DATA SHEET

NE/SA556
Dual timer

Product data
2001 Aug 03

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

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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

PIN CONFIGURATION

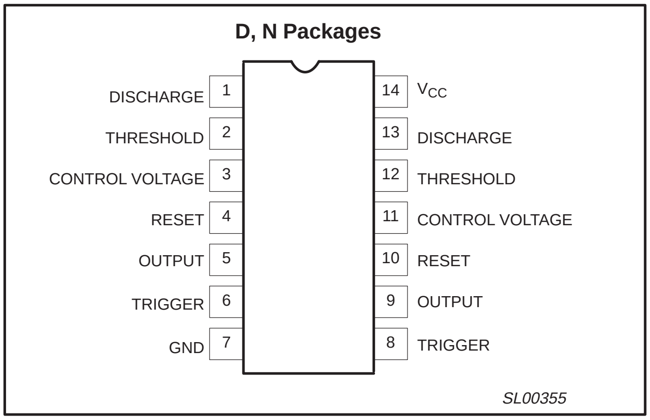


Figure 1. Pin Configuration

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

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

BLOCK DIAGRAM

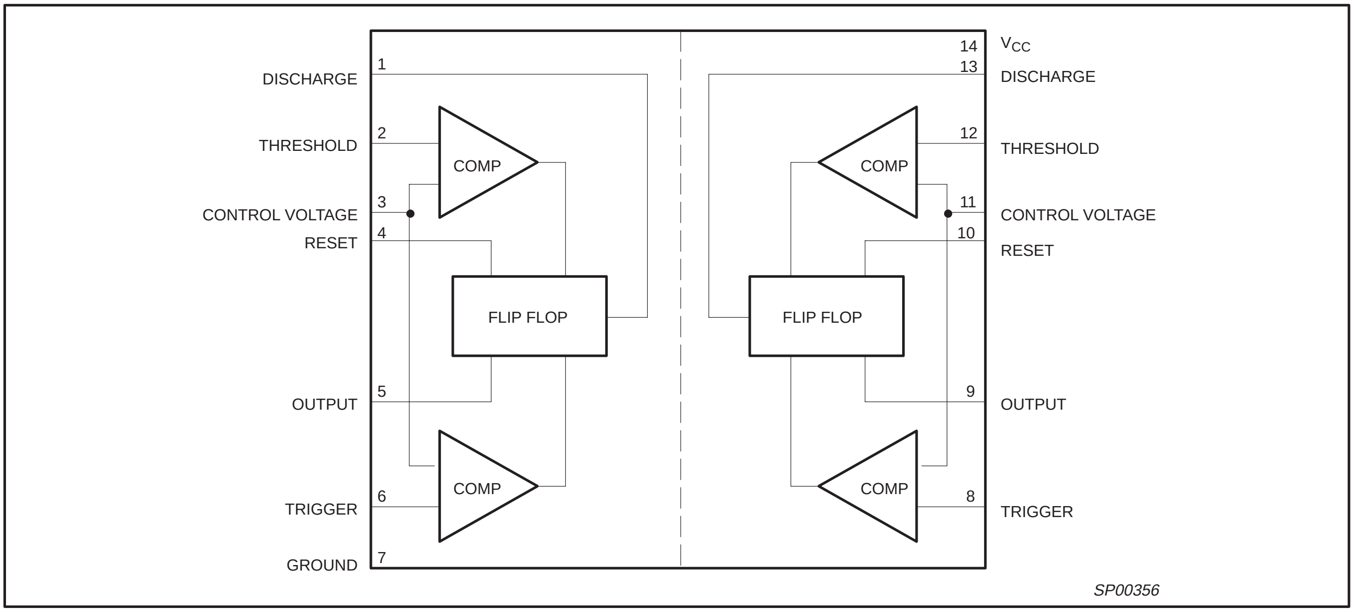


Figure 2. Block Diagram

EQUIVALENT SCHEMATIC (Shown for one circuit only)

