Draft Detection Tolerance Allocation and Test Limits

Examines Three levels of “calculation precision”, seeking to allow for analog detection

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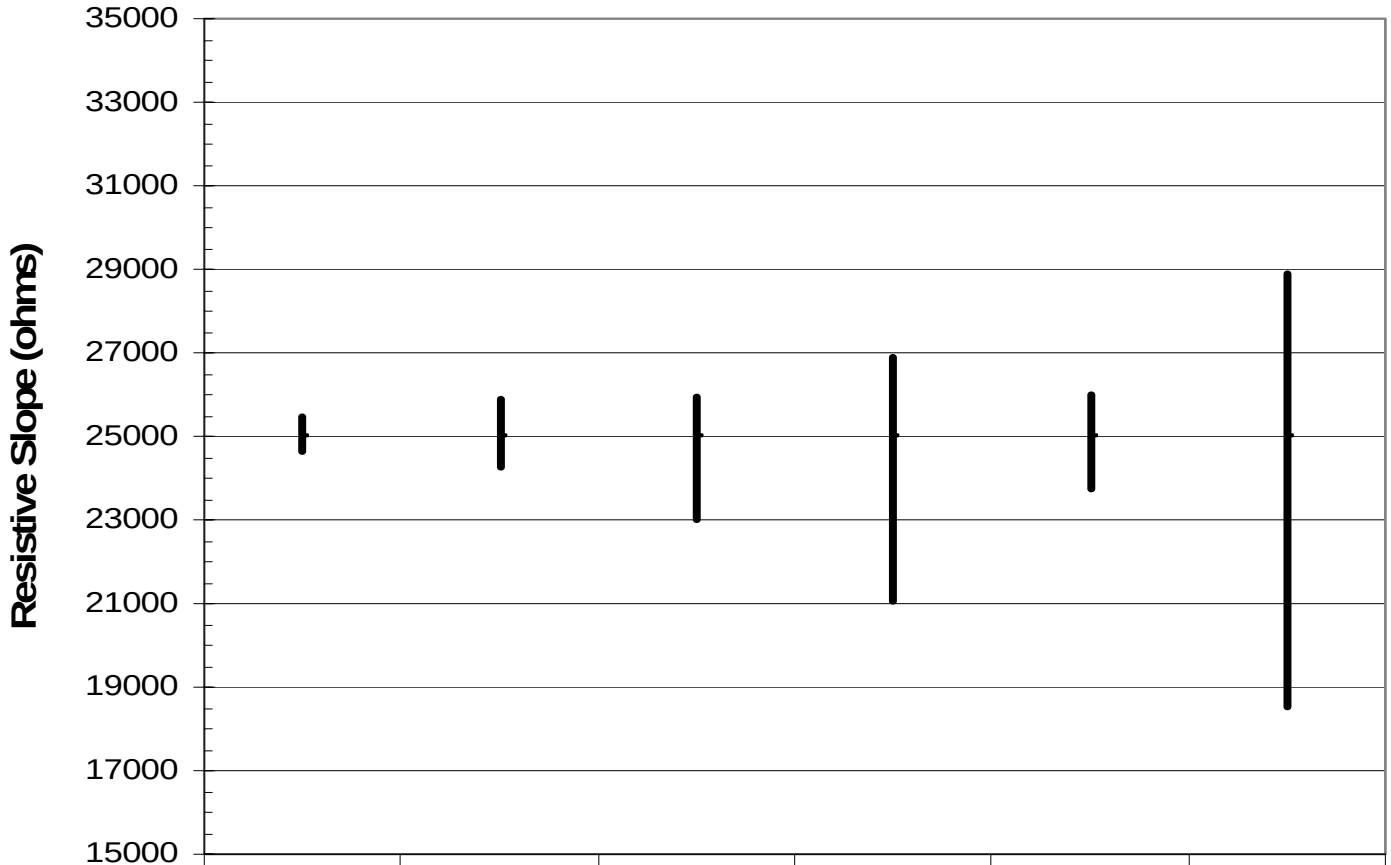
Budget Sheet, +/- 3% Calculation Tolerance

