

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

Send any inquiries to <http://www.renesas.com/inquiry>.

Not recommended
for new design

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.
 - "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.
 - "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.
 - "Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

M52036SP

SYNC SIGNAL PROCESSOR

REJ03F0086-0100Z

Rev.1.0

Sep.22.2003

Description

The M52036SP is a semiconductor integrated circuit for the automatic selection and rectification of sync waveforms. The IC operates with synchronizing signals in three forms, that is, separate sync(positive or negative polarity, 1 to 5 Vp-p), composite sync (positive or negative polarity, 1 to 5 Vp-p), and synchronous video (negative sync). This IC is optimal for processing sync signals for multi-scan-type displays.

Features

- Indicates the presence or absence of synchronizing-signal input and the polarities of the signals
- Pulse-output circuit is for open-collector output
- Clamp-pulse output and Clamp-pulse trigger is generated at the front edge for separate sync and composite sync input, and at the rear edge for sync on video input.
- 20-pin shrink-DIP

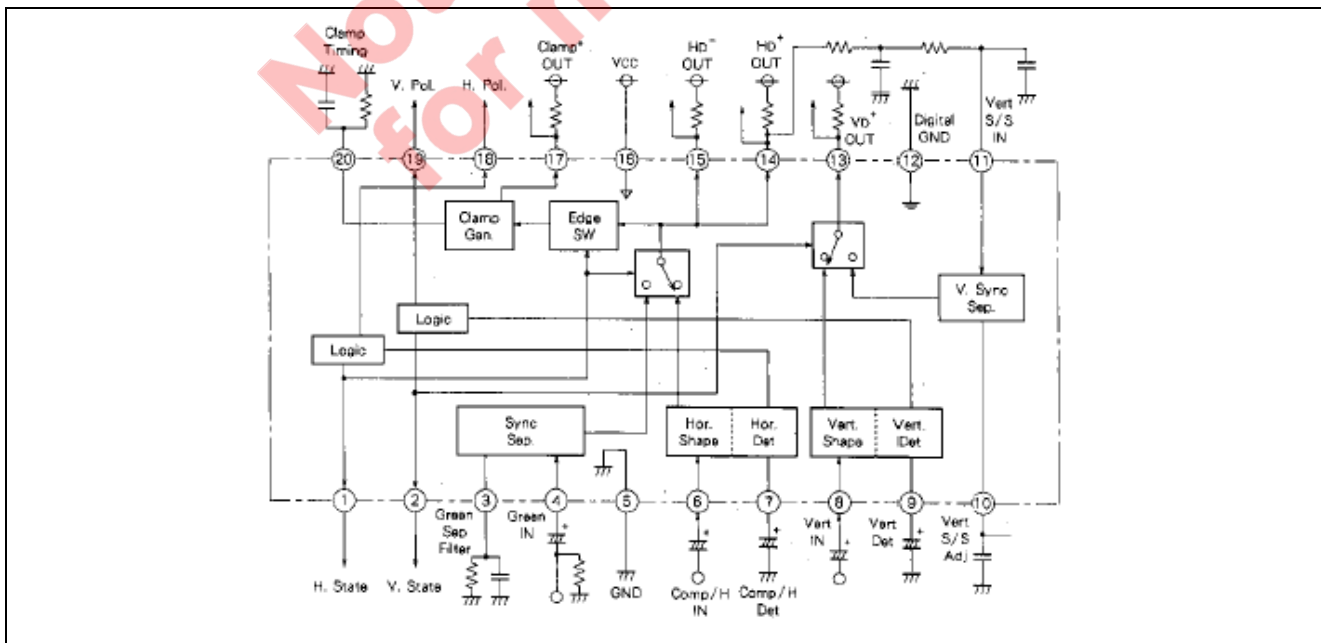
Application

- Display Monitor

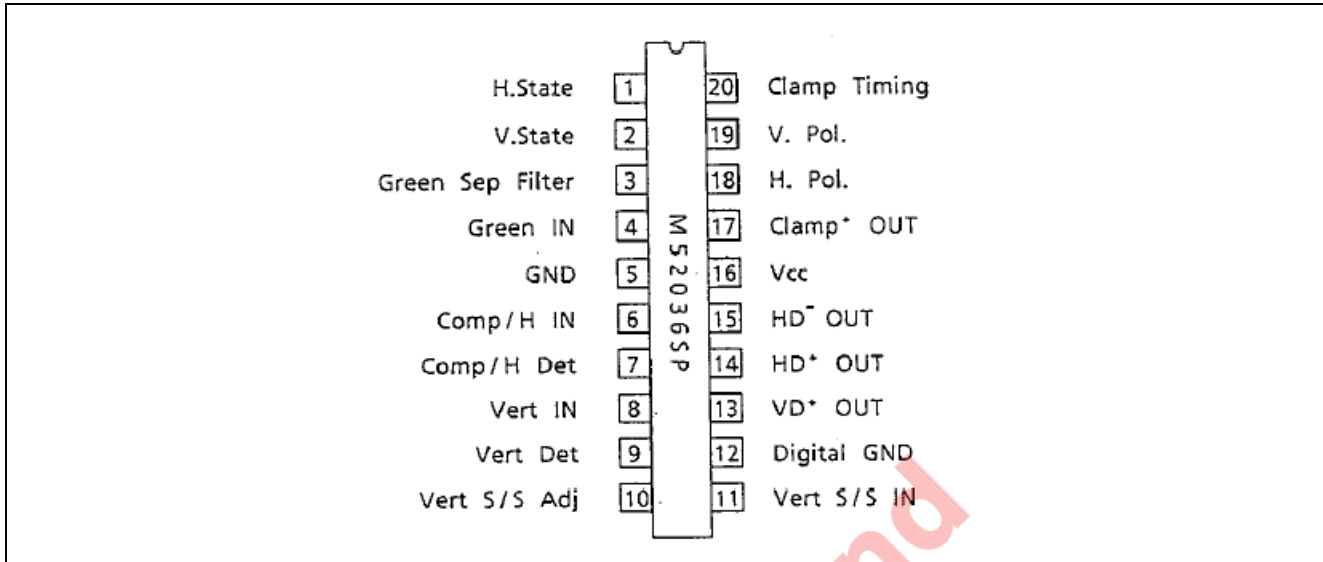
Recommended Operating Condition

- Supply voltage range: 11 to 13 V
- Rated supply voltage: 12 V

Block Diagram

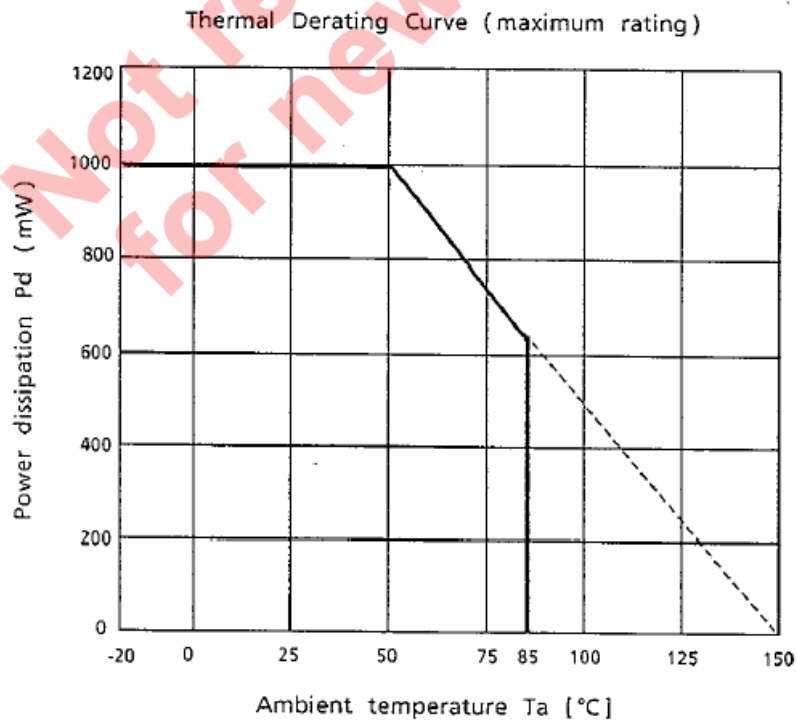


Pin Functions



Absolute Maximum Rating

Item	Symbol	Rated values	Units
Supply voltage	Vcc	14.0	V
Power dissipation	Pd	1000	mW
Operating ambient temperature	Topr	-20 to 85	°C
Storing temperature	Tstg	-40 to 150	°C



Electrical Characteristics

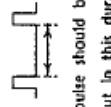

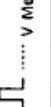


(Ta = 25°C Vcc = 12 V, VDD = Open)

