NEC
ELECTRON DEVICE

MOS INTEGRATED CIRCUIT
μPD5555

CMOS TIMER

Description

The μPD5555 is a CMOS RC timer providing significantly improved performance over the standard bipolar 555 timer, while at the same time being direct replacement for that device in most applications. Improved parameters include low supply current, wide operating supply voltage range, THRESHOLD, TRIGGER and RESET currents as low as 2 pA, no crowbarring of the power supply during output transitions, higher frequency performance, and no requirement to decouple control voltage for stable operation.

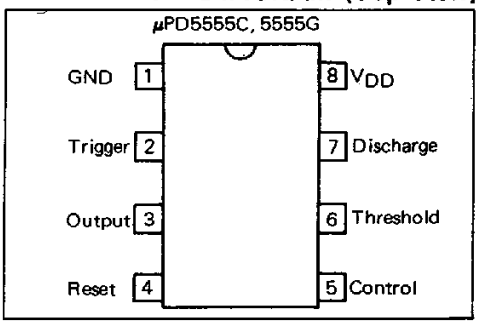
Specifically, the μPD5555 is stable controller capable of producing accurate time delays or frequencies.

In the one-shot mode, the pulse width of each circuit is precisely controlled by one external resistor and capacitor. For astable operation as an oscillator, the free running frequency and the duty cycle are controlled by two external resistors and one capacitor. The circuits can source or sink current large enough to drive TTL loads or provide minimal offsets to drive CMOS loads.

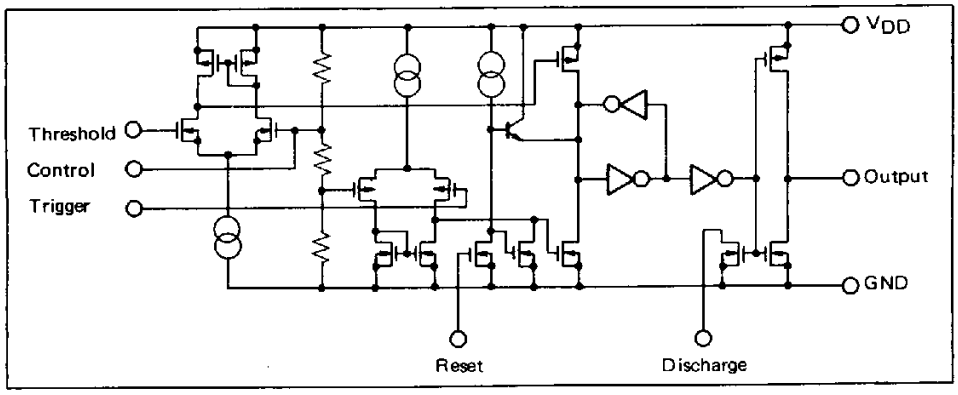
Features

- Exact equivalent in most cases for industry standard 555 timer
- Low supply current
- 3 to 16 V operating voltage range
- Timing from microseconds through hours

CONNECTION DIAGRAM (Top View)



EQUIVALENT CIRCUIT



ORDERING INFORMATION

Part Number	Package
μPD5555C	8 PIN PLASTIC DIP (300 mil)
μPD5555G2	8 PIN PLASTIC SOP (225 mil)

ABSOLUTE MAXIMUM RATINGS (T_a=25 °C)

PARAMETER		SYMBOL	μPD5555	UNIT
Supply Voltage		V_{DD}	18	V
Input Voltage (Trigger, Threshold, Reset, Control)		V_{IN}	$GND - 0.3 \leqq V_{IN} \leqq V_{DD} + 0.3$	V
Output Current		I_O	100	mA
Operating Temperature Range		T_{opt}	−20 ~ +70	°C
Storage Temperature Range		T_{stg}	−55 ~ +125	°C
Power Dissipation	C Package (Note 1)	P_T	350	mW
	G Package (Note 2)		440	

Note 1: Thermal derating factor is −5 mW/°C when ambient temperature is higher than 55 °C.

