

대화면 Display 기술 동향

2001. 11. 22



LG 전자(주)/ Digital Display 研究所

所長 常務 朴明鎬 (mikepark@lge.com)

목차

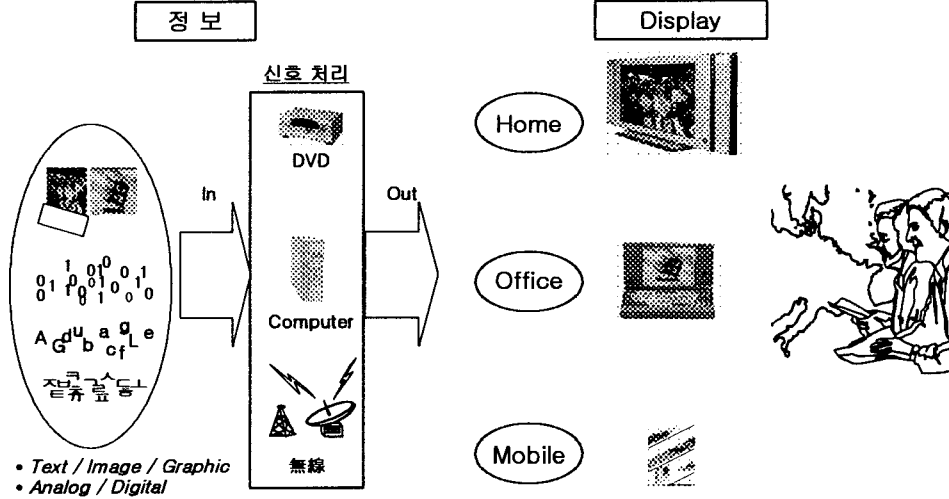
I . Introduction

II . 대 화면 Display

III . 미래의 대 화면

Display의 定義

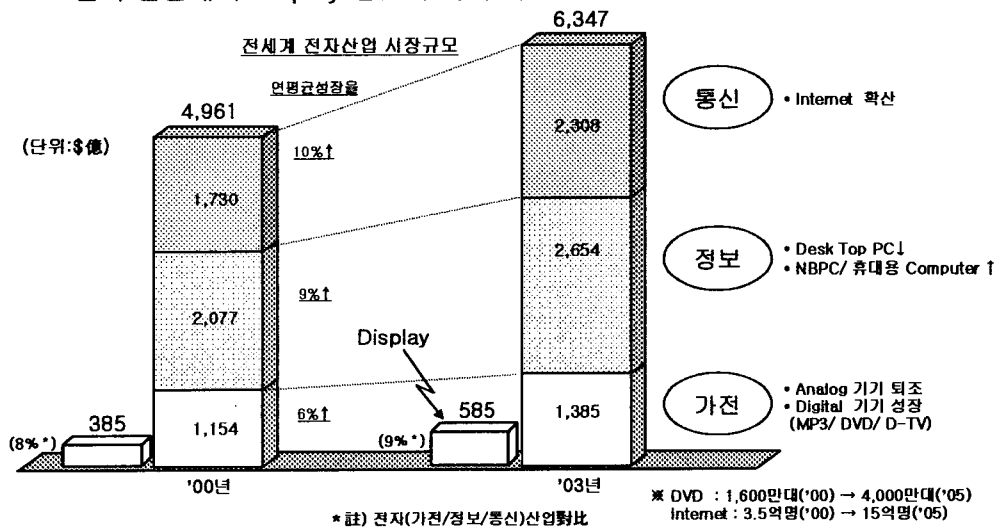
Display는 인간에게 視覺的으로 情報과 즐거움을 제공하는 裝置

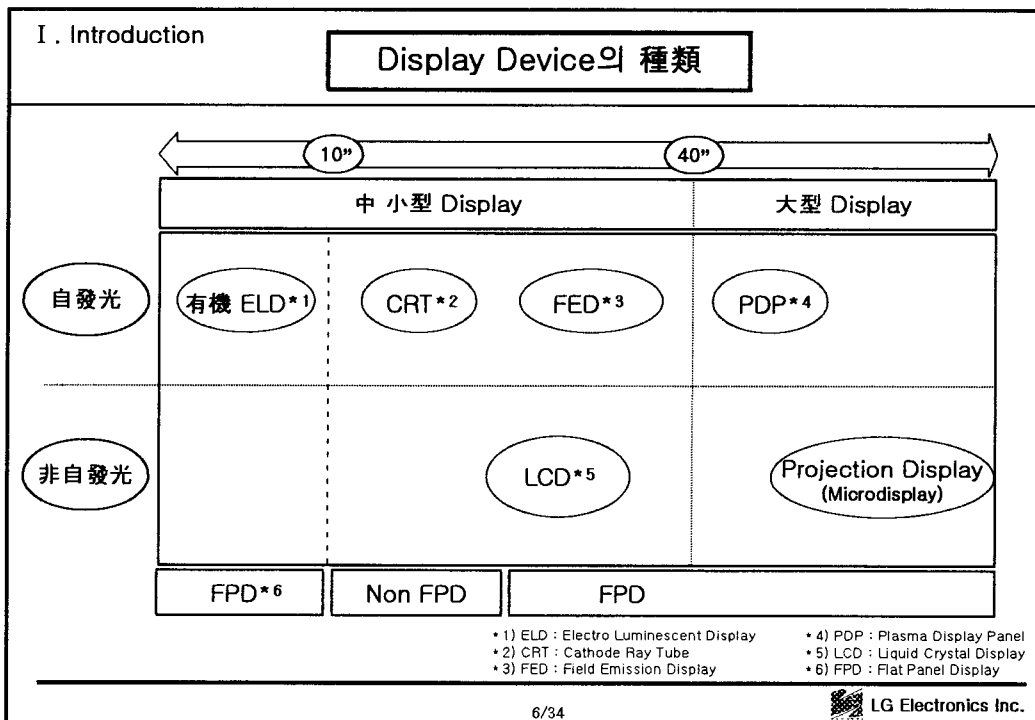
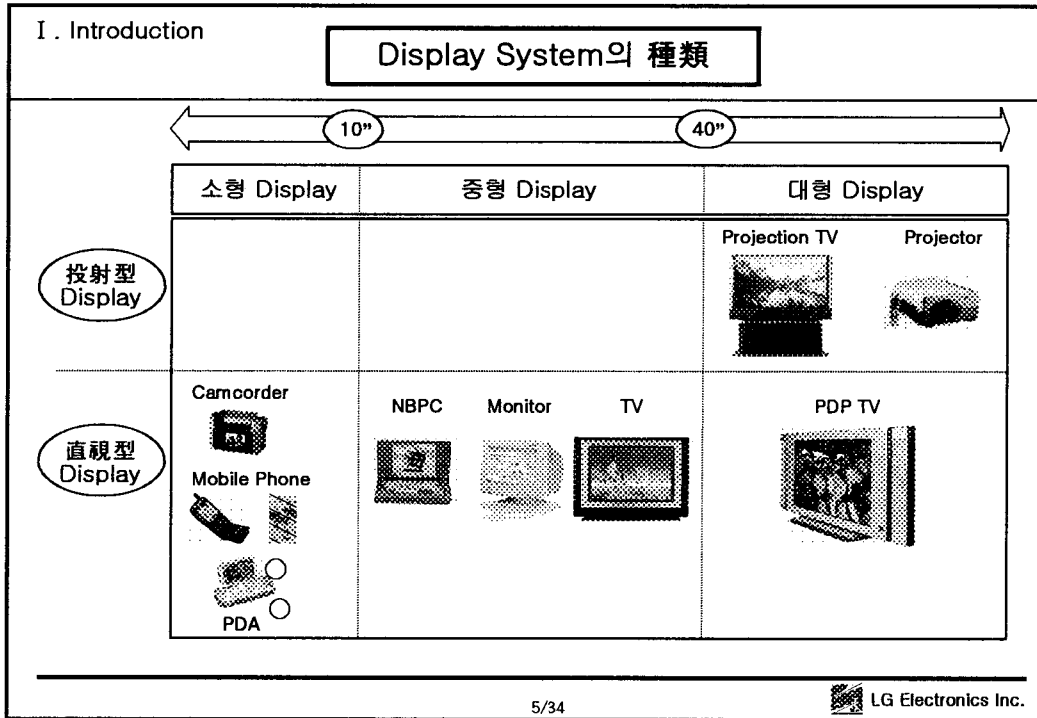


- Text / Image / Graphic
- Analog / Digital

電子 産業에서 Display의 比重

전자 산업에서 Display 산업이 차지 하는 比重은 10% 수준임.



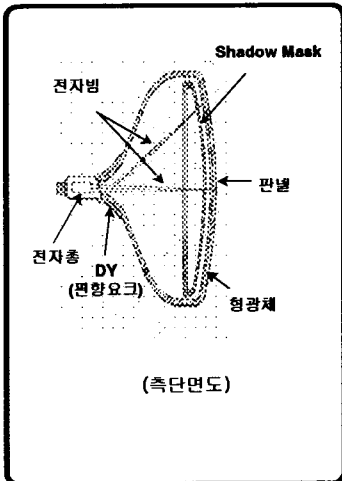