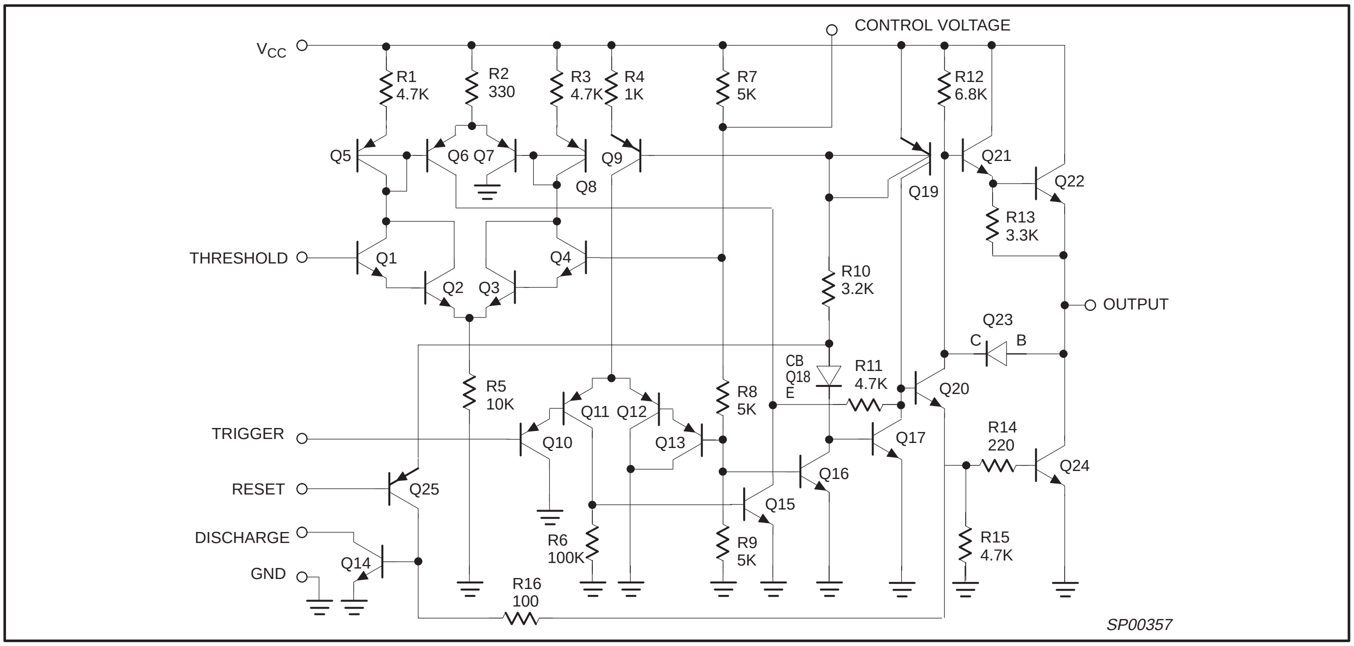


Figure 3. Equivalent Schematic

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 NE556 SA556	 0 to +70 -40 to +85	 °C °C
T_{stg}	Storage temperature range	-65 to +150	°C
T_{SOLD}	Lead soldering temperature (10 sec max)	+230	°C

NOTE:
1. 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

ELECTRICAL CHARACTERISTICS

T_{amb} = 25 °C, V_{CC} = +5 V to +15 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 V, $R_L = \infty$ V_{CC} = 15 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 = 2k Ω to 100 kΩ C = 0.1 μF T = 1.1 RC		 0.75 50 0.1	 3.0 150 0.5	 % ppm/°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 kΩ to 100 kΩ C = 0. μF V_{CC} = 15 V		 5 400 0.3	 13 500 1	 % ppm/°C %/V
V_C	Control voltage level	V_{CC} = 15 V V_{CC} = 5 V	9.0 2.6	10.0 3.33	11.0 4.0	V
V_{TH}	Threshold voltage	V_{CC} = 15 V V_{CC} = 5 V	8.8 2.4	10.0 3.33	11.2 4.2	V V
I_{TH}	Threshold current[3]	V_{CC} = 15 V, V_{TH} = 10.5 V		30	250	nA
V_{TRIG}	Trigger voltage	V_{CC} = 15 V V_{CC} = 5 V	4.5 1.1	5.0 1.67	5.6 2.2	V V
I_{TRIG}	Trigger current	V_{TRIG} = 0 V		0.5	2.0	μA
V_{RESET}	Reset voltage[5]		0.4	0.7	1.0	V
	Reset current	V_{RESET} = 0.4 V	0.4	0.1	0.6	mA
I_{RESET}	Reset current	V_{RESET} = 0 V		0.4	1.5	mA
V_{OL}	Output voltage (low)	V_{CC} = 15 V I_{SINK} = 10 mA I_{SINK} = 50 mA I_{SINK} = 100 mA I_{SINK} = 200 mA		 0.1 0.4 2.0 2.5	 0.25 0.75 3.2	V
		V_{CC} = 5 V I_{SINK} = 8 mA I_{SINK} = 5 mA		 0.25 0.15	 0.3 0.25	V
V_{OH}	Output voltage (high)	V_{CC} = 15 V I_{SOURCE} = 200 mA I_{SOURCE} = 100 mA	 12.75	 12.5 13.3		V
		V_{CC} = 5 V I_{SOURCE} = 100 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/°C %/V

