SGS-THOMSON MICROELECTRONICS

# STV5725

## 4-HEAD PLAYBACK AND RECORD AMPLIFIER FOR VCR

**PRELIMINARY DATA**

- ONE 5V POWER SUPPLY
- PLAYBACK/RECORD MODE SELECTION THROUGH A LOGIC INPUT
- PINNING COMPATIBLE WITH STV5727 AND STV5728
- SO20 PACKAGE

### PLAYBACK MODE

- LOW NOISE AND WIDE BAND AMPLIFIERS FOR 4 HEADS
- AUTOMATIC OFFSET CANCELLATION BETWEEN THE 2 SELECTED HEADS
- ONE PLAYBACK OUTPUT WITH AGC
- ONE PLAYBACK OUTPUT (CONSTANT GAIN)
- ONE OUTPUT FOR AUTOMATIC VIDEO TRACKING
- SP/LP ENVELOPE COMPARATOR OUTPUT

### RECORD MODE

- TRANSCONDUCTANCE AMPLIFIER

### DESCRIPTION

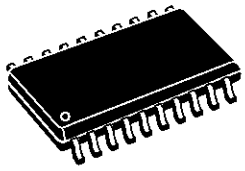
STV5725 is intended for 4 heads VCR applications. It includes all the electrical functions necessary to achieve play-back and record processing for VHS applications.
Record or Playback Mode can be selected through SWR Pin. SWH allows to select the video head input (H1SP or H2SP, H1LP or H2LP), while SWM will select the mode SP or LP.

#### Playback Mode

Signals applied on H1SP, H2SP, H1LP and H2LP input pins will be amplified by 60dB voltage gain. $I_{OUTSP}$ and $I_{OUTLP}$ Pins are AC short-circuited to ground. The input signal can be selected through SWH and SWM inputs and the corresponding output signal will be available on Pin CPB. The offset voltage between the two selected heads is automatically cancelled after 32 switching head cycles. A constant output signal will be available on Pin YPB thanks to an AGC function (Automatic Gain Control). The time constant of the AGC is determined by the capacitor value connected to CAGC Pin. For Automatic Tracking, a signal which is a function of the selected input signal amplitude is present on Pin TRIV.

#### Record Mode

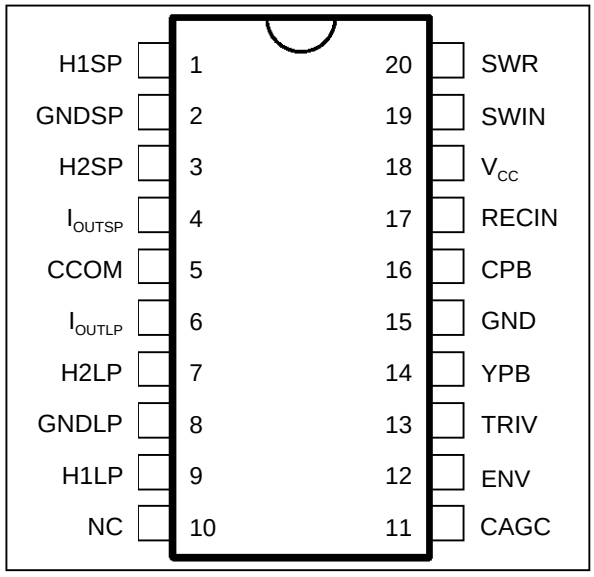
The current input applied on RECIN Pin is amplified through a transconductance amplifier. Special care has been taken to speed up commutation from Playback to Record and from Record to Playback, avoiding spikes through the loads (the rotary transformers). The recording current level in LP mode is 0.9 time the value of SP one.



