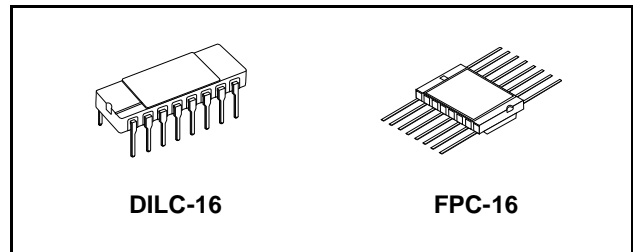


RAD-HARD QUAD 2 CHANNEL MULTIPLEXER (INV.)

- HIGH SPEED:
 $t_{PD} = 14\text{ns}$ (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:
 $|I_{OH}| = |I_{OL}| = 4\text{mA}$ (MIN)
- BALANCED PROPAGATION DELAYS:
 $t_{PLH} \cong t_{PHL}$
- OUTPUTS DRIVE CAPABILITY
 10 LSTTL LOADS
- WIDE OPERATING VOLTAGE RANGE:
 V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH
 54 SERIES 158
- 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-9408-059

DESCRIPTION

The M54HC158 is an high speed CMOS QUAD 2 CHANNEL MULTIPLEXER fabricated with silicon gate C²MOS technology.



ORDER CODES

PACKAGE	FM	EM
DILC	M54HC158D	M54HC158D1
FPC	M54HC158K	M54HC158K1

These device consist of four 2-input digital multiplexer with common select and strobe inputs. The M54HC158 is an inverting multiplexer. When the STROBE input is held high, selection of data is inhibited and all the outputs become high. The SELECT decoding determines whether the A or B inputs get routed to their corresponding Y outputs. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

