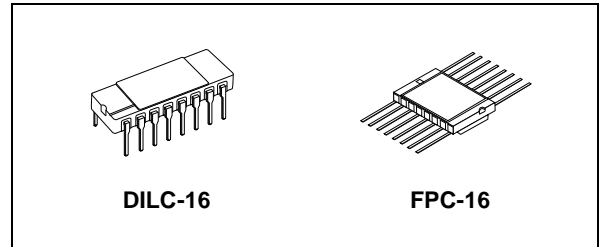


## RAD-HARD HEX BUS BUFFER WITH 3 STATE OUTPUTS (NON INVERTING)

- HIGH SPEED:  
 $t_{PD} = 10\text{ns}$  (TYP.) at  $V_{CC} = 6\text{V}$
- LOW POWER DISSIPATION:  
 $I_{CC} = 4\mu\text{A}$ (MAX.) at  $T_A=25^\circ\text{C}$
- HIGH NOISE IMMUNITY:  
 $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (MIN.)
- SYMMETRICAL OUTPUT IMPEDANCE:  
 $|I_{OH}| = I_{OL} = 6\text{mA}$  (MIN)
- BALANCED PROPAGATION DELAYS:  
 $t_{PLH} \approx t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE:  
 $V_{CC}$  (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 54 SERIES 365
- SPACE GRADE-1: ESA SCC QUALIFIED
- 50 krad QUALIFIED, 100 krad AVAILABLE ON REQUEST
- NO SEL UNDER HIGH LET HEAVY IONS IRRADIATION
- DEVICE FULLY COMPLIANT WITH SCC-9401-052

### DESCRIPTION

The 54HC365 is an advanced high-speed CMOS HEX BUS BUFFER (3-STATE) fabricated with silicon gate C<sup>2</sup>MOS technology.



### ORDER CODES

PACKAGE	FM	EM
DILC	M54HC365D	M54HC365D1
FPC	M54HC365K	M54HC365K1

All six buffers are controlled by the combination of two enable inputs (G1 and G2); all outputs of these buffers are enabled only when both G1 and G2 inputs are held low, under all other conditions these outputs are disabled in a high-impedance state.

The M54HC365 has non inverting outputs. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

