FMH11N90E **FUJI POWER MOSFET**

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Super FAP-E^3 series

N-CHANNEL SILICON POWER MOSFET

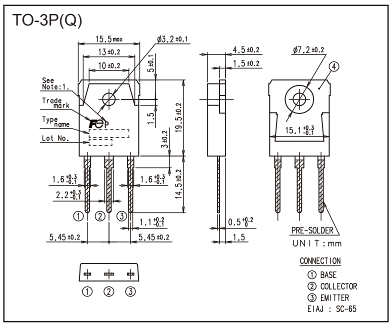
Features

- Maintains both low power loss and low noise
- Lower R_{DS}(on) characteristic
- More controllable switching dv/dt by gate resistance
- Smaller V_{GS} ringing waveform during switching
- Narrow band of the gate threshold voltage (4.0±0.5V)
- High avalanche durability

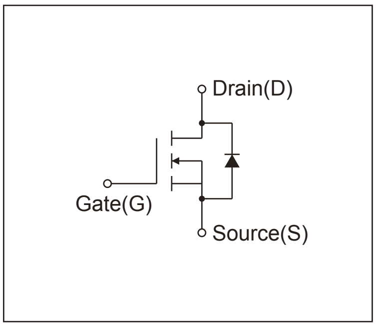
Applications

- Switching regulators
- UPS (Uninterruptible Power Supply)
- DC-DC converters

Outline Drawings [mm]



Equivalent circuit schematic



Maximum Ratings and Characteristics

● Absolute Maximum Ratings at Tc=25°C (unless otherwise specified)

Description	Symbol	Characteristics	Unit	Remarks
Drain-Source Voltage	V_{DS}	900	V	
	V_{DSX}	900	V	V_{GS} = -30V
Continuous Drain Current	I_D	±11	A	
Pulsed Drain Current	I_{DP}	±44	A	
Gate-Source Voltage	V_{GS}	±30	V	
Repetitive and Non-Repetitive Maximum AvalancheCurrent	I_{AR}	11	A	Note*1
Non-Repetitive Maximum Avalanche Energy	E_{AS}	811.9	mJ	Note*2
Repetitive Maximum Avalanche Energy	E_{AR}	28.5	mJ	Note*3
Peak Diode Recovery dV/dt	dV/dt	2.2	kV/µs	Note*4
Peak Diode Recovery -di/dt	-di/dt	100	A/µs	Note*5
Maximum Power Dissipation	P_D	2.5	W	Ta=25°C
		285		Tc=25°C
Operating and Storage Temperature range	T_{ch}	150	°C	
	T_{stg}	-55 to + 150	°C	

● Electrical Characteristics at Tc=25°C (unless otherwise specified)

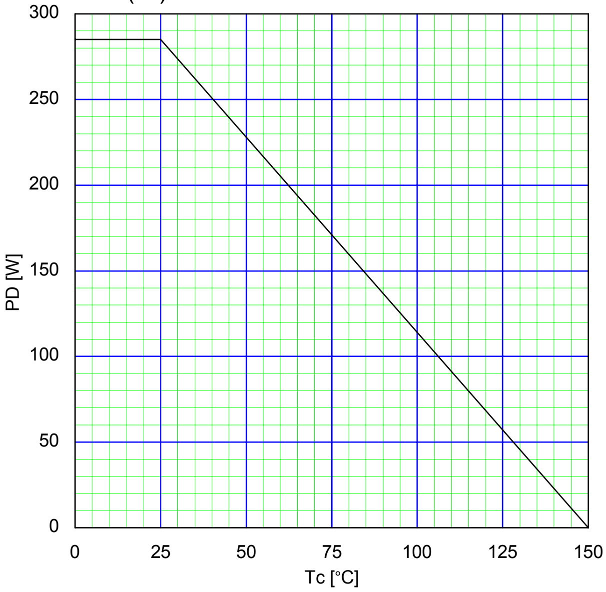
Description	Symbol	Conditions		min.	typ.	max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250µA, V_{GS}=0V		900	-	-	V
Gate Threshold Voltage	V_{GS} (th)	I_D=250µA, V_{DS}=V_{GS}		3.5	4.0	4.5	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=900V, V_{GS}=0V	T_{ch}=25°C	-	-	25	µA
		V_{DS}=720V, V_{GS}=0V	T_{ch}=125°C	-	-	250	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V		-	10	100	nA
Drain-Source On-State Resistance	R_{DS} (on)	I_D=5.5A, V_{GS}=10V		-	0.83	1.0	Ω
Forward Transconductance	g_{fs}	I_D=5.5A, V_{DS}=25V		6.5	13	-	S
Input Capacitance	Ciss	V_{DS}=25V		-	2300	3450	pF
Output Capacitance	Coss	V_{GS}=0V		-	200	300	
Reverse Transfer Capacitance	Crss	f=1MHz		-	15	22.5	
Turn-On Time	td(on)	V_{cc}=600V		-	37	56	ns
	tr	V_{GS}=10V		-	32	48	
Turn-Off Time	td(off)	I_D=5.5A		-	124	186	
	tf	R_G=20Ω		-	34	51	
Total Gate Charge	Q_G	V_{cc}=450V		-	60	90	nC
Gate-Source Charge	Q_{GS}	I_D=11A		-	17	26	
Gate-Drain Charge	Q_{GD}	V_{GS}=10V		-	23	35	
Gate-Drain Crossover Charge	Q_{SW}			-	7	11	
Avalanche Capability	I_{AV}	L=4.92mH, T_{ch}=25°C		11	-	-	A
Diode Forward On-Voltage	V_{SD}	I_F=11A, V_{GS}=0V, T_{ch}=25°C		-	0.90	1.35	V
Reverse Recovery Time	trr	I_F=11A, V_{GS}=0V		-	2.0	-	µS
Reverse Recovery Charge	Qrr	-di/dt=100A/µs, Tch=25°C		-	20	-	µC

