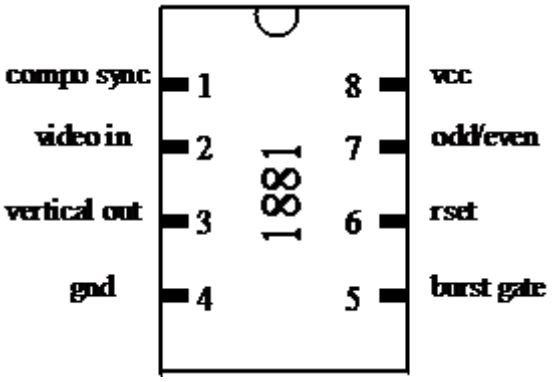
AT1881
Video Sync Separator

The AT1881 Video sync separator extracts timing information including composite and vertical sync, burst/back porch timing, and odd/even field information from standard negative going sync NTSC, PAL* and SECAM video signals with amplitude from 0.5V to 2V p-p. The integrated circuit is also capable of providing sync separation for non-standard, faster horizontal rate video signals. The vertical output is produced on the rising edge of the first serration in the vertical sync period. A default vertical output is produced after a time delay if the rising edge mentioned above does not occur within the externally set delay period, such as might be the case for a non-standard video signal.

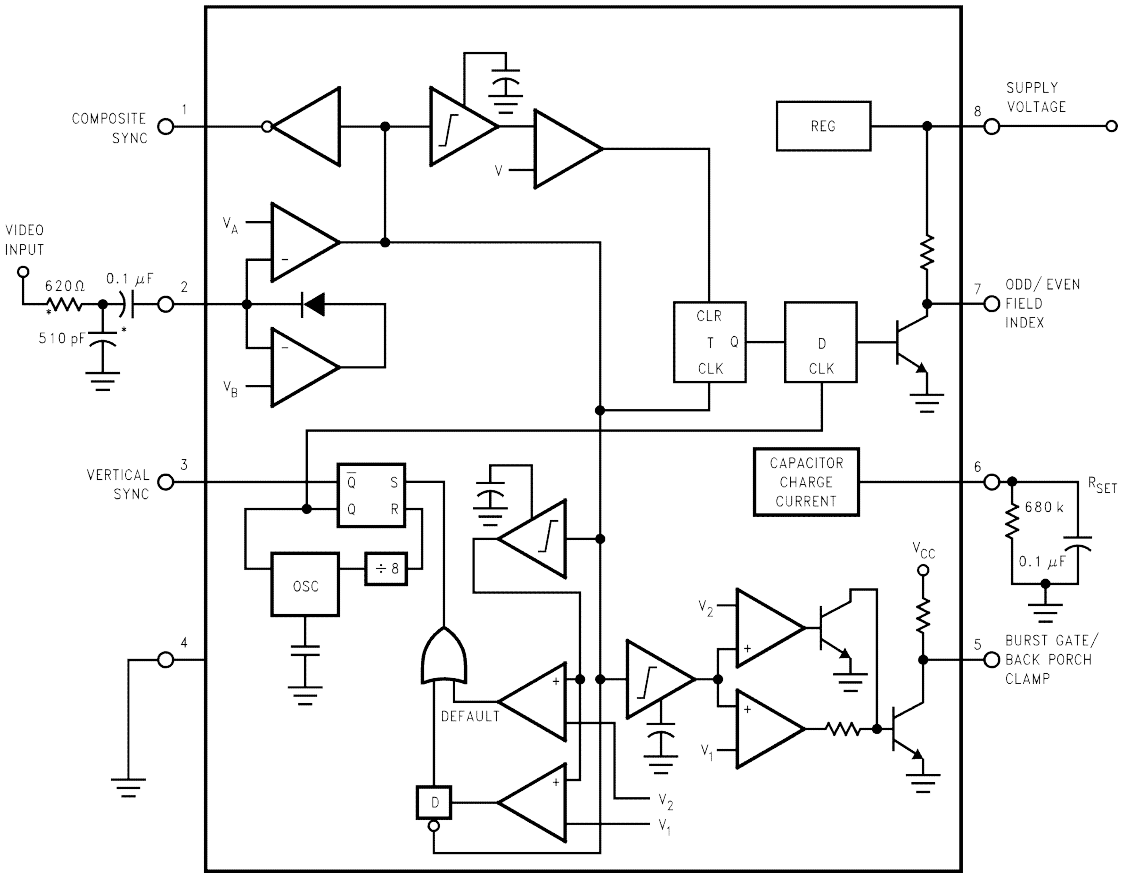
Features

- AC coupled composite input signal
