Maplesemi

SLP65R170E7/SLF65R170E7

LEAD FREE RoHS COMPLIANT

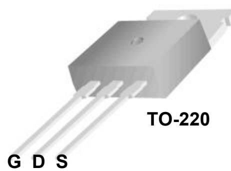
SLP65R170E7 / SLF65R170E7
650V N-Channel MOSFET

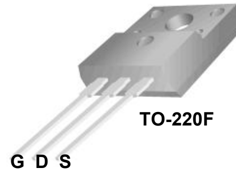
General Description

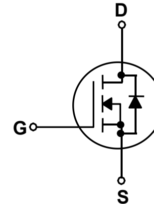
This Power MOSFET is produced using Maple semi's advanced trench MOSFET technology.
This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies.

Features

- 20A, 650V, $R_{DS(on)}$ =170mΩ@V_{GS} = 10 V
- Low gate charge(typ. Qg = 30.2nC)
- High ruggedness Ultra
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability







Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter		SLP65R170E7 / SLF65R170E7	Units
V_{DSS}	Drain-Source Voltage		650	V
I_D	Drain Current - Continuous (T_C = 25℃)		20 *	A
	- Continuous (T_C = 100℃)		12*	A
I_{DM}	Drain Current - Pulsed	(Note 1)	57 *	A
V_{GSS}	Gate-Source Voltage		±30	V
EAS	Single Pulsed Avalanche Energy	(Note 2)	76	mJ
I_{AR}	Avalanche Current	(Note 1)	4	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	1.62	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	20	V/ns
	MOSFET dv/dt		100	
P_D	Power Dissipation (T_C = 25℃)		36	W
	- Derate above 25℃		0.29	W/℃
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		260	℃

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	SLP65R170E7 / SLF65R170E7	Units
$R_{θJC}$	Thermal Resistance, Junction-to-Case	3.5	℃/W
$R_{θJS}$	Thermal Resistance, Case-to-Sink Typ.	-	℃/W
$R_{θJA}$	Thermal Resistance, Junction-to-Ambient	62.5	℃/W

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SLP65R170E7/SLF65R170E7

Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 1mA	650	--	--	V
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 1mA,TJ = 150℃	650	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 V, V_{GS} = 0 V	--	--	1	uA
		V_{DS} =480 V, T_C = 125℃	--	2	--	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 1.7mA	2.5	--	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 10 A	--	150	170	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 400 V, V_{GS} = 0 V, f = 250KHz	--	1240	--	pF
C_{oss}	Output Capacitance		--	34	--	pF
C_{rss}	Reverse Transfer Capacitance		--	--	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 400 V, I_D = 10 A, R_G = 10 Ω,VGS = 10 V (Note 4, 5)	--	12	--	ns
t_r	Turn-On Rise Time		--	8	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	53	--	ns
t_f	Turn-Off Fall Time		--	10	--	ns
Q_g	Total Gate Charge	V_{DS} = 400 V, I_D = 10 A, V_{GS} = 10 V (Note 4, 5)	--	30.2	--	nC
Q_{gs}	Gate-Source Charge		--	5.8	--	nC
Q_{gd}	Gate-Drain Charge		--	15.4	--	nC
R_G	Gate Resistance	f = 1MHz		1.3		Ω
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	20	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	57	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 10 A	--	--	1.2	V
t_{rr}	Reverse Recovery Time	V_{DD} = 400 V, I_S = 10A, dI_F / dt = 100 A/us (Note 4)	--	274	--	ns
Q_{rr}	Reverse Recovery Charge		--	3.33	--	uC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. I_{AS} = 4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. $I_{SD} \leq$ 10A, di/dt ≤ 200A/us, $V_{DD} \leq$400, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

