
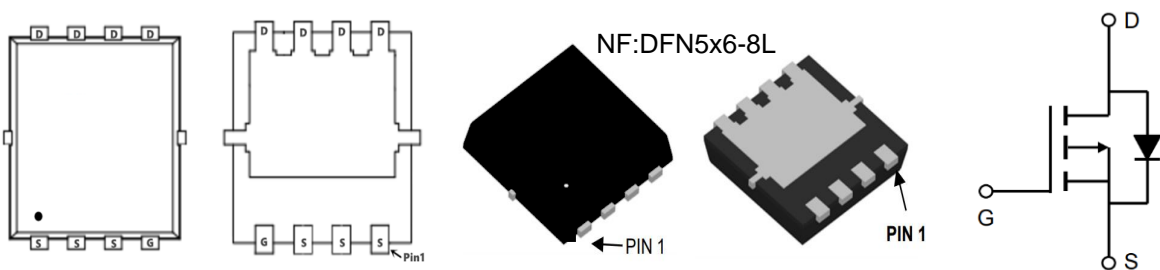




TM70P03NF

P-Channel Enhancement Mosfet

<p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM 	<p>General Features</p> <p>$V_{DS} = -30V$ $I_D = -70A$ $R_{DS(ON)} = 6m\Omega(\text{typ.}) @ V_{GS} = -10V$</p> <p>100% UIS Tested 100% R_g Tested</p> 
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NF:DFN5x6-8L

Marking: 70P03F

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current@-10V ¹	I_D	$T_C=25^\circ C$	-70
		$T_C=75^\circ C$	-40
Pulsed Drain Current ²	I_{DM}	-175	A
Single Pulse Avalanche Energy ³	EAS	31	mJ
Avalanche Current	I_{AS}	-70	A
Total Power Dissipation ⁴	$T_C=25^\circ C$	P_D	31.2
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ¹	$R_{\theta JA}$	61	$^\circ C/W$
Thermal Resistance from Junction-to-Case ¹	$R_{\theta JC}$	4	$^\circ C/W$

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Electrical Characteristics $T_c = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30	-	-	V
Gate-body Leakage current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA
Zero Gate Voltage Drain Current	$T_J=25^\circ\text{C}$	$V_{DS} = -24V, V_{GS} = 0V$	-	-	-1	μA
	$T_J=55^\circ\text{C}$		-	-	-5	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-1.6	-2.5	V
Drain-Source On-Resistance ²	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -12A$	-	6	8.8	m Ω
		$V_{GS} = -4.5V, I_D = -8A$	-	9	14	
Forward Transconductance	g_{fs}	$V_{DS} = -5V, I_D = -20A$	-	28	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = -15V, V_{GS} = 0V, f = 1\text{MHz}$	-	4320	-	pF
Output Capacitance	C_{oss}		-	529	-	
Reverse Transfer Capacitance	C_{rss}		-	487	-	
Switching Characteristics						
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0\text{MHz}$	-	4.0	-	Ω
Total Gate Charge	Q_g	$V_{GS} = -10V, V_{DS} = -15V, I_D = -15A$	-	45	-	nC
Gate-Source Charge	Q_{gs}		-	8.5	-	
Gate-Drain Charge	Q_{gd}		-	12.8	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = -10V, V_{DD} = -15V, R_G = 2.5\Omega, I_D = -15A$	-	18.9	-	nS
Rise Time	t_r		-	15.7	-	
Turn-Off Delay Time	$t_{d(off)}$		-	64.8	-	
Fall Time	t_f		-	36.5	-	
Drain-Source Body Diode Characteristics						
Diode Forward Voltage ²	V_{SD}	$I_S = -1A, V_{GS} = 0V$	-	-	-1	V
Continuous Source Current ^{1,5}	I_S	$V_G = V_D = 0V$, Force Current	-	-	-70	A

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD} = -25V, V_{GS} = -10V, L = 0.1\text{mH}, I_{AS} = -25A$
- 4.The power dissipation is limited by 150 $^\circ\text{C}$ junction temperature
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.