- >10 kΩ input resistance
- <10 mA power supply drain current
- Composite sync and vertical outputs
- Odd/even field output
- Burst gate/back porch output
- Horizontal scan rates to 150 kHz
- Edge triggered vertical output
- Default triggered vertical output for non-standard video signal (video games-home computers)



DIP, SOP-8

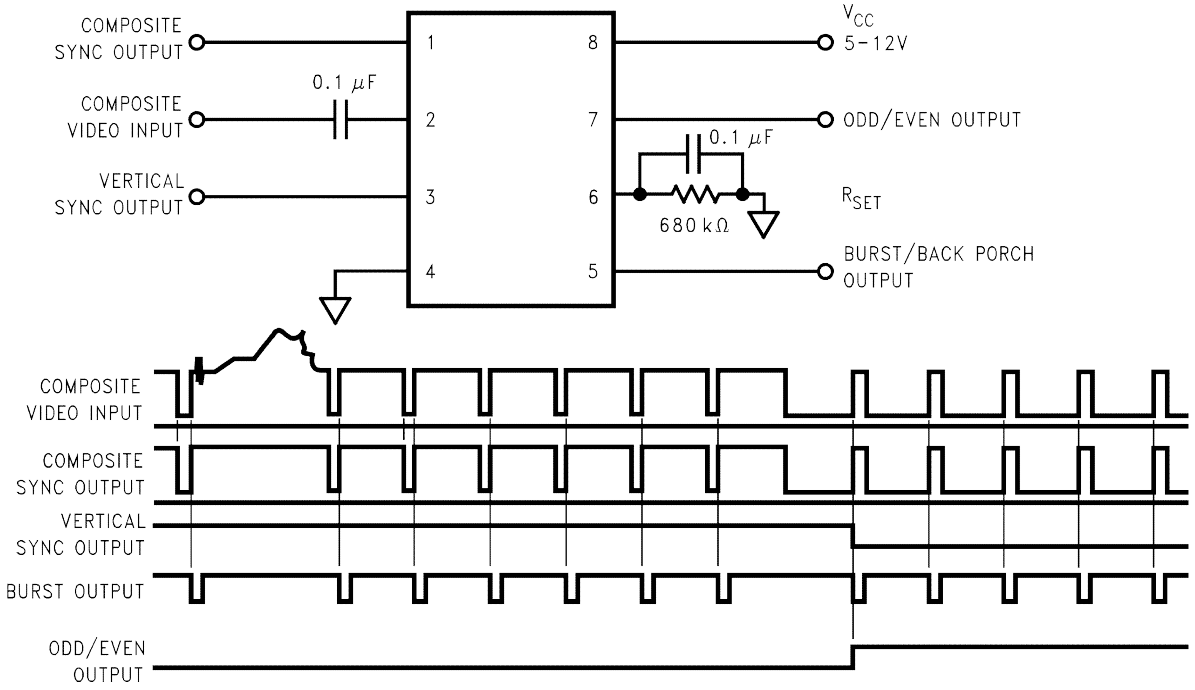
Application Notes



Pin Definition:

Pin No.	Pin Name	Functional Description
1	composite sync	composite sync signal output
2	video input	video signal input
3	Vertical sync out	Vertical sync signal output
4	gnd	gnd
5	burst gate/back porch clamp	burst gate/back porch clamp
6	rset	rset
7	odd/even	odd/even output
8	Vcc	Vcc

Connection Diagram



Electrical Characteristics AT1881

V_{CC} = 5V; R_{SET} = 680 kΩ; T_A = 0°C to +70°C by correlation with 100% electrical testing at T_A=25°C