**SO20**
(Plastic Micropackage)

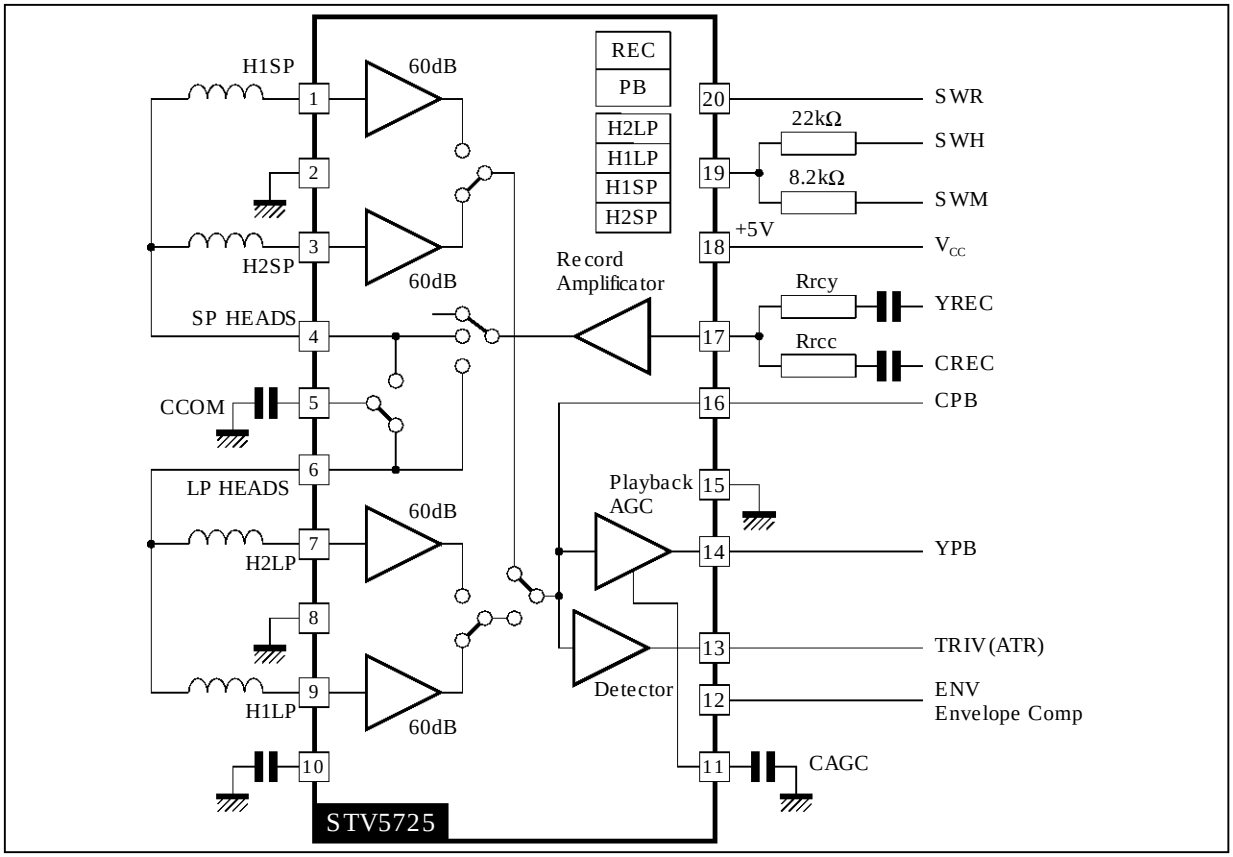
**ORDER CODE :** STV5725

### PIN CONNECTIONS




5725-01.EPS

## BLOCK DIAGRAM




## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CC}$ | Power Supply Voltage | 6 | V |
| $T_j$ | Junction Temperature | 150 | °C |
| $T_{oper}$ | Operating Temperature | 0, +70 | °C |

5725-01.TBL

## THERMAL DATA

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{th\ (j-a)}$ | Junction-ambient Thermal Resistance (IC solded on the PC board) | 90 | °C/W |

5725-02.TBL

## RECOMMENDED OPERATING CHARACTERISTICS

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | Power Supply | 4.75 | 5 | 5.25 | V |
| CAGC | Capacitance on Pin CAGC | 4.7 | 22 | | nF |
| CCOM | Decoupling Capacitor | 4.7 | 470 | | nF |

5725-03.TBL

**ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25°C, unless otherwise specified)

**Playback Mode**

$V_{CC}$ = 5V, no load on YPB and CPB Pins, after 32 SWH (SWitching Head) cycles.

