650V N-Channel Power MOSFET

V_{DSS}	650V
I_D @V_{GS}=10V	65A
$R_{DS(ON)_Typ.}$ @V_{GS}=10V	21mΩ

DESCRIPTION：

·Excellent $R_{DS(ON)}$, and Low Gate Charge

·100% UIS Tested

·100% ΔVds Tested

·Halogen-free; RoHS-compliant

TYPICAL APPLICATIONS：

·SMPS with PFC

·Flyback and LLC topologies

·Silver ATX, adapter, TV, lighting, Telecom



TO-247

MAXIMUM RATINGS (at T_C = 25 °C, unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	65 41	A
Pulsed Drain Current (1)		I_{DM}	Refer to Fig.4	A
Single Pulse Avalanche Energy (2)		E_{AS}	1037	mJ
Power dissipation	Tc=25℃ Tc=100℃	P_D	313 125	W
Junction & Storage temperature Range		T_J, T_{STG}	-55~+150	℃

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction-to-Case Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	0.4 42	℃/W

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. E_{AS} condition: Starting T_J=25℃, V_{DD}=50V, V_{GS}=10V, R_G=25ohm, L=10mH, I_{AS}=14.4A, V_{DD}=0V during time in avalanche.

ELECTRICAL CHARATERISTICS (at T_J = 25 °C, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage VGS = 0V, ID = 250uA	$V_{(BR)DSS}$	650			V
Zero Gate Voltage Drain Current VDS = 650 V, VGS = 0 V	I_{DSS}			10.0	uA
Gate-Source Leakage Current VGS = ±30V, VDS = 0V	I_{GSS}			±100	nA
Gate-Source threshold voltage VDS = VGS, ID = 250uA	$V_{GS(th)}$	2.7	3.8	4.9	V
Drain-Source On-State Resistance VGS = 10V, ID = 40A	$R_{DS(on)}$		21	30	mΩ
Input capacitance f=1MHz, VDS=325 V, VGS=0 V	C_{iss}		10022	13529	pF
Output capacitance f=1MHz, VDS=325 V, VGS=0 V	C_{oss}		193	261	pF
Reverse transfer capacitance f=1MHz, VDS=325 V, VGS=0 V	C_{rss}		9.5		pF
Gate Resistance VGS = 0V, VDS= 0V, f = 1MHz	R_G		1.9		Ω
Total Gate Charge VDS= 325V, ID= 40A, VGS= 0 to 10V	Q_G		193	260	nC
Gate to Source Charge VDS= 325V, ID= 40A, VGS= 0 to 10V	Q_{GS}		67	91	nC
Gate to Drain Charge VDS= 325V, ID= 40A, VGS= 0 to 10V	Q_{GD}		71	95	nC
Turn-on delay time VDS= 320V, ID= 40A, VGS= 10V, R_{GEN}=25Ω	$td_{(ON)}$		189		ns
Rise time VDS= 320V, ID= 40A, VGS= 10V, R_{GEN}=25Ω	tr		97		ns
Turn-off delay time VDS= 320V, ID= 40A, VGS= 10V, R_{GEN}=25Ω	$td_{(OFF)}$		478		ns
Fall time VDS= 320V, ID= 40A, VGS= 10V, R_{GEN}=25Ω	tf		108		ns
Revers Recovery Time IS=40A, di/dt = 100A/us	Trr		213	288	ns
Revers Recovery Charge IS=40A, di/dt = 100A/us	Qrr		2228		nC
Continuous Body Diode Current	IS			65	A
Pulsed Diode Forward Current	ISM			262	A
Diode Forward Voltage VGS = 0V, I_S = 40A	V_{SD}			1.2	V

