Silicon Carbide Schottky Diode

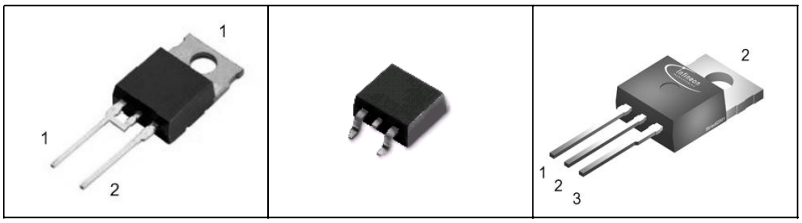
thinQ!™ SiC Schottky Diode

- Worlds first 600V Schottky diode
- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery
- No temperature influence on the switching behavior
- Ideal diode for Power Factor Correction up to 1200W[1)]
- No forward recovery

Product Summary

V_{RRM}	600	V
Q_c	21	nC
I_F	6	A

P-TO220-2-2. P-TO220-3.SMD P-TO220-3-1.



Type	Package	Ordering Code	Marking	Pin 1	Pin 2	Pin 3
SDP06S60	P-TO220-3-1.	Q67040-S4371	D06S60	n.c.	C	A
SDB06S60	P-TO220-3.SMD	Q67040-S4370	D06S60	n.c.	C	A
SDT06S60	P-TO220-2-2.	Q67040-S4446	D06S60	C	A	

Maximum Ratings, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous forward current, T_C=100°C	I_F	6	A
RMS forward current, f=50Hz	I_{FRMS}	8.4	
Surge non repetitive forward current, sine halfwave T_C=25°C, t_p=10ms	I_{FSM}	21.5	
Repetitive peak forward current T_j=150°C, T_C=100°C, D=0.1	I_{FRM}	28	
Non repetitive peak forward current t_p=10µs, T_C=25°C	I_{FMAX}	60	
i^2t value, T_C=25°C, t_p=10ms	$\int i^2dt$	2.3	A²s
Repetitive peak reverse voltage	V_{RRM}	600	V
Surge peak reverse voltage	V_{RSM}	600	
Power dissipation, T_C=25°C	P_{tot}	57.6	W
Operating and storage temperature	T_j , T_{stg}	-55... +175	°C

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	-	2.6	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	62	
SMD version, device on PCB:	R_{thJA}				
P-TO263-3-2: @ min. footprint		-	-	62	
P-TO263-3-2: @ 6 cm^2 cooling area [2)]		-	35	-	
P-TO252-3-1: @ min. footprint		-	-	75	
P-TO252-3-1: @ 6 cm^2 cooling area [2)]		-	-	50	

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Diode forward voltage	V_F				V
I_F=6A, T_j=25°C		-	1.5	1.7	
I_F=6A, T_j=150°C		-	1.7	2.1	
Reverse current	I_R				µA
V_R=600V, T_j=25°C		-	20	200	
V_R=600V, T_j=150°C		-	50	1000	

[1]CCM, V_{IN}= 85VAC, T_j = 150°C, T_C =100°C, η = 93%, Δ I_{IN} = 30%

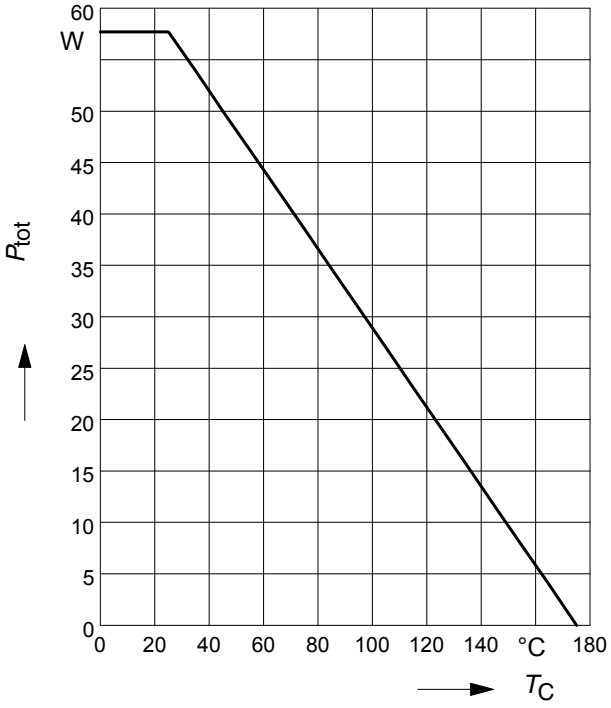
[2]Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Total capacitive charge V_R=400V, I_F=6A, di_F/dt=200A/µs, T_j=150°C	Q_c	-	21	-	nC
Switching time V_R=400V, I_F=6A, di_F/dt=200A/µs, T_j=150°C	t_{rr}	-	n.a.	-	ns
Total capacitance	C				pF
V_R=0V, T_C=25°C, f=1MHz		-	300	-	
V_R=300V, T_C=25°C, f=1MHz		-	20	-	
V_R=600V, T_C=25°C, f=1MHz		-	15	-	

