



TMP3070NF

P-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

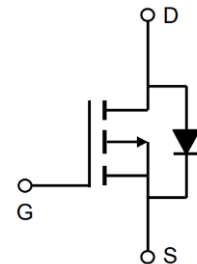
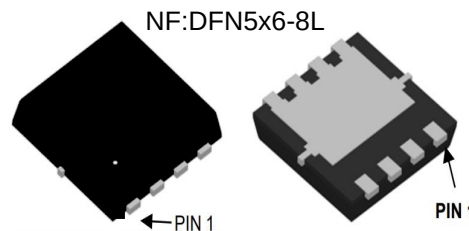
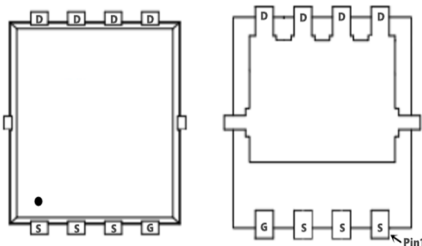
Applications

- Load switch
- PWM

General Features

 $V_{DS} = -30V$ $I_D = -70A$ $R_{DS(ON)} = 6m\Omega(\text{typ.}) @ V_{GS} = -10V$

100% UIS Tested

100% R_g Tested

Marking: 70P03F OR 3070

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ 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	$T_C = 25^\circ\text{C}$	I_D	-70	A
	$T_C = 75^\circ\text{C}$		-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	$T_C = 25^\circ\text{C}$	P_D	31.2	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

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



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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	$T_J=25^{\circ}C$	I_{DSS}	$V_{DS} = -24V, V_{GS} = 0V$	-	-	-1	μA
	$T_J=55^{\circ}C$			-	-	-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	mΩ
			$V_{GS} = -4.5V, I_D = -8A$	-	9	14	
Forward Transconductance		g_{fs}	$V_{DS} = -5V, I_D = -20A$	-	28	-	S
Dynamic Characteristics							
Input Capacitance		C_{iss}	$V_{DS} = -15V, V_{GS} = 0V, f = 1MHz$	-	4320	-	pF
Output Capacitance		C_{oss}		-	529	-	
Reverse Transfer Capacitance		C_{rss}		-	487	-	
Switching Characteristics							
Gate Resistance		R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	-	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 20Z 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 $V_{DD} = -25V, V_{GS} = -10V, L = 0.1mH, I_{AS} = -25A$
- 4.The power dissipation is limited by 150°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

