COLOR TFT SIGNAL PROCESSOR

■ GENERAL DESCRIPTION

The **NJM2527** is a color TFT signal processor.

It contains all function, like as Y/C separator circuit, color signal de-modulator, synchronous separate circuit, RGB interface, and sideblack control circuit, required by color TFT signal processing.

The **NJM2527** keeps selecting NTSC/PAL with external VCXO circuit TRAP circuit for each broadcasting.

■ PACKAGE OUTLINE

NJM2527FR2

■ FEATURES

- ● NTSC/PAL matching (Resemblance PAL de-modulation system)
- ● Internal Y/C separate circuit
- ● Input mode: Composite video signal, Y/C separate signal, External RGB signal
- ● Internal synchronous separate circuit (Liquid crystal panel PLL use)
- ● Internal black level insertion circuit (Use for aspect ratio change)
- ● Internal Gamma 2-point correction circuit
- ● Bipolar technology
- ● Package Outline QFP48-R2

■ BLOCK DIAGRAM
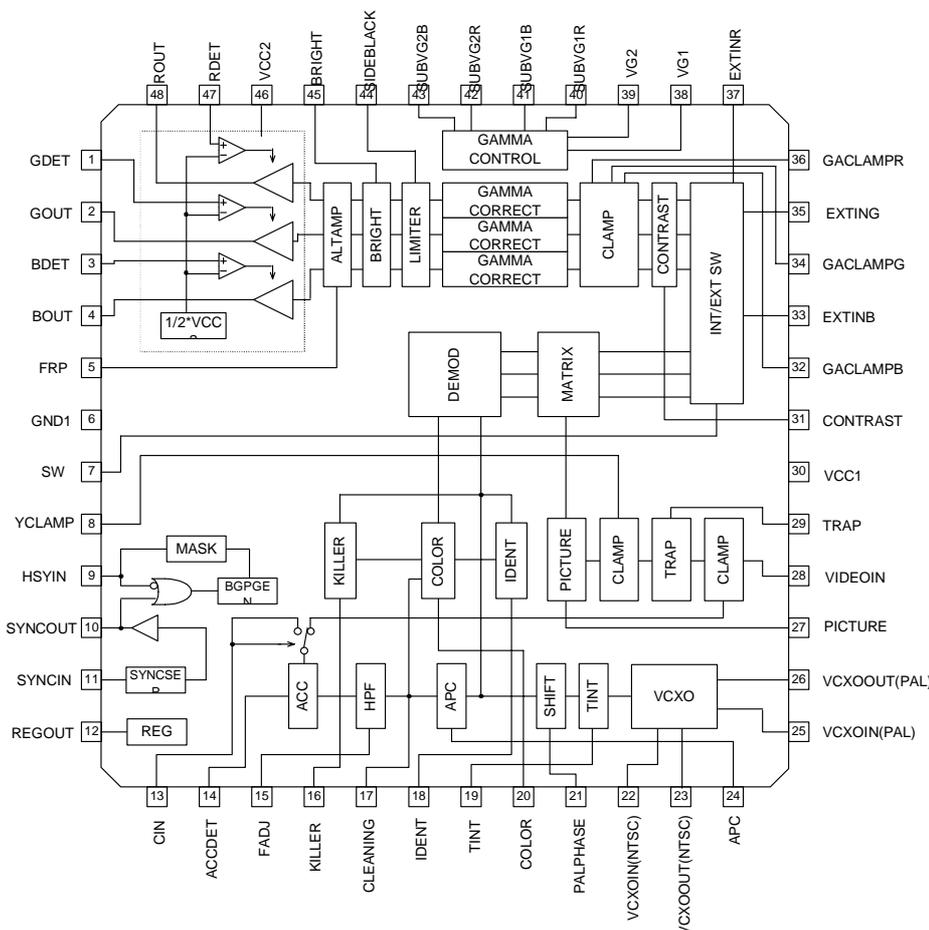
■ PIN CONFIGURATION

1 . GDET	25.VCXOIN(PAL)
2 . GOUT	26.VCXOOUT(PAL)
3 . BDET	27.PICTURE
4 . BOUT	28.VIDEOIN
5 . FRP	29.TRAP
6 . GND1	30.VCC1
7 . SW	31.CONTRAST
8 . YCLAMP	32.GACLAMPB
9 . HSYIN	33.EXTINB
10.SYNCOUT	34.GACLAMPG
11.SYNCIN	35.EXTING
12.REGOUT	36. GACLAMPR
13.CIN	37.EXTINR
14.ACCDET	38. VG1
15.FADJ	39. VG2
16.KILLER	40. SUBVG1R
17.CLEANING	41. SUBVG1B
18.IDENT	42. SUBVG2R
19.TINT	43. SUBVG2B
20.COLOR	44. SIDEBLACK
21.PALPHASE	45. BRIGHT
22.VCXOIN(NTSC)	46.VCC2
23.VCXOOUT(NTSC)	47. RDET
24.APC	48. ROUT

■ **ABSOLUTE MAXIMUM RATINGS** (Ta=25°C)

PARAMETERS	SYMBOL	RATINGS	UNIT
Supply Voltage 1	$V_{CC}1$ - GND	10.0	V
Supply Voltage 2	$V_{CC}2$ - GND	10.0	V
Power Dissipation	P_D	1000*	W
Each Adjustment Terminal	V_{IN}	$V_{CC}1$	V
Sync Out Voltage	V_{SD}	10.0	V
Video Input Voltage	V_{VDIN}	3.0	V_{P-P}
External Input Voltage	EXT_{IN}	$V_{CC}1$	V
Analog RGB Input Signal	RGB_{IN}	$V_{CC}1$	V
FRP Input Signal Voltage	FRP_{IN}	$V_{CC}1$	V
SYNC Input Voltage	$SYNC_{IN}$	3.0	V_{P-P}
Operating Temperature Range	Topr	-40 to +85	°C
Storage Temperature Range	Tstr	-40 to +150	°C

*Test Board(117.0x84.0x0.8mm)mounting

■ **RECOMMENDED OPERATING CONDITION** (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage Range	-	$V_{CC}1$ - GND	4.75	5.0	5.25	V
	-	$V_{CC}2$ - GND	$V_{CC}1$	5.0	7.0	V
Composite Signal Voltage	V_{IN}	Pedestal-White	0.6	0.7	0.8	V_{P-P}
Y Input Signal Voltage	Y_{IN}	Pedestal-White	0.6	0.7	0.8	V_{P-P}
C Input Signal Voltage	C_{IN}	Amplitude of Burst Signal	0.2	0.3	0.4	V_{P-P}
Analog RGB Input Signal	RGB_{IN}	Pedestal-White	0.6	0.7	0.8	V_{P-P}
SYNC Input Signal	$SYNC_{IN}$	C.Sync	0.3	1.0	1.5	V_{P-P}
		Sync Tip-Pedestal				
HSY Input Signal	HSY_{IN}		2	-	5	V_{P-P}
TINT Adjust Voltage	TINT	NTSC	1.6	-	4.1	V
		PAL	-	0	0.3	V
Color Adjust Voltage	COLOR		0	-	5	V
BY De-mod. Axis Adjust Voltage	PALPHASE		0	-	5	V
Picture Adjust Voltage	PICTURE		0	-	5	V
Contrast Adjust Voltage	CONTRAST		1.5	-	2.8	V
Gamma 1 Adjust Voltage	VG1		1.5	-	3.5	V
Gamma 2 Adjust Voltage	VG2		1.5	-	3.8	V
Sub Gamma 1 Adjust Voltage	SUBVG1R, B		0	-	5	V
Sub Gamma 2 Adjust Voltage	SUBVG2R, B		0	-	5	V
Bright Adjust Voltage	BRIGHT		1.9	-	3.6	V

(Point 1) Investigation Crosstalk level when design for depend to application.

