

SIGNAL PROCESSOR FOR COLOR TV

■ GENERAL DESCRIPTION

The NJW1300A is a color TFT signal processor which include color signal modulator, count down circuit, RGB demodulator, RGB interface, and common pole driver, required by color TFT signal processing after Y/C separator. It corresponds broadcasting systems of both NTSC and PAL, because it can select the down (1/525 or 1/625) by the internal switch.

The NJW1300A is suitable for TFT LCD pannel and car navigation systems.

■ PACKAGE OUTLINE

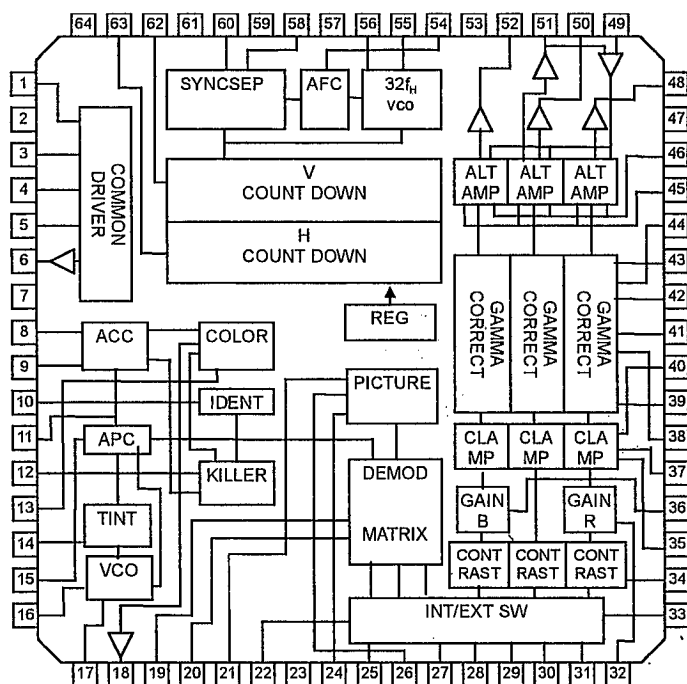


NJW1300AFG1

■ FEATURES

- Low Supply Voltage 5V
- Y/C Separator Input
- NTSC/PAL System (3.58MHz, 4.43MHz)
- Unnecessary Adjustment of Oscillation Frequency for Internal Count Down Circuit.
- External Two System Input for Analog RGB
- Internal Enhancer Circuit
- Internal GAMMA 2 Point Correction Circuit
- Internal Color TFT Common Pole Driver
- Bi-CMOS Technology
- Package Outline TQFP64

■ PIN CONFIGURATION



PIN FUNCTION

1.VCOMAMP	23.VCC1	45.BRIGHT
2.VCC3	24.YINH	46.FRP
3.VCOMIN	25.EXTINB2	47.VCC2
4.VCOMCENT	26.YIN	48.ROUT
5.VCOMFB	27.EXTING1	49.VCENTER
6.VCOMOUT	28.SW1	50.GOUT
7.VEE1	29.EXTING2	51.CDET
8.ACCDET	30.SW2	52.BOUT
9.CIN	31.EXTINR1	53.REGOUT
10.IDENT	32.GAINR	54.LPF
11.CLEANING	33.EXTINR2	55.VCOOUT
12.KILLER	34.CONTRAST	56.VCOIN
13.COLOR	35.GACLAMPB	57.GND1
14.TINT	36.GAINB	58.VS
15.APC	37.GACLAMPG	59.GND2
16.VCXO1	38.VG1	60.SYNCIN
17.VCXO2	39.VG2	61.VDD
18.CHROMAOUT	40.GACLAMPB	62.VD
19.RYIN	41.SUBVG2R	63.HD
20.BYIN	42.SUBVG2B	64.DIGREF
21.PICTURE	43.SUBVG1R	
22.EXTINB1	44.SUBVG1B	