### PIN CONNECTION

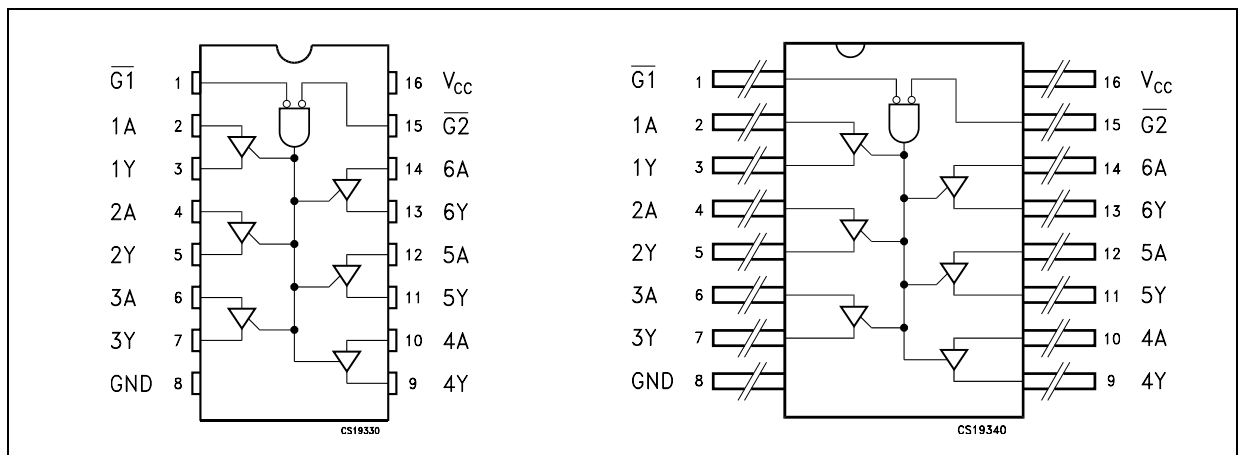


Figure 1: IEC Logic Symbols

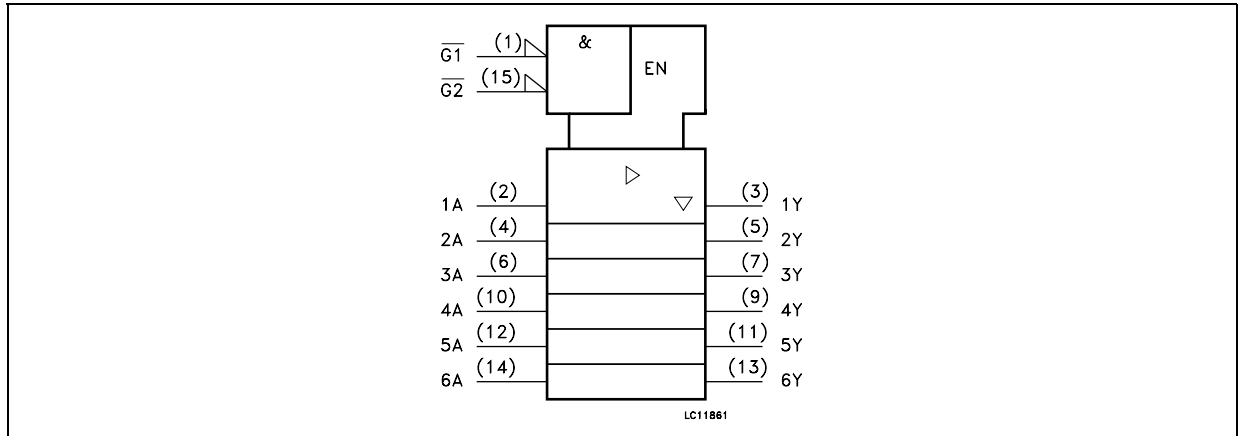


Figure 2: Input And Output Equivalent Circuit

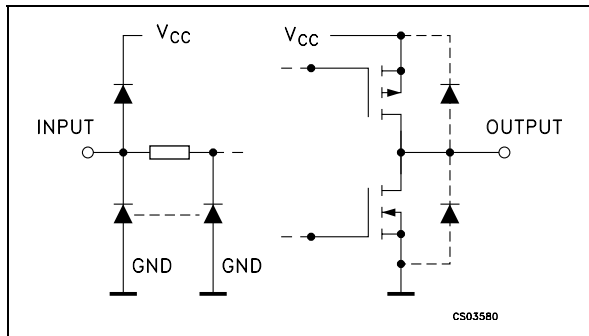


Table 1: Pin Description

PIN N°	SYMBOL	NAME AND FUNCTION
1, 15	G1, G2	Output Enable Inputs
2, 4, 6, 10, 12, 14	1A to 6A	Data Inputs
3, 5, 7, 9, 11, 13	1Y to 6Y	Data Outputs
8	GND	Ground (0V)
16	V <sub>CC</sub>	Positive Supply Voltage

Table 2: Truth Table

INPUTS			OUTPUTS
$\overline{G1}$	$\overline{G2}$	A <sub>n</sub>	Y
L	L	L	L
L	L	H	H
H	X	X	Z
X	H	X	Z

X : Don't Care  
Z : High Impedance

**Table 3: Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	-0.5 to +7	V
$V_I$	DC Input Voltage	-0.5 to $V_{CC} + 0.5$	V
$V_O$	DC Output Voltage	-0.5 to $V_{CC} + 0.5$	V
$I_{IK}$	DC Input Diode Current	$\pm 20$	mA
$I_{OK}$	DC Output Diode Current	$\pm 20$	mA
$I_O$	DC Output Current	$\pm 35$	mA
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ or Ground Current	$\pm 70$	mA
$P_D$	Power Dissipation	420	mW
$T_{stg}$	Storage Temperature	-65 to +150	°C
$T_L$	Lead Temperature (10 sec)	265	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied

**Table 4: Recommended Operating Conditions**

Symbol	Parameter	Value	Unit	
$V_{CC}$	Supply Voltage	2 to 6	V	
$V_I$	Input Voltage	0 to $V_{CC}$	V	
$V_O$	Output Voltage	0 to $V_{CC}$	V	
$T_{op}$	Operating Temperature	-55 to 125	°C	
$t_r, t_f$	Input Rise and Fall Time	$V_{CC} = 2.0V$	0 to 1000	ns
		$V_{CC} = 4.5V$	0 to 500	ns
		$V_{CC} = 6.0V$	0 to 400	ns

Table 5: DC Specifications

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V <sub>IH</sub>	High Level Input Voltage	2.0		1.5			1.5		1.5		V
		4.5		3.15			3.15		3.15		
		6.0		4.2			4.2		4.2		
V <sub>IL</sub>	Low Level Input Voltage	2.0				0.5		0.5		0.5	V
		4.5				1.35		1.35		1.35	
		6.0				1.8		1.8		1.8	
V <sub>OH</sub>	High Level Output Voltage	2.0	I <sub>O</sub> =-20 μA	1.9	2.0		1.9		1.9		V
		4.5	I <sub>O</sub> =-20 μA	4.4	4.5		4.4		4.4		
		6.0	I <sub>O</sub> =-20 μA	5.9	6.0		5.9		5.9		
		4.5	I <sub>O</sub> =-6.0 mA	4.18	4.31		4.13		4.10		
		6.0	I <sub>O</sub> =-7.8 mA	5.68	5.8		5.63		5.60		
V <sub>OL</sub>	Low Level Output Voltage	2.0	I <sub>O</sub> =20 μA		0.0	0.1		0.1		0.1	V
		4.5	I <sub>O</sub> =20 μA		0.0	0.1		0.1		0.1	
		6.0	I <sub>O</sub> =20 μA		0.0	0.1		0.1		0.1	
		4.5	I <sub>O</sub> =6.0 mA		0.17	0.26		0.33		0.40	
		6.0	I <sub>O</sub> =7.8 mA		0.18	0.26		0.33		0.40	
I <sub>I</sub>	Input Leakage Current	6.0	V <sub>I</sub> = V <sub>CC</sub> or GND			± 0.1		± 1		± 1	μA
I <sub>OZ</sub>	High Impedance Output Leakage Current	6.0	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>O</sub> = V <sub>CC</sub> or GND			± 0.5		± 5		± 10	μA
I <sub>CC</sub>	Quiescent Supply Current	6.0	V <sub>I</sub> = V <sub>CC</sub> or GND			4		40		80	μA

Table 6: AC Electrical Characteristics ( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