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C,V_{CC}1=5V, V_{CC}2=5V,TP20=TP31=TP45=2.5V,
TP19=2.8V,TP7=5V,TP38=1V,TP39=3V,TP44=0V,SW13=SW7=L)

PARAMETER	SYMBOL	TEST CONDITION (TP=IC Pin No.)	MIN.	TYP.	MAX.	UNIT
Operating Current 1	I_{CC}1	V_{CC}1, No signal	-	45.0	60.0	mA
Operating Current 2	I_{CC}2	V_{CC}2, No signal	-	14.5	20.0	mA
Contrast Adjust Gain Variable Range	G_{CT}1	SG1 applied to TP33, TP35 and TP37. SG10 applied to TP5, SG11 applied to TP9, SG2 applied to TP11, define the each amplitude (BLK-WHT) at SW7=H, and TP31=0V, 2.5V, 5V as V1, V2 and V3. Then measure the each output of the non-inverting G_{CT1}=20LOG(V1/V2) G_{CT2}=20LOG(V3/V2) Measure points are Rout, Gout, Bout.	-	-12.0	-9.0	dB
	G_{CT}2		1.0	2.5	-	
Image Quality Adjust Variable Minimum Range (Y/C)	G_{PSMIN}1	SG3 (100KHz, 2.0MHz / 70mVp-p) applied to TP28, SG10 applied to TP5, SG11 applied to TP9, SG2 applied to TP11, 1.5V applied to TP38, 3.2V applied to TP39.measure amplitude on TP2 of non-inverting. The each gain on SG3 of sin signal of frequency define as G(2.0M),G(100K). G_{PSMIN1}=G (2.0M)-G (100K) At SW27=H, TP27=0V G_{PSMAX1}=G (2.0M)-G (100K) At SW27=H, TP27=5V	-	0.0	4.0	dB
Image Quality Adjust Variable Maximum Range (Y/C)	G_{PSMAX}1		10.0	15.0	-	
Image Quality Adjust Variable Minimum Range (Composite)	G_{PSMIN}2	SW13=H, TP13(B)=0V, SG3 (100KHz, 2.0MHz / 70mVp-p) applied to TP28, SG10 applied to TP5, SG11 applied to TP9,SG2 applied to TP11, 1.5V applied to TP38, 3.2V applied to TP39.measure amplitude on TP2 of non-inverting.The each gain on SG3 of sin signal of frequency define as G(2.0M),G (100K). (typical swing) G_{PSMIN2}=G (2.0M)-G (100K) at SW27=H,TP27=0V G_{PSMAX1}=G (2.0M)-G (100K) at SW27=H,TP27=5V	-	-5.0	-1.0	dB
Image Quality Adjust Variable Maximum Range (Composite)	G_{PSMAX}2		6.0	10.0	-	
Trap attenuation (NTSC)	G_{CF} NT	SW13=H, TP13(B)=0V,TP27=2.5V,SG2 applied to TP11, SG11 applied to TP9, SG3 (100KHz, 3.579545MHz , 4.43361875MHz 200mVpp) applied to TP28. B1, B2 define output swing of TP2	-	-45	-30	dB
Trap attenuation (PAL)	G_{CF} PAL	at TP19=2.8V,SG3 (3.579545MHz), SG3 (100KHz). B3, B4 define output swing of TP2 at TP19=0V, SG3 (4.43361875MHz), SG3 (100kHz). G_{CF}NT=20*LOG (B1/B2) G_{CF}PAL=20*LOG (B3/B4)	-	-45	-30	

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C,V_{CC}1=5V, V_{CC}2=5V,TP20=TP31=TP45=2.5V,
TP19=2.8V,TP7=5V,TP38=1V,TP39=3V,TP44=0V,SW13=SW7=L)

PARAMETER	SYMBOL	TEST CONDITION (TP=IC Pin No.)	MIN.	TYP.	MAX.	UNIT
ACC Characteristic (NTSC)	G_A1	SG11 applied to TP9, SG2 applied to TP11, 0.7V applied to TP38,SG6 (3.579545MHz, 300mVpp typical swing) applied to TP13, Vo1, Vo2 and Vo3 define output swing of TP2 at set SG6 on 0dB, +6dB, -25dB toward 0.3Vpp. G_{A1}=20LOG(Vo2/Vo1) G_{A2}=20LOG(Vo3/Vo1)	-	0.0	2.0	dB
	G_A2		-15.0	-10.0	-	
ACC Characteristic (PAL)	G_A3	SG11 applied to TP9, SG2 applied to TP11, 0.7V applied to TP38,SG6 (4.43MHz, 300mVpp typical swing) applied to TP13,TP19=L.Vo1, Vo2 and Vo3 define output swing of TP2 at set SG6 on 0dB, +6dB,-25dB toward 0.3Vpp. G_A3=20LOG(Vo2/Vo1) G_A4=20LOG(Vo3/Vo1)	-	0.0	2.0	dB
	G_A4		-15.0	-10.0	-	
Color Control Gain Variable Range	G_c1	SG11 applied to TP9, SG2 applied to TP11, 0.7V applied to TP38,SG6 (3.579545MHz,typical Swing 300mVpp) applied to TP13. Vo1, Vo2 and Vo3 define output swing of TP2 at TP20=0V, 2.5V, 5.0V. G_C1=20LOG(Vo1/Vo2) G_C2=20LOG(Vo3/Vo2)	-70	-50	-40	dB
	G_c2		2.0	4.0	-	
APC Capture Range (Input Composite Signal, NTSC)	f_A1	SG11 applied to TP9, SG2 applied to TP11, SG6 (3.579545MHz, 300mVpp typical swing) applied to TP13 or TP28. This item is difference between the input frequency and 3.579545 MHz at work out 2V of TP16 voltage by variable the BURST frequency. f_A1=when approach BURST frequency from low frequency. f_A2= when approach BURST frequency from high frequency at SW13=H,TP13(B)=0V,VIDEOIN=SG6 f_A3=when approach BURST frequency from low frequency. f_A4= when approach BURST frequency from high frequency at SW13=L,TP13=SG6	-	-2900	-700	Hz
	f_A2		+700	+1500	-	
APC Capture Range (Input Y/C Signal, NTSC)	f_A3		-	-2900	-700	Hz
	f_A4		+700	+1500	-	

■ **ELECTRICAL CHARACTERISTICS**

(Ta=25°C,V_{CC}1=5V, V_{CC}2=5V,TP20=TP31=TP45=2.5V,
TP19=2.8V,TP7=5V,TP38=1V,TP39=3V,TP44=0V,SW13=SW7=L)

PARAMETER	SYMBOL	TEST CONDITION (TP=IC Pin No.)	MIN.	TYP.	MAX.	UNIT
APC Capture Range (Input Composite Signal, PAL)	f_A5	SG11 applied to TP9, SG2 applied to TP11, TP19=0, SG6 (4.43361875, 300mVpp typical swing) applied to TP13 or TP28. This item is Difference between the input frequency and 4.43361875 MHz at work out 2V of TP16 voltage by variable the BURST frequency. f_A5=when approach BURST frequency from low frequency. f_A6= when approach BURST frequency from high frequency at SW13=H,TP13(B)=0V,VIDEOIN=SG6 f_A7=when approach BURST frequency from low frequency. f_A8= when approach BURST frequency from high frequency at SW13=L,TP13=SG6	-	-2900	-700	Hz
	f_A6		+700	+1500	-	
APC Capture Range (Input Y/C Signal, PAL)	f_A7		-	-2900	-700	Hz
	f_A8		+700	+1500	-	
Composite→Y/C Input Switching Voltage	$V_{TH}CY$	SG3 (700mVpp, 3.579545MHz) applied to TP28, SG2 applied to TP11, SG11 applied to TP9. SW13=H, TP13 (B) voltage at change Y/C to composite by raise on TP13 (B) voltage.	1.3	1.6	1.9	V
Y/C→Composite Input Switching Voltage	$V_{TH}YC$	SG3 (700mVpp, 3.579545MHz) applied to TP28, SG2 applied to TP11, SG11 applied to TP9, SG10 applied to TP5, SW13=H, TP13 (B) Voltage at change composite to Y/C by drop on TP13 (B) voltage.	0.7	1.0	1.3	V
TINT Variable Range	Θ_T1	SG6 (3.579545MHz, 300mVpp) applied to TP13, SG2 applied to TP11, SG11 applied to TP9. The $\Theta1$ was controlled input phase so that output swing of TP2 maximum at TP19=1.6V. The each $\Theta2$ and $\Theta3$ were the controlled input phase so that output swing of TP2 maximum at TP19=2.8V, 4.0V. $\Theta_{T1}=\Theta2-\Theta1$ $\Theta_{T2}=\Theta2-\Theta3$	+30	+45	-	deg
	Θ_T2		-	-45	-30	
NTSC /PAL Switching Voltage	$V_{TH}NP$	SG6 (3.58MHz, 300mVpp) applied to TP13, SG2 applied to TP11, SG11 applied to TP9.This item TP19 voltage at change from NTSC to PAL at down TP19 voltage.	0.4	0.7	1.0	V

