



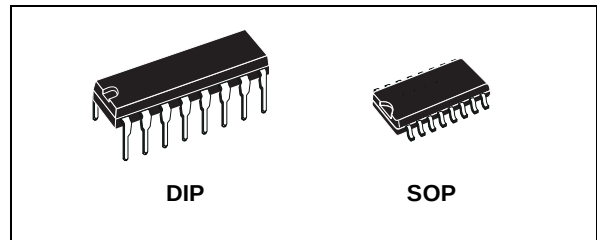
HCF4008B

4 BIT FULL ADDER WITH PARALLEL CARRY OUTPUT

- HIGH SPEED OPERATION :
SUM IN TO SUM OUT 160ns (Typ.)
CARRY IN TO CARRY OUT 50ns (Typ.)
at $V_{DD} = 10V$, $C_L = 50pF$
- 4 SUM OUTPUTS PLUS PARALLEL
LOOK-AHEAD CARRY OUTPUT
- QUIESCENT CURRENT SPECIFIED UP TO
20V
- 5V, 10V AND 15V PARAMETRIC RATINGS
- INPUT LEAKAGE CURRENT
 $I_l = 100nA$ (MAX) AT $V_{DD} = 18V$ $T_A = 25^\circ C$
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC
JESD13B " STANDARD SPECIFICATIONS
FOR DESCRIPTION OF B SERIES CMOS
DEVICES"

DESCRIPTION

The HCF4008B is a monolithic integrated circuit fabricated in Metal Oxide Semiconductor technology available in DIP and SOP packages. The HCF4008B consists of four full adder stages with fast look ahead carry provision from stage to

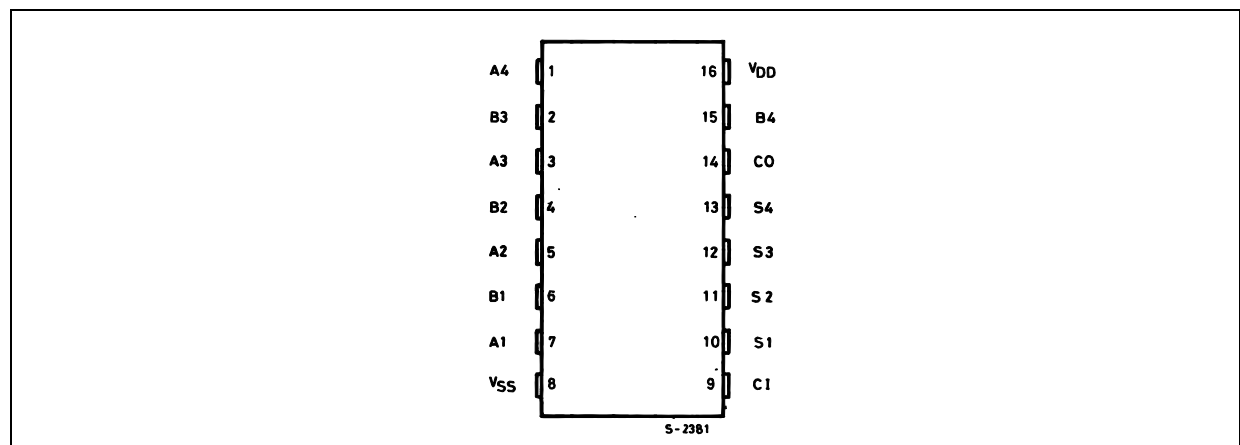


ORDER CODES

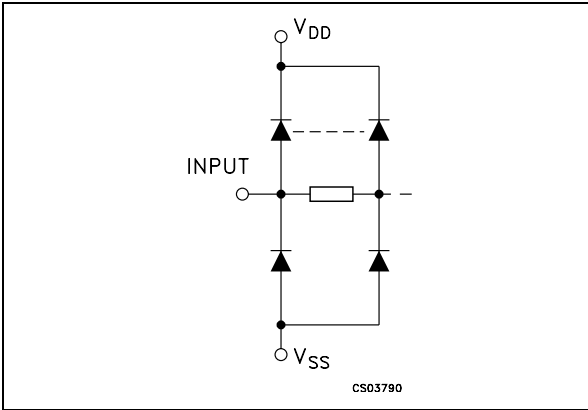
PACKAGE	TUBE	T & R
DIP	HCF4008BEY	
SOP	HCF4008BM1	HCF4008M013TR

stage. Circuitry is included to provide a fast "parallel carry out" to permit high speed operation in arithmetic sections using several HCF4008B's. HCF4008B inputs include the four sum bits, S1 to S4. In addition to the high speed "parallel carry out" which may be utilized at a succeeding HCF4008B section.