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| PLAYBACK AMPLIFIER | | | | | | |
| $I_{CC1}$ | Supply Current | | 34 | 46 | 54 | mA |
| GPB | Playback Gain | Sinewave 600kHz, 0.4mV$_{PP}$ on inputs | 58 | 60 | 62 | dB |
| EN | Equivalent Voltage Noise | Input grounded via $I_{OUT}$ Pin @ 600kHz, BW = 10kHz | 0.5 | 0.6 | 0.7 | $\frac{nV}{\sqrt{Hz}}$ |
| IN | Equivalent Input Current | Input open @ 6MHz, BW = 10kHz | 1.4 | 2 | 2.6 | $\frac{pA}{\sqrt{Hz}}$ |
| CRT1 | Crosstalk | Sinewave @ 4MHz, 0.4mV$_{PP}$ | | -35 | -30 | dB |
| CRT2 | Crosstalk | Sinewave @ 600kHz, 0.4mV$_{PP}$ | | -50 | | dB |
| CRT3 | Crosstalk Between SP1 and LP2 Channels (or SP2 to LP1 Channels) | Sinewave @ 6MHz, 0.4mV$_{PP}$ | | -60 | -50 | dB |
| RPBSW | Playback Switch on Resistor | @ 6MHz | 0.8 | 2.5 | 18 | Ω |
| BWLCF | Attenuation @ 100kHz | Reference level @ 600kHz | -1 | 0 | 1 | dB |
| BWHCF | Attenuation @ 8MHz | Reference level @ 4MHz | -3 | -1 | 1 | dB |
| $C_{IN}$ | Input Capacitance | @ 6MHz | 22 | 27 | 32 | pF |
| $R_{IN}$ | Input Resistance | @ 6MHz | 500 | 730 | 930 | Ω |
| ZCPB | Output Resistance | DC | 5 | 14 | 50 | Ω |
| VDCPB1 | DC Level on Pin CPB | | 1.35 | 1.75 | 2.15 | V |
| DVDC | Head Switch Offset | | -200 | 0 | 200 | mV |
| SHPB1 | 2nd Harmonic | Sinewave @ 4MHz, 0.4mV$_{PP}$ | | -43 | -37 | dB |
| PLAYBACK AGC FUNCTION | | | | | | |
| ZYPB | Output Impedance @ YPB | | 5 | 14 | 50 | Ω |
| VDCPB2 | DC Level @ YPB | | 1.15 | 1.45 | 1.85 | V |
| BWLCF2 | Attenuation @ 100kHz | Reference @ 4MHz, PB AGC locked | -1 | 0 | 1 | dB |
| BWHCF2 | Attenuation @ 8MHz | Reference @ 4MHz, PB AGC locked | -3 | -1 | 1 | dB |
| VLPB | Output Amplitude | Sinuswave @ 4MHz, 0.4mV$_{PP}$ on input | 160 | 200 | 250 | mV$_{PP}$ |
| SHPB2 | Second Harmonic | Sinuswave @ 4MHz, 0.4mV$_{PP}$ on input | | -44 | -40 | dB |
| IPB+ | CAGC Sink Current | | 50 | 100 | 150 | µA |
| IPB- | CAGC Source Current | | -150 | -100 | -50 | µA |
| DVLP | AGC Sensitivity | Sinuswave @ 4MHz, 0.2mV$_{PP}$ on input, -5dB and +6dB | -1 | 0 | 1 | dB |
| TRIV FUNCTION | | | | | | |
| VTRIV0 | Output Level (1) | SP mode, $V_{cpb}$ = 0mV$_{PP}$ @ 4MHz | 0.05 | 0.28 | 0.7 | V |
| VTRIV4 | Output Level (4) | LP mode, $V_{cpb}$ = 600mV$_{PP}$ @ 4MHz | 3.8 | 4.1 | 4.5 | V |
| VTRIV5 | Output Level (5) | SP mode, $V_{cpb}$ = 100mV$_{PP}$ @ 4MHz | | 1.33 | | V |
| VTRIV6 | Output Level (6) | SP mode, $V_{cpb}$ = 200mV$_{PP}$ @ 4MHz | | 2.27 | | V |
| VTRIV7 | Output Level (7) | LP mode, $V_{cpb}$ = 100mV$_{PP}$ @ 4MHz | 1.4 | 1.8 | 2.2 | V |
| VTRIV8 | Output Level (8) | LP mode, $V_{cpb}$ = 200mV$_{PP}$ @ 4MHz | | 3.11 | | V |
| VTRIV9 | Output Level (9) | SP mode, $V_{cpb}$ = 300mV$_{PP}$ @ 4MHz | | 2.95 | | V |
| VTRIV10 | Output Level (10) | SP mode, $V_{cpb}$ = 600mV$_{PP}$ @ 4MHz | 3.45 | 3.85 | 4.25 | V |
| FTRIV1 | Response Lower Frequency, Attenuation @ 1MHz | Reference : SP mode, $V_{cpb}$ = 100mV$_{PP}$ @ 4MHz | | -6 | | dB |
| FTRIV2 | Response Higher Frequency, Attenuation @ 8MHz | Reference : SP mode, $V_{cpb}$ = 100mV$_{PP}$ @ 4MHz | | -1 | | dB |

