

NP60N055VUK

R07DS0588EJ0100

MOS FIELD EFFECT TRANSISTOR

Rev.1.00

Dec 12, 2011

Description

The NP60N055VUK is N-channel MOS Field Effect Transistor designed for high current switching applications.

Features

- Super low on-state resistance
 $R_{DS(on)} = 5.5 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 30 \text{ A)}$
- Low C_{iss} : $C_{iss} = 2500 \text{ pF TYP. (} V_{DS} = 25 \text{ V)}$
- Designed for automotive application and AEC-Q101 qualified

Ordering Information

Part No.	Lead Plating	Packing		Package
NP60N055VUK-E1-AY *1	Pure Sn (Tin)	Tape 2500 p/reel	Taping (E1 type)	TO-252 (MP-3ZP)
NP60N055VUK-E2-AY *1			Taping (E2 type)	

Note: *1 Pb-free (This product does not contain Pb in the external electrode)

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	55	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 60	A
Drain Current (pulse) *1	$I_{D(pulse)}$	± 240	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	105	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	1.2	W
Channel Temperature	T_{ch}	175	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to 175	$^\circ\text{C}$
Repetitive Avalanche Current *2	I_{AR}	25	A
Repetitive Avalanche Energy *2	E_{AR}	63	mJ

Notes: *1 $T_C = 25^\circ\text{C}$, $P_W \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

*2 $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

Thermal Resistance

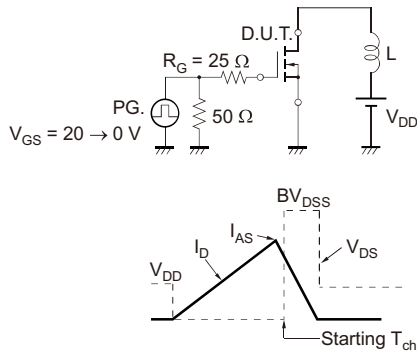
Channel to Case Thermal Resistance	$R_{th(ch-C)}$	1.43	$^\circ\text{C/W}$
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	125	$^\circ\text{C/W}$

Electrical Characteristics ($T_A = 25^\circ\text{C}$)

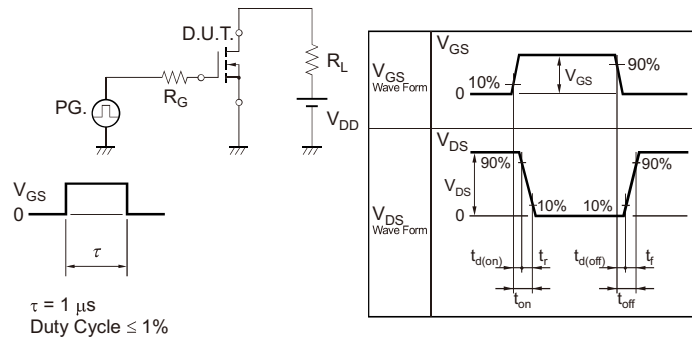
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 55\text{ V}, V_{GS} = 0\text{ V}$
Gate Leakage Current	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$
Gate to Source Threshold Voltage	$V_{GS(th)}$	2.0	3.0	4.0	V	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$
Forward Transfer Admittance *1	$ y_{fs} $	22	44	—	S	$V_{DS} = 5\text{ V}, I_D = 30\text{ A}$
Drain to Source On-state Resistance *1	$R_{DS(on)}$	—	4.6	5.5	m Ω	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$
Input Capacitance	C_{iss}	—	2500	3750	pF	$V_{DS} = 25\text{ V}$
Output Capacitance	C_{oss}	—	260	390	pF	$V_{GS} = 0\text{ V}$
Reverse Transfer Capacitance	C_{rss}	—	100	180	pF	$f = 1\text{ MHz}$
Turn-on Delay Time	$t_{d(on)}$	—	19	50	ns	$V_{DD} = 28\text{ V}, I_D = 30\text{ A}$
Rise Time	t_r	—	7	20	ns	$V_{GS} = 10\text{ V}$
Turn-off Delay Time	$t_{d(off)}$	—	45	90	ns	$R_G = 0\ \Omega$
Fall Time	t_f	—	5	20	ns	
Total Gate Charge	Q_G	—	42	63	nC	$V_{DD} = 44\text{ V}$
Gate to Source Charge	Q_{GS}	—	11	—	nC	$V_{GS} = 10\text{ V}$
Gate to Drain Charge	Q_{GD}	—	10	—	nC	$I_D = 60\text{ A}$
Body Diode Forward Voltage *1	$V_{F(S-D)}$	—	0.9	1.5	V	$I_F = 60\text{ A}, V_{GS} = 0\text{ V}$
Reverse Recovery Time	t_{rr}	—	44	—	ns	$I_F = 60\text{ A}, V_{GS} = 0\text{ V}$
Reverse Recovery Charge	Q_{rr}	—	45	—	nC	$di/dt = 100\text{ A}/\mu\text{s}$

