

MPSW45, MPSW45A

One Watt Darlington Transistors

NPN Silicon

Features

- Pb-Free Packages are Available*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage MPSW45 MPSW45A	V_{CES}	40 50	Vdc
Collector - Base Voltage MPSW45 MPSW45A	V_{CBO}	50 60	Vdc
Emitter - Base Voltage	V_{EBO}	12	Vdc
Collector Current - Continuous	I_C	1.0	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	1.0 8.0	W mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	2.5 20	W mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	50	$^\circ\text{C}/\text{W}$

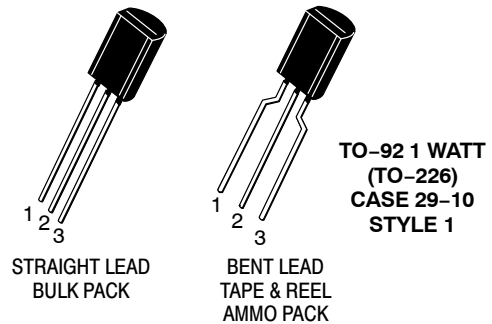
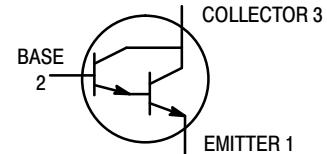
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

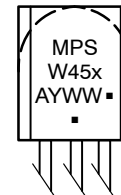


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MARKING DIAGRAM



MPSW45x = Device Code
 x = 45A Devices
 A = Assembly Location
 Y = Year
 WW = Work Week
 ■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage ($I_C = 100 \mu\text{Adc}$, $V_{BE} = 0$)	MPSW45 MPSW45A	$V_{(BR)CES}$	40 50	– –	Vdc
Collector – Base Breakdown Voltage ($I_C = 100 \mu\text{Adc}$, $I_E = 0$)	MPSW45 MPSW45A	$V_{(BR)CBO}$	50 60	– –	Vdc
Emitter – Base Breakdown Voltage ($I_E = 10 \mu\text{Adc}$, $I_C = 0$)		$V_{(BR)EBO}$	12	–	Vdc
Collector Cutoff Current ($V_{CB} = 30 \text{Vdc}$, $I_E = 0$) ($V_{CB} = 40 \text{Vdc}$, $I_E = 0$)	MPSW45 MPSW45A	I_{CBO}	– –	100 100	nAdc
Emitter Cutoff Current ($V_{EB} = 10 \text{Vdc}$, $I_C = 0$)		I_{EBO}	–	100	nAdc

ON CHARACTERISTICS (Note 1)

DC Current Gain ($I_C = 200 \text{mAdc}$, $V_{CE} = 5.0 \text{Vdc}$) ($I_C = 500 \text{mAdc}$, $V_{CE} = 5.0 \text{Vdc}$) ($I_C = 1.0 \text{Adc}$, $V_{CE} = 5.0 \text{Vdc}$)		h_{FE}	25,000 15,000 4,000	150,000 – –	–
Collector – Emitter Saturation Voltage ($I_C = 1.0 \text{Adc}$, $I_B = 2.0 \text{mAdc}$)		$V_{CE(sat)}$	–	1.5	Vdc
Base – Emitter Saturation Voltage ($I_C = 1.0 \text{Adc}$, $I_B = 2.0 \text{mAdc}$)		$V_{BE(sat)}$	–	2.0	Vdc
Base – Emitter On Voltage ($I_C = 1.0 \text{Adc}$, $V_{CE} = 5.0 \text{Vdc}$)		$V_{BE(on)}$	–	2.0	Vdc

SMALL-SIGNAL CHARACTERISTICS

Current – Gain – Bandwidth Product ($I_C = 200 \text{mAdc}$, $V_{CE} = 5.0 \text{Vdc}$, $f = 100 \text{MHz}$)		f_T	100	–	MHz
Collector – Base Capacitance ($V_{CB} = 10 \text{Vdc}$, $I_E = 0$, $f = 1.0 \text{MHz}$)		C_{cb}	–	6.0	pF

1. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$; Duty Cycle $\leq 2.0\%$.