5725-04.TBL

**ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25°C, unless otherwise specified) (continued)

**Playback Mode** (continued)

$V_{CC}$ = 5V, no load on YPB and CPB Pins.

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| SP/LP ENVELOPE DETECTOR | | | | | | |
| $R_{OH}$ | Output Resistance @ ENVC | Sinewave 600µ$V_{PP}$ @ 4 MHz on H2SP | 0.65 | 1.6 | 2.8 | kΩ |
| $R_{OL}$ | Output Resistance @ ENVC | Sinewave 600µ$V_{PP}$ @ 4 MHz on H1LP | 0.65 | 1.6 | 2.8 | kΩ |
| VENVCH | Output Level | | 4 | | 5 | V |
| VENVCL | Output Level | | 0 | | 1 | V |
| SENS1 | Sensibility | 100µ$V_{PP}$ to 600µ$V_{PP}$ @ LP input pins | | | 1 | V |
| SENS2 | Sensibility | 100µ$V_{PP}$ to 600µ$V_{PP}$ @ SP input pins | 4 | | | V |

**Record Mode**

$V_{CC}$ = 5V, SWR = 5V, RRCY = 2.2kΩ, RRCC = 8.2kΩ, CCOM = 470nF, SWM = 0V.

Load 10µH//1kΩ for each simulated head.

Damping network of 1nF/620Ω connected between $I_{OUTSP}$ record output and Ground.