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETERS	SYMBOL	RATINGS	UNIT
Supply Voltage 1	$V_{CC1}-GND$	8.0	V
Supply Voltage 2	$V_{CC2}-GND$	8.0	V
Supply Voltage 3	$V_{CC3}-V_{EE1}$	15.0	V
Supply Voltage 4	$V_{DD}-DIGREF$	7.0	V
Supply Voltage 5	$V_{EE1}-GND$	-7.0	V
Power Dissipation	P_D	700	mW
Each Adjustment Terminal	V_{IN}	V_{CC1}	V
SYNC OUT Voltage	V_{SD}	$V_{EE1}+15.0$	V
Picture Input Voltage	V_{VDIN}	3.0	V_{PP}
External Input Voltage	EXT_{IN}	V_{CC1}	V
FRP Input Signal Voltage	FRP_{IN}	V_{CC1}	V
SYNC Input Voltage	$SYNC_{IN}$	V_{CC1}	V
Analog RGB Input Signal	RGB_{IN}	3.0	V_{PP}
Operating Temperature Range	T _{orp}	-30~+85	°C
Storage Temperature Range	T _{str}	-40~+125	°C

■ RECOMMENDED OPERATING CONDITION

(Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage Range		$V_{CC1}-GND$	4.75	5.00	5.25	V
		$V_{CC2}-GND$	V_{CC1}	5.00	5.25	V
		$V_{CC3}-V_{EE1}$	11.00	12.00	13.00	V
		$V_{EE1}-GND$	-5.25	-5.0	-4.75	V
		$V_{DD}-DIGREF$	4.75	5.00	5.25	V
Y Input Signal Voltage	Y_{IN}	Pedestal—White	0.30	0.35	0.40	V_{P-P}
Y Input Signal Voltage	C_{IN}	Amplitude of Burst Signal	0.10	0.15	0.20	V_{P-P}
Analog RGB Input Signal	RGB_{IN}		0.6	0.7	0.8	V_{P-P}
SYNC Input Signal	$SYNC_{IN}$		0.3	1.0	1.5	V_{P-P}

■ ELECTRICAL CHARACTERISTICS ($V_{CC1}=5V, V_{CC2}=5V, V_{CC3}=7V, V_{DD}=5V, V_{EE1}=-5V, T_a=25^{\circ}C$)

PARAMETERS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX	UNIT
Operating Current 1	I_{CC1}	V_{CC1}	—	33.5	45.0	mA
Operating Current 2	I_{CC2}	V_{CC2}	—	6.5	8.4	mA
Operating Current 3	I_{CC3}	V_{CC3}	—	5.8	7.7	mA
Operating Current 4	I_{CC4}	V_{DD}	—	4.7	6.6	mA
Operating Current 5	I_{EE1}	V_{EE1}	-11.8	-7.5	—	mA
Contrast Adjust Gain Variable Range	G_{CT1}	SG1 applied to V22, V27 and V31, define the each amplitude (BLK — WHT) at V28=H, V30=L and V34=0V, 2.5V, 5V as A, B and C.	—	-12.5	-9.0	dB
	G_{CT2}	$G_{ST1} = 20\log(A / B)$ $G_{ST2} = 20\log(C / B)$ $R_{OUT}, G_{OUT}, B_{OUT}$ terminals.	1.0	2.5	—	dB
Sub Contrast Adjust Gain Variable Range	G_{SC1}	SG1 applied to V22 and V31, define the each amplitude (BLK — WHT) at V28=H, V30=L, V34=0V, V32=0V, 2.5V, 5V, V36=0V, 2.5V, 5V as A, B, and C.	—	-2.5	-1.0	dB
	G_{SC2}	$G_{SC1} = 20\log(A / B)$ $G_{SC2} = 20\log(C / B)$ $R_{OUT}, G_{OUT}, B_{OUT}$ terminals.	1.0	2.5	—	dB
Image Quality Adjust Variable Minimum Range	G_{PS}	SG3(100KHz, 2.4MHz) applied to V24, V26 define each gain of sin signal of frequency as A, B. $G_P = A - B$ (at V21=5V)	—	0	—	dB
Image Quality Adjust Variable Maximum Range	G_{PM}	SG3(100KHz, 2.4MHz) applied to V24, V26 define each gain of sin signal of frequency as A, B. $G_P = A - B$ (at V22=5V)	—	16.0	—	dB
Chroma Maximum Output	V_{CMAX}	SG6(4.43MHz) applied to V14=0V, V13=5V, V9, measure the chroma amplitude on V18.	0.6	0.95	1.35	V_{P-P}
ACC Characteristic (NTSC)	G_{A1}	SG6(3.58MHz, 0dB, +6dB, -25dB) applied to V9, measure the amplitude on V18 at 0dB, +6dB, -25dB. Define the each value as A, B, and C.	—	0.0	2.0	dB
	G_{A2}	$G_{A1} = 20\log(B / A)$ $G_{A2} = 20\log(C / A)$	-12.5	-7.5	—	dB
ACC Characteristic (PAL)	G_{A3}	SG6(4.43MHz, 0dB, +6dB, -25dB) applied to V9, measure the amplitude on V18 at 0dB, +6dB, -25dB. Define the each value as A, B, and C.	—	0.0	2.0	dB
	G_{A4}	$G_{A3} = 20\log(B / A)$ $G_{A4} = 20\log(C / A)$	-12.5	-7.5	—	dB

