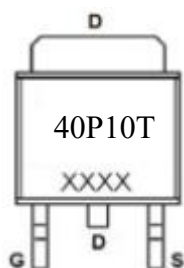


**Features**

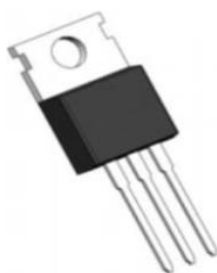
- Super Low Gate Charge
- Green Device Available
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology
- 100% EAS Guaranteed

Bvdss**-100V****Rdson****31mΩ****ID****-40A****Application**

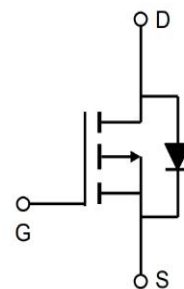
- PWM applications
- Load Switch
- Power management

RoHS**Package**

Marking and pin assignment



TO-220 top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
40P10T	HL40P10T	TO-220	50

Absolute Maximum Ratings ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	-100	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	-40	A
	$T_C=100^{\circ}\text{C}$		-25	
Single Pulsed Avalanche Energy		EAS	110	mJ
Total Power Dissipation	$T_C = 25^{\circ}\text{C}$	P_D	111	W
Storage Temperature Range		T_{STG}	-55 ~ 150	$^{\circ}\text{C}$
Operating Junction Temperature Range		T_J	-55 ~ 150	$^{\circ}\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	84	$^{\circ}\text{C/W}$
Thermal Resistance Junction to Case ¹	$R_{\theta JC}$	1.13	$^{\circ}\text{C/W}$



Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free		G	D	S	
HL40P10T	TO-220	1	2	3	Tube

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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-100V, V_{GS}=0V$	-	-	-1	μA
Gate to Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.5	-2	-2.5	V
Drain-Source On-Resistance ³	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-22A$	-	31	37	m Ω
		$V_{GS}=-4.5V, I_D=-10A$	-	37	48	
Forward Transconductance	g_{fs}	$V_{DS}=-5V, I_D=-22A$	-	60	-	S
Total Gate Charge	Q_g	$V_{DS}=-50V, V_{GS}=-10V,$ $I_D=-22A, f=1MHz$	-	102	-	nC
Gate-Source Charge	Q_{gs}		-	25	-	
Gate-Drain Charge	Q_{gd}		-	19	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=-10V, V_{DD}=-50V,$ $R_G=2.7\Omega, I_D=-22A$	-	15	-	ns
Rise Time	t_r		-	38	-	
Turn-Off Delay Time	$t_{d(off)}$		-	86	-	
Fall Time	t_f		-	68	-	
Input Capacitance	C_{iss}	$V_{DS}=-50V, V_{GS}=0V, f=1MHz$	-	5612	-	pF
Output Capacitance	C_{oss}		-	180	-	
Reverse Transfer Capacitance	C_{rss}		-	80	-	
Continuous Source Current	I_S	-	-	-	-40	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-22A$	-	-0.9	-1.3	V
Reverse Recovery Time	t_{rr}	$I_F=-22A, di/dt=100A/\mu s$	-	36	-	ns
Reverse Recovery Charge	Q_{rr}		-	62	-	nC



