PQA600B and PQASW Picture Quality Analyzer

Measurement Reference



071-3281-00

How to use preconfigured measurements

The PQA600B and PQASW (PQA) perform full-reference comparisons of picture quality measurements between two video sequences (Reference and Test) or a no-reference measurement of the luminance signal in a video sequence.

The PQA suite of measurements includes:

- Critical viewing picture quality (human vision system model, full-reference)
- Casual viewing picture quality (attention weighted, full-reference or no-reference)
- Peak signal-to-noise ratio (PSNR, full-reference)
- Focus of attention (full-reference and no-reference)
- MPEG artifacts (full-reference except for DC blockiness)
- DC blockiness (full-reference and no-reference)

The PQA uses both default ITU-R BT.500 and user-configurable conditions to perform measurements. The other side of this card lists the measurements supplied with the PQA and shows the default settings for each of the configuration nodes. This side of the card lists the user-configurable parameters you can adjust to create custom measurements for your specific video application.

Use measurements 001–008 to obtain general predictive video-quality measurements, performed without any weighting, for SD, HD, mobile, and home theater viewing conditions. PQR measurements show the absolute PQ based on the JND. DMOS measurements show the relative PQ compared to the worst case BT.500 training sequence.

Use measurements 009–014 to add attention weighting to the predictive DMOS measurements. The dominant weighting for Sport sequences is motion and the dominant weighting for Talking Head sequences is skin detection.

Use measurements 015–018 to measure the predicted subjective quality of video format conversions. Included in the measurement calculation are the differences in measurement conditions between video formats.

Use measurement 019 to visualize which portion of the image is attracting viewer attention. You can measure for specific attention attractors such as motion or human skin. When you perform an attention-weighted measurement with the same parameters used in this measurement, you are measuring only the portion of the video image identified by this measurement.

Use measurement 020 to use PSNR to detect small differences in the video that humans cannot perceive. Use the Summary Node to select the measurement units (dB or LSB). dB shows the noise power relative to the white level. LSB shows the difference of the LSB.

Use measurements 021–024 to measure the percentage of typical MPEG artifacts in the video (removed edges, added edges, rotated edges, and DC blockiness).

Use measurements 025–029 to measure PSNR with weighting for MPEG artifacts. Use these measurements to investigate the root cause of video impairment.

Use measurements 030–033 to measure the objective quality of video format conversions with weighting for MPEG artifacts.

Use measurement 034 to measure PSNR with attention model weighting.

Use measurement 035 to measure DC blockiness when there is no reference sequence available.

Use measurements 36–38 to measure PQR, HD DMOS, and HD ADMOS using Perceptual Difference parameters calibrated by subjective viewer assessments. (Refer to application note 28W-24876-0.pdf)

Node name

Tektronix

Configural	ole parame	ters	
Display Model			
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Display technology type. Select between CRT, LCD, and DMD. Each display type has preset and user-configurable parameters, such as interlace/progressive, gamma, response time, etc.

Optimization. ¹Select accuracy or speed.

NOTE. Reference and Test can be configured independently.

Node name

PSNR

Configurable parameters

R None.

Perceptual Difference

Viewer characteristics. Select Typical or Expert to use a preconfigured setting or select Custom to adjust the viewer settings: visual acuity, sensitivity to changes in average brightness, response speed to a moving object, sensitivity to photosensitive epilepsy triggers, etc.

Optimization. ¹Select accuracy or speed.

Artifact Detection

Artifacts. Set the weighting for spatial gradient artifacts: lost edges (blurring), added edges (ringing), and rotated edges (blocking), or set the weighting for DC blockiness (removed detail within a block).

Enable or disable a report of complimentary artifact data.

Attention Model

Configuration. Select Typical (the preconfigured setting) or select Custom to adjust the weighting for the following attention attractors:

- Temporal: motion.
- Spatial: center, people (skin), foreground, contrast, color, shape, and size.
- Distractions: differences.
- Optimization. ¹Select accuracy or speed.

Weighting. Set the weighting given to the Attention Model compared to the other measurement factors.

