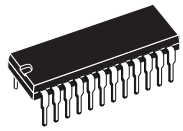
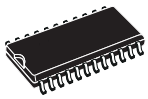
M74HC4515

4 TO 16 LINE DECODER/LATCH (INV.)

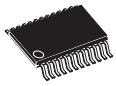
- HIGH SPEED:
  t_{PD}= 20 ns (TYP.) at V_{CC} = 6V
- LOW POWER DISSIPATION:
  I_{CC} = 4µA(MAX.) at T_A=25°C
- HIGH NOISE IMMUNITY:
  $V_{NIH} = V_{NIL}$ = 28 % V_{CC} (MIN.)
- SYMMETRICAL OUTPUT IMPEDANCE:
  $|I_{OH}| = I_{OL}$ = 4mA (MIN)
- BALANCED PROPAGATION DELAYS:
  $t_{PLH} \cong t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE:
  V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 4515



DIP



SOP



TSSOP

ORDER CODES

PACKAGE	TUBE	T & R
DIP	M74HC4515B1R	
SOP	M74HC4515M1R	M74HC4515RM13TR
TSSOP		M74HC4515TTR

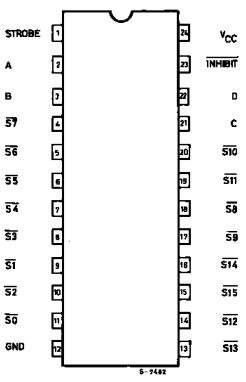
DESCRIPTION

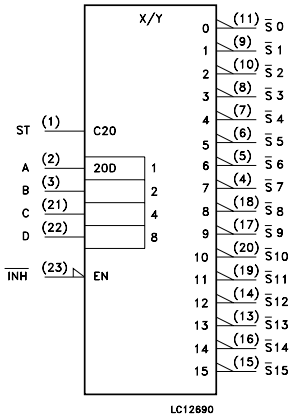
The M74HC4515 is an high speed CMOS 4 LINE TO 16 LINE SEGMENT DECODER WITH LATCHED INPUTS fabricated with silicon gate C^2MOS technology.

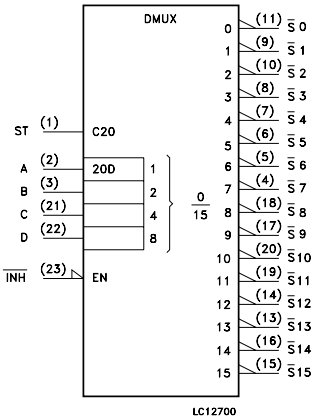
A binary code stored in the four input latches (A to D) provides a low level at the selected one of sixteen outputs excluding the other fifteen outputs, when the inhibit input ($\overline{INHIBIT}$) is held low. When the inhibit input($\overline{INHIBIT}$) is held high, all outputs are kept high level, while the latch function is available. The data applied to the data inputs are transferred to the Q outputs of latches when the strobe input is held high. When the strobe input is taken low, the information data applied to the data input at a time is retained at the output of the latches.

All inputs are equipped with protection circuits against static discharge and transient excess voltage.

