

TMP9R01-SEP Total Ionizing Dose (TID) Report



ABSTRACT

This report covers Total Ionizing Dose (TID) radiation characterization test results of the TMP9R01-SEP (high-accuracy, remote and local temperature sensor). The study shows TID effects under Low Dose Rate (LDR) up to 50krad(Si). TMP9R01-SEP (TMP9R01MDGSTSEP) test results meet and/or exceed specified test limits up to 50krad(Si).

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1 Device Information

1.1 Product Description

The TMP9R01-SEP device is a radiation-hardened, high-accuracy, low-power remote temperature sensor monitor with a built-in local temperature sensor. The remote temperature sensors are typically low-cost discrete NPN or PNP transistors, or substrate thermal transistors or diodes that are integral parts of microprocessors, analog-to-digital converters (ADC), digital-to-analog converters (DAC), microcontrollers, or field-programmable gate arrays (FPGA). Temperature is represented as a 12-bit digital code for both local and remote sensors, giving a resolution of 0.0625°C. The two-wire serial interface accepts the SMBus communication protocol with up to nine different pin-programmable addresses.

Advanced features such as series resistance cancellation, programmable non-ideality factor (η -factor), programmable offset, programmable temperature limits, and a programmable digital filter are combined to provide a robust thermal monitoring design with improved accuracy and noise immunity.

The TMP9R01-SEP is designed for for multi-location, high-accuracy temperature measurements in a variety of distributed telemetry applications. The integrated local and remote temperature sensors simplify spacecraft housekeeping activities by providing a simple way of measuring temperature gradients. The device is specified for operation over a supply voltage range of 1.7V to 3.6V, and a temperature range of –55°C to 125°C.

1.2 Device Details

Table 1-1 lists the device information used in the RHA TID characterization and qualification for LDR.

Table 1-1. Device and Exposure Details

TID LDR Details: up to 50krad(Si)	
TI Device Number	TMP9R01-SEP
A/T Lot Number	5019141ML5
Die Lot Number	7411803DM5
Parent Die Name	CTMP9R01AAV
Package	10-Pin DGS (VSSOP)
Technology	LBC8LV
LDR Quantity Tested	<ul style="list-style-type: none"> • 15/15 biased/unbiased irradiated devices (20 krad(Si), 30 krad(Si), 50 krad(Si)) • 1 control
LDR Radiation Facility	VPTRad, Chelmsford Massachusetts
LDR Dose Level	20krad(Si), 30krad(Si), 50krad(Si), ⁽¹⁾
LDR Dose Rate	0.01rad(Si)/s
LDR Radiation Source	JLSA 81-22 Co-60
Lot Accept/Reject	Devices all pass up to 50krad(Si)
Irradiation Temperature	Ambient, room temperature
VID Number	V62/24615

(1) 50-krad(Si) units pass Total Ionization Dose (TID) per MIL-STD-883 1019.9, Condition D.

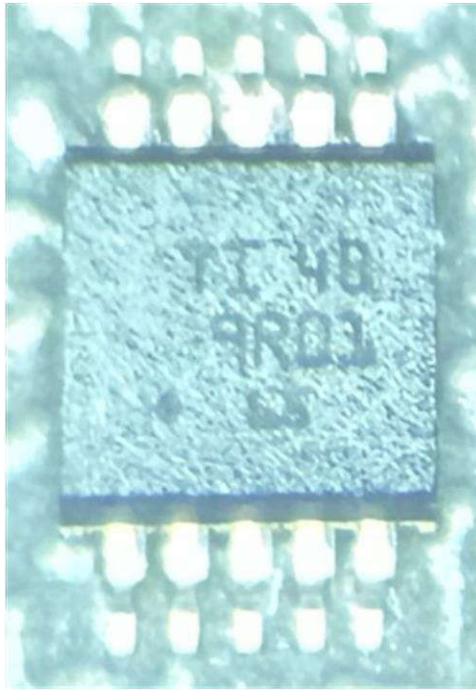


Figure 1-1. TMP9R01-SEP Device

2 Total Dose Test Setup

2.1 Test Overview

The TMP9R01-SEP was tested according to MIL-STD-883, Test Method 1019.9. For this testing, Conditions A and D were used. For this test, the product was irradiated up to the target radiation level and then put through full electrical parametric testing on the production Automated Test Equipment (ATE). The device was functional and passed all parametric tests.

2.2 Test Description and Facilities

The TMP9R01-SEP LDR exposure was performed on biased and unbiased devices in a Co60 gamma cell at VPT Rad facility in Chelmsford, Massachusetts. A uniform radiation beam is emitted through a single divergent beam port on the irradiator. A range of dose rates from 0.01 to 0.1 rad(Si)/sec is available by varying the distance to the beam port. Lead-aluminum test boxes provide energy spectrum hardening for the device under test (DUT). The DUT is positioned using a precise and versatile positioning system. An adjacent laboratory area provides a location for bias power supplies, monitoring, and test instrumentation. After exposure, the devices were packed in dry ice (per MIL-STD-883 Method 1019.9 section 3.10) and returned to TI Dallas for a full post radiation electrical evaluation using Texas Instruments production Automated Test Equipment (ATE). ATE guard band test limits are set within SMD electrical limits to verify a minimum Cpk and test error margin based on initial qualification and characterization data. Post radiation measurements were taken within 30 minutes of removal of the devices from the dry ice container. The devices were allowed to reach room temperature prior to electrical post radiation measurements.

2.3 Test Setup Details

The devices under LDR exposure were tested in both; biased and unbiased conditions as described below.

2.3.1 Unbiased

For unbiased LDR conditions, exposure was performed with all pins grounded.

2.3.2 Biased

Figure 2-1 shows bias conditions for each pin during LDR exposure.

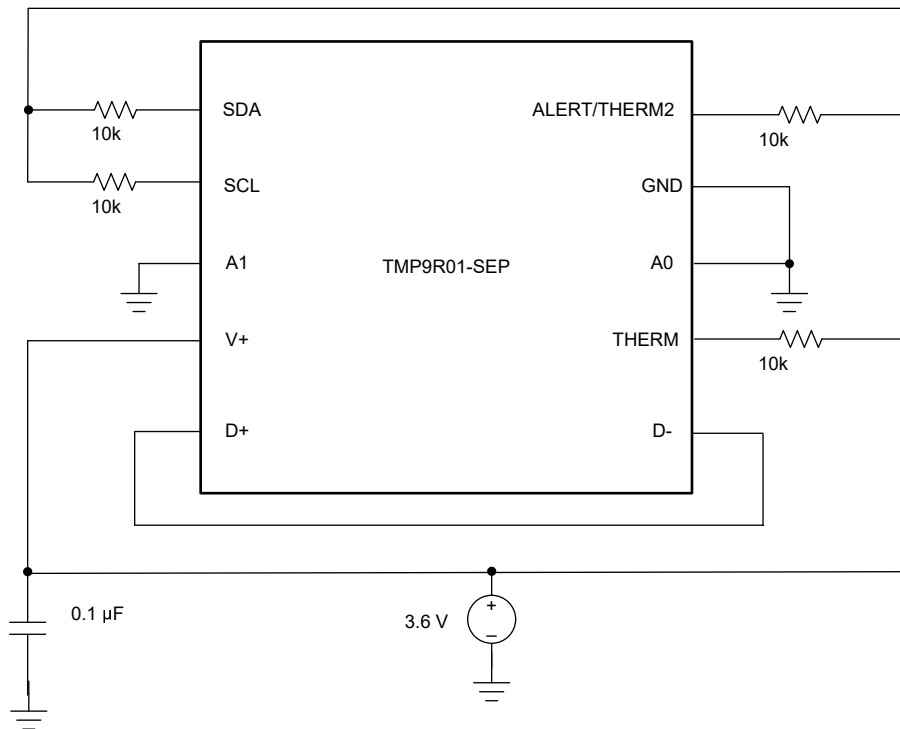


Figure 2-1. Bias Diagram Used in TID Exposure

2.4 Test Configuration and Condition

Devices at LDR were stressed at 20 krad(Si), 30 krad(Si), 50 krad(Si) for biased and unbiased conditions.

End point electrical test is performed on irradiated devices to verify the devices are within specified SMD electrical test limits. MIL-STD-883, Test Method 1019.9, Condition D is used in this case.

Table 2-1 show serialized devices used for LDR RHA characterization.

Table 2-1. LDR = 10-mrad(Si)/s Biased and Unbiased Exposure Information

LDR Exposure Level: 10 mrad(Si)/s				
Level		20krad(Si)	30krad(Si)	50krad(Si)
Device: TMP9R01MDGSTSEP Wafer Lot #: 7411803DM5 A/T Lot #: 5019141ML5	Biased	1,2,3,4,5	6,7,8,9,10	11,12,13,14,15
	Unbiased	16,17,18,19,20	21,22,23,24,25	26,27,28,29,30
	Control	32		

3 Total Ionizing Dose (RHA) Characterization Test Results

3.1 Total Ionizing Dose RHA Characterization Summary Results

The parametric data for the TMP9R01-SEP passes up to 50-krad(Si) LDR TID per MIL-STD-883, TM1010, condition D.

TID performance is based on “Pre” and “Post” radiation test measurements with respect to SMD electrical min-max specification limits. Measurements were taken at each radiation level shown in [Reference Documents](#). Data and graphs show some increase in quiescent current (IQ) at 1.7V and 3.6V for LDR at higher dose levels. Nonetheless, characterization results for all irradiated devices in the sample are within SMD electrical “Pre-rad” test limits. Both 1.7V and 3.6V supply voltage conditions have similar behavior overall at each exposure level. Tables in [Appendix A](#) depict “Pre & Post” radiation minimum and maximum values measured at each radiation exposure level.

Please see [Appendix A](#) for device specific parameters and graphs.

3.2 Specification Compliance Matrix

Table 3-1. Electrical Test Parameters

TEST	SYMBOL	CONDITIONS ⁽¹⁾	GROUP A SUBGROUPS	DEVICE TYPE	LIMITS		UNIT	TEST NUMBER
					MIN	MAX		
TEMPERATURE MEASUREMENT								
Local temperature sensor accuracy	T _{A(LOCAL)}	T _A = -55°C to +125°C, V+ = 1.7V to 3.6V	1, 2, 3	1	-2	2	°C	4.24, 4.26, 4.27
Remote temperature sensor accuracy	T _{A(REMOTE)}	T _A = -55°C to +125°C, T _D = -55°C to +150°C, V+ = 1.7V to 3.6V	1, 2, 3	1	-1.5	1.5	°C	4.10, 4.11, 4.12, 4.14, 4.15, 4.17, 4.18
Temperature sensor error versus supply (local or remote)		V+ = 1.7V to 3.6V	1, 2, 3	1	-0.3	0.3	°C/V	4.29
ADC conversion time		One-shot mode, per channel (local + remote)	9, 10, 11	1	28	34	ms	4.30
Remote sensor source current high		Series resistance 1kΩ (max)	1, 2, 3	1	85	155	μA	4.4
Remote sensor source current medium		Series resistance 1kΩ (max)	1, 2, 3	1	30	60	μA	4.2
Remote sensor source current low		Series resistance 1kΩ (max)	1, 2, 3	1	5	10	μA	4.0
SERIAL INTERFACE								
Low-level input voltage	V _{OL}	I _{OUT} = -6mA	1, 2, 3	1	0	0.4	V	2.4, 2.5, 2.6
Serial bus timeout			9, 10, 11	1	20	30	ms	2.24
POWER SUPPLY								
Specified supply voltage range	V+		1, 2, 3	1	1.7	3.6	V	
Quiescent current	I _Q	Active conversion, local sensor	1, 2, 3	1	0	375	μA	1.12, 5.2
		Active conversion, remote sensor	1, 2, 3		0	600		1.13, 5.3
		Standby mode (between conversions)	1, 2, 3		0	35		1.11, 5.1
		Shutdown mode, serial bus inactive	1, 2, 3		0	8		1.10, 5.0

Table 3-1. Electrical Test Parameters (continued)

TEST	SYMBOL	CONDITIONS ⁽¹⁾	GROUP A SUBGROUPS	DEVICE TYPE	LIMITS		UNIT	TEST NUMBER
					MIN	MAX		
Two-wire timing requirements								
SCL operating frequency	f _(SCL)	Fast mode	4, 5, 6	1	0.001	0.4	MHz	Built-in test
		High speed mode			0.001	2.17		
Bus free time between stop and start condition	t _(BUF)	Fast mode	9, 10, 11	1	1300		ns	
		High speed mode			160			
Hold time after repeated start condition. After this period, the first clock is generated.	t _(HDSTA)	Fast mode	9, 10, 11	1	600		ns	
		High speed mode			160			

(1) $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$, V+ = 1.7V to 3.6V, unless otherwise specified.

4 Applicable and Reference Documents

4.1 Applicable Documents

- [TMP9R01-SEP Product Page](#)

4.2 Reference Documents

Texas Instruments total ionizing dose radiation (total dose) test procedure follows the standards put forth in MIL-STD-883 TM 1019.

A LDR Total Ionizing Dose Report

This appendix provides the TMP9R01-SEP LDR TID report.

