Radiation Report

TPS7H2221-SEP Neutron Displacement Damage (NDD) Characterization

ABSTRACT

This report presents the effect of neutron displacement damage (NDD) on the TPS7H2221-SEP device. The results show that all devices were fully functional and within production test limits after having been irradiated up to 1 × 10^{13} n/cm^2 [1-MeV(Si) equivalent]. A sample size of nine units were exposed per MIL-STD-883, Method 1017 for Neutron Irradiation, and an additional two devices were used as control units and were not irradiated. Electrical testing was performed at Texas Instruments before and after neutron irradiation using the production test program for TPS7H2221-SEP.

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Trademarks

1 Overview

The TPS7H2221-SEP device is a small, single channel load switch with controlled slew rate. The device contains an N-channel MOSFET that can operate over an input voltage range of 1.6 V to 5.5 V and can support a maximum continuous current of 1.25 A.

The switch ON state is controlled by a digital input that is capable of interfacing directly with low-voltage control signals. When power is first applied, a Smart Pull Down is used to keep the ON pin from floating until system sequencing is complete. Once the pin is deliberately driven High (>VIH), the Smart Pull Down will be disconnected to prevent unnecessary power loss.

The TPS7H2221-SEP load switch is also selfprotected, meaning that it protects against short circuit events on the output of the device.

Table 1-1. Overview Information

TI Part Number	**TPS7H2221-SEP**
VID Number	V62/22609
Device Name	PTPS7H2221MDCKTSEP
Device Function	Load Switch
Technology	LBC9 (Linear BiCmos 9)
Assembly Lot Number / Lot Trace Code	2504471HNA / 25Z705H
Unbiased Quantity Tested	9
Exposure Facility	VPT Rad
Neutron Fluence (1-MeV equivalent)	1.0×10^{12}, 5.0×10^{12}, 1.0×10^{13} n/cm^2
Irradiation Temperature	Room temperature
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2 Test Procedures

The TPS7H2221-SEP was electrically pre and post-tested using the production automated test equipment program.

General test procedures adhered to MIL-STD-883, Method 1017 for Neutron Irradiation of TPS7H2221-SEP. Neutron irradiation conditions are listed in Table 2-1.

Table 2-1. Neutron Irradiation Conditions

GROUP	SAMPLE QTY	NEUTRON FLUENCE (n/cm^2)	BIAS
A	3	1.0×10^{12}	Unbiased
B	3	5.0×10^{12}	Unbiased
C	3	1.0×10^{13}	Unbiased

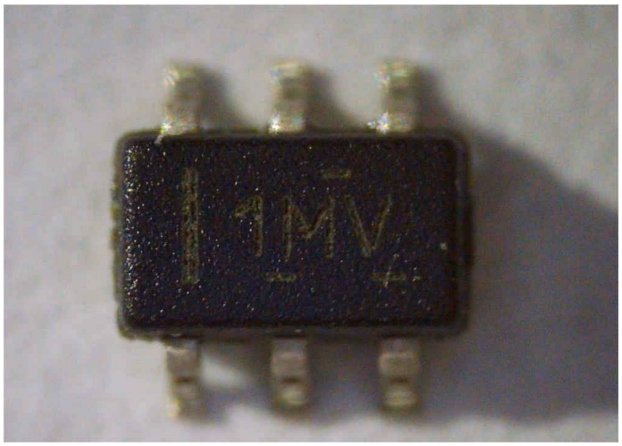


Figure 2-1. TPS7H2221-SEP Device (Front)

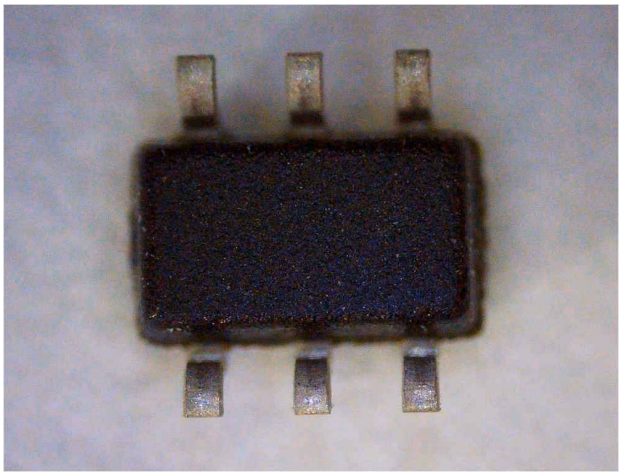


Figure 2-2. TPS7H2221-SEP Device (Back)

3 Facility

VPT Rad performs all neutron displacement damage irradiations in a Low-Enriched, open-pool, water moderated, thermal neutron reactor. It utilizes flat-plate type fuel, and having a maximum thermal energy output of up to 1 MW. The Fast Neutron Irradiator (FNI) faces one side of the reactor core, its design produces a geometrical planar beam of fast neutrons that is approximately uniform over an area of 12 in × 20 in. Lead and thermal neutron absorbing compounds are combined to filter out both fission gammas and thermal neutrons. The ratio of fast-to-thermal neutrons is approximately 400:1, with a gamma exposure of less than 150 rad (Si) for a 1E12 n/cm2 (1 MeV Si equivalent) exposure. The FNI can accommodate a sample or samples with size up to 30 cm in diameter and 15-cm thick including packaging materials. The minimum neutron fluence rate is 1E6 n/cm2-s. The maximum neutron fluence rate is approximately 1.0 E11 n/cm2-s. (both values are 1 MeV Si equivalent).

The neutron fluence rate is determined using the previously-measured neutron radiation field for the FNI, performed in accordance with ASTM standards (ASTM F1190 &), and correlated to the measured reactor power level. The neutron dose is timed to meet the customer-specified fluence for the irradiation. Neutron dosimetry meeting ASTM standards (ASTM E265) is utilized to track and ensure irradiations meet the required minimum. The facility retains source-suitability with the Defense Logistics Agency (DLA) Laboratory Suitability Program for ASTM Test Method 1017. The DUTS are typically irradiation in an unbiased condition as per TM1017. If bias conditions are required, they can be maintained via dry thimbles connected to the irradiation volume.

4 Results

There were no functional failures at any irradiation level. All parametric measurements remained well within all data sheet limits for all exposure levels. The full parameter list is shown in Section 4.1 and the related data can be found in Appendix A.