PIN CONNECTION



IINPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

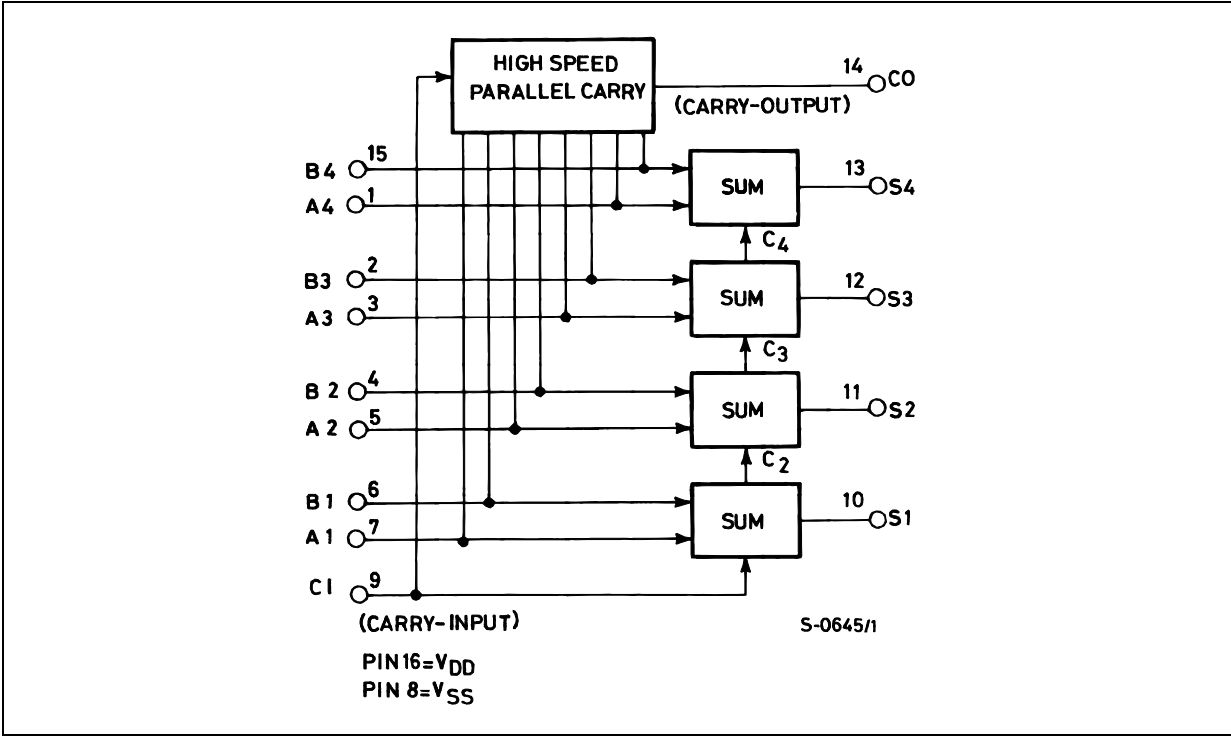
PIN No	SYMBOL	NAME AND FUNCTION
7, 5, 3, 1	A1 to A4	A Operand Inputs
6, 4, 2, 15	B1 to B4	B Operand Inputs
10, 11, 12, 13	S1 to S4	Sum Outputs
9	CI	Carry In
14	CO	Carry Out
8	V _{SS}	Negative Supply Voltage
16	V _{DD}	Positive Supply Voltage

