
M52045FP

PAL Video Chroma Signal Processor

REJ03F0181-0200
Rev.2.00
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Description

The M52045FP is a semiconductor integrated circuit for video signal processing that been developed for PAL system liquid crystal (LCD) color TV. This IC has a built-in luminance signal processing circuit and color signal processing circuit, which is employed to convert a composite video signal to an RGB signal.

Features

- Low voltage and low power dissipation design
- Built-in Y/C separation circuit and external chroma trap switchable (fc is nearly equal to 1.5 MHz)
- Built-in sync separation circuit
- Provided with Y-signal blanking function by HD pulse
- R.G.B. signal output
- Tint, contrast, picture quality and color control linearly adjustable
- 24-pin, shrink pitch, flat package employed
- Same package as in NTSC system video chroma IC M52042FP, pins perfectly compatible

Application

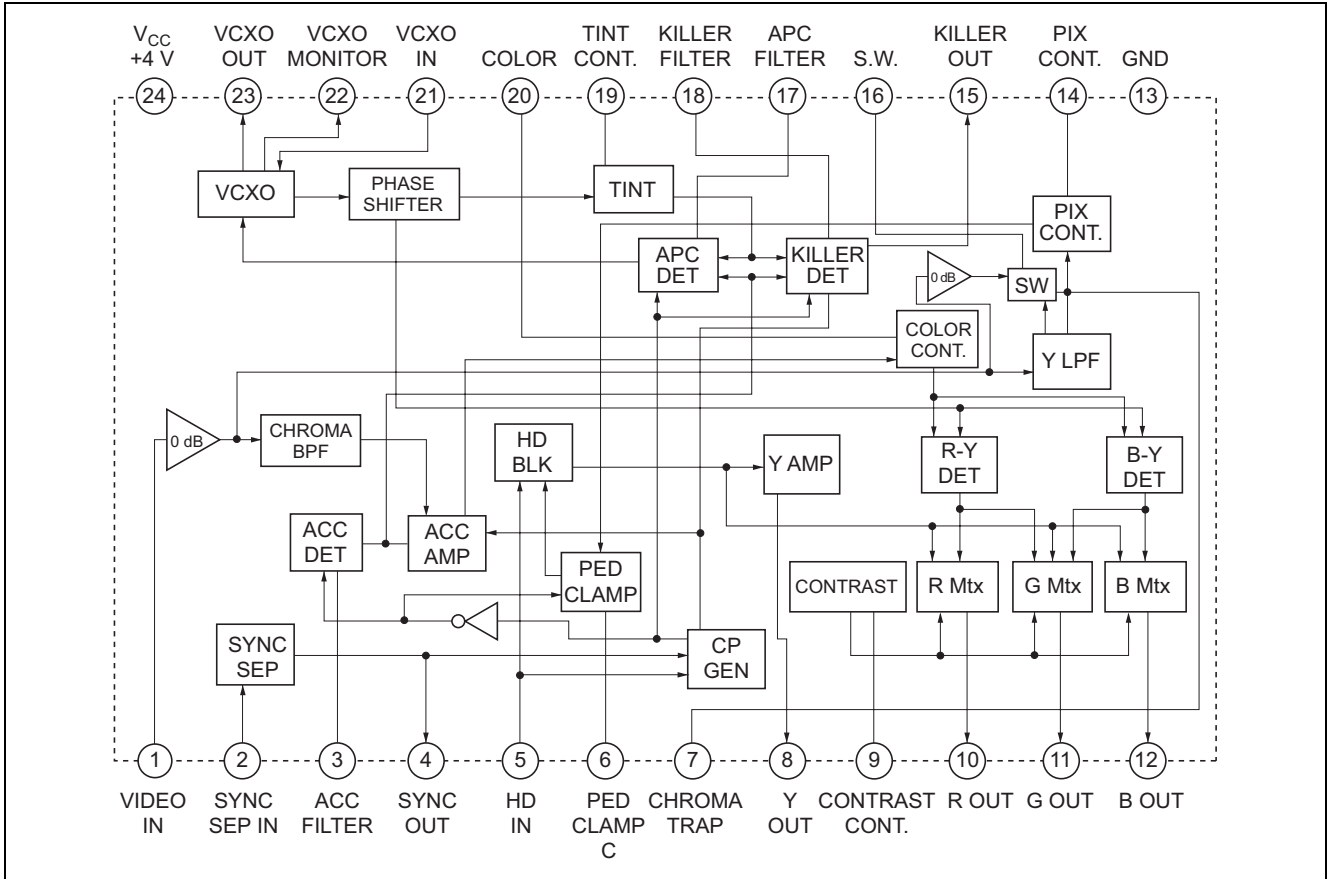
LCD color TV and LCD color view finder

Recommended Operating Condition

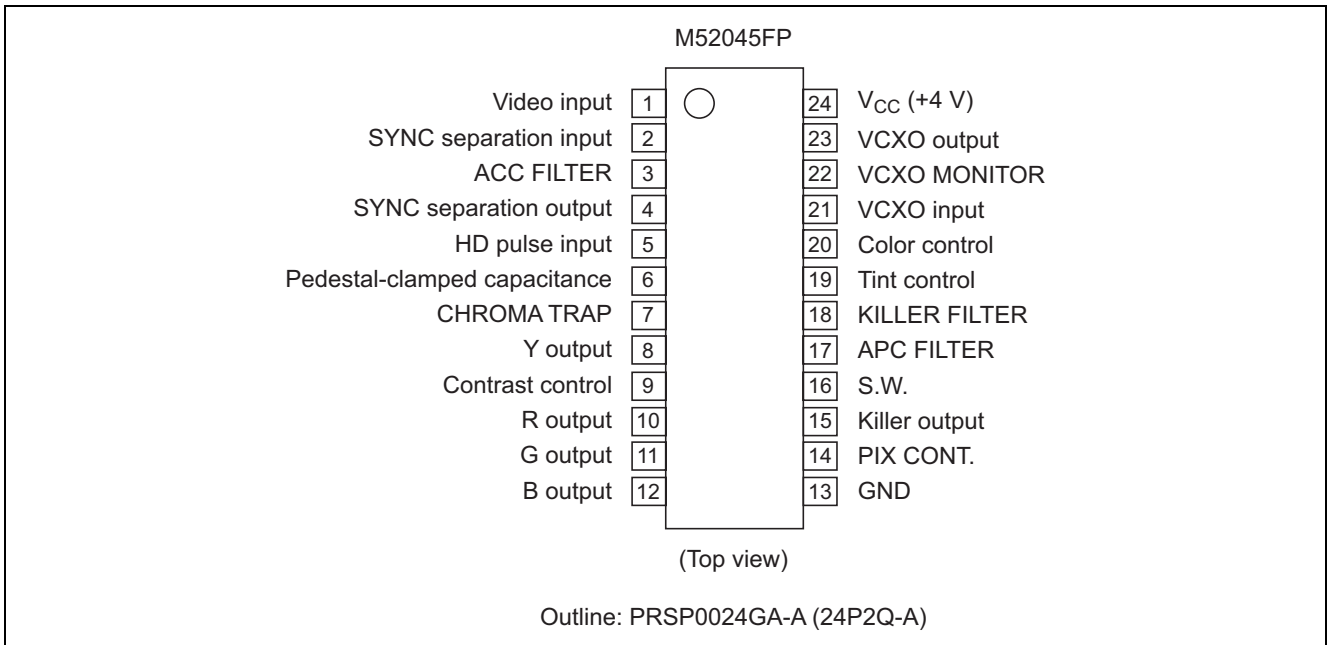
Supply voltage range: 3.8 to 4.2 V

Rated supply voltage: 4.0 V

Block Diagram



Pin Arrangement



Pin Description

| Pin No. | Name | Peripheral Circuit of Pins |
|---------|--|----------------------------|
| 1 | VIDEO IN (Video input) | |
| 2 | SYNC SEP IN (SYNC separation input) | |
| 3 | ACC FILTER | |
| 4 | SYNC OUT (SYNC separation output) | |
| 5 | HD IN (HD pulse input) | |

| Pin No. | Name | Peripheral Circuit of Pins |
|---------|---|----------------------------|
| 6 | PED CLAMP C (Pedestal-clamped capacitance) | |
| 7 | CHROMA TRAP | |
| 8 | Y OUT (Y output) | |
| 9 | CONTRAST CONT. (Contrast control) | |
| 10 | R OUT (R output) | |
| 11 | G OUT (G output) | |
| 12 | B OUT (B output) | |
| 13 | GND (Grounding) | — |
| 24 | V _{CC} +4 V (Power supply) | — |

