Log, Gamma and Toe

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2013

Contents

1 Introduction

This documents presents the transfer curves that are obtained by setting various gamma, toe and log parameters. The curves are shown both against linear (bottom set of curves) and logarithmic exposure levels (top set of curves), on the same graphs. Black is 0.0 and white is 1.0 at both input and output.

For each setting, the exposure index correction in stops is shown. The exposure correction is based on the requirement that a 18% gray object should result in a 40% output level.

2 Graphs

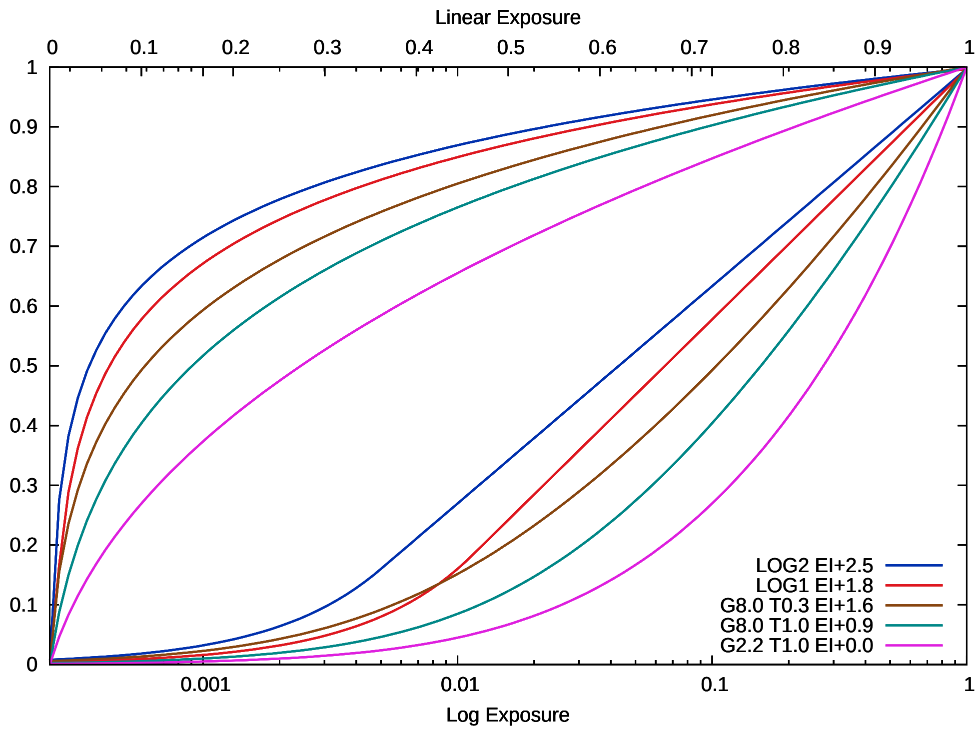

Figure 1: Response characteristics of the LOG1 and LOG2 modes. For comparison, the default gamma of 2.2, a gamma of 8.0 and a gamma of 8.0 with toe of 0.3 are included.

