

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

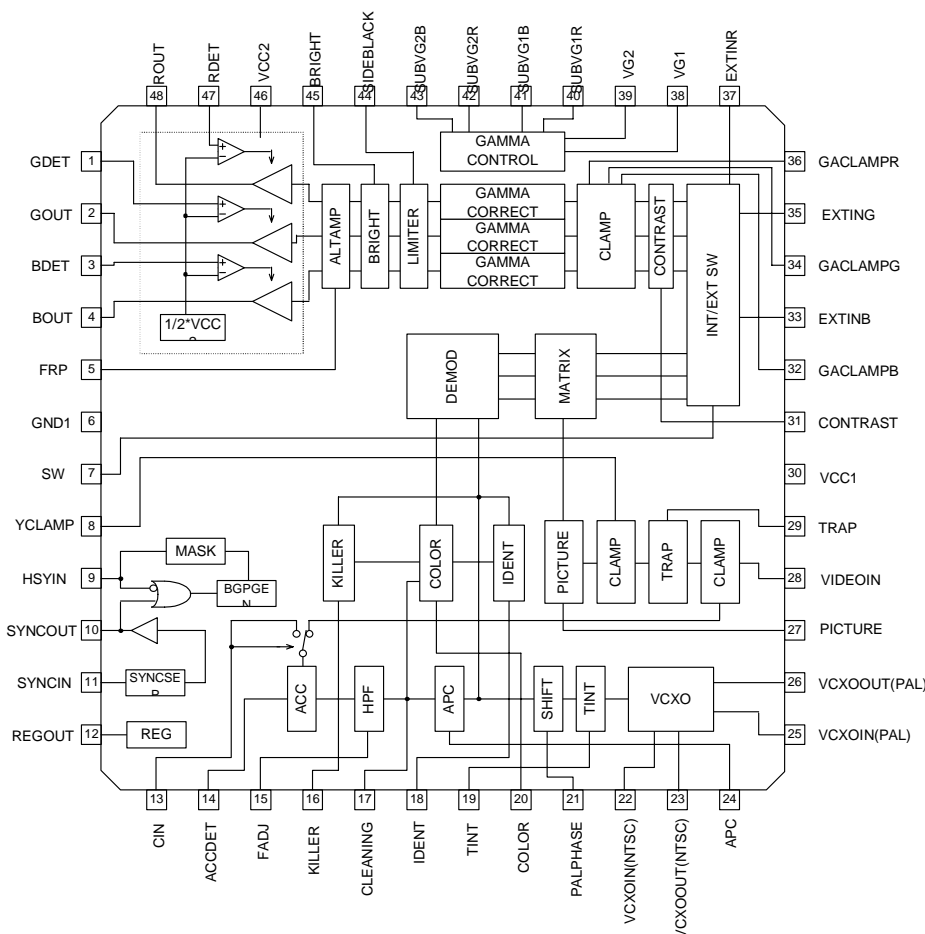


NJM2527FR2

■ 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 _{CC1} - GND | 10.0 | V |
| Supply Voltage 2 | V _{CC2} - GND | 10.0 | V |
| Power Dissipation | P _D | 1000* | W |
| Each Adjustment Terminal | V _{IN} | V _{CC1} | 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 _{CC1} | V |
| Analog RGB Input Signal | RGB _{IN} | V _{CC1} | V |
| FRP Input Signal Voltage | FRP _{IN} | V _{CC1} | V |
| SYNC Input Voltage | SYNC _{IN} | 3.0 | V _{P-P} |
| Operating Temperature Range | T _{opr} | -40 to +85 | °C |
| Storage Temperature Range | T _{str} | -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 _{CC1} - GND | 4.75 | 5.0 | 5.25 | V |
| | - | V _{CC2} - GND | V _{CC1} | 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_{CC1}=5V, V_{CC2}=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 _{CC1} | V _{CC1} , No signal | - | 45.0 | 60.0 | mA |
| Operating Current 2 | I _{CC2} | V _{CC2} , No signal | - | 14.5 | 20.0 | mA |
| Contrast Adjust Gain Variable Range | G _{CT1} | 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 | - | -12.0 | -9.0 | dB |
| | G _{CT2} | $G_{CT1}=20\text{LOG}(V1/V2)$ $G_{CT2}=20\text{LOG}(V3/V2)$ Measure points are Rout, Gout, Bout. | 1.0 | 2.5 | - | |
| Image Quality Adjust Variable Minimum Range (Y/C) | G _{PSMIN1} | 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). | - | 0.0 | 4.0 | dB |
| Image Quality Adjust Variable Maximum Range (Y/C) | G _{PSMAX1} | $G_{PSMIN1}=G(2.0M)-G(100K)$ At SW27=H, TP27=0V $G_{PSMAX1}=G(2.0M)-G(100K)$ At SW27=H, TP27=5V | 10.0 | 15.0 | - | |
| Image Quality Adjust Variable Minimum Range (Composite) | G _{PSMIN2} | 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) | - | -5.0 | -1.0 | dB |
| Image Quality Adjust Variable Maximum Range (Composite) | G _{PSMAX2} | $G_{PSMIN2}=G(2.0M)-G(100K)$ at SW27=H,TP27=0V $G_{PSMAX1}=G(2.0M)-G(100K)$ at SW27=H,TP27=5V | 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). $G_{CFNT}=20*\text{LOG}(B1/B2)$ $G_{CFPAL}=20*\text{LOG}(B3/B4)$ | - | -45 | -30 | |