■ ELECTRICAL CHARACTERISTICS (Ta=25°C,VCC1=5V,VCC2=5V,VC3=7V,VDD=5V,VEE1=-5V)

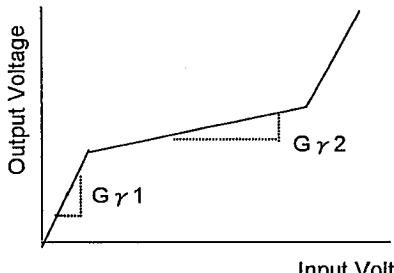
PARAMETERS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX	UNIT
Color Control Gain Variable Range	G _{c1}	SG6 applied to define the each chroma amplitude of V18 at V14=0V,2.9V and 5V as A,B and C.	-40.0	-30.0	-20.0	dB
	G _{c2}	G _{c1} = 20log(A / B) G _{c2} = 20log(C / B)	0.7	2.7	—	dB
APC Capture Range (NTSC)	f _{A1}	SG6(3.58MHz,0dB) applied to V9,Variable the BURST frequency until the voltage on V12 drops below 2V. Work out the difference between the frequency at that time and 3.579545MHz.	—	-2900	-700	Hz
	f _{A2}	f _{A1} = when approach BURST frequency from low frequency. f _{A2} = when approach BURST frequency from high frequency	+700	+1500	—	Hz
APC Capture Range (PAL)	f _{A3}	SG6(4.43MHz,0dB) applied to V9,Variable the BURST frequency until the voltage on V12 drops below 2V. Work out the difference between the frequency at that time and 4.433619MHz.	—	-2500	-600	Hz
	f _{A4}	f _{A3} = when approach BURST frequency from low frequency f _{A4} = when approach BURST frequency from high frequency	+600	+1700	—	Hz
TINT Variable Range	Θ _{T1}	SG6 applied to V9, define the phase causing the maximum amplitude at V14= 8V on Gout as A. Define the each phase causing the maximum amplitude at V14=2.7V,3.6V on Gout as B and C.	+30	+60	—	deg
	Θ _{T2}	Θ _{T1} = A-B Θ _{T2} = C-B	—	-60	-30	deg
NTSC /PAL Switching Voltage	V _{THNP}	SG6 applied to V9 decrease the voltage on V14 until the signal on Gout disappears. V14 terminals.	0.4	0.7	1.0	V
Color Killer Operating Input Level(NTSC)	V _{KIN1}	SG6(NTSC) applied to V9,decause the input amplitude until the killer is turned on , and measure the input attenuation.	—	-42	-37	dB
Color Killer Operating Input Level (PAL)	V _{KIN2}	SG6(PAL) applied to V9,decause the input amplitude until the killer is turned on , and measure the input attenuation	—	-38	-32	dB

