M52693SP

BURST LOCK CLOCK GENERATOR

DESCRIPTION

The M52693SP is a semiconductor integrated circuit developed for analog signal processing of a picture-in-picture system, consisting of a sync separator, an ACC, a burst lock clock generator circuit, an analog switch and a clamp circuit, etc. It is also available on digital video signal systems other than the above.

FEATURES

- Low power dissipation of supply voltage 5.0V and circuit current 32mA (Typ.)
- Built-in 4fsc burst lock clock generator circuit required for digital video signal processing
- Small picture chroma level following main picture burst level
- Main picture pedestal level matching small picture pedestal level
- Built-in reference voltage source for A/D converter

APPLICATION

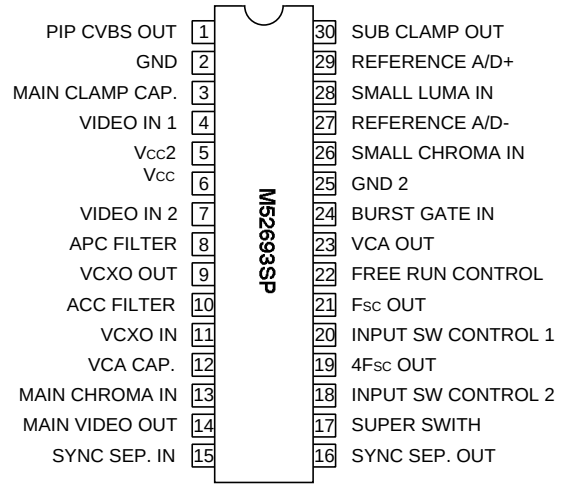
TV, VCR

RECOMMENDED OPERATING CONDITION

Supply voltage range.....4.7 to 5.3V

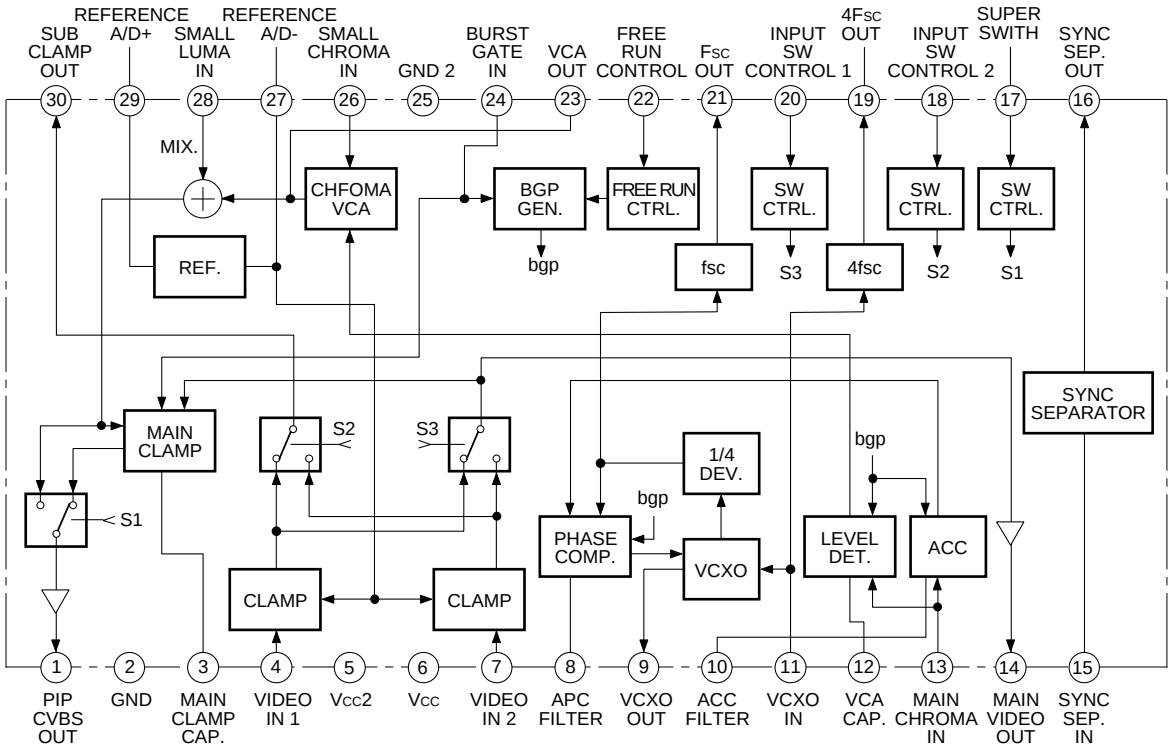
Rated supply voltage.....5.0V

PIN CONFIGURATION (TOP VIEW)



