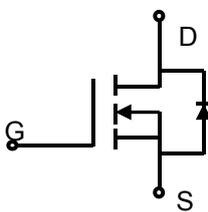


Lonten N-channel 650V, 40A, 0.105Ω LonFET™ Power MOSFET

<p>Description LonFET™ 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.</p> <p>Features</p> <ul style="list-style-type: none"> ◆ Ultra low $R_{DS(on)}$ ◆ Ultra low gate charge (typ. $Q_g = 49.8\text{nC}$) ◆ 100% UIS tested ◆ RoHS compliant <p>Applications</p> <ul style="list-style-type: none"> ◆ Power factor correction (PFC). ◆ Switched mode power supplies (SMPS). ◆ Uninterruptible power supply (UPS). 	<p>Product Summary</p> <table style="width: 100%; border: none;"> <tr><td style="padding: 2px 5px;">$V_{DS} @ T_{j,max}$</td><td style="padding: 2px 5px;">700V</td></tr> <tr><td style="padding: 2px 5px;">$R_{DS(on),max}$</td><td style="padding: 2px 5px;">0.105Ω</td></tr> <tr><td style="padding: 2px 5px;">I_{DM}</td><td style="padding: 2px 5px;">120A</td></tr> <tr><td style="padding: 2px 5px;">$Q_{g,typ}$</td><td style="padding: 2px 5px;">49.8nC</td></tr> </table> <div style="text-align: center; margin: 10px 0;">  TO-220F </div> <div style="text-align: center; margin: 10px 0;">  N-Channel MOSFET </div> <div style="text-align: right; margin-top: 10px;">  </div>	$V_{DS} @ T_{j,max}$	700V	$R_{DS(on),max}$	0.105Ω	I_{DM}	120A	$Q_{g,typ}$	49.8nC
$V_{DS} @ T_{j,max}$	700V								
$R_{DS(on),max}$	0.105Ω								
I_{DM}	120A								
$Q_{g,typ}$	49.8nC								

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	650	V
Continuous drain current ($T_C = 25^\circ\text{C}$) ($T_C = 100^\circ\text{C}$)	I_D	40	A
		26	A
Pulsed drain current ¹⁾	I_{DM}	120	A
Gate-Source voltage	V_{GSS}	± 30	V
Avalanche energy, single pulse ²⁾	E_{AS}	1000	mJ
Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	P_D	34.8	W
		0.28	W/ $^\circ\text{C}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$
Continuous diode forward current	I_S	40	A
Diode pulse current	$I_{S,pulse}$	120	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.6	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$
Soldering temperature, wavesoldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	$^\circ\text{C}$

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Tube
LSD65R105HF	TO-220F	LSD65R105HF	50

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0\text{ V}, I_D=0.25\text{ mA}$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=0.25\text{ mA}$	3.0	3.5	4.5	V
Drain cut-off current	I_{DSS}	$V_{DS}=650\text{ V}, V_{GS}=0\text{ V}, T_j = 25^\circ\text{C}$	-	-	5	μA
Gate leakage current, Forward	I_{GSSF}	$V_{GS}=30\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
Gate leakage current, Reverse	I_{GSSR}	$V_{GS}=-30\text{ V}, V_{DS}=0\text{ V}$	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=20\text{ A}$ $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	- - -	0.096 0.25	0.105 -	Ω
Gate resistance	R_G	$f=1\text{ MHz}, \text{open drain}$	-	2.0	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V},$ $f = 250\text{ kHz}$	-	2870	-	μF
Output capacitance	C_{oss}		-	104	-	
Reverse transfer capacitance	C_{rss}		-	2.2	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 400\text{ V}, I_D = 20\text{ A}$ $R_G = 10\ \Omega, V_{GS}=10\text{ V}$	-	29.8	-	ns
Rise time	t_r		-	59.2	-	
Turn-off delay time	$t_{d(off)}$		-	63.5	-	
Fall time	t_f		-	4.4	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	$V_{DD}=520\text{ V}, I_D=20\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	16.3	-	nC
Gate to drain charge	Q_{gd}		-	11.1	-	
Gate charge total	Q_g		-	49.8	-	
Gate plateau voltage	$V_{plateau}$		-	5.0	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=20\text{ A}$	-	-	1.2	V
Reverse recovery time	t_{rr}	$V_R=400\text{ V}, I_F=20\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	184.0	-	ns
Reverse recovery charge	Q_{rr}		-	1.5	-	μC
Peak reverse recovery current	I_{rrm}		-	16.7	-	A

