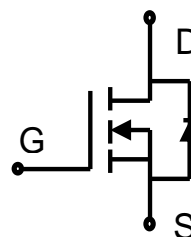




### Description

WENLAI Power MOSFET is fabricated using advanced super junction technology. The resulting device has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.



N-Channel MOSFET

### Features

- ◆ Ultra low  $R_{DS(on)}$
- ◆ Ultra low gate charge (typ.  $Q_g = 71.3nC$ )
- ◆ 100% UIS tested
- ◆ RoHS compliant

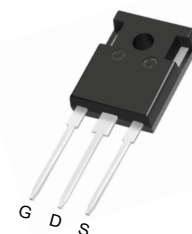
### Applications

- ◆ Power factor correction (PFC).
- ◆ Switched mode power supplies (SMPS).
- ◆ Uninterruptible power supply (UPS).

### Product Summary

$V_{DS} @ T_{j,max}$	700V
$R_{DS(on),max}$	0.099Ω
$I_{DM}$	120A
$Q_{g,typ}$	71.3 nC

### Pin Configuration



TO-247

### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	650	V
Continuous drain current ( $T_C = 25^\circ C$ ) ( $T_C = 100^\circ C$ )	$I_D$	40	A
		25.3	A
Pulsed drain current <sup>1)</sup>	$I_{DM}$	120	A
Gate-Source voltage	$V_{GSS}$	$\pm 30$	V
Avalanche energy, single pulse <sup>2)</sup>	$E_{AS}$	992	mJ
Power Dissipation	$P_D$	357	W
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ C$
Continuous diode forward current	$I_S$	40	A
Diode pulse current	$I_{S,pulse}$	120	A

### Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.35	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient <sup>3)</sup>	$R_{\theta JA}$	65	$^\circ C/W$
Soldering temperature, wavesoldering only allowed at leads. (1.6mm from case for 10s)	$T_{sold}$	260	$^\circ C$

### Package Marking and Ordering Information

Device	Device Package	Marking	Units/Tube
WLP099R650GT	TO-247	WLP099R650GT	30



### Electrical Characteristics T<sub>c</sub> = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static characteristics</b>						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =0.25mA	650	-	-	V
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =0.25mA	2.5	3.5	4.5	V
Drain cut-off current	I <sub>DSS</sub>	V <sub>DS</sub> =650 V, V <sub>GS</sub> =0 V, T <sub>j</sub> = 25°C	-	-	1	μA
Gate leakage current, Forward	I <sub>GSSF</sub>	V <sub>GS</sub> =30 V, V <sub>DS</sub> =0 V	-	-	100	nA
Gate leakage current, Reverse	I <sub>GSSR</sub>	V <sub>GS</sub> =-30 V, V <sub>DS</sub> =0 V	-	-	-100	nA
Drain-source on-state resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10 V, I <sub>D</sub> =20 A T <sub>j</sub> = 25°C T <sub>j</sub> = 150°C	-	-	-	Ω
			-	0.085	0.099	
			-	0.2	-	
Gate resistance	R <sub>G</sub>	f=1 MHz, open drain	-	4.0	-	Ω
<b>Dynamic characteristics</b>						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, f = 250kHz	-	3250	-	pF
Output capacitance	C <sub>oss</sub>		-	115	-	
Reverse transfer capacitance	C <sub>riss</sub>		-	4.5	-	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 400V, I <sub>D</sub> = 20A R <sub>G</sub> = 10Ω, V <sub>GS</sub> =10V	-	81	-	ns
Rise time	t <sub>r</sub>		-	35.5	-	
Turn-off delay time	t <sub>d(off)</sub>		-	108	-	
Fall time	t <sub>f</sub>		-	6	-	
<b>Gate charge characteristics</b>						
Gate to source charge	Q <sub>gs</sub>	V <sub>DD</sub> =520 V, I <sub>D</sub> =20A, V <sub>GS</sub> =0 to 10 V	-	16.5	-	nC
Gate to drain charge	Q <sub>gd</sub>		-	28.3	-	
Gate charge total	Q <sub>g</sub>		-	71.3	-	
Gate plateau voltage	V <sub>plateau</sub>		-	5.5	-	V
<b>Reverse diode characteristics</b>						
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0 V, I <sub>F</sub> =40A	-	-	1.1	V
Reverse recovery time	t <sub>rr</sub>	V <sub>R</sub> =400 V, I <sub>F</sub> =20A, dI <sub>F</sub> /dt=100 A/μs	-	381	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	7.2	-	μC
Peak reverse recovery current	I <sub>rrm</sub>		-	38	-	A