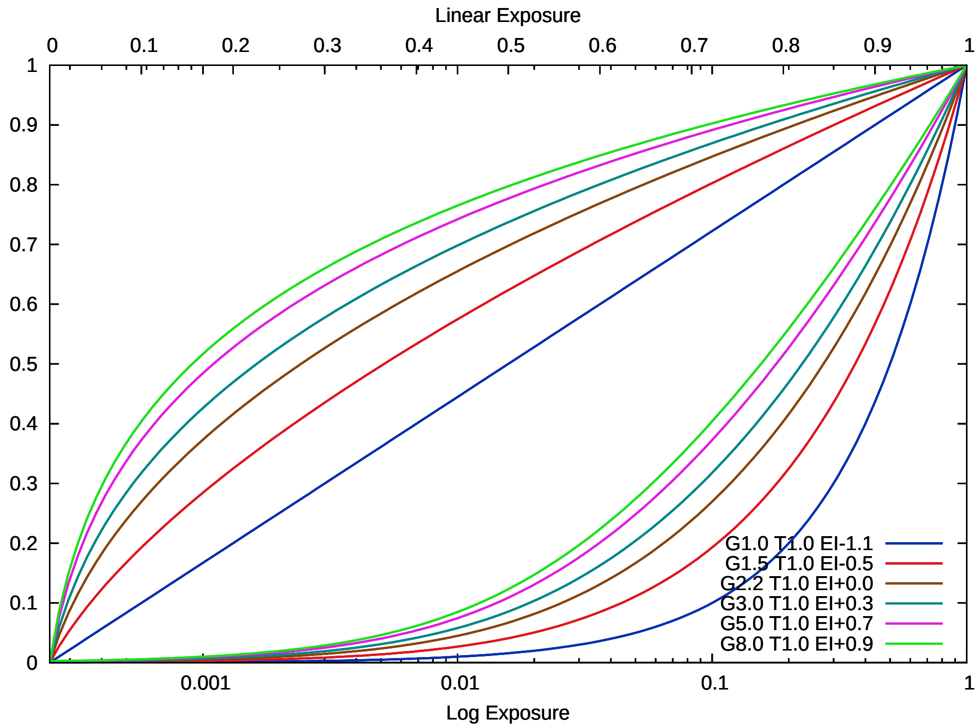

Figure 2: Response characteristics for various gamma settings, with default toe (1.0).

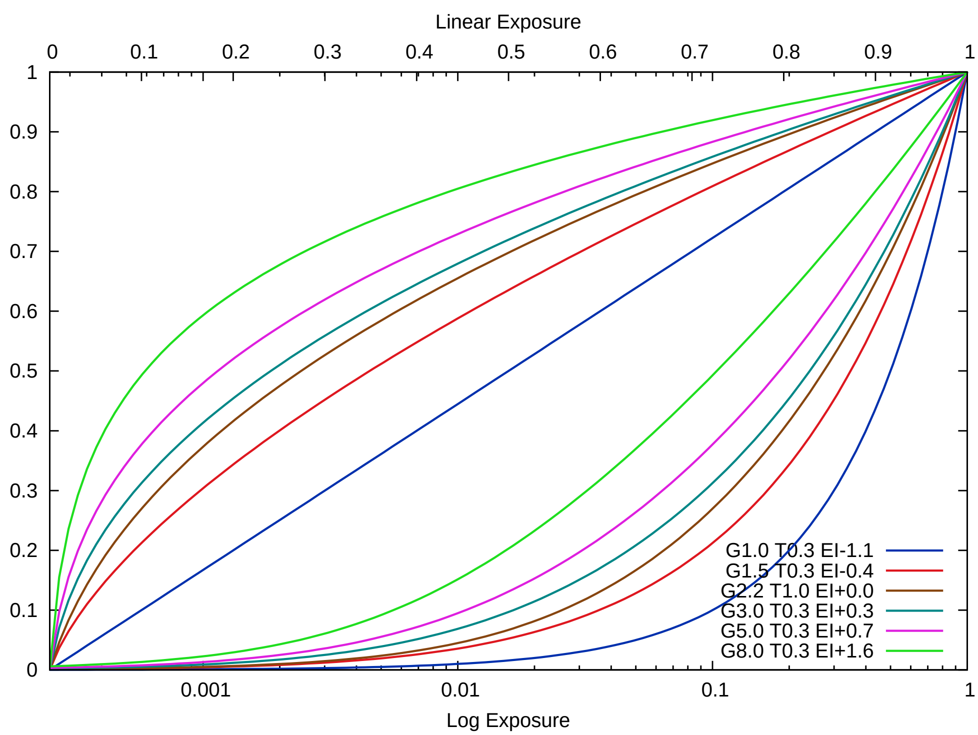

Figure 3: Response characteristics for various gamma settings, with a toe setting of 0.3.

