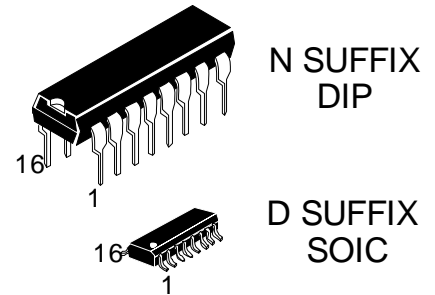


**MICROCIRCUIT HT3232AN, HT3232AR INTERFACE  
 TRANSCEIVER OF THE SERIAL DATA OF THE STANDARD RS -232  
 (compatible to MAX3232 (MAXIM USA))**

Microcircuits HT3232A is interface transceiver of serial data under RS - 232 standard with single power supply source & bipolar output voltage of transmitter, forming by build-in voltage multiplier on 4 external capacities, 0.1  $\mu$ F. HT3232A correspond to EIA/TIA-232E, V.28 standard and is purposed for application in modern high efficient calculating systems with the wide range of supply voltage, fast-operating electronic devices with high level of fidelity of information exchange among distant devices.



N SUFFIX  
DIP

D SUFFIX  
SOIC

**IC marking in package**

HT3232AN Plastic DIP

HT3232AR SOIC

$T_A =$  from  $-40$  to  $85$  °C

For all packages

**Functions and structure:**

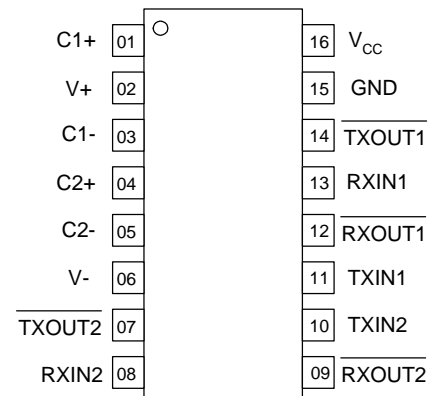
- Microcircuit contains 2 transmitters and 2 receivers of the serial data of the standard RS-232.
- The microcircuit supply voltage range is from 3.0 to 5.5 V.
- The microcircuits is available in 16-pin DIP-package (MS-001BB). 16-pin SO-package (MS-012AC).

