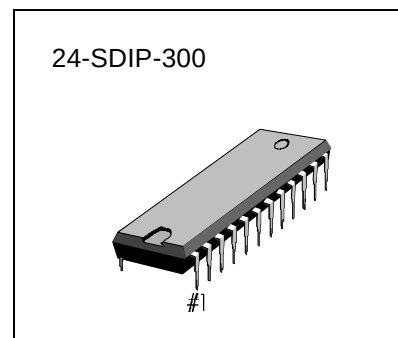


WIDE BAND ANALOG SWITCH

The device has internal switches for switching between wideband R/G/B signals and H/V Sync. also, has an internal Sync. Separator.



INTRODUCTION

- Video Input Switch for High-End Color Monitor
- 5V Power Supply Voltage Operating Condition
- WideBand R/G/B Video Switch (~300 MHz)
- 0.7Vpp R/G/B Video Input (typ.)
- TTL H/V Sync. Input
- Schmitt-Trigger Input Design for H/V Sync.
- Sync. Separator for SOG (Sync On Green) Input
- 24-SDIP-300 Package

ORDERING INFORMATION

Device	Package	Operating Temperature
KA2507	24-SDIP-300	-25 °C ~ +75 °C

FEATURES

- Total Current: 27 mA
- f-3dB Band Width: 300 MHz
- R/G/B Voltage Gain: -1.0 dB
- R/G/B Maximum Output Level: 2.4 Vpp
- Channel Crosstalk 10 MHz: -40 dB
- Channel Crosstalk 100 MHz: -30 dB
- Input Crosstalk 10MHz: -40 dB
- Input Crosstalk 100MHz: -30 dB

