Radiation Report

AFE7950-SP Total Ionizing Dose (TID) Radiation Report

ABSTRACT

This report covers the radiation characterization results of Texas Instrument's AFE7950-SP. The AFE7950-SP was studied for Total Ionizing Dose (TID) effects under high dose rate (HDR) up to 120rad(Si)/s as a one-time characterization. The results show that all samples passed within the specified limits up to 100krad(Si).

To ensure TID performance in production, Radiation Lot Acceptance Testing (RLAT) is performed using five units from every wafer lot up to a dose level of 100 krad(Si). Additionally, the AFE7950-SP is Single Event Latch-Up (SEL) immune up to 70MeV-cm^2/mg, which makes it suitable for Radiation Hardness Assured Space Applications in LEO, MEO, and GEO orbits.

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Trademarks

1 Device Information

The AFE7950-SP is a high performance, wide bandwidth, multi-channel transceiver, integrating four RF sampling transmitter chains, four RF sampling receiver chains and two RF sampling feedback chains (six RF sampling ADCs total). With analog bandwidth up to 12GHz, this device enables direct RF sampling in the L, S, C and X-band frequency ranges without the need for additional frequency conversions stages. This improvement in density and flexibility enables high-channel-count, software-defined, multi-use, radio frequency sub-systems.

1.1 Device Details

Table 1-1 lists the device information used for TID HDR characterization and qualification.

Table 1-1. Device and Exposure Details

TID HDR Details	
TI Device Number	AFE7950-SP
Package	400-pin FC-BGA
Technology	TSMC C28.HPC+
Die Lot Number	3001601
A/T Lot Number / Lot Trace Code	3305472PHI/36AG1TW
Quantity Tested	25 irradiated devices + 2 control
Lot Accept/Reject	Devices passed 3 krad(Si), 10 krad(Si), 30 krad(Si), 50 krad(Si), 100 krad(Si)
HDR Radiation Facility	Texas Instruments CLAB, Dallas, TX
HDR Dose Level	100 krad(Si)
HDR Dose Rate	120 rad(Si)/s
HDR Radiation Source	Gammacell (GR420) Co-60
Irradiation Temperature	Ambient, room temperature

2 TID Test Setup

2.1 Test Methodology

Known-good and tested AFE7950-SP samples were irradiated at a dose rate of 120 rad(Si)/s up to a total dose of 100 krad(Si). After exposure, units were re-tested using the production test solution, ensuring devices still meet datasheet specifications.

2.2 Test Description and Facilities

The AFE7950-SP HDR exposure was performed on biased devices in a Co-60 gamma cell at TI's CLAB facility in Dallas, TX. The unattenuated dose rate of this cell is 120 rad(Si)/s. After exposure, the devices completed a full post irradiation electrical evaluation using the production test, or ATE, solution. ATE guard banded test limits are set within data sheet electrical specifications to ensure a minimum Cpk and test error margin based on initial qualification and characterization data. Post-irradiation measurements were taken within 30 minutes of irradiation.

2.3 Test Setup Details

During TID exposure, the device is powered up with VDD digital supply voltages set to 0.9V; Tx, Rx and PLL analog supplies set to 1.2V; and IO supplies set to 1.8V. Typical power dissipation is 10.5W during exposure.

2.3.1 Biasing Conditions

Figure 2-1 shows the bias conditions for each pin during irradiation.

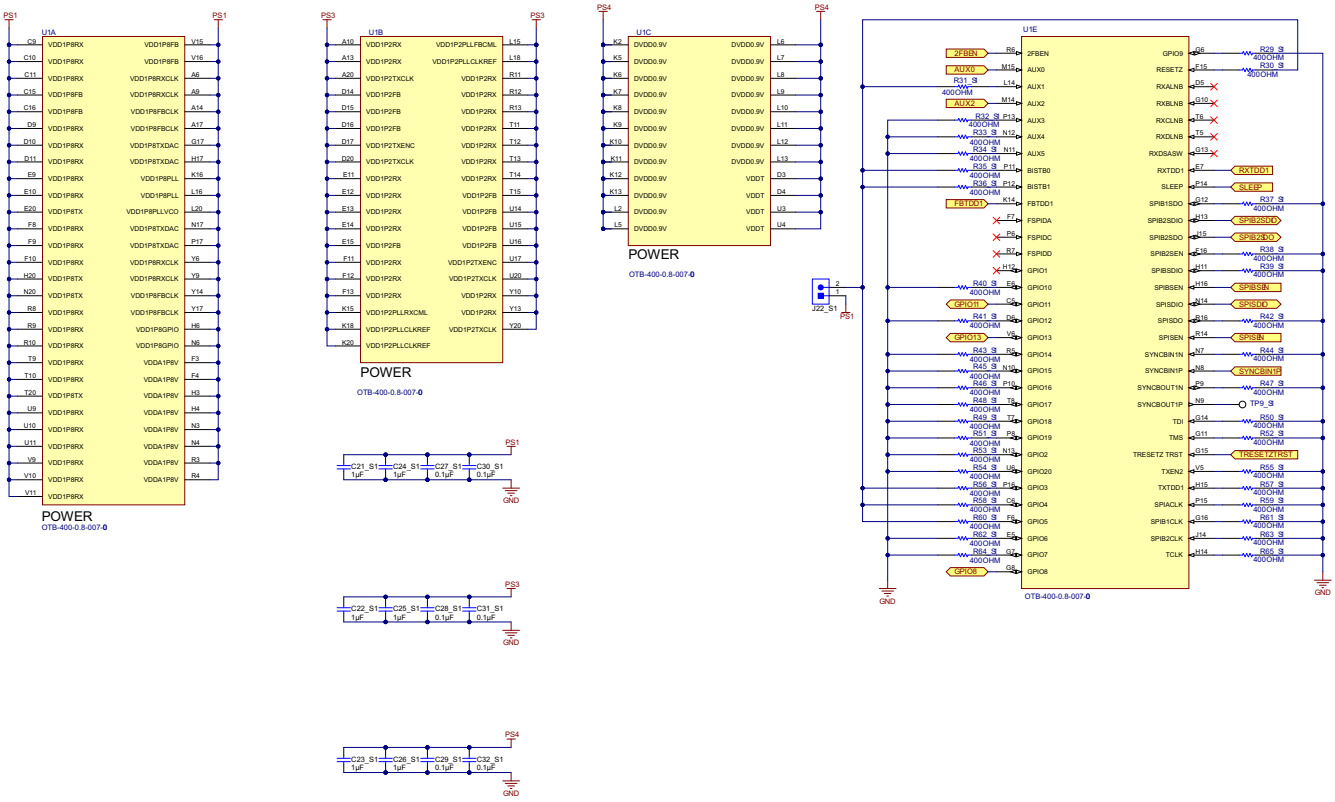


Figure 2-1. AFE7950-SP Biasing Diagram

2.4 Exposure Details

Twenty-five (25) units were characterized at the 120 rad(Si)/s dose level with biased voltage conditions.

Table 2-1. Irradiation Information

Dose Rate	120 rad(Si)/s
Total Samples	27 (5 samples per dose level; 2 control)
Exposure Levels	3 krad(Si), 10 krad(Si), 30 krad(Si), 50 krad(Si), 100 krad(Si)
Supply Voltages	DVDD = 0.9V AVDD = 1.2V IOVDD = 1.8V

3 TID Characterization Test Results

Electrical and parametric test results for all units at every dose level were within data sheet limits.

