

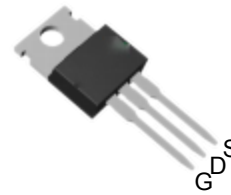
Features

- 40V/180A
 $R_{DS(ON)}=1.5\text{m}\Omega(\text{typ.})@V_{GS}=10\text{V}$
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free and Green Devices Available
(RoHS Compliant)

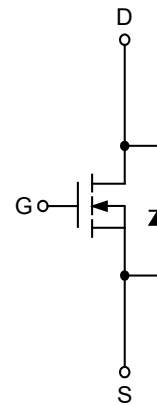
Applications

- SMPS Synchronous Rectification.
- BLDC Motor drive applications.
- Load Switch.
- DC-DC Conversion.
- Or-ing.

Pin Description



Top View of TO-220



N-Channel MOSFET

Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V _{DSS}	Drain-Source Voltage		40	V
V _{GSS}	Gate-Source Voltage		±20	
T _J	Maximum Junction Temperature		175	°C
T _{STG}	Storage Temperature Range		-55 to 175	
I _S	Diode Continuous Forward Current	T _C =25°C	95	A
I _D	Continuous Drain Current	T _C =25°C	180	
	Continuous Drain Current	T _C =100°C	136	
I _{DM} ^b	Pulsed Drain Current	T _C =25°C	400	
P _D	Maximum Power Dissipation	T _C =25°C	136	W
		T _C =100°C	68	
R _{θJC}	Thermal Resistance-Junction to Case	Steady State	1.1	°C/W
I _D	Continuous Drain Current	T _A =25°C	25.5	A
		T _A =70°C	21.3	
I _{DM} ^b	Pulsed Drain Current	T _A =25°C	102	
P _D	Maximum Power Dissipation	T _A =25°C	2.4	W
		T _A =70°C	1.68	
R _{θJA}	Thermal Resistance-Junction to Ambient	Steady State	62.5	°C/W
I _{AS} ^c	Avalanche Current, Single pulse	L=0.1mH	224	A
E _{AS} ^c	Avalanche Energy, Single pulse	L=0.1mH	2508	mJ

Note a : Maximum continuous current is limited by bonding wire.

Note b : Pulse width limited by maximum junction temperature.

Note c : UIS tested and pulse width limited by maximum junction temperature (initial temperature $T_J=25^{\circ}\text{C}$).

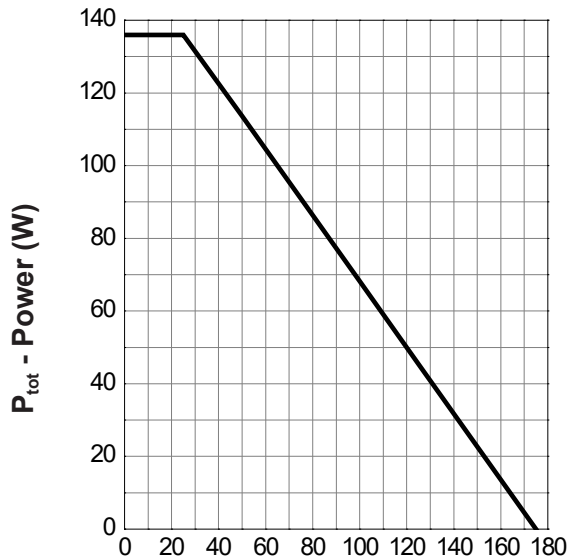
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