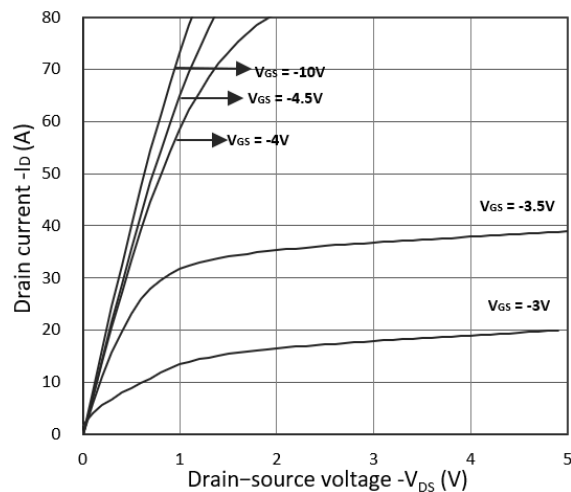


Figure 1. Output Characteristics

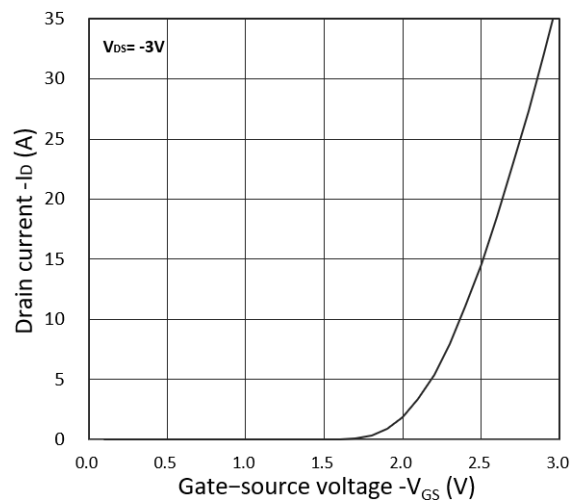


Figure 2. Transfer Characteristics

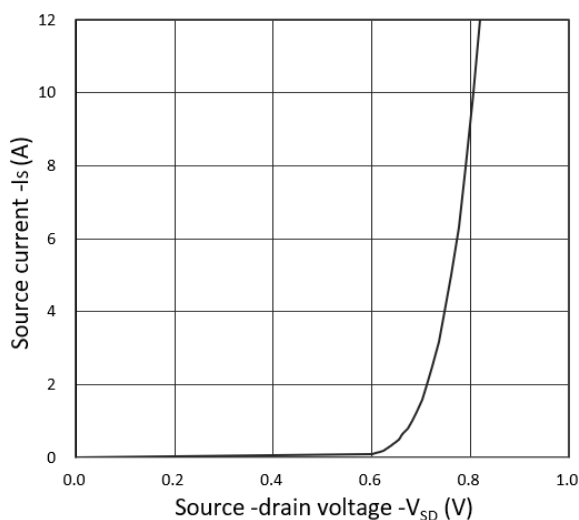


Figure 3. Forward Characteristics of Reverse

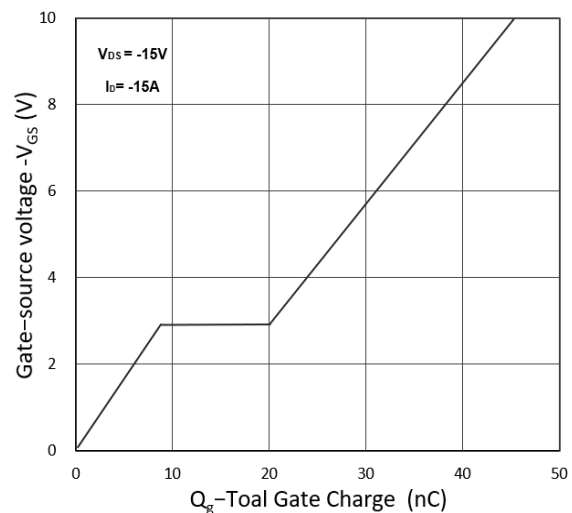


Figure 4. Gate Charge Characteristics

