

General Purpose Transistors

PNP Silicon

- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: >4000 V
– Machine Model: >400 V
- Pb-Free Packages are Available

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

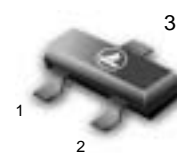
| Rating | Symbol | Value | Unit |
|---|-----------|-------------------|------|
| Collector-Emitter Voltage LBC856 LBC857 LBC858, LBC859 | V_{CE0} | -65 -45 -30 | V |
| Collector-Base Voltage LBC856 LBC857 LBC858, LBC859 | V_{CBO} | -80 -50 -30 | V |
| Emitter-Base Voltage | V_{EBO} | -5.0 | V |
| Collector Current – Continuous | I_C | -100 | mAdc |

THERMAL CHARACTERISTICS

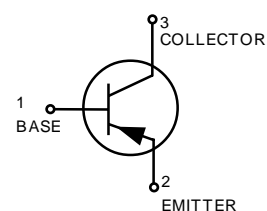
| Characteristic | Symbol | Max | Unit |
|--|-----------------|----------------|----------------------------|
| Total Device Dissipation FR-5 Board, (Note 1.) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 225 1.8 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 556 | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation Alumina Substrate, (Note 2.) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 300 2.4 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

1. FR-5 = 1.0 x 0.75 x 0.062 in
2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

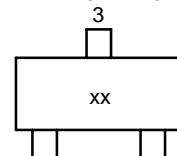
LBC856ALT1 Series



SOT-23



MARKING DIAGRAM



xx= Device Marking
(See Table Below)

LBC856ALT1 Series**DEVICE MARKING AND ORDERING INFORMATION**

| Device | Marking | Package | Shipping |
|-------------|-----------------|---------|----------------|
| LBC856ALT1 | 3A | SOT-23 | 3000/Tape&Reel |
| LBC856ALT1G | 3A (Pb-Free) | SOT-23 | 3000/Tape&Reel |
| LBC856BLT1 | 3B | SOT-23 | 3000/Tape&Reel |
| LBC856BLT1G | 3B (Pb-Free) | SOT-23 | 3000/Tape&Reel |
| LBC857ALT1 | 3E | SOT-23 | 3000/Tape&Reel |
| LBC857ALT1G | 3E (Pb-Free) | SOT-23 | 3000/Tape&Reel |
| LBC857BLT1 | 3F | SOT-23 | 3000/Tape&Reel |
| LBC857BLT1G | 3F (Pb-Free) | SOT-23 | 3000/Tape&Reel |
| LBC857CLT1 | 3G | SOT-23 | 3000/Tape&Reel |
| LBC857CLT1G | 3G (Pb-Free) | SOT-23 | 3000/Tape&Reel |
| LBC858ALT1 | 3J | SOT-23 | 3000/Tape&Reel |
| LBC858ALT1G | 3J (Pb-Free) | SOT-23 | 3000/Tape&Reel |
| LBC858BLT1 | 3K | SOT-23 | 3000/Tape&Reel |
| LBC858BLT1G | 3K (Pb-Free) | SOT-23 | 3000/Tape&Reel |
| LBC858CLT1 | 3L | SOT-23 | 3000/Tape&Reel |
| LBC858CLT1G | 3L (Pb-Free) | SOT-23 | 3000/Tape&Reel |
| LBC859BLT1 | 4B | SOT-23 | 3000/Tape&Reel |
| LBC859BLT1G | 4B (Pb-Free) | SOT-23 | 3000/Tape&Reel |
| LBC859CLT1 | 4C | SOT-23 | 3000/Tape&Reel |
| LBC859CLT1G | 4C (Pb-Free) | SOT-23 | 3000/Tape&Reel |