Notes:

- Limited by maximum junction temperature, maximum duty cycle is 0.75.
- $I_{AS} = 8\text{ A}, V_{DD} = 50\text{ V}, R_G = 30\ \Omega, \text{Starting } T_j = 25^\circ\text{C}.$

Electrical Characteristics Diagrams

Figure 1. On-Region Characteristics

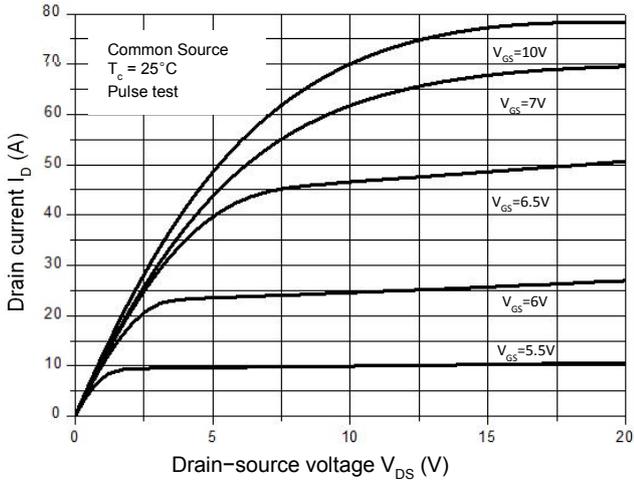


Figure 2. Transfer Characteristics

