

74HC74 Dual D-Type Positive-Edge-Triggered Flip-Flops With Clear and Preset

1. General Description

1.1 Description

The 74HC74 series devices contain two independent D-type positive-edge-triggered flip-flops with asynchronous preset and clear pins for each.

1.2 Features

- Buffered inputs
- Wide operating voltage range of 2V to 6V
- Wide operating temperature range: -40°C to +85°C

- Supports fanout up to 10 LSTTL loads
- Significant power reduction compared to LSTTL logic ICs

1.3 Device Information

PART NUMBER	PACKAGE
74HC74	DIP
	SOP
	SSOP
	TSSOP

2. Connection Diagrams and Pin Description

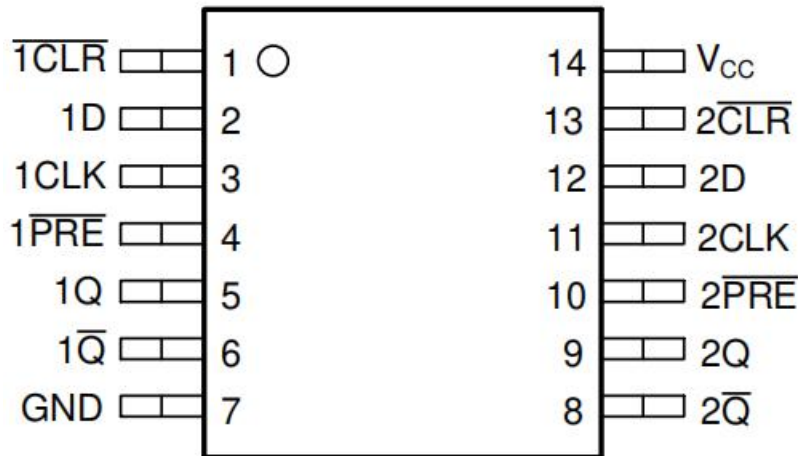


Figure 2.1: Top View



PIN No.	NAME	I/O	FUNCTION
1	$\overline{1CLR}$	I	Clear Input, Active Low
2	1D	I	Data Input
3	1CLK	I	Positive Edge Triggered Clock Input
4	$\overline{1PRE}$	I	Preset Input, Active Low
5	1Q	O	Data Output
6	$\overline{1Q}$	O	Data Inverted Output
7	GND		Ground
8	$\overline{2Q}$	O	Data Inverted Output
9	2Q	O	Data Output
10	$\overline{2PRE}$	I	Preset Input, Active Low
11	2CLK	I	Positive Edge Triggered Clock Input
12	2D	I	Data Input
13	$\overline{2CLR}$	I	Clear Input, Active Low
14	VCC		Supply Voltage