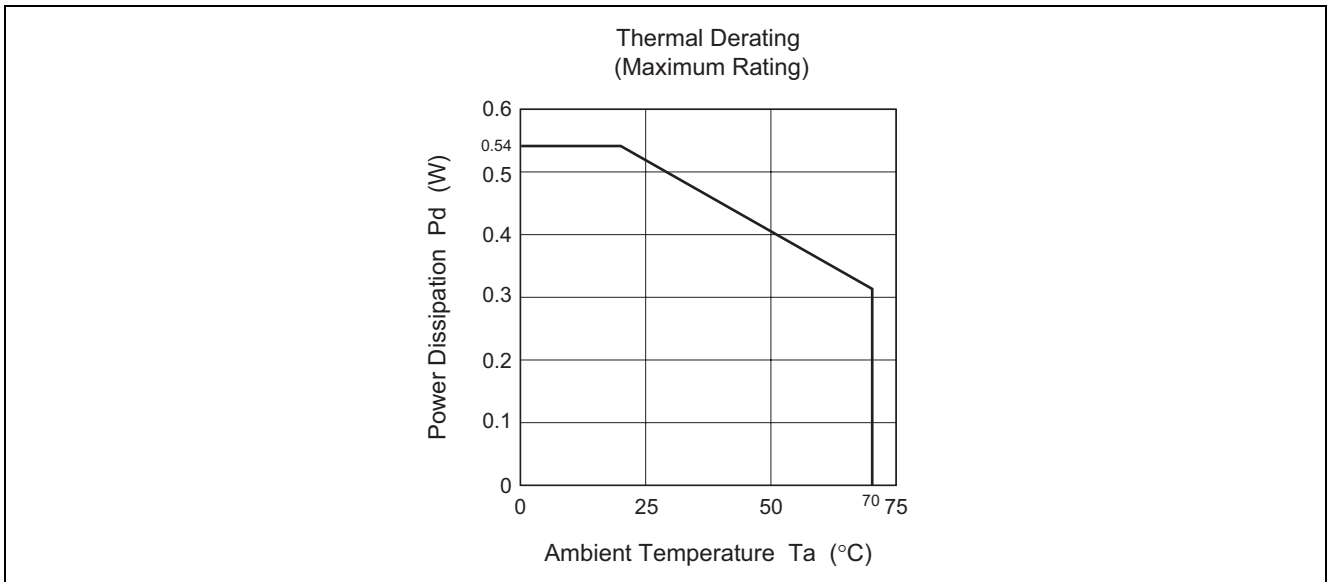
| Pin No. | Name | Peripheral Circuit of Pins |
|---------|--|----------------------------|
| 16 | S.W. (Selector switch) | |
| 22 | VCXO MONITOR | |
| 14 | PIX CONT. (Picture quality control) | |
| 15 | KILLER OUT (Killer output) | |
| 17 | APC FILTER | |

| Pin No. | Name | Peripheral Circuit of Pins |
|---------|------------------------------|----------------------------|
| 18 | KILLER FILTER | |
| 19 | TINT CONT. (Tint control) | |
| 20 | COLOR (Color control) | |
| 21 | VCXO IN (VCXO input) | |
| 23 | VCXO OUT (VCXO output) | |

Absolute Maximum Ratings


| Item | Symbol | Ratings | Unit |
|------------------------|--------------|-------------|-------|
| Supply voltage | V_{CC} | 4.5 | V |
| Power dissipation | P_d | 680 | mW |
| Operating temperature | T_{opr} | -10 to 70 | °C |
| Storage temperature | T_{stg} | -45 to 120 | °C |
| Thermal derating | K_{θ} | 5.4 | mW/°C |
| Electrostatic capacity | V_{max} | $\pm 200^*$ | V |

