see similar files: http://farbe.li.tu-berlin.de/BET4/BET4.HTM
technical information: http://farbe.li.tu-berlin.de or http://farbe.li.tu-berlin.de

TUB registration: 20220301-BET4/BET4L0NP.PDF /.PS
TUB material: code=rha4ta
application for measurement of display output

log (L*) IECsRGBJND lightness
$\log(L^*)$ L^*
IECsRGBJND lightness for all colours, L^*_W=100:
$L^*_{IECsRGBJND} = 100, (Y/Y_n)^{1/7,2}$ $(Y_n$=100 $Y > 1/255)$
L^*_u=50, Y_u=0
$\log(L^*_u)$=1,89, m_u=0,13
application range
BET40−1A

log (L*/L*_u) relative IECsRGBJND lightness
L^*/L^*_u
relative normalized IECsRGBJND data
IECsRGBJND lightness for all colours, L^*_W=100:
$L^*_{IECsRGBJND} = 100 (Y/Y_n)^{1/7,2}$ $(Y_n$=100, $Y > 1/255)$
L^*=50, Y_u=0
$\log[(L^*)/(L^*_u)]$=0, m_u=0,13
application range
BET40−2A

log (L*) LABJND lightness
$\log(L^*)$ L^*
$L^*_{LABJND}= (A_0/A_2)\, ln\, (A_1 + A_2 \cdot Y)$
A_0=1,50 A_1=0,0170 A_2=0,0058
L^*=508, Y_u=18, dY_u=0,08, dY_u/Y_u=0,004
$\log(L^*_u)$=2,7, m_u=0,43
application range
BET41−1A

log (L*/L*_u) relative LABJND lightness
L^*/L^*_u
$L^*_{LABJND}= (A_0/A_2)\, ln\, (A_1 + A_2 \cdot Y)$
$L^*/L^*_u = ln\, (A_1 + A_2 \cdot Y) - ln\, (A_1 + A_2 \cdot Y_u)$
A_0=1,50 A_1=0,0170 A_2=0,0058
L^*_u=508, Y_u=18, dY_u=0,08, dY_u/Y_u=0,004
$\log[(L^*)/(L^*_u)]$=0, m_u=0,43
application range
BET41−2A

log ΔY IECsRGBJND−tristimulus value difference
$\log(\Delta Y)$ ΔY
$L^*_{IECsRGBJND} = 100 (Y/Y_n)^{1/7,2}$
IECsRGBJND−tristimulus value difference
$\log(dY) = \log(\, 7,2\, (Y_n/100)\,) + (1-(1/7,2))\log(Y/Y_n)$
$= \log(7,2(Y_n^{1/7,2})/100) + (1-(1/7,2))\log(Y)$
Y_u=0, dY_u=0,09, dY_u/Y_u=0,1440
$\log(dY)$=1,64, m_u=0,86
application range
BET40−3A

log(ΔY/ΔY_u) relative IECsRGBJND−tristimulus value
$\Delta Y/\Delta Y_u$
$L^*_{IECsRGBJND} = 100 (Y/Y_n)^{1/7,2}$
relative IECsRGBJND−tristimulus value difference
$\log(dY) = \log(\, 7,2\, (Y_n/100)\,) + (1-(1/7,2))\log(Y/Y_n)$
$= \log(7,2(Y_n^{1/7,2})/100) + (1-(1/7,2))\log(Y)$
Y_u=0, dY_u=0,09, dY_u/Y_u=0,1440
$\log[(dY)/(dY_u)]$=0, m_u=0,86
application range
BET40−4A

log ΔY LABJND−tristimulus value difference
$\log(\Delta Y)$ ΔY
$L^*_{LABJND}= (A_0/A_2)\, ln\, (A_1 + A_2 \cdot Y)$
A_0=1,50 A_1=0,0170 A_2=0,0058
tristimulus value difference
$\log(dY) = \log\, [\,(A_1 + A_2 \cdot Y)\, / A_0\,]$
Y_u=18, dY_u=0,08, dY_u/Y_u=0,004
$\log(dY)$=−1,09, m_u=0,86
application range
BET41−3A

log(ΔY/ΔY_u) relative LABJND−tristimulus value difference
$\Delta Y/\Delta Y_u$
$L^*_{LABJND}= (A_0/A_2)\, ln\, (A_1 + A_2 \cdot Y)$
A_0=1,50 A_1=0,0170 A_2=0,0058
relative tristimulus value difference
$\log(dY/dY_u) = \log\, (A_1 + A_2 \cdot Y)$
$- \log\, (A_1 + A_2 \cdot Y_u)$
Y_u=18, dY_u=0,08, dY_u/Y_u=0,004
$\log[(dY)/(dY_u)]$=0, m_u=0,86
application range
BET41−4A

log (ΔY/Y) IECsRGBJND−tristimulus value sensitivity
$\log(C_r)$ C_r=(ΔY/Y)
$L^*_{IECsRGBJND} = 100 (Y/Y_n)^{1/7,2}$
IECsRGBJND−tristimulus value sensitivity
$\log[(dY/Y = \log(7,2(Y_n^{1/7,2})/100) - (1/7,2)\log(Y)$
$\log(dY/Y)$=−1,03, m_u=−0,13
Y_u=0, dY_u=0,09, dY_u/Y_u=0,1440
application range
BET40−5A