BLOCK DIAGRAM

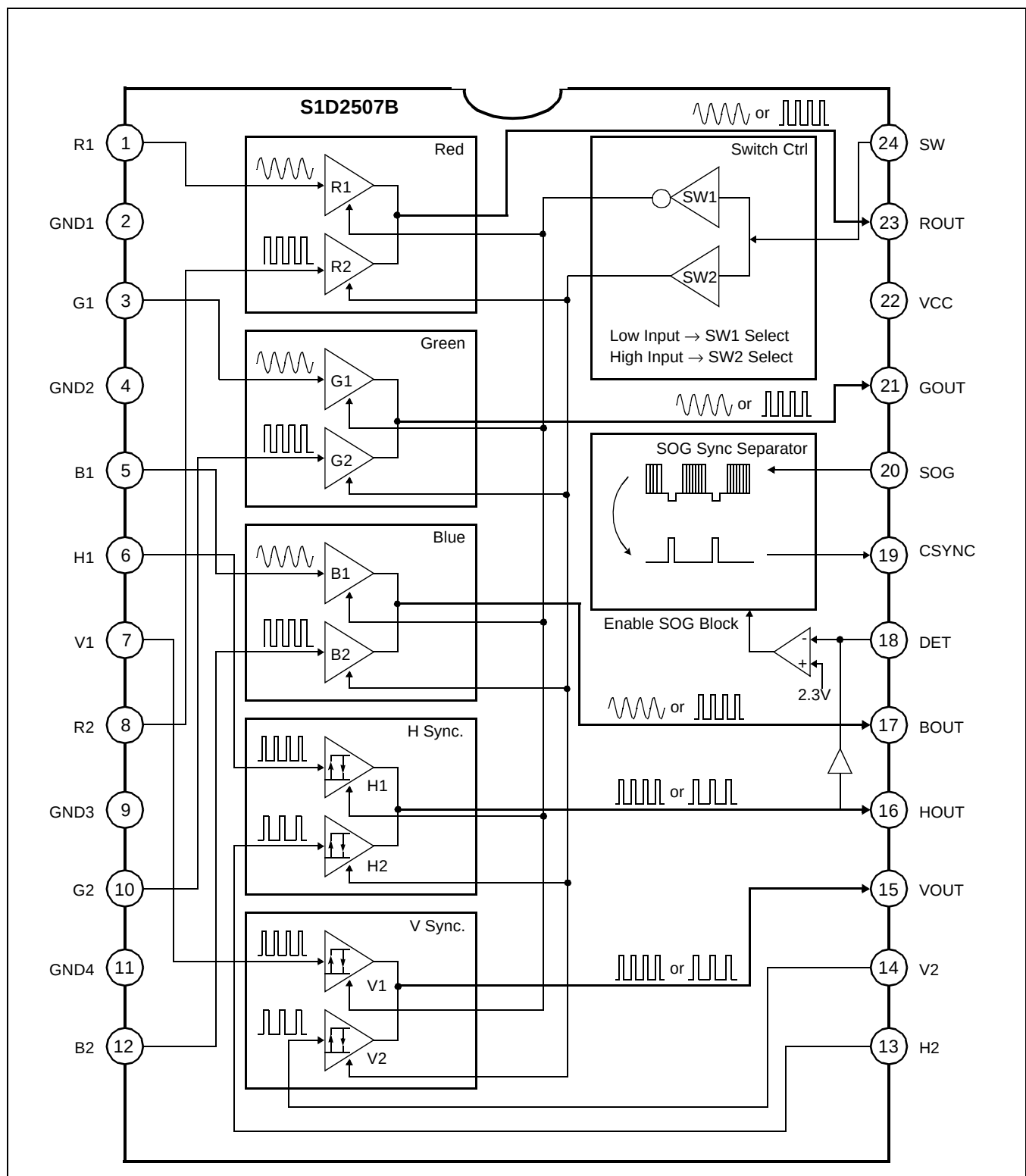


Figure 1. Block Diagram

PIN CONFIGURATIONS

Table 1. Pin Configurations

Pin No	Symbol	I/O	Configurations
1	R1	I	Red 1 Input
2	GND1	-	Ground 1 (Red)
3	G1	I	Green 1 Input
4	GND2	-	Ground 2 (Green)
5	B1	I	Blue 1 Input
6	H1	I	Horizontal Sync. 1 Input
7	V1	I	Vertical Sync. 1 Input
8	R2	I	Red 2 Input
9	GND3	-	Ground 3 (Blue)
10	G2	I	Green 2 Input
11	GND4	-	Ground 4 (HV, SOG, SW)
12	B2	I	Blue 2 Input
13	H2	I	Horizontal Sync. 2 Input
14	V2	I	Vertical Sync. 2 Input
15	VOUT	O	Vertical Sync. Output
16	HOUT	O	Horizontal Sync. Output
17	BOUT	O	Blue Output
18	DET	-	Horizontal Sync. Detection & SOG Mute Cap
19	CSYNC	O	Composite Sync. Output
20	SOG	I	SOG Input
21	GOUT	O	Green Output
22	V _{CC}	-	Power Supply
23	ROUT	O	Red Output
24	SW	I	Input 1, 2 Select Switch

PIN DESCRIPTION

Table 2. Pin Description

Pin No	Pin Name	Schematic	Description
1 3 5 8 10 12	R1 G1 B1 R2 G2 B2		Video Input • max. Level = 2.4 V _{pp} • f-3dB = 300 MHz
2	GND1	-	Red Block Ground
4	GND2	-	Green Block Ground
9	GND3	-	Blue Block Ground
11	GND4	-	HV, SOG, SW Block Ground
6 7 13 14	H1 V1 H2 V2		Horizontal/Vertical Sync Input • TTL Level

Table 2. Pin Description (Continued)

Pin No	Pin Name	Schematic	Description
15 16	VOUT HOUT		Horizontal/Vertical Sync Output • TTL Level
17 21 23	BOUT GOUT ROUT		Video Output • Max. Level = 2.4 Vpp
18	DET		H Sync Detection → SOG Mute • CSYNC Mutable Cap Voltage = 2.3 V ↑