TRUTH TABLE

A _n	B _n	CI	CO	SUM
L	L	L	L	L
H	L	L	L	H
L	H	L	L	H
H	H	L	H	L
L	L	H	L	H
H	L	H	H	L
L	H	H	H	L
H	H	H	H	H

X : Don't Care

LOGIC DIAGRAM



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

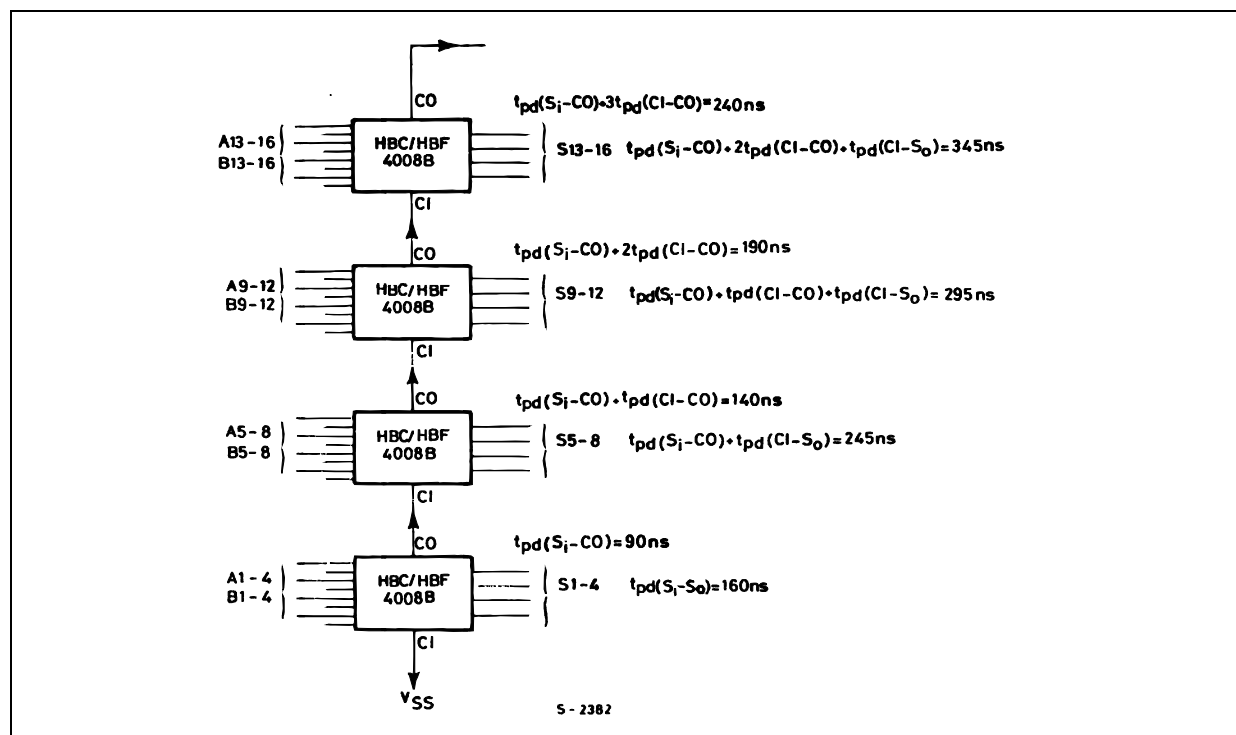
DC SPECIFICATIONS

Symbol	Parameter	Test Condition				Value								Unit
		V _I (V)	V _O (V)	I _{OL} (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		±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

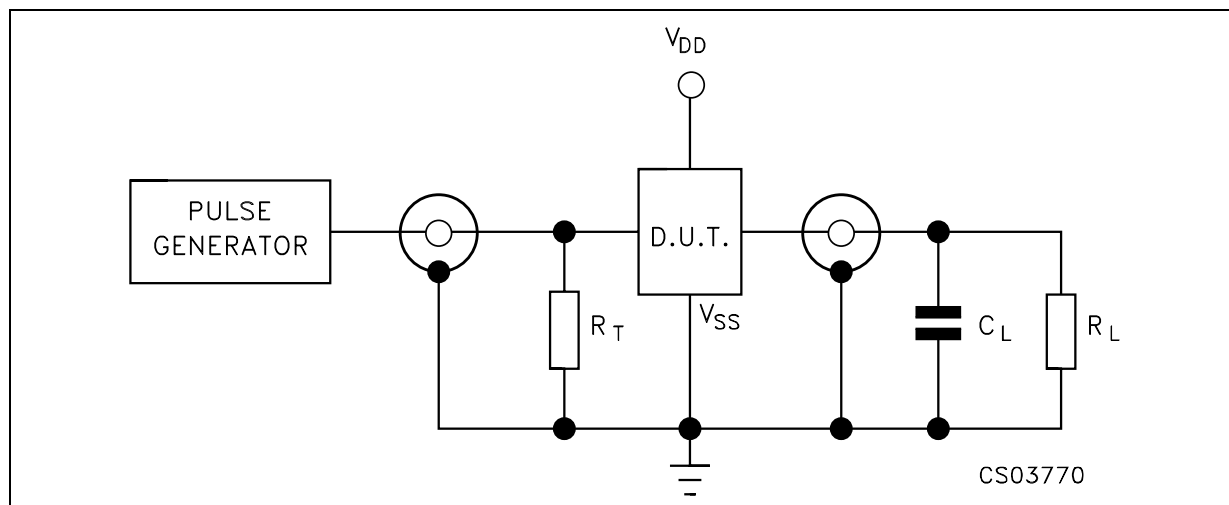
DYNAMIC ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$, $C_L = 50\text{pF}$, $R_L = 200\text{K}\Omega$, $t_r = t_f = 20\text{ ns}$)