1 Power dissipation

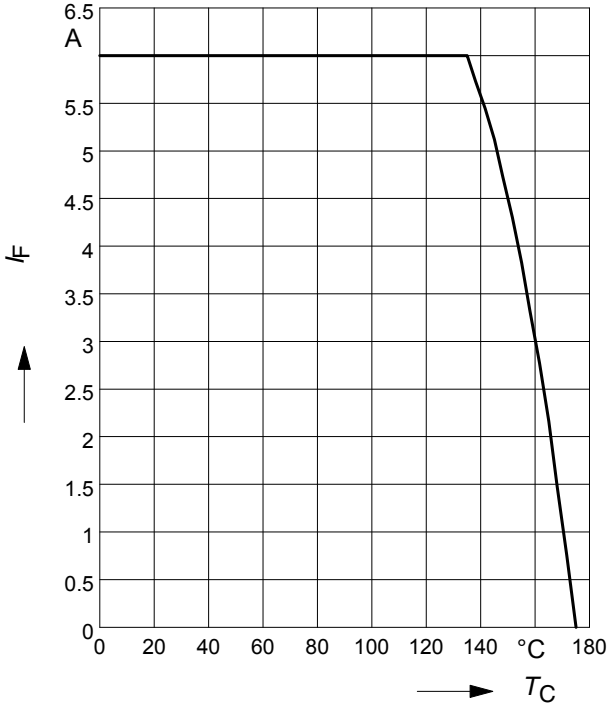
$P_{tot} = f(T_C)$



2 Diode forward current

$I_F = f(T_C)$

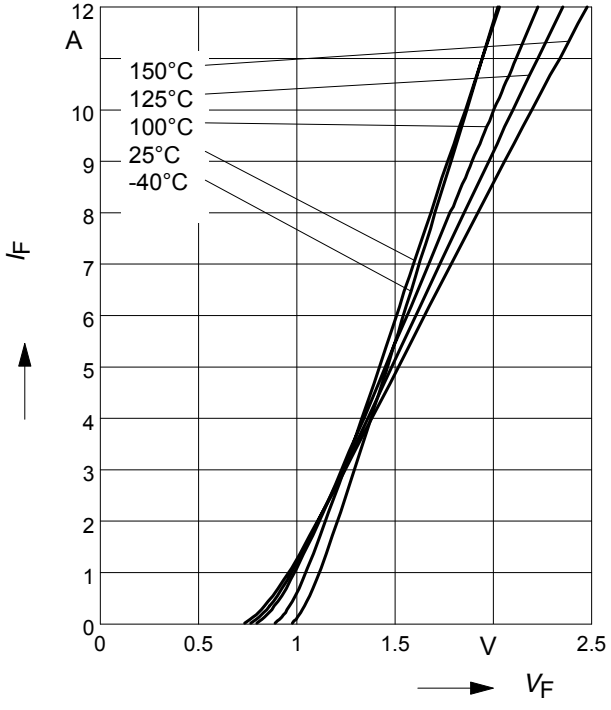
parameter: $T_j \leq 175$ °C



