

DATA SHEET

NE/SA556 Dual timer

Product data
Replaces NE/SA/SE556/NE556-1 of 1994 Aug 31
IC11

2001 Aug 03

Dual timer

NE/SA556

DESCRIPTION

Both the NE556 and SA556 Dual Monolithic timing circuits are highly stable controllers capable of producing accurate time delays or oscillation. The 556 is a dual 555. Timing is provided by an external resistor and capacitor for each timing function. The two timers operate independently of each other, sharing only V_{CC} and ground. The circuits may be triggered and reset on falling waveforms. The output structures may sink or source 200 mA.

FEATURES

- Timing from microseconds to hours
- Replaces two 555 timers
- Operates in both astable and monostable modes
- High output current
- Adjustable duty cycle
- TTL compatible
- Temperature stability of 0.005%/°C

APPLICATIONS

- Precision timing
- Sequential timing
- Pulse shaping
- Pulse generator
- Missing pulse detector
- Tone burst generator
- Pulse width modulation
- Time delay generator
- Frequency division
- Touch-Tone® encoder
- Industrial controls
- Pulse position modulation
- Appliance timing
- Traffic light control

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
14-Pin Plastic Small Outline (SO) Package	0 to +70°C	NE556D	SOT108-1
14-Pin Plastic Dual In-Line Package (DIP)	0 to +70°C	NE556N	SOT27-1
14-Pin Plastic Dual In-Line Package (DIP)	-40°C to +85°C	SA556N	SOT27-1

PIN CONFIGURATION

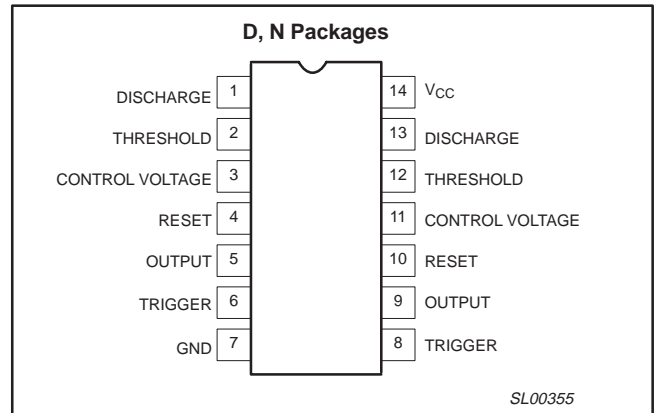


Figure 1. Pin Configuration

® Touch-Tone is a registered trademark of AT&T.