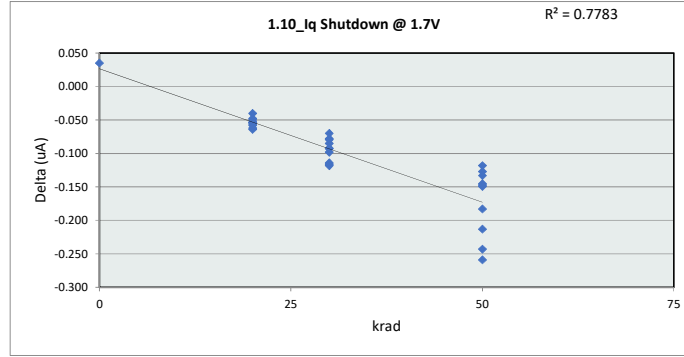
Delta Threshold 10.00%

TID Report
TMP9R01-SEP

TID Report
TMP9R01-SEP

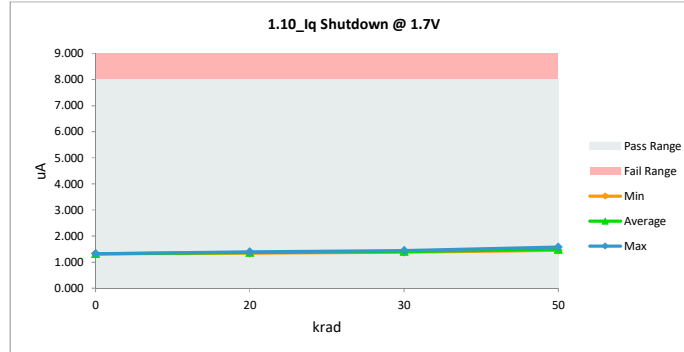
1.10_Iq Shutdown @ 1.7V		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	8	8
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	1.327	1.383	-0.056
20	2	1.342	1.392	-0.050
20	3	1.309	1.371	-0.062
20	4	1.294	1.348	-0.054
20	5	1.309	1.357	-0.048
30	6	1.311	1.409	-0.098
30	7	1.303	1.419	-0.116
30	8	1.301	1.419	-0.118
30	9	1.329	1.422	-0.093
30	10	1.309	1.379	-0.070
50	11	1.302	1.451	-0.149
50	12	1.292	1.505	-0.213
50	13	1.273	1.456	-0.183
50	14	1.321	1.580	-0.259
50	15	1.331	1.574	-0.243
20	16	1.290	1.344	-0.054
20	17	1.317	1.375	-0.058
20	18	1.317	1.357	-0.040
20	19	1.328	1.381	-0.053
20	20	1.317	1.381	-0.064
30	21	1.332	1.417	-0.085
30	22	1.300	1.392	-0.092
30	23	1.306	1.385	-0.079
30	24	1.329	1.443	-0.114
30	25	1.350	1.428	-0.078
50	26	1.332	1.459	-0.127
50	27	1.334	1.452	-0.118
50	28	1.342	1.487	-0.145
50	29	1.327	1.460	-0.133
50	30	1.309	1.456	-0.147
0	32	1.360	1.325	0.035
	Max	1.360	1.580	0.035
	Average	1.318	1.420	-0.102
	Min	1.273	1.325	-0.259
	Std Dev	0.019	0.061	0.062



1.10_Iq Shutdown @ 1.7V		
Test Site	Junkins	
Tester	FETS36405	
Test Number	EE131301	
Max Limit	8	uA
Min Limit	0	uA

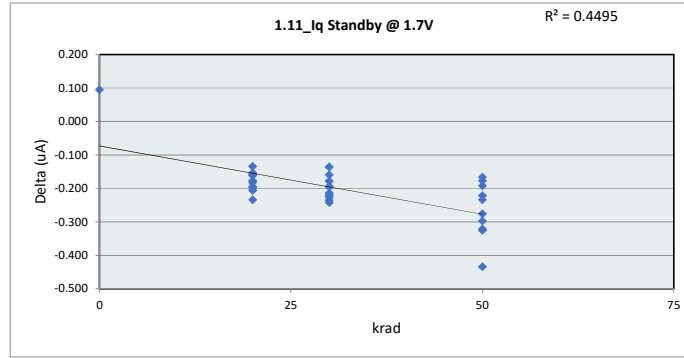
krad	0	20	30	50
LL	0.000	0.000	0.000	0.000
Min	1.325	1.344	1.379	1.451
Average	1.325	1.369	1.411	1.488
Max	1.325	1.392	1.443	1.580
UL	8.000	8.000	8.000	8.000



TID Report TMP9R01-SEP

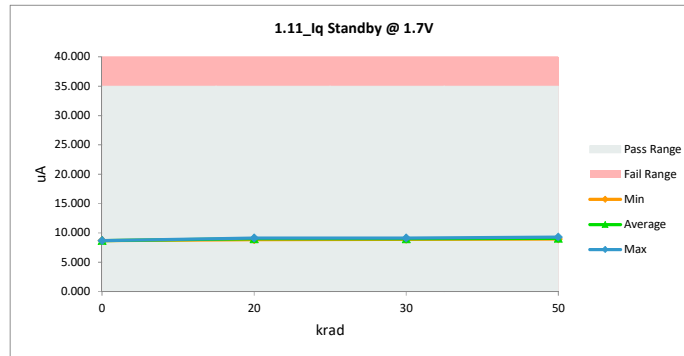
1.11_Iq Standby @ 1.7V		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	35	35
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	8.818	8.995	-0.177
20	2	8.877	9.111	-0.234
20	3	8.808	9.002	-0.194
20	4	8.757	8.939	-0.182
20	5	8.796	9.002	-0.206
30	6	8.734	8.976	-0.242
30	7	8.859	9.094	-0.235
30	8	8.682	8.902	-0.220
30	9	8.828	9.054	-0.226
30	10	8.770	8.964	-0.194
50	11	8.672	8.948	-0.276
50	12	8.669	8.990	-0.321
50	13	8.746	9.043	-0.297
50	14	8.728	9.162	-0.434
50	15	8.951	9.276	-0.325
20	16	8.771	8.969	-0.198
20	17	8.711	8.845	-0.134
20	18	8.784	8.938	-0.154
20	19	8.829	8.986	-0.157
20	20	8.900	9.061	-0.161
30	21	8.837	8.996	-0.159
30	22	8.776	8.970	-0.194
30	23	8.755	8.933	-0.178
30	24	8.698	8.912	-0.214
30	25	8.966	9.102	-0.136
50	26	8.811	8.977	-0.166
50	27	8.805	8.997	-0.192
50	28	8.895	9.072	-0.177
50	29	8.950	9.184	-0.234
50	30	8.802	9.023	-0.221
0	32	8.776	8.681	0.095
Max		8.966	9.276	0.095
Average		8.799	9.003	-0.205
Min		8.669	8.681	-0.434
Std Dev		0.080	0.107	0.084



1.11_Iq Standby @ 1.7V		
Test Site	Junkins	
Tester	FETS36405	
Test Number	EE131301	
Max Limit	35	uA
Min Limit	0	uA

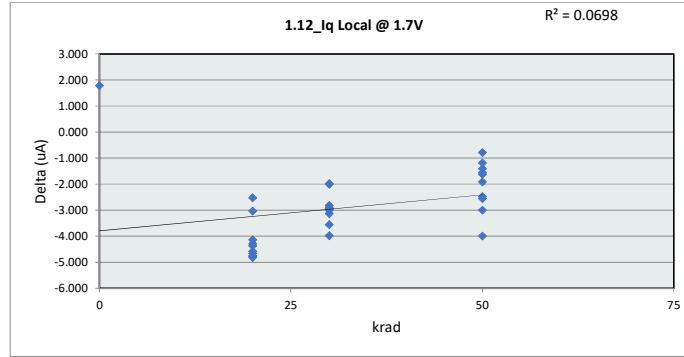
krad	0	20	30	50
LL	0.000	0.000	0.000	0.000
Min	8.681	8.845	8.902	8.948
Average	8.681	8.985	8.990	9.067
Max	8.681	9.111	9.102	9.276
UL	35.000	35.000	35.000	35.000



TID Report TMP9R01-SEP

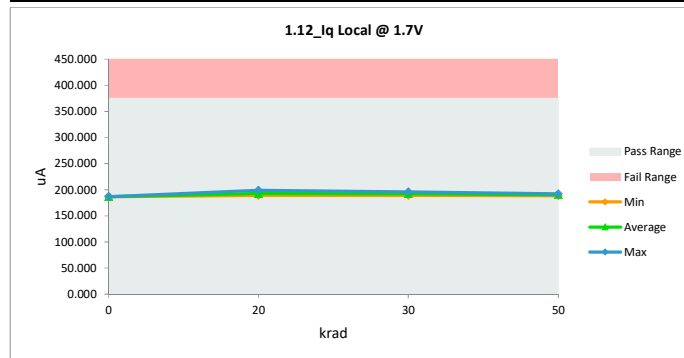
1.12_Iq Local @ 1.7V		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	375	375
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	190.505	195.264	-4.759
20	2	189.276	193.415	-4.139
20	3	184.454	188.823	-4.369
20	4	187.070	191.828	-4.758
20	5	186.233	190.895	-4.662
30	6	187.324	190.455	-3.131
30	7	187.902	191.455	-3.553
30	8	185.924	188.743	-2.819
30	9	189.272	193.252	-3.980
30	10	188.920	191.919	-2.999
50	11	185.554	188.551	-2.997
50	12	186.142	188.617	-2.475
50	13	186.541	190.536	-3.995
50	14	189.689	190.474	-0.785
50	15	190.135	192.050	-1.915
20	16	189.690	193.978	-4.288
20	17	187.083	189.604	-2.521
20	18	188.549	191.583	-3.034
20	19	194.143	198.960	-4.817
20	20	187.939	192.520	-4.581
30	21	190.922	193.824	-2.902
30	22	192.854	195.821	-2.967
30	23	189.925	191.903	-1.978
30	24	187.478	190.408	-2.930
30	25	190.761	192.762	-2.001
50	26	189.307	190.711	-1.404
50	27	188.415	190.972	-2.557
50	28	187.731	189.347	-1.616
50	29	190.741	192.298	-1.557
50	30	188.726	189.912	-1.186
0	32	188.695	186.913	1.782
	Max	194.143	198.960	1.782
	Average	188.642	191.542	-2.900
	Min	184.454	186.913	-4.817
	Std Dev	2.112	2.448	1.451



1.12_Iq Local @ 1.7V		
Test Site	Junkins	
Tester	FETS36405	
Test Number	EE131301	
Max Limit	375	uA
Min Limit	0	uA

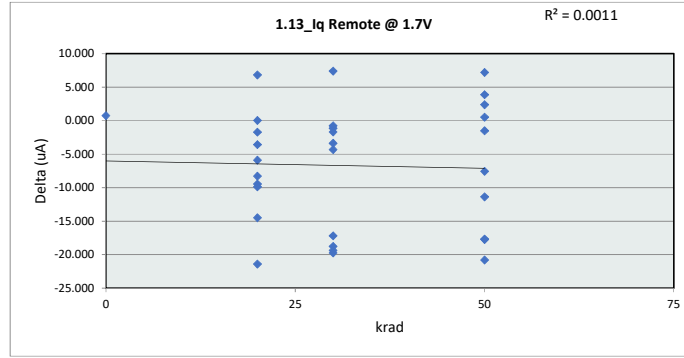
krad	0	20	30	50
LL	0.000	0.000	0.000	0.000
Min	186.913	188.823	188.743	188.551
Average	186.913	192.687	192.054	190.347
Max	186.913	198.960	195.821	192.298
UL	375.000	375.000	375.000	375.000



TID Report TMP9R01-SEP

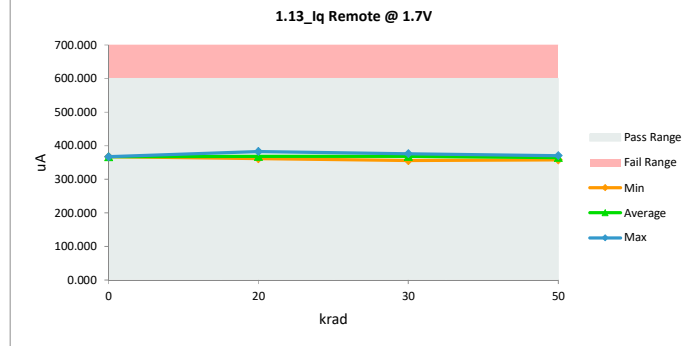
1.13_Iq Remote @ 1.7V		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	600	600
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	359.702	367.962	-8.260
20	2	361.368	361.323	0.045
20	3	346.515	367.912	-21.397
20	4	354.160	368.670	-14.510
20	5	357.234	363.116	-5.882
30	6	363.064	355.648	7.416
30	7	365.111	369.442	-4.331
30	8	346.991	366.726	-19.735
30	9	356.883	376.256	-19.373
30	10	353.951	372.707	-18.756
50	11	363.564	363.042	0.522
50	12	349.212	370.026	-20.814
50	13	352.632	370.367	-17.735
50	14	359.728	357.349	2.379
50	15	357.883	369.245	-11.362
20	16	364.650	374.526	-9.876
20	17	370.605	363.771	6.834
20	18	361.203	370.656	-9.453
20	19	379.116	382.686	-3.570
20	20	360.682	362.386	-1.704
30	21	368.500	371.879	-3.379
30	22	371.675	373.349	-1.674
30	23	363.440	364.190	-0.750
30	24	354.007	371.200	-17.193
30	25	359.966	361.103	-1.137
50	26	360.393	361.906	-1.513
50	27	364.756	360.861	3.895
50	28	354.261	361.808	-7.547
50	29	372.045	364.842	7.203
50	30	351.296	368.964	-17.668
0	32	367.710	366.962	0.748
	Max	379.116	382.686	7.416
	Average	360.397	367.125	-6.728
	Min	346.515	355.648	-21.397
	Std Dev	7.645	5.803	9.020



1.13_Iq Remote @ 1.7V	
Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	600 uA
Min Limit	0 uA

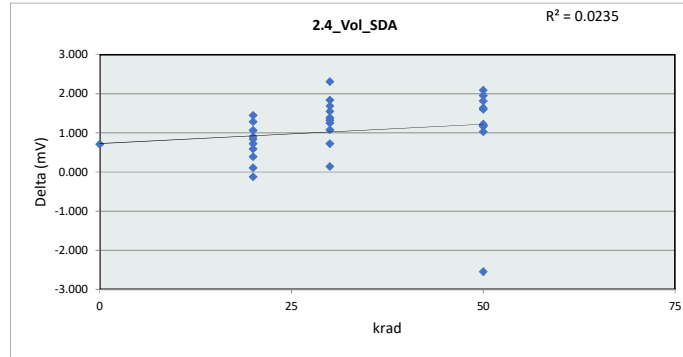
krad	0	20	30	50
LL	0.000	0.000	0.000	0.000
Min	366.962	361.323	355.648	357.349
Average	366.962	368.301	368.250	364.841
Max	366.962	382.686	376.256	370.367
UL	600.000	600.000	600.000	600.000