**Notes:**

- Limited by maximum junction temperature, maximum duty cycle is 0.75.
- I<sub>AS</sub>=8A, L=31mH, V<sub>DD</sub> = 60V, Starting T<sub>j</sub>= 25°C.
- The value of R<sub>thJA</sub> is measured by placing the device in a still air box which is one cubic foot.



### Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

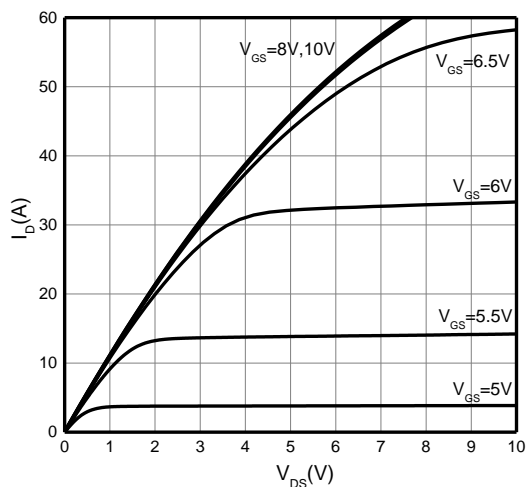


Figure 2. Transfer Characteristics

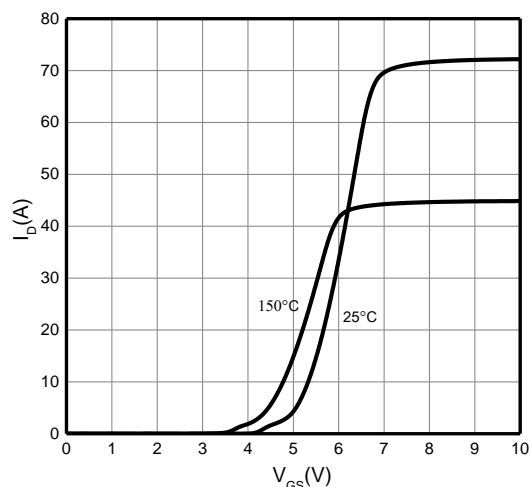


Figure 3. On-Resistance vs. Drain Current

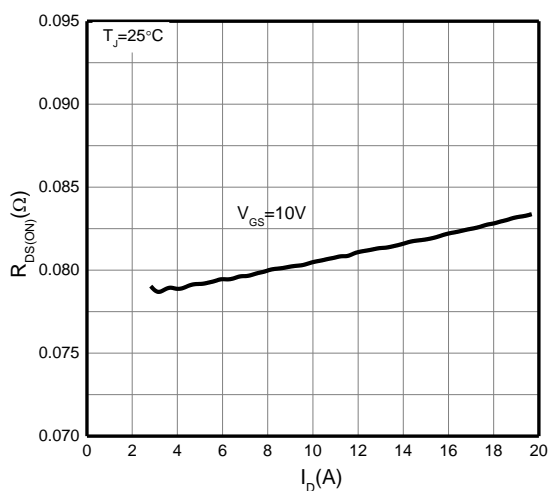


Figure 4. On-Resistance vs. Temperature

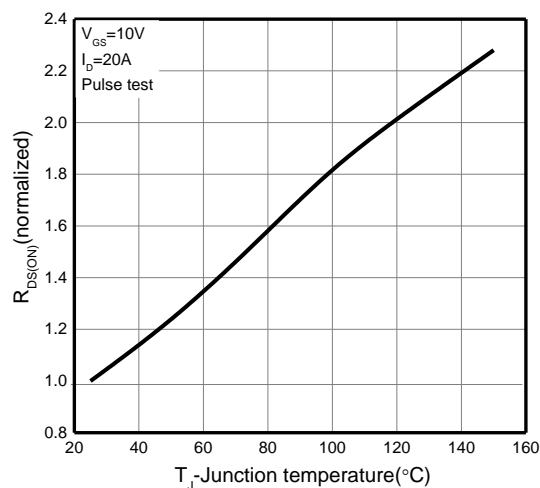


Figure 5. Breakdown Voltage vs. Temperature

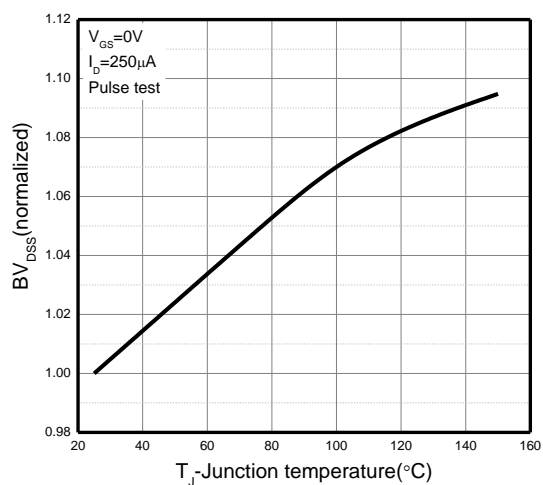


Figure 6. Threshold Voltage vs. Temperature

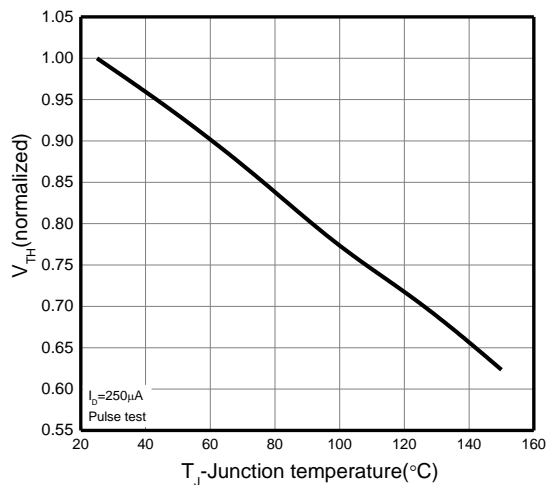