4.1 Data Sheet Electrical Parameters and Associated Tests

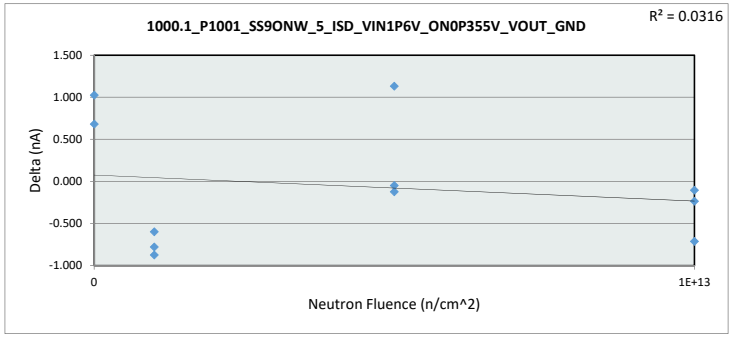
PARAMETER		TEST CONDITION	TPS7H2221-SEP DATA SHEET				TEST #
			MIN	TYP	MAX	UNIT	
Input Supply (VIN)							
$I_{Q, VIN}$	VIN Quiescent Current	V_{OUT} = Open,		8.2	15	µA	1000.5, 10.1
$I_{SD, VIN}$	VIN Shutdown Current	$V_{ON} \le V_{IL}$, V_{OUT} = GND		2	20	nA	1000.1, 1000.3
ON-Resistance (RON)							
R_{ON}	ON-State Resistance	I_{OUT} = -200 mA, V_{IN} = 5 V		116	150	mΩ	5700.2
		I_{OUT} = -200 mA, V_{IN} = 3.3 V		115	150	mΩ	Corner cases tested with 5700.2 and 5700.1
		I_{OUT} = -200 mA, V_{IN} = 1.8 V		133	300	mΩ	5700.1
Output Short Protection (ISC)							
I_{SC}	Short Circuit Current Limit	$V_{OUT} \le V_{IN}$ - 1.5 V		3		A	5700.3
		$V_{OUT} \le V_{SC}$	30	512	900	mA	5700.4
V_{SC}	Output Short Detection Threshold	$V_{OUT} \le V_{SC}$	0.22	0.36	0.57	V	5700.5
Enable Pin (ON)							
I_{ON}	ON Pin Leakage	$V_{ON} \ge V_{IH}$			100	nA	1000.6
$R_{PD, ON}$	Smart Pull Down Resistance	$V_{ON} \le V_{IL}$		491		kΩ	1000.4
$V_{IH,ON}$	ON Pin Input High (V_{IH} Rising)		1			V	Tested as go-no-go through test 20000.1
$V_{IL,ON}$	ON Pin Threshold (V_{IL} Falling)				0.35	V	Tested as go-no-go through test 20000.2
Quick-output Discharge (QOD)							
$R_{PD, QOD}$	QOD Pin Internal Discharge Resistance	$V_{ON} \le V_{IL}$		6		Ω	1000.2
Switching Characteristics							
t_{ON}	Turn ON Time	V_{IN} = 3.3 V		1500		µs	20000.1
t_{OFF}	Turn OFF Time	V_{IN} = 1.8 V to 5.0V, R_L = 100Ω, C_L = 0.1uF		5.22		µs	20000.2

A Appendix: NDD Report Data

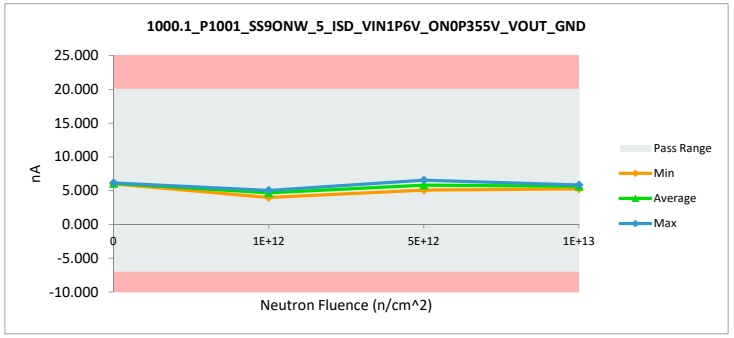
This appendix contains the detailed NDD test results.

NDD Report
TPS7H2221-SEP

	1000.1_P1001_SS9ONW_5_ISD_VIN1P6V_ON0P355V_VOUT_GND		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	nA	nA	
Max Limit	20	20	
Min Limit	-7	-7	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	4.588	3.988	-0.600
1E+12	2	5.824	5.044	-0.780
1E+12	3	5.869	4.994	-0.875
5E+12	4	5.423	6.554	1.131
5E+12	5	5.201	5.077	-0.124
5E+12	6	5.844	5.794	-0.050
1E+13	7	6.075	5.838	-0.237
1E+13	8	5.978	5.264	-0.714
1E+13	9	5.945	5.839	-0.106
0	10	5.115	6.140	1.025
0	11	5.328	6.008	0.680
	Max	6.075	6.554	1.131
	Average	5.563	5.504	-0.059
	Min	4.588	3.988	-0.875
	Std Dev	0.467	0.713	0.713

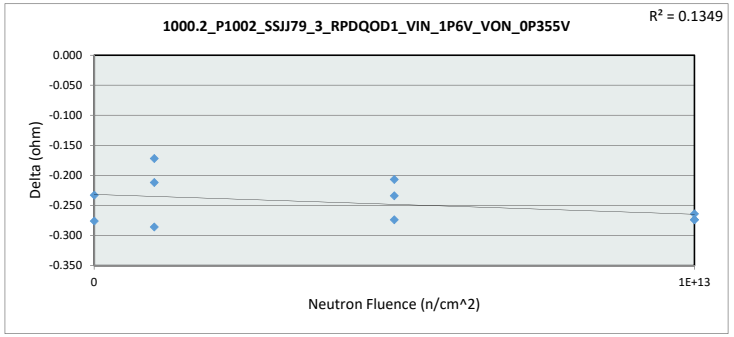


	1000.1_P1001_SS9ONW_5			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	20	nA		
Min Limit	-7	nA		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	-7.000	-7.000	-7.000	-7.000
Min	6.008	3.988	5.077	5.264
Average	6.074	4.675	5.808	5.647
Max	6.140	5.044	6.554	5.839
UL	20.000	20.000	20.000	20.000

