General Description

The AME8817 family of positive, linear regulators feature low quiescent current (35µA typ.) with low dropout voltage, making them ideal for battery applications.

Output voltages are set at the factory and trimmed to 1.5% accuracy.

These rugged devices have both thermal shutdown, and current fold-back to prevent device failure under the "worst" of operating conditions.

In applications requiring a low noise, regulated supply, place a 1000pF capacitor between Bypass and Ground.

An additional feature is a "Power Good" detector, which pulls low when the output is out of regulation.

The AME8817 is stable with an output capacitance of 4.7µF or greater.

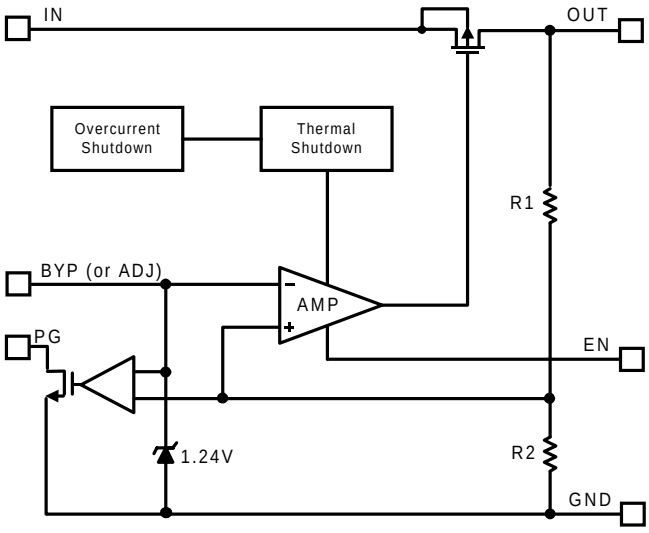
Features

- Very Low Dropout Voltage
- Guaranteed 1.5A Output
- Accurate to within 1.5%
- 35µA Quiescent Current Typically
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Noise Reduction Bypass Capacitor
- Power Good Output
- Power-Saving Shutdown Mode
- Space-Saving DDPAK-7 Package
- Low Temperature Coefficient

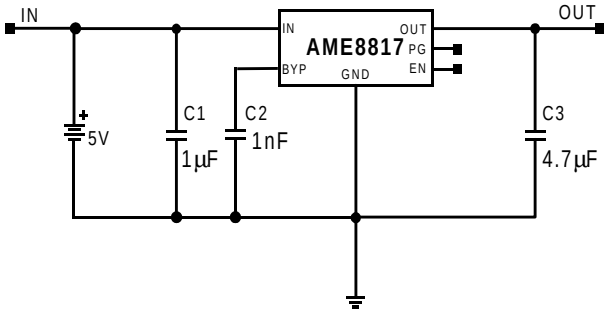
Applications

- Instrumentation
- Portable Electronics
- Wireless Devices
- PC Peripherals
- Battery Powered Widgets

Functional Block Diagram



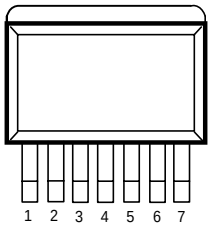
Typical Application



■ Pin Configuration

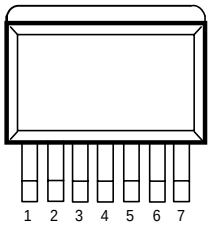
DDPAK-7 (TO-263) Top View

AME8817AEDZXXX



1. EN
2. PG
3. V_{IN}
4. GND
5. V_{OUT}
6. V_{OUT}
7. BYP

AME8817BEDZXXX



1. EN
2. PG
3. V_{IN}
4. GND
5. V_{OUT}
6. V_{OUT}
7. ADJ

■ Ordering Information

Output Voltage	Package Type DDPAK-7	MARKING
1.50	AME8817AEDZ150	AME8817 AEDZ150 yyww
1.80	AME8817AEDZ180	AME8817 AEDZ180 yyww
2.50	AME8817AEDZ250	AME8817 AEDZ250 yyww
3.30	AME8817AEDZ330	AME8817 AEDZ330 yyww
4.75	AME8817AEDZ475	AME8817 AEDZ475 yyww
5.00	AME8817AEDZ500	AME8817 AEDZ500 yyww
ADJ	AME8817BEDZADJ	AME8817 BEDZADJ yyww

Please consult AME sales office or authorized Rep./Distributor for other output voltages, package types or pin configurations.