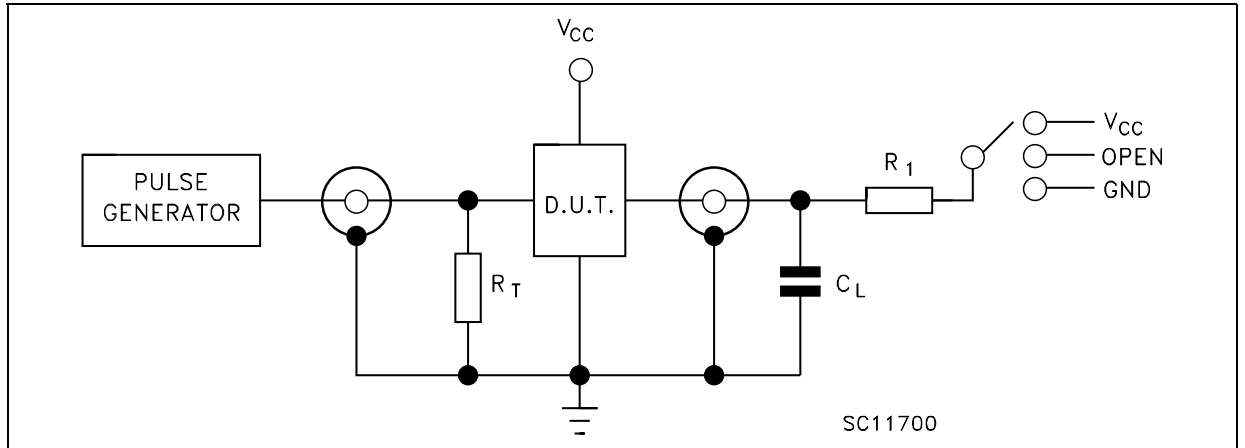
Symbol	Parameter	Test Condition			Value						Unit	
		$V_{CC}$ (V)	$C_L$ (pF)		$T_A = 25^\circ\text{C}$			$-40$ to $85^\circ\text{C}$		$-55$ to $125^\circ\text{C}$		
					Min.	Typ.	Max.	Min.	Max.	Min.		Max.
$t_{TLH}$ $t_{THL}$	Output Transition Time	2.0	50			25	60		75		90	ns
		4.5				7	12		19		18	
		6.0				6	10		13		15	
$t_{PLH}$ $t_{PHL}$	Propagation Delay Time	2.0	50			38	90		115		135	ns
		4.5				12	18		23		27	
		6.0				10	15		20		23	
		2.0	150			51	130		165		195	ns
		4.5				17	26		33		39	
		6.0				14	22		28		33	
$t_{PZL}$ $t_{PZH}$	High Impedance Output Enable Time	2.0	50	$R_L = 1\text{ K}\Omega$		64	130		165		195	ns
		4.5				16	26		33		39	
		6.0				14	22		28		33	
		2.0	150	$R_L = 1\text{ K}\Omega$		76	150		190		225	ns
		4.5				19	30		38		45	
		6.0				16	26		32		38	
$t_{PLZ}$ $t_{PHZ}$	High Impedance Output Disable Time	2.0	50	$R_L = 1\text{ K}\Omega$		42	130		165		195	ns
		4.5				18	26		33		39	
		6.0				15	22		28		33	

Table 7: Capacitive Characteristics

Symbol	Parameter	Test Condition			Value						Unit	
		$V_{CC}$ (V)			$T_A = 25^\circ\text{C}$			$-40$ to $85^\circ\text{C}$		$-55$ to $125^\circ\text{C}$		
					Min.	Typ.	Max.	Min.	Max.	Min.		Max.
$C_{IN}$	Input Capacitance	5.0				5	10		10		10	pF
$C_{PD}$	Power Dissipation Capacitance (note 1)	5.0				27						pF

1)  $C_{PD}$  is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation.  $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/6$  (per gate)

Figure 3: Test Circuit



TEST	SWITCH
$t_{PLH}$ , $t_{PHL}$	Open
$t_{PZL}$ , $t_{PLZ}$	$V_{CC}$
$t_{PZH}$ , $t_{PHZ}$	GND

$C_L = 50pF/150pF$  or equivalent (includes jig and probe capacitance)  
 $R_1 = 1K\Omega$  or equivalent  
 $R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

Figure 4: Propagation Delay Times Waveform (f=1MHz; 50% duty cycle)