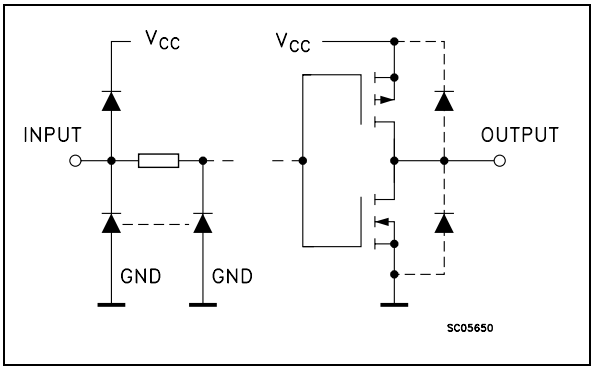
PIN CONNECTION AND IEC LOGIC SYMBOLS







INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

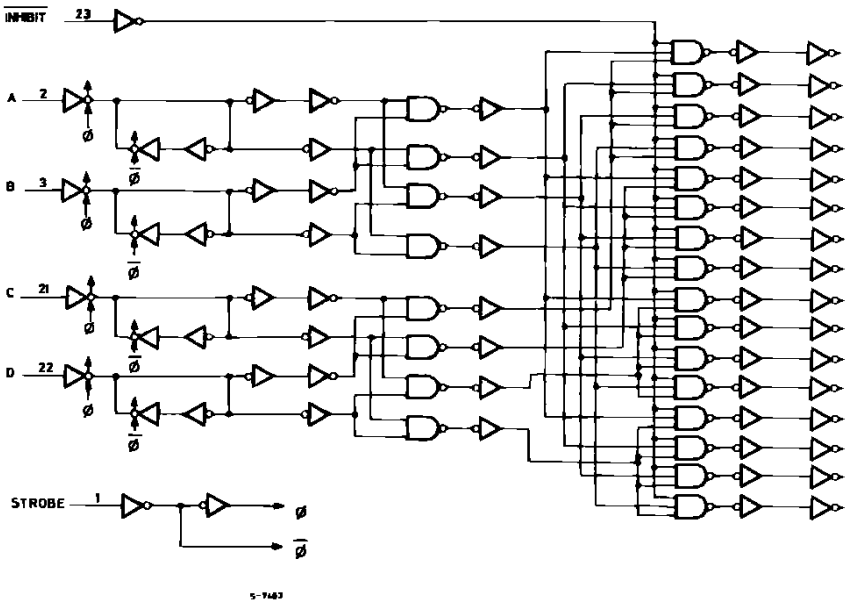
PIN No	SYMBOL	NAME AND FUNCTION
1	STROBE	Strobe Input
2, 3, 21, 22	A to D	Address Inputs
11, 9, 10, 8, 7, 6, 5, 4, 18, 17, 20, 19, 14, 13, 16, 15	$\overline{S0}$ to $\overline{S15}$	Multiplexer Outputs (Active HIGH)
23	$\overline{INHIBIT}$	Enable Input
12	GND	Ground (0V)
24	V_{CC}	Positive Supply Voltage

TRUTH TABLE

INPUTS					STROBE	SELECT OUTPUT
$\overline{INHIBIT}$	A	B	C	D		
L	L	L	L	L	STROBE = "H" Refer to truth table	$\overline{S0}$
L	H	L	L	L		$\overline{S1}$
L	L	H	L	L		$\overline{S2}$
L	H	H	L	L	STROBE = "L" Data at the negative going transition of strobe shall be provided on the each output while strobe is held low.	$\overline{S3}$
L	L	L	H	L		$\overline{S4}$
L	H	L	H	L		$\overline{S5}$
L	L	H	H	L		$\overline{S6}$
L	H	H	H	L		$\overline{S7}$
L	L	L	L	H		$\overline{S8}$
L	H	L	L	H		$\overline{S9}$
L	L	H	L	H		$\overline{S10}$
L	H	H	L	H		$\overline{S11}$
L	L	L	H	H		$\overline{S12}$
L	H	L	H	H		$\overline{S13}$
L	L	H	H	H		$\overline{S14}$
L	H	H	H	H		$\overline{S15}$
H	X	X	X	X		ALL OUTPUTS "H"

X : Don't Care

LOGIC DIAGRAM



This logic diagram has not be used to estimate propagation delays

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	500(*)	mW
T_{stg}	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied
(*) 500mW at 65 °C; derate to 300mW by 10mW/°C from 65°C to 85°C

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

DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°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 µA	1.9	2.0		1.9		1.9		V
		4.5	I_O=-20 µA	4.4	4.5		4.4		4.4		
		6.0	I_O=-20 µA	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 µA		0.0	0.1		0.1		0.1	V
		4.5	I_O=20 µA		0.0	0.1		0.1		0.1	
		6.0	I_O=20 µA		0.0	0.1		0.1		0.1	
		4.5	I_O=4.0 mA		0.17	0.26		0.37		0.40	
		6.0	I_O=5.2 mA		0.18	0.26		0.37		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

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input $t_r = t_f$ = 6ns)

