459.206	457.839	1.367
10	793	474.791	473.941	0.849
10	794	470.054	469.150	0.904
Max		492.057	491.337	1.367
Average		475.479	474.870	0.609
Min		459.206	457.839	0.003
Std Dev		8.787	8.969	0.415



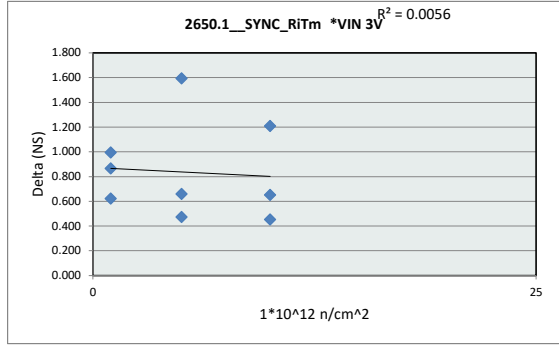
7653.1_SYNC_IOH *VIN6p3V			
Test Site			
Tester			
Test Number			
Max Limit	580		KHZ
Min Limit	430		KHZ
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	430.000	430.000	430.000
Min	473.036	478.464	457.839
Average	474.195	483.440	466.977
Max	475.272	491.337	473.942
UL	580.000	580.000	580.000



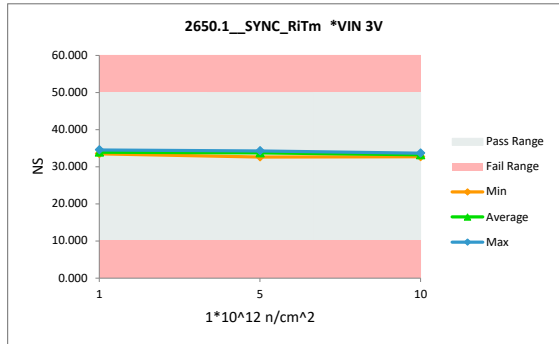
NDD Report  
TPS50601-SP

		2650.1_SYNC_RiTm *VIN 3V	
Test Site			
Tester			
Test Number			
Unit	nS	NS	
Max Limit	50	50	
Min Limit	10	10	

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	34.756	33.762	0.994
1	787	34.112	33.490	0.622
1	788	35.394	34.529	0.866
5	789	34.746	34.273	0.473
5	791	33.259	32.601	0.658
5	792	35.840	34.246	1.594
10	790	34.303	33.652	0.651
10	793	33.777	33.325	0.452
10	794	33.860	32.651	1.208
Max		35.840	34.529	1.594
Average		34.450	33.614	0.835
Min		33.259	32.601	0.452
Std Dev		0.819	0.684	0.376



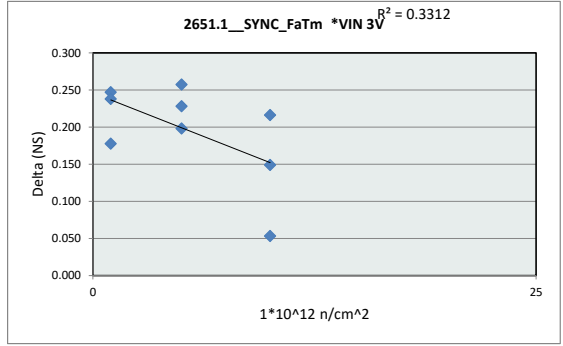
		2650.1_SYNC_RiTm *VIN 3V		
Test Site				
Tester				
Test Number				
Max Limit	50	NS		
Min Limit	10	NS		
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10	
LL	10.000	10.000	10.000	
Min	33.490	32.601	32.651	
Average	33.927	33.707	33.209	
Max	34.529	34.273	33.652	
UL	50.000	50.000	50.000	



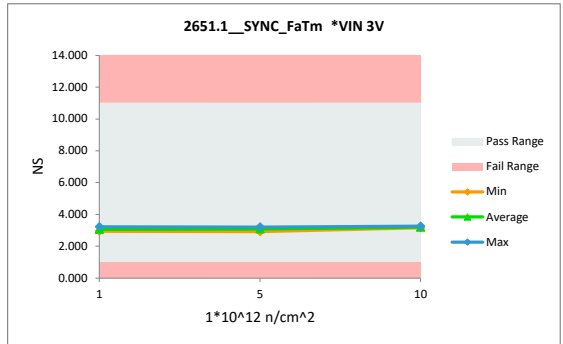
NDD Report  
TPS50601-SP

2651.1_SYNC_FaTm *VIN 3V	
Test Site	
Tester	
Test Number	
Unit	nS
Max Limit	11
Min Limit	1