No.	Items	Symbols	Switch conditions			Input pins	Input conditions	Output pins	Output waveform	Rated values			Types of Unit	Remarks
			4	6	8					Min.	Typ.	Max.		
1	Circuit current	Icc	2	2	2	16		A		25	35	45	mA	Pins 4, 6, and 8 shall have no input signal. The input pin shall be connected to GND via a capacitor.
2	Pin 1 output Hi level	1OH	2	1	1	6		1	DC	4.0	5.0	5.3	V	
						8								
3	Pin 1 output Low level	1OL	2	1	1	6		1	DC	-	-	0.5	V	The input signal 0.7 Vpp is equivalent to NO SYNC.
						8								
4	Pin 2 output Hi leve	2OH	2	1	1	6		2	DC	4.0	5.0	5.3	V	
						8								
5	Pin 2 output Low level	2OL	2	1	1	6		2	DC	-	-	0.5	V	The input signal 0.7 Vpp is equivalent to NO SYNC.
						8								
6	Pin 18 output Hi level	18OH	2	1	1	6		18	DC	4.0	5.0	5.3	V	
						8								
7	Pin 18 output Low level	18OL	2	1	1	6		18	DC	-	-	0.5	V	
						8								
8	Pin 19 output Hi level	19OH	2	1	1	6		19	DC	4.0	5.0	5.3	V	
						8								
9	Pin 19 output Low level	19OL	2	1	1	6		19	DC	-	-	0.5	V	
						8								
10	Threshold voltage	V10	2	2	2			10	DC	0.7	1.0	1.4	V	

Refer to Attached Table 2 for truth table.

Electrical Characteristics (cont.)

(Ta = 25°C Vcc = 12 V, V_{DD} = Open)

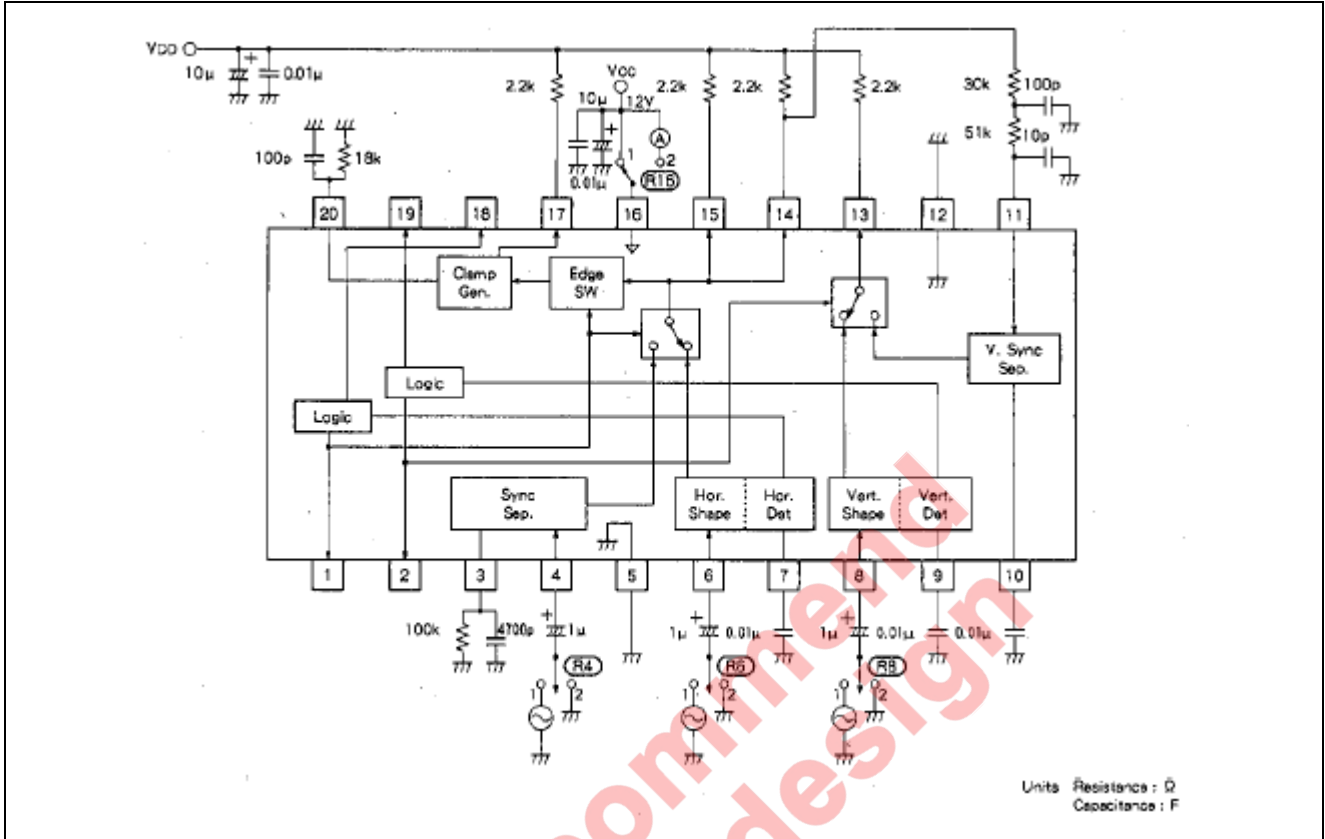
No.	Items	Symbols	Switch conditions			Input pins	Input conditions	Output pins	Output waveforms	Rated values			Types of Unit	Remarks
			4	6	8					16	Min.	Typ.		
11	Maximum noise amplitude of voltage of input signal	SS-NV	1	2	2	1	4	14	No pulse should be output.	--	--	0.1	V	The input signal 0.1V _{p-p} is a dummy noise signal.
12	Minimum voltage amplitude of input signal	SS-LV	1	2	2	1	4	14	16KHz  No pulse should be output in this duration.	0.2	--	--	V	If malfunction by noise occurs is checked.
13	15pin HD* Output Low level	15OL	1	1	2	1	4/6	15	 V Meas	--	--	0.5	V	
14	14pin HD* Output Low level	14OL	1	1	2	1	4/6	14	 V Meas	--	--	0.5	V	
15	17pin CP* Output Low level	17OL	1	1	2	1	4/6	17	 V Meas	--	--	0.5	V	
16	13pin VD* Output Low level	13OL	2	2	1	1	8	13	 V Meas	--	--	0.5	V	