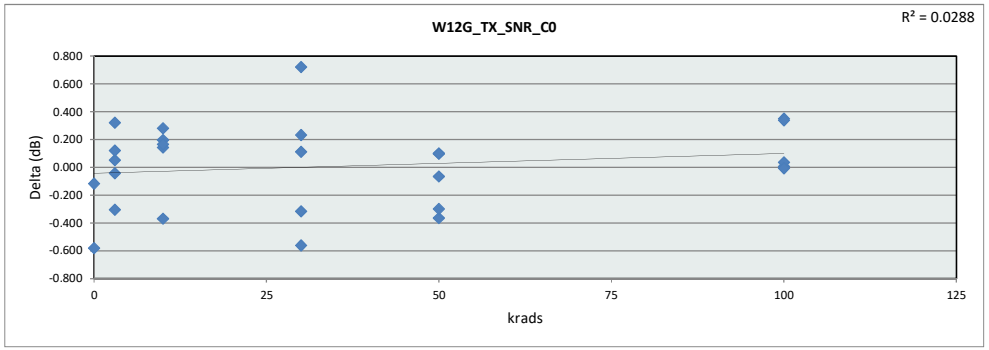
Unit Number	Dose Level, krad(Si)	Result
C1, C2	N/A (control)	PASS
1-5	3	PASS
6-10	10	PASS
11-15	30	PASS
16-20	50	PASS
21-25	100	PASS

A TID Data Plots

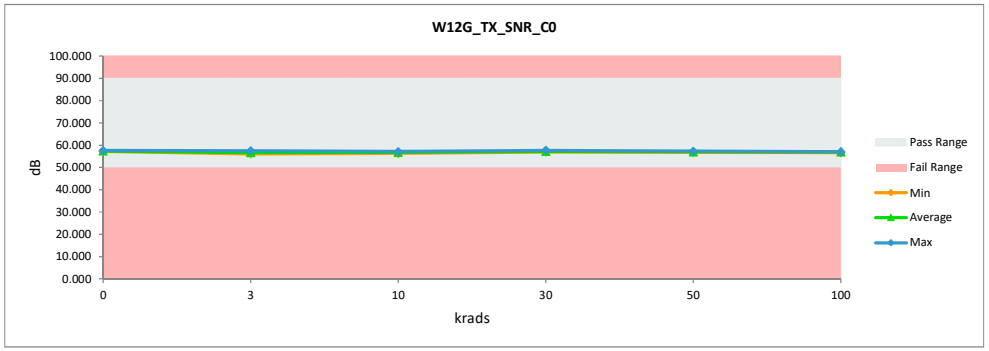
This appendix provides the AFE7950-SP TID HDR report data plots. The plots show the variation for each critical parameter up to 100krad(Si).

TID Report
AFE7950ALKSHP

	W12G_TX_SNR_C0		
Test Site	CLAB	CLAB	
Tester	VLCT92	VLCT92	
Test Number	VL713302	VL713302	
Unit	dB	dB	
Max Limit	90	90	
Min Limit	50	50	
krads	Serial #	Pre	Post	Delta
0	C1	57.126	57.243	-0.117
0	C2	56.986	57.567	-0.581
100	1	57.014	57.008	0.006
100	2	57.308	56.959	0.349
100	3	56.676	56.640	0.036
100	4	57.055	57.062	-0.007
100	5	57.429	57.091	0.338
50	6	56.744	57.108	-0.364
50	7	57.457	57.359	0.098
50	8	56.917	56.983	-0.066
50	9	56.935	56.836	0.100
50	10	56.804	57.104	-0.300
30	11	57.044	56.932	0.112
30	12	57.096	57.412	-0.316
30	13	57.149	57.711	-0.562
30	14	57.459	57.228	0.231
30	15	57.664	56.944	0.720
3	16	57.521	57.469	0.052
3	17	56.889	56.568	0.321
3	18	56.224	56.104	0.120
3	19	56.744	57.049	-0.305
3	20	56.235	56.277	-0.042
10	21	56.984	56.789	0.196
10	22	57.241	57.099	0.142
10	23	56.796	57.166	-0.370
10	24	56.924	56.643	0.281
10	25	56.464	56.299	0.165
	Max	57.664	57.711	0.720
	Average	56.996	56.987	0.009
	Min	56.224	56.104	-0.581
	Std Dev	0.359	0.386	0.301



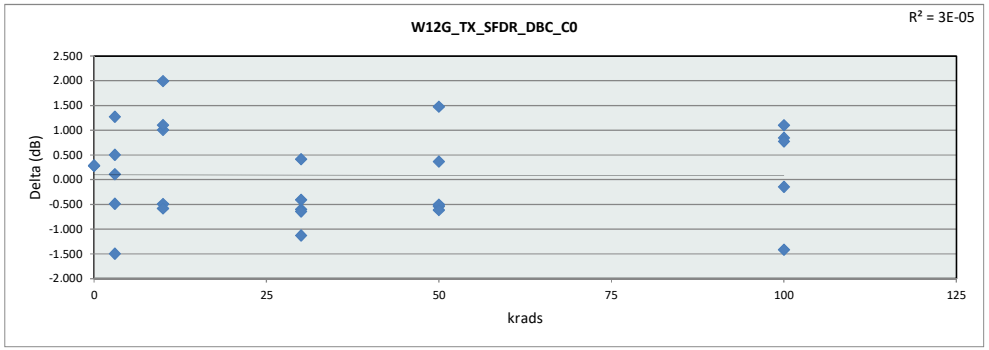
	W12G_TX_SNR_C0					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	57.243	56.104	56.299	56.932	56.836	56.640
Average	57.405	56.693	56.799	57.245	57.078	56.952
Max	57.567	57.469	57.166	57.711	57.359	57.091
UL	90.000	90.000	90.000	90.000	90.000	90.000



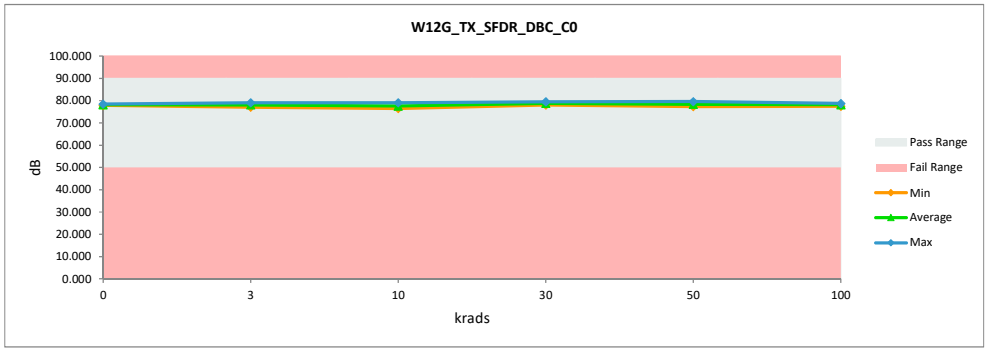
TID Report
AFE7950ALKSHP

	W12G_TX_SFDR_DBC_C0	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	78.119	77.841	0.277
0	C2	78.718	78.429	0.289
100	1	78.777	77.678	1.099
100	2	79.376	78.533	0.844
100	3	78.251	77.478	0.773
100	4	77.251	78.664	-1.413
100	5	78.242	78.389	-0.147
50	6	77.763	78.301	-0.538
50	7	78.827	79.329	-0.502
50	8	77.665	77.298	0.367
50	9	78.827	77.349	1.478
50	10	78.974	79.589	-0.615
30	11	79.076	78.664	0.413
30	12	77.421	78.021	-0.599
30	13	78.307	79.436	-1.129
30	14	78.379	79.021	-0.642
30	15	78.515	78.921	-0.406
3	16	78.352	77.850	0.503
3	17	79.165	79.054	0.112
3	18	78.335	77.063	1.272
3	19	77.678	78.164	-0.486
3	20	76.656	78.151	-1.495
10	21	78.569	79.059	-0.490
10	22	78.419	76.428	1.992
10	23	77.033	77.615	-0.582
10	24	79.110	78.103	1.007
10	25	77.791	76.685	1.106
Max		79.376	79.589	1.992
Average		78.281	78.189	0.092
Min		76.656	76.428	-1.495
Std Dev		0.687	0.826	0.903