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, Vcc1=5V, Vcc2=5V, Vcc3=7V, VDD=5V, VEE1=-5V)

PARAMETERS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Level Voltage Difference among RGB	ΔV_{BCEN}	SG1(0.7Vpp) and V46=SG10 applied to V60=SG2, V21=0V, V28=H, V22, V27, V31, adjust the amplitude of Gout 3.0Vpp. Then define the non-inverting side of Rout, Gout, Bout as VRB, VGB, and VBB, the invert side of them as VRBI, VGBI, and VBBI. $\Delta V_{BRGB} = VRB - VGB, VBB - VGB$ $= VRBI - VGBI, VBBI - VGBI$	-150	0	+150	mV
INT-EXT Output Black Level Voltage Difference	ΔV_{BIE}	SG4 applied to V28=L, V26, define the non-inverting side of Rout, Gout, Bout as VRB(Y), VGB(Y), and VBB(Y), the invert side of VRBI(Y), VGBI(Y), and VBBI(Y). $VBIE = VRB - VRBI(Y), VGB - VGBI,$ $= VBB - VBB(Y), VRBI - VRBI(Y),$ $= VGBI - VGBI(Y), VBBI - VBBI(Y)$				
Gain Difference Between Invert And Non-invert	ΔG_{INV}	SG1(0.7Vpp) applied to V28=H, V22, V27, V31, measure the amplitude(BLK-WHT) of R _{OUT} , G _{OUT} , B _{OUT} . Define the non-inverting side of VRG, VGG, VBG, the invert side of VRGI, VGGI, VBGI.	—	0	±0.6	dB
Gain Difference Among RGB	ΔV_{RGB}	$\Delta G_{INV} = 20\log(VRGI/VRG)$ $= 20\log(VGGI/VGG)$ $= 20\log(VBGI/VBG)$ $\Delta VRG = 20\log(VRG/VGG)$ $= 20\log(VGG/VBG)$ $= 20\log(VBG/VRG)$				
FRP Input Threshold Voltage	V _{THFRP}	SG1 applied to V28=H, V27, increase V46 until the signal on Gout invert. Then, measure the voltage on V46.	1.2	1.5	1.8	V
Interface Frequency Characteristic	f _{INT}	SG1(100kHz) applied to V28=H, V27, for making the amplitude of sine wave part of the non-invert signal on Gout, increase the frequency until attenuate by 3dB from the amplitude at the 100kHz.	6	7	—	MHz
EXTRGB Input Threshold Voltage	V _{THEXH}	Switching Voltage of V28, V30 V _{THEXH} =ON level voltage	3.3	—	—	V
	V _{THEXL}	V _{THEXH} =OFF level voltage	—	—	1.6	V

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■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V_{CC1}=5V, V_{CC2}=5V, V_{CC3}=7V, V_{DD}=5V, V_{EE1}=-5V)