Note 2: Thermal derating factor is −4.4 mW/°C when ambient temperature is higher than 25 °C.

RECOMMENDED OPERATING CONDITIONS

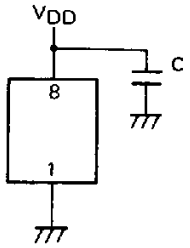
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Oscillation Frequency				500	kHz
Supply Voltage	V_{DD}	3		16	V
Input Voltage	V_{IN}	0		V_{DD}	V
Output Sink Current	$I_{O\ SINK}$			3.2	mA
Output Source Current	$I_{O\ SOURCE}$			1	mA
Operating Temperature	T_{opt}	−20		70	°C

3-5

ELECTRICAL CHARACTERISTICS (T_a=25 °C, V_{DD} =+3~+15 V)

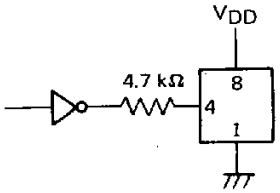
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Supply Current	I_{DD}		115	250	μA	V_{DD}=5 V
			150	350		V_{DD}=15 V
Threshold Voltage	V_{th}		2/3 V_{DD}		V	
Threshold Current	I_{th}		50		pA	V_{DD}=15 V
			10			V_{DD}=5 V
			1			V_{DD}=3 V
Trigger Voltage	V_{tr}		1/3 V_{DD}		V	
Trigger Current	I_{tr}		50		pA	V_{DD}=15 V
			10			V_{DD}=5 V
			1			V_{DD}=3 V
Reset Voltage (V_O becoms low)	V_{reset}	0.6	1.1	2.0	V	V_{DD}=15 V
		0.6	1.1	2.0		V_{DD}=3 V
Reset Current	I_{reset}		100		pA	V_{RESET}=GND, V_{DD}=15 V
			20			V_{RESET}=GND, V_{DD}=5 V
			2			V_{RESET}=GND, V_{DD}=3 V
Output Low Voltage	V_{OL}		0.06	0.4	V	V_{DD}=15 V, I_{SINK}=3.2 mA
			0.14	0.4		V_{DD}=5 V, I_{SINK}=3.2 mA
Output High Voltage	V_{OH}	14.25	14.85		V	V_{DD}=15 V, I_{SOURCE}=1 mA
		4.0	4.7			V_{DD}=5 V, I_{SOURCE}=1 mA
Output Rise Time	t_{rise}		40		ns	R_L=10 MΩ, C_L=7 pF, V_{DD}=5 V
Output Fall Time	t_{fall}		40		ns	R_L=10 MΩ, C_L=7 pF, V_{DD}=5 V
Max. Oscillation Frequency		500			kHz	Astable Operation
Propagation Delay	t_{pd}		350		ns	Monostable Operation Trigger Level = 0.1 : V_{DD}
Minimum Trigger Pulse Width (V_{DD}=5 V)	t_{tr}		160		ns	Trigger Level = 0.1 · V_{DD}
Control Voltage	V_{cont}		2/3 V_{DD}		V	
Timing Error Initial Accuracy			2		%	R_1, R_2=1 k~100 kΩ C=0.1 μF V_{DD}=5~15 V
Temperature Drift			50		ppm/°C	
Supply Voltage Drift			1		%/V	

Note 1: To reduce transient switching noise on the supply voltage line, install a bypass capacitor from V_{DD} to ground. Connect the capacitor, with value listed below, close to V_{DD}.



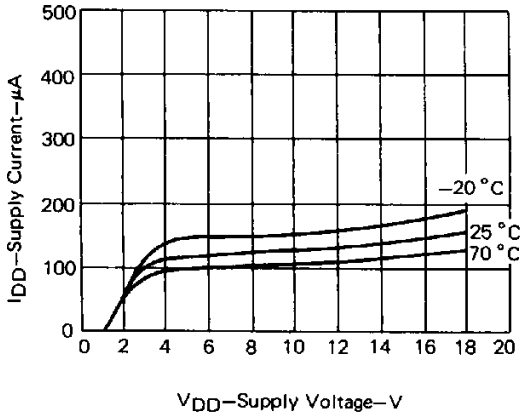
Capacitance C≧0.047 μF V_{DD}≦10 V
C≧0.1 μF V_{DD}>10 V

Note 2: Install a series resistor (R≧4.7 kΩ) to Reset, when reset is controled by digital devices.