I . Introduction

CRT

• CRT : Cathode Ray Tube

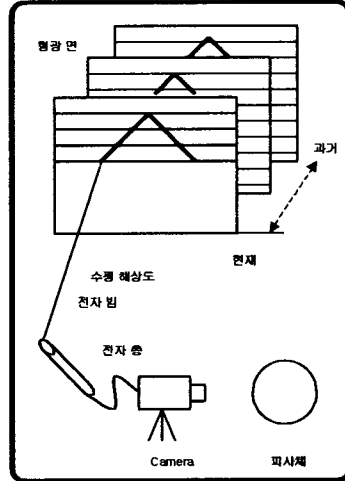
구조



동작 원리

- 전자총에서 전자 발생
- DY에 의해 휜
- Shadow Mask 통과
- 형광체 충돌 → 發光

구동



I . Introduction

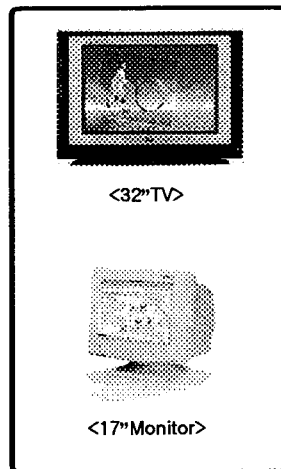
CRT

• CRT : Cathode Ray Tube

특징

- 고속 응답
- 고 색순도
- 고 휘도
- Wide Viewing Angle
- 저 가격
- Bulky
- 주변부 Uniformity ↓

적용 제품



I . Introduction

LCD

• LCD: Liquid Crystal Display

구조

동작 원리

- Lamp에서 빛 발생
- 상하 전극에 의해 액정 반응
- Lamp 빛 통과 제어

구동

9/34

LG Electronics Inc.