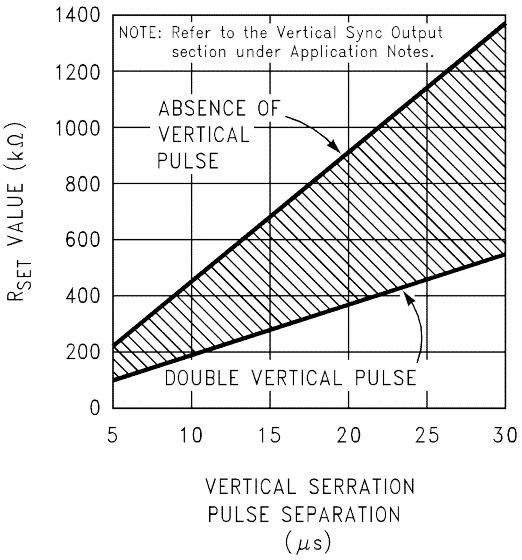
Parameter	Conditions		Min	Typ	Max	Units
Supply Current	Outputs at	V_{CC} = 5V		5.2	10	mA
	Logic 1	V_{CC} = 12V		5.5	12	
DC Input Voltage	Pin 2		1.3	1.5	1.8	V
Input Threshold Voltage	(Note 6)		55	70	85	mV
Input Discharge Current	Pin 2; V_{IN} = 2V		6	11	16	µA
Input Clamp Charge Current	Pin 2; V_{IN} = 1V		0.2	0.8		mA
R_{SET} Pin Reference Voltage	Pin 6; (Note 7)		1.10	1.22	1.35	V
Composite Sync. & Vertical Outputs	I_{OUT} = 40 µA; Logic 1	V_{CC} = 5V	4.0	4.5		V
	I_{OUT} = 1.6 mA Logic 1	V_{CC} = 12V	11.0			
		V_{CC} = 5V	2.4	3.6		V
		V_{CC} = 12V	10.0			
Burst Gate & Odd/Even Outputs	I_{OUT} = 40 µA; Logic 1	V_{CC} = 5V	4.0	4.5		V
		V_{CC} = 12V	11.0			
Composite Sync. Output	I_{OUT} = −1.6 mA; Logic 0; Pin 1			0.2	0.8	V
Vertical Sync. Output	I_{OUT} = −1.6 mA; Logic 0; Pin 3			0.2	0.8	V
Burst Gate Output	I_{OUT} = −1.6 mA; Logic 0; Pin 5			0.2	0.8	V
Odd/Even Output	I_{OUT} = −1.6 mA; Logic 0; Pin 7			0.2	0.8	V
Vertical Sync Width			190	230	300	µs
Burst Gate Width	2.7 kΩ from Pin 5 to V_{CC}		2.5	4	4.7	µs
Vertical Default Time			32	65	90	µs

Absolute Maximum Ratings

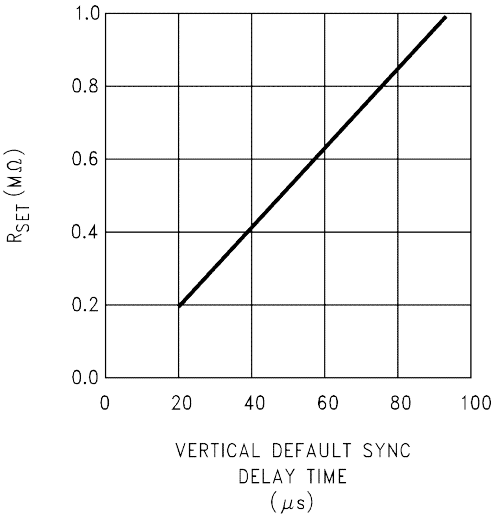
Supply Voltage	13.2V	Max
Input Voltage	3V (vcc=5V) 6V (vcc≧8V)	Max
Output Sink Currents; Pins, 1, 3, 5	5mA	Max
Output Sink Current; Pin 7	2mA	Max
Operating Temperature Range	0℃～70℃	
Storage Temperature Range	-65℃～+150℃	
ESD Susceptibility	2kV	