Typical Characteristics

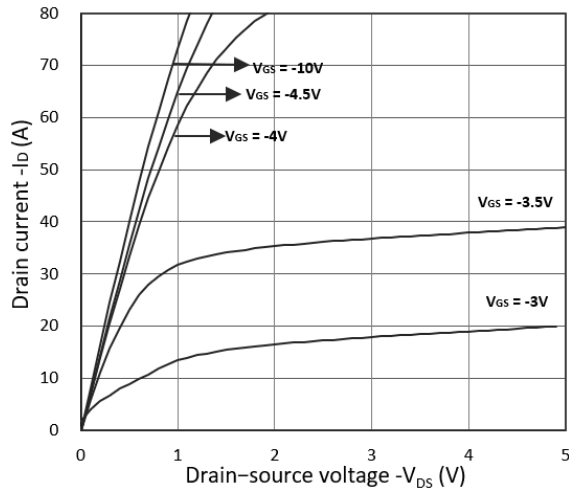


Figure 1. Output Characteristics

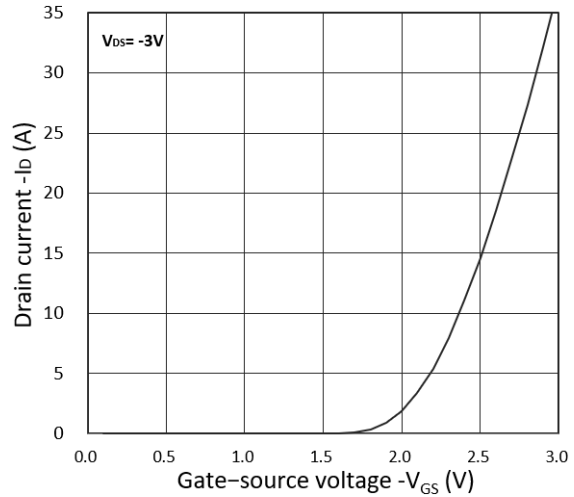


Figure 2. Transfer Characteristics

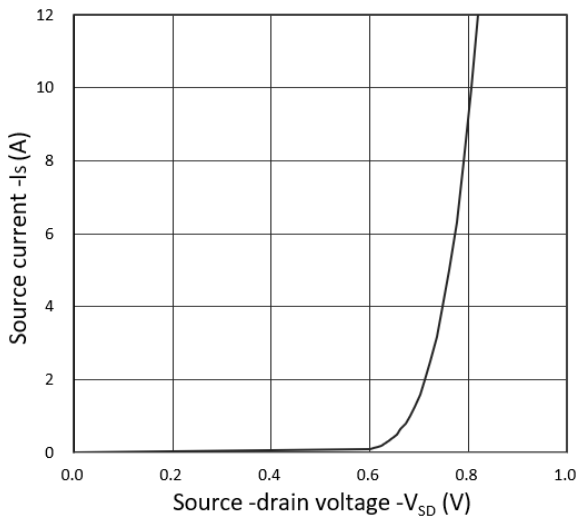


Figure 3. Forward Characteristics of Reverse

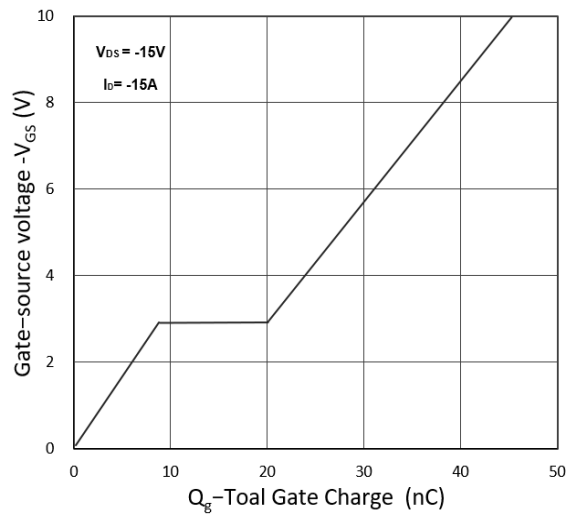


Figure 4. Gate Charge Characteristics