Note: *1 Pulsed test

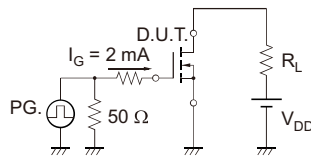
TEST CIRCUIT 1 AVALANCHE CAPABILITY



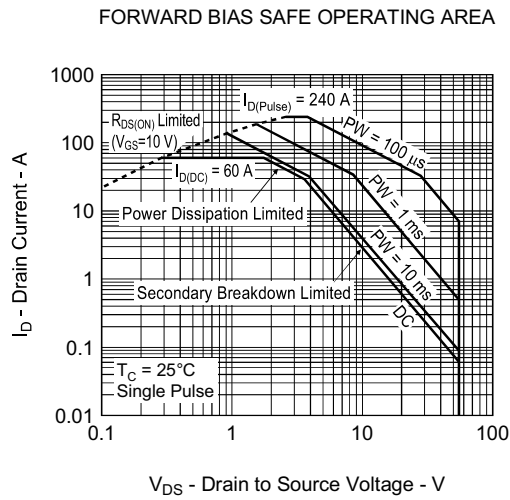
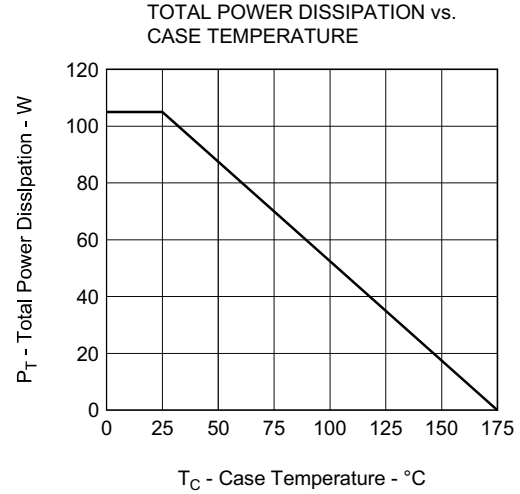
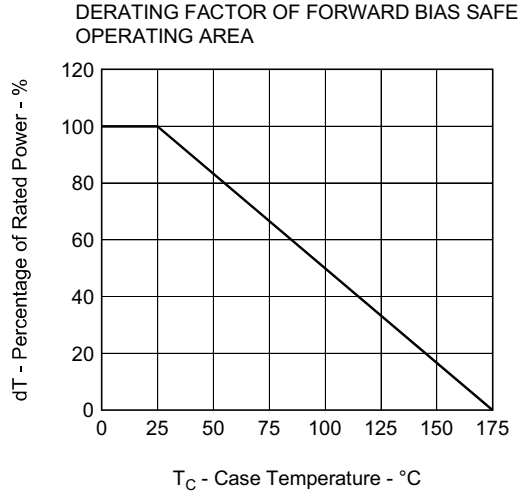
TEST CIRCUIT 2 SWITCHING TIME



