Internally Compensated, High Performance Dual Operational Amplifiers

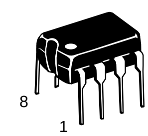
MC1458, C

The MC1458, C was designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.

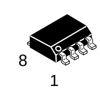
- No Frequency Compensation Required
- Short Circuit Protection
- Wide Common Mode and Differential Voltage Ranges
- Low Power Consumption
- No Latch–Up

DUAL OPERATIONAL AMPLIFIERS
(DUAL MC1741)

SEMICONDUCTOR TECHNICAL DATA



P1 SUFFIX
PLASTIC PACKAGE
CASE 626



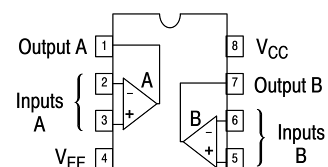
D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO–8)

MAXIMUM RATINGS (T_A = +25°C, unless otherwise noted.)

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC} V_{EE}	+18 –18	Vdc
Input Differential Voltage	V_{ID}	±30	V
Input Common Mode Voltage (Note 1)	V_{ICM}	±15	V
Output Short Circuit Duration (Note 2)	t_{SC}	Continuous	
Operating Ambient Temperature Range	T_A	0 to +70	°C
Storage Temperature Range	T_{stg}	–55 to +125	°C
Junction Temperature	T_J	150	°C

NOTES: 1. For supply voltages less than ±15 V, the absolute maximum input voltage is equal to the supply voltage.
2. Supply voltage equal to or less than 15 V.

PIN CONNECTIONS

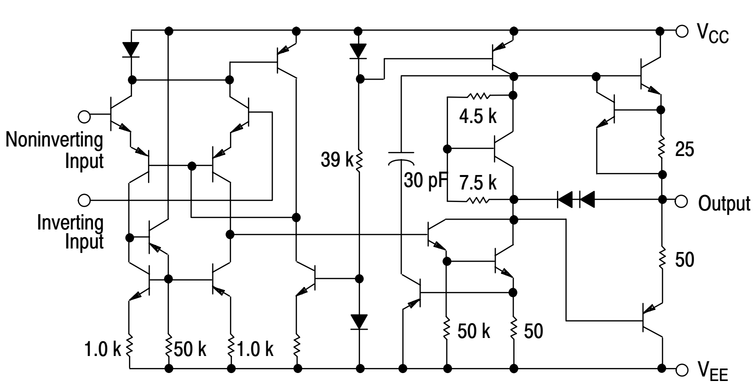


(Top View)

ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC1458CD, D	T_A = 0° to +70°C	SO–8
MC1458CP1, P1		Plastic DIP

Representative Schematic Diagram



ELECTRICAL CHARACTERISTICS (V_{CC} = +15 V, V_{EE} = –15 V, T_A = 25°C, unless otherwise noted. (Note 3))