Outline 30P4B

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise noted)

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	6.0	V
P_d	Power dissipation	1265	mW
T_{opr}	Operating temperature	-20 to +75	°C
T_{stg}	Storage temperatare	-40 to +125	°C

ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise noted)

Symbol	Parameter	Test pin	Test conditions																										Limits			Unit
			Pin conditions																						Switch conditions								
			4	5	6	7	11	13	14	15	16	17	18	19	20	21	22	23	26	27	28	29	30	SW 4	SW 7	SW 11	SW 13	SW 26	SW 28	Min.	Typ.	Max.	
I_{CC}	Circuit current	⑤⑥	SG 1	5.0 V	5.0 V	–	–	SG 2	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	b	a	OFF	b	a	a	20.8	32.0	43.2	mA
Vin1	Video signal input 1 output voltage	④	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	2.16	2.41	2.66	V
Vin2	Video signal input 2 output voltage	⑦	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	2.16	2.41	2.66	V
V_{RH}	Reference voltage H	㉙	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	3.60	3.75	3.90	V
V_{RL}	Reference voltage L	㉗	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	2.18	2.33	2.48	V
V_R	(VRT - VRB) voltage	–	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	1.27	1.42	1.57	V
V_{SOH}	Sync separation signal output voltage H	⑯	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	3.40	4.20	–	V
V_{SOL}	Sync separation signal output voltage L	⑯	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	–	0.90	1.20	V
t_H	Sync separation signal output pulse width	⑯	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	5.00	5.30	5.80	µs
t_{PDH}	Sync separation signal output delay time	⑯	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	–	0.12	0.30	µs
$S_{ync\text{-}in}$	Sync separation signal input level	⑯	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	0.10	0.30	0.60	$V_{P\text{-}P}$
V_{SUb}	Video signal output voltage (small picture system)	㉚	–	5.0 V	5.0 V	–	–	–	–	PG 1	–	0 V	5.0V / 0V	–	0V / 5.0V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	2.25	2.40	2.55	V
ΔV_{SRB}	Clamp offset	㉚	–	5.0 V	5.0 V	–	–	–	–	PG 1'	–	0 V	5.0V / 0V	–	0V / 5.0V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	30	60	90	mV
G_{SUb}	Video signal output gain (small picture system)	㉚	SG 1	5.0 V	5.0 V	SG 1	–	–	–	PG 1'	–	0 V	5.0V / 0V	–	5.0 V	–	0 V	–	–	–	–	–	–	b	b	ON	a	a	a	-1.00	0	1.00	dB
CT_{SUb}	Video signal output crosstalk (small picture system)	㉚	SG3	5.0 V	5.0 V	SG3	–	–	–	PG 1'	–	0 V	5→0V / 0→5V	–	5.0 V	–	0 V	–	–	–	–	–	–	b/a	b/a	ON	a	a	a	–	-55	-45	dB
fBW_{SUb}	Video signal output frequency band (small picture system)	㉚	SG 4	5.0 V	5.0 V	SG 4	–	–	–	PG 1'	–	0 V	5.0V / 0V	–	5.0 V	–	0 V	–	–	–	–	–	–	b	b	ON	a	a	a	10	–	–	MHz
V_{main}	Video signal output voltage (main picture system)	⑭	–	5.0 V	5.0 V	–	–	–	–	PG 1'	–	0 V	5.0 V	–	5.0V / 0V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	1.20	1.45	1.70	V
G_{main}	Video signal output gain (main picture system)	⑭	SG 1	5.0 V	5.0 V	SG 1	–	–	–	PG 1'	–	0 V	5.0 V	–	5.0V / 0V	–	0 V	–	–	–	–	–	–	b	b	ON	a	a	a	1.3	2.3	3.3	dB

ELECTRICAL CHARACTERISTICS (cont.)