Table 2. Pin Description (Continued)

Pin No	Pin Name	Schematic	Description
19	CSYNC		Composite Sync Output Separated from SOG • TTL Level
20	SOG		Sync on Green Input • Video + Sync = 1 V_{PP}
22	V _{CC}	-	Power Supply
24	SW		Switch Input • TTL Level Input • Low → Input1 Select • High → Input2 Select

ABSOLUTE MAXIMUM RATINGS(Ta = 25 °C) ⁽¹⁾**Table 3. Absolute Maximum Ratings**

No	Item	Symbol	Value			Unit
			Min	Typ	Max	
1	Maximum Supply Voltage	Vccmax	-	-	7	V
2	Operating Temperature ⁽²⁾	Topr	-25	-	75	°C
3	Storage Temperature	Tstg	-65	-	150	°C
4	Operating Supply Voltage	Vccop	4.5	5.0	5.5	V ⁽³⁾
5	Maximum Power Dissipation	Pdmax	-	-	0.42	W

THERMAL & ESD PARAMETER**Table 4. Thermal & ESD Parameter**

No	Item	Symbol	Value			Unit
			Min	Typ	Max	
1	Thermal Resistance (Junction-ambient)	θ_{ja}	-	83	-	°C/W
2	Junction Temperature	Tj	-	110	-	°C
3	Human Body Model (C = 100 p, R = 1.5 k)	HBM	±2	-	-	KV
4	Machine Model (C = 200 p, R = 0)	MM	±300	-	-	V
5	Charge Device Model	CDM	±800	-	-	V

ELECTRICAL CHARACTERISTICS

SWITCH CONTROL ELECTRICAL CHARACTERISTICS

Ta = 25 °C, V_{CC} = 5 V; Unless Otherwise Stated

Table 5. Switch Control Electrical Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Supply Current	V24 = 0, 5V	ICC	15	27	35	mA
Maximum Supply Current	V22 = 7V, V24 = 0, 5V	ICCmax	30	45	60	mA
Switch Low Input Voltage	V24 = 2V → 0V V6. 7 = 5V, V13. 14 = 0V	VL24	1.2	1.7	-	V
Switch High Input Voltage	V24 = 0V → 2V V6. 7 = 5V, V13. 14 = 0V	VH24	-	1.5	1.8	V
Switch Low Input Current	V24 = 0V	IL24	-5.0	-1.0	-	μA
Switch High Input Current	V24 = 5V	IH24	80	100	120	μA

RGB VIDEO SWITCH ELECTRICAL CHARACTERISTICS

Ta = 25 °C, V_{CC} = 5 V; Unless Otherwise Stated

Table 6. RGB Video Switch Electrical Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Input Voltage (RGB Input Pin DC)	V24 = 0, 5V	Vi	3.2	3.5	3.8	V
Output Voltage (RGB Output Pin DC)	V24 = 0, 5V	Vo	1.4	1.9	2.4	V
Voltage Gain	V24 = 0V, V1. 3. 5 = S1(1 MHz) V24 = 5V, V8. 10. 12 = S1(1 MHz)	Av	-1.0	-0.5	-	dB
Voltage Gain Difference	V24 = 0V, V1. 3. 5 = S1(1 MHz) V24 = 5V, V8. 10. 12 = S1(1 MHz)	ΔAv	-0.2	-	0.2	dB
Voltage Gain 100 MHz	V24 = 0V, V1. 3. 5 = S2 (100 MHz) V24 = 5V, V8. 10. 12 = S2 (100 MHz)	Av'	-2.0	-1.0	-	dB
Voltage Gain Difference 100 MHz	V24 = 0V, V1. 3. 5 = S2 (100 MHz) V24 = 5V, V8. 10. 12 = S2 (100 MHz)	ΔAv'	-0.2	-	0.2	dB
f - 3dB Bandwidth	V24 = 0V, V1. 3. 5 = S2 V24 = 5V, V8. 10. 12 = S2	f - 3dB	300	350	-	MHz
input crosstalk 10 MHz	V24 = 0V, V8. 10. 12 = S2 (10 MHz) V24 = 5V, V1. 3. 5 = S2 (10 MHz)	CT1	-	-50	-40	dB
Input Crosstalk 100 MHz	V24 = 0V, V8. 10. 12 = S2 (100 MHz) V24 = 5V, V1. 3. 5 = S2 (100 MHz)	CT1'	-	-40	-30	dB

