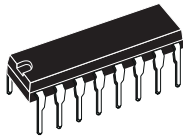
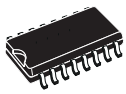
HCF4018B

PRESETTABLE DIVIDE-BY-N COUNTER

- MEDIUM SPEED OPERATION 10 MHz (Typ.) at V_{DD} - V_{SS}= 10V
- FULLY STATIC OPERATION
- STANDARDIZED SYMMETRICAL OUTPUT CHARACTERISTICS
- QUIESCENT CURRENT SPECIFIED UP TO 20V
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT LEAKAGE CURRENT I_I = 100nA (MAX) AT V_{DD} = 18V T_A = 25°C
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC JESD13B " STANDARD SPECIFICATIONS FOR DESCRIPTION OF B SERIES CMOS DEVICES"



DIP



SOP

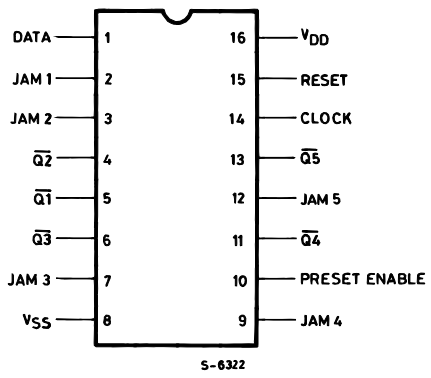
ORDER CODES

PACKAGE	TUBE	T & R
DIP	HCF4018BEY	
SOP	HCF4018BM1	HCF4018M013TR

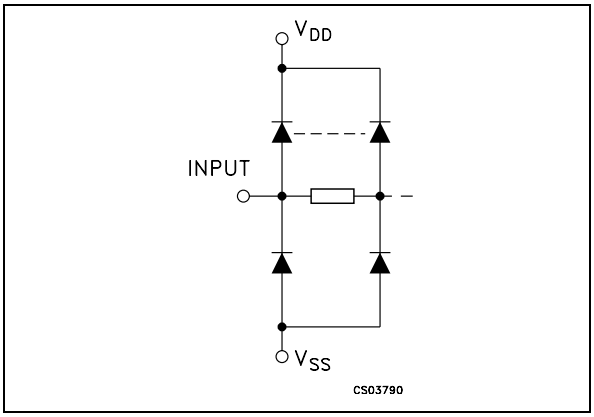
DESCRIPTION

The HCF4018B is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages.
The HCF4018B consist of 5 Johnson counter stages, buffered Q outputs from each stage, and counter preset control gating. CLOCK, RESET, DATA, PRESET ENABLE, and 5 individual JAM inputs are provided. Divide by 10, 8, 6, 4 or 2 counter configuration can be implemented by feeding the Q5, Q4, Q3, Q2, Q1 signals, respectively, back to the data input.
Divide-by-9, 7, 5, or 3 counter configurations can be implemented by the use of a HCF4011B gate package to properly gate the feedback connection to the DATA input. Divide-by-functions greater than 10 can be achieved by use of multiple HCF4018B units. The counter is advanced one count at the positive clock signalstransition. Schmitt trigger action on the clock line permits unlimited clock rise and fall times. A high RESET signal clears the counter to an all-zero condition. A high PRESENT-ENABLE signal allows information on the JAM inputs to preset the counter.
Anti-lock gating is provided to assure the proper counting sequence.