Typical Performance Characteristics

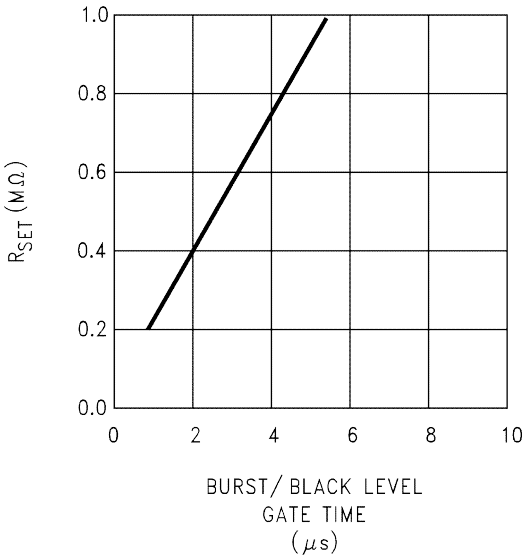
R_{SET} Value Selection vs Vertical Serration Pulse Separation



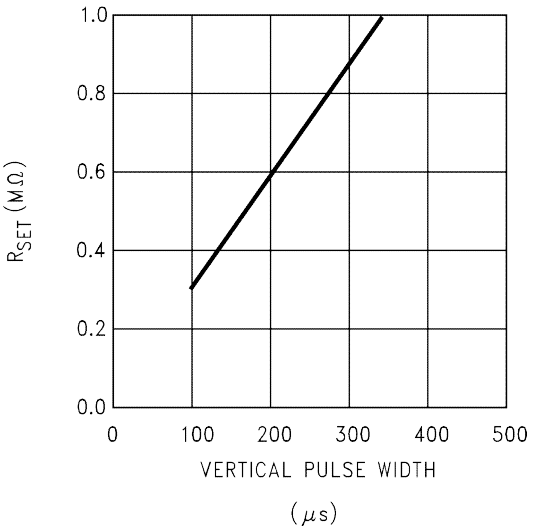
Vertical Default Sync Delay Time vs R_{SET}



Burst/Black Level Gate Time vs R_{SET}

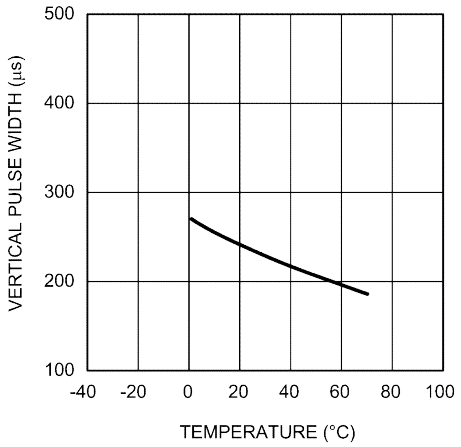


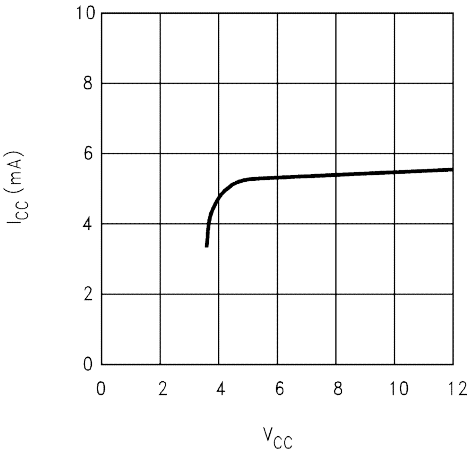
Vertical Pulse Width vs R_{SET}



Vertical Pulse Width vs Temperature

Supply Current vs Supply Voltage





Application Notes

using a series C-R network. This may be necessary in applications which require high horizontal scan rates in combination with normal (60 Hz－120 Hz) vertical scan rates.