Characteristic	Symbol	MC1458 Min	MC1458 Typ	MC1458 Max	MC1458C Min	MC1458C Typ	MC1458C Max	Unit
Input Offset Voltage (R_S ≤ 10 k)	V_{IO}	–	2.0	6.0	–	2.0	1.0	mV
Input Offset Current	I_{IO}	–	20	200	–	20	300	nA
Input Bias Current	I_{IB}	–	80	500	–	80	700	nA
Input Resistance	r_i	0.3	2.0	–	–	2.0	–	MΩ
Input Capacitance	C_i	–	1.4	–	–	1.4	–	pF
Offset Voltage Adjustment Range	V_{IOR}	–	±15	–	–	±15	–	mV
Common Mode Input Voltage Range	V_{ICR}	±12	±13	–	±11	±13	–	V
Large Signal Voltage Gain	A_{VOL}							V/mV
(V_O = ±10 V, R_L = 2.0 k)		20	200	–	–	–	–	
(V_O = ±10 V, R_L = 10 k)		–	–	–	20	200	–	
Output Resistance	r_o	–	75	–	–	75	–	Ω
Common Mode Rejection (R_S ≤ 10 k)	CMR	70	90	–	60	90	–	dB
Supply Voltage Rejection (R_S ≤ 10 k)	PSR	–	30	150	–	30	–	µV/V
Output Voltage Swing	V_O							V
(R_S ≤ 10 k)		±12	±14	–	±11	±14	–	
(R_S ≤ 2.0 k)		±10	±13	–	±9.0	±13	–	
Output Short Circuit Current	I_{SC}	–	20	–	–	20	–	mA
Supply Currents (Both Amplifiers)	I_D	–	2.3	5.6	–	2.3	8.0	mA
Power Consumption	P_C	–	70	170	–	70	240	mW
Transient Response (Unity Gain)								
(V_I = 20 mV, R_L ≥ 2.0 kΩ, C_L ≤ 100 pF) Rise Time	t_{TLH}	–	0.3	–	–	0.3	–	µs
(V_I = 20 mV, R_L ≥ 2.0 kΩ, C_L ≤ 100 pF) Overshoot	os	–	15	–	–	15	–	%
(V_I = 10 V, R_L ≥ 2.0 kΩ, C_L ≤ 100 pF) Slew Rate	SR	–	0.5	–	–	0.5	–	V/µs

ELECTRICAL CHARACTERISTICS (V_{CC} = +15 V, V_{EE} = –15 V, T_A = T_{high} to T_{low}, unless otherwise noted. (Note 3))*

Characteristic	Symbol	MC1458 Min	MC1458 Typ	MC1458 Max	MC1458C Min	MC1458C Typ	MC1458C Max	Unit
Input Offset Voltage (R_S ≤ 10 kΩ)	V_{IO}	–	–	7.5	–	–	12	mV
Input Offset Current (T_A = 0° to +70°C)	I_{IO}	–	–	300	–	–	400	nA
Input Bias Current (T_A = 0° to +70°C)	I_{IB}	–	–	800	–	–	1000	nA
Output Voltage Swing	V_O							V
(R_s ≤ 10 k)		±12	±14	–	–	–	–	
(R_s ≤ 2 k)		±10	±13	–	±9.0	±13	–	
Large Signal Voltage Gain	A_{VOL}							V/mV
(V_O = ±10 V, R_L = 2 k)		15	–	–	–	–	–	
(V_O = ±10 V, R_L = 10 k)		–	–	–	15	–	–	

*T_{low} = 0°C for MC1458, C T_{high} = +70°C for MC1458, C

NOTE: 3. Input pins of an unused amplifier must be grounded for split supply operation or biased at least 3.0 V above V_{EE} for single supply operation.