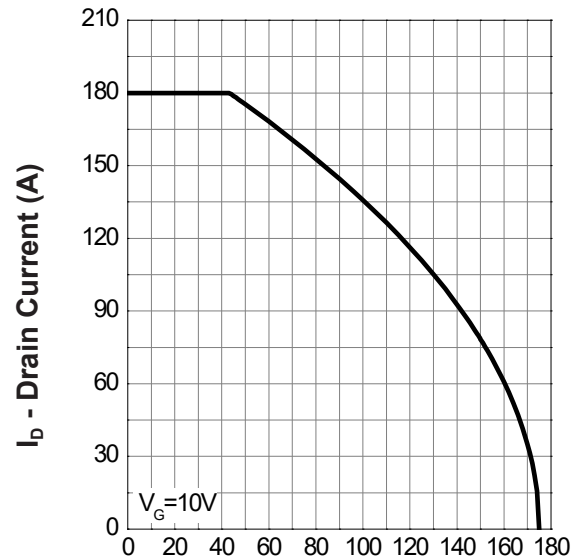
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1	1.6	2.2	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^d	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =20A	-	1.5	2.1	mΩ
Gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =15A	-	41.5	-	S
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =20A, V _{GS} =0V	-	0.8	1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =20A, dI _{SD} /dt=100A/μs	-	44.2	-	ns
t _a	Charge Time		-	22.6	-	
t _b	Discharge Time		-	21.6	-	
Q _{rr}	Reverse Recovery Charge		-	42.7	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,F=1MHz	-	2	4	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, Frequency=1.0MHz	-	10347	-	pF
C _{oss}	Output Capacitance		-	1155	-	
C _{rss}	Reverse Transfer Capacitance		-	1058	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =20V, R _L =20Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	18.4	34	ns
t _r	Turn-on Rise Time		-	13.6	25	
t _{d(OFF)}	Turn-off Delay Time		-	60.9	110	
t _f	Turn-off Fall Time		-	107.6	194	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V, I _{DS} =20A	-	60.6	84.8	nC
Q _{gth}	Threshold Gate Charge		-	13.3	-	
Q _{gs}	Gate-Source Charge		-	18.4	-	
Q _{gd}	Gate-Drain Charge		-	9	-	

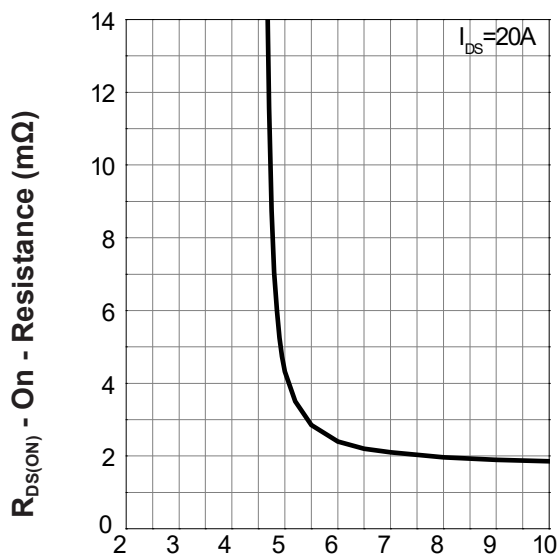
Note d : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

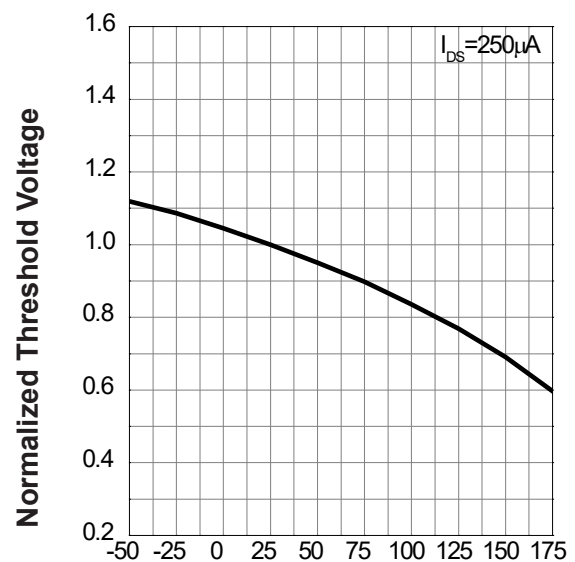
Note e : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