3 Typ. forward characteristic

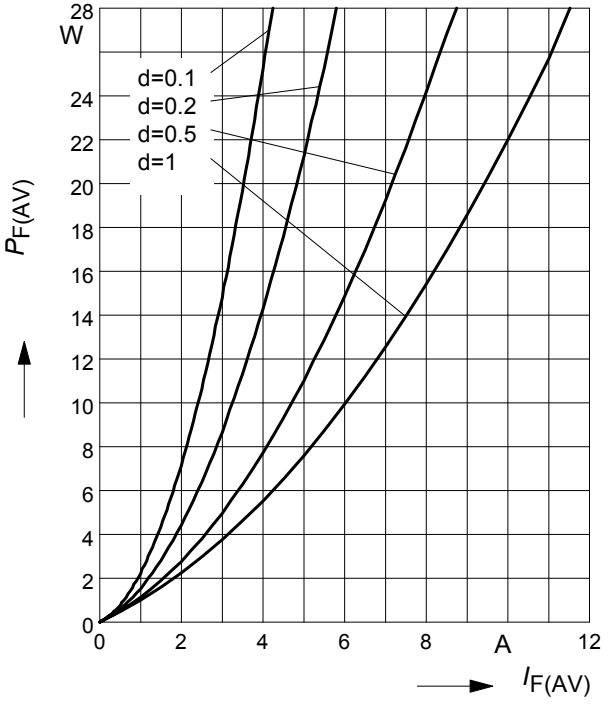
$I_F = f(V_F)$

parameter: T_j , tp = 350 µs



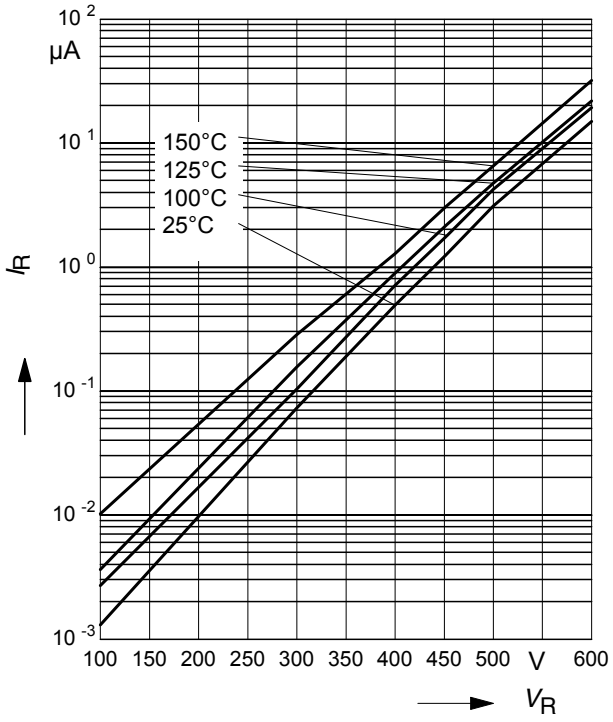
4 Typ. forward power dissipation vs. average forward current