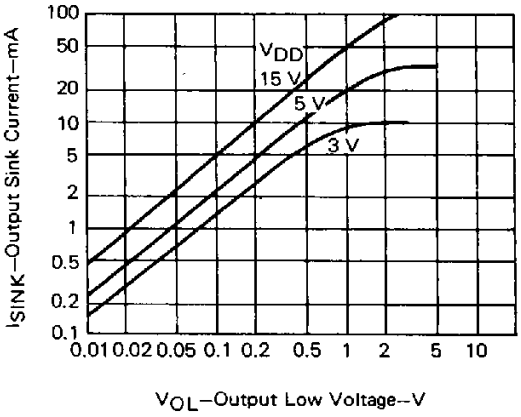


TYPICAL PERFORMANCE CHARACTERISTICS (T_a=25 °C)

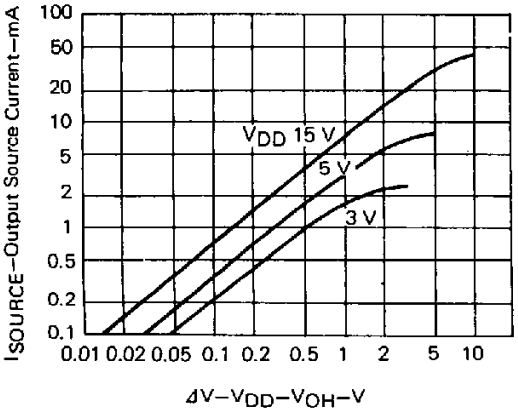
SUPPLY CURRENT



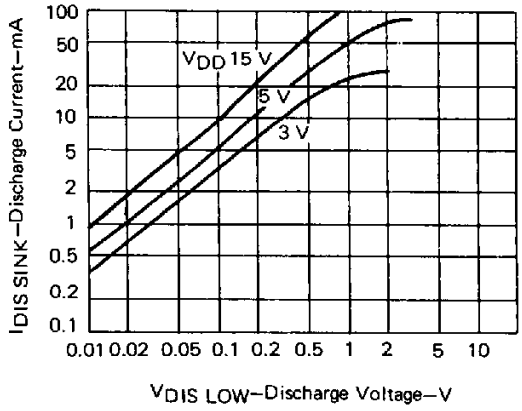
OUTPUT SINK CURRENT



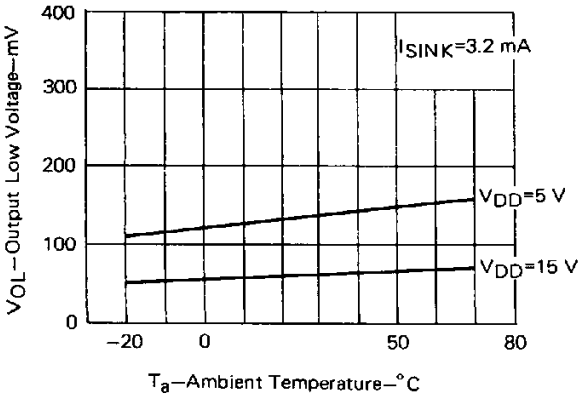