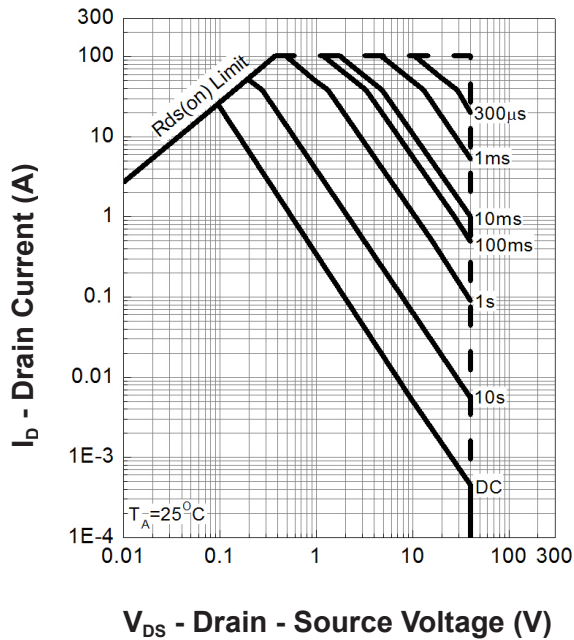
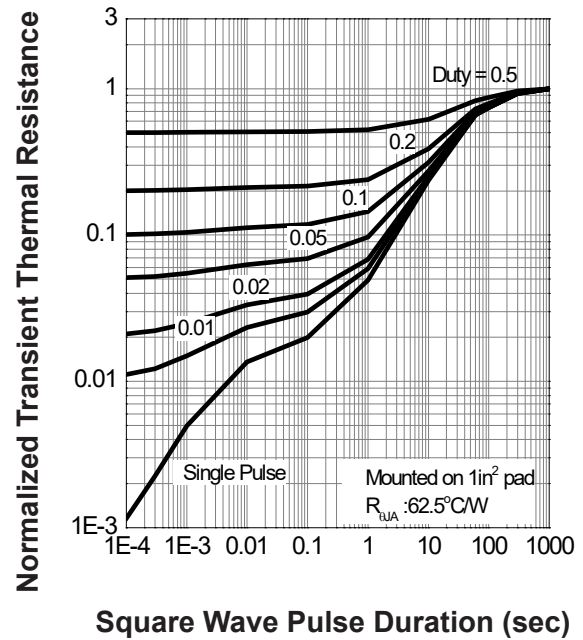
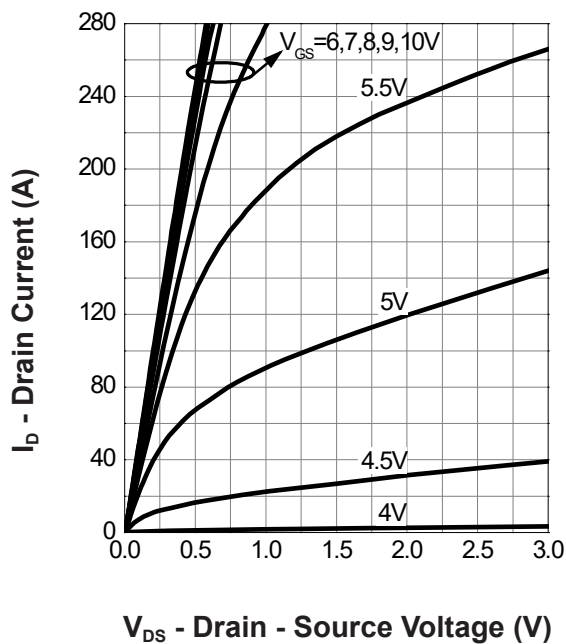
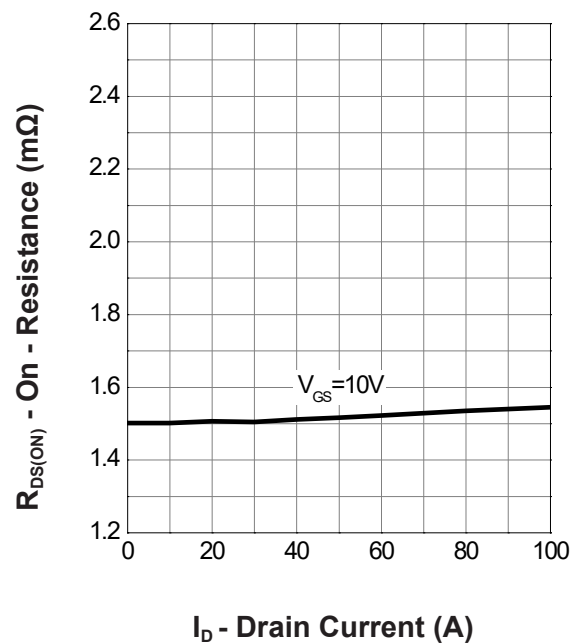
Power Dissipation