Note: Charging capacitance: 200 pF




Electrical Characteristics

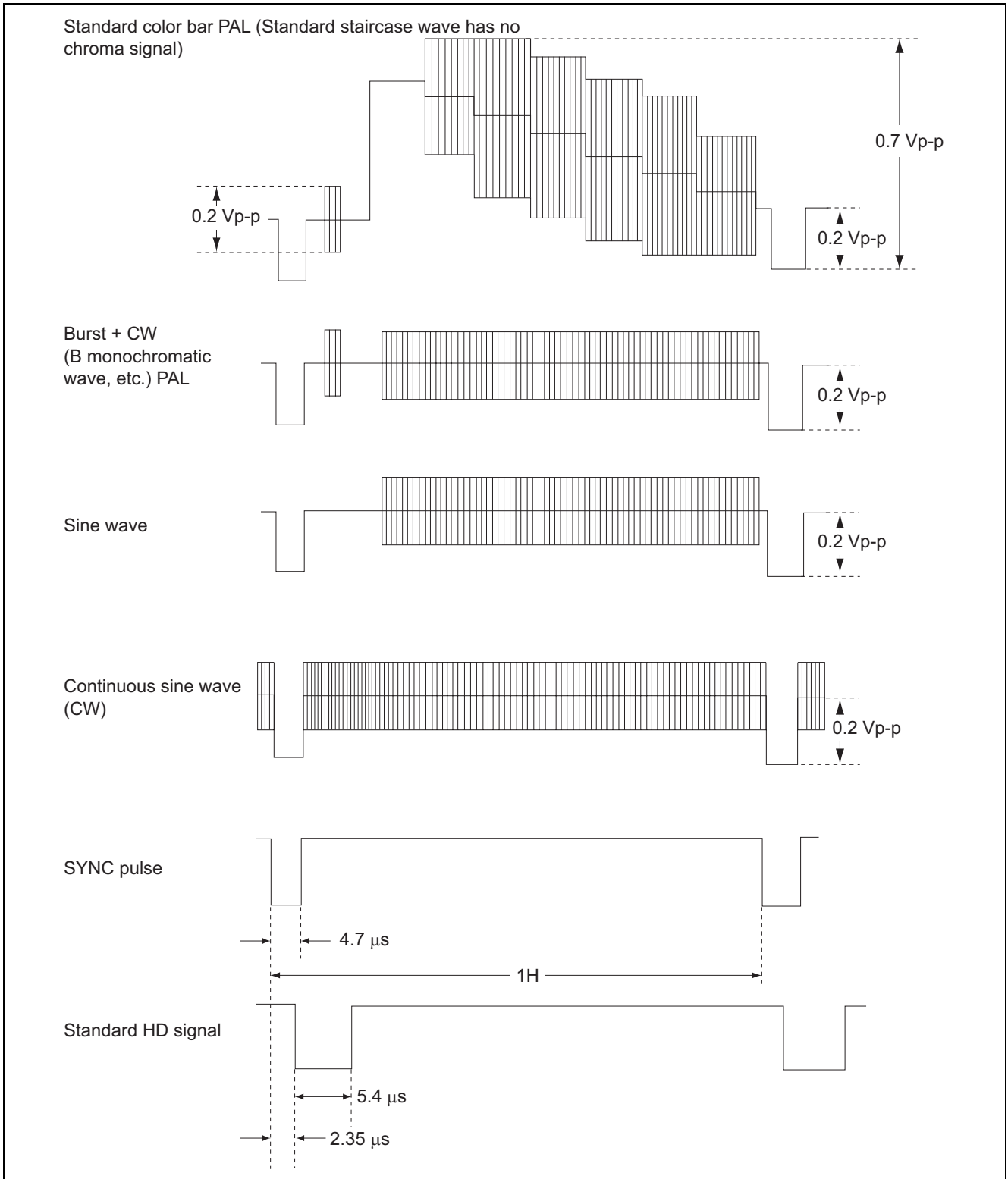
(Ta = 25°C, unless otherwise noted)