PIN CONNECTION



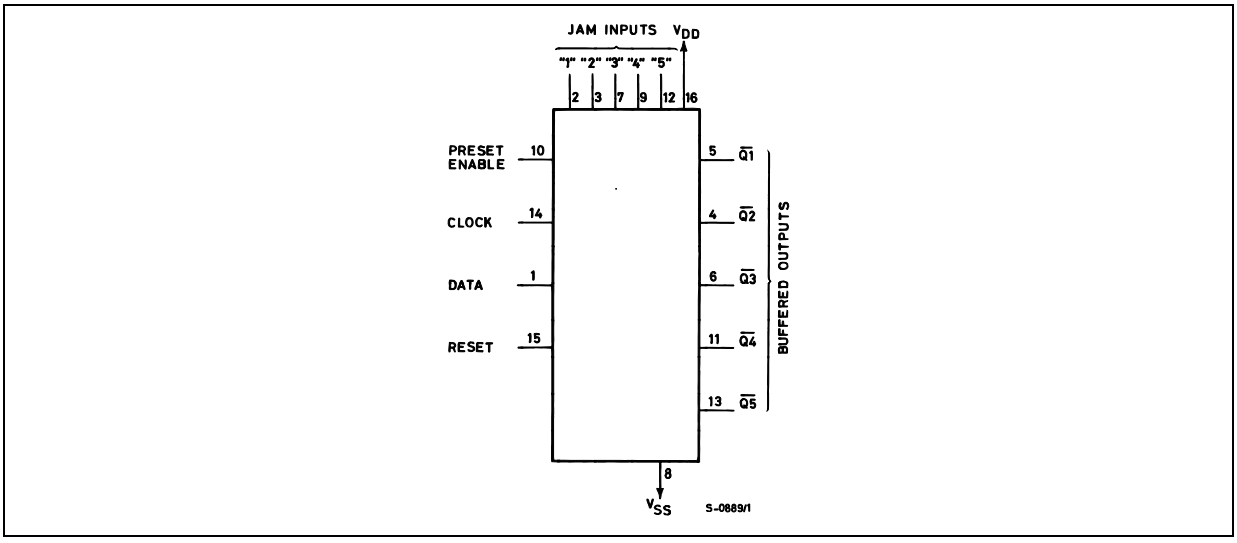
INPUT EQUIVALENT CIRCUIT



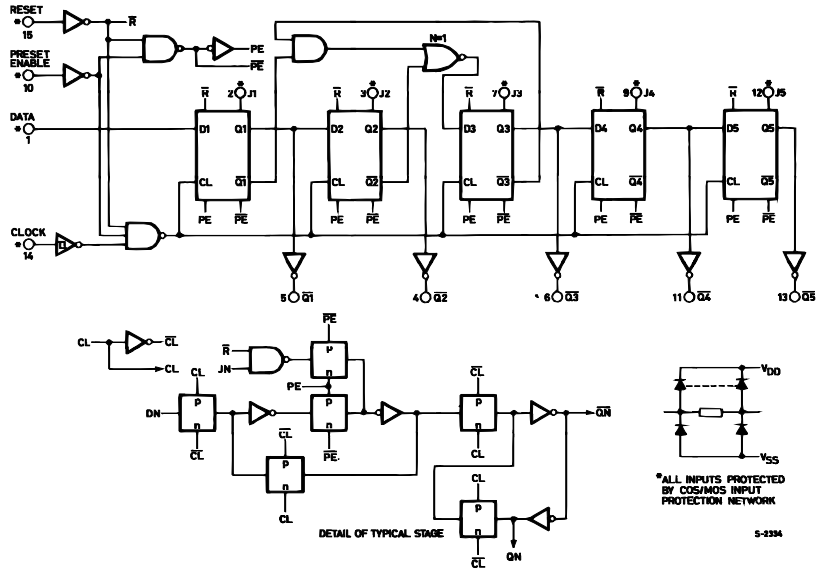
PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
2, 3, 7, 9, 12	JAM1 to JAM5	Jam Inputs
1	DATA	Data Input
4, 5, 6, 11, 13	$\overline{Q1}$ to $\overline{Q5}$	Buffered Outputs
15	RESET	Reset Input
14	CLOCK	Clock Input
10	PRESET ENABLE	Preset Enable Input
8	V_{SS}	Negative Supply Voltage
16	V_{DD}	Positive Supply Voltage