Typical Performance Characteristics

Fig 1: Output Characteristics

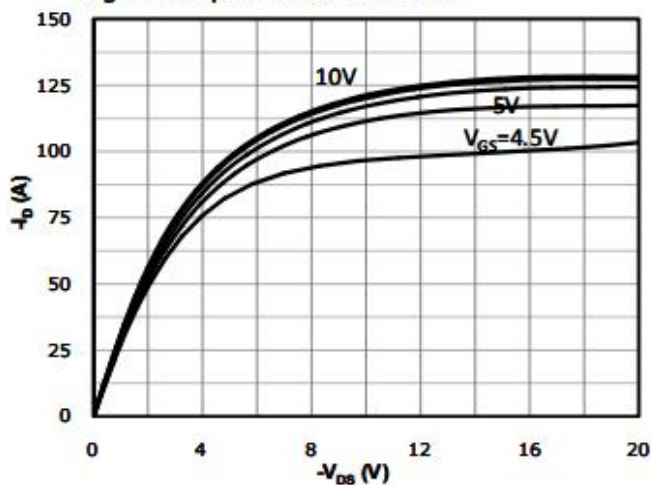


Fig 2: Transfer Characteristics

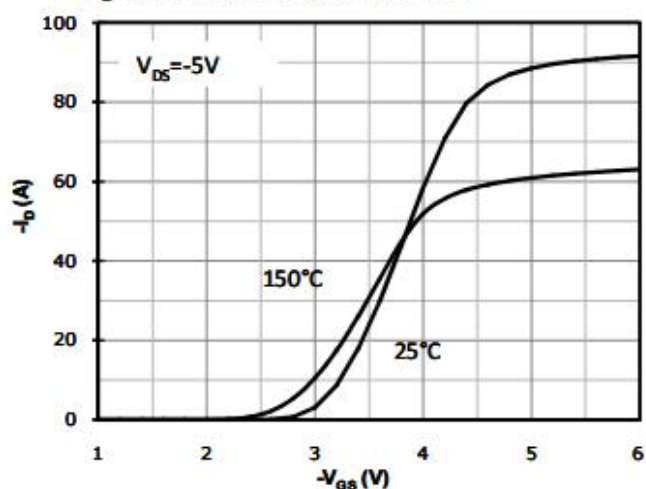


Fig 3: Rds(on) vs Drain Current and Gate Voltage

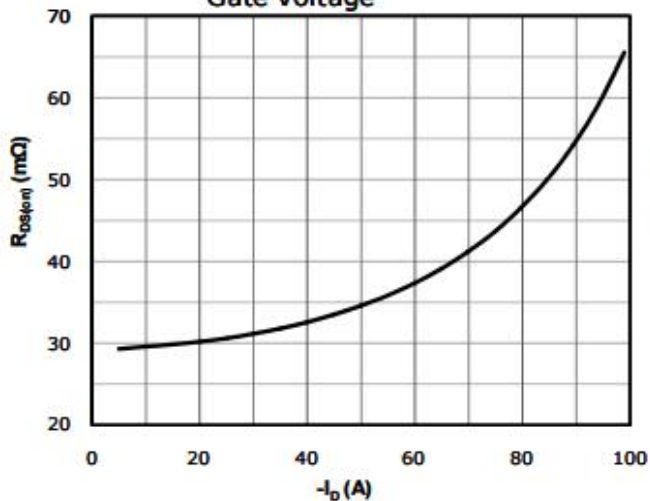


Fig 4: Rds(on) vs Gate Voltage

