Multimedia ICs

Video signal switcher, 1×3-channel with clamped-input

BA7653AF/BA7653AFV

The BA7653AF/AFV is a video-signal switching IC that contains a three-channel clamped-input multiplexer. The inputs are sync-tip clamped (synchronous edge of the video input signals are aligned to the same voltage), and as the input impedance is extremely large, it is possible to use a small value for the clamp capacitor (the recommended capacitor is $0.01\mu F$ (FZ) ceramic).

●**Applications**

Video cassette recorders, television and camcorders

●**Features**

1) Small clamp capacitors can be used (ceramic, 3000pF (Min.), $0.01\mu F$ (FS) (recommended)).
2) Low supply voltage operation possible. Supply voltage range is 3.7V to 7.7V.
3) Superimposition used for fast switching speed with low switching noise (70nsec.Typ.).
4) Low power consumption (when $V_{CC}=5V$, 25mW Typ.).
5) Wide dynamic range ($3.1V_{P-P}$ Typ. for $V_{CC}=5V$).
6) Excellent frequency characteristics (10MHz, 0dB Typ.).
7) Low interchannel crosstalk (-70dB Typ.).
8) Voltage can be applied to the control pins even when V_{CC} is not applied.

●**Absolute maximum ratings** (Ta=25°C)

Parameter	Symbol	Limits	Unit
Applied voltage	V_{CC}	9	V
Power dissipation	Pd	$500^{*1}/350^{*2}$	mW
Operating temperature	Topr	−25 to +75	℃
Storage temperature	Tstg	−55 to +125	℃

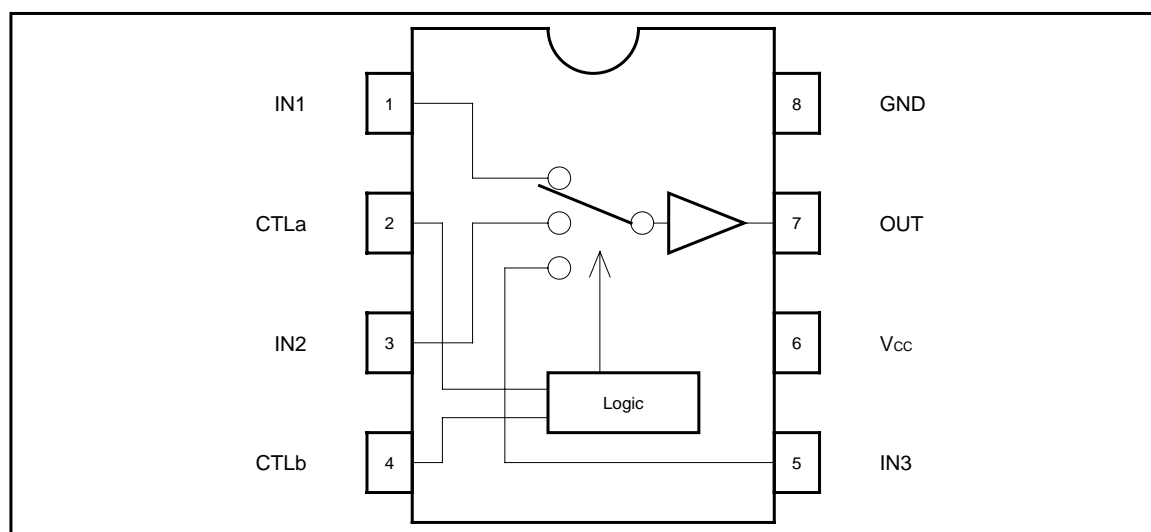∗1 When mounted on a 50mm × 50mm board, reduced by 5mW for each increase in Ta of 1℃ over 25℃. (BA7653AF)
∗2 When mounted on a 50mm × 50mm board, reduced by 3.5mW for each increase in Ta of 1℃ over 25℃. (BA7653AFV)

●**Recommended operating conditions** (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	4.0 to 7.0	V

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Multimedia ICs

●**Block diagram**

●**Pin descriptions**

Pin No.	Pin name	Function
1	IN1	Input 1
2	CTLa	Control input a
3	IN2	Input 2
4	CTLb	Control input b
5	IN3	Input 3
6	V_{CC}	Supply voltage
7	OUT	Output
8	GND	GND