TID Report TMP9R01-SEP

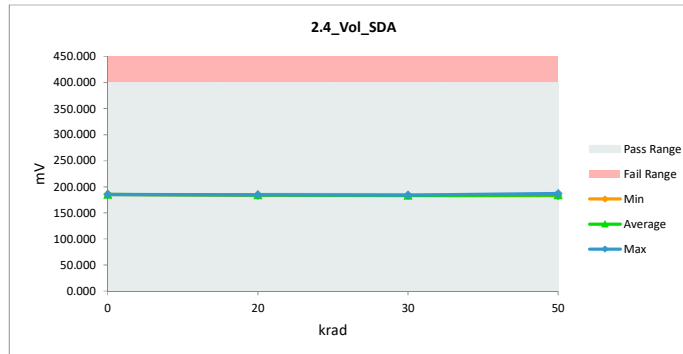
2.4_Vol_SDA		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	mV	mV
Max Limit	400	400
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	184.651	184.773	-0.122
20	2	184.738	184.011	0.727
20	3	183.816	183.424	0.392
20	4	183.903	183.798	0.105
20	5	185.311	184.411	0.900
30	6	185.635	184.248	1.387
30	7	184.489	183.411	1.078
30	8	183.853	183.711	0.142
30	9	185.062	183.224	1.838
30	10	184.862	183.611	1.251
50	11	184.514	187.063	-2.549
50	12	184.738	182.647	2.091
50	13	185.411	183.807	1.604
50	14	185.411	184.381	1.030
50	15	186.145	184.331	1.814
20	16	184.601	183.761	0.840
20	17	185.921	184.635	1.286
20	18	185.909	184.461	1.448
20	19	185.286	184.698	0.588
20	20	185.647	184.585	1.062
30	21	184.813	184.086	0.727
30	22	186.058	184.373	1.685
30	23	185.236	183.911	1.325
30	24	185.896	184.348	1.548
30	25	185.373	183.061	2.312
50	26	184.800	183.582	1.218
50	27	185.473	184.306	1.167
50	28	185.983	184.792	1.191
50	29	186.332	184.693	1.639
50	30	186.233	184.281	1.952
0	32	186.058	185.348	0.710
Max		186.332	187.063	2.312
Average		185.231	184.186	1.045
Min		183.816	182.647	-2.549
Std Dev		0.715	0.790	0.887



2.4_Vol_SDA	
Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	400 mV
Min Limit	0 mV

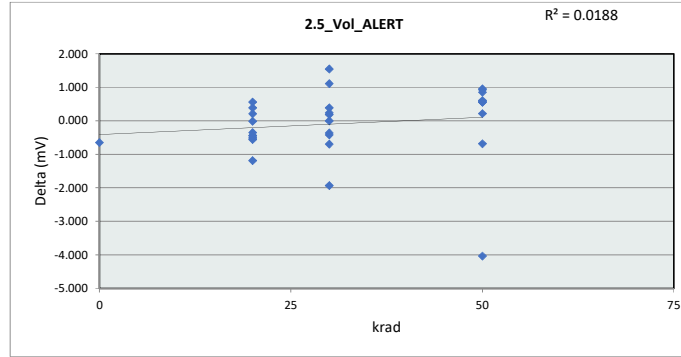
	krad	0	20	30	50
LL		0.000	0.000	0.000	0.000
Min		185.348	183.424	183.061	182.647
Average		185.348	184.256	183.798	184.388
Max		185.348	184.773	184.373	187.063
UL		400.000	400.000	400.000	400.000



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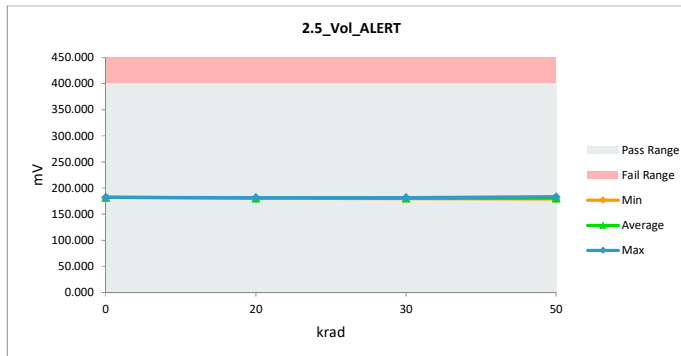
2.5_Vol_ALERT		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	mV	mV
Max Limit	400	400
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	180.598	181.785	-1.187
20	2	180.087	180.598	-0.511
20	3	180.274	180.723	-0.449
20	4	180.573	181.135	-0.562
20	5	181.233	181.585	-0.352
30	6	180.162	180.860	-0.698
30	7	180.610	180.223	0.387
30	8	180.361	180.785	-0.424
30	9	180.847	180.848	-0.001
30	10	179.913	181.847	-1.934
50	11	179.303	183.338	-4.035
50	12	180.112	179.557	0.555
50	13	180.747	180.194	0.553
50	14	181.332	181.117	0.215
50	15	180.797	180.219	0.578
20	16	181.058	180.848	0.210
20	17	181.283	180.723	0.560
20	18	180.822	181.260	-0.438
20	19	181.258	181.273	-0.015
20	20	180.760	180.373	0.387
30	21	181.158	180.048	1.110
30	22	180.610	180.973	-0.363
30	23	181.507	179.961	1.546
30	24	180.511	180.323	0.188
30	25	181.283	181.048	0.235
50	26	181.370	182.053	-0.683
50	27	181.669	180.743	0.926
50	28	181.631	181.030	0.601
50	29	181.357	180.506	0.851
50	30	181.756	180.805	0.951
0	32	181.494	182.147	-0.653
	Max	181.756	183.338	1.546
	Average	180.854	180.933	-0.079
	Min	179.303	179.557	-4.035
	Std Dev	0.588	0.756	1.037



2.5_Vol_ALERT	
Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	400 mV
Min Limit	0 mV

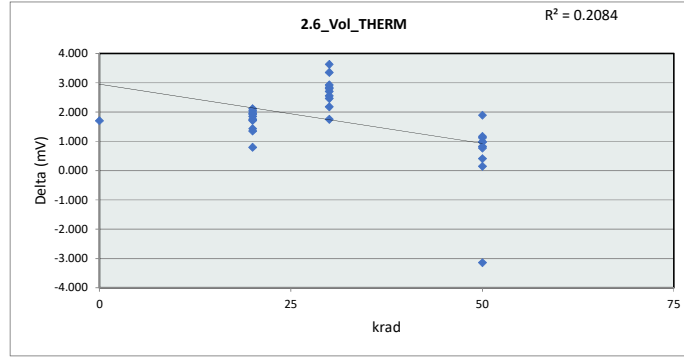
	krad 0	20	30	50
LL	0.000	0.000	0.000	0.000
Min	182.147	180.373	179.961	179.557
Average	182.147	181.030	180.692	180.956
Max	182.147	181.785	181.847	183.338
UL	400.000	400.000	400.000	400.000



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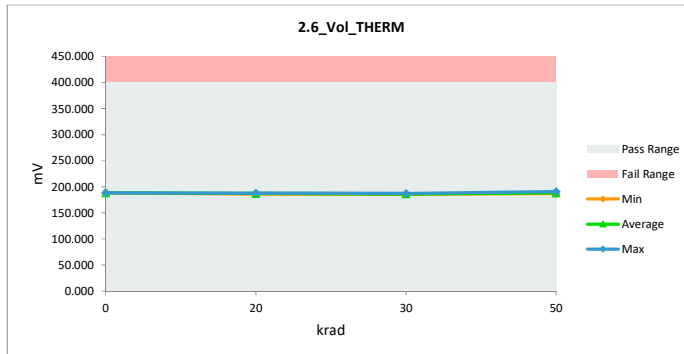
2.6_VoI_THERM		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	mV	mV
Max Limit	400	400
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	188.915	187.559	1.356
20	2	188.317	186.460	1.857
20	3	187.146	186.347	0.799
20	4	187.744	186.310	1.434
20	5	188.927	186.810	2.117
30	6	188.840	186.660	2.180
30	7	189.077	186.147	2.930
30	8	187.869	186.110	1.759
30	9	189.189	186.347	2.842
30	10	188.853	186.297	2.556
50	11	187.545	190.688	-3.143
50	12	187.508	187.356	0.152
50	13	188.541	187.556	0.985
50	14	188.853	188.018	0.835
50	15	189.014	187.843	1.171
20	16	187.968	186.210	1.758
20	17	188.877	186.947	1.930
20	18	188.765	186.722	2.043
20	19	189.164	187.447	1.717
20	20	188.927	186.959	1.968
30	21	188.379	185.672	2.707
30	22	189.014	186.547	2.467
30	23	189.176	185.547	3.629
30	24	189.301	185.947	3.354
30	25	189.899	187.097	2.802
50	26	188.940	188.529	0.411
50	27	189.201	188.429	0.772
50	28	190.148	189.166	0.982
50	29	189.737	188.617	1.120
50	30	189.263	187.369	1.894
0	32	190.060	188.359	1.701
Max		190.148	190.688	3.629
Average		188.812	187.164	1.648
Min		187.146	185.547	-3.143
Std Dev		0.728	1.138	1.228



2.6_VoI_THERM	
Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	400 mV
Min Limit	0 mV

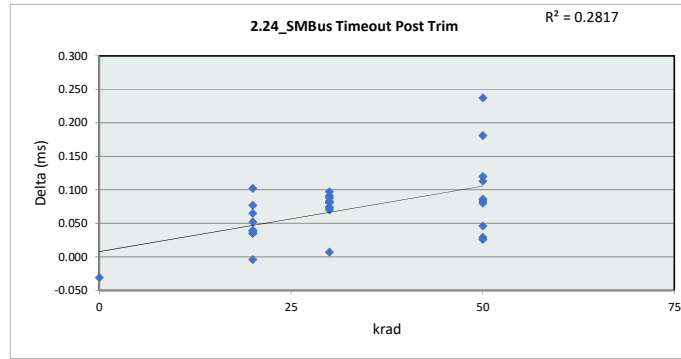
krad	0	20	30	50
LL	0.000	0.000	0.000	0.000
Min	188.359	186.210	185.547	187.356
Average	188.359	186.777	186.237	188.357
Max	188.359	187.559	187.097	190.688
UL	400.000	400.000	400.000	400.000



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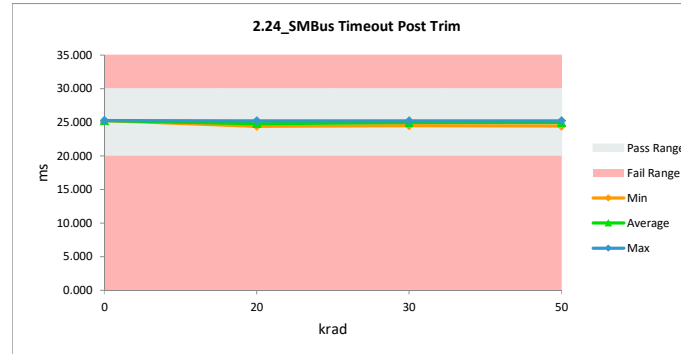
2.24_SMBus Timeout Post Trim		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	ms	ms
Max Limit	30	30
Min Limit	20	20

krad	Serial #	pre_shift	post_shift	Delta
20	1	24.576	24.580	-0.004
20	2	24.499	24.397	0.102
20	3	25.266	25.227	0.039
20	4	24.623	24.546	0.077
20	5	24.546	24.494	0.052
30	6	25.213	25.122	0.091
30	7	25.114	25.040	0.074
30	8	25.320	25.239	0.081
30	9	25.287	25.205	0.082
30	10	25.288	25.218	0.070
50	11	24.616	24.435	0.181
50	12	25.330	25.217	0.113
50	13	25.259	25.176	0.083
50	14	24.658	24.421	0.237
50	15	25.062	24.942	0.120
20	16	24.573	24.534	0.039
20	17	25.227	25.162	0.065
20	18	25.242	25.207	0.035
20	19	25.174	25.135	0.039
20	20	24.662	24.627	0.035
30	21	24.557	24.484	0.073
30	22	24.578	24.481	0.097
30	23	24.677	24.594	0.083
30	24	25.286	25.198	0.088
30	25	25.088	25.081	0.007
50	26	25.074	24.994	0.080
50	27	25.155	25.109	0.046
50	28	25.092	25.063	0.029
50	29	25.153	25.067	0.086
50	30	25.268	25.242	0.026
0	32	25.239	25.270	-0.031
	Max	25.330	25.270	0.237
	Average	24.990	24.920	0.071
	Min	24.499	24.397	-0.031
	Std Dev	0.306	0.321	0.051



2.24_SMBus Timeout Post Trim		
Test Site	Junkins	
Tester	FETS36405	
Test Number	EE131301	
Max Limit	30	ms
Min Limit	20	ms

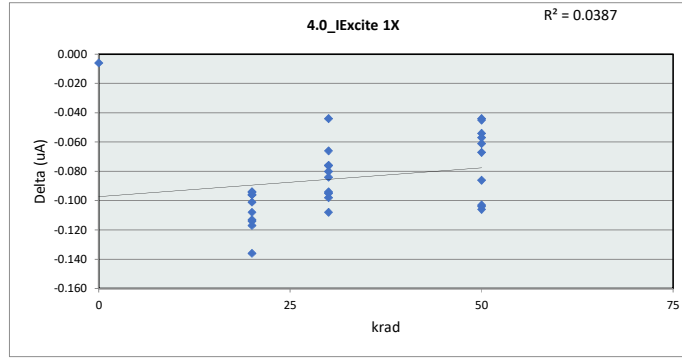
krad	0	20	30	50
LL	20.000	20.000	20.000	20.000
Min	25.270	24.397	24.481	24.421
Average	25.270	24.791	24.966	24.967
Max	25.270	25.227	25.239	25.242
UL	30.000	30.000	30.000	30.000