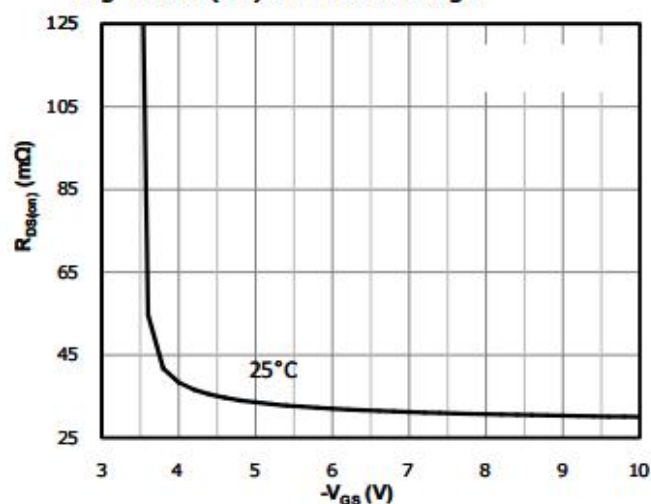


Fig 5: Rds(on) vs. Temperature

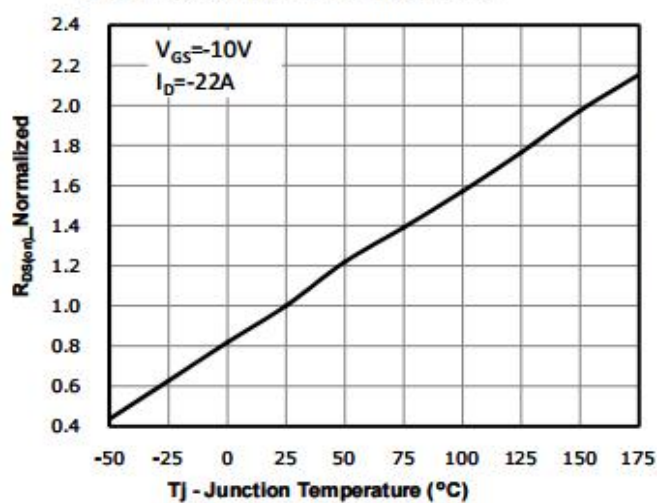


Fig 6: Capacitance Characteristics

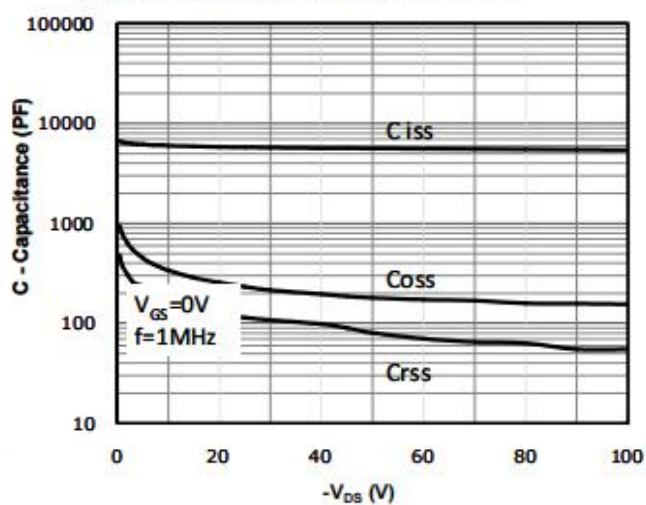




Fig 7: Gate Charge Characteristics

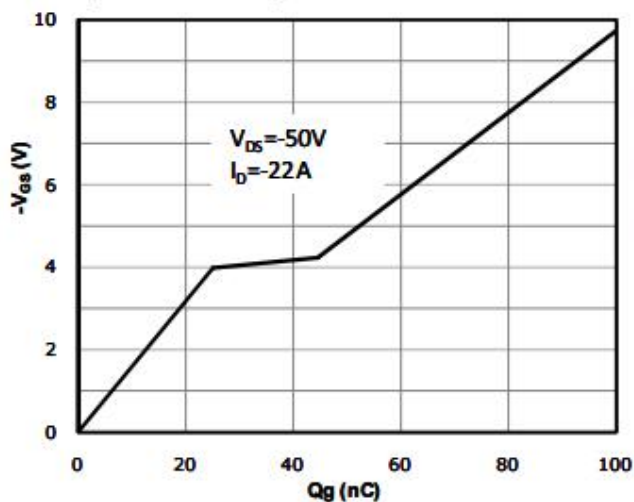


Fig 8: Body-diode Forward Characteristics

