

SWITCHING

N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3507 is N-channel MOS FET device that features a low on-state resistance and excellent switching characteristics, designed for low voltage high current applications such as DC/DC converter with synchronous rectifier.

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3507-ZK	TO-252 (MP-3ZK)

FEATURES

- 4.5 V drive available
- Low on-state resistance
 $R_{DS(on)1} = 45 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 11 \text{ A)}$
- Low gate charge
 $Q_G = 8.5 \text{ nC TYP. (} V_{DD} = 24 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 22 \text{ A)}$
- Built-in G-S protection diode
- Surface mount package available

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	30	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 16	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 22	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 45	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	20	W
Total Power Dissipation ^{Note2}	P_{T2}	1.5	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	$-55 \text{ to } +150$	$^\circ\text{C}$
Single Avalanche Current ^{Note3}	I_{AS}	10	A
Single Avalanche Energy ^{Note3}	E_{AS}	10	mJ

Notes 1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

2. Mounted on glass epoxy board of 1 inch x 1 inch x 1.6 mm

3. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 15 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

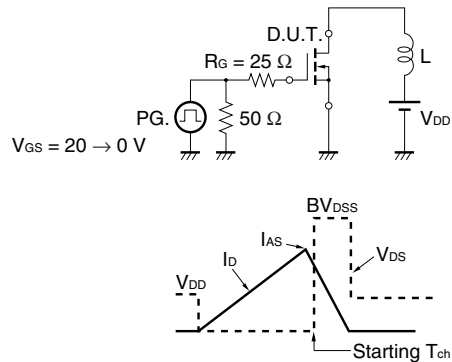
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

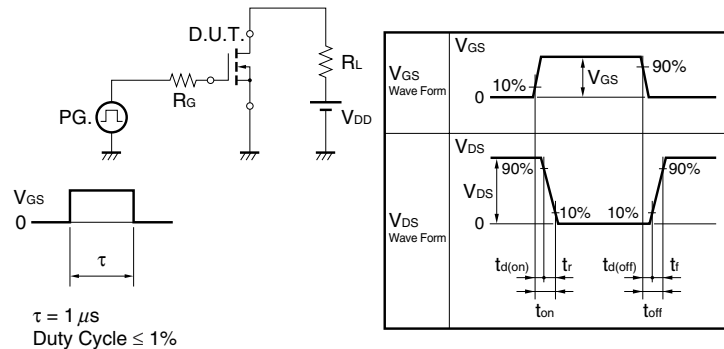
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.5		2.5	V
Forward Transfer Admittance Note	y _{fs}	V _{DS} = 4.0 V, I _D = 11 A	6			S
Drain to Source On-state Resistance Note	R _{DS(on)1}	V _{GS} = 10 V, I _D = 11 A		28	45	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 11 A		46	76	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		360		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		125		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		65		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 15 V, I _D = 11 A		6.6		ns
Rise Time	t _r	V _{GS} = 10 V		3.6		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		16		ns
Fall Time	t _f			5.3		ns
Total Gate Charge	Q _G	V _{DD} = 24 V		8.5		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		2		nC
Gate to Drain Charge	Q _{GD}	I _D = 22 A		2.1		nC
Body Diode Forward Voltage Note	V _{F(S-D)}	I _F = 22 A, V _{GS} = 0 V		1.0		V
Reverse Recovery Time	t _{rr}	I _F = 22 A, V _{GS} = 0 V		31		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		26		nC