Figure 1. Burst Noise versus Source Resistance

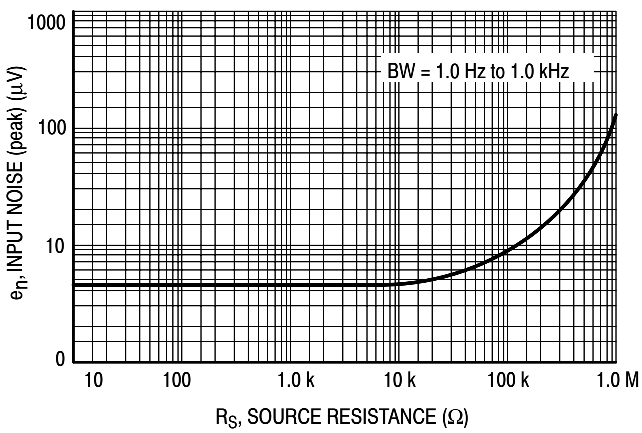


Figure 2. RMS Noise versus Source Resistance

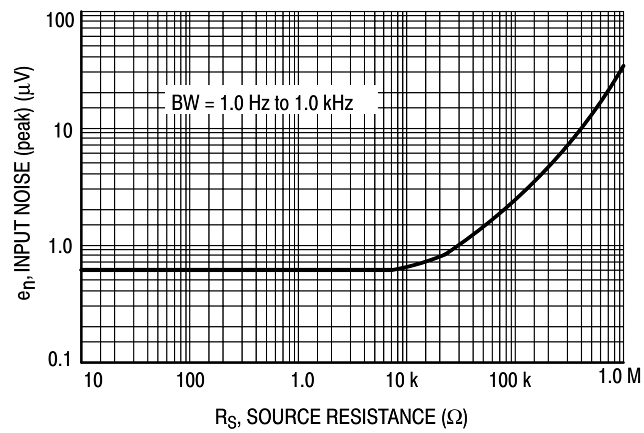


Figure 3. Output Noise versus Source Resistance

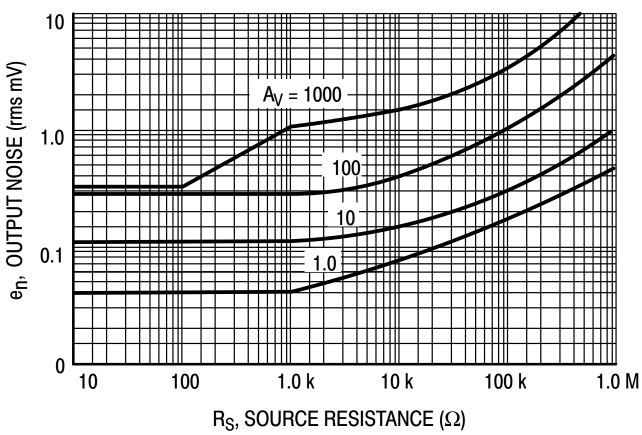


Figure 4. Spectral Noise Density

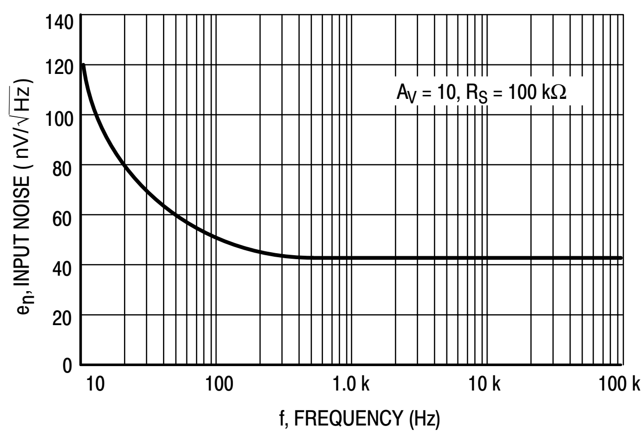
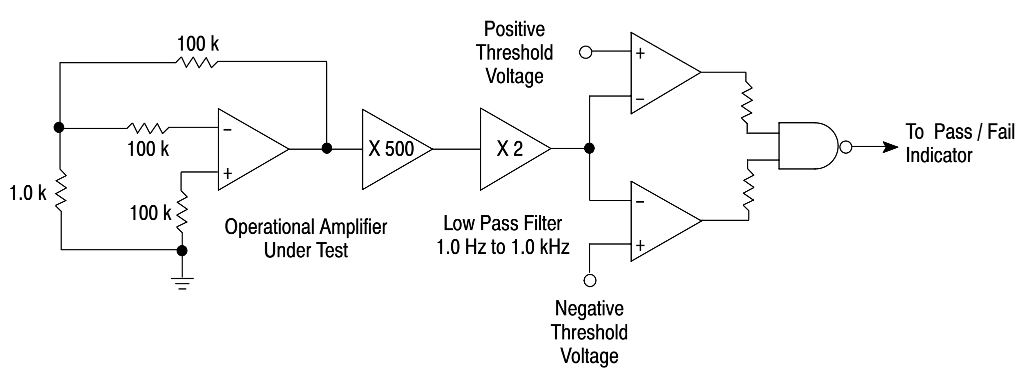


Figure 5. Burst Noise Test Circuit



Unlike conventional peak reading or RMS meters, this system was especially designed to provide the quick response time essential to burst (popcorn) noise testing.