Typical Performance Characteristics

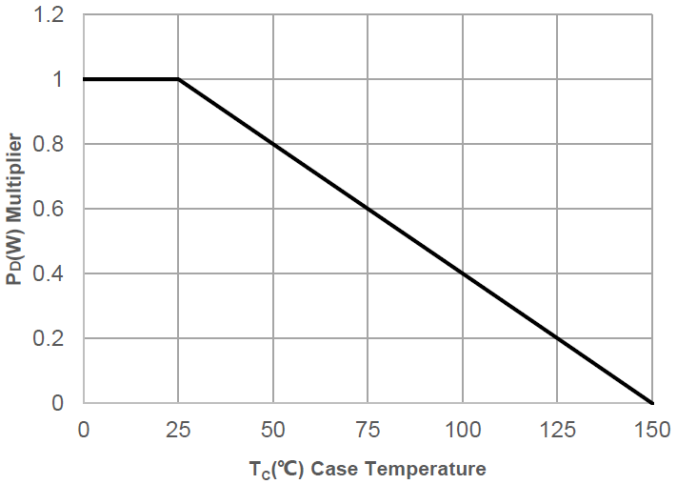


Figure 1. Power De-rating

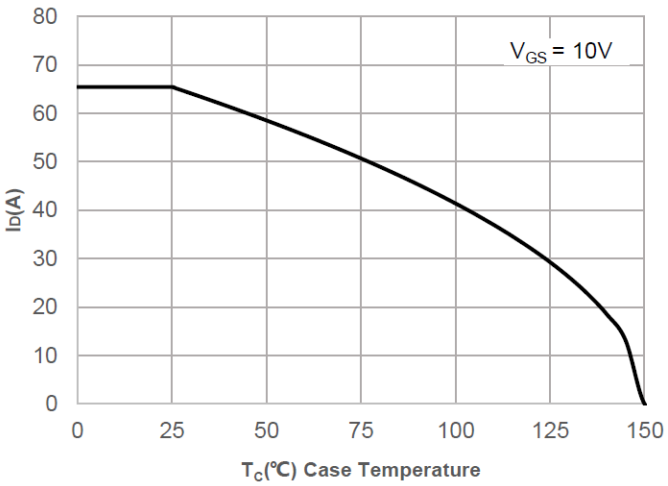


Figure 2. Current De-rating

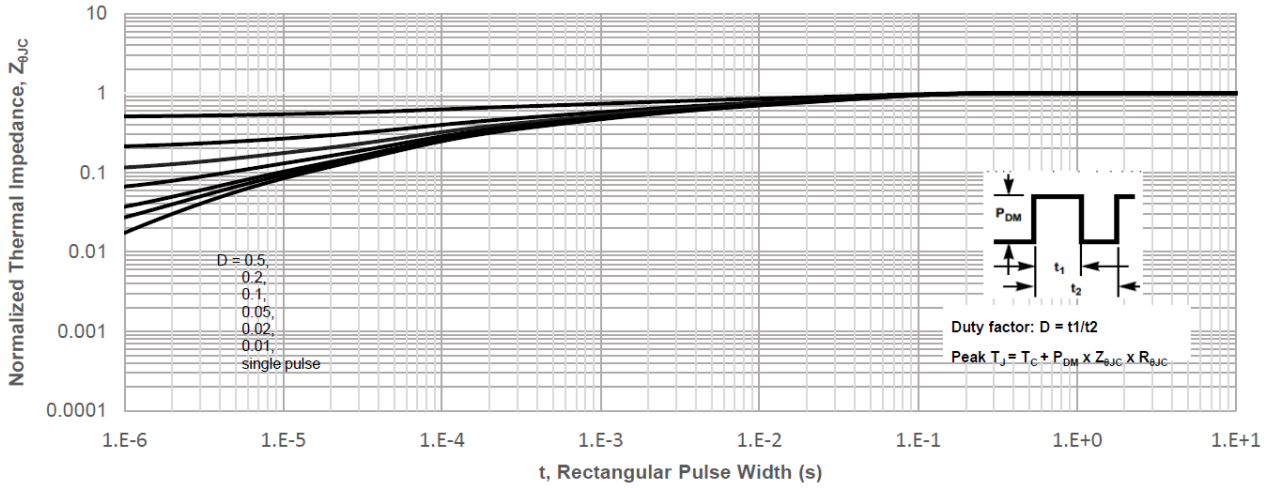


Figure 3. Normalized Maximum Transient Thermal Impedance

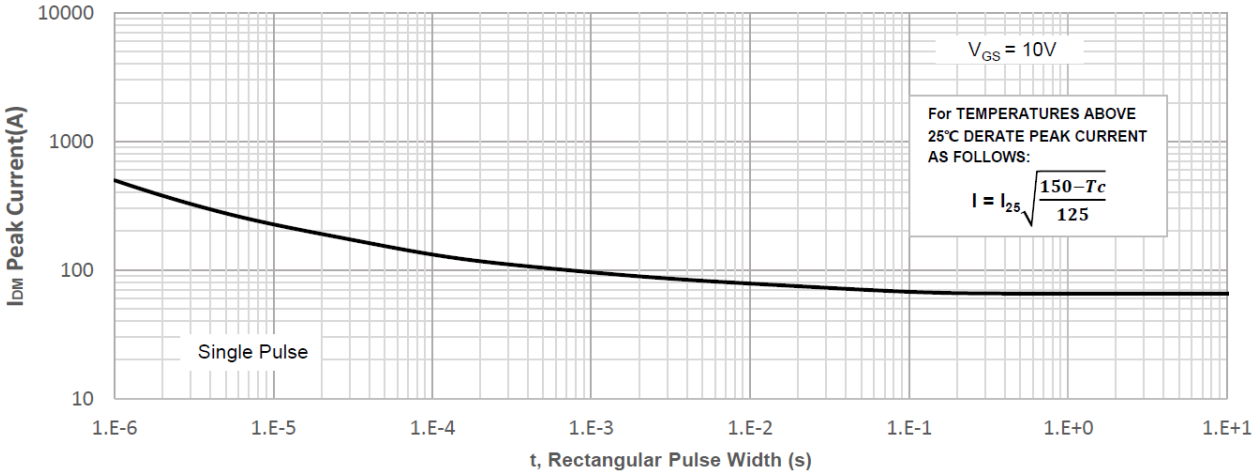


Figure 4. Peak Current Capacity

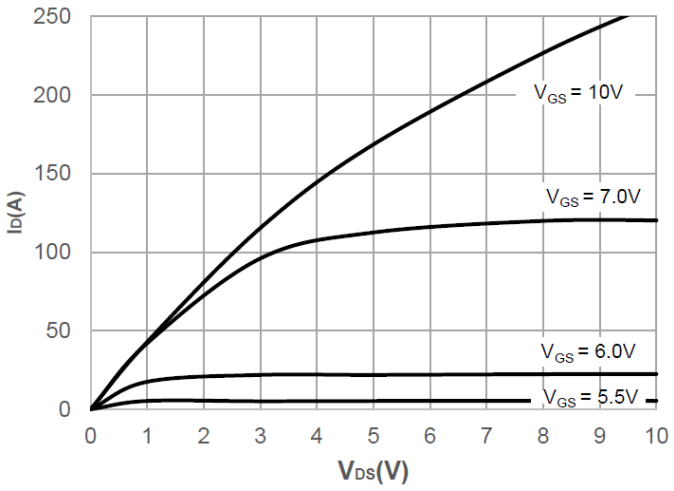