LBC856ALT1 Series

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---------------|----------------------|-------------|-------------|---------------------|
| OFF CHARACTERISTICS | | | | | | |
| Collector–Emitter Breakdown Voltage ($I_C = -10\text{ mA}$) | LBC856 Series LBC857 Series LBC858, LBC859 Series | $V_{(BR)CEO}$ | -65 -45 -30 | - - - | - - - | V |
| Collector–Emitter Breakdown Voltage ($I_C = -10\ \mu\text{A}$, $V_{EB} = 0$) | LBC856 Series LBC857 Series LBC858, LBC859 Series | $V_{(BR)CES}$ | -80 -50 -30 | - - - | - - - | V |
| Collector–Base Breakdown Voltage ($I_C = -10\ \mu\text{A}$) | LBC856 Series LBC857 Series LBC858, LBC859 Series | $V_{(BR)CBO}$ | -80 -50 -30 | - - - | - - - | V |
| Emitter–Base Breakdown Voltage ($I_E = -1.0\ \mu\text{A}$) | LBC856 Series LBC857 Series LBC858, LBC859 Series | $V_{(BR)EBO}$ | -5.0 -5.0 -5.0 | - - - | - - - | V |
| Collector Cutoff Current ($V_{CB} = -30\text{ V}$) ($V_{CB} = -30\text{ V}$, $T_A = 150^\circ\text{C}$) | | I_{CBO} | - - | - - | -15 -4.0 | nA μA |

ON CHARACTERISTICS

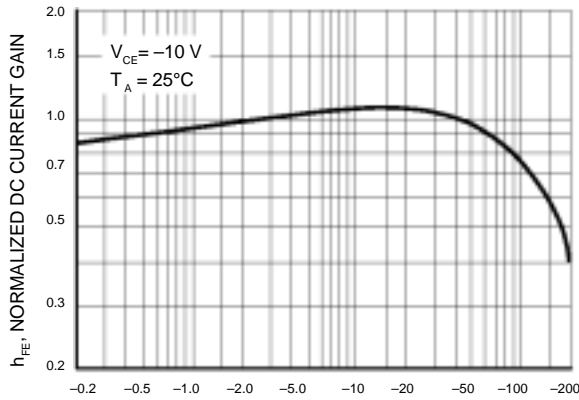
| | | | | | | |
|---|--|---------------|-------------------|-------------------|-------------------|---|
| DC Current Gain ($I_C = -10\ \mu\text{A}$, $V_{CE} = -5.0\text{ V}$) | LBC856A, LBC857A, LBC858A LBC856B, LBC857B, LBC858B, LBC859B LBC857C, LBC858C, LBC859C | h_{FE} | - - - | 90 150 270 | - - - | - |
| ($I_C = -2.0\text{ mA}$, $V_{CE} = -5.0\text{ V}$) | LBC856A, LBC857A, LBC858A LBC856B, LBC857B, LBC858B, LBC859B LBC857C, LBC858C, LBC859C | | 125 220 420 | 180 290 520 | 250 475 800 | |
| Collector–Emitter Saturation Voltage ($I_C = -10\text{ mA}$, $I_B = -0.5\text{ mA}$) ($I_C = -100\text{ mA}$, $I_B = -5.0\text{ mA}$) | | $V_{CE(sat)}$ | - - | - - | -0.3 -0.65 | V |
| Base–Emitter Saturation Voltage ($I_C = -10\text{ mA}$, $I_B = -0.5\text{ mA}$) ($I_C = -100\text{ mA}$, $I_B = -5.0\text{ mA}$) | | $V_{BE(sat)}$ | - - | -0.7 -0.9 | - - | V |
| Base–Emitter On Voltage ($I_C = -2.0\text{ mA}$, $V_{CE} = -5.0\text{ V}$) ($I_C = -10\text{ mA}$, $V_{CE} = -5.0\text{ V}$) | | $V_{BE(on)}$ | -0.6 - | - - | -0.75 -0.82 | V |