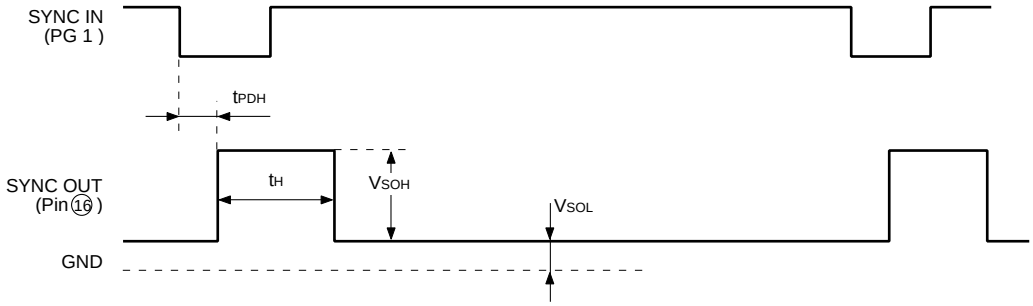
Symbol	Parameter	Test point	Test conditions																										Limits			Unit
			Pin conditions																						Switch conditions								
			4	5	6	7	11	13	14	15	16	17	18	19	20	21	22	23	26	27	28	29	30	SW 4	SW 7	SW 11	SW 13	SW 26	SW 28	Min.	Typ.	Max.	
CT_{main}	Video signal output crosstalk (main picture system)	⑭	SG3	5.0 V	5.0 V	SG3	–	–	–	PG 1'	–	0 V	5.0 V	–	5→0V / 0→5V	–	0 V	–	–	–	–	–	–	b/a	a/b	ON	a	a	a	–	-55	-45	dB
fBW_{main}	Video signal output frequency band (main picture system)	⑭	SG 4	5.0 V	5.0 V	SG 4	–	–	–	PG 1'	–	0 V	5.0 V	–	5.0V 0V	–	0 V	–	–	–	–	–	–	b	b	ON	a	a	a	10	–	–	MHz
V_{PIP}	PIP output voltage (Sub)	–	–	5.0 V	5.0 V	–	–	–	–	RG 1	–	5.0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	1.40	1.65	1.90	V
ΔV_{PIP}	PIP output clamp offset	–	–	5.0 V	5.0 V	–	–	–	–	RG 1	–	0 V	5.0 V	–	5.0V 0V	–	0 V	–	–	–	–	–	–	a	a	ON	a	a	a	0	–	15	mV
G_{PIPSC}	PIP output gain (Sub-C)	–	–	5.0 V	5.0 V	–	–	–	–	RG 1	–	5.0 V	5.0 V	–	5.0 V	–	0 V	–	SG 5	–	–	–	–	a	a	ON	a	b	a	4.3	5.3	6.3	dB
G_{PIPSI}	PIP output gain (Sub-Luma)	–	–	5.0 V	5.0 V	–	–	–	–	RG 1	–	5.0 V	5.0 V	–	5.0 V	–	0 V	–	–	–	SG 6	–	–	a	a	ON	a	a	b	4.6	5.6	6.6	dB
G_{PIP}	PIP output gain	–	SG 1	5.0 V	5.0 V	SG 1	–	–	–	RG 1	–	0 V	5.0 V	–	5.0V 0V	–	0 V	–	–	–	–	–	–	b	b	ON	a	a	a	4.3	5.3	6.3	dB
fBW_{PIP}	PIP output frequency band	–	SG 4	5.0 V	5.0 V	SG 4	–	–	–	RG 1	–	0 V	5.0 V	–	5.0V 0V	–	0 V	–	–	–	–	–	–	b	b	ON	a	a	a	10	–	–	MHz
fBW_{PIPS}	PIP output frequency band (s)	–	–	5.0 V	5.0 V	–	–	–	–	RG 1	–	5.0 V	5.0 V	–	5.0 V	–	5.0 V	–	SG 7	–	–	–	–	a	a	ON	a	b	a	10	–	–	MHz
CT_{PIP}	PIP output crosstalk	–	SG 3	5.0 V	5.0 V	SG 3	–	–	–	RG 1	–	0V ↓ 5V	5.0 V	–	5.0V 0V	–	0 V	–	–	–	–	–	–	b	b	ON	a	a	a	–	-50	-45	dB
CT_{PIPS}	PIP output crosstalk (s)	–	–	5.0 V	5.0 V	–	–	SG 2	–	RG 1	–	5V ↓ 0V	5.0 V	–	5.0V 0V	–	0 V	–	SG 5	–	–	–	–	a	a	ON	b	b	a	–	-50	-45	dB
$VCA_{typ.}$	VCA output	㉓	–	5.0 V	5.0 V	–	–	SG 2	–	RG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	SG 5	–	–	–	–	a	a	ON	b	b	a	2.0	3.5	5.0	dB
VCA_{max}	VCA control maximum	㉓	–	5.0 V	5.0 V	–	–	SG 2	–	RG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	SG 5	–	–	–	–	a	a	ON	b	b	a	7.0	8.5	10.0	dB
$VCA_{min.}$	VCA control minimum	㉓	–	5.0 V	5.0 V	–	–	SG 2'	–	RG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	SG 5	–	–	–	–	a	a	ON	b	b	a	-12.0	-9.0	-6.0	dB
$G_{max.}$	VCA control maximum gain	㉓	–	5.0 V	5.0 V	–	–	SG 2'	–	RG 1	–	0 V	5.0 V	–	5.0 V	–	5.0 V	–	SG 5	–	–	–	–	a	a	ON	b	b	a	0.8	2.8	4.8	dB
L_{VCA}	VCA output leak	㉓	–	5.0 V	5.0 V	–	–	–	–	RG 1	–	0 V	5.0 V	–	5.0 V	–	0 V	–	SG 5	–	–	–	–	a	a	ON	a	b	a	–	–	-9.0	dB
f_{FR}	VCXO free running frequency	⑲	–	5.0 V	5.0 V	–	–	–	–	RG 1	–	0 V	5.0 V	–	5.0 V	0 V	—	–	–	–	–	–	–	a	a	OFF	a	a	a	–	14.318	–	MHz
$V4f_{SCH}$	4fsc output voltage H	⑲	–	5.0 V	5.0 V	–	–	SG 2	–	PG 1	–	0 V	5.0 V	–	5.0 V	0 V	—	–	–	–	–	–	–	a	a	OFF	b	a	a	3.4	3.9	–	V