The test time employed is 10 sec and the 20 µV peak limit refers to the operational amplifier input thus eliminating errors in the closed loop gain factor of the operational amplifier .

Figure 6. Power Bandwidth (Large Signal Swing versus Frequency)

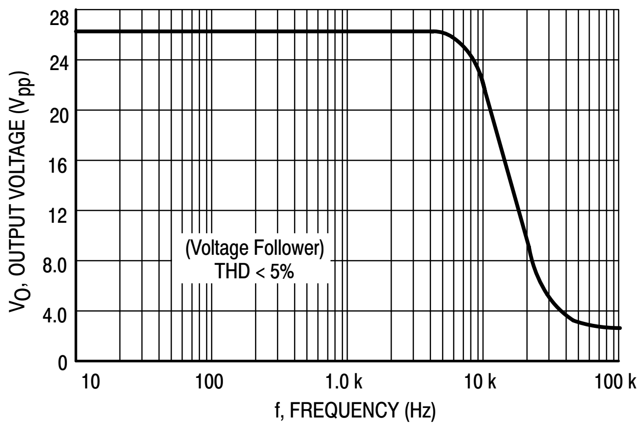


Figure 7. Open Loop Frequency Response

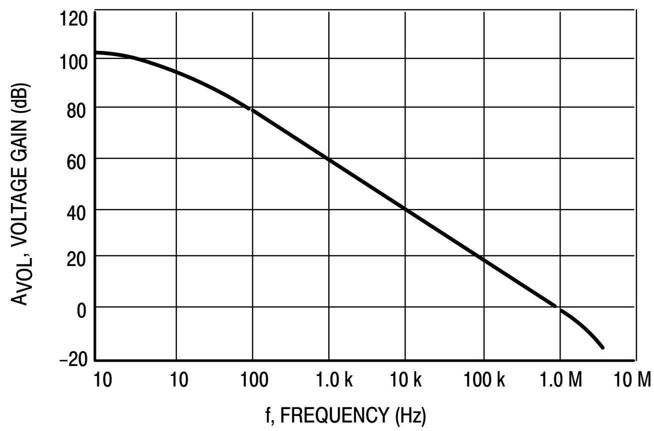


Figure 8. Positive Output Voltage Swing versus Load Resistance

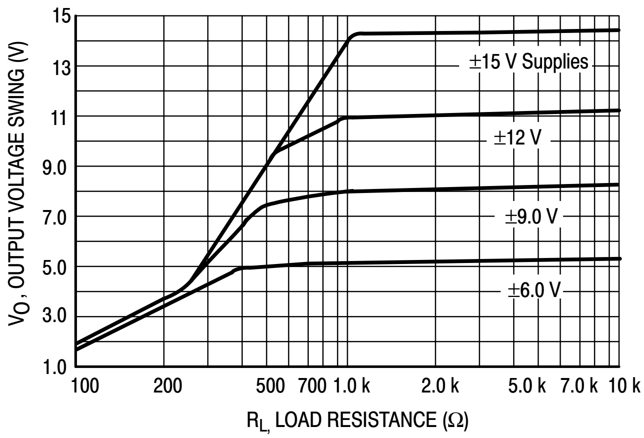


Figure 9. Negative Output Voltage Swing versus Load Resistance

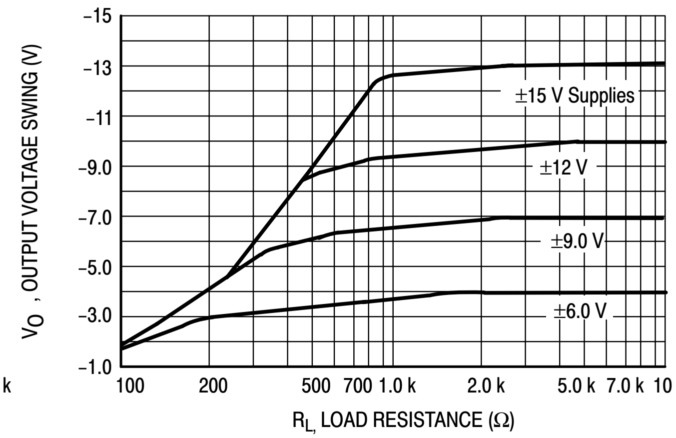


Figure 10. Output Voltage Swing versus Load Resistance (Single Supply Operation)