OUTPUT SOURCE CURRENT



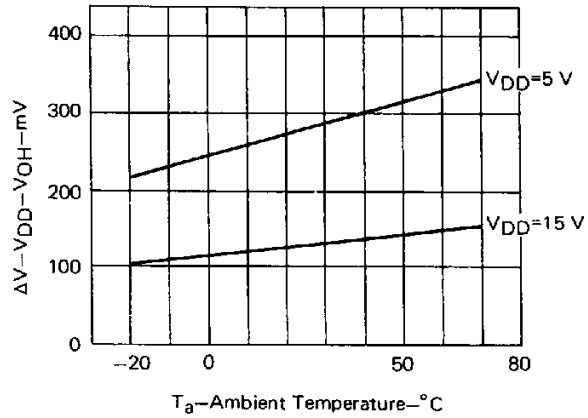
DISCHARGE CURRENT



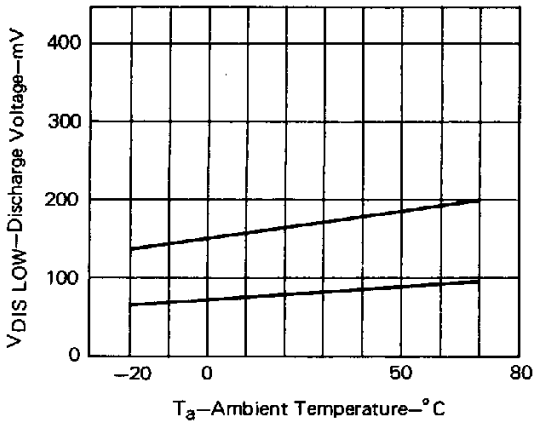
OUTPUT LOW VOLTAGE



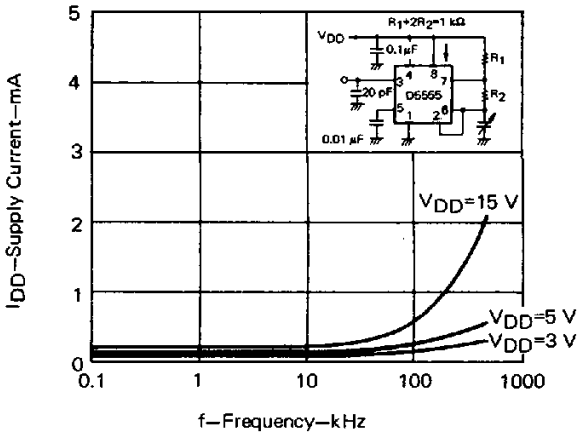
V_{DD}-OUTPUT HIGH VOLTAGE



