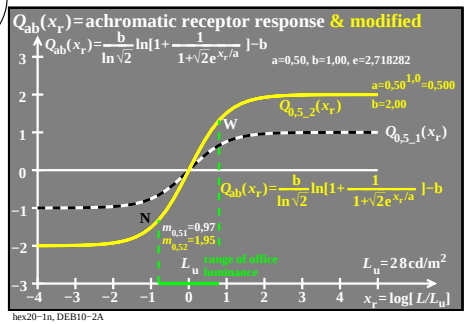
see similar files of the whole serie: http://farbe.li.tu-berlin.de/hexs.htm
technical information: http://farbe.li.tu-berlin.de or http://color.li.tu-berlin.de

TUB registration: 20241201-hex2/hex2l0np.pdf /.ps
application for evaluation and measurement of display or print output
TUB material: code=rha4ta



hex20−1n, DEB10−2A

Achromatic receptor-response function
$Q_{ab}[x_r/a]$

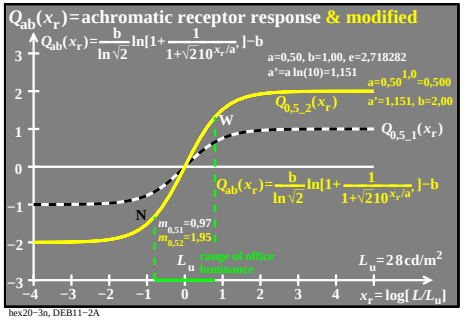
with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$Q_{ab}[x_r/a]=\frac{b}{\ln\sqrt{2}}\ln[\frac{1}{1+\sqrt{2}e^{(x_r/a)}}]-b$$

function values for b=1 and a>0 :

$Q_{a1}[x_r/a\to-\infty]$	=−1	x=log$L$, u=logL_u
$Q_{a1}[x_r/a=0]$	= 0	x_r=log [L/L_u] = $x-u$
$Q_{a1}[x_r/a\to+\infty]$	=+1	

hex20−2n, eeo20−2n



hex20−3n, DEB11−2A

Achromatic receptor-response function
$Q_{ab}[x_r/a']$ a'=a ln(10)

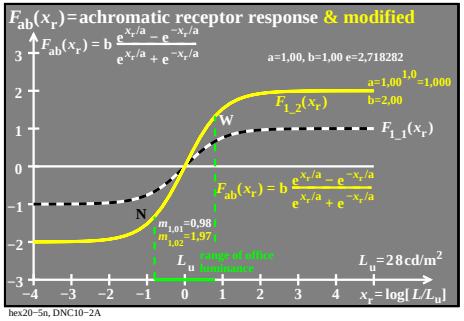
with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$Q_{ab}[x_r/a']=\frac{b}{\ln\sqrt{2}}\ln[\frac{1}{1+\sqrt{2}\,10^{(x_r/a')}}]-b$$

function values for b=1 and a'=a ln(10)>0 :

$Q_{a1}[x_r/a'\to-\infty]$	=−1	x=log$L$, u=logL_u
$Q_{a1}[x_r/a'=0]$	= 0	x_r=log [L/L_u] = $x-u$
$Q_{a1}[x_r/a'\to+\infty]$	=+1	

hex20−4n, eeo20−4n



hex20−5n, DNC10−2A

Achromatic receptor-response function
$F_{ab}[x_r/a]$ x_r=log(relative luminance)

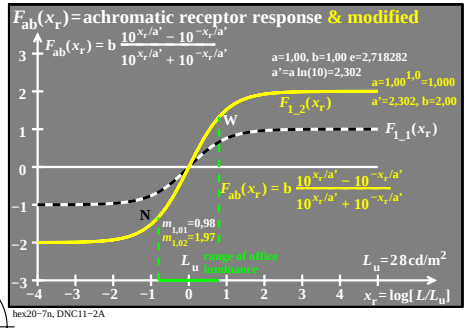
with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$F_{ab}[x_r/a]=b\,\frac{e^{x_r/a}-e^{-x_r/a}}{e^{x_r/a}+e^{-x_r/a}}=b\tanh[x_r/a]$$

function values for b=1 and a>0 :

$F_{a1}[x_r/a\to-\infty]$	=−1	x=log$L$, u=logL_u
$F_{a1}[x_r/a=0]$	= 0	x_r=log [L/L_u] = $x-u$
$F_{a1}[x_r/a\to+\infty]$	=+1	

hex20−6n, eeo20−6n



hex20−7n, DNC11−2A

Achromatic receptor-response function
$F_{ab}[x_r/a']$ x_r=log(relative luminance)

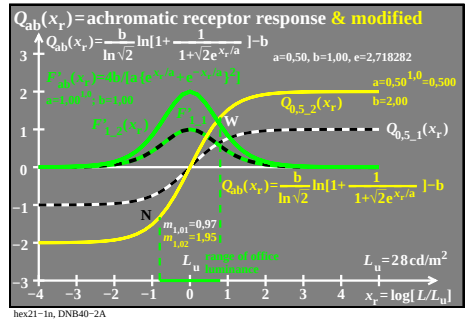
with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$F_{ab}[x_r/a']=b\,\frac{10^{x_r/a'}-10^{-x_r/a'}}{10^{x_r/a'}+10^{-x_r/a'}}=b\tanh[x_r/a']$$

function values for b=1 and a'=a ln(10) >0 :