PIN CONNECTION

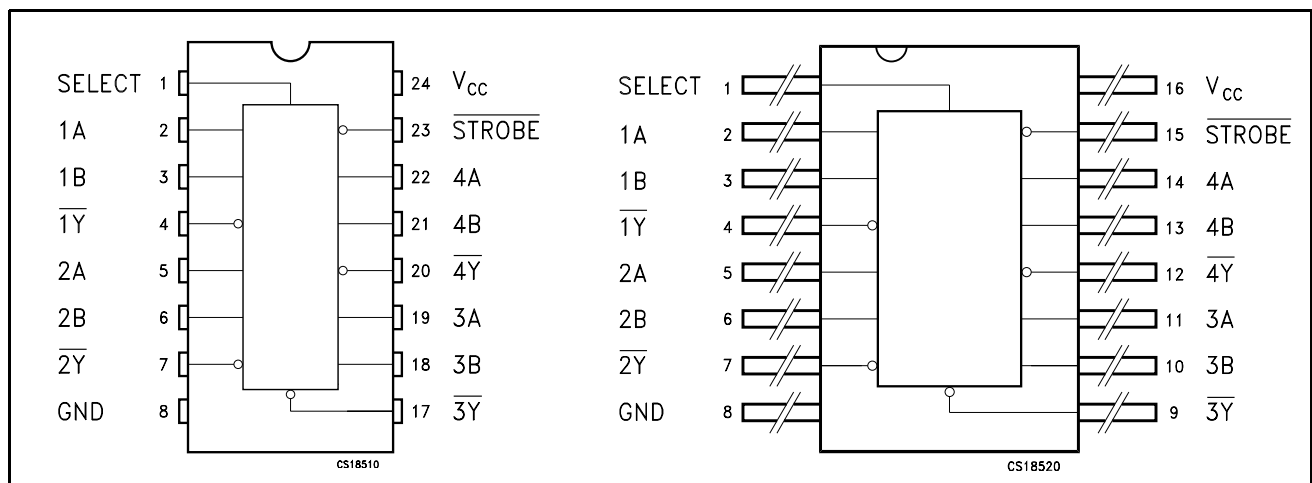


Figure 1: IEC Logic Symbols

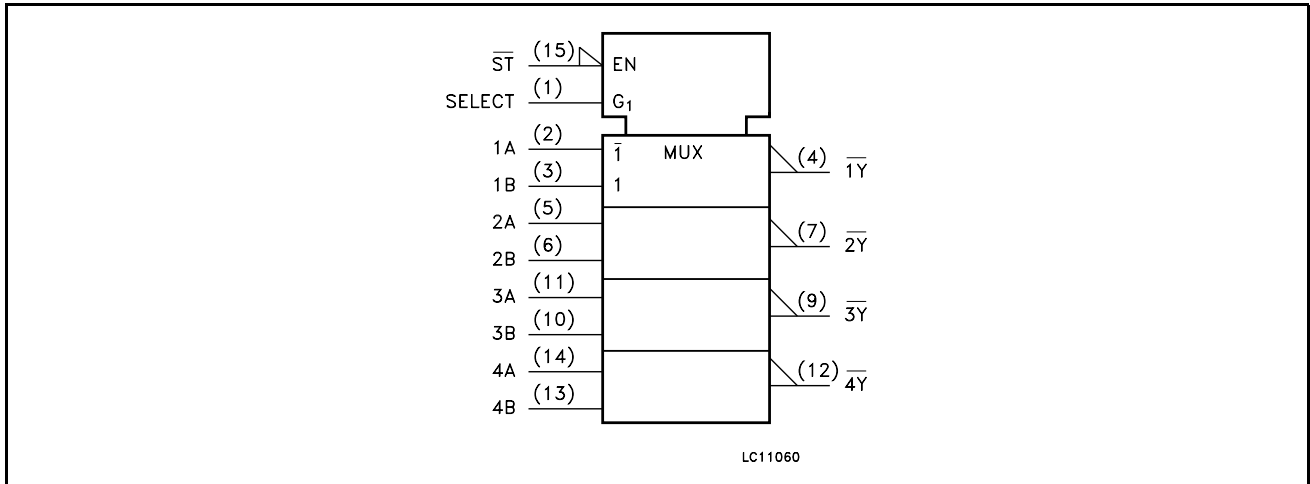


Figure 2: Input And Output Equivalent Circuit

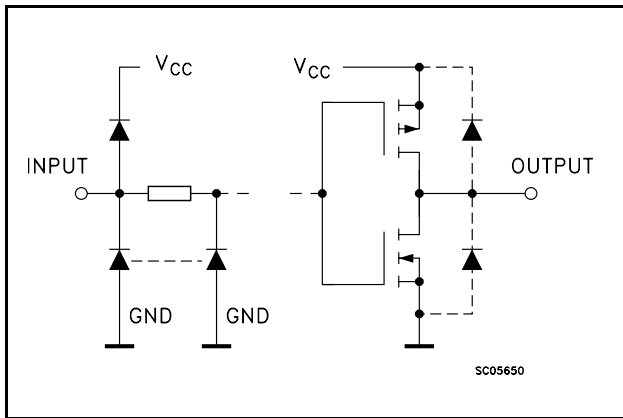


Table 1: Pin Description

PIN N°	SYMBOL	NAME AND FUNCTION
1	SELECT	Common Data Select Input
2, 5, 11, 14	1A to 4A	Data Inputs From Source A
3, 6, 10, 13	1B to 4B	Data Inputs From Source B
4, 7, 9, 12	1Y to 4Y	Multiplexer Output
15	STROBE	Strobe Inputs
8	GND	Ground (0V)
16	V _{CC}	Positive Supply Voltage