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C,V_{CC}1=5V, V_{CC}2=5V,TP20=TP31=TP45=2.5V,
TP19=2.8V,TP7=5V,TP38=1V,TP39=3V,TP44=0V,SW13=SW7=L)

PARAMETER	SYMBOL	TEST CONDITION (TP=IC Pin No.)	MIN.	TYP.	MAX.	UNIT
Color Killer Operating Input Level (NTSC)	$V_{KIN}1$	SG6 (3.58MHz, 300mVpp) applied to TP13, SG2 applied to TP11, SG11 applied to TP9.This item Measure input level at killer is tern on at decrease the input swing.	-	-42	-	dB
Color Killer Operating Input Level (PAL)	$V_{KIN}2$	TP19=0V, SG2 applied to TP11, SG11 applied to TP9, SG6 (4.43MHz, 300mVpp) applied To TP13.This item measure input level at killer is tern on at decrease The input swing.	-	-37	-	dB
Output Level Voltage Difference among RGB	ΔVBRGB	SG2 applied to TP11, SG11 applied to TP9, SW7=H, SG1 (700mVpp) applied to TP33, TP35, TP37, SG10 applied to TP5. Then VRB, VGB, and VBB define the non-invert black level of TP48, TP2, TP4. VRBI, VGBI, and VBBI define the invert black level of them. ΔVBRGB=VRB-VGB,VBB-VGB= VRBI-VGBI,	-150	0	+150	mV
INT-EXT Output Black Level Voltage Difference	ΔVBIE	SW7=L,SG4 applied to TP28. Then VRB (Y),VGB (Y), and VBB (Y) defines the non-inverting black level of TP48, TP2, and TP4. VRBI (Y), VGBI(Y), and VBBI (Y) define the invert black level of them. VBIE=VRB-VRB (Y), VGB-VGB (Y), =VBB-VBB (Y),VRBI-VRBI(Y), =VGBI-VGBI(Y),VBBI-VBBI(Y)	-150	0	+150	mV
Gain Difference Between Invert And Non-invert	ΔGINV	SG2 applied to TP11, SG11 Applied to TP9, SW7=H, SG1 (700mVpp) applied to TP33, TP35, TP37, SG10 applied TP5. This item measure the signal swing (BLK-WHT) of TP48, TP2, TP4. VRG, VGG, VBG define the non-inverting side of them. VRGI, VGGI, VBGI define the invert side of them.	-0.6	0	+0.6	dB
Gain Difference Among RGB	ΔGRGB	SW7=L, SG4 applied TP28. This item measure the signal swing (BLK-WHT) of TP48, TP2, TP4. VYRG, VYGG, VYBG define the non-inverting side of them. ΔGINV =20LOG(VRGI/VRG) =20LOG(VGGI/VGG) =20LOG(VBGI/VBG)	-0.6	0	+0.6	dB
INT-EXT Gain Difference	ΔGIE	ΔVRGB =20LOG(VRG/VGG) =20LOG(VGG/VBG) =20LOG(VBG/VRG) ΔGIE =20LOG(VRG/VYRG) =20LOG(VGG/VYGG) =20LOG(VBG/VYBG)	-0.6	0	+0.6	dB

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C,V_{CC}1=5V, V_{CC}2=5V,TP20=TP31=TP45=2.5V,
TP19=2.8V,TP7=5V,TP38=1V,TP39=3V,TP44=0V,SW13=SW7=L)

PARAMETER	SYMBOL	TEST CONDITION (TP=IC Pin No.)	MIN.	TYP.	MAX.	UNIT
FRP Input Threshold Voltage	$V_{TH}FRP$	SG2 applied to TP11, SG11 Applied to TP9, SW7=H, SG1 applied to TP35.This item define TP5 voltage at invert output of TP2 at increase TP5 voltage.	1.2	1.5	1.8	V
Interface Frequency as Characteristic	f_{INT}	SG2 applied to TP11, SG11 applied to TP9, SW7=H, 1.5V applied to TP31 , 3.2V applied to TP38, SG5 (100kHz) applied to TP35. Sine wave of non-invert output signal of TP2 is input signal frequency at –3dB Toward swing of 100kHz at variable frequency of SG5.	5.0	6.5	-	MHz
EXTRGB Input Threshold Voltage	$V_{TH}EXH$	Switching Voltage of TP7 $V_{TH}EXH$=ON Level Voltage	2.0	-	-	V
	$V_{TH}EXL$	Switching Voltage of TP7 $V_{TH}EXL$=OFF Level Voltage	-	-	0.8	
Gamma Characteristic	$G\gamma1$	SG2 applied to TP11,SG11 applied to TP9,SW7=H,SG10 applied to TP5 SG7(350mVpp) applied to TP33,TP35,TP37. This item measure the slope on TP48,TP2, and TP4 at TP38=1.8V,TP39=3.0V.	22.0	26.0	30.0	dB
	$G\gamma2$		7.5	11.5	15.5	
Synchronous Separate Input Sensitivity Current	IIS	Current flow from TP11. Then measure current at TP10 change from High to Low.	-	21	30	µA
Synchronous Separate Output ON Voltage	VON	SG2 applied to TP11.Then Measure output signal level voltage of TP10.	-	0.2	0.5	V
Leak Current at Synchronous Separate Output OFF	ISL	Current 40uA flow from TP11.Then measure current of sink to TP10 at TP10=5V.	-	-	1.0	µA
Synchronous Separate Output Delay 1	tPHLSY	SG2 applied to TP11.Then Measure time difference of 50% swing level of SYNCIN and TP10	-	0.3	-	µs
Synchronous Separate Output Delay 2	tPLHSY		-	0.4	-	

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■ ELECTRICAL CHARACTERISTICS

(Ta=25°C,V_{CC}1=5V, V_{CC}2=5V,TP20=TP31=TP45=2.5V,
TP19=2.8V,TP7=5V,TP38=1V,TP39=3V,TP44=0V,SW13=SW7=L)

PARAMETER	SYMBOL	TEST CONDITION (TP=IC Pin No.)	MIN.	TYP.	MAX.	UNIT
Synchronous Separate Output Turn OFF Time	ttHL	SG2 applied to TP11.Then measure time difference of 20% to 80% swing level of TP10.	-	0.2	-	μs
Synchronous Separate Output Turn OFF Time	ttLH		-	0.2	-	
External Synchronous Input Timing 1	t1	Sync Separate Output 	3.0	-	-	μs
External Synchronous Input Timing 2	t2		2.0	-	-	
External Synchronous Input Timing 3	t3		1.6	2.0	2.4	

RGB Output Delay Time 1	tPHL1	SG2 applied to TP11, SG11 applied to TP9, SW7=H, SG10 applied TP5, SG8 (0.35Vpp) applied to TP33, TP35, TP37. Then measure time difference of 50% swing level of TP33 and TP48,TP35 and TP2, TP37 and TP4
		  tPHL1=turn ON
		  tPHL2=turn OFF
			-	0.1	-	μs

