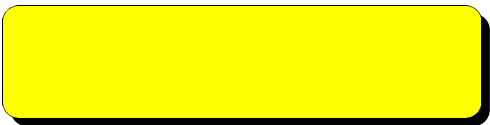


MSA

(MSA: Measurement System Assesment)

()

(. :)



1 .

- 1. ()
- 2.
- 3. (TIMS)

2 . MSA

- 1.
- 2.
- 3.

. T/F

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. 가

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1 .

1. ()

가.

- ☐ : 3 416
- ☐ : 51 , : 34 3
- ☐ : 16,426

- .
- ☐ TV, VCR, , , , ,

. (:)

	`96	`97	`98.08
()	15.9 (6.8)	18.4 (6.8)	12.5 (4.6)

. ()

- ☐ '78 : TQC
1 ()

- ☐ '82 : (TQC ,)

- ☐ '93 : 全 ISO 9000 System

- ☐ '94 : CS Center
1次 : . SVC .
(KMAC)
1 ()

- ☐ '95 : 2次 : . .

- ☐ '97.1:
가 ()

- ☐ '98.3: 6σ ()
(=>)

.

. ()

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. ()

2.

가.

□ 1972. 09

□ 1986. 06 가 (6 : 가)

1. 13-2. 11.
13-4. 13-1. 12.

□ 1986. 12 가 가 (7)
13-3. 13-5. 13-6. 14-1.
14-2. 14-3. 14-4.

□ 1987. 01 ()

□ 1989. 11 System (, , System)

□ 1990. 05 가 가 (3.)

□ 1990. 08 가 (:COMBI)
(:3 3 , :4 1 9)

□ 1991. 07 (: 364m² → 786m², System)

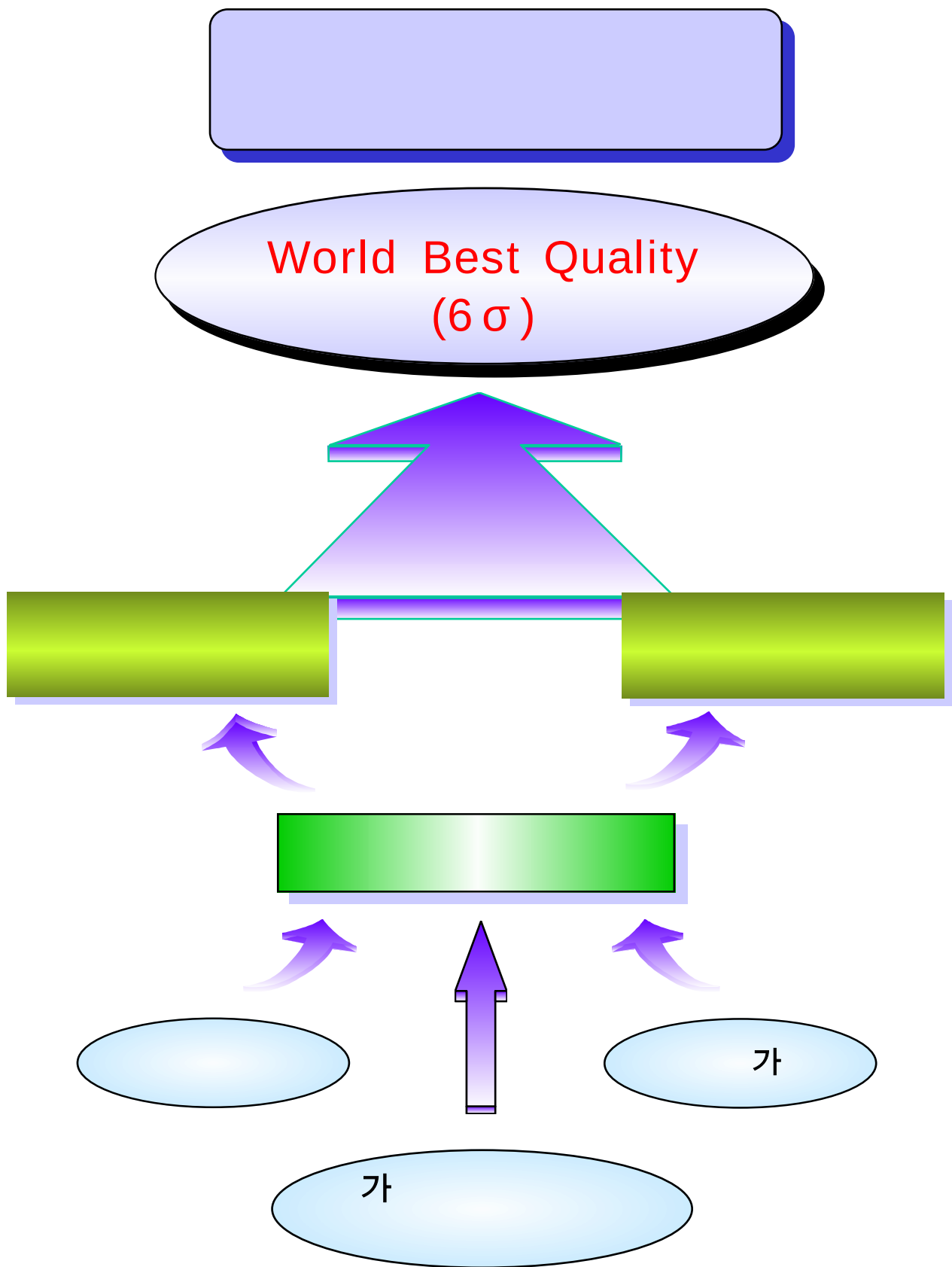
□ 1993. 04 가 가 (3)
7-2. 8. 30.

□ 1993. 11 ()

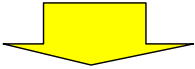
□ 1995. 12 (:35)
:1 2 ()

□ 1996. 11 ()

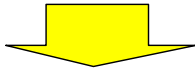
□ 1998. 01 (TIMS)



()



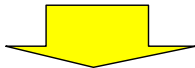
CS
()



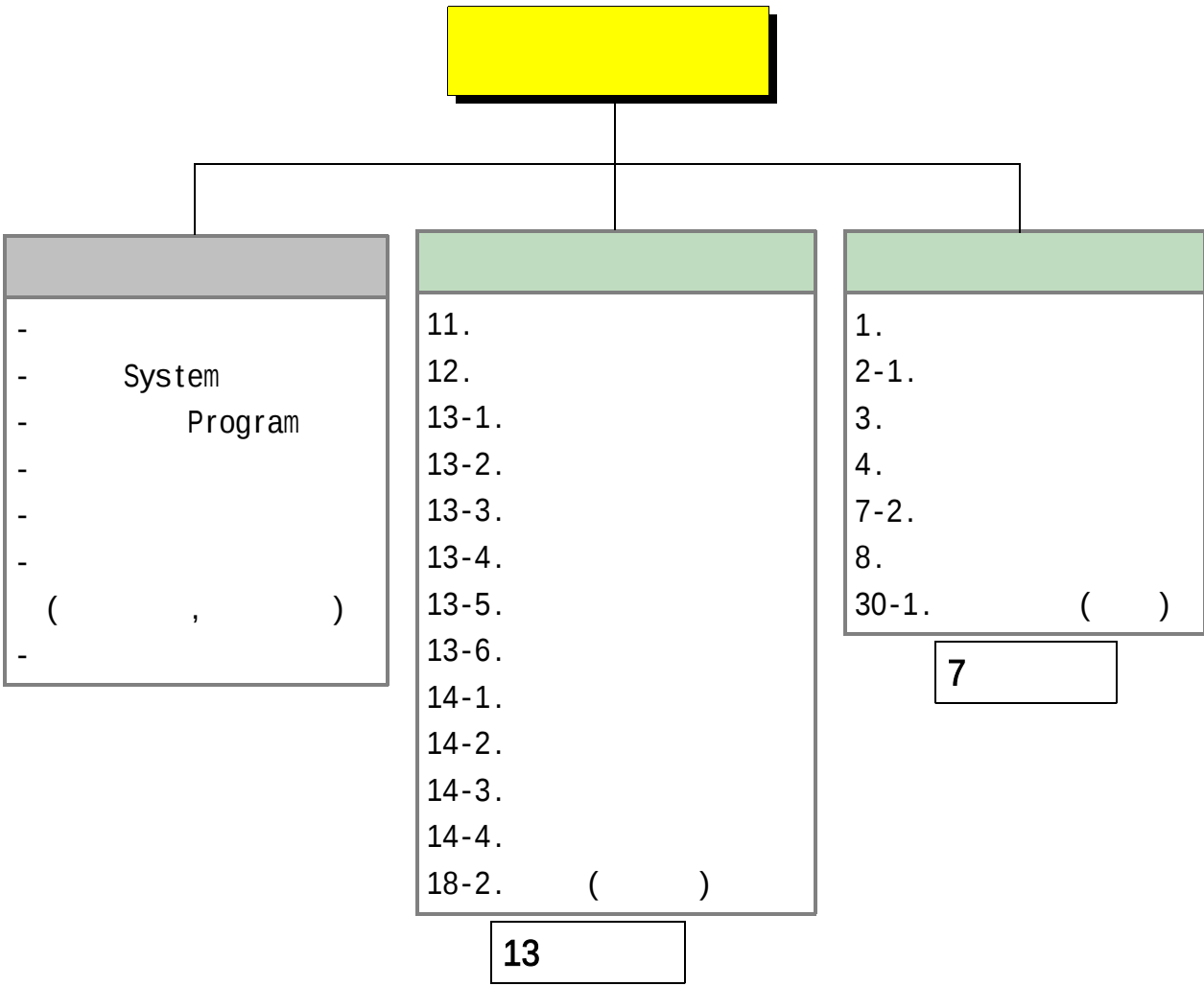
()	가 , , , , 가



--	--



	Data
--	------



.

