PRELIMINARY
Notice:This is not a final specification.
Some parametric limits are subject to change.



# M65656FP

## SCAN CONVERTER

## DESCRIPTION

The M65656FP is an integrated circuit that converts analog VGA inputs directly into NTSC/PAL TV format outputs.

This circuit integrates a digital NTSC/PAL encoder with 8bit ADC's and 10bit DAC's.

## FEATURES

- VGA picture signal to NTSC / PAL signal conversion
- Input Format, 60Hz, 640×480 (Standard VGA format)
- High performance Non-Flicker Filter
- Built-in Line Memories
  Fully integrated with no external memory requirement
- Built-in triple 8bit-A/D converters for RGB
- Built-in triple 10bit-D/A converters for TV signal outputs
- Single +3.3V Power Supply
- I²C Bus Control
- 64pin Flat Package

## APPLICATION

VGA to Video converter Modules

TV, VCR

Mobile PC

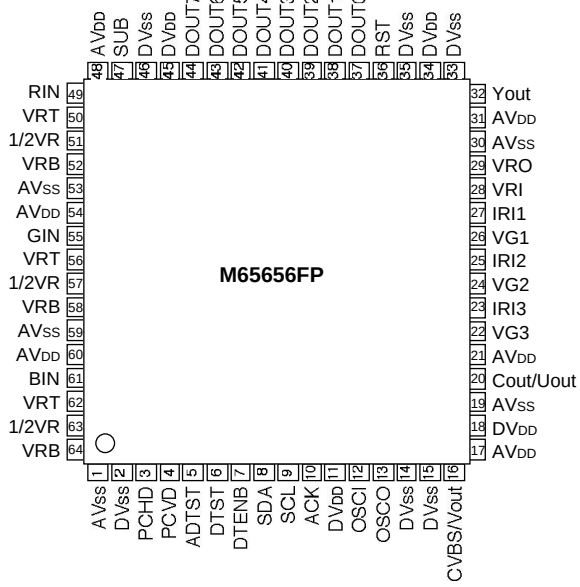
Multi-media Systems (Set-Top-Box)