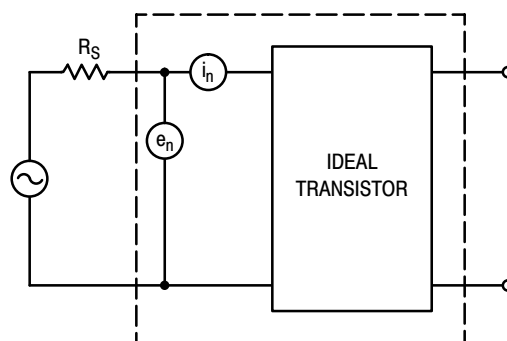


Figure 1. Transistor Noise Model

MPSW45, MPSW45A

NOISE CHARACTERISTICS

($V_{CE} = 5.0$ Vdc, $T_A = 25^\circ\text{C}$)

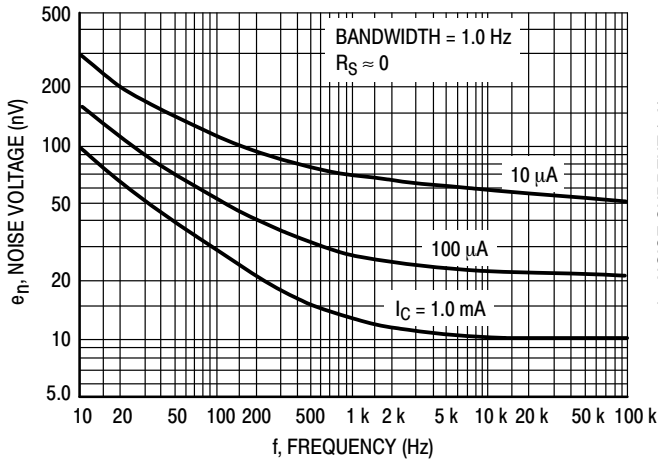


Figure 2. Noise Voltage

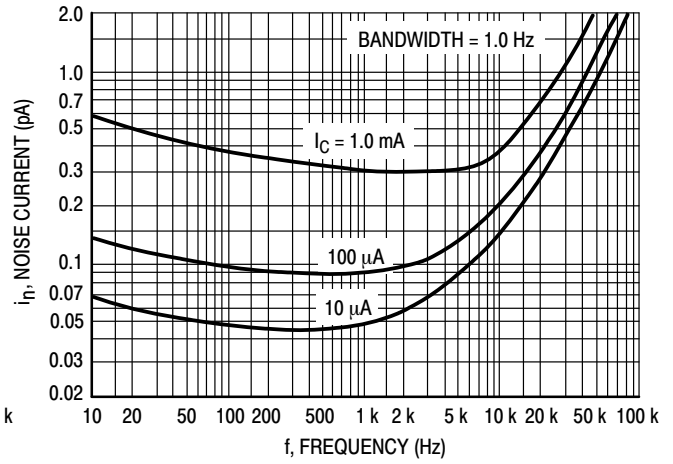


Figure 3. Noise Current

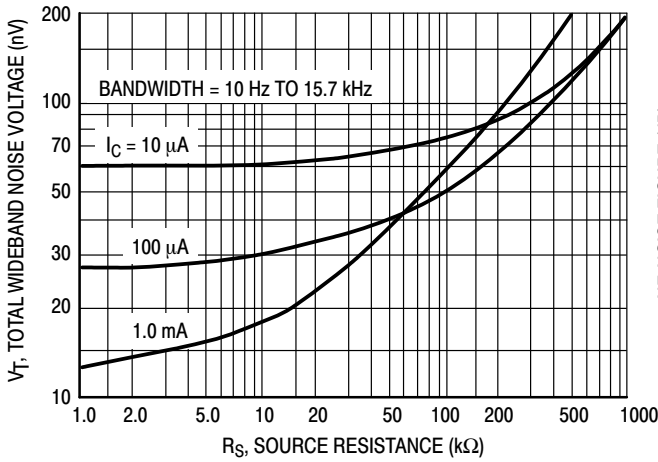


Figure 4. Total Wideband Noise Voltage

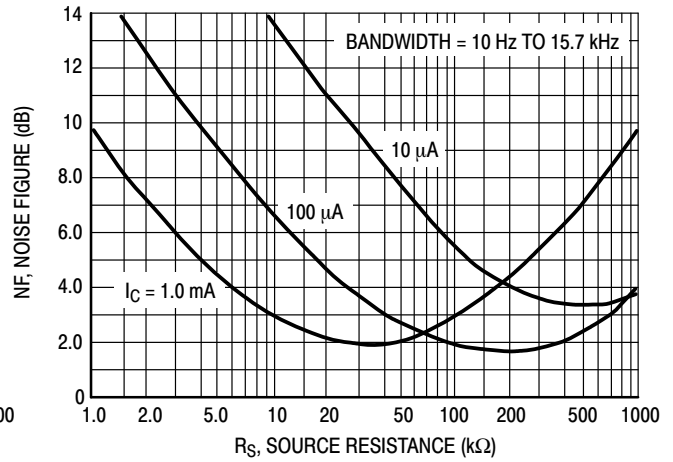


Figure 5. Wideband Noise Figure

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SMALL-SIGNAL CHARACTERISTICS