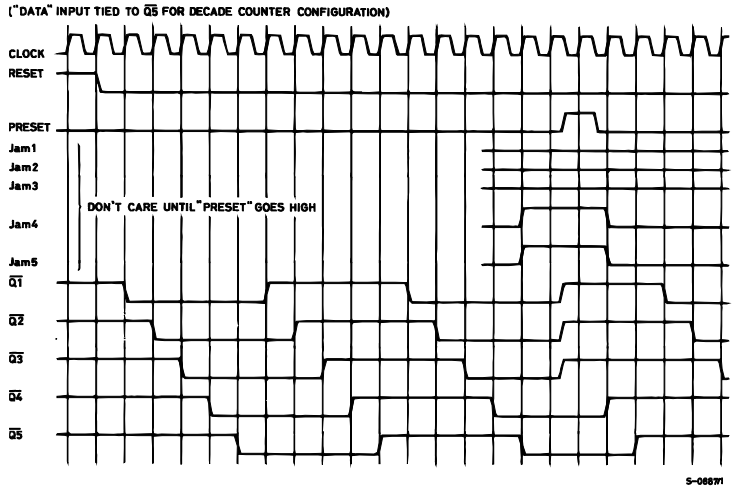
FUNCTIONAL DIAGRAM



LOGIC DIAGRAM



TIMING CHART



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	-0.5 to +22	V
V_I	DC Input Voltage	-0.5 to V_{DD} + 0.5	V
I_I	DC Input Current	± 10	mA
P_D	Power Dissipation per Package	200	mW
	Power Dissipation per Output Transistor	100	mW
T_{op}	Operating Temperature	-55 to +125	°C
T_{stg}	Storage Temperature	-65 to +150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.
All voltage values are referred to V_{SS} pin voltage.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	3 to 20	V
V_I	Input Voltage	0 to V_{DD}	V
T_{op}	Operating Temperature	-55 to 125	°C

DC SPECIFICATIONS

Symbol	Parameter	Test Condition				Value							Unit
		V_I (V)	V_O (V)	$\|I_O\|$ (μA)	V_{DD} (V)	T_A = 25°C			-40 to 85°C		-55 to 125°C		
						Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
I_L	Quiescent Current	0/5			5		0.04	5		150		150	μA
		0/10			10		0.04	10		300		300	
		0/15			15		0.04	20		600		600	
		0/20			20		0.08	100		3000		3000	
V_{OH}	High Level Output Voltage	0/5		<1	5	4.95			4.95		4.95		V
		0/10		<1	10	9.95			9.95		9.95		
		0/15		<1	15	14.95			14.95		14.95		
V_{OL}	Low Level Output Voltage	5/0		<1	5		0.05			0.05		0.05	V
		10/0		<1	10		0.05			0.05		0.05	
		15/0		<1	15		0.05			0.05		0.05	
V_{IH}	High Level Input Voltage		0.5/4.5	<1	5	3.5			3.5		3.5		V
			1/9	<1	10	7			7		7		
			1.5/13.5	<1	15	11			11		11		
V_{IL}	Low Level Input Voltage		4.5/0.5	<1	5			1.5		1.5		1.5	V
			9/1	<1	10			3		3		3	
			13.5/1.5	<1	15			4		4		4	
I_{OH}	Output Drive Current	0/5	2.5	<1	5	-1.36	-3.2		-1.1		-1.1		mA
		0/5	4.6	<1	5	-0.44	-1		-0.36		-0.36		
		0/10	9.5	<1	10	-1.1	-2.6		-0.9		-0.9		
		0/15	13.5	<1	15	-3.0	-6.8		-2.4		-2.4		
I_{OL}	Output Sink Current	0/5	0.4	<1	5	0.44	1		0.36		0.36		mA
		0/10	0.5	<1	10	1.1	2.6		0.9		0.9		
		0/15	1.5	<1	15	3.0	6.8		2.4		2.4		
I_I	Input Leakage Current	0/18	Any Input		18		$\pm 10^{-5}$	±0.1		±1		±1	μA
C_I	Input Capacitance		Any Input				5	7.5					pF

The Noise Margin for both "1" and "0" level is: 1V min. with V_{DD}=5V, 2V min. with V_{DD}=10V, 2.5V min. with V_{DD}=15V

DYNAMIC ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C, C_L = 50pF, R_L = 200KΩ, $t_r = t_f$ = 20 ns)

