

MJLM555-X REV 1A0

 Original Creation Date: 08/02/95
 Last Update Date: 03/16/01
 Last Major Revision Date: 02/22/01

PRECISION TIMER
General Description

The LM555 is a highly stable device for generating accurate time delays or oscillation. Additional terminals are provided for triggering or resetting if desired. In the time delay mode of operation, the time is precisely controlled by one external resistor and capacitor. For astable operation as an oscillator, the free running frequency and duty cycle are accurately controlled with two external resistors and one capacitor. The circuit may be triggered and reset on falling waveforms, and the output circuit can source or sink up to 200mA or drive TTL circuits.

Industry Part Number

LM555

Prime Die

LM7555

NS Part Numbers

 JL555BGA
 JL555BPA
 JL555SGA
 JL555SPA

Controlling Document

38510/10901, AMEND. 3 REV A

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Direct replacement for SE555/NE555
- Timing from microseconds through hours
- Operates in both astable and monostable modes
- Adjustable duty cycle
- Output can source or sink 200mA
- Output and supply TTL compatible
- Temperature stability better than 0.005% per degrees C
- Normally on and normally off output

Applications

- Precision timing
- Pulse generation
- Sequential timing
- Time delay generation
- Pulse width modulation
- Pulse position modulation
- Linear ramp generator

(Absolute Maximum Ratings)

(Note 1)

Supply Voltage	+18V
Discharge Current	+200mA
Output Sink Current	+200mA
Output Source Current	-200mA
Power Dissipation (Note 2)	
LM555H	300mW at 125 C
LM555J	370mW at 125 C
Operating Temperature Range	-55 C to +125 C
Maximum Junction Temperature	175 C
Storage Temperature Range	-65 C ≤ Ta ≤ +150 C
Soldering Information (Soldering, 10 seconds)	300 C
Thermal Resistance	
ThetaJA	
METAL CAN (Still Air)	171 C/W
(500LF/Min Air flow)	92 C/W
CERDIP (Still Air)	123 C/W
(500LF/Min Air flow)	69 C/W
ThetaJC	
METAL CAN	41 C/W
CERDIP	18 C/W
ESD Tolerance (Note 3)	1000V

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. 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.

Note 2: The maximum power dissipation must be derated at elevated temperatures and is dictated by Tjmax (maximum junction temperature), ThetaJA (package junction to ambient thermal resistance), and TA (ambient temperature). The maximum allowable power dissipation at any temperature is $P_{dmax} = (T_{jmax} - T_A) / \Theta_{JA}$ or the number given in the Absolute Maximum Ratings, whichever is lower.

Note 3: Human body model, 1.5K Ohms in series with 100pF.

Recommended Operating Conditions

Supply Voltage Range

+4.5V to +16.5Vdc

Electrical Characteristics

DC PARAMETERS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Icc	Power Supply Current	Vcc = 4.5V				5	mA	1, 2, 3
		Vcc = 16.5V				20	mA	1, 2, 3
Vtr	Trigger Voltage	Vcc = 4.5V			1.3	1.8	V	1
					1.3	2.1	V	2
					1.15	1.8	V	3
		Vcc = 16.5V			5.2	5.8	V	1
					5.2	6.1	V	2
					5	5.8	V	3
Itr	Trigger Current	Vcc = 16.5V			-5		uA	1, 2, 3
Vth	Threshold Voltage	Vcc = 4.5V			2.7	3.3	V	1
					2.6	3.4	V	2, 3
		Vcc = 16.5V			10.7	11.3	V	1
					10.6	11.4	V	2, 3
Ith	Threshold Current	Vcc = 16.5V				250	nA	1, 2
						2500	nA	3
Vol	Logical "0" Output Voltage	Vcc = 4.5V, Isink = 5mA				0.25	V	1
						0.35	V	2, 3
		Vcc = 4.5V, Isink = 50mA				2.2	V	1, 2
						2.6	V	3
		Vcc = 16.5V, Isink = 10mA				0.15	V	1, 3
						0.25	V	2
		Vcc = 16.5V, Isink = 50mA				0.5	V	1, 3
						0.7	V	2
Voh	Logical "1" Output Voltage	Vcc = 4.5V, Isource = -100mA			2.6		V	1, 2
					2.2		V	3
		Vcc = 16.5V, Isource = -100mA			14.6		V	1, 2
					14		V	3

Electrical Characteristics

DC PARAMETERS(Continued)