Symbol	Parameter	Test Condition		Value (*)			Unit
		V_{DD} (V)		Min.	Typ.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time (SUM IN to SUM OUT)	5			400	800	ns
		10			160	320	
		15			115	230	
t_{PLH} t_{PHL}	Propagation Delay Time (CARRY IN to SUM OUT)	5			370	740	ns
		10			155	310	
		15			115	230	
t_{PLH} t_{PHL}	Propagation Delay Time (SUM IN to CARRY OUT)	5			200	400	ns
		10			90	180	
		15			65	130	
t_{PLH} t_{PHL}	Propagation Delay Time (CARRY IN to CARRY OUT)	5			100	200	ns
		10			50	100	
		15			40	80	
t_{THL} t_{TLH}	Transition Time (carry out or decoded out lines)	5			100	200	ns
		10			50	100	
		15			40	80	

(*) Typical temperature coefficient for all V_{DD} value is 0.3 %/°C.**TYPICAL APPLICATION****SPEED CHARACTERISTICS OF A 16 BIT-ADDER**

NOTES : All "A" and "B" input bits occur at $t = 0$
 All sums settled at $t = 345\text{ns}$
 $C_L = 50\text{pF}$, $T_{amb} = 25^{\circ}\text{C}$, $V_{DD} - V_{SS} = 10\text{V}$

TEST CIRCUIT



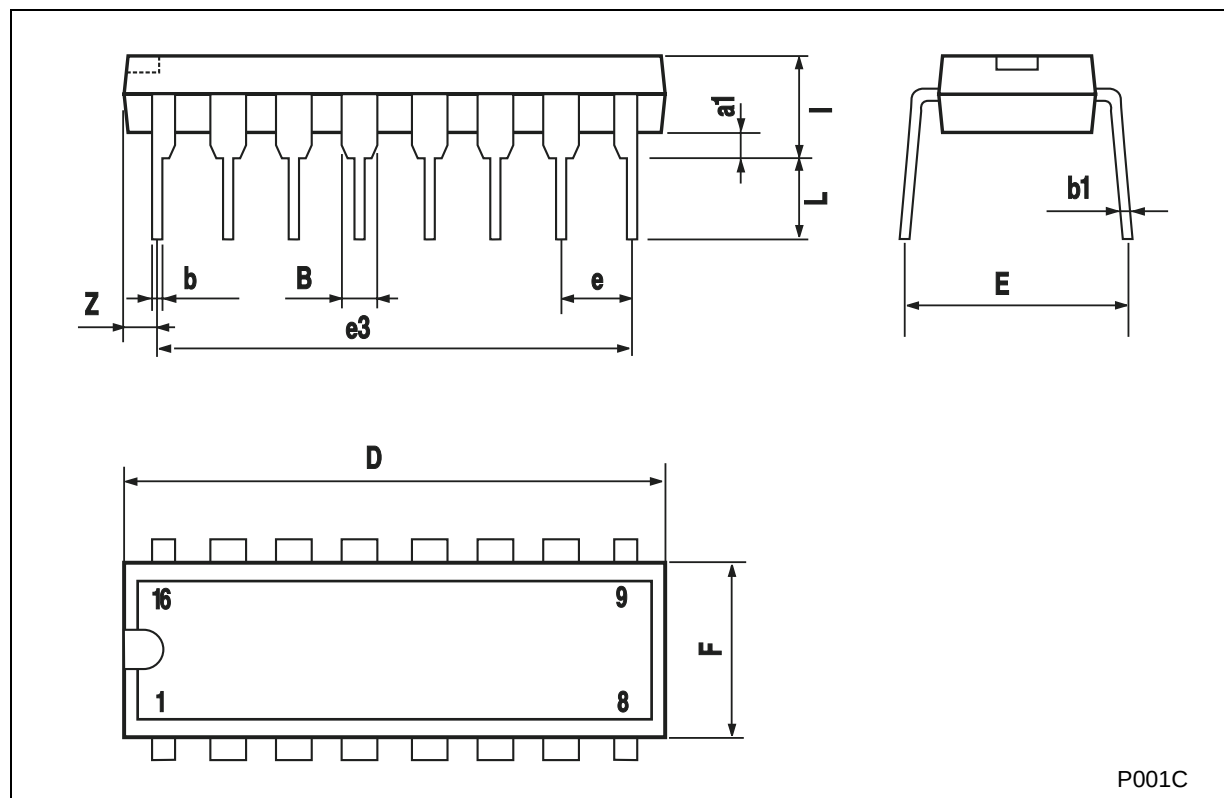
C_L = 50pF or equivalent (includes jig and probe capacitance)