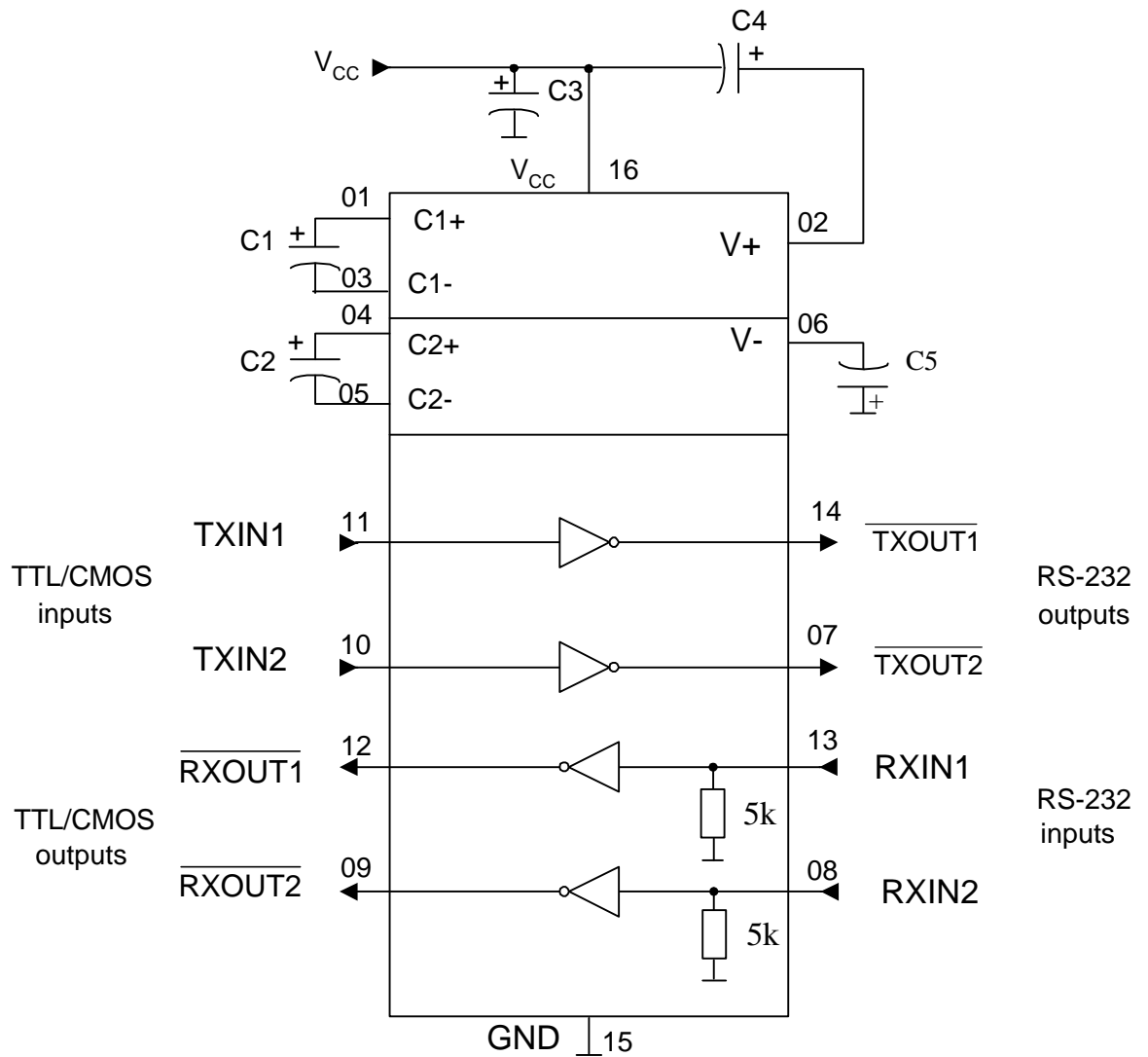
**Truth Table**

Input	Output
RXIN, TXIN	$\overline{\text{RXOUT}}, \overline{\text{TXOUT}}$
H	L
L	H

Note –  
 L – low voltage level;  
 H – high voltage level

**Pinning**



**Functional diagram**


C1 – capacitor  $0.1 \mu\text{F} \pm 10\%$  for  $U_{\text{CC}} = 3.3 \text{ V} \pm 10\%$  ( $0.047 \mu\text{F} \pm 10\%$  for  $U_{\text{CC}} = 5.0 \text{ V} \pm 10\%$ )

C2, C4, C5– capacitors  $0.1 \mu\text{F} \pm 10\%$  for  $U_{\text{CC}} = 3.3 \text{ V} \pm 10\%$  ( $0.33 \mu\text{F} \pm 10\%$  for  $U_{\text{CC}} = 5.0 \text{ V} \pm 10\%$ )

C3 – capacitor  $0.1 \mu\text{F} \pm 10\%$

**Pin description table**

Pin number	Pin description	Symbol
01	Positive terminal of the voltage multiplier charge-pump capacitor	C1+
02	Positive voltage multiplier output	V+
03	Negative terminal of the voltage multiplier charge-pump capacitor	C1-
04	Positive terminal of the voltage multiplier charge-pump capacitor	C2+
05	Negative terminal of the voltage multiplier charge-pump capacitor	C2-
06	Negative voltage multiplier output	V-
07	Transmitter output (RS-232 levels)	$\overline{\text{TXOUT2}}$
08	Receiver input (RS-232 levels)	RXIN2
09	Receiver output (TTL/CMOS levels)	$\overline{\text{RXOUT2}}$
10	Transmitter input (TTL/CMOS levels)	TXIN2
11	Transmitter input (TTL/CMOS levels)	TXIN1
12	Receiver output (TTL/CMOS levels)	$\overline{\text{RXOUT1}}$
13	Receiver input (RS-232 levels)	RXIN1
14	Transmitter output (RS-232 levels)	$\overline{\text{TXOUT1}}$
15	Common pin	GND
16	Supply voltage	V <sub>CC</sub>