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Typical Characteristics

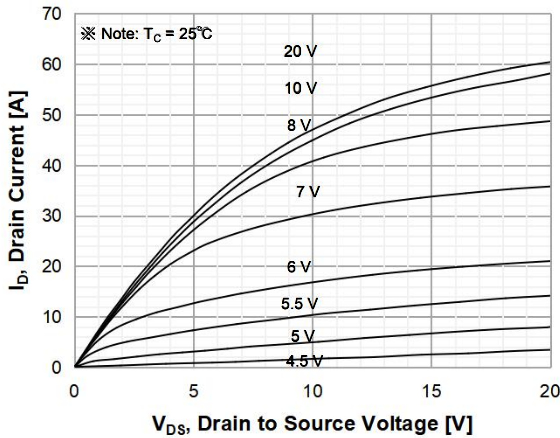

Figure 1. On-Region Characteristics

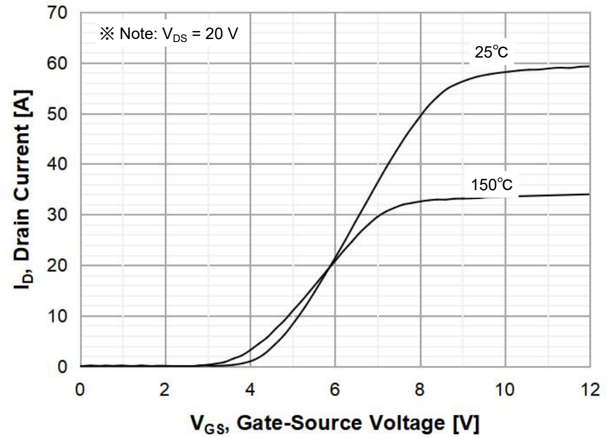

Figure 2. Transfer Characteristics

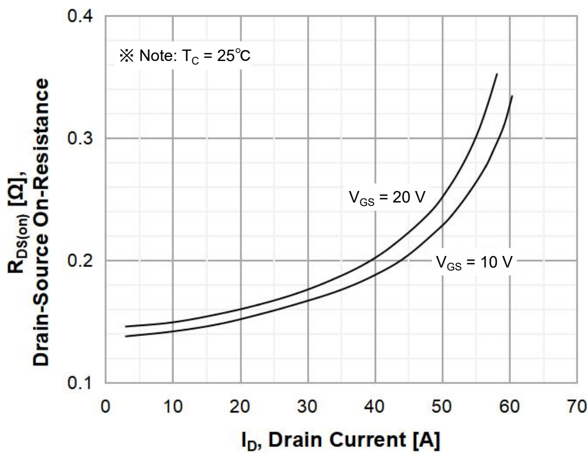

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

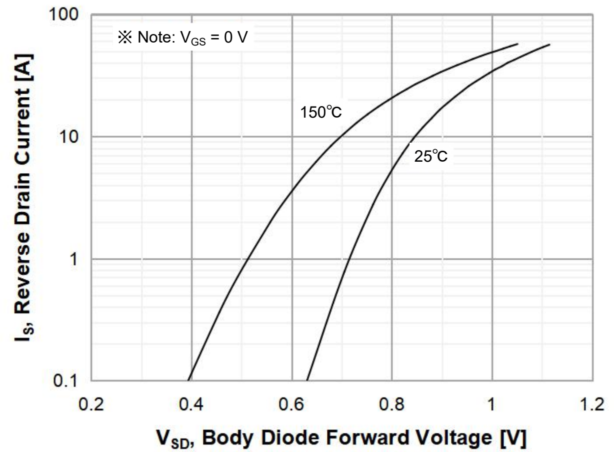

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

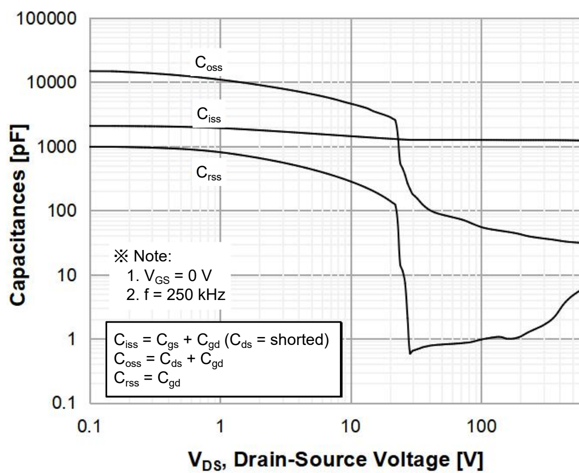

Figure 5. Capacitance Characteristics

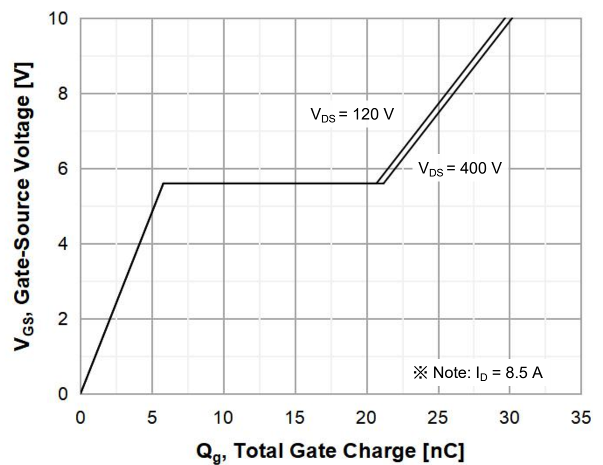

Figure 6. Gate Charge Characteristics

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Typical Characteristics (Continued)