Electrical Characteristics (cont.)

(Ta = 25°C Vcc = 12 V, VDD = Open)

No.	Items	Symbols	Switch conditions			Input pins	Input conditions	Output pins	Output waveforms	Rated values		Types of Unit	Remarks	
			4	6	8					16	Min.			Typ. Max.
17	HD ⁻ —delay time (A)	HD ⁻ —DA	1	1	2	1	4/6	15		—	120	350	ns	
18	HD ⁻ —delay time (B)	HD ⁻ —DB	1	1	2	1	4/6	15		—	150	350	ns	
19	HD ⁺ —delay time (A)	HD ⁺ —DA	1	1	2	1	4/6	14		—	120	350	ns	
20	HD ⁺ —delay time (B)	HD ⁺ —DB	1	1	2	1	4/6	14		—	100	350	ns	
21	CP [*] — delay time	CP [*] —DT	1	1	2	1	4/6	17		—	120	350	ns	
22	CP [*] —PULSE—WIDTH	CP [*] —PW	1	1	2	1	4/6	17		450	700	950	ns	
23	VD [*] —delay time (A)	VD [*] —DA	2	2	1	1	8	13		—	120	350	ns	
24	VD [*] —delay time (B)	VD [*] —DB	2	2	1	1	8	13		—	100	350	ns	

Test Circuit



Logic Table

Table.1 Decoder Logic Output

Input to pin 6 HD.COMP	Input to pin 8 VD	Output pins			
		1	2	18	19
HD. COMP. (POS)	NON	H	L	L	L
HD. COMP. (POS)	VD (POS)	H	H	L	L
HD. COMP. (POS)	VD (NEG)	H	H	L	H
HD. COMP. (NEG)	NON	H	L	H	L
HD. COMP. (NEG)	VD (POS)	H	H	H	L
HD. COMP. (NEG)	VD (NEG)	H	H	H	H
NON	NON	L	L	L	L
NON	VD (POS)	L	H	L	L
NON	VD (NEG)	L	H	L	H

Table.2 Allowable Amplitude of Input Voltage




Amplitude of input to pin 4	
Amplitude of input to pin 6	
Amplitude of input to pin 8	

Table.3 Output Priority

Input signals (pin)			Output signals (pin)		
4 pin	6 pin	8 pin	14 pin 15 pin	13 pin	17 pin
O	×	×	4	11	4
O	O	×	6	11	6
O	×	O	4	8	4
O	O	O	6	8	6
×	×	×	×	×	×
×	O	×	6	11	6
×	×	O	×	8	×
×	O	O	6	8	6

Table.4 Pulse Duty Ratio for Allowable Maximum Input Signal

Input Pulse to Pin 6 (HD.COMP.)

 $F_H = 16 \text{ kHz}$

Maximum voltage amplitude (V_{P-P})		1.0	3.3	4.0	5.0
POS.	%	15.0	13.8	11.2	9.0
	Time (μs)	9.38	8.63	7.00	8.63
NEG.	%	15.0	13.0	10.5	8.8
	Time (μs)	9.38	8.13	6.56	5.50

Input Pulse to Pin 8 (VD)

 $F_V = 60 \text{ Hz}$

Maximum voltage amplitude (V_{P-P})		1.0	3.3	4.0	5.0
POS.	%	14.1	12.1	9.8	7.7
	Time (ms)	2.35	2.02	1.63	1.28
NEG.	%	14.8	11.3	9.2	7.5
	Time (ms)	2.47	1.88	1.53	1.25

Precautions for Application

1. Input

- 1) Green (Sync on Video) input (pins [3] and [4])

The input signals must be in sync negative polarity.