Figure 7. Body-Diode Characteristics

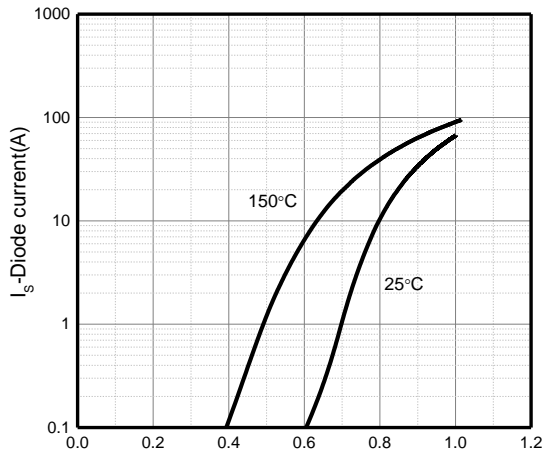


Figure 8. Capacitance Characteristics

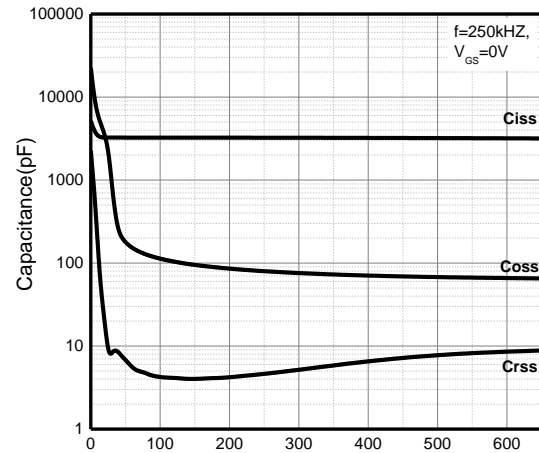


Figure 9. Gate Charge Characteristics

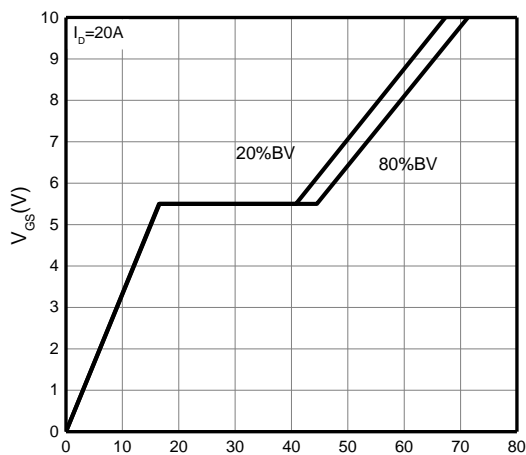


Figure 10. Drain Current Derating

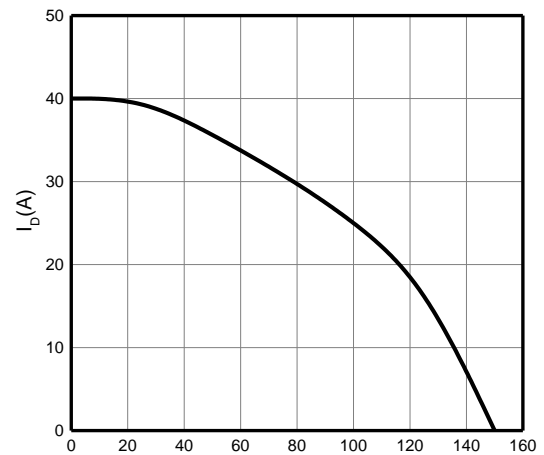


Figure 11. Power Dissipation vs. Temperature