NOTES:
1. Supply current when output is high is typically 1.0 mA less.
2. Tested at V_{CC} = 5 V and V_{CC} = 15 V.
3. This will determine maximum value of R_A+R_B. For 15 V operation, the max total R = 10 MΩ, and for 5 V operation, the maximum total R = 3.4 MΩ.
4. Matching characteristics refer to the difference between performance characteristics for each timer section in the monostable mode.
5. 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.
6. 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.

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 μF 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 $1.1R_2C_2$.

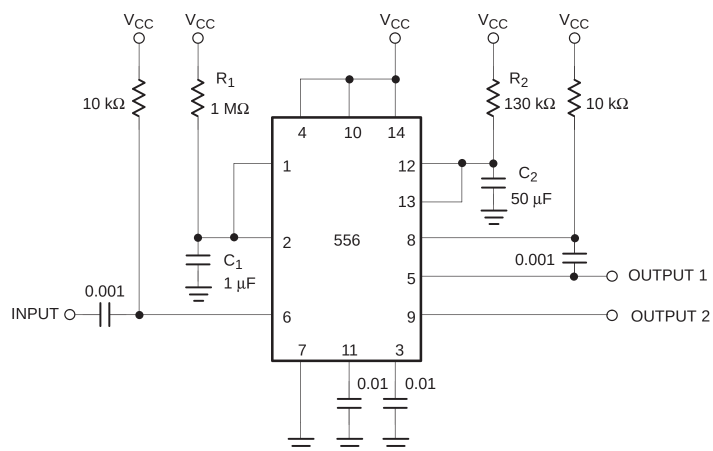


Figure 4. Sequential Timer

TYPICAL PERFORMANCE CHARACTERISTICS

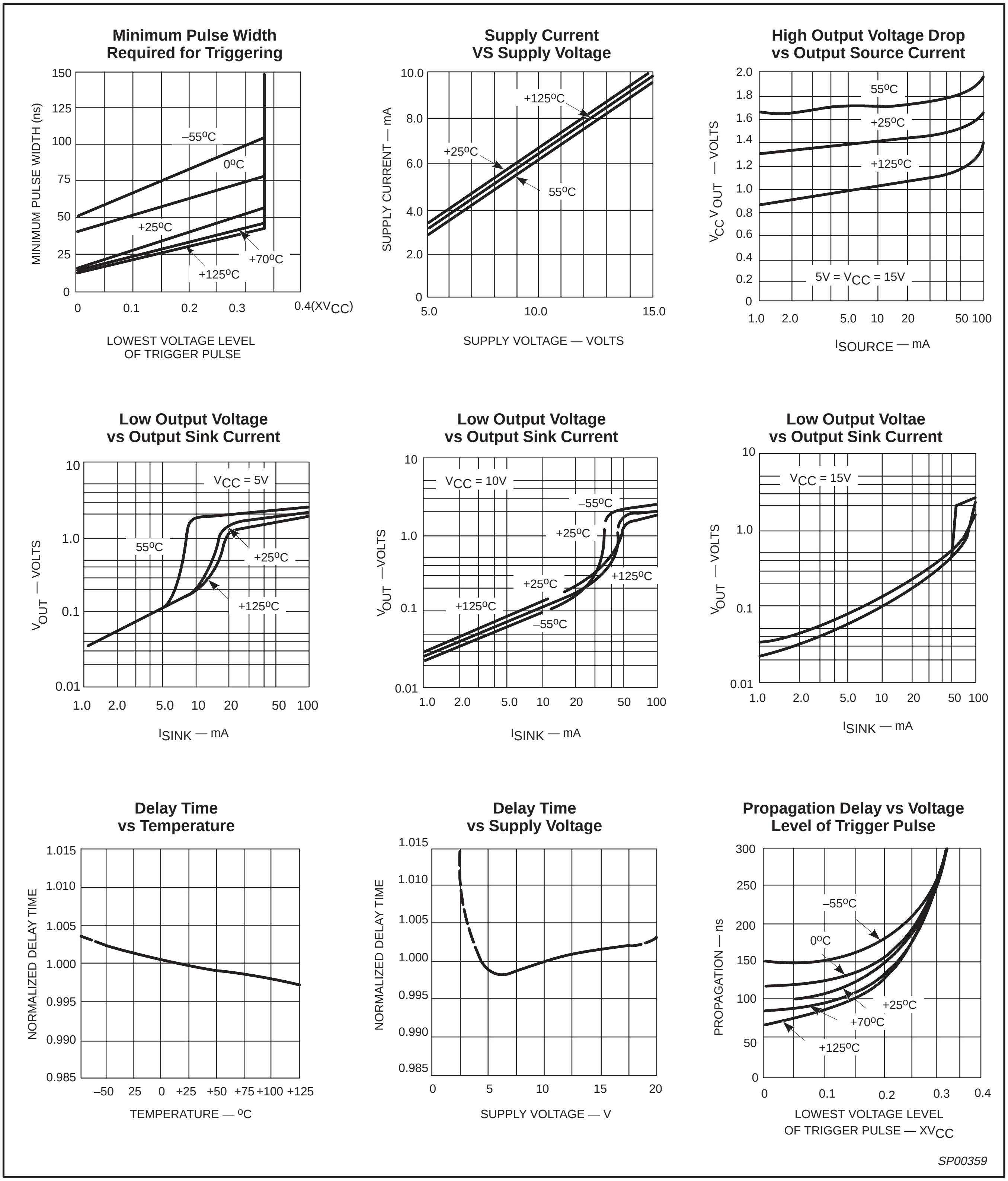
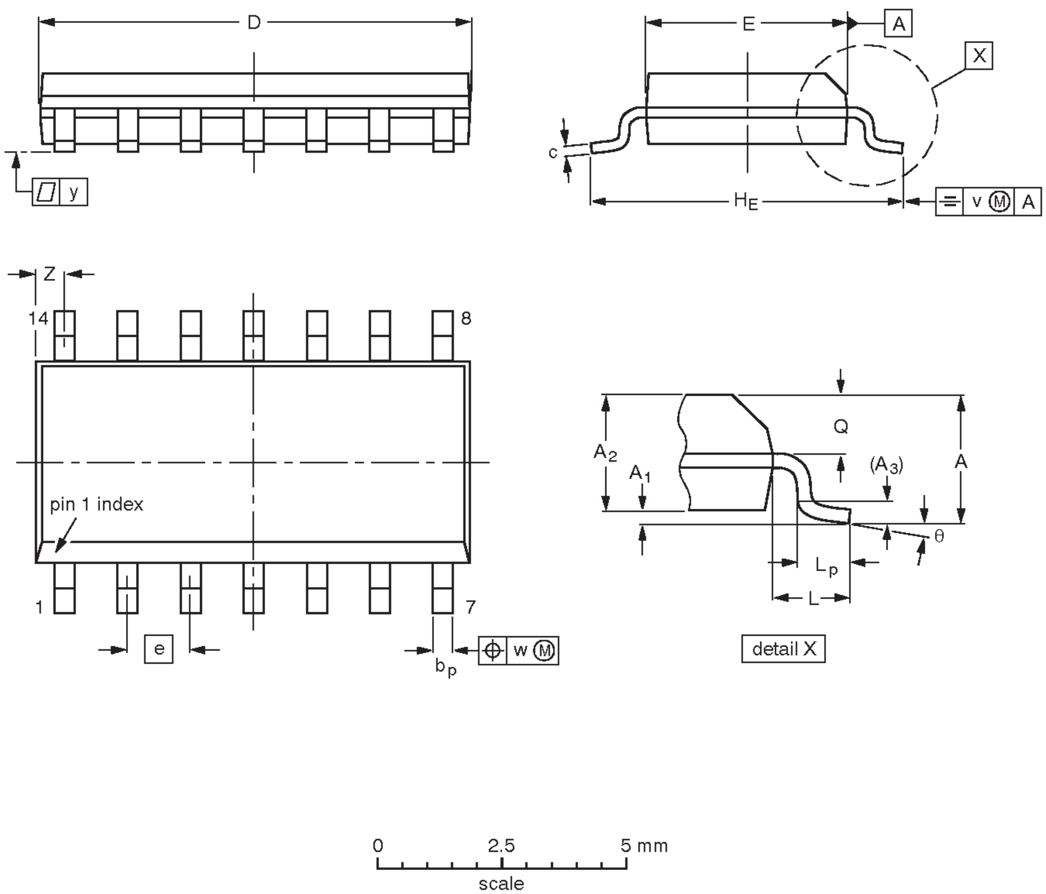