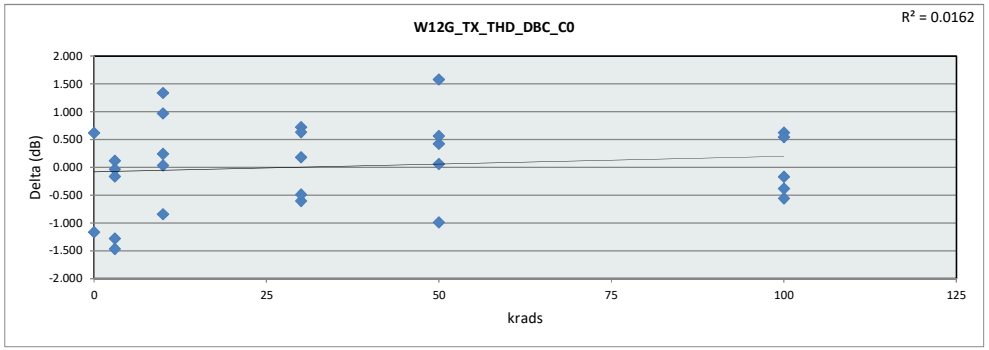
	W12G_TX_SFDR_DBC_C0					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	77.841	77.063	76.428	78.021	77.298	77.478
Average	78.135	78.056	77.578	78.812	78.373	78.148
Max	78.429	79.054	79.059	79.436	79.589	78.664
UL	90.000	90.000	90.000	90.000	90.000	90.000



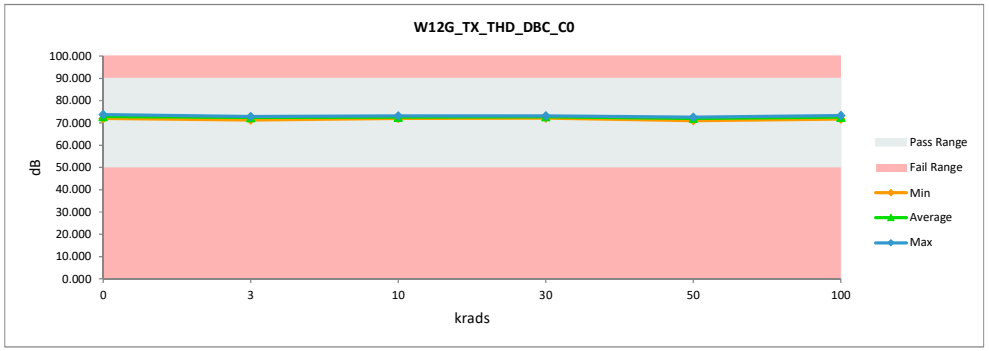
TID Report
AFE7950ALKSHP

	W12G_TX_THD_DBC_C0	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	72.603	73.770	-1.167
0	C2	72.565	71.946	0.619
100	1	72.041	72.601	-0.560
100	2	73.209	73.376	-0.167
100	3	72.513	72.894	-0.381
100	4	72.362	71.738	0.624
100	5	72.863	72.320	0.543
50	6	72.472	72.414	0.058
50	7	72.727	72.305	0.423
50	8	72.634	72.074	0.561
50	9	72.567	70.990	1.577
50	10	71.611	72.600	-0.988
30	11	72.072	72.675	-0.603
30	12	73.511	72.790	0.721
30	13	72.843	72.213	0.630
30	14	73.353	73.172	0.181
30	15	72.515	73.006	-0.490
3	16	73.071	72.955	0.117
3	17	71.292	72.757	-1.465
3	18	71.234	71.267	-0.034
3	19	71.420	72.700	-1.281
3	20	71.988	72.152	-0.164
10	21	73.452	72.117	1.335
10	22	72.985	72.742	0.243
10	23	72.295	73.138	-0.843
10	24	72.939	72.904	0.035
10	25	73.013	72.044	0.969
Max		73.511	73.770	1.577
Average		72.524	72.506	0.018
Min		71.234	70.990	-1.465
Std Dev		0.628	0.615	0.778



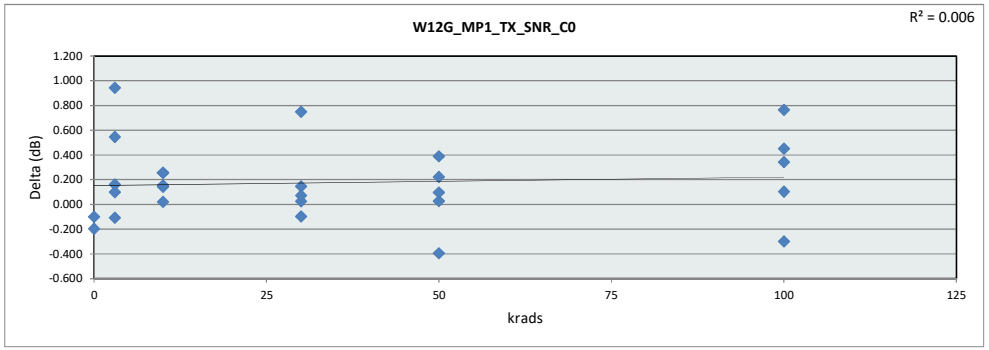
	W12G_TX_THD_DBC_C0					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	71.946	71.267	72.044	72.213	70.990	71.738
Average	72.858	72.366	72.589	72.771	72.076	72.586
Max	73.770	72.955	73.138	73.172	72.600	73.376
UL	90.000	90.000	90.000	90.000	90.000	90.000



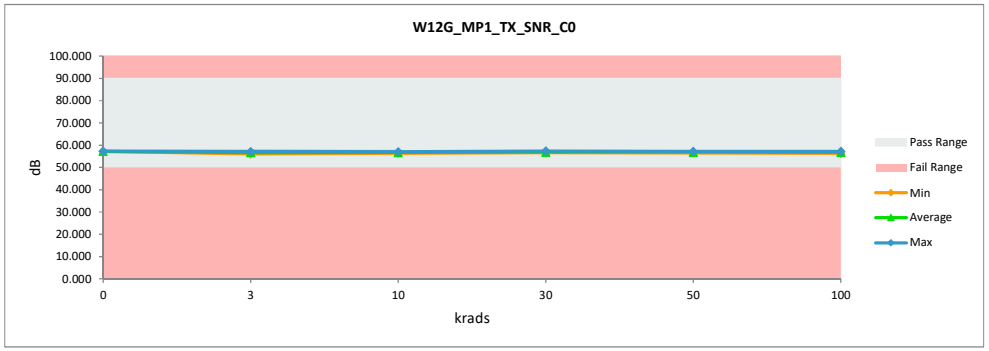
TID Report
AFE7950ALKSHP

	W12G_MP1_TX_SNR_C0	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	57.050	57.247	-0.197
0	C2	57.200	57.300	-0.100
100	1	56.231	56.531	-0.300
100	2	57.321	57.218	0.103
100	3	56.832	56.381	0.451
100	4	57.375	57.032	0.342
100	5	57.610	56.846	0.764
50	6	57.214	57.187	0.027
50	7	57.430	57.208	0.222
50	8	56.640	56.543	0.096
50	9	56.922	56.533	0.388
50	10	56.776	57.171	-0.395
30	11	56.765	56.619	0.146
30	12	56.605	56.702	-0.097
30	13	57.440	57.415	0.025
30	14	57.211	57.139	0.071
30	15	57.427	56.678	0.749
3	16	57.328	57.166	0.162
3	17	56.809	56.709	0.100
3	18	56.937	55.994	0.942
3	19	56.956	57.063	-0.108
3	20	57.022	56.476	0.546
10	21	57.042	57.022	0.020
10	22	56.488	56.347	0.142
10	23	57.085	56.829	0.256
10	24	56.928	56.774	0.154
10	25	56.868	56.612	0.256
Max		57.610	57.415	0.942
Average		57.019	56.842	0.177
Min		56.231	55.994	-0.395
Std Dev		0.326	0.355	0.315