Figure 5. Output Characteristics

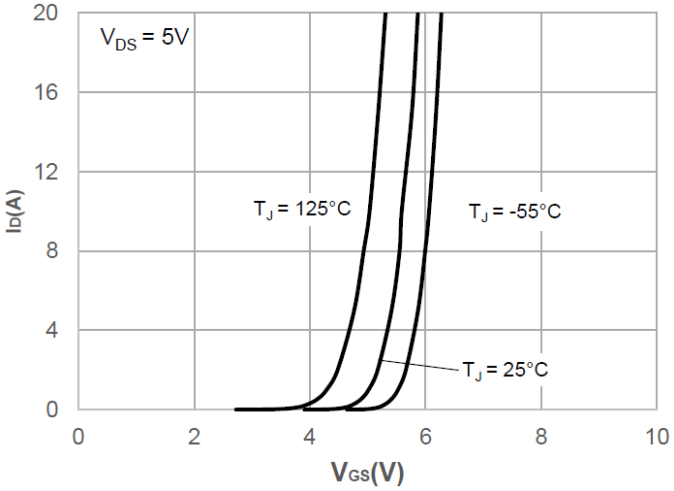


Figure 6. Typical Transfer Characteristics

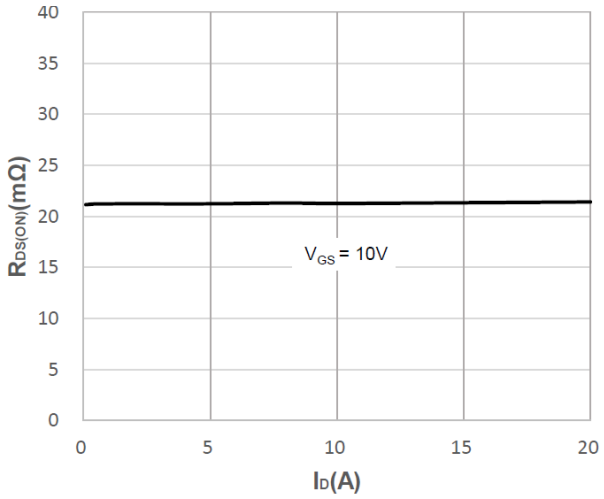


Figure 7. On-resistance vs. Drain Current

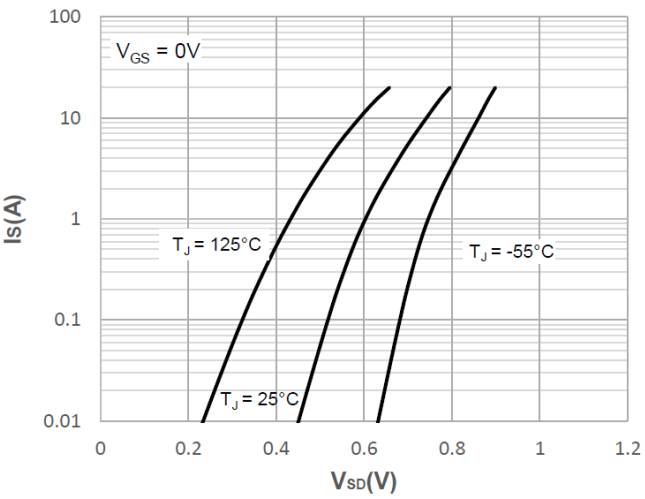


Figure 8.Body Diode Characteristics

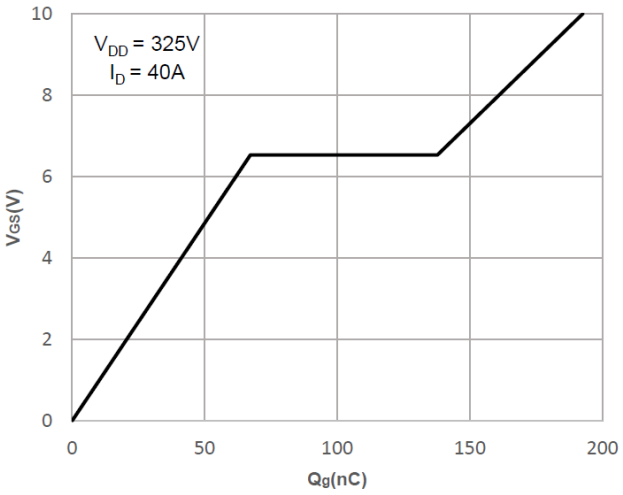


Figure 9. Gate Charge Characteristics

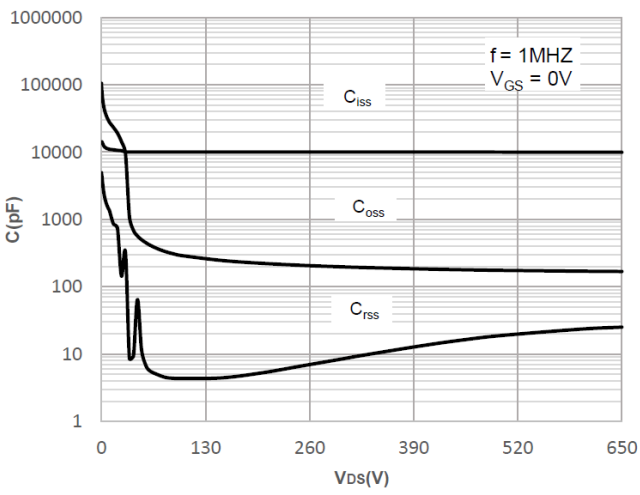