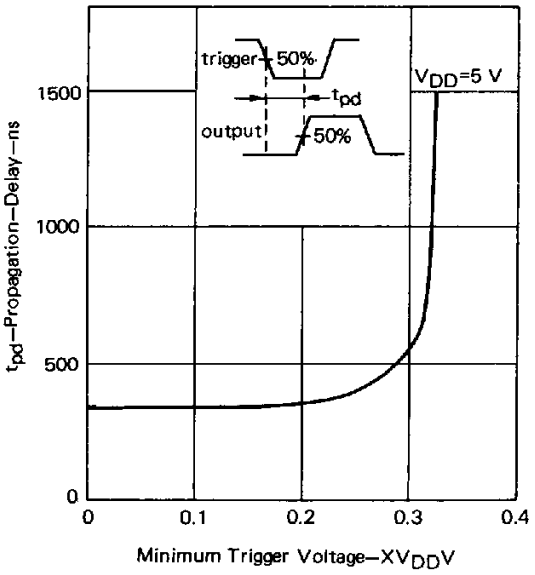
DISCHARGE VOLTAGE



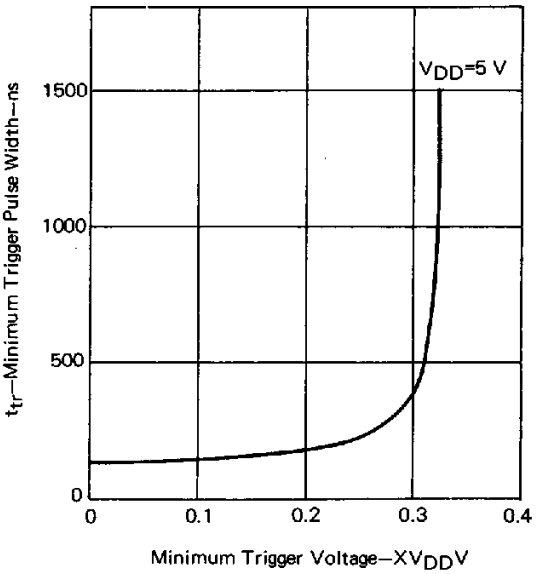
DYNAMIC CURRENT



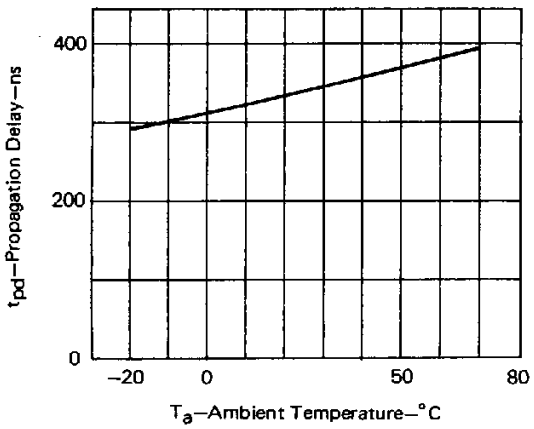
PROPAGATION DELAY



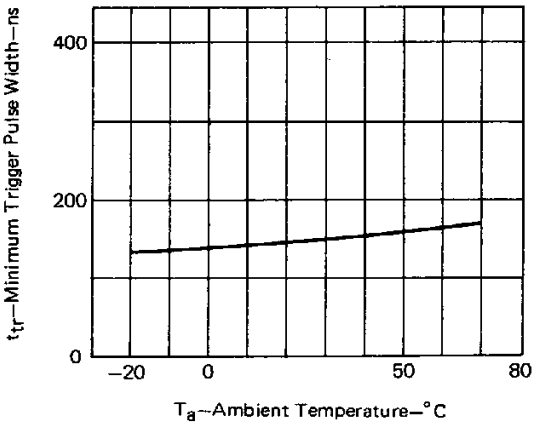
MINIMUM TRIGGER PULSE WIDTH