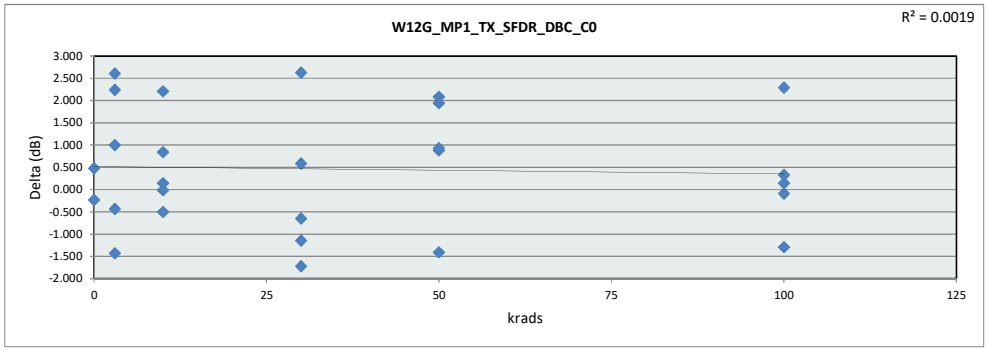
	W12G_MP1_TX_SNR_C0					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	57.247	55.994	56.347	56.619	56.533	56.381
Average	57.273	56.682	56.717	56.910	56.929	56.801
Max	57.300	57.166	57.022	57.415	57.208	57.218
UL	90.000	90.000	90.000	90.000	90.000	90.000



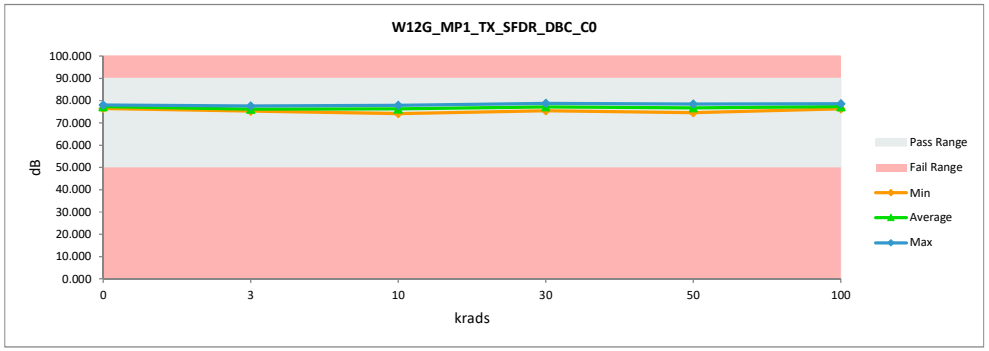
TID Report
AFE7950ALKSHP

	W12G_MP1_TX_SFDR_DBC_C0	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	77.826	78.058	-0.231
0	C2	76.970	76.492	0.478
100	1	77.292	77.380	-0.088
100	2	77.461	77.318	0.143
100	3	77.215	76.888	0.327
100	4	77.298	78.591	-1.293
100	5	78.652	76.364	2.288
50	6	77.116	78.526	-1.411
50	7	79.077	76.996	2.081
50	8	76.494	74.554	1.940
50	9	77.428	76.548	0.880
50	10	78.290	77.359	0.931
30	11	76.503	77.155	-0.652
30	12	76.843	76.258	0.586
30	13	76.550	78.273	-1.722
30	14	77.608	78.757	-1.149
30	15	78.148	75.523	2.625
3	16	76.385	76.820	-0.435
3	17	76.235	77.668	-1.433
3	18	77.835	75.232	2.603
3	19	76.497	75.497	1.000
3	20	78.114	75.876	2.238
10	21	78.054	77.913	0.141
10	22	76.424	74.215	2.209
10	23	74.828	75.331	-0.503
10	24	78.078	77.237	0.840
10	25	76.795	76.807	-0.013
	Max	79.077	78.757	2.625
	Average	77.260	76.801	0.458
	Min	74.828	74.215	-1.722
	Std Dev	0.902	1.212	1.333



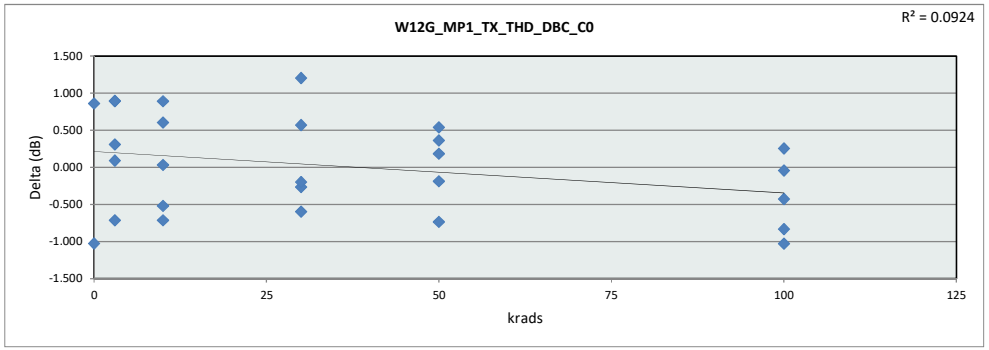
	W12G_MP1_TX_SFDR_DBC_C0					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	76.492	75.232	74.215	75.523	74.554	76.364
Average	77.275	76.219	76.301	77.193	76.797	77.308
Max	78.058	77.668	77.913	78.757	78.526	78.591
UL	90.000	90.000	90.000	90.000	90.000	90.000