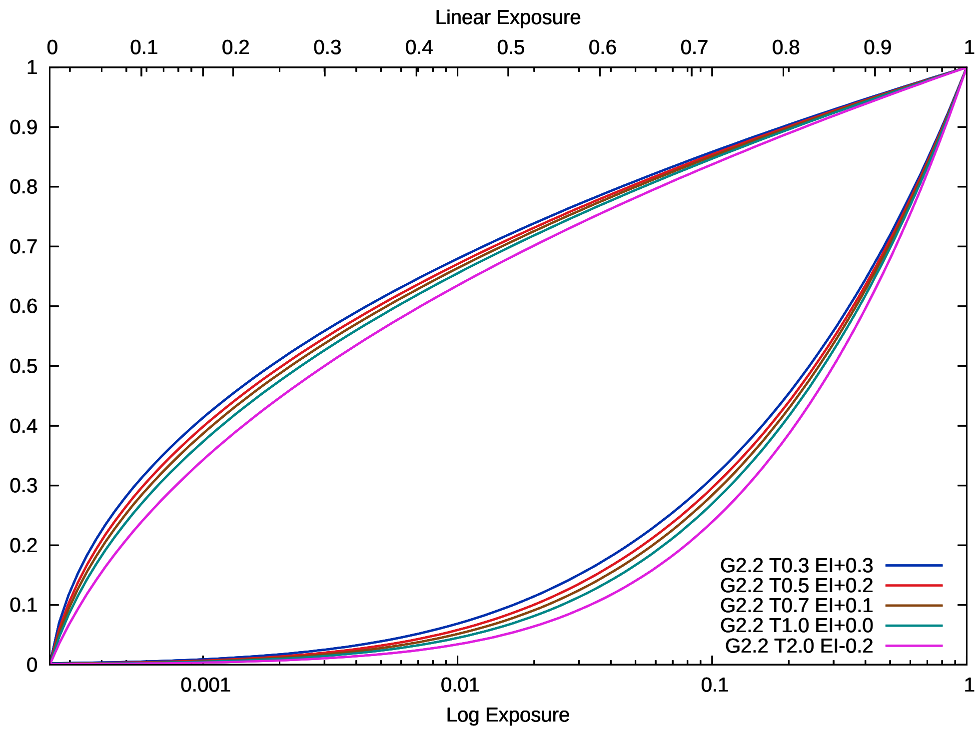

Figure 4: Effect of various toe settings with default gamma (2.2)

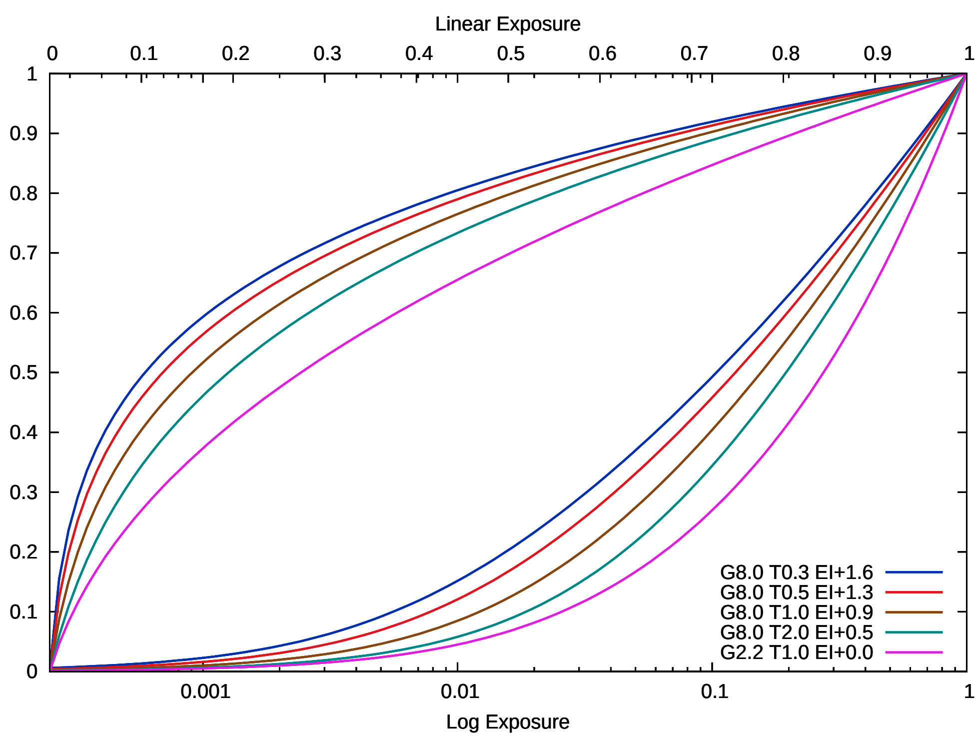

Figure 5: Effect of various toe settings with a gamma of 8.0

	a	b	c	d	e	s
Log1	0.182	30.0	0.011375	0.0	0.377675	16.0
Log2	0.158	30.0	0.004938	0.0	0.459732	32.0

Table 1: Log curve parameters.

3 Log mode formula

The log curves are generated according to the following formula, using the parameters in Table 1. Y is the output level between 0 and 1.0 and x is the normalized linear light level, also between 0 and 1.0.

$$Y_L(x) = \begin{cases} sx & \text{when } x \leq c \\ a\ln(bx+d)+e & \text{otherwise} \end{cases} \tag{1}$$

4 Gamma curve formula

To construct the gamma curve, start with the gamma and toe settings G and T, and calculate the parameters γ and ϵ as:

$$\gamma = \frac{1}{1+1.19(G-1)} \tag{2}$$

$$\epsilon = 0.02T \tag{3}$$

then the gamma curve is given by:

$$Y_\gamma(x) = \frac{(x+\epsilon)^\gamma - \epsilon^\gamma}{(1+\epsilon)^\gamma - \epsilon^\gamma} \tag{4}$$