	7	08 01	14
	9	11 08	33
	2	10 01	11
	18	10 1 /	57



□

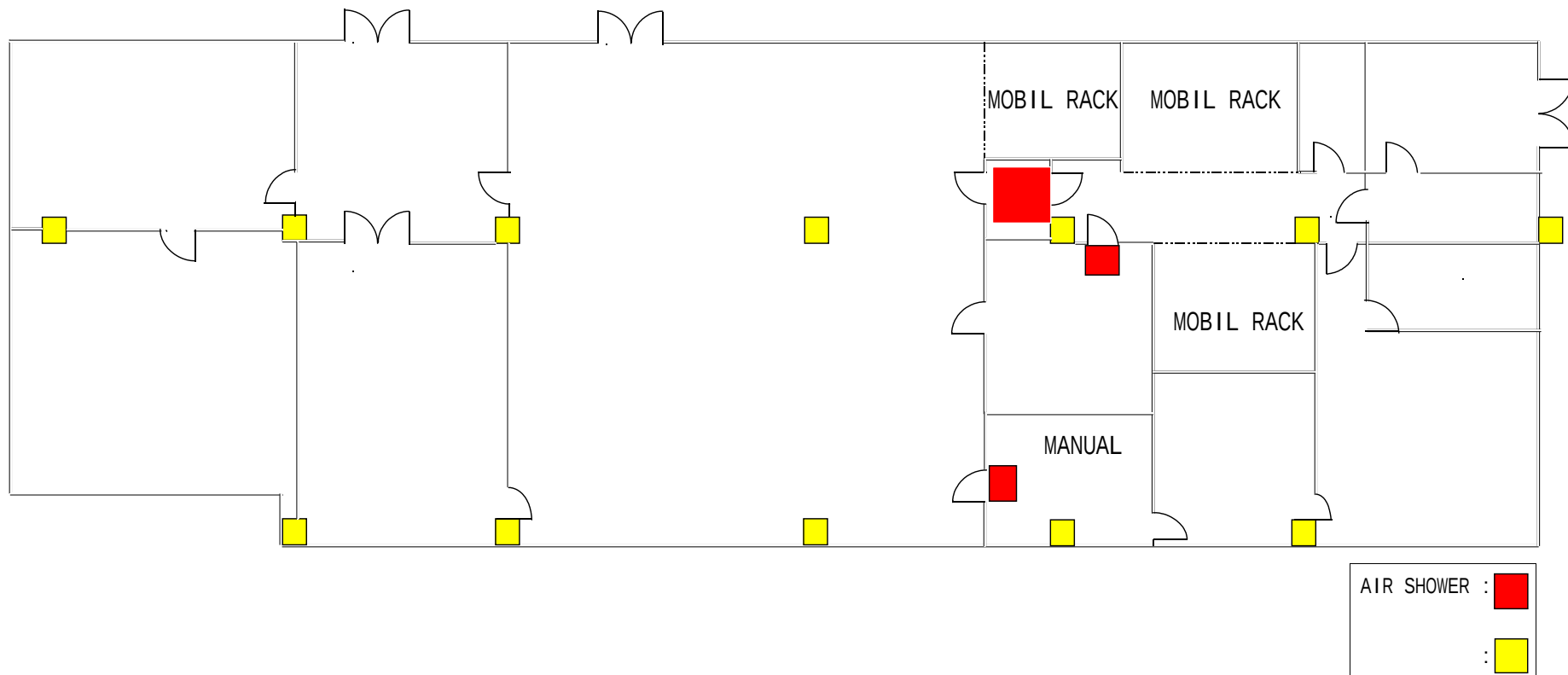
		()
		23 ± 1
		20 ± 1
		50% ± 2% RH
		45% ± 2% RH
		50,000~100,000 Class
		150μV/m
		BUS 2Ω
		BUS 5Ω
		: 0.1~30Hz 0.25μm
		가 : 30~200Hz 0.001g
		45 dB(A) 가 , OFF
		700 lx
		10Pa
		2 %

□

	286.2 m ² (86.6)	
	66.1 m ² (20.0)	
	66.1 m ² (20.0)	
	51.6 m ² (15.6)	
	49.6 m ² (15.0)	
	266.4 m ² (80.6)	, , ,
	786.0 m ² (237.8)	

□ LAY-OUT

LAY-OUT (1 / 200)





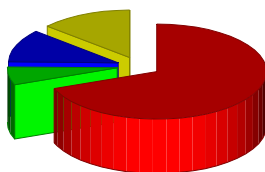
□

(:)

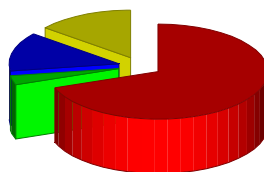
		'96	'97	'98.7
		24,589	22,111	10,693
		2,173	983	148
		3,970	4,217	1,420
		4,797	4,515	2,723
		35,529	31,826	14,984



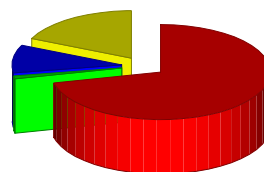
'96년



'97년



'98년 7월말현재



■ 사내장비

■ 수입검사

■ 업체의뢰

■ 업체출장

□

		'95	'96	'97	'98 7
0		-	-	46 /2	24 /1
0		38 /3	25 /2	21 /1	44 /1
0		375 /	180 /	80 /	-
()					
0		71	41	-	-

.()

□

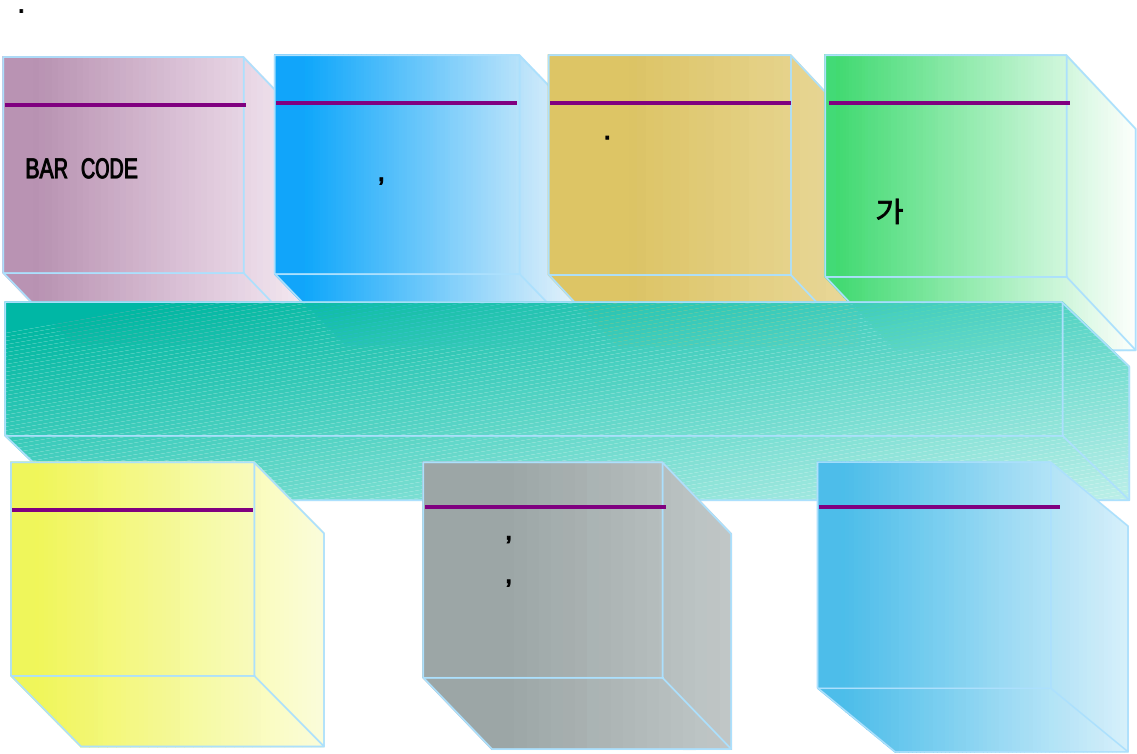
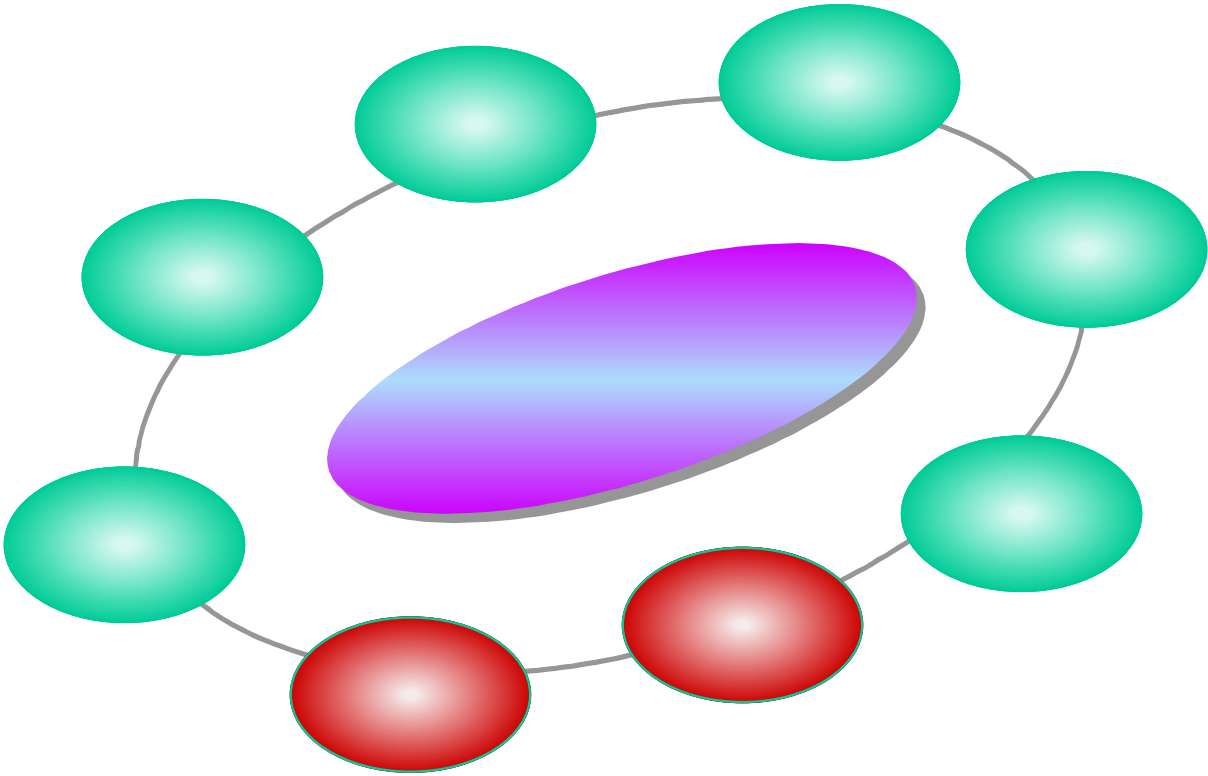
1994	3	,	,
1995	4	,	,
1996	3	,	DC, AC, DC, AC, ,
1997	1		