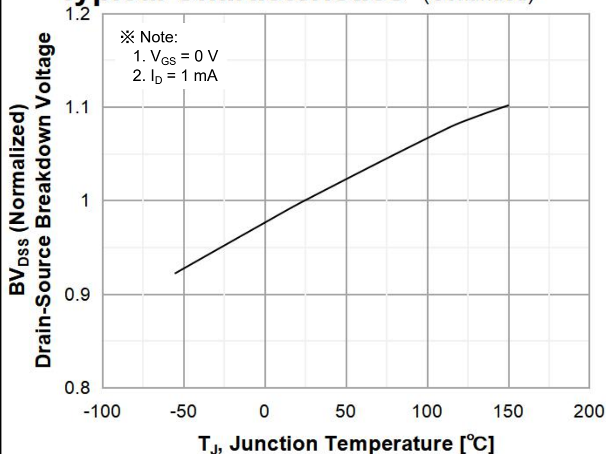

Figure 7. Breakdown Voltage Variation vs Temperature

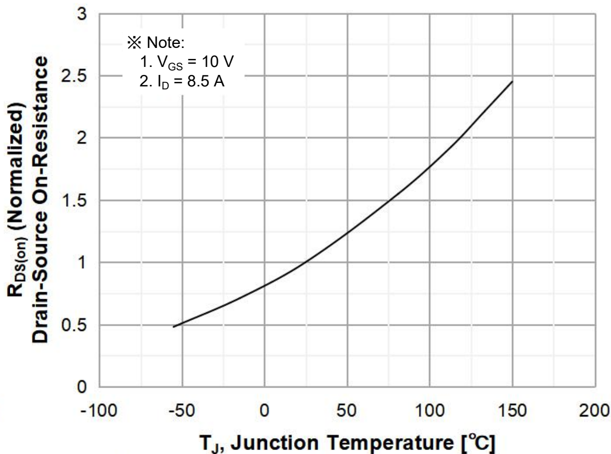

Figure 8. On-Resistance Variation vs Temperature

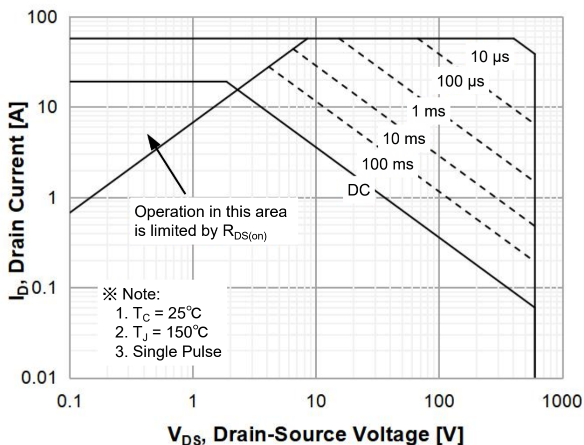

Figure 9. Maximum Safe Operating Area

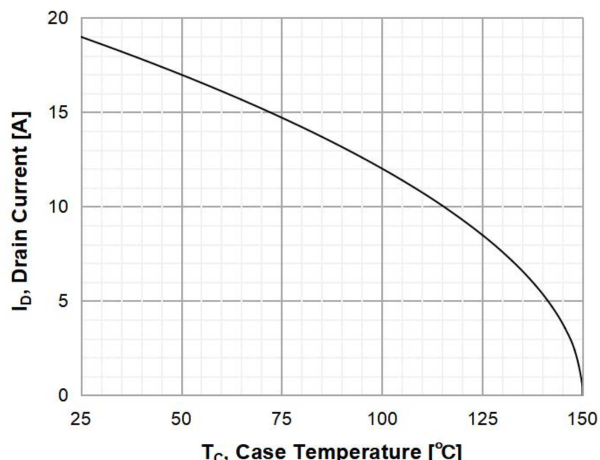

Figure 10. Maximum Drain Current vs. Case Temperature

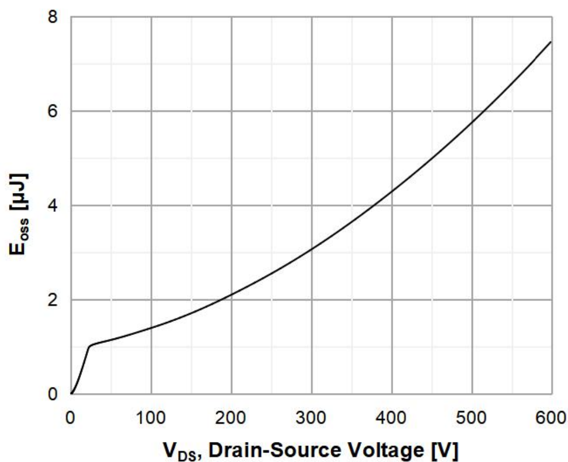