3. System Diagram

3.1 Logic Diagram

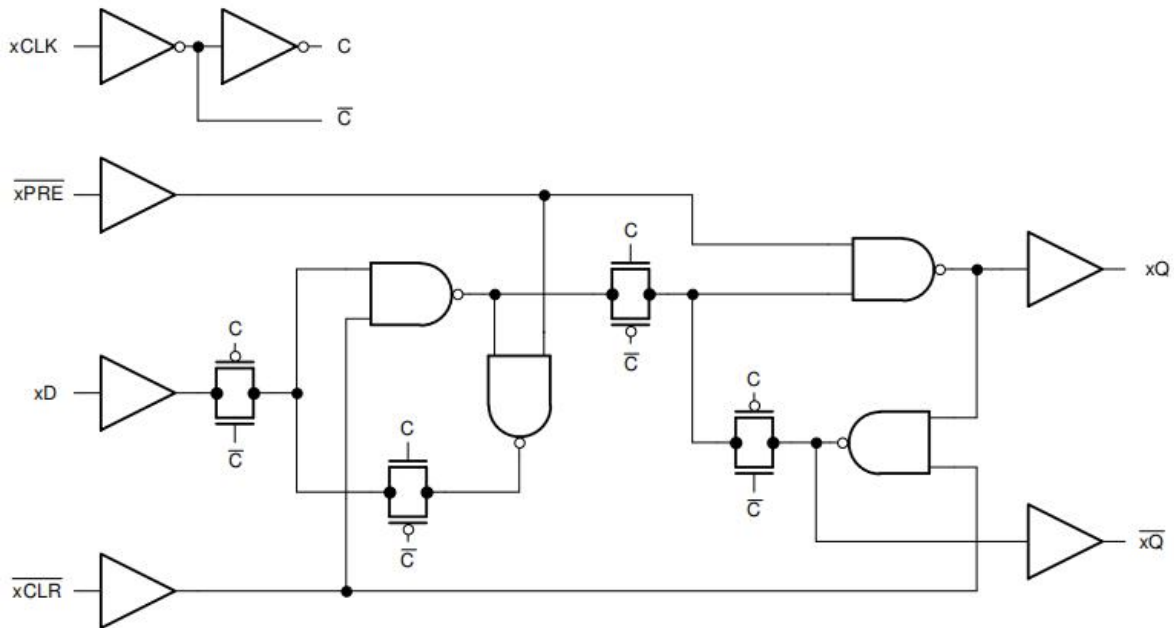


Figure 3.1: 74HC74 Logic Diagram

3.2 Function Table

Input				Output	
$\overline{\text{PRE}}$	$\overline{\text{CLR}}$	CLK	D	Q	$\overline{\text{Q}}$
0	1	X	X	1	0
1	0	X	X	0	1
0	0	X	X	1 ⁽¹⁾	1 ⁽¹⁾
1	1	↑	1	1	0
1	1	↑	0	0	1
1	1	0	X	Q0	$\overline{\text{Q0}}$

X = don't care, 1=High State, 0=Low State, ↑=positive-going transition

- (1) This configuration is nonstable; that is, it does not persist when $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ returns to its inactive (high) level.

4. Specifications

4.1 Absolute Maximum Ratings

Symbol	Parameter	MIN	MAX	Unit
V_{CC}	Supply Voltage	-0.5	7	V
P_D	Power Dissipation		500	mW
T_J	Junction Temperature		125	°C
T_{OP}	Operating Temperature	-40	85	°C

Absolute maximum ratings are those values beyond which the device could be permanently damaged. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under normal operating conditions.



4.2 Recommended Operating Conditions

Symbol	Parameter	Test Condition	MIN	NOM	MAX	Unit
V_{CC}	Supply Voltage		2	5	6	V
V_{IH}	High Level Input Voltage	$V_{CC}=2V$	1.5			V
		$V_{CC}=4.5V$	3.15			V
		$V_{CC}=6V$	4.2			V
V_{IL}	Low Level Input Voltage	$V_{CC}=2V$			0.5	V
		$V_{CC}=4.5V$			1.35	V
		$V_{CC}=6V$			1.8	V
V_I	Input voltage		0		V_{CC}	V

4.3 Electrical Characteristics

($T_a=25^{\circ}C$, voltages are referenced to GND (ground=0V), unless otherwise specified)

Symbol	Parameter	Test Condition	MIN	TYP	MAX	Unit
V_{OH}	High Level Output Voltage	$V_{CC}=2V, I_o=-20\mu A$	1.9	--	--	V
		$V_{CC}=4.5V, I_o=-20\mu A$	4.4	--	--	V
		$V_{CC}=6V, I_o=-20\mu A$	5.9	--	--	V
		$V_{CC}=4.5V, I_o=-4mA$	4.0	--	--	V
		$V_{CC}=6V, I_o=-5.2mA$	5.5	--	--	V
V_{OL}	Low Level Output Voltage	$V_{CC}=2V, I_o=20\mu A$	--	--	0.1	V
		$V_{CC}=4.5V, I_o=20\mu A$	--	--	0.1	V
		$V_{CC}=6V, I_o=20\mu A$	--	--	0.1	V
		$V_{CC}=4.5V, I_o=4mA$	--	--	0.26	V
		$V_{CC}=6V, I_o=5.2mA$	--	--	0.26	V
I_I	Input Leakage Current	$V_{CC}=6V, V_I=V_{CC}$ or GND	--	0	± 1	μA
I_{CC}	Quiescent Supply Current	$V_{CC}=6V, V_I=V_{CC}/GND$	--	0	10	μA