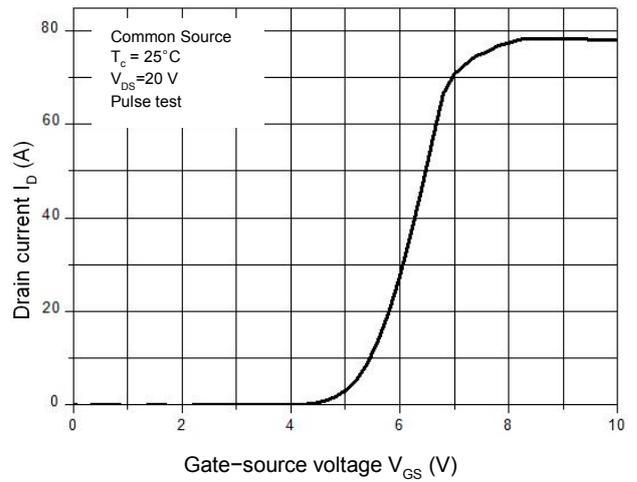


Figure 3. On-Resistance Variation vs. Drain Current

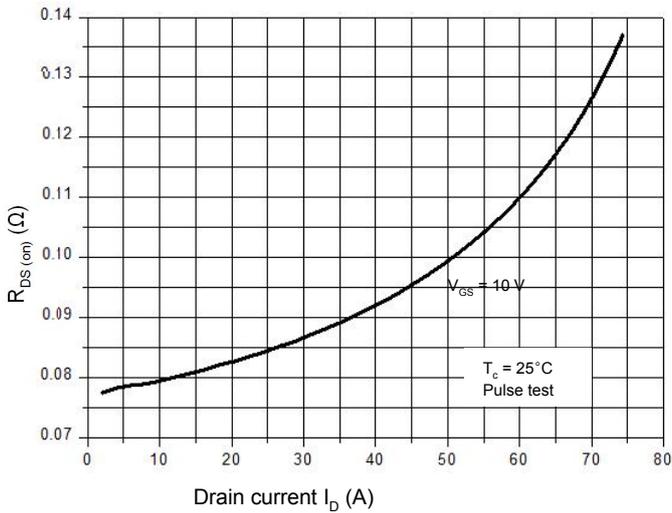


Figure 4. Threshold Voltage vs. Temperature

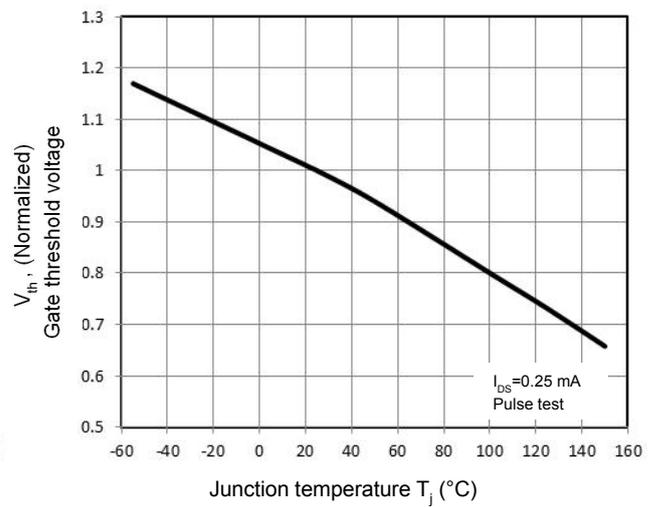


Figure 5. Breakdown Voltage vs. Temperature

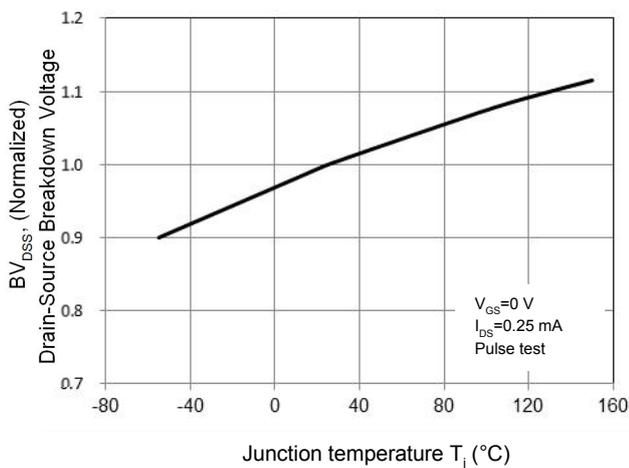