$P_{F(AV)}=f(I_F)$ T_C=100°C, $d = t_p/T$



5 Typ. reverse current vs. reverse voltage

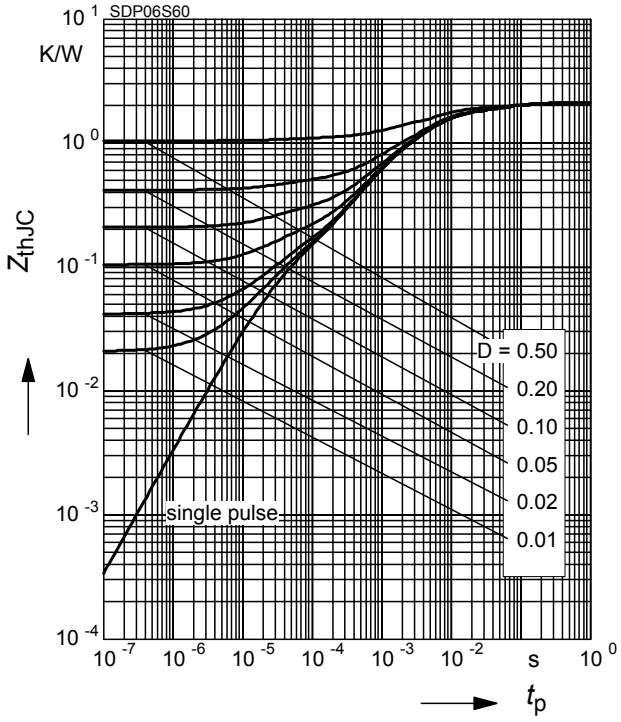
$I_R=f(V_R)$



6 Transient thermal impedance

$Z_{thJC} = f(t_p)$

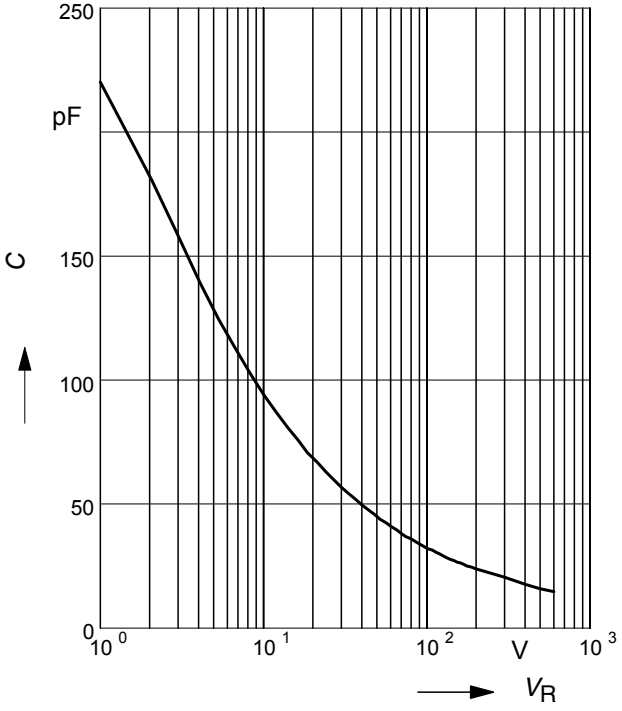
parameter : $D = t_p/T$



7 Typ. capacitance vs. reverse voltage

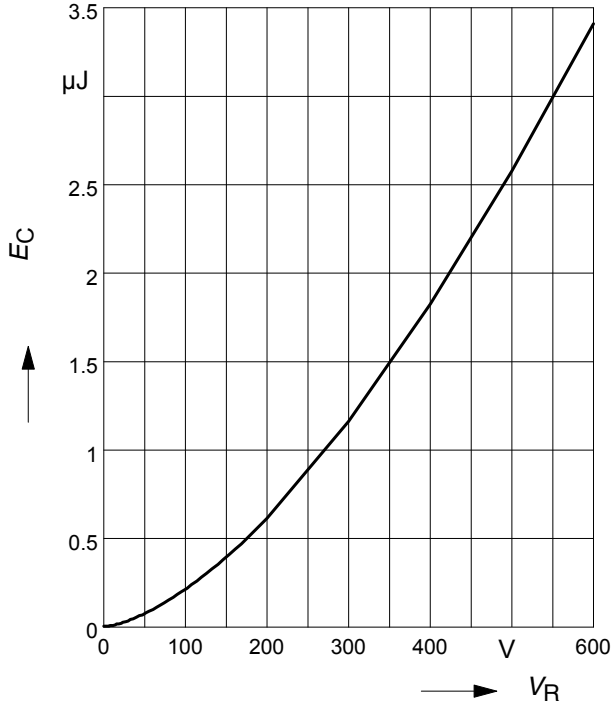
$C= f(V_R)$

parameter: T_C = 25 °C, f = 1 MHz



8 Typ. C stored energy

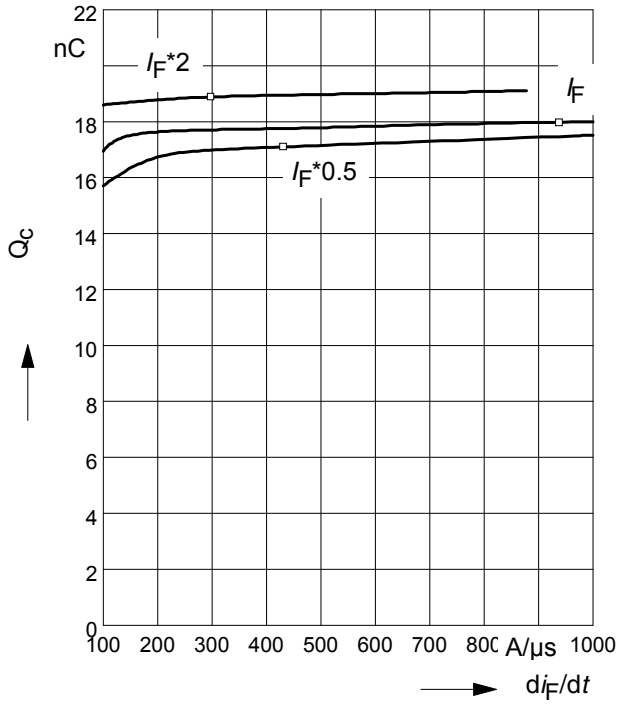
$E_C=f(V_R)$



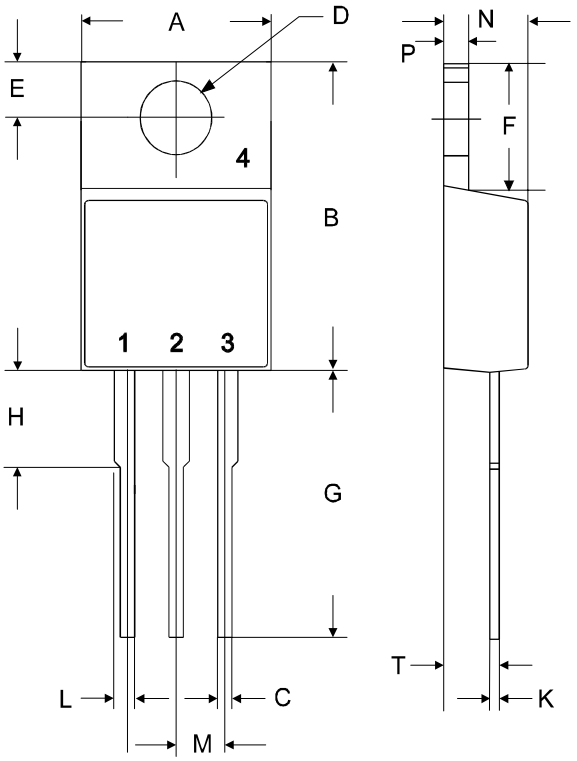
9 Typ. capacitive charge vs. current slope

