

## 700V 7A N-Channel Enhancement Mode Power MOSFET

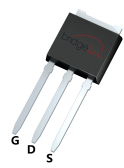
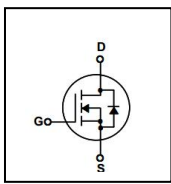
### General Description

BXP7N70 is Bridgelux high voltage MOSFET family based on advanced planar stripe DMOS technology. This advanced MOSFET family has optimized on-state resistance, and also provides superior switching performance and higher avalanche energy strength. This device family is suitable for high efficiency switch mode power supplies.

### FEATURES

- $R_{DS(ON)} \leq 1.5 \Omega$  @  $V_{GS}=10V, I_D=3.5A$
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Fast switching capability
- Lead free product is acquired

### SYMBOL



TO-251L



TO-252



TO-220



TO-220F

### ASSEMBLY MESSAGE

Product Name	Marking	Package	Packaging
BXP7N70U	BXP7N70U	TO-251L	Tube
BXP7N70D	BXP7N70D	TO-252	Tube/Reel
BXP7N70P	BXP7N70P	TO-220	Tube
BXP7N70F	BXP7N70F	TO-220F	Tube

### ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Rating			Unit
		BXP7N70U/D	BXP7N70P	BXP7N70F	
Drain-Source Voltage	$V_{DSS}$	700			V
Drain Current	Continuous ( $T_C = 25^\circ\text{C}$ )	7			A
	Continuous ( $T_C = 100^\circ\text{C}$ )	4.1			A
Drain Current	Pulsed (Note1)	28			A
Gate-Source Voltage	$V_{GSS}$	$\pm 30$			V
Avalanche Energy	Single Pulse (Note2)	441			mJ
	Repetitive (Note1)	21			mJ
Avalanche Current (Note1)	$I_{AR}$	7			A
Peak Diode Recovery $dv/dt$ (Note3)	$dv/dt$	5			V/ns
Power Dissipation (Note 2)	$T_C = 25^\circ\text{C}$	114	130	38	W
	Derate above $25^\circ\text{C}$	0.912	1.04	0.304	W/ $^\circ\text{C}$
Maximum Junction Temperature	$T_J$	150			$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 to 150			$^\circ\text{C}$

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2.  $L=18\text{mH}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25 \Omega$ , Starting  $T_J = 25^\circ\text{C}$

3.  $I_{SD} \leq 7.0\text{A}$ ,  $di/dt \leq 100\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Parameter	Symbol	Max.			Unit
		BXP7N70U/D	BXP7N70P	BXP7N70F	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.1	0.96	3.3	°C / W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	120	°C / W

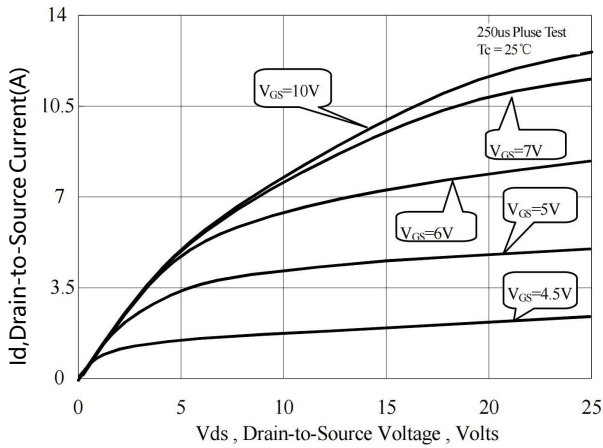
**ELECTRICAL CHARACTERISTICS** ( $T_J=25^\circ\text{C}$ , unless otherwise Noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	700			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=700V, V_{GS}=0V$			1	$\mu A$
		$V_{DS}=560V, T_C = 125^\circ\text{C}$			100	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSS}$	$V_{GS}=30V$			100	nA
Gate-Body Leakage Current, Reverse		$V_{GS}=-30V$			-100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250 \mu A$		0.72		$V/^\circ\text{C}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2		4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=3.5A$		1.35	1.5	$\Omega$
Forward Transconductance (Note4)	$g_{FS}$	$V_{DS} = 50V, I_D = 3.5A$		7.5		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$		1610		pF
Output Capacitance	$C_{OSS}$			110		pF
Reverse Transfer Capacitance	$C_{RSS}$			4.5		pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=350V, I_D=7A, V_{GS} = 10V, R_G=10\Omega$ (Note4,5)		24		ns
Turn-ON Rise Time	$t_R$			16		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			40		ns
Turn-OFF Fall-Time	$t_F$			15		ns
Total Gate Charge(Note5)	$Q_G$	$V_{DS} = 560V, V_{GS} = 10V, I_D = 7A$ (Note4,5)		25		nC
Gate Source Charge	$Q_{GS}$			6.1		nC
Gate Drain Charge	$Q_{GD}$			9		nC
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=7A, V_{GS}=0V$			1.4	V
Diode Continuous Forward Current	$I_S$				7	A
Pulsed Drain-Source Current	$I_{SM}$				28	A
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0V, I_{SD} = 7A$		320		ns
Reverse Recovery Charge	$Q_{RR}$	$di/dt=100A/\mu s$ (Note4,5)		2.7		$\mu C$