RGB Output Delay Time 2	tPHL2		-	0.1	-	
Crosstalk Among RGB	CTRGB1	SG2 applied to TP11, SG11 applied to TP9, SW7=H, TP7=H, TP5=H, TP35= TP33=GND, SG5 (1MHz, 700mVpp) applied to TP37. Measure the output of 1MHz component on TP48, TP2 and TP4. Calculate the swing ratio of TP2, TP4 toward TP48.	-	-50	-40	dB
	CTRGB2	SG2 applied to TP11 , SG11 applied to TP9,SW7=H, TP7=H,TP5=H,TP37=TP33=GND, SG5 (1MHz, 700mVpp) applied to TP35. Measure the output of 1MHz component on TP48, TP2 and TP4. Calculate the swing ratio of TP48, TP4 toward TP2.	-	-50	-40	
	CTRGB3	SG2 applied to T P11, SG11 applied to TP9,SW7=H, TP7=H,TP5=H, TP37=TP35=GND, SG5 (1MHz, 700mVpp) applied to TP33. Measure the output of 1MHz component on TP48, TP2 and TP4. Calculate the swing ratio of TP48, TP2 toward TP4.	-	-50	-40	

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C,V_{CC}1=5V, V_{CC}2=5V,TP20=TP31=TP45=2.5V,
TP19=2.8V,TP7=5V,TP38=1V,TP39=3V,TP44=0V,SW13=SW7=L)

PARAMETER	SYMBOL	TEST CONDITION (TP=IC Pin No.)	MIN.	TYP.	MAX.	UNIT
Crosstalk 1 Between SW (EXT→INT)	CTERINT	SG2 applied to TP11, SG11 applied to TP9, SW7=H, TP5=H, SG5 (1MHz, 700mVpp) applied to TP37, TP28=GND. Measure the output of 1MHz component on TP48. Calculate the swing ratio of TP7=5V, 0V.	-	-50	-35	dB
	CTEGINT	SG2 applied to TP11, SG11 applied to TP9, SW7=H, TP5=H, SG5 (1MHz, 700mVpp) applied To TP35, TP28 =GND. Measure the output of 1MHz component on TP2.Calculate the swing ratio of TP7=5V, 0V.	-	-50	-35	
	CTEBINT	SG2 applied to TP11, SG11 applied to TP9, SW7=H, TP5=H, SG5 (1MHz, 700mVpp) applied To TP33, TP28 =GND. Measure the output of 1MHz component on TP4.Calculate the swing ratio of TP7=5V, 0V.	-	-50	-35	
Crosstalk 2 Between SW (INT→EXT)	CTIE1R	SG2 applied to TP11, SG11 applied to TP9, SW7=H, TP5=H, SG3 (1MHz, 700mVpp) applied to TP28, TP37=GND. Measure the output of 1MHz component on TP48.Calculate the swing ratio of TP7=5V, 0V.	-	-50	-35	dB
	CTIE1G	SG2 applied to TP11, SG11 applied to TP9, SW7=H, TP5=H, SG3 (1MHz, 700mVpp) applied To TP28, TP35=GND. Measure the output of 1MHz component on TP2.Calculate the swing ratio of TP7=5V,0V.	-	-50	-35	
	CTIE1B	SG2 applied to TP11, SG11 applied to TP9, SW7=H, TP5=H, SG3 (1MHz, 700mVpp) applied To TP28, TP33=GND. Measure the output of 1MHz component on TP4.Calculate the swing ratio of TP7=5V, 0V.	-	-50	-35	

■ **ELECTRICAL CHARACTERISTICS**
(Ta=25°C,V_{CC}1=5V, V_{CC}2=5V,TP20=TP31=TP45=2.5V,
TP19=2.8V,TP7=5V,TP38=1V,TP39=3V,TP44=0V,SW13=SW7=L)

PARAMETER	SYMBOL	TEST CONDITION (TP=IC Pin No.)	MIN.	TYP.	MAX.	UNIT
Side-black Level	V_{SB}	SG2 applied to TP11 , SG11 applied to TP9,SW7=H,SG10 applied to TP5. When TP44=5V, define the non-invert black level of TP48, TP2, TP4 as VRB, VGB, VBB. When TP44=5V, define the invert black level of TP48,TP2,TP4 as VRBI,VGBI, VBBI. When TP44=0V, define the non-invert black level of TP48,TP2, TP4 as VRB (B), VGB (B), VBB (B). When TP44=0V, define the invert black level of TP48,TP2,TP4 as VRBI(B), VGBI (B), VBBI (B). V_{SB}=VRB-VRB (B), VGB-VGB (B), VBB-VBB (B) =VRBI (B)-VRBI, VGBI (B)-VGBI, VBBI (B)-VBBI	-	100	-	mV
Delay Between Y-C	∆TdYC	Delay time of Y signal and C signal At TP2.	-	200	-	ns
RGB Slew Rate	SR_{RGB}	SG2 applied to TP11.SG11 applied To TP9.SW7=H, TP7=H, SG8 applied to TP33, TP35, TP37.TP11=SG2. Measure the tern on and tern off time at 20% to 80% of output wave on TP48, TP2, TP4.Then convert to slew rate.	9	22	40	V/µs
Demodulation Relativity Swing (R-Y/B-Y)	$\frac{R\text{-}Y}{B\text{-}Y}$	SG6 (3.58MHz, 300mVpp) applied to TP13, SG10 applied to TP5, SG2 applied to TP11,SG11 applied to TP9.TP38=1.5V,TP39=3.0V, vary the chroma phase on SG6,define non-inverting maximum output swing of TP48, TP2, SYNC IN as VR, VG, VB. (R-Y)/(B-Y)=VR/VB (G-Y)/(B-Y)=VG/VB	-	0.65	-	-
Demodulation Relativity Swing (G-Y/B-Y)	$\frac{G\text{-}Y}{B\text{-}Y}$		-	0.45	-	

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C,V_{CC}1=5V, V_{CC}2=5V,TP20=TP31=TP45=2.5V,
TP19=2.8V,TP7=5V,TP38=1V,TP39=3V,TP44=0V,SW13=SW7=L)

PARAMETER	SYMBOL	TEST CONDITION (TP=IC Pin No.)	MIN.	TYP.	MAX.	UNIT
Demodulation Relativity Phase (R-Y/B-Y)	ΘRB	SG6 (3.58MHz, 300mVpp) applied to TP13, SG10 applied to TP5, SG2 applied to TP11, SG11 applied to TP9. TP38=1.5V,TP39=3.0V,vary the chroma phase on SG6, define the phase at maximum output amplitude of TP48, TP2, TP4 as ΘR,ΘG,ΘB. ΘRB=ΘR-ΘB ΘGB=ΘG-ΘB	-	90	-	deg
Demodulation Relativity Phase (G-Y/B-Y)	ΘGB		-	240	-	
Demodulation Output residual Carrier	VCR	SG6 (3.58MHz, 300mVpp) applied to TP13, DC5V applied to TP5, SG2 Applied to TP11, SG11 applied to TP4, adjust the chroma phase on SG6 for maximum the amplitude of TP4. Measure the ratio of 7.159059MHz component to the 15.734kHz component.	-	-40	-	dB

■ APPLICATION CIRCUIT EXAMPLE (NTSC/PAL)