For sync separation, a method is used in which the sync tip is clamped by a capacitor attached externally to pin [4] and by the C and R attached to pin [3].

Then sync tip of pin [4] shows approximately 4 V.

2) Comp Sync/H sync, V sync input

Connect the composite sync input to pin [6]. For the separate sync input, connect H and V to pins [6] and [8] respectively. The bias and impedance at pins [6] and [8] are 6 V and 10 k Ω , respectively.

Waveform shaping and polarity detection are performed by a double threshold converter installed inside.

The internal circuit is as shown in Fig.B. The average DC voltage is set to approximately 0.7 V higher and lower than V_2 .

Thus, as shown in Fig. A, this processor is energized by an input signal 0.7 Vp-p or over when the duty ratio is small. On the other hand, approximately 1.4 Vp-p is suitable when the duty ratio is large. Fig. C indicates an allowable standard value for the input duty.

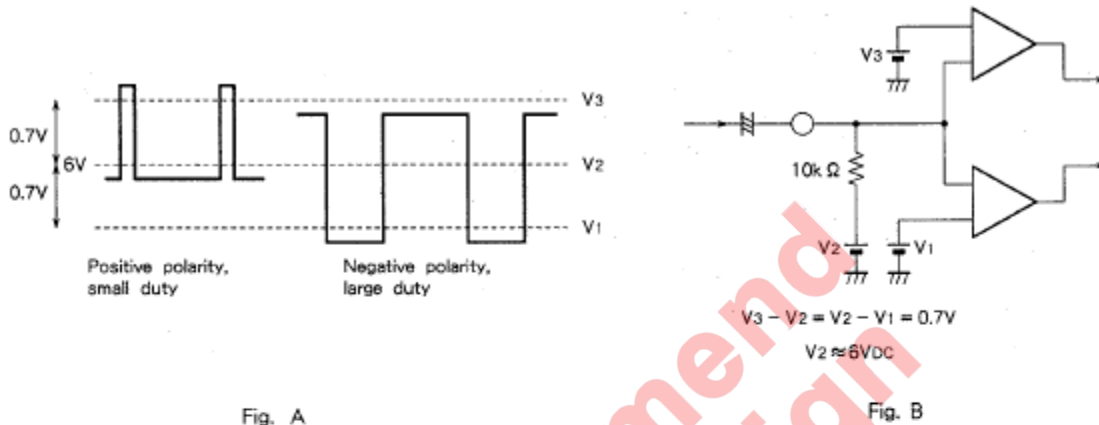


Fig. A

Fig. B

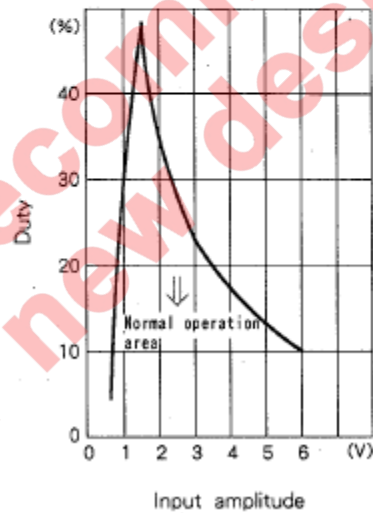
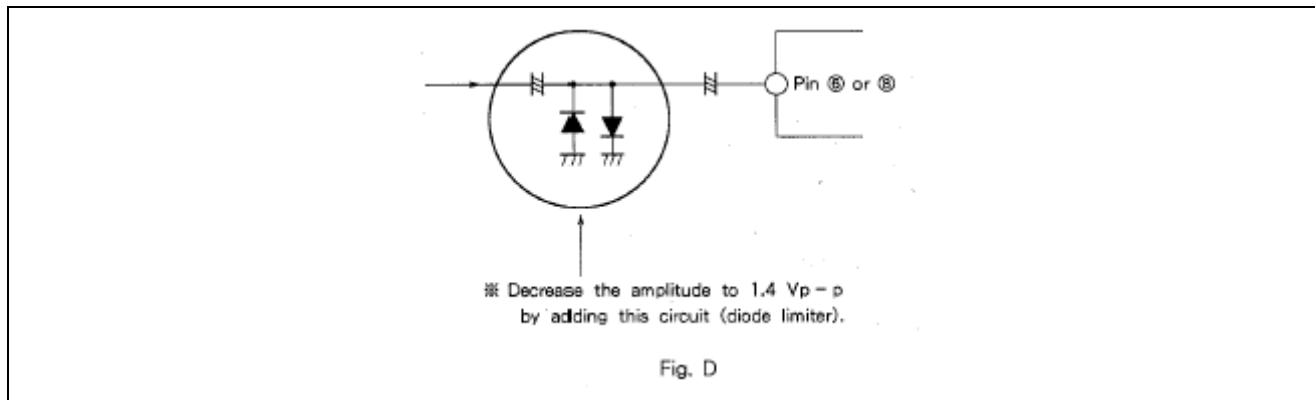
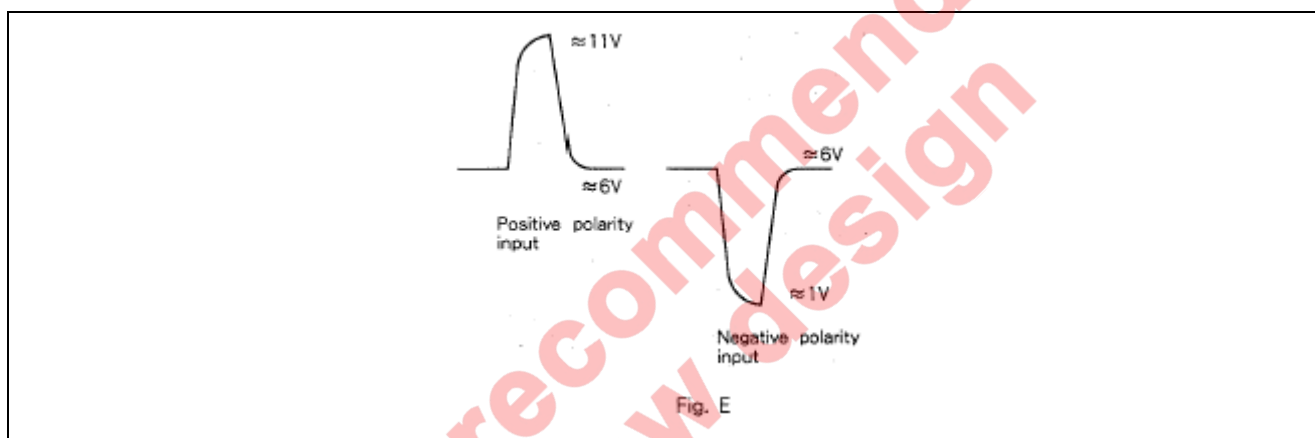


Fig. C

Fig. D shows an example of the measures for improving the allowable duty ratio in a range of 1.4 V_{p-p} or over of the input signal.



For use in a range outside the specified value, confirm that the waveform complies with Fig. E when measured it after removing the filters in pins [7] and [9].



3) Polarity detection and empty input detection (pins [7] and [9])

A capacitor is required to be installed external as a filter for polarity detection and empty input detection. The larger the capacitance, the smaller the ripple and reduces malfunction. However, the detecting time is lengthened.

