

QUAD 2 CHANNEL MULTIPLEXER

- HIGH SPEED:
 $t_{PD} = 10ns$ (TYP.) at $V_{CC} = 6V$
- LOW POWER DISSIPATION:
 $I_{CC} = 4\mu A$ (MAX.) at $T_A = 25^\circ C$
- 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 157



ORDER CODES

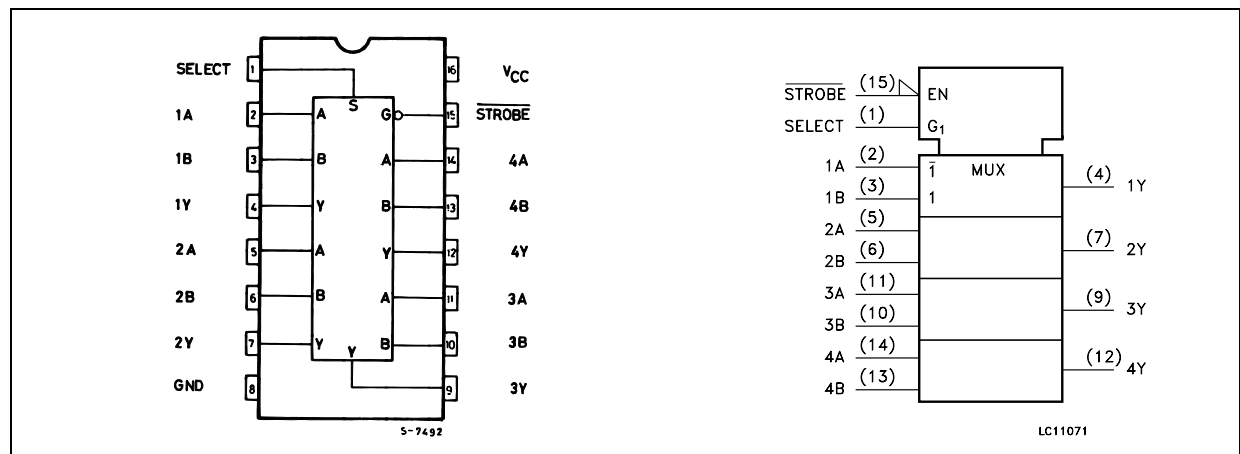
PACKAGE	TUBE	T & R
DIP	M74HC157B1R	
SOP	M74HC157M1R	M74HC157RM13TR
TSSOP		M74HC157TTR

DESCRIPTION

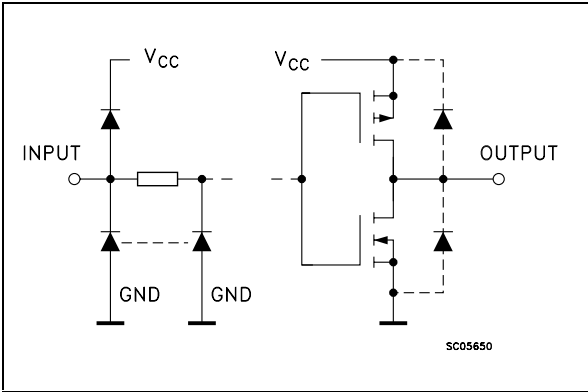
The M74HC157 is an high speed CMOS QUAD 2 CHANNEL MULTIPLEXER fabricated with silicon gate C²MOS technology. These device consist of four 2-input digital multiplexer with common select and strobe inputs. When the STROBE input is held high, selection of data is inhibited and all the outputs become low.