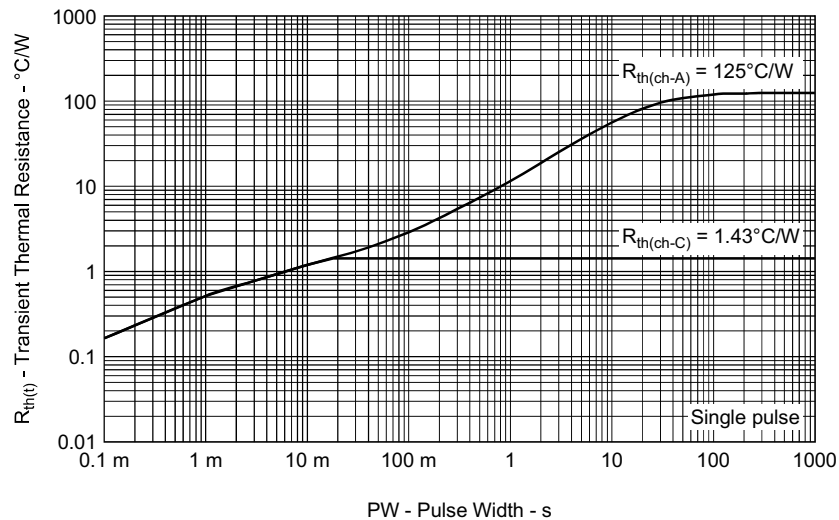
TEST CIRCUIT 3 GATE CHARGE



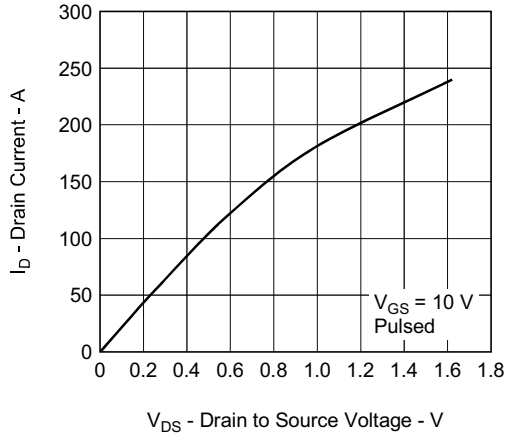
Typical Characteristics ($T_A = 25^\circ\text{C}$)



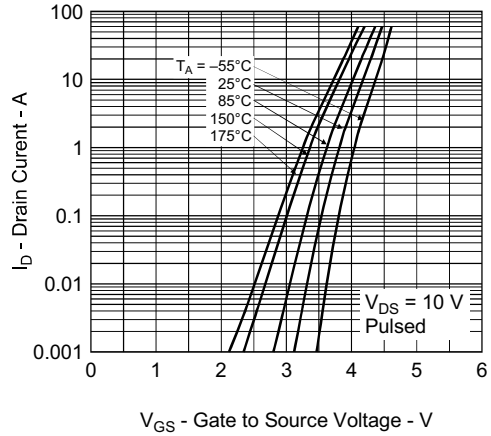
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



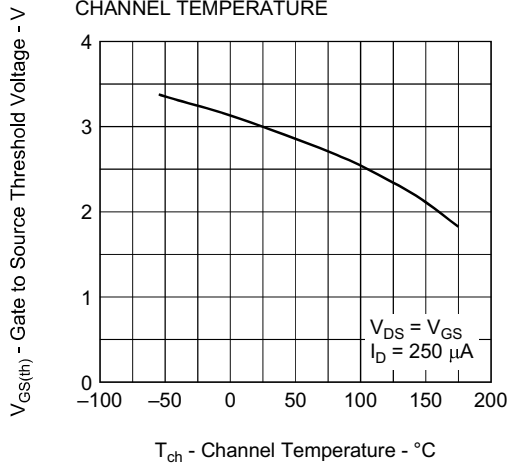
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