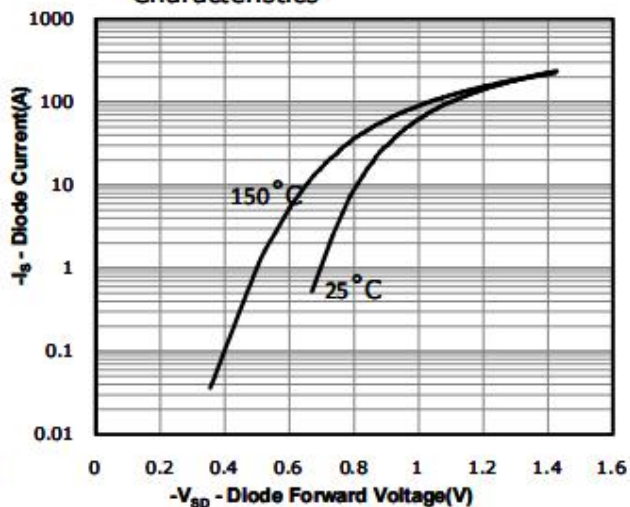


Fig 9: Power Dissipation

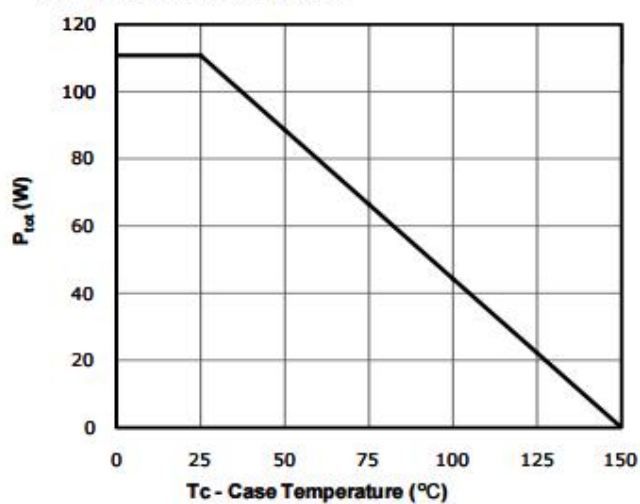


Fig 10: Drain Current Derating

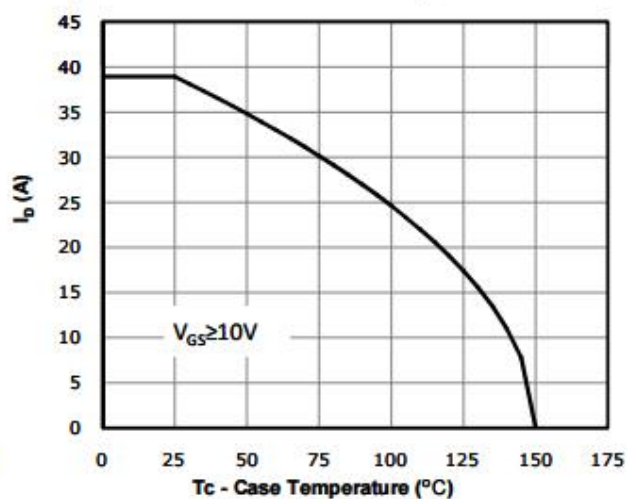


Fig 11: Safe Operating Area

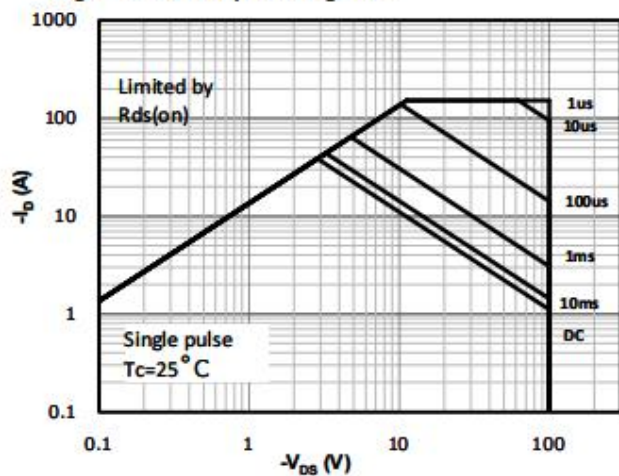
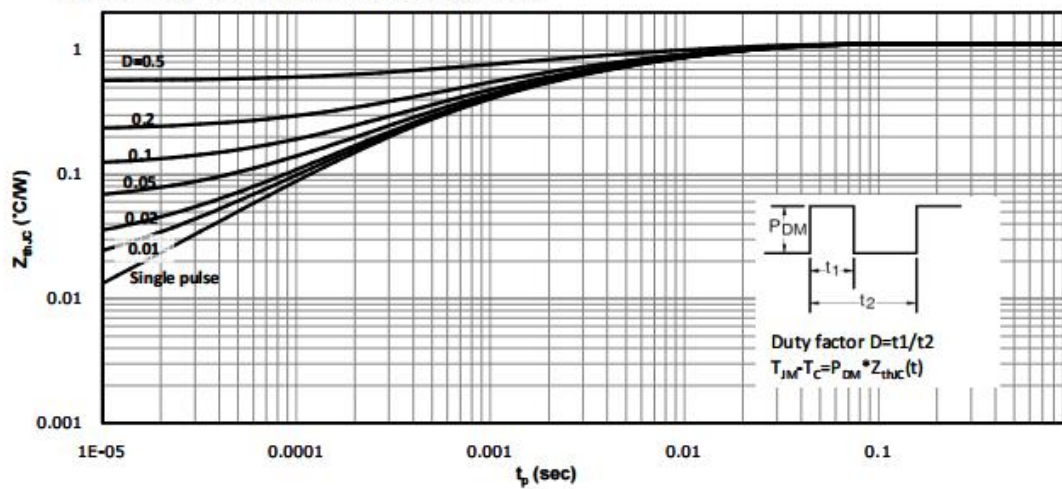