		Relative to 25K ohm Reference			
PD Budget		Pos. Delta Influence		Neg. Delta Influence	
	Assumption	Ohms	%	Ohms	%
25 K ohm signature tolerance	Comp. Tolerance	250	1.0	-250	-1.0
Diode series effects (2 diodes)	Sm. Sig, AC diode resistance	200	0.8	0	0.0
Volt. dependent leakage (diodes, isolation, flux)	5 meg ohms, parallel	0	0.0	-124	-0.5
PD Variation Criteria		***450***	*1.8*	***-374***	*-1.5*
Aging, contamination margin **("6 dB")**		450	1.8	-374	-1.5
PD Variation Over Time	Total	***900***	*3.6*	***-748***	*-3.0*
Loop, X-Connect Budget		Pos. Delta Influence		Neg. Delta Influence	
	Assumption	Ohms	%	Ohms	%
Cable series effect	Loop length	25	0.1	0	0.0
Cable leakage	100 meg ohms, parallel	0	0.0	-6	0.0
Cable infrastructure voltage dependent leakage	1 meg ohms, parallel	0	0.0	-610	-2.4
Aging, contamination margin **("6 dB")**		25	0.1	-616	-2.5
	Total	50	0.2	-1232	-4.9
PD + Loop Variation	Total	***950***	3.8	***-1980***	-7.9
Margin to ensure Detection	(extra "6 dB")	950	3.8	-1980	-7.9
PSE shall accept		***1900***	7.6	***-3960***	-15.8
PSE Budget		Pos. Delta Influence		Neg. Delta Influence	
	Assumption	Ohms	%	Ohms	%
25 K ohm reference tolerance	Component Tolerance	250	1.0	-250	-1.0
Switch voltage dependent leakage	5 meg ohms, parallel	0	0.0	-124	-0.5
Misc other voltage dependent leakage	5 meg ohms, parallel	0	0.0	-124	-0.5
Calculation Precision (+/-)	3%	750	3.0	-750	-3.0
PSE Variation Criteria		***1000***	4.0	***-1248***	-5.0
Aging, contamination margin **("6 dB")**	"6 dB"	1000	4.0	-1248	-5.0
	Total	2000	8.0	-2496	-10.0
PSE's view of "Shall Accept"	Total Variation	***3900***	15.6	***-6456***	-25.8
	Total variation (%)	41			
	+/- variation (%)	21			

Absolute Slope Ranges with +/- 3% Calculation



	PD variation criteria	PD variation, over time	PD + Loop variations	PSE shall accept	PSE variation criteria	PSE's view of "shall accept"
High (ohms)	25450	25900	25950	26900	26000	28900
Low (ohms)	24626	24252	23020	21040	23752	18544
- Basis	25000	25000	25000	25000	25000	25000