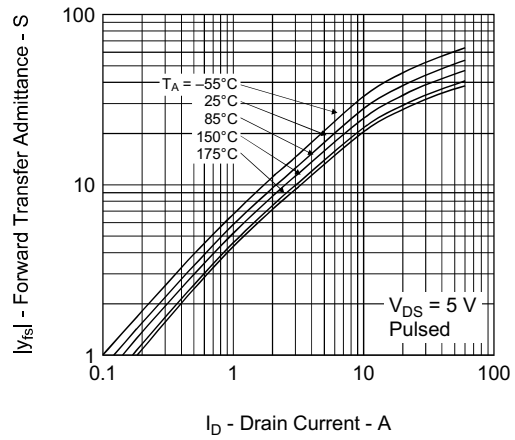
FORWARD TRANSFER CHARACTERISTICS



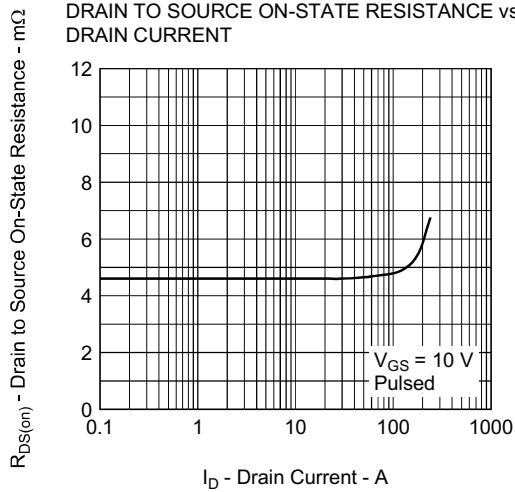
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



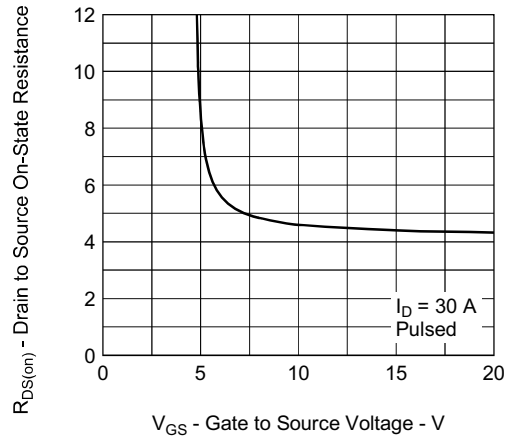
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

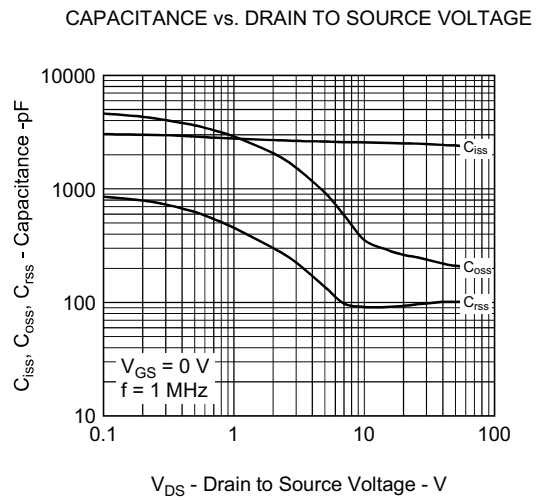
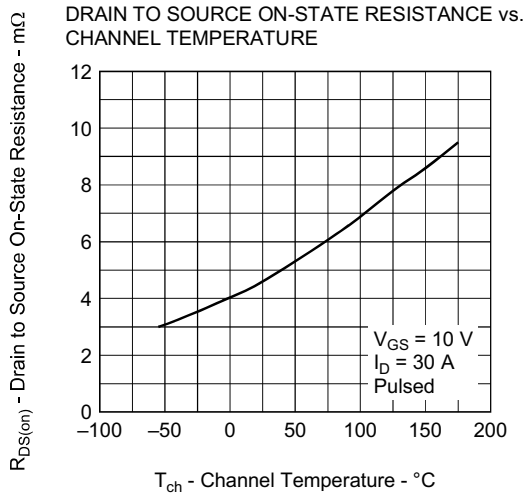