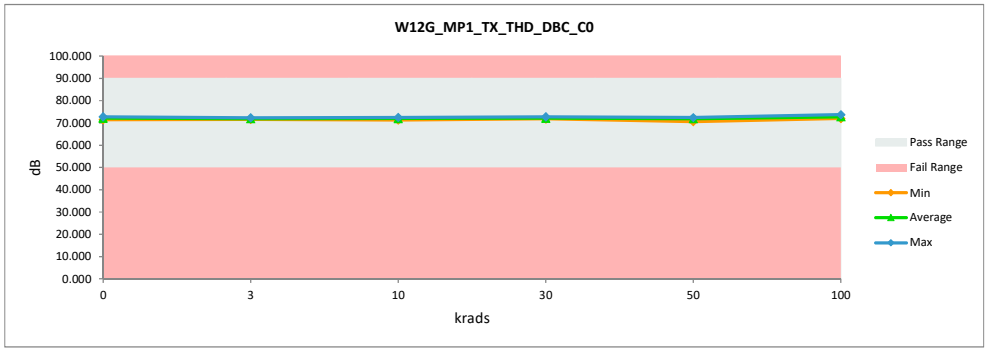
TID Report
AFE7950ALKSHP

	W12G_MP1_TX_THD_DBC_C0	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	72.326	71.466	0.860
0	C2	71.752	72.778	-1.026
100	1	72.242	71.989	0.253
100	2	71.670	72.699	-1.029
100	3	71.991	72.035	-0.045
100	4	72.813	73.239	-0.426
100	5	72.826	73.658	-0.832
50	6	71.611	71.800	-0.189
50	7	72.588	72.225	0.363
50	8	71.625	72.361	-0.736
50	9	71.096	70.559	0.538
50	10	72.599	72.415	0.184
30	11	71.402	72.000	-0.598
30	12	72.965	71.761	1.204
30	13	72.499	72.764	-0.265
30	14	72.896	72.326	0.570
30	15	71.607	71.807	-0.200
3	16	71.996	71.687	0.308
3	17	72.953	72.058	0.895
3	18	70.794	71.508	-0.715
3	19	71.954	71.864	0.090
3	20	73.222	72.330	0.892
10	21	72.589	71.987	0.602
10	22	71.791	71.760	0.032
10	23	71.957	72.477	-0.520
10	24	71.712	72.427	-0.715
10	25	72.210	71.320	0.889
	Max	73.222	73.658	1.204
	Average	72.137	72.122	0.014
	Min	70.794	70.559	-1.029
	Std Dev	0.616	0.618	0.657



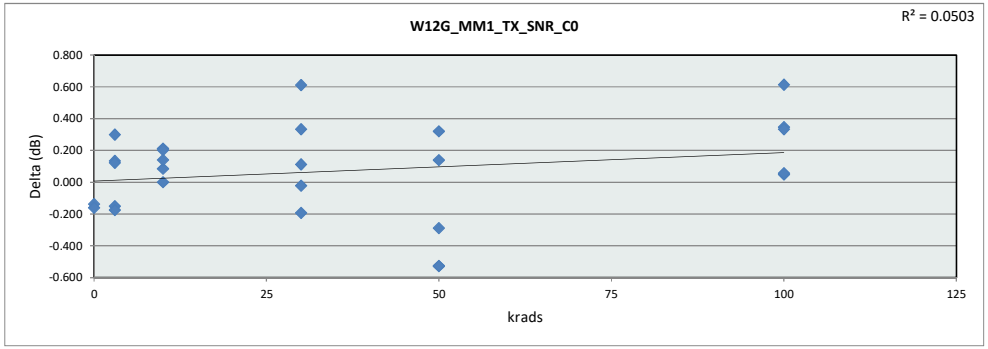
	W12G_MP1_TX_THD_DBC_C0					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	71.466	71.508	71.320	71.761	70.559	71.989
Average	72.122	71.890	71.994	72.132	71.872	72.724
Max	72.778	72.330	72.477	72.764	72.415	73.658
UL	90.000	90.000	90.000	90.000	90.000	90.000



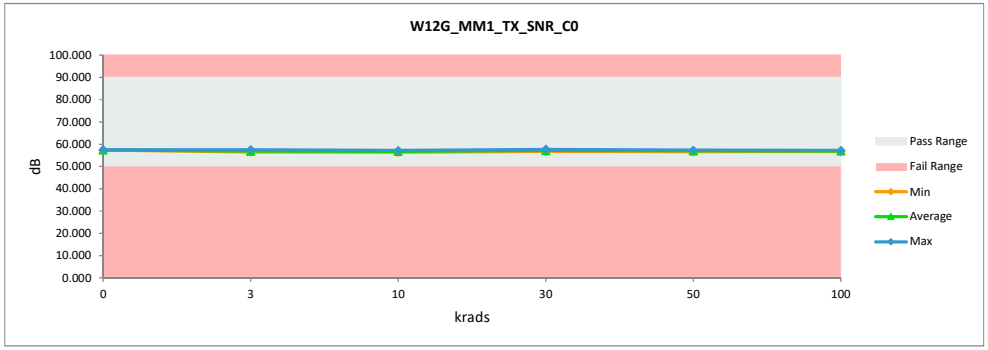
TID Report
AFE7950ALKSHP

	W12G_MM1_TX_SNR_C0	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	57.150	57.289	-0.138
0	C2	57.370	57.530	-0.161
100	1	56.873	56.825	0.048
100	2	57.490	57.143	0.347
100	3	57.104	56.770	0.334
100	4	57.189	57.132	0.057
100	5	57.696	57.083	0.613
50	6	56.770	57.297	-0.527
50	7	57.294	57.156	0.138
50	8	56.923	56.603	0.320
50	9	56.705	56.994	-0.289
50	10	56.556	57.083	-0.527
30	11	57.194	57.082	0.113
30	12	57.689	57.711	-0.022
30	13	57.110	57.303	-0.193
30	14	57.337	57.003	0.333
30	15	57.340	56.730	0.611
3	16	57.516	57.216	0.300
3	17	57.068	56.934	0.135
3	18	56.648	56.526	0.121
3	19	57.356	57.507	-0.151
3	20	56.261	56.436	-0.175
10	21	56.957	56.873	0.084
10	22	57.280	57.069	0.212
10	23	57.185	57.185	0.000
10	24	56.865	56.662	0.203
10	25	56.473	56.333	0.140
	Max	57.696	57.711	0.613
	Average	57.089	57.018	0.071
	Min	56.261	56.333	-0.527
	Std Dev	0.361	0.334	0.285



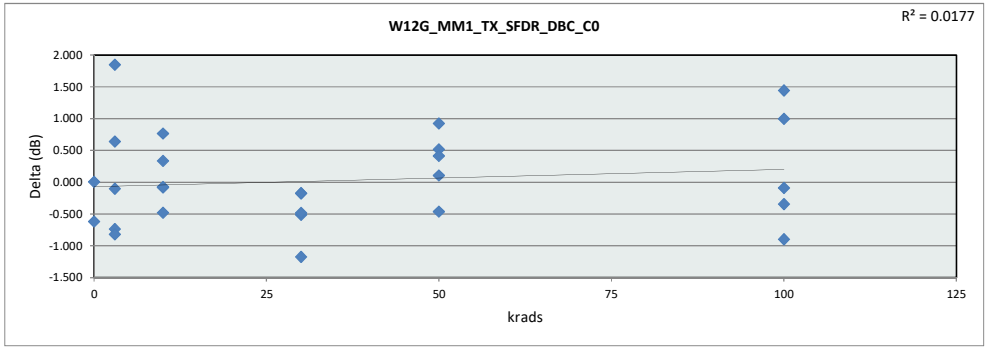
	W12G_MM1_TX_SNR_C0					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	57.289	56.436	56.333	56.730	56.603	56.770
Average	57.409	56.924	56.824	57.166	57.027	56.991
Max	57.530	57.507	57.185	57.711	57.297	57.143
UL	90.000	90.000	90.000	90.000	90.000	90.000