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
I _{cex}	Discharge Transistor Leakage Current	V _{cc} = 16.5V				100	nA	1, 3
						3000	nA	2
V _{sat}	Discharge Transistor Saturation Voltage	V _{cc} = 16.5V				0.8	V	1, 3
						1	V	2
V _r	Reset Voltage	V _{cc} = 16.5V	1, 2		0.1	1.3	V	1, 2, 3
I _r	Reset Current	V _{cc} = 16.5V			-1.6		mA	1, 2, 3

AC PARAMETERS

t _{PLH}	Propagation Delay Time	V _{cc} = 4.5V				800	nS	9, 11
						900	nS	10
		V _{cc} = 16.5V				800	nS	9, 11
						900	nS	10
t _{PHL}	Propagation Delay Time	V _{cc} = 4.5V				12	uS	9, 10, 11
		V _{cc} = 16.5V				12	uS	9, 10, 11
t _{TLH}	Transition Time	V _{cc} = 4.5V				300	nS	9, 10, 11
		V _{cc} = 16.5V				300	nS	9, 10, 11
t _{THL}	Transition Time	V _{cc} = 4.5V				300	nS	9, 10, 11
		V _{cc} = 16.5V				300	nS	9, 10, 11
t _{D(OH)}	Time Delay Output High	V _{cc} = 4.5V			106.7	113.3	uS	9, 10, 11
		V _{cc} = 16.5V			106.7	113.3	uS	9, 10, 11
		V _{cc} =4.5V			10.67	11.33	mS	9, 10, 11
		V _{cc} =16.5V			10.67	11.33	mS	9, 10, 11
Delta t _D / Delta V _{cc}	Drift In Time Delay	Delta V _{cc} = 12, V _{cc} = 4.5V to 16.5V			-220	220	nS/V	9

Electrical Characteristics

AC PARAMETERS(Continued)

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Delta tD/ Delta T	Temperature Coefficient of Time Delay	Vcc = 16.5V	3		-11	11	nS/C	10, 11
tCH	Capacitor Charge Time	Vcc = 4.5V			120	156	uS	9, 10, 11
		Vcc = 16.5V			120	156	uS	9, 10, 11
		Vcc=4.5V			11.3	15	mS	9, 10, 11
		Vcc=16.5V			11.3	15	mS	9, 10, 11
tDIS	Capacitor Discharge Time	Vcc = 4.5V			57.5	80	uS	9, 10, 11
		Vcc = 16.5V			57.5	80	uS	9, 10, 11
		Vcc=4.5V			5.4	7.7	mS	9, 10, 11
		Vcc=16.5V			5.4	7.7	mS	9, 10, 11
Delta tCH/ Delta Vcc	Drift In Capacitor Charge Time	Delta Vcc = 12, Vcc = 4.5V to 16.5V			-820	820	nS/V	9
Delta tCH/ Delta T	Temperature Coefficient Capacitor Charge Time	Vcc = 16.5V	3		-68	68	nS/C	10, 11
tRES	Reset Time	Vcc = 16.5V				1.5	uS	9, 11
						2	uS	10

DC PARAMETERS: DRIFT VALUES

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: "Delta calculations performed on JAN S and QMLV devices at group B, subgroup 5 only".

Vtr	Trigger Voltage	Vcc = 16.5V			-0.05	0.05	V	1
Vth	Threshold Voltage	Vcc = 16.5V			-0.05	0.05	V	1
Vol	Logical "0" Output Voltage	Vcc = 16.5V, Isink = 10mA			-0.05	0.05	V	1
Icex	Discharge Transistor Leakage Current	Vcc = 16.5V			-50	50	nA	1

Note 1: Parameter tested go-no-go only.

Note 2: Datalog reading of 0.7V will reflect the Reset Voltage levels passing and a reading of 0.05V or 1.5V reflects the Reset Voltage levels failing the low level or high level respectfully.