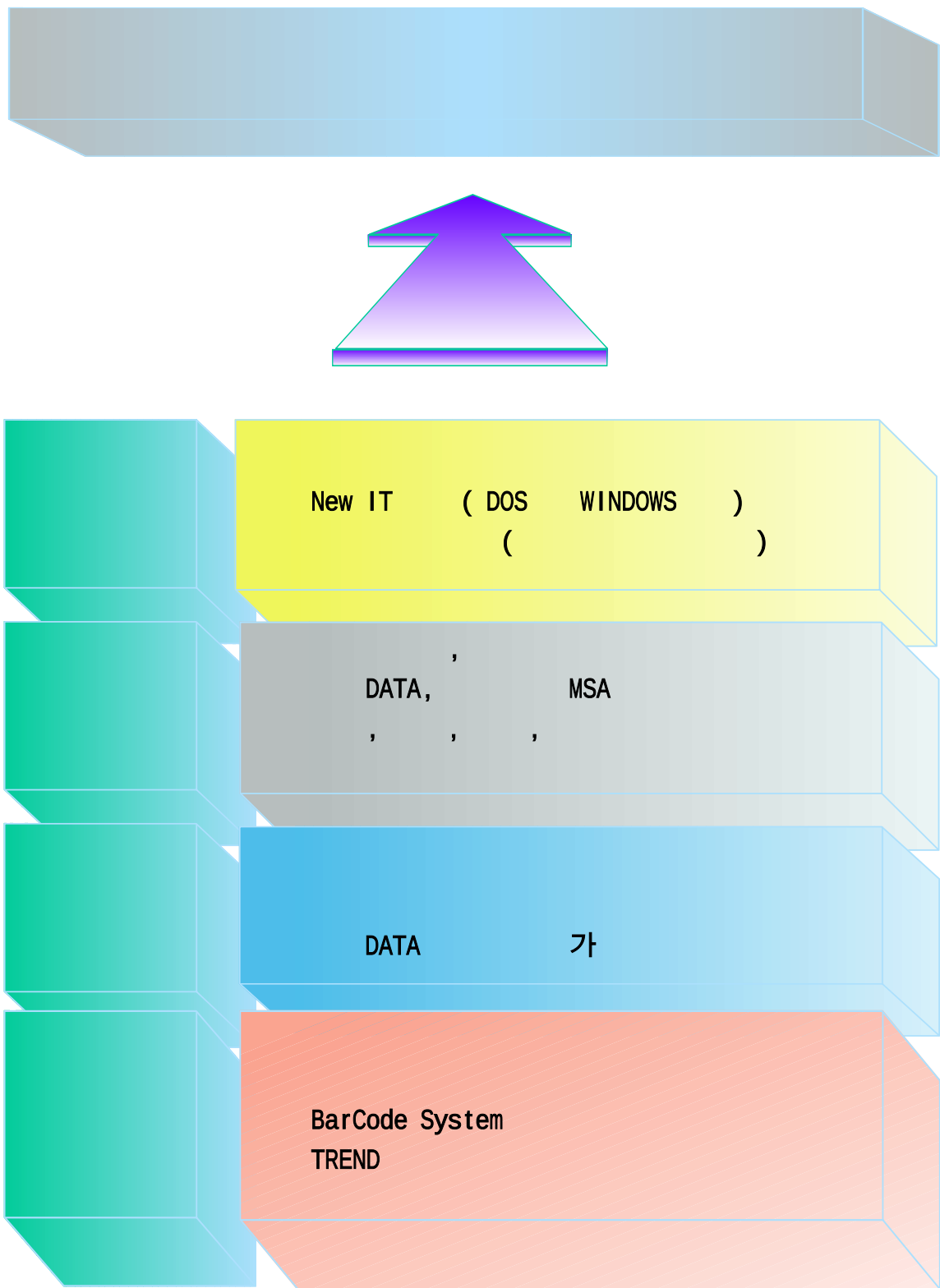
□

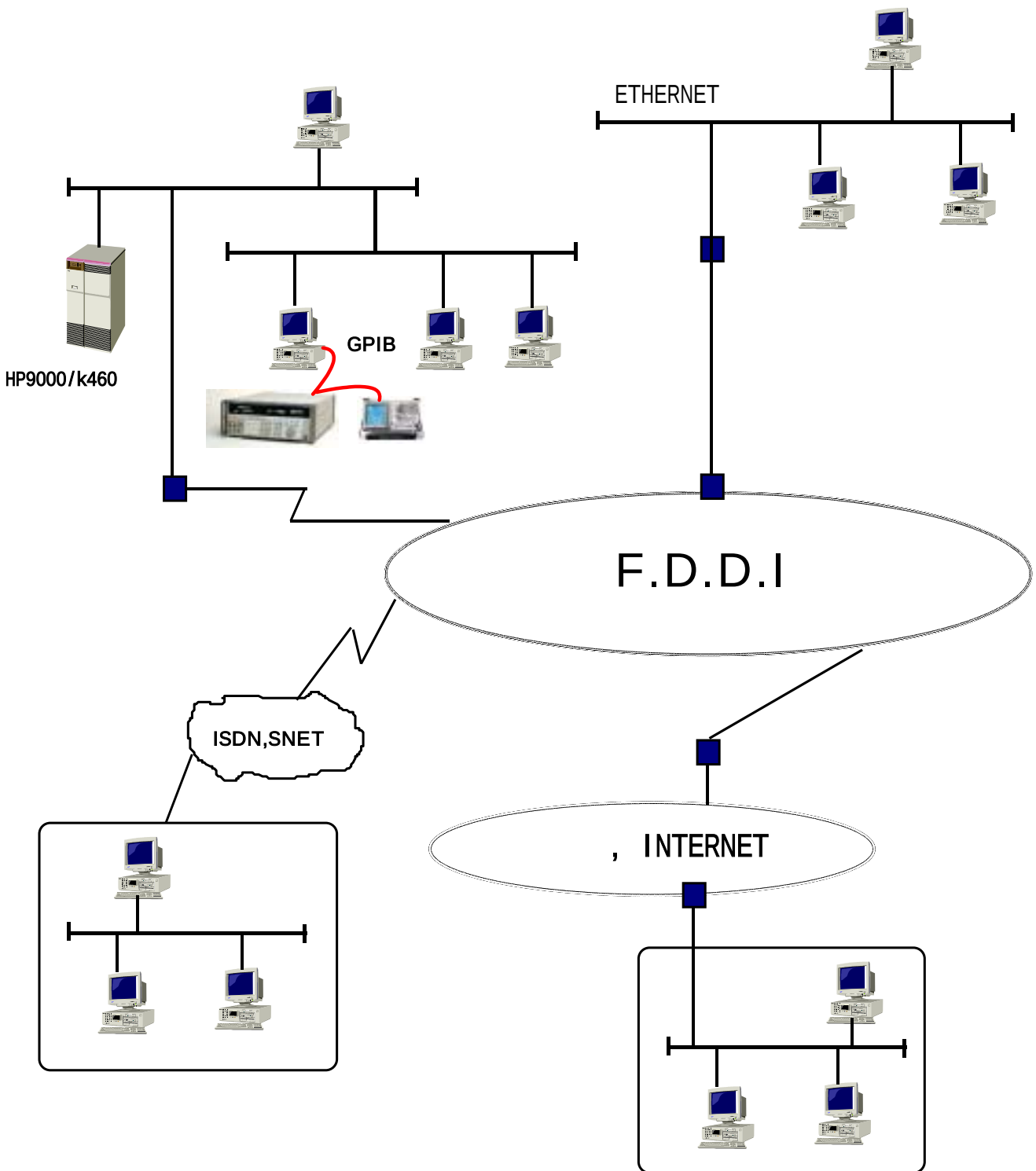
1995	(SEIN) (SMI) (SESA) (SEMUJ)	o o Lay_out o
1996	(SEHZ) (TSEC) (TTSEC) (SDMA) (TSE)	o Setup o o 가
1997	(SAVINA) (SEIN)	o o
1998 7	(SIEL) (TSE) (SAVINA)	o

3. (TIMS)

가.









2 . MSA

1.

_____ , _____
_____ 가
_____ 가 .
_____ 가 _____ / _____ (_____ , _____ , _____)
_____ , _____ ,
_____ 가
_____ 가가 .
_____ (_____ , C/TV) OEM Buyer 가 _____
_____ White balance MSA(_____ 가) _____ 가
_____ , _____
_____ .
_____ MSA _____ 2000 _____ 6 σ _____
SPC _____ , _____
_____ 가 _____ Tool
_____ 가 .

2.

가.

CRT R.G.B (Illuminance) (Luminance)
White Balance
cd/m² fL(Foot Lamberts) 가 .