Note Pulsed

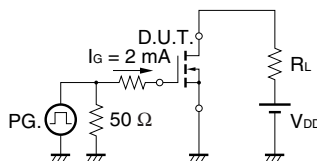
TEST CIRCUIT 1 AVALANCHE CAPABILITY



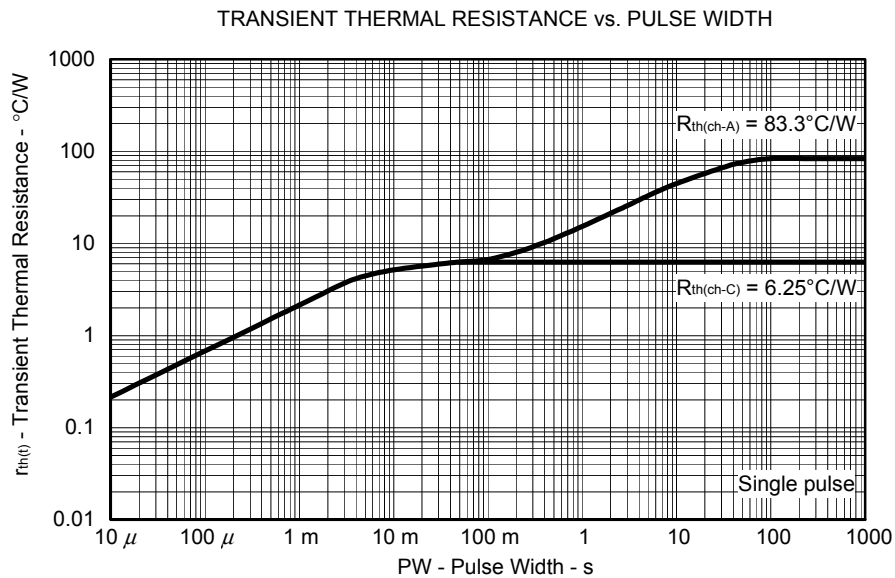
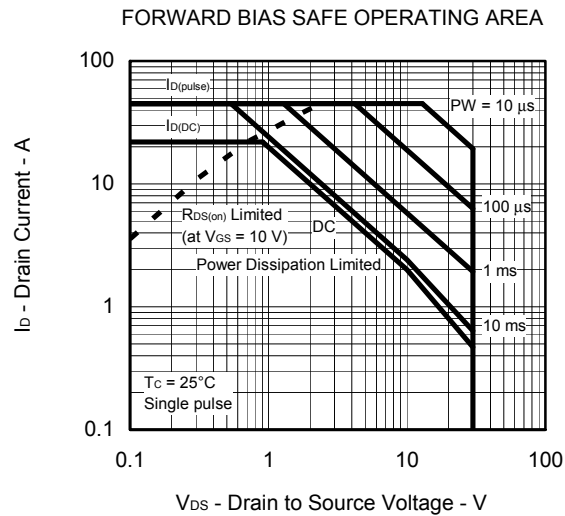
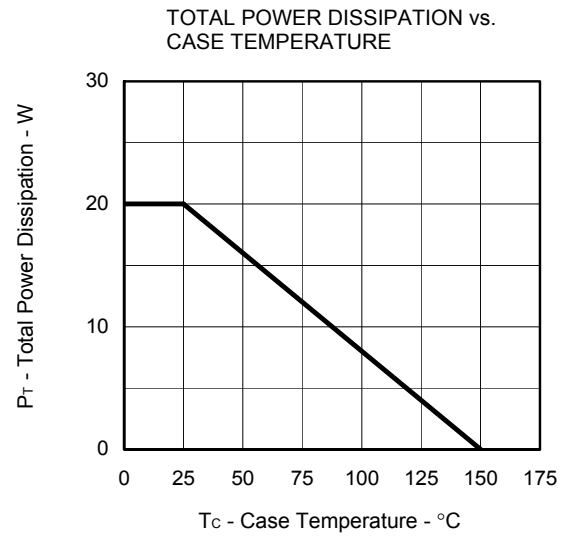
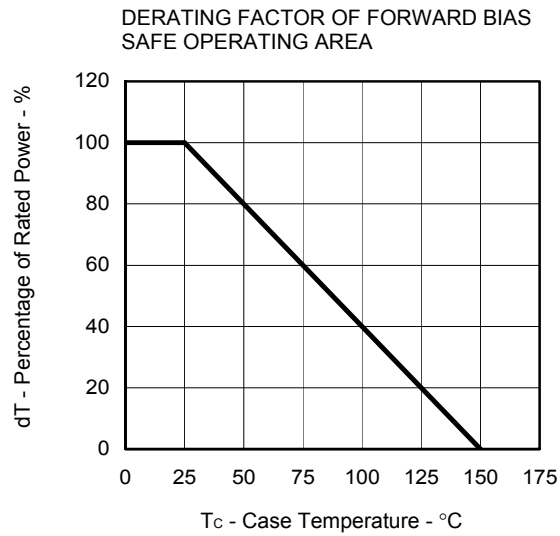
TEST CIRCUIT 2 SWITCHING TIME