 T_c - Case Temperature (°C)

Drain Current

 T_c - Case Temperature (°C)

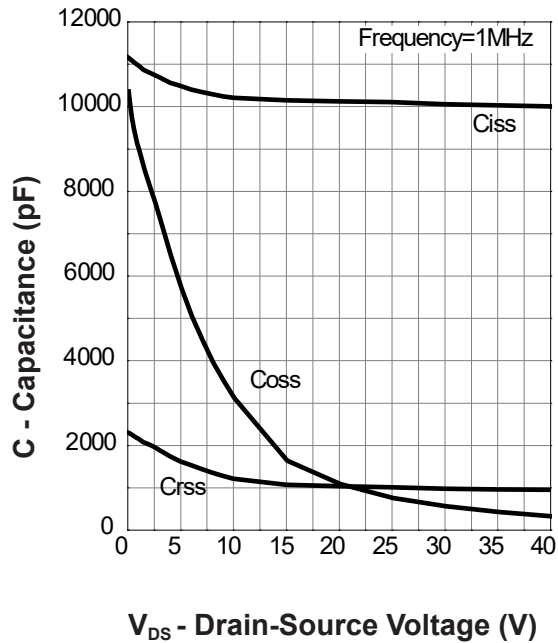
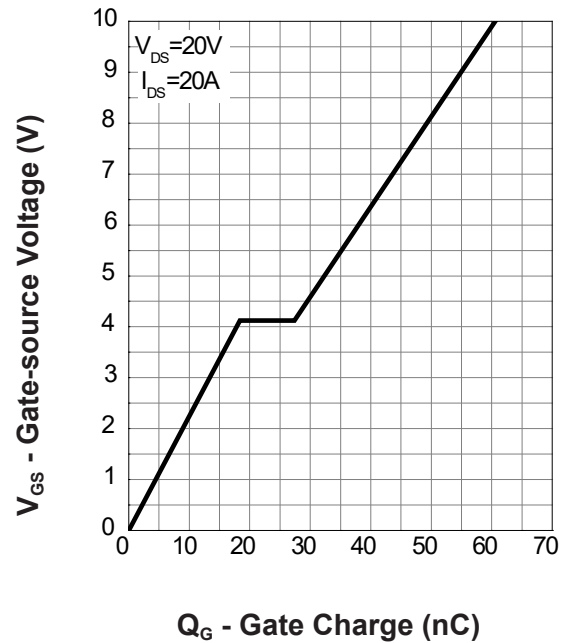
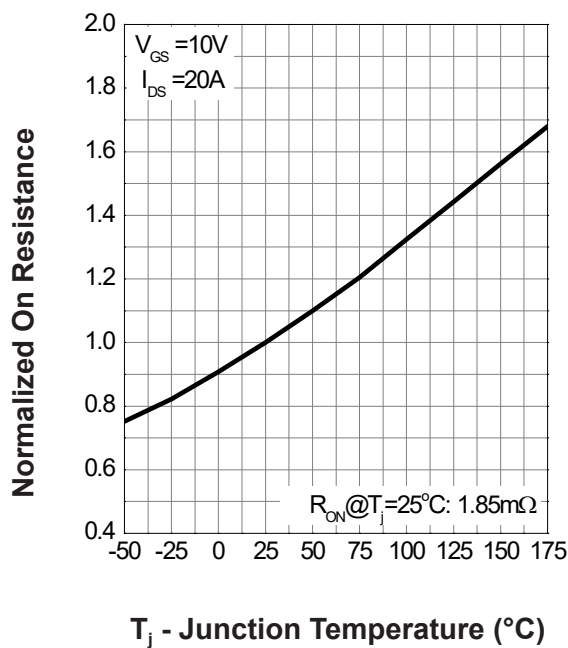
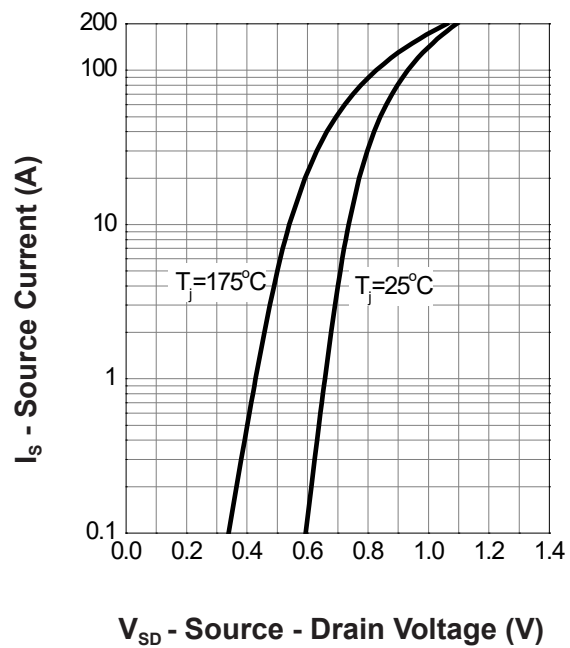
Gate-Source On Resistance