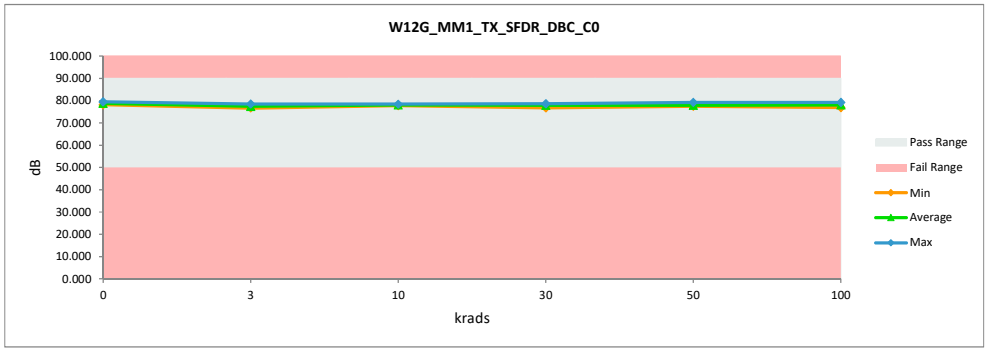
TID Report
AFE7950ALKSHP

	W12G_MM1_TX_SFDR_DBC_C0	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	78.171	78.166	0.006
0	C2	78.844	79.464	-0.620
100	1	78.309	76.866	1.443
100	2	78.195	78.285	-0.091
100	3	78.253	77.258	0.995
100	4	78.524	78.868	-0.344
100	5	78.316	79.212	-0.896
50	6	78.218	77.701	0.517
50	7	78.778	79.239	-0.461
50	8	77.865	77.453	0.412
50	9	77.702	77.597	0.105
50	10	78.487	77.563	0.924
30	11	76.244	76.757	-0.513
30	12	77.466	77.949	-0.482
30	13	77.451	77.625	-0.174
30	14	77.449	78.625	-1.176
30	15	78.232	78.407	-0.175
3	16	77.775	78.513	-0.738
3	17	78.831	76.984	1.847
3	18	77.310	76.671	0.639
3	19	77.261	77.363	-0.102
3	20	76.844	77.662	-0.819
10	21	78.758	77.991	0.767
10	22	77.858	77.939	-0.081
10	23	77.939	78.419	-0.481
10	24	77.657	77.733	-0.076
10	25	78.613	78.278	0.335
Max		78.844	79.464	1.847
Average		77.976	77.948	0.028
Min		76.244	76.671	-1.176
Std Dev		0.636	0.751	0.729



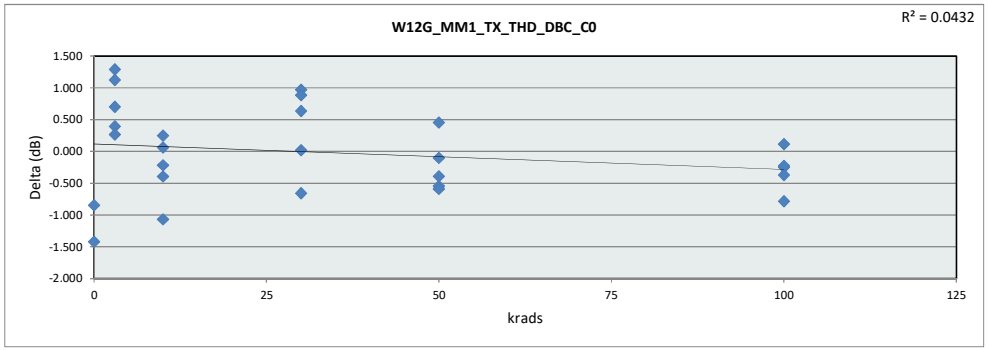
	W12G_MM1_TX_SFDR_DBC_C0					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	78.166	76.671	77.733	76.757	77.453	76.866
Average	78.815	77.439	78.072	77.872	77.911	78.098
Max	79.464	78.513	78.419	78.625	79.239	79.212
UL	90.000	90.000	90.000	90.000	90.000	90.000



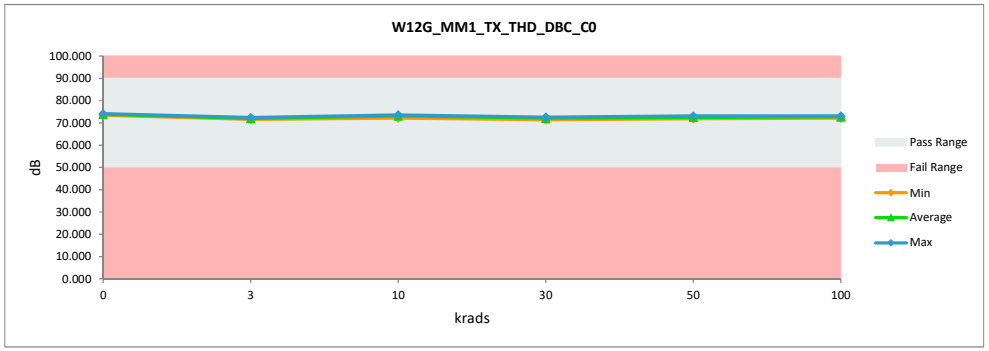
TID Report
AFE7950ALKSHP

	W12G_MM1_TX_THD_DBC_C0	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	72.702	74.123	-1.421
0	C2	72.636	73.485	-0.849
100	1	71.732	72.515	-0.783
100	2	72.639	72.890	-0.251
100	3	72.265	72.494	-0.230
100	4	72.756	73.126	-0.369
100	5	72.276	72.160	0.116
50	6	72.524	73.070	-0.546
50	7	72.403	72.995	-0.591
50	8	72.352	71.899	0.453
50	9	71.672	72.063	-0.391
50	10	72.087	72.190	-0.103
30	11	72.350	71.382	0.969
30	12	73.207	72.572	0.635
30	13	72.561	72.541	0.020
30	14	72.778	71.894	0.884
30	15	71.521	72.177	-0.657
3	16	72.614	72.221	0.394
3	17	72.674	72.408	0.266
3	18	72.792	71.503	1.289
3	19	72.860	71.735	1.124
3	20	72.794	72.093	0.701
10	21	73.381	73.596	-0.215
10	22	72.522	73.590	-1.068
10	23	73.165	73.561	-0.396
10	24	72.693	72.631	0.061
10	25	72.403	72.155	0.249
	Max	73.381	74.123	1.289
	Average	72.532	72.558	-0.026
	Min	71.521	71.382	-1.421
	Std Dev	0.433	0.696	0.686



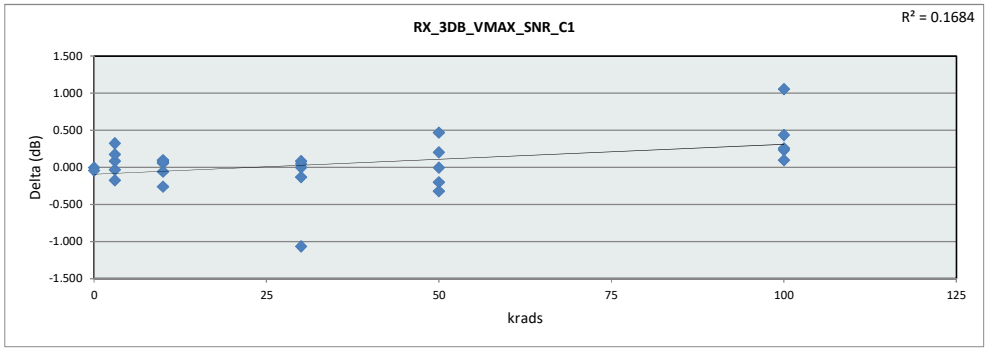
	W12G_MM1_TX_THD_DBC_C0					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	73.485	71.503	72.155	71.382	71.899	72.160
Average	73.804	71.992	73.107	72.113	72.443	72.637
Max	74.123	72.408	73.596	72.572	73.070	73.126
UL	90.000	90.000	90.000	90.000	90.000	90.000