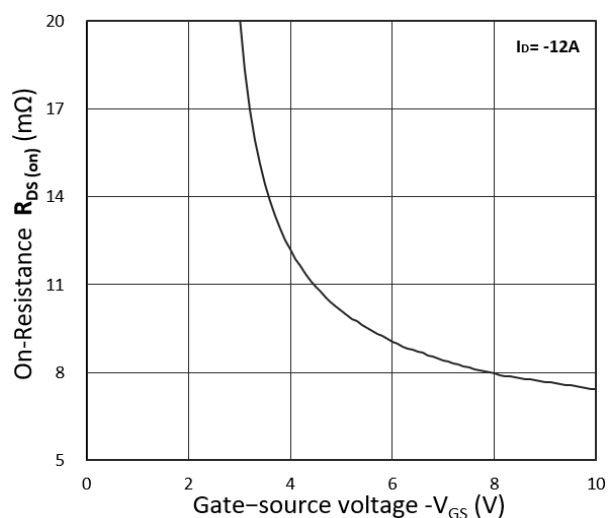


Figure 5. $R_{DS(on)}$ vs. V_{GS}

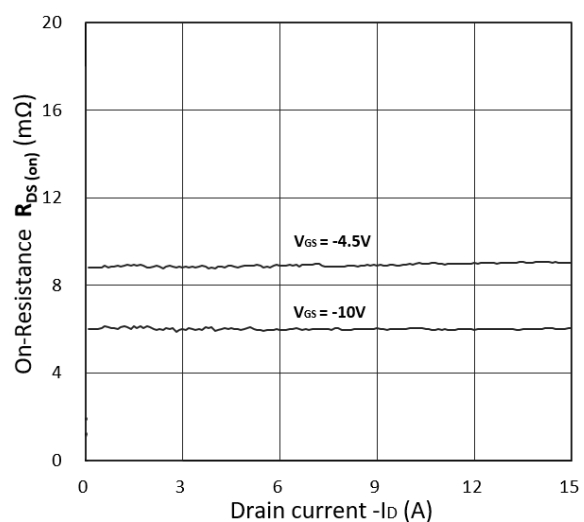


Figure 6. $R_{DS(on)}$ vs. I_D

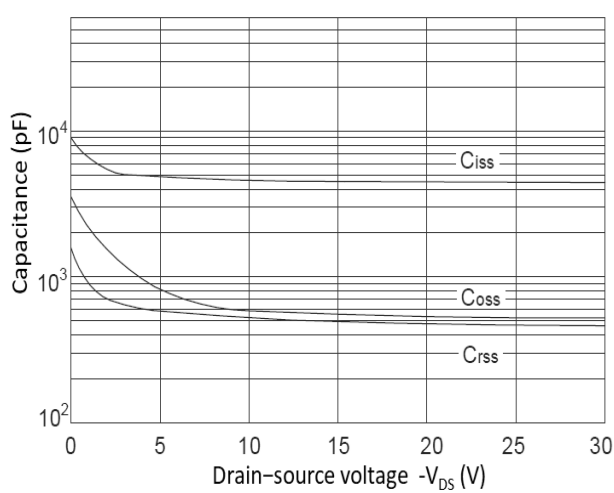


Figure 7. Capacitance Characteristics

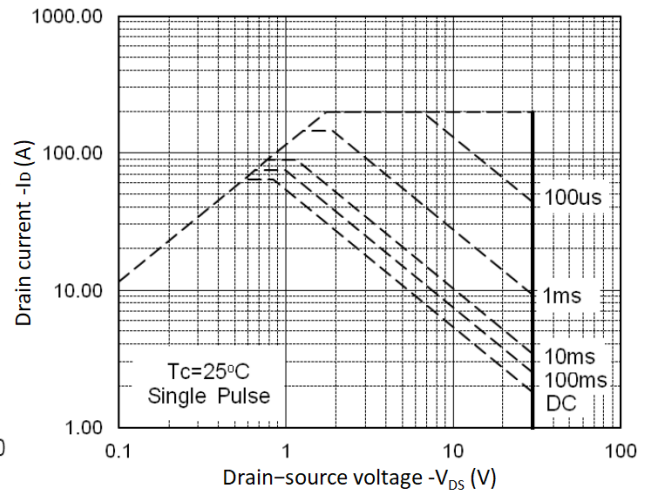


Figure 8. Safe Operating Area

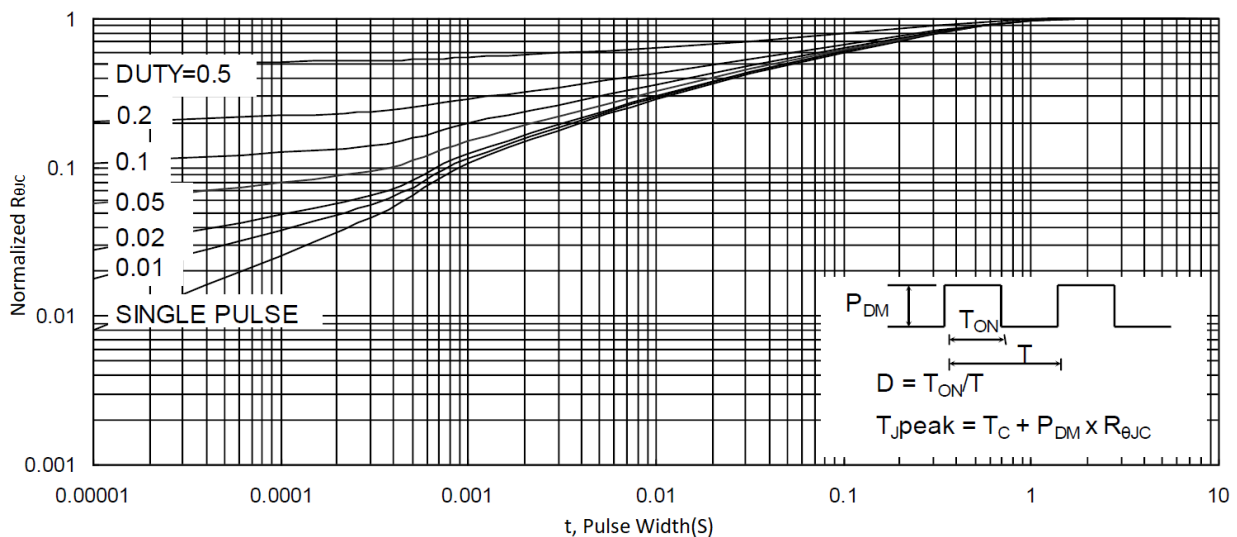