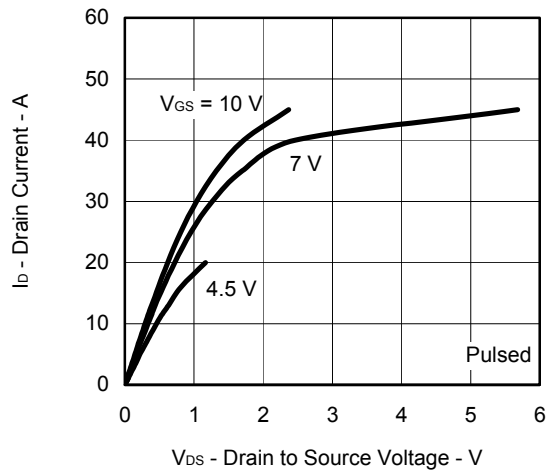
TEST CIRCUIT 3 GATE CHARGE



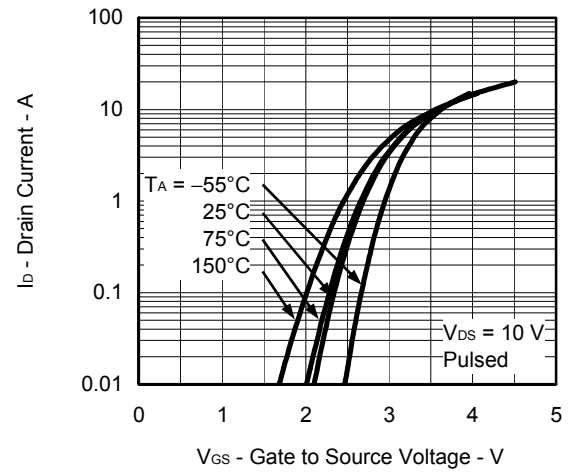
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



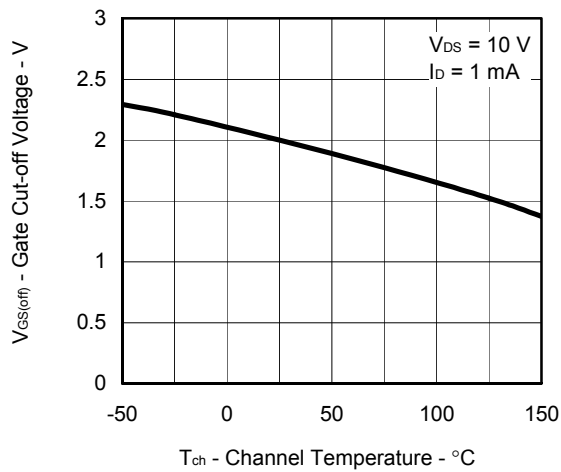
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



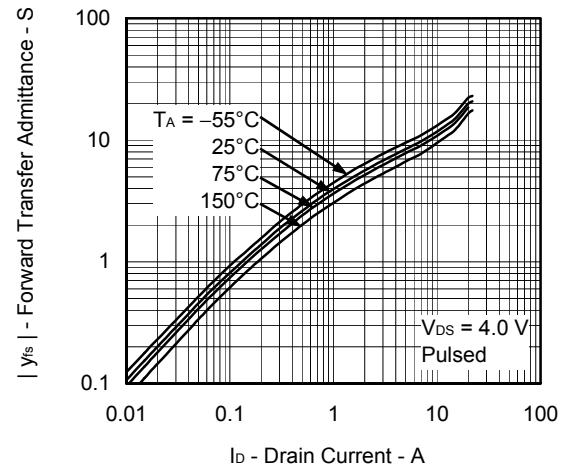
FORWARD TRANSFER CHARACTERISTICS



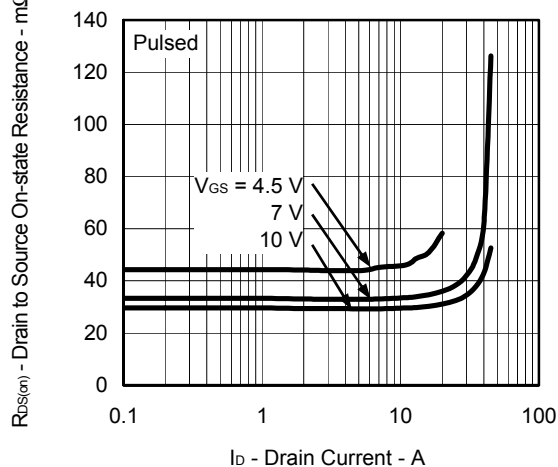
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