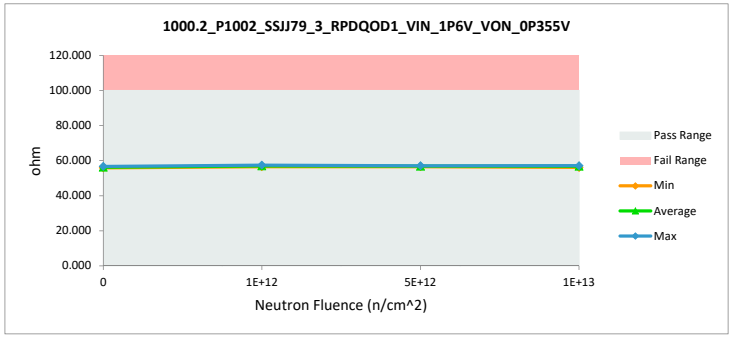


NDD Report
TPS7H2221-SEP

	1000.2_P1002_SSJJ79_3_RPDQOD1_VIN_1P6V_VON_0P355V		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	ohm	ohm	
Max Limit	100	100	
Min Limit	0	0	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	56.718	56.506	-0.212
1E+12	2	57.151	56.979	-0.172
1E+12	3	57.749	57.463	-0.286
5E+12	4	56.766	56.492	-0.274
5E+12	5	57.238	57.031	-0.207
5E+12	6	57.135	56.901	-0.234
1E+13	7	57.358	57.094	-0.264
1E+13	8	57.312	57.038	-0.274
1E+13	9	56.378	56.104	-0.274
0	10	56.944	56.668	-0.276
0	11	56.132	55.899	-0.233
	Max	57.749	57.463	-0.172
	Average	56.989	56.743	-0.246
	Min	56.132	55.899	-0.286
	Std Dev	0.465	0.462	0.037

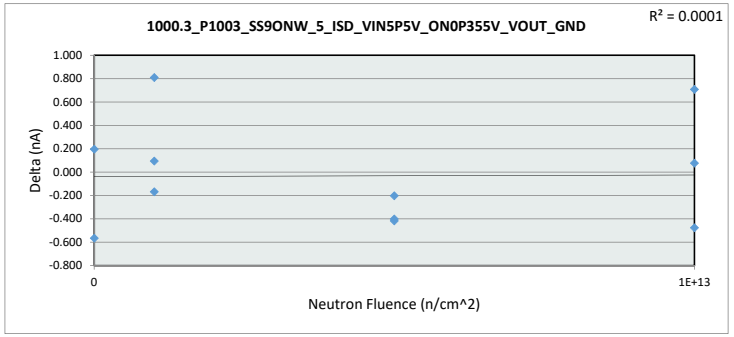


	1000.2_P1002_SSJJ79_3_			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	100	ohm		
Min Limit	0	ohm		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	0.000	0.000	0.000	0.000
Min	55.899	56.506	56.492	56.104
Average	56.284	56.983	56.808	56.745
Max	56.668	57.463	57.031	57.094
UL	100.000	100.000	100.000	100.000

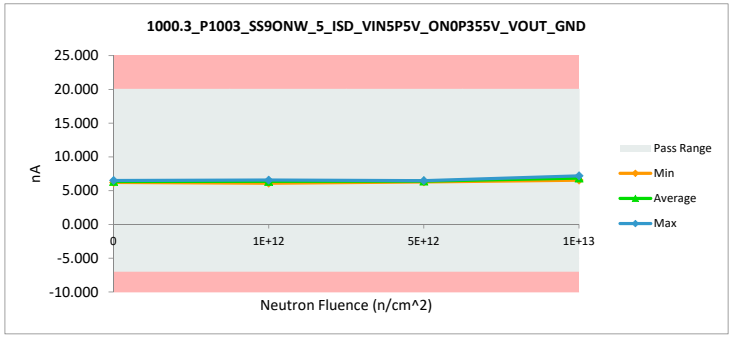


NDD Report
TPS7H2221-SEP

	1000.3_P1003_SS9ONW_5_ISD_VIN5P5V_ON0P355V_VOUT_GND		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	nA	nA	
Max Limit	20	20	
Min Limit	-7	-7	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	5.755	6.563	0.808
1E+12	2	6.278	6.109	-0.169
1E+12	3	6.338	6.432	0.094
5E+12	4	6.890	6.488	-0.402
5E+12	5	6.646	6.443	-0.203
5E+12	6	6.704	6.285	-0.419
1E+13	7	6.777	6.853	0.076
1E+13	8	7.026	6.549	-0.477
1E+13	9	6.485	7.192	0.707
0	10	6.308	6.503	0.195
0	11	6.769	6.202	-0.567
	Max	7.026	7.192	0.808
	Average	6.543	6.511	-0.032
	Min	5.755	6.109	-0.567
	Std Dev	0.359	0.301	0.464

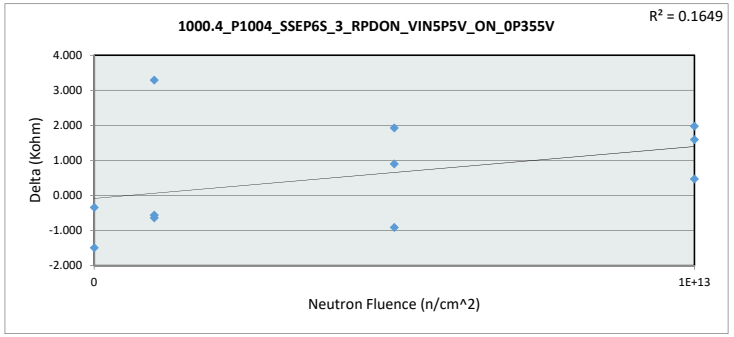


	1000.3_P1003_SS9ONW_5			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	20	nA		
Min Limit	-7	nA		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	-7.000	-7.000	-7.000	-7.000
Min	6.202	6.109	6.285	6.549
Average	6.353	6.368	6.405	6.865
Max	6.503	6.563	6.488	7.192
UL	20.000	20.000	20.000	20.000