*1:332PN-2636BS(TOKO)
*2:3.579545MHz X'tal DSX151GA(DAISHINKU)
*3:4.433619MHz X'tal DSX151GA(DAISHINKU)
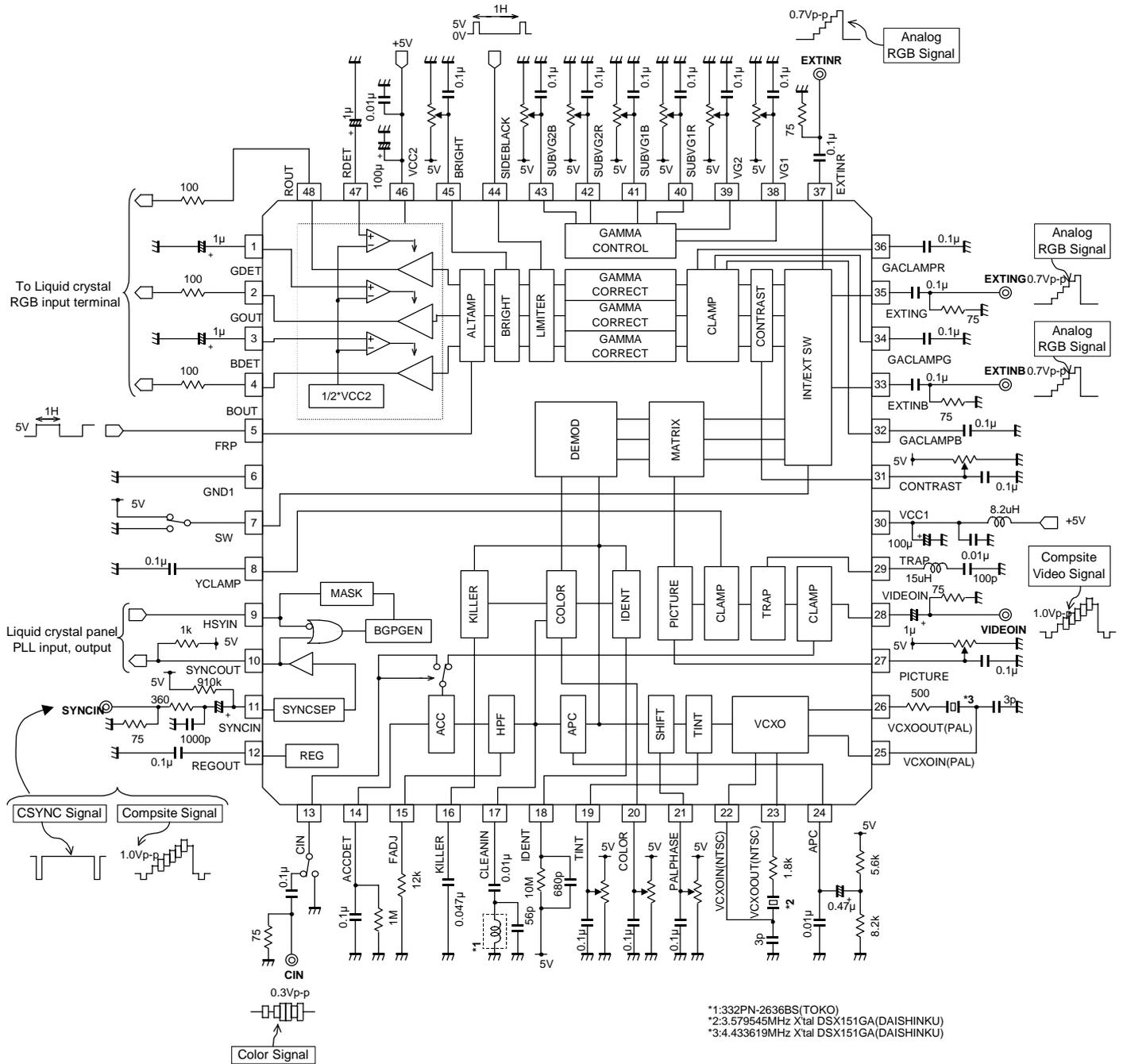
■ APPLICATION CIRCUIT EXAMPLE (NTSC)
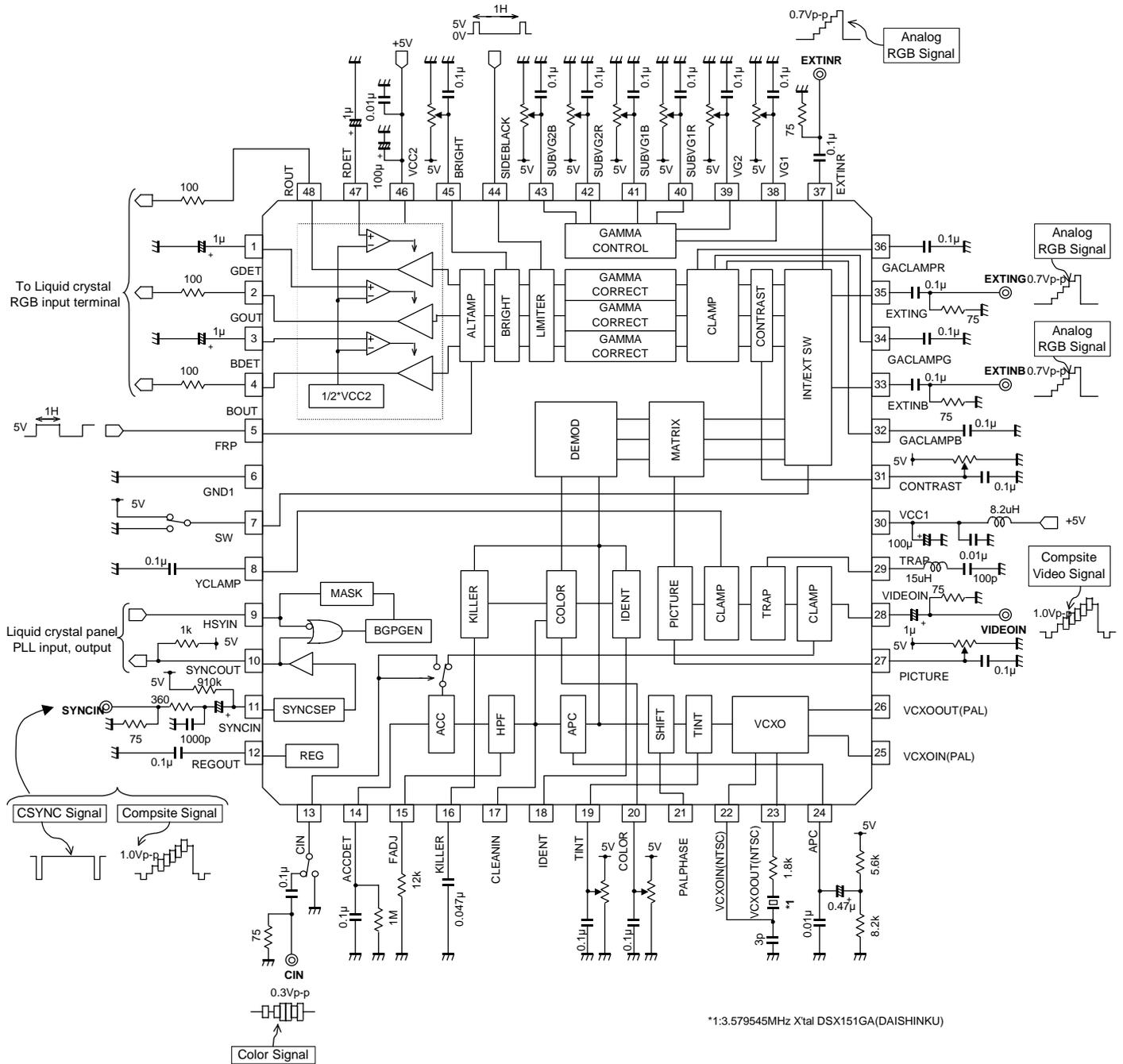
■ APPLICATION CIRCUIT EXAMPLE (PAL)
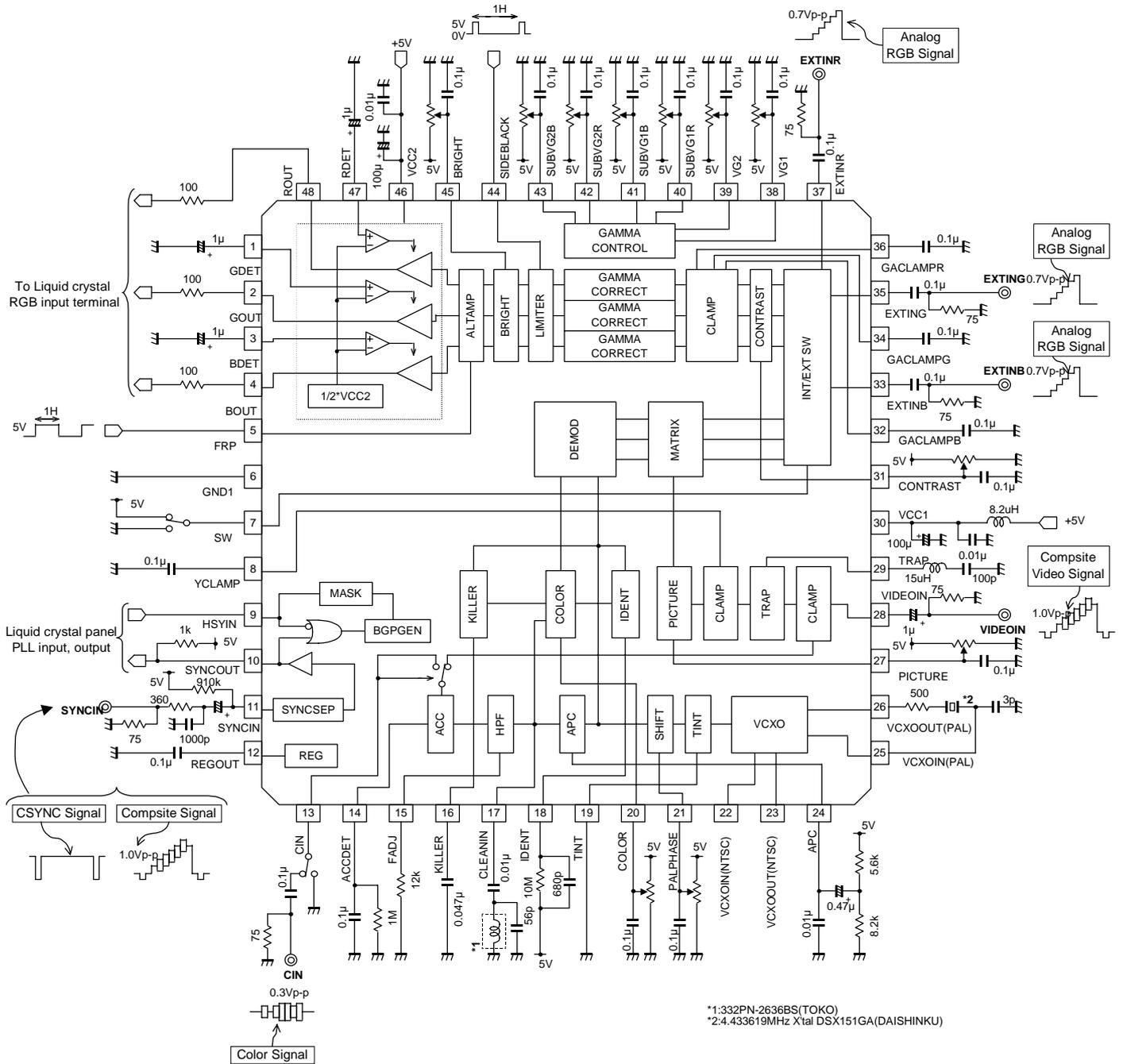
*1:332PN-2636BS(TOKO)
*2:4.433619MHz X'tal DSX151GA(DAISHINKU)