Table 6. RGB Video Switch Electrical Characteristics (Continued)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Channel Crosstalk 10 MHz	V24 = 0V, V3 = S2 (10 MHz) V24 = 5 V, V10 = S2 (10 MHz)	CTC	-	-50	-40	dB
Channel Crosstalk 100 MHz	V24 = 0V, V3 = S2 (100 MHz) V24 = 5V, V10 = S2 (100 MHz)	CTC'	-	-40	-30	dB
Rise Time	V24 = 0V, V1. 3. 5 = S3 V24 = 5 V, V8. 10. 12 = S3	Tr	-	1.0	1.2	nS
Fall Time	V24 = 0V, V1. 3. 5 = S3 V24 = 5V, V8. 10. 12 = S3	Tf	-	1.0	1.2	nS

HV SYNC SWITCH ELECTRICAL CHARACTERISTICS

Ta = 25 °C, V_{CC} = 5V; Unless Otherwise Stated

Table 7. HV Sync Switch Electrical Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Low Output Voltage (HV Output Pin DC)	V24 = 0V, V6. 7 = 0V V24 = 5 V, V13. 14 = 0V	VL	-	0.1	0.2	V
High Output Voltage (HV Output Pin DC)	V24 = 0V, V6. 7 = 5V V24 = 5V, V13. 14 = 5V	VH	3.9	4.2	-	V
Low Input Voltage (HV Input Pin DC)	V24 = 0V, V6. 7 = 3V → 0V V24 = 5V, V13. 14 = 3V → 0V	ViL	1.2	1.5	1.8	V
High Input Voltage (HV Input Pin DC)	V24 = 0V, V6. 7 = 0V → 3V V24 = 5V, V13. 14 = 0V → 3V	ViH	2.2	2.5	2.8	V
Low Input Current	V24 = 0V, V6. 7 = 0V V24 = 5V, V13. 14 = 0V	IL	-5.0	-1.0	-	μA
High Input Current	V24 = 0V, V6. 7 = 5V V24 = 5V, V13. 14 = 5V	IH	80	100	120	μA
Rise Time	V24 = 0V, V6. 7 = S4 V24 = 5V, V13. 14 = S4	Tr	-	20	40	nS
Fall Time	V24 = 0V, V6. 7 = S4 V24 = 5V, V13. 14 = S4	Tf	-	10	20	nS
Rise Delay Time	V24 = 0V, V6. 7 = S4 V24 = 5V, V13. 14 = S4	Trd	-	50	80	nS
Fall Delay Time	V24 = 0V, V6. 7 = S4 V24 = 5V, V13. 14 = S4	Tfd	-	30	50	nS