5. Application Information

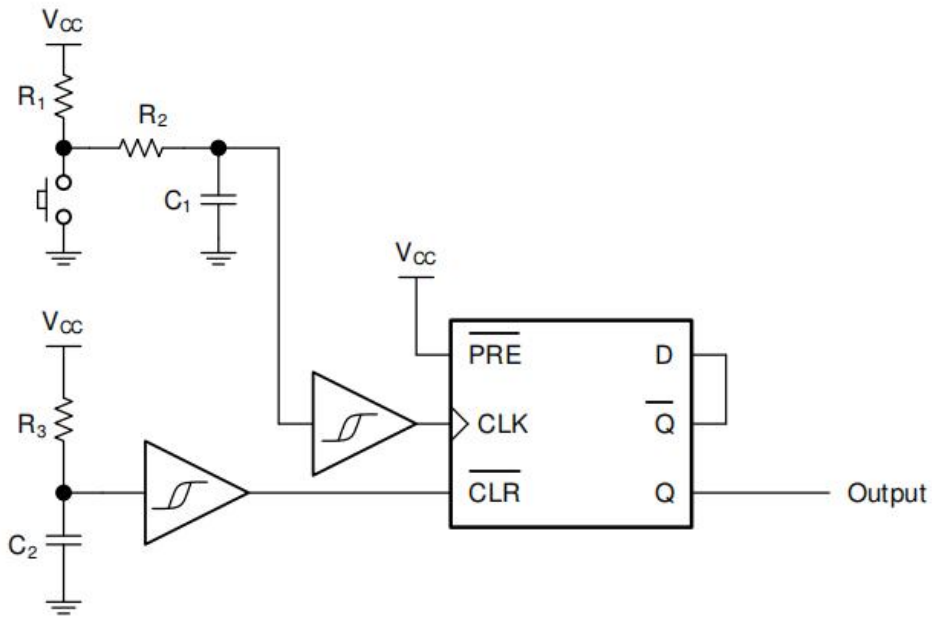


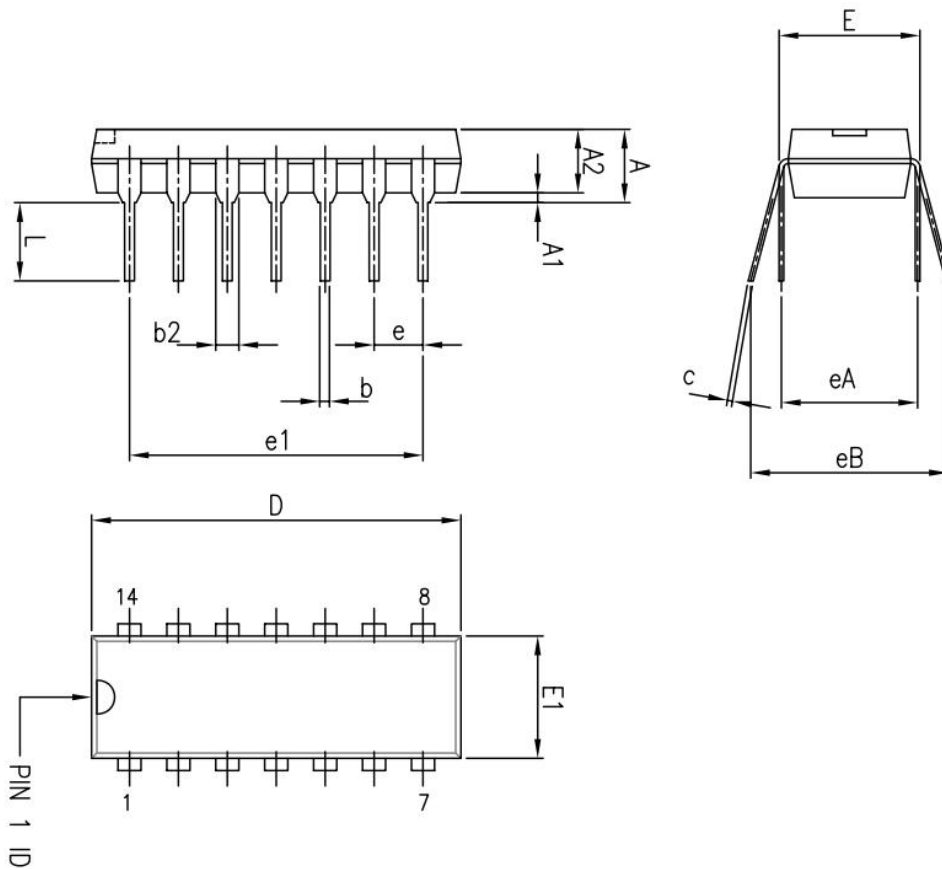
Figure 5.1: Typical application schematic