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| RECORD AMPLIFIER | | | | | | |
| $I_{CC2}$ | Current Supply | | 59 | 75 | 95 | mA |
| IHA0 | DC Current through $I_{OUT}$ | | 27 | 42 | 55 | mA |
| IHA2 | 2nd Harmonic | VRCY = 300m$V_{PP}$ @ 4MHz | | -49 | -40 | dB |
| IMAX | Maximum Current | @ 4MHz, 2nd harmonic < 35dB | 35 | | | m$A_{PP}$ |
| BWRECL | Attenuation at 100kHz | Reference level @ 600kHz | -1 | 0 | 1 | dB |
| BWRECH | Attenuation at 8MHz | Reference level @ 4MHz | -2 | 0 | 1 | dB |
| TRSP | Transconductance SP | $V_{IN}$ = 300m$V_{PP}$ @ 4MHz | 63 | 68 | 73 | mA/V |
| TRLP | Transconductance LP | $V_{IN}$ = 300m$V_{PP}$ @ 4MHz, SWM = 5V | 58 | 62.5 | 67 | mA/V |
| RSAT | Output Stage Resistance | @ 4MHz | 5 | 11 | 20 | Ω |
| TRR | Transconductance Ratio | TRSP / TRLP | 0.8 | 1 | 1.2 | dB |
| RIOUT | Impedance on $I_{OUTSP}$ ($I_{OUTLP}$) | ΔV = 1V | 40 | 100 | 300 | kΩ |
| SWITCHING LEVELS | | | | | | |
| VSWIN1 | SWIN Input Threshold | Selects head H2SP | 0 | | 0.4 | V |
| VSWIN2 | SWIN Input Threshold | Selects head H1SP | 1 | | 2.2 | V |
| VSWIN3 | SWIN Input Threshold | Selects head H1LP | 2.8 | | 4 | V |
| VSWIN4 | SWIN Input Threshold | Selects head H2LP | 4.6 | | 5 | V |
| ISWIN1 | VSWIN = 0V | Input current | -1 | -0.5 | -0.1 | µA |
| ISWIN2 | VSWIN = 1.5V | Input current | 0.1 | 0.4 | 2 | µA |
| ISWIN3 | VSWIN = 3.5V | Input current | 0.1 | 0.4 | 2 | µA |
| ISWIN4 | VSWIN = 5V | Input current | 0.1 | 0.5 | 2 | µA |
| VSWRH | SWR Input Threshold | Selects record mode | 3.5 | | 5 | V |
| VSWRL | SWR Input Threshold | Selects playback mode | 0 | | 1.5 | V |
| ISWRH | VSWR = 5V | Input current | 0 | 0.1 | 5 | µA |
| ISWRL | VSWR = 0V | Input current | -10 | -5 | -0.5 | µA |
| $T_{ON}$ | Switching Delay | Signal appears on CPB | | | 500 | ns |
| T1 | Delay from Playback to Record : Signal Disappears on Pin CPB | | | 1 | | µs |
| T2 | Delay from Record to Playback : Signal Appears on Pin CPB | | | 800 | | µs |
| T3 | Delay from Playback to Record : Signal Appears on Pin $I_{OUTSP}$ or $I_{OUTLP}$ | | | 20 | | µs |
| T4 | Delay from Record to Playback : Signal Disappears on Pin $I_{OUTSP}$ or $I_{OUTLP}$ | | | 1 | | µs |