Dual timer

NE/SA556

BLOCK DIAGRAM

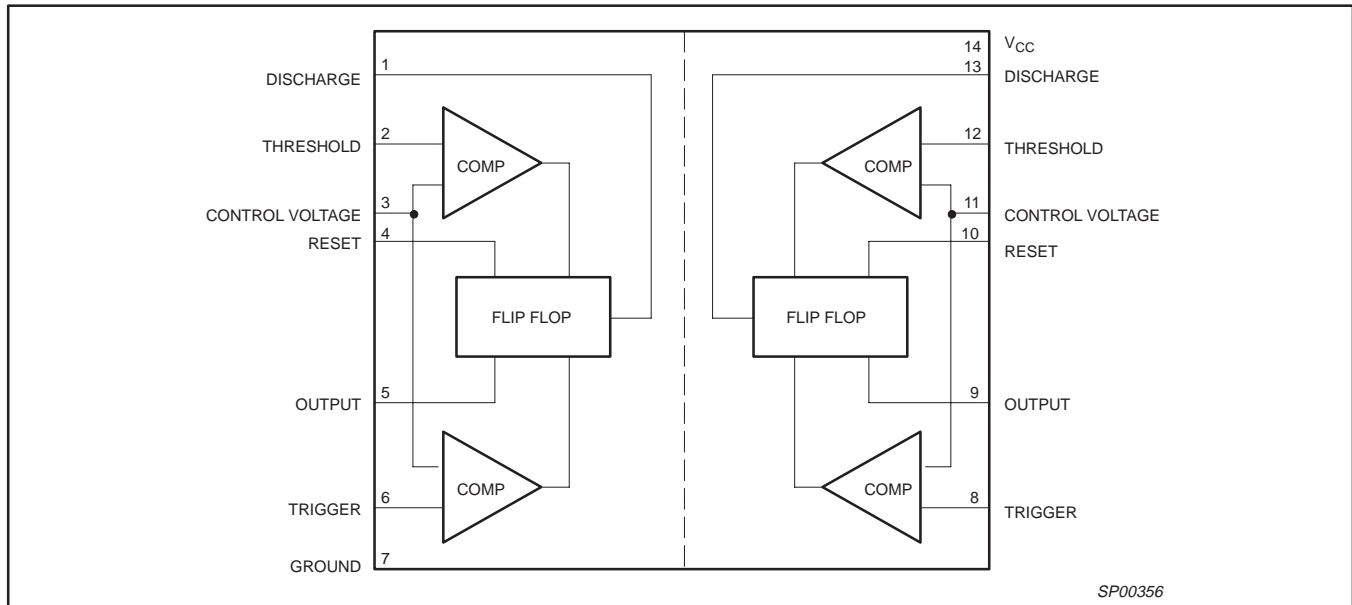


Figure 2. Block Diagram

EQUIVALENT SCHEMATIC (Shown for one circuit only)