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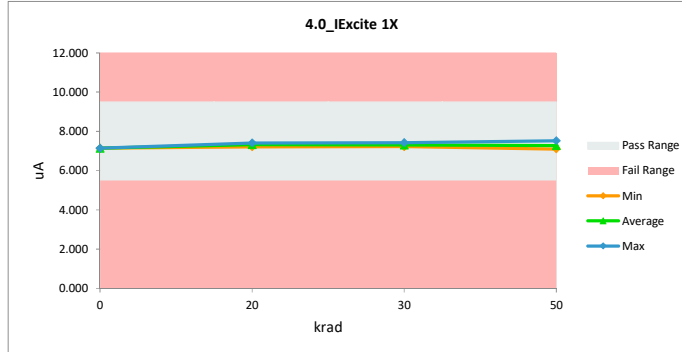
4.0_IExcite 1X		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	9.5	9.5
Min Limit	5.5	5.5

krad	Serial #	pre_shift	post_shift	Delta
20	1	7.269	7.365	-0.096
20	2	7.276	7.389	-0.113
20	3	7.117	7.211	-0.094
20	4	7.180	7.288	-0.108
20	5	7.218	7.319	-0.101
30	6	7.162	7.260	-0.098
30	7	7.193	7.237	-0.044
30	8	7.157	7.233	-0.076
30	9	7.288	7.396	-0.108
30	10	7.340	7.420	-0.080
50	11	7.179	7.285	-0.106
50	12	7.156	7.201	-0.045
50	13	7.263	7.367	-0.104
50	14	7.087	7.173	-0.086
50	15	7.471	7.515	-0.044
20	16	7.236	7.372	-0.136
20	17	7.170	7.266	-0.096
20	18	7.154	7.248	-0.094
20	19	7.296	7.410	-0.114
20	20	7.256	7.373	-0.117
30	21	7.271	7.365	-0.094
30	22	7.143	7.219	-0.076
30	23	7.220	7.286	-0.066
30	24	7.202	7.297	-0.095
30	25	7.214	7.298	-0.084
50	26	7.083	7.137	-0.054
50	27	7.361	7.464	-0.103
50	28	7.047	7.104	-0.057
50	29	7.144	7.211	-0.067
50	30	7.182	7.243	-0.061
0	32	7.136	7.142	-0.006
Max		7.471	7.515	-0.006
Average		7.209	7.293	-0.085
Min		7.047	7.104	-0.136
Std Dev		0.089	0.099	0.028



4.0_IExcite 1X	
Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	9.5 uA
Min Limit	5.5 uA

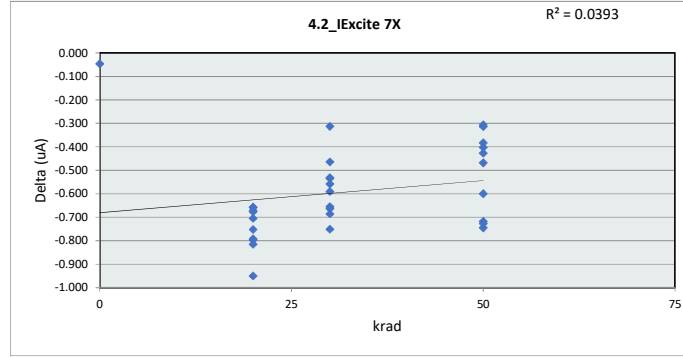
krad	0	20	30	50
LL	5.500	5.500	5.500	5.500
Min	7.142	7.211	7.219	7.104
Average	7.142	7.324	7.301	7.270
Max	7.142	7.410	7.420	7.515
UL	9.500	9.500	9.500	9.500



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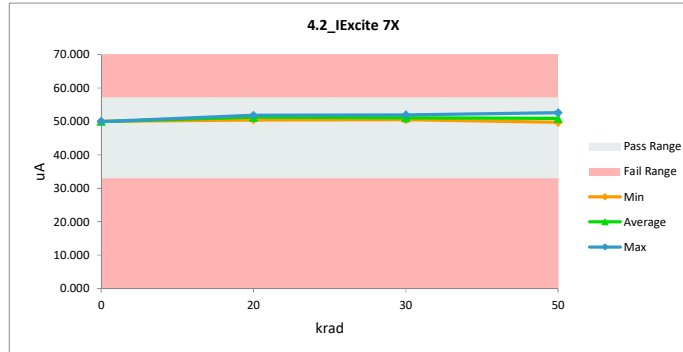
4.2_IExcite 7X		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	57	57
Min Limit	33	33

krad	Serial #	pre_shift	post_shift	Delta
20	1	50.881	51.557	-0.676
20	2	50.931	51.723	-0.792
20	3	49.822	50.479	-0.657
20	4	50.262	51.014	-0.752
20	5	50.525	51.230	-0.705
30	6	50.136	50.822	-0.686
30	7	50.348	50.661	-0.313
30	8	50.099	50.630	-0.531
30	9	51.019	51.770	-0.751
30	10	51.379	51.937	-0.558
50	11	50.253	50.998	-0.745
50	12	50.095	50.409	-0.314
50	13	50.840	51.567	-0.727
50	14	49.608	50.208	-0.600
50	15	52.299	52.605	-0.306
20	16	50.654	51.604	-0.950
20	17	50.188	50.860	-0.672
20	18	50.079	50.737	-0.658
20	19	51.074	51.871	-0.797
20	20	50.795	51.610	-0.815
30	21	50.898	51.553	-0.655
30	22	49.998	50.533	-0.535
30	23	50.538	51.002	-0.464
30	24	50.413	51.076	-0.663
30	25	50.495	51.085	-0.590
50	26	49.578	49.961	-0.383
50	27	51.527	52.245	-0.718
50	28	49.326	49.728	-0.402
50	29	50.010	50.478	-0.468
50	30	50.273	50.700	-0.427
0	32	49.950	49.996	-0.046
	Max	52.299	52.605	-0.046
	Average	50.461	51.053	-0.592
	Min	49.326	49.728	-0.950
	Std Dev	0.620	0.694	0.192



4.2_IExcite 7X	
Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	57 uA
Min Limit	33 uA

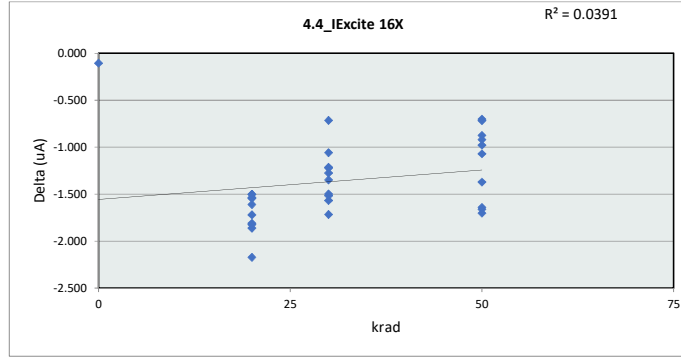
krad	0	20	30	50
LL	33.000	33.000	33.000	33.000
Min	49.996	50.479	50.533	49.728
Average	49.996	51.269	51.107	50.890
Max	49.996	51.871	51.937	52.605
UL	57.000	57.000	57.000	57.000



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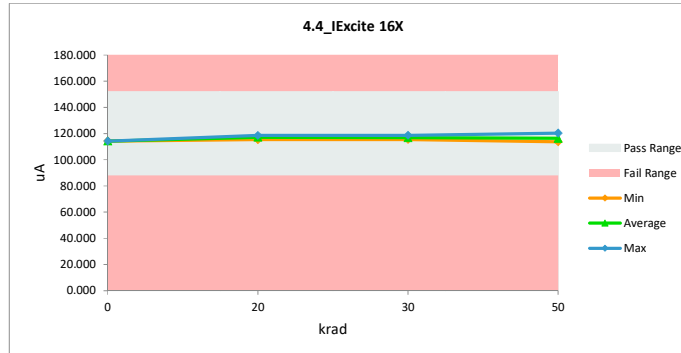
4.4_IExcite 16X		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	152	152
Min Limit	88	88

krad	Serial #	pre_shift	post_shift	Delta
20	1	116.300	117.846	-1.546
20	2	116.415	118.225	-1.810
20	3	113.879	115.382	-1.503
20	4	114.884	116.604	-1.720
20	5	115.487	117.097	-1.610
30	6	114.596	116.164	-1.568
30	7	115.081	115.796	-0.715
30	8	114.512	115.726	-1.214
30	9	116.616	118.332	-1.716
30	10	117.438	118.713	-1.275
50	11	114.863	116.566	-1.703
50	12	114.503	115.221	-0.718
50	13	116.206	117.867	-1.661
50	14	113.389	114.761	-1.372
50	15	119.540	120.241	-0.701
20	16	115.780	117.952	-2.172
20	17	114.715	116.251	-1.536
20	18	114.467	115.970	-1.503
20	19	116.740	118.563	-1.823
20	20	116.103	117.965	-1.862
30	21	116.339	117.836	-1.497
30	22	114.280	115.503	-1.223
30	23	115.516	116.575	-1.059
30	24	115.230	116.746	-1.516
30	25	115.416	116.765	-1.349
50	26	113.321	114.196	-0.875
50	27	117.776	119.417	-1.641
50	28	112.744	113.664	-0.920
50	29	114.308	115.379	-1.071
50	30	114.909	115.887	-0.978
0	32	114.172	114.277	-0.105
	Max	119.540	120.241	-0.105
	Average	115.340	116.693	-1.354
	Min	112.744	113.664	-2.172
	Std Dev	1.418	1.586	0.438



4.4_IExcite 16X		
Test Site	Junkins	
Tester	FETS36405	
Test Number	EE131301	
Max Limit	152	uA
Min Limit	88	uA

krad	0	20	30	50
LL	88.000	88.000	88.000	88.000
Min	114.277	115.382	115.503	113.664
Average	114.277	117.186	116.816	116.320
Max	114.277	118.563	118.713	120.241
UL	152.000	152.000	152.000	152.000

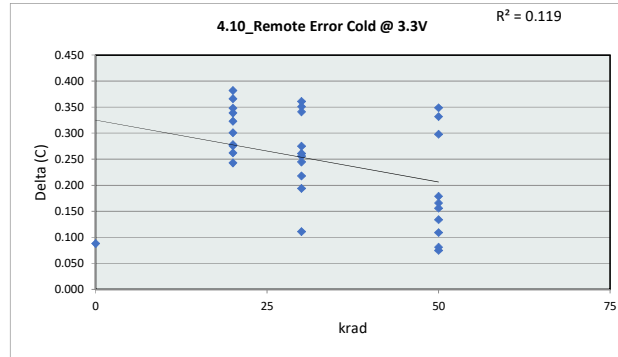


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4.10_Remote Error Cold @ 3.3V

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C	C
Max Limit	1.5	1.5
Min Limit	-1.5	-1.5

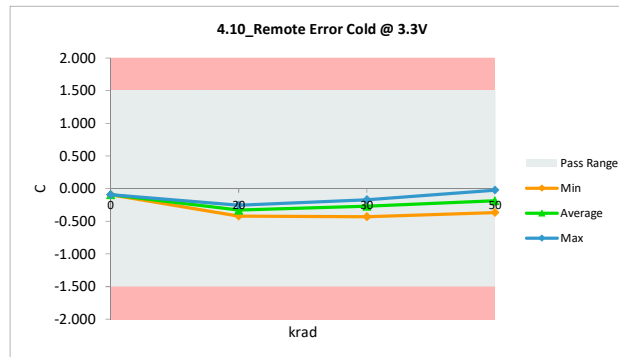
krad	Serial #	pre_shift	post_shift	Delta
20	1	0.035	-0.288	0.323
20	2	-0.008	-0.374	0.366
20	3	0.025	-0.323	0.348
20	4	0.048	-0.253	0.301
20	5	-0.080	-0.342	0.262
30	6	-0.171	-0.432	0.261
30	7	-0.059	-0.170	0.111
30	8	-0.022	-0.278	0.256
30	9	0.072	-0.279	0.351
30	10	-0.018	-0.236	0.218
50	11	-0.027	-0.359	0.332
50	12	0.047	-0.109	0.156
50	13	-0.019	-0.368	0.349
50	14	0.058	-0.023	0.081
50	15	-0.022	-0.156	0.134
20	16	0.071	-0.311	0.382
20	17	-0.085	-0.328	0.243
20	18	0.009	-0.269	0.278
20	19	-0.054	-0.393	0.339
20	20	-0.148	-0.424	0.276
30	21	0.165	-0.196	0.361
30	22	0.071	-0.270	0.341
30	23	0.009	-0.185	0.194
30	24	-0.036	-0.281	0.245
30	25	-0.099	-0.374	0.275
50	26	-0.099	-0.278	0.179
50	27	0.089	-0.209	0.298
50	28	-0.036	-0.145	0.109
50	29	-0.036	-0.111	0.075
50	30	0.057	-0.109	0.166
0	32	-0.005	-0.093	0.088
Max		0.165	-0.023	0.382
Average		-0.009	-0.257	0.248
Min		-0.171	-0.432	0.075
Std Dev		0.073	0.106	0.095



4.10_Remote Error Cold @ 3.3V

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	1.5 C
Min Limit	-1.5 C

krad	0	20	30	50
LL	-1.500	-1.500	-1.500	-1.500
Min	-0.093	-0.424	-0.432	-0.368
Average	-0.093	-0.331	-0.270	-0.187
Max	-0.093	-0.253	-0.170	-0.023
UL	1.500	1.500	1.500	1.500

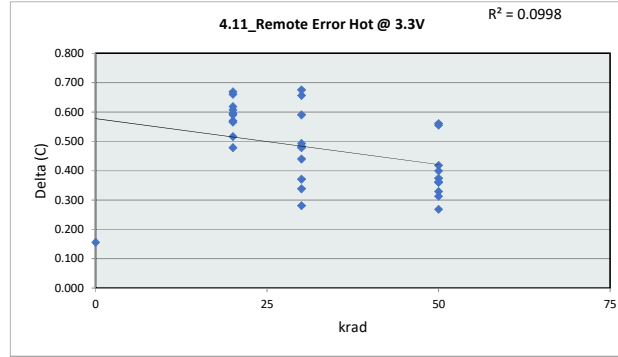


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4.11_Remote Error Hot @ 3.3V

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C	C
Max Limit	1.5	1.5
Min Limit	-1.5	-1.5