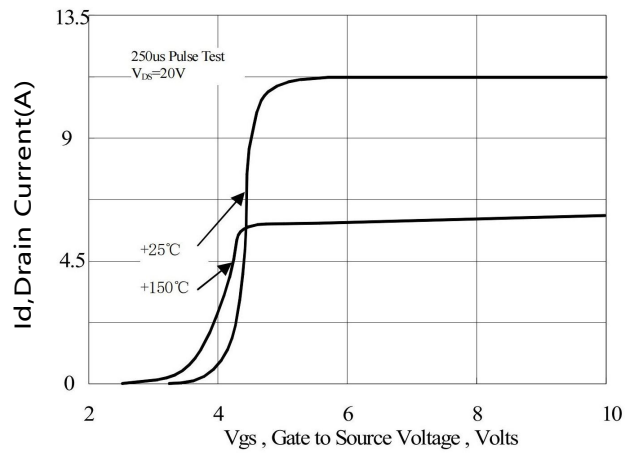
Note: 4. Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

5. Essentially independent of operating temperature

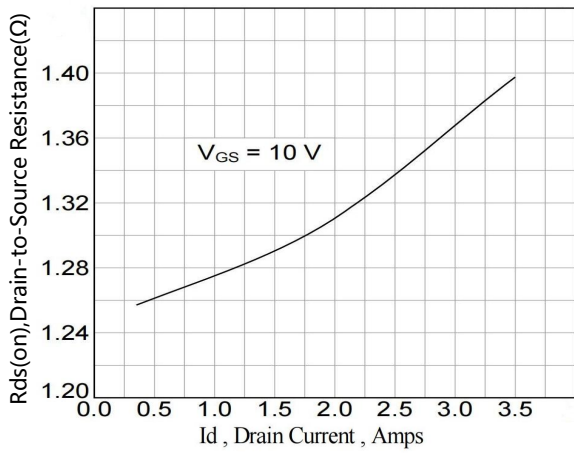
**TYPICAL CHARACTERISTICS**



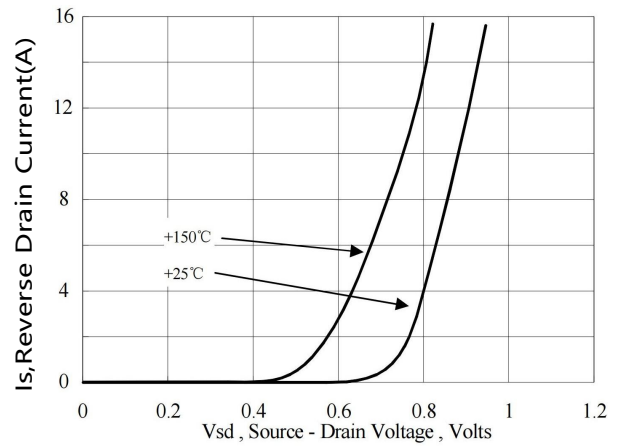
**Figure1. Typical Output Characteristics**



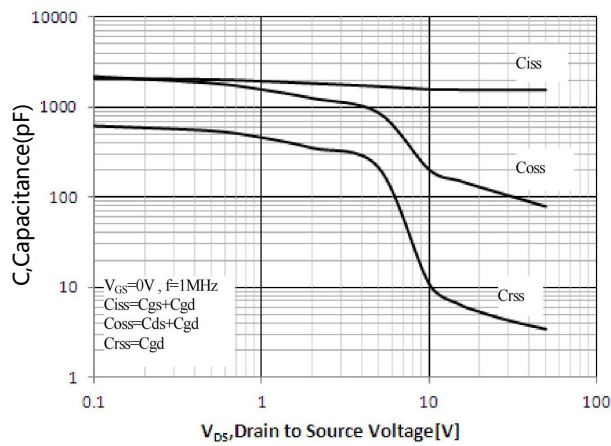
**Figure2. Typical Transfer Characteristics**