**Maximum Ratings & Recommended Operating Conditions**

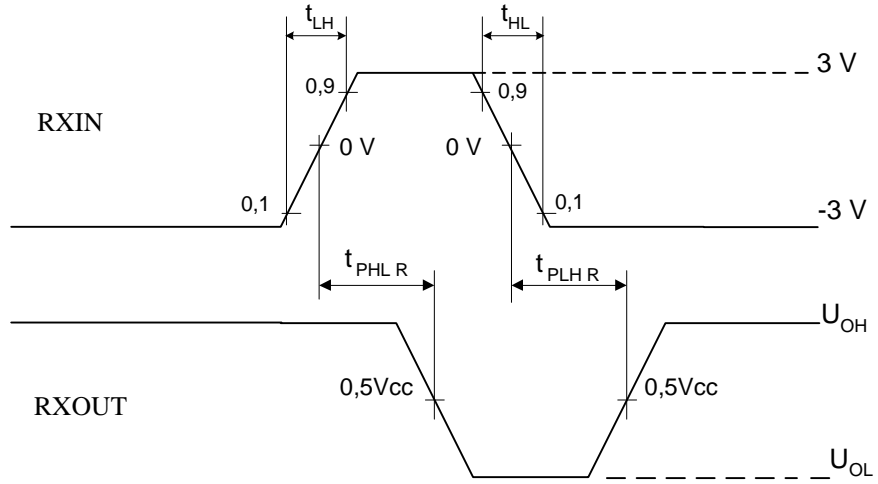
Parameter, unit	Symbol	Recommended operating conditions		Maximum rate	
		min	max	min	max
Supply voltage, V	U <sub>CC</sub>	3.0	5.5	-0.3	6.0
Voltage applied to transmitter output, V	U <sub>OT</sub>	–	–	-13.2	13.2
Multiplier positive output voltage, V	U+	5.0	–	-0.3	7.0
Multiplier negative output voltage, V	U-	-5.0	–	-7.0	0.3
Receiver input voltage, V	U <sub>IR</sub>	-25	25	-25	25
Receiver output voltage, V	U <sub>OR</sub>	–	–	-0.3	U <sub>CC</sub> +0.3
Transmitter low level input voltage, V	U <sub>IL</sub>	0	0.8	-0.3	–
Transmitter high level input voltage, V	U <sub>IH</sub>	2.0 (U <sub>CC</sub> =3.3 V)	U <sub>CC</sub>	–	6
		2.4 (U <sub>CC</sub> =5.0 V)			
Multiplier outputs voltages difference, V	U <sub>+</sub> + U <sub>-</sub>	–	–	–	13
Receiver low level threshold input voltage, V	U <sub>ITL</sub>	0.6 (U <sub>CC</sub> =3.3 V)	–	–	–
		0.8 (U <sub>CC</sub> =5.0 V)			
Receiver high level threshold input voltage, V	U <sub>ITH</sub>	–	2.4	–	–