$Q_c = f(di_F/dt)$

parameter: T_j = 150 °C

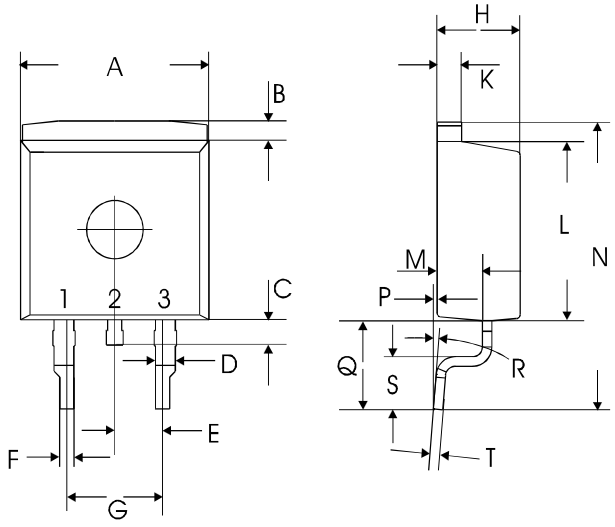


P-TO220-3-1

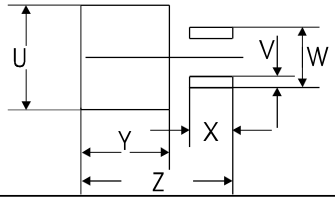


symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.70	10.30	0.3819	0.4055
B	14.88	15.95	0.5858	0.6280
C	0.65	0.86	0.0256	0.0339
D	3.55	3.89	0.1398	0.1531
E	2.60	3.00	0.1024	0.1181
F	6.00	6.80	0.2362	0.2677
G	13.00	14.00	0.5118	0.5512
H	4.35	4.75	0.1713	0.1870
K	0.38	0.65	0.0150	0.0256
L	0.95	1.32	0.0374	0.0520
M	2.54 typ.		0.1 typ.	
N	4.30	4.50	0.1693	0.1772
P	1.17	1.40	0.0461	0.0551
T	2.30	2.72	0.0906	0.1071