$F_{a1}[x_r/a'\to-\infty]$	=−1	x=log$L$, u=logL_u
$F_{a1}[x_r/a'=0]$	= 0	x_r=log [L/L_u] = $x-u$
$F_{a1}[x_r/a'\to+\infty]$	=+1	

hex20−8n, eeo20−8n



hex21−1n, DNB40−2A

Derivation of achromatic receptor response
$F'_{ab}[x_r/a]$ x_r=log(relative luminance)

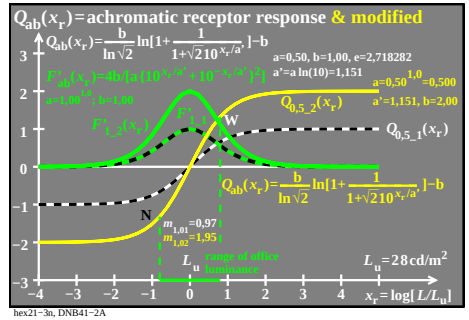
with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$F'_{ab}[x_r/a]=\frac{4b}{a\{e^{x_r/a}+e^{-x_r/a}\}^2}=\frac{b}{a\sinh^2[x_r/a]}$$

function values for b=1 and a>0 :

$F'_{a1}[x_r/a\to-\infty]$	=0	x=log$L$, u=logL_u
$F'_{a1}[x_r/a=1]$	=1	x_r=log [L/L_u] = $x-u$
$F'_{a1}[x_r/a\to+\infty]$	=0	

hex21−2n, eeo21−2n



hex21−3n, DNB41−2A

Derivation of achromatic receptor response
$F'_{ab}[x_r/a]$ x_r=log(relative luminance)

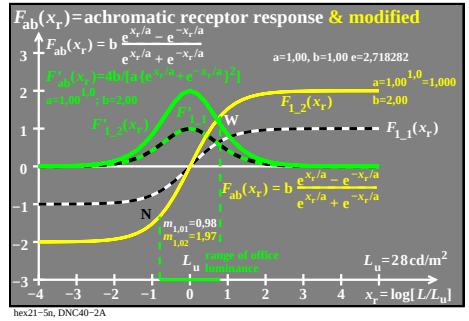
with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$F'_{ab}[x_r/a]=\frac{4b}{a'\{10^{x_r/a'}+10^{-x_r/a'}\}^2}=\frac{b}{a'\sinh^2[x_r/a']}$$

function values for b=1 and a'= a ln(10) >0 :

$F'_{a1}[x_r/a'\to-\infty]$	=0	x=log$L$, u=logL_u
$F'_{a1}[x_r/a'=1]$	=1	x_r=log [L/L_u] = $x-u$
$F'_{a1}[x_r/a'\to+\infty]$	=0	

hex21−4n, eeo21−4n



hex21−5n, DNC40−2A

Derivation of achromatic receptor response
$F'_{ab}[x_r/a]$ x_r=log(relative luminance)

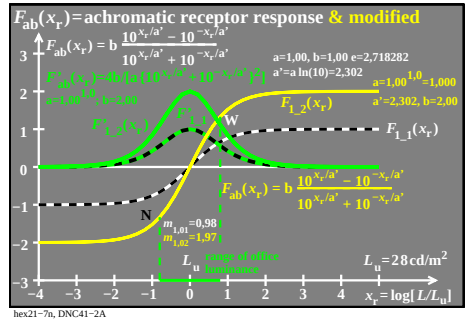
with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$F'_{ab}[x_r/a]=\frac{4b}{a\{e^{x_r/a}+e^{-x_r/a}\}^2}=\frac{b}{a\sinh^2[x_r/a]}$$

function values for b=1 and a>0 :

$F'_{a1}[x_r/a\to-\infty]$	=0	x=log$L$, u=logL_u
$F'_{a1}[x_r/a=1]$	=1	x_r=log [L/L_u] = $x-u$
$F'_{a1}[x_r/a\to+\infty]$	=0	

hex21−6n, eeo21−6n



hex21−7n, DNC41−2A

Derivation of achromatic receptor response
$F'_{ab}[x_r/a]$ x_r=log(relative luminance)

with x_r=log [L/L_u] (L=test luminance)
L_u=surround luminance

$$F'_{ab}[x_r/a]=\frac{4b}{a'\{10^{x_r/a'}+10^{-x_r/a'}\}^2}=\frac{b}{a'\sinh^2[x_r/a']}$$

function values for b=1 and a'= a ln(10) >0 :

$F'_{a1}[x_r/a'\to-\infty]$	=0	x=log$L$, u=logL_u
$F'_{a1}[x_r/a'=1]$	=1	x_r=log [L/L_u] = $x-u$
$F'_{a1}[x_r/a'\to+\infty]$	=0	

hex21−8n, eeo21−8n

TUB-test chart hex2; Model of two response functions $F_{ab}(x_r)$ & $Q_{ab}(x_r)$ and derivation $F'_{ab}(x_r)$
Tangens hyperbolicus tanh(x_r) and modified functions with e^{xr} and 10^{xr}; a^n=$a^{1,0}$