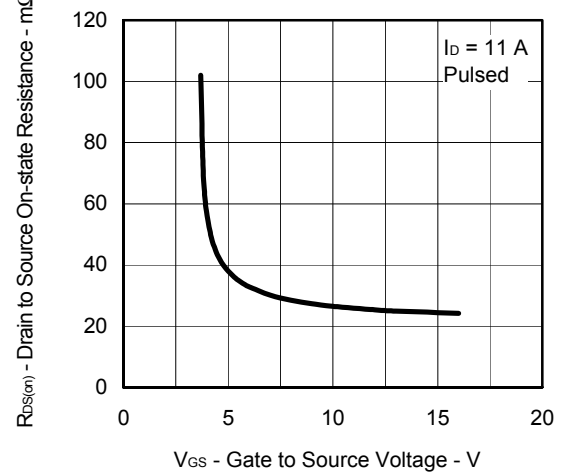
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



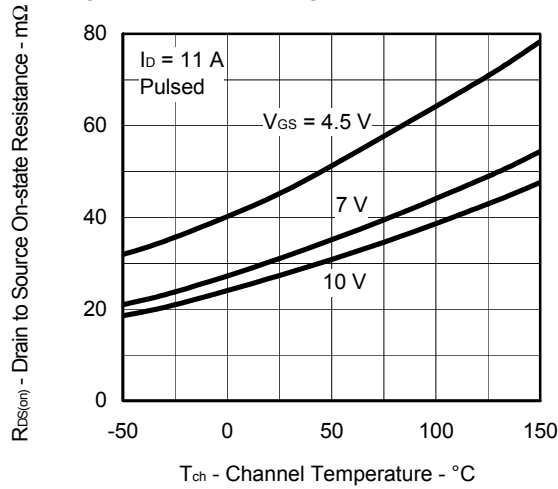
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



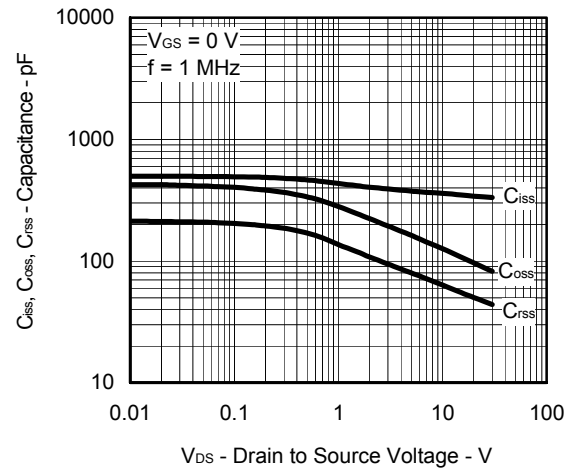
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



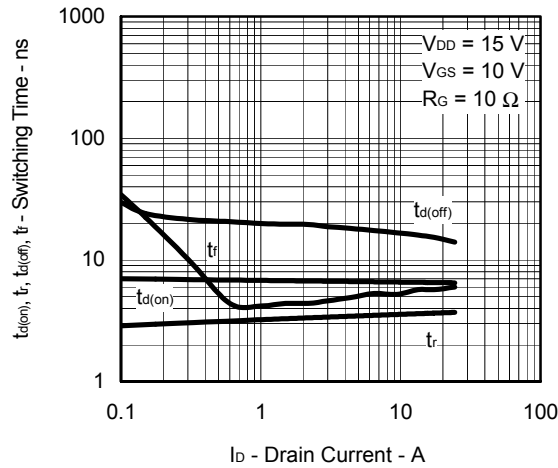
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



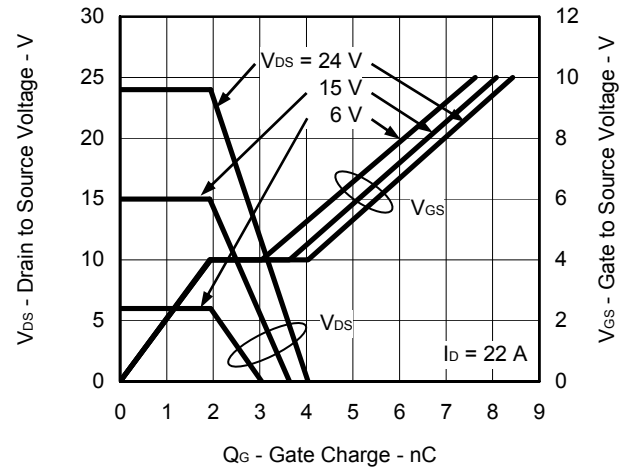
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