PARAMETERS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX	UNIT
Gamma Characteristic	G _{r1}	SG7 applied to V28=H, V22, V27 and V31, define at V38=1.8V, V39=3.0V, measure the slope on Rout, Gout, and B _{OUT} .	17.0	23.0	29.0	dB
	G _{r2}		4.0	9.0	14.0	dB
AFC Lock Range	Δf _{HL1}	SG2 applied to V28=H, V60, define frequency of miss lock SYNC at valuable frequency of SG2 when AFC is lock.	—	+700	—	Hz
	Δf _{HL2}	Δf _{HL1} =miss lock to high frequency Δf _{HL2} =miss lock to low frequency	—	-1000	—	Hz
AFC Capture Range	Δf _{HP1}	SG2 applied to V28=H, V60, define frequency of miss lock SYNC at valuable frequency of SG2 when AFC is miss lock.	—	+700	—	Hz
	Δf _{HP2}	Δf _{HP1} =capture from high frequency Δf _{HP2} =capture from low frequency	—	-1000	—	Hz
AFC Free-run Frequency	f _{OH}	V60 is non-input. Measure the output frequency on V63.	15.2	15.7	16.2	kHz
Horizontal Output Pulth Width	P _{WHD}	Output pulth width on V63	3.5	3.9	4.3	μs
Horizontal Output Delay	T _{PDH}	Delay time of between before external filter and V63.	0.70	0.86	1.02	μs
Horizontal Output Saturation Level	V _{OLH}	Low level of output on V63	—	0.1	0.3	V
Vertical Output Pulth Width	P _{WVD}	Output pulth width on V63	3.5	4.0	4.5	H
Vertical Output Delay	T _{PVD}		0.45	0.65	0.85	H

(※Point1) When suspected SYNC input to NJW1300A, necessary on 5H(1H:horizontal term, about 63.5us) of pulth width of suspected SYNC.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V_{CC}1=5V, V_{CC}2=5V, V_{CC}3=7V, VDD=5V, VEE1=-5V)

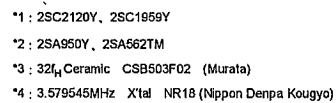
PARAMETERS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX	UNIT
Crosstalk Among RGB	CTRGB1	SG5(1MHz,700mVpp) applied to V28=H, V 22.V21,V27,V31=GND,V49=1.3V.Measure the amplitude of 1MHz component on Rout, Gout and Bout. Calculate the amplitude ratio of Rout and Gout to Bout.	—	-50	-40	dB
	CTRGB2	SG5(1MHz,700mVpp) applied to V28=H, V 27.V21,V23,V31=GND,V49=2.2V.Measure the amplitude of 1MHz component on Rout, Gout and Bout. Calculate the amplitude ratio of Rout and Bout to Gout.	—	-50	-40	dB
	CTRGB3	SG5(1MHz,700mVpp) applied to V28=H, V 31.V21,V27=GND,V49=1.3V.Measure the amplitude of 1MHz component on Rout, Gout and Bout. Calculate the amplitude ratio of Rout to Gout and Bout.	—	-50	-40	dB
Crosstalk 1 Between SW (EXT1→INT) (※Point2)	CTE1IR	SG5(1MHz,700mVpp) applied to V31, V21, V26=GND,V49=1.3V.Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V28=0V,5V .	—	-50	-35	dB
	CTE1IG	SG5(1MHz,700mVpp) applied to V27, V21, V26=GND,V49=2.2V.Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V28=0V,5V.	—	-50	-35	dB
	CTE1IB	SG5(1MHz,700mVpp) applied to V22, V21, V26=GND,V49=1.3V.Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V28=0V,5V.	—	-50	-35	dB
Crosstalk 2 Between SW (EXT1→EXT2)	CTE1E2R	SG5(1MHz,700mVpp) applied to V31, V21, V33=GND,V28=5V,V49=1.3V.Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V30=0V,5V .	—	-50	-35	dB
	CTE1E2G	SG5(1MHz,700mVpp) applied to V27, V21, V33=GND,V28=5V,V49=2.2V.Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V30=0V,5V .	—	-50	-35	dB
	CTE1E2B	SG5(1MHz,700mVpp) applied to V22, V21, V33=GND,V28=5V,V49=1.3V.Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V30=0V,5V .	—	-50	-35	dB

(※Point 2) Investigation Crosstalk level when design for depend to application.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V_{CC}1=5V, V_{CC}2=5V, V_{CC}3=7V, V_{DD}=5V, V_{EE}1=-5V)