. WHITE BALANCE

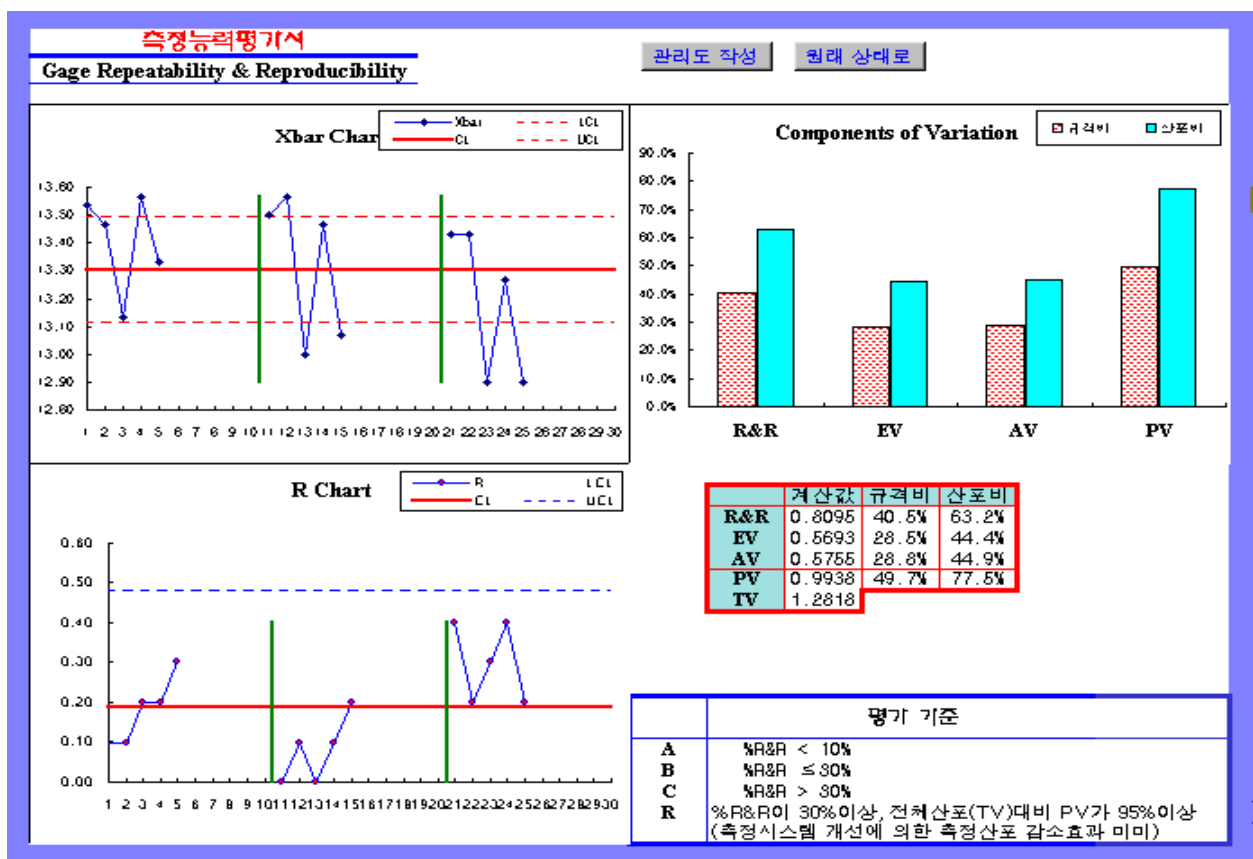
Color RGB 가

가

측정능력평가서				측정시스템	거측기 No	검표정일	평가일						
Gage Repeatability & Reproducibility				측정특성	공정명	실시자/부서	1997/11/8						
SAMSUNG 삼성전자				특기사항									
측정시스템	A==>				B==>				C==>				전체시도
시도번호	1회	2회	3회	범위	1회	2회	3회	범위	1회	2회	3회	범위	평균
1	13.50	13.50	13.60	0.10	13.50	13.50	13.50	0.00	13.50	13.20	13.60	0.40	13.49
2	13.50	13.40	13.50	0.10	13.60	13.50	13.60	0.10	13.50	13.50	13.30	0.20	13.49
3	13.20	13.00	13.20	0.20	13.00	13.00	13.00	0.00	13.00	12.70	13.00	0.30	13.01
4	13.50	13.70	13.50	0.20	13.50	13.50	13.40	0.10	13.20	13.50	13.10	0.40	13.43
5	13.20	13.50	13.30	0.30	13.00	13.00	13.20	0.20	13.00	12.80	12.90	0.20	13.10
6													
7													
8													
9													
10													
	Xbar A	13.41	Rbar A	0.18	Xbar B	13.32	Rbar B	0.08	Xbar C	13.19	Rbar C	0.3	13.30
시스템	A	B	C	전체									
시도수(n)	5	5	5	15									
반복측정 수(r)	3	3	3	3									
평균(Mean)	13.41	13.32	13.19	13.30									
표준편차(S.D)	0.19	0.25	0.29	0.25									
Rbar	0.18	0.08	0.3	0.19									
최대값(MAX)	13.70	13.60	13.60	13.70									
최소값(MIN)	13.00	13.00	12.70	12.70									
반복횟수	2	3											
K1	4.56	3.05											
D4	3.27	2.58											
A2	1.880	1.023											
시스템 수	2	3											
K2	3.65	2.7											
산포추정													
●시료범위이음(Rbar/d2) 0.47778													
○시료 표준편차 이음(S) 0.23049													
시도수	2	3	4	5	6	7	8	9	10				
K3	3.65	2.70	2.30	2.08	1.93	1.82	1.74	1.67	1.62				
CS센터 Release 3.0													

CS센터 Release 3.0

□

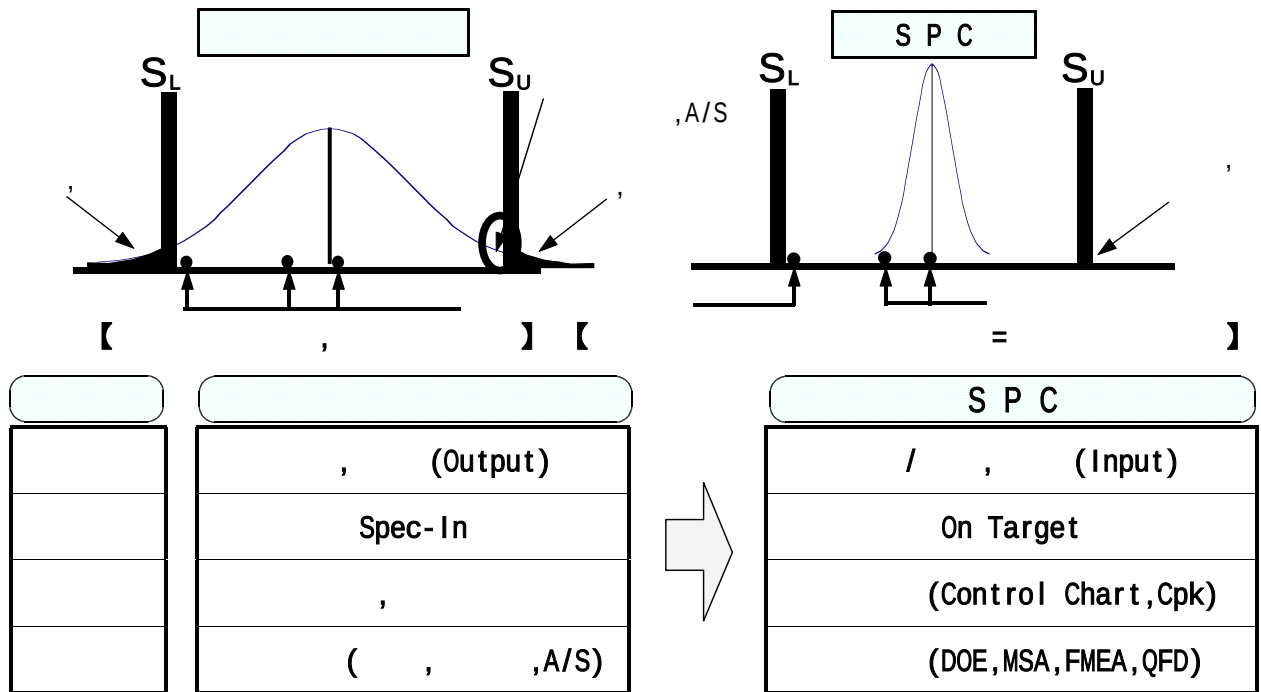


CS센터 Release 3.0

. SPC

가 /

○ 6σ SPC . (SPC : Statistical Process Control)

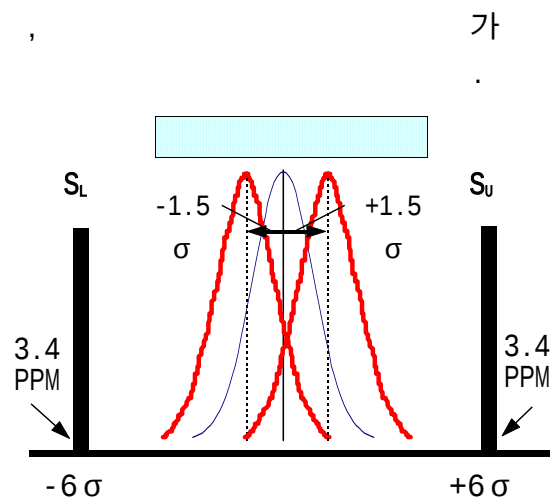


. 6σ Vision

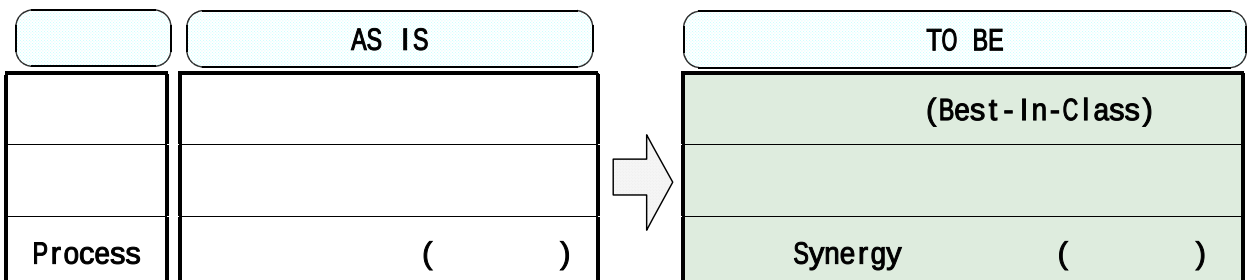
3.4PPM

(Best-in-Class)

σ PPM	
σ	Cp PPM
3 σ	1.00 2,700 PPM
4 σ	1.33 63 PPM
5 σ	1.67 574 PPB
6 σ	2.00 2 PPB



□ 6σ VISION



3.