For an input of 15 kHz, a capacitor of 0.05 μ F or larger is recommended. For 60 Hz, a 10 μ F or larger is sufficient. If it is necessary to use a capacitor of smaller capacitance, measure the waveform at the filter terminal under the condition of the lowest frequency of the input sync signal to be used and the smallest duty ratio. And make sure that the signal shows 7.5 V (actually 6.6 V) or over for positive polarity input or 4.5 V (actually 5.5 V) or lower for a negative polarity input.

4) VERT S/S IN (pins [11])

For V sync separation, signals are generated by externally integrating composite sync signals, and are then input.

The composite sync signals that are input to pin [6] (H + V) are output to pin [14] HD⁺. For V sync separation, pin [14] HD⁺ output is externally integrated, and input to pin [11]. Check pin [11] waveform to see if the H element is adequately low.

In the IC, the sync separation threshold level is set to approximately 1 V when no external adjustment is provided.

5) VERT S/S ADJ (pins [10])

The threshold voltage is approximately 1 V when no external adjustment is provided. The threshold voltage is dependent on IC internal resistance. Pin [10] may be open; however, if noise may give adverse effect, ground the pin with capacitor.

When the H element cannot be lowered sufficiently, connect resistance between pin [10] and V_{CC} to change the threshold level. (Provide resistance such that when V_{DD} (Digital V_{CC}) is 12 V, the threshold voltage will be 8 V or less; and when V_{DD} is 5 V, the threshold voltage will be 4 V or less.)