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Test point	Test conditions																										Limits			Unit
			Pin conditions																						Switch conditions								
			4	5	6	7	11	13	14	15	16	17	18	19	20	21	22	23	26	27	28	29	30	SW 4	SW 7	SW 11	SW 13	SW 26	SW 28	Min.	Typ.	Max.	
V_{4fSCL}	4fsc output voltage L	⑲	–	5.0 V	5.0 V	–	–	SG 2	–	PG 1	–	0 V	5.0 V	–	5.0 V	0 V	–	–	–	–	–	–	–	a	a	OFF	b	a	a	–	0.1	0.5	V
V_{fSCH}	fsc output voltage H	㉑	–	5.0 V	5.0 V	–	–	SG 2	–	PG 1	–	0 V	5.0 V	–	5.0 V	0 V	–	–	–	–	–	–	–	a	a	OFF	b	a	a	3.4	3.9	–	V
V_{fSCL}	fsc output voltage L	㉑	–	5.0 V	5.0 V	–	–	SG 2	–	PG 1	–	0 V	5.0 V	–	5.0 V	0 V	–	–	–	–	–	–	–	a	a	OFF	b	a	a	–	0.1	0.5	V
$4f_{SC}$	4fsc output frequency	⑲	–	5.0 V	5.0 V	–	–	SG 2	–	PG 1	–	0 V	5.0 V	–	5.0 V	0 V	–	–	–	–	–	–	–	a	a	OFF	b	a	a	–	14.318	–	MHz
f_{SC}	fsc output frequency	㉑	–	5.0 V	5.0 V	–	–	SG 2	–	PG 1	–	0 V	5.0 V	–	5.0 V	0 V	–	–	–	–	–	–	–	a	a	OFF	b	a	a	–	3.5795	–	MHz
$f_{CP\ (+)}$	Capture range (+)	⑲	–	5.0 V	5.0 V	–	–	SG 8	–	PG 1	–	0 V	5.0 V	–	5.0 V	0 V	–	–	–	–	–	–	–	a	a	OFF	b	a	a	400	650	–	Hz
$f_{CP\ (-)}$	Capture range (-)	⑲	–	5.0 V	5.0 V	–	–	SG 8	–	PG 1	–	0 V	5.0 V	–	5.0 V	0 V	–	–	–	–	–	–	–	a	a	OFF	b	a	a	–	-1200	-400	Hz
C-IN	Chroma signal input level (burst)	⑲	–	5.0 V	5.0 V	–	–	SG2' / SG2'	–	PG 1	–	0 V	5.0 V	–	5.0 V	0 V	–	–	–	–	–	–	–	a	a	OFF	b	a	a	0.01	0.10	0.20	V_{P-P}