5725-05.TBL

## INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS

**Figure 1**

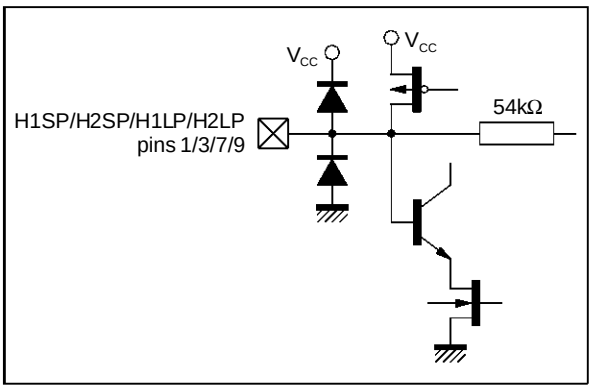



**Figure 2**

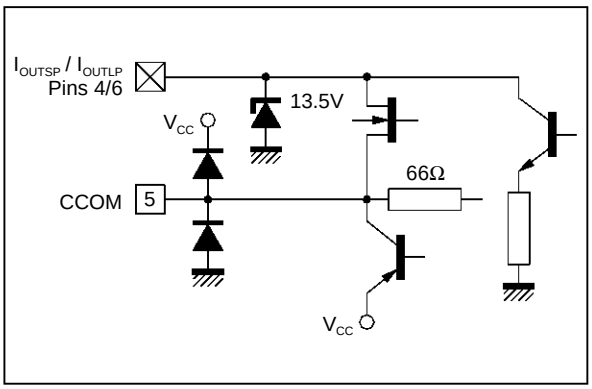



**Figure 3**

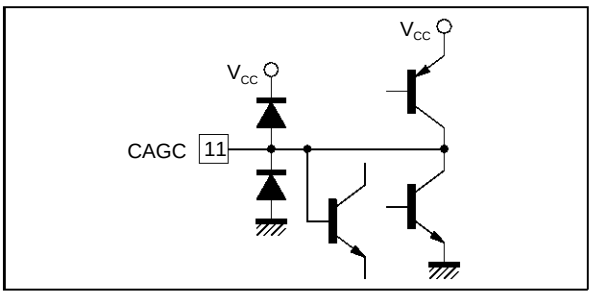



**Figure 4**

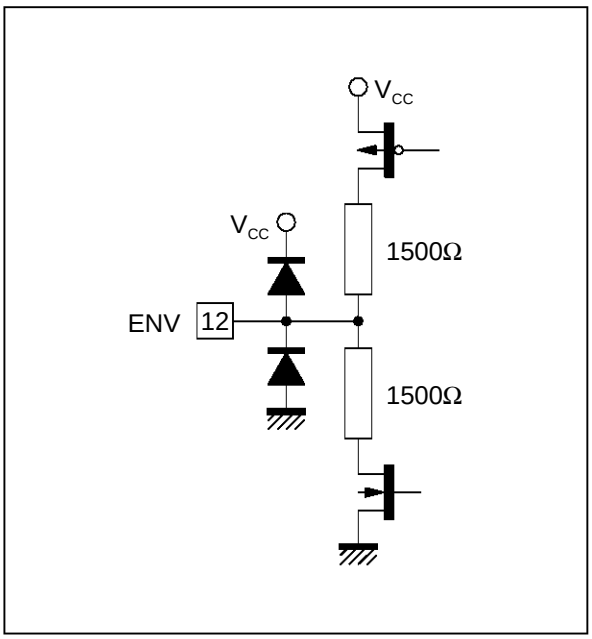



**Figure 5**

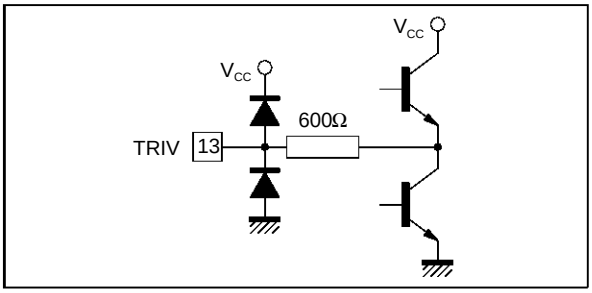



**Figure 6**

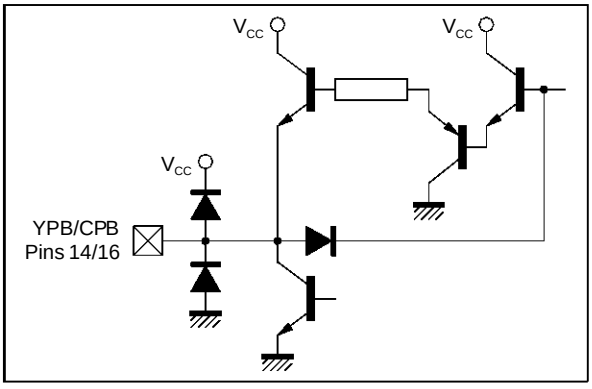
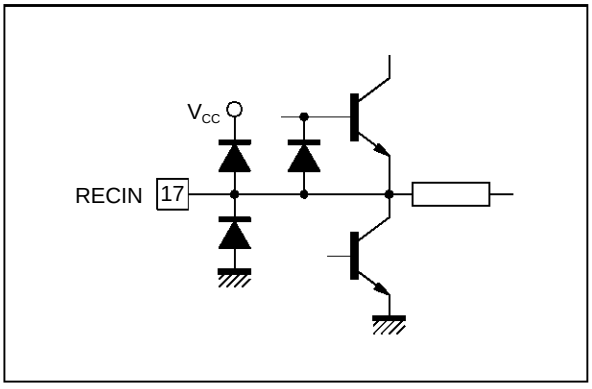