When there are serration pulses or other pulses during the V period, provide resistance such that the threshold voltage will be half as high as V_{DD}.

2. CP-Width

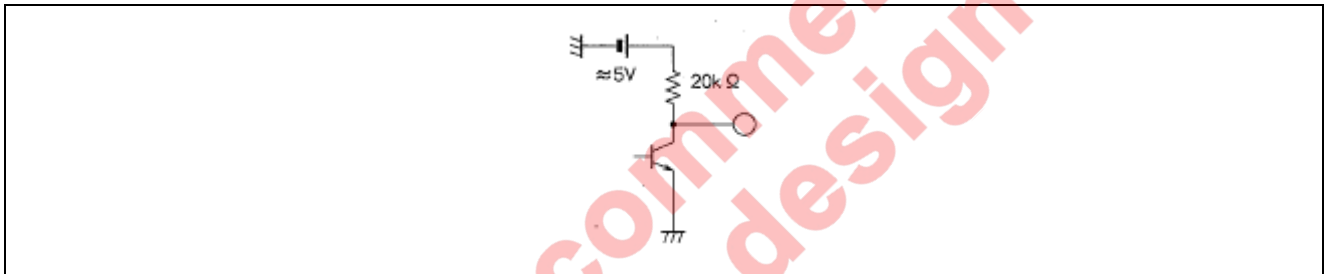
Timing terminal (pins [20])

The time constant depends on the current flowing out through pin [20] and the capacitance of the timing terminal. The current flowing out through pin [20] is usually determined by the terminal voltage and the resistance of externally attached resistor. A pulse width of 0.7 μ sec is obtained by an 18 kΩ (or 200 μA) resistor and a 100 pF capacitor both installed externally.

3. Output stage

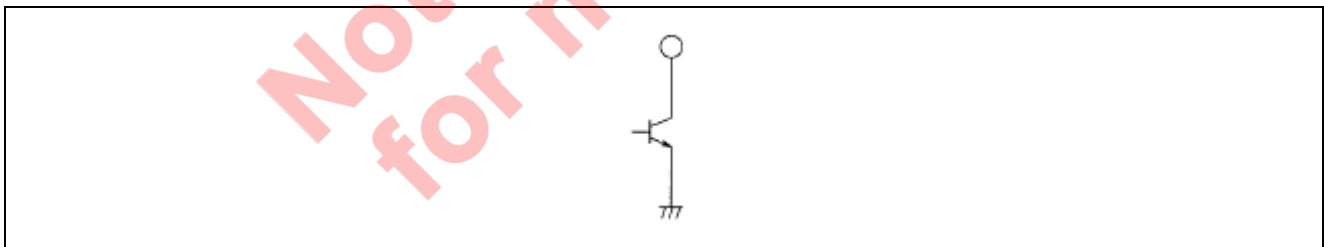
1) Logic output (pins [1], [2], [18] and [19])

This output system is illustrated in the figure shown below. The internal load resistance of this IC is 20 kΩ.



2) Pulse output (pins [13], [14], [15] and [17])

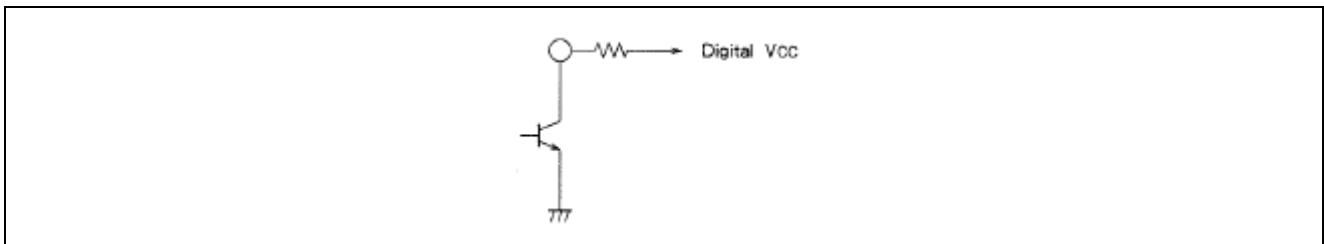
This output system is of open collector type as illustrated in the figure shown below. Approximately 6 mA can be charged in.



3) Power supply

Supply 12 V to pin [16].

For the pulse output power, supply a digital V_{CC} of 5 to 12 V as illustrated below.



4. Other

Differences between M52036SP and M52346SP

The clamp pulse trigger is different between M52036SP and M52346SP when “S on G” and “H/H + V” are input simultaneously, or when only “H/H + V” is input.