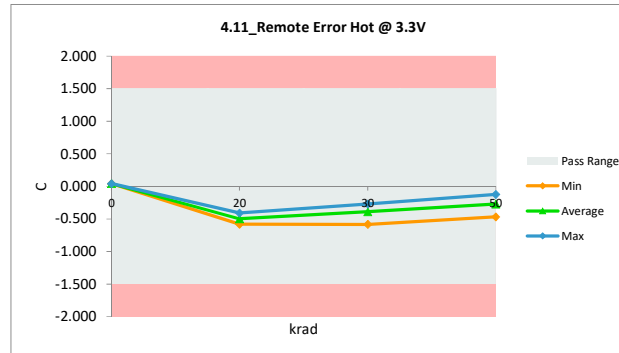
krad	Serial #	pre_shift	post_shift	Delta
20	1	0.039	-0.477	0.516
20	2	0.053	-0.554	0.607
20	3	0.147	-0.522	0.669
20	4	0.130	-0.460	0.590
20	5	0.082	-0.488	0.570
30	6	0.031	-0.307	0.338
30	7	0.113	-0.477	0.590
30	8	0.143	-0.335	0.478
30	9	0.213	-0.462	0.675
30	10	0.164	-0.319	0.483
50	11	0.000	-0.399	0.399
50	12	0.145	-0.123	0.268
50	13	0.092	-0.469	0.561
50	14	0.104	-0.209	0.313
50	15	0.063	-0.297	0.360
20	16	0.037	-0.581	0.618
20	17	0.068	-0.410	0.478
20	18	0.068	-0.528	0.596
20	19	0.162	-0.498	0.660
20	20	0.099	-0.466	0.565
30	21	0.068	-0.425	0.493
30	22	0.006	-0.434	0.440
30	23	0.099	-0.272	0.371
30	24	0.073	-0.583	0.656
30	25	0.011	-0.270	0.281
50	26	0.136	-0.238	0.374
50	27	0.167	-0.388	0.555
50	28	0.105	-0.224	0.329
50	29	0.261	-0.157	0.418
50	30	0.167	-0.194	0.361
0	32	0.198	0.042	0.156
Max	0.261	0.042	0.675	
Average	0.105	-0.372	0.476	
Min	0.000	-0.583	0.156	
Std Dev	0.063	0.150	0.137	



4.11_Remote Error Hot @ 3.3V

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	1.5 C
Min Limit	-1.5 C

krad	0	20	30	50
LL	-1.500	-1.500	-1.500	-1.500
Min	0.042	-0.581	-0.583	-0.469
Average	0.042	-0.498	-0.388	-0.270
Max	0.042	-0.410	-0.270	-0.123
UL	1.500	1.500	1.500	1.500

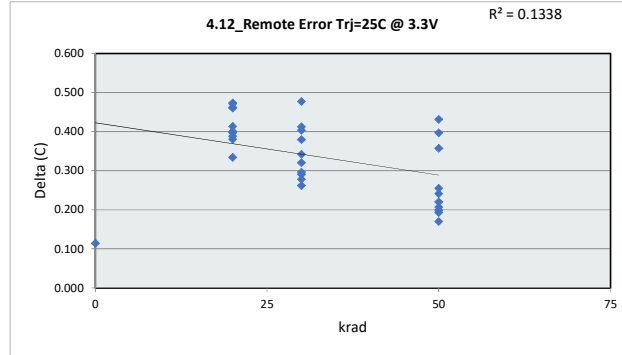


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4.12_Remote Error Trj=25C @ 3.3V

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C	C
Max Limit	1.5	1.5
Min Limit	-1.5	-1.5

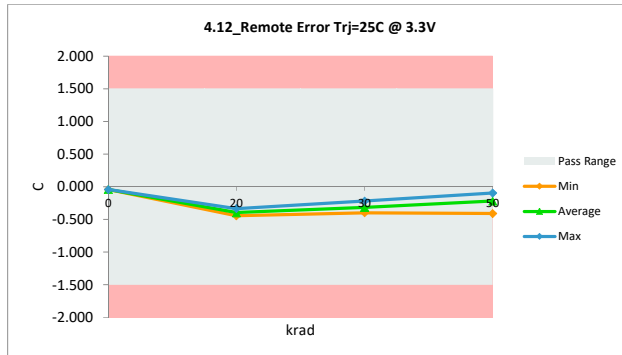
krad	Serial #	pre_shift	post_shift	Delta
20	1	0.036	-0.361	0.397
20	2	0.016	-0.444	0.460
20	3	0.072	-0.399	0.471
20	4	0.080	-0.333	0.413
20	5	-0.018	-0.398	0.380
30	6	-0.093	-0.384	0.291
30	7	0.007	-0.289	0.296
30	8	0.042	-0.300	0.342
30	9	0.127	-0.350	0.477
30	10	0.052	-0.268	0.320
50	11	-0.017	-0.374	0.357
50	12	0.085	-0.114	0.199
50	13	0.024	-0.407	0.431
50	14	0.076	-0.094	0.170
50	15	0.010	-0.210	0.220
20	16	0.058	-0.415	0.473
20	17	-0.026	-0.360	0.334
20	18	0.032	-0.369	0.401
20	19	0.029	-0.433	0.462
20	20	-0.052	-0.440	0.388
30	21	0.128	-0.284	0.412
30	22	0.046	-0.333	0.379
30	23	0.044	-0.218	0.262
30	24	0.006	-0.397	0.403
30	25	-0.056	-0.334	0.278
50	26	-0.008	-0.263	0.255
50	27	0.119	-0.278	0.397
50	28	0.018	-0.175	0.193
50	29	0.078	-0.129	0.207
50	30	0.100	-0.141	0.241
0	32	0.073	-0.041	0.114
Max		0.128	-0.041	0.477
Average		0.035	-0.301	0.336
Min		-0.093	-0.444	0.114
Std Dev		0.054	0.112	0.101



4.12_Remote Error Trj=25C @

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	1.5 C
Min Limit	-1.5 C

krad	0	20	30	50
LL	-1.500	-1.500	-1.500	-1.500
Min	-0.041	-0.444	-0.397	-0.407
Average	-0.041	-0.395	-0.316	-0.219
Max	-0.041	-0.333	-0.218	-0.094
UL	1.500	1.500	1.500	1.500

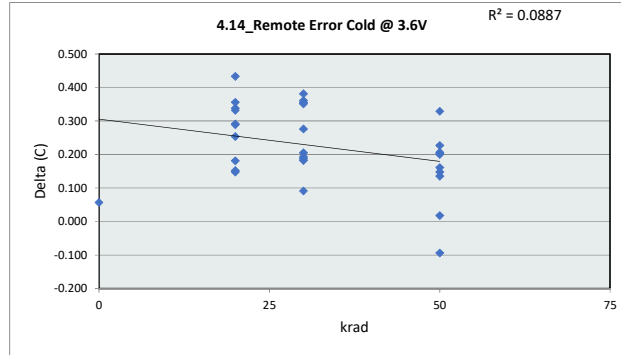


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4.14_Remote Error Cold @ 3.6V

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C	C
Max Limit	1.5	1.5
Min Limit	-1.5	-1.5

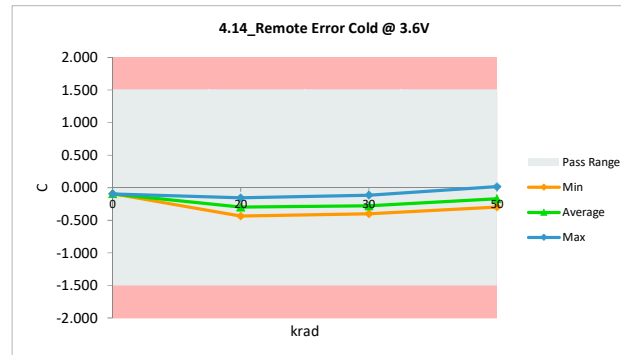
krad	Serial #	pre_shift	post_shift	Delta
20	1	0.003	-0.288	0.291
20	2	-0.008	-0.156	0.148
20	3	-0.037	-0.291	0.254
20	4	0.048	-0.284	0.332
20	5	-0.080	-0.436	0.356
30	6	-0.046	-0.401	0.355
30	7	-0.059	-0.264	0.205
30	8	0.072	-0.309	0.381
30	9	0.041	-0.310	0.351
30	10	-0.018	-0.205	0.187
50	11	-0.090	-0.296	0.206
50	12	-0.078	0.016	-0.094
50	13	-0.082	-0.243	0.161
50	14	0.027	0.009	0.018
50	15	0.009	-0.218	0.227
20	16	0.009	-0.280	0.289
20	17	-0.116	-0.297	0.181
20	18	-0.023	-0.175	0.152
20	19	0.040	-0.393	0.433
20	20	-0.023	-0.361	0.338
30	21	0.040	-0.321	0.361
30	22	-0.023	-0.114	0.091
30	23	-0.054	-0.247	0.193
30	24	-0.036	-0.312	0.276
30	25	-0.130	-0.312	0.182
50	26	-0.068	-0.216	0.148
50	27	0.057	-0.272	0.329
50	28	0.026	-0.177	0.203
50	29	0.057	-0.143	0.200
50	30	-0.036	-0.171	0.135
0	32	-0.036	-0.093	0.057
Max	0.072	0.016	0.433	
Average	-0.020	-0.244	0.224	
Min	-0.130	-0.436	-0.094	
Std Dev	0.054	0.107	0.117	



4.14_Remote Error Cold @ 3.6V

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	1.5 C
Min Limit	-1.5 C

krad	0	20	30	50
LL	-1.500	-1.500	-1.500	-1.500
Min	-0.093	-0.436	-0.401	-0.296
Average	-0.093	-0.296	-0.280	-0.171
Max	-0.093	-0.156	-0.114	0.016
UL	1.500	1.500	1.500	1.500

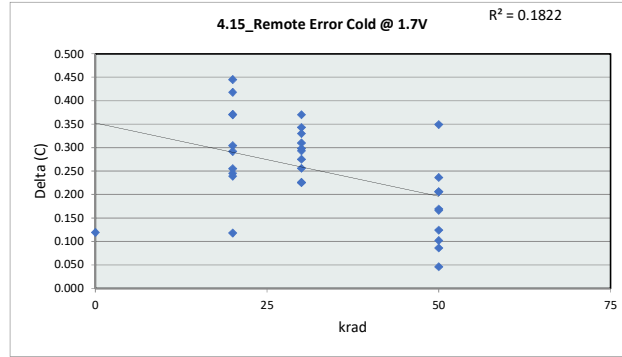


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4.15_Remote Error Cold @ 1.7V

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C	C
Max Limit	1.5	1.5
Min Limit	-1.5	-1.5

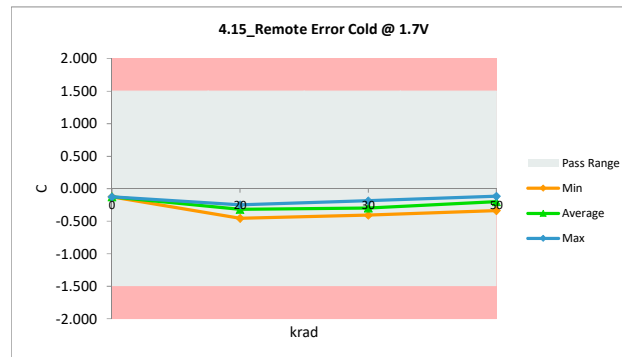
krad	Serial #	pre_shift	post_shift	Delta
20	1	0.035	-0.257	0.292
20	2	0.055	-0.249	0.304
20	3	-0.068	-0.323	0.255
20	4	-0.014	-0.253	0.239
20	5	0.045	-0.373	0.418
30	6	-0.077	-0.370	0.293
30	7	0.066	-0.264	0.330
30	8	-0.084	-0.340	0.256
30	9	0.041	-0.185	0.226
30	10	0.013	-0.330	0.343
50	11	-0.059	-0.265	0.206
50	12	-0.016	-0.140	0.124
50	13	0.012	-0.337	0.349
50	14	0.027	-0.179	0.206
50	15	-0.085	-0.187	0.102
20	16	0.134	-0.311	0.445
20	17	-0.179	-0.297	0.118
20	18	0.040	-0.331	0.371
20	19	-0.085	-0.330	0.245
20	20	-0.085	-0.455	0.370
30	21	0.071	-0.227	0.298
30	22	0.071	-0.239	0.310
30	23	0.009	-0.216	0.225
30	24	-0.036	-0.406	0.370
30	25	-0.099	-0.374	0.275
50	26	-0.099	-0.185	0.086
50	27	-0.005	-0.241	0.236
50	28	-0.068	-0.114	0.046
50	29	0.026	-0.143	0.169
50	30	-0.005	-0.171	0.166
0	32	-0.005	-0.124	0.119
Max	0.134	-0.114	0.445	
Average	-0.014	-0.265	0.251	
Min	-0.179	-0.455	0.046	
Std Dev	0.068	0.088	0.101	



4.15_Remote Error Cold @ 1.7V

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	1.5 C
Min Limit	-1.5 C

krad	0	20	30	50
LL	-1.500	-1.500	-1.500	-1.500
Min	-0.124	-0.455	-0.406	-0.337
Average	-0.124	-0.318	-0.295	-0.196
Max	-0.124	-0.249	-0.185	-0.114
UL	1.500	1.500	1.500	1.500

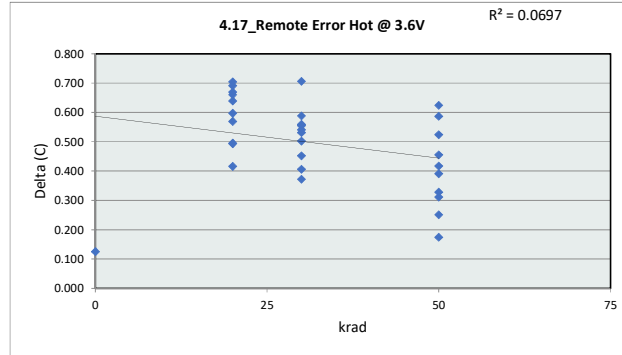


TID Report
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4.17_Remote Error Hot @ 3.6V