SMALL–SIGNAL CHARACTERISTICS

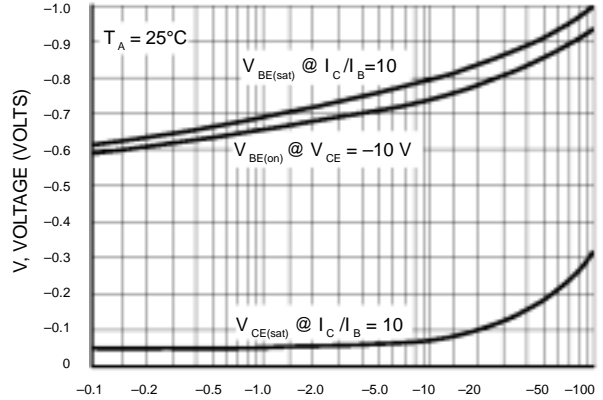
| | | | | | | |
|--|--|----------|--------|--------|-----------|-----|
| Current–Gain – Bandwidth Product ($I_C = -10\text{ mA}$, $V_{CE} = -5.0\text{ Vdc}$, $f = 100\text{ MHz}$) | | f_T | 100 | - | - | MHz |
| Output Capacitance ($V_{CB} = -10\text{ V}$, $f = 1.0\text{ MHz}$) | | C_{ob} | - | - | 4.5 | pF |
| Noise Figure ($I_C = -0.2\text{ mA}$, $V_{CE} = -5.0\text{ Vdc}$, $R_S = 2.0\text{ k}\Omega$, $f = 1.0\text{ kHz}$, $BW = 200\text{ Hz}$) LBC856, LBC857, LBC858 Series LBC859 Series | | NF | - - | - - | 10 4.0 | dB |

LBC856ALT1 Series

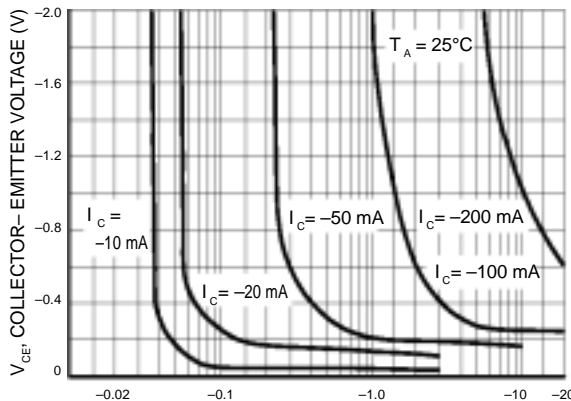
LBC857/ LBC858



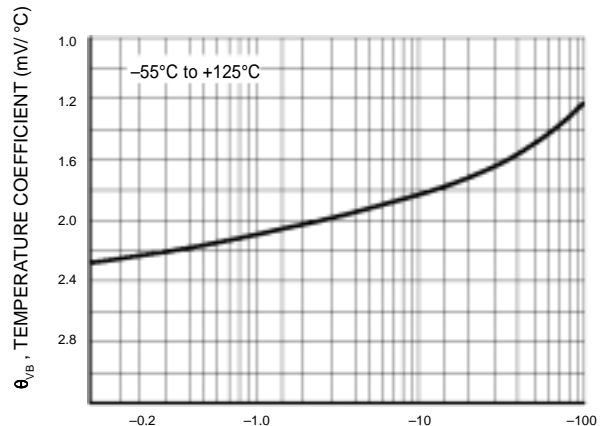
I_C , COLLECTOR CURRENT (mAdc)
Figure 1. Normalized DC Current Gain



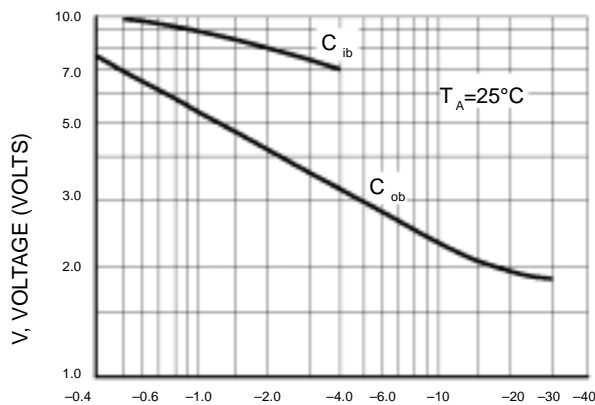
I_C , COLLECTOR CURRENT (mAdc)
Figure 2. "Saturation" and "On" Voltages