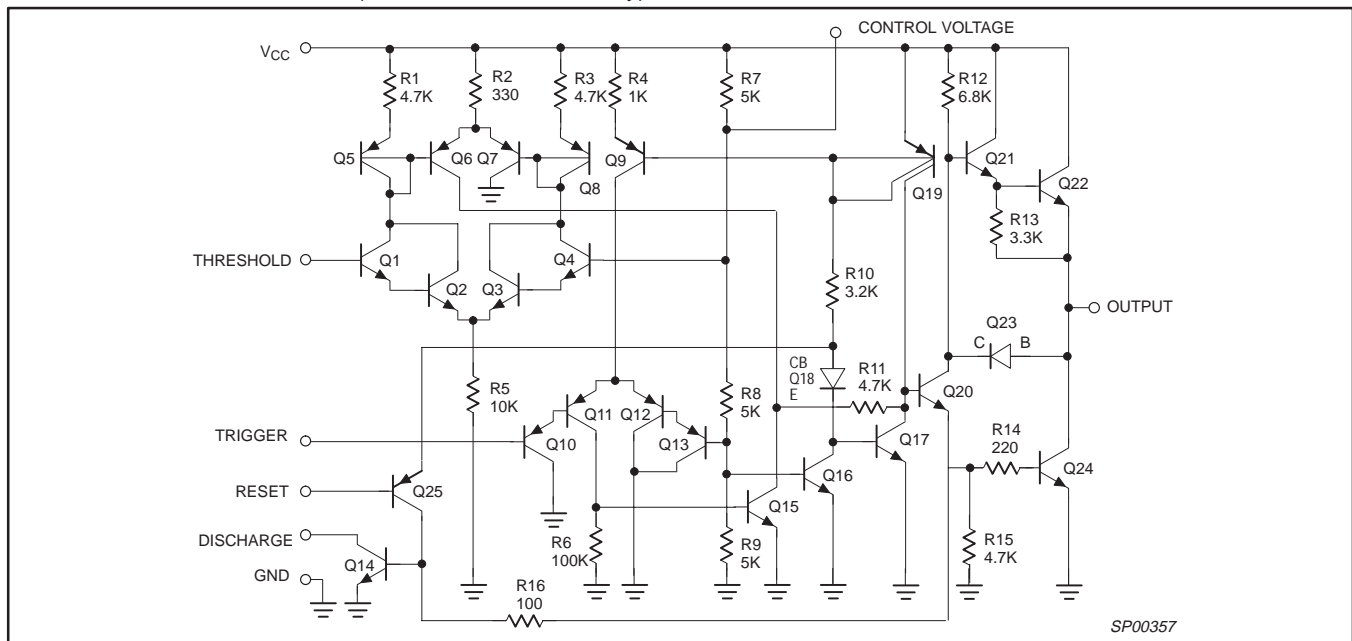


Figure 3. Equivalent Schematic

Dual timer

NE/SA556

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V _{CC}	Supply voltage	+16	V
P _D	Maximum allowable power dissipation ¹	800	mW
T _{amb}	Operating temperature range	0 to +70	°C
	NE556	-40 to +85	°C
	SA556		
T _{stg}	Storage temperature range	-65 to +150	°C
T _{SOLD}	Lead soldering temperature (10 sec max)	+230	°C

NOTE:

- The junction temperature must be kept below 125 °C for the D package and below 150 °C for the N package. At ambient temperatures above 25 °C, where this limit would be exceeded, the Maximum Allowable Power Dissipation must be derated by the following:

D package 115 °C/W

N package 80 °C/W

Dual timer

NE/SA556

ELECTRICAL CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$, $V_{CC} = +5\text{ V}$ to $+15\text{ V}$, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	Min	Typ	Max	UNIT
V_{CC}	Supply voltage		4.5		16	V
I_{CC}	Supply current (low state) ¹	$V_{CC} = 5\text{ V}$, $R_L = \infty$ $V_{CC} = 15\text{ V}$, $R_L = \infty$		6 20	12 30	mA mA
t_M $\Delta t_M/\Delta T$ $\Delta t_M/\Delta V_S$	Timing error (monostable) Initial accuracy ² Drift with temperature Drift with supply voltage	$R_A = 2\text{ k}\Omega$ to $100\text{ k}\Omega$ $C = 0.1\text{ }\mu\text{F}$ $T = 1.1\text{ RC}$		0.75 50 0.1	3.0 150 0.5	% ppm/ $^{\circ}\text{C}$ %/V
t_A $\Delta t_A/\Delta T$ $\Delta t_A/\Delta V_S$	Timing error (astable) Initial accuracy ² Drift with temperature Drift with supply voltage	$R_A, R_B = 1\text{ k}\Omega$ to $100\text{ k}\Omega$ $C = 0.1\text{ }\mu\text{F}$ $V_{CC} = 15\text{ V}$		5 400 0.3	13 500 1	% ppm/ $^{\circ}\text{C}$ %/V
V_C	Control voltage level	$V_{CC} = 15\text{ V}$ $V_{CC} = 5\text{ V}$	9.0 2.6	10.0 3.33	11.0 4.0	V
V_{TH}	Threshold voltage	$V_{CC} = 15\text{ V}$ $V_{CC} = 5\text{ V}$	8.8 2.4	10.0 3.33	11.2 4.2	V V
I_{TH}	Threshold current ³	$V_{CC} = 15\text{ V}$, $V_{TH} = 10.5\text{ V}$		30	250	nA
V_{TRIG}	Trigger voltage	$V_{CC} = 15\text{ V}$ $V_{CC} = 5\text{ V}$	4.5 1.1	5.0 1.67	5.6 2.2	V V
I_{TRIG}	Trigger current	$V_{TRIG} = 0\text{ V}$		0.5	2.0	μA
V_{RESET}	Reset voltage ⁵		0.4	0.7	1.0	V
	Reset current	$V_{RESET} = 0.4\text{ V}$	0.4	0.1	0.6	mA
I_{RESET}	Reset current	$V_{RESET} = 0\text{ V}$		0.4	1.5	mA
V_{OL}	Output voltage (low)	$V_{CC} = 15\text{ V}$ $I_{SINK} = 10\text{ mA}$ $I_{SINK} = 50\text{ mA}$ $I_{SINK} = 100\text{ mA}$ $I_{SINK} = 200\text{ mA}$		0.1 0.4 2.0 2.5	0.25 0.75 3.2	V
		$V_{CC} = 5\text{ V}$ $I_{SINK} = 8\text{ mA}$ $I_{SINK} = 5\text{ mA}$		0.25 0.15	0.3 0.25	V
V_{OH}	Output voltage (high)	$V_{CC} = 15\text{ V}$ $I_{SOURCE} = 200\text{ mA}$ $I_{SOURCE} = 100\text{ mA}$	12.75	12.5 13.3		V
		$V_{CC} = 5\text{ V}$ $I_{SOURCE} = 100\text{ mA}$	2.75	3.3		
t_R	Rise time of output			100	300	ns
t_F	Fall time of output			100	300	ns
	Discharge leakage current			20	100	nA
	Matching characteristics ⁴ Initial accuracy ² Drift with temperature Drift with supply voltage			1.0 ± 10 0.2	2.0 0.5	% ppm/ $^{\circ}\text{C}$ %/V