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C	C
Max Limit	1.5	1.5
Min Limit	-1.5	-1.5

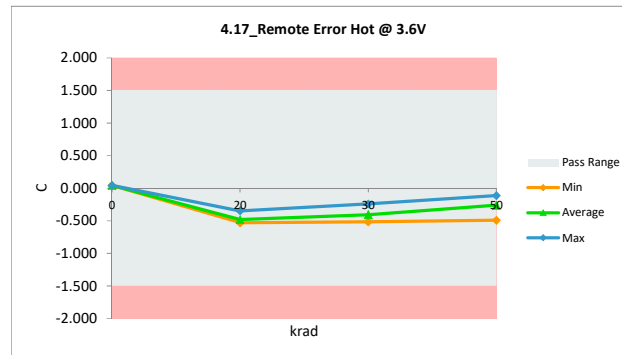
krad	Serial #	pre_shift	post_shift	Delta
20	1	0.196	-0.508	0.704
20	2	0.116	-0.523	0.639
20	3	0.147	-0.522	0.669
20	4	0.098	-0.397	0.495
20	5	0.050	-0.519	0.569
30	6	0.093	-0.495	0.588
30	7	0.145	-0.414	0.559
30	8	0.143	-0.398	0.541
30	9	0.275	-0.431	0.706
30	10	0.102	-0.350	0.452
50	11	0.031	-0.493	0.524
50	12	0.051	-0.123	0.174
50	13	0.155	-0.469	0.624
50	14	0.136	-0.115	0.251
50	15	0.094	-0.234	0.328
20	16	0.006	-0.487	0.493
20	17	0.068	-0.348	0.416
20	18	0.131	-0.466	0.597
20	19	0.131	-0.529	0.660
20	20	0.162	-0.529	0.691
30	21	0.099	-0.456	0.555
30	22	0.037	-0.465	0.502
30	23	0.131	-0.241	0.372
30	24	0.011	-0.520	0.531
30	25	0.105	-0.301	0.406
50	26	0.073	-0.238	0.311
50	27	0.230	-0.357	0.587
50	28	0.105	-0.286	0.391
50	29	0.292	-0.125	0.417
50	30	0.261	-0.194	0.455
0	32	0.167	0.042	0.125
Max		0.292	0.042	0.706
Average		0.124	-0.371	0.495
Min		0.006	-0.529	0.125
Std Dev		0.072	0.153	0.150



4.17_Remote Error Hot @ 3.6V

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	1.5 C
Min Limit	-1.5 C

krad	0	20	30	50
LL	-1.500	-1.500	-1.500	-1.500
Min	0.042	-0.529	-0.520	-0.493
Average	0.042	-0.483	-0.407	-0.263
Max	0.042	-0.348	-0.241	-0.115
UL	1.500	1.500	1.500	1.500

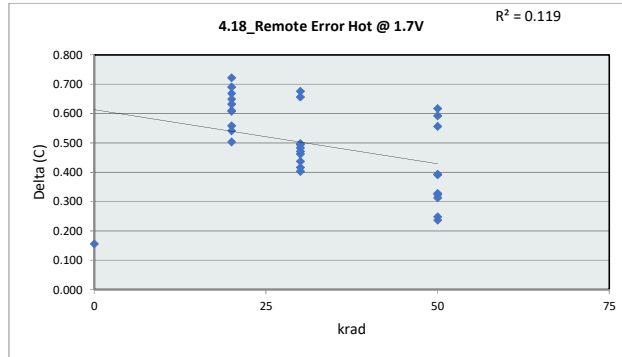


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4.18_Remote Error Hot @ 1.7V

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C	C
Max Limit	1.5	1.5
Min Limit	-1.5	-1.5

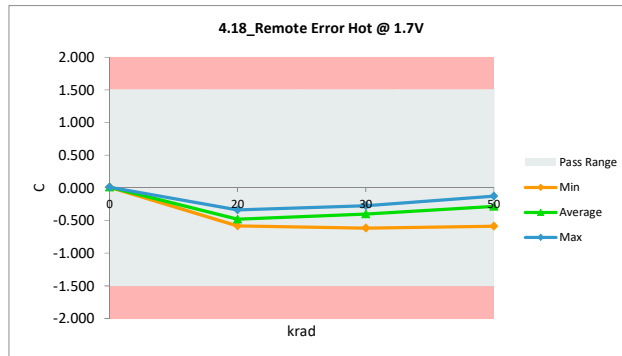
krad	Serial #	pre_shift	post_shift	Delta
20	1	0.133	-0.477	0.610
20	2	0.147	-0.461	0.608
20	3	0.147	-0.522	0.669
20	4	0.223	-0.335	0.558
20	5	0.113	-0.519	0.632
30	6	0.093	-0.401	0.494
30	7	0.145	-0.352	0.497
30	8	0.143	-0.273	0.416
30	9	0.182	-0.494	0.676
30	10	0.164	-0.319	0.483
50	11	0.031	-0.586	0.617
50	12	0.083	-0.154	0.237
50	13	0.123	-0.469	0.592
50	14	0.104	-0.209	0.313
50	15	0.094	-0.234	0.328
20	16	0.068	-0.581	0.649
20	17	0.131	-0.410	0.541
20	18	0.193	-0.497	0.690
20	19	0.162	-0.560	0.722
20	20	0.068	-0.435	0.503
30	21	0.006	-0.456	0.462
30	22	0.037	-0.434	0.471
30	23	0.131	-0.272	0.403
30	24	0.042	-0.614	0.656
30	25	0.073	-0.364	0.437
50	26	0.042	-0.206	0.248
50	27	0.105	-0.451	0.556
50	28	0.167	-0.224	0.391
50	29	0.198	-0.125	0.323
50	30	0.230	-0.163	0.393
0	32	0.167	0.011	0.156
Max	0.230	0.011	0.722	
Average	0.121	-0.374	0.495	
Min	0.006	-0.614	0.156	
Std Dev	0.058	0.156	0.148	



4.18_Remote Error Hot @ 1.7V

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	1.5 C
Min Limit	-1.5 C

	0	20	30	50
LL	-1.500	-1.500	-1.500	-1.500
Min	0.011	-0.581	-0.614	-0.586
Average	0.011	-0.480	-0.398	-0.282
Max	0.011	-0.335	-0.272	-0.125
UL	1.500	1.500	1.500	1.500

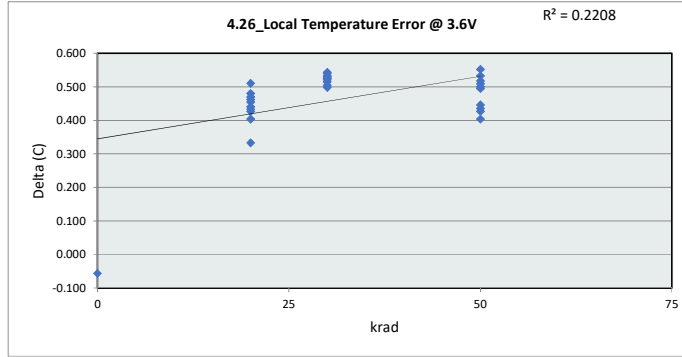


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4.26_Local Temperature Error @

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C	C
Max Limit	2	2
Min Limit	-2	-2

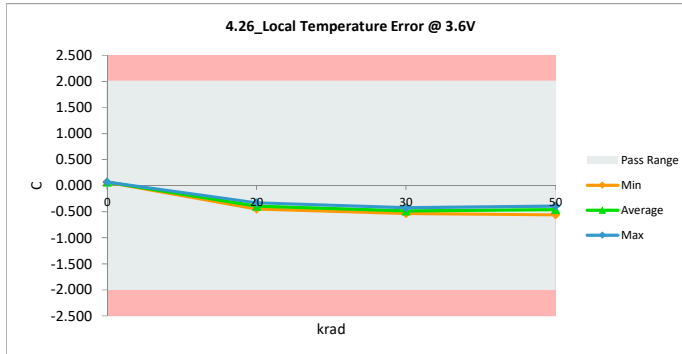
krad	Serial #	pre_shift	post_shift	Delta
20	1	0.003	-0.424	0.427
20	2	0.104	-0.329	0.433
20	3	0.054	-0.401	0.455
20	4	-0.002	-0.406	0.404
20	5	0.062	-0.378	0.440
30	6	0.065	-0.467	0.532
30	7	0.070	-0.470	0.541
30	8	0.050	-0.454	0.504
30	9	0.009	-0.534	0.543
30	10	0.027	-0.495	0.521
50	11	0.036	-0.516	0.552
50	12	0.032	-0.414	0.446
50	13	-0.029	-0.561	0.533
50	14	-0.019	-0.423	0.404
50	15	0.040	-0.455	0.495
20	16	0.049	-0.414	0.463
20	17	0.055	-0.425	0.480
20	18	0.001	-0.332	0.333
20	19	0.077	-0.393	0.469
20	20	0.059	-0.451	0.510
30	21	0.070	-0.464	0.533
30	22	0.002	-0.527	0.528
30	23	0.092	-0.422	0.514
30	24	-0.029	-0.527	0.498
30	25	0.034	-0.491	0.525
50	26	-0.002	-0.437	0.436
50	27	0.004	-0.505	0.509
50	28	0.083	-0.435	0.518
50	29	0.040	-0.460	0.500
50	30	0.037	-0.389	0.427
0	32	0.013	0.070	-0.057
Max	0.104	0.070	0.552	
Average	0.035	-0.430	0.465	
Min	-0.029	-0.561	-0.057	
Std Dev	0.035	0.108	0.110	



4.26_Local Temperature Error

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	2 C
Min Limit	-2 C

krad	0	20	30	50
LL	-2.000	-2.000	-2.000	-2.000
Min	0.070	-0.451	-0.534	-0.561
Average	0.070	-0.395	-0.485	-0.460
Max	0.070	-0.329	-0.422	-0.389
UL	2.000	2.000	2.000	2.000

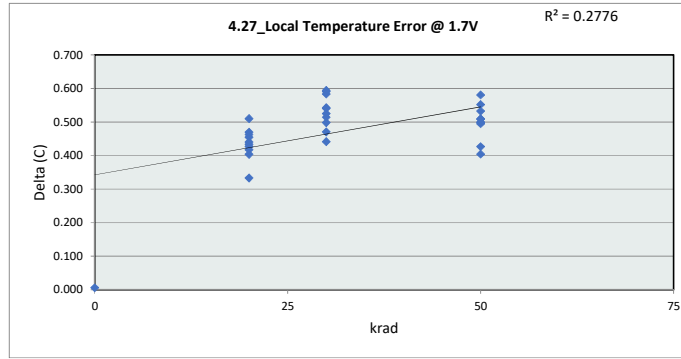


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4.27_Local Temperature Error @

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C	C
Max Limit	2	2
Min Limit	-2	-2

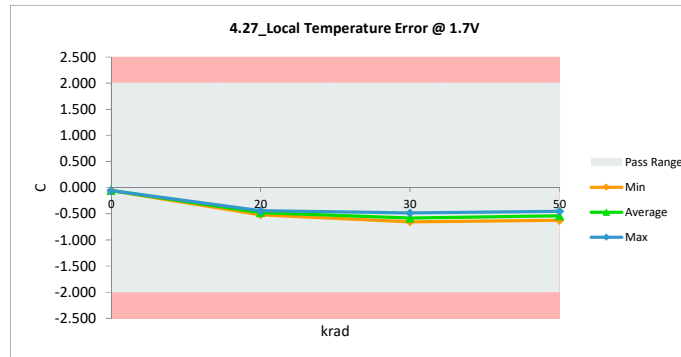
krad	Serial #	pre_shift	post_shift	Delta
20	1	-0.060	-0.487	0.427
20	2	-0.021	-0.454	0.433
20	3	-0.009	-0.463	0.455
20	4	-0.065	-0.468	0.404
20	5	-0.001	-0.441	0.440
30	6	0.002	-0.592	0.594
30	7	-0.055	-0.595	0.541
30	8	-0.075	-0.516	0.441
30	9	-0.054	-0.597	0.543
30	10	-0.036	-0.619	0.584
50	11	-0.027	-0.579	0.552
50	12	-0.030	-0.539	0.509
50	13	-0.091	-0.624	0.533
50	14	-0.082	-0.486	0.404
50	15	-0.022	-0.517	0.495
20	16	-0.014	-0.477	0.463
20	17	-0.070	-0.487	0.417
20	18	-0.124	-0.457	0.333
20	19	-0.048	-0.518	0.469
20	20	-0.003	-0.513	0.510
30	21	-0.055	-0.526	0.471
30	22	-0.061	-0.652	0.591
30	23	0.030	-0.485	0.514
30	24	-0.091	-0.590	0.498
30	25	-0.091	-0.616	0.525
50	26	-0.064	-0.562	0.498
50	27	-0.059	-0.568	0.509
50	28	0.021	-0.560	0.580
50	29	-0.022	-0.522	0.500
50	30	-0.025	-0.452	0.427
0	32	-0.049	-0.055	0.006
Max	0.030	-0.055	0.594	
Average	-0.044	-0.517	0.473	
Min	-0.124	-0.652	0.006	
Std Dev	0.036	0.104	0.107	



4.27_Local Temperature Error

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	2 C
Min Limit	-2 C

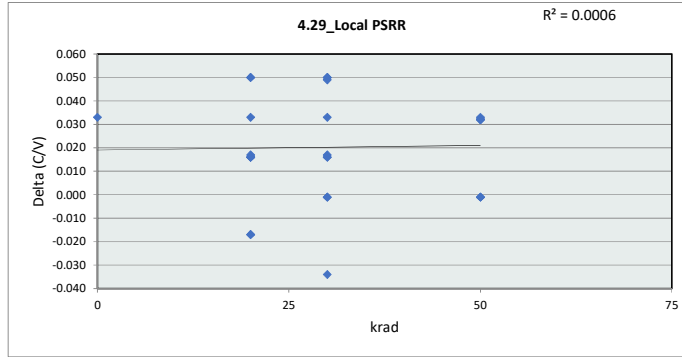
krad	0	20	30	50
LL	-2.000	-2.000	-2.000	-2.000
Min	-0.055	-0.518	-0.652	-0.624
Average	-0.055	-0.477	-0.579	-0.541
Max	-0.055	-0.441	-0.485	-0.452
UL	2.000	2.000	2.000	2.000