Table 2: Truth Table

INPUTS				OUTPUTS
STROBE	SELECT	A	B	Y
H	X	X	X	H
L	L	L	X	H
L	L	H	X	L
L	H	X	L	H
L	H	X	H	L

X : Don't Care

Figure 3: Logic Diagram

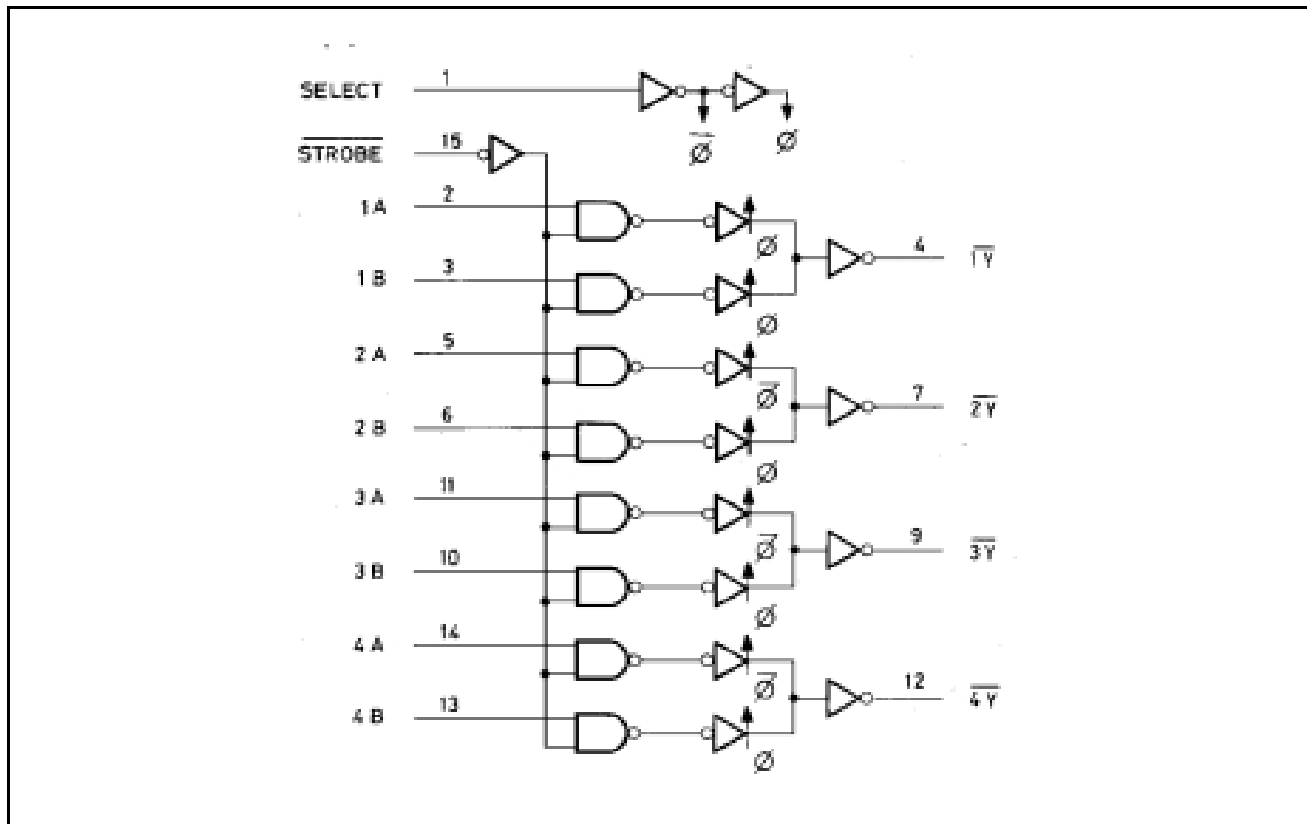


Table 3: Absolute Maximum Ratings

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	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Current	± 25	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 50	mA
P_D	Power Dissipation	300	mW
T_{stg}	Storage Temperature	-65 to +150	$^{\circ}C$
T_L	Lead Temperature (10 sec)	265	$^{\circ}C$

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_{CC} (V)		$T_A = 25^\circ C$			-40 to $85^\circ C$		-55 to $125^\circ C$		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V_{IH}	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_{IL}	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_{OH}	High Level Output Voltage	2.0	$I_O = -20 \mu A$	1.9	2.0		1.9		1.9		V
		4.5	$I_O = -20 \mu A$	4.4	4.5		4.4		4.4		
		6.0	$I_O = -20 \mu A$	5.9	6.0		5.9		5.9		
		4.5	$I_O = -4.0 mA$	4.18	4.31		4.13		4.10		
		6.0	$I_O = -5.2 mA$	5.68	5.8		5.63		5.60		
V_{OL}	Low Level Output Voltage	2.0	$I_O = 20 \mu A$		0.0	0.1		0.1		0.1	V
		4.5	$I_O = 20 \mu A$		0.0	0.1		0.1		0.1	
		6.0	$I_O = 20 \mu A$		0.0	0.1		0.1		0.1	
		4.5	$I_O = 4.0 mA$		0.17	0.26		0.33		0.40	
		6.0	$I_O = 5.2 mA$		0.18	0.26		0.33		0.40	
I_I^*	Input Leakage Current	6.0	$V_I = V_{CC}$ or GND			± 0.1		± 1		± 1	μA
I_{CC}	Quiescent Supply Current	6.0	$V_I = V_{CC}$ or GND			4		40		80	μA