Figure 11. E_{oss} vs. Drain to Source Voltage

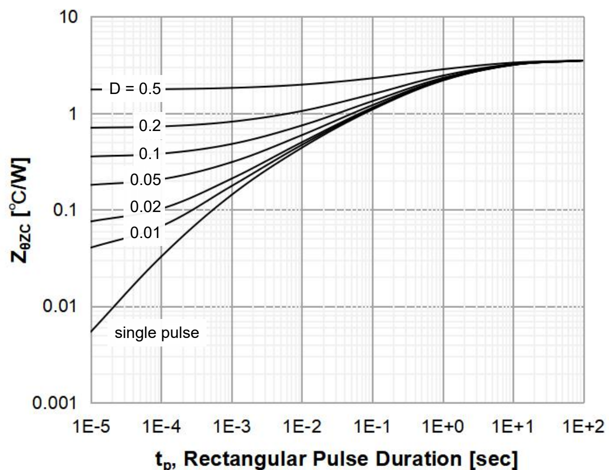

Figure 12. Transient Thermal Response Curve

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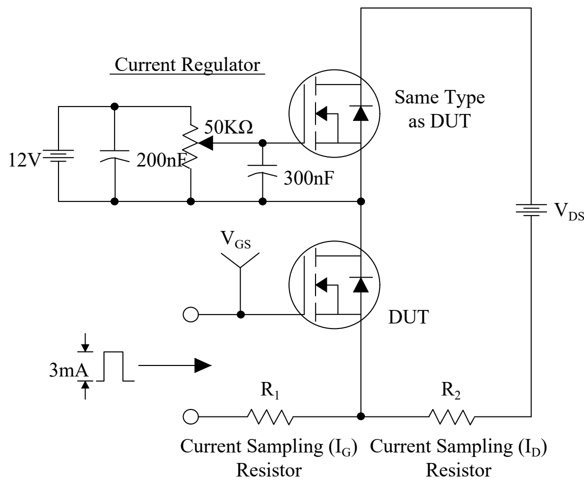
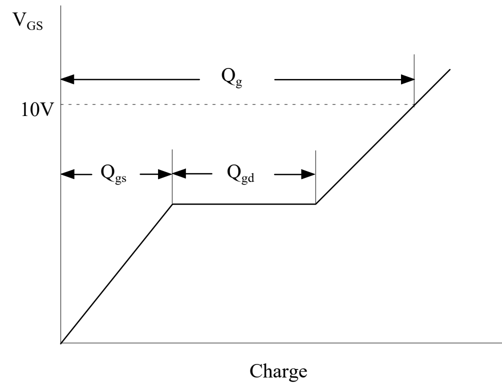
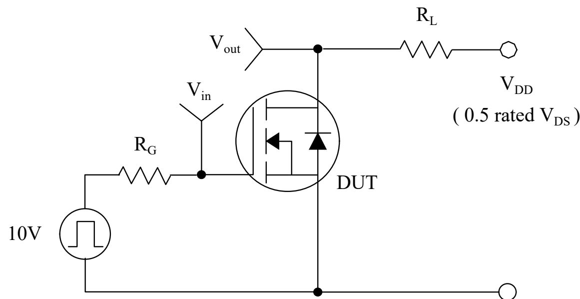
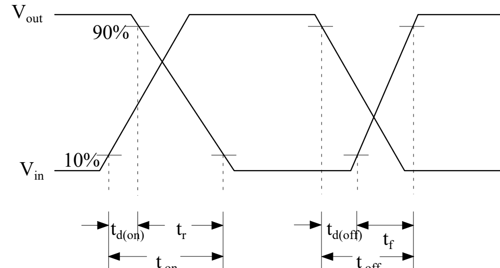
Gate Charge Test Circuit & Waveform