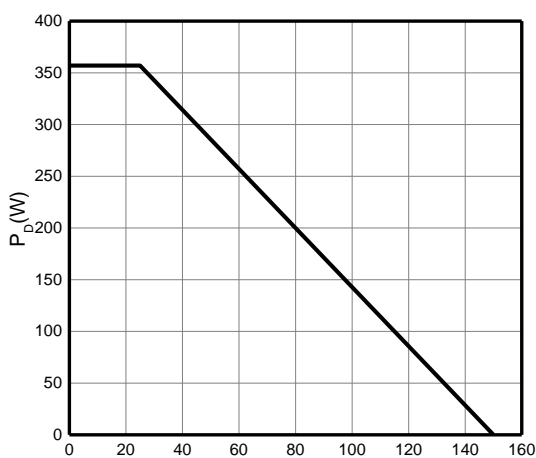


Figure 12. Safe Operating Area

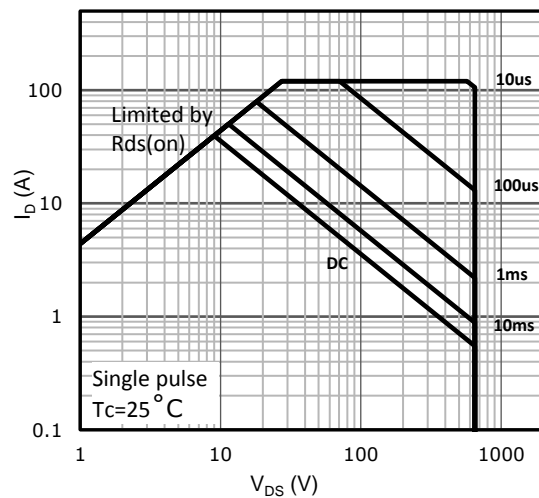
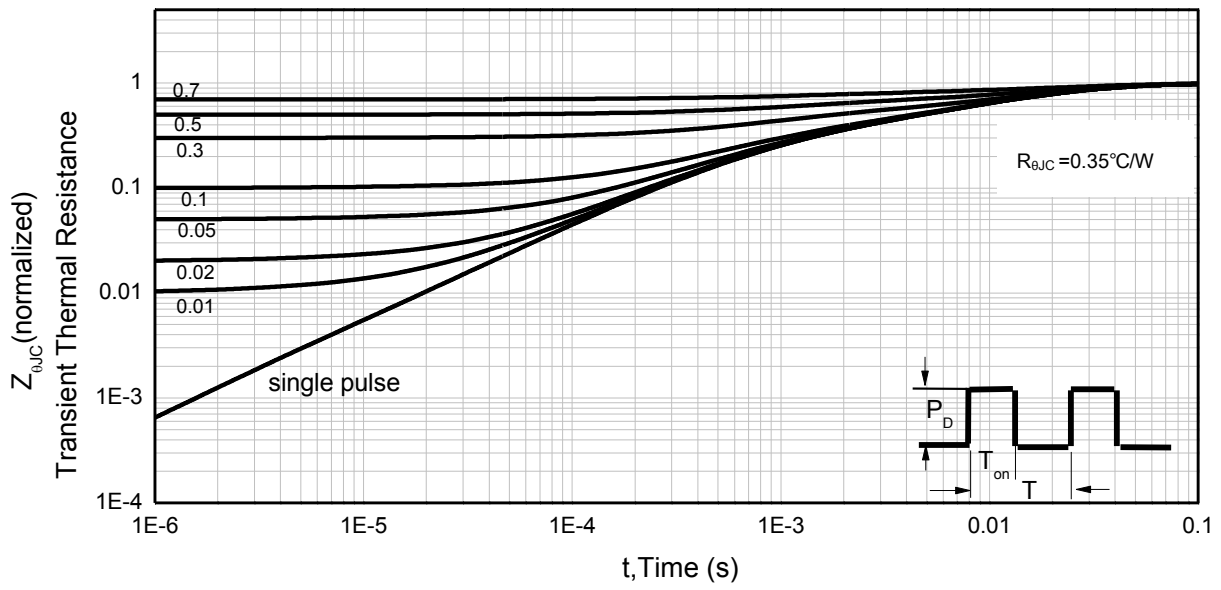




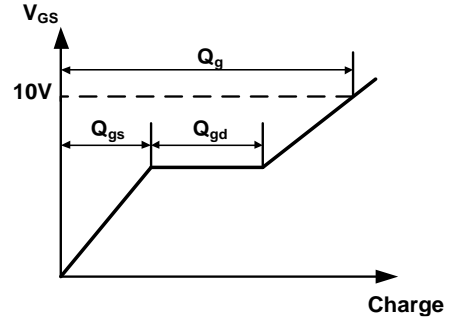
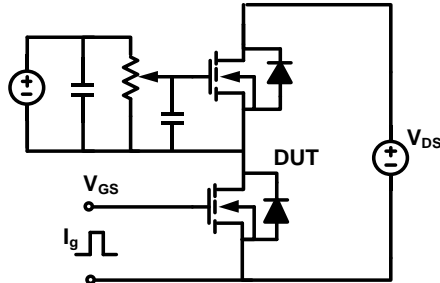
Figure 13. Normalized Maximum Transient Thermal Impedance ( $R_{thJC}$ )



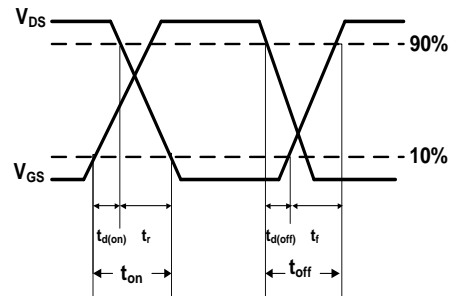
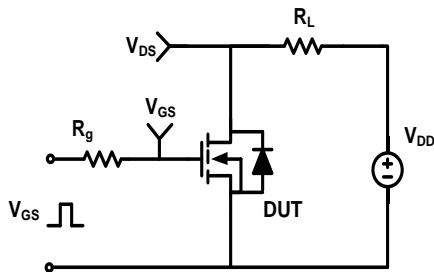