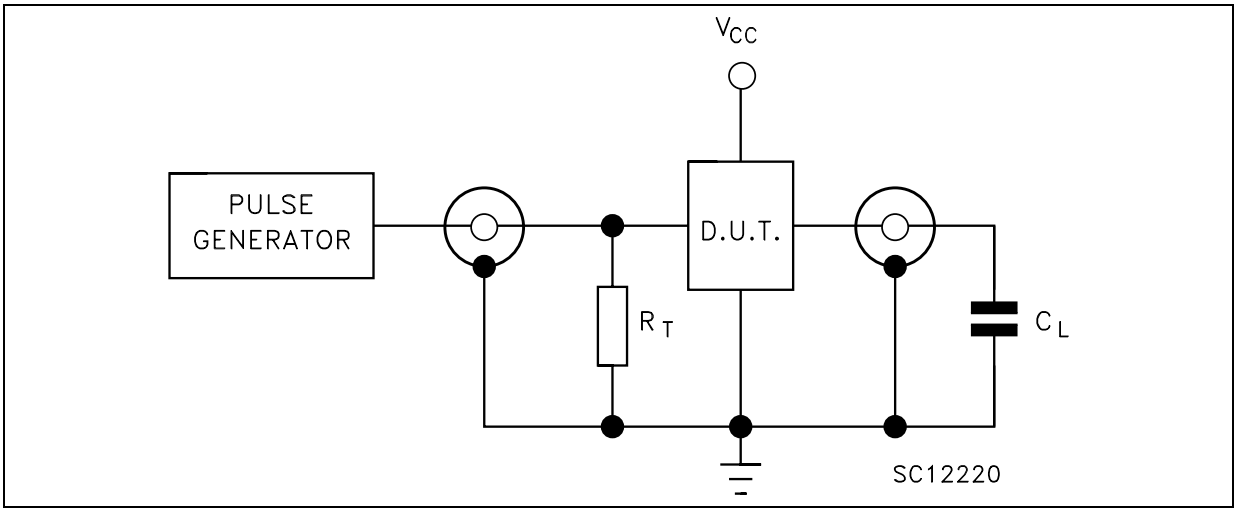
Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{TLH} t_{THL}	Output Transition Time	2.0			30	75		95		110	ns
		4.5			8	15		19		25	
		6.0			7	13		16		23	
t_{PLH} t_{PHL}	Propagation Delay Time (DATA , $\overline{Sn}$.)	2.0			65	175		220		230	ns
		4.5			22	35		44		56	
		6.0			19	30		37		45	
t_{PLH} t_{PHL}	Propagation Delay Time (STROBE, $\overline{Sn}$.)	2.0			75	175		220		260	ns
		4.5			24	35		44		56	
		6.0			20	30		37		45	
t_{PLH} t_{PHL}	Propagation Delay Time ($\overline{INHIBIT}$, $\overline{Sn}$.)	2.0			60	175		220		260	ns
		4.5			20	35		44		56	
		6.0			17	30		37		45	
$t_{W(L)}$	Minimum Pulse Width (STROBE)	2.0			14	75		95		110	ns
		4.5			6	15		19		26	
		6.0			6	13		16		23	
t_s	Minimum Set Up Time (DATA)	2.0			10	50		65		80	ns
		4.5			2	10		13		20	
		6.0			1	9		11		17	
t_h	Minimum Hold Time (DATA)	2.0				5		5		5	ns
		4.5				5		5		5	
		6.0				5		5		5	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
C_{IN}	Input Capacitance				5	10		10		10	pF
C_{PD}	Power Dissipation Capacitance (note 1)				61						pF