■ **INPUT SIGNAL**

SYMBOL	INPUT SIGNAL
SG1	No Sync 10 Step Video Signal 350mVp-p 700mVp-p 1H
SG2	Composite Y Signal with Sync signal or 10 STEP Signal 4.7μs 286mVp-p 1H
SG3	Sine Video Signal with Sync Variable frequency and amplitude Variable amplitude 100mVp-p, 700mVp-p 350mVp-p 286mVp-p 1H
SG4	10STEP Vide Signal 700mVp-p 1H
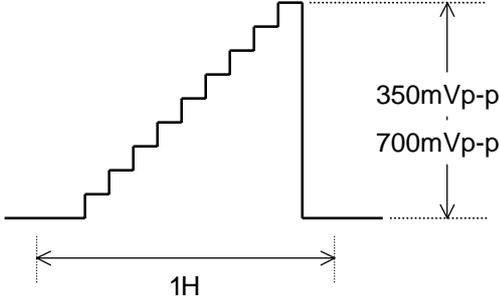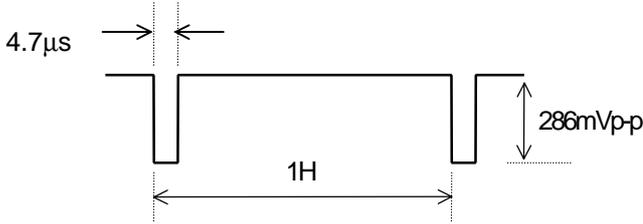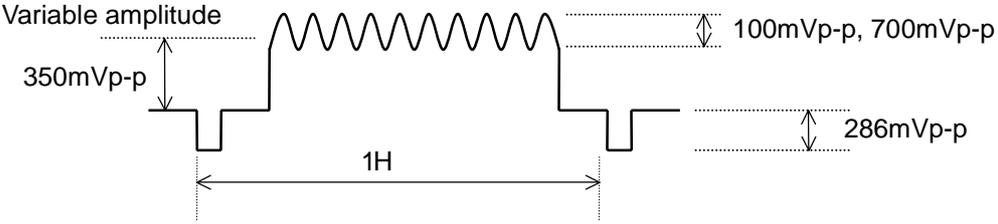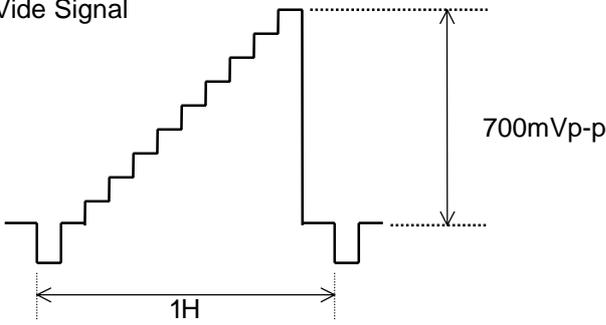
■ **INPUT SIGNAL**

SYMBOL	INPUT SIGNAL
SG5	Sine Video Signal with No sync Variable frequency and amplitude Variable amplitude 350mVp-p 400mVp-p, 700mVp-p 1H
SG6	C Signal Burst Swing =300mV$_{P-P}$ Chroma Swing =300mV$_{P-P}$
SG7	Ramp Video Signal with no sync 350mVp-p 1H
SG8	Turn ON, Turn OFF Video Signal under 50ns 350mVp-p 1H
SG9	Turn ON, Turn OFF Signal under 50ns 5V 5Vp-p 0V 1H
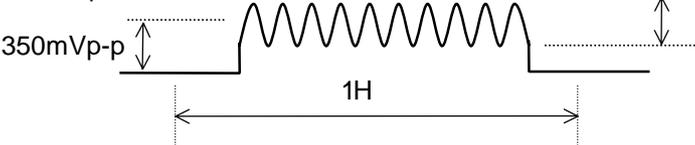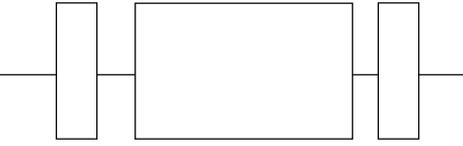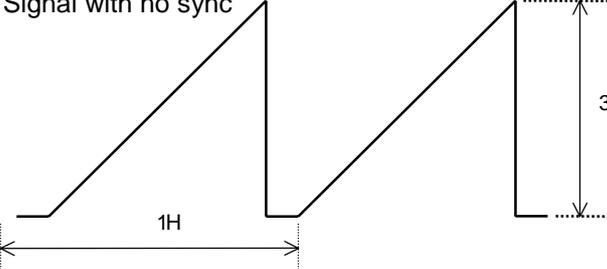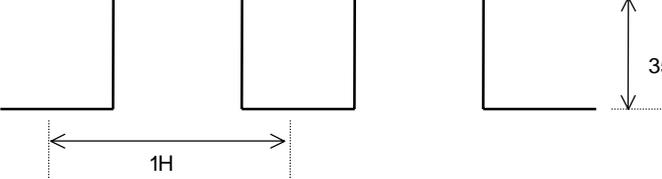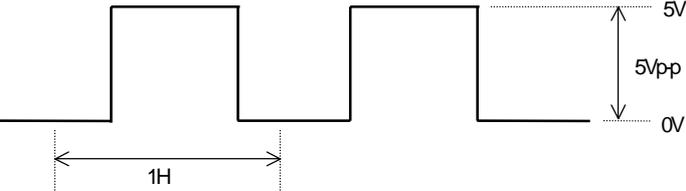
■ **INPUT SIGNAL**