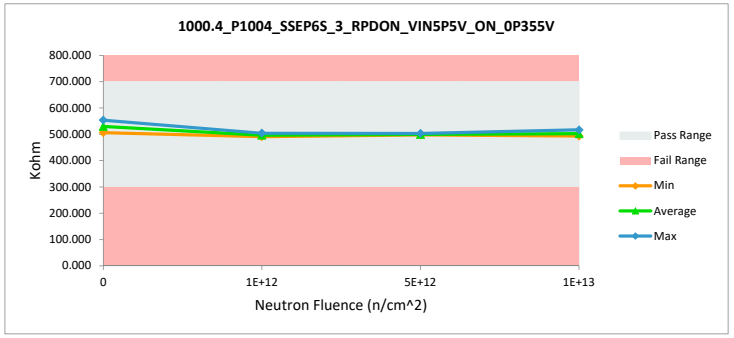


NDD Report
TPS7H2221-SEP

	1000.4_P1004_SSEP6S_3_RPDON_VIN5P5V_ON_0P355V		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	Kohm	Kohm	
Max Limit	700	700	
Min Limit	300	300	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	501.163	504.452	3.289
1E+12	2	495.165	494.602	-0.563
1E+12	3	492.017	491.375	-0.642
5E+12	4	496.646	497.544	0.898
5E+12	5	495.622	497.544	1.922
5E+12	6	504.250	503.334	-0.916
1E+13	7	495.274	496.865	1.591
1E+13	8	491.244	493.219	1.975
1E+13	9	516.328	516.794	0.466
0	10	506.859	506.513	-0.346
0	11	555.401	553.907	-1.494
	Max	555.401	553.907	3.289
	Average	504.543	505.104	0.562
	Min	491.244	491.375	-1.494
	Std Dev	18.417	17.737	1.497



	1000.4_P1004_SSEP6S_3_			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	700	Kohm		
Min Limit	300	Kohm		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	300.000	300.000	300.000	300.000
Min	506.513	491.375	497.544	493.219
Average	530.210	496.810	499.474	502.293
Max	553.907	504.452	503.334	516.794
UL	700.000	700.000	700.000	700.000



NDD Report
TPS7H2221-SEP

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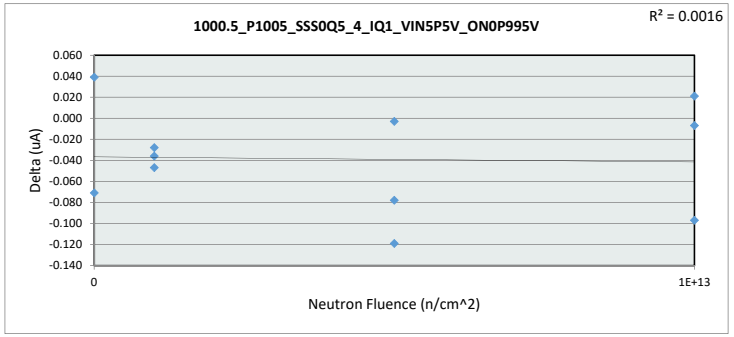
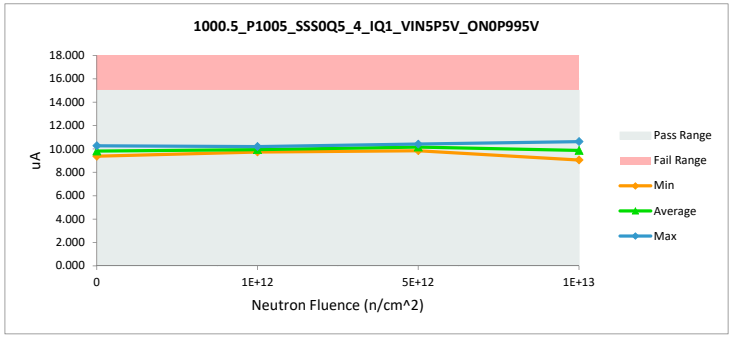
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	uA	uA	
Max Limit	15	15	
Min Limit	0	0	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	9.910	9.874	-0.036
1E+12	2	9.760	9.732	-0.028
1E+12	3	10.248	10.201	-0.047
5E+12	4	9.917	9.839	-0.078
5E+12	5	10.529	10.410	-0.119
5E+12	6	10.240	10.237	-0.003
1E+13	7	9.951	9.944	-0.007
1E+13	8	10.723	10.626	-0.097
1E+13	9	9.026	9.047	0.021
0	10	10.335	10.264	-0.071
0	11	9.330	9.369	0.039
	Max	10.723	10.626	0.039
	Average	9.997	9.958	-0.039
	Min	9.026	9.047	-0.119
	Std Dev	0.501	0.462	0.050

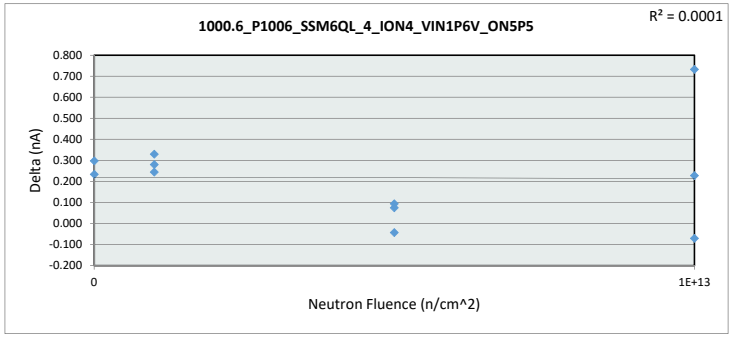


	1000.5_P1005_SSS0Q5_4			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	15	uA		
Min Limit	0	uA		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	0.000	0.000	0.000	0.000
Min	9.369	9.732	9.839	9.047
Average	9.817	9.936	10.162	9.872
Max	10.264	10.201	10.410	10.626
UL	15.000	15.000	15.000	15.000