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	3.193	2.946	0.247
1	787	3.189	3.011	0.178
1	788	3.454	3.216	0.238
5	789	3.138	2.910	0.228
5	791	3.384	3.126	0.257
5	792	3.406	3.208	0.198
10	790	3.373	3.157	0.216
10	793	3.327	3.178	0.149
10	794	3.308	3.255	0.053
Max		3.454	3.255	0.257
Average		3.308	3.112	0.196
Min		3.138	2.910	0.053
Std Dev		0.110	0.125	0.064



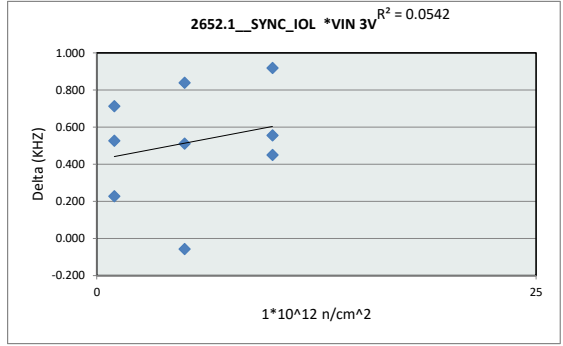
2651.1_SYNC_FaTm *VIN 3V			
Test Site			
Tester			
Test Number			
Max Limit	11	NS	
Min Limit	1	NS	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	1.000	1.000	1.000
Min	2.946	2.910	3.157
Average	3.058	3.082	3.196
Max	3.216	3.208	3.255
UL	11.000	11.000	11.000



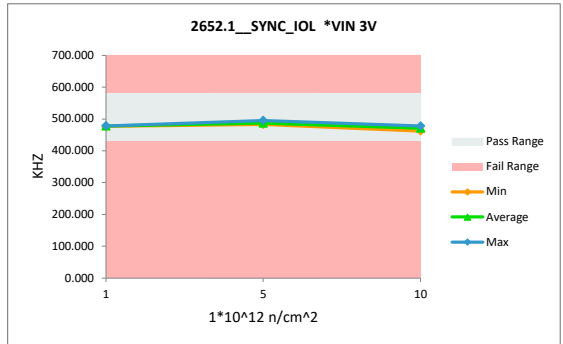
NDD Report  
TPS50601-SP

2652.1_SYNC_IOL *VIN 3V		
Test Site		
Tester		
Test Number		
Unit		KHZ
Max Limit	580	580
Min Limit	430	430

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	479.018	478.305	0.712
1	787	476.793	476.567	0.227
1	788	478.716	478.190	0.526
5	789	484.208	483.370	0.839
5	791	482.655	482.713	-0.058
5	792	495.698	495.188	0.510
10	790	462.832	461.915	0.918
10	793	478.278	477.828	0.449
10	794	474.196	473.641	0.554
Max		495.698	495.188	0.918
Average		479.155	478.635	0.520
Min		462.832	461.915	-0.058
Std Dev		8.725	8.823	0.301



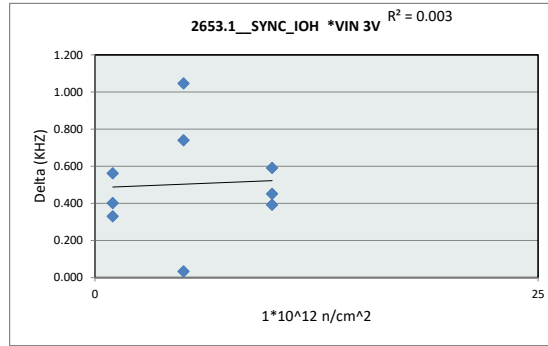
2652.1_SYNC_IOL *VIN 3V			
Test Site			
Tester			
Test Number			
Max Limit	580		KHZ
Min Limit	430		KHZ
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	430.000	430.000	430.000
Min	476.567	482.713	461.915
Average	477.688	487.090	471.128
Max	478.305	495.188	477.828
UL	580.000	580.000	580.000