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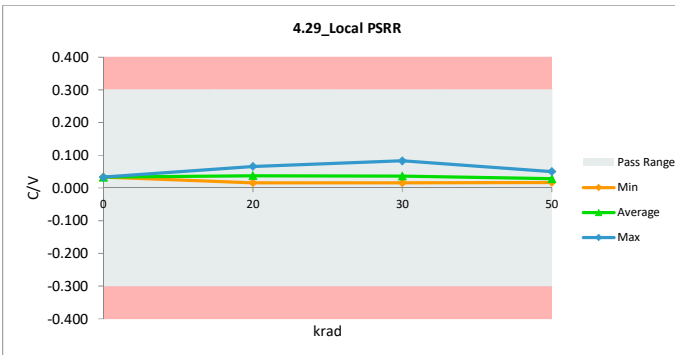
4.29_Local PSRR		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	C/V	C/V
Max Limit	0.3	0.3
Min Limit	-0.3	-0.3

krad	Serial #	pre_shift	post_shift	Delta
20	1	0.049	0.033	0.016
20	2	0.066	0.049	0.017
20	3	0.049	0.033	0.016
20	4	0.049	0.033	0.016
20	5	0.049	0.066	-0.017
30	6	0.049	0.050	-0.001
30	7	0.066	0.016	0.050
30	8	0.066	0.049	0.017
30	9	0.049	0.083	-0.034
30	10	0.049	0.000	0.049
50	11	0.049	0.017	0.032
50	12	0.049	0.050	-0.001
50	13	0.049	0.017	0.032
50	14	0.049	0.017	0.032
50	15	0.049	0.017	0.032
20	16	0.049	0.033	0.016
20	17	0.066	0.016	0.050
20	18	0.066	0.033	0.033
20	19	0.066	0.016	0.050
20	20	0.049	0.066	-0.017
30	21	0.066	0.016	0.050
30	22	0.049	0.050	-0.001
30	23	0.049	0.033	0.016
30	24	0.049	0.033	0.016
30	25	0.066	0.033	0.033
50	26	0.066	0.033	0.033
50	27	0.049	0.050	-0.001
50	28	0.049	0.050	-0.001
50	29	0.049	0.017	0.032
50	30	0.049	0.017	0.032
0	32	0.066	0.033	0.033
Max		0.066	0.083	0.050
Average		0.054	0.034	0.020
Min		0.049	0.000	-0.034
Std Dev		0.008	0.019	0.022



4.29_Local PSRR		
Test Site	Junkins	
Tester	FETS36405	
Test Number	EE131301	
Max Limit	0.3	C/V
Min Limit	-0.3	C/V

krad	0	20	30	50
LL	-0.300	-0.300	-0.300	-0.300
Min	0.033	0.016	0.016	0.017
Average	0.033	0.038	0.036	0.029
Max	0.033	0.066	0.083	0.050
UL	0.300	0.300	0.300	0.300

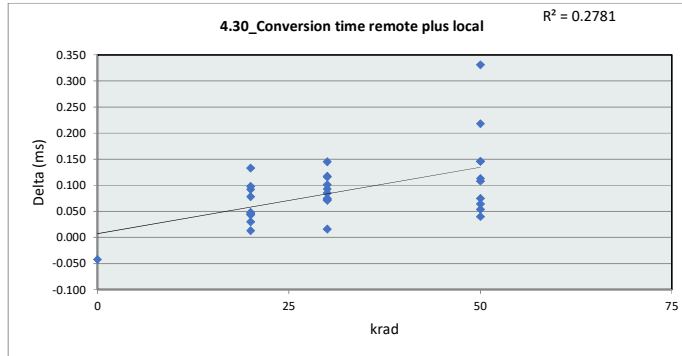


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4.30_Conversion time remote plus local

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	ms	ms
Max Limit	34	34
Min Limit	28	28

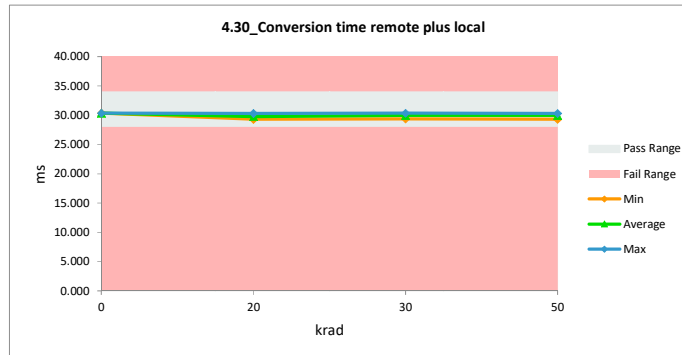
krad	Serial #	pre_shift	post_shift	Delta
20	1	29.514	29.501	0.013
20	2	29.441	29.308	0.133
20	3	30.395	30.303	0.092
20	4	29.550	29.452	0.098
20	5	29.450	29.420	0.030
30	6	30.285	30.169	0.116
30	7	30.161	30.068	0.093
30	8	30.463	30.318	0.145
30	9	30.380	30.305	0.075
30	10	30.421	30.336	0.085
50	11	29.534	29.316	0.218
50	12	30.435	30.289	0.146
50	13	30.385	30.239	0.146
50	14	29.634	29.303	0.331
50	15	30.097	29.984	0.113
20	16	29.496	29.452	0.044
20	17	30.303	30.225	0.078
20	18	30.367	30.319	0.048
20	19	30.279	30.232	0.047
20	20	29.595	29.551	0.044
30	21	29.465	29.392	0.073
30	22	29.488	29.371	0.117
30	23	29.659	29.558	0.101
30	24	30.380	30.309	0.071
30	25	30.170	30.154	0.016
50	26	30.107	30.053	0.054
50	27	30.255	30.147	0.108
50	28	30.132	30.092	0.040
50	29	30.207	30.143	0.064
50	30	30.398	30.323	0.075
0	32	30.318	30.360	-0.042
Max		30.463	30.360	0.331
Average		30.025	29.935	0.089
Min		29.441	29.303	-0.042
Std Dev		0.387	0.402	0.067



4.30_Conversion time remote plus local

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	34 ms
Min Limit	28 ms

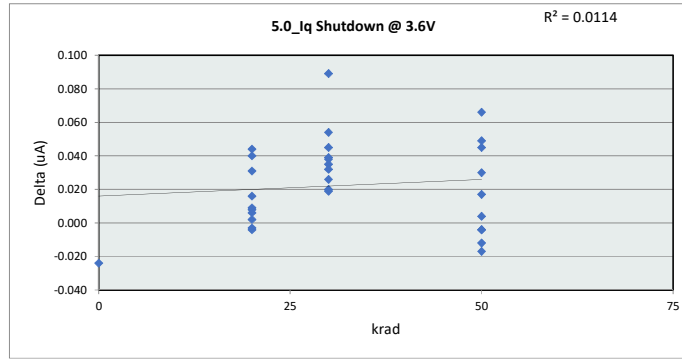
krad	0	20	30	50
LL	28.000	28.000	28.000	28.000
Min	30.360	29.308	29.371	29.303
Average	30.360	29.776	29.998	29.989
Max	30.360	30.319	30.336	30.323
UL	34.000	34.000	34.000	34.000



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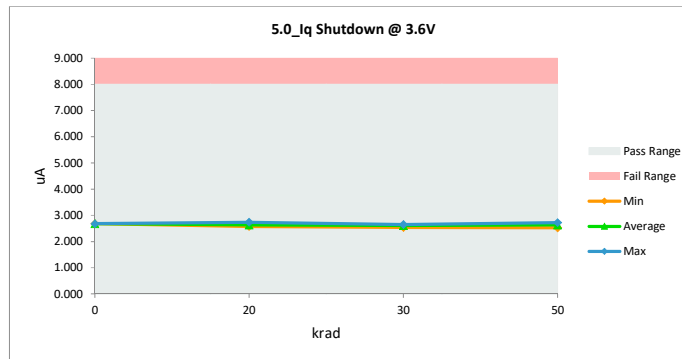
5.0_Iq Shutdown @ 3.6V		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	8	8
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	2.628	2.626	0.002
20	2	2.640	2.632	0.008
20	3	2.667	2.658	0.009
20	4	2.615	2.575	0.040
20	5	2.627	2.596	0.031
30	6	2.655	2.620	0.035
30	7	2.649	2.560	0.089
30	8	2.575	2.537	0.038
30	9	2.661	2.641	0.020
30	10	2.671	2.645	0.026
50	11	2.661	2.631	0.030
50	12	2.668	2.680	-0.012
50	13	2.680	2.663	0.017
50	14	2.620	2.637	-0.017
50	15	2.607	2.611	-0.004
20	16	2.622	2.606	0.016
20	17	2.670	2.664	0.006
20	18	2.645	2.649	-0.004
20	19	2.731	2.734	-0.003
20	20	2.643	2.599	0.044
30	21	2.660	2.615	0.045
30	22	2.653	2.621	0.032
30	23	2.664	2.625	0.039
30	24	2.631	2.577	0.054
30	25	2.668	2.649	0.019
50	26	2.682	2.633	0.049
50	27	2.715	2.719	-0.004
50	28	2.678	2.633	0.045
50	29	2.624	2.620	0.004
50	30	2.594	2.528	0.066
0	32	2.654	2.678	-0.024
Max		2.731	2.734	0.089
Average		2.650	2.628	0.022
Min		2.575	2.528	-0.024
Std Dev		0.032	0.045	0.026



5.0_Iq Shutdown @ 3.6V		
Test Site	Junkins	
Tester	FETS36405	
Test Number	EE131301	
Max Limit	8	uA
Min Limit	0	uA

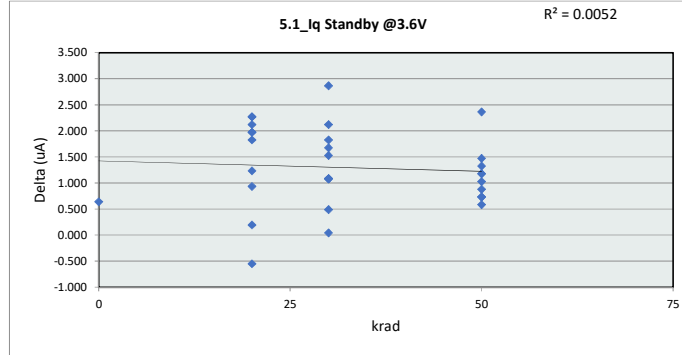
	krad	0	20	30	50
LL		0.000	0.000	0.000	0.000
Min		2.678	2.575	2.537	2.528
Average		2.678	2.634	2.609	2.636
Max		2.678	2.734	2.649	2.719
UL		8.000	8.000	8.000	8.000



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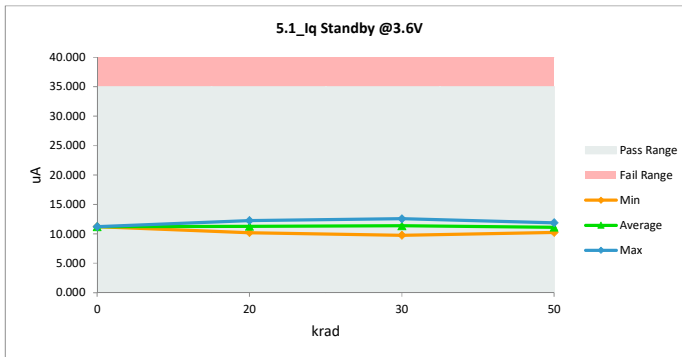
5.1_Iq Standby @3.6V		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	35	35
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	12.457	10.189	2.268
20	2	13.348	11.524	1.824
20	3	13.051	10.931	2.120
20	4	13.051	10.782	2.269
20	5	12.903	10.931	1.972
30	6	12.606	11.079	1.527
30	7	12.012	11.969	0.043
30	8	13.051	10.931	2.120
30	9	13.645	12.563	1.082
30	10	12.606	9.744	2.862
50	11	12.161	10.837	1.324
50	12	12.606	10.243	2.363
50	13	11.864	10.985	0.879
50	14	11.864	10.837	1.027
50	15	12.309	11.727	0.582
20	16	12.161	11.969	0.192
20	17	11.715	12.266	-0.551
20	18	13.200	11.227	1.973
20	19	12.309	11.376	0.933
20	20	12.903	11.673	1.230
30	21	12.457	11.969	0.488
30	22	13.348	12.266	1.082
30	23	12.903	11.079	1.824
30	24	12.457	10.782	1.675
30	25	12.309	11.227	1.082
50	26	11.715	10.540	1.175
50	27	12.903	11.430	1.473
50	28	12.606	11.876	0.730
50	29	12.606	11.876	0.730
50	30	12.161	10.985	1.176
0	32	11.864	11.227	0.637
Max		13.645	12.563	2.862
Average		12.553	11.259	1.294
Min		11.715	9.744	-0.551
Std Dev		0.514	0.654	0.764



5.1_Iq Standby @3.6V	
Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	35 uA
Min Limit	0 uA

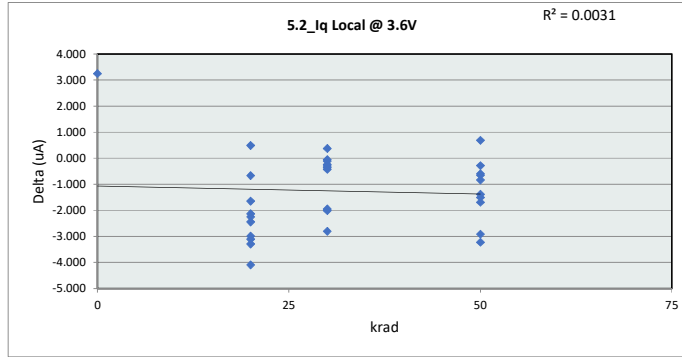
krad	0	20	30	50
LL	0.000	0.000	0.000	0.000
Min	11.227	10.189	9.744	10.243
Average	11.227	11.287	11.361	11.134
Max	11.227	12.266	12.563	11.876
UL	35.000	35.000	35.000	35.000