Figure 9. Normalized Maximum Transient Thermal Impedance

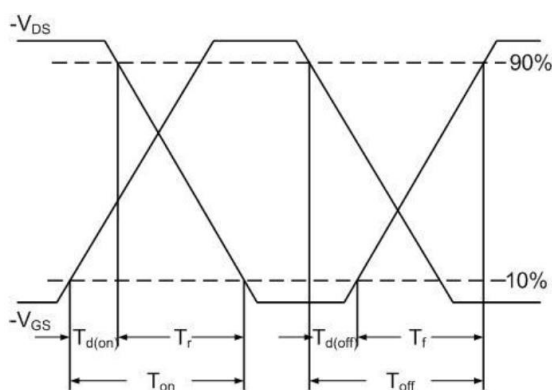
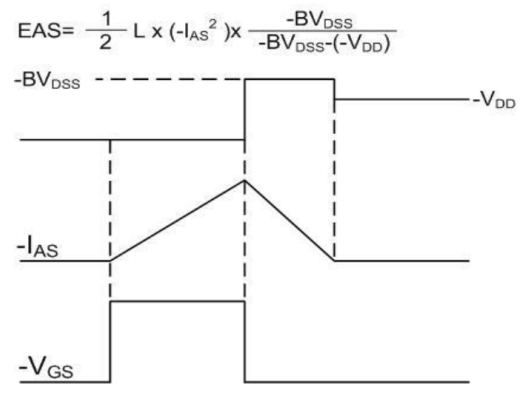
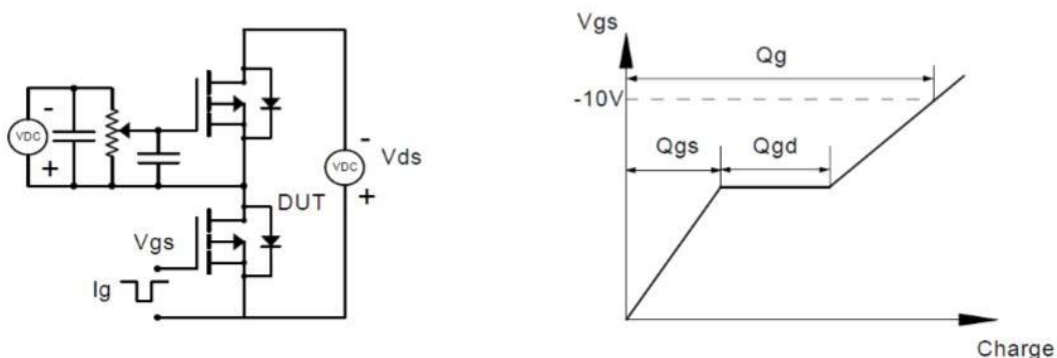


Figure 10. Switching Time Waveform

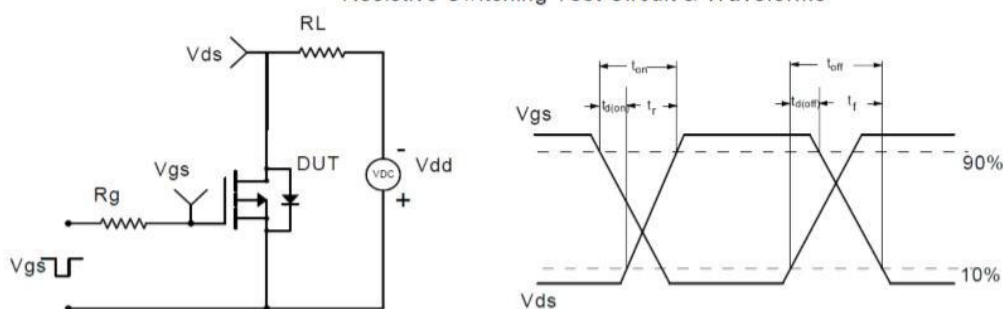
Figure 11. Unclamped Inductive Switching
Waveform