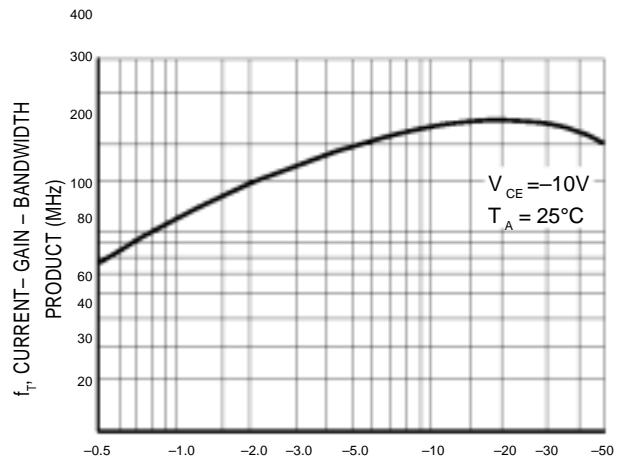
I_B , BASE CURRENT (mA)
Figure 3. Collector Saturation Region



I_C , COLLECTOR CURRENT (mA)
Figure 4. Base-Emitter Temperature Coefficient



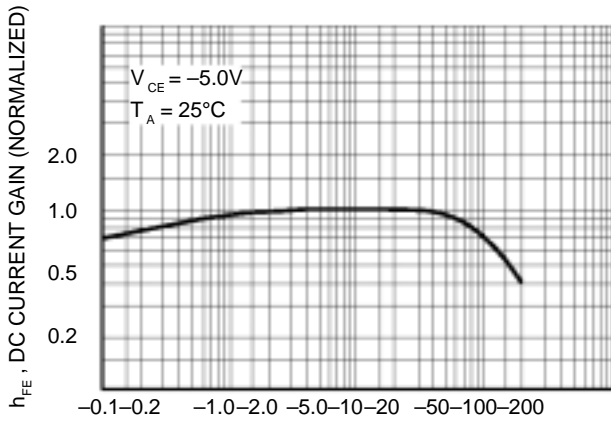
V_R , REVERSE VOLTAGE (VOLTS)
Figure 5. Capacitances



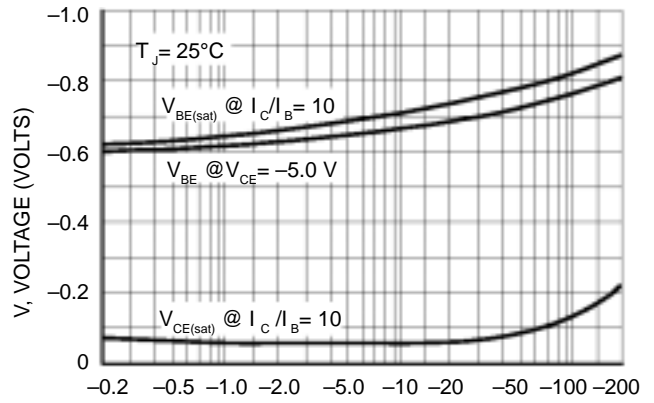
I_C , COLLECTOR CURRENT (mAdc)
Figure 6. Current-Gain - Bandwidth Product