SOG SYNC SEPARATOR ELECTRICAL CHARACTERISTICS

Ta = 25 °C, V_{CC} = 5 V; Unless Otherwise Stated

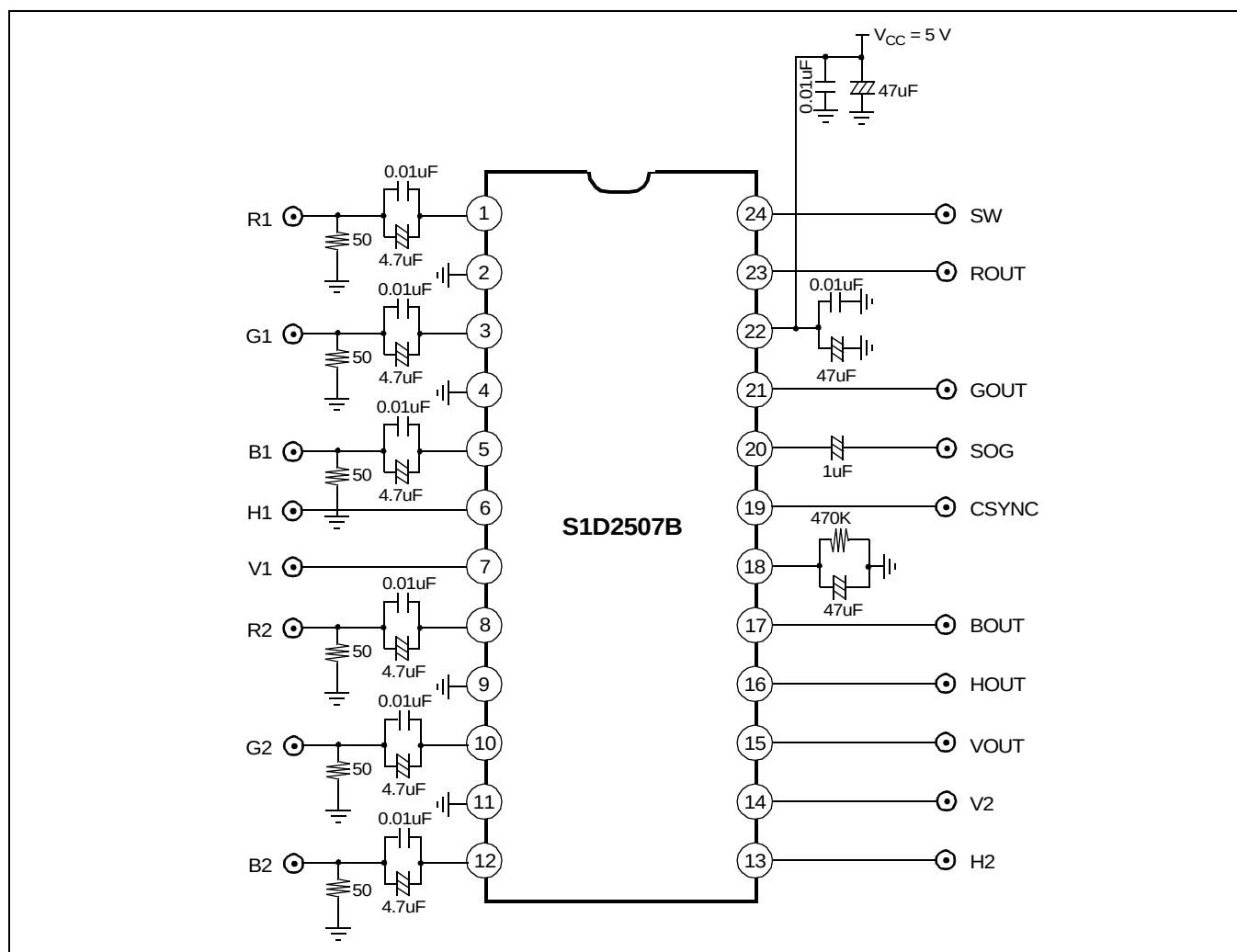
Table 8. SOG Sync Separator Electrical Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
SOG Low Output Voltage	V20 = S5 (30 kHz, Pw = 3μS)	VL19	-	0.1	0.2	V
SOG High Output Voltage	V20 = S5 (30 kHz, Pw = 3μS)	VH19	3.9	4.2	-	V
SOG Rise Time	V20 = S5 (30 kHz, Pw = 3μS)	Tr_sog	-	20	40	nS
SOG Fall Time	V20 = S5 (30 kHz, Pw = 3μS)	Tf_sog	-	10	20	nS
SOG Rise Delay Time	V20 = S5 (30 kHz, Pw = 3μS)	Trd_sog	-	70	100	nS
SOG Fall Delay Time	V20 = S5 (30 kHz, Pw = 3μS)	Tfd_sog	-	50	80	nS
SOG Min Pulse Width 1 (f = 20 kHz, Video Black)	V20 = S5 (20 kHz, 150mV, Pw = 2μS → 0μS)	PWmin 1	-	0.5	2.5	uS
SOG Min Pulse Width 2 (f = 200 kHz, Video Black)	V20 = S5 (200 kHz, 150mV, Pw = 0.2μS → 0μS)	PWmin 2	-	0.05	0.25	uS
SOG Min Pulse Width 1' (f = 20 kHz, Video White)	V20 = S6 (20 kHz, Sync = 150mV, Pw = 2μS → 0μS)	PWmin 1'	-	0.5	2.5	uS
SOG Min Pulse Width 2' (f = 200 kHz, Video White)	V20 = S6 (200 kHz, Sync = 150mV, Pw = 0.2μS → 0μS)	PWmin 2'	-	0.05	0.25	uS
SOG Min Separatable Level 1 (f = 20 kHz, Video Black)	V20 = S5 (20 kHz, Pw = 2μS, Sync = 0.3V → 0V)	VSmin 1	-	50	100	mV
SOG Min Separatable Level 2 (f = 200 kHz, Video Black)	V20 = S5 (200 kHz, Pw = 0.2μS, Sync = 0.3V → 0V)	VSmin 2	-	50	100	mV
SOG Min Separatable Level 1' (f = 20 kHz, Video White)	V20 = S6 (20 kHz, Pw = 2μS, Sync = 0.3V → 0V)	VSmin 1'	-	50	100	mV
SOG Min Separatable Level 2' (f = 200 kHz, Video White)	V20 = S6 (200 kHz, Pw = 0.2μS, Sync = 0.3V → 0V)	VSmin 2'	-	50	100	mV