●**Control pin truth table**

CTLa	CTLb	OUT
L	L	IN1
H	L	IN2
L	H	IN3
H	H	IN3

●**Electrical characteristics** (Unless otherwise noted, Ta=25°C, V_{CC}=5.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating voltage	V_{CC}	3.7	–	7.7	V	–
Supply current	I_{CC}	2.7	5.0	8.2	mA	–
Maximum output level	V_{om}	2.6	3.1	–	V_{P-P}	f = 1kHz, THD = 1.0%
Voltage gain	G_V	−0.5	0	0.5	dB	f = 1MHz, V_{IN} = 1.0V_{P-P}
Interchannel crosstalk	C_{ta}	–	−70	–	dB	f = 4.43MHz, V_{IN} = 1.0V_{P-P}
Frequency characteristic	G_f	−3.0	0	1.0	dB	f = 10MHz / 1MHz, V_{IN} = 1.0V_{P-P}
CTL switching voltage	$V_{TH L}$	–	–	1.0	V	V_{CC} − CTL Threshold Level $V_{TH} = \dfrac{V_{CC} - V_F}{45} \times 20$ (V)
	$V_{TH H}$	2.5	–	–		

●**Guaranteed design parameters** (Unless otherwise noted, Ta=25°C, V_{CC}=5.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential gain	DG	–	0	0.5	%	V_{IN} = 1.0V_{P-P}, standard staircase signal
Differential phase	DP	–	0.5	1.0	deg	V_{IN} = 1.0V_{P-P}, standard staircase signal

Multimedia ICs

●Input / output circuit

Pin No.	Pin name	DC voltage (Vcc = 5V)	Input / output impedance	Equivalent circuit
1	IN 1	1.65V	10MΩ or more	
2	CTLa	—	—	
3	IN 2	1.65V	10MΩ or more	
4	CTLb	—	—	

Pin No.	Pin name	DC voltage (Vcc = 5V)	Input / output impedance	Equivalent circuit
5	IN 3	1.65V	10MΩ or more	
6	Vcc	5.0V	—	
7	OUT	0.95V	26Ω	
8	GND	0V	—	