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 AND IEC LOGIC SYMBOLS



INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

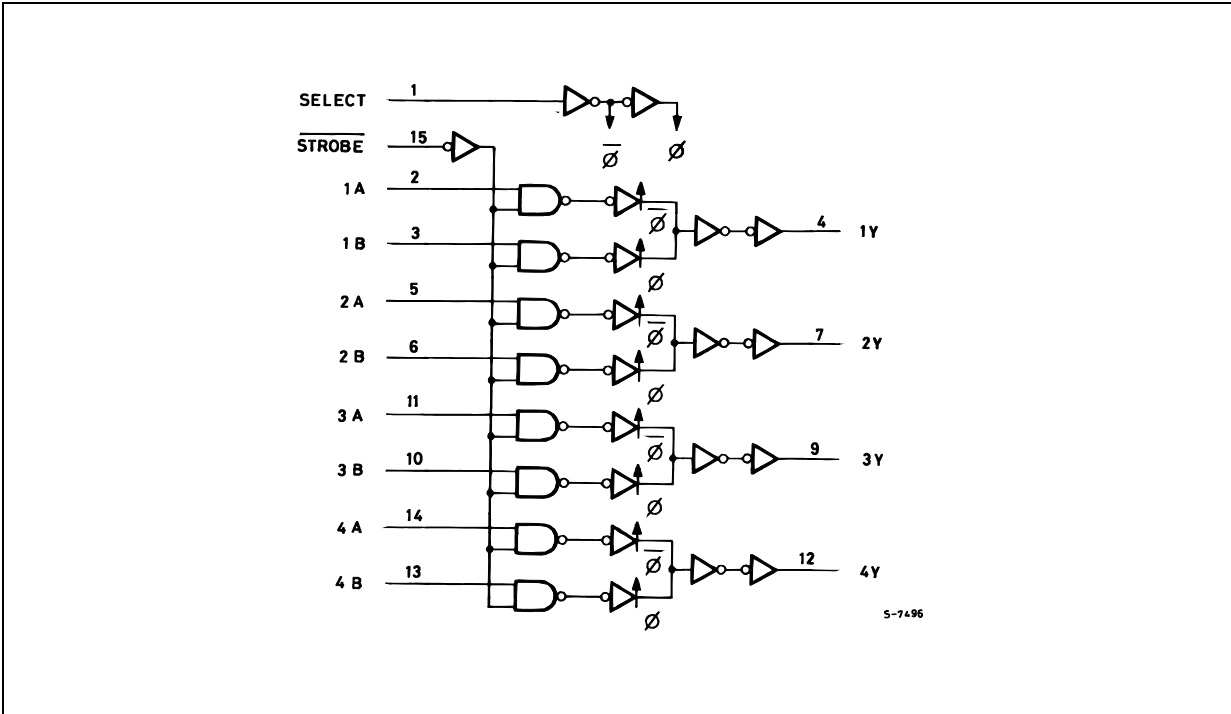
PIN No	SYMBOL	NAME AND FUNCTION
1	SELECT	Common Data Select Input
2, 5, 11, 14	1A to 4A	Data Inputs From Source A
3, 6, 10, 13	1B to 4B	Data Inputs From Source B
4, 7, 9, 12	1Y to 4Y	Multiplexer Output
15	STROBE	Strobe Inputs
8	GND	Ground (0V)
16	V _{CC}	Positive Supply Voltage

TRUTH TABLE

INPUTS				OUTPUTS
<u>STROBE</u>	SELECT	A	B	Y
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

X : Don't Care

LOGIC DIAGRAM



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		0.33		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, $\overline{G}$ inputAC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input t_r = t_f = 6ns)

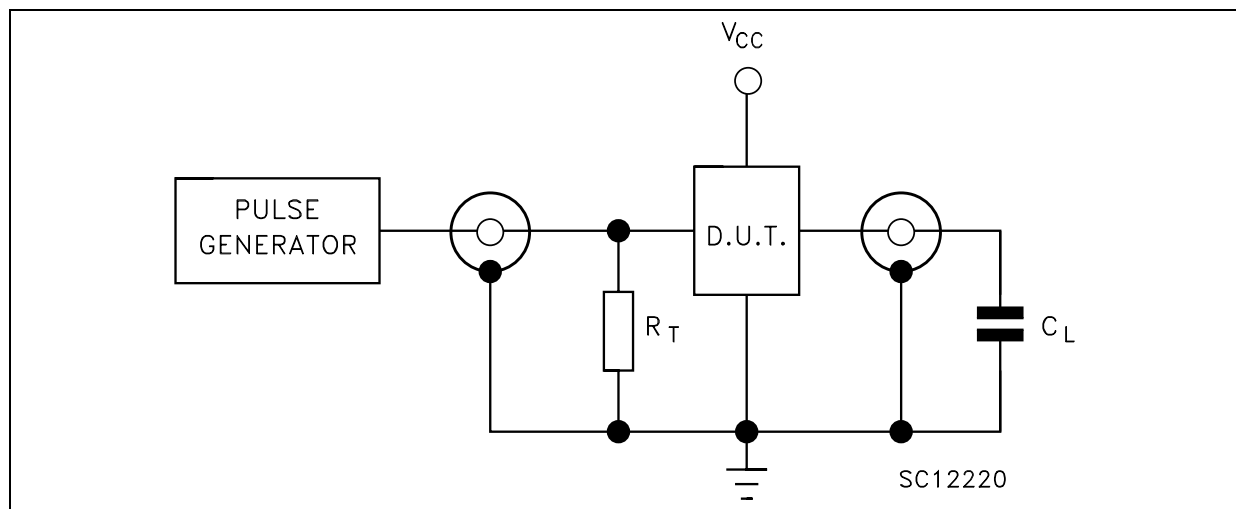
Symbol	Parameter	Test Condition		Value						Unit	
		V _{CC} (V)		T _A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t _{TLH} t _{THL}	Output Transition Time	2.0			30	75		95		110	ns
		4.5			8	15		19		22	
		6.0			7	13		16		19	
t _{PLH} t _{PHL}	Propagation Delay Time (A, 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	

