

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

MITSUBISHI ICs (TV)

**M65657FP**

SCAN CONVERTER

**DESCRIPTION**

The M65657FP is an integrated circuit that converts digital VGA inputs directly into NTSC/PAL TV format outputs.

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

**FEATURES**

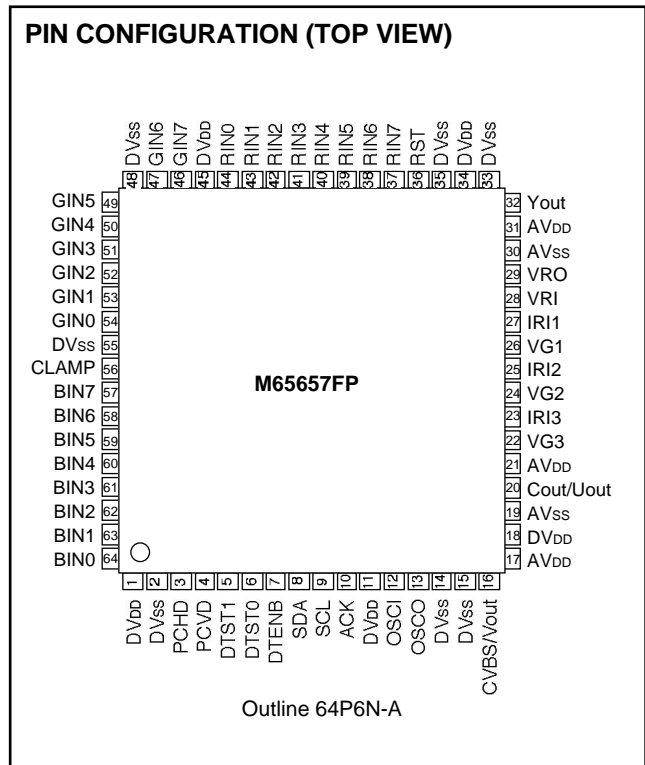
- VGA picture signal to NTSC / PAL signal conversion
- Input Format, 60Hz, 640x480 (Standard VGA format)
- High performance Non-Flicker Filter
- Built-in Line Memories  
Fully integrated with no external memory requirement
- Digital input for RGB
- Clamp pulse output
- Built-in triple 10bit-D/A converters for TV signal outputs
- Single +3.3V Power Supply
- I<sup>2</sup>C Bus Control
- 64pin Flat Package