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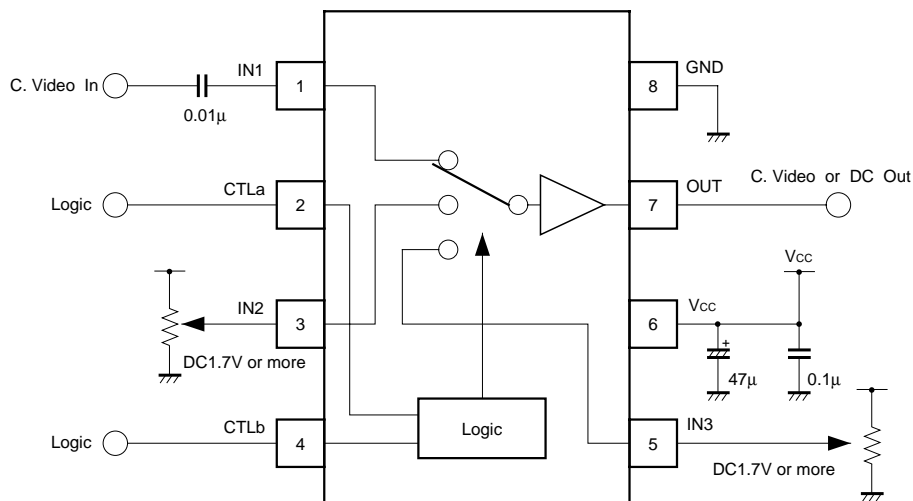
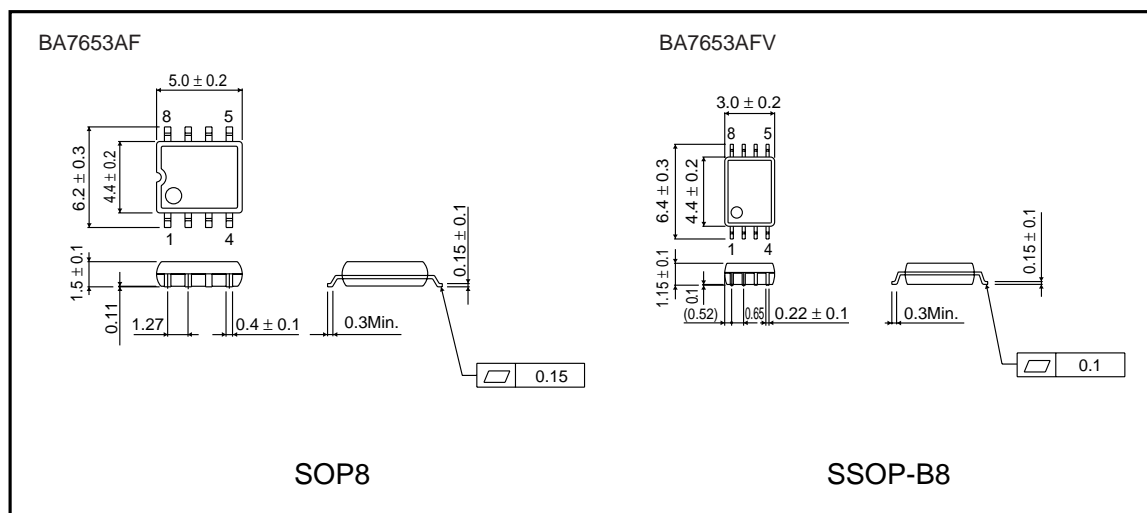●**Application examples**
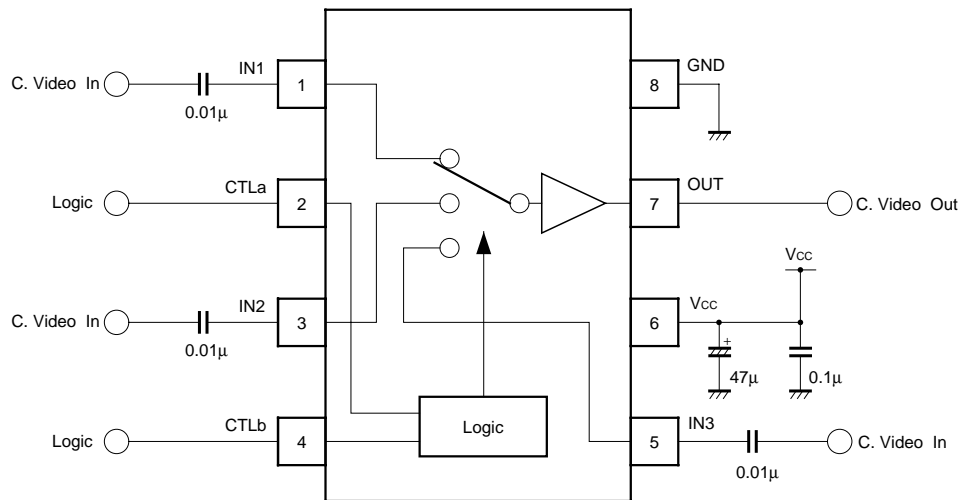
When superimposition is used

Fig. 1

●**Operation note**

(1) To ensure stable clamp operation, the output impedance of the previous stage connected to the inputs should be 1kΩ or lower.

(2) If large input clamp capacitors are used, the time constant of the circuit will mean that some time will be required until stable operation after power is applied. The value for the input clamp capacitors is 0.1μF Max.
(0.01μF(FZ) ceramic capacitor recommended).
(3) The BA7653AF/BA7653AFV is a three-channel

multiplexer, but two-channel operation is also possible. In this case, if the unused input is left open it will oscillate, but this will not effect the other inputs and cause problems. If this is a concern, ground the unused input via a capacitor, or connect it directly to V_{CC}.
(4) If control inputs are left open they will be unstable, set to H or L.
(5) When using superimposition, the DC voltage directly applied to the inputs should be at least 1.7V.

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Multimedia ICs

●**External dimensions** (Unit : mm)

BA7653AF

8
5

5.0 ± 0.2

6.2 ± 0.3
4.4 ± 0.2

1
4

1.5 ± 0.1
0.11
1.27
0.4 ± 0.1

0.3Min.
0.15 ± 0.1
0.15

SOP8

BA7653AFV

8
5

3.0 ± 0.2

6.4 ± 0.3
4.4 ± 0.2

1
4

1.15 ± 0.1
0.1
(0.52)
0.65
0.22 ± 0.1

0.3Min.
0.15 ± 0.1
0.1

SSOP-B8

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