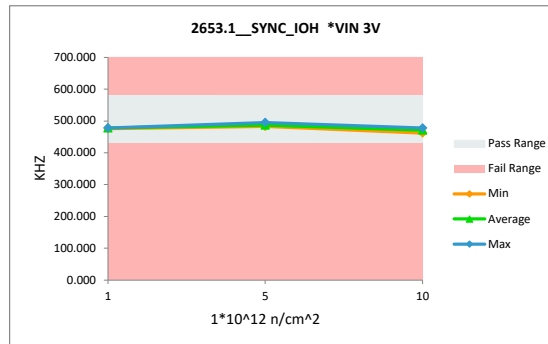
# NDD Report TPS50601-SP

2653.1_SYNC_IOH *VIN 3V	
Test Site	
Tester	
Test Number	
Unit	KHZ
Max Limit	580
Min Limit	430

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	478.860	478.299	0.561
1	787	476.696	476.367	0.329
1	788	478.448	478.048	0.401
5	789	484.237	483.191	1.046
5	791	482.709	482.676	0.033
5	792	495.749	495.010	0.739
10	790	462.712	462.122	0.590
10	793	478.193	477.801	0.391
10	794	474.096	473.646	0.450
Max		495.749	495.010	1.046
Average		479.078	478.573	0.505
Min		462.712	462.122	0.590
Std Dev		8.784	8.725	0.283



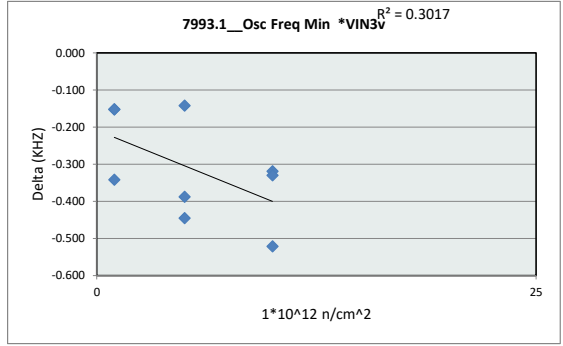
2653.1_SYNC_IOH *VIN 3V			
Test Site			
Tester			
Test Number			
Max Limit	580	KHZ	
Min Limit	430	KHZ	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	430.000	430.000	430.000
Min	476.367	482.676	462.122
Average	477.571	486.959	471.190
Max	478.299	495.010	477.801
UL	580.000	580.000	580.000



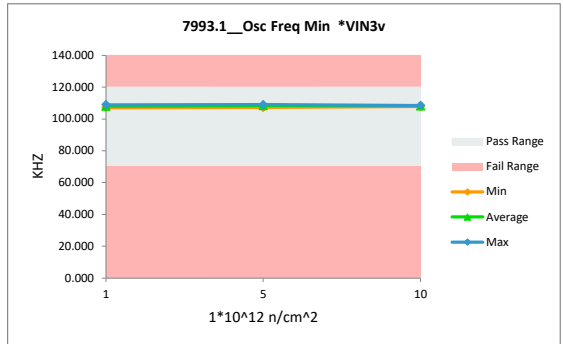
NDD Report  
TPS50601-SP

7993.1_Osc Freq Min *VIN3v		
Test Site		
Tester		
Test Number		
Unit		KHZ
Max Limit	120	120
Min Limit	70	70

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	107.617	107.959	-0.342
1	787	106.830	106.982	-0.153
1	788	108.794	108.946	-0.152
5	789	106.760	107.206	-0.446
5	791	108.630	109.018	-0.388
5	792	108.743	108.886	-0.142
10	790	107.625	108.147	-0.522
10	793	108.182	108.501	-0.320
10	794	107.509	107.840	-0.330
Max		108.794	109.018	-0.142
Average		107.855	108.165	-0.311
Min		106.760	106.982	-0.522
Std Dev		0.779	0.745	0.136