**APPLICATION**

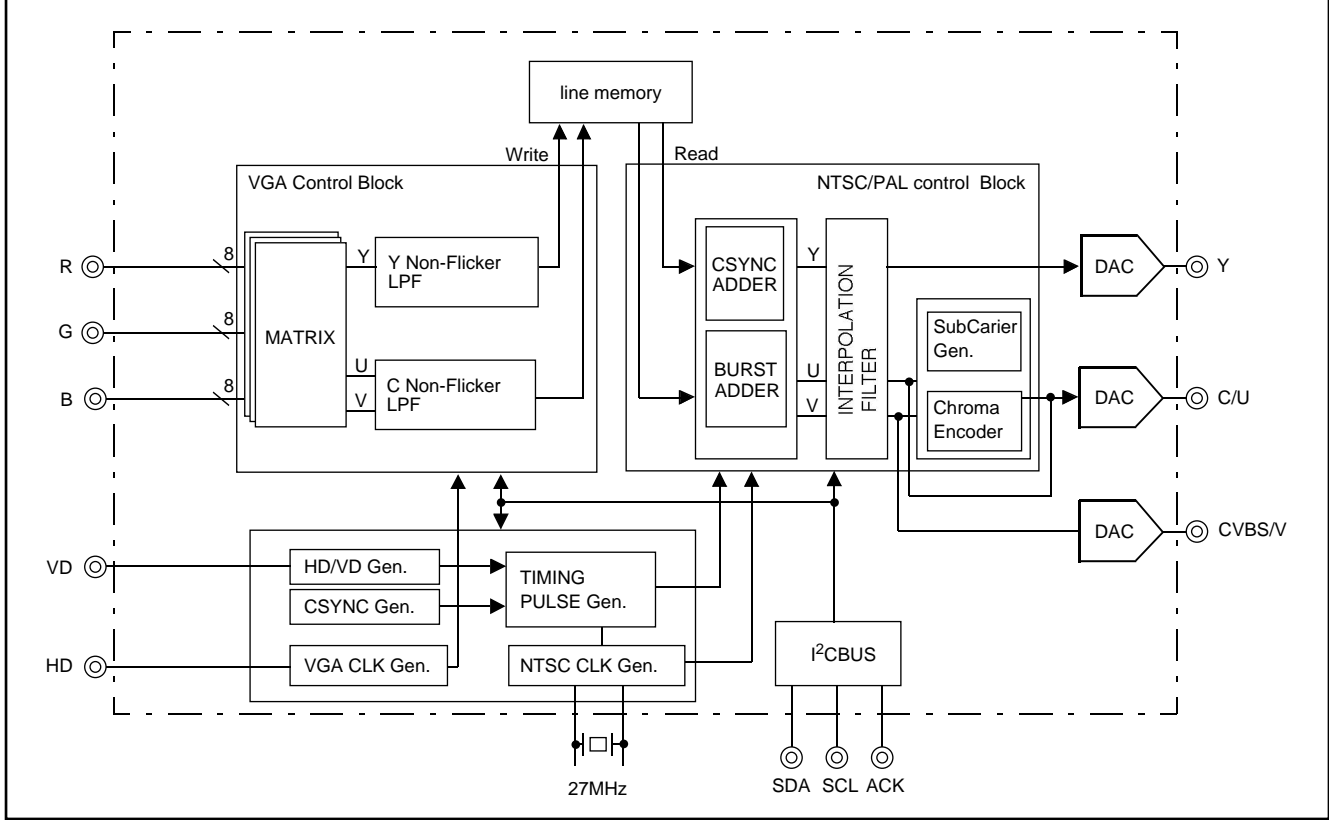
- VGA to Video converter Modules
- TV, VCR
- Mobile PC
- Multi-media Systems (Set-Top-Box)

**RECOMMENDED OPERATING CONDITION**

Supply voltage range.....3.0 to 3.6V  
 Rated supply voltage.....3.3V



**BLOCK DIAGRAM**



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**ABSOLUTE MAXIMUM RATINGS** (V<sub>SS</sub>=0V)

Symbol	Parameter	Limits		Unit
		Min.	Max.	
V <sub>DD3</sub>	Supply voltage (3.3V)	-0.3	3.6	V
V <sub>I</sub>	Input voltage	-0.3	V <sub>DD3</sub> +0.3	V
V <sub>O</sub>	Output voltage	-0.3	V <sub>DD3</sub> +0.3	V
I <sub>O</sub>	Output current ( 1 )	-	I <sub>OL</sub> =20 I <sub>OH</sub> =-26	mA
P <sub>d</sub>	Power dissipation		500	mW
T <sub>opr</sub>	Operating temperature	0	75	°C
T <sub>stg</sub>	Storage temperature	-50	125	°C

1 : Output current per output terminal. But P<sub>d</sub> limits all current.