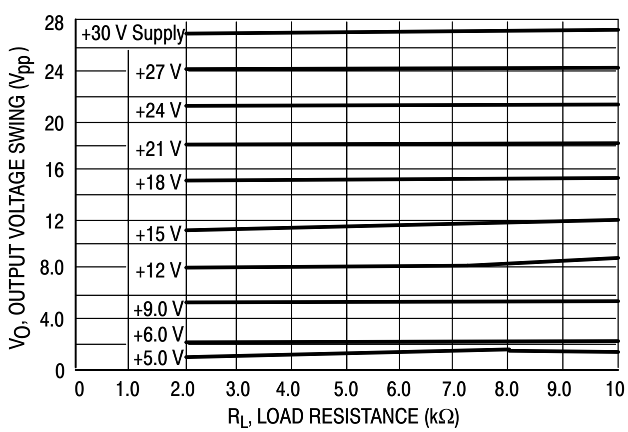


Figure 11. Single Supply Inverting Amplifier

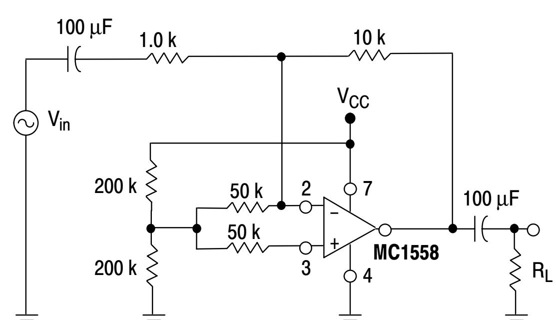


Figure 12. Noninverting Pulse Response

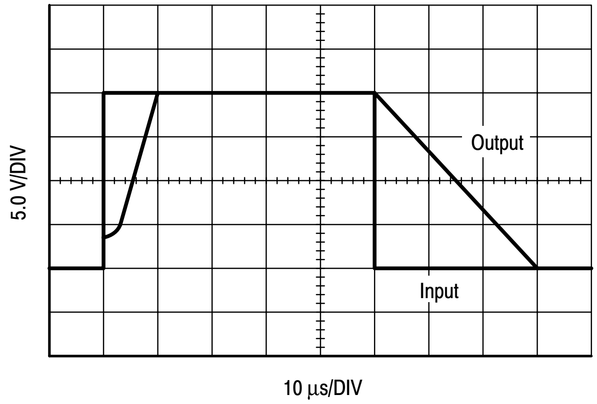


Figure 13. Transient Response Test Circuit

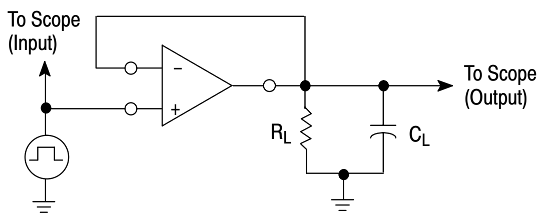


Figure 14. Unused OpAmp

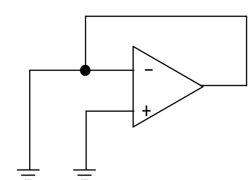
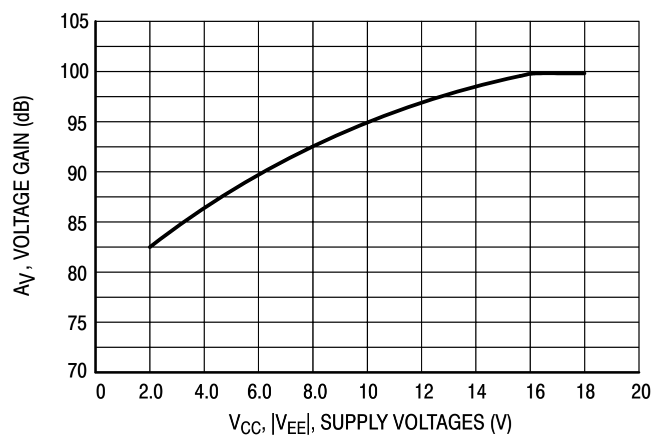
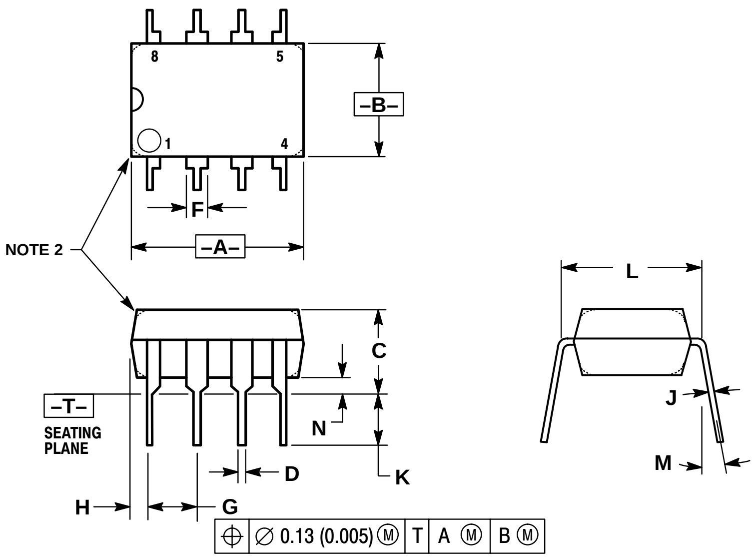