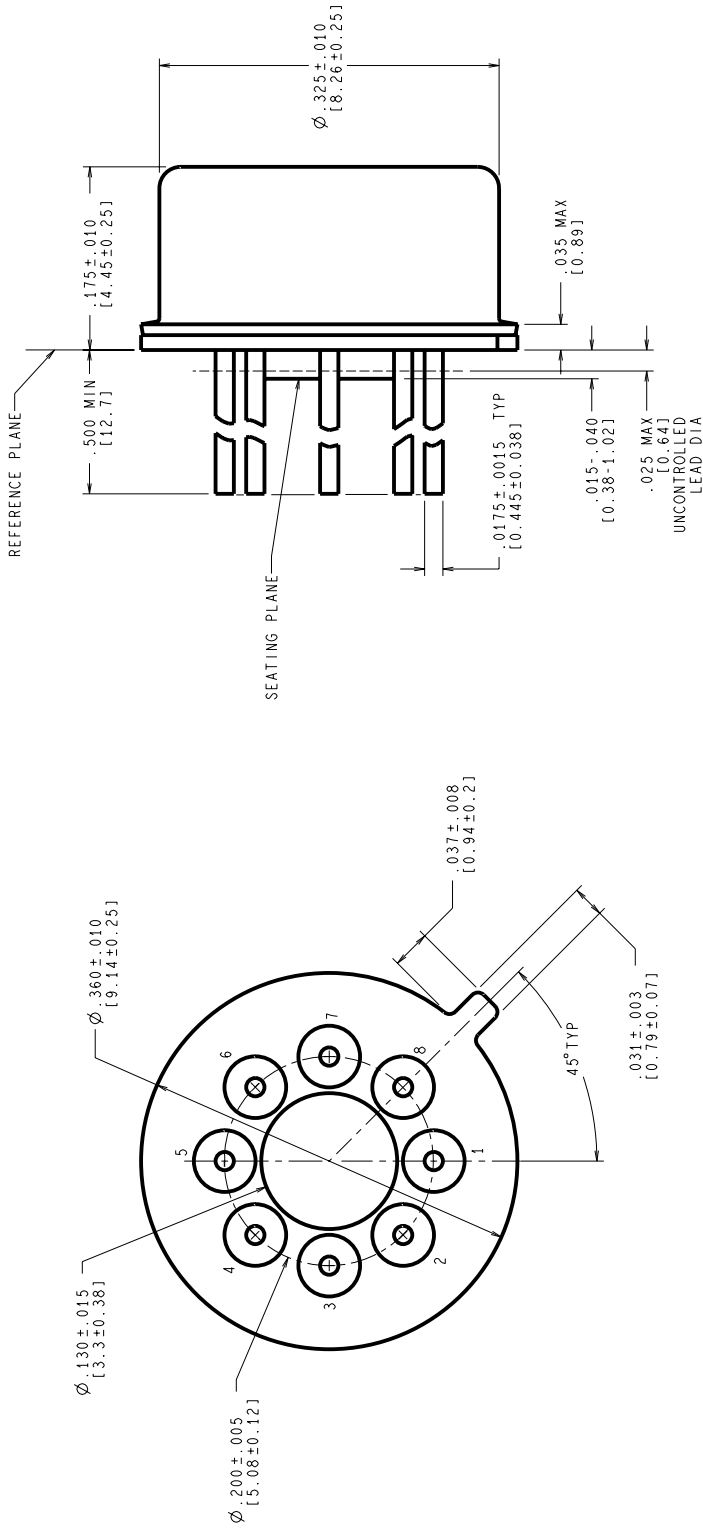
Note 3: Calculated parameter.

Graphics and Diagrams

GRAPHICS#	DESCRIPTION
05543HRA2	METAL CAN (H), TO-99, 8LD, .200 DIA P.C. (B/I CKT)
05747HRA2	CERDIP (J), 8 LEAD (B/I CKT)
H08CRF	METAL CAN (H), TO-99, 8LD, .200 DIA P.C. (P/P DWG)
J08ARL	CERDIP (J), 8 LEAD (P/P DWG)
P000368A	METAL CAN (H), TO-99, 8LD, .200 DIA P.C. (PINOUT)
P000369A	CERDIP (J), 8 LEAD (PINOUT)

See attached graphics following this page.

REVISIONS			
LTR	DESCRIPTION	E.C.N.	DATE
F	REVISE & REDRAW PER CURRENT STANDARD; UPDATE MIL/AERO STAMP & TITLE.	11002	06/22/95
			MS/