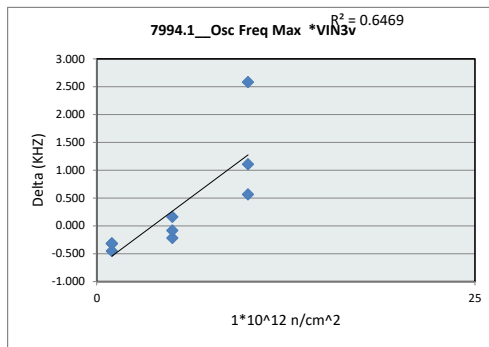


7993.1_Osc Freq Min *VIN3v			
Test Site			
Tester			
Test Number			
Max Limit	120		KHZ
Min Limit	70		KHZ
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	70.000	70.000	70.000
Min	106.982	107.206	107.840
Average	107.963	108.370	108.163
Max	108.946	109.018	108.501
UL	120.000	120.000	120.000

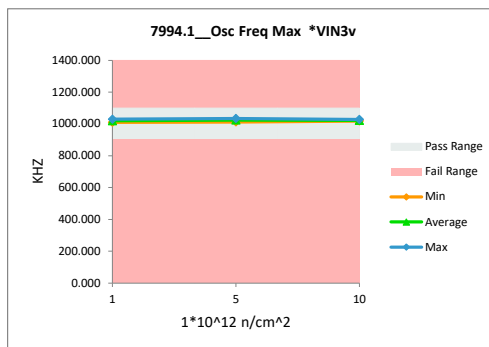


# NDD Report TPS50601-SP

7994.1_Osc Freq Max *VIN3v				
Test Site				
Tester				
Test Number				
Unit			KHZ	
Max Limit	1100	1100		
Min Limit	900	900		
1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	1017.713	1018.035	-0.322
1	787	1009.925	1010.380	-0.455
1	788	1029.418	1029.734	-0.316
5	789	1012.715	1012.554	0.161
5	791	1034.174	1034.393	-0.219
5	792	1027.431	1027.517	-0.086
10	790	1019.494	1018.388	1.106
10	793	1023.103	1020.521	2.581
10	794	1028.980	1028.415	0.565
Max		1034.174	1034.393	2.581
Average		1022.550	1022.215	0.335
Min		1009.925	1010.380	-0.455
Std Dev		8.190	8.214	0.980



7994.1_Osc Freq Max *VIN3v			
Test Site			
Tester			
Test Number			
Max Limit	1100	KHZ	
Min Limit	900	KHZ	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	900.000	900.000	900.000
Min	1010.381	1012.554	1018.388
Average	1019.383	1024.821	1022.441
Max	1029.734	1034.393	1028.415
UL	1100.000	1100.000	1100.000

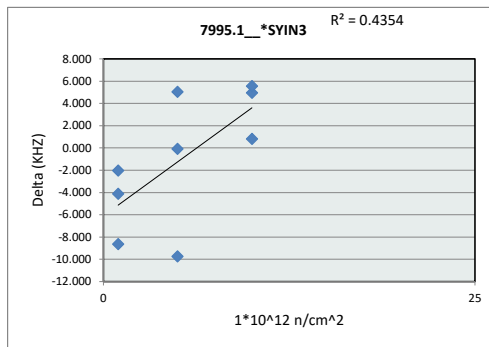




# NDD Report TPS50601-SP

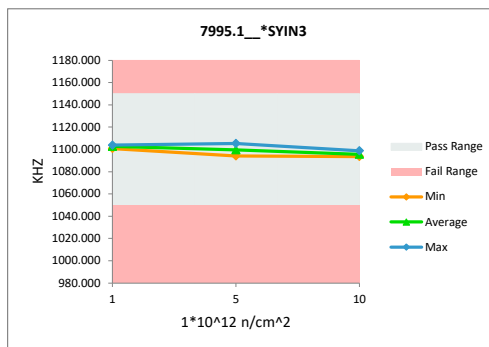
7995.1_*SYIN3	
Test Site	
Tester	
Test Number	
Unit	KHZ
Max Limit	1150
Min Limit	1050