| Item | Symbol | Min | Typ | Max | Unit | Test No. | Test Conditions |
|---|----------------------------|------|------|------|------------------|----------|---|
| Circuit current | I _{CC} | — | 17 | 21 | mA | 1 | Input standard color bar signal of V _{CC} = 4 V. |
| SYNC SEP section | | | | | | | |
| SYNC tip voltage | V _{sync 1} | 2.20 | 2.30 | 2.40 | V | 2 | Measure each output signal SYNC tip voltage at pins (1), (7) when standard color bar signal of 0.7 V _{p-p} is input. |
| | V _{sync 7} | 1.25 | 1.40 | 1.50 | | | |
| SYNC output amplitude | V _{sync H} | 2.7 | 3.1 | 3.4 | V _{p-p} | 3 | Input only SYNC pulse of pulse width 4.7μs to pin (1). Measure the output amplitude at pin (4) when the input SYNC pulse amplitudes are 0.2 and 0.05 V _{p-p} . |
| | V _{sync L} | 2.7 | 3.1 | 3.4 | | | |
| SYNC output pulse width | T _{sync H} | 3.7 | 4.7 | 5.7 | μs | 4 | Input only SYNC pulse of pulse width 4.7μs to pin (1). Measure the output amplitude at pin (4) when the input SYNC pulse amplitudes are 0.2 and 0.05 V _{p-p} . |
| | T _{sync L} | 3.7 | 4.7 | 5.7 | | | |
| SYNC output pulse delay | D _{sync H} | 3.7 | 4.7 | 6.0 | μs | 5 | Input only SYNC pulse of pulse width 4.7μs to pin (1). Measure the pulse width + delay time when the input SYNC pulse amplitudes are 0.2 and 0.05 V _{p-p} . |
| | D _{sync L} | 3.7 | 4.7 | 6.0 | | | |
| Video section | | | | | | | |
| YLPF frequency characteristics (Pin (7)) | VLPF (L) | 1.45 | 1.55 | — | MHz | 6 | Measure the frequency at which the sine wave output amplitude is -3 dB when the input signal ( 0.2 V _{p-p}) 0.2 V _{p-p} is input. Also measure the output gain at input sine wave 3.58 MHz. |
| | VLPF (H) | -30 | -24 | -21 | dB | | |
| Maximum output | Y _{max} | 1.1 | 1.4 | 1.7 | V _{p-p} | 7 | Input standard staircase wave of 0.7 V _{p-p} . Measure the output amplitude at pin (12) when V ₉ is 0 V. |
| Video amplifier gain | G _{ymax} | 4.0 | 6.0 | 8.0 | dB | 8 | Input standard staircase wave of 0.7 V _{p-p} . Calculate the ratio between the output amplitude at pin (12) and input amplitude when V ₉ is 1.7 V. |
| Contrast control characteristics | Y _{ctrast} (1) | 1.20 | 2.45 | 4.50 | dB | 9 | Input standard staircase wave of 0.7 V _{p-p} , and calculate the ratio of the input amplitude to the output amplitude in Test No.8 above when V ₉ is changed to 1 V, 2.5 V and 3.5 V. |
| | Y _{ctrast} (2, 5) | -7.3 | -5.0 | -2.7 | | | |
| | Y _{ctrast} (3, 5) | — | -30 | -17 | | | |
| PIX control characteristics | XPIX (4) | -3.5 | -2.0 | -0.5 | dB | 10 | Input 1.5 MHz sine wave of 0.2 V _{p-p} to the input. Measure the output amplitude at pin (12) when V ₉ is 1.7 V, and V ₁₄ is charged to 2, 4 and 0 V and calculate the ratio between the input respectively and the output amplitude when V ₁₄ = 2 V. |
| | XPIX (0) | 10.0 | 12.0 | 14.0 | dB | | |
| Y AMP gain | G _{ymap} | 9.1 | 11.0 | 12.6 | dB | 11 | Input standard staircase wave of 0.7 V _{p-p} and calculate the ratio between the output amplitudes at pin (8) and input amplitude. |
| PED offset level | V _{ped} | 0.00 | 0.05 | 0.06 | — | 12 | When input SYNC pulse at 0.2 V _{p-p} , measure pin (12) output pedestal offset and calculate ratio of the offset to that when 0.7 V _{p-p} standard staircase is input. |