■ Absolute Maximum Ratings:

Parameter	Maximum	Unit
Input Voltage	8	V
Output Current	$P_D / (V_{IN} - V_O)$	mA
Output Voltage	GND - 0.3 to V_{IN} + 0.3	V
ESD Classification	B	

■ Recommended operating Conditions:

Parameter	Rating	Unit
Ambient Temperature Range	-40 to +85	^oC
Junction Temperature	-40 to +125	^oC

■ Thermal Information

Parameter	Maximum	Unit
Thermal Resistance (θ_{jc})	60	^oC / W
Internal Power Dissipation (P_D) ($\Delta T = 100^oC$)	2.7	W
Maximum Junction Temperature	150	^oC
Maximum Lead Temperature (10 Sec)	300	^oC

Caution: Stress above the listed absolute rating may cause permanent damage to the device

Electrical Specifications

TA = 25°C unless otherwise noted

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
Input Voltage	V_{IN}			Note 1		7	V
Output Voltage Accuracy	V_O	I_O=1mA to 1.5A		-1.5		1.5	%
Dropout Voltage	$V_{DROPOUT}$	I_O=1500mA V_O=V_{ONOM} -2.0%	1.5V<=V_{ONOM}<=2.0V		See chart	1000	mV
			2.0V<V_{ONOM}<=2.8V			800	
			2.8V<V_{ONOM}<3.8V			600	
Output Current	I_O	V_O>1.2V		1500			mA
Current Limit	I_{LIM}	V_O>1.2V		1500	2000		mA
Short Circuit Current	I_{SC}	V_O<0.4V			750	1500	mA
Quiescent Current	I_Q	I_O=0mA			35	50	µA
Ground Pin Current	I_{GND}	I_O=1mA to 1.5A			35		µA
Line Regulation	REG_{LINE}	I_O=1mA V_{IN}=V_O+1 to V_O+2	V_O < 2.0V	-0.15		0.15	%
			4.0V > V_O >= 2.0V	-0.1	0.02	0.1	%
			Vo >=4.0V	-0.4	0.2	0.4	%
Load Regulation	REG_{LOAD}	I_O=1mA to 1500mA			0.2	1	%
Over Temerature Shutdown	OTS				150		°C
Over Temerature Hysterisis	OTH				30		°C
V_O Temperature Coefficient	TC				30		ppm/°C
Power Supply Rejection	PSRR	I_O=100mA C_O=4.7µF	f=1kHz		50		dB
			f=10kHz		20		
			f=100kHz		15		
Power Supply Rejection	PSRR	I_O=100mA C_O=4.7µF C_{BYP}=0.01µF	f=1kHz		75		dB
			f=10kHz		55		
			f=100kHz		30		
Output Voltage Noise	eN	f=10Hz to 100kHz I_O=10mA,C_{BYP}=0µF	Co=4.7µF		30		mVrms
			Co=100µF		20		
Output Voltage Noise	eN	f=10Hz to 100kHz I_O=10mA,C_{BYP}=0.01µF	Co=4.7µF		30		mVrms
			Co=100µF		20		
ADJ Input Bias Current	I_{ADJ}				1		mA
ADJ Reference Voltage	V_{REF}			1.223	1.242	1.261	V
EN Input Threshold	V_{EH}	V_{IN}=2.7V to 7V		2.0		Vin	V
	V_{EL}	V_{IN}=2.7V to 7V		0		0.4	V
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}, V_{IN}=2.7V to 7V				0.1	µA
	I_{EL}	V_{EN}=V_{OV}, V_{IN}=2.7V to 7V				0.5	µA
Shutdown Supply Current	I_{SD}	V_{IN}=5V, V_O=0V, V_{EN}<V_{EL}			0.5	1	µA
Output Under Voltage	V_{UV}	Note1				85	%$V_{O(NOM)}$
Output Over Voltage	V_{OV}	Note1		115			%$V_{O(NOM)}$
PG Leakage Current	I_{LC}	V_{PG}=7V				1	mA
PG Voltage Rating	V_{PG}	V_O in regulation				7	V
PG Voltage Low	V_{OL}	I_{SINK}=500µA				0.4	V

Note1:$V_{IN(min)}$=V_{OUT}+$V_{DROPOUT}$

■ Detailed Description

The AME8817 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, and thermal shutdown.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150°C, or the current exceeds 2.2A. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 110°C.