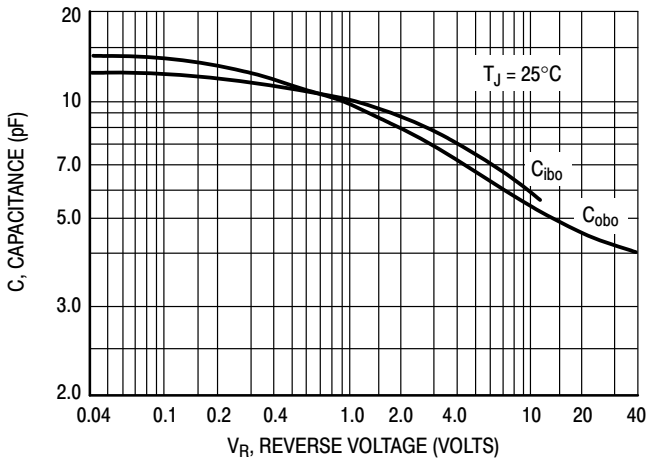


Figure 6. Capacitance

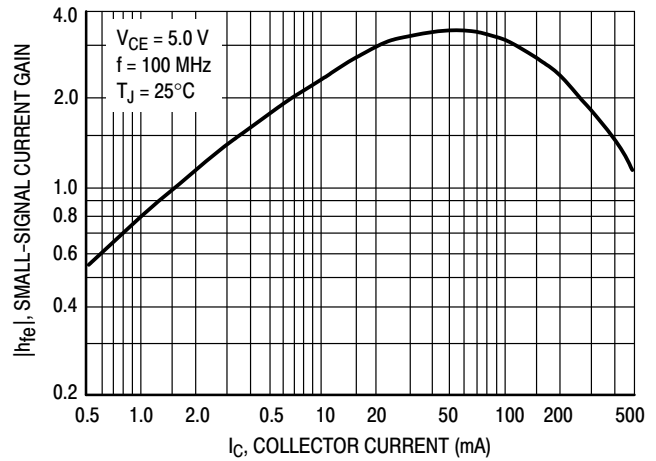


Figure 7. High Frequency Current Gain

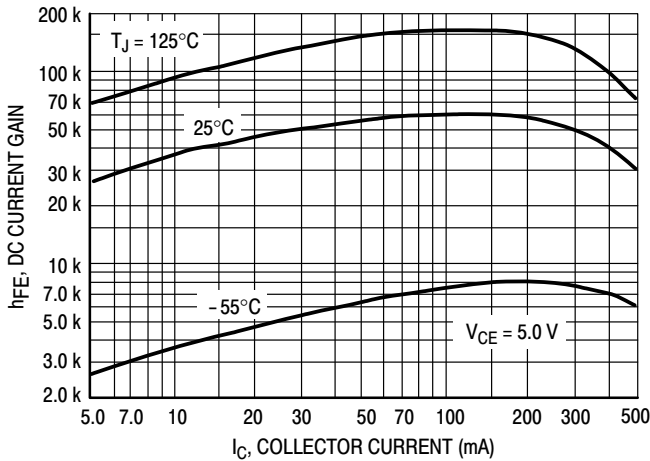


Figure 8. DC Current Gain

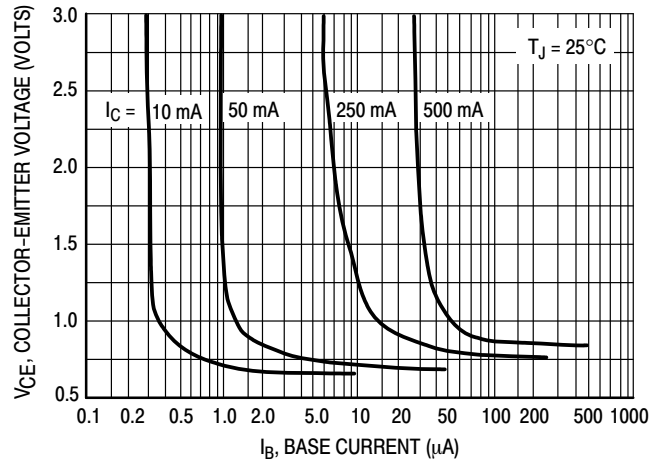