1	T/F	○ T/F (2 , DISPLAY 13) ○	`98.3.13 -`
2		○ () 가 (MSA) ○ ○ 가	`98.4.15 -`
3		○ ○ ○ ○ ○	`98.4.29 -`
4	가	○ Line (C - Line) ○ () 2 가 (MSA) ○ 가	`98.6.22 -`
5		○ / ○ / ○	`98.7.15 -`
6		○ ○ .	`98.8.01 -`

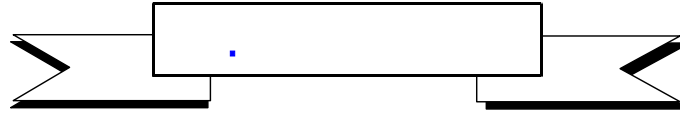


1. : 16

	C S		DISPLAY			
		6σ		C S		
	2	1	6	3	2	2

2.

	MSA	○ T/F ○ ○ Data ○ ○ ○ MSA ()
6σ	6σ	○ 6σ ○ 6σ SPC . ○ 6σ , 가
		○ Data ○ ○ MASTER - (3) ○ MSA 가 ○ Setup . ○ OEM
C S	/	○ ○ Feed Back
	/	○ ○ (Buyer)
	6σ	○ SPC Feed Back(Cpk) ○ 6σ 가



1. MSA 가

가. R&R 가

가	10	3
가 .		

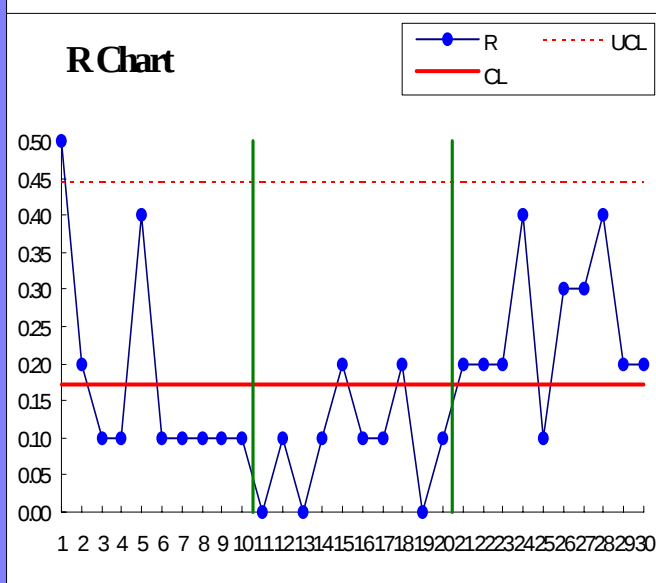
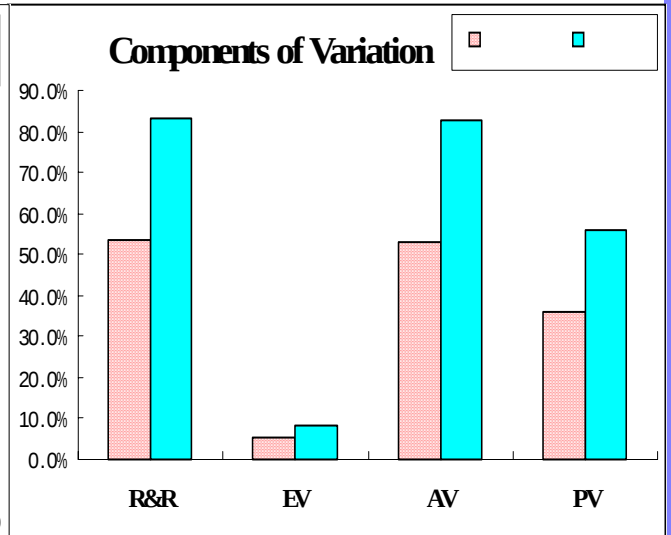
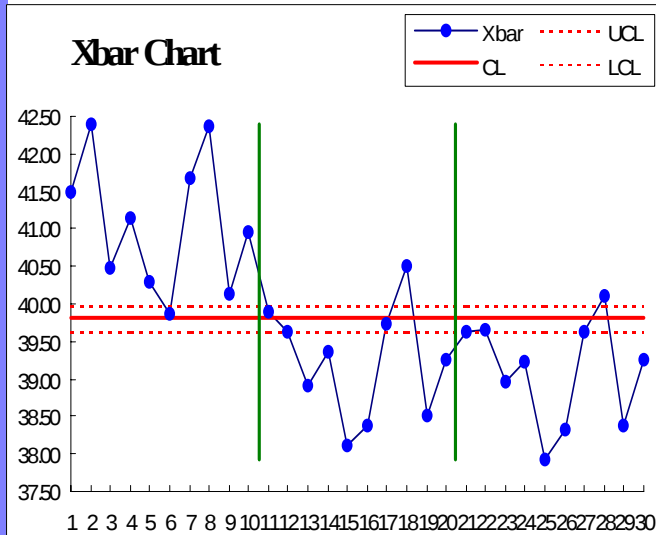
< 가 DATA >

가													
Gage Repeatability & Reproducibility				308006-022				No				CA-100	
				H-COLOR Y				WB				가	
				Model (Full white)									
SAMSUNG													
삼성전자													
	A⇒				B⇒				C⇒				
	1	2	3		1	2	3		1	2	3		
1	41.60	41.70	41.20	0.50	39.90	39.90	39.90	0.00	39.50	39.70	39.70	0.20	40.34
2	42.40	42.50	42.30	0.20	39.70	39.60	39.60	0.10	39.80	39.60	39.60	0.20	40.57
3	40.50	40.50	40.40	0.10	38.90	38.90	38.90	0.00	39.10	38.90	38.90	0.20	39.44
4	41.10	41.10	41.20	0.10	39.30	39.40	39.40	0.10	39.50	39.10	39.10	0.40	39.91
5	40.30	40.10	40.50	0.40	38.20	38.10	38.00	0.20	38.00	37.90	37.90	0.10	38.78
6	39.80	39.90	39.90	0.10	38.40	38.30	38.40	0.10	38.50	38.30	38.20	0.30	38.86
7	41.60	41.70	41.70	0.10	39.80	39.70	39.70	0.10	39.80	39.60	39.50	0.30	40.34
8	42.30	42.40	42.40	0.10	40.50	40.40	40.60	0.20	40.30	40.10	39.90	0.40	40.99
9	40.20	40.10	40.10	0.10	38.50	38.50	38.50	0.00	38.50	38.30	38.30	0.20	39.00
10	41.00	41.00	40.90	0.10	39.30	39.20	39.30	0.10	39.40	39.20	39.20	0.20	39.83
	Xbar A	41.08	Rbar A	0.18	Xbar B	39.23	Rbar B	0.09	Xbar C	39.11	Rbar C	0.25	39.81
	A	B	C										
(n)	10	10	10	30									Su () 45
(r)	3	3	3	3									SL () 35
(Mean)	41.08	39.23	39.11	39.81									Tolerance () 10
(Median)	41.05	39.30	39.20	39.70									2.211
(S.D)	0.87	0.73	0.69	1.18									0.768
Rbar	0.18	0.09	0.25	0.17									41.08
(MAX)	42.50	40.60	40.30	42.50									39.11
(MIN)	39.80	38.00	37.90	37.90									1.97
	2	3											
K1	4.56	3.05											A 0.18
D4	3.27	2.58											B 0.09
A2	1.880	1.023											C 0.25
	2	3											0.17
K2	3.65	2.7											
	2	3	4	5	6	7	8	9	10				
K3	3.65	2.70	2.30	2.08	1.93	1.82	1.74	1.67	1.62				



(Rp) 2.211
(S) 0.768

가 Gage Repeatability & Reproducibility



R&R	5.3354	53.4%	83.0%
EV	0.5287	5.3%	8.2%
AV	5.3091	53.1%	82.6%
PV	3.5820	35.8%	55.7%
TV	6.4263		

	가
A	%R&R < 10%
B	%R&R ≤ 30%
C	%R&R > 30%

☐ %R&R 가 %R&R 53.4%

☐ 6 σ

☐ White Balance
800 ppm . (1,368 /171)

%R&R	가
10 %	
10~30 %	
30 %	



가

(: cd/m²)

		Spec.		
TV Color Analyzer (CA-100)	x	0.313 ± 2 digits	0.309	-0.004
	y	0.329 ± 2 digits	0.325	-0.004
	Y	40.1 ± 0.8 fL(2 %)	41.3	+1.2
Pattern Generator	RGB level	700 ± 10 mVp-p	726 mVp-p	+26 mVp-p



가

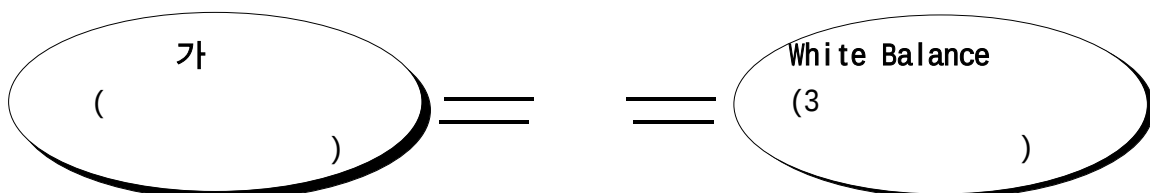
2.