**DC CHARACTERISTICS** (V<sub>SS</sub>=0V)

Symbol	Parameter		Test conditions	Limits			Unit
				Min.	Typ.	Max.	
V <sub>IL</sub>	Input voltage (CMOS interface)	L	V <sub>DD</sub> =2.7V	0	-	0.81	V
V <sub>IH</sub>		H	V <sub>DD</sub> =3.6V	2.52	-	3.6	V
V <sub>T-</sub>	Input voltage schmitt trigger (CMOS interface)	-	V <sub>DD</sub> =3.3V	0.5	-	1.65	V
V <sub>T+</sub>		+		1.4	-	2.4	V
V <sub>H</sub>		Hysteresis		0.3	-	1.2	V
V <sub>OL</sub>	Output voltage	L	V <sub>DD</sub> =3.3V,  I <sub>O</sub>  <1μA	-	-	0.05	V
V <sub>OH</sub>		H		3.25	-	-	V
I <sub>OL</sub>	Output current	L	V <sub>DD</sub> =3.0V, V <sub>OL</sub> =0.4V	4	-	-	mA
I <sub>OH</sub>		H	V <sub>DD</sub> =3.0V, V <sub>OH</sub> =2.6V	-	-	-4	mA
I <sub>IH</sub>	Input current	L	V <sub>DD</sub> =3.6V, V <sub>I</sub> =0V	-1	-	1	μA
I <sub>IL</sub>		H	V <sub>DD</sub> =3.6V, V <sub>I</sub> =3.6V	-1	-	1	μA
I <sub>OZL</sub>	Output leakage current	L	V <sub>DD</sub> =3.6V, V <sub>O</sub> =0V	-1	-	1	μA
I <sub>OZH</sub>		H	V <sub>DD</sub> =3.6V, V <sub>O</sub> =3.6V	-1	-	1	μA
C <sub>I</sub>	Input pin capacitance		f=1MHz, V <sub>DD</sub> =0V	-	7	15	pF
C <sub>O</sub>	Output pin capacitance			-	7	15	pF
C <sub>IO</sub>	Bidirectional pin capacitance			-	7	15	pF
I <sub>DD</sub>	Operating current	3.3V supply		-	-	200	mA

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**DESCRIPTION OF PIN**

Pin No.	Name	I/O	Function	Remarks
1	DVDD		Digital power supply	
2	DVSS		Digital GND	
3	PCHD	I	HD signal input from PC	
4	PCVD	I	VD signal input from PC	
5	DTST1	I	for TEST	TEST
6	DTST0	I	for TEST	
7	DTENB	I	for TEST	
8	SDA	I/O	I <sup>2</sup> C Bus data input	I <sup>2</sup> C Control
9	SCL	I	I <sup>2</sup> C Bus clock input	
10	ACK	I/O	I <sup>2</sup> C Bus data/acknowledge signal	
11	DVDD		Digital VDD for OSC	OSC
12	OSCI	I	OSC input	
13	OSCO	O	OSC output	
14	DVSS		Digital GND for OSC	
15	DVSS		Digital GND	D/A
16	CVBS/Vout	O	Composite/V output	
17	AVDD		Analog power supply	
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	
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	RIN7	I	R signal input	(MSB)
38	RIN6	I	R signal input	
39	RIN5	I	R signal input	
40	RIN4	I	R signal input	
41	RIN3	I	R signal input	LSB
42	RIN2	I	R signal input	
43	RIN1	I	R signal input	
44	RIN0	I	R signal input	
45	DVDD		Digital power supply	
46	GIN7	I	G signal input	MSB
47	GIN6	I	G signal input	
48	DVSS		Digital GND	AD
49	GIN5	I	G signal input	LSB
50	GIN4	I	G signal input	
51	GIN3	I	G signal input	
52	GIN2	I	G signal input	

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**DESCRIPTION OF PIN (CONT.)**

Pin No.	Name	I/O	Function	Remarks
53	GIN1	I	G signal input	LSB
54	GIN0	I	G signal input	
55	DVss		Digital GND	
56	CLAMP	O	Clamp pulse output signal	
57	BIN7	I	B signal input	MSB
58	BIN6	I	B signal input	
59	BIN5	I	B signal input	
60	BIN4	I	B signal input	
61	BIN3	I	B signal input	
62	BIN2	I	B signal input	
63	BIN1	I	B signal input	
64	BIN0	I	B signal input	LSB

**APPLICATION EXAMPLE**