*: Applicable only to DIR, G, \bar{G} input

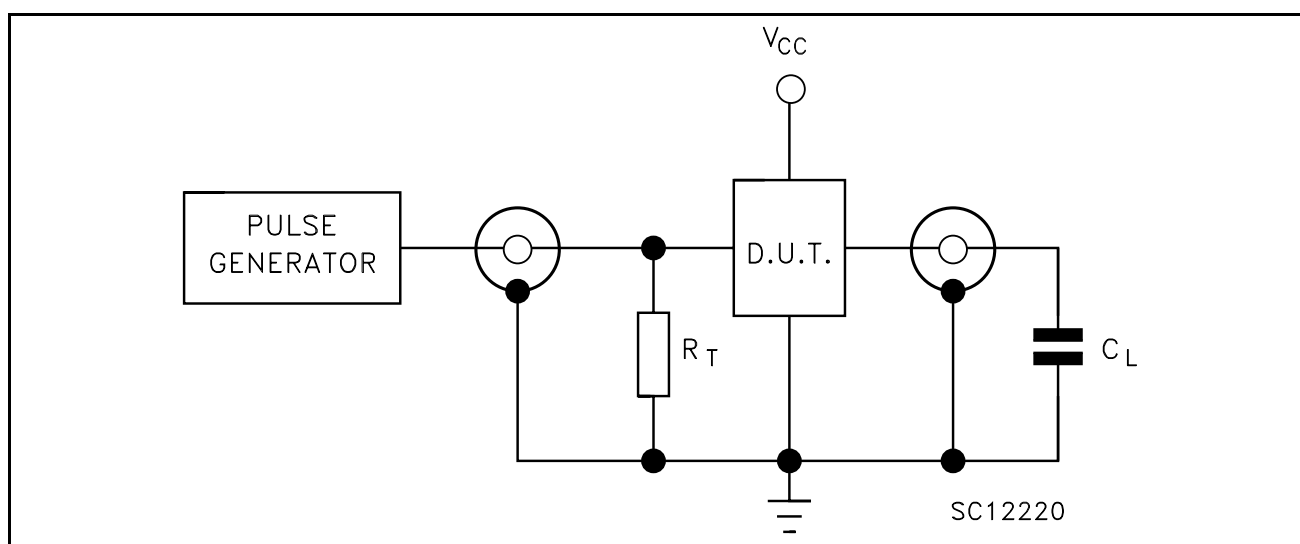
Table 6: AC Electrical Characteristics ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

Symbol	Parameter	Test Condition		Value						Unit	
		V_{CC} (V)		$T_A = 25^\circ\text{C}$			$-40 \text{ to } 85^\circ\text{C}$		$-55 \text{ to } 125^\circ\text{C}$		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t_{TLH} t_{THL}	Output Transition Time	2.0			30	75		95		110	ns
		4.5			8	15		19		22	
		6.0			7	13		16		19	
t_{PLH} t_{PHL}	Propagation Delay Time (A, B - Y)	2.0			30	100		125		150	ns
		4.5			12	20		25		30	
		6.0			10	17		21		26	
t_{PLH} t_{PHL}	Propagation Delay Time (SELECT - Y)	2.0			50	125		155		190	ns
		4.5			16	25		31		38	
		6.0			14	21		26		32	
t_{PLH} t_{PHL}	Propagation Delay Time (STROBE - Y)	2.0			36	115		145		175	ns
		4.5			12	23		29		35	
		6.0			10	20		25		30	