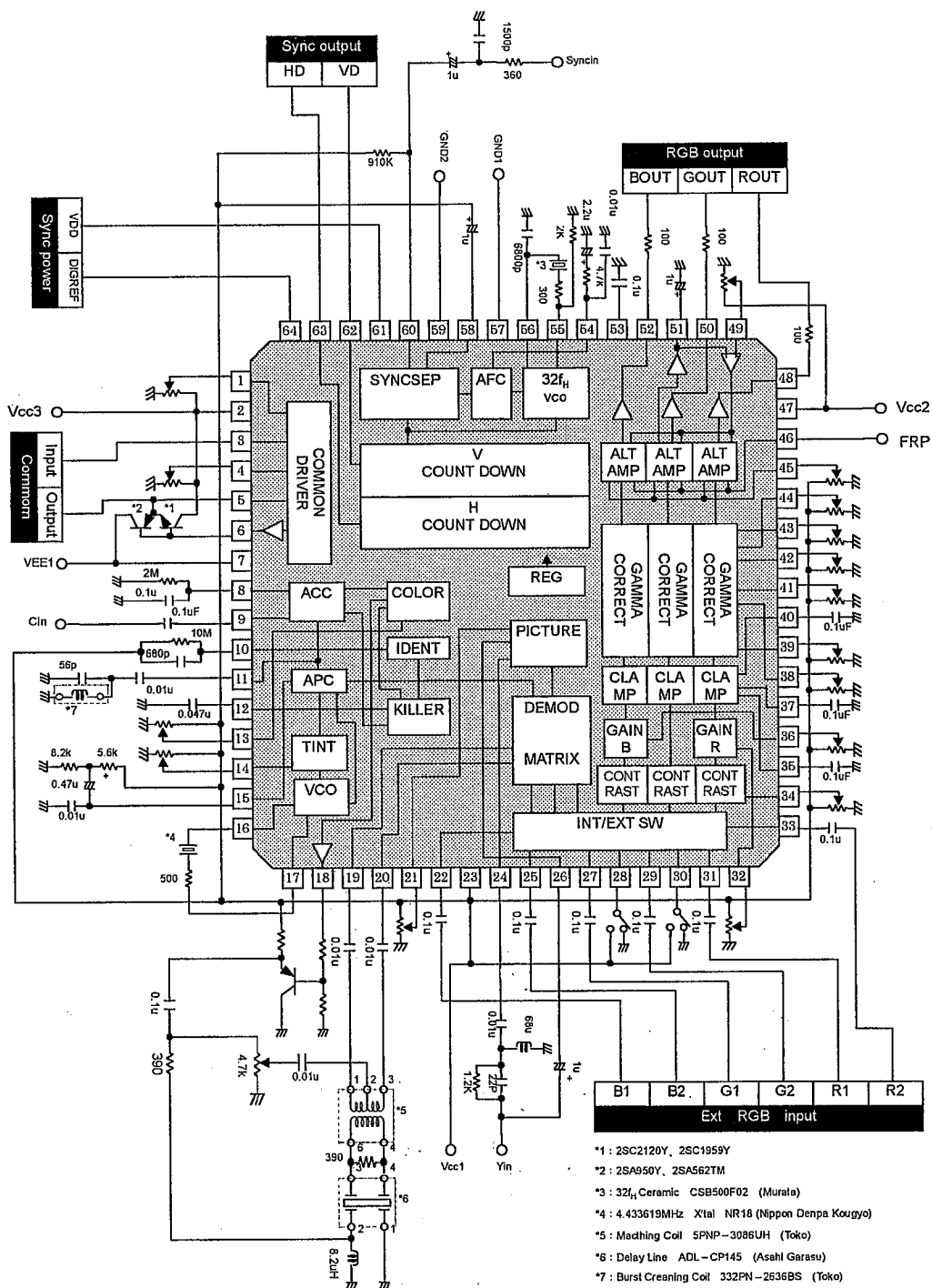
PARAMETERS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX	UNIT
Crosstalk 3 Between SW (EXT2→INT) (※Point 2)	CTE2IR	SG5(1MHz, 700mVpp) applied to V33, V21, V26=GND, V30=5V, V49=1.3V. Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V28=0V, 5V.	—	-50	-35	dB
	CTE2IG	SG5(1MHz, 700mVpp) applied to V29, V21, V26=GND, V30=5V, V49=2.2V. Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V28=0V, 5V.	—	-50	-35	dB
	CTE2IB	SG5(1MHz, 700mVpp) applied to V25, V21, V26=GND, V30=5V, V49=1.3V. Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V28=0V, 5V.	—	-50	-35	dB
Crosstalk 4 Between SW (EXT2→EXT1)	CTE2E1R	SG5(1MHz, 700mVpp) applied to V33, V21, V31=GND, V28=5V, V49=1.3V. Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V30=0V, 5V.	—	-50	-35	dB
	CTE2E1G	SG5(1MHz, 700mVpp) applied to V29, V21, V27=GND, V28=5V, V49=2.2V. Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V30=0V, 5V.	—	-50	-35	dB
	CTE2E1B	SG5(1MHz, 700mVpp) applied to V25, V21, V23=GND, V28=5V, V49=1.3V. Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V30=0V, 5V.	—	-50	-35	dB
Crosstalk 5 Between SW (INT→EXT1)	CTIE1R	SG5(1MHz, 350mVpp) applied to V26, V21, V31=GND, V49=2.2V. Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V28=0V, 5V.	—	-50	-35	dB
	CTIE1G	SG5(1MHz, 350mVpp) applied to V26, V21, V26=GND, V49=2.2V. Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V28=0V, 5V.	—	-50	-35	dB
	CTIE1B	SG5(1MHz, 700mVpp) applied to V26, V21, V23=GND, V49=2.2V. Measure the amplitude of 1MHz component on Rout. Calculate the amplitude ratio of V28=0V, 5V.	—	-50	-35	dB
VCOM Output Slew Rate	SRVCOM	SG9 applied to V3. Measure the output on V5.	4.0	9.0	—	V/μs
VCOM Center Voltage	VCVCOM	SG9 applied to V3. Measure the output on V5.	—	1.2	—	V
VCOM Amplitude	VAVCOM	SG9 applied to V3. Measure the output on V5.	—	6.5	—	V _{p,p}
Delay Between Y-C	ΔT _{dYC}		—	400	—	ns