● Thermal Characteristics

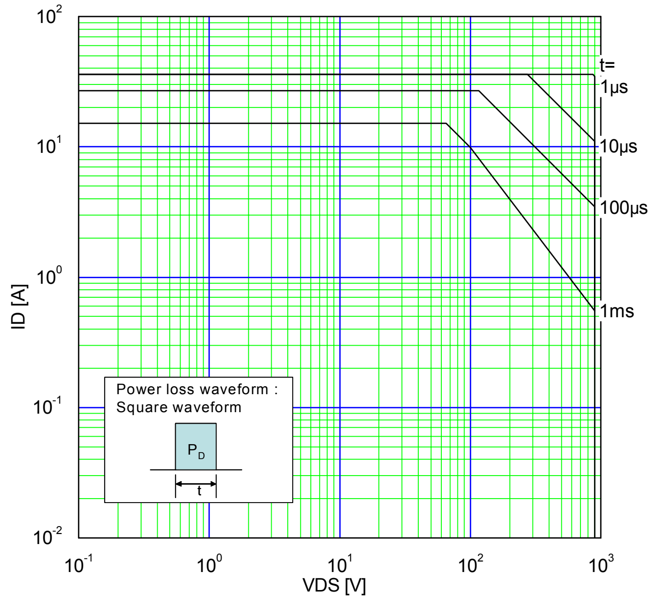
Description	Symbol	Test Conditions	min.	typ.	max.	Unit
Thermal resistance	Rth (ch-c)	Channel to case			0.4386	°C/W
	Rth (ch-a)	Channel to ambient			50.0	°C/W

Note *1 : Tch≤150°C
Note *2 : Stating Tch=25°C, I_{AS}=4.4A, L=76.9mH, Vcc=90V, R_G=10Ω
E_{AS} limited by maximum channel temperature and avalanche current.
See to 'Avalanche current' graph.
Note *3 : Repetitive rating : Pulse width limited by maximum channel temperature.
See to the 'Transient Themal impeadance' graph.
Note *4 : I_F≤-I_D, -di/dt=100A/µs, Vcc≤BV_{DSS}, Tch≤150°C.
Note *5 : I_F≤-I_D, dv/dt=2.2kV/µs, Vcc≤BV_{DSS}, Tch≤150°C.

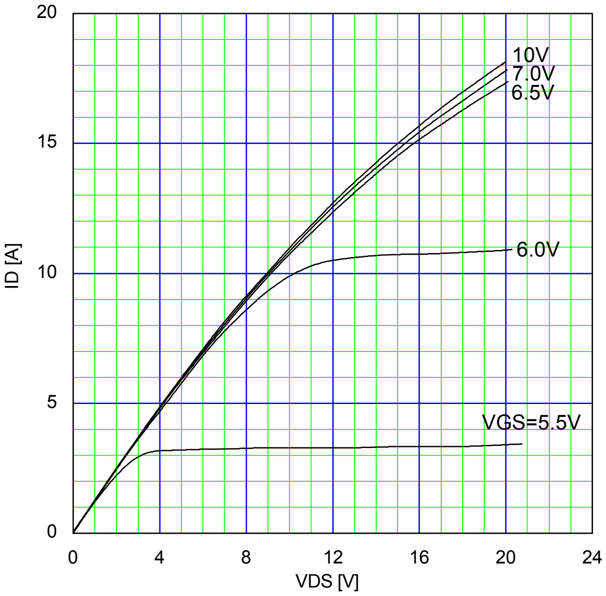
Allowable Power Dissipation
PD=f(Tc)