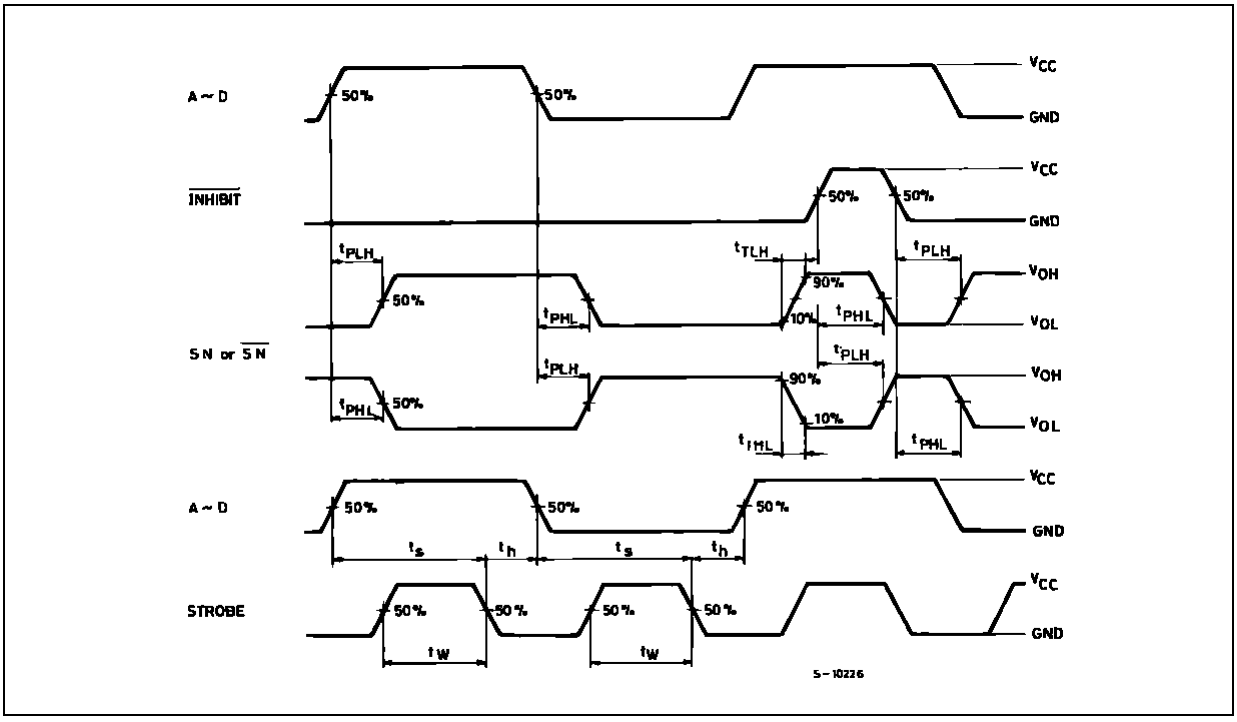
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

TEST CIRCUIT



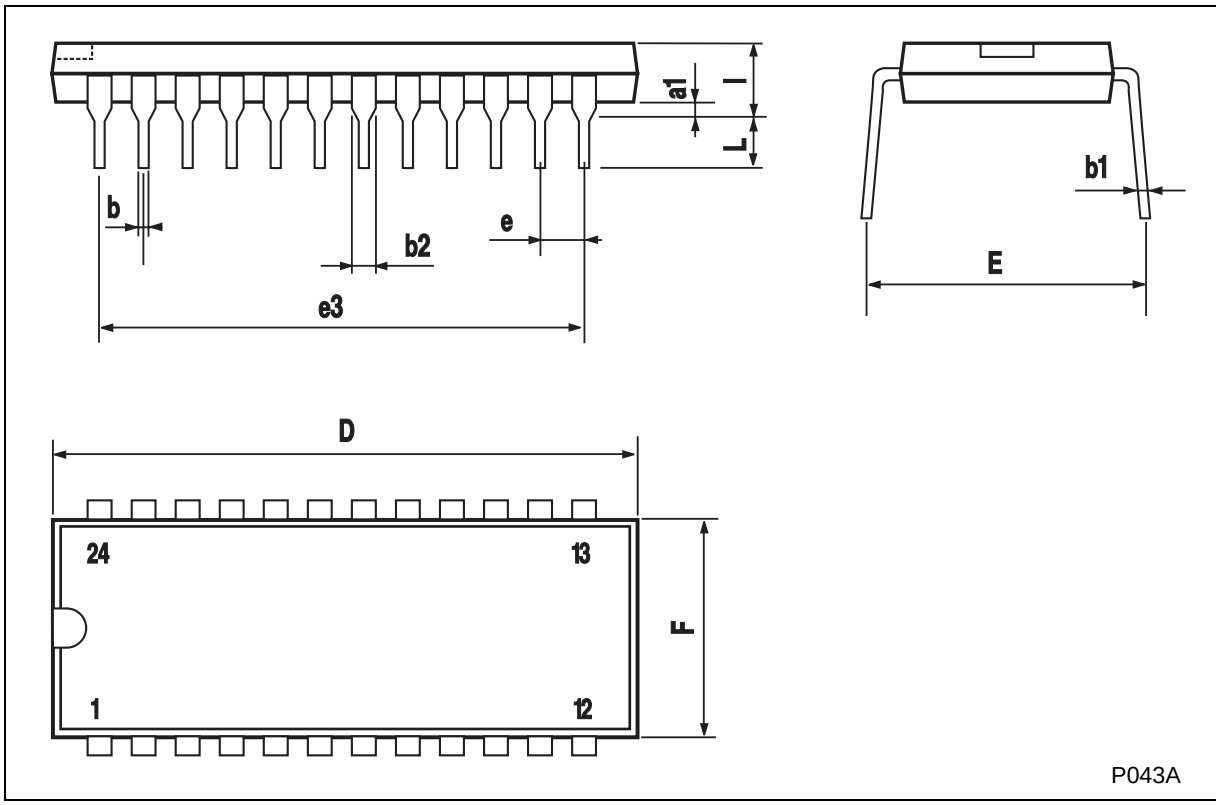
C_L = 50pF or equivalent (includes jig and probe capacitance)
R_T = Z_{OUT} of pulse generator (typically 50Ω)