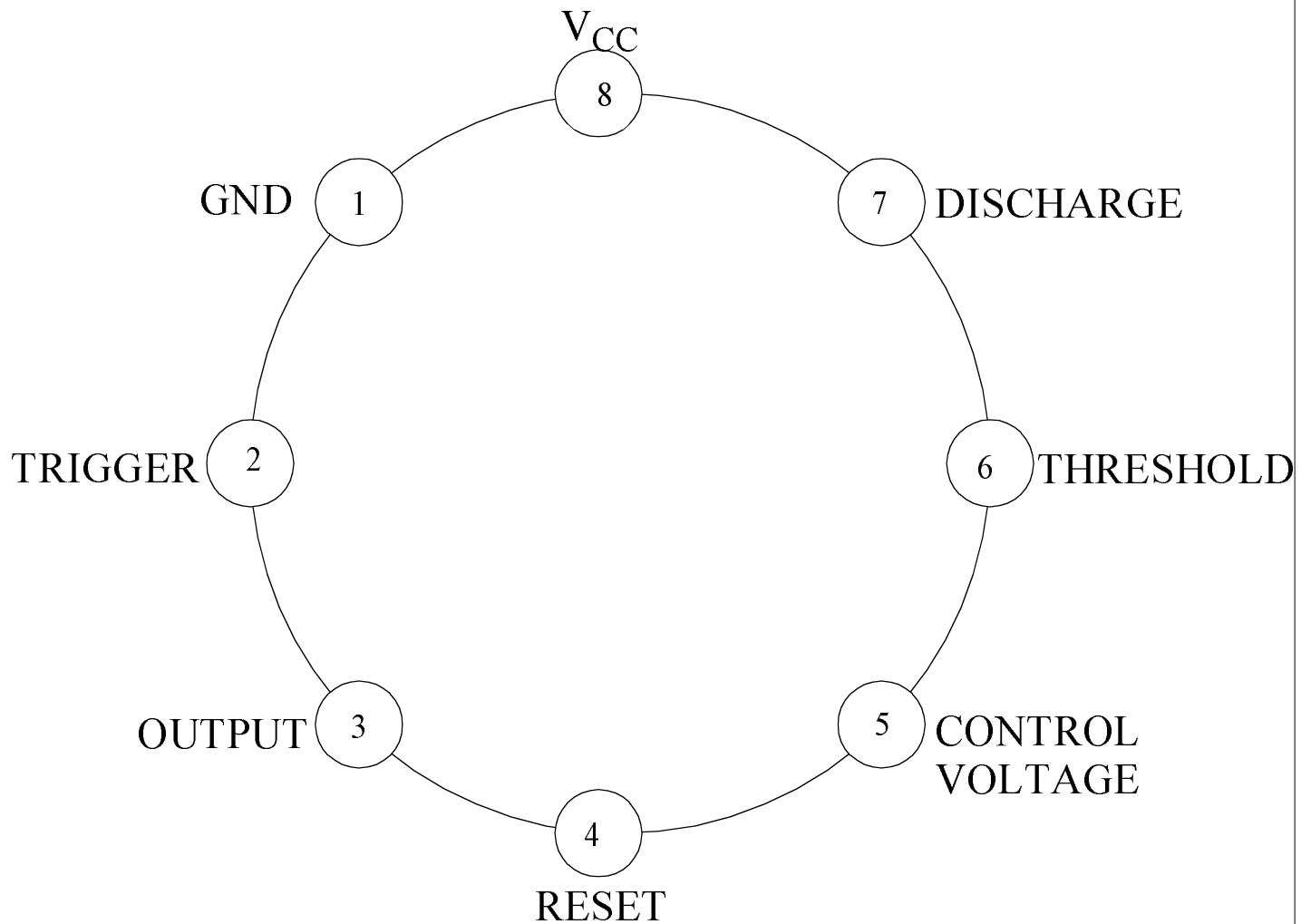
CONTROLLING DIMENSION IS INCH
VALUES IN [] ARE MILLIMETERS

MIL-I-38535
CONFIGURATION CONTROL

NOTES: UNLESS OTHERWISE SPECIFIED

- LEADS TO BE LOCATED WITHIN .007 IN/ 0.18 mm OF THEIR TRUE POSITIONS RELATIVE TO A MAXIMUM WIDTH TAB.
- STANDARD METAL CAN TYPE: SOLID BASE WITH CERAMIC STANDOFF.
- APPLIES TO MIL-AERO AND LINEAR PRODUCTS.
- REFERENCE JEDEC REGISTRATION TO-99, JEDEC PUBLICATION No.95.

APPROVALS		DATE	National Semiconductor	
DESIGN	MARIA SUCHY	06/22/95	2000 Semiconductor dr., Santa Clara, CA 95052-8000	
DATE	CHK.			
DATE	CHK.			
PROJECTION				
SCALE	N/A	C	SIZE	MKT-H08C
DRAWING NUMBER			REV	F
DO NOT SCALE DRAWING			SHEET 1 of 1	



LM555H
8 - PIN METAL CAN
CONNECTION DIAGRAM
TOP VIEW
P000368A



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MIL/AEROSPACE OPERATIONS
2900 SEMICONDUCTOR DRIVE
SANTA CLARA, CA 95050



LM555J

8 - LEAD DIP

CONNECTION DIAGRAM

TOP VIEW

P000369A



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2900 SEMICONDUCTOR DRIVE
SANTA CLARA, CA 95050

Revision History

Rev	ECN #	Rel Date	Originator	Changes
1A0	M0003787	03/16/01	Rose Malone	Update MDS: MJLM555-X, Rev. 0B0 to MJLM555-X, Rev. 1A0. Deleted parameter Pd in DC Parameter Electrical Section and Note 4. Added Pin Out drawings and B/I Ckts to Graphics Section.