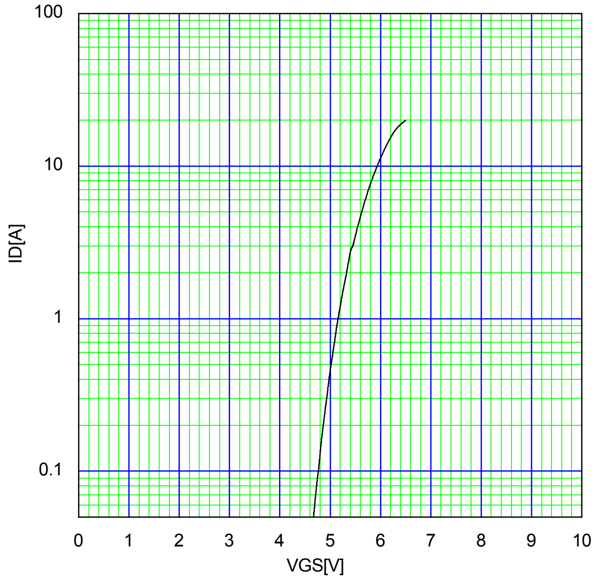
Safe Operating Area
I_D=f(V_{DS}):Duty=0(Single pulse),Tc=25 °c



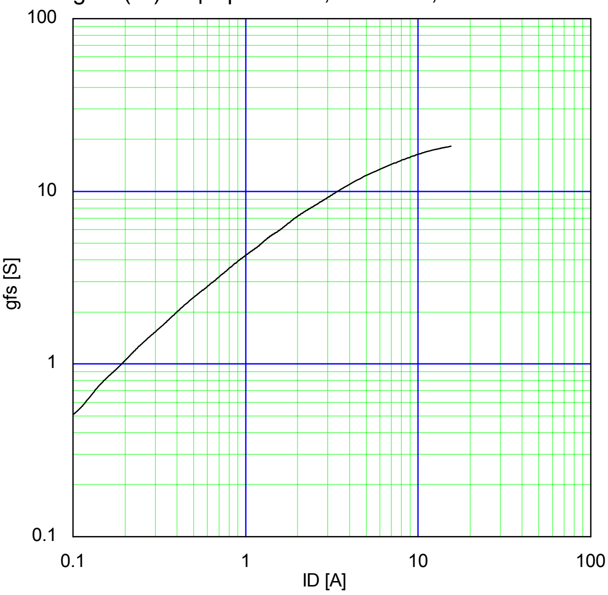
Typical Output Characteristics
ID=f(VDS):80 μs pulse test,Tch=25 °C



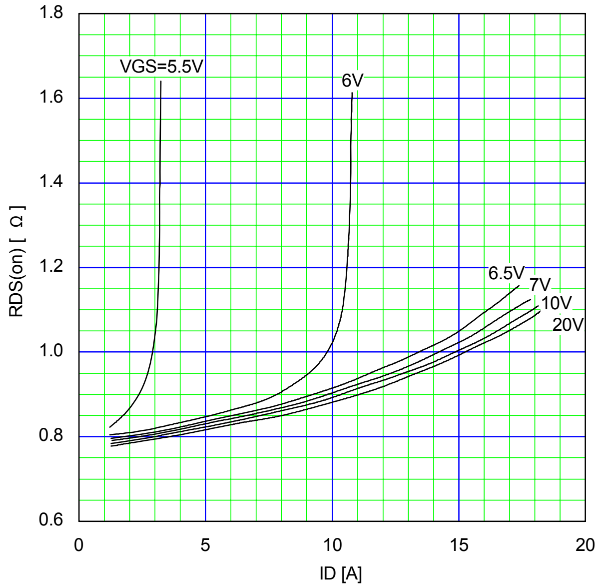
Typical Transfer Characteristic
ID=f(VGS):80 μs pulse test,VDS=25V,Tch=25 °C



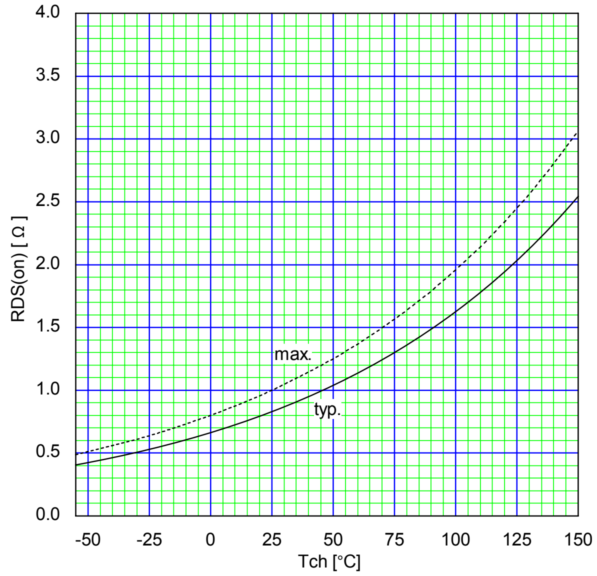
Typical Transconductance
gfs=f(ID):80 μs pulse test,VDS=25V,Tch=25 °C