NOTES:

- Supply current when output is high is typically 1.0 mA less.
- Tested at $V_{CC} = 5\text{ V}$ and $V_{CC} = 15\text{ V}$.
- This will determine maximum value of $R_A + R_B$. For 15 V operation, the max total $R = 10\text{ M}\Omega$, and for 5 V operation, the maximum total $R = 3.4\text{ M}\Omega$.
- Matching characteristics refer to the difference between performance characteristics for each timer section in the monostable mode.
- Specified with trigger input high. In order to guarantee reset the voltage at reset pin must be less than or equal to 0.4 V. To disable reset function, the voltage at reset pin has to be greater than 1 V.
- Time measured from a positive-going input pulse from 0 to 0.4 V_{CC} into the threshold to the drop from high to low of the output. Trigger is tied to threshold.

Dual timer

NE/SA556

TYPICAL APPLICATIONS

One feature of the dual timer is that by utilizing both halves it is possible to obtain sequential timing. By connecting the output of the first half to the input of the second half via a $0.001 \mu\text{F}$ coupling capacitor sequential timing may be obtained. Delay t_1 is determined by the first half and t_2 by the second half delay.

The first half of the timer is started by momentarily connecting Pin 6 to ground. When it is timed out (determined by $1.1R_1C_1$) the second half begins. Its duration is determined by $1.1R_2C_2$.