### Test Circuit & Waveforms

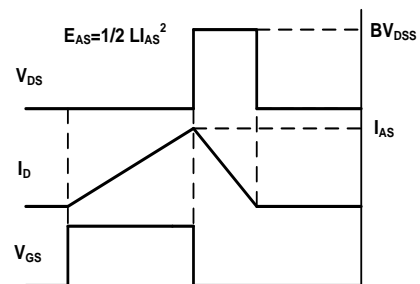
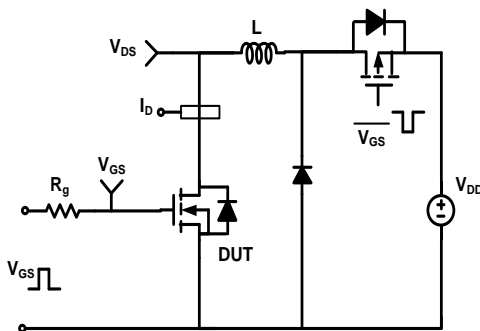
#### Gate Charge Test Circuit & Waveform



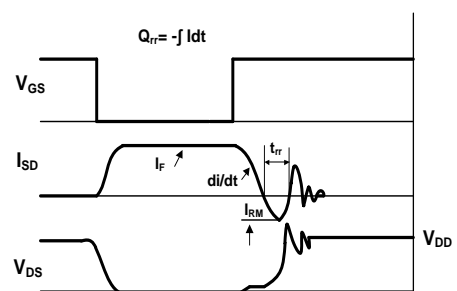
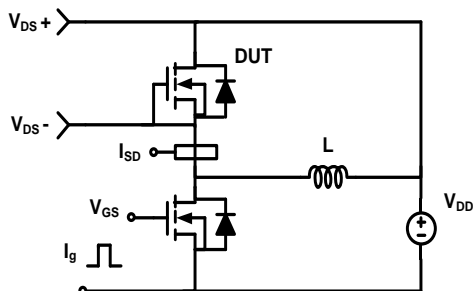
#### Resistive Switching Test Circuit & Waveform



#### Unclamped Inductive Switching (UIS) Test Circuit & Waveform

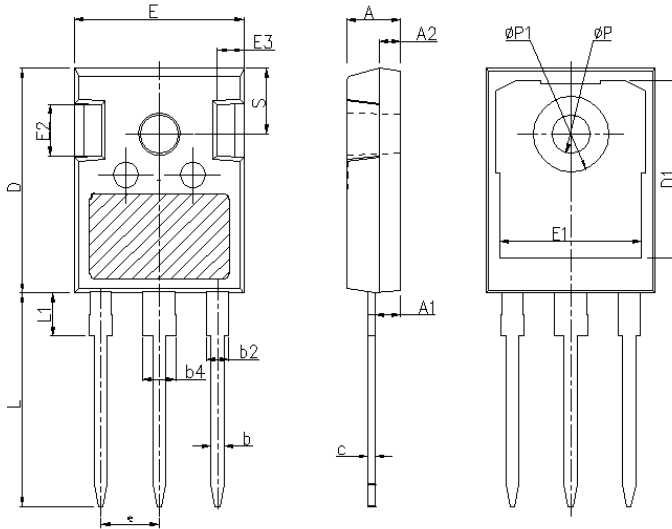


#### Diode Recovery Test Circuit & Waveform





### Mechanical Dimensions for TO-247



DIMENSIONS IN MILLITMETERS		
SYMBOL	MIN	MAX
A	4.8	5.21
A1	2.21	2.61
A2	1.85	2.16
b	1.07	1.36
b2	1.91	2.41
b4	2.87	3.38
c	0.51	0.75
D	20.7	21.3
D1	16.25	17.65
E	15.5	16.13
E1	13	13.6
E2	3.68	5.2
E3	1	2.7
e	5.44BSC	
L	19.62	20.32
L1	-	4.4
ΦP	3.4	3.8
ΦP1	-	7.4
S	6.04	6.3



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