## RECOMMENDED OPERATING CONDITION

Supply voltage range.....3.0 to 3.6V

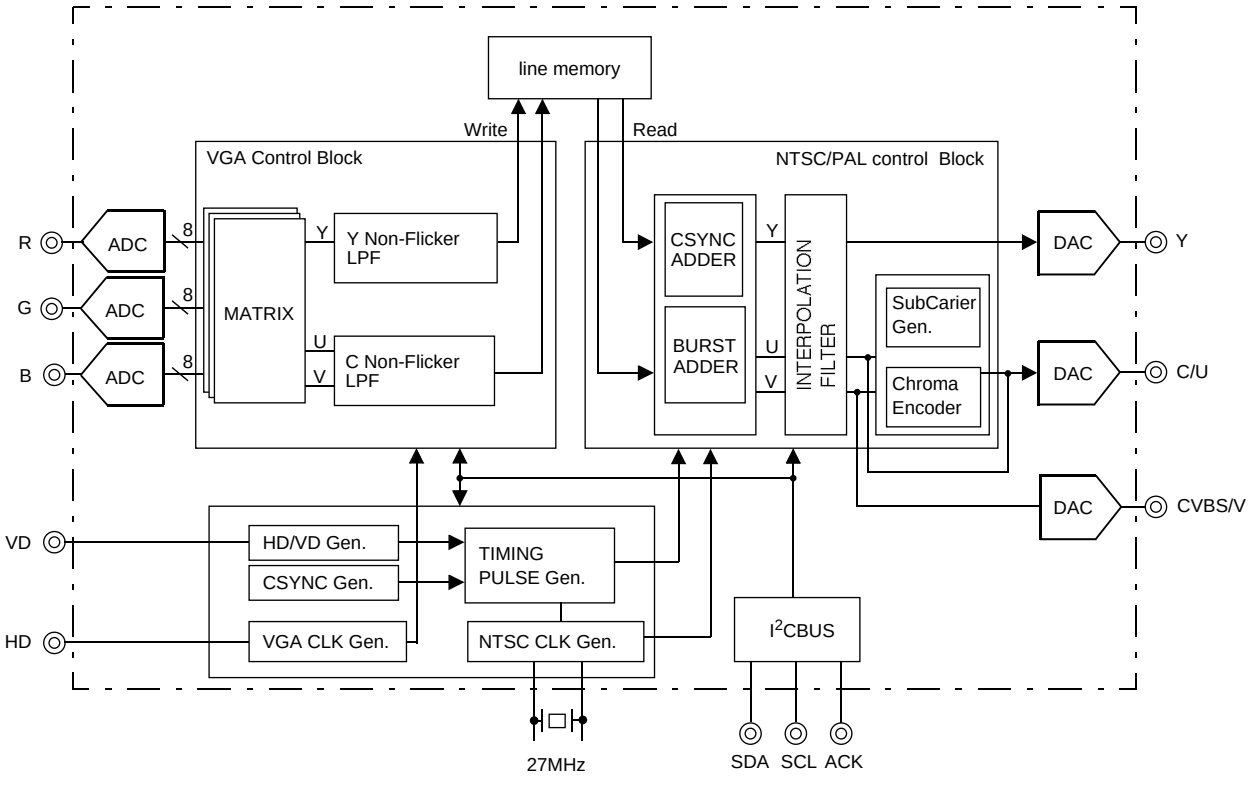
Rated supply voltage.....3.3V

## PIN CONFIGURATION (TOP VIEW)




Outline 64P6N-A

## BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS ($V_{SS}$=0V)

| Symbol | Parameter | Limits | | Unit |
|---|---|---|---|---|
| | | Min. | Max. | |
| $V_{DD3}$ | Supply voltage (3.3V) | -0.3 | 3.6 | V |
| $V_I$ | Input voltage | -0.3 | $V_{DD3}$+0.3 | V |
| $V_O$ | Output voltage | -0.3 | $V_{DD3}$+0.3 | V |
| $I_O$ | Output current ( 1) | −<br>− | $I_{OL}$=20<br>$I_{OH}$=-26 | mA |
| $P_d$ | Power dissipation | | 500 | mW |
| $T_{opr}$ | Operating temperature | 0 | 75 | °C |
| $T_{stg}$ | Storage temperrature | -50 | 125 | °C |

1 : Output current per output terminal. But $P_d$ limits all current.

## DC CHARACTERISTICS ($V_{SS}$=0V)

| Symbol | Parameter | | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| $V_{IL}$ | Input voltage (CMOS interface) | L | $V_{DD}$=2.7V | 0 | − | 0.81 | V |
| $V_{IH}$ | | H | $V_{DD}$=3.6V | 2.52 | − | 3.6 | V |
| $V_{T-}$ | Input volyage schmitt trigger (CMOS interface) | - | $V_{DD}$=3.3V | 0.5 | − | 1.65 | V |
| $V_{T+}$ | | + | | 1.4 | − | 2.4 | V |
| $V_H$ | | Hysteresis | | 0.3 | − | 1.2 | V |
| $V_{OL}$ | Output voltage | L | $V_{DD}$=3.3V, \| $I_O$ \|<1µA | − | − | 0.05 | V |
| $V_{OH}$ | | H | | 3.25 | − | − | V |
| $I_{OL}$ | Output current | L | $V_{DD}$=3.0V, $V_{OL}$=0.4V | 4 | − | − | mA |
| $I_{OH}$ | | H | $V_{DD}$=3.0V, $V_{OH}$=2.6V | − | − | -4 | mA |
| $I_{IH}$ | Input current | L | $V_{DD}$=3.6V, $V_I$=0V | -1 | − | 1 | µA |
| $I_{IL}$ | | H | $V_{DD}$=3.6V, $V_I$=3.6V | -1 | − | 1 | µA |
| $I_{OZL}$ | Output leakage current | L | $V_{DD}$=3.6V, $V_O$=0V | -1 | − | 1 | µA |
| $I_{OZH}$ | | H | $V_{DD}$=3.6V, $V_O$=3.6V | -1 | − | 1 | µA |
| $C_I$ | Input pin capacitance | | f=1MHz, $V_{DD}$=0V | − | 7 | 15 | pF |
| $C_O$ | Output pin capacitance | | | − | 7 | 15 | pF |
| $C_{IO}$ | Bidirectional pin capacitance | | | − | 7 | 15 | pF |
| $I_{DD}$ | Operating current | 3.3V supply | | − | − | 200 | mA |

