



Product Specification

AU OPTRONICS CORPORATION

G320ZAN02.2

(✓) Preliminary Specifications

() Final Specifications

Module	32 Inch Color TFT-LCD
Model Name	G320ZAN02.2

<table><tr><td>Customer</td><td>Date</td></tr><tr><td> </td><td> </td></tr><tr><td>Checked & Approved by</td><td>Date</td></tr><tr><td> </td><td> </td></tr></table>	Customer	Date			Checked & Approved by	Date			<table><tr><td>Approved by</td><td>Date</td></tr><tr><td><u>Jason Pan</u></td><td><u>2021/07/16</u></td></tr><tr><td>Prepared by</td><td>Date</td></tr><tr><td><u>Buffy Chen</u></td><td><u>2021/07/16</u></td></tr></table>	Approved by	Date	<u>Jason Pan</u>	<u>2021/07/16</u>	Prepared by	Date	<u>Buffy Chen</u>	<u>2021/07/16</u>
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Record of Revision

[illegible]

I. Operating Precautions

- 1) Since front polarizer is easily damaged, please be cautious and not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or soft cloth.
- 5) Since the panel is made of glass, it may be broken or cracked if dropped or bumped on hard surface.
- 6) To avoid ESD (Electro Static Discharge) damage, be sure to ground yourself before handling TFT-LCD Module.
- 7) Do not open nor modify the module assembly.
- 8) Do not press the reflector sheet at the back of the module to any direction.
- 9) In case if a module has to be put back into the packing container slot after it was taken out from the container, do not press the center of the LED light bar edge. Instead, press at the far ends of the LED light bar edge softly. Otherwise the TFT Module may be damaged.
- 10) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 11) TFT-LCD Module is not allowed to be twisted & bent even force is added on module in a very short time. Please design your display product well to avoid external force applying to module by end-user directly.
- 12) Small amount of materials having no flammability grade is used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950-1 or UL1950), or be applied exemption.
- 13) Severe temperature condition may result in different luminance, response time and lamp ignition voltage.
- 14) Continuous operating TFT-LCD display under low temperature environment may accelerate lamp exhaustion and reduce luminance dramatically.
- 15) The data on this specification sheet is applicable when LCD module is placed in landscape position.
- 16) Continuous displaying fixed pattern may induce image sticking. It's recommended to use screen saver or shuffle content periodically if fixed pattern is displayed on the screen.



2. General Description

This specification applies to the Color Active Matrix Liquid Crystal Display G320ZAN02.2 composed of a TFT-LCD display, a driver and power supply circuit, and a LED backlight system. The screen format is intended to support the UHD (3840(H)x2160(V)) screen and 1.07B colors. All input signals are eDP interface compatible. LED driving board for backlight unit is included in G320ZAN02.2.

2.1 Display Characteristics

The following items are characteristics summary on the table under 25°C condition:

Items	Unit	Specifications
Screen Diagonal	[inch]	32.0" (812.8mm)
Active Area	[mm]	708.48 (H) × 398.52 (V)
Resolution		3840(x3) × 2160
Pixel Pitch	[mm]	0.1845 (per one triad) × 0.1845
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		Normally Black, AHVA
Nominal Input Voltage VDD	[Volt]	+12.0 V
Power Consumption	[Watt]	Max.133W (Logi.c: max. 34W + BL power: max.99W)
Weight	[Grams]	4630 (Typ)
Physical Size	[mm]	727.3 (H) × 424.5 (V) × 20.48 (D) (Typ)
Electrical Interface		eDP(4lane)
Surface Treatment		Anti-Glare treatment
Support Color		10bit(True 10)
Temperature Range		
Operating	[°C]	0 to +50
Storage (Non-Operating)	[°C]	-20 to +60
RoHS Compliance		Yes

2.2 Optical Characteristics

The optical characteristics are measured under stable conditions(warm up 30 mins) at 25°C(Room Temperature), VDD 12V , Frame rate:60Hz:

Item	Unit	Conditions		Min.	Typ.	Max.	Note
White Luminance	cd/m ²	ILED=95mA(center point)		680	850	---	1
Uniformity	%	9 points		---	---	20	2,3
Contrast Ratio	--			1260	1800		4
Response Time	msec	Rising		---	TBD	TBD	5
		Falling		---	TBD	TBD	
		Rising + Falling		---	(22)	TBD	
Viewing Angle	degree	Horizontal CR >= 10	(Right)	75	89	---	6
			(Left)	75	89	---	
		Vertical CR >= 10	(Upper)	75	89	---	
			(Lower)	75	89	---	
Color / Chromaticity Coordinates (CIE 1931)	--	Red x		TBD	(0.687)	TBD	
		Red y		TBD	(0.308)	TBD	
		Green x		TBD	(0.211)	TBD	
		Green y		TBD	(0.730)	TBD	
		Blue x		TBD	(0.149)	TBD	
		Blue y		TBD	(0.051)	TBD	
		White x		0.283	0.313	0.343	
		White y		0.299	0.329	0.359	
Adobe RGB coverage ratio	%(typ)			DCI : 98% / Adobe RGB : 100%			

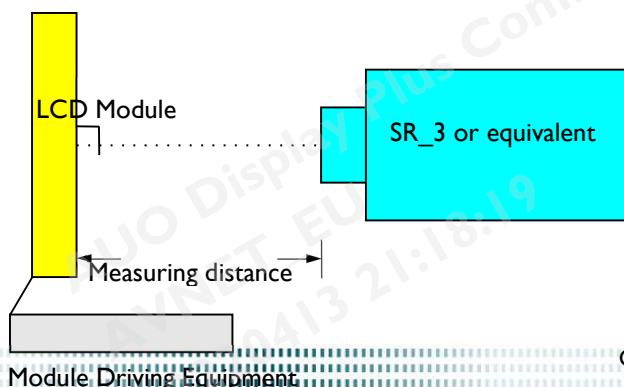
Note 1: Measurement method

Equipment Pattern Generator, Power Supply, Digital Voltmeter, Luminance meter (SR_3 or equivalent)

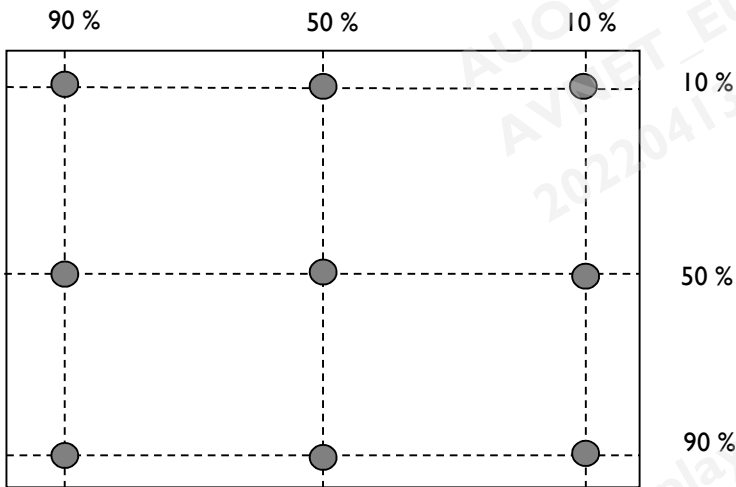
Aperture 1 with 50cm viewing distance

Test Point Center

Environment < 1 lux



Note 2: Definition of 9 points position



Note 3: Definition of luminance uniformity of 9 points.

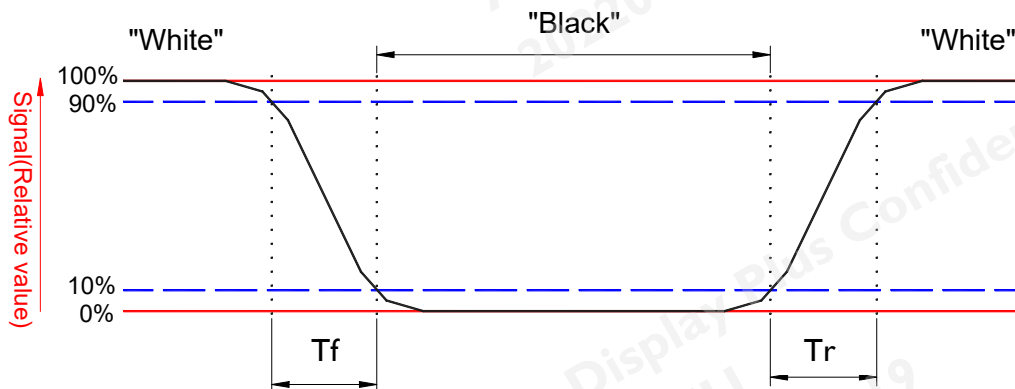
$$\delta_{w9} = \frac{|B_{\max} \text{ or } B_{\min} - B_{\text{avg}}|}{B_{\text{avg}}} \times 100\%$$