Figure 6. On-Resistance vs. Temperature

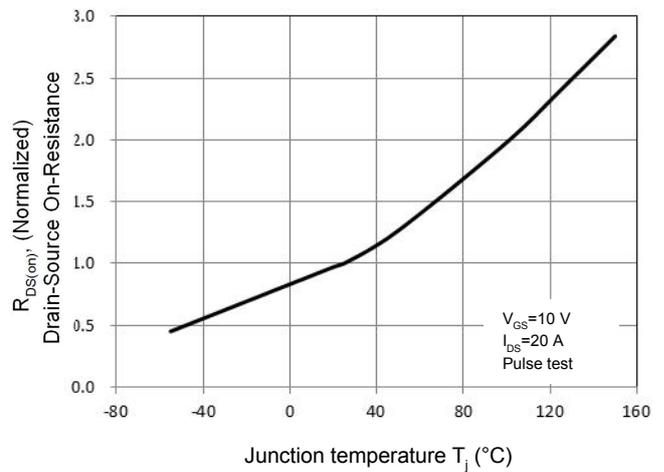


Figure 7. Capacitance Characteristics

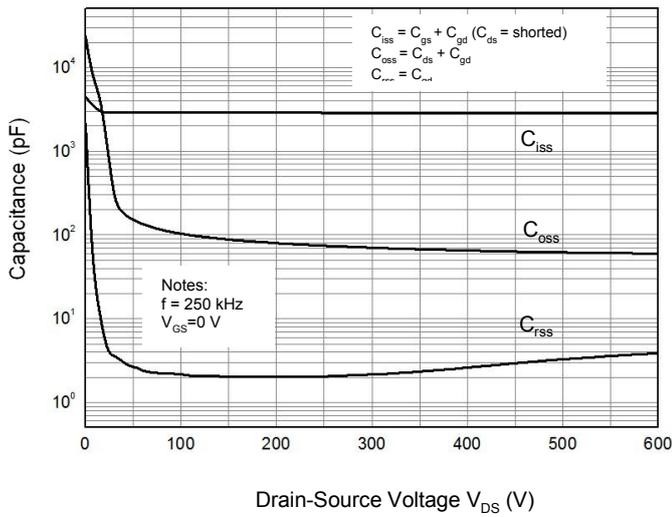


Figure 8. Gate Charge Characteristics

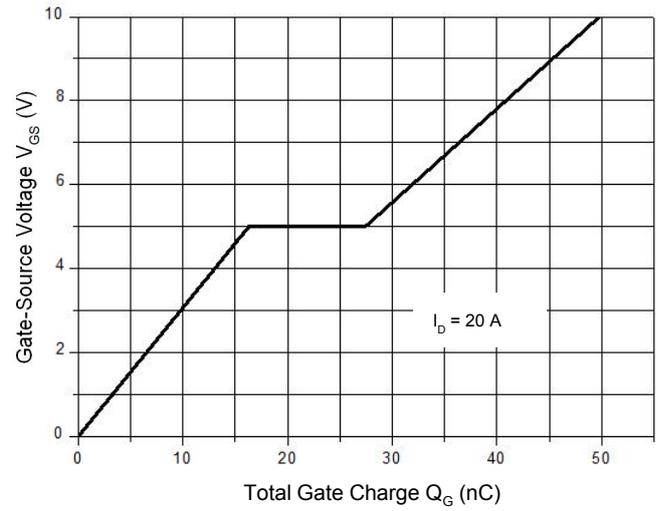


Figure 9. Power Dissipation vs. Temperature

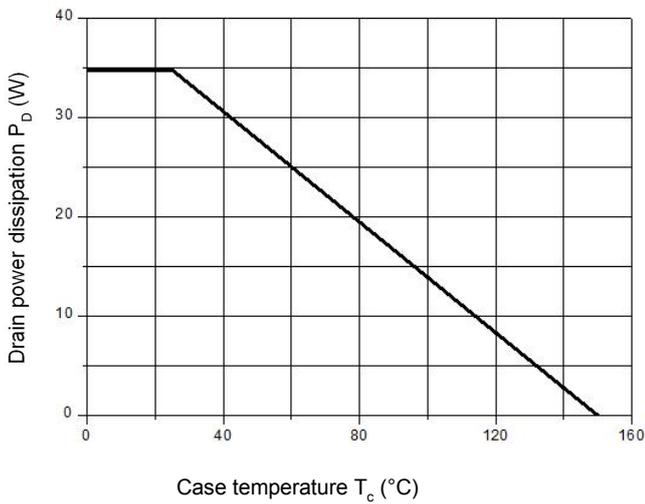