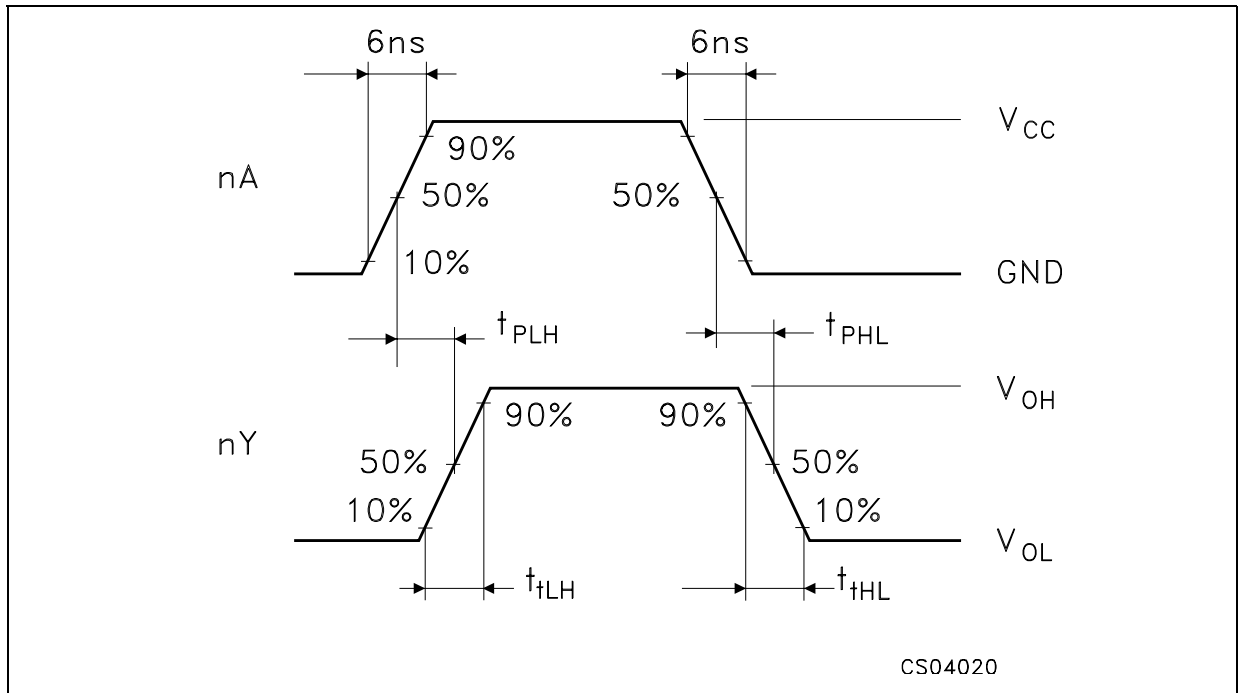
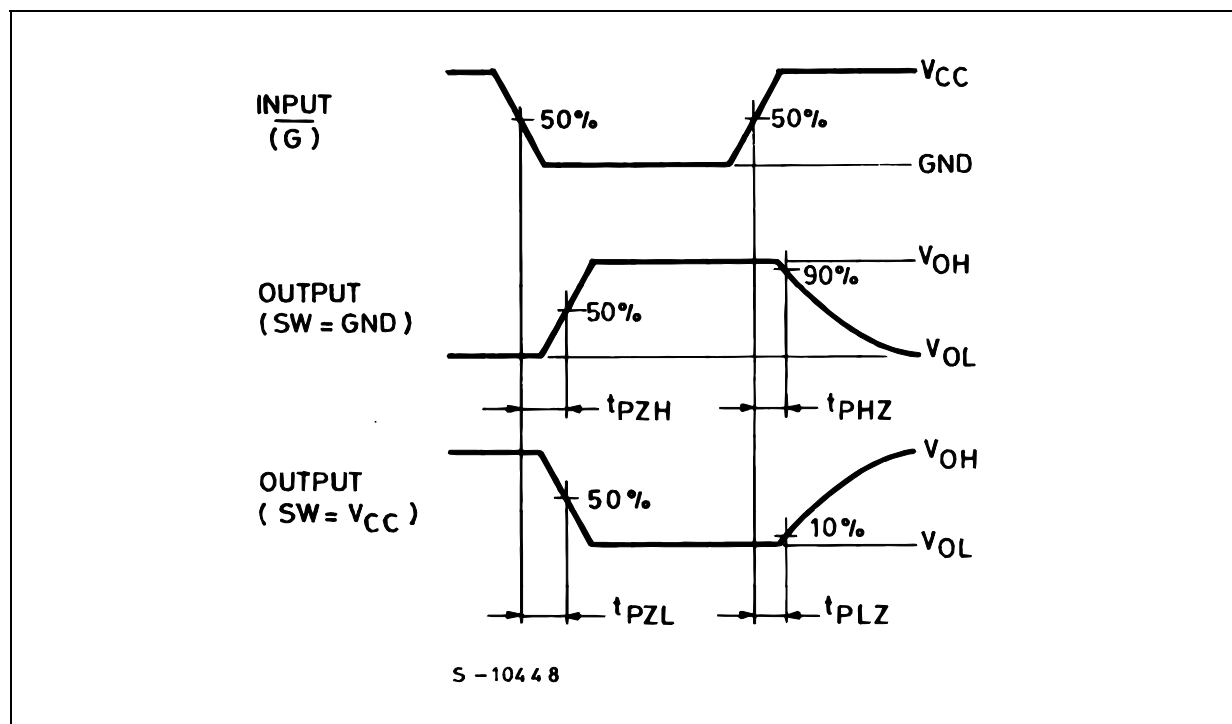