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

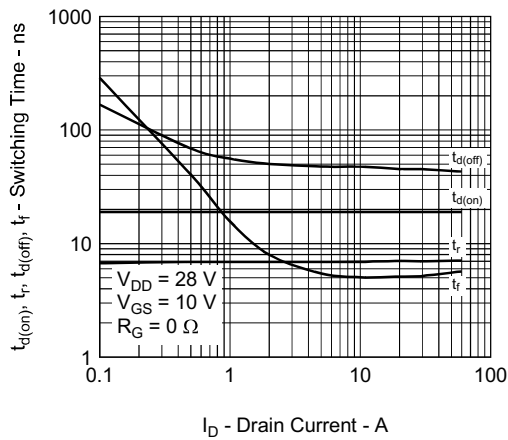


DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

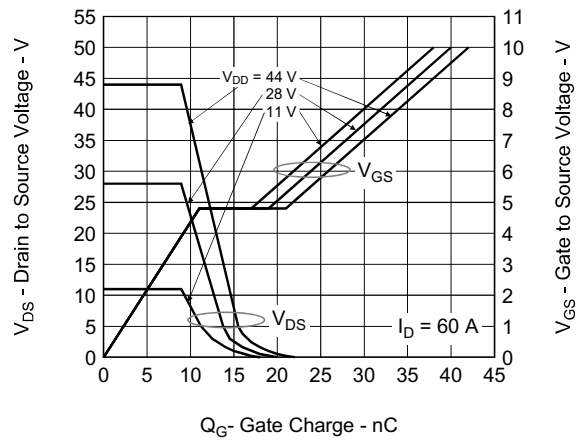




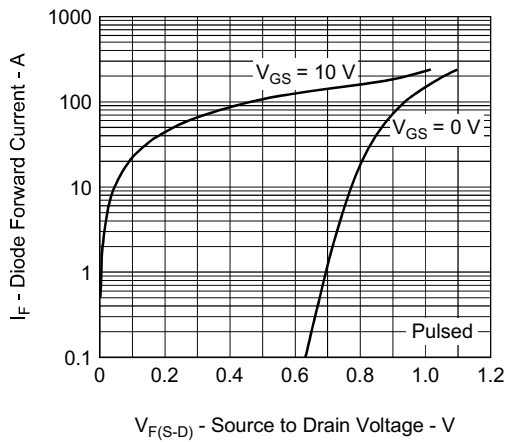
SWITCHING CHARACTERISTICS



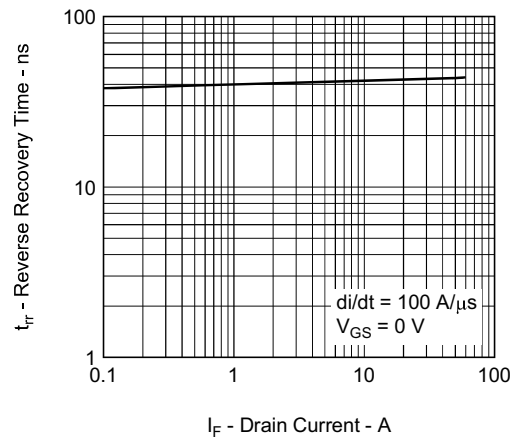
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