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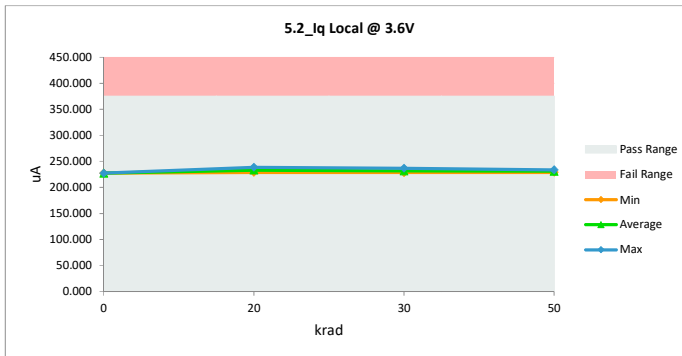
5.2_Iq Local @ 3.6V		
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	375	375
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	233.526	236.636	-3.110
20	2	232.731	234.865	-2.134
20	3	226.374	228.817	-2.443
20	4	229.553	233.643	-4.090
20	5	229.736	231.383	-1.647
30	6	229.064	229.489	-0.425
30	7	229.003	231.810	-2.807
30	8	228.208	228.511	-0.303
30	9	231.081	233.093	-2.012
30	10	230.958	231.199	-0.241
50	11	227.658	230.573	-2.915
50	12	227.475	228.985	-1.510
50	13	227.291	230.512	-3.221
50	14	232.059	233.445	-1.386
50	15	230.958	232.651	-1.693
20	16	233.098	235.353	-2.255
20	17	229.186	228.695	0.491
20	18	230.775	231.444	-0.669
20	19	235.359	238.652	-3.293
20	20	229.614	232.604	-2.990
30	21	235.298	234.926	0.372
30	22	236.643	237.003	-0.360
30	23	231.509	231.566	-0.057
30	24	228.636	230.588	-1.952
30	25	230.470	230.588	-0.118
50	26	230.470	230.757	-0.287
50	27	229.614	230.451	-0.837
50	28	228.575	229.229	-0.654
50	29	231.814	231.123	0.691
50	30	229.981	230.573	-0.592
0	32	230.531	227.290	3.241
	Max	236.643	238.652	3.241
	Average	230.556	231.821	-1.265
	Min	226.374	227.290	-4.090
	Std Dev	2.432	2.705	1.532



5.2_Iq Local @ 3.6V		
Test Site	Junkins	
Tester	FETS36405	
Test Number	EE131301	
Max Limit	375	uA
Min Limit	0	uA

krad	0	20	30	50
LL	0.000	0.000	0.000	0.000
Min	227.290	228.695	228.511	228.985
Average	227.290	233.209	231.877	230.830
Max	227.290	238.652	237.003	233.445
UL	375.000	375.000	375.000	375.000

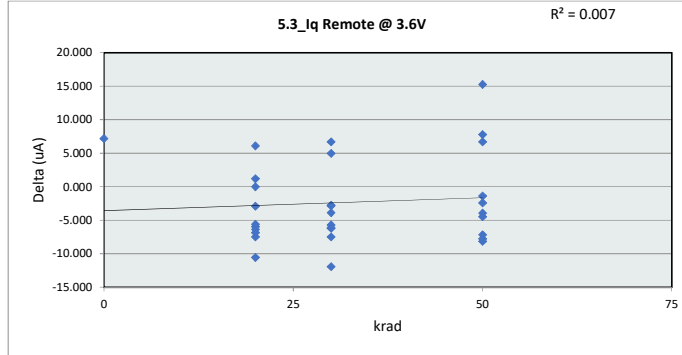


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5.3_Iq Remote @ 3.6V

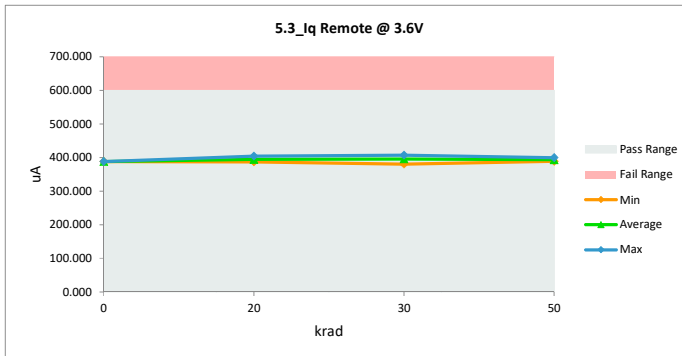
Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	uA	uA
Max Limit	600	600
Min Limit	0	0

krad	Serial #	pre_shift	post_shift	Delta
20	1	387.246	393.213	-5.967
20	2	387.124	394.618	-7.494
20	3	383.029	393.580	-10.551
20	4	387.063	393.457	-6.394
20	5	384.435	387.348	-2.913
30	6	387.124	380.445	6.679
30	7	395.070	407.020	-11.950
30	8	384.924	391.136	-6.212
30	9	394.398	401.888	-7.490
30	10	390.486	396.207	-5.721
50	11	387.002	395.166	-8.164
50	12	387.308	395.105	-7.797
50	13	390.180	391.562	-1.382
50	14	398.126	390.340	7.786
50	15	404.483	389.240	15.243
20	16	394.092	399.689	-5.597
20	17	397.943	391.869	6.074
20	18	388.530	395.412	-6.882
20	19	404.605	404.637	-0.032
20	20	394.214	393.030	1.184
30	21	394.031	397.917	-3.886
30	22	399.715	402.499	-2.784
30	23	397.576	392.602	4.974
30	24	390.119	396.268	-6.149
30	25	389.752	392.602	-2.850
50	26	399.532	392.845	6.687
50	27	388.775	391.195	-2.420
50	28	395.865	399.810	-3.945
50	29	391.892	396.388	-4.496
50	30	386.941	394.128	-7.187
0	32	395.437	388.265	7.172
	Max	404.605	407.020	15.243
	Average	392.162	394.499	-2.338
	Min	383.029	380.445	-11.950
	Std Dev	5.718	5.299	6.377



5.3_Iq Remote @ 3.6V	
Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	600 uA
Min Limit	0 uA

krad	0	20	30	50
LL	0.000	0.000	0.000	0.000
Min	388.265	387.348	380.445	389.240
Average	388.265	394.685	395.858	393.578
Max	388.265	404.637	407.020	399.810
UL	600.000	600.000	600.000	600.000

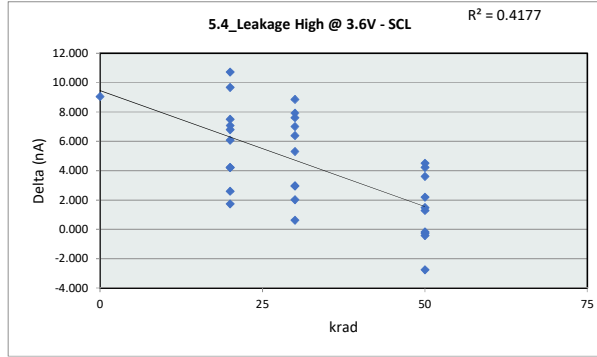


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5.4_Leakage High @ 3.6V - SCL

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	nA	nA
Max Limit	150	150
Min Limit	-150	-150

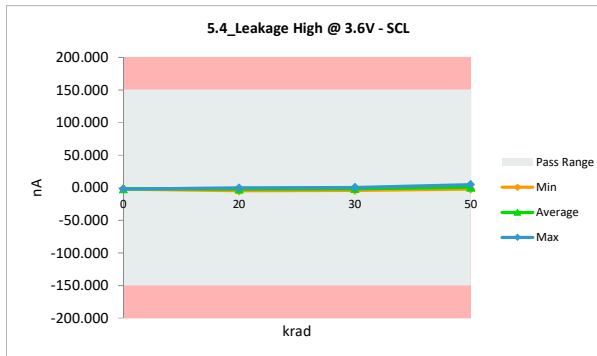
krad	Serial #	pre_shift	post_shift	Delta
20	1	3.311	-0.894	4.205
20	2	1.399	-4.678	6.077
20	3	2.141	-0.457	2.598
20	4	6.949	-2.733	9.682
20	5	8.033	-2.688	10.721
30	6	5.922	-1.998	7.920
30	7	4.624	-2.978	7.602
30	8	1.300	-1.651	2.951
30	9	4.467	-2.541	7.008
30	10	0.115	-0.506	0.621
50	11	2.227	-2.284	4.511
50	12	3.568	-0.657	4.225
50	13	1.542	0.258	1.284
50	14	0.629	-0.861	1.490
50	15	2.983	-0.614	3.597
20	16	5.180	-1.618	6.798
20	17	6.250	-0.819	7.069
20	18	5.979	-1.527	7.506
20	19	0.201	-1.527	1.728
20	20	0.658	-3.562	4.220
30	21	7.035	-1.817	8.852
30	22	3.382	0.414	2.968
30	23	5.665	0.354	5.311
30	24	1.485	-0.536	2.021
30	25	2.070	-4.320	6.390
50	26	1.942	2.117	-0.175
50	27	1.999	-0.192	2.191
50	28	0.672	0.940	-0.268
50	29	4.010	4.440	-0.430
50	30	2.027	4.789	-2.762
0	32	7.092	-1.953	9.045
Max	8.033	4.789	10.721	
Average	3.382	-0.971	4.353	
Min	0.115	-4.678	-2.762	
Std Dev	2.334	2.102	3.388	



5.4_Leakage High @ 3.6V - SCL

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	150 nA
Min Limit	-150 nA

krad	0	20	30	50
LL	-150.000	-150.000	-150.000	-150.000
Min	-1.953	-4.678	-4.320	-2.284
Average	-1.953	-2.050	-1.558	0.794
Max	-1.953	-0.457	0.414	4.789
UL	150.000	150.000	150.000	150.000

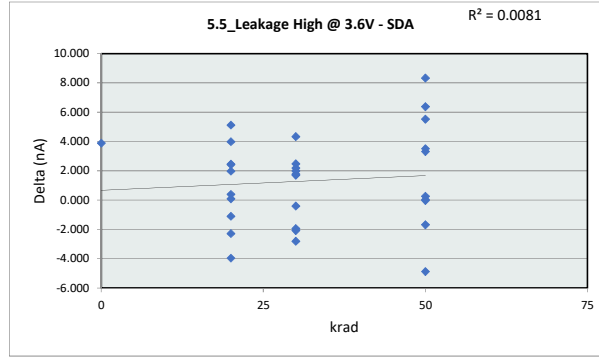


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5.5_Leakage High @ 3.6V - SDA

Test Site	Junkins	Junkins
Tester	FETS36405	FETS36405
Test Number	EE131301	EE131301
Unit	nA	nA
Max Limit	150	150
Min Limit	-150	-150

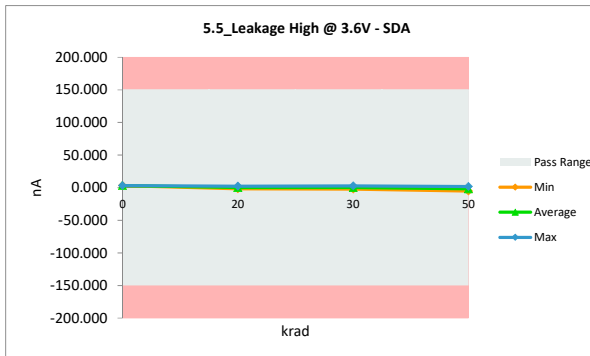
krad	Serial #	pre_shift	post_shift	Delta
20	1	-0.001	2.280	-2.281
20	2	4.067	-1.062	5.129
20	3	3.265	1.290	1.975
20	4	3.594	1.135	2.459
20	5	3.551	-0.428	3.979
30	6	0.243	2.318	-2.075
30	7	1.217	-0.777	1.994
30	8	0.629	-1.071	1.700
30	9	1.030	-1.164	2.194
30	10	-1.849	0.090	-1.939
50	11	3.150	-5.185	8.335
50	12	3.952	-1.578	5.530
50	13	1.002	0.734	0.268
50	14	1.073	-2.247	3.320
50	15	-2.966	1.912	-4.878
20	16	0.815	-1.604	2.419
20	17	-2.393	-1.294	-1.099
20	18	-0.531	-0.923	0.392
20	19	-2.006	1.955	-3.961
20	20	-0.688	-0.783	0.095
30	21	2.119	-2.216	4.335
30	22	-0.087	2.720	-2.807
30	23	3.651	1.173	2.478
30	24	0.873	1.281	-0.408
30	25	1.245	-0.529	1.774
50	26	1.102	-2.407	3.509
50	27	2.634	-3.745	6.379
50	28	-3.925	-2.247	-1.678
50	29	-2.407	-2.378	-0.029
50	30	0.328	0.284	0.044
0	32	7.189	3.293	3.896
Max	7.189	3.293	8.335	
Average	0.964	-0.360	1.324	
Min	-3.925	-5.185	-4.878	
Std Dev	2.445	1.993	3.097	



5.5_Leakage High @ 3.6V - SDA

Test Site	Junkins
Tester	FETS36405
Test Number	EE131301
Max Limit	150 nA
Min Limit	-150 nA

krad	0	20	30	50
LL	-150.000	-150.000	-150.000	-150.000
Min	3.293	-1.604	-2.216	-5.185
Average	3.293	0.057	0.183	-1.686
Max	3.293	2.280	2.720	1.912
UL	150.000	150.000	150.000	150.000



6 Revision History

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

Changes from Revision * (June 2025) to Revision A (July 2025) Page

- Updated values in Electrical Test Parameters table..... 7
-

Changes from Revision A (July 2025) to Revision B (July 2025) Page

- Changed parent die name from CTMP461AAV to CTMP9R01AAV..... 2
-

Changes from Revision B (July 2025) to Revision C (August 2025) Page

- Changed 300Krad(Si) to 30Krad(Si)..... 5
 - Updated conditions in Electrical Test Parameter table..... 7
-

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