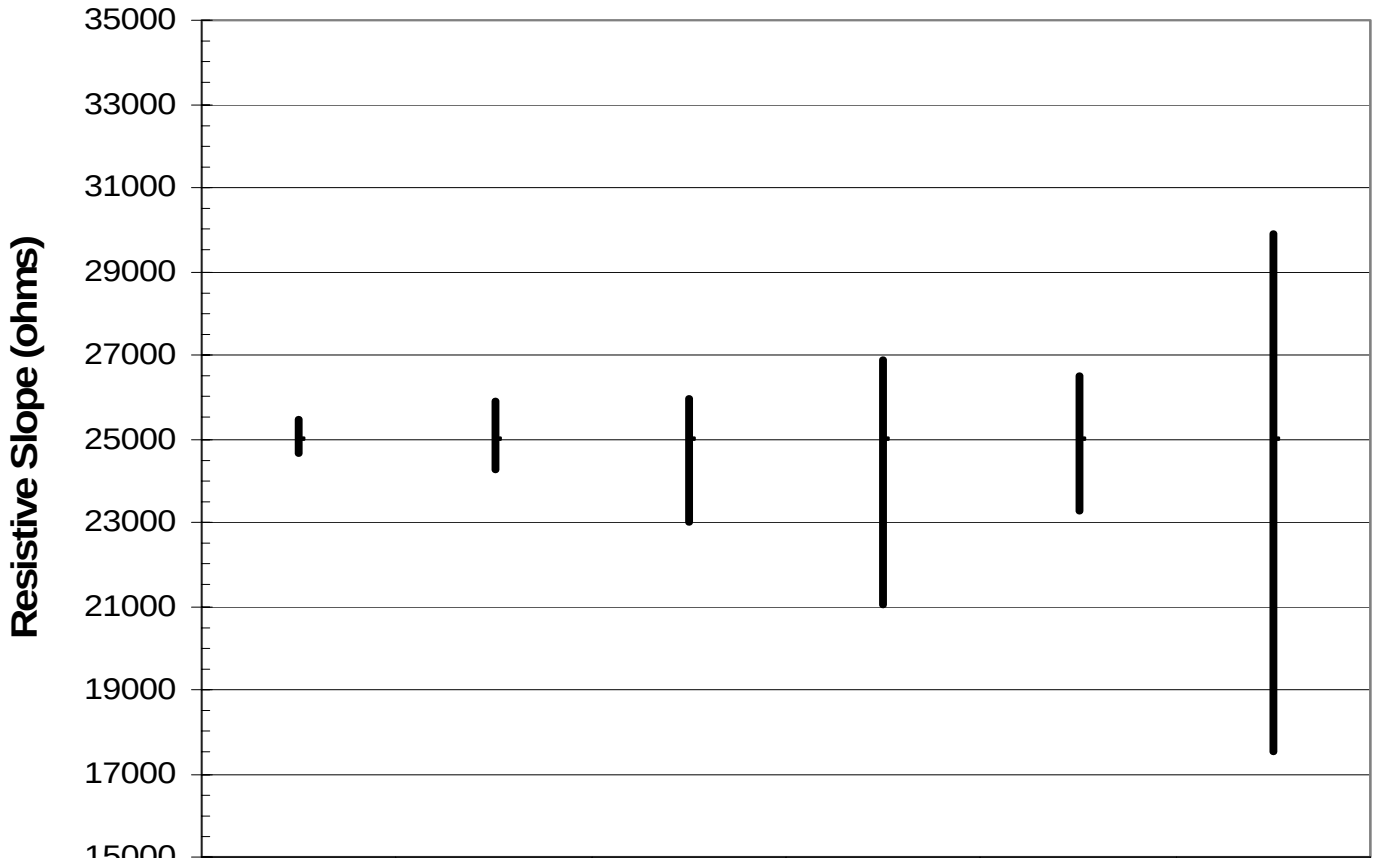
Requirements with +/- 3% Calculation

	Absolute Limits on Slopes	
	High (ohms)	Low (ohms)
PD resistive slope shall be within	25450	24626
PSE shall **reject** slopes greater than	(na)	28901
PSE outcome is **undefined**	28900	26901
PSE shall **accept** slopes within	26900	21040
PSE outcome is **undefined**	21039	18544
PSE shall **reject** slopes less than	18543	(na)

Budget Sheet, +/- 5% Calculation Tolerance

		Relative to 25K ohm Reference			
PD Budget		Pos. Delta Influence		Neg. Delta Influence	
	Assumption	Ohms	%	Ohms	%
25 K ohm signature tolerance	Comp. Tolerance	250	1.0	-250	-1.0
Diode series effects (2 diodes)	Sm. Sig, AC diode resistance	200	0.8	0	0.0
Volt. dependent leakage (diodes, isolation, flux)	5 meg ohms, parallel	0	0.0	-124	-0.5
PD variationCriteria		***450***	*1.8*	***-374***	*-1.5*
Aging, contamination margin **("6 dB")**		450	1.8	-374	-1.5
PD Variation Over Time	Total	***900***	*3.6*	***-748***	*-3.0*
Loop, X-Connect Budget		Pos. Delta Influence		Neg. Delta Influence	
	Assumption	Ohms	%	Ohms	%
Cable series effect	Loop length	25	0.1	0	0.0
Cable leakage	100 meg ohms, parallel	0	0.0	-6	0.0
Cable infrastructure voltage dependent leakage	1 meg ohms, parallel	0	0.0	-610	-2.4
Aging, contamination margin **("6 dB")**		25	0.1	-616	-2.5
	Total	50	0.2	-1232	-4.9
PD + Loop Variation	Total	***950***	3.8	***-1980***	-7.9
Margin to ensure Detection	(extra "6 dB")	950	3.8	-1980	-7.9
PSE shall accept		***1900***	7.6	***-3960***	-15.8
PSE Budget		Pos. Delta Influence		Neg. Delta Influence	
	Assumption	Ohms	%	Ohms	%
25 K ohm reference tolerance	Component Tolerance	250	1.0	-250	-1.0
Switch voltage dependent leakage	5 meg ohms, parallel	0	0.0	-124	-0.5
Misc other voltage dependent leakage	5 meg ohms, parallel	0	0.0	-124	-0.5
Calculation Precision (+/-)	5%	1250	5.0	-1250	-5.0
PSE Test Criteria		***1500***	6.0	***-1748***	-7.0
Aging, contamination margin **("6 dB")**	"6 dB"	1500	6.0	-1748	-7.0
	Total	3000	12.0	-3496	-14.0
Extreme PSE "reports for valid PD (Shall Accept)	Total Variation	***4900***	19.6	***-7456***	-29.8
	Total variation (%)	49			
	+/- variation (%)	25			