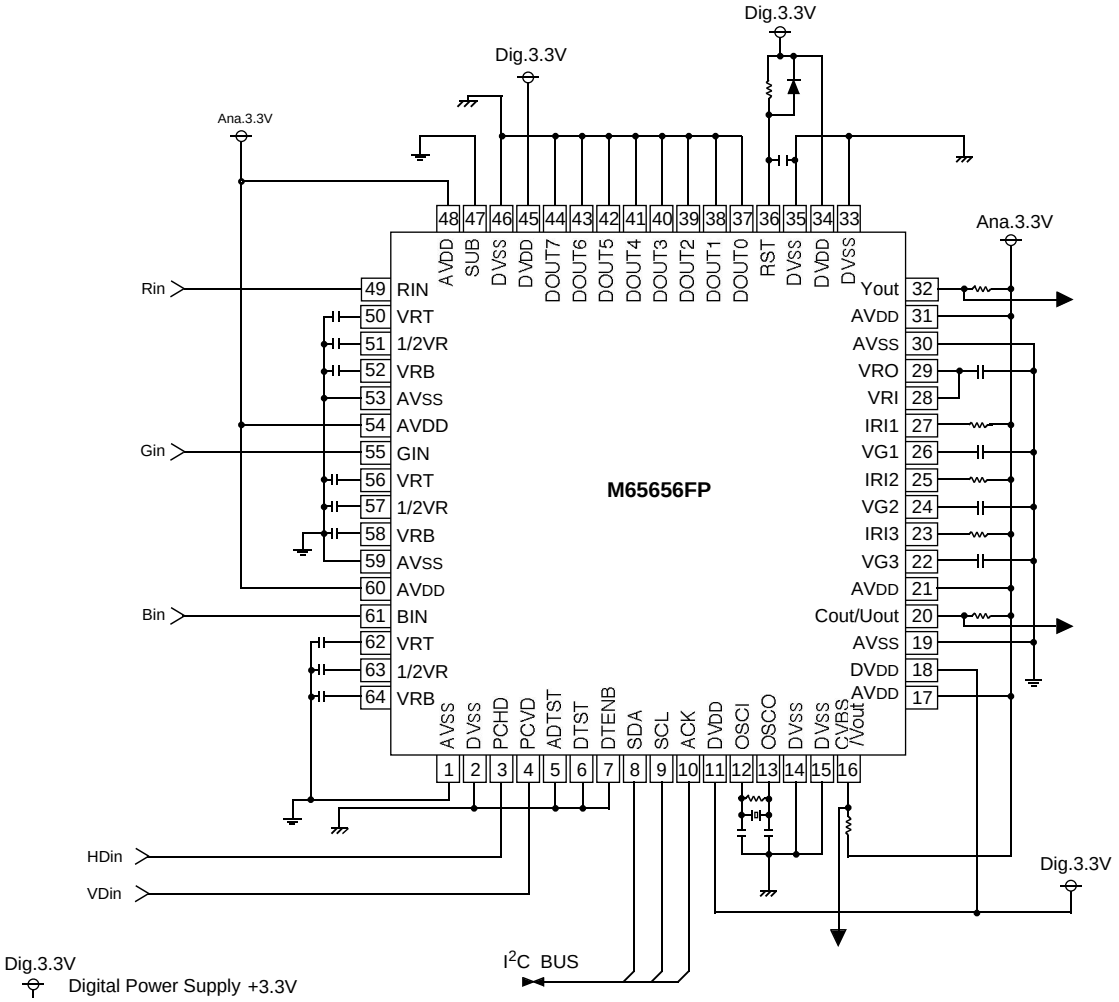
## DESCRIPTION OF PIN

| Pin No. | Name | I/O | Function | Remarks |
|---|---|---|---|---|
| 1 | AVSS | | Analog GND | A/D |
| 2 | DVSS | | Digital GND | |
| 3 | PCHD | I | HD signal input from PC | |
| 4 | PCVD | I | VD signal input from PC | |
| 5 | ADTST | I | for TEST | |
| 6 | DTST | I | for TEST | TEST |
| 7 | DTENB | I | for TEST | |
| 8 | SDA | I/O | $I^2C$ Bus data input | |
| 9 | SCL | I | $I^2C$ Bus clock input | $I^2C$ Control |
| 10 | ACK | I/O | $I^2C$ Bus data/acknowledge signal | |
| 11 | DVDD | | Digital VDD for OSC | |
| 12 | OSCI | I | OSC input | OSC |
| 13 | OSCO | O | OSC output | |
| 14 | DVSS | | Digital GND for OSC | |
| 15 | DVSS | | Digital GND | |
| 16 | CVBS/Vout | O | Composite/V output | |
| 17 | AVDD | | Analog power suplly | |
| 18 | DVDD | | Digital power supply | |
| 19 | AVSS | | Analog GND | |
| 20 | Cout/Uout | O | Chrominance/V output | |
| 21 | AVDD | | Analog power supply | |
| 22 | VG3 | O | Bias voltage for CVBS/Vout output | |
| 23 | IRI3 | I | Reference Current for CVBS/Vout output | |
| 24 | VG2 | O | Bias voltage for Cout/Uout output | D/A |
| 25 | IRI2 | I | Reference Current for Cout/Uout output | |
| 26 | VG1 | O | Bias Voltage for Y output | |
| 27 | IRI1 | I | Reference Current for Y output | |
| 28 | VRI | I | Reference voltage input for 3DACs | |
| 29 | VRO | O | Reference voltage output for 3DACs | |
| 30 | AVSS | | Analog GND | |
| 31 | AVDD | | Analog power supply | |