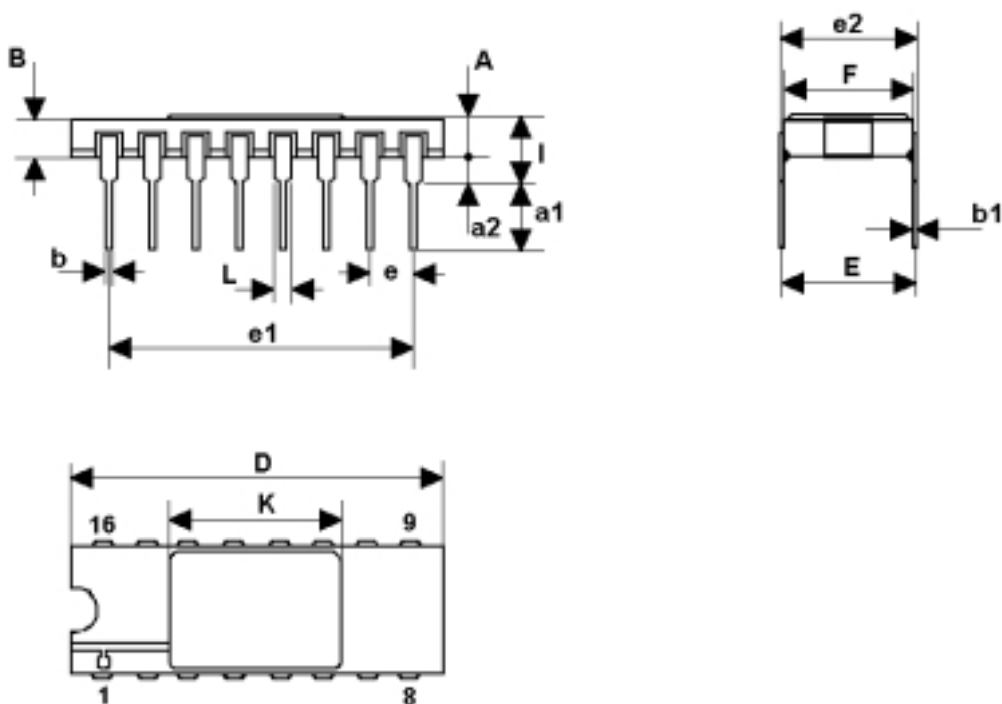