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V_{CC1}=5V, V_{CC2}=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 | - | -2900 | -700 | Hz |
| | f _{A2} | | +700 | +1500 | - | |
| APC Capture Range (Input Y/C Signal, NTSC) | f _{A3} | 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 _{A4} | | +700 | +1500 | - | |

■ ELECTRICAL CHARACTERISTICS

($T_a=25^{\circ}\text{C}$, $V_{CC1}=5\text{V}$, $V_{CC2}=5\text{V}$, $TP20=TP31=TP45=2.5\text{V}$,
 $TP19=2.8\text{V}$, $TP7=5\text{V}$, $TP38=1\text{V}$, $TP39=3\text{V}$, $TP44=0\text{V}$, $SW13=SW7=L$)

| 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 | - | -2900 | -700 | Hz |
| | f_{A6} | | +700 | +1500 | - | |
| APC Capture Range (Input Y/C Signal, PAL) | f_{A7} | 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_{A8} | | +700 | +1500 | - | |
| Composite→Y/C Input Switching Voltage | V_{THCY} | 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_{THYC} | 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 Θ_1 was controlled input phase so that output swing of TP2 maximum at TP19=1.6V. The each Θ_2 and Θ_3 were the controlled input phase so that output swing of TP2 maximum at TP19=2.8V, 4.0V. $\Theta_{T1}=\Theta_2-\Theta_1$ $\Theta_{T2}=\Theta_2-\Theta_3$ | +30 | +45 | - | deg |
| | Θ_{T2} | | - | -45 | -30 | |
| NTSC /PAL Switching Voltage | V_{THNP} | 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_{CC1}=5V, V_{CC2}=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 _{KIN1} | 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 _{KIN2} | 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 | - | |
| 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. SW7=L, SG4 applied TP28. | -0.6 | 0 | +0.6 | dB |
| Gain Difference Among RGB | ΔGRGB | 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) ΔVRGB =20LOG(VRG/VGG) =20LOG(VGG/VBG) =20LOG(VBG/VRG) | -0.6 | 0 | +0.6 | |
| INT-EXT Gain Difference | ΔGIE | ΔGIE =20LOG(VRG/VYRG) =20LOG(VGG/VYGG) =20LOG(VBG/VYBG) | -0.6 | 0 | +0.6 | |

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V_{CC1}=5V, V_{CC2}=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 _{THFRP} | 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 _{THEXH} | Switching Voltage of TP7 V _{THEXH} =ON Level Voltage | 2.0 | - | - | V |
| | V _{THEXL} | Switching Voltage of TP7 V _{THEXL} =OFF Level Voltage | - | - | 0.8 | |
| Gamma Characteristic | G _{γ1} | 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 _{γ2} | | 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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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 | <p>Sync Separate Output</p> <p>External Sync Input</p> | 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 TP11, 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_{CC1}=5V, V_{CC2}=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 | |

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■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V_{CC1}=5V, V_{CC2}=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 | ΔT _{dYC} | 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) | $\frac{R-Y}{B-Y}$ | 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) | $\frac{G-Y}{B-Y}$ | | - | 0.45 | - | |