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	5.0			5	10		10		10	pF
C _{PD}	Power Dissipation Capacitance (note 1)	5.0			47						pF

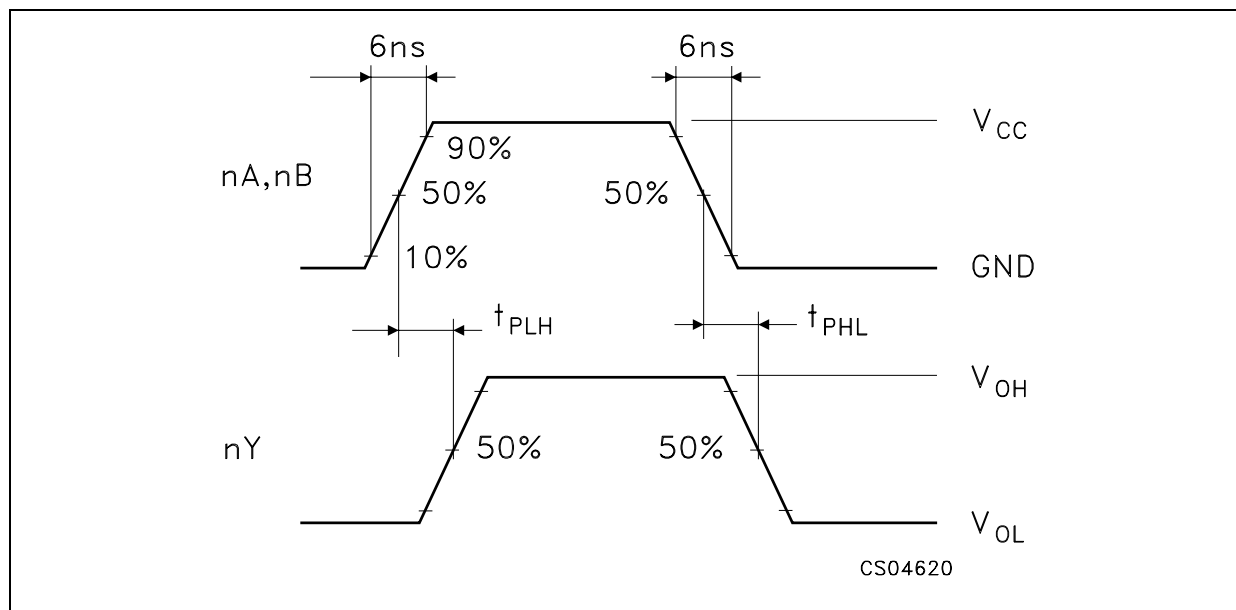
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/4$ (per channel)