R_L = 200K Ω

R_T = Z_{OUT} of pulse generator (typically 50 Ω)

Plastic DIP-16 (0.25) MECHANICAL DATA

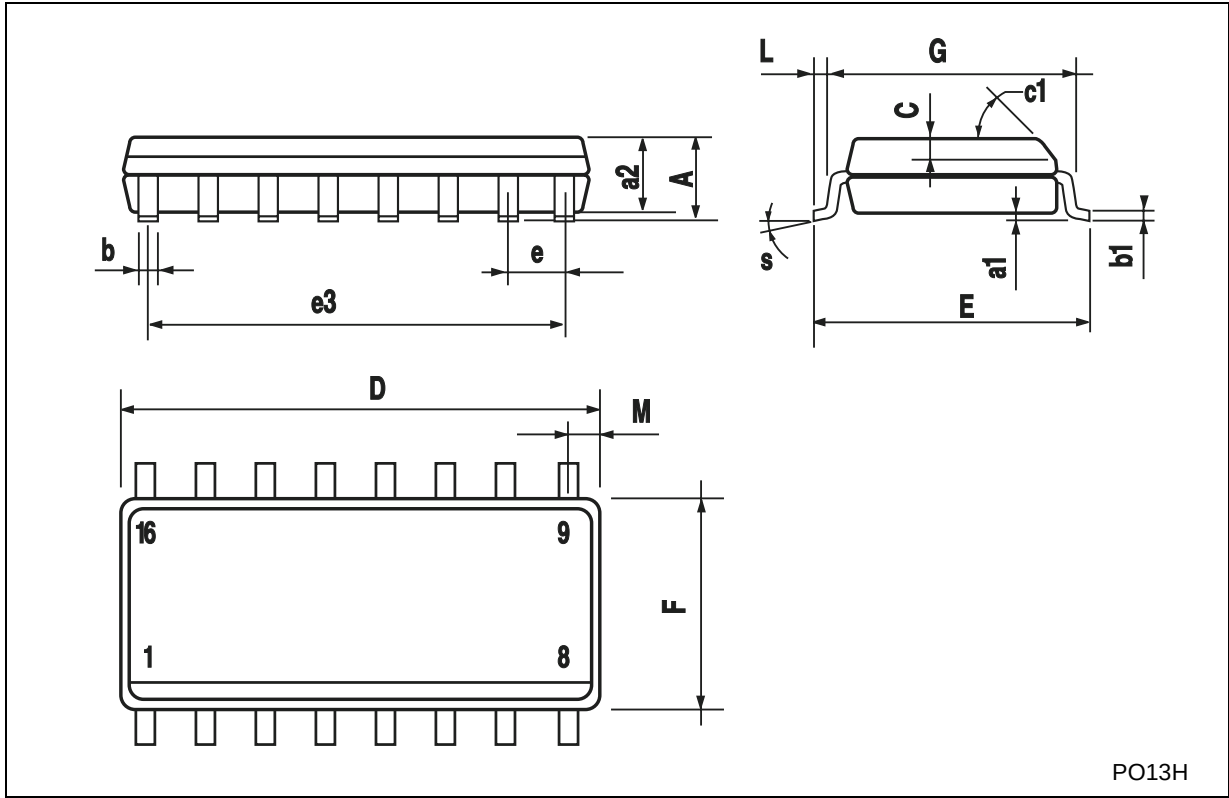
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



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.)					



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