**Electric parameters**

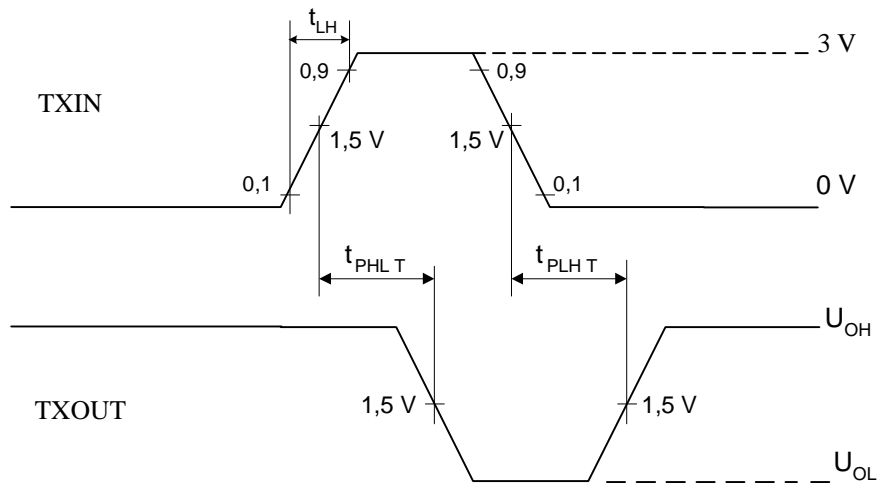
Parameter, unit	Symbol	Norm		Mode	T <sub>A</sub> , °C
		Min	Max		
Supply current, μA	I <sub>CC1</sub>	-	1.0 1.4	U <sub>CC</sub> = 3.3 V; 5.0 V; U <sub>IL</sub> = 0 V	25±10 -40; 85
Receiver					
Low level output voltage, V	U <sub>OLR</sub>	-	0.3	U <sub>CC</sub> = 3.3V ±10%; U <sub>ITH</sub> = 2.4V; I <sub>OL</sub> = 1.6 mA	25±10
			0.4		-40; 85
			0.3	U <sub>CC</sub> = 5.0V ±10%; U <sub>ITH</sub> = 2.4V; I <sub>OL</sub> = 1.6 mA	25±10
			0.4		-40; 85
High level output voltage, V	U <sub>OHR1</sub>	-	2.5	U <sub>CC</sub> = 3.3V ±10%; U <sub>ITL</sub> = 0.6 V; I <sub>OH</sub> = -1.0 mA	25±10
			2.4		-40; 85
	U <sub>OHR2</sub>		4.0	U <sub>CC</sub> = 5.0V ±10%; U <sub>ITL</sub> = 0.8 V; I <sub>OH</sub> = -1.0 mA	25±10
			3.9		-40; 85
Receiver hysteresis, V	U <sub>hR</sub>	0.2	1.0	U <sub>CC</sub> = 3.3 V ± 10%; 5.0 V ± 10%	25±10
Input resistance, kOhm	R <sub>I</sub>	3	7	-	25±10
OFF-ON switching propagation delay, ns	t <sub>PHLR</sub> , t <sub>PLHR</sub>	-	1500	U <sub>CC</sub> = 5.0V ±10 %; C <sub>L</sub> = 150 pF; U <sub>IL</sub> = 0 V; U <sub>IH</sub> = 3.0 V; t <sub>LH</sub> = t <sub>HL</sub> ≤ 10 ns	
Propagation delays difference, ns	t <sub>SKD</sub>	-	600		
Transmitter					
Low level output voltage, V	U <sub>OLT1</sub>	-	-5.07	U <sub>CC</sub> =3.3V ±10%; U <sub>IH</sub> = 2.0V; R <sub>L</sub> = 3 kOhm	25±10
			-5.0		-40; 85
	U <sub>OLT2</sub>		-5.07	U <sub>CC</sub> =5.0V ±10%; U <sub>IH</sub> = 2.4V; R <sub>L</sub> = 3 kOhm	25±10
			-5.0		-40; 85
High level output voltage, V	U <sub>OHT</sub>	-	5.07	U <sub>CC</sub> =3.3V ±10%; U <sub>IL</sub> = 0.8V; R <sub>L</sub> = kOhm	25±10
			5.0		-40; 85
			5.07	U <sub>CC</sub> =5.0V ±10%; U <sub>IL</sub> = 0.8V; R <sub>L</sub> = kOhm	25±10
			5.0		-40; 85
Transmitter hysteresis, V	U <sub>hT</sub>	0.1	1.0	U <sub>CC</sub> = 3.3 V ± 10%; 5.0 V ± 10%	25±10
Low level input leakage current, μA	I <sub>ILL</sub>	-	-0.5	U <sub>CC</sub> = 5.5 V; U <sub>IL</sub> = 0V	25±10
			-1.0		-40; 85
High level input leakage current, μA	I <sub>ILH</sub>	-	0.5	U <sub>CC</sub> = 5.5 V; U <sub>IH</sub> = 5.5V	25±10
			1.0		-40; 85
Output resistance, Ohm	R <sub>O</sub>	-	350	U <sub>CC</sub> = U <sub>V+</sub> * = U <sub>V-</sub> * = 0 V; U <sub>O</sub> = ±2 V	25±10
			300		-40; 85

