



To get a new Ultra HD Premium "sticker" a display must meet a set of criteria, these are:

- Image Resolution: 3840x2160
- Color Bit Depth: 10-bit signal
- Color Palette (Wide Color Gamut)
- High Dynamic Range



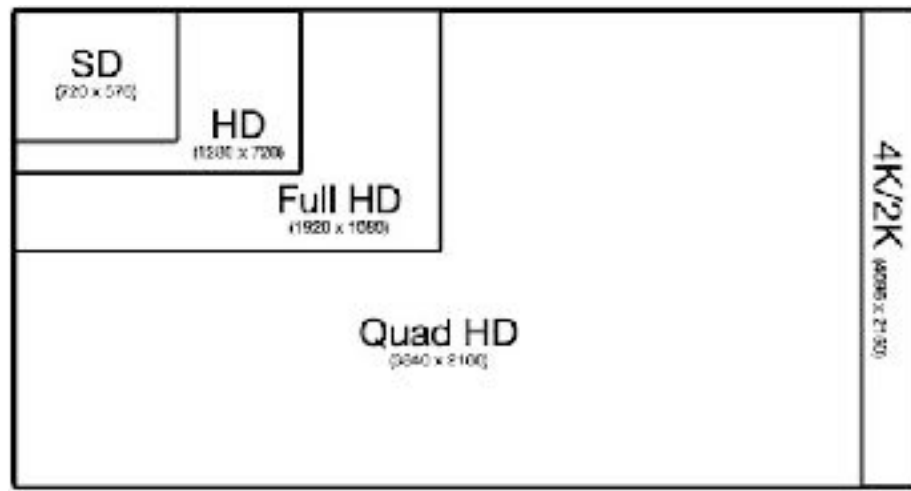
Type	Resolution	Frame Rate	Color Compression	Deep Color Bit Depth	HDR	Wide Color Gamut	HDMI Version	Data Rate
HD	1920x1080	24	4:2:0	8 BIT	NO	NO	1.4	3.23 GBPS
HD	1920x1080	60	4:2:0	8 BIT	NO	NO	1.4	4.45 GBPS
HD	1920x1080	60	4:4:4	8 BIT	NO	NO	1.4	4.45 GBPS
UHD	3840x2160	24	4:2:0	8 BIT	NO	NO	1.4	8.91 GBPS
UHD	3840x2160	24	4:4:4	8 BIT	NO	NO	1.4	8.91 GBPS
UHD	3840x2160	24	4:2:0	10 BIT	YES	YES	2.0(a/b)	11.14 GBPS
UHD	3840x2160	24	4:4:4	10 BIT	YES	YES	2.0(a/b)	11.14 GBPS
UHD	3840x2160	24	4:4:4	12 BIT	YES	YES	2.0(a/b)	15.37 GBPS
UHD	3840x2160	60	4:2:0	10 BIT	NO	YES	2.0	11.14 GBPS
UHD	3840x2160	60	4:4:4	10 BIT	NO	YES	2.0	11.14 GBPS
UHD	3840x2160	60	4:4:4	12 BIT	NO	YES	2.0	15.37 GBPS
UHD	3840x2160	60	4:4:4	8 BIT	NO	YES	2.0	11.14 GBPS

Data Rates	All the following technical specs add to the bandwidth required. You can mix and match specs to be able to get a preferred result eg if bandwidth through your cable or tv or Blu-ray was being restricted to 9Gbps you could choose your Blu-ray player to output 24 frames reducing the amount of data being sent from 60 and use that free bandwidth to get a better colour spectrum, better colour depth & HDR	
18gbps	UHD, 60Hz, 444, at 8 bit' or '422 at 10/12bit' no HDR	Our C-Views are hitting this, if it can do this it can do anything atm, any new hdmi's we bring out will hit this
13gbps	UHD, 60Hz, 420, at 12 bit' or '24hz 444 with HDR'	
11gbps	UHD, 60Hz, 420, at 10bit' or '24hz 444 both HDR'	Most common UHD spec
9gbps	UHD, 60Hz, 420, at 8bit' or '24hz 422 10bit with HDR'	

Hdmi version	HDCP is copy protection to stop you starting up a sideline
2.1 out in 2018	48gbs, 10k, Dynamic HDR, 120hz, Atmos over arc (audio return)
2.0b	Improved Wide colour gamut and HDR
2.0a	Upgrade to allow HDR & WCG
2.0	4k spec with HDCP 2.2 for ultra HD
1.4	Could possibly reach 4K bandwidth needs but doesn't comply with HDCP 2.2 so could have
1.3a	Unlikely

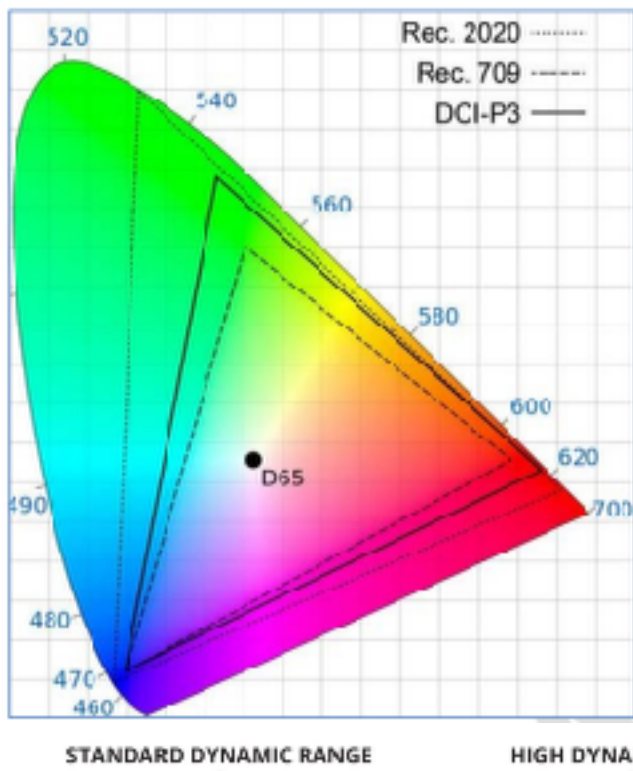


Colour bit depth	Blu Ray has been 8 bit, which means 256 possible values for red, green and blue. UHD Blu Ray is 10 bit, giving 1024 values for RGB. 12 bit color provides 4096 values for RGB.
16bit	
12bit	
10bit	
8bit	