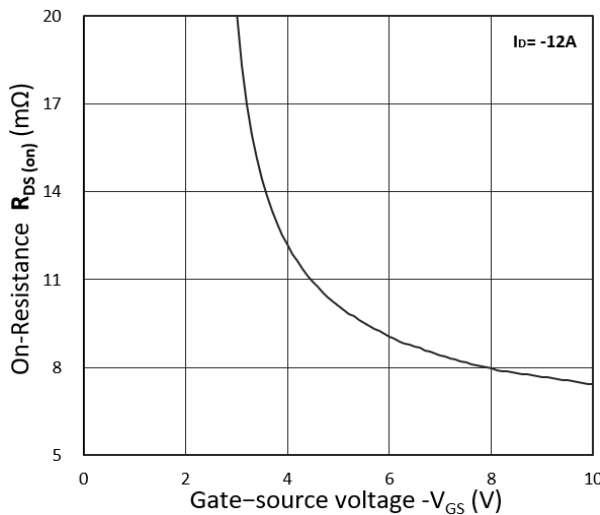


Figure 5. $R_{DS(on)}$ vs. V_{GS}

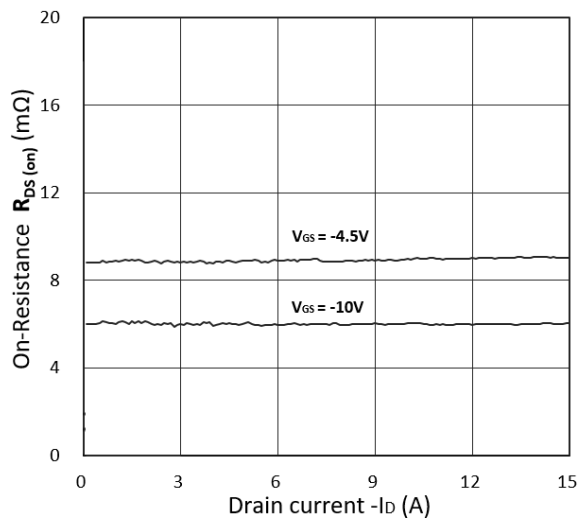


Figure 6. $R_{DS(on)}$ vs. I_D

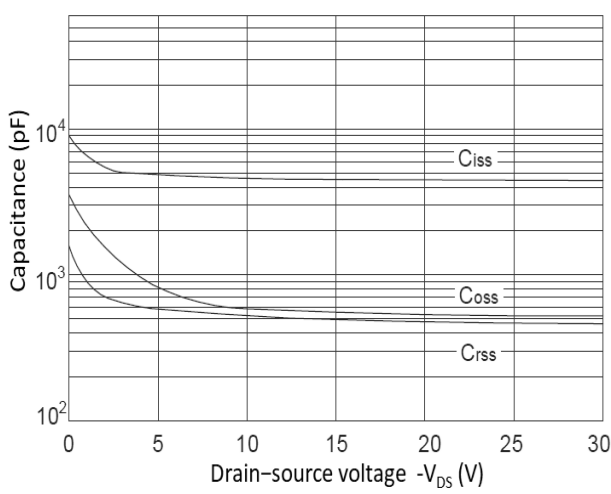


Figure 7. Capacitance Characteristics

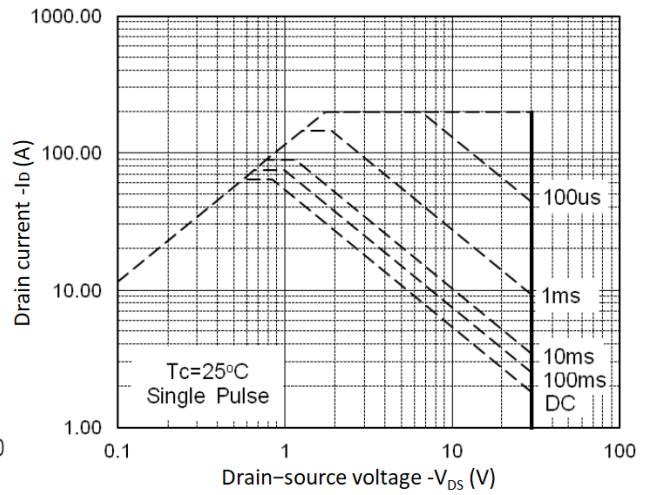


Figure 8. Safe Operating Area