log [(ΔY/Y) / (ΔY_u/Y_u)] relative IECsRGBJND−tristimulus value sensitivity
C_r/C_{ru}=(ΔY/Y)/(ΔY_u/Y_u)
$L^*_{IECsRGBJND} = 100 (Y/Y_n)^{1/7,2}$
relative IECsRGBJND−tristimulus value sensitivity
$\log(dY/Y)/(dY_u/Y_u)] = \log(Y/Y_u)^{-1/7,2}$
$\log[(dY/Y)/(dY_u/Y_u)]$=0, m_u=−0,13
Y_u=0, dY_u=0,09, dY_u/Y_u=0,1440
application range
BET40−6A

log (ΔY/Y) LABJND−tristimulus value sensitivity
$\log(C_r)$ C_r=(ΔY/Y)
$L^*_{LABJND}= (A_0/A_2)\, ln\, (A_1 + A_2 \cdot Y)$
A_0=1,50 A_1=0,0170 A_2=0,0058
LABJND−tristimulus value sensitivity
$\log(dY/Y) = \log\, [\, (A_1 + A_2 \cdot Y)\, / (A_0 \cdot Y)\,]$
$\log(dY/Y)$=−2,34, m_u=−0,13
Y_u=18, dY_u=0,08, dY_u/Y_u=0,004
application range
BET41−5A

log [(ΔY/Y) / (ΔY_u/Y_u)] relative LABJND−tristimulus value sensitivity
C_r/C_{ru}=(ΔY/Y)/(ΔY_u/Y_u)
$L^*_{LABJND}= (A_0/A_2)\, ln\, (A_1 + A_2 \cdot Y)$
A_0=1,50 A_1=0,0170 A_2=0,0058
relative LABJND−tristimulus value sensitivity
$\log[(dY/Y)/(dY_u/Y_u)] = \log\, [\, (A_1 + A_2 \cdot Y)\, / Y\,]$
$- \log\, [\, (A_1 + A_2 \cdot Y_u)\, / Y_u\,]$
$\log[(dY/Y)/(dY_u/Y_u)]$=0, m_u=−0,13
Y_u=18, dY_u=0,08, dY_u/Y_u=0,004
application range
BET41−6A

log (Y/ΔY) IECsRGBJND−tristimulus value contrast
$\log(S_r)$ S_r=(Y/ΔY)
$L^*_{IECsRGBJND} = 100 (Y/Y_n)^{1/7,2}$
IECsRGBJND−tristimulus value contrast
$\log(Y/dY) = \log[(1/7,2)\, (100/Y_n)] + (1/7,2)\log(Y/Y_n)$
$= \log[(1/7,2)\, 100/(Y_n^{1/7,2})] + (1/7,2)\log(Y)$
L^*_u=50, Y_u=0, dY_u=0,09, Y_u/dY_u=6
$\log(Y/dY)$=1,03, m_u=0,13
application range
BET40−7A
BET40−7N

log [(Y/ΔY) / (Y_u/ΔY_u)] relative IECsRGBJND−tristimulus value contrast
$\log(S_r)$ S_r/S_{ru}=(Y/ΔY)/(Y_u/ΔY_u) mulus value contrast
$L^*_{IECsRGBJND} = 100 (Y/Y_n)^{1/7,2}$
relative IECsRGBJND−tristimulus value contrast
$\log[(Y/ΔY)/(Y_u/ΔY_u)] = \log(Y/Y_u)^{1/7,2}$
L^*_u=50, Y_u=0, dY_u=0,09
L^*=50, Y_u=0, dY_u=0,09, Y_u/dY_u=6
$\log[(Y/dY)/(Y_u/dY_u)]$=0, m_u=0,13
application range
BET40−8A

log (Y/ΔY) LABJND−tristimulus value contrast
$\log(S_r)$ S_r=(Y/ΔY)
$L^*_{LABJND}= (A_0/A_2)\, ln\, (A_1 + A_2 \cdot Y)$
A_0=1,50 A_1=0,0170 A_2=0,0058
LABJND−tristimulus value contrast
$\log(Y/dY) = \log\, [\, (A_1 + A_2 \cdot Y)\, / (A_0 \cdot Y)\,]$
Y_u=18, dY_u=0,08, Y_u/dY_u=222
$\log(Y/dY)$=2,34, m_u=0,13
application range
BET41−7A
BET41−7N

log [(Y/ΔY) / (Y_u/ΔY_u)] relative LABJND−tristimulus value contrast
$\log(S_r)$ S_r/S_{ru}=(Y/ΔY)/(Y_u/ΔY_u) mulus value contrast
$L^*_{LABJND}= (A_0/A_2)\, ln\, (A_1 + A_2 \cdot Y)$
A_0=1,50 A_1=0,0170 A_2=0,0058
relative LABJND−tristimulus value contrast
$\log[(Y/dY)/(Y_u/dY_u)] = \log\, [\, Y\, / (A_1 + A_2 \cdot Y)\,]$
$- \log\, [\, Y_u/ (A_1 + A_2 \cdot Y_u)\,]$
Y_u=18, dY_u=0,08, Y_u/dY_u=222
$\log[(Y/dY)/(Y_u/dY_u)]$=0, m_u=0,13
application range
BET41−8A

TUB-test chart BET4; CIELAB and LABJND color-difference formulae
Absolute and relative lightness, sensitivity and contrast; colour line element and derivation
input: *w/rgb*