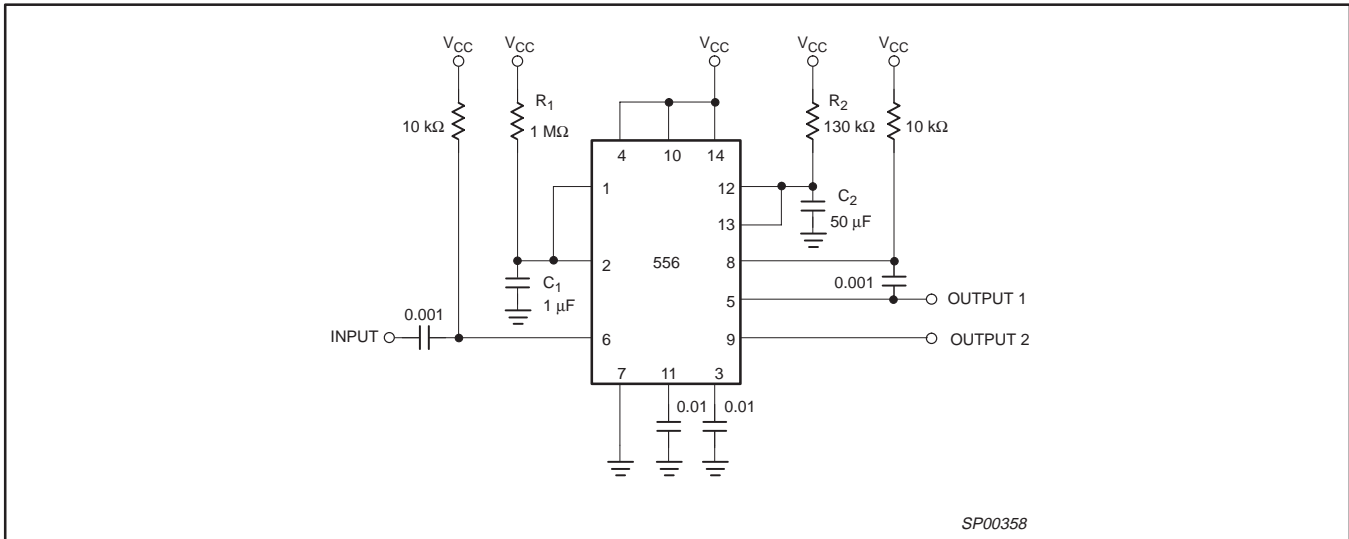


Figure 4. Sequential Timer

Dual timer

NE/SA556

TYPICAL PERFORMANCE CHARACTERISTICS

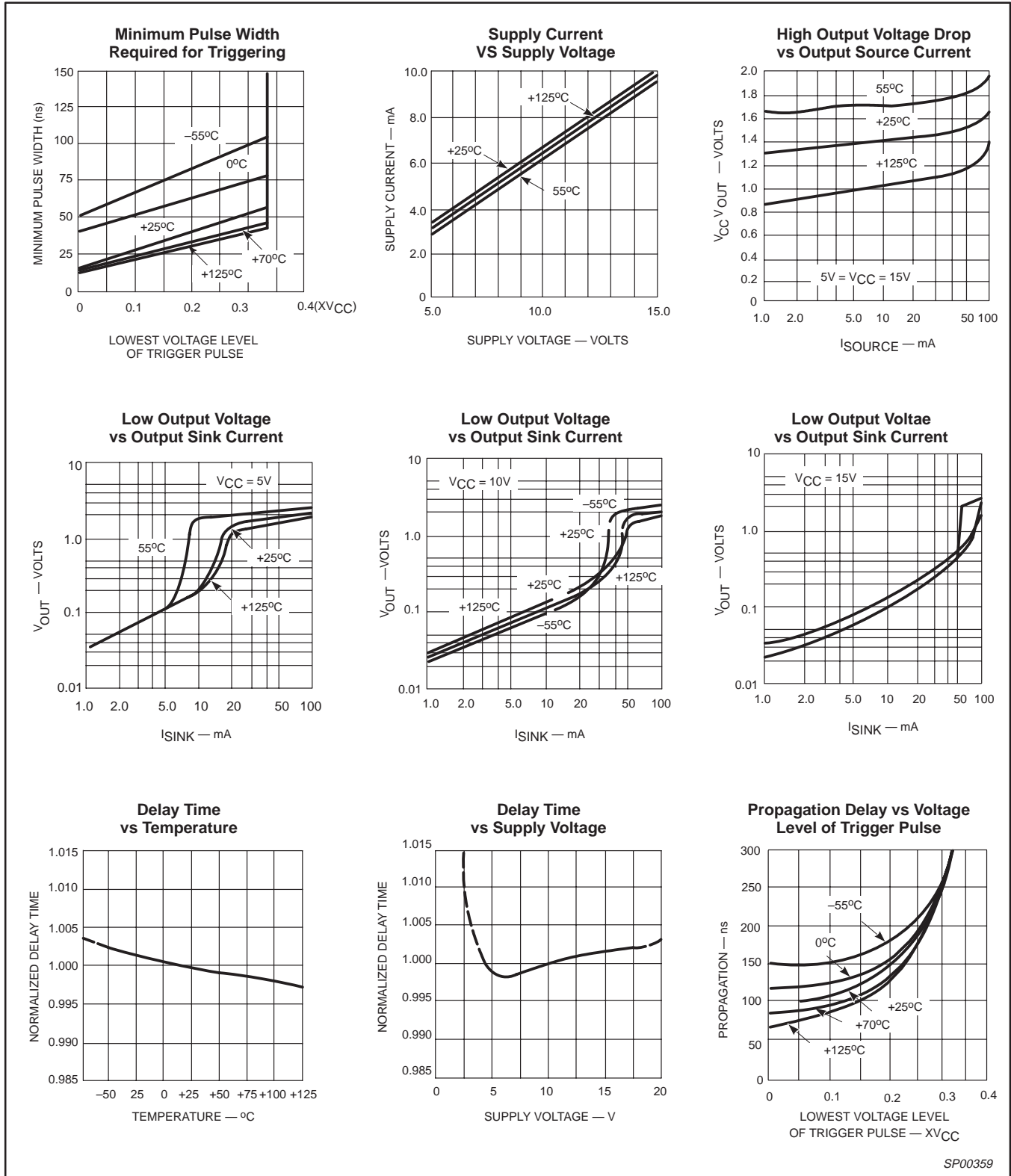


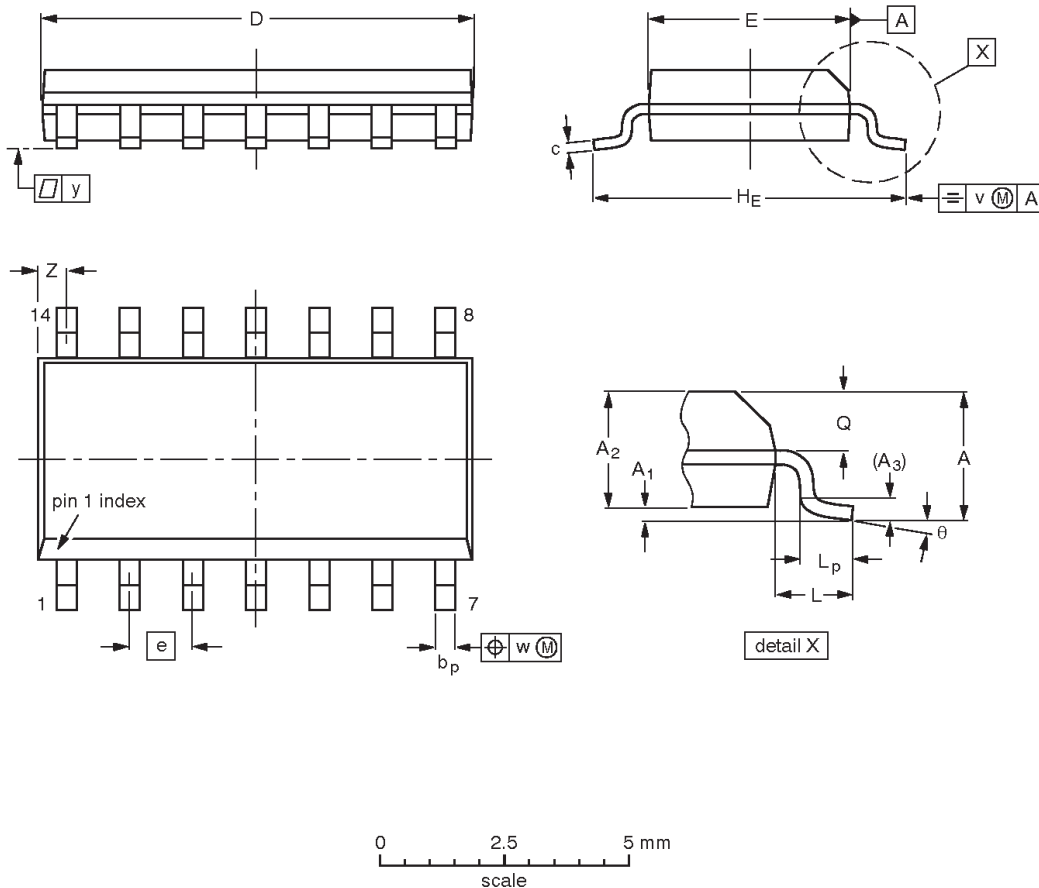
Figure 5. Typical Performance Characteristics

Dual timer

NE/SA556

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	HE	L	L _p	Q	v	w	y	Z ⁽¹⁾	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