I . Introduction

LCD

• LCD: Liquid Crystal Display

특징

- Thin/ Light
- Low Power
- 저 응답 속도
- Narrow Viewing Angle
- 저 색순도

적용 제품

<40" LCD TV/Monitor>

<14.1"NBPC>

10/34

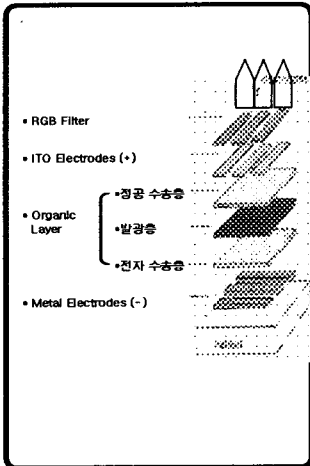
LG Electronics Inc.

I . Introduction

유기 ELD

• ELD : Electro Luminescent Display

구조



동작 원리

- 음극에서 전자/양극에서 정공, 이동
- 전자와 정공이 결합, Exciton 형성
- Exciton이 유기형광 분자와 충돌하여 발광.

특징

- Thin/ Light
- Low Power
- 고속 응답
- Wide Viewing Angle
- 수명 연구 중

적용 제품



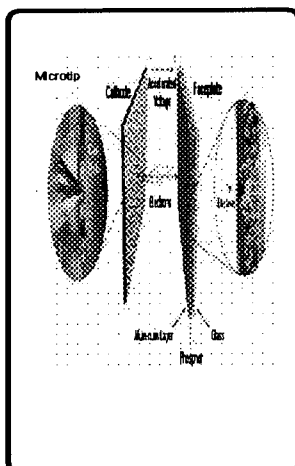
<2" 有機 ELD 적용 Mobile Phone>

I . Introduction

FED

• FED : Field Emission Display

구조



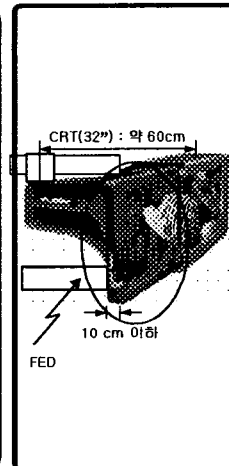
동작 원리

- 냉 음극 판에서 전자 방출
- 방출된 전자가 양극판의 형광체에 충돌하여 발광

특징

- Thin/ Light
- 고속 응답
- Wide Viewing Angle
- 고 색순도
- 고 휘도
- 신뢰성 연구 개발중

적용 제품



대 화면 Display

시장

왜 대화면인가?

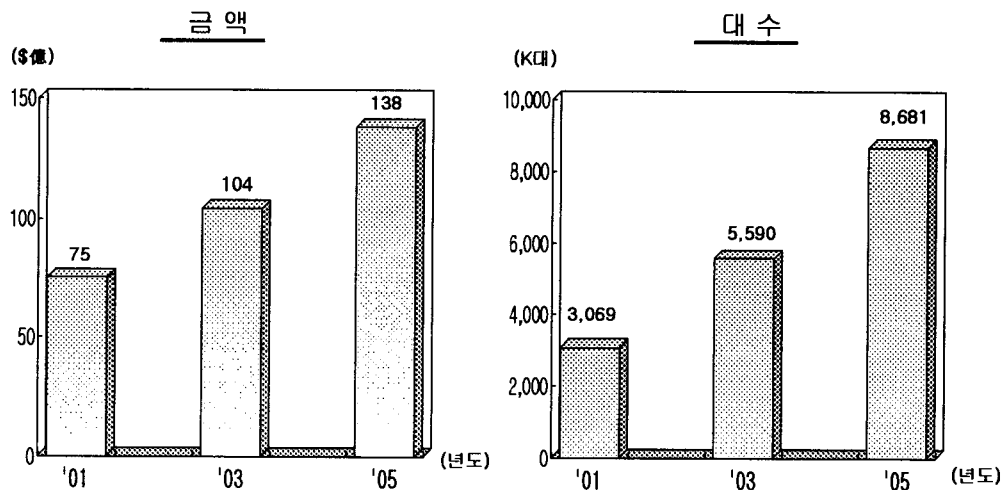
Projection TV

PDP

II. 대 화면 Display

대화면 Display 시장 추이

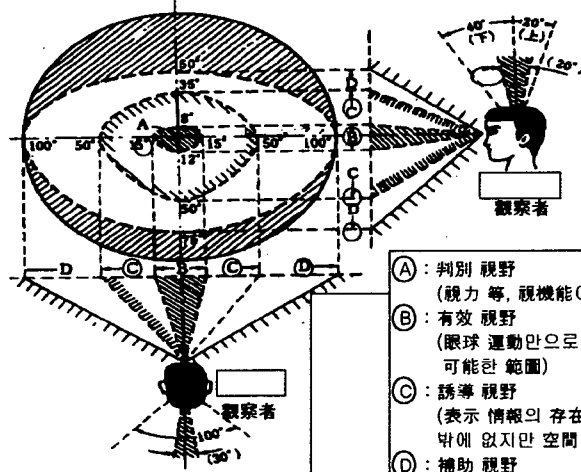
Projection TV, PDP



• Source : JPMorgan('01)
• Source : MCG('01)

왜 大畫面인가?