ELECTRICAL CHARACTERISTICS TEST METHOD

V_R
$V_R = V_{RH} - V_{RL}$
V_{SOH}, V_{SOL}, t_H and t_{PDH}



Sync-in
Measure t_H and t_{PDH} when the input amplitude of pin ⑮ is $0.1V_{P-P}$. Make sure that t_H and t_{PDH} are within the allowable range. When the input amplitude of pin ⑮ is $0.6V_{P-P}$, make sure that t_H and t_{PDH} are within the allowable range.

Vsub and ΔV_{SRB}
Measure pin ㉚ DC output voltage in correspondence to the "H" and "L" states of pin ⑱ .

If the voltage which appears at pin ㉚ when pin ⑱ is "H" is taken as Vsub1, and the voltage which appears at pin ㉚ when pin ⑱ is "L" is taken as Vsub2, the clamp offset is given by the following expression:
DV_{SRB} = (Vsub1 - V27), (Vsub2 - V27)

Gsub
Measure pin ㉚ gain in correspondence to the "H" and "L" states of pin ⑱ .

CTsub, Cmain, and CT_{PIP}
Measure crosstalk under the following input conditions:

Prameter		Input signal	Pin connection Switching condition:Left Input codition:Right						
			4		7		17	18	20
CTsub	CTsub 1	Sine wave Amplitude : $0.3V_{P-P}$ Frequency : 3.58MHz	b	IN	a	- -	0V	5 ⇨ 0V	0V
	Ctsub 2		a	- -	b	IN	0V	0 ⇨ 5V	0V
CTmain	CTmain 1		b	IN	a	- -	0V	0V	5 ⇨ 0V
	CTmain 2		a	- -	b	IN	0V	0V	0 ⇨ 5V
CT_{PIP}	CT_{PIP} 1		b	IN	a	- -	0 ⇨ 5V	0V	5V
	CT_{PIP} 2		a	- -	b	IN	0 ⇨ 5V	0V	0V

fBWsub
Measure pin ㉚ frequency characteristics in correspondence to the "H" and "L" states of pin ⑱. Condition: ≤-3dB

fBWmain
Measure pin ⑭ frequency characteristics in correspondence to the "H" and "L" states of pin ⑳. Condition: ≤-3dB

Vmain
Measure pin ⑭ DC output voltage in correspondence to the "H" and "L" states of pin ⑳ .

ΔV_{PIP}
If the voltage which appears at pin ① when pin ⑳ is "H" is taken as Vpip1, and the voltage which appears at pin 1 when pin ⑳ is "L" is taken as Vpip2, ΔV_{PIP} is given by the following expression:

$$\Delta V_{PIP} = |V_{pip}1 - V_{PIP}|, |V_{pip}2 - V_{PIP}|$$

Gmain
Measure pin ⑭ gain in correspondence to the "H" and "L" states of pin ⑳ .

GPIPSC
Pin ⑫ = 2.185V V1 = Amplitude of pin ① V23 = Amplitude of pin ㉓
GPIPSC = 20 log (V1/V23)

GPIP
Measure pin ① gain in correspondence to the "H" and "L" states of pin ⑳ .