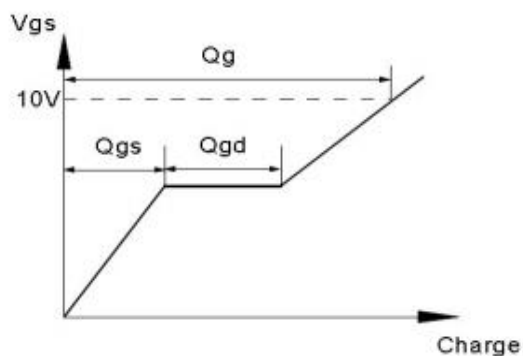
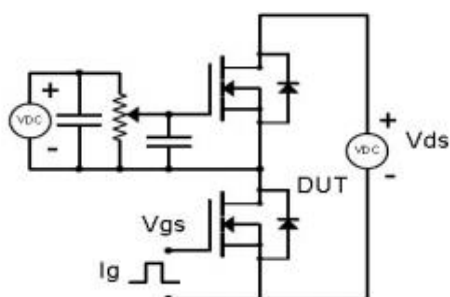
Fig 12: Max. Transient Thermal Impedance



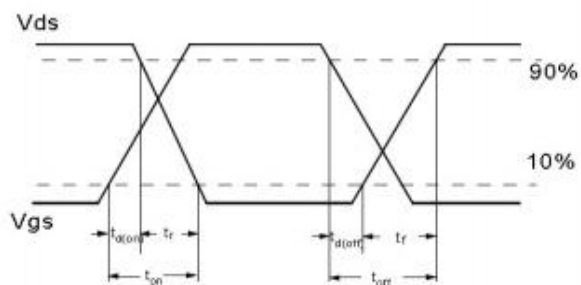
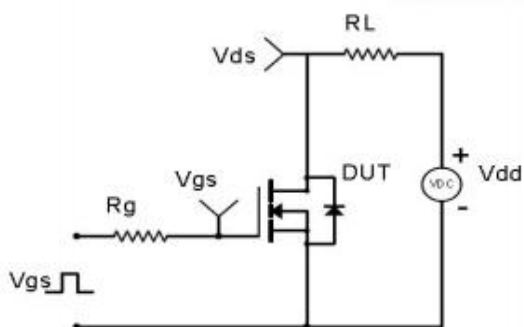