| 32 | YOUT | O | Luminance output | |
| 33 | DVSS | | Digital GND | |
| 34 | DVDD | | Digital power supply | |
| 35 | DVSS | | Digital GND | |
| 36 | RST | I | Reset signal input | |
| 37 | DOUT0 | I/O | for TEST | |
| 38 | DOUT1 | I/O | for TEST | |
| 39 | DOUT2 | I/O | for TEST | |
| 40 | DOUT3 | I/O | for TEST | TEST |
| 41 | DOUT4 | I/O | for TEST | |
| 42 | DOUT5 | I/O | for TEST | |
| 43 | DOUT6 | I/O | for TEST | |
| 44 | DOUT7 | I/O | for TEST | |
| 45 | DVDD | | Digital power supply | |
| 46 | DVSS | | Digital GND | |
| 47 | SUB | | Substrate | |
| 48 | AVDD | | Analog power supply | |
| 49 | RIN | I | R signal input from PC | |
| 50 | VRT | O | Vref+ for R Signal | AD |
| 51 | 1/2VR | O | Reference voltage for R Signal | |
| 52 | VRB | O | Vref- for R Signal | |

**DESCRIPTION OF PIN** (CONT.)

| Pin No. | Name | I/O | Function | Remarks |
|---|---|---|---|---|
| 53 | AVSS | | Analog GND | A/D |
| 54 | AVDD | | Analog power supply | |
| 55 | GIN | I | G signal input from PC | |
| 56 | VRT | O | Vref+ for G Signal | |
| 57 | 1/2VR | O | Reference voltage for G Signal | |
| 58 | VRB | O | Vref- for G Signal | |
| 59 | AVSS | | Analog GND | |
| 60 | AVDD | | Analog power supply | |
| 61 | BIN | I | B signal input from PC | |
| 62 | VRT | O | Vref+ for B Signal | |
| 63 | 1/2VR | O | Reference voltage for B Signal | |
| 64 | VRB | O | Vref- for B Signal | |

## APPLICATION EXAMPLE




Dig.3.3V
Digital Power Supply +3.3V

Digital Ground

Ana.3.3V
Analog Power Supply +3.3V

Analog Ground