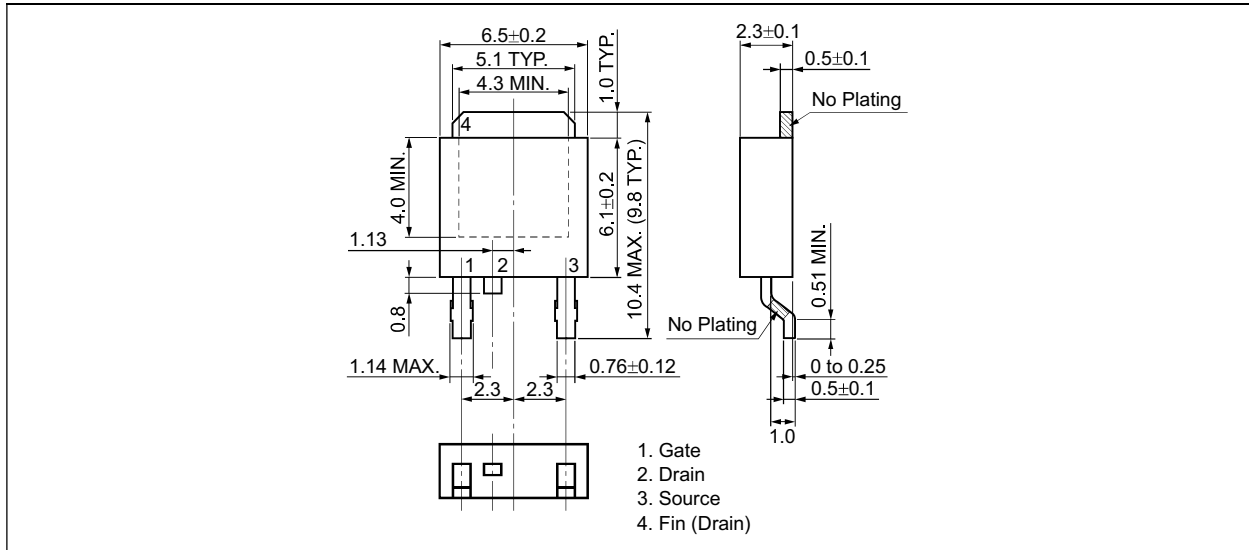


REVERSE RECOVERY TIME vs. DRAIN CURRENT

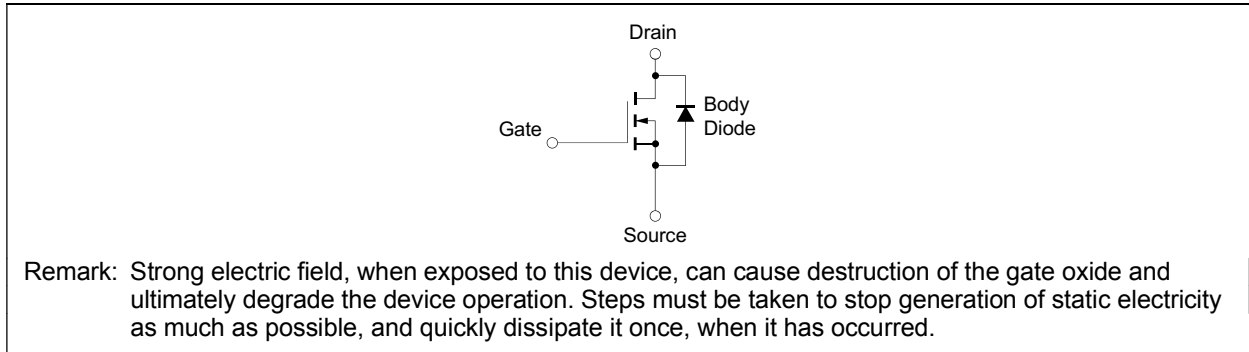


Package Drawing (Unit: mm)

TO-252 (MP-3ZP) (Mass: 0.27 g TYP.)



Equivalent Circuit



Revision History	NP60N055VUK Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Dec 12, 2011	—	First Edition Issued

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