TO-220-3-45 (P-TO220SMD)

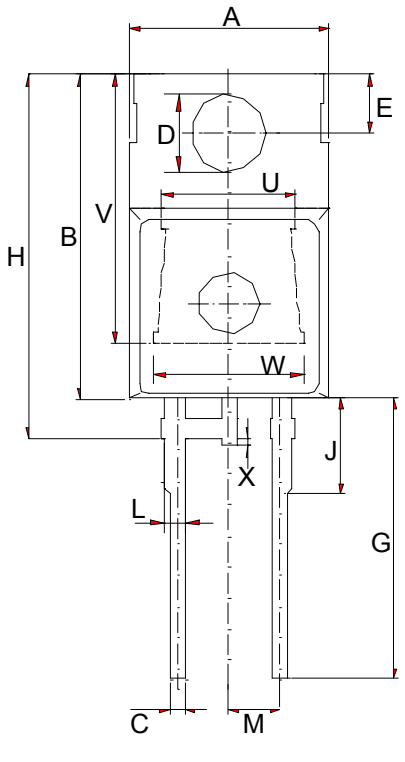


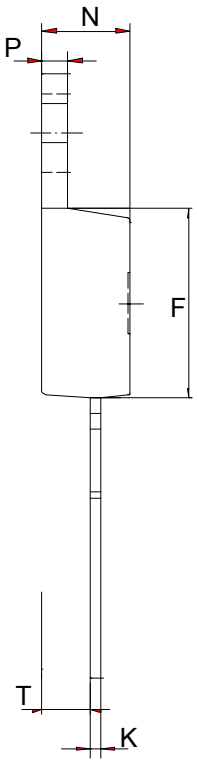
Footprint
(dif. scale)



symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.80	10.00	0.3858	0.3937
B	1.3 typ.		0.0512 typ.	
C	1.25	1.75	0.0492	0.0689
D	0.95	1.15	0.0374	0.0453
E	2.54 typ.		0.1 typ.	
F	0.72	0.85	0.0283	0.0335
G	5.08 typ.		0.2 typ.	
H	4.30	4.50	0.1693	0.1772
K	1.28	1.40	0.0504	0.0551
L	9.00	9.40	0.3543	0.3701
M	2.30	2.50	0.0906	0.0984
N	14.1 typ.		0.5551 typ.	
P	0.00	0.20	0.0000	0.0079
Q	3.30	3.90	0.1299	0.1535
R	8° max		8° max	
S	1.70	2.50	0.0669	0.0984
T	0.50	0.65	0.0197	0.0256
U	10.8 typ.		0.4252 typ.	
V	1.35 typ.		0.0532 typ.	
W	6.43 typ.		0.2532 typ.	
X	4.60 typ.		0.1811 typ.	
Y	9.40 typ.		0.3701 typ.	
Z	16.15 typ.		0.6358 typ.	

TO-220-2-2





symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.70	10.10	0.3819	0.3976
B	15.30	15.90	0.6024	0.6260
C	0.65	0.85	0.0256	0.0335
D	3.55	3.85	0.1398	0.1516
E	2.60	3.00	0.1024	0.1181
F	9.00	9.40	0.3543	0.3701
G	13.00	14.00	0.5118	0.5512
H	17.20	17.80	0.6772	0.7008
J	4.40	4.80	0.1732	0.1890
K	0.40	0.60	0.0157	0.0236
L	1.05 typ.		0.41 typ.	
M	2.54 typ.		0.1 typ.	
N	4.4 typ.		0.173 typ.	
P	1.10	1.40	0.0433	0.0551
T	2.4 typ.		0.095 typ.	
U	6.6 typ.		0.26 typ.	
V	13.0 typ.		0.51 typ.	
W	7.5 typ.		0.295 typ.	
X	0.00	0.40	0.0000	0.0157

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