6. Ordering Information

Orderable Device	Package Type	Pins	Packing	Package Qty
74HC74ND14ATBE	DIP	14	Tube	25
74HC74NS14ARDQ	SOP	14	Tape & Reel	4000
74HC74SS14ARBQ	SSOP	14	Tape & Reel	2000
74HC74TS14ARDQ	TSSOP	14	Tape & Reel	4000

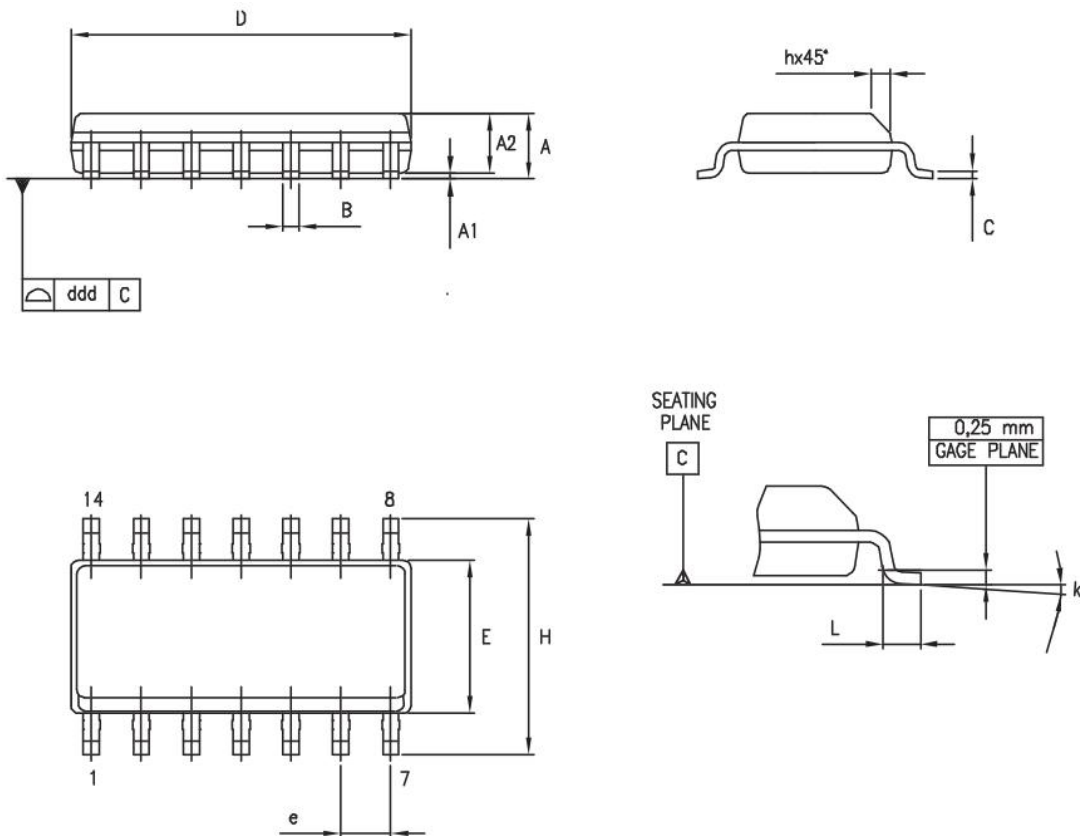
7. Package Information

7.1 DIP14



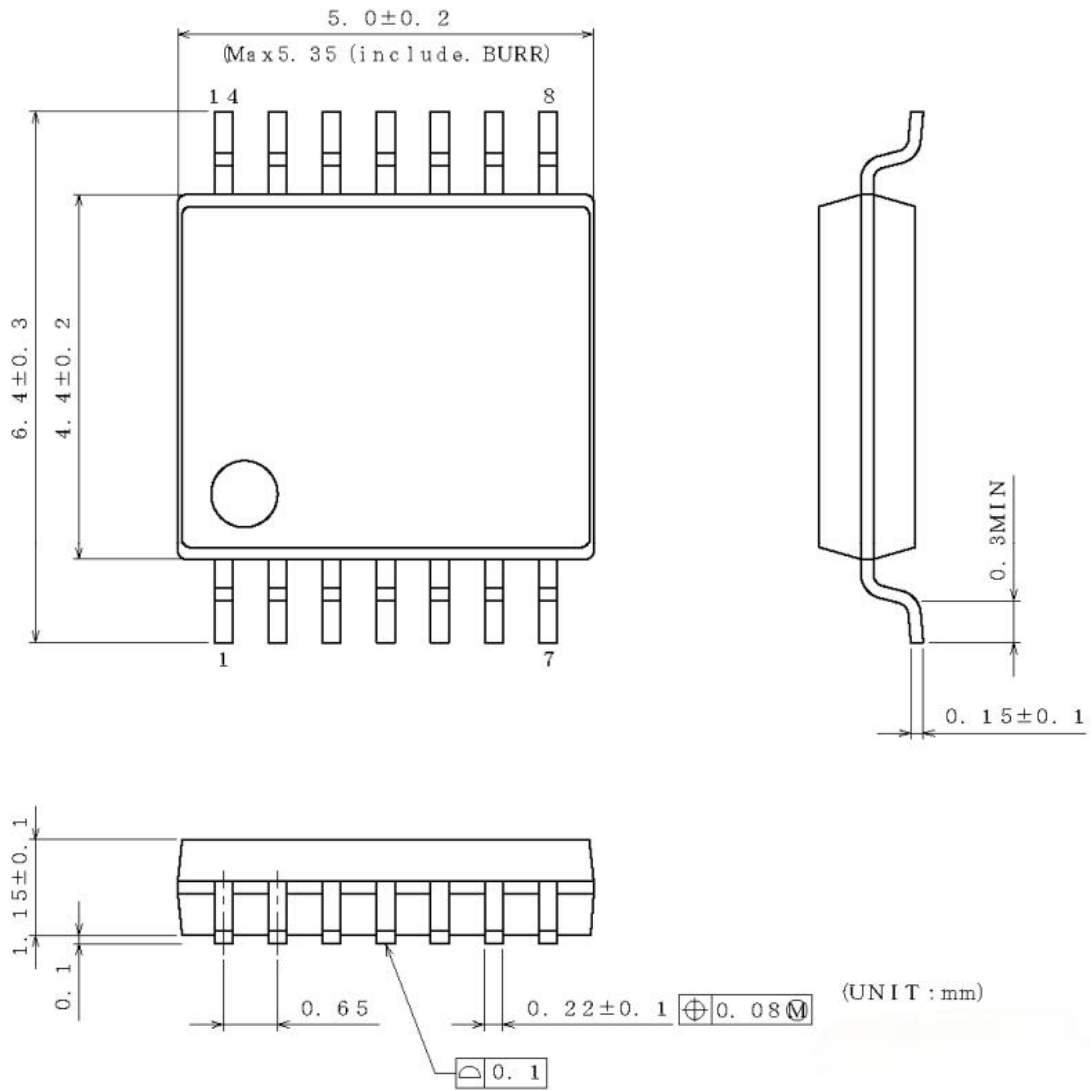
Dimensions						
Ref.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5.33			0.21
A1	0.38			0.015		
A2	2.92	3.30	4.95	0.11	0.13	0.19
b	0.36	0.46	0.56	0.014	0.018	0.022
b2	1.14	1.52	1.78	0.04	0.06	0.07
c	0.20	0.25	0.36	0.007	0.009	0.01
D	18.67	19.05	19.69	0.73	0.75	0.77
E	7.62	7.87	8.26	0.30	0.31	0.32
E1	6.10	6.35	7.11	0.24	0.25	0.28
e		2.54			0.10	
e1		15.24			0.60	
eA		7.62			0.30	
eB			10.92			0.43
L	2.92	3.30	3.81	0.11	0.13	0.15