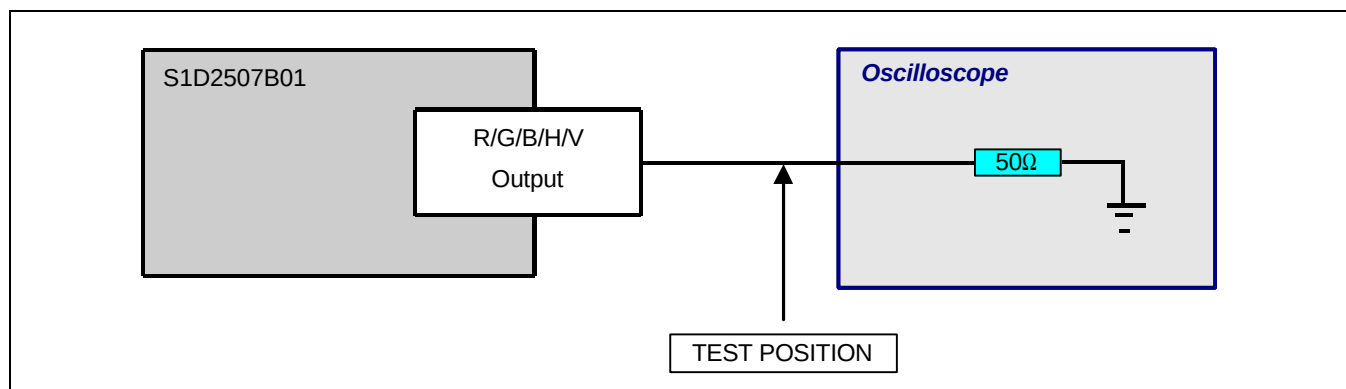
NOTES:

1. Absolute Maximum Rating Indicates limit beyond which damage to the device may occur.
2. Operating Ratings indicate conditions for which the device is functional but do not guarantee specific performance limits. For guaranteed specifications and test conditions, See the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.
3. V_{CC} supply pin22 must be externally wired to gether to prevent internal damage during V_{CC} power on/off cycles.