가.

□

가

.



TV Color Analyzer(CA-100) Sensor

R.G.B 3가

가 .

□

TV Color Analyzer(CA-100)

- CH (CH00) : Calibration Data가
- CH(CH01~10) : User가

CH



.

☐

○

,

W/B

(Line

)

○

- User

☐

SETUP

○

800

(20

40

)

○

`98.06.15 DISPLAY限

		가
CA-100	136	775
MSPG	661	2,712

☐ White Balance

가 .

○

Display

.

.

☐ Operation

○

Zero

가

가

☐

Video signal level

가

/

○ 38

Video level

18

가

.

☐ W/B

○

/

,

/

○

OEM

3. 가

가. 가 (CA-100 Probe Color View)

CA-100

(/ 4 fL)

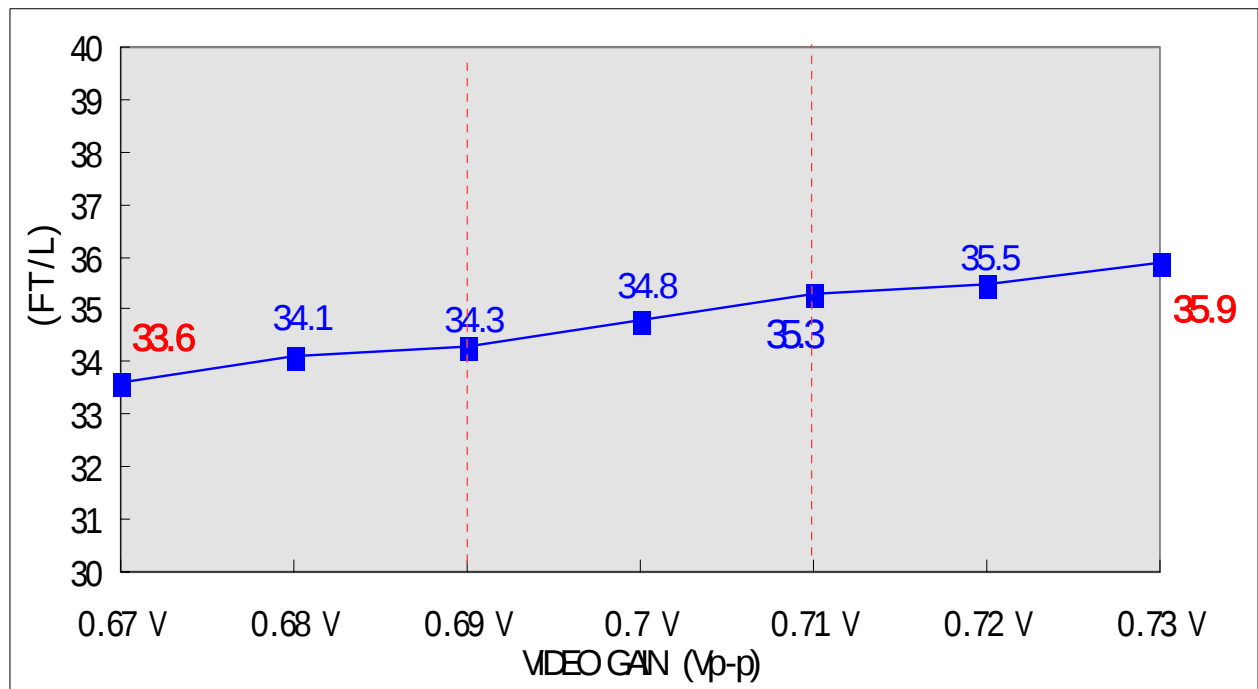
Spec 0.8 fL 5 ()

		DUT1	DUT2	DUT3	DUT4	DUT5	DUT6	DUT7	DUT8	DUT9	DUT10	Δ
x		312	312	312	312	312	312	312	312	312	312	1
		317	313	314	313	314	313	321	316	316	313	8
		314	313	311	312	314	313	317	313	317	313	6
		3	0	3	1	0	0	4	3	1	0	4
	-	2	1	2	0	2	1	5	1	5	1	5
y		329	329	329	329	329	329	329	329	329	329	0
		335	330	338	330	329	330	337	327	333	333	11
		331	329	334	329	330	330	339	329	332	333	10
		4	1	4	1	1	0	2	2	1	0	4
	-	2	0	5	0	1	1	10	0	3	4	10
Y		40.0	39.7	39.7	39.7	40.0	40.0	40.0	40.0	40.0	40.0	0.3
		37.7	40.9	39.8	39.5	41.3	40.1	41.0	39.6	40.1	39.3	3.6
		41.0	41.1	40.7	39.9	41.4	40.4	39.9	42.0	40.9	39.5	2.5
		3.3	0.2	0.9	0.4	0.1	0.3	1.1	2.4	0.8	0.2	3.2
	-	1	1.4	1	0.2	1.4	0.4	0.1	2	0.9	0.5	1.9

(Linearity) 가
(Level CA-100 가)

Video gain Spec(0.7 Vp-p ± 10 mV) 1 fL가
CA-100 (0.8 fL)
Video Level(0.67~0.73V) 2.3 fL 가 .
 ± 5 fL ± 3 fL

	0.67V	0.68V	0.69V	0.7V	0.71V	0.72V	0.73V	MAX	MIN	AVG	Δ
x	280	280	280	280	280	280	280	280	280	280	0
y	300	300	300	300	300	300	300	300	300	300	0
Y	33.6	34.1	34.3	34.8	35.3	35.5	35.9	35.9	33.6	34.8	2.3

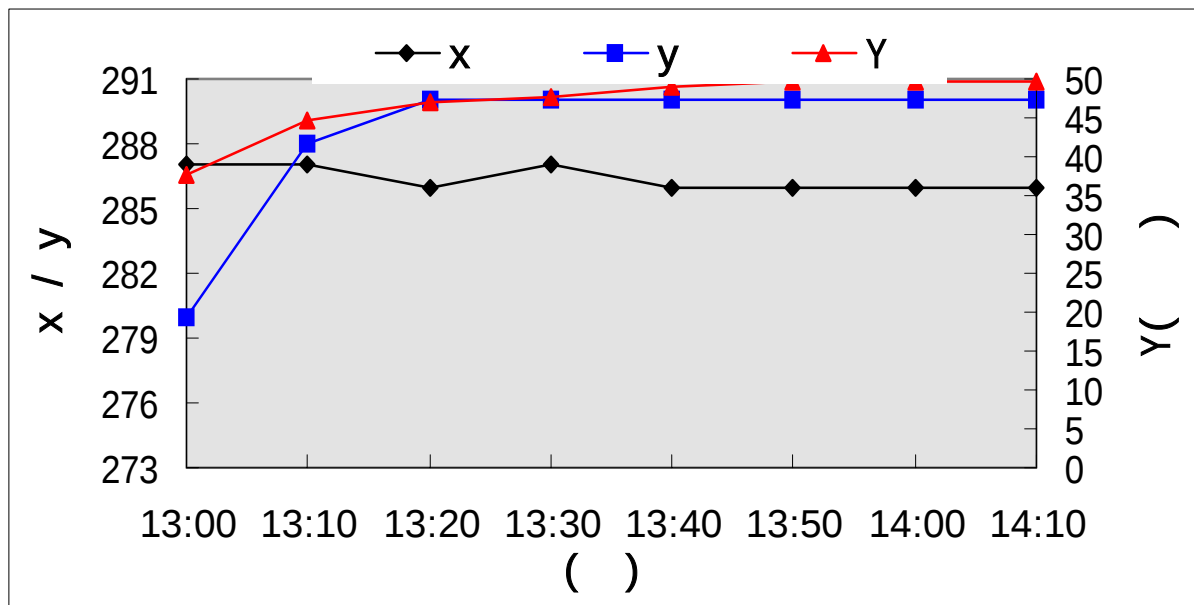


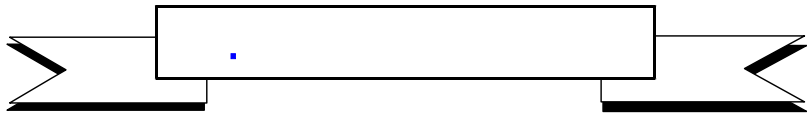
가
(Video Generator Warm Up Time 가)

: 10

Warm Up Time
Video Generator 40 Warming-Up
CA-100 Warming Up 가

NO	TIME	x	y	Y
1	13:00	287	280	37.8
2	13:10	287	288	44.6
3	13:20	286	290	47.1
4	13:30	287	290	47.7
5	13:40	286	290	49.0
6	13:50	286	290	49.7
7	14:00	286	290	49.6
8	14:10	286	290	49.8





1.

가.