The AME8817 behaves like a current source when the load reaches 2.2A. However, if the load impedance drops below 0.3 ohms, the current drops back to 600mA to prevent excessive power dissipation. Normal operation is restored when the load resistance exceeds 0.75 ohms.

■ External Capacitors

The AME8817 is stable with an output capacitor to ground of 4.7µF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1µF ceramic capacitor with a 10µF Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

A second capacitor is recommended between the input and ground to stabilize Vin. The input capacitor should be at least 0.1µF to have a beneficial effect.

A third capacitor can be connected between the BYPASS pin and GND. This capacitor can be a low cost Polyester Film variety between the value of 0.001 ~ 0.01µF. A larger capacitor improves the AC ripple rejection, but also makes the output come up slowly. This "Soft" turn-on is desirable in some applications to limit turn-on surges.

All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

■ Enable

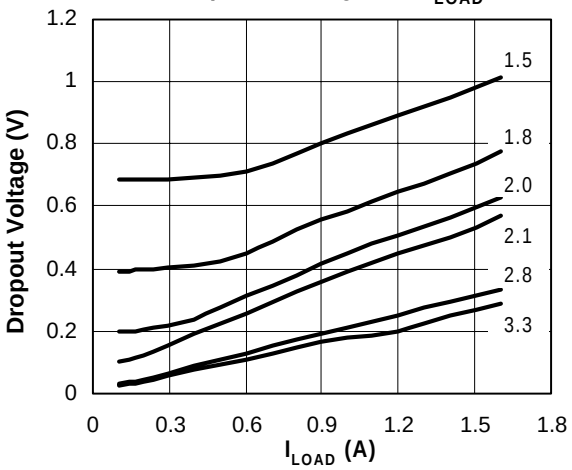
When pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the quiescent current is less than 1µA. This pin behaves much like an electronic switch.

■ Power Good

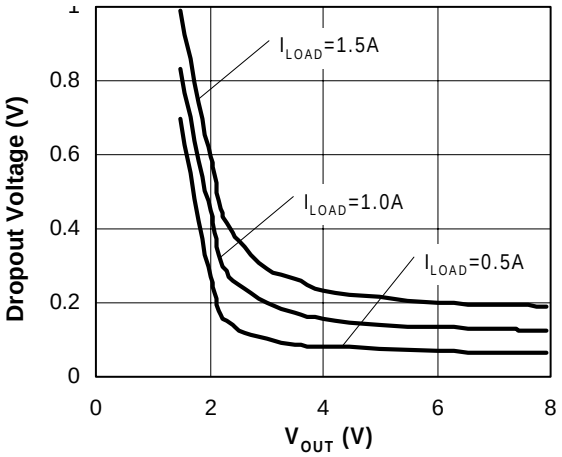
The AME8817 includes the Power Good feature. Normally, the PG pin is "Floating", however, when the output is not within ±15% of the specified voltage, it pulls low. This can occur under the following conditions:

1) Input Voltage too low.
2) During Over-Temperature.
3) During Over-Current.
4) If output is pulled up.