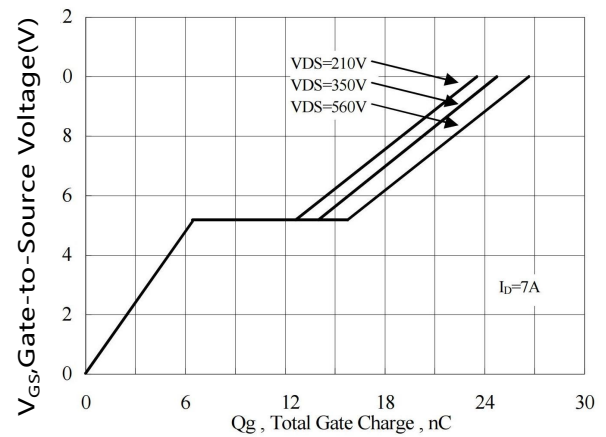
**Figure3. On-Resistance versus Drain Current**



**Figure4. Diode forward - Drain voltage versus Current**

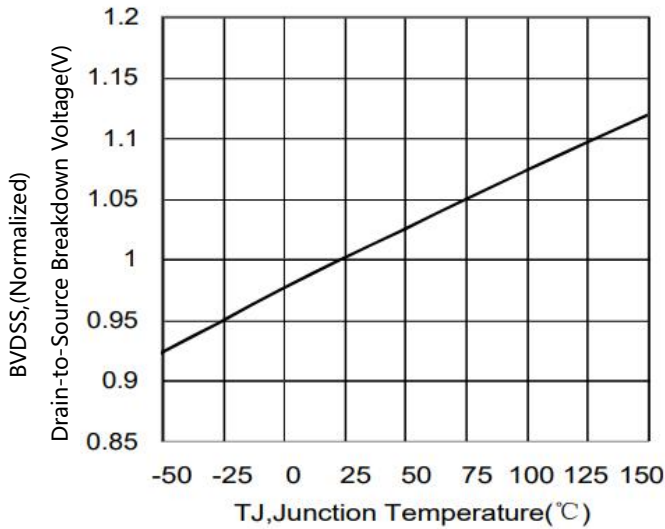


**Figure5. Typical Capacitance versus VDS**

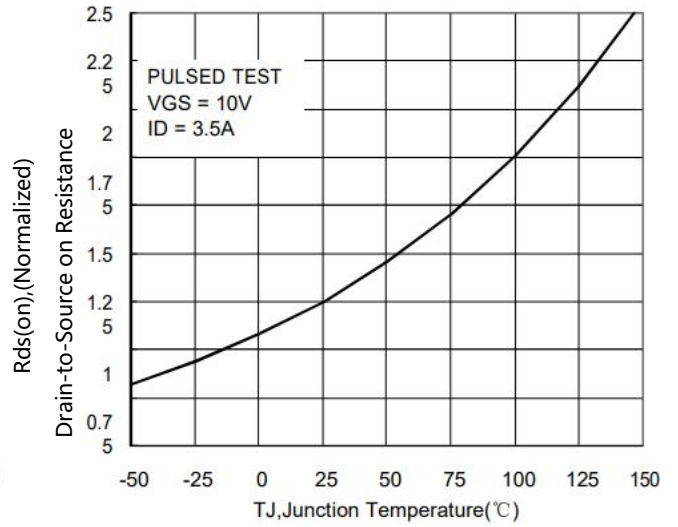


**Figure6. Typical Gate Charge versus VGS**

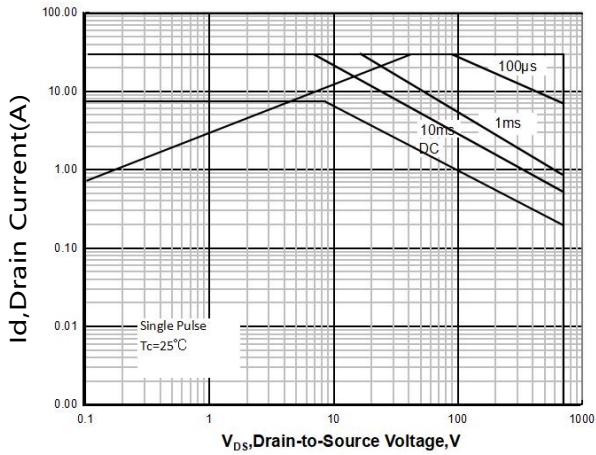
**TYPICAL CHARACTERISTICS(Cont.)**



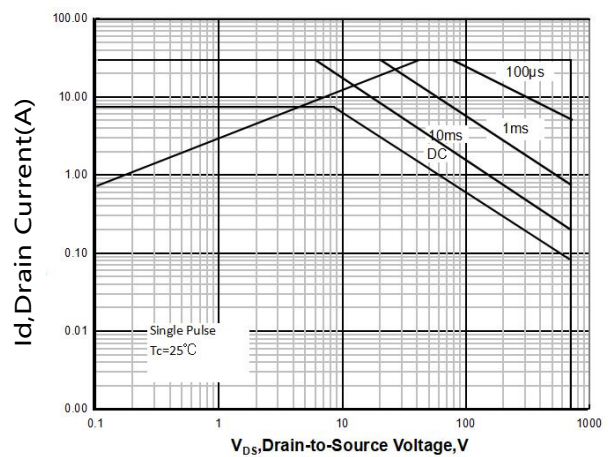
**Figure7.  $BV_{DSS}$  Variation with Temperature**



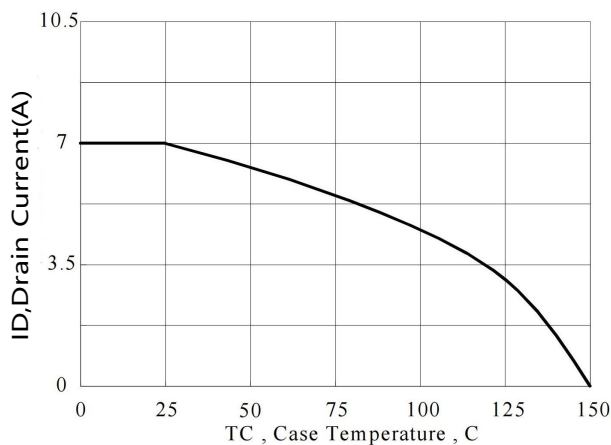
**Figure8. On-Resistance Variation with Temperature**