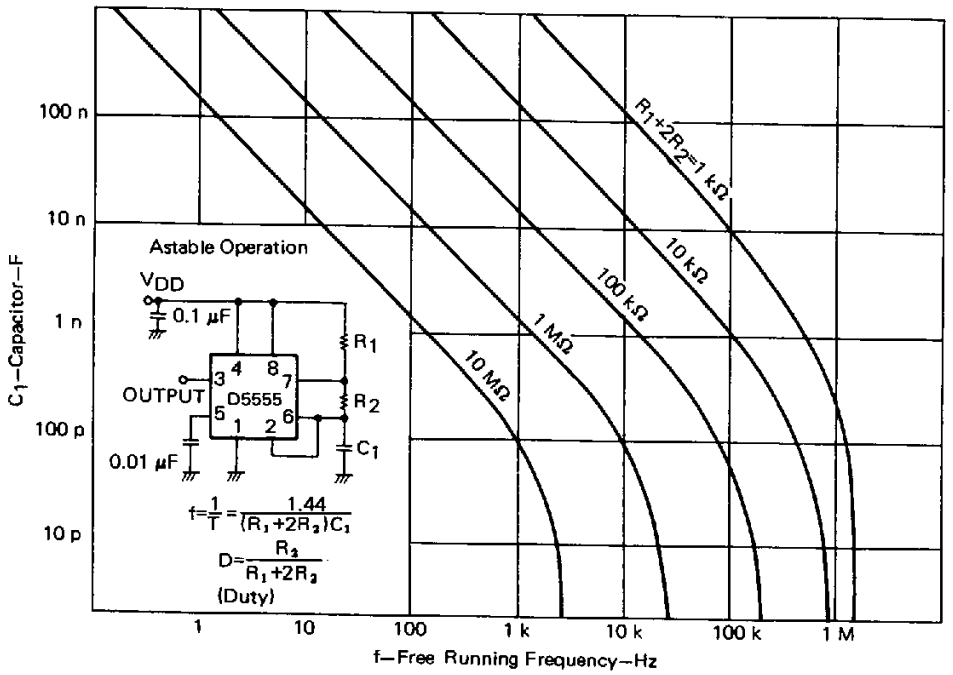
PROPAGATION DELAY



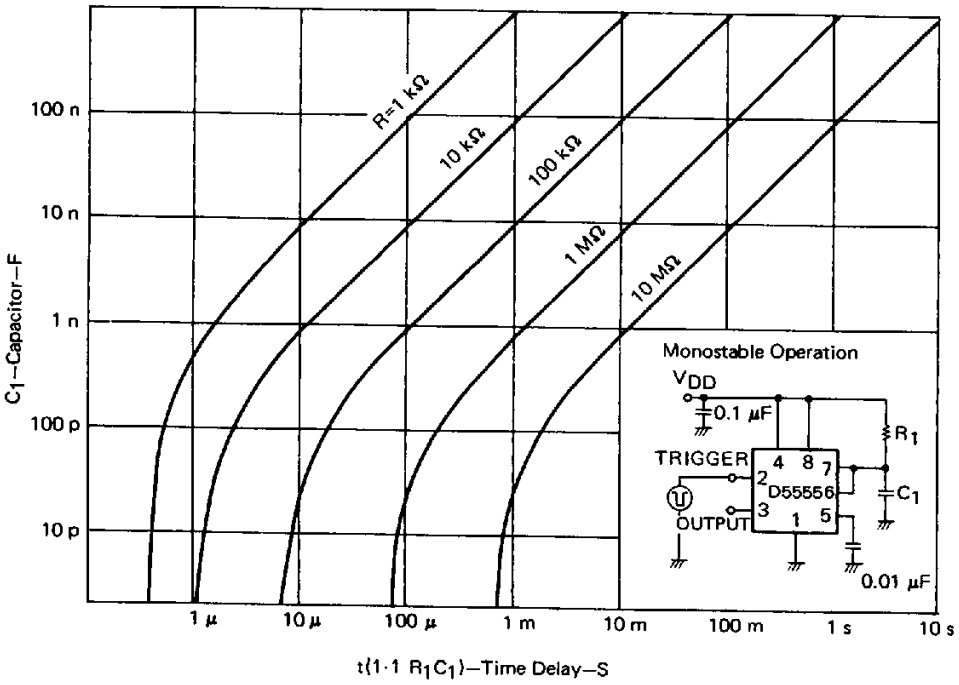
MINIMUM TRIGGER PULSE WIDTH



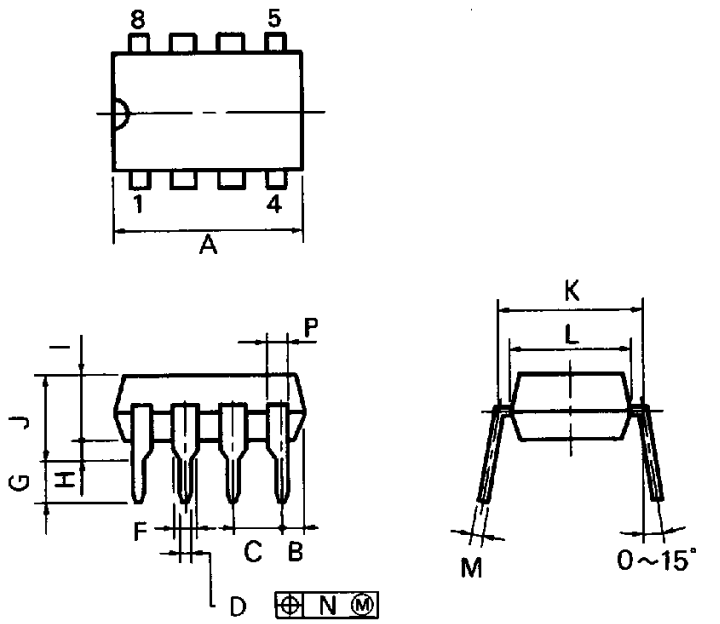
FREE RUNNING FREQUENCY



TIME DELAY



8PIN PLASTIC DIP (300 mil)