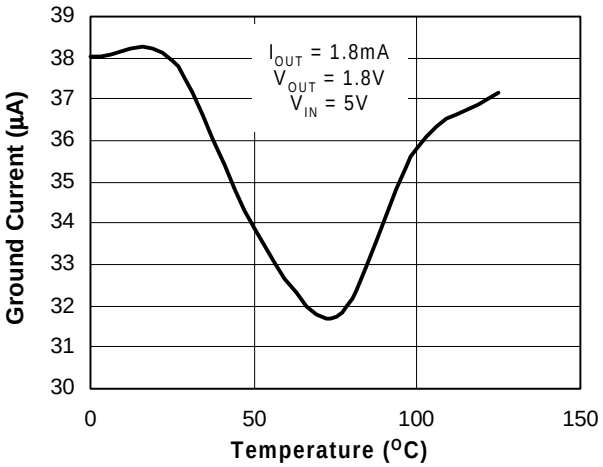
Dropout Voltage vs. I_{LOAD}



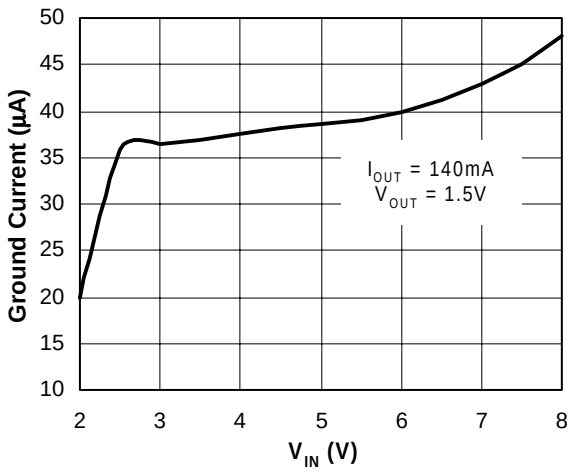
Dropout Voltage vs. V_{OUT}



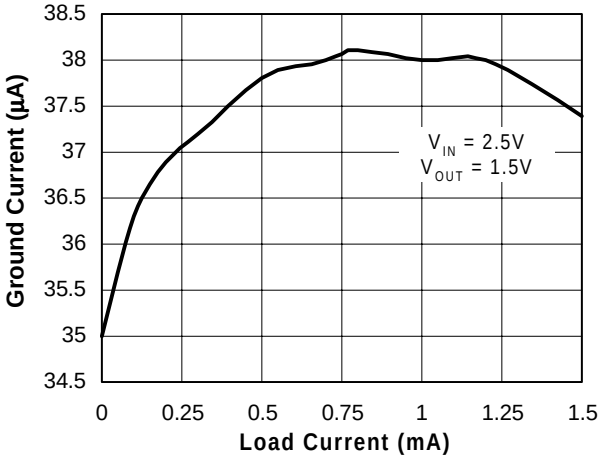
Ground Current vs. Temperature



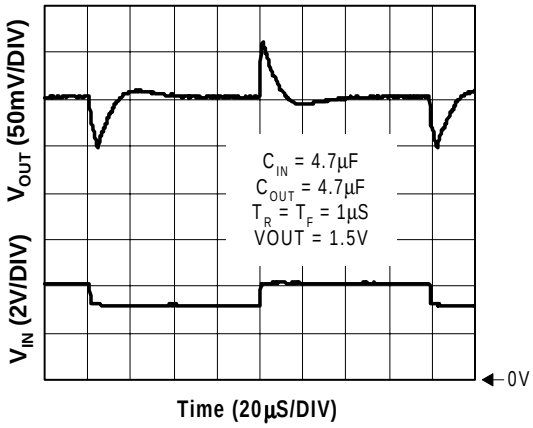
Ground Current vs. V_{IN}



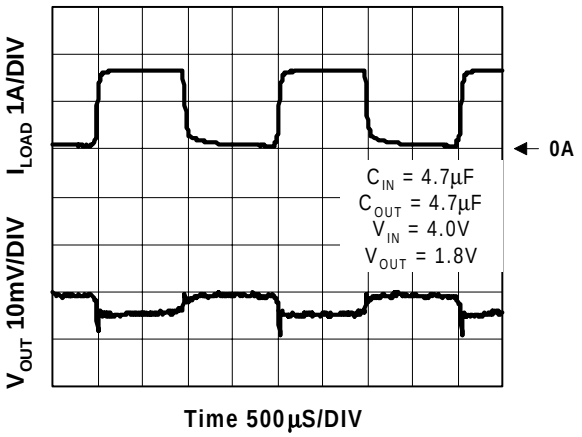
Ground Current vs. Load Current



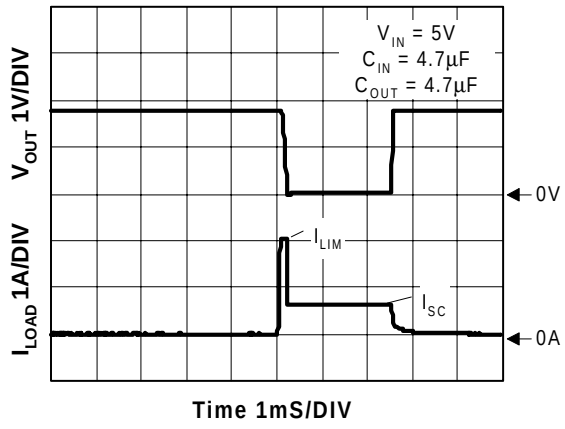
Transient Line Response



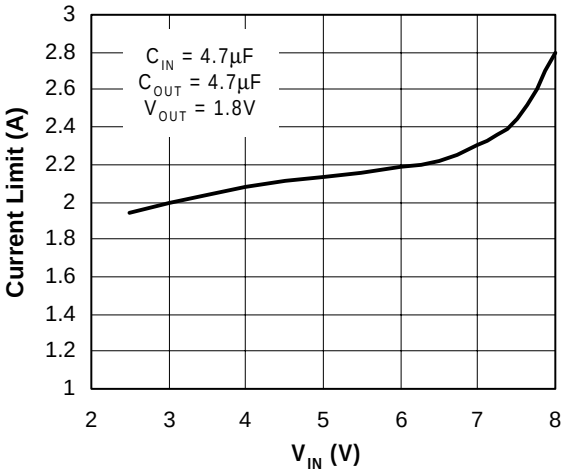
Load Step 40mA to 1.5A



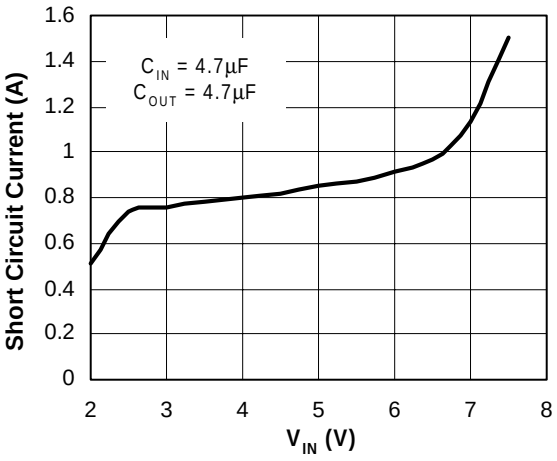
Current Limit Response



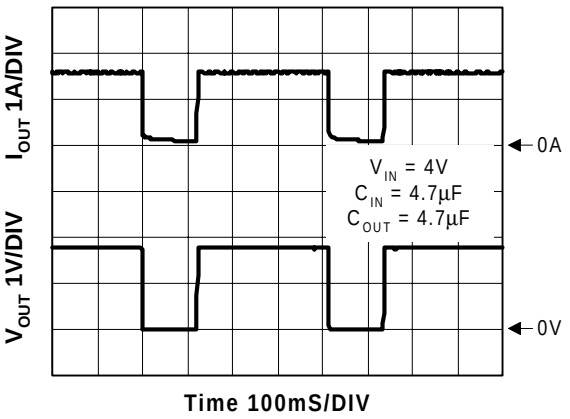