인간의 시야

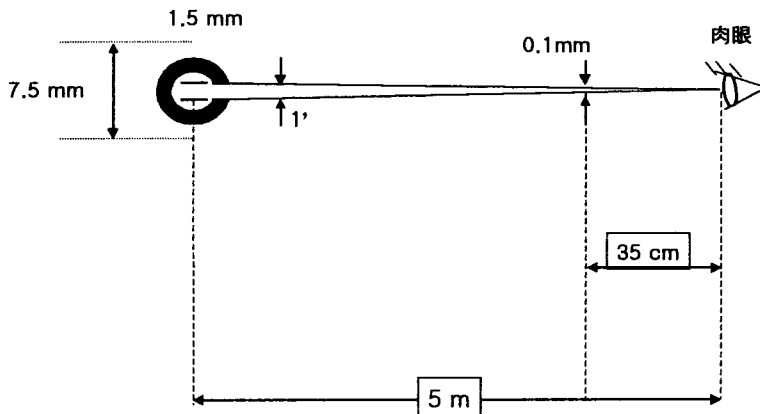


- (A) : 判別 視野
(視力 等, 視機能이 優秀한 範圍)
- (B) : 有效 視野
(眼球 運動만으로 注視해서, 순간적인 情報受容이 可能な 範圍)
- (C) : 誘導 視野
(表示 情報의 存在를 알 수 있는 程度의 識別 能力 外에 없지만 空間 座標系의 影響을 받는 範圍)
- (D) : 補助 視野

※ 視野內 情報 受容 特性 ○ 觀察者 頭部에 表示된 寸자 : 頭部 水平, 垂直 運動角, ◎ 괄호內 寸자 : 頭部 運動이 誘發되지 않는 範圍

왜 大畫面인가?

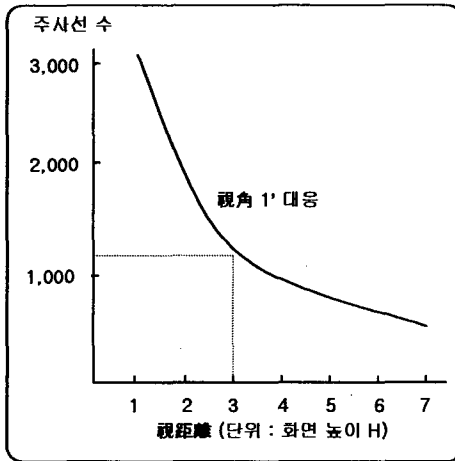
시력 측정



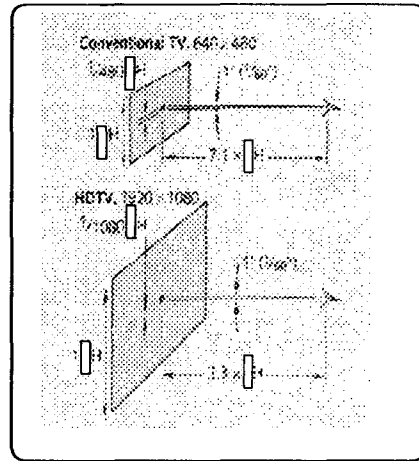
< 시력 1.0을 규정하는 Landolt 環 >

왜 大畫面인가?