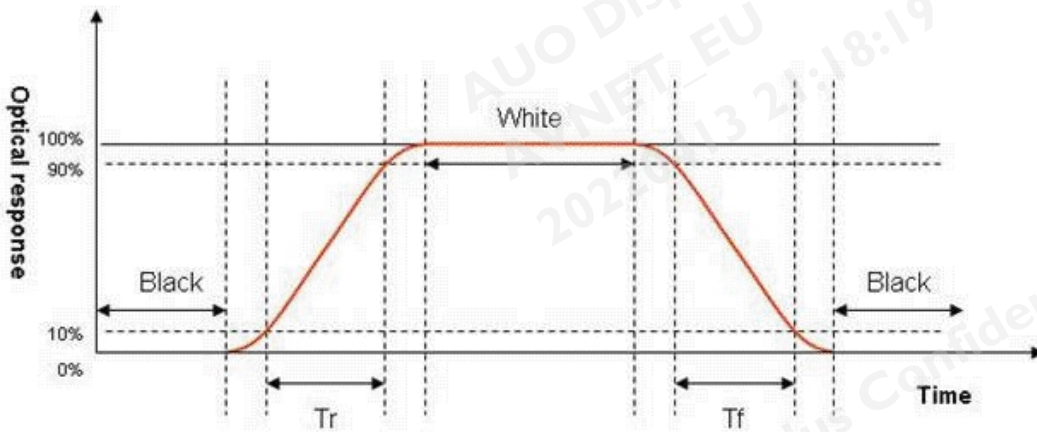
Note 4: Definition of contrast ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$

Note 5: Definition of response time:

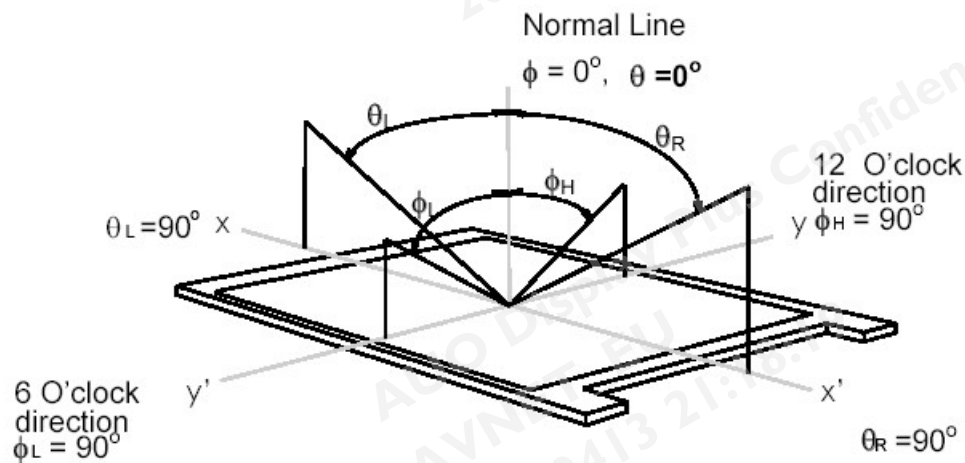
The output signals of photo detector are measured when the input signals are changed from "White" to "Black" (falling time) and from "Black" to "White" (rising time), respectively. The response time interval is between 10% and 90% of amplitudes. Please refer to the figure as below.





Note 6: Definition of viewing angle

Viewing angle is the measurement of contrast ratio ≥ 10 , at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 90° (θ) horizontal left and right, and 90° (ϕ) vertical high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated to its center to develop the desired measurement viewing angle.



The following diagram shows the functional block of the 32 inch color TFT/LCD module:



Connector Name / Designation	Signal Connector
------------------------------	------------------

part 1	part 2	part 3	part 4	part 5	part 6	part 7	part 8	part 9	part 10	part 11	part 12	part 13	part 14	part 15	part 16	part 17	part 18	part 19	part 20	part 21	part 22	part 23	part 24	part 25	part 26	part 27	part 28	part 29	part 30	part 31	part 32	part 33	part 34	part 35	part 36	part 37	part 38	part 39	part 40	part 41	part 42	part 43	part 44	part 45	part 46	part 47	part 48	part 49	part 50	part 51	part 52	part 53	part 54	part 55	part 56	part 57	part 58	part 59	part 60	part 61	part 62	part 63	part 64	part 65	part 66	part 67	part 68	part 69	part 70	part 71	part 72	part 73	part 74	part 75	part 76	part 77	part 78	part 79	part 80	part 81	part 82	part 83	part 84	part 85	part 86	part 87	part 88	part 89	part 90	part 91	part 92	part 93	part 94	part 95	part 96	part 97	part 98	part 99	part 100	part 101	part 102	part 103	part 104	part 105	part 106	part 107	part 108	part 109	part 110	part 111	part 112	part 113	part 114	part 115	part 116	part 117	part 118	part 119	part 120	part 121	part 122	part 123	part 124	part 125	part 126	part 127	part 128	part 129	part 130	part 131	part 132	part 133	part 134	part 135	part 136	part 137	part 138	part 139	part 140	part 141	part 142	part 143	part 144	part 145	part 146	part 147	part 148	part 149	part 150	part 151	part 152	part 153	part 154	part 155	part 156	part 157	part 158	part 159	part 160	part 161	part 162	part 163	part 164	part 165	part 166	part 167	part 168	part 169	part 170	part 171	part 172	part 173	part 174	part 175	part 176	part 177	part 178	part 179	part 180	part 181	part 182	part 183	part 184	part 185	part 186	part 187	part 188	part 189	part 190	part 191	part 192	part 193	part 194	part 195	part 196	part 197	part 198	part 199	part 200	part 201	part 202	part 203	part 204	part 205	part 206	part 207	part 208	part 209	part 210	part 211	part 212	part 213	part 214	part 215	part 216	part 217	part 218	part 219	part 220	part 221	part 222	part 223	part 224	part 225	part 226	part 227	part 228	part 229	part 230	part 231	part 232	part 233	part 234	part 235	part 236	part 237	part 238	part 239	part 240	part 241	part 242	part 243	part 244	part 245	part 246	part 247	part 248	part 249	part 250	part 251	part 252	part 253	part 254	part 255	part 256	part 257	part 258	part 259	part 260	part 261	part 262	part 263	part 264	part 265	part 266	part 267	part 268	part 269	part 270	part 271	part 272	part 273	part 274	part 275	part 276	part 277	part 278	part 279	part 280	part 281	part 282	part 283	part 284	part 285	part 286	part 287	part 288	part 289	part 290	part 291	part 292	part 293	part 294	part 295	part 296	part 297	part 298	part 299	part 300	part 301	part 302	part 303	part 304	part 305	part 306	part 307	part 308	part 309	part 310	part 311	part 312	part 313	part 314	part 315	part 316	part 317	part 318	part 319	part 320	part 321	part 322	part 323	part 324	part 325	part 326	part 327	part 328	part 329	part 330	part 331	part 332	part 333	part 334	part 335	part 336	part 337	part 338	part 339	part 340	part 341	part 342	part 343	part 344	part 345	part 346	part 347	part 348	part 349	part 350	part 351	part 352	part 353	part 354	part 355	part 356	part 357	part 358	part 359	part 360	part 361	part 362	part 363	part 364	part 365	part 366	part 367	part 368	part 369	part 370	part 371	part 372	part 373	part 374	part 375	part 376	part 377	part 378	part 379	part 380	part 381	part 382	part 383	part 384	part 385	part 386	part 387	part 388	part 389	part 390	part 391	part 392	part 393	part 394	part 395	part 396	part 397	part 398	part 399	part 400	part 401	part 402	part 403	part 404	part 405	part 406	part 407	part 408	part 409	part 410	part 411	part 412	part 413	part 414	part 415	part 416	part 417	part 418	part 419	part 420	part 421	part 422	part 423	part 424	part 425	part 426	part 427	part 428	part 429	part 430	part 431	part 432	part 433	part 434	part 435	part 436	part 437	part 438	part 439	part 440	part 441	part 442	part 443	part 444	part 445	part 446	part 447	part 448	part 449	part 450	part 451	part 452	part 453	part 454	part 455	part 456	part 457	part 458	part 459	part 460	part 461	part 462	part 463	part 464	part 465	part 466	part 467	part 468	part 469	part 470	part 471	part 472	part 473	part 474	part 475	part 476	part 477	part 478	part 479	part 480	part 481	part 482	part 483	part 484	part 485	part 486	part 487	part 488	part 489	part 490	part 491	part 492	part 493	part 494	part 495	part 496	part 497	part 498	part 499	part 500	part 501	part 502	part 503	part 504	part 505	part 506	part 507	part 508	part 509	part 510	part 511	part 512	part 513	part 514	part 515	part 516	part 517	part 518	part 519	part 520	part 521	part 522	part 523	part 524	part 525	part 526	part 527	part 528	part 529	part 530	part 531	part 532	part 533	part 534	part 535	part 536	part 537	part 538	part 539	part 540	part 541	part 542	part 543	part 544	part 545	part 546	part 547	part 548	part 549	part 550	part 551	part 552	part 553	part 554	part 555	part 556	part 557	part 558	part 559	part 560	part 561	part 562	part 563	part 564	part 565	part 566	part 567	part 568	part 569	part 570	part 571	part 572	part 573	part 574	part 575	part 576	part 577	part 578	part 579	part 580	part 581	part 582	part 583	part 584	part 585	part 586	part 587	part 588	part 589	part 590	part 591	part 592	part 593	part 594	part 595	part 596	part 597	part 598	part 599	part 600	part 601	part 602	part 603	part 604	part 605	part 606	part 607	part 608	part 609	part 610	part 611	part 612	part 613	part 614	part 615	part 616	part 617	part 618	part 619	part 620	part 621	part 622	part 623	part 624	part 625	part 626	part 627	part 628	part 629	part 630	part 631	part 632	part 633	part 634	part 635	part 636	part 637	part 638	part 639	part 640	part 641	part 642	part 643	part 644	part 645	part 646	part 647	part 648	part 649	part 650	part 651	part 652	part 653	part 654	part 655	part 656	part 657	part 658	part 659	part 660	part 661	part 662	part 663	part 664	part 665	part 666	part 667	part 668	part 669	part 670	part 671	part 672	part 673	part 674	part 675	part 676	part 677	part 678	part 679	part 680	part 681	part 682	part 683	part 684	part 685	part 686	part 687	part 688	part 689	part 690	part 691	part 692	part 693	part 694	part 695	part 696	part 697	part 698	part 699	part 700	part 701	part 702	part 703	part 704	part 705	part 706	part 707	part 708	part 709	part 710	part 711	part 712	part 713	part 714	part 715	part 716	part 717	part 718	part 719	part 720	part 721	part 722	part 723	part 724	part 725	part 726	part 727	part 728	part 729	part 730	part 731	part 732	part 733	part 734	part 735	part 736	part 737	part 738	part 739	part 740	part 741	part 742	part 743	part 744	part 745	part 746	part 747	part 748	part 749	part 750	part 751	part 752	part 753	part 754	part 755	part 756	part 757	part 758	part 759	part 760	part 761	part 762	part 763	part 764	part 765	part 766	part 767	part 768	part 769	part 770	part 771	part 772	part 773	part 774	part 775	part 776	part 777	part 778	part 779	part 780	part 781	part 782	part 783	part 784	part 785	part 786	part 787	part 788	part 789	part 790	part 791	part 792	part 793	part 794	part 795	part 796	part 797	part 798	part 799	part 800	part 801	part 802	part 803	part 804	part 805	part 806	part 807	part 808	part 809	part 810	part 811	part 812	part 813	part 814	part 815	part 816	part 817	part 818	part 819	part 820	part 821	part 822	part 823	part 824	part 825	part 826	part 827	part 828	part 829	part 830	part 831	part 832	part 833	part 834	part 835	part 836	part 837	part 838	part 839	part 840	part 841	part 842	part 843	part 844	part 845	part 846	part 847	part 848	part 849	part 850	part 851	part 852	part 853	part 854	part 855	part 856	part 857	part 858	part 859	part 860	part 861	part 862	part 863	part 864	part 865	part 866	part 867	part 868	part 869	part 870	part 871	part 872	part 873	part 874	part 875	part 876	part 877	part 878	part 879	part 880	part 881	part 882	part 883	part 884	part 885	part 886	part 887	part 888	part 889	part 890	part 891	part 892	part 893	part 894	part 895	part 896	part 897	part 898	part 899	part 900	part 901	part 902	part 903	part 904	part 905	part 906	part 907	part 908	part 909	part 910	part 911	part 912	part 913	part 914	part 915	part 916	part 917	part 918	part 919	part 920	part 921	part 922	part 923	part 924	part 925	part 926	part 927	part 928	part 929	part 930	part 931	part 932	part 933	part 934	part 935	part 936	part 937	part 938	part 939	part 940	part 941	part 942	part 943	part 944	part 945	part 946	part 947	part 948	part 949	part 950	part 951	part 952	part 953	part 954	part 955	part 956	part 957	part 958	part 959	part 960	part 961	part 962	part 963	part 964	part 965	part 966	part 967	part 968	part 969	part 970	part 971	part 972	part 973	part 974	part 975	part 976	part 977	part 978	part 979	part 980	part 981	part 982	part 983	part 984	part 985	part 986	part 987	part 988	part 989	part 990	part 991	part 992	part 993	part 994	part 995	part 996	part 997	part 998	part 999	part 1000
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4. Absolute Maximum Ratings