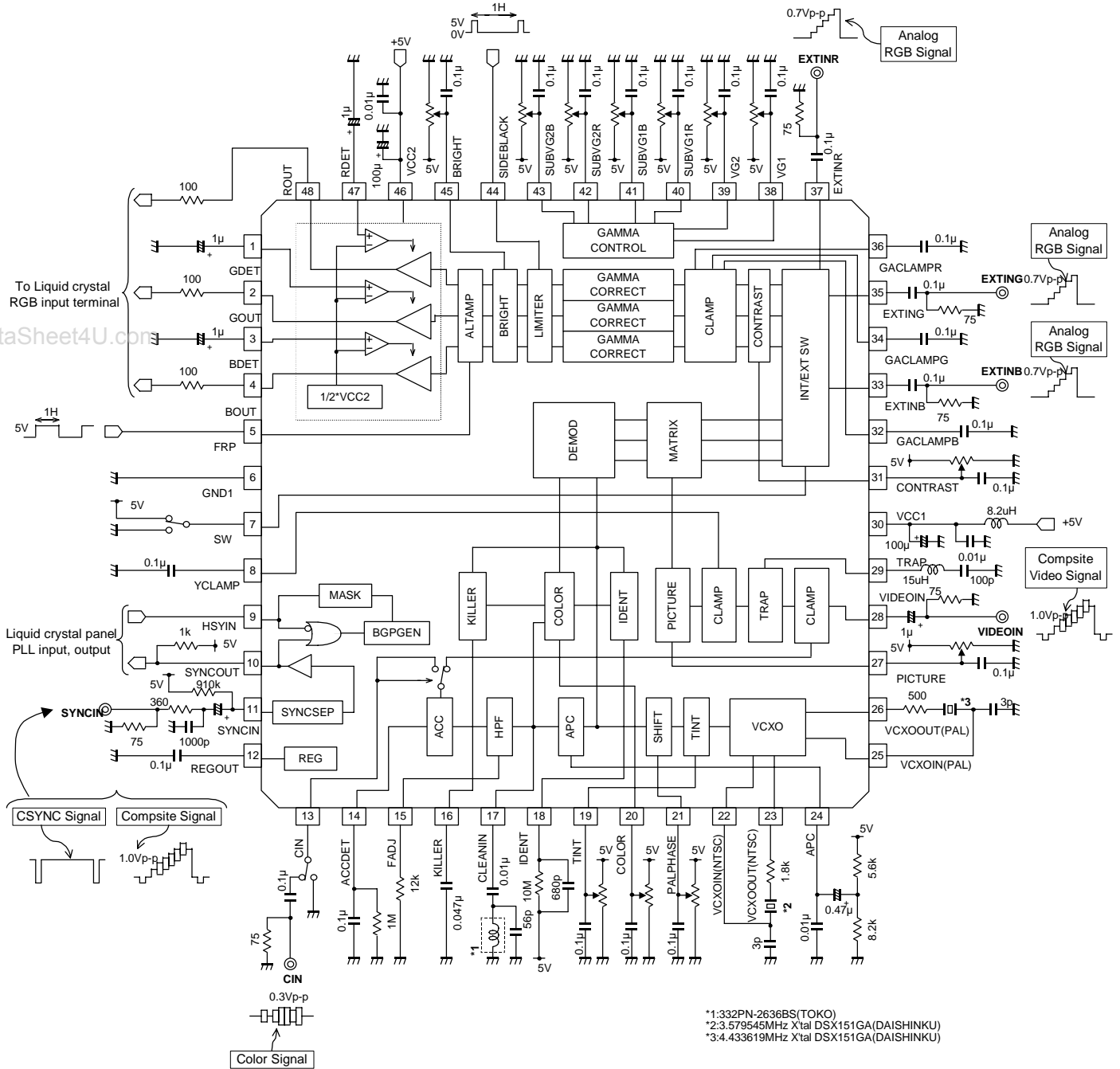
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■ ELECTRICAL CHARACTERISTICS