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	1095.166	1103.809	-8.644
1	787	1099.180	1103.303	-4.123
1	788	1098.774	1100.811	-2.037
5	789	1099.169	1094.144	5.025
5	791	1099.192	1099.285	-0.094
5	792	1095.506	1105.253	-9.747
10	790	1099.239	1094.300	4.939
10	793	1099.185	1093.629	5.555
10	794	1099.572	1098.765	0.808
Max		1099.572	1105.253	5.555
Average		1098.331	1099.256	-0.924
Min		1095.166	1093.629	-9.747
Std Dev		1.712	4.445	5.748



7995.1_*SYIN3	
Test Site	
Tester	
Test Number	
Max Limit	1150 KHZ
Min Limit	1050 KHZ

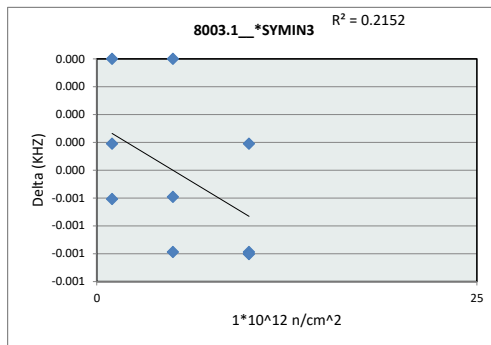
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	1050.000	1050.000	1050.000
Min	1100.811	1094.144	1093.629
Average	1102.641	1099.561	1095.565
Max	1103.809	1105.253	1098.765
UL	1150.000	1150.000	1150.000



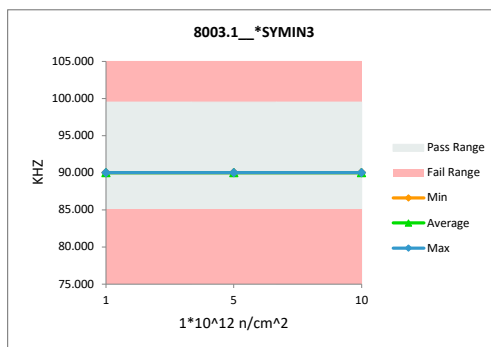
# NDD Report TPS50601-SP

8003.1_*SYMIN3	
Test Site	
Tester	
Test Number	
Unit	KHZ
Max Limit	99.5
Min Limit	85

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	89.994	89.995	-0.001
1	787	89.995	89.995	0.000
1	788	89.994	89.994	0.000
5	789	89.994	89.994	0.000
5	791	89.995	89.995	0.000
5	792	89.994	89.995	-0.001
10	790	89.994	89.995	-0.001
10	793	89.994	89.995	-0.001
10	794	89.995	89.995	0.000
Max		89.995	89.995	0.000
Average		89.994	89.995	0.000
Min		89.994	89.994	-0.001
Std Dev		0.000	0.000	0.000



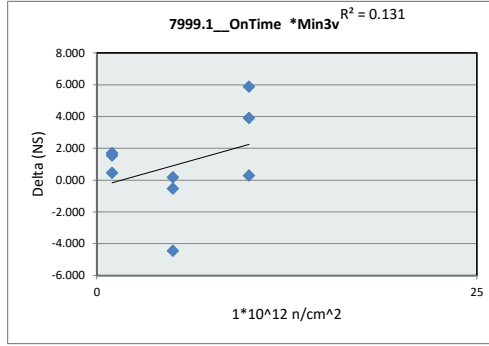
8003.1_*SYMIN3			
Test Site			
Tester			
Test Number			
Max Limit	99.5	KHZ	
Min Limit	85	KHZ	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	85.000	85.000	85.000
Min	89.994	89.995	89.995
Average	89.995	89.995	89.995
Max	89.995	89.995	89.995
UL	99.500	99.500	99.500



NDD Report  
TPS50601-SP

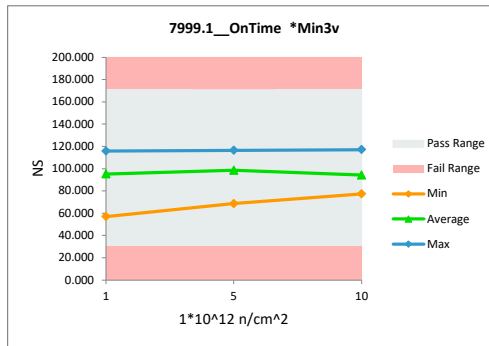
7999.1_OnTime *Min3v	
Test Site	
Tester	
Test Number	
Unit	nS
Max Limit	171
Min Limit	30