SWITCHING CHARACTERISTICS TEST WAVEFORM (f=1MHz; 50% duty cycle)



Plastic DIP-24 (0.25) MECHANICAL DATA

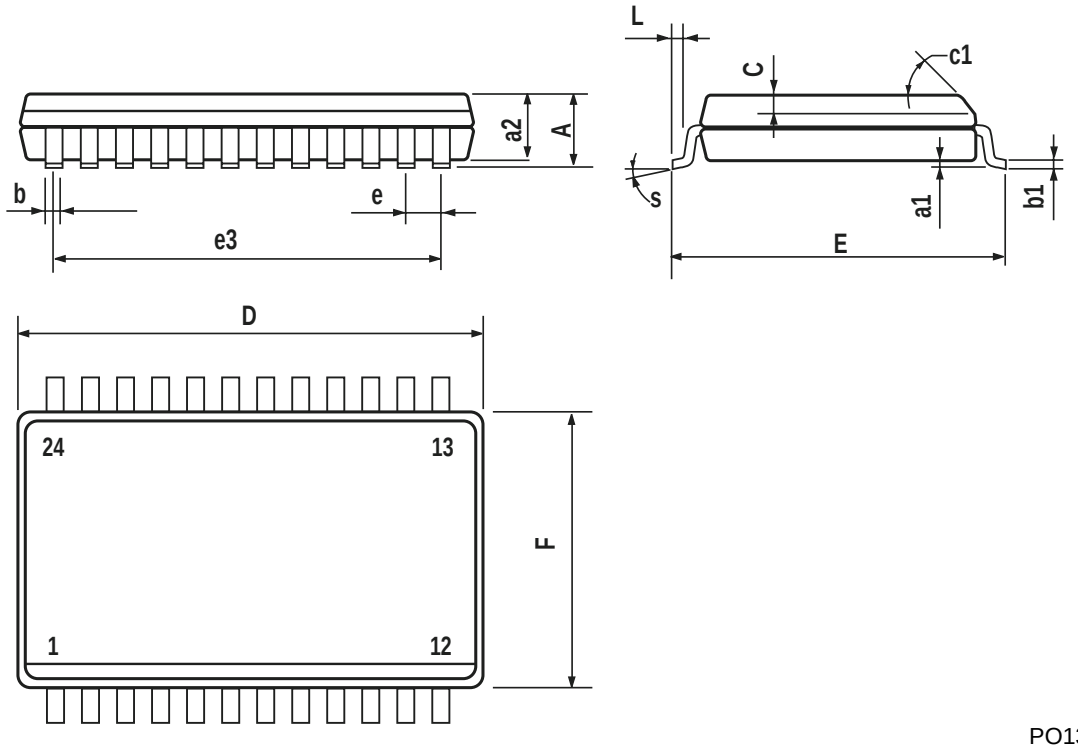
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1		0.63			0.025	
b		0.45			0.018	
b1	0.23		0.31	0.009		0.012
b2		1.27			0.500	
D			32.2			1.268
E	15.2		16.68	0.598		0.657
e		2.54			0.100	
e3		27.94			1.100	
F			14.1			0.555
I		4.445			0.175	
L		3.3			0.130	