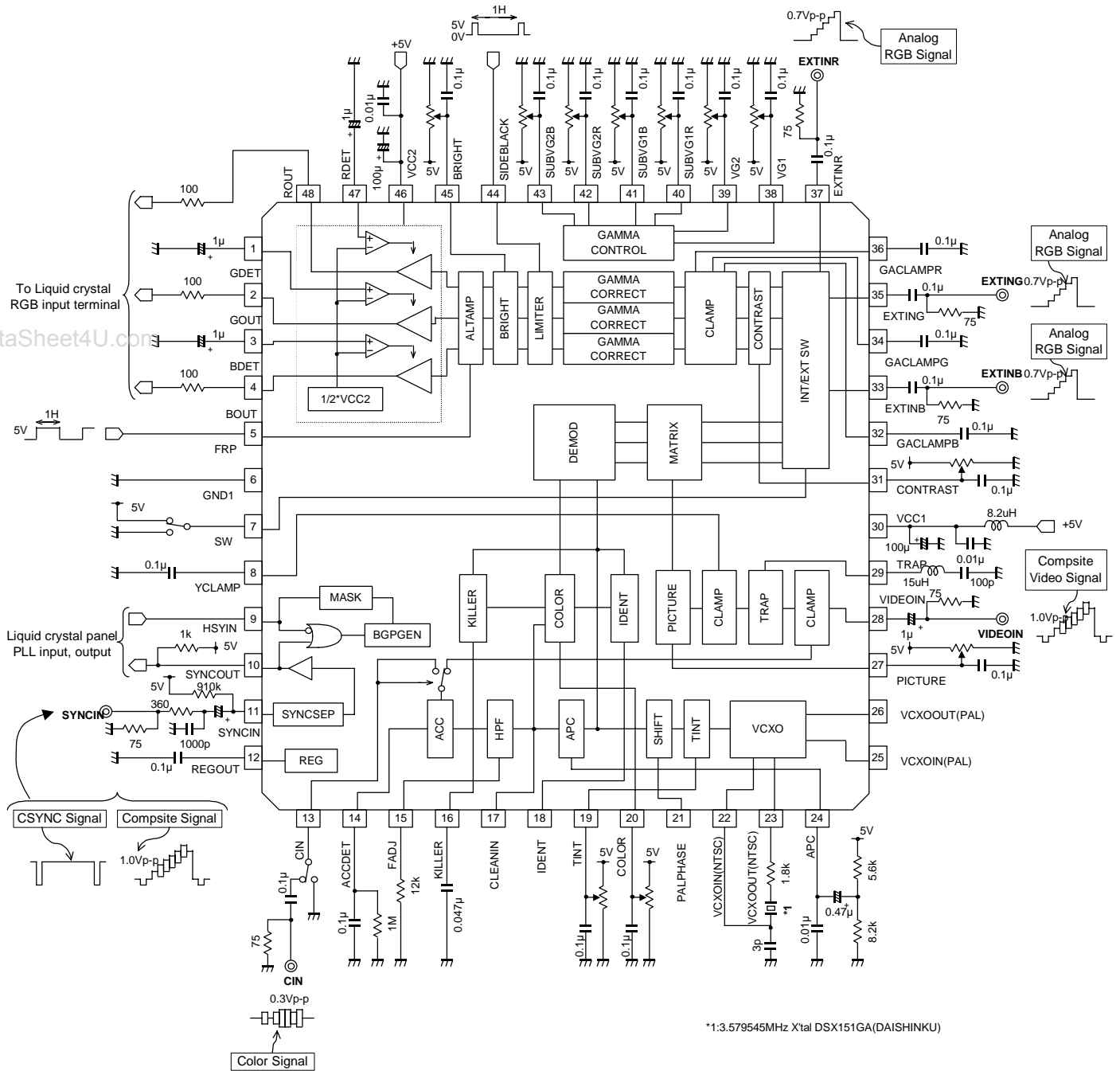
(Ta=25°C, V_{CC1}=5V, V_{CC2}=5V, TP20=TP31=TP45=2.5V,
TP19=2.8V, TP7=5V, TP38=1V, TP39=3V, TP44=0V, SW13=SW7=L)

| PARAMETER | SYMBOL | TEST CONDITION (TP=IC Pin No.) | MIN. | TYP. | MAX. | UNIT |
|---|---------------|---|------|------|------|------|
| Demodulation Relativity Phase (R-Y/B-Y) | θ_{RB} | 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 $\theta_R, \theta_G, \theta_B$. $\theta_{RB} = \theta_R - \theta_B$ $\theta_{GB} = \theta_G - \theta_B$ | - | 90 | - | deg |
| Demodulation Relativity Phase (G-Y/B-Y) | θ_{GB} | | - | 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 |