**Figure 7**



## INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS (continued)

**Figure 8**

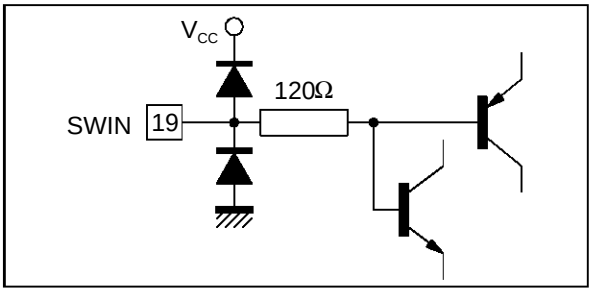
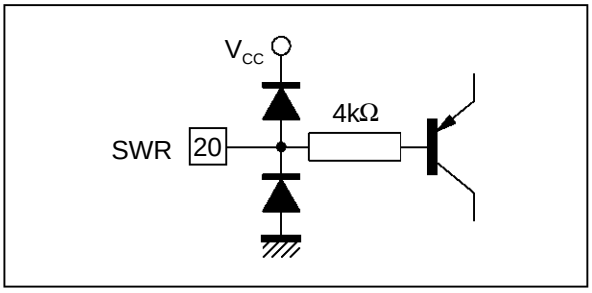
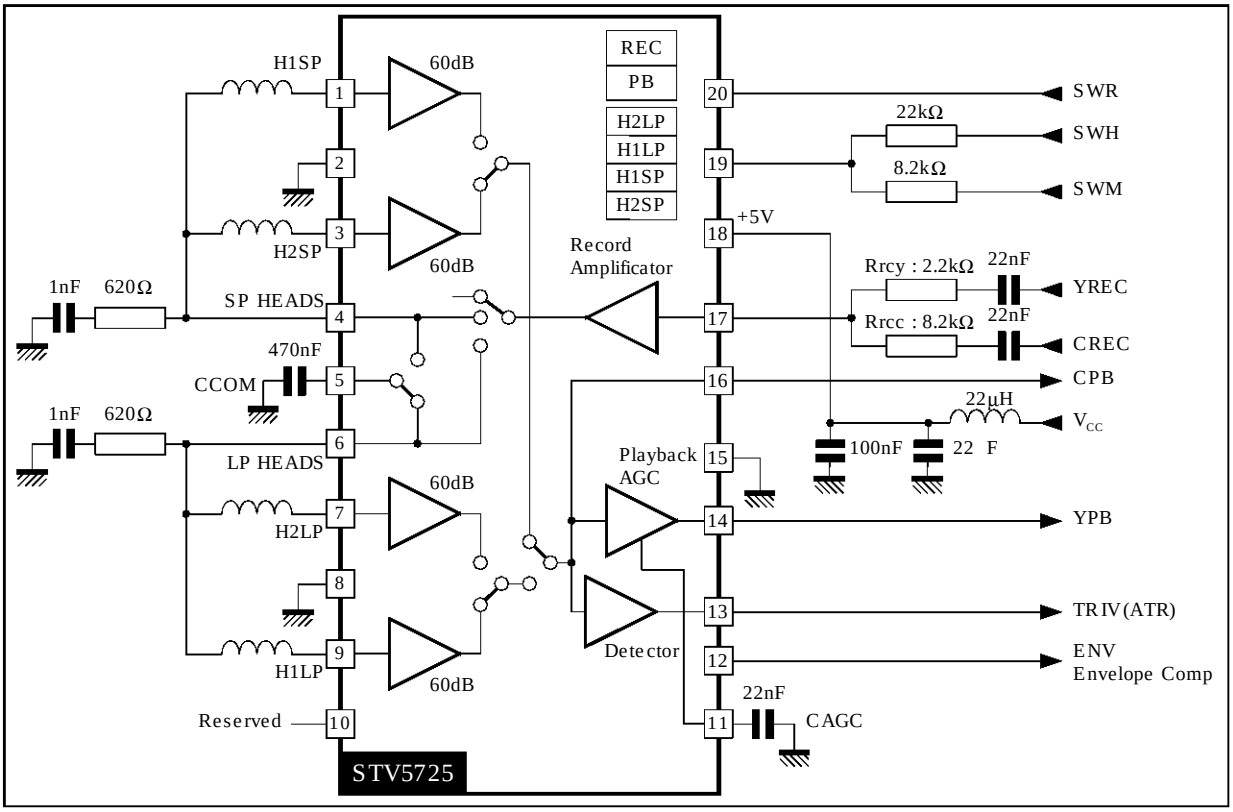



