

DYNAMIC RANGE COMPARISON CHART

Brian A. Karr
University of Warwick, UK

Note: RS = Relative Spacing

Dynamic Range Representations					Number of Bits Required			Terms	HVS
Density	Decades	Contrast Ratio	DR (dB)	DR (Stops)	Linear	Log	LogLuv		
Log10(CR)	10	10^Density	20Log10(CR)	Log2(CR)	1% RS	1% RS	0.27% RS		
0	10 ⁰	1.0	0	0.0	0.0	0.0	0.0	LDR	HVS with no adaption
0.15		1.4	3	0.5	7.1	5.1	7.0		
0.2		1.6	4	0.7	7.3	5.5	7.4		
0.3		2.0	6	1.0	7.6	6.1	8.0		
0.4		2.5	8	1.3	8.0	6.5	8.4		
0.6		4.0	12	2.0	8.6	7.1	9.0		
0.8		6.3	16	2.7	9.3	7.5	9.4		
1	10 ¹	10	20	3.3	10.0	7.9	9.7		
1.2		16	24	4.0	10.6	8.1	10.0		
1.4		25	28	4.7	11.3	8.3	10.2		
1.6		40	32	5.3	12.0	8.5	10.4		
1.8		63	36	6.0	12.6	8.7	10.6		
2	10 ²	100	40	6.6	13.3	8.9	10.7	EDR	HVS with minimal adaption
2.2		158	44	7.3	14.0	9.0	10.9		
2.4		251	48	8.0	14.6	9.1	11.0		
2.6		398	52	8.6	15.3	9.2	11.1		
2.8		631	56	9.3	15.9	9.3	11.2		
3	10 ³	1,000	60	10.0	16.6	9.4	11.3		
3.2		1,585	64	10.6	17.3	9.5	11.4		
3.4		2,512	68	11.3	17.9	9.6	11.5		
3.6		3,981	72	12.0	18.6	9.7	11.6	HDR	HVS with full adaption
3.8		6,310	76	12.6	19.3	9.8	11.7		
4	10 ⁴	10,000	80	13.3	19.9	9.9	11.7		
4.2		15,849	84	14.0	20.6	9.9	11.8		
4.4		25,119	88	14.6	21.3	10.0	11.9		
4.6		39,811	92	15.3	21.9	10.1	11.9		
4.8		63,096	96	15.9	22.6	10.1	12.0		
5	10 ⁵	100,000	100	16.6	23.3	10.2	12.1		
5.2		158,489	104	17.3	23.9	10.2	12.1		
5.4		251,189	108	17.9	24.6	10.3	12.2		
5.6		398,107	112	18.6	25.2	10.3	12.2		
5.8		630,957	116	19.3	25.9	10.4	12.3		
6	10 ⁶	10 ⁶	120	19.9	26.6	10.4	12.3		
6.2		10 ^{6.2}	124	20.6	27.2	10.5	12.4		
6.4		10 ^{6.4}	128	21.3	27.9	10.5	12.4		
6.6		10 ^{6.6}	132	21.9	28.6	10.6	12.5		
6.8		10 ^{6.8}	136	22.6	29.2	10.6	12.5		
7	10 ⁷	10 ⁷	140	23.3	29.9	10.7	12.5		
7.2		10 ^{7.2}	144	23.9	30.6	10.7	12.6		
7.4		10 ^{7.4}	148	24.6	31.2	10.7	12.6		
7.6		10 ^{7.6}	152	25.2	31.9	10.8	12.7		
7.8		10 ^{7.8}	156	25.9	32.6	10.8	12.7		
8	10 ⁸	10 ⁸	160	26.6	33.2	10.9	12.7		
9	10 ⁹	10 ⁹	180	29.9	36.5	11.0	12.9		
10	10 ¹⁰	10 ¹⁰	200	33.2	39.9	11.2	13.1		
11	10 ¹¹	10 ¹¹	220	36.5	43.2	11.3	13.2		
12	10 ¹²	10 ¹²	240	39.9	46.5	11.4	13.3		
13	10 ¹³	10 ¹³	260	43.2	49.8	11.6	13.4		
14	10 ¹⁴	10 ¹⁴	280	46.5	53.2	11.7	13.5		
15	10 ¹⁵	10 ¹⁵	300	49.8	56.5	11.8	13.6		
16	10 ¹⁶	10 ¹⁶	320	53.2	59.8	11.9	13.7		
17	10 ¹⁷	10 ¹⁷	340	56.5	63.1	11.9	13.8		
18	10 ¹⁸	10 ¹⁸	360	59.8	66.4	12.0	13.9		