Figure 10. Drain Current Derating

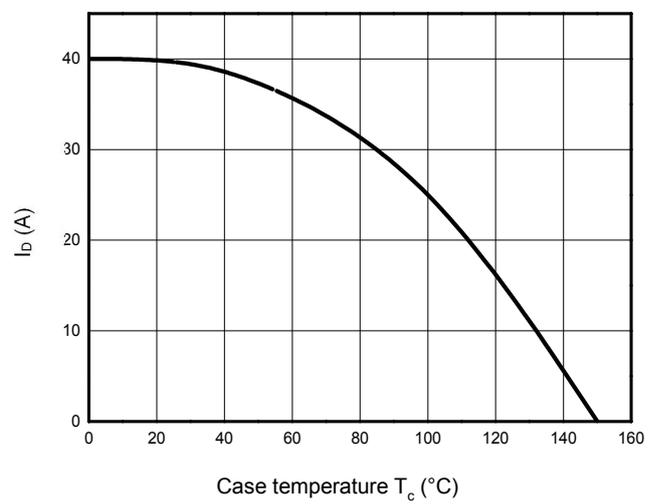
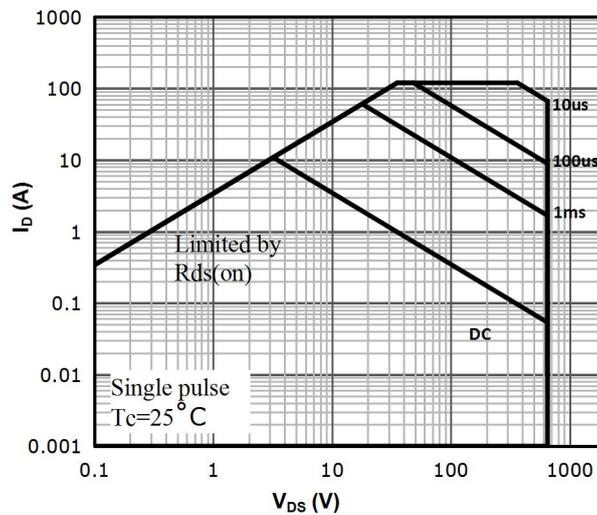
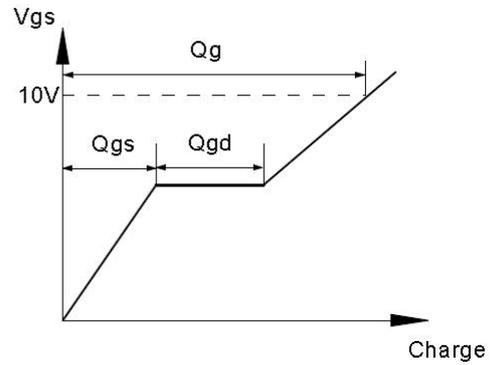
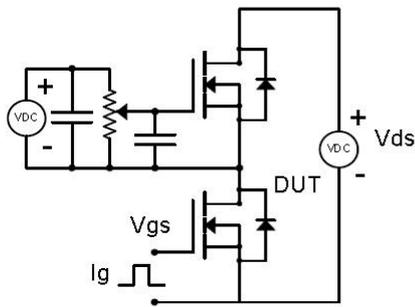


Figure 11: Safe Operating Area

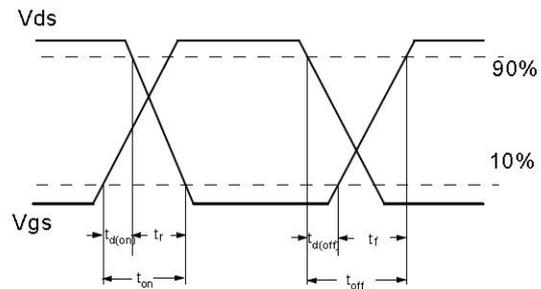
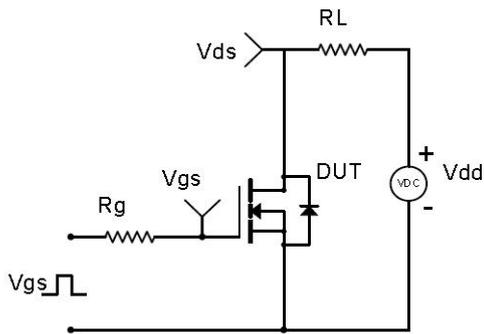