**Figure 9**




## TYPICAL APPLICATION



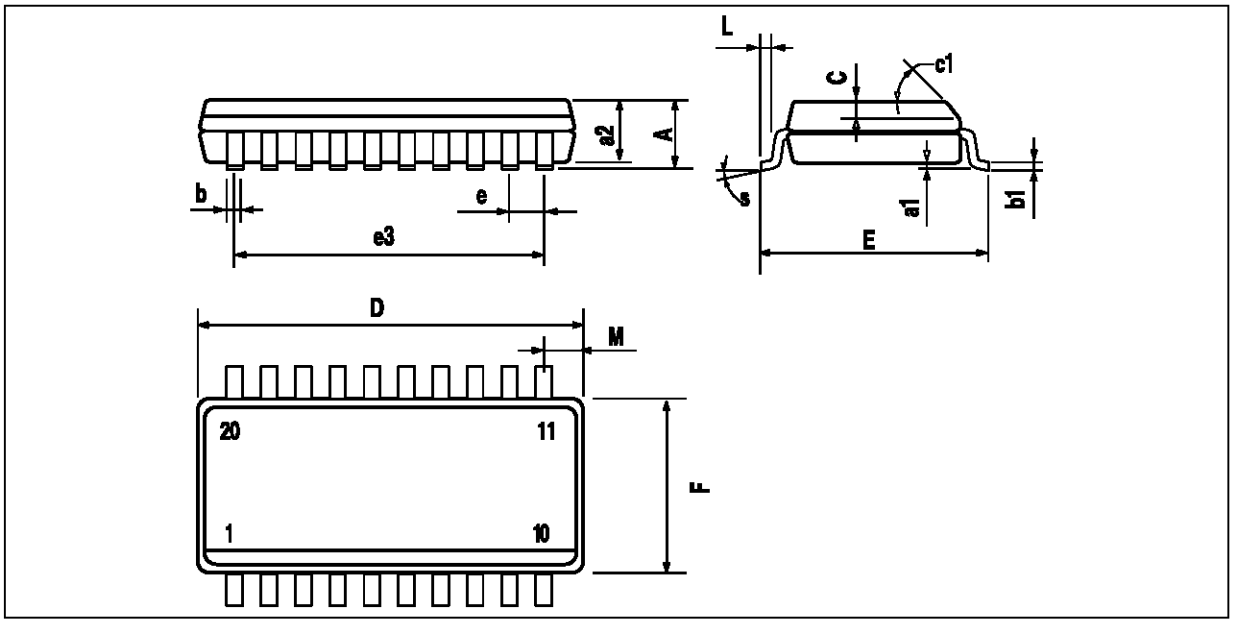

## SWITCH TABLE

| SWR | SWM | SWH | Channel | ENVC |
|---|---|---|---|---|
| L (PB) | L | L | H2SP | HIGH if LP < SP |
| | | H | H1SP | |
| | H | L | H1LP | LOW if LP > SP |
| | | H | H2LP | |
| H (REC) | L | L | SP | |
| | | H | | |
| | H | L | LP | |
| | | H | | |

5725-06.TBL

## PACKAGE MECHANICAL DATA

20 PINS - PLASTIC MICROPACKAGE (SO)




PM-SO20.EPS

| Dimensions | Millimeters | | | Inches | | |
|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | | | 2.65 | | | 0.104 |
| a1 | 0.1 | | 0.3 | 0.004 | | 0.012 |
| a2 | | | 2.45 | | | 0.096 |
| b | 0.35 | | 0.49 | 0.014 | | 0.019 |
| b1 | 0.23 | | 0.32 | 0.009 | | 0.013 |
| C | | 0.5 | | | 0.020 | |
| c1 | $45^o$ (typ.) | | | | | |
| D | 12.6 | | 13.0 | 0.496 | | 0.512 |
| E | 10 | | 10.65 | 0.394 | | 0.419 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 11.43 | | | 0.450 | |
| F | 7.4 | | 7.6 | 0.291 | | 0.299 |
| L | 0.5 | | 1.27 | 0.020 | | 0.050 |
| M | | | 0.75 | | | 0.030 |
| S | $8^o$ (Max.) | | | | | |

SO20.TBL