Figure 9. Collector Saturation Region

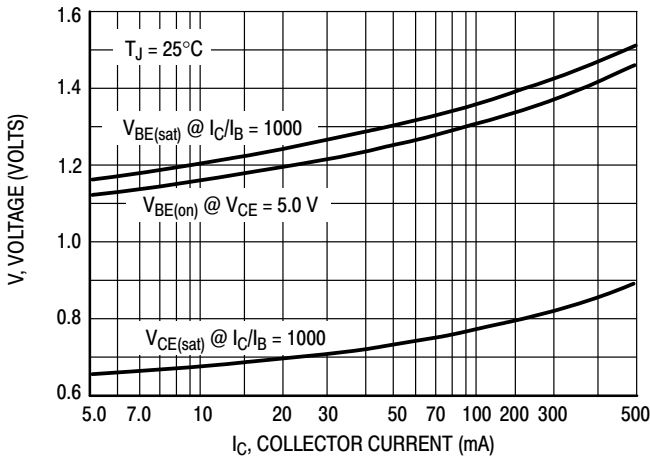


Figure 10. "On" Voltages

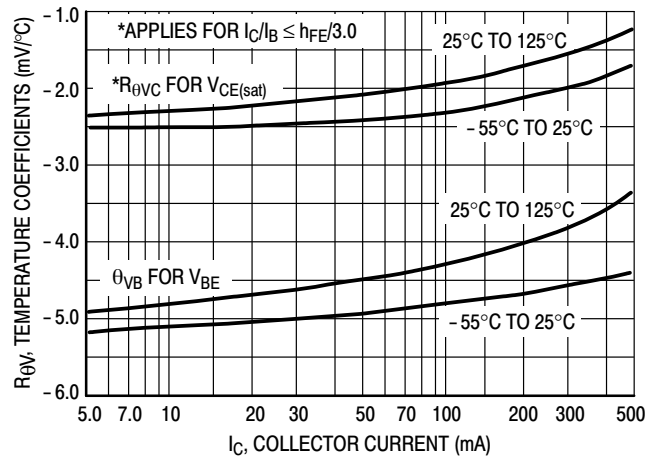


Figure 11. Temperature Coefficients

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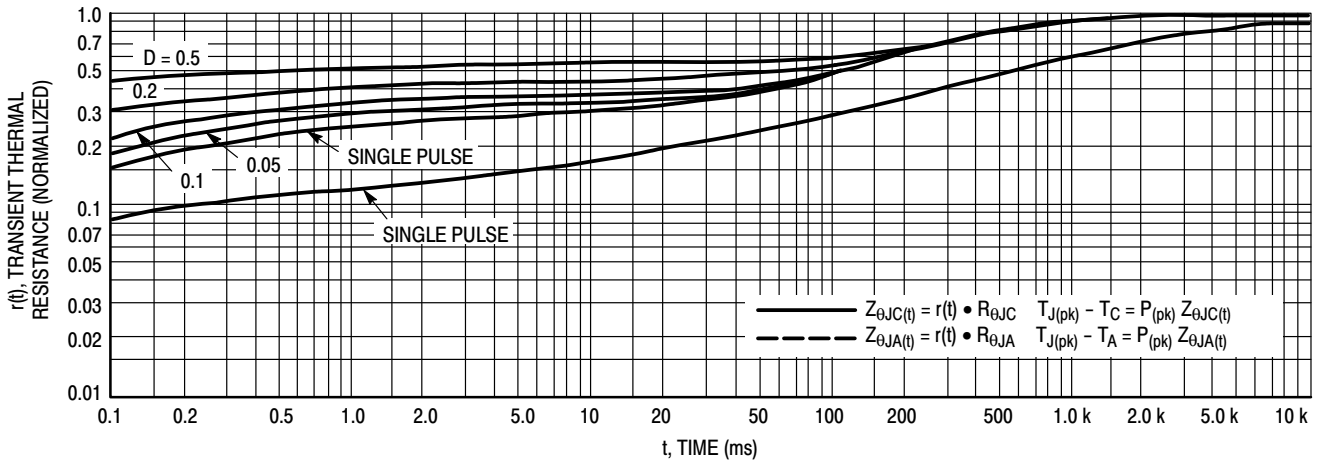