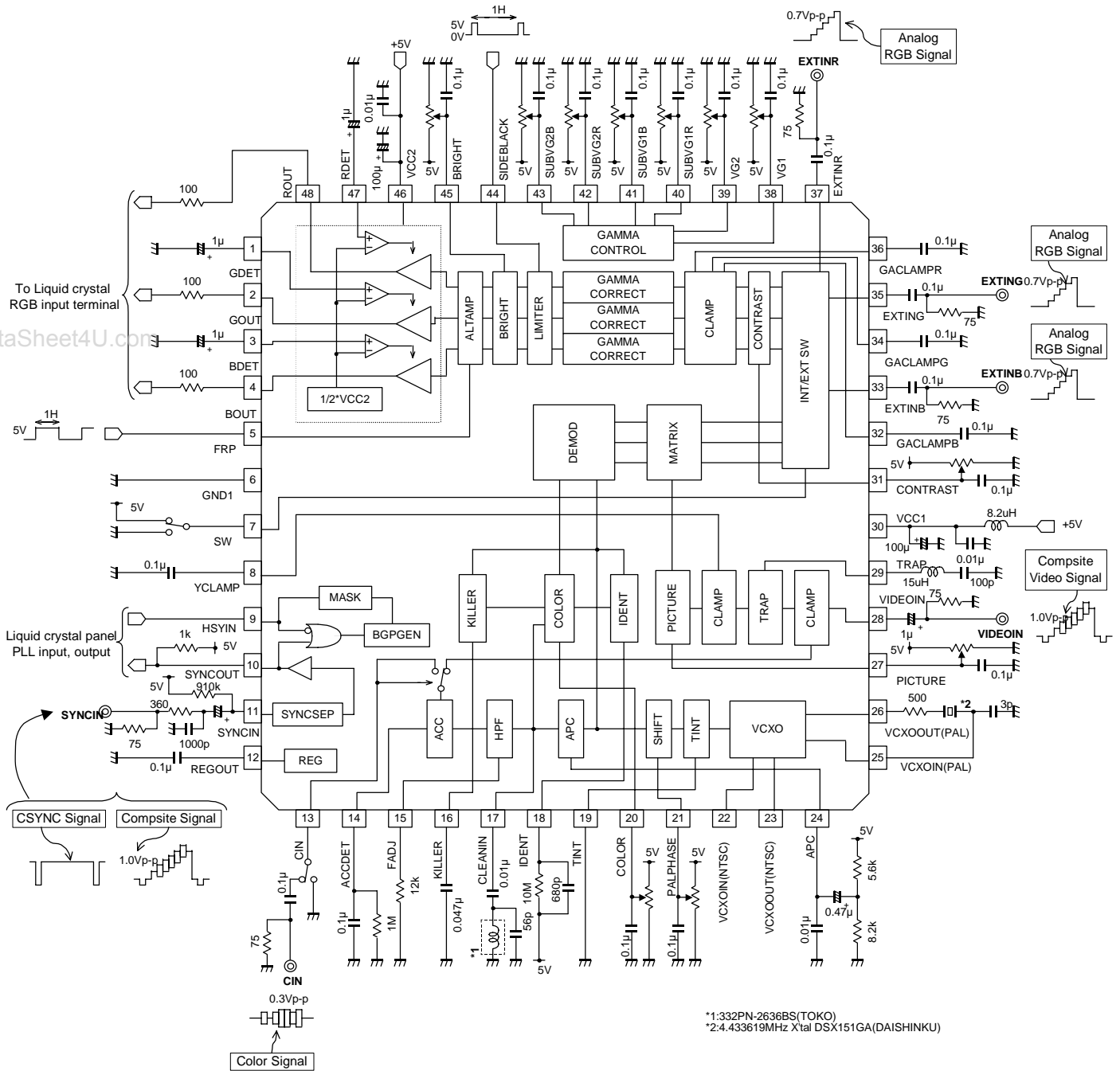
APPLICATION CIRCUIT EXAMPLE (NTSC/PAL)