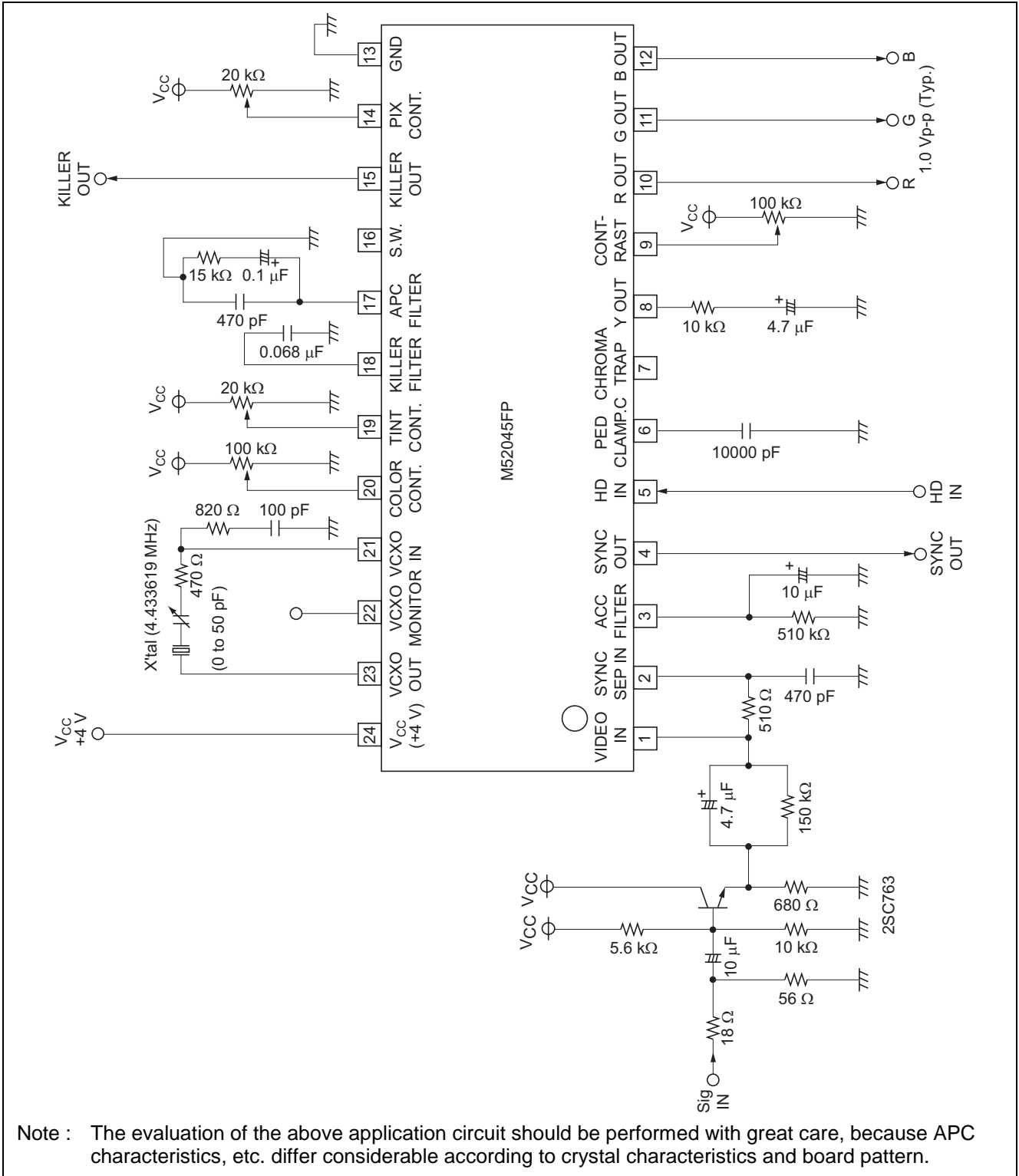
Electrical Characteristics (cont.)