Test Circuit & Waveforms

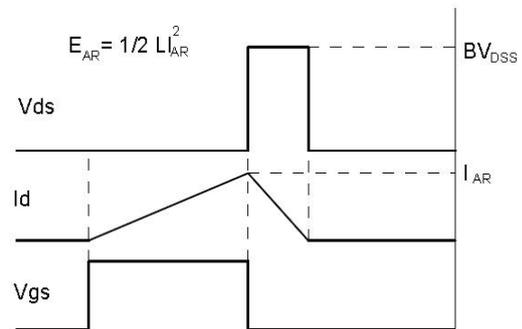
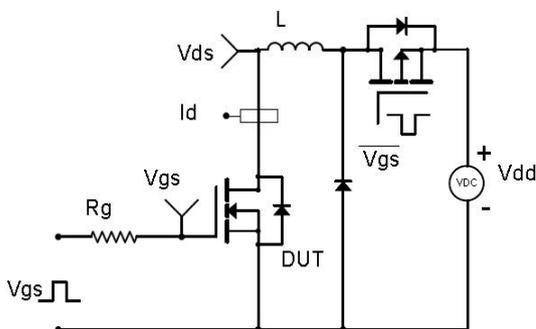
Gate Charge Test Circuit & Waveform



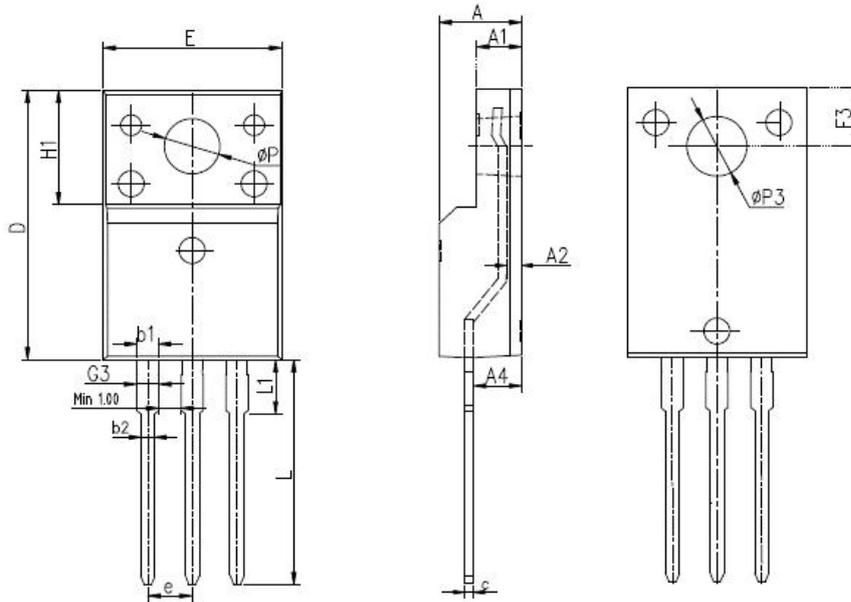
Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Mechanical Dimensions for TO-220F



DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES	
SYMBOL	MIN	MAX	MIN	MAX
A	4.4	4.9	0.173	0.193
A1	2.34	2.74	0.092	0.108
A2	0.3	0.7	0.012	0.028
A4	2.5	2.96	0.098	0.117
c	0.4	0.7	0.016	0.028
D	15.57	16.4	0.613	0.646
E	9.96	10.4	0.392	0.409
H1	6.48	6.95	0.255	0.274
e	2.54BSC		0.1BSC	
L	12.68	14.2	0.499	0.559
L1	2.88	3.6	0.113	0.142
ΦP	3	3.38	0.118	0.133
ΦP3	3.15	3.65	0.124	0.144
F3	3.15	3.45	0.124	0.136
G3	1.15	1.58	0.045	0.062
b1	1.18	1.43	0.046	0.056
b2	0.7	1	0.028	0.039

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