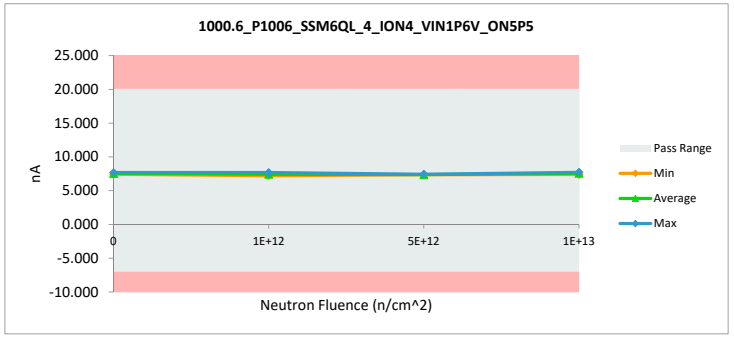


NDD Report
TPS7H2221-SEP

	1000.6_P1006_SSM6QL_4_ION4_VIN1P6V_ON5P5		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	nA	nA	
Max Limit	20	20	
Min Limit	-7	-7	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	6.925	7.205	0.280
1E+12	2	7.433	7.677	0.244
1E+12	3	7.061	7.390	0.329
5E+12	4	7.349	7.423	0.074
5E+12	5	7.283	7.376	0.093
5E+12	6	7.394	7.350	-0.044
1E+13	7	7.496	7.723	0.227
1E+13	8	7.454	7.383	-0.071
1E+13	9	6.861	7.593	0.732
0	10	7.200	7.433	0.233
0	11	7.374	7.671	0.297
	Max	7.496	7.723	0.732
	Average	7.257	7.475	0.218
	Min	6.861	7.205	-0.071
	Std Dev	0.218	0.165	0.218

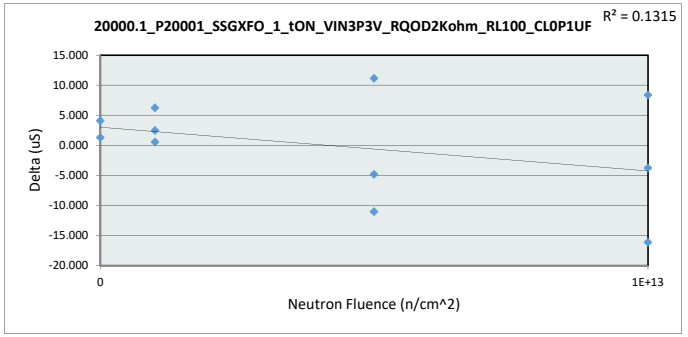


	1000.6_P1006_SSM6QL_4			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	20	nA		
Min Limit	-7	nA		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	-7.000	-7.000	-7.000	-7.000
Min	7.433	7.205	7.350	7.383
Average	7.552	7.424	7.383	7.566
Max	7.671	7.677	7.423	7.723
UL	20.000	20.000	20.000	20.000

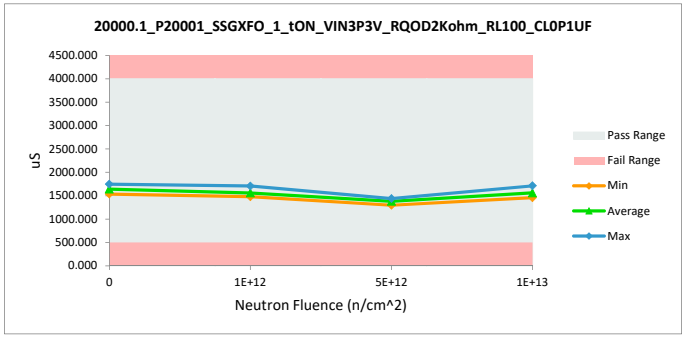


NDD Report
TPS7H2221-SEP

	20000.1_P20001_SSGXFO_1_tON_VIN3P3V_RQOD2Kohm_RL100_CL0P		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	uS	uS	
Max Limit	4000	4000	
Min Limit	500	500	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	1476.163	1476.713	0.550
1E+12	2	1703.541	1705.995	2.454
1E+12	3	1482.877	1489.109	6.232
5E+12	4	1394.322	1405.470	11.148
5E+12	5	1443.718	1438.884	-4.834
5E+12	6	1307.450	1296.420	-11.030
1E+13	7	1529.156	1513.003	-16.153
1E+13	8	1702.470	1710.842	8.372
1E+13	9	1459.472	1455.707	-3.765
0	10	1531.696	1532.979	1.283
0	11	1743.706	1747.784	4.078
	Max	1743.706	1747.784	11.148
	Average	1524.961	1524.810	-0.151
	Min	1307.450	1296.420	-16.153
	Std Dev	138.106	141.248	8.232

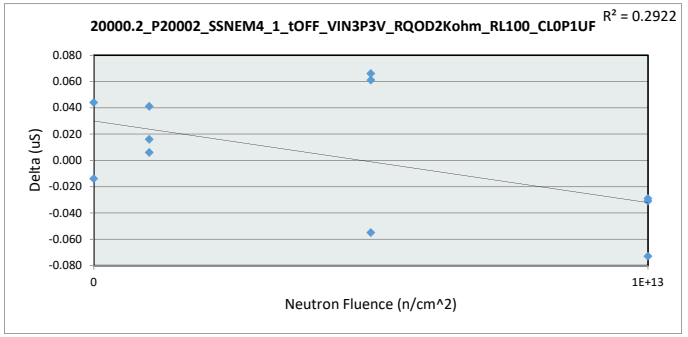


	20000.1_P20001_SSGXFO_			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	4000	uS		
Min Limit	500	uS		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	500.000	500.000	500.000	500.000
Min	1532.979	1476.713	1296.420	1455.707
Average	1640.382	1557.272	1380.258	1559.851
Max	1747.784	1705.995	1438.884	1710.842
UL	4000.000	4000.000	4000.000	4000.000

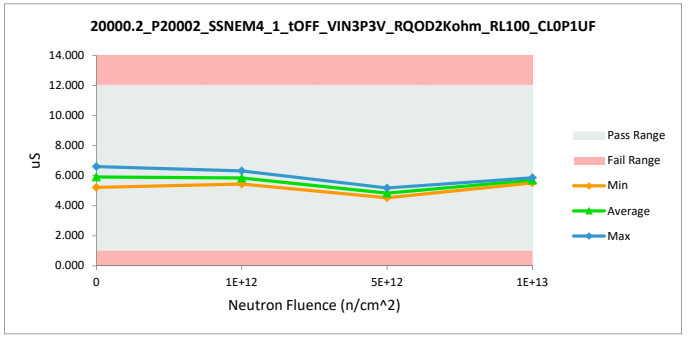


NDD Report
TPS7H2221-SEP

	20000.2_P20002_SSNEM4_1_tOFF_VIN3P3V_RQOD2Kohm_RL100_CL0I		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	uS	uS	
Max Limit	12	12	
Min Limit	1	1	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	5.394	5.435	0.041
1E+12	2	6.309	6.315	0.006
1E+12	3	5.749	5.765	0.016
5E+12	4	4.736	4.802	0.066
5E+12	5	5.122	5.183	0.061
5E+12	6	4.586	4.531	-0.055
1E+13	7	5.885	5.856	-0.029
1E+13	8	5.760	5.729	-0.031
1E+13	9	5.592	5.519	-0.073
0	10	5.226	5.212	-0.014
0	11	6.558	6.602	0.044
	Max	6.558	6.602	0.066
	Average	5.538	5.541	0.003
	Min	4.586	4.531	-0.073
	Std Dev	0.608	0.610	0.047