Figure 10.Capacitance Characteristics

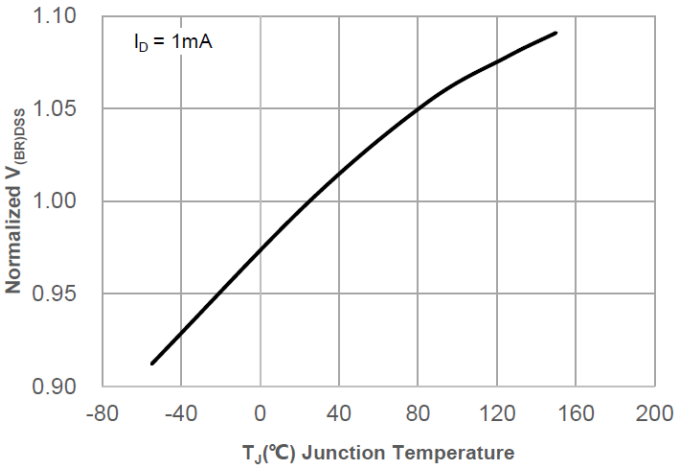


Figure 11. Normalized Breakdown voltage vs. Junction Temperature

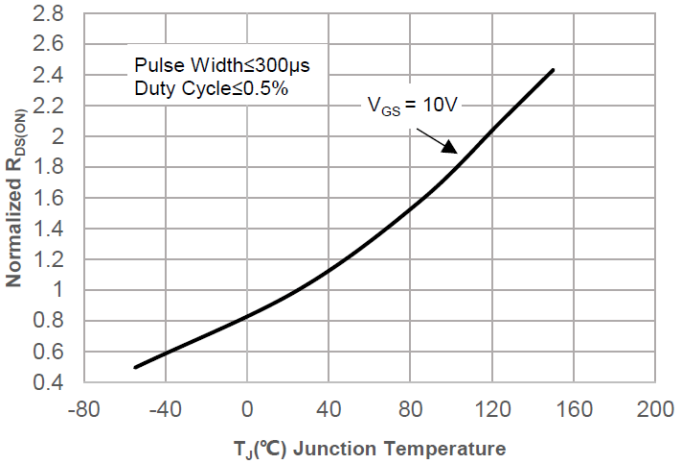


Figure 12. Normalized on Resistance vs. Junction Temperature

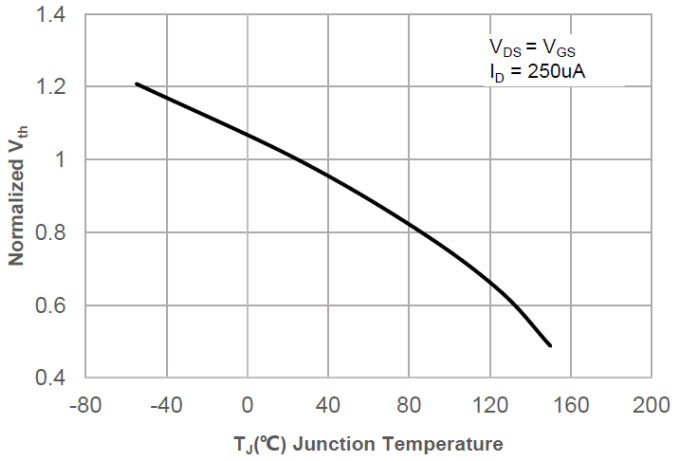


Figure 13. Normalized Threshold Voltage vs. Junction Temperature

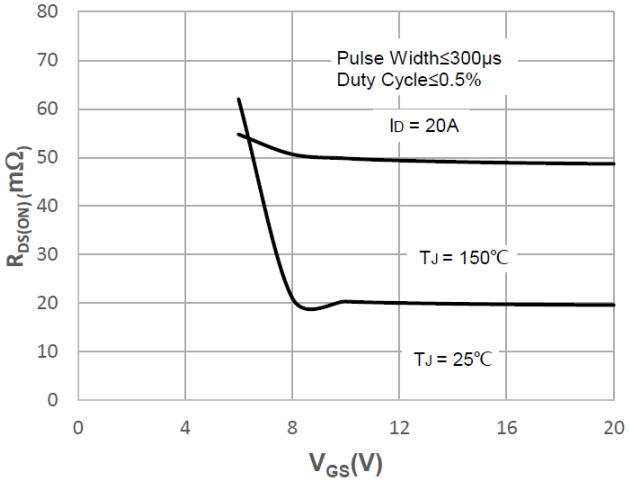