SYMBOL	INPUT SIGNAL
SG10	FRP Signal of inverting Every 1H 1H 5V 5Vp-p 0V
SG11	Horizontal Sync. Signal Synchronous to SG2 4.7μS 1H 286mVp-p SG2 t1 t3=2μS(typ) 2.0V t2=5μS(typ) SG11 0.8V
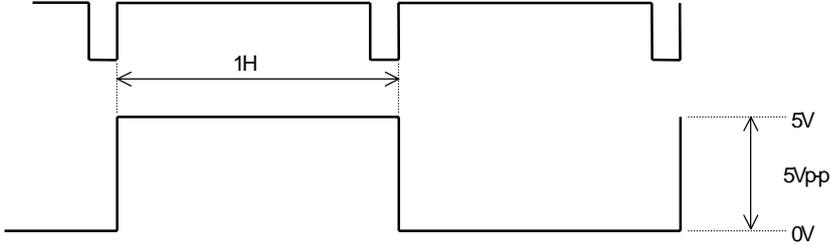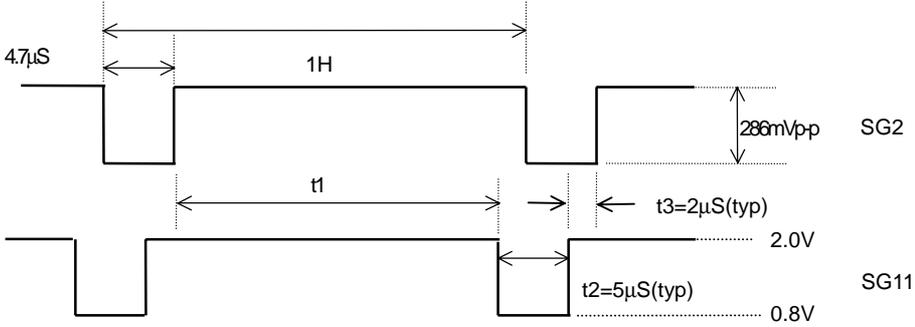
■ **EQUIVALENT CIRCUIT**

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
1	GDET	Connect to the capacitor for G signal center mpdulator. Leakless capacitor for use.	
2	GOUT	G signal output.	
3	BDET	Connect to the capacitor for B signal center modulator. Leakless capacitor for use.	
4	BOUT	B signal output.	

■ EQUIVALENT CIRCUIT

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
5	FRP	Connect to the polarity reversal pulse of RGB output signal. Input: 5V$_{P-P}$	
6	GND1	Connect to GND.	
7	SW	Select the internal/external signal. SW=Low:Internal signal mode High:External signal mode | SW	OUT
---	---
L	INT
H	EXT		
8	YCLAMP	Connect to the CLAMP capaciter for Y-signal. Leakless capacitor for use.	

■ **EQUIVALENT CIRCUIT**

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
9	HSYIN	Connect to the outside synchronous. Fripfrop reverse with the start of synchronous signal at PAL.	
10	SYNC OUT	Composite synchronous signal output, non-inverting and open collector.	
11	SYNCIN	Synchronous signal input, synchronize with RGBOUT. Input level is 2Vp-p maximum,and can input include Y-signal and composite video signal.	
12	REGOUT	Regurator output,connect to decupling capacitor internal use only.	

■ **EQUIVALENT CIRCUIT**

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
13	CIN	Chroma signal input,300mV$_{P-P}$ CIN=GND:Composite input mode	
14	ACCDET	Connect to ACC filter.	
15	FADJ	Adjust the frequency with internal filter.	
16	KILLER	Connect to the color killer filter.	

■ **EQUIVALENT CIRCUIT**

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
17	CLEAN ING	Connect to the burst cleaning coil at PAL selection. NTSC selection:open	
18	IDENT	Connect to the ident filter at PAL selection. NTSC selection:open	
19	TINT	Adjust Hue signal. Adjustable Hue range:±45deg to control DC supply. TINT=GND:PAL mode =High:NTSC mode	
20	COLOR	Adjust color. Adjust the tint color by input voltage.	

■ EQUIVALENT CIRCUIT

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
21	PAL PHASE	Adjust the BY de-modulator axis. Adjust the de-modulation angle to 90 degree at PAL. NTSC selection:open	
22	VCXOIN (NTSC)	VCXO input at NTSC.	
23	VCXO OUT (NTSC)	VCXO output at NTSC.	
24	APC	Connect to the APC detector filter.	

■ **EQUIVALENT CIRCUIT**

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
25	VCXOIN (PAL)	VCXO input at PAL.	
26	VCXO OUT (PAL)	VCXO output at PAL.	
27	PICTURE	Adjust the frequency of Y-signal for revise outline of Y-signal. Emphasize outline,when voltage increase.	
28	VIDEO IN	Composite video signal / Y-signal input. CIN (6pin) =GND:Composite input mode.	

■ EQUIVALENT CIRCUIT

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
29	TRAP	Connect to the ceramic condenser (100pF) or TRAP filter for Y/C separate.	
30	VCC1	Supply voltage,+5V Connect to +5V supply	
31	CONT RAST	Adjust the gain of RGB signal. Adjust the RGB signal range by CONTRAST input voltage.	
32	GA CLAMPB	Connect to the CLAMP pedestal level of B signal. Leakless capacitor for use.	

■ EQUIVALENT CIRCUIT

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
33	EXTINB	External B(RGB) signal input, 700mV$_{P-P}$ and source color signal.	
34	GA CLAMPG	Connect to the CLAMP pedestal level of G signal. Leakless capacitor for use.	
35	EXTING	External G(RGB) signal input, 700mV$_{P-P}$ and source color signal.	
36	GA CLAMPR	Connect to the CLAMP pedestal level of R signal. Leakless capacitor for use.	

■ EQUIVALENT CIRCUIT

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
37	EXTINR	External R(RGB) signal input, 700mV$_{P-P}$ and source color signal	
38	VG1	Adjust the first point of low side in RGB γ characteristic. Pre-set and controlled RGB together.	
39	VG2	Adjust the first point of high side in RGB γ characteristic. Pre-set and controlled RGB together.	
40	SUBVG1R	Adjust the second point of low side in R signal γ characteristic. Pre-set and not controlled RGB together,adjust the R signal only.	

■ EQUIVALENT CIRCUIT

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
41	SUBVG1B	Adjust the second point of low side in B signal γ characteristic. Pre-set and not controlled RGB together,adjust the B signal only.	
42	SUBVG2R	Adjust the second point of high side in R signal γ characteristic. Pre-set and not controlled RGB together,adjust the R signal only.	
43	SUBVG2B	Adjust the second point of high side in B signal γ characteristic. Pre-set and not controlled RGB together,adjust the B signal only.	
44	SIDE BLACK	Control signal input with both black side of moniter,when aspect ratio change 4:3 and 16:9. SIDEBLACK=High:Black level SIDEBLACK=Low or OPEN:Through RGB signal is controlled together.	

■ EQUIVALENT CIRCUIT

PI N NO.	SYMBOL	FUNCTION	INSIDE EQIVALENT CIRCUIT
45	BRIGHT	Adjust the bright of RGB signal,controlled black level.	
46	VCC2	RGB output Supply voltage,+5V Connect to +5V supply. VCC2 ≥ VCC1	
47	RDET	Connect to the capacitor for R signal center modulator. Leakless capacitor for use.	
48	ROUT	R signal output.	