TEST CIRCUIT

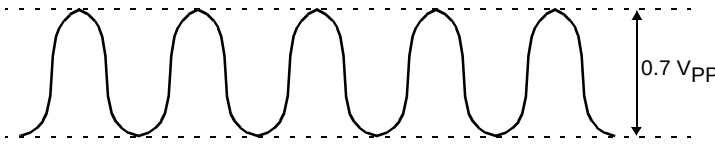
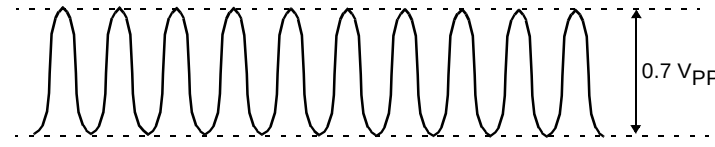
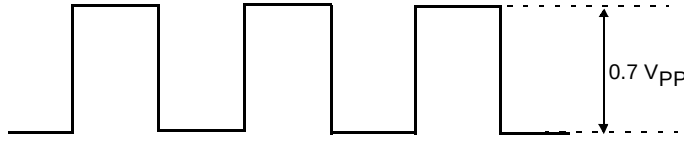
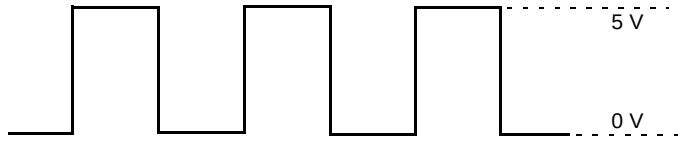
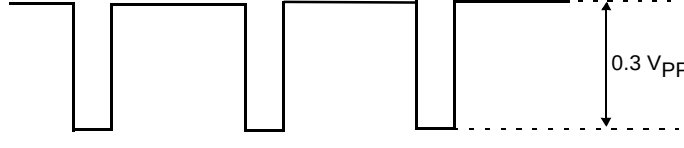
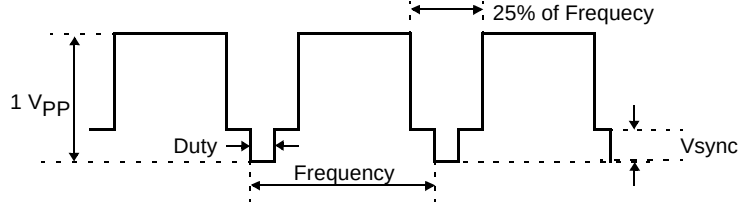


TEST METHODS



TEST SIGNAL FORMAT

Table 9. Test Signal Format

SG No.	Input Signals	
S1	Sine Wave Frequency = 1 MHz Amplitude = $0.7 V_{PP}$, Var.	
S2	Sine Wave Frequency = Var. Amplitude = $0.7 V_{PP}$	
S3	Square Wave Frequency = 200 kHz Amplitude = $0.7 V_{PP}$ Duty = 50%	
S4	Square Wave Frequency = 200 kHz Low/High Level = 0V/5V Duty = 50%	
S5	Pulse Frequency = Var. Duty = Var. Vsync = Var.	
S6	Sync on Green Frequency = Var. Duty = Var. Vsync = Var.	