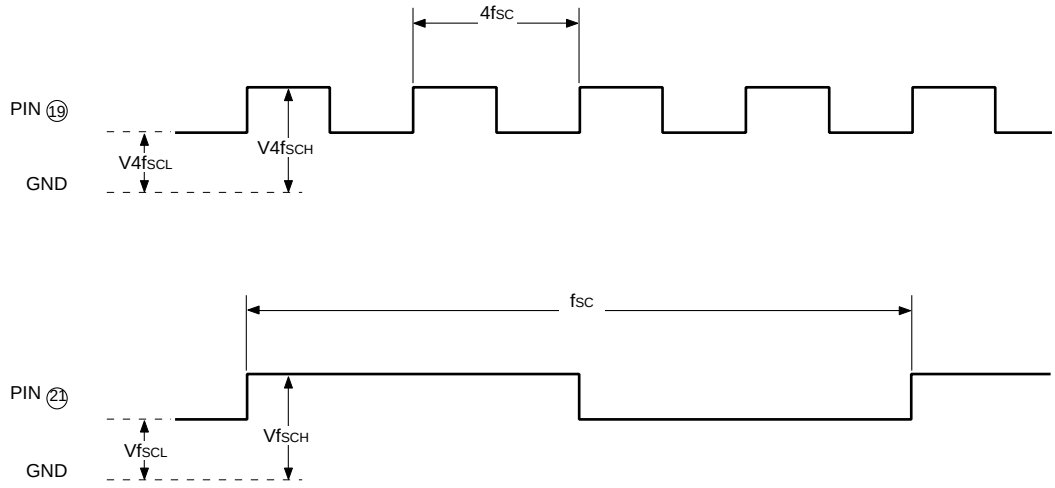
fBWPIP
Measure pin ① frequency characteristics in correspondence to the "H" and "L" states of pin ⑳. Condition: ≤-3dB

fBWPIPS
Condition: ≤-3dB

CTPIPS
Apply 5.0V to pin ⑳. Define as VOS1 the amplitude which appears at pin ① a when pin ⑰ is "H", and as VOM1 the amplitude which appears when pin ⑰ is "L". Then apply 0V to pin ⑳ . Define as VOS2 the amplitude which appears at pin ① when pin ⑰ is "H", and as VOM2 the amplitude which appears at pin ① when "L". CTPIPS is given under the above conditions by the equation given below.
CTPIPS=20log (VOMI/VOSI), 201log (VOM2/VOS2)

VCAtyp, VCAmax, VCAmin, Gmax, Lvca
20 log {(amplitude of pin 23)/SG5}

V4fSCH, L; VfSCH, L; 4fsc; fsc
Make sure that the input signal at pin ⑬ is synchronous with the output signal at pin ⑲ .

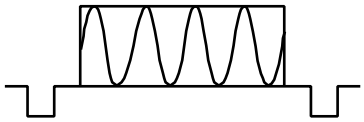
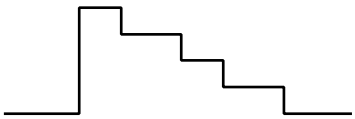
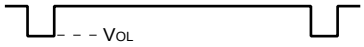


fcp (+)
1) Raise the frequency of SG8 input signal so that the signal is synchronous with pin ⑲ output signal.
2) Lower the SG8 frequency.
3) Measure the SG8 frequency (f1) when the SG8 input signal is synchronous with the pin ⑲ output signal.
4) fcp(+) = f1 - fc (fc = 3.579545MHz)