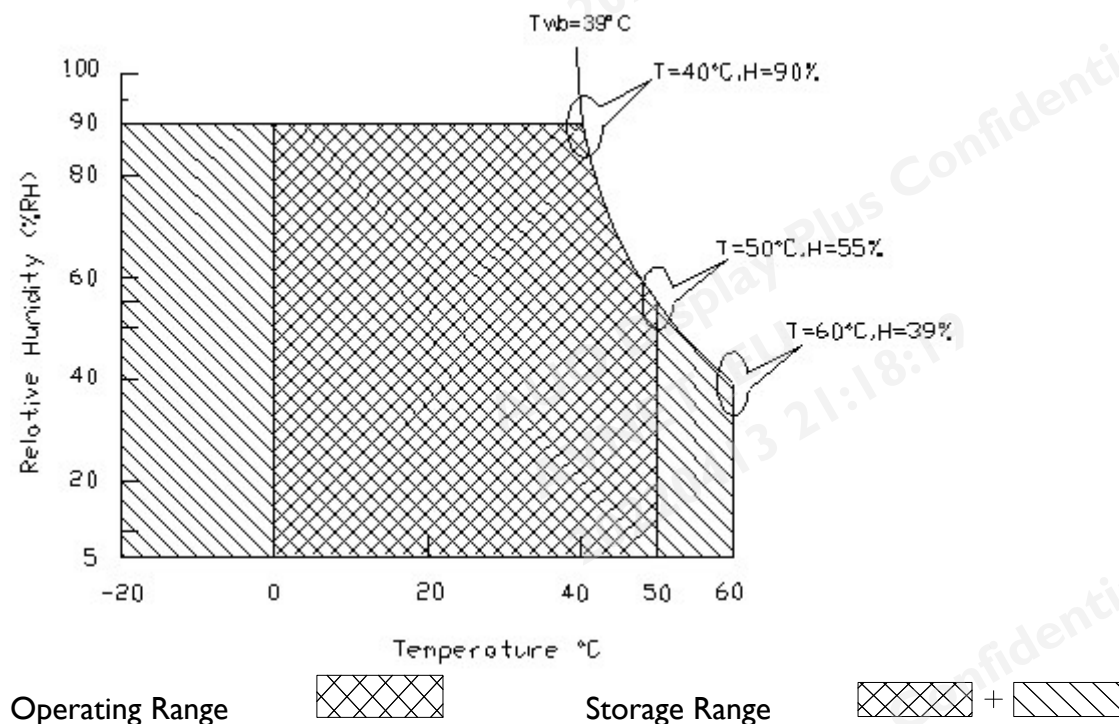
4.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min	Max	Unit
Logic/LCD drive Voltage	Vin	-0.3	+13.5	[Volt]

4.2 Absolute Ratings of Environment

Item	Symbol	Min	Max	Unit
Operating Temperature	TOP	0	+50	[°C]
Operation Humidity	HOP	5	90	[%RH]
Storage Temperature	TST	-20	+60	[°C]
Storage Humidity	HST	5	90	[%RH]

Note: Maximum Wet-Bulb should be 39°C and no condensation.



5. Electrical Characteristics

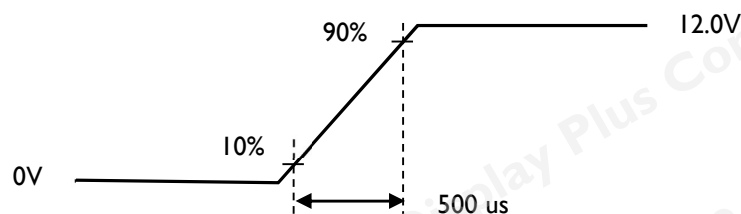
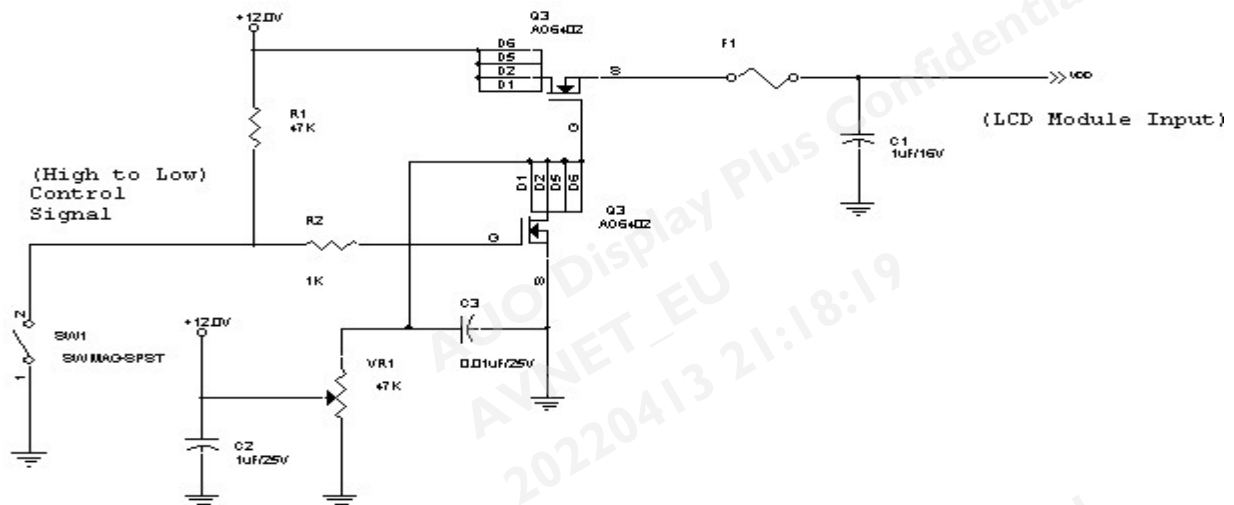
5.1 TFT LCD Module