Table 7: Capacitive Characteristics

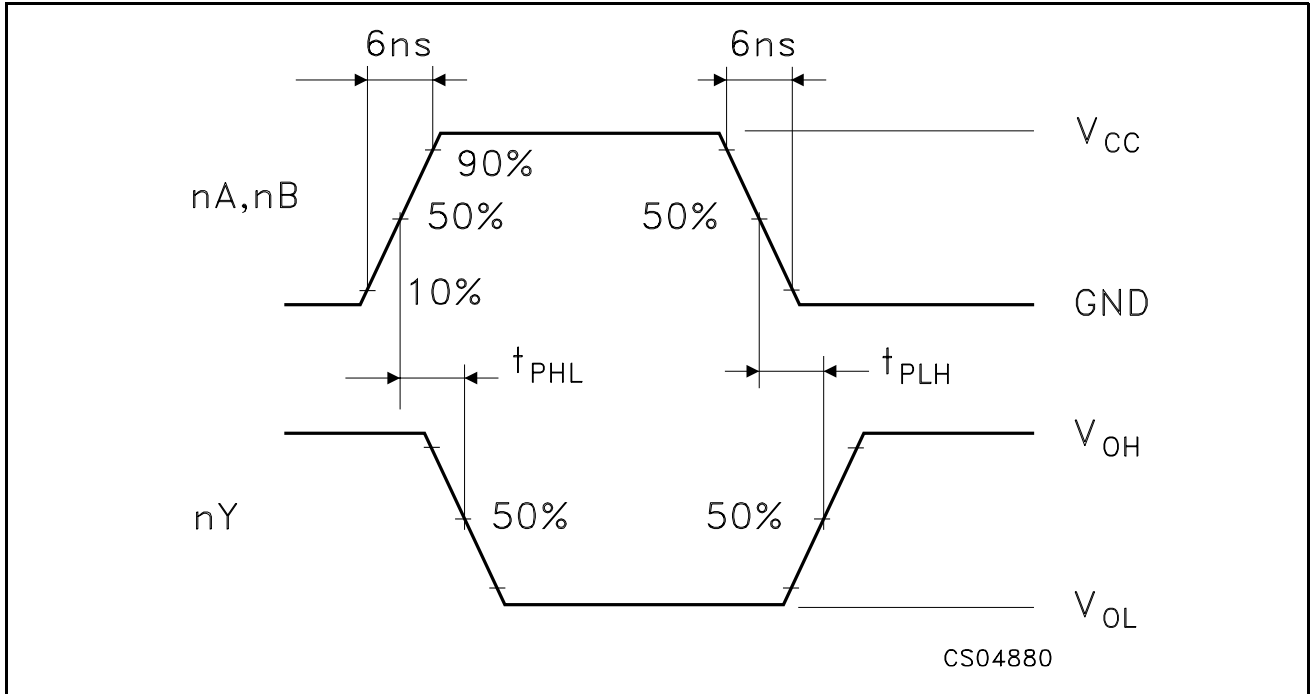
Symbol	Parameter	Test Condition		Value						Unit	
		V_{CC} (V)		$T_A = 25^\circ\text{C}$			$-40 \text{ to } 85^\circ\text{C}$		$-55 \text{ to } 125^\circ\text{C}$		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
C_{IN}	Input Capacitance	5.0			5	10		10		10	pF
C_{PD}	Power Dissipation Capacitance (note 1)	5.0			47						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. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/4$ (per channel)

Figure 4: Test Circuit

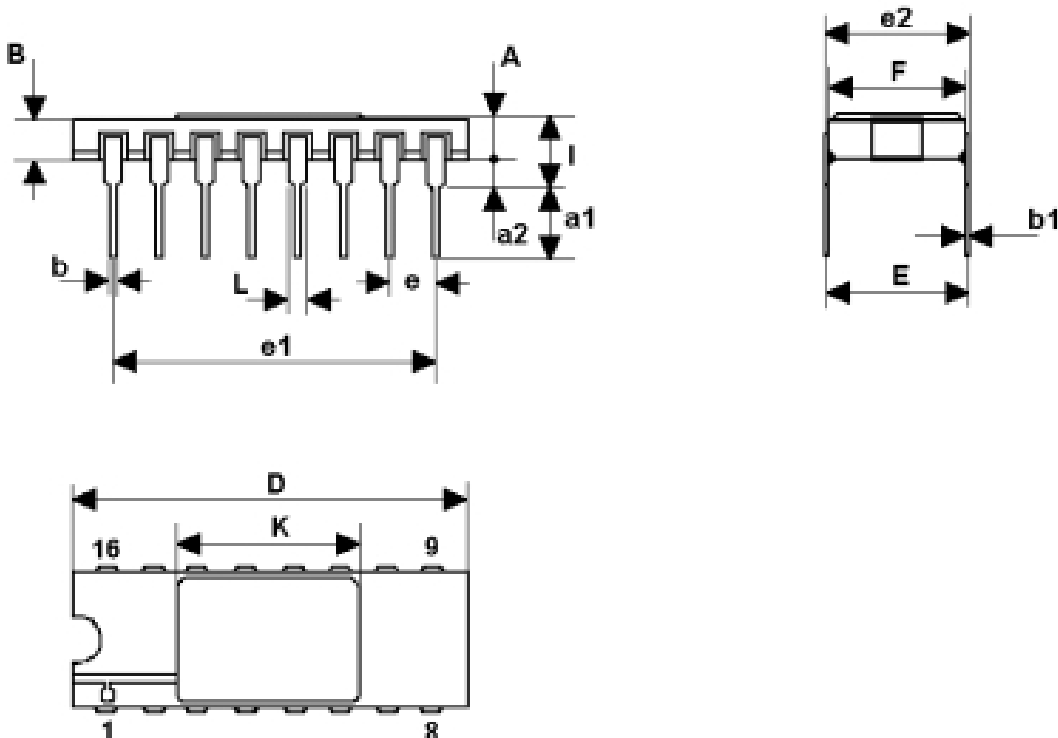
$C_L = 50 \text{ pF}$ or equivalent (includes jig and probe capacitance)
 $R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