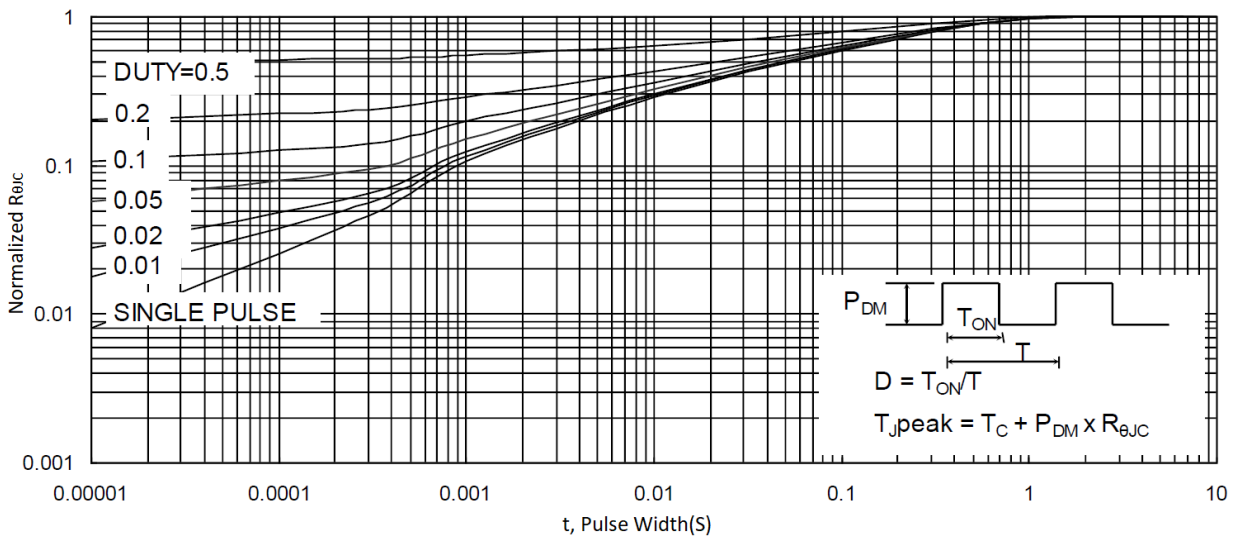


Figure 9. Normalized Maximum Transient Thermal Impedance

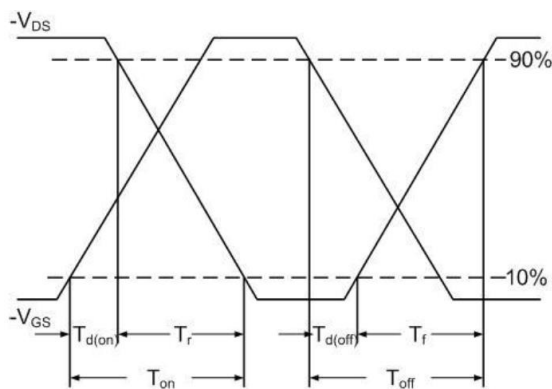


Figure 10. Switching Time Waveform

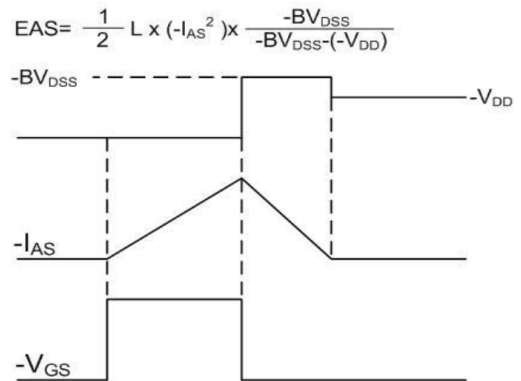
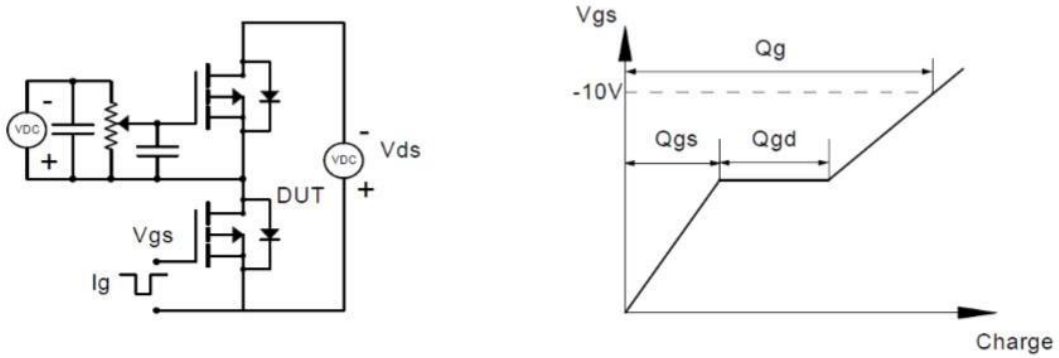


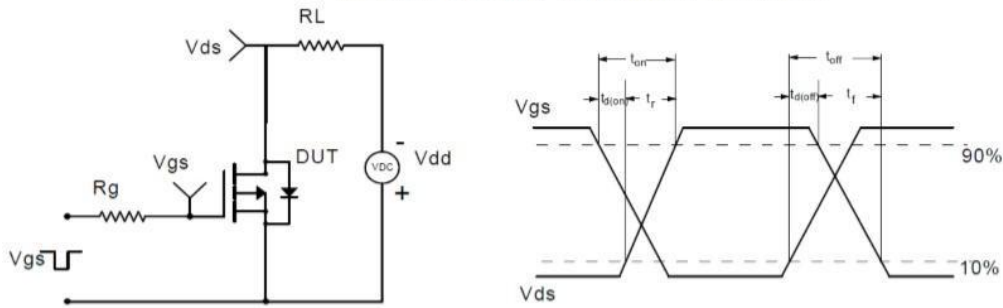
Figure 11. Unclamped Inductive Switching
Waveform