M52036SP: Generated at the first edge of “H/H + V” input.

M52346SP: Generated at the latter edge of “H/H + V” input.

M52346SP clamp pulses are generated at the latter edge of signals that have been given priority.

The M52036SP pin configuration is the same as that of M52346SP.

**Not recommend
for new design**

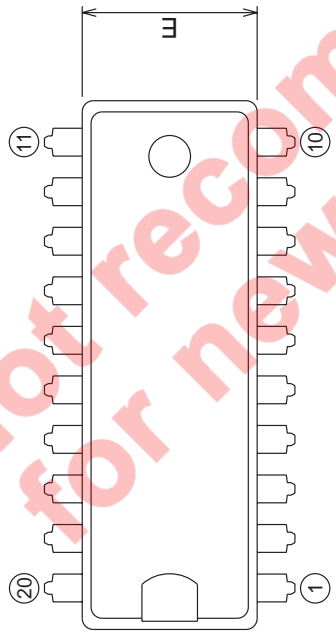
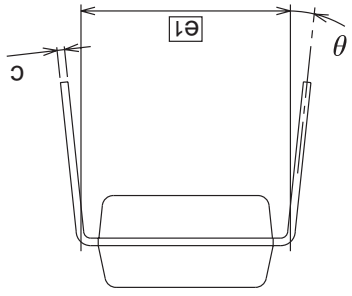
Package Dimensions

Plastic 20pin 300mil SDIP

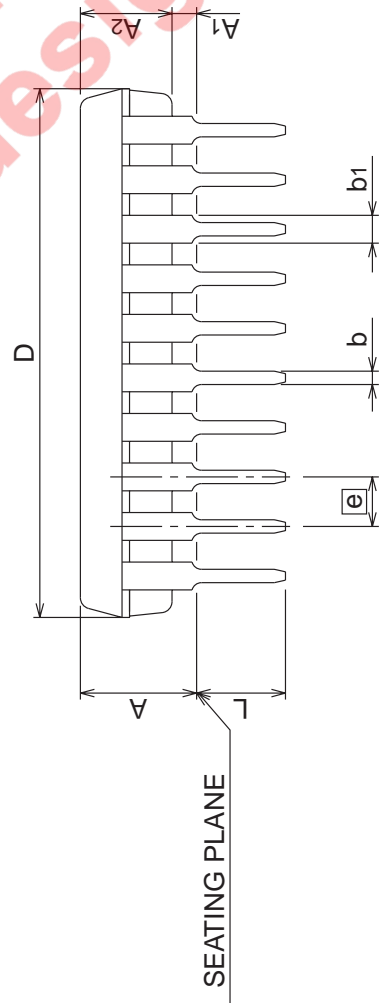
MMP

20P4B

EIAJ Package Code SDIP20-P-300-1.78	JEDEC Code —	Weight(g) 1.0	Lead Material Alloy 42/Cu Alloy
----------------------------------------	-----------------	------------------	------------------------------------



Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	—	—	4.5
A1	0.51	—	—
A2	—	3.3	—
b	0.38	0.48	0.58
b1	0.9	1.0	1.3
c	0.22	0.27	0.34
D	18.8	19.0	19.2
E	6.15	6.3	6.45
e	—	1.778	—
e1	—	7.62	—
L	3.0	—	—
theta	0°	—	15°



Not recommended for new design

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Keep safety first in your circuit designs!

1. Renesas Technology Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corp. product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corp. or a third party.
2. Renesas Technology Corp. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corp. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor for the latest product information before purchasing a product listed herein.
The information described here may contain technical inaccuracies or typographical errors.
Renesas Technology Corp. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
Please also pay attention to information published by Renesas Technology Corp. by various means, including the Renesas Technology Corp. Semiconductor home page (<http://www.renesas.com>).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corp. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corp. semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corp. is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corp. for further details on these materials or the products contained therein.



RENESAS SALES OFFICES

<http://www.renesas.com>

Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500 Fax: <1> (408) 382-7501

Renesas Technology Europe Limited.
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, United Kingdom
Tel: <44> (1628) 585 100, Fax: <44> (1628) 585 900

Renesas Technology Europe GmbH
Dornacher Str. 3, D-85622 Feldkirchen, Germany
Tel: <49> (89) 380 70 0, Fax: <49> (89) 929 30 11

Renesas Technology Hong Kong Ltd.
7/F., North Tower, World Finance Centre, Harbour City, Canton Road, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2375-6836

Renesas Technology Taiwan Co., Ltd.
FL 10, #99, Fu-Hsing N. Rd., Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.
26/F., Ruijin Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.
1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001