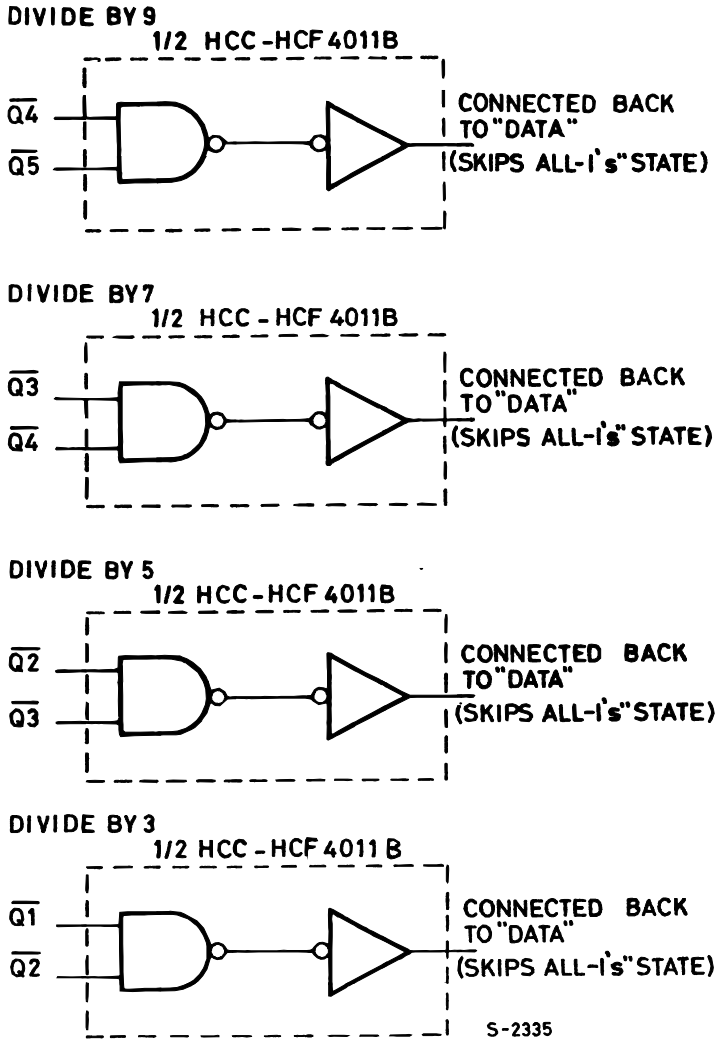
Symbol	Parameter	Test Condition		Value (*)			Unit
		V_{DD} (V)		Min.	Typ.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time	5			200	400	ns
		10			90	180	
		15			65	130	
t_{THL} t_{TLH}	Transition Time	5			100	200	ns
		10			50	100	
		15			40	80	
f_{CL}	Maximum Clock Input Frequency	5		3	6		MHz
		10		7	14		
		15		8.5	17		
t_W	Minimum Clock Pulse Width	5		160	80		ns
		10		70	35		
		15		50	25		
t_r , t_f	Clock Input Rise or Fall Time	5		unlimited			µs
		10					
		15					
t_{setup}	Data Setup Time Minimum Clock Inhibit	5		40	20		ns
		10		12	6		
		15		6	3		
t_H	Data Input Hold-Time	5		140	70		ns
		10		80	40		
		15		60	30		
PRESET(1) or RESET OPERATION							
t_{PLH}, t_{PHL}	Propagation Delay Time (reset or reset to Q)	5			275	550	ns
		10			125	250	
		15			90	180	
t_W	Preset or Reset Pulse Width	5		160	80		ns
		10		70	35		
		15		50	25		
t_{REM}	Preset or Reset Removal Time	5		80	40		ns
		10		30	15		
		15		20	10		

(*) Typical temperature coefficient for all V_{DD} value is 0.3 %/°C.
(1) At PRESET ENABLE or JAM inputs