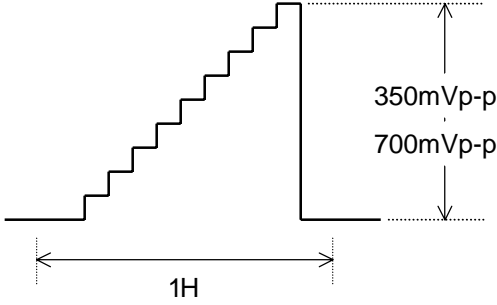
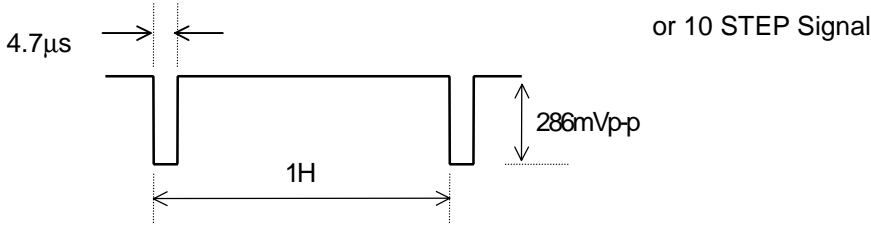
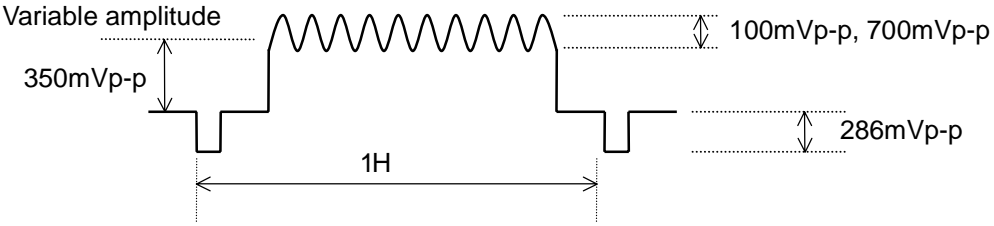
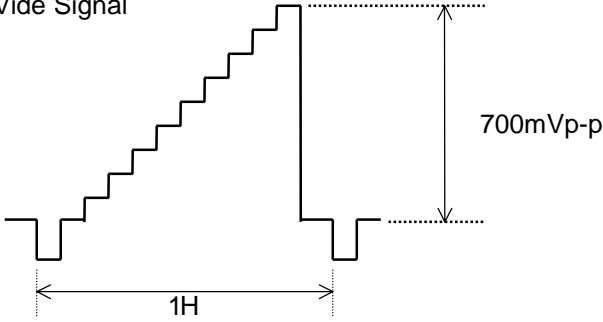
APPLICATION CIRCUIT EXAMPLE (NTSC)



APPLICATION CIRCUIT EXAMPLE (PAL)

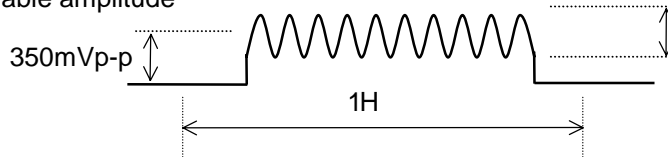

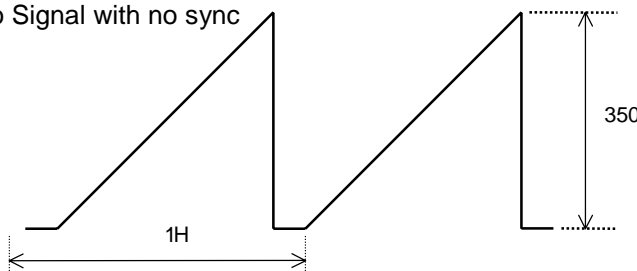
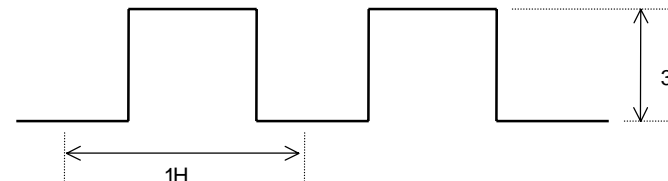
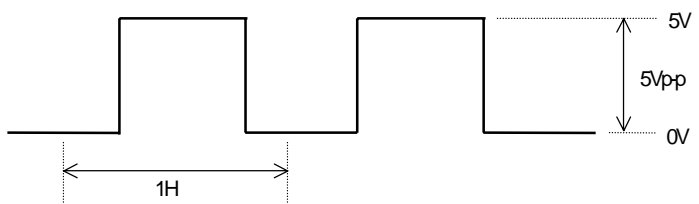