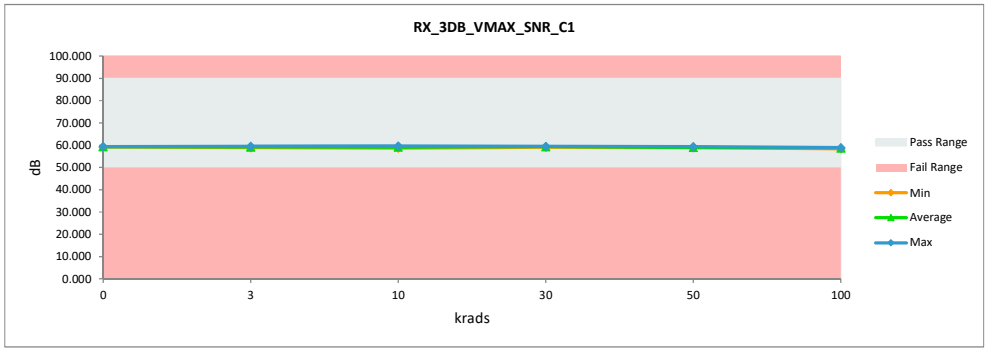
TID Report
AFE7950ALKSHP

	RX_3DB_VMAX_SNR_C1	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	59.380	59.385	-0.005
0	C2	59.167	59.210	-0.043
100	1	59.098	58.865	0.233
100	2	59.157	58.902	0.256
100	3	58.831	58.737	0.095
100	4	59.212	58.778	0.434
100	5	59.372	58.320	1.052
50	6	58.929	58.933	-0.004
50	7	58.530	58.851	-0.321
50	8	59.357	58.889	0.468
50	9	59.202	59.403	-0.201
50	10	59.108	58.907	0.201
30	11	58.118	59.183	-1.065
30	12	59.188	59.191	-0.004
30	13	59.482	59.434	0.048
30	14	59.199	59.116	0.083
30	15	59.259	59.392	-0.133
3	16	59.546	59.579	-0.033
3	17	59.358	59.035	0.322
3	18	58.922	58.839	0.083
3	19	59.038	59.215	-0.177
3	20	59.574	59.401	0.173
10	21	59.433	59.337	0.096
10	22	58.700	58.643	0.057
10	23	59.370	59.631	-0.261
10	24	59.177	59.236	-0.059
10	25	59.079	59.002	0.078
	Max	59.574	59.631	1.052
	Average	59.140	59.089	0.051
	Min	58.118	58.320	-1.065
	Std Dev	0.320	0.309	0.350

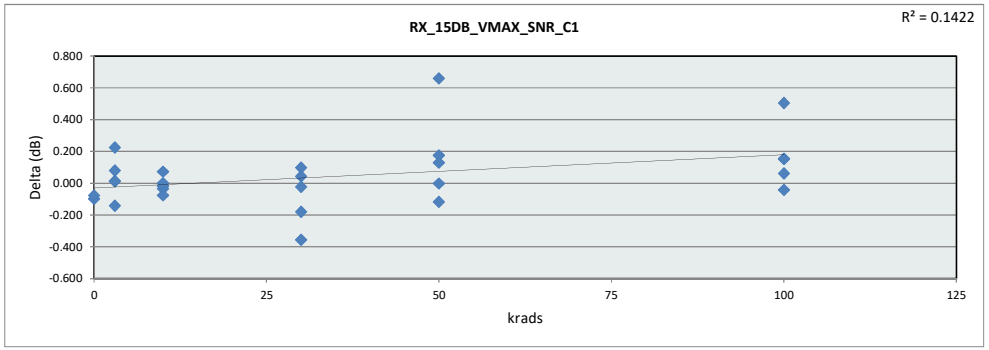


	RX_3DB_VMAX_SNR_C1					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	59.210	58.839	58.643	59.116	58.851	58.320
Average	59.298	59.214	59.170	59.263	58.997	58.720
Max	59.385	59.579	59.631	59.434	59.403	58.902
UL	90.000	90.000	90.000	90.000	90.000	90.000

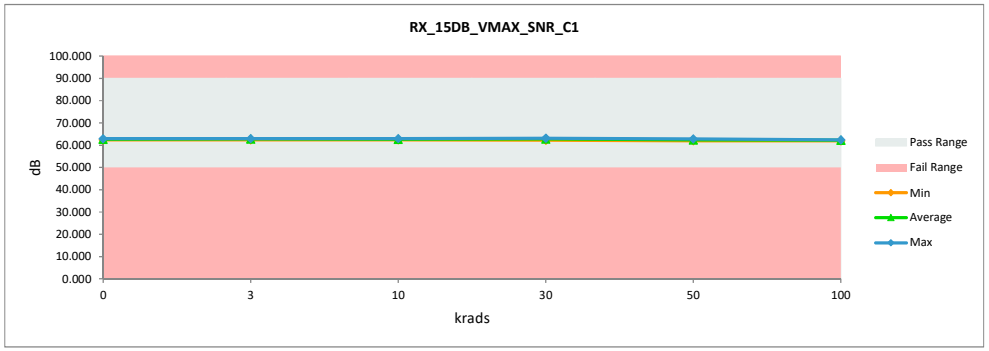


TID Report
AFE7950ALKSHP

	RX_15DB_VMAX_SNR_C1		
Test Site	CLAB	CLAB	
Tester	VLCT92	VLCT92	
Test Number	VL713302	VL713302	
Unit	dB	dB	
Max Limit	90	90	
Min Limit	50	50	
krads	Serial #	Pre	Post	Delta
0	C1	62.844	62.941	-0.098
0	C2	62.349	62.426	-0.077
100	1	62.585	62.431	0.153
100	2	62.138	62.180	-0.042
100	3	62.266	62.204	0.062
100	4	62.158	62.005	0.153
100	5	62.833	62.328	0.505
50	6	62.182	62.007	0.175
50	7	62.222	62.339	-0.117
50	8	62.902	62.244	0.659
50	9	62.857	62.859	-0.002
50	10	62.381	62.252	0.129
30	11	62.815	63.171	-0.356
30	12	63.106	63.062	0.043
30	13	62.698	62.877	-0.180
30	14	62.423	62.325	0.098
30	15	62.209	62.232	-0.023
3	16	62.992	62.980	0.012
3	17	62.387	62.374	0.013
3	18	62.879	62.799	0.080
3	19	63.033	62.808	0.225
3	20	62.736	62.877	-0.141
10	21	62.435	62.471	-0.036
10	22	62.632	62.708	-0.077
10	23	62.998	63.015	-0.018
10	24	62.370	62.371	-0.001
10	25	62.722	62.649	0.072
	Max	63.106	63.171	0.659
	Average	62.598	62.553	0.045
	Min	62.138	62.005	-0.356
	Std Dev	0.307	0.343	0.198



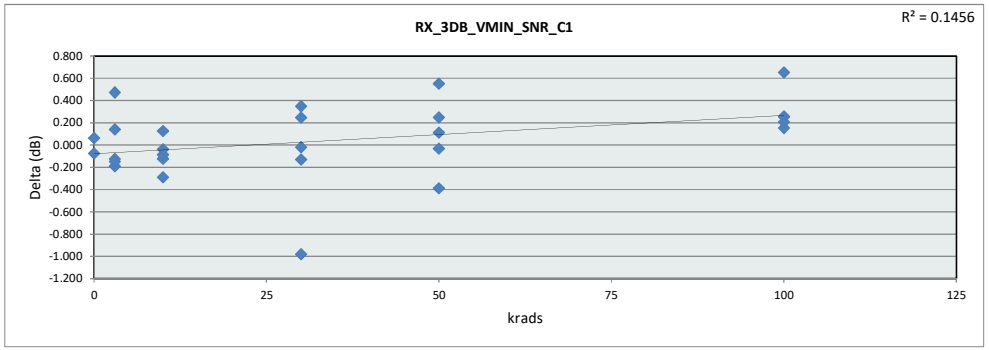
	RX_15DB_VMAX_SNR_C1					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	62.426	62.374	62.371	62.232	62.007	62.005
Average	62.684	62.768	62.643	62.734	62.340	62.230
Max	62.941	62.980	63.015	63.171	62.859	62.431
UL	90.000	90.000	90.000	90.000	90.000	90.000