**Electric parameters**

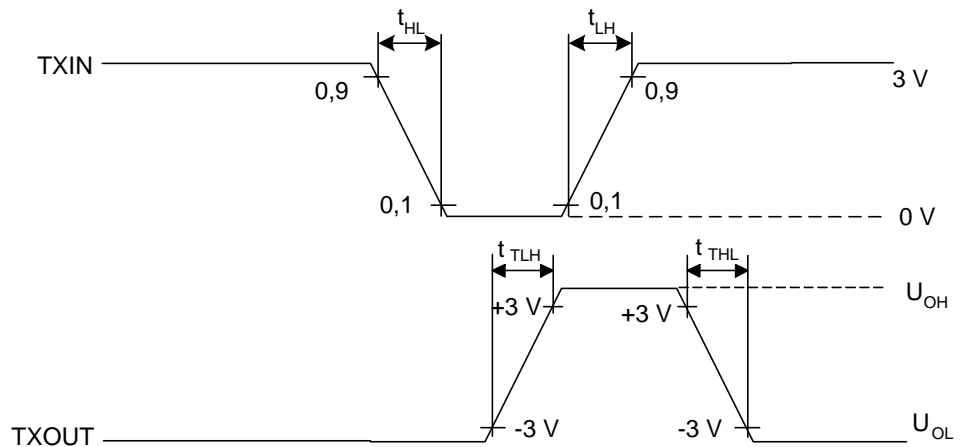
Parameter, unit	Symbol	Norm		Mode	T <sub>A</sub> , °C
		Min	Max		
Transmitter					
Short circuit current, mA	I <sub>OS</sub>	-	53	U <sub>CC</sub> = 3.6 V	25±10
			60		-40; 85
			-53	U <sub>CC</sub> = 3.6 V	25±10
			-60		-40; 85
			53	U <sub>CC</sub> = 5.5 V	25±10
			60		-40; 85
			-53	U <sub>CC</sub> = 5.5 V	25±10
			-60		-40; 85
Low level output current for OFF-state, μA	I <sub>OZLT</sub>	-	-10 -25	U <sub>CC</sub> = 0V; U <sub>O</sub> = -12 V; transmitter output is disabled	25±10 -40; 85
High level output current for OFF-state, μA	I <sub>OZHT</sub>	-	10 25	U <sub>CC</sub> = 0V; U <sub>O</sub> = 12 V; transmitter output is disabled	25±10 -40; 85
Maximum Data Rate, Kbit/s	ST	140	-	R <sub>L</sub> = 3 kOhm; C <sub>L</sub> = 1000 pF	25±10
		120			-40÷85
Transition-Region Slew Rate, V/μs	SR	6	30	U <sub>CC</sub> = 3.3 V; R <sub>L</sub> = (3-7) kOhm; U <sub>OT</sub> is from +3 to -3 V or from -3 to +3 V; C <sub>L</sub> = (150-1000) pF	25±10
		4	30	U <sub>CC</sub> = 3.3 V; R <sub>L</sub> = (3-7) kOhm; U <sub>OT</sub> is from +3 to -3 V or from -3 to +3 V; C <sub>L</sub> = (150-2500) pF	
Propagation delays difference, ns	t <sub>SKEW</sub>	-	600	U <sub>CC</sub> = 5.0V ±10 %; U <sub>IL</sub> = 0 V; U <sub>IH</sub> = 3.0 V; t <sub>LH</sub> = t <sub>HL</sub> ≤ 10 ns; R <sub>L</sub> =3 kOhm; C <sub>L</sub> =1000 pF	
* U <sub>V+</sub> , U <sub>V-</sub> - voltages applied to pins 02 , 06. Note – Electric parameters is indicated for C1=0.047 μF, C2-C4 = 0.33 μF & U <sub>CC</sub> = 5.0 V±10 % (or C1-C4 = 0.1 μF & U <sub>CC</sub> = 3.3 V±10 %)					



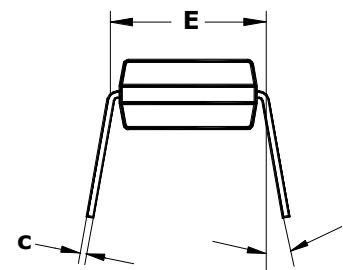
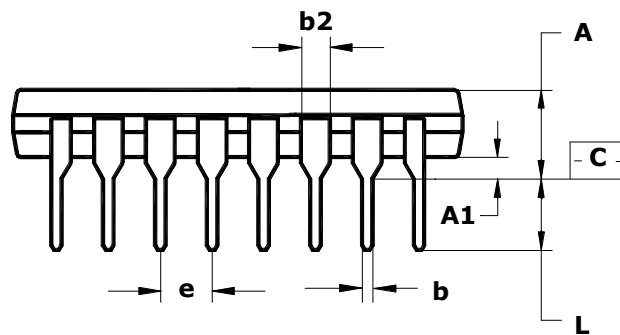
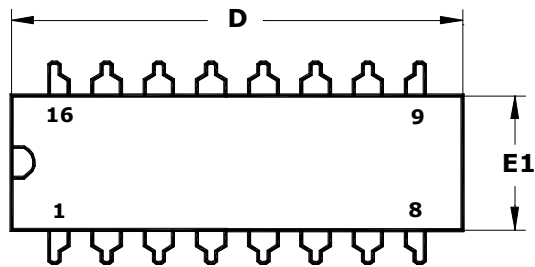
**Receiver output & input signals time diagram**