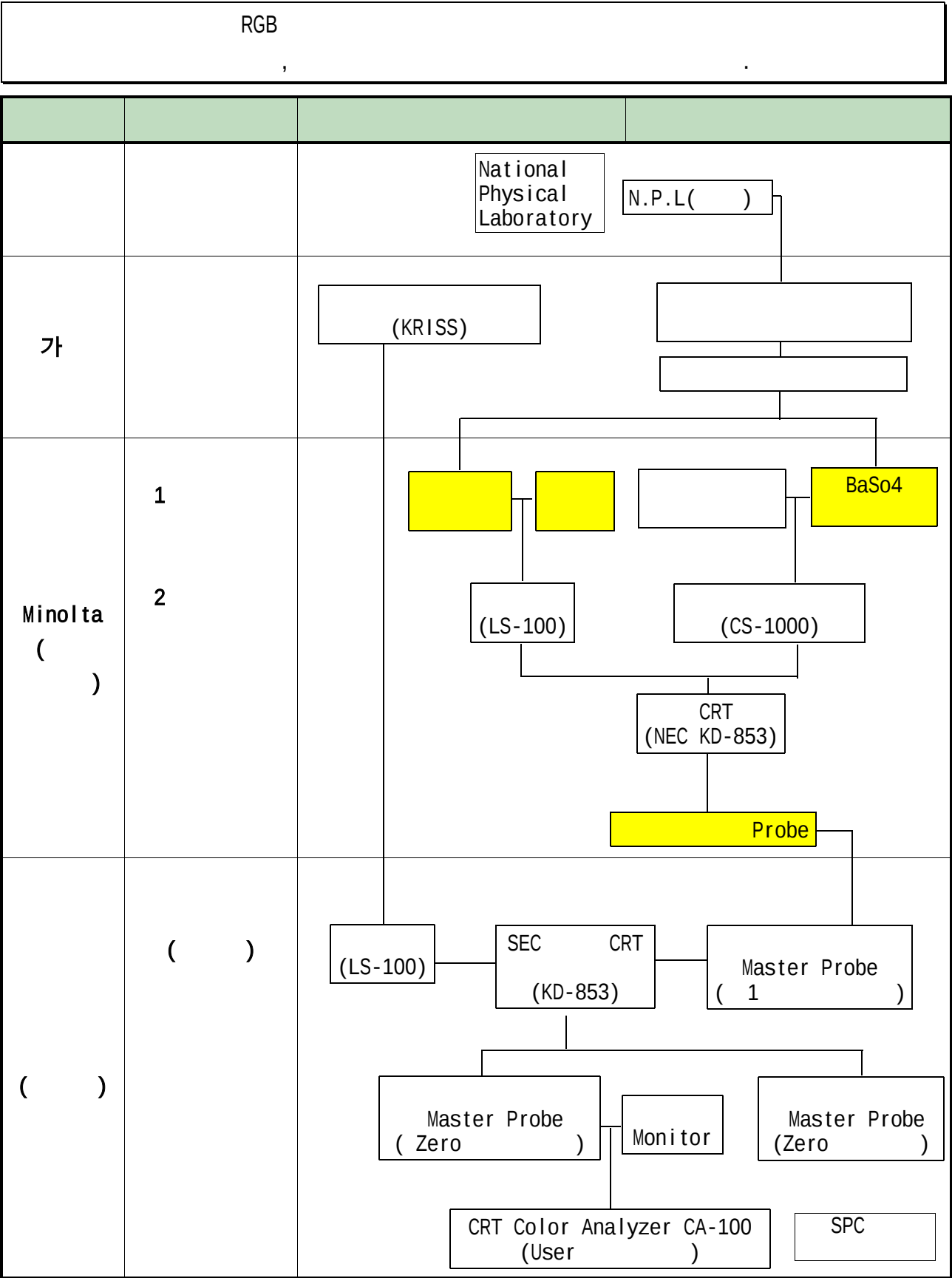
. MSA

. Data

2.

	☐ ☐ 가	98.05.19
	☐ CA-100 CH => CH 00 ☐ White Balance => Program ☐ Video Generator Level (0.62 ~ 1.00 V p-p => 0.7 Vp-p) ☐ Monitor => Coupling	98.06.13
	☐ / => CA-100 (, Cleaning) => Video Genertor (Level, Cable) ☐ => Table ☐ CA-100 Probe => ☐ SPC White Balance	98.06.10

가. =>





1

NO			
1	TV Color Analyzer	1838-100	MINOLTA
2	P-ROM	1838-0002-75	MINOLTA
3	MASTER PROBE	1838-0001-75	MINOLTA
4	EXTENTION BOARD	1838-710	MINOLTA
5	PROBE HOLD	1838-0007-35	-
6	ANALOG	1838-0004-75	MINOLTA
7	CRT DATA P-ROM	1838-0005-75	MINOLTA
8	MONITOR	PC-KD853N	N.E.C
9	VIDEO SIGNAL GENERATOR	VG814	ASTRODESIGN
10	Program	C Language	SAMSUNG

2)



< 前 面 >



< 後 面 >

- 1) CH00
- ☐ OEM => (Basic 00)
 - ☐ => Master
 - ☐ 가 가 ==> 00
 - ☐ / ==>
 - (2.5 fL ==> 0.2 fL 10 가)
 - ☐ / /QC/Buyer/

- 2) Video Generator Level 0.7 Vp-p
- ☐ Video generator, Color monitor
 - 가 ==> Zero
 - ☐ Video Level (Level)
 - ☐ 0.62~1.00 Vp-p 34 ==> 0.7 Vp-p 3

- 3) Color Monitor (Coupling)
- ☐ Video Generator Offset

- 4) OEM (5) (00)
- ☐ OEM (H.P, SIMENSE, IBM, COMPAQ)

5) White Balance

(Target)

9

Program

Line

가

【 White Balance 】

삼 성 전 자	W/B ADJUSTER	WBAS 9501 v6.60K	98/09/22
---------	--------------	------------------	----------

HIGH-LIGHT

X



313

 y 

329

Y



39.90

[F1]:실행	[F2]:정지	[F3]:RESET	[F4]:종료	[F5]:불량
LINE :	MODEL :	COUNT : 1		

1) / (9)

2) CA-100 / (가 Spec.)

☐

(Sheet)

☐ CA-100

가

Sensor

3) **Lead time**

4) (:KQW-6107 -9)

(Color analyzer

Video generator

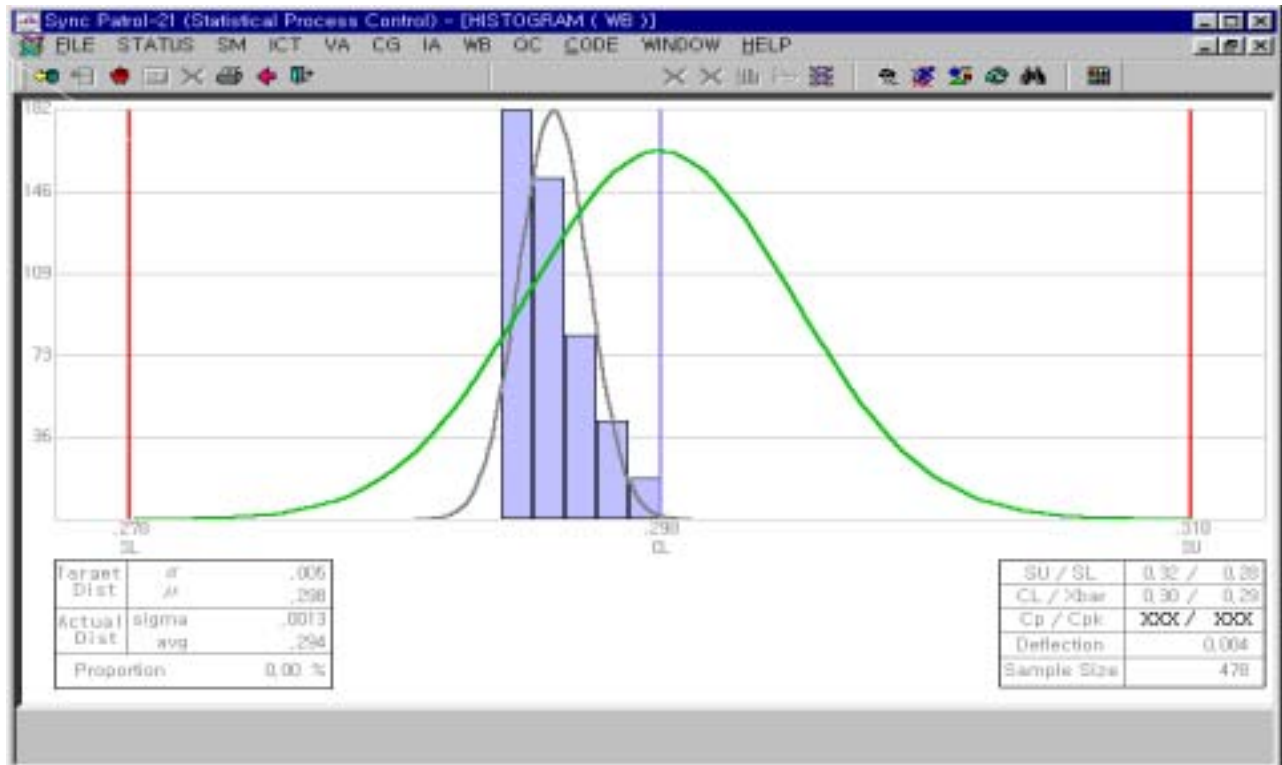
가)