■ EQUIVALENT CIRCUIT

■ **PIN FUNCTION at NO USE**

No	SYMBOL	FUNCTION	No	SYMBOL	FUNCTION
1	GDET	Connect to capacitor for demodulate G signal	25	VCXOIN (PAL)	OPEN
2	GOUT	OPEN	26	VCXOOUT (PAL)	OPEN
3	BDET	Connect to capacitor for demodulate B signal	27	PICTURE	OPEN
4	BOUT	OPEN	28	VIDEOIN	Connect with 0.01uF to GND
5	FRP	Input inverting pulse of RGB output	29	TRAP	OPEN
6	GND1	GND	30	VCC1	Supply voltage (+5V)
7	SW	OPEN: composite mode only	31	CONTRAST	Input fixed DC voltage
8	YCLAMP	OPEN	32	GACLAMPB	Connect to clamp capacitor
9	HSYIN	Connects to external synchronous Signal without fail.	33	EXTINB	OPEN
10	SYNCOUT	OPEN	34	GACLAMPG	Connect to clamp capacitor
11	SYNCIN	Synchronous signal input	35	EXTING	OPEN
12	REGOUT	Connect to capacitor without fail.	36	GACLAMPR	Connect to clamp capacitor
13	CIN	GND: when composite signal input OPEN: other	37	EXTINR	OPEN
14	ACCDET	OPEN	38	VG1	Input fixed DC voltage
15	FADJ	Connect with 12KΩ	39	VG2	Input fixed DC voltage
16	KILLER	OPEN	40	SUBVG1R	OPEN
17	CLEANING	OPEN	41	SUBVG1B	OPEN
18	IDENT	OPEN	42	SUBVG2R	OPEN
19	TINT	NTSC MODE: 1.6V or higher voltage PAL MODE: GND	43	SUBVG2B	OPEN
20	COLOR	OPEN	44	SIDEBLACK	OPEN
21	PALPHASE	OPEN	45	BRIGHT	Input fixed DC voltage
22	VCXOIN (NTSC)	OPEN	46	VCC2	Supply voltage (+5V ≥ VCC1)
23	VCXOOUT (NTSC)	OPEN	47	RDET	Connect to capacitor for demodulate R signal
24	APC	OPEN	48	ROUT	GND

■ **None-use PIN Connection**

1). Do not use composite mode demodulator.
Color demodulate system:
14pin, 16-18pin ,20pin and 22-26pin are OPEN.
NTSC: 19pin connect to the DC voltage of 1.6V over.
PAL: 19pin connect to GND.
Brightness signal processing system:
28pin connect with 0.01uF to GND.
29pin, 8pin ,27pin are OPEN.

2). Do not use composite mode NTSC demodulator.
22pin, 23pin are OPEN.
19pin connect to GND.

3). Do not use composite mode PAL demodulator.
17pin, 18pin, 25pin,26pin and 21pin are OPEN.
19pin connect to the DC voltage of 1V over.

4). Do not use external analog RGB input.
7pin, 33pin, 35pin and 37pin are OPEN.

5). Do not use synchronous signal processor.
Because it is necessary to produce BGP and Clamp Pulse in IC,
please use a synchronous signal processing circuit without fail.

6). Do not use the other SYNC IN terminal.
SYNC signal input 11pin.
Please do not 11pin and 9pin openly.

7). Do not use C-SYNC output.
10pin is OPEN.

8). Do not use the adjust terminal of interface and Gamma circuit.
As for 31pin, 38pin, 39pin, 45pin, please input DC voltage of request without fail.
40-43pin are OPEN.

9). Do not use SIDE BLACK circuit.
44pin is OPEN.

■ **FUNCTION DESCRIPTION**

1. Synchronous Mode

The composite signal or synchronous signal input to pin-11 (SYNCIN).

The signal that was input to pin-11 (SYNCIN) is separated synchronous.

The pin-9 (HSYIN) input external synchronous signal without fail.

In the case that HSY (Horizontal synchronous pulse) is not input, NJM2527 does not do a normal action, because inside clamp pulse does not generate.

2. Color Signal Play Mode

1) ACC Circuit (Automatic Chroma Control)

The chroma signal input to pin-13 (CIN), and detect the burst-signal through the HPF circuit, and controlled stable burst-signal feedback from demodulate output. When the pin-13 is GND level, the mode is composite input, and pin-28 (VIDEOIN) composite-video signal input to ACC circuit.

2) APC Circuit, and VCXO (Automatic Phase Control)

The burst signal level of chroma is constant by ACC circuit. The PLL circuit consists of VCXO and locked burst signal. The pin-19 (TINT) input DC voltage adjust the VCXO phase, and adjust the demodulate axis. When the pin-19 is GND, the mode is PAL, and only accepts analog RGB input.

3) Color Killer

The chroma signal is output to demodulator when PLL locked, and the color killer is - 42dB(NTSC).

4) IDENT Circuit

NJM2527 synchronizes to H-SYNC in PAL mode.   And, the career is reversing 90-degree phases.

IDENT circuit arranges the flip-flop polarity (that is driven by HD) and the color burst phase of the chroma signal that are input from 13-Pin (CIN). In the case that IDENT circuit does not act normally, Color-Killer acts, and the chroma signal is not output to de-modulator.

5) CLEANING

Cleaning filter avoids receiving the influence of burst signal noise that is input to APC and ACC circuit by tuning circuit. Chroma phase can be adjusted by utilizing this cleaning filter.

6) Color Circuit

This circuit adjusts the color TINT. The pin-20 (COLOR) adjusts the chroma signal range from ACC circuit. This signal demodulator without burst signal by burst gate pulse (BGP).

7) DEMOD

This DEMOD circuits demodulate color differential signal after the ACC circuit. The RGB signal consists of color differential and Y signal by matrix circuit, and input to Int./Ext. signal switches.

3. Y-signal Mode

1) TRAP

The composite video signal input to pin-28 (VIDEOIN) without the chroma by TRAP circuit. The TPAP frequency is 3.58MHz or 4.43MHz, and not through when Y/C input mode.

2) Picture Circuit

The Y/composite-signal input to pin-28 (VIDEOIN) without the synchronous signal.

The pin-27 (PICTURE) adjusts the frequency characteristic around 2MHz and emphasizes the outline.

The pin-27 level emphasizes outline depend on the DC voltage. includes second differential circuit.

4. INT./EXT. Signal Switch Mode

The analog RGB signal (0.7V$_{P-P}$ typ.) input to pin-37, pin-35, and pin-33, and these signal clamps pedestal.

The ext-signal select Y/C-signal or Int-signal by pin-7 (SW).

5. RGB Signal Mode

1) Contrast

The pin-31 (CONTRAST) adjusts the all of RGB signal, which is black-to-white range.

2) Gamma Amplifier

This circuit is non-liner amplifier to adjust the RGB signal equal to the luminous gamma characteristics.

There is two-point adjustment for accurate correction. The pin-38 (VG1) adjusts low side, and the pin-39 (VG2) adjusts high side.

| Input Signal | VG1 adjust | VG2 adjust |
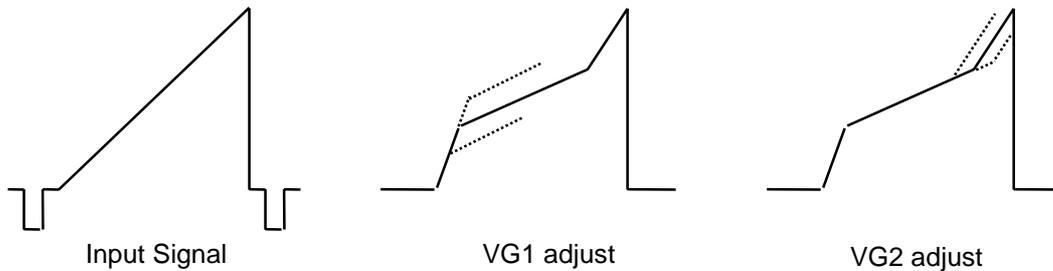
3) Sub Gamma Circuit

This circuit adjusts gamma characteristics of B/R signal, and sub gamma adjusts white-balance for the monitor. The pin-40 (SUBVG1R) and pin-42 (SUBVG2R) adjust low side with R-signal and high side with gamma characteristics. The pin-41 (SUBVG1B) and pin-43 (SUBVG2B) adjust low side with B-signal and high side for gamma characteristics. These terminal controls R-signal and B-signal separately.

4) Bright

The pin-45 (BRIGHT) clamps the pedestal after the brightness adjustment (black to black).

5) Side Black

The side-black circuit output black level, when the mode is black mask for wide picture.

The RGB signal is black level when pin-44 (SIDEBLACK) input signal is low period only.

6) Output Amplifier

The pin-5 (FRP) input to the timing pulse with inverting RGB output, and output the inverting RGB signal per every 1H. The RGB outputs are:

FRP-High: Non-inverting output

FRP-Low: Inverting output

The center voltage is preset to half of Vcc2.

Yin

FRP

RGB output   Vcenter