| Item | Symbol | Min | Typ | Max | Unit | Test No. | Test Conditions |
|-----------------------------------|---------------|------|------|------|---------|----------|--|
| Chroma section | | | | | | | |
| Acc control characteristics | Cacc (+4) | 0 | 0.7 | 1.5 | dB | 14 | Input burst 0.2 Vp-p + CW 4.33 MHz shall be 0 dB. Measure the output at pin (12) when the input is changed to +4 dB and -20 dB, and calculate the ratio of the measured amplitude to the output amplitude at 0 dB. |
| | Cacc (-20) | -6.0 | -2.0 | 0 | | | |
| Killer operation | Ckilor | -54 | -50 | -42 | dB | 15 | Input a chroma signal of 0.2 Vp-p to the input. Reduce the amplitude and measure the amplitude ratio when the voltage at pin (15) exceeds 2.5 V. |
| Color control characteristics | Cast (4) | 2.0 | 2.2 | 4.5 | dB | 16 | Input burst 0.2 Vp-p + CW 4.33 MHz, change V20 to 2 V, 4 V, 3 V, 1 V and 0.5 V to measure each output (100 kHz beat) amplitude at pin (12), and calculate the ratio between the measured amplitude and the output amplitude at V20 = 1 V. |
| | Cast (3) | 1.5 | 2.0 | 4.0 | | | |
| | Cast (1) | -8.5 | -6 | -4 | | | |
| | Cast (0, 5) | -17 | -13 | -10 | | | |
| APC pull-in range | Δ fapc | +350 | +600 | — | Hz | 17 | Input only SYNC, and after adjusting free run, input 0.2 Vp-p CW () , then change the frequency. Measure the frequency when VCXO oscillator is placed in a locked condition from the free-run condition. |
| | | — | -600 | -400 | | | |
| B demodulator sensitivity | DB | 0.8 | 1.2 | 1.6 | Vp-p | 18 | Input CW 4.33 MHz of 0.2 Vp-p to the input, and measure the output amplitude at pin (12) when V20 = 1 V. |
| Demodulated out put voltage ratio | R (R/B) | 0.46 | 0.52 | 0.60 | — | 19 | Input CW 4.33 MHz of 0.2 Vp-p to the input, measure the output amplitude at pins (10), (11) when V20 = 1 V, and calculate the ratio of the measured amplitude to the output amplitude in Test No.18 above. |
| | R (G/B) | 0.20 | 0.30 | 0.40 | | | |
| Killer output voltage H | Vkiller H | 2.5 | 3.2 | — | V | 21 | Measure DC voltage at pin (15) when 0 V and 4 V are applied to pin (18). |
| Killer output voltage L | Vkiller L | — | 0.20 | 0.40 | | | |
| HD for chroma delay | Dhd | — | 2.0 | 2.2 | μ s | 22 | Apply B monochromatic wave 0.4 Vp-p and burst 0.2 Vp-p to the input. Measure the delay time from HD pulse rise to the chroma rise of pin (12) output. |
| IDENT characteristics | ID | — | — | — | — | 23 | The IDENT (identification) characteristics should be not higher than the killer level. |