Application

Apart from extracting a composite sync signal free of video information, the AT1881 outputs allow a number of interesting applications to be developed. As mentioned above, the burst gate/backporch clamp pulse allows DC restoration of the original video waveform for display or remodulation on an R.F. carrier, and retrieval of the color burst for color synchronization and decoding into R.G.B. components. For frame memory storage applications, the odd/even field lever allows identification of the appropriate field ensuring the correct read or write sequence. The vertical pulse output is particularly useful since it begins at a precise time—the rising edge of the first vertical serration in the sync waveform. This means that individual lines within the vertical blanking period (or anywhere in the active scan line period) can easily be extracted by counting the required number of transitions in the composite sync waveform following the start of the vertical output pulse. The vertical blanking interval is proving popular as a means to transmit data which will not appear on a normal T.V. receiver screen. Data can be inserted beginning with line 10 (the first horizontal scan line on which the color burst appears) through to line 21. Usually lines 10 through 13 are not used which leaves lines 14 through 21 for inserting signals,which may be different from field to field. In the U.S., line 19 is normally reserved for a vertical interval reference signal(VIRS) and line 21 is reserved for closed caption data for the hearing impaired. The remaining lines are used in a number of ways. Lines 17 and 18 are frequently used during studio processing to add and delete vertical interval test signals(VITS) while lines 14 through 18 and line 20 can be used for Videotex/Teletext data. Several institutions are proposing to transmit financial data on line 17 and cable systems use the available lines in the vertical interval to send decoding data for descrambler terminals.Since the vertical output pulse from the AT1881 coincides with the leading edge of the first vertical serration, sixteen positive or negative transitions later will be the start of line 14 in either field. At this point simple counters can be used to select the desired line(s) for insertion or deletion of data.

VIDEO LINE SELECTOR

The circuit in *Figure 3* puts out a singe video line according to the binary coded information applied to line select bits b0－b7. A line is selected by adding two to the desired line number, converting to a binary equivalent and applying the result to the line select inputs. The falling edge of the AT1881’s vertical pulse is used to load the appropriate number into the counters and to set a start count latch using two NAND

gates. Composite sync transitions are counted using the borrow out of the desired number of counters. The final borrow out pulse is used to turn on the analog switch during the desired line. The falling edge of this signal also resets the start count latch,thereby terminating the counting.

The circuit, as shown, will provide a single line output for each field in an interlaced video system (television) or a single line output in each frame for a non-interlaced video system (computer monitor). When a particular line in only one field of an interlaced video signal is desired, the odd/

even field index output must be used instead of the vertical output pulse (invert the field index output to select the odd field). A single counter is needed for selecting lines 3 to 14;two counters are needed for selecting lines 15 to 253; and three counters will work for up to 2046 lines. An output buffer