Figure 14. $R_{DS(ON)}$ vs. V_{GS}

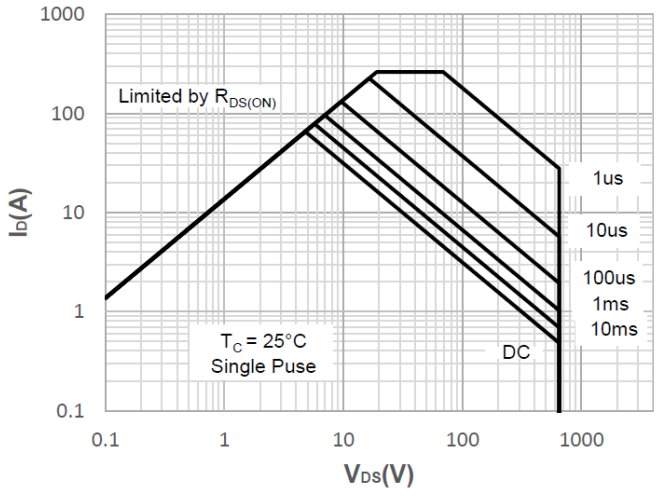
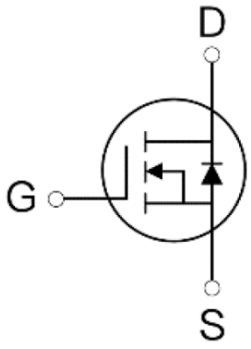
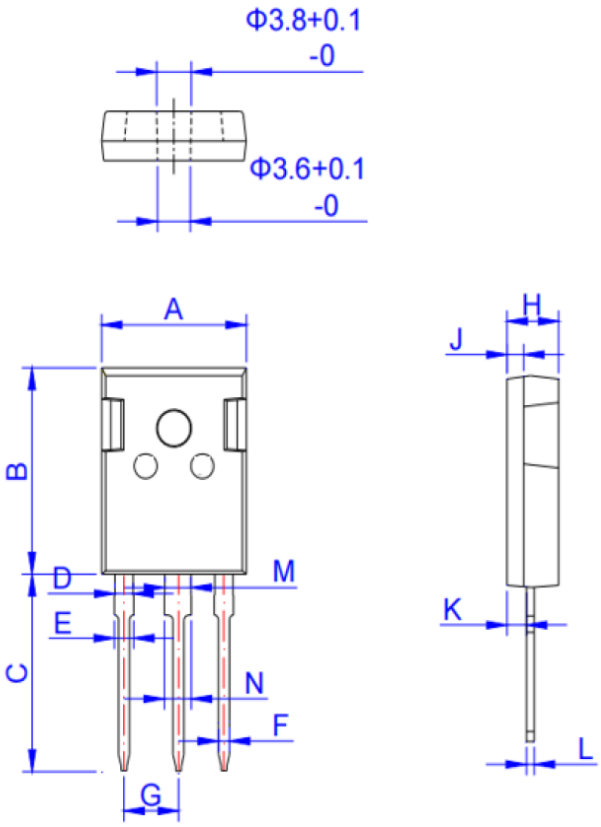


Figure 15. Maximum Safe Operating Area

·Circuit diagram



·Package outlines : Dimensions in (mm)



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.50	15.80	16.10	0.610	0.622	0.634
B	20.80	21.00	21.20	0.819	0.827	0.835
C	19.70	20.00	20.30	0.776	0.787	0.799
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.90	2.10	2.30	0.075	0.083	0.091
F	1.00	1.20	1.40	0.039	0.047	0.055
G	5.25		5.65	0.207		0.222
H	4.80	5.00	5.20	0.189	0.197	0.205
J	1.90	2.00	2.10	0.075	0.079	0.083
K	2.20	2.35	2.50	0.087	0.093	0.098
L	0.41	0.60	0.79	0.016	0.024	0.031
M	2.80	3.00	3.20	0.110	0.118	0.126
N	2.90	3.10	3.30	0.114	0.122	0.130

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