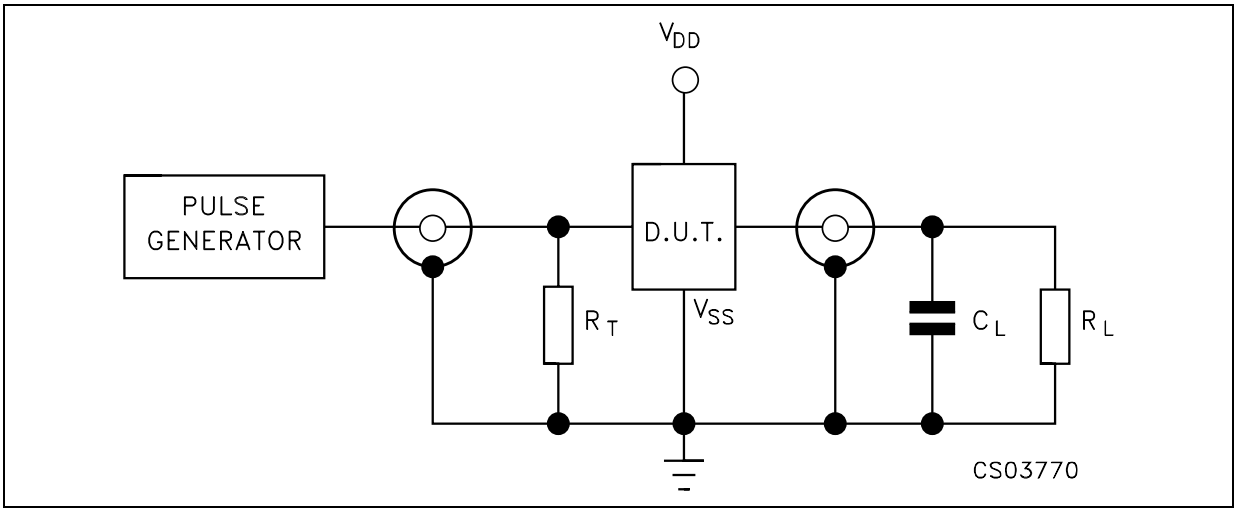
TYPICAL APPLICATION

External connections for divide by 10, 9, 8, 7, 6, 5, 4, 3, 2 operation

DIVIDE BY 10 $\overline{Q5}$	CONNECTED BACK TO "DATA"	NO EXTERNAL COMPONENTS REQUIRED
DIVIDE BY 8 $\overline{Q4}$		
DIVIDE BY 6 $\overline{Q3}$		
DIVIDE BY 4 $\overline{Q2}$		
DIVIDE BY 2 $\overline{Q1}$	NO CONNECTED	