Figure 12. Thermal Response

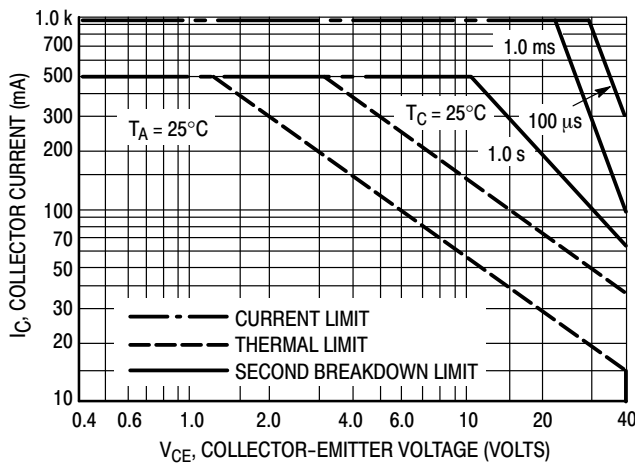
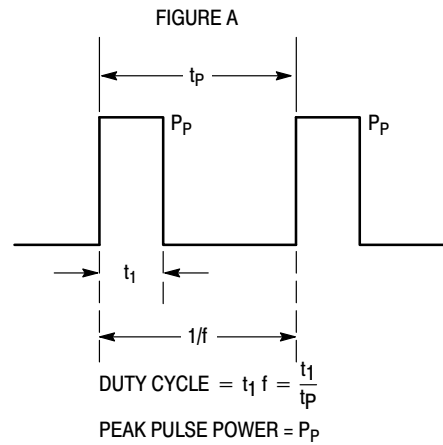


Figure 13. Active Region Safe Operating Area



Design Note: Use of Transient Thermal Resistance Data

ORDERING INFORMATION

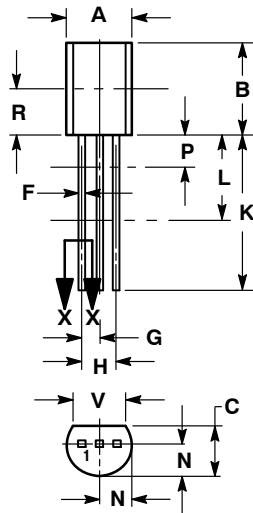
Device	Package	Shipping†
MPSW45G	TO-92 (Pb-Free)	5,000 Units / Box
MPSW45RLREG	TO-92 (Pb-Free)	2,000 / Tape & Reel
MPSW45A	TO-92	5,000 Units / Box
MPSW45AG	TO-92 (Pb-Free)	5,000 Units / Box
MPSW45ARLRA	TO-92	2,000 / Tape & Reel
MPSW45ARLRAG	TO-92 (Pb-Free)	2,000 / Tape & Reel
MPSW45AZL1	TO-92	2,000 / Ammo Pack
MPSW45AZL1G	TO-92 (Pb-Free)	2,000 / Ammo Pack

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

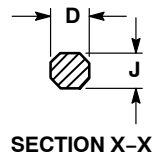
MPSW45, MPSW45A

PACKAGE DIMENSIONS

TO-92 (TO-226) 1 WATT
CASE 29-10
ISSUE O



STRAIGHT LEAD
BULK PACK

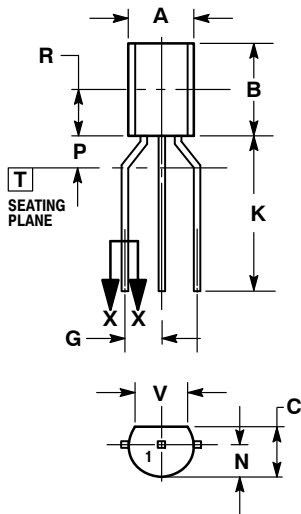


NOTES:

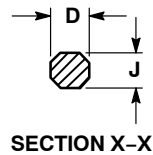
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN DIMENSIONS P AND L. DIMENSIONS D AND J APPLY BETWEEN DIMENSIONS L AND K MINIMUM. THE LEAD DIMENSIONS ARE UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.44	5.21
B	0.290	0.310	7.37	7.87
C	0.125	0.165	3.18	4.19
D	0.018	0.021	0.46	0.53
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.018	0.024	0.46	0.61
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.135	---	3.43	---
V	0.135	---	3.43	---

STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR



BENT LEAD
TAPE & REEL
AMMO PACK



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
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D	0.018	0.021	0.46	0.53
G	0.094	0.102	2.40	2.80
J	0.018	0.024	0.46	0.61
K	0.500	---	12.70	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.135	---	3.43	---
V	0.135	---	3.43	---

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