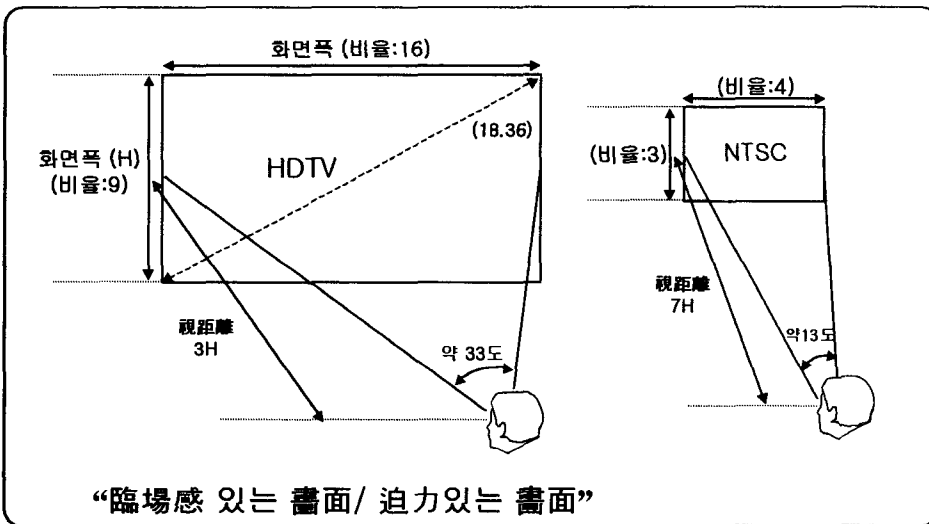
주사선수와 시 거리 관계



적정 시 거리



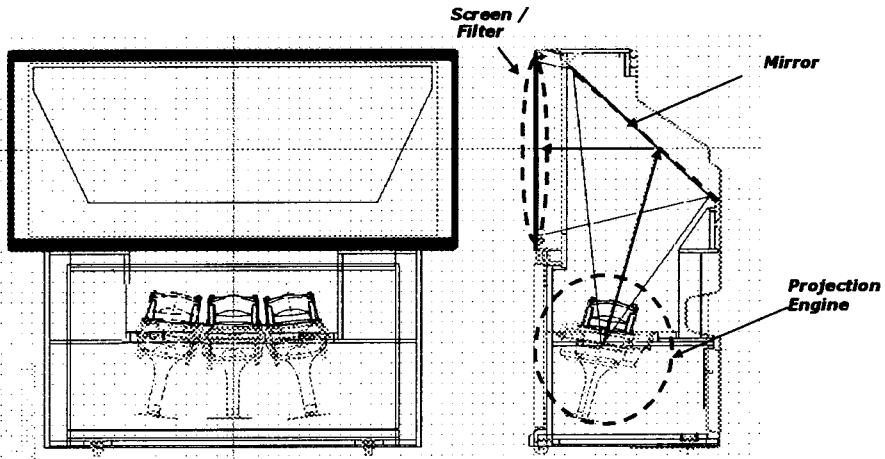
왜 大畫面인가?



Projection

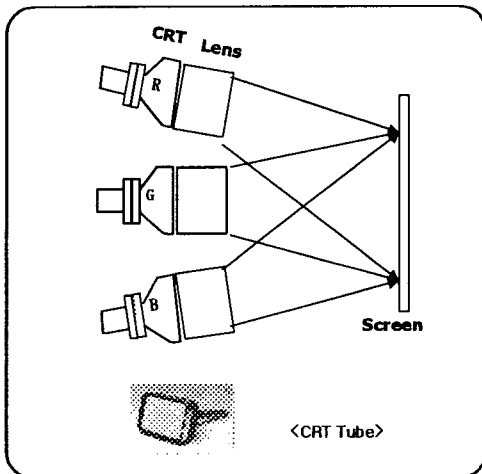
Principle

일정 거리에 있는 Screen에 화면을 확대, 투사함.