Figure 5: Output Enable And Disable Times Waveform ( $f=1\text{MHz}$ ; 50% duty cycle)

## DILC-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.1		2.71	0.083		0.107
a1	3.00		3.70	0.118		0.146
a2	0.63	0.88	1.14	0.025	0.035	0.045
B	1.82		2.39	0.072		0.094
b	0.40	0.45	0.50	0.016	0.018	0.020
b1	0.20	0.254	0.30	0.008	0.010	0.012
D	20.06	20.32	20.58	0.790	0.800	0.810
e	7.36	7.62	7.87	0.290	0.300	0.310
e1		2.54			0.100	
e2	17.65	17.78	17.90	0.695	0.700	0.705
e3	7.62	7.87	8.12	0.300	0.310	0.320
F	7.29	7.49	7.70	0.287	0.295	0.303
I			3.83			0.151
K	10.90		12.1	0.429		0.476
L	1.14		1.5	0.045		0.059

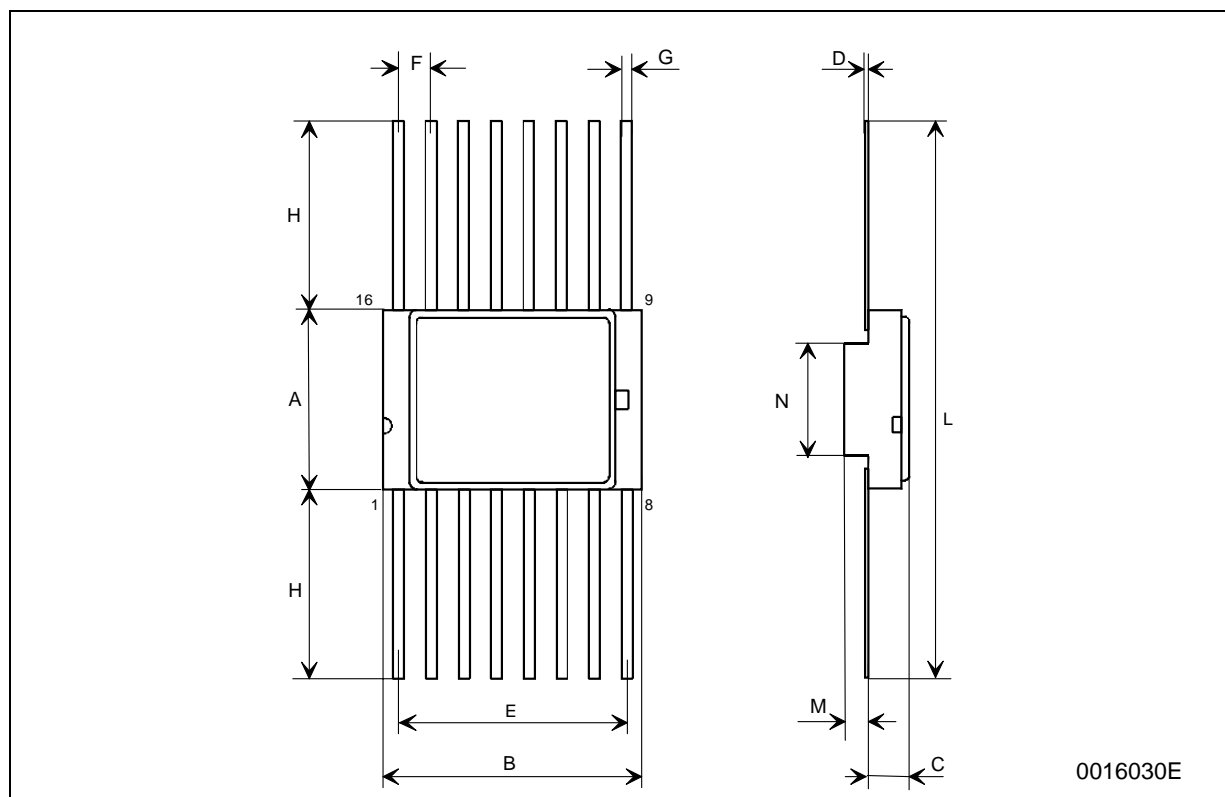


0056437F



## FPC-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	6.75	6.91	7.06	0.266	0.272	0.278
B	9.76	9.94	10.14	0.384	0.392	0.399
C	1.49		1.95	0.059		0.077
D	0.102	0.127	0.152	0.004	0.005	0.006
E	8.76	8.89	9.01	0.345	0.350	0.355
F		1.27			0.050	
G	0.38	0.43	0.48	0.015	0.017	0.019
H	6.0			0.237		
L	18.75		22.0	0.738		0.867
M	0.33	0.38	0.43	0.013	0.015	0.017
N		4.31			0.170	



0016030E

**Table 8: Revision History**

<b>Date</b>	<b>Revision</b>	<b>Description of Changes</b>
03-May-2004	1	First Release

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