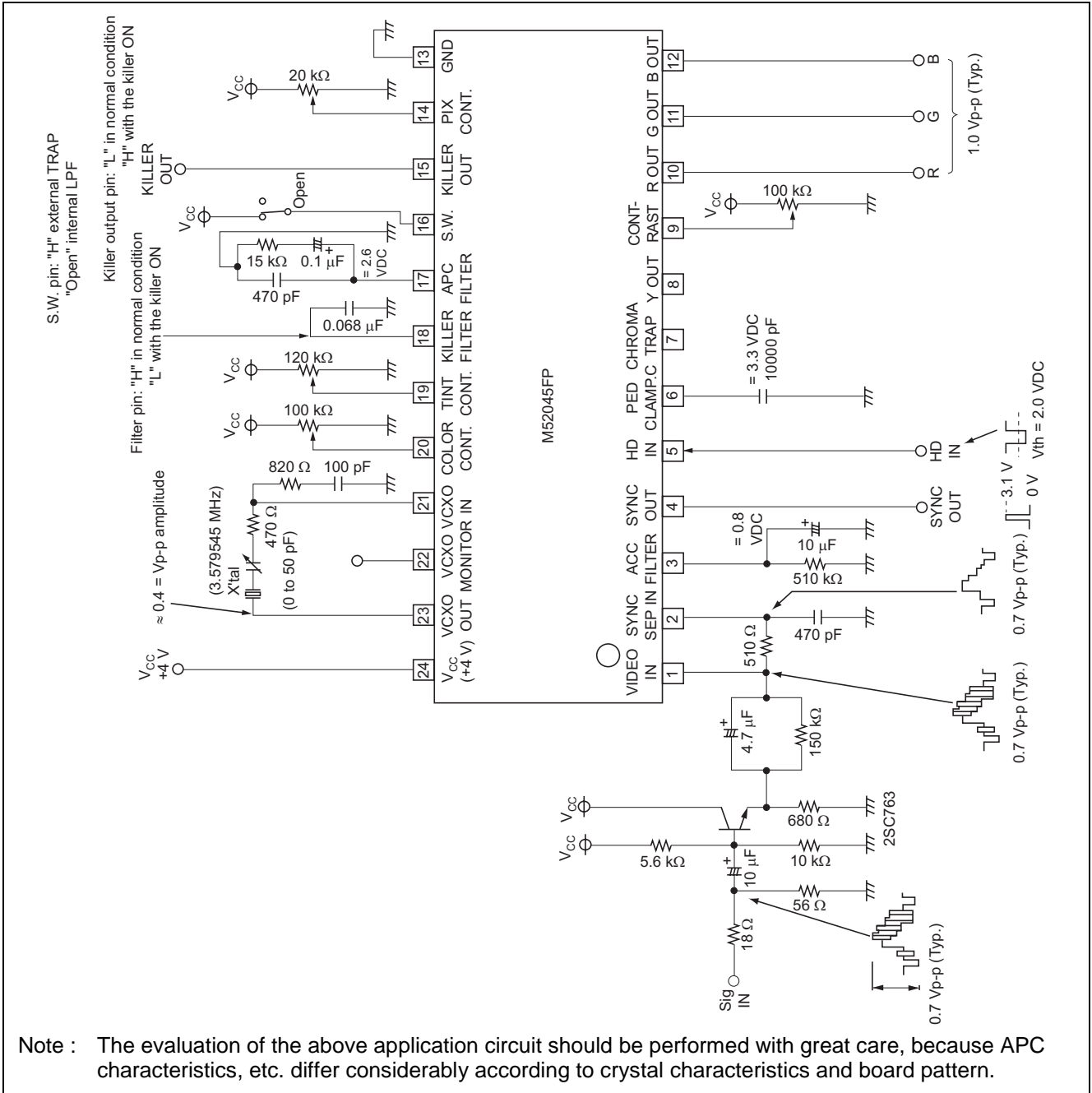
Input Signal



Test Circuit

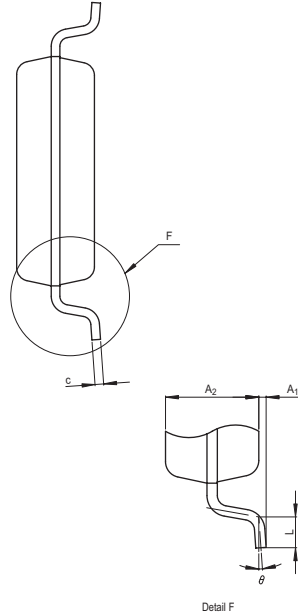
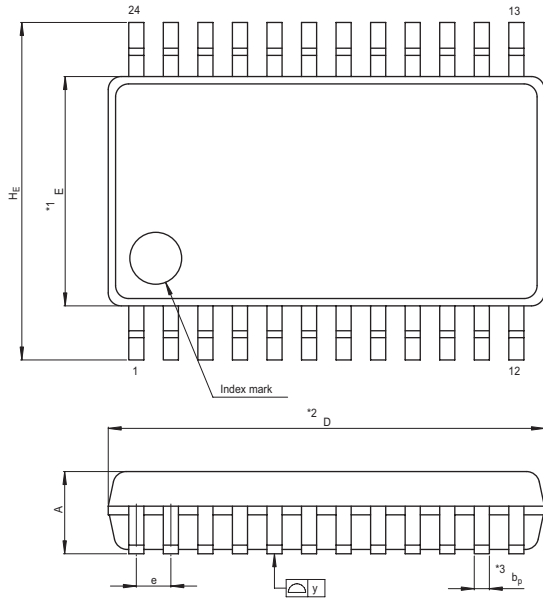


Application Example



Package Dimensions

| | | | |
|------------------------|--------------|---------------|------------|
| JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
| P-SSOP24-5.3x10.1-0.80 | PRSP0024GA-A | 24P2Q-A | 0.2g |



NOTE)
 1. DIMENSIONS **1" AND **2"
 DO NOT INCLUDE MOLD FLASH.
 2. DIMENSION **3" DOES NOT
 INCLUDE TRIM OFFSET.

| Reference Symbol | Dimension in Millimeters | | |
|------------------|--------------------------|------|------|
| | Min | Nom | Max |
| D | 10.0 | 10.1 | 10.2 |
| E | 5.2 | 5.3 | 5.4 |
| A ₂ | — | 1.8 | — |
| A | — | — | 2.1 |
| A ₁ | 0 | 0.1 | 0.2 |
| b _p | 0.3 | 0.35 | 0.45 |
| c | 0.18 | 0.2 | 0.25 |
| θ | 0° | — | 8° |
| H _E | 7.5 | 7.8 | 8.1 |
| e | 0.65 | 0.8 | 0.95 |
| y | — | — | 0.10 |
| L | 0.4 | 0.6 | 0.8 |

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