Figure 5: Waveform: Propagation Delay Times (f=1MHz; 50% duty cycle)



DILC-16 MECHANICAL DATA

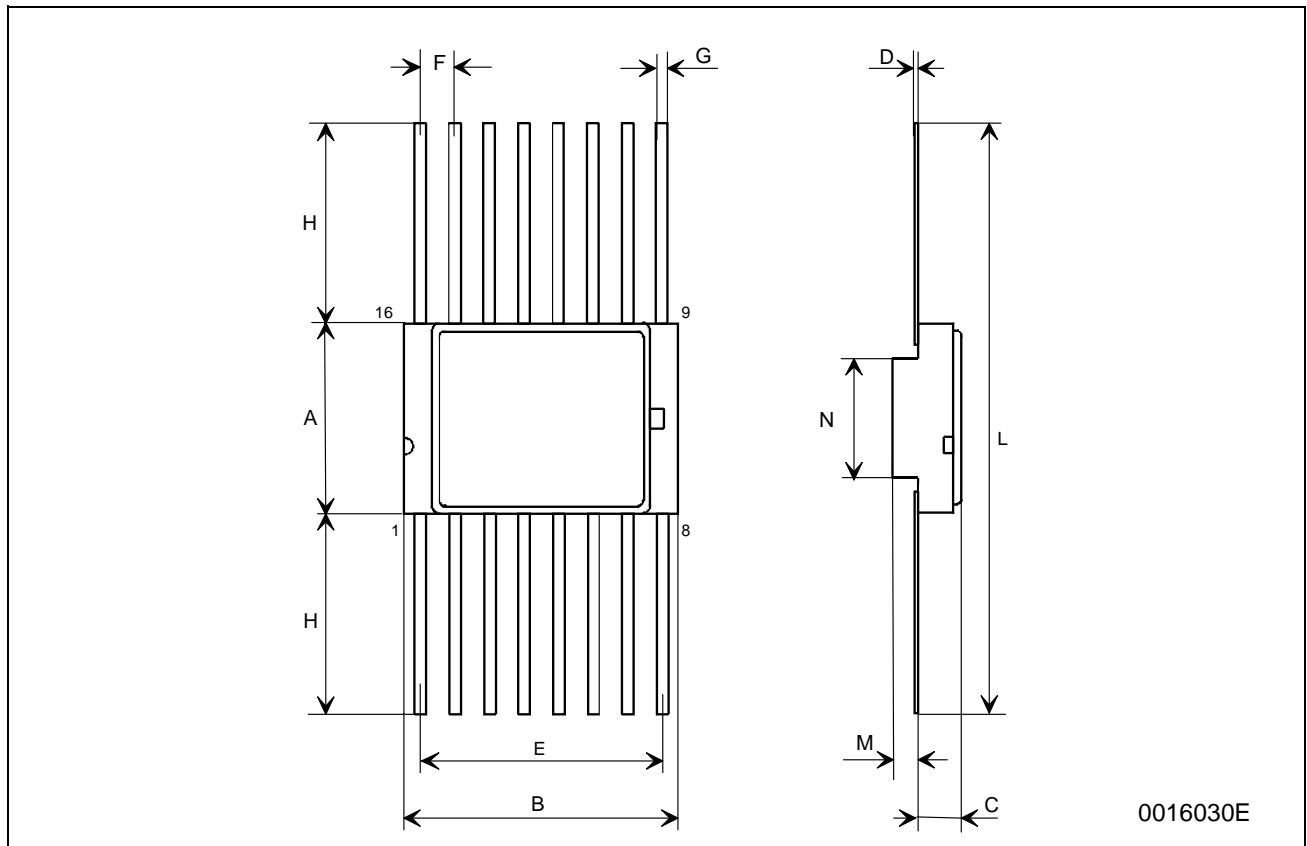
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.1		2.71	0.083		0.107
a1	3.00		3.70	0.118		0.146
a2	0.63	0.88	1.14	0.025	0.035	0.045
B	1.82		2.39	0.072		0.094
b	0.40	0.45	0.50	0.016	0.018	0.020
b1	0.20	0.254	0.30	0.008	0.010	0.012
D	20.06	20.32	20.58	0.790	0.800	0.810
e	7.36	7.62	7.87	0.290	0.300	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

Date	Revision	Description of Changes
30-Apr-2004	1	First Release

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