7.2 SOP14

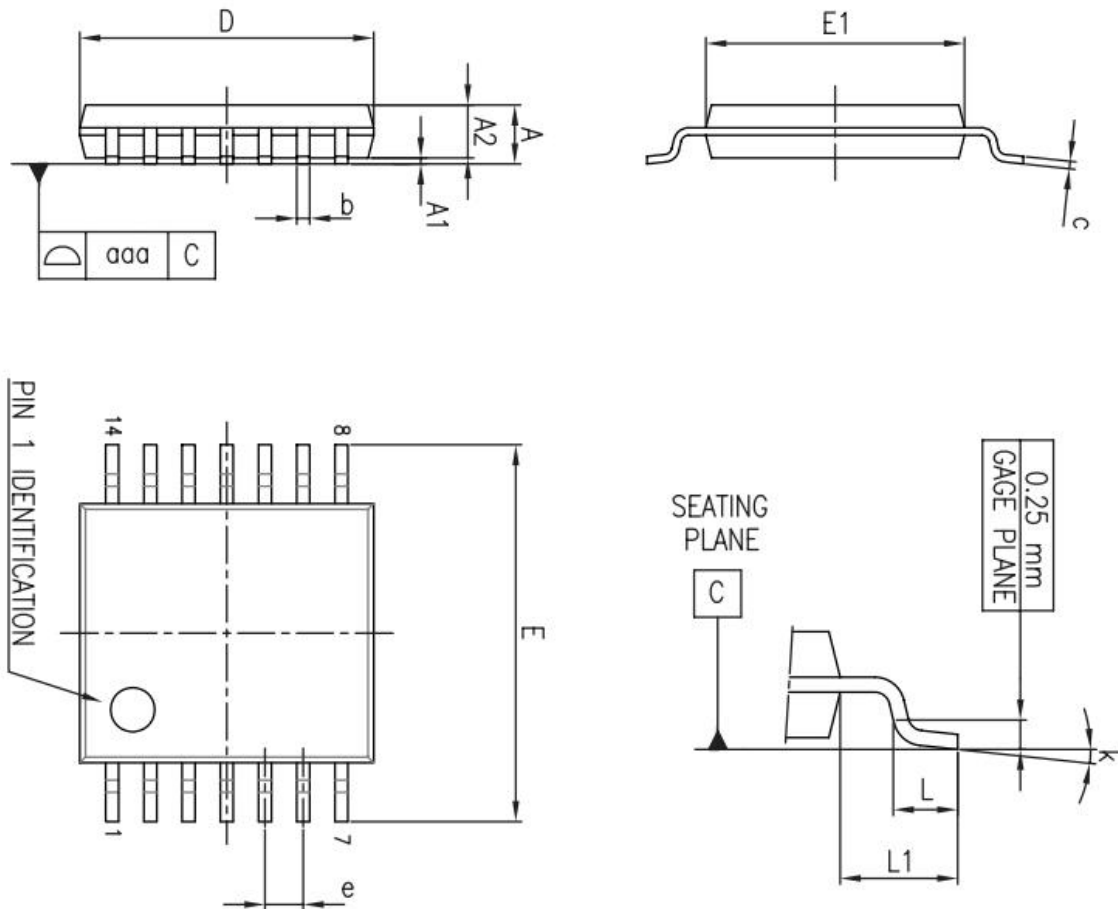


Dimensions						
Ref.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.75	0.05		0.068
A1	0.10		0.25	0.004		0.009
A2	1.10		1.65	0.04		0.06
B	0.33		0.51	0.01		0.02
C	0.19		0.25	0.007		0.009
D	8.55		8.75	0.33		0.34
E	3.80		4.0	0.15		0.15
e		1.27			0.05	
H	5.80		6.20	0.22		0.24
h	0.25		0.50	0.009		0.02
L	0.40		1.27	0.015		0.05
k	8° (max.)					
ddd			0.10			0.004

7.3 SSOP14



7.4 TSSOP14



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.20			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.80	1.00	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	4.90	5.00	5.10	0.193	0.197	0.201
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.176
e		0.65			0.0256	
L	0.45	0.60	0.75	0.018	0.024	0.030
L1		1.00			0.039	
k	0°		8°	0°		8°
aaa			0.10			0.004