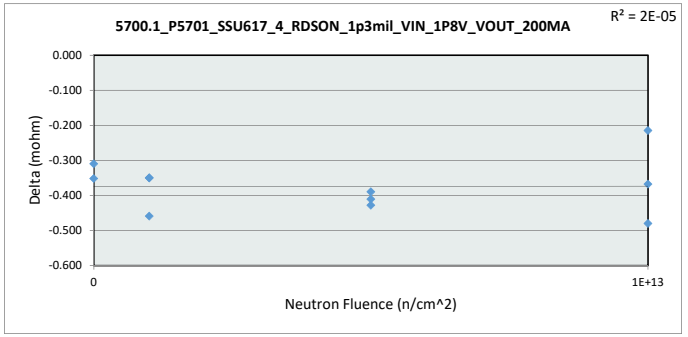


	20000.2_P20002_SSNEM4			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	12	uS		
Min Limit	1	uS		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	1.000	1.000	1.000	1.000
Min	5.212	5.435	4.531	5.519
Average	5.907	5.838	4.839	5.701
Max	6.602	6.315	5.183	5.856
UL	12.000	12.000	12.000	12.000

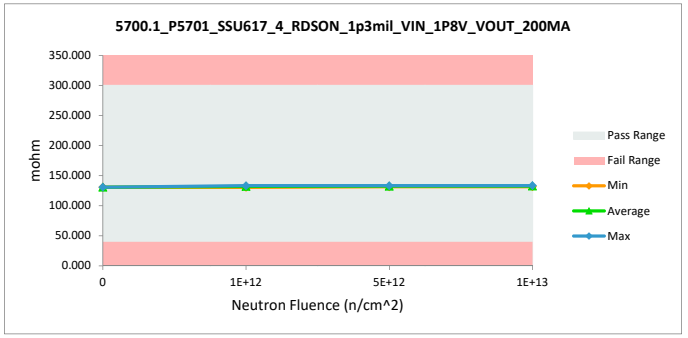


NDD Report
TPS7H2221-SEP

	5700.1_P5701_SSU617_4_RDSON_1p3mil_VIN_1P8V_VOUT_200MA		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	mohm	mohm	
Max Limit	300	300	
Min Limit	40	40	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	133.645	133.186	-0.459
1E+12	2	132.576	132.226	-0.350
1E+12	3	130.944	130.594	-0.350
5E+12	4	133.139	132.728	-0.411
5E+12	5	131.860	131.432	-0.428
5E+12	6	133.656	133.266	-0.390
1E+13	7	132.035	131.555	-0.480
1E+13	8	133.152	132.937	-0.215
1E+13	9	133.860	133.492	-0.368
0	10	131.089	130.779	-0.310
0	11	131.049	130.697	-0.352
	Max	133.860	133.492	-0.215
	Average	132.455	132.081	-0.374
	Min	130.944	130.594	-0.480
	Std Dev	1.116	1.109	0.074

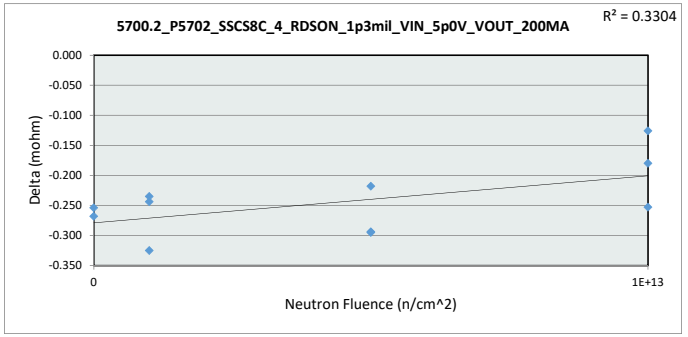


	5700.1_P5701_SSU617_4_			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	300	mohm		
Min Limit	40	mohm		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	40.000	40.000	40.000	40.000
Min	130.697	130.594	131.432	131.555
Average	130.738	132.002	132.475	132.661
Max	130.779	133.186	133.266	133.492
UL	300.000	300.000	300.000	300.000

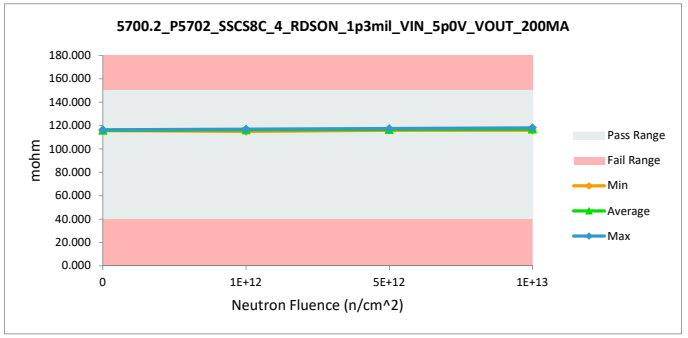


NDD Report
TPS7H2221-SEP

	5700.2_P5702_SSCS8C_4_RDSON_1p3mil_VIN_5p0V_VOUT_200MA		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	mohm	mohm	
Max Limit	150	150	
Min Limit	40	40	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	117.196	116.871	-0.325
1E+12	2	117.046	116.811	-0.235
1E+12	3	115.286	115.042	-0.244
5E+12	4	117.638	117.344	-0.294
5E+12	5	116.201	115.906	-0.295
5E+12	6	116.597	116.379	-0.218
1E+13	7	116.244	115.991	-0.253
1E+13	8	118.122	117.996	-0.126
1E+13	9	117.039	116.859	-0.180
0	10	115.918	115.650	-0.268
0	11	116.646	116.392	-0.254
	Max	118.122	117.996	-0.126
	Average	116.721	116.476	-0.245
	Min	115.286	115.042	-0.325
	Std Dev	0.804	0.824	0.056