P8C-100-300B,C

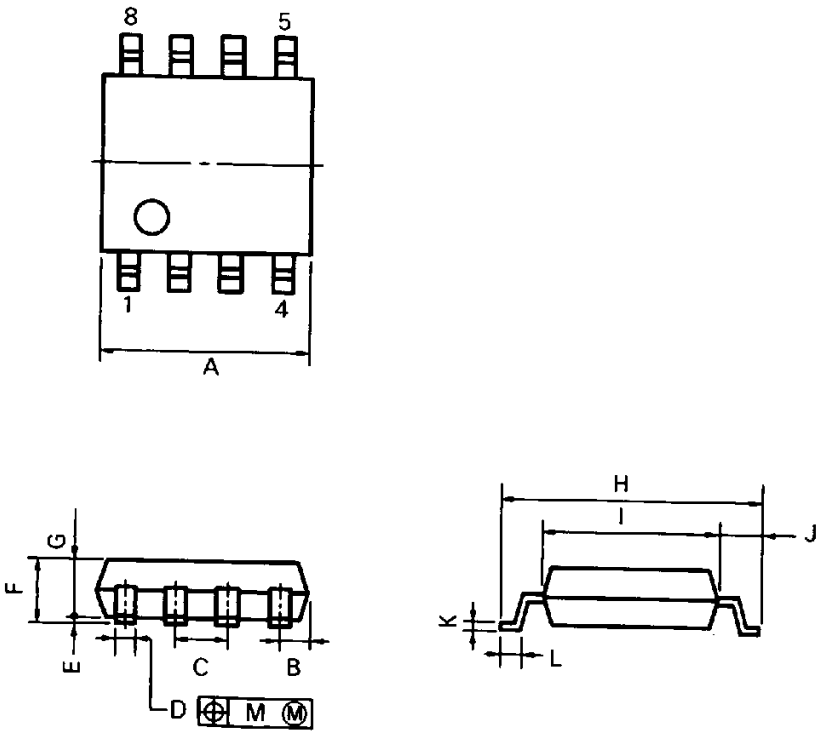
NOTES

1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

2) Item "K" to center of leads when formed parallel.

ITEM	MILLIMETERS	INCHES
A	10.16 MAX.	0.400 MAX.
B	1.27 MAX.	0.050 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
D	$0.50^{\pm 0.10}$	$0.020^{+0.004}_{-0.005}$
F	1.4 MIN.	0.055 MIN.
G	$3.2^{\pm 0.3}$	$0.126^{\pm 0.012}$
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.08 MAX.	0.200 MAX.
K	7.62 (T.P.)	0.300 (T.P.)
L	6.4	0.252
M	$0.25^{+0.10}_{-0.05}$	$0.010^{+0.004}_{-0.003}$
N	0.25	0.01
P	0.9 MIN.	0.035 MIN.

8PIN PLASTIC SOP (225 mil)



S8GM-50-225B

NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	5.70 MAX.	0.225 MAX.
B	0.94 MAX.	0.037 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	$0.40^{+0.10}_{-0.05}$	$0.016^{+0.004}_{-0.003}$
E	0.1 ± 0.1	0.004 ± 0.004
F	1.8 MAX.	0.071 MAX.
G	1.49	0.059
H	6.5 ± 0.3	0.256 ± 0.012
I	4.4	0.173
J	1.1	0.043
K	$0.15^{+0.10}_{-0.05}$	$0.006^{+0.004}_{-0.002}$
L	0.6 ± 0.2	$0.024^{+0.008}_{-0.009}$
M	0.12	0.005

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