**Transmitter output & input signals time diagram**



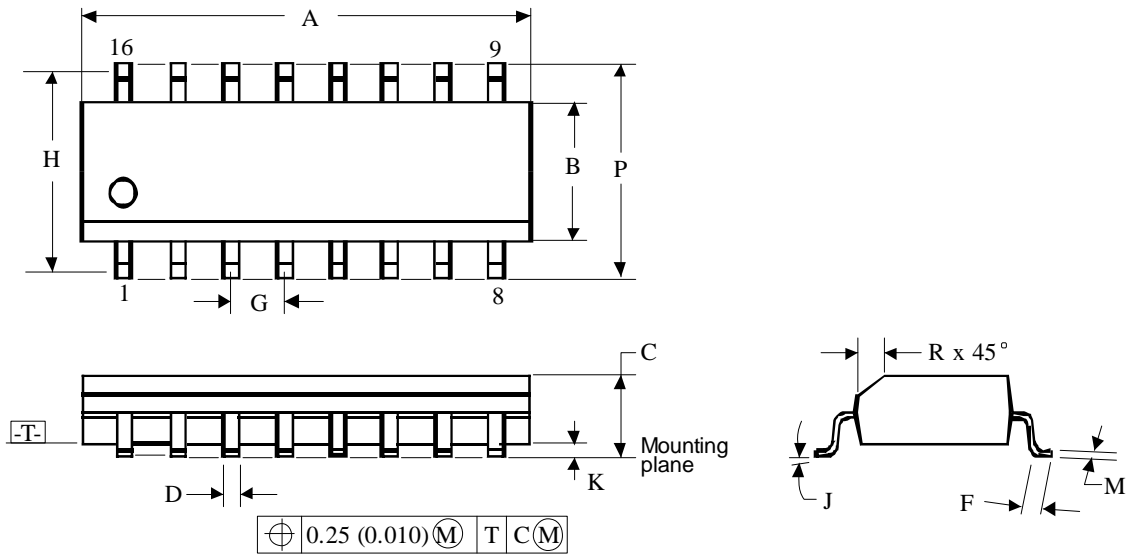
**Transmitter output & input signals time diagram**

**Package Dimensions**  
**DIP-package MS-001BB**


⊕ 0,25 (0,010) (M) C

Note - Dimensions D, E1 do not include the fin value, which should not exceed 0.25 mm (0.010) per side.

	D	E1	A	b	b2	e	$\alpha$	L	E	c	A1
mm											
min	18.93	6.07	—	0.36	1.14	2.54	0°	2.93	7.62	0.20	0.38
max	19.43	7.11	5.33	0.56	1.78		15°	3.81	8.26	0.36	—
Inches											
min	0.355	0.240	—	0.014	0.045	0.1	0°	0.115	0.300	0.008	0.015
max	0.400	0.280	0.210	0.022	0.070		15°	0.150	0.325	0.014	—

**Package Dimensions**  
**SO-package MS-012AC**

**Note:**

1. Dimensional sizes A and B are preset without consideration of fin and the metal bulges.
2. Availability of the fin and the metal bulges for A – up to 0.15 mm (0.006) per side; for B – up to 0.25 mm (0.010) per side.

Identifi- cation	Sizes, mm	
	MIN	MAX
A	9.80	10.0
B	3.80	4.00
C	1.35	1.75
D	0.33	0.51
F	0.40	1.27
G	1.27	
H	5.72	
J	0°	8°
K	0.10	0.25
M	0.19	0.25
P	5.80	6.20
R	0.25	0.50