Figure 15. Open Loop Voltage Gain versus Supply Voltage



PACKAGE DIMENSIONS

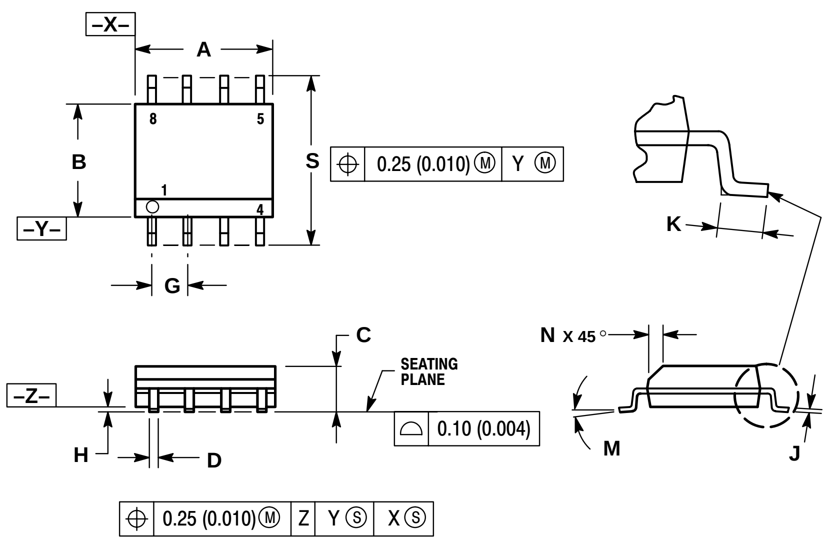
P1 SUFFIX
PLASTIC PACKAGE
CASE 626–05
ISSUE L



NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	0.76	1.27	0.030	0.050
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	---	10°	---	10°
N	0.76	1.01	0.030	0.040

D SUFFIX
PLASTIC PACKAGE
CASE 751–07
(SO–8)
ISSUE W



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

Notes

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