Absolute Slope Ranges with +/- 5% Calculation



	PD variation criteria	PD variation, over time	PD + Loop variations	PSE shall accept	PSE variation criteria	PSE's view of "shall accept"
High (ohms)	25450	25900	25950	26900	26500	29900
Low (ohms)	24626	24252	23020	21040	23252	17544
- Basis	25000	25000	25000	25000	25000	25000

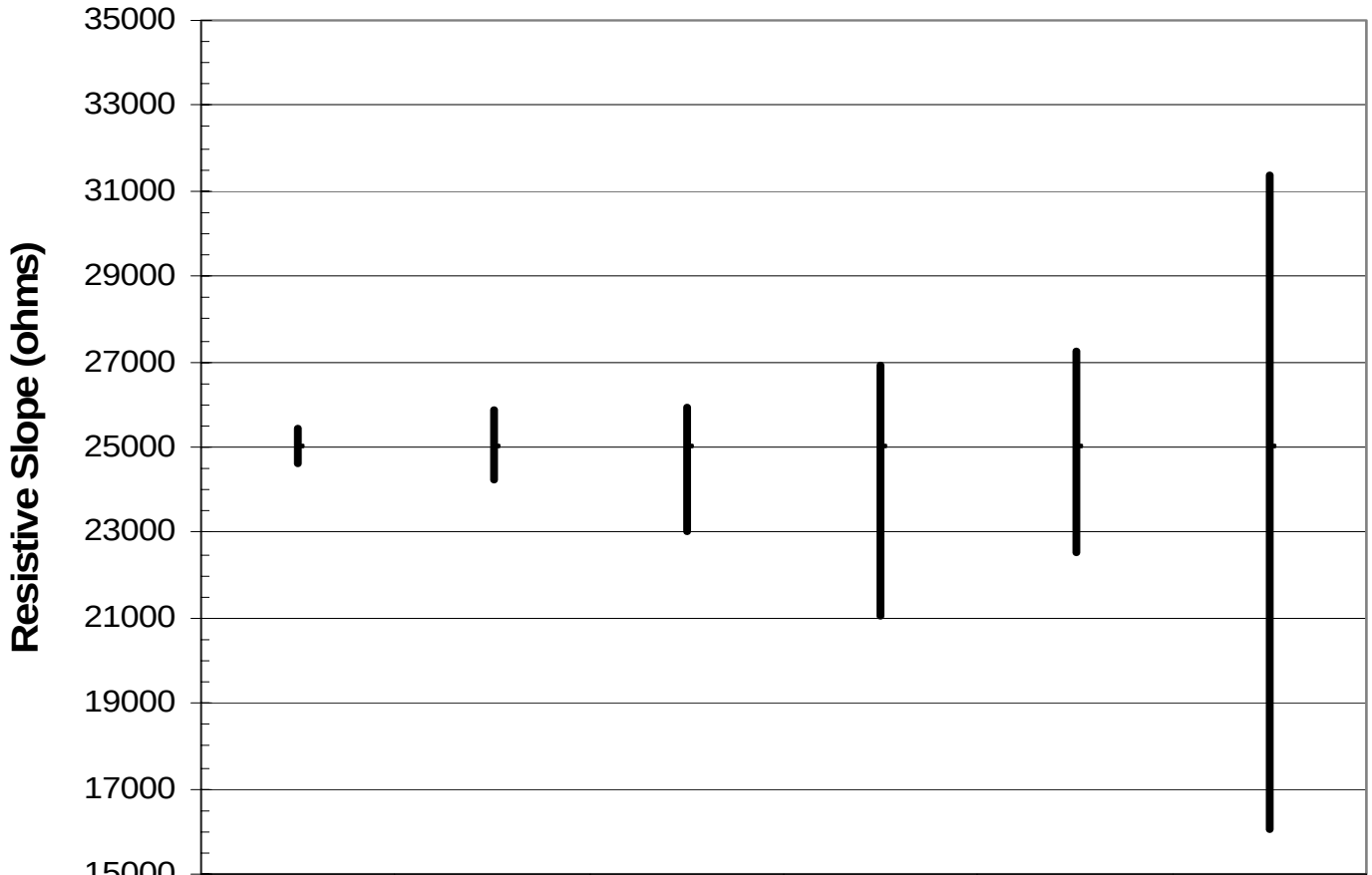
Requirements with +/- 5% Calculation

	Absolute Limits on Slopes	
	High (ohms)	Low (ohms)
PD resistive slope shall be within	25450	24626
PSE shall **reject** slopes greater than	(na)	29901
PSE outcome is **undefined**	29900	26901
PSE shall **accept** slopes within	26900	21040
PSE outcome is **undefined**	21039	17544
PSE shall **reject** slopes less than	17543	(na)

Budget Sheet, +/- 8% Calculation Tolerance

		Relative to 25K ohm Reference			
PD Budget		Pos. Delta Influence		Neg. Delta Influence	
	Assumption	Ohms	%	Ohms	%
25 K ohm signature tolerance	Comp. Tolerance	250	1.0	-250	-1.0
Diode series effects (2 diodes)	Sm. Sig, AC diode resistance	200	0.8	0	0.0
Volt. dependent leakage (diodes, isolation, flux)	5 meg ohms, parallel	0	0.0	-124	-0.5
PD Variation Criteria		***450***	*1.8*	***-374***	*-1.5*
Aging, contamination margin **("6 dB")**		450	1.8	-374	-1.5
PD Variation Over Time	Total	***900***	*3.6*	***-748***	*-3.0*
Loop, X-Connect Budget		Pos. Delta Influence		Neg. Delta Influence	
	Assumption	Ohms	%	Ohms	%
Cable series effect	Loop length	25	0.1	0	0.0
Cable leakage	100 meg ohms, parallel	0	0.0	-6	0.0
Cable infrastructure voltage dependent leakage	1 meg ohms, parallel	0	0.0	-610	-2.4