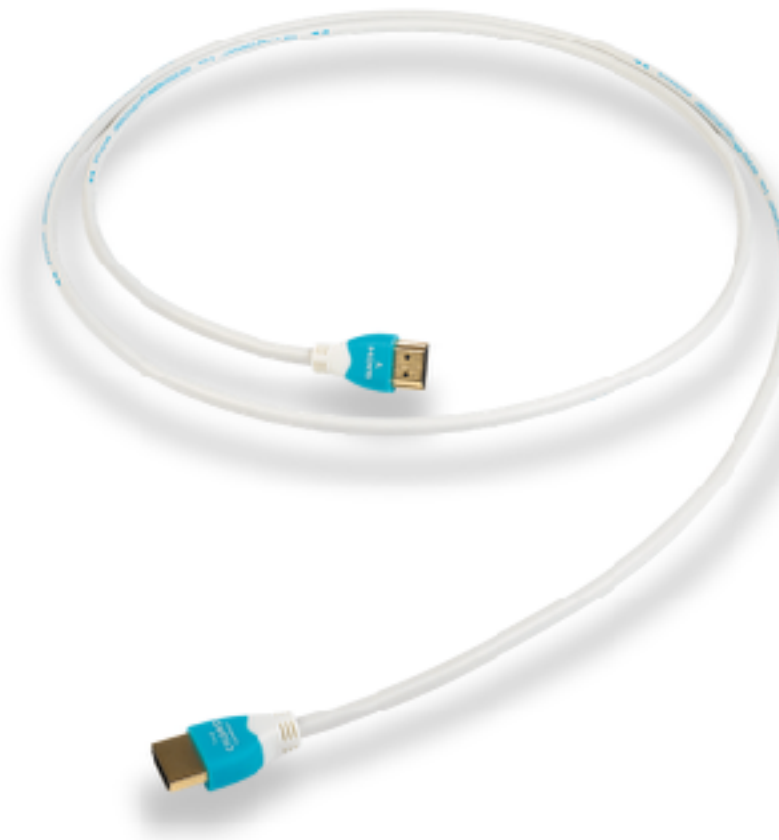


Resolution	How many lines of pixels VxH
4K 2k (4096x2160) some projectors	
4K (3840x2160) most new TVs	
1080 Full HD	
720 HD	
576 Eu SD (standard def)	
480 old U.S. SD (standard def)	

Chipsets inside Electronics and HDMI's only launched with the new 18Gbps spec in late 2015.



Wide Colour Gamut	spectrum of colours used
Rec2020 (UHD Standard)	
DCI-P3 (cinema)	
Rec709 (early UHD, Blu-ray, DVD)	



What is the Ultra HD Blu Ray specification?

The Ultra HD Blu Ray spec is as follows

- Up to 4K resolution
- 4:2:0 color sub-sampling
- Up to 10 bit color
- Up to 60 frames per second
- Support for wide color gamuts (REC.2020)
- Support for HDR10 and Dolby Vision
- No 3D support
- HDCP2.2



Variations of High Dynamic Range	Improved contrast ratio of black to white: A combination of peak brightness and black level either: More than 1000 nits peak brightness and less than 0.05 nits black level OR More than 540 nits peak brightness and less than 0.0005 nits black level (for OLED tv's that don't go quite as bright but have amazing black levels). A nit is a measurement of brightness intensity
HDR	
HDR 10	
Dolby Vision	



Original without color subsampling. 200% zoom.



Image after color subsampling (compressed with Sony Vegas DV codec, box filtering applied.)

Chroma subsampling		Blu-ray Discs are naturally stored as ycrb 4:2:0 so it is left to the display to convert it to 422 then 444 then finally info to the RGB pixels. With 4:2:0, for every two rows of four pixels, color is sampled from two pixels in the top row and zero pixels in the bottom row. Surprisingly, this seemingly dramatic approximation has little effect on how our eyes perceive color. If your camera supports 4:2:2 subsampling, this doubles the color resolution by including color from an additional two pixels in the second row. 444 uses a very large amount of bandwidth									
444	<table border="1"> <tr><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td></tr> </table>	1	2	3	4	1	2	3	4	a = 4 b = 4	full horizontal resolution, full vertical resolution
1	2	3	4								
1	2	3	4								
422	<table border="1"> <tr><td>1</td><td>2</td><td></td><td></td></tr> <tr><td>1</td><td>2</td><td></td><td></td></tr> </table>	1	2			1	2			a = 2 b = 2	1/2 horizontal resolution, full vertical
1	2										
1	2										
420	<table border="1"> <tr><td>1</td><td>2</td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table>	1	2							a = 2 b = 0	1/2 horizontal resolution, 1/2 vertical
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411	<table border="1"> <tr><td></td><td>1</td><td></td><td></td></tr> <tr><td></td><td>1</td><td></td><td></td></tr> </table>		1				1			a = 1 b = 1	1/4 horizontal resolution, full vertical
	1										
	1										
YCrCb	Brightness	Chroma red	Chroma blue	Digital compression							
RGB	Red	Green	Blue								