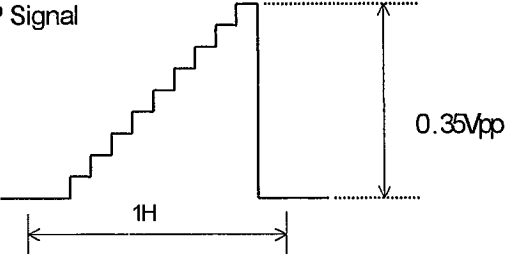
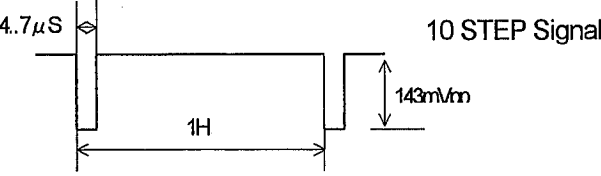
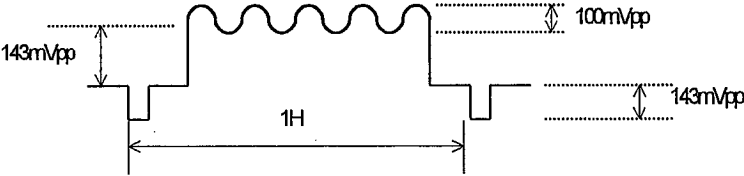
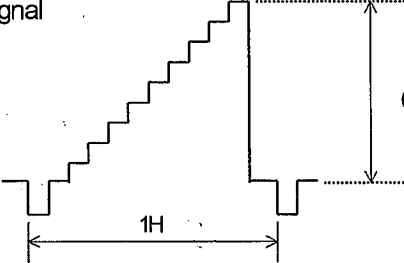
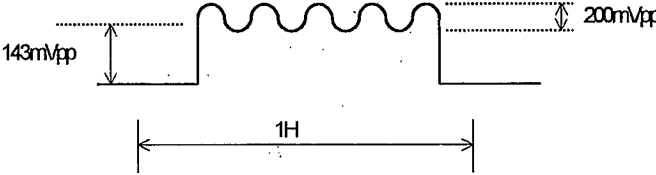
(※Point 2) Investigation Crosstalk level when design for depend to application