LBC856ALT1 Series

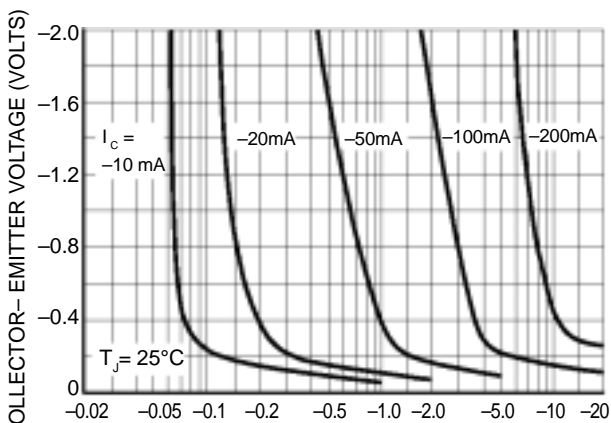
LBC856



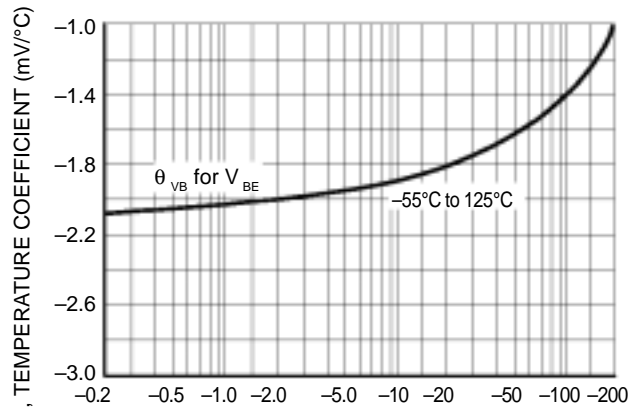
I_C , COLLECTOR CURRENT (mA)
Figure 7. DC Current Gain



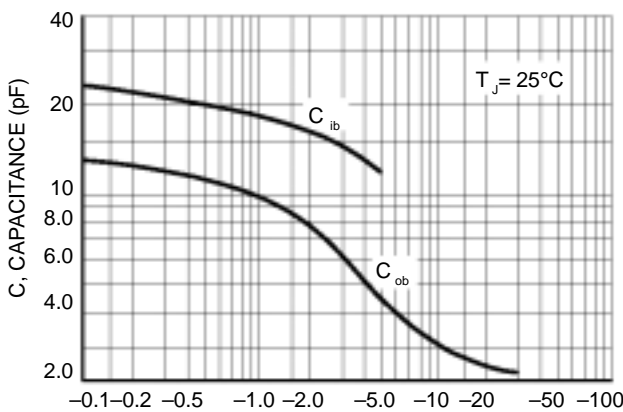
I_C , COLLECTOR CURRENT (mA)
Figure 8. "On" Voltage



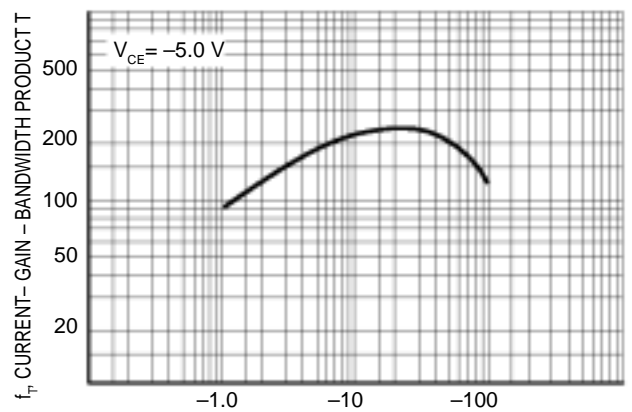
I_B , BASE CURRENT (mA)
Figure 9. Collector Saturation Region