5) SPC

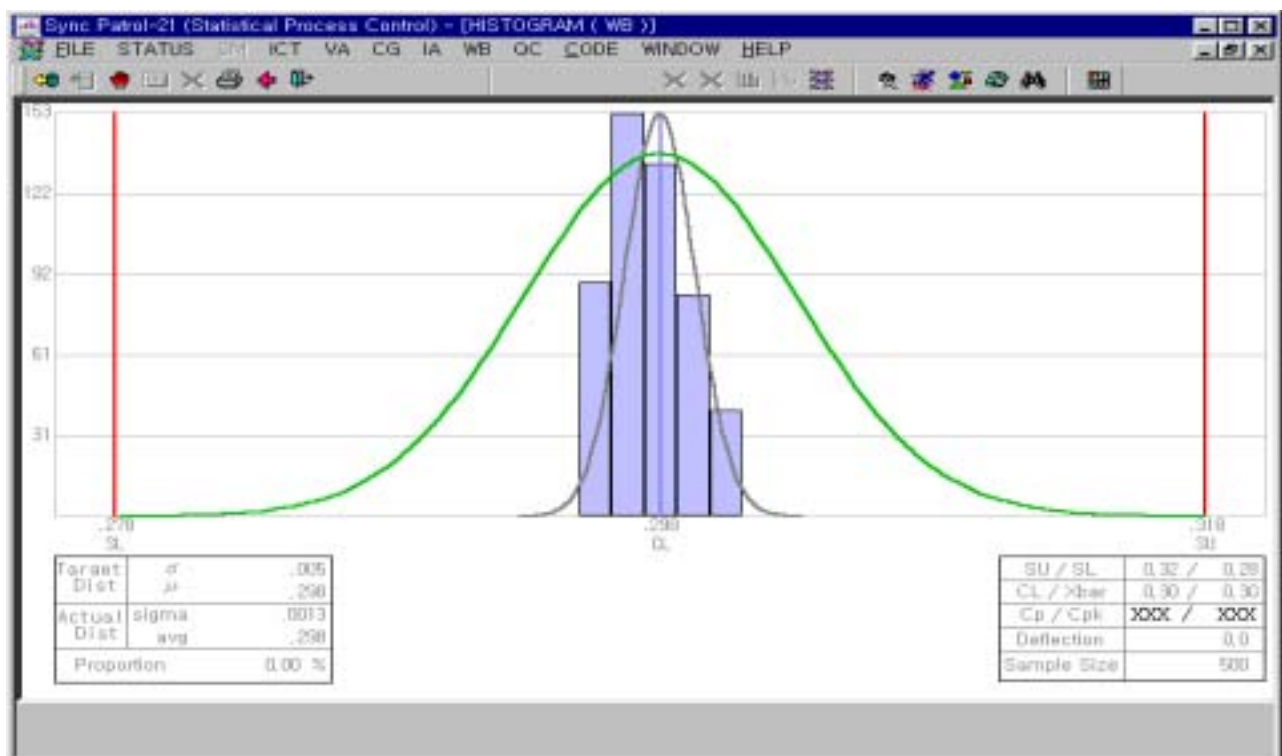
White Balance

【 / White Balance 】

○ (`98.4.1~4.30)



○ (`98.7.1~7.31)

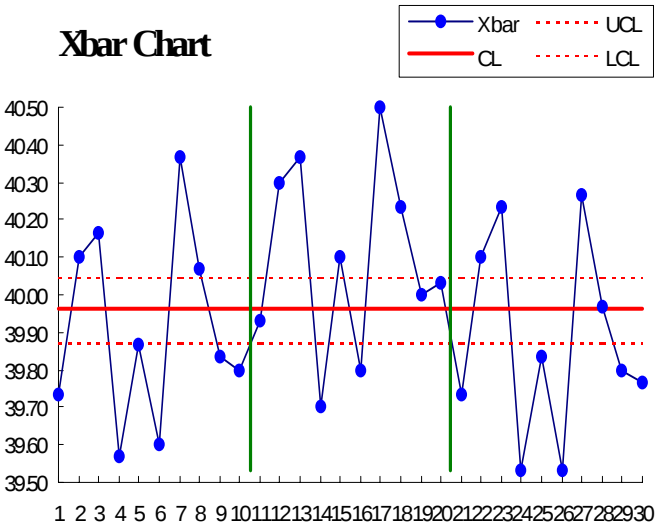


$\overline{R}$ 가 0.17 0.09

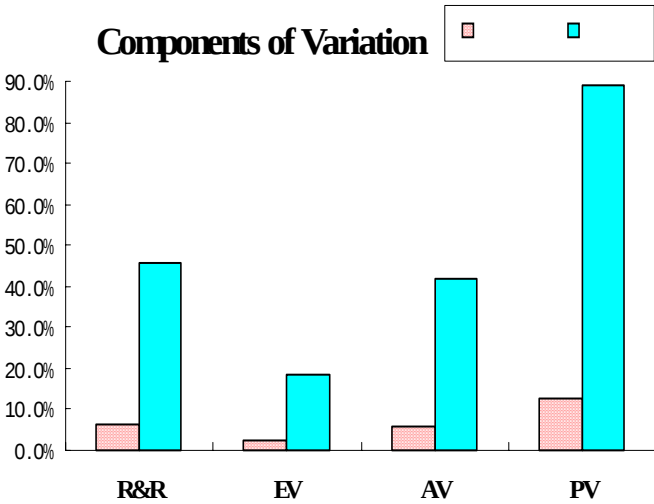
가

Gage Repeatability & Reproducibility

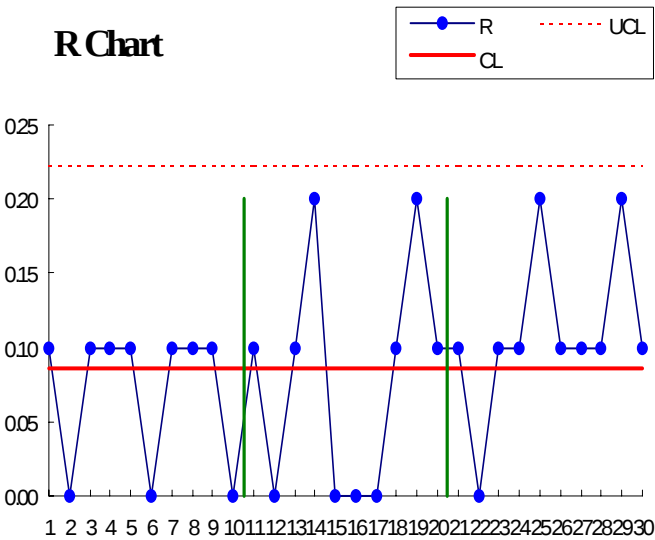
Xbar Chart



Components of Variation



R Chart



R&R	0.6484	6.5%	45.8%
EV	0.2643	2.6%	18.7%
AV	0.5920	5.9%	41.8%
PV	1.2600	12.6%	88.9%
TV	1.4170		

	가
A	%R&R < 10%
B	%R&R ≤ 30%
C	%R&R > 30%

%R&R 53.4% 6.5% 88% .

(AV)가 53.1% 5.9% 89% 가

가.

□ / : 1,560

【 】



$$- \quad \text{가} \quad (287) \times 12 \quad \times \quad (39) \\ \times \quad (19,200) = 1,236$$



□ : 234
QC 가

■

(30 %)

- (39) X (1) X (2)

X (30%) = 234

□ Lead Time : 1,210
CA-100 Video generator QC
Master /
40 10 (Table)

■

(797) X (30) X 30

- (1,687)) = 1,210

X

Lead time : 165,940 / ==> 3,985 /
(797 x 40 x 30 ==> 797 x 10 x 30)

□ : 48

■

(9) X (5.3%)

-

= 48

2)

□ 가 (- 1)

	(`98.1`6)	()	
	800 ppm	10 ppm	
(Cpk)	1.09	1.47	

□ Buyer 가



.

1)

.

2)

가 .

2 .

가.

=>

. White Balance

=>

,Video Generator

, Probe

. CA-100

=> OEM 4

Basic

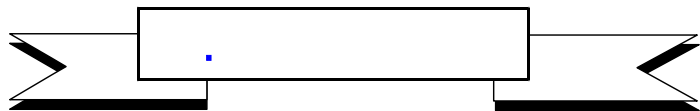
CH(00)

. Video Level

(700mVp-p)

=> 0.62~1.00mVp-p 30

3



1.

가. White Balance (~'98.11)
- Color TV, CCTV Monitor

. / (~ `99.12)
- TV Color Analyzer
- White Balance

. Data (`98.08 ~)

.
(`99.01 ~)

2.

6 White Balance

,

가(MSA)

.

가

가

.



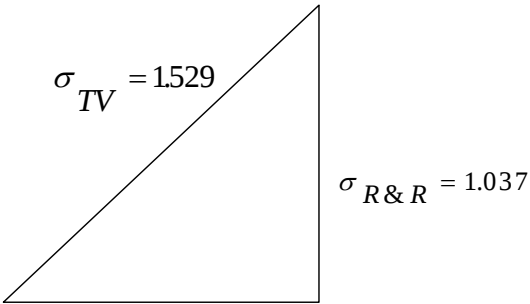
1 : _____

* 98.01% W/B : 800 ppm
: 800 ppm ==> Cpk = Cp = 1.09

1. $C_p = \frac{S_U - S_L}{6\sigma} = \frac{40 - 30}{6\sigma} = 1.09$
 $\frac{10}{6 \times 1.09} = \sigma = 1.529$

2. %R&R = 53.4% 0.534
 $= \frac{5.15\sigma_{R\&R}}{S_U - S_L} = \frac{5.15\sigma_{R\&R}}{10} = 0.534$
 $\sigma_{R\&R} = \frac{10 \times 0.534}{5.15} = 1.037$

3. $\sigma_{TV}^2 = \sigma_{PV}^2 + \sigma_{R\&R}^2$
 $\sqrt{\sigma_{TV}^2 - \sigma_{R\&R}^2} = \sigma_{PV} = 1.124$



4. %R&R = 6.4% 0.064
 $0.064 = \frac{5.15\sigma_{R\&R}}{S_U - S_L} = \frac{5.15\sigma_{R\&R}}{10}$
 $\sigma_{R\&R} = \frac{10 \times 0.064}{5.15} = 0.124$
 $\sigma_{PV} = 1.124$

5. $\sigma_{TV} = \sqrt{\sigma_{PV}^2 + \sigma_{R\&R}^2} = \sqrt{1.124^2 + 0.124^2} = 1.131$ (σ=1.131)

6. $C_p = (C_{PK}) = \frac{S_U - S_N}{6\sigma} = \frac{10}{6 \times 1.131} = 1.47$

Cp가 1.47 9.8 ppm (- 10 ppm)
σ = 4.4 . (Cpk 2.0 = 6 σ)

7.

		()
	800 ppm	10 ppm
Cpk	1.09	1.47
σ	3.3	4.4