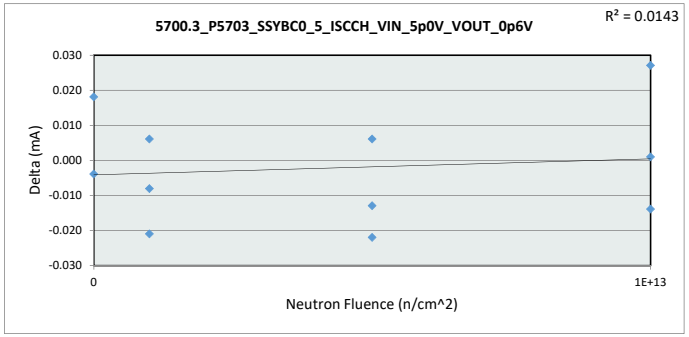


	5700.2_P5702_SSCS8C_4			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	150	mohm		
Min Limit	40	mohm		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	40.000	40.000	40.000	40.000
Min	115.650	115.042	115.906	115.991
Average	116.021	116.241	116.543	116.949
Max	116.392	116.871	117.344	117.996
UL	150.000	150.000	150.000	150.000

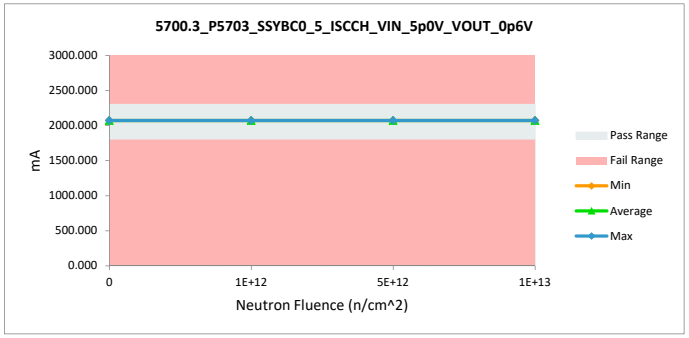


NDD Report
TPS7H2221-SEP

		5700.3_P5703_SSYBC0_5_ISCCH_VIN_5p0V_VOUT_0p6V		
	Test Site	Dallas	Dallas	
	Tester	ETS8801	ETS8801	
	Test Number	EB671802	EB671802	
	Unit	mA	mA	
	Max Limit	2300	2300	
	Min Limit	1800	1800	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	2071.156	2071.135	-0.021
1E+12	2	2071.137	2071.143	0.006
1E+12	3	2071.152	2071.144	-0.008
5E+12	4	2071.151	2071.129	-0.022
5E+12	5	2071.150	2071.156	0.006
5E+12	6	2071.149	2071.136	-0.013
1E+13	7	2071.118	2071.145	0.027
1E+13	8	2071.151	2071.137	-0.014
1E+13	9	2071.134	2071.135	0.001
0	10	2071.135	2071.153	0.018
0	11	2071.149	2071.145	-0.004
	Max	2071.156	2071.156	0.027
	Average	2071.144	2071.142	-0.002
	Min	2071.118	2071.129	-0.022
	Std Dev	0.011	0.008	0.016

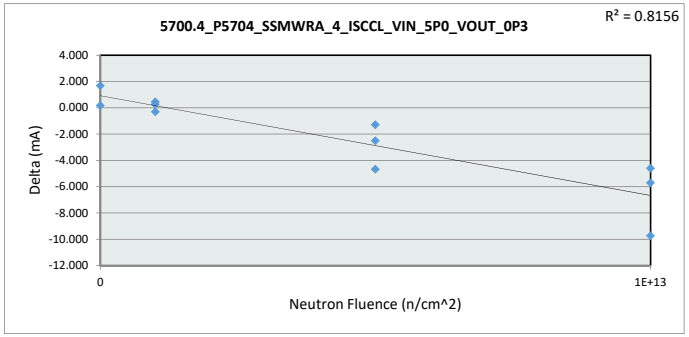


	5700.3_P5703_SSYBC0_5_			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	2300	mA		
Min Limit	1800	mA		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	1800.000	1800.000	1800.000	1800.000
Min	2071.145	2071.135	2071.129	2071.135
Average	2071.149	2071.141	2071.140	2071.139
Max	2071.153	2071.144	2071.156	2071.145
UL	2300.000	2300.000	2300.000	2300.000

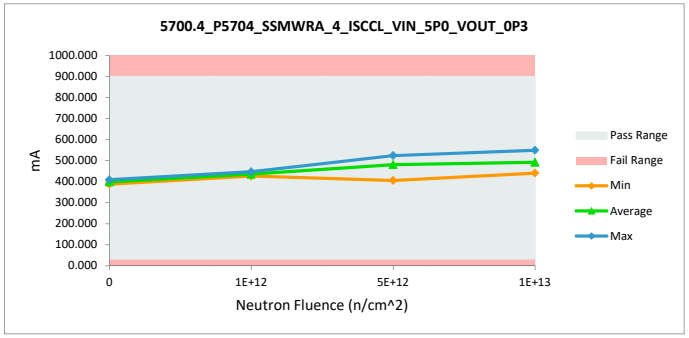


NDD Report
TPS7H2221-SEP

	5700.4_P5704_SSMWRA_4_ISCCL_VIN_5P0_VOUT_0P3		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	mA	mA	
Max Limit	900	900	
Min Limit	30	30	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	425.973	426.236	0.263
1E+12	2	447.616	447.310	-0.306
1E+12	3	432.214	432.664	0.450
5E+12	4	514.317	513.022	-1.295
5E+12	5	410.215	405.536	-4.679
5E+12	6	526.372	523.860	-2.512
1E+13	7	450.141	440.395	-9.746
1E+13	8	554.670	548.952	-5.718
1E+13	9	491.869	487.262	-4.607
0	10	386.405	388.082	1.677
0	11	409.222	409.390	0.168
	Max	554.670	548.952	1.677
	Average	459.001	456.610	-2.391
	Min	386.405	388.082	-9.746
	Std Dev	54.751	53.433	3.451