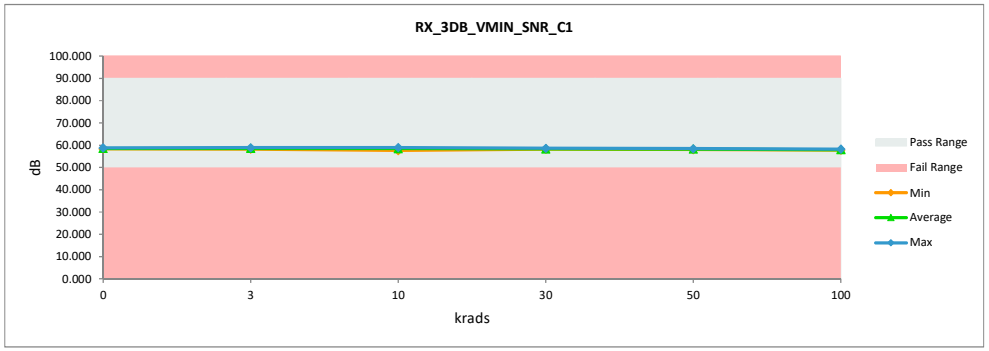
TID Report
AFE7950ALKSHP

	RX_3DB_VMIN_SNR_C1	
Test Site	CLAB	CLAB
Tester	VLCT92	VLCT92
Test Number	VL713302	VL713302
Unit	dB	dB
Max Limit	90	90
Min Limit	50	50

krads	Serial #	Pre	Post	Delta
0	C1	58.698	58.774	-0.076
0	C2	58.383	58.321	0.063
100	1	58.533	58.278	0.255
100	2	58.097	57.842	0.255
100	3	58.010	57.856	0.154
100	4	58.150	57.942	0.208
100	5	58.713	58.061	0.652
50	6	58.189	58.222	-0.033
50	7	57.914	58.303	-0.388
50	8	58.709	58.157	0.551
50	9	58.569	58.456	0.113
50	10	58.247	57.998	0.248
30	11	57.296	58.277	-0.981
30	12	58.616	58.634	-0.018
30	13	58.584	58.235	0.349
30	14	58.611	58.364	0.247
30	15	58.225	58.355	-0.130
3	16	58.689	58.815	-0.126
3	17	58.664	58.192	0.472
3	18	58.397	58.587	-0.190
3	19	58.301	58.450	-0.148
3	20	58.971	58.830	0.141
10	21	58.712	58.587	0.126
10	22	57.488	57.611	-0.123
10	23	58.694	58.984	-0.290
10	24	58.431	58.517	-0.086
10	25	58.507	58.545	-0.038
	Max	58.971	58.984	0.652
	Average	58.385	58.340	0.045
	Min	57.296	57.611	-0.981
	Std Dev	0.384	0.330	0.323

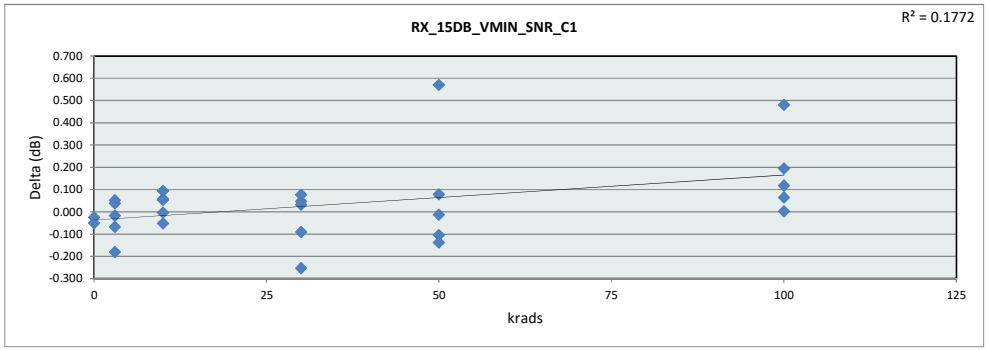


	RX_3DB_VMIN_SNR_C1					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	58.321	58.192	57.611	58.235	57.998	57.842
Average	58.547	58.575	58.449	58.373	58.227	57.996
Max	58.774	58.830	58.984	58.634	58.456	58.278
UL	90.000	90.000	90.000	90.000	90.000	90.000

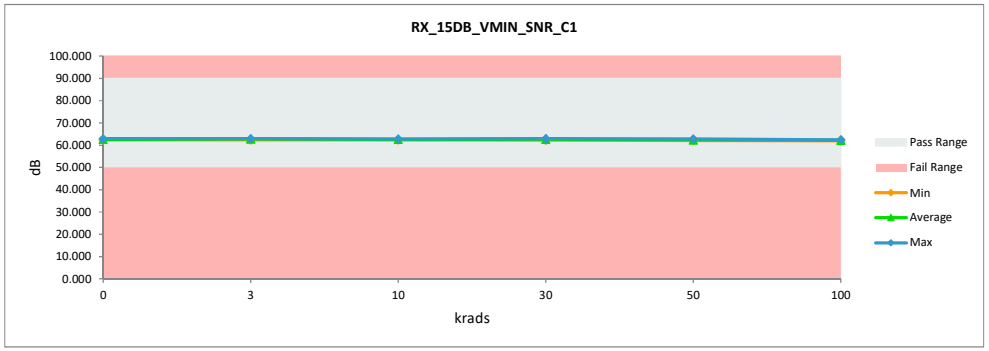


TID Report
AFE7950ALKSHP

	RX_15DB_VMIN_SNR_C1		
Test Site	CLAB	CLAB	
Tester	VLCT92	VLCT92	
Test Number	VL713302	VL713302	
Unit	dB	dB	
Max Limit	90	90	
Min Limit	50	50	
krads	Serial #	Pre	Post	Delta
0	C1	62.844	62.895	-0.051
0	C2	62.266	62.291	-0.025
100	1	62.649	62.454	0.195
100	2	62.288	62.170	0.118
100	3	62.133	62.068	0.065
100	4	61.976	61.973	0.003
100	5	62.757	62.275	0.482
50	6	62.153	62.257	-0.104
50	7	62.139	62.277	-0.138
50	8	62.829	62.259	0.570
50	9	62.801	62.814	-0.013
50	10	62.194	62.116	0.078
30	11	62.766	63.019	-0.253
30	12	62.968	62.921	0.047
30	13	62.689	62.656	0.033
30	14	62.584	62.507	0.077
30	15	62.136	62.227	-0.091
3	16	62.939	63.007	-0.068
3	17	62.340	62.357	-0.017
3	18	62.711	62.659	0.052
3	19	62.740	62.921	-0.181
3	20	62.840	62.802	0.038
10	21	62.523	62.468	0.055
10	22	62.346	62.398	-0.052
10	23	62.866	62.870	-0.004
10	24	62.344	62.286	0.057
10	25	62.815	62.721	0.094
	Max	62.968	63.019	0.570
	Average	62.542	62.506	0.036
	Min	61.976	61.973	-0.253
	Std Dev	0.303	0.316	0.171



	RX_15DB_VMIN_SNR_C1					
Test Site	CLAB					
Tester	VLCT92					
Test Number	VL713302					
Max Limit	90	dB				
Min Limit	50	dB				
krads	0	3	10	30	50	100
LL	50.000	50.000	50.000	50.000	50.000	50.000
Min	62.291	62.357	62.286	62.227	62.116	61.973
Average	62.593	62.749	62.549	62.666	62.345	62.188
Max	62.895	63.007	62.870	63.019	62.814	62.454
UL	90.000	90.000	90.000	90.000	90.000	90.000



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