Aging, contamination margin **("6 dB")**		25	0.1	-616	-2.5
	Total	50	0.2	-1232	-4.9
PD + Loop Variation	Total	***950***	3.8	***-1980***	-7.9
Margin to ensure Detection	(extra "6 dB")	950	3.8	-1980	-7.9
PSE shall accept		***1900***	7.6	***-3960***	-15.8
PSE Budget		Pos. Delta Influence		Neg. Delta Influence	
	Assumption	Ohms	%	Ohms	%
25 K ohm reference tolerance	Component Tolerance	250	1.0	-250	-1.0
Switch voltage dependent leakage	5 meg ohms, parallel	0	0.0	-124	-0.5
Misc other voltage dependent leakage	5 meg ohms, parallel	0	0.0	-124	-0.5
Calculation Precision (+/-)	8%	2000	8.0	-2000	-8.0
PSE Variation Criteria		***2250***	9.0	***-2498***	-10.0
Aging, contamination margin **("6 dB")**	"6 dB"	2250	9.0	-2498	-10.0
	Total	4500	18.0	-4996	-20.0
PSE's view of "Shall Accept"	Total Variation	***6400***	25.6	***-8956***	-35.8
	Total variation (%)	61			
	+/- variation (%)	31			

Absolute Slope Ranges with +/- 8% Calculation



	PD variation criteria	PD variation, over time	PD + Loop variations	PSE shall accept	PSE variation criteria	PSE's view of "shall accept"
High (ohms)	25450	25900	25950	26900	27250	31400
Low (ohms)	24626	24252	23020	21040	22502	16044
- Basis	25000	25000	25000	25000	25000	25000

Requirements with +/- 8% Calculation

	Absolute Limits on Slopes	
	High (ohms)	Low (ohms)
PD resistive slope shall be within	25450	24626
PSE shall **reject** slopes greater than	(na)	31401
PSE outcome is **undefined**	31400	26901
PSE shall **accept** slopes within	26900	21040
PSE outcome is **undefined**	21039	16044
PSE shall **reject** slopes less than	16043	(na)