**Figure9. Maximum Safe Operating Area  
BXP7N70U/D/P**

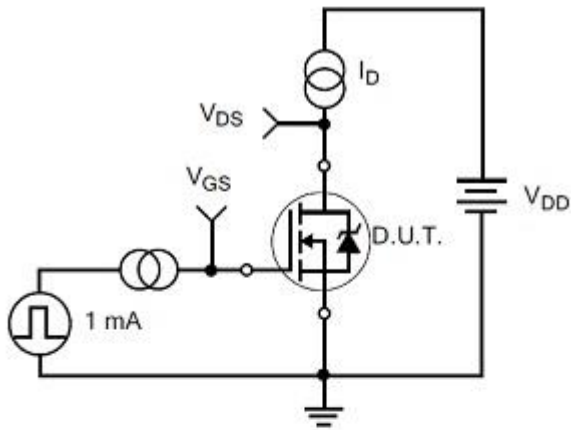


**Figure9. Maximum Safe Operating Area  
BXP7N70F**

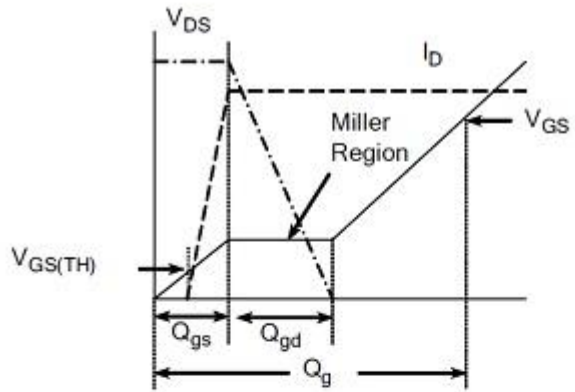


**Figure10. Maximum Continuous Drain Current  
versus Case Temperature**

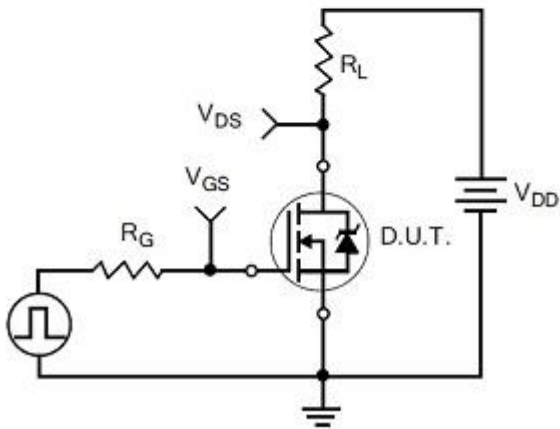
TEST CIRCUITS AND WAVEFORMS



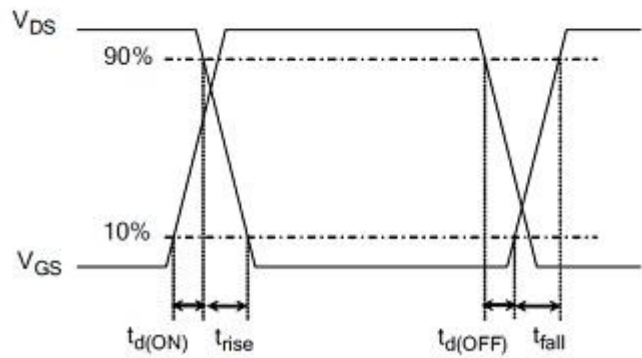
Gate Charge Test Circuit



Gate Charge Waveform

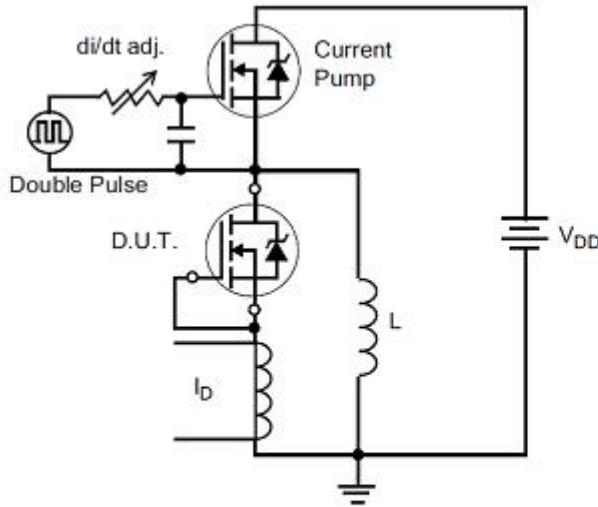


Resistive Switching Test Circuit

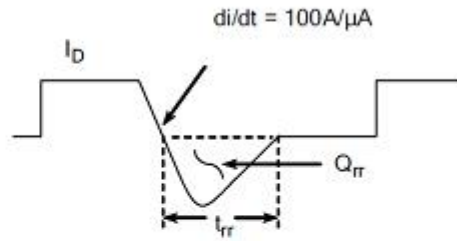