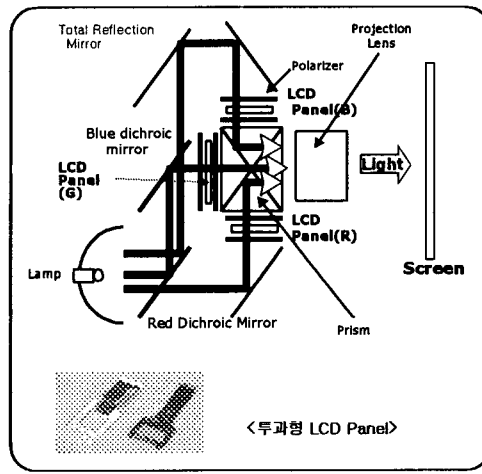
Projection 광학 Engine

CRT based



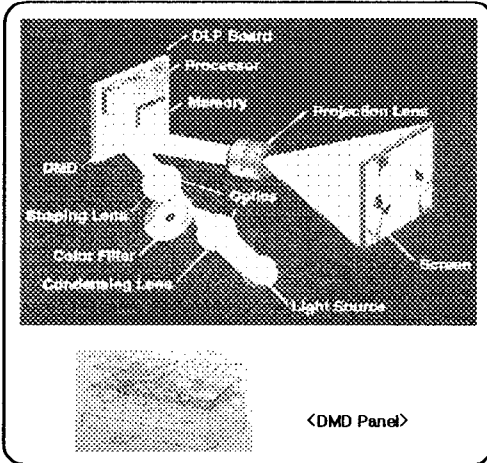
LCD based

--투과형

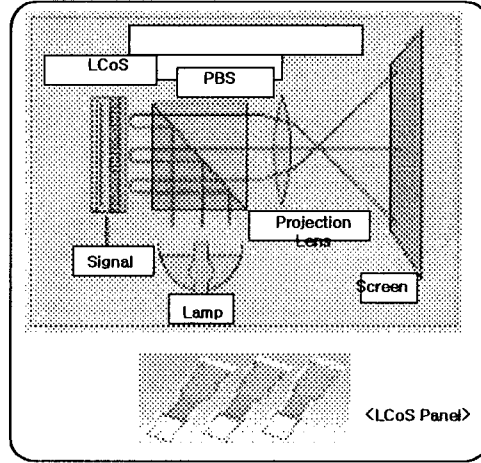


Projection 광학 Engine

DMD^{*1} based



LCoS^{*2} based

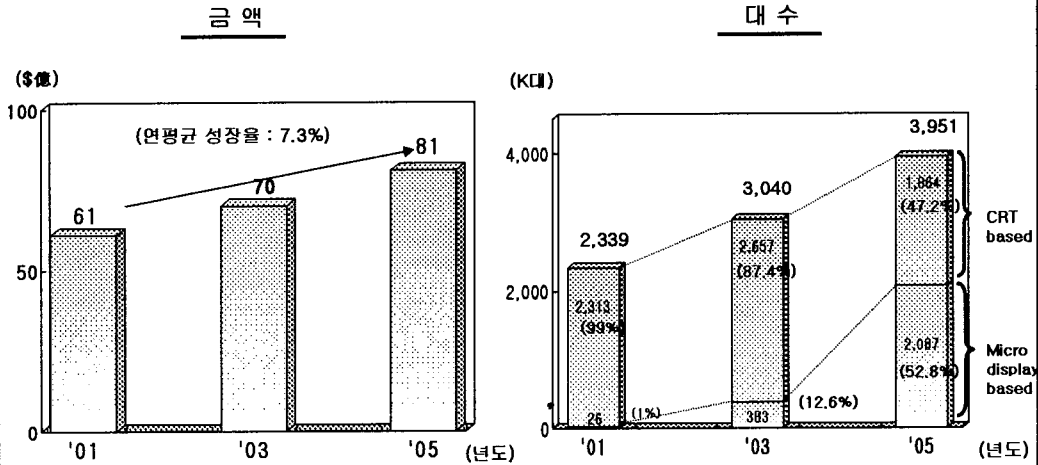


* 1) DMD : Digital Micromirror Device
* 2) LCoS : Liquid Crystal on Silicon

Projection 제품 전망

	현재	2005년
Panel	CRT based	LCD/ DMD/ LCoS based
해상도	SD급	HD급
밝기	400 nits	600 nits
Contrast	100:1	130:1
Thin Depth/ Light	70cm / 100kg (50" CRT based 기준)	30cm / 45kg (50" LCD based 기준)
가격	\$100/ inch	\$50/ inch

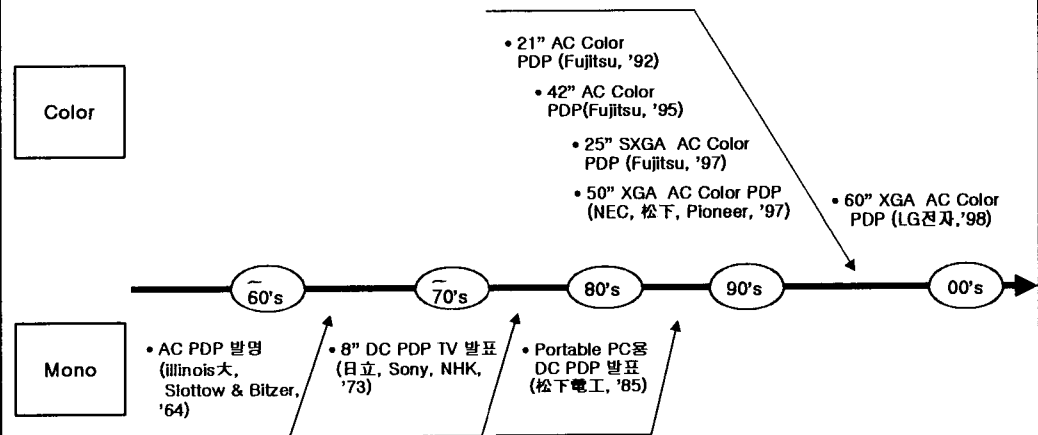
Projection Market Trend



Source : MCG('01)