Test Circuit

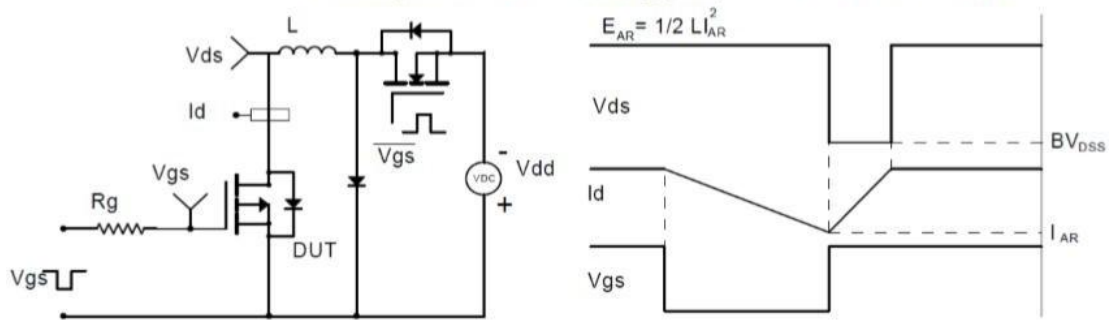
Gate Charge Test Circuit & Waveform



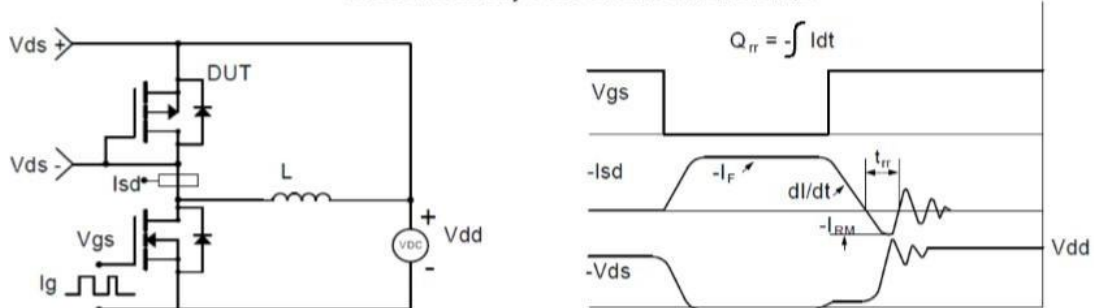
Resistive Switching Test Circuit & Waveforms



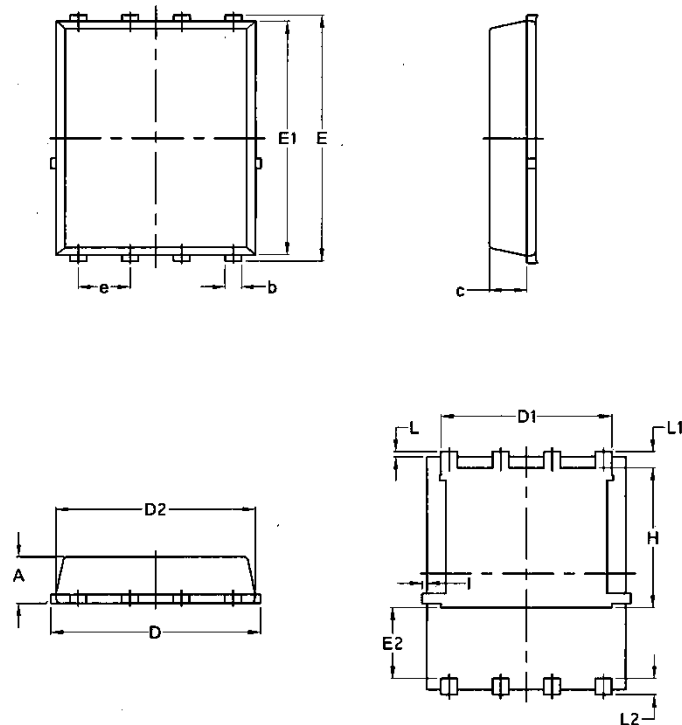
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data: DFN5x6-8L



Symbol	Common			
	mm		Inch	
	Min	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070

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