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	113.266	112.816	0.449
1	787	58.601	57.066	1.535
1	788	117.573	115.879	1.694
5	789	110.975	110.800	0.175
5	791	115.932	116.473	-0.540
5	792	64.132	68.586	-4.453
10	790	123.011	117.133	5.878
10	793	77.605	77.325	0.280
10	794	92.049	88.144	3.904
Max		123.011	117.133	5.878
Average		97.016	96.025	0.991
Min		58.601	57.066	-4.453
Std Dev		24.682	23.560	2.886



7999.1_OnTime *Min3v	
Test Site	
Tester	
Test Number	
Max Limit	171
Min Limit	30

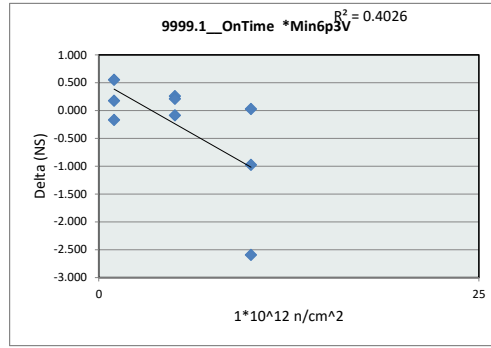
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	30.000	30.000	30.000
Min	57.066	68.586	77.325
Average	95.254	98.619	94.201
Max	115.879	116.473	117.133
UL	171.000	171.000	171.000



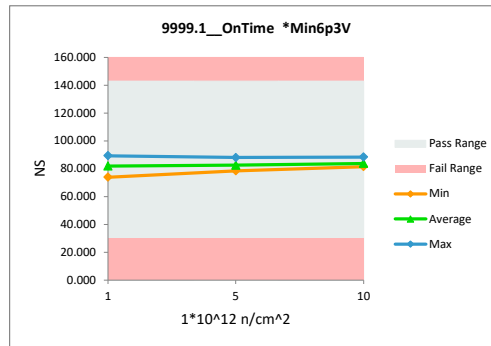
# NDD Report TPS50601-SP

9999.1_OnTime *Min6p3V	
Test Site	
Tester	
Test Number	
Unit	nS
Max Limit	143
Min Limit	30

1*10^12 n/cm^2	Serial #	Pre Data	Post Data	Delta
1	785	89.875	89.324	0.551
1	787	74.102	73.928	0.175
1	788	82.377	82.546	-0.169
5	789	87.892	87.978	-0.086
5	791	81.193	80.936	0.258
5	792	78.665	78.456	0.208
10	790	87.344	88.323	-0.979
10	793	79.045	81.641	-2.595
10	794	81.507	81.479	0.028
Max		89.875	89.324	0.551
Average		82.445	82.735	-0.290
Min		74.102	73.928	-2.595
Std Dev		5.084	5.050	0.963



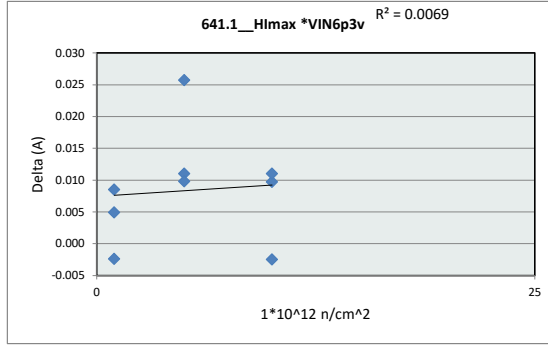
9999.1_OnTime *Min6p3V			
Test Site			
Tester			
Test Number			
Max Limit	143	NS	
Min Limit	30	NS	
1*10^12 n/cm^2	1	5	10
LL	30.000	30.000	30.000
Min	73.928	78.456	81.479
Average	81.933	82.457	83.814
Max	89.324	87.978	88.323
UL	143.000	143.000	143.000