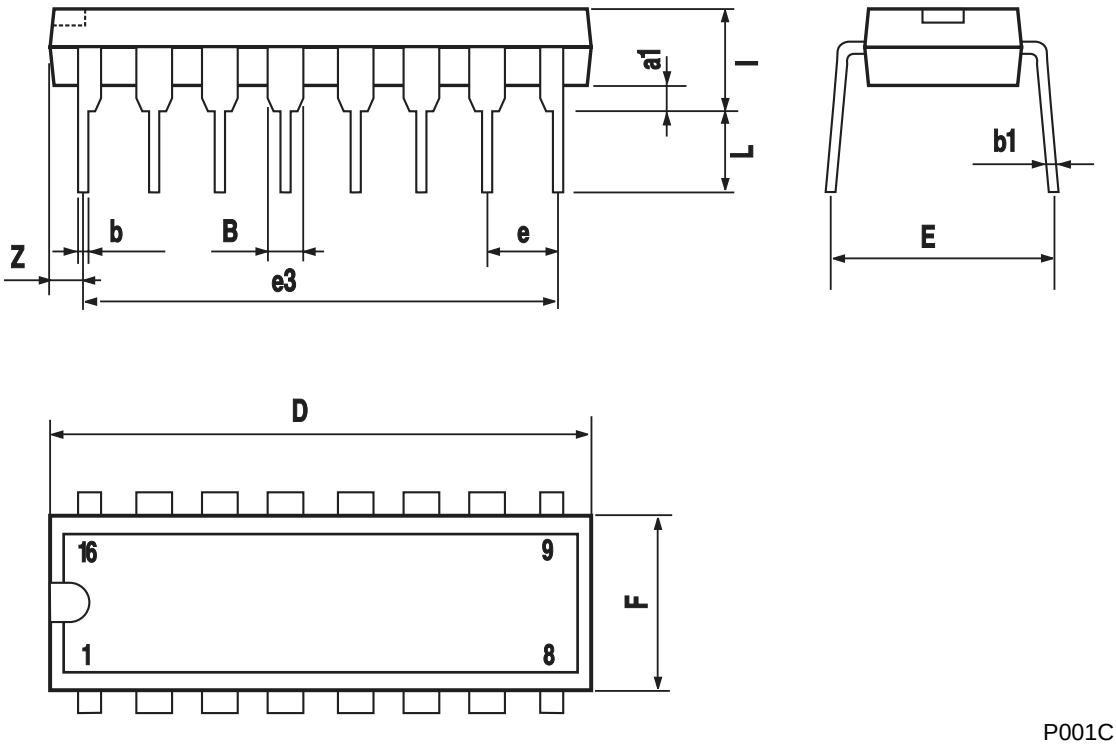
TEST CIRCUIT



C_L = 50pF or equivalent (includes jig and probe capacitance)
R_L = 200KΩ
R_T = Z_{OUT} of pulse generator (typically 50Ω)

Plastic DIP-16 (0.25) MECHANICAL DATA

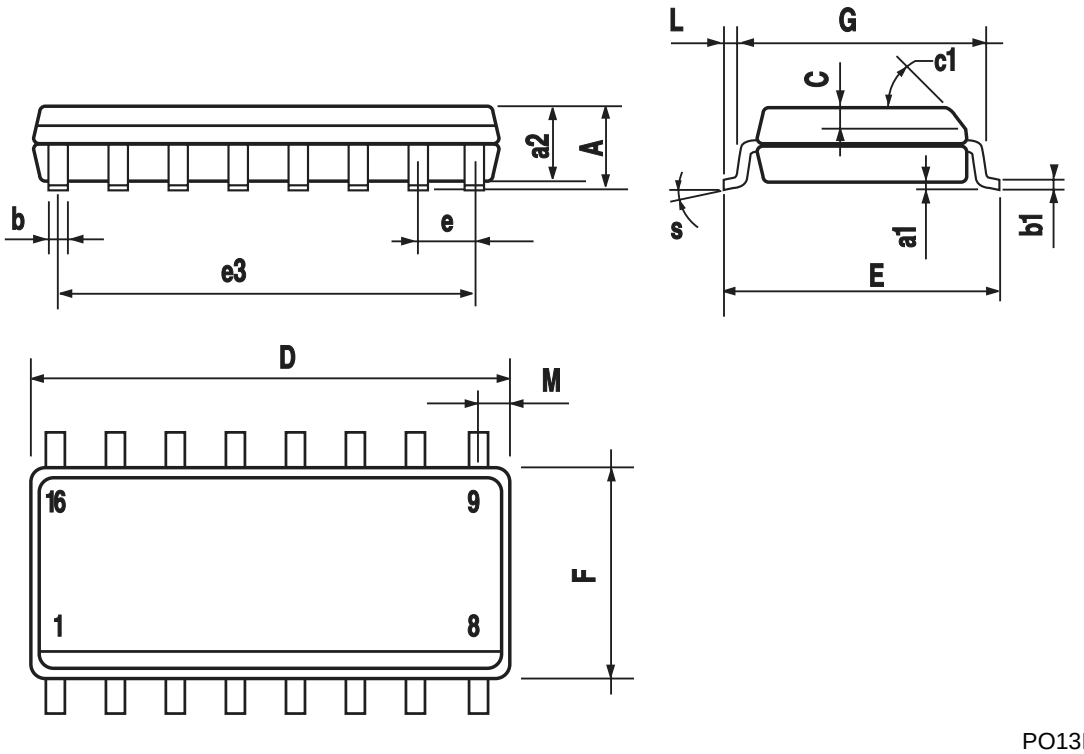
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

SO-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S	8° (max.)					



PO13H