I_C , COLLECTOR CURRENT (mA)
Figure 10. Base-Emitter Temperature Coefficient



V_R , REVERSE VOLTAGE (VOLTS)
Figure 11. Capacitance



I_C , COLLECTOR CURRENT (mA)
Figure 12. Current-Gain - Bandwidth Product

LBC856ALT1 Series

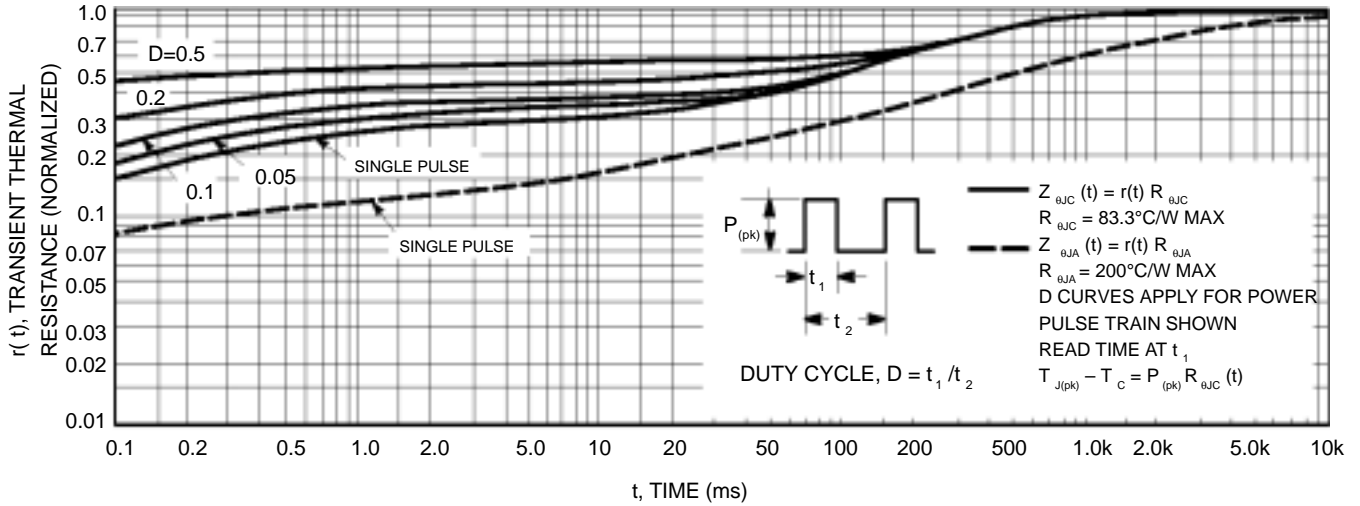


Figure 13. Thermal Response

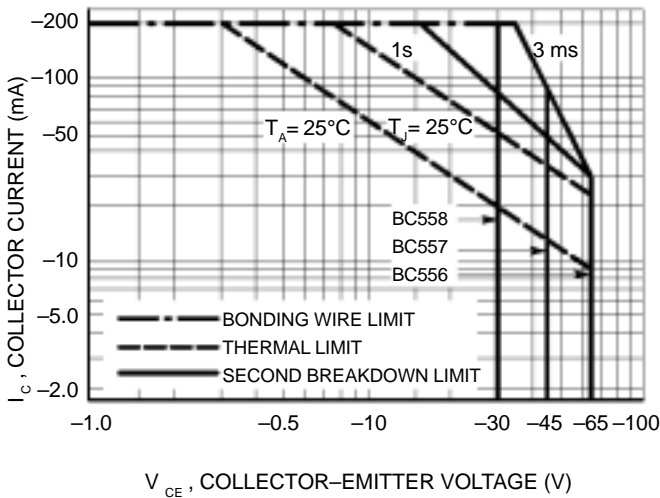


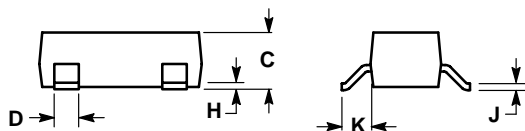
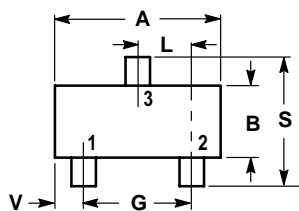
Figure 14. Active Region Safe Operating Area

The safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 14 is based upon $T_{J(pk)} = 150^\circ\text{C}$; T_C or T_A is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by the secondary breakdown.

LBC856ALT1 Series

SOT-23



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|--------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.1102 | 0.1197 | 2.80 | 3.04 |
| B | 0.0472 | 0.0551 | 1.20 | 1.40 |
| C | 0.0350 | 0.0440 | 0.89 | 1.11 |
| D | 0.0150 | 0.0200 | 0.37 | 0.50 |
| G | 0.0701 | 0.0807 | 1.78 | 2.04 |
| H | 0.0005 | 0.0040 | 0.013 | 0.100 |
| J | 0.0034 | 0.0070 | 0.085 | 0.177 |
| K | 0.0140 | 0.0285 | 0.35 | 0.69 |
| L | 0.0350 | 0.0401 | 0.89 | 1.02 |
| S | 0.0830 | 0.1039 | 2.10 | 2.64 |
| V | 0.0177 | 0.0236 | 0.45 | 0.60 |