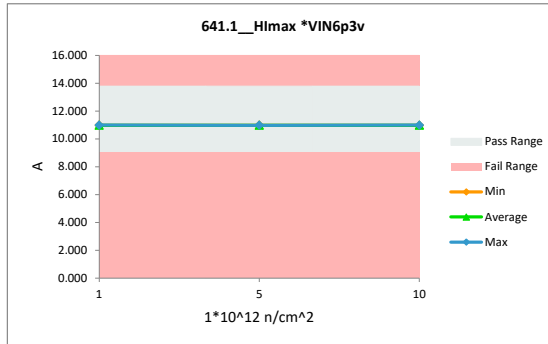
NDD Report  
TPS50601-SP

641.1_HImax *VIN6p3v		
Test Site		
Tester		
Test Number		
Unit	A	A
Max Limit	13.7754	13.7754
Min Limit	9	9

1*10 <sup>12</sup> n/cm <sup>2</sup>	Serial #	Pre Data	Post Data	Delta
1	785	10.979	10.981	-0.002
1	787	10.991	10.983	0.009
1	788	10.984	10.979	0.005
5	789	10.984	10.973	0.011
5	791	11.001	10.975	0.026
5	792	10.989	10.979	0.010
10	790	10.981	10.972	0.010
10	793	10.980	10.969	0.011
10	794	10.980	10.983	-0.003
Max		11.001	10.983	0.026
Average		10.986	10.977	0.008
Min		10.979	10.969	-0.003
Std Dev		0.007	0.005	0.008



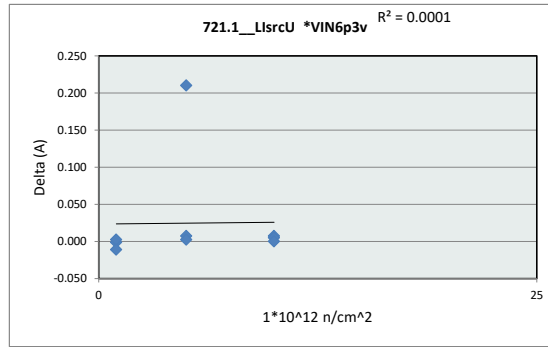
641.1_HImax *VIN6p3v			
Test Site			
Tester			
Test Number			
Max Limit	13.7754	A	
Min Limit	9	A	
1*10 <sup>12</sup> n/cm <sup>2</sup>	1	5	10
LL	9.000	9.000	9.000
Min	10.979	10.973	10.969
Average	10.981	10.976	10.975
Max	10.983	10.979	10.983
UL	13.775	13.775	13.775



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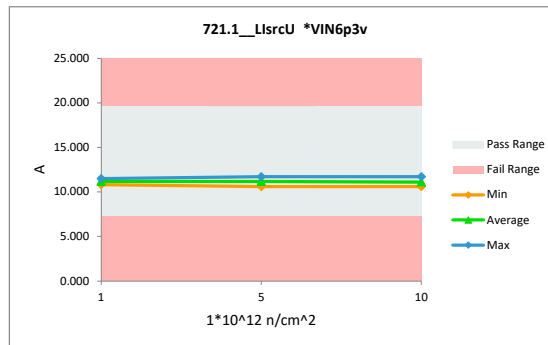
721.1_LlsrcU *VIN6p3v	
Test Site	
Tester	
Test Number	
Unit	A
Max Limit	19.577
Min Limit	7.2266

1*10^12 n/cm^2	Serial #	Pre Data	Post Data	Delta
1	785	10.814	10.815	-0.001
1	787	11.262	11.260	0.002
1	788	11.471	11.482	-0.011
5	789	10.813	10.603	0.210
5	791	11.265	11.257	0.007
5	792	11.704	11.702	0.002
10	790	11.051	11.044	0.007
10	793	11.704	11.699	0.005
10	794	10.599	10.599	0.000
Max		11.704	11.702	0.210
Average		11.187	11.162	0.025
Min		10.599	10.599	-0.011
Std Dev		0.398	0.428	0.070



721.1_LlsrcU *VIN6p3v	
Test Site	
Tester	
Test Number	
Max Limit	19.577
Min Limit	7.2266

1*10^12 n/cm^2	1	5	10
LL	7.227	7.227	7.227
Min	10.815	10.603	10.599
Average	11.186	11.187	11.114
Max	11.482	11.702	11.699
UL	19.577	19.577	19.577



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