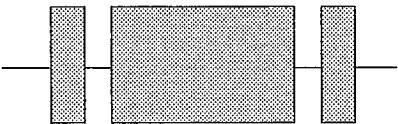
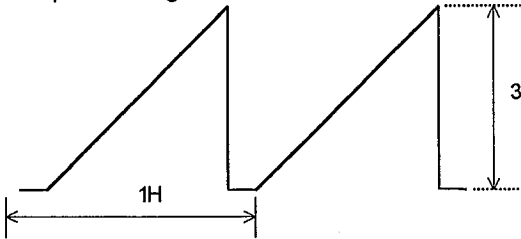
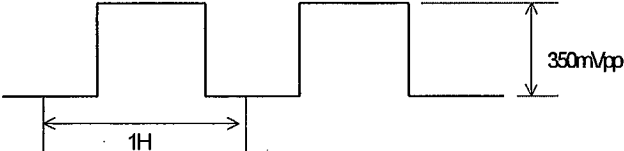
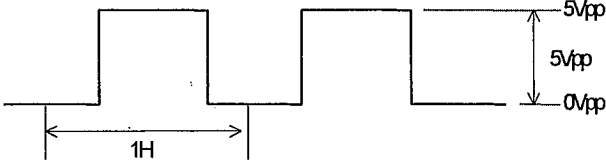
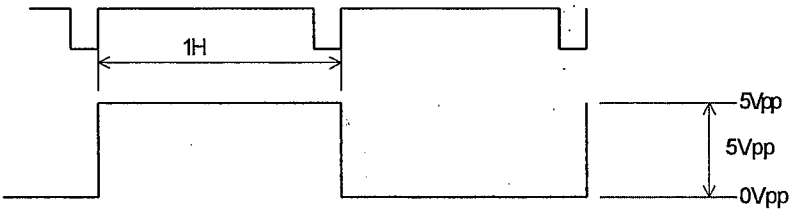
$$(V_{CC1}=5V, V_{CC2}=5V, V_{CC3}=7V, V_{DD}=5V, V_{EE1}=-5V, GND=0V, DIGREF=0V)$$


■ Application Circuit (PAL)

($V_{CC1}=5V, V_{CC2}=5V, V_{CC3}=7V, V_{DD}=5V, V_{EE1}=-5V, GND=0V, DIGREF=0V$)



SG 1	No Sync 10STEP Signal 
SG 2	Composite Y Signal With Sync 
SG 3	Sine Video Signal With Sync 
SG 4	10STEP Video Signal 
SG 5	No SYNC Sine Video Signal 

SG 6	C Signal  Burst Amplitude=150mVpp Chroma Amplitude=150mVpp
SG 7	No SYNC Ramp Video Signal  350mVpp 1H
SG 8	Video Signal Of Turn ON, Turn OFF Under 50nS  350mVpp 1H
SG 9	Turn ON, Turn OFF Under 50nS  5Vpp 5Vpp 0Vpp 1H
SG 10	 5Vpp 5Vpp 0Vpp 1H FRP Signal Of Non-inverting Every 1H

NJW1300A

MEMO

[CAUTION]

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