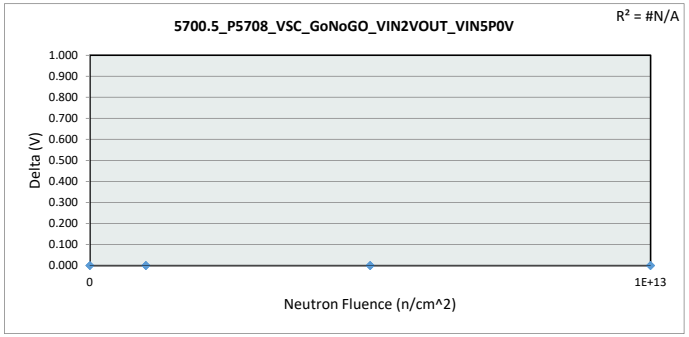


	5700.4_P5704_SSMWRA_4			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	900	mA		
Min Limit	30	mA		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	30.000	30.000	30.000	30.000
Min	388.082	426.236	405.536	440.395
Average	398.736	435.403	480.806	492.203
Max	409.390	447.310	523.860	548.952
UL	900.000	900.000	900.000	900.000

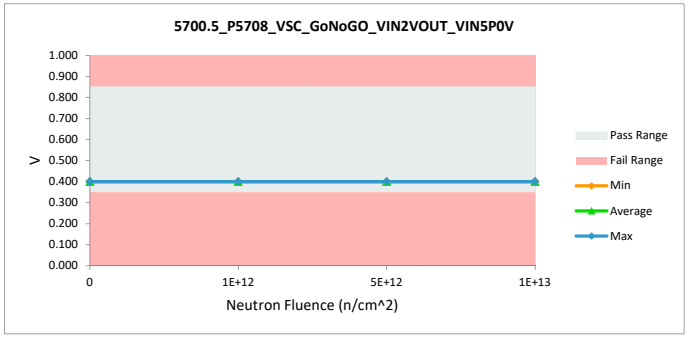


NDD Report
TPS7H2221-SEP

	5700.5_P5708_VSC_GoNoGO_VIN2VOUT_VIN5P0V		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	V	V	
Max Limit	0.85	0.85	
Min Limit	0.35	0.35	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	0.400	0.400	0.000
1E+12	2	0.400	0.400	0.000
1E+12	3	0.400	0.400	0.000
5E+12	4	0.400	0.400	0.000
5E+12	5	0.400	0.400	0.000
5E+12	6	0.400	0.400	0.000
1E+13	7	0.400	0.400	0.000
1E+13	8	0.400	0.400	0.000
1E+13	9	0.400	0.400	0.000
0	10	0.400	0.400	0.000
0	11	0.400	0.400	0.000
	Max	0.400	0.400	0.000
	Average	0.400	0.400	0.000
	Min	0.400	0.400	0.000
	Std Dev	0.000	0.000	0.000

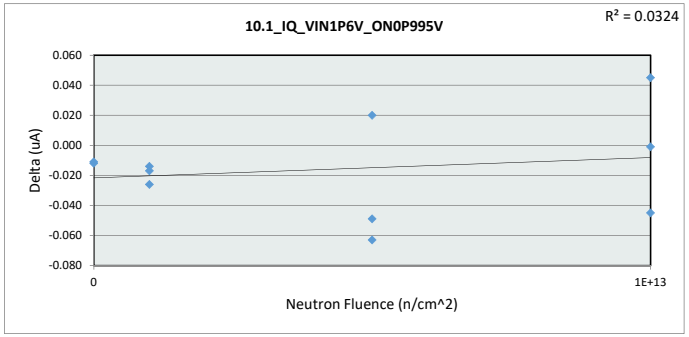


	5700.5_P5708_VSC_GoNoG			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	0.85	V		
Min Limit	0.35	V		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	0.350	0.350	0.350	0.350
Min	0.400	0.400	0.400	0.400
Average	0.400	0.400	0.400	0.400
Max	0.400	0.400	0.400	0.400
UL	0.850	0.850	0.850	0.850

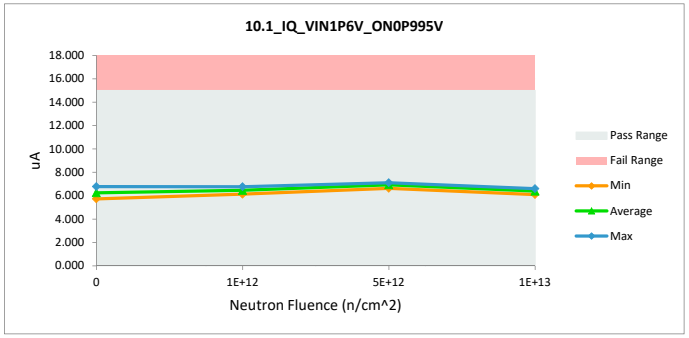


NDD Report
TPS7H2221-SEP

	10.1_IQ_VIN1P6V_ON0P995V		
Test Site	Dallas	Dallas	
Tester	ETS8801	ETS8801	
Test Number	EB671802	EB671802	
Unit	uA	uA	
Max Limit	15	15	
Min Limit	0	0	
Neutron Fluence (n/cm^2)	Serial #	Pre	Post	Delta
1E+12	1	6.479	6.465	-0.014
1E+12	2	6.154	6.128	-0.026
1E+12	3	6.783	6.766	-0.017
5E+12	4	6.687	6.624	-0.063
5E+12	5	7.164	7.115	-0.049
5E+12	6	7.051	7.071	0.020
1E+13	7	6.423	6.468	0.045
1E+13	8	6.648	6.603	-0.045
1E+13	9	6.094	6.093	-0.001
0	10	6.791	6.780	-0.011
0	11	5.737	5.725	-0.012
	Max	7.164	7.115	0.045
	Average	6.546	6.531	-0.016
	Min	5.737	5.725	-0.063
	Std Dev	0.426	0.421	0.031



	10.1_IQ_VIN1P6V_ON0P99			
Test Site	Dallas			
Tester	ETS8801			
Test Number	EB671802			
Max Limit	15	uA		
Min Limit	0	uA		
Neutron Fluence (n/cm^2)	0	1E+12	5E+12	1E+13
LL	0.000	0.000	0.000	0.000
Min	5.725	6.128	6.624	6.093
Average	6.253	6.453	6.937	6.388
Max	6.780	6.766	7.115	6.603
UL	15.000	15.000	15.000	15.000



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