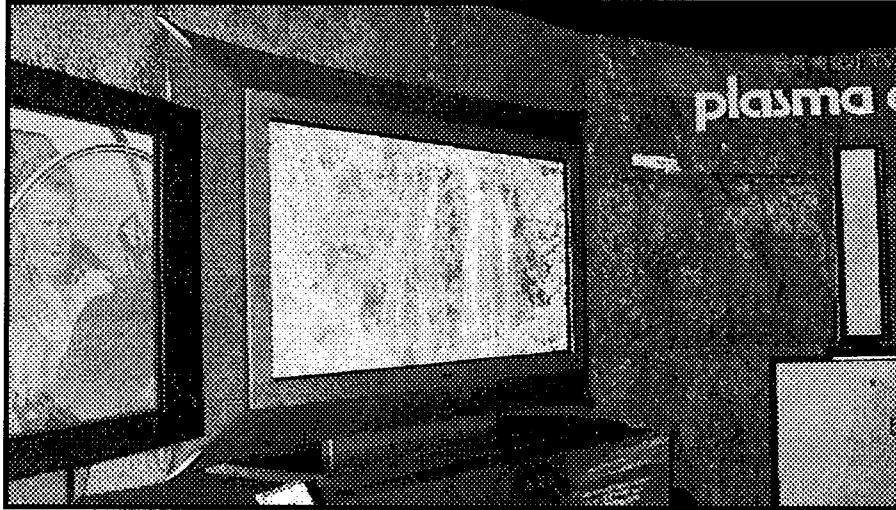
PDP

History

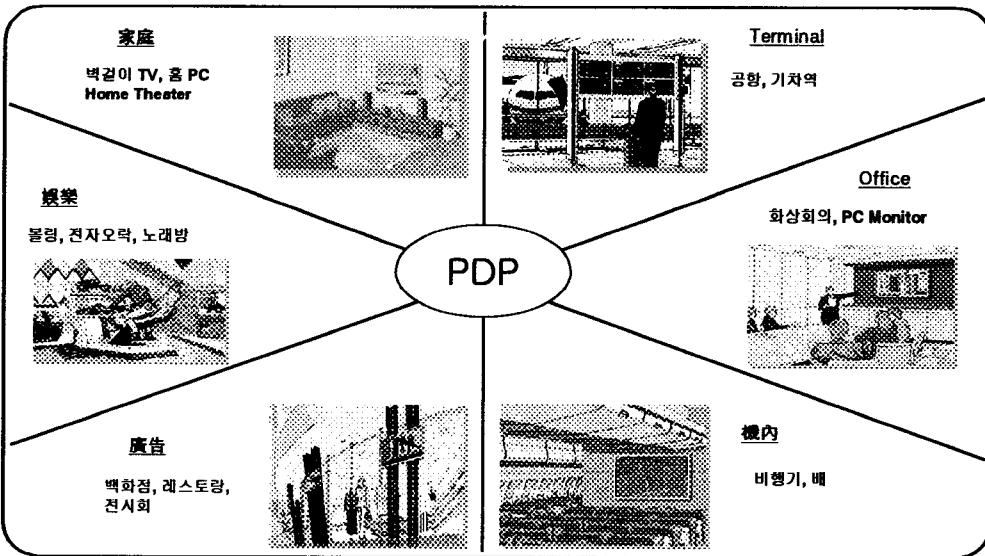


LG's World First 60" PDP

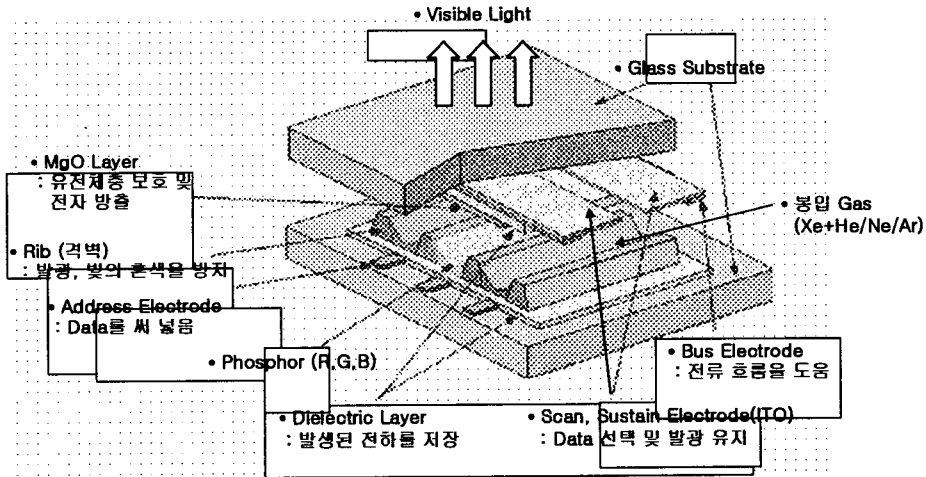
'98 KE Show



PDP Applications

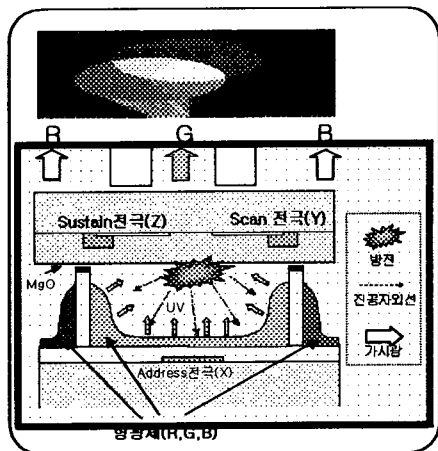


PDP Structure



PDP 發光 原理

PDP는 방전에 의한 플라즈마 생성을 통하여 발광을 얻음. (自發光)



1) X전극과 Y전극에 펄스 형태의 전위차 형성 방전 (Address)

2) Y전극 Z전극 방전 유도 (Sustain)

3) 방전과정에서 생성된 진공 자외선에 의하여 RGB 형광체가 발광

4) R, G, B 광 조합으로 화면 형성

II. 대 화면 Display

PDP Features

<ul style="list-style-type: none"> Thin / Light <ul style="list-style-type: none"> - PDP(40") : 8cm, 32kg - CRT(38") : 60cm, 107kg 	<ul style="list-style-type: none"> 2장의 인접한 유리기판 구성 	<ul style="list-style-type: none"> PDP = LCD > CRT
<ul style="list-style-type: none"> Wide Viewing Angle (170도) 	<ul style="list-style-type: none"> 자발광 	<ul style="list-style-type: none"> PDP = CRT > LCD
<ul style="list-style-type: none"> Large Screen Size (~ 70") 	<ul style="list-style-type: none"> Memory 기능, Active 소자 不要 	<ul style="list-style-type: none"> PDP > CRT, LCD
<ul style="list-style-type: none"> 화면 중앙/주변부 Uniformity 	<ul style="list-style-type: none"> Pixel 단위 발광 	<ul style="list-style-type: none"> PDP = LCD > CRT
<ul style="list-style-type: none"> Digital 신호 수신 적합 	<ul style="list-style-type: none"> Digital 구동 (Pulse수에 의한 계조 표현) 	<ul style="list-style-type: none"> PDP > CRT, LCD
<ul style="list-style-type: none"> 지자체 Free 	<ul style="list-style-type: none"> 진공 자외선이용 형광체 발광 (CRT는 전자 Beam 이용) 	<ul style="list-style-type: none"> PDP = LCD > CRT