■ INPUT SIGNAL

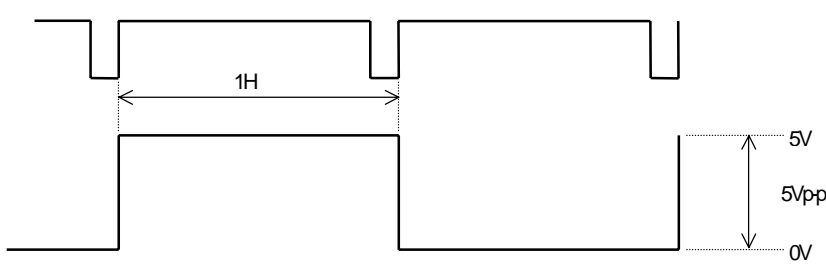
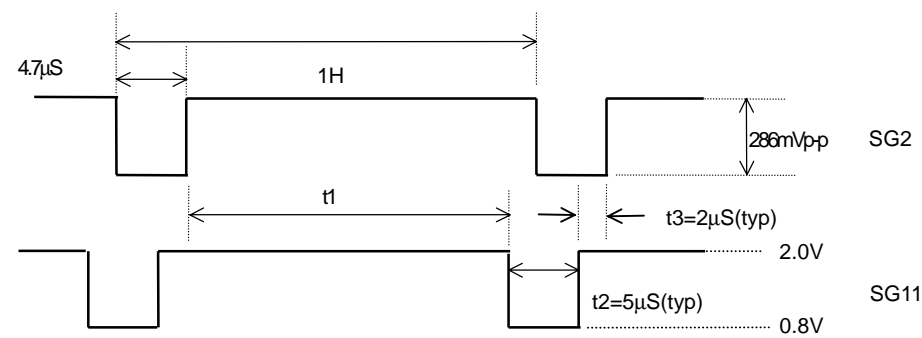
| SYMBOL | INPUT SIGNAL |
|--------|---|
| SG1 | <p>No Sync 10 Step Video Signal</p>  |
| SG2 | <p>Composite Y Signal with Sync signal or 10 STEP Signal</p>  |
| SG3 | <p>Sine Video Signal with Sync</p> <p>Variable frequency and amplitude</p>  |
| SG4 | <p>10STEP Vide Signal</p>  |

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■ INPUT SIGNAL

| SYMBOL | INPUT SIGNAL |
|------------|--|
| <p>SG5</p> | <p>Sine Video Signal with No sync</p> <p>Variable frequency and amplitude</p> <p>Variable amplitude</p>  <p>350mVp-p</p> <p>1H</p> <p>400mVp-p, 700mVp-p</p> |
| <p>SG6</p> | <p>C Signal</p>  <p>Burst Swing = 300mVp-p</p> <p>Chroma Swing = 300mVp-p</p> |
| <p>SG7</p> | <p>Ramp Video Signal with no sync</p>  <p>350mVp-p</p> <p>1H</p> |
| <p>SG8</p> | <p>Turn ON, Turn OFF Video Signal under 50ns</p>  <p>350mVp-p</p> <p>1H</p> |
| <p>SG9</p> | <p>Turn ON, Turn OFF Signal under 50ns</p>  <p>5V</p> <p>5Vpp</p> <p>0V</p> <p>1H</p> |

INPUT SIGNAL

| SYMBOL | INPUT SIGNAL |
|-------------|---|
| <p>SG10</p> | <p>FRP Signal of inverting Every 1H</p>  |
| <p>SG11</p> | <p>Horizontal Sync. Signal Synchronous to SG2</p>  |

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■ EQUIVALENT CIRCUIT

| PI N NO. | SYMBOL | FUNCTION | INSIDE EQUIVALENT CIRCUIT |
|----------|--------|--|---------------------------|
| 1 | GDET | Connect to the capacitor for G signal center modulator. 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. | |