P043A

SO-24 MECHANICAL DATA

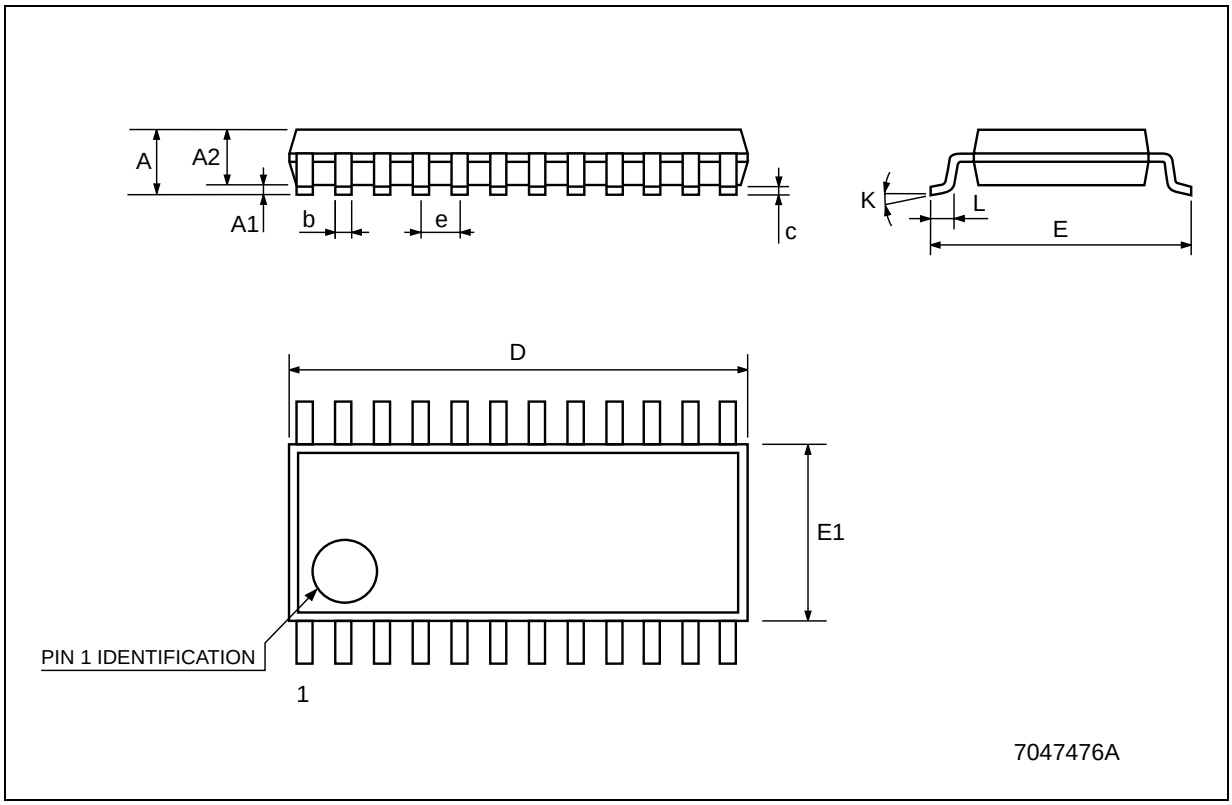
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.1		0.2	0.004		0.008
a2			2.45			0.096
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.012
C		0.5			0.020	
c1	45° (typ.)					
D	15.20		15.60	0.598		0.614
E	10.00		10.65	0.393		0.419
e		1.27			0.050	
e3		13.97			0.550	
F	7.40		7.60	0.291		0.300
L	0.50		1.27	0.020		0.050
S	8° (max.)					



PO13T

TSSOP24 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.1			0.043
A1	0.05		0.15	0.002		0.006
A2		0.9			0.035	
b	0.19		0.30	0.0075		0.0118
c	0.09		0.20	0.0035		0.0079
D	7.7		7.9	0.303		0.311
E	6.25		6.5	0.246		0.256
E1	4.3		4.5	0.169		0.177
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.50		0.70	0.020		0.028



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