Resistive Switching Waveforms

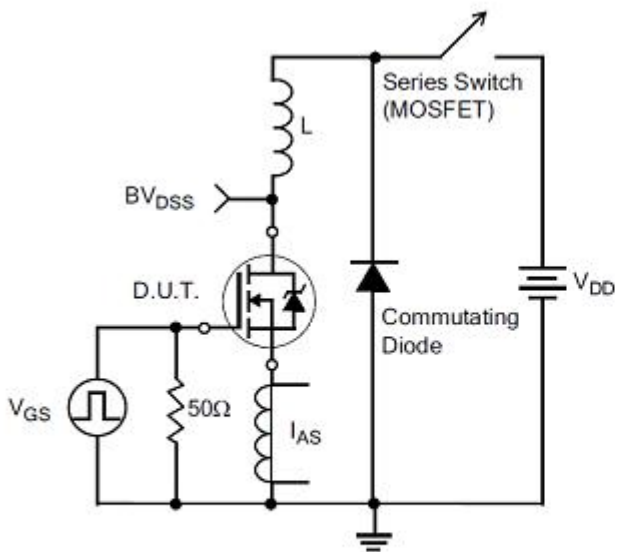
TEST CIRCUITS AND WAVEFORMS(Cont.)



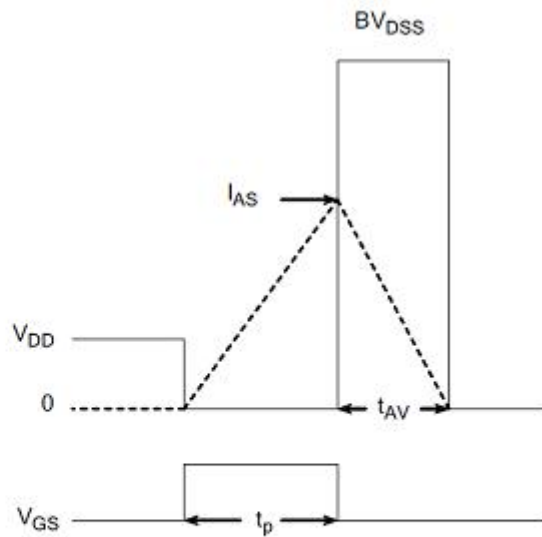
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



Unclamped Inductive Switching Test Circuit



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Unclamped Inductive Switching Waveforms

## Revision history

### Document revision history

Date	Revision	Changes
12-Oct-2021	1.0	First release
5-Jan-2022	1.1	Update parameter

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