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■ EQUIVALENT CIRCUIT

| PI N NO. | SYMBOL | FUNCTION | INSIDE EQUIVALENT 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 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>SW</td> <td>OUT</td> </tr> <tr> <td>L</td> <td>INT</td> </tr> <tr> <td>H</td> <td>EXT</td> </tr> </table> | SW | OUT | L | INT | H | EXT | |
| SW | OUT | | | | | | | | |
| L | INT | | | | | | | | |
| H | EXT | | | | | | | | |
| 8 | YCLAMP | Connect to the CLAMP capacitor for Y-signal. Leakless capacitor for use. | | | | | | | |

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■ EQUIVALENT CIRCUIT

| PI N NO. | SYMBOL | FUNCTION | INSIDE EQUIVALENT 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

| PIN NO. | SYMBOL | FUNCTION | INSIDE EQUIVALENT 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

| PIN NO. | SYMBOL | FUNCTION | INSIDE EQUIVALENT CIRCUIT |
|---------|----------|---|---------------------------|
| 17 | CLEANING | 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 EQUIVALENT 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 EQUIVALENT 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 EQUIVALENT 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 | CONTRAST | 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 EQUIVALENT 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 EQUIVALENT 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 EQUIVALENT 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 monitor,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 EQUIVALENT CIRCUIT |
|----------|--------|--|---------------------------|
| 45 | BRIGHT | Adjust the bright of RGB signal,controlled black level. | |
| 46 | VCC2 | RGB output Supply voltage,+5V Connect to +5V supply. $VCC2 \geq VCC1$ | |
| 47 | RDET | Connect to the capacitor for R signal center modulator. Leakless capacitor for use. | |
| 48 | ROUT | R signal output. | |

■ 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).

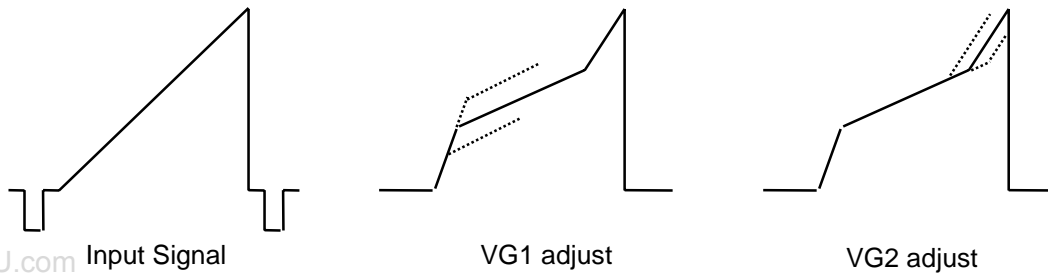
5. RGB Signal Mode
1) Contrast

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

2) Gamma Amplifier

This circuit is non-linear 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.


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.

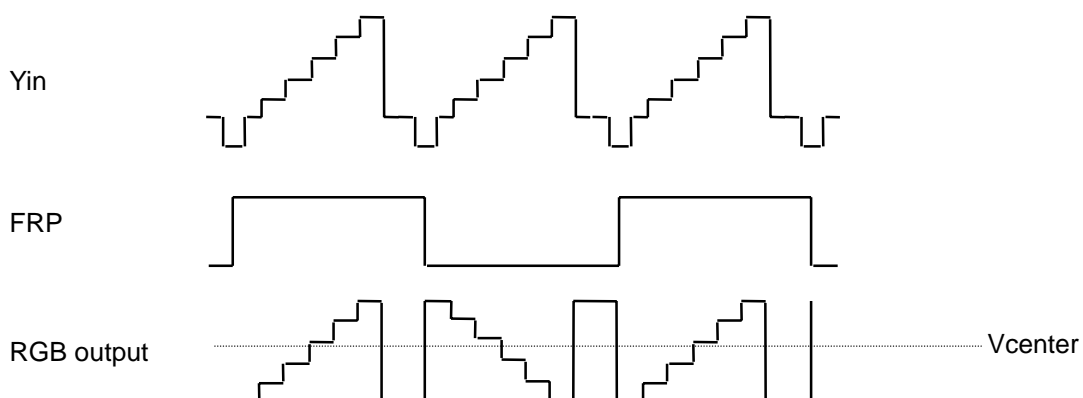
6) Output Amplifier

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 V_{cc2} .



[CAUTION]
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