Current Limit Vs. V_{IN}

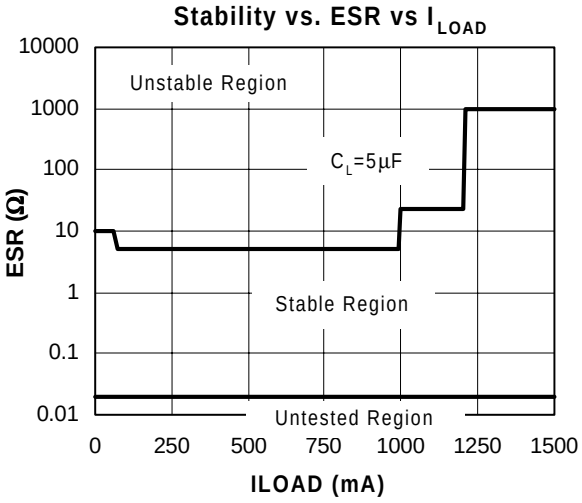


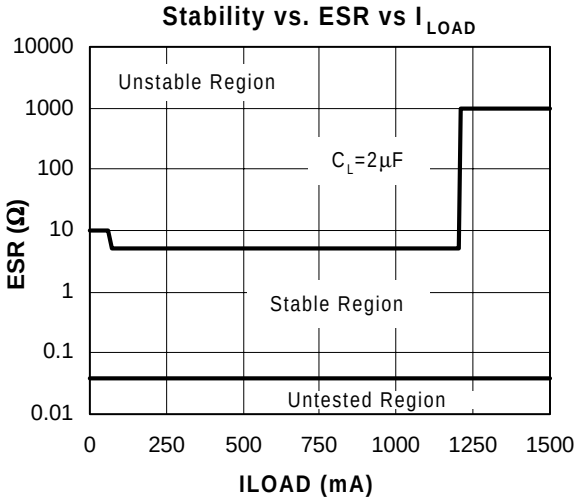
Short Circuit Current VS. V_{IN}

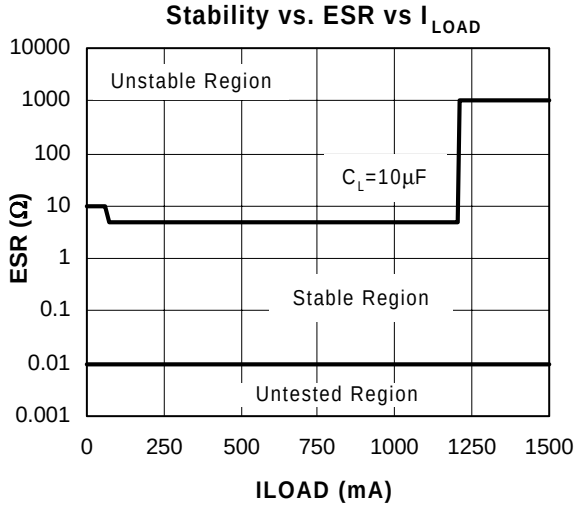


Overtemperature Shutdown



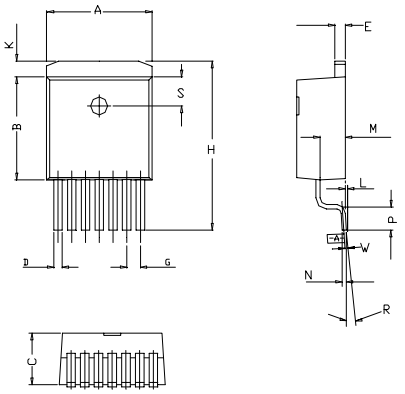

Stability vs. ESR vs I LOAD
10000
1000
100
10
1
0.1
0.01
ESR (Ω)
Unstable Region
C L=5µF
Stable Region
Untested Region
0
250
500
750
1000
1250
1500
ILOAD (mA)


Stability vs. ESR vs I LOAD
10000
1000
100
10
1
0.1
0.01
ESR (Ω)
Unstable Region
C L=2µF
Stable Region
Untested Region
0
250
500
750
1000
1250
1500
ILOAD (mA)


Stability vs. ESR vs I LOAD
10000
1000
100
10
1
0.1
0.01
0.001
ESR (Ω)
Unstable Region
C L=10µF
Stable Region
Untested Region
0
250
500
750
1000
1250
1500
ILOAD (mA)

■ Package Dimension

TO-263 (DDPAK-7)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.05	10.31	0.396	0.406
B	8.28	8.53	0.326	0.336
C	4.31	4.57	0.170	0.180
D	0.66	0.91	0.026	0.036
E	1.14	1.40	0.045	0.055
G	1.27 ref		0.050 ref	
H	14.73	15.75	0.580	0.620
K	1.40	1.68	0.000	0.066
L	0.00	0.25	0.055	0.010
M	2.49	2.74	0.000	0.108
N	0.43	0.58	0.098	0.023
P	2.29	2.79	0.017	0.110
R	0^{o}	$8^{?}$	0^{o}	$8^{?}$
S	2.41	2.67	0.095	0.105
W	0.25		0.01	

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