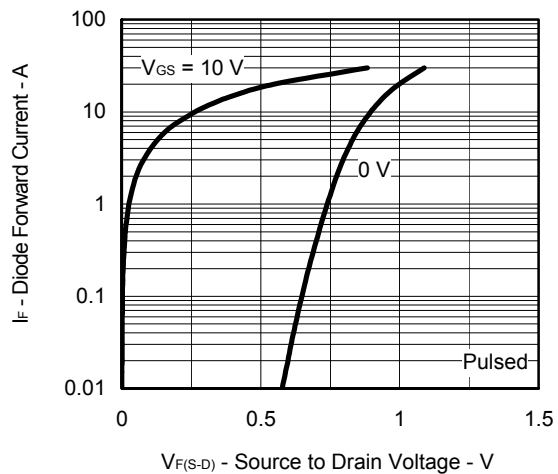
SWITCHING CHARACTERISTICS



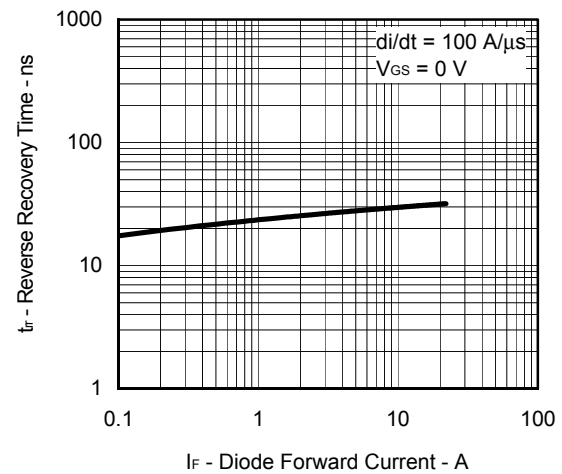
DYNAMIC INPUT/OUTPUT CHARACTERISTICS

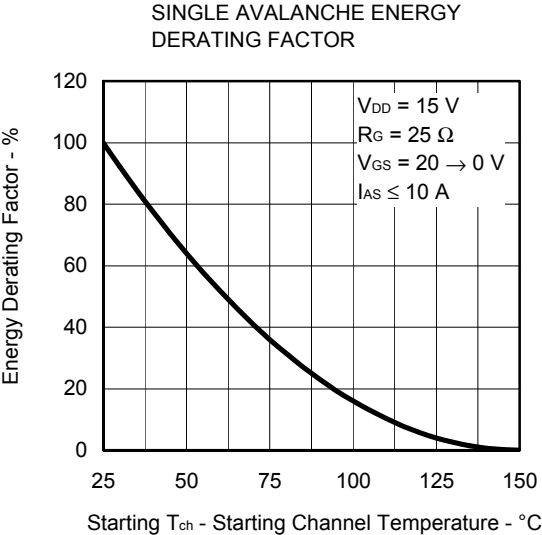
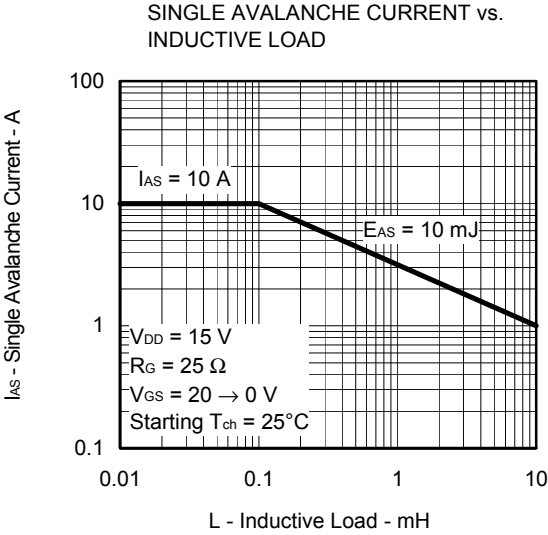


SOURCE TO DRAIN DIODE FORWARD VOLTAGE

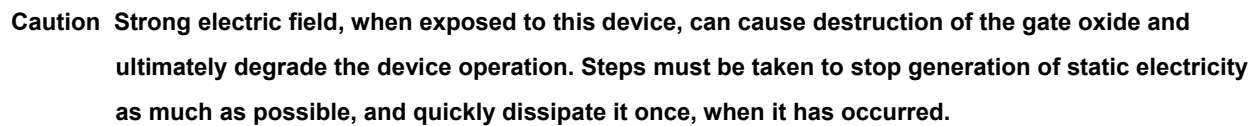


REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT





TO-252 (MP-3ZK)



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