 V_{GS} - Gate - Source Voltage (V)

Gate Threshold Voltage

 T_J - Junction Temperature (°C)

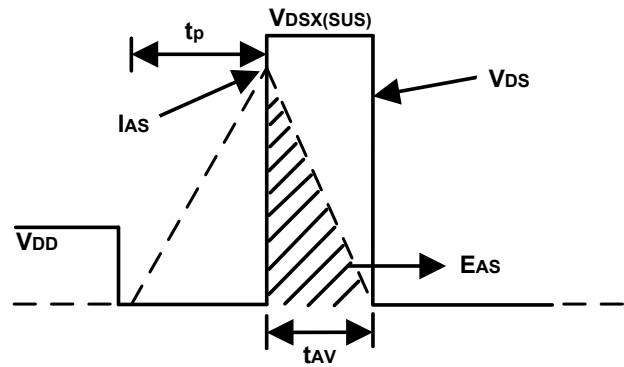
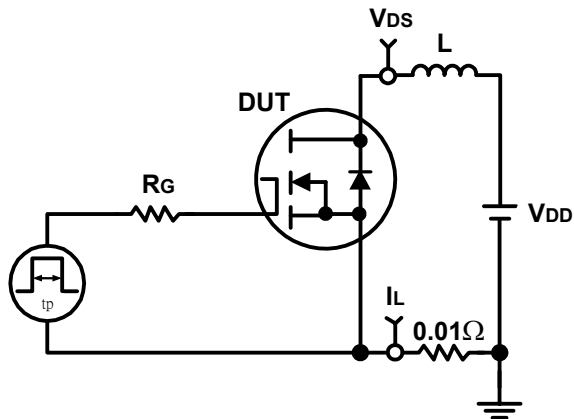
Typical Operating Characteristics(Cont.)