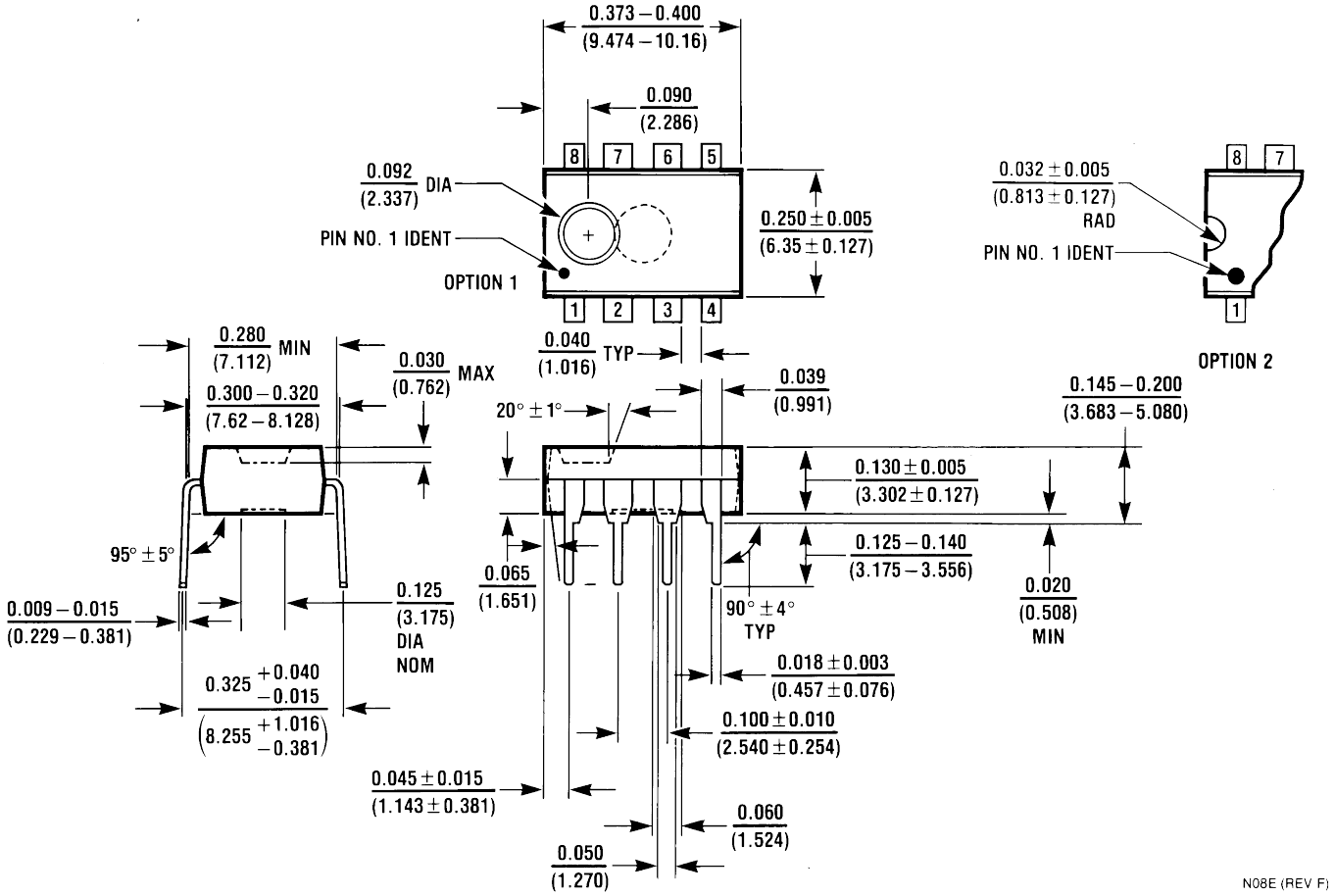
is required to drive low impedance loads.

MULTIPLE CONTIGUOUS VIDEO LINE

SELECTOR WITH BLACK LEVEL RESTORATION

The circuit in *Figure 4* will select a number of adjoining lines starting with the line selected as in the previous example.Additional counters can be added as described previously for either higher starting line numbers or an increased number of contiguous output lines. The back porch pulse output of the AT1881 is used to gate the video input’s black level through a low pass filter (10 kΩ, 10 μF) providing black level restoration at the video output when the output selected line(s) is not being gated through.

Physical Dimensions inches (millimeters) unless otherwise noted


0.373 – 0.400
(9.474 – 10.16)
0.090
(2.286)
0.092
(2.337) DIA
PIN NO. 1 IDENT
OPTION 1
0.250 ± 0.005
(6.35 ± 0.127)
0.032 ± 0.005
(0.813 ± 0.127)
RAD
PIN NO. 1 IDENT
OPTION 2
0.280
(7.112) MIN
0.300 – 0.320
(7.62 – 8.128)
0.030
(0.762) MAX
0.040
(1.016) TYP
0.039
(0.991)
20° ± 1°
0.145 – 0.200
(3.683 – 5.080)
0.130 ± 0.005
(3.302 ± 0.127)
95° ± 5°
0.125 – 0.140
(3.175 – 3.556)
0.065
(1.651)
0.020
(0.508)
MIN
0.009 – 0.015
(0.229 – 0.381)
0.125
(3.175)
DIA
NOM
90° ± 4°
TYP
0.018 ± 0.003
(0.457 ± 0.076)
0.325 +0.040 −0.015
(8.255 +1.016 −0.381)
0.100 ± 0.010
(2.540 ± 0.254)
0.045 ± 0.015
(1.143 ± 0.381)
0.060
(1.524)
0.050
(1.270)
N08E (REV F)