Figure 5. Typical Performance Characteristics

SO14: plastic small outline package; 14 leads; body width 3.9 mm SOT108-1

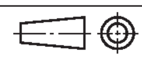


DIMENSIONS (inch dimensions are derived from the original mm dimensions)

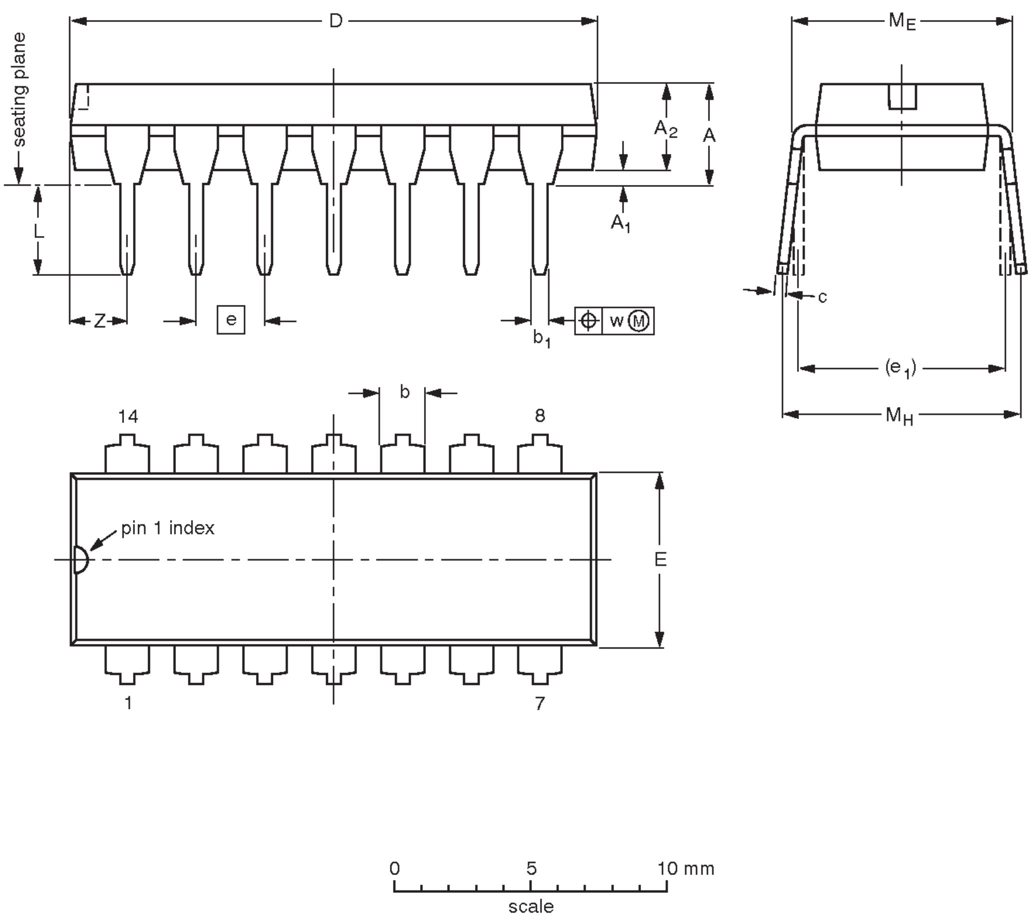
UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	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

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

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Data sheet status [1]	Product status [2]	Definitions
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