Test Circuit

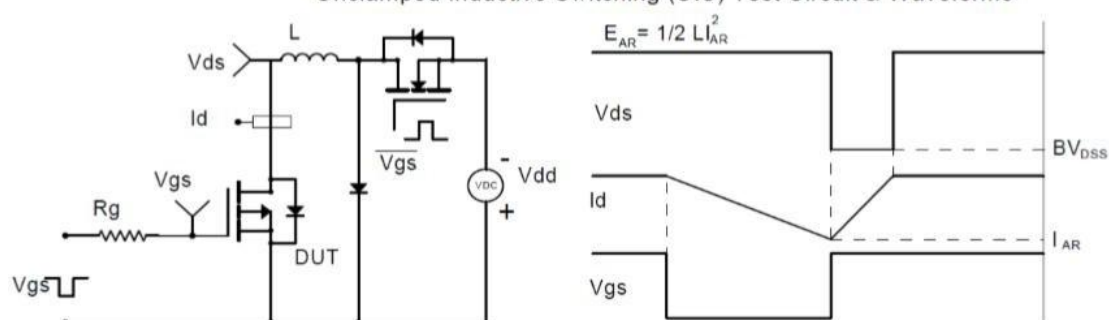
Gate Charge Test Circuit & Waveform



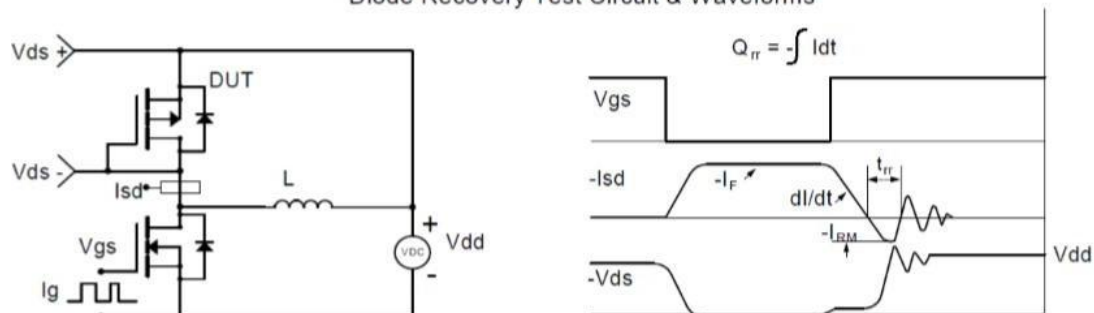
Resistive Switching Test Circuit & Waveforms



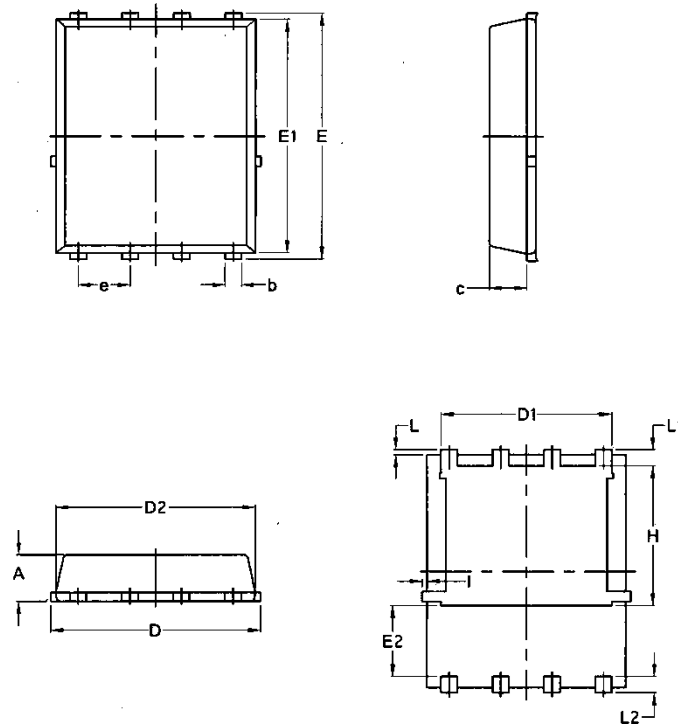
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data: DFN5x6-8L



Symbol	Common			
	mm		Inch	
	Mim	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