5.1.1 Power Specification

Input power specifications are shown as follows;

Symbol	Parameter	Min	Typ	Max	Units	Remark
VDD	Logic/LCD Drive Voltage	10.8	12.0	13.2	[Volt]	±10%
IDD	VDD Current	-	(2.3)	(2.83)	[A]	White Pattern (VDD=12V, at 60Hz)
Irush	LCD Inrush Current	-	-	4	[A]	<i>Note 1</i>
PDD	VDD Power	-	27.6	34	[Watt]	White Pattern (VDD=12V, at 60Hz)
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	VDD* 5%	[mV]	VDD= 12.0V, White pattern, Fv=60Hz

Note 1: Measurement condition:



VDD rising time



5.2 Backlight Unit

5.2.1 LED Backlight Unit: Driver Connector

Connector Name / Designation	Lamp Connector
Manufacturer	JST
Connector Model Number	SI4B-PH-SM6-K-TB(HF)
Mating Model Number	PHR-14

Pin #	Symbol	Pin Description
1	VBL	+24V
2	VBL	+24V
3	VBL	+24V
4	VBL	+24V
5	VBL	+24V
6	GND	GND
7	GND	GND
8	GND	GND
9	GND	GND
10	GND	GND
11	BL_DIM_A	Analog Dimming
12	BL_EN	BL enable (3.3V-On / 0V-Off)
13	NC	N/A
14	BL_DIM_P	PWM Dimming

Note 1: Use the PWM mode. The pin.11 must be NC.

Note 2: Use the Analog mode. The pin.14 must be NC.

5.2.2 Parameter guideline for LED

Following characteristics are measured under a stable condition using an inverter at 25°C(Room Temperature):

LED characteristics

Symbol	Parameter	Min	Typ	Max	Units	Condition
PLED	Backlight Power Consumption	---	(72.96)	(82.69)	[Watt]	LED only
LTLED	LED Life-Time	30,000	---	---	Hour	LED only

Note 1: Calculator value for reference $P_{LED} = V_F$ (Normal Distribution) * I_F (Normal Distribution)

Note 2: The LED life-time define as the estimated time to 50% degradation of initial luminous.

Backlight input signal characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Remark
VDD	Input Voltage	21.6	24.0	26.4	[Volt]	
I _{VDD}	Input Current	---	3.63	---	[A]	100% PWM Duty
P _{VDD}	Power Consumption	---	(87.3)	(99.0)	[Watt]	100% PWM Duty
Backlight on/off	On control Voltage	2	3.3	5	[Volt]	
	Off control Voltage		---	0.8	[Volt]	
Backlight Dimming (Analog Mode)	Dimming Voltage	0	---	3	[Volt]	Adjustable Dimming Range
Backlight Dimming (PWM Mode)	Dimming Frequency	0.2		15	[kHz]	
	Swing Voltage	3	---	3.6	V	Note3
	Dimming Duty Cycle	10	-	100	%	
I _F (one channel)	LED Forward Current	---	(95)	---	mA	Ta = 25°C

Note 1: Ta means ambient temperature of TFT-LCD module.

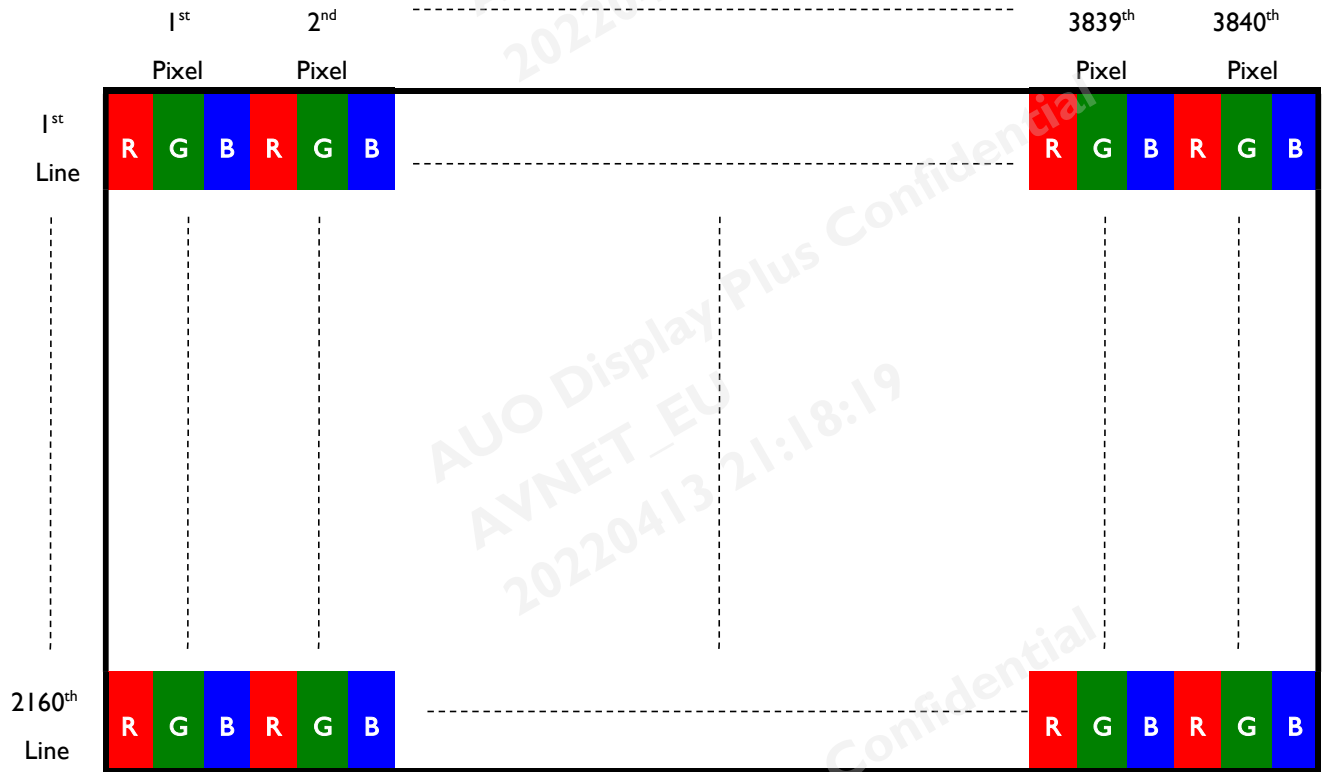
Note 2: VDD, I_{VDD}, P_{VDD}, I_{rush} LED are defined for LED B/L.(100% duty of PWM dimming).

Note 3: Swing voltage 3V is best linear of PWM mode.

6. Signal Characteristic

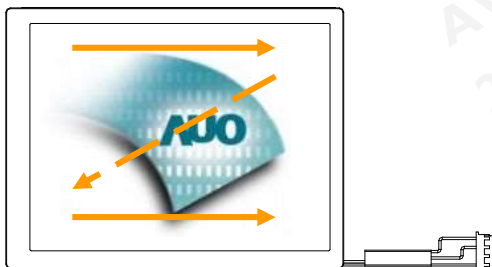
6.1 Pixel Format Image

Following figure shows the relationship between input signal and LCD pixel format.



6.2 Scanning Direction

The following figures show the image seen from the front view. The arrow indicates the direction of scan.



6.3 Signal Description

The module uses a V By One receiver embedded in AUO's ASIC. eDP is a differential signal technology for LCD interface and a high-speed data transfer device.

6.3.1 TFT LCD Module: LCD Connector

Connector Name / Designation	Signal Connector
Manufacturer	JAE
Connector Model Number	FI-RE51S-HF
Adaptable Plug	FI-RE51CL

PIN #	Symbol	Description
1	VDD	Power +12V
2	VDD	Power +12V
3	VDD	Power +12V
4	VDD	Power +12V
5	VDD	Power +12V
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	NC	No connection (for AUO test only. Do not connect)
10	NC	No connection (for AUO test only. Do not connect)
11	NC	No connection (for AUO test only. Do not connect)
12	NC	No connection (for AUO test only. Do not connect)
13	NC	No connection (for AUO test only. Do not connect)
14	NC	No connection (for AUO test only. Do not connect)
15	NC	No connection (for AUO test only. Do not connect)
16	NC	No connection (for AUO test only. Do not connect)
17	GND	Ground
18	1st Lane3_N	Negative eDP differential data input
19	1st Lane3_P	Positive eDP differential data input
20	GND	Ground
21	1st Lane2_N	Negative eDP differential data input
22	1st Lane2_P	Positive eDP differential data input
23	GND	Ground
24	1st Lane1_N	Negative eDP differential data input
25	1st Lane1_P	Positive eDP differential data input
26	GND	Ground
27	1st Lane0_N	Negative eDP differential data input
28	1st Lane0_P	Positive eDP differential data input
29	GND	Ground

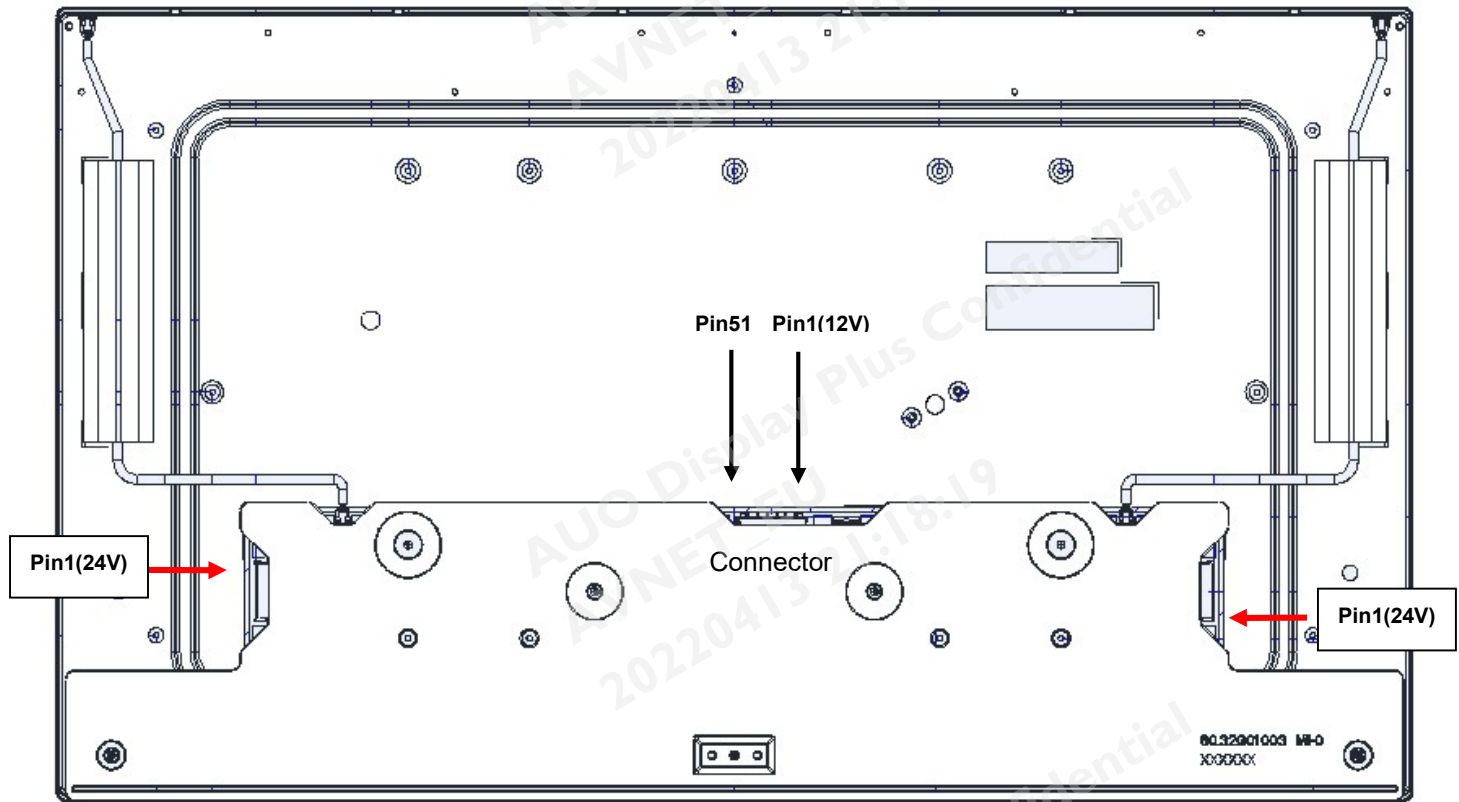
30	Ist AUX_CH_P	Positive AUX Channel differential data input
31	Ist AUX_CH_N	Negative AUX Channel differential data input
32	GND	Ground
33	NC	No connection (for AUO test only. Do not connect)
34	GND	Ground
35	NC	No connection (for AUO test only. Do not connect)
36	NC	No connection (for AUO test only. Do not connect)
37	GND	Ground
38	NC	No connection (for AUO test only. Do not connect)
39	NC	No connection (for AUO test only. Do not connect)
40	GND	Ground
41	NC	No connection (for AUO test only. Do not connect)
42	NC	No connection (for AUO test only. Do not connect)
43	GND	Ground
44	NC	No connection (for AUO test only. Do not connect)
45	NC	No connection (for AUO test only. Do not connect)
46	GND	Ground
47	NC	No connection (for AUO test only. Do not connect)
48	NC	No connection (for AUO test only. Do not connect)
49	GND	Ground
50	HPD	Hot plug detection
51	GND	Ground

Note 1: Input Signals shall be in low status when VDD is off.

Note 2: High stands for "3.3V", Low stands for "0V", NC means "No Connection".

Note 3: RSV means "Reserved".

Note1: Pin1 start position



6.4 The Input Data Format

6.4.1 eDP Data Format

The brightness of each primary color is based on the 10bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

Lane 0	Lane 1	Lane 2	Lane 3
R0-9:2	R1-9:2	R2-9:2	R3-9:2
R0-1:0/G0-9:4	R1-1:0/G1-9:4	R2-1:0/G2-9:4	R3-1:0/G3-9:4
G0-3:0/B0-9:6	G1-3:0/B1-9:6	G2-3:0/B2-9:6	G3-3:0/B3-9:6
B0-5:0/R4-9:8	B1-5:0/R5-9:8	B2-5:0/R6-9:8	B3-5:0/R7-9:8
R4-7:0	R5-7:0	R6-7:0	R7-7:0
G4-9:2	G5-9:2	G6-9:2	G7-9:2
G4-1:0/B4-9:4	G5-1:0/B5-9:4	G6-1:0/B6-9:4	G7-1:0/B7-9:4
B4-3:0/R8-9:6	B5-3:0/R9-9:6	B6-3:0/R10-9:6	B7-3:0/R11-9:6
R8-5:0/G8-9:8	R9-5:0/G9-9:8	R10-5:0/G10-9:8	R11-5:0/G11-9:8
G8-7:0	G9-7:0	G10-7:0	G11-7:0
B8-9:2	B9-9:2	B10-9:2	B11-9:2
B8-1:0/R12-9:4	B9-1:0/R13-9:4	B10-1:0/R14-9:4	B11-1:0/R15-9:4
R12-3:0/G12-9:6	R13-3:0/G13-9:6	R14-3:0/G14-9:6	R15-3:0/G15-9:6
G12-5:0/B12-9:8	G13-5:0/B13-9:8	G14-5:0/B14-9:8	G15-5:0/B15-9:8
B12-7:0	B13-7:0	B14-7:0	B15-7:0

10bit RGB to a 4-Lane Main-Link Mapping

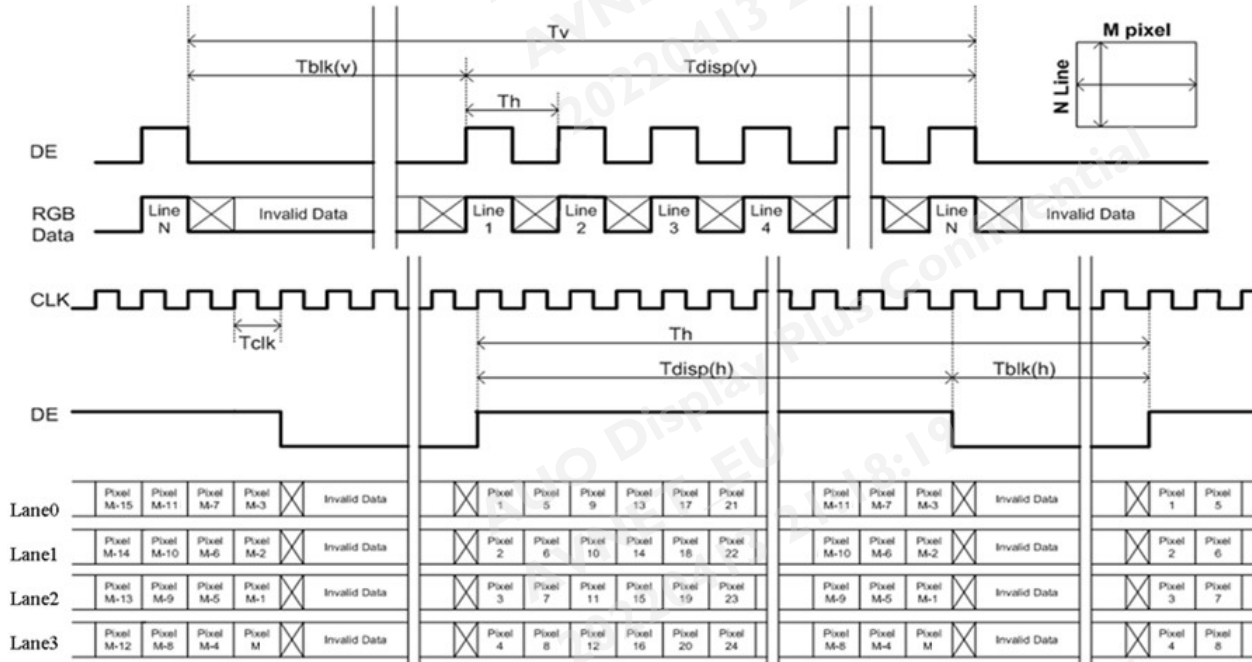
6.4.2 The Input Data Format(eDP)

The following table is for color versus input data (10bit). The higher the gray level, the brighter the color.

Color	Gary Level	Color Input Data																												Remark			
		RED data (MSB:R9,LSB:R0)										GREEN data (MSB:G9,LSB:G0)										BLUE data (MSB:B9,LSB:B0)											
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2		B1	B0	
Black	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
White	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
L511	-	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1		
Red	L0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Black	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	L1023	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Green	L0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Black	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	L1023	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0		
Blue	L0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Black	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	L1023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1		

6.4.3 Timing Diagram

(Lane0~3 eDP data:1, 2, 3, 4, ...,3837,3838,3839,3840)



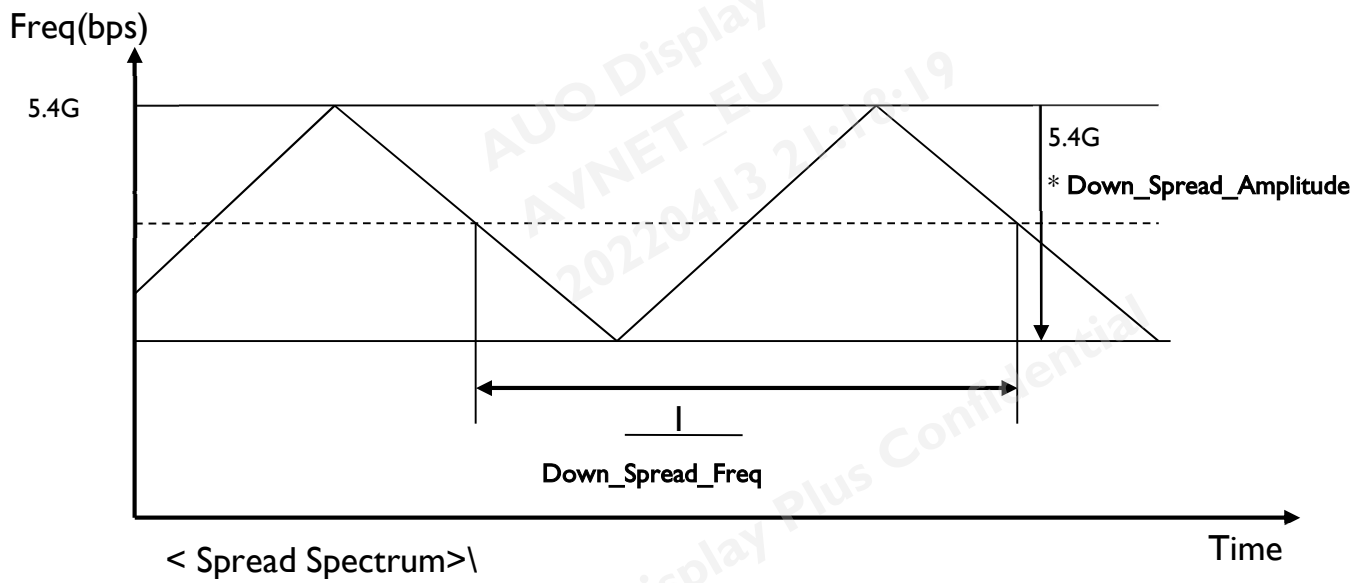
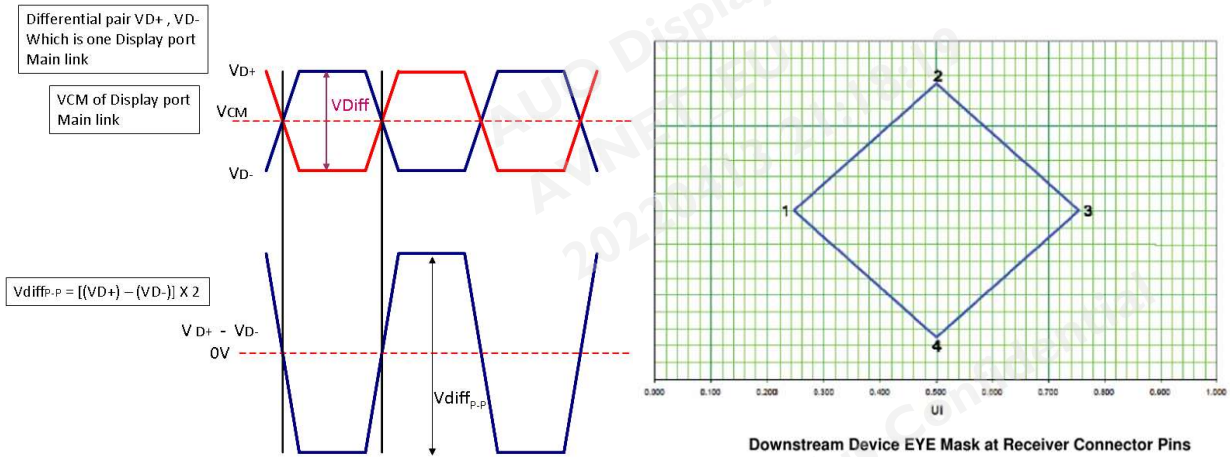
6.5 eDP Specification (Follow VESA Display Port Standard Version 1.2)

6.5.1 DisplayPort Main Link Signal:

DisplayPort Main Link					
		Min	Typ	Max	unit
Frequency	Main Link Frequency	-	5.4	-	Gbps
UI	Unit Interval	-	185	-	ps
VCM	RX input DC Common Mode Voltage	-	0	-	[Volt]
VDiff _{P-P}	Peak-to-peak Voltage at a receiving Device	70	-	-	[mVolt]
Down_Spread_Freq	Link clock down spread frequency	30	-	33	KHz
Down_Spread_Amplitude	Link clock down spread amplitude	-	-	0.5	%

Point	Time(UI)	Voltage (V)
1	0.310	0
2	0.375~0.625	35mV
3	0.310	0
4	0.375~0.625	-35mV

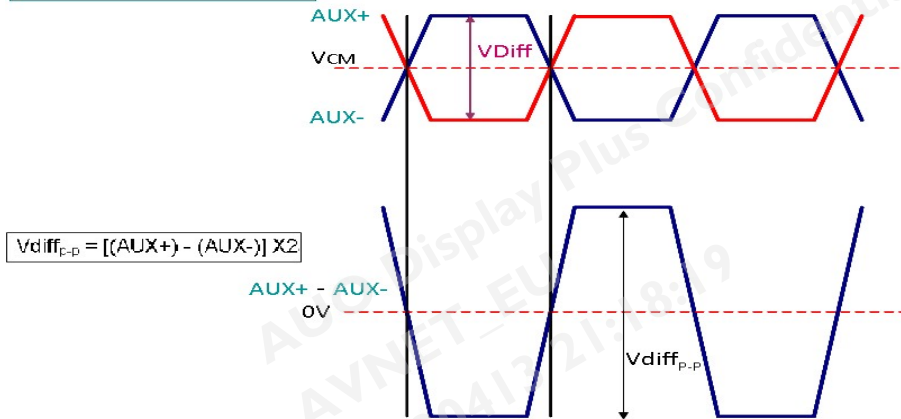
Downstream Device EYE Mask at Receiver Connector for HBR2



6.5.2 DisplayPort AUX_CH Signal:

DisplayPort AUX_CH					
		Min	Typ	Max	unit
VCM	AUX DC Common Mode Voltage	-	0	-	[Volt]
VDiff _{P-P}	AUX Peak-to-peak voltage at a receiving device	70	-	-	[mVolt]

Differential AUX+ , AUX-
Which is Display pot AUX_CH



6.5.3 DisplayPort VHPD Signal:

Display Port VHPD					
		Min	Typ	Max	unit
VHPD	HPD Voltage	2.25	-	3.6	[Volt]

6.5.3 Intra-Pair Skew:

LRX-SKEW-INTRA_PAIR					
		Min	Typ	Max	unit
LRX-SKEW-INTRA_PAIR	Lane Intra-pair Skew Tolerance	-	-	50	[ps]

6.5.4 Inter-Pair Skew

LRX-SKEW-INTER_PAIR					
		Min	Typ	Max	unit
LRX-SKEW-INTER_PAIR	Lane-to-Lane Skew at RX package pins	-	-	5700	[ps]

6.6 Interface Timing

6.6.1 Timing Characteristics

The input timing is shown as the following table.

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
Tv	Vertical Section	Period	(2190)	2200	(2760)	Th	
Tdisp (v)		Active	(2160)	2160	(2160)	Th	
Tblk (v)		Blanking	(30)	40	(600)	Th	
Fv		Frequency	(50)	60	(63)	Hz	Note 6-6
Th	Horizontal Section	Period	(4000)	4120	(4240)	Tclk	
Tdisp (h)		Active	(3840)	3840	(3840)	Tclk	
Tblk (h)		Blanking	(160)	280	(400)	Tclk	
Fh		Frequency	(109.5)	132	(147.3)	kHz	Note 6-4
Tclk	Pixel Clock	Period	(1.7)	1.84	(2.3)	ns	1/Fclk
Fclk		Frequency	(438)	543.8	(589.2)	MHz	Note 6-5
Link Rate per Lane			5.4			Gbps	5.4

Note 6-4: The equation is listed as following. Please don't exceed the above recommended value.

$$\begin{aligned} F_h (\text{Min.}) &= F_{\text{clk}} (\text{Min.}) / T_h (\text{Min.}) \\ F_h (\text{Typ.}) &= F_{\text{clk}} (\text{Typ.}) / T_h (\text{Typ.}) \\ F_h (\text{Max.}) &= F_{\text{clk}} (\text{Max.}) / T_h (\text{Min.}) \end{aligned}$$

Note 6-5: The equation is listed as following. Please don't exceed the above recommended value.

1st Lane N & 2nd Lane N skew < 200ns

$$F_{\text{clk}} (\text{Typ.}) = F_v (\text{Typ.}) \times T_h (\text{Typ.}) \times T_v (\text{Typ.})$$

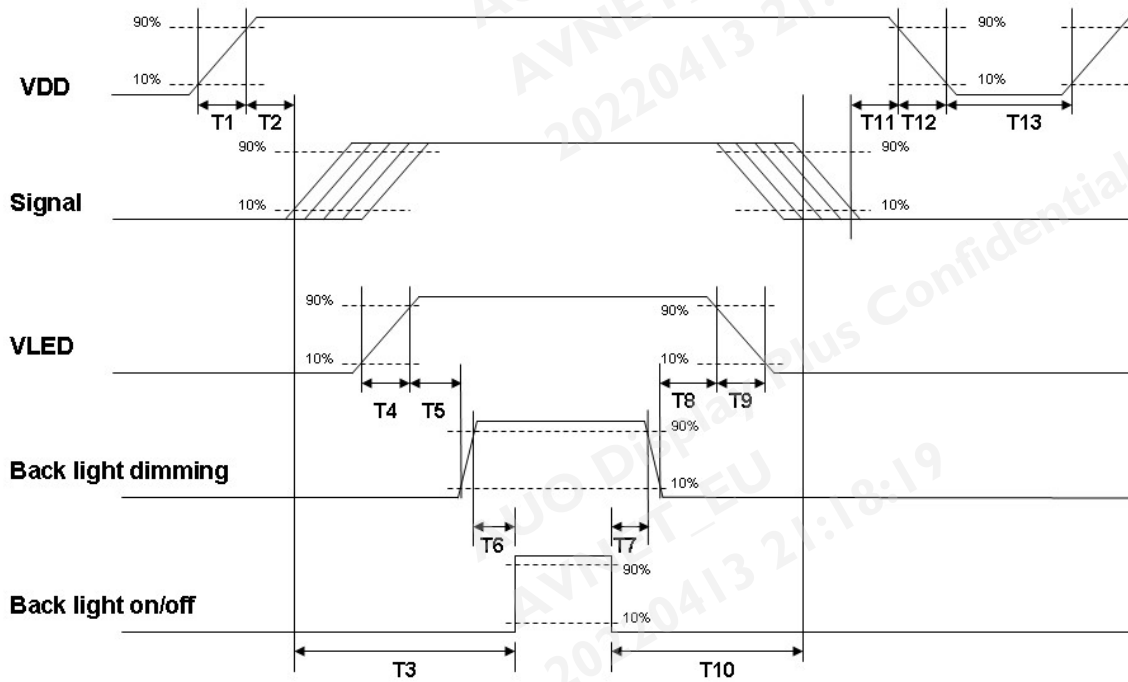
$$F_{\text{clk}} (\text{Min.}) \leq F_v \times T_h \times T_v \leq F_{\text{clk}} (\text{Max.})$$

Note 6-6: The equation is listed as following. Please don't exceed the above recommended value.

$$F_v = F_{\text{clk}} (\text{Typ.}) / (T_v \times T_h)$$

6.7 Power ON/OFF Sequence

VDD power and lamp on/off sequence is as below. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power sequence timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	ms
T2	40	-	-*1	
T3	200	-	-	
T4	0.5	-	10	
T5	10	-	-	
T6	10	-	-*2	
T7	0	-	-	
T8	10	-	-	
T9	-	-	10	
T10	110	-	-	
T11	0	16	50	
T12	0	-	10	
T13	1000	-	-	

Note 1 (T2) : The maximum timing of VDD rising(90%) to HTPDN falling edge decided by customer system.

Note 2 (T6) : voltage of VDD must decay smoothly after power-off.(customer system decide this value)

7. Reliability Test Criteria

All testing under following setting: VDD 12V, Frame rate: 60Hz

Items	Required Condition	Note
Temperature Humidity Bias (Ta)	50°C/80%,300Hr	
High Temperature Operation (Ta)	50°C, 300Hr (center point of panel surface)	
Low Temperature Operation (Ta)	0°C, 300Hr	
Hot Storage	60°C, 300 hours	
Cold Storage	-20°C, 300 hours	
Thermal Shock Test (Ta)	-20°C /30 min ,60 °C /30 min ,100cycles, 40°C minimum ramp rate	
Shock Test (Non-Operating)	50G,20ms,Half-sine wave,(+X,+Y,+Z)	
Vibration Test (Non-Operating)	1.0G, 10~300Hz, Random wave 10mins/axis, 3 direction (X, Y, Z)	
Altitude Test	Operation : 10,000ft Non-Operation : 30,000ft	
ESD	Contact : ± 8KV/ operation, Class B Air : ± 15KV / operation, Class B	Note 1

Note1: According to EN61000-4-2, ESD class B: Some performance degradation allowed. No data lost

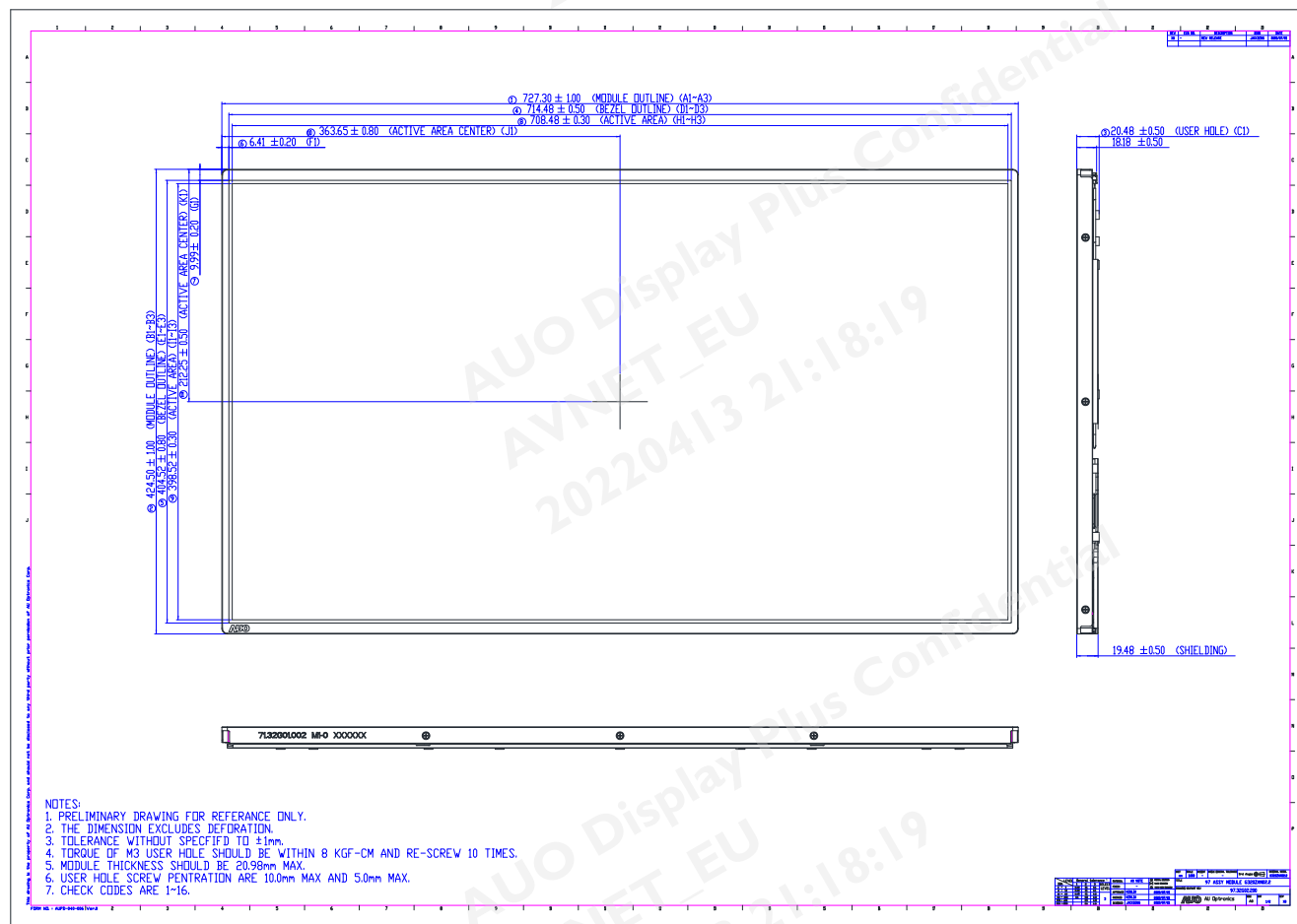
. Self-recoverable. No hardware failures.

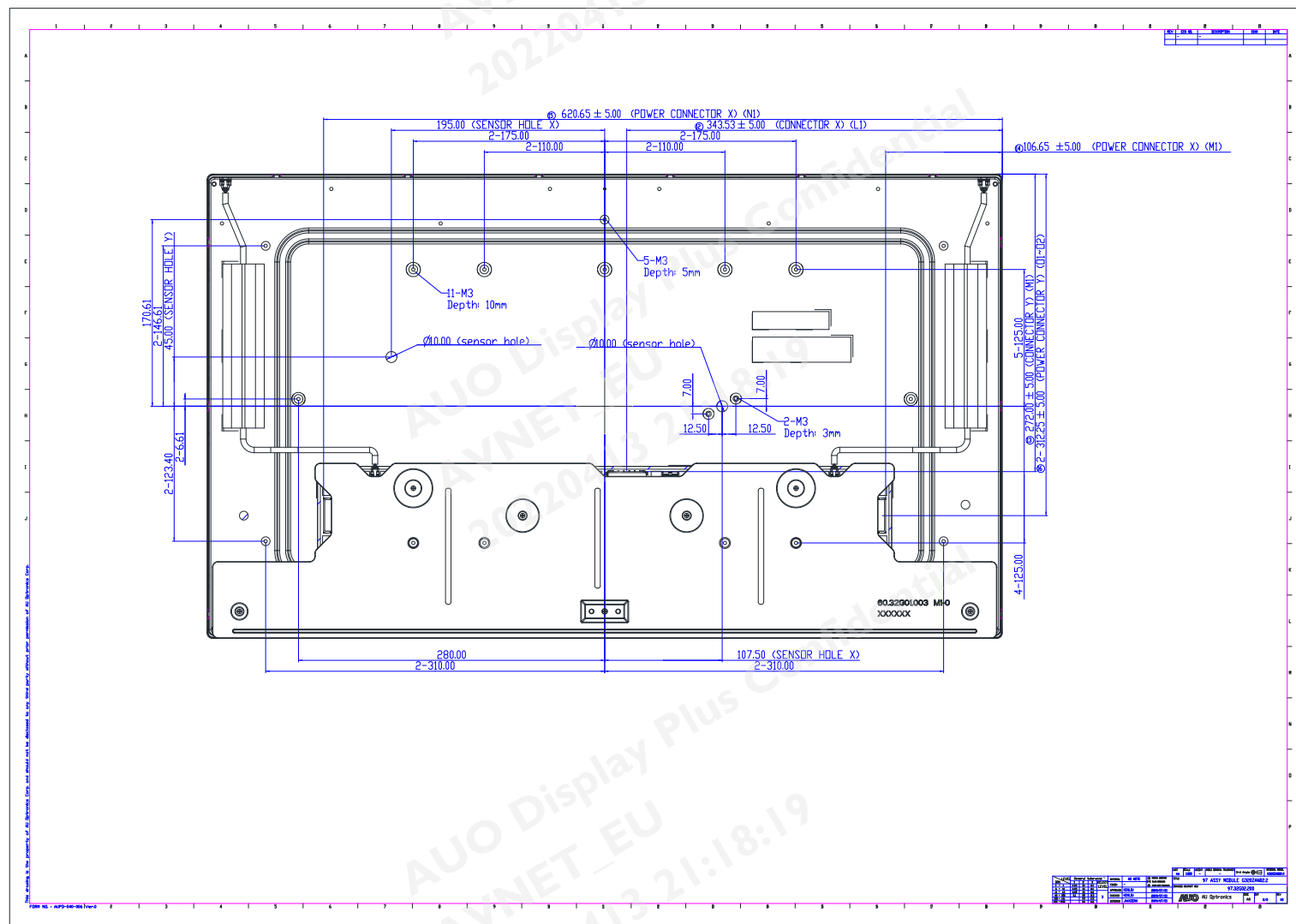
Note2:

- Water condensation is not allowed for each test items.
- Each test is done by new TFT-LCD module. Don't use the same TFT-LCD module repeatedly for reliability test.
- The reliability test is performed only to examine the TFT-LCD module capability.
- To inspect TFT-LCD module after reliability test, please store it at room temperature and room humidity for 24 hours at least in advance.
- No function failure occurs.

8. Mechanical Characteristics

8.1 LCM Outline Dimension



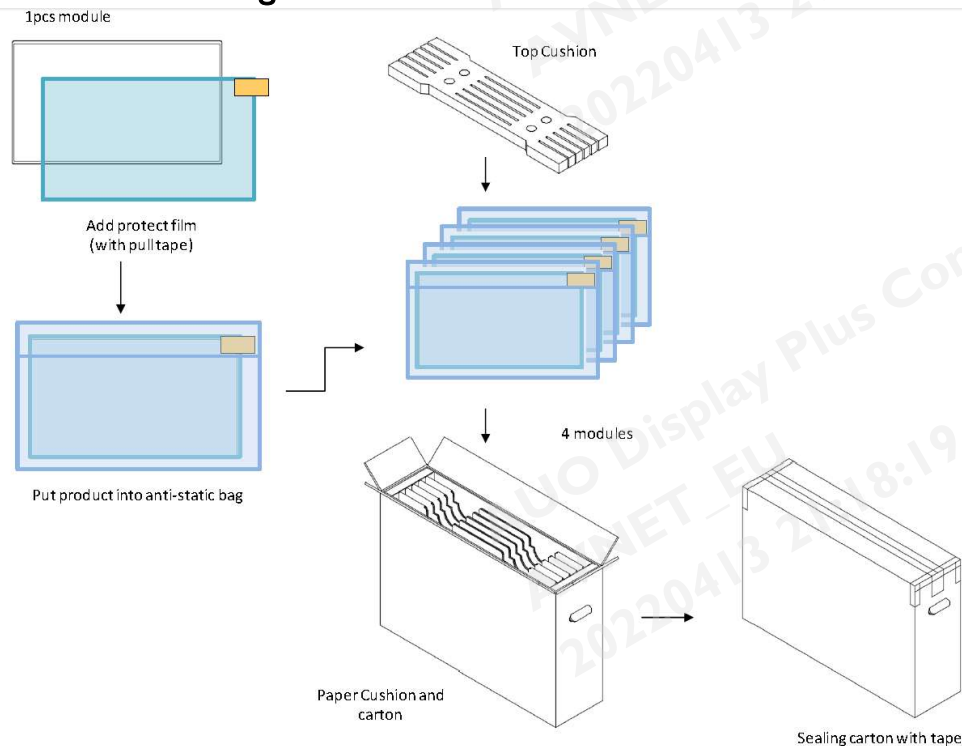


9. Label and Packaging

9.1 Shipping Label (on the rear side of TFT-LCD display)



9.2 Carton Package



Capacity: 4 modules /carton

Weight: 21.5±0.5 kg

Carton Dim.: 820(L)mm* 220(W)mm* 535(H)mm

Pallet Dim.: 1150(L)mm* 840(W)mm* 132(H)mm

Module by air: (1*5)*2 layers, one pallet put 10 boxes, total 40pcs module.

Module by sea: One pallet (1*5)*2 layers + One pallet (1*5)*1 layer, total 60pcs module.

Module by sea (HQ): One pallet (1*5)*2 layers + One pallet (1*5)*2 layers, total 80pcs module



10 Safety

10.1 Sharp Edge Requirements

There will be no sharp edges or comers on the display assembly that could cause injury.

10.2 Materials

10.2.1 Toxicity

There will be no carcinogenic materials used anywhere in the display module. If toxic materials are used, they will be reviewed and approved by the responsible AUO toxicologist.

10.2.2 Flammability

All components including electrical components that do not meet the flammability grade UL94-VI in the module will complete the flammability rating exception approval process.

The printed circuit board will be made from material rated 94-VI or better. The actual UL flammability rating will be printed on the printed circuit board.

10.3 Capacitors

If any polarized capacitors are used in the display assembly, provisions will be made to keep them from being inserted backwards.

10.4 National Test Lab Requirement

The display module will satisfy all requirements for compliance to:
UL 60950-1 second edition U.S.A. Information Technology Equipment