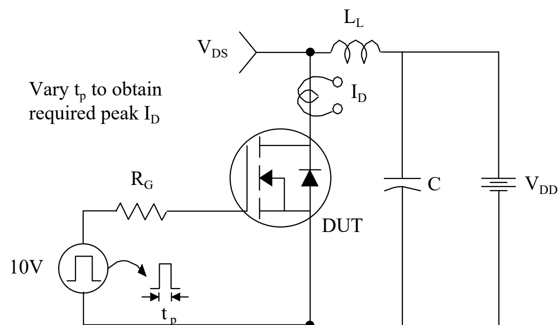


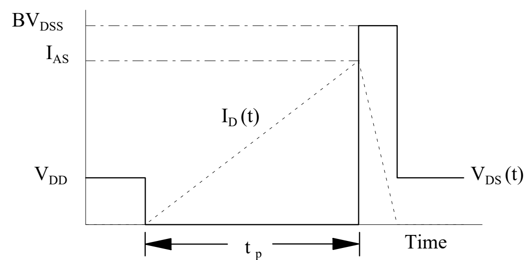
Resistive Switching Test Circuit & Waveforms





Unclamped Inductive Switching Test Circuit & Waveforms





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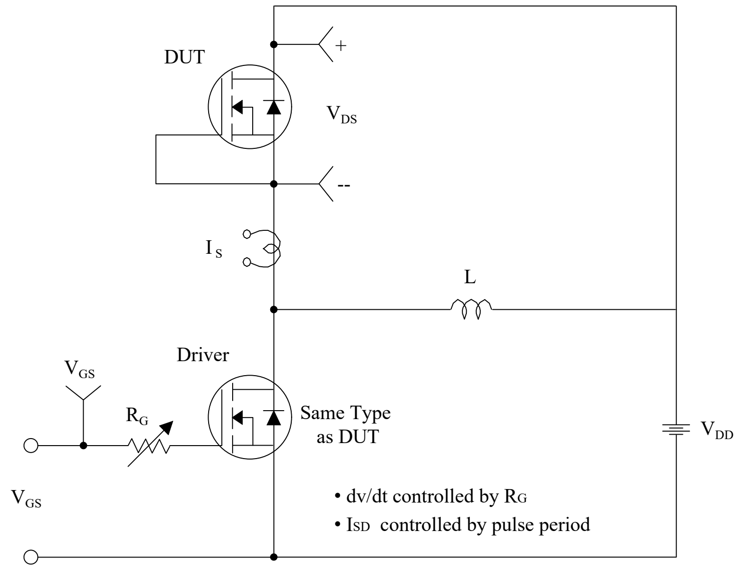
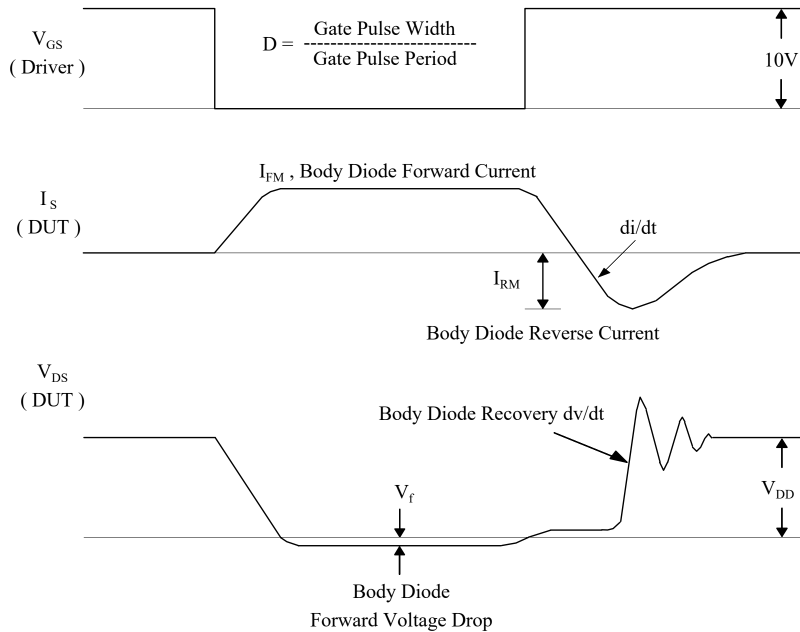
Peak Diode Recovery dv/dt Test Circuit & Waveforms





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