Summary Node

Statistical Units. Set the units used by measurements:

- Subjective (Perceptual Difference): Predicted DMOS, PQR or % Perceptual Contrast.
- Objective (PSNR). Select mean absolute LSB or dB.
- Artifact Units. Select percent of maximum artifact or dB.

Save Results. Select how the measurement results are saved: None, Maps and Values, Values Only, Map Overwrite, or Value Overwrite.

Measure Map Display. Set the Gain and Offset for the Measure Map display. Enable or disable signed data (signed on gray or unsigned on black).

Event Log. Set the threshold for the warning level and error level.

ITU-R BT.500 Worst Case Training Sequence Response. Use the default value, manually enter, or import an Minkowski average result (determined via Worst Case Video % Perceptual Contrast).

Select Accuracy for the most accurate measurement results. Select Speed if the speed of the measurement is more important than accuracy.

View Model

Environment. Set the viewing distance and ambient luminance for Reference and Test independently.

Optimization. ¹Select accuracy or speed.

Default spatial alignment:

- Select automatic or manual image cropping. Reference and Test can be configured independently.
- Select automatic or manual for the horizontal/ vertical scale and shift. For Test only.
- Select automatic or manual contrast (AC gain) and brightness (DC offset). For Test only.
- 1 Select Accuracy for the most accurate measurement results. Select Speed if the speed of the measurement is more important than accuracy.

nent Class	Measurement Name	Configuration Nod	e Default Values	PSNR	Perceptual Difference	Artifact Detection	Attention Model	Summary Node
urement	000 View Video				 			
t values used by the PC	2A View Model are derived from the view model portion of the	e ITU-R BT.500 standards.						
I: Full Service								
iewing	001 SD Broadcast PQR 002 HD Broadcast PQR 003 CIF and QVGA PQR 004 D-CINEMA PQR	SD Broadcast CRT HD Broadcast CRT CIF/QVGA LCD DMD Projector	ITU-R BT.500 ITU-R BT.500 7 screen heights, 20 cd/m² 3 screen heights, 0.1 cd/m²		Typical Typical Typical Typical			PQR units PQR units PQR units PQR units
liswing	005 SD Broadcast DMOS 006 HD Broadcast DMOS 007 CIF and QVGA DMOS 008 D-CINEMA DMOS	SD Broadcast CRT HD Broadcast CRT CIF/QVGA LCD DMD Projector	ITU-R BT.500 ITU-R BT.500 T screen heights, 20 cd/m ² 3 screen heights, 0.1 cd/m ²		Typical Typical Typical Typical			DMOS units DMOS units DMOS units DMOS units
	009 SD Broadcast ADMOS 010 HD Broadcast ADMOS 011 CIF and QVGA ADMOS 012 SD Sports Broadcast ADMOS 013 HD Sports Broadcast ADMOS 014 SD Talking Head Broadcast ADMOS	SD Broadcast CRT HD Broadcast CRT CIF/QVGA LCD SD Broadcast CRT HD Broadcast CRT SD Broadcast CRT	ITU-R BT.500 ITU-R BT.500 7 screen heights, 20 cd/m ² ITU-R BT.500 ITU-R BT.500 ITU-R BT.500 ITU-R BT.500		Typical Typical Typical Typical Typical		Default weightings Default weightings Default weightings Motion & foreground dominant Motion & foreground dominant Skin & foreground dominant	DMOS units DMOS units DMOS units DMOS units DMOS units DMOS units
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	019 Stand-alone Attention Model				1		Default weightings	Map units: % probability of focus of attention
gs are independent. Use ents: Full Reference	e any combination of Display Model and View Model condition :e	ns with each of the above mea	surements.					
	020 PSNR dB		Auto-align spatial	Selected	1			dB units
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ma to SD DVD to CIF o SD to QCIF	030 SD DVD from D-Cinema Artifact weighted PSNR dB 031 CIF from SD Broadcast Artifact weighted PSNR dB 032 SD from HD Broadcast Artifact weighted PSNR dB 033 QCIF from CIF and QVGA Artifact weighted PSNR dB		Auto-align spatial Auto-align spatial Auto-align spatial Auto-align spatial	Selected Selected Selected Selected		All artifacts selected All artifacts selected All artifacts selected All artifacts selected All artifacts selected		dB units dB units dB units dB units
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