Test Circuit & Waveform

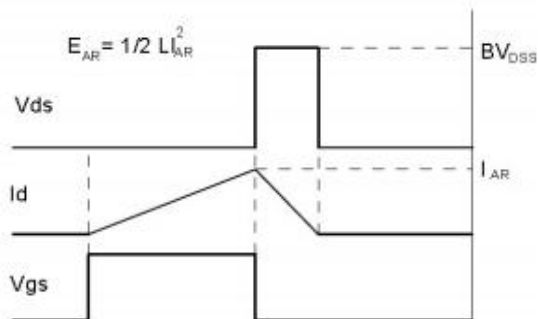
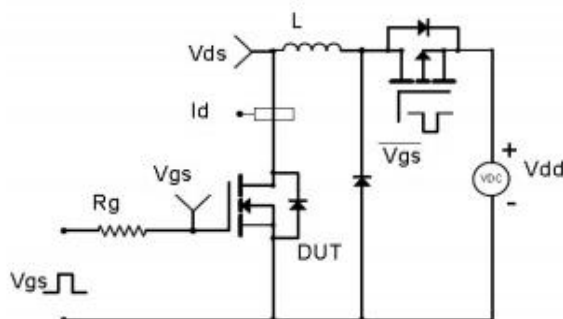
Gate Charge Test Circuit & Waveform



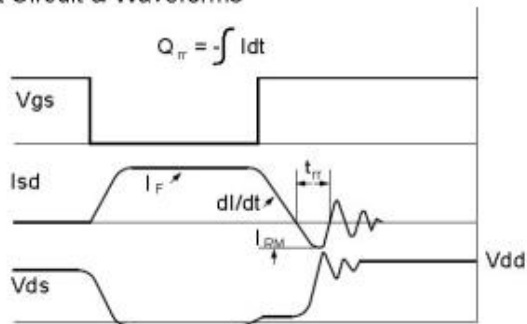
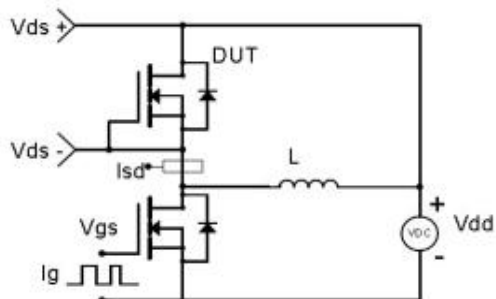
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

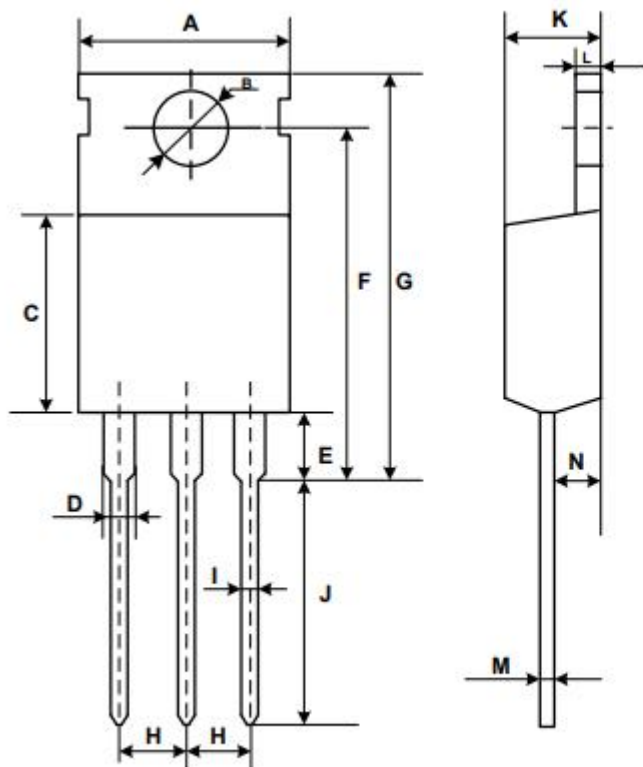


Diode Recovery Test Circuit & Waveforms





Package Mechanical Data TO-220



SYMBOL	MM	
	MIN	MAX
A	9.70	10.30
B	3.40	3.80
C	8.80	9.40
D	1.17	1.47
E	2.60	3.50
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60



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