APPLICATION BOARD CIRCUIT

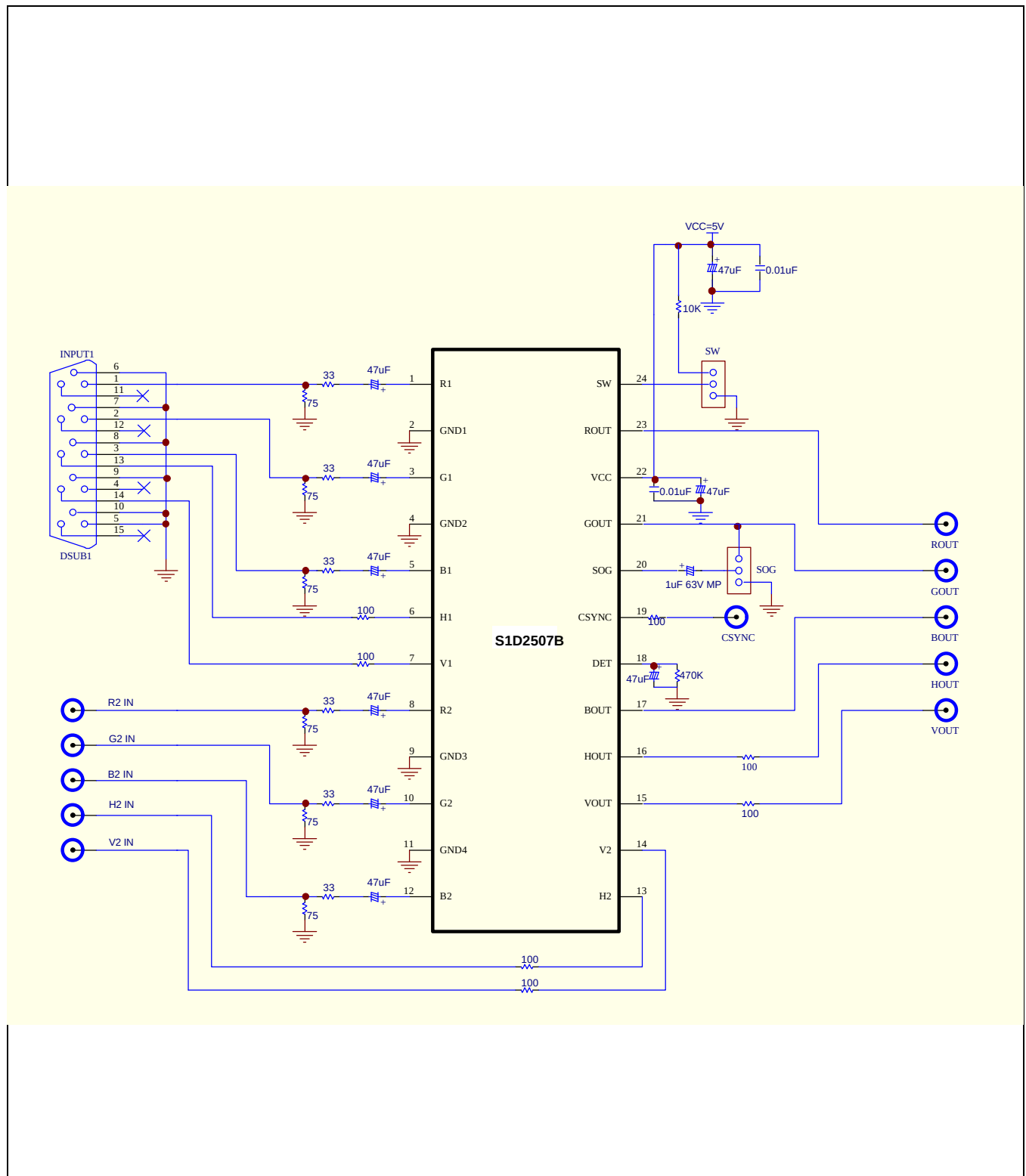


Figure 2. Application Board Circuit

The schematic shows a 4-channel 12-bit DAC system. It consists of two S1D2500A DAC chips and two S1D2507B DAC chips. The S1D2500A chips are configured as 12-bit DACs, and the S1D2507B chips are configured as 12-bit DACs. The circuit includes input buffers, DAC chips, and output buffers. Power supply rails are VCC=5V and VCC=12V. The output is a 4-bit digital signal (R Out, G Out, B Out) and a 4-bit analog signal (R In, G In, B In).

Figure 3. Typical Application circuit