Safe Operation Area

Thermal Transient Impedance

Output Characteristics

Drain-Source On Resistance


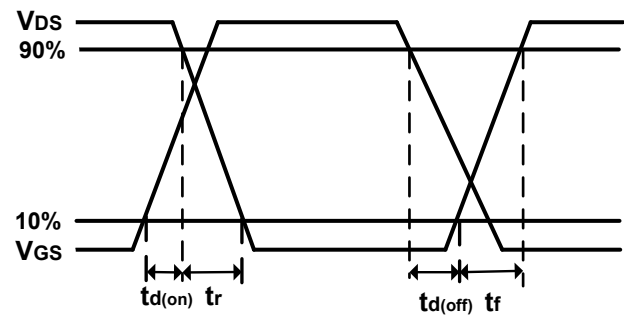
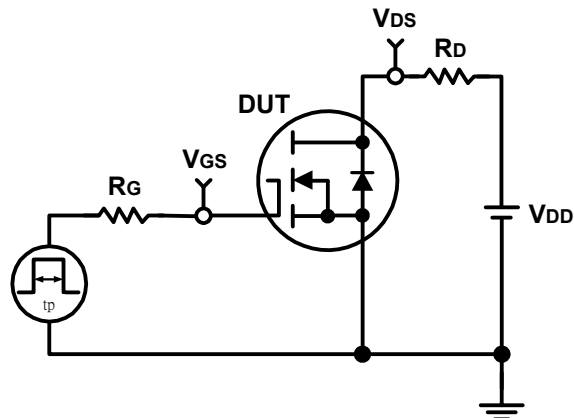
Typical Operating Characteristics(Cont.)

Capacitance

Gate Charge

Drain-Source On Resistance

Source-Drain Diode Forward


Avalanche Test Circuit and Waveforms

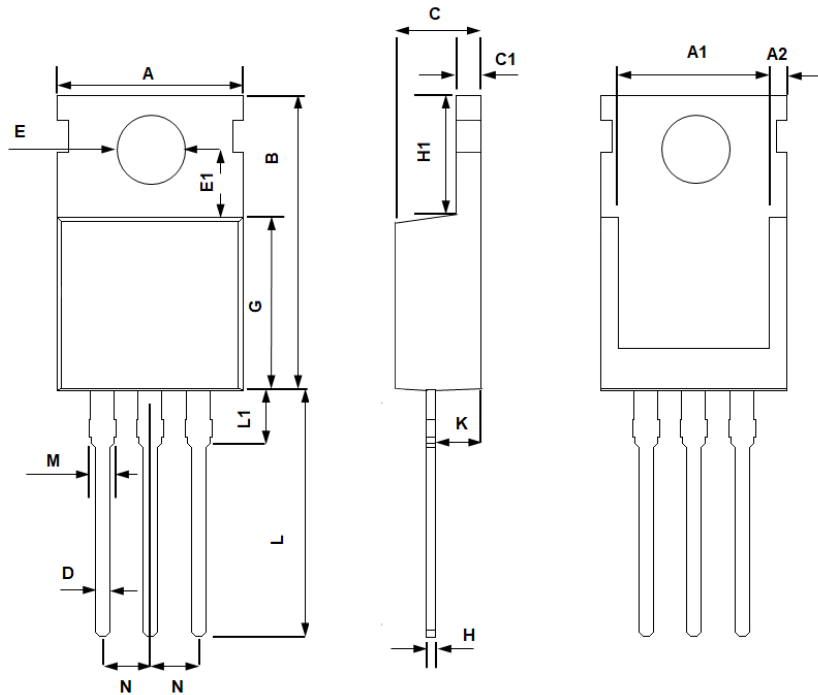


Switching Time Test Circuit and Waveforms



Package Information

TO-220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	10.400	9.700	0.409	0.382
A1	8.900	7.400	0.350	0.291
A2	1.400	0.800	0.055	0.031
B	16.500	14.500	0.650	0.571
C	4.750	4.200	0.187	0.165
C1	1.500	1.100	0.059	0.043
D	1.000	0.600	0.039	0.024
E	4.000	3.300	0.157	0.130
E1	3.800	3.400	0.150	0.134
G	9.400	8.400	0.370	0.331
H	0.600	0.200	0.024	0.008
H1	6.850	6.200	0.270	0.244
K	2.850	2.100	0.112	0.083
L	14.000	12.500	0.551	0.492
L1	4.000	2.700	0.157	0.106
M	1.750	1.100	0.069	0.043
N	2.640	2.440	0.104	0.096