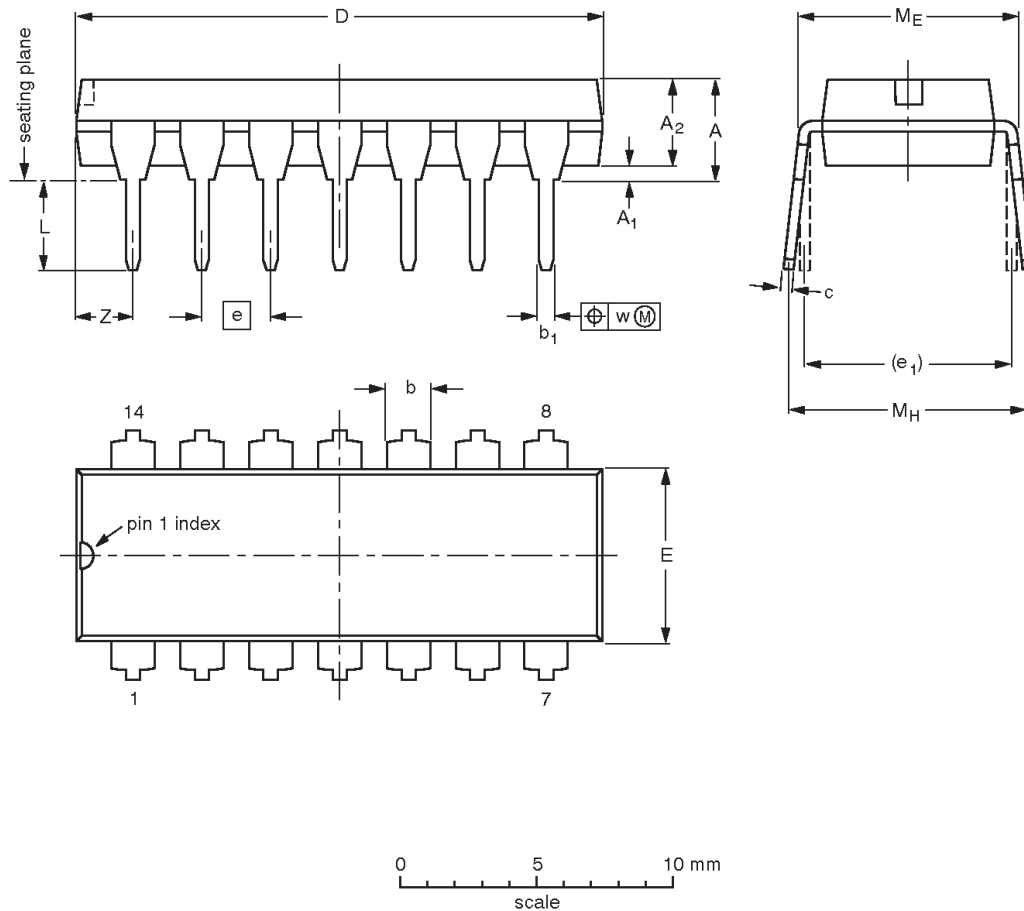
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT108-1	076E06	MS-012				97-05-22 99-12-27

Dual timer

NE/SA556

DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A ₁ min.	A ₂ max.	b	b ₁	c	D ⁽¹⁾	E ⁽¹⁾	e	e ₁	L	M _E	M _H	w	Z ⁽¹⁾ max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.020	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT27-1	050G04	MO-001	SC-501-14			95-03-11 99-12-27

Dual timer

NE/SA556

Data sheet status

Data sheet status ^[1]	Product status ^[2]	Definitions
Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Changes will be communicated according to the Customer Product/Process Change Notification (CPCN) procedure SNW-SQ-650A.

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Disclaimers

Life support — These products are not designed for use in life support appliances, devices or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes, without notice, in the products, including circuits, standard cells, and/or software, described or contained herein in order to improve design and/or performance. Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

Contact information

For additional information please visit
<http://www.semiconductors.philips.com>. Fax: +31 40 27 24825

© Koninklijke Philips Electronics N.V. 2001
 All rights reserved. Printed in U.S.A.

Date of release: 10-01

For sales offices addresses send e-mail to:
sales.addresses@www.semiconductors.philips.com

Document order number:

9397 750 08928

Let's make things better.