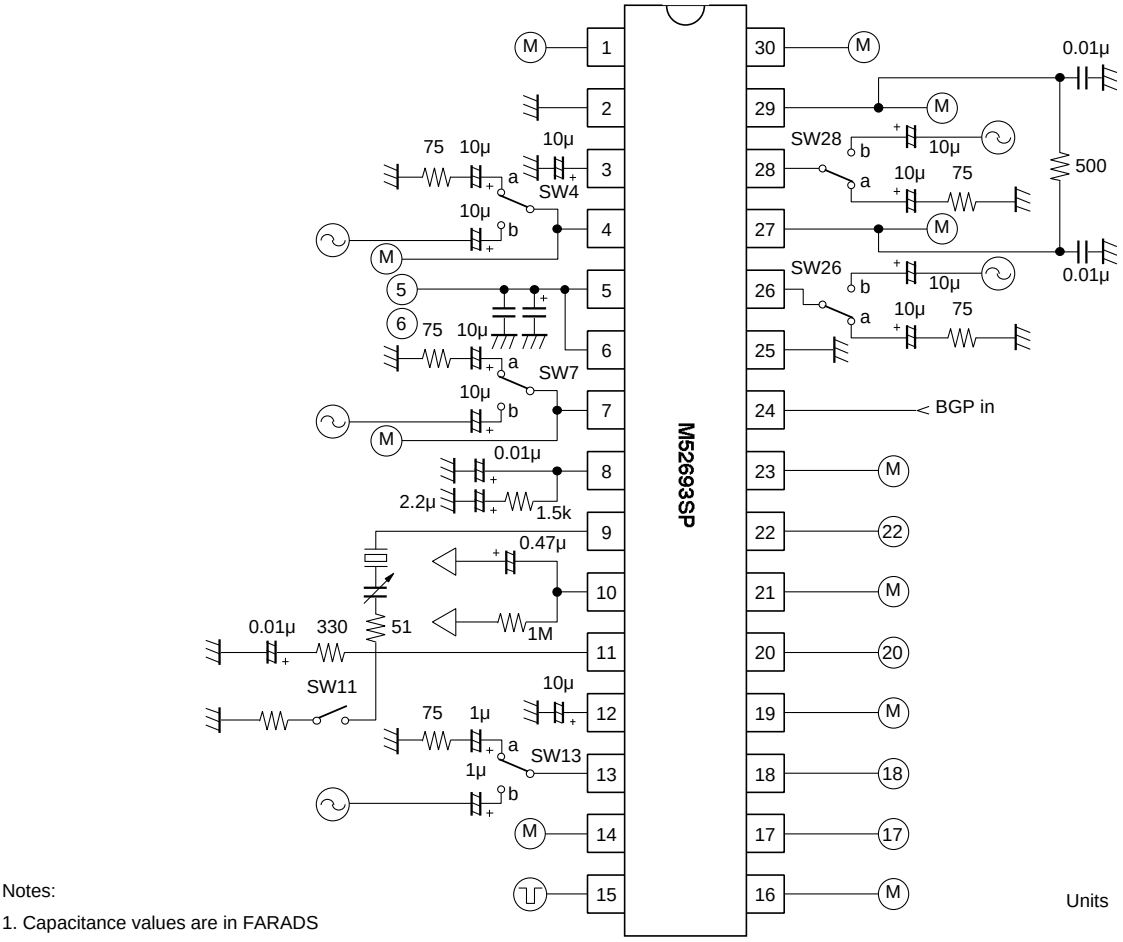
fcp (-)
1) Lower the frequency of SG8 input signal so that the signal is synchronous with pin ⑲ output signal.
2) Raise the SG8 frequency.
3) Measure the SG8 frequency (f2) when the SG8 input signal is synchronous with the pin ⑲ output signal.
4) fcp(-) = f2 - fc (fc = 3.579545MHz)

C-IN
Make sure that the pin ⑬ input signal is synchronous with the pin ⑲ output signal when the input amplitude of pin ⑬ is 0.20VP-P. Then make sure that the pin ⑬ input signal is synchronous with the pin ⑲ output signal when the input amplitude is 0.01VP-P.

INPUT SIGNAL

SG No.	Input signal	Remarks
SG1	NTSC system composite video signal (1V_{P-P})	– – –
SG2	Sine wave Frequency: 3.58MHz Amplitude : 0.1V_{P-P}	– – –
SG2'	Sine wave Frequency: 3.58MHz Amplitude : 0.2V_{P-P}	– – –
SG2''	Sine wave Frequency: 3.58MHz Amplitude : 0.01V_{P-P}	– – –
SG3	Sine wave Frequency: 3.58MHz Amplitude : 0.3V_{P-P}	
SG4	C-Sync + sine wave C-Sync Frequency: 15.734kHz Amplitude : 0.285V_{P-P} Sine wave Frequency: 1/10MHz Amplitude : 0.715V_{P-P}	
SG5	Sine wave Frequency: 3.58MHz Amplitude : 0.2V_{P-P}	– – –
SG6	Y signal Amplitude : 0.715V_{P-P}	
SG7	Sine wave Frequency: 1/10MHz Amplitude : 0.2V_{P-P}	– – –
SG8	Sine wave Frequency: Variable Amplitude : 0.1V_{P-P}	– – –
PG1	C-Sync Frequency: 15.734kHz Amplitude : 0.3V_{P-P} V_{OL}=2.75V	
PG1'	C-Sync Amplitude : 0.1V_{P-P} 0.6V_{P-P}	– – –

TEST CIRCUIT



Notes:

1. Capacitance values are in FARADS
2. Resistors are in OHMS
3. : Vcc : GND

Units Resistance : Ω
Capacitance : F

TYPICAL CHARACTERISTICS

THERMAL DERATING (MAXIMUM RATING)