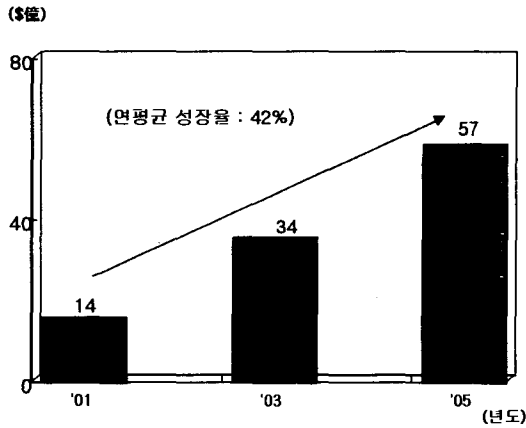
II. 대 화면 Display

PDP 제품 Trend

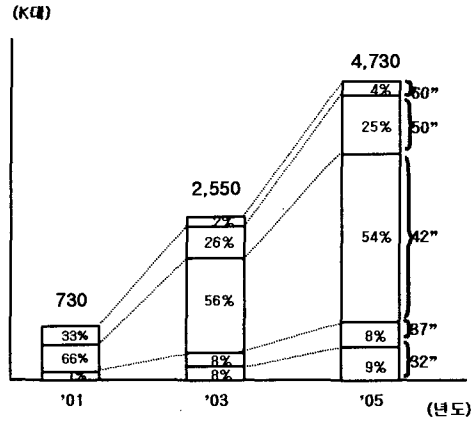
Size/ Maker	42" / FHP		50" / Pioneer	
Model (출시년도)	PDS4221 (1998.10)	W42-PD2000 (2001.10)	PD-501HD (1998.10)	PD-503CMX (2001.10)
Aspect ratio	16:9	16:9	16:9	16:9
Pixels (HxV)	1024X 1024	1024X 1024	1280 X 768	1280 X 768
Contrast Ratio(暗)	350 :1	350 :1	150 :1	560 :1
휘도 (Peak)	500cd/m ²	750cd/m ²	350cd/m ²	900cd/m ²
효율 (Panel)	0.8lm/W	1.0lm/W	1.1lm/W	1.8lm/W
소비전력 (Set)	450W	270W	495W	380W
Retail Price	¥130만	¥100만	¥220만	¥135만

PDP Market Trend

시장 규모



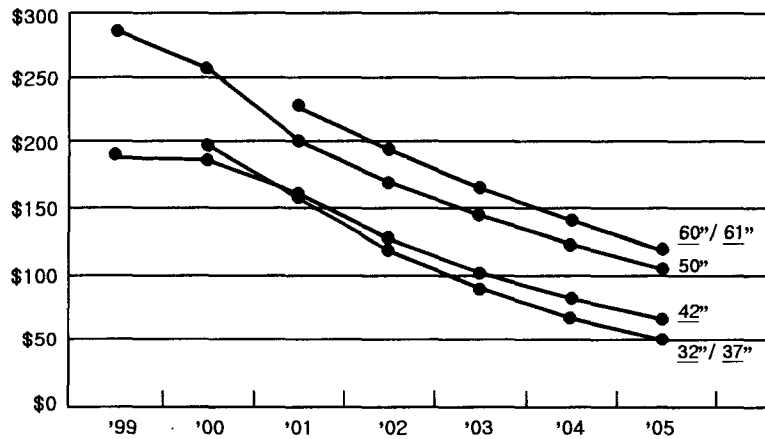
대 수



* Source : JPMorgan('01)

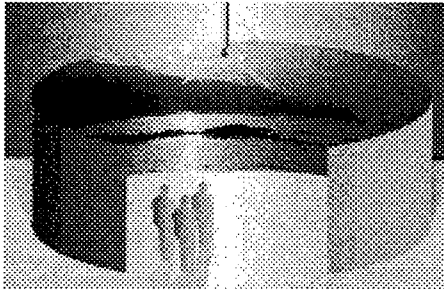
PDP Market Trend

Inch당 가격 추이



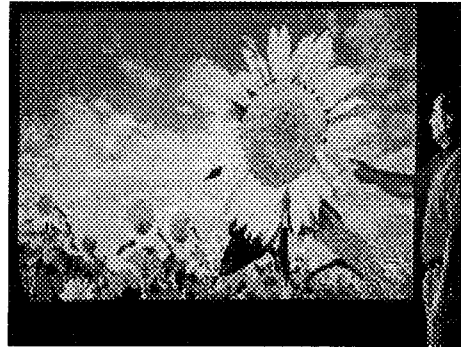
* Source : Display Search('01)

Laser Display

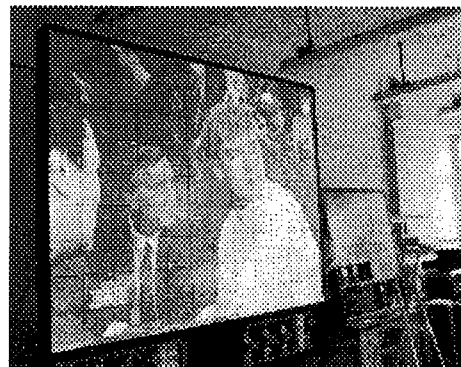


Curve Surface (Schneider company)

Flat Surface (Silicon Light Machine)



Wall Display





Digitally yours,

Contact us

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