TEST CIRCUIT



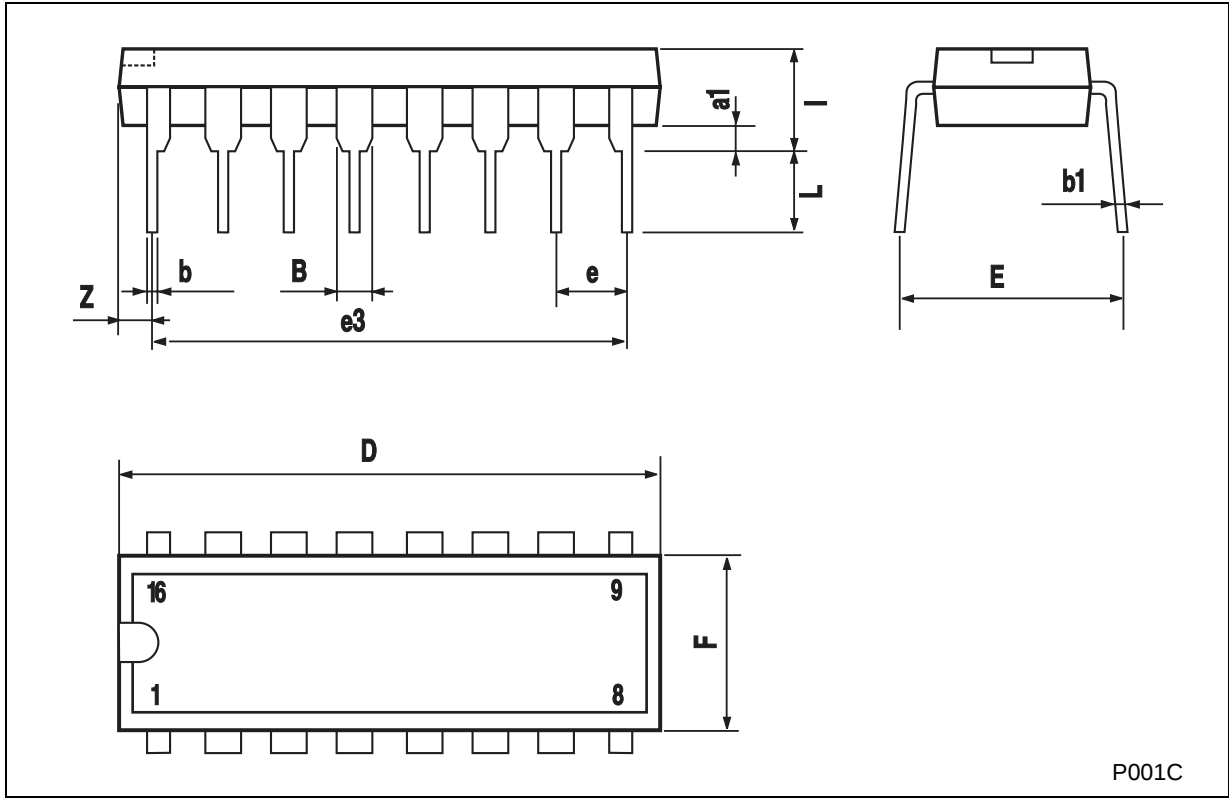
C_L = 50pF or equivalent (includes jig and probe capacitance)
R_T = Z_{OUT} of pulse generator (typically 50Ω)

WAVEFORM : PROPAGATION DELAY TIMES (f=1MHz; 50% duty cycle)



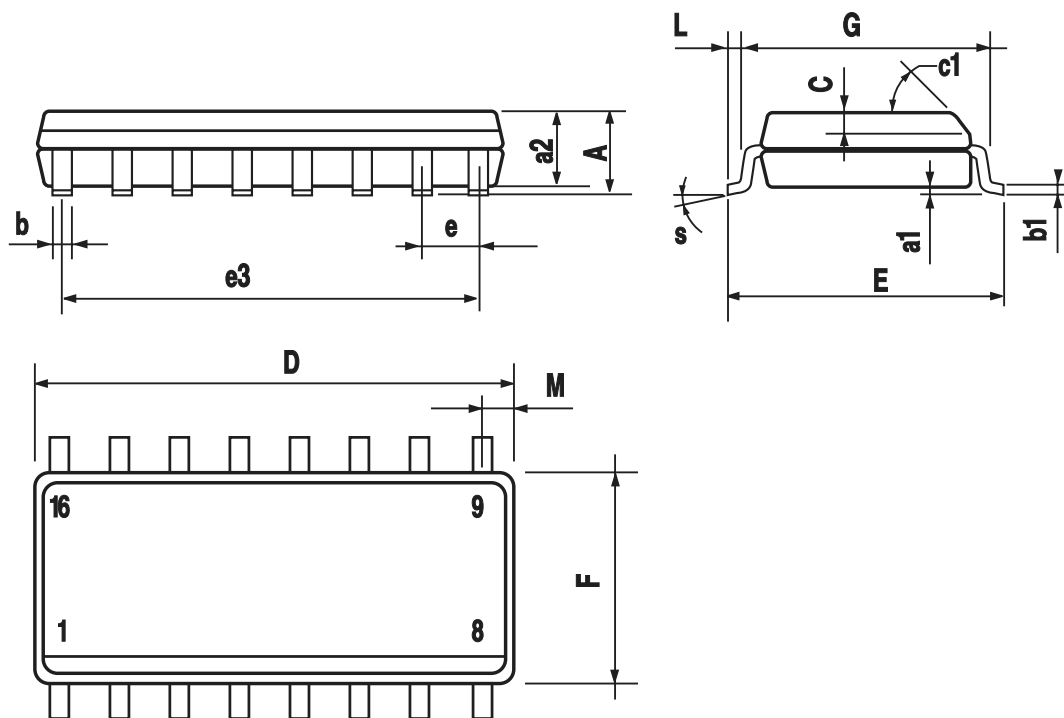
Plastic DIP-16 (0.25) MECHANICAL DATA

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



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

TSSOP16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0089
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030



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