Ivent Solutions Market Trend Update <u>April 2019</u>

DLC Display - New TFT Product Offering Q1/2019

IPS — In-Plane Switching

In-Plane Switching (IPS) TFTs were developed to improve on the poor viewing angle and the poor color reproduction of TN TFT panels at that time. The crystal molecules move parallel to the panel plane instead of perpendicular to it. This change reduced the amount of light scattering in the matrix, which gives IPS its characteristic wide viewing angles and good color reproduction. Because of its wide viewing angle and accurate color reproduction (with almost no off-angle color shift), IPS is widely employed in high-end monitors aimed at professional applications. Until now this has been the domain of the flat panel TV manufacturers, however now this technology is available in small size industrial TFT.

The name In-Plane Switching comes from the crystals in the cells of the IPS panel lying always in the same plane and being always parallel to the panel's plane (if we don't take into account the minor interference from the electrodes). When voltage is applied to a cell, the crystals of that cell all make a 90-degrees turn. An IPS panel also lets the backlight pass through in its active state and shutters it in its passive state (when no voltage is applied), so if a thin-film transistor crashes, the corresponding pixel will always remain black, unlike with TN matrices.

IPS (In-Plane Switching) displays provide consistent, accurate color from all viewing angles without blur or grayscale inversion. IPS displays show clear images with fast response time, and no halo effect produced when touched. Each pixel within an IPS type TFT consists of three sub-pixels (R, G, B). Each sub-pixel has a pair of electrodes to control the twisting of the liquid crystals. Unlike TN type TFTs where the electrodes are on opposing plates, the electrodes in an IPS TFT are on only one of the glass plates (in the same plane). When voltage is applied to the electrodes, all the liquid crystal molecules align in parallel with that plane and allow light to pass through to the polarizers and RGB color filters. In effect, TN displays force the liquid crystal molecules perpendicular to the glass which blocks light from coming out at wide angles, while IPS displays keep the liquid crystal molecules in line to allow light through at all angles.



The MIPI Display Serial Interface (MIPI DSISM) defines a high-speed serial interface between a host processor and a display module. The interface enables manufacturers to integrate displays to achieve high performance, low power, and low electromagnetic interference (EMI) while reducing pin count and maintaining compatibility across different vendors. Designers can use MIPI DSI to facilitate brilliant color rendering for the most demanding imagery and video scenes and to support transmission of stereoscopic content.

MIPI DSI has been widely adopted. It is ubiquitous in smartphones and also being used in tablets, laptops and laptop/tablet hybrids. It is also being implemented by the automotive industry for dashboard displays and in-car infotainment systems, and used in wearables, IoT and virtual/augmented reality applications.

MIPI DSI operates on the MIPI D-PHY physical layer. It uses a command set defined in the MIPI Display Command Set (MIPI DCS). It also incorporates the Display Stream Compression (DSC) Standard from the Video Electronics Standards Association (VESA). Overall, the feature set of MIPI DSI is quite similar to that of the more recent MIPI DSI-2 specification, which offers support for both D-PHY and C-PHY.











DLC0295AZOM

ltem	Contents	Unit
Size	2.95	inch
Resolution	1080x(RGB)x1200	١
Interface	MIPI	/
Display Mode	AMOLED	١
Active Area	50.112 x 55.68	mm
Outline	52.912 x 62.58 x 0.653	mm
Brightness	300	cd/m ²
Remark	Wide temperature range	





ltem	Contents	Unit
Size	3.4	inch
Resolution	800x(RGB)x800	\
Interface	MIPI	/
Display Mode	SFT	\
Active Area	Ф87.6	mm
Outline	99.0 x 96.6 x 3.98	mm
Brightness	350	cd/m ²
Remark	Round with capacitive touch	







DLC0430BCP07RF-1

ltem	Contents	Unit
Size	4.3	inch
Resolution	480x(RGB)x272	\
Interface	RGB	/
Display Mode	IPS	\
Active Area	95.04 x 53.86	mm
Outline	105.5 x 67.2 x 2.9	mm
Brightness	280	cd/m ²
Remark	No MOQ Long term available	







ltem	Contents	Unit
Size	10.25	inch
Resolution	1920x(RGB)x720	\
Interface	LVDS	/
Display Mode	IPS	\
Active Area	243.648 x 91.368	mm
Outline	260.15 x 110.50 x 6.52	mm
Brightness	800	cd/m ²
Remark	High-end application Wide temperature range Long term available	

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NZD versus AUD - AU\$0.950 vs NZ\$1.00



Copper - USD6400 / tonne



0.720 0.700 0.680 0.660 0.640 Apr Jun Aug Oct Dec Feb 19

NZD versus USD - US\$0.680 vs NZ\$1.00

Lead - USD2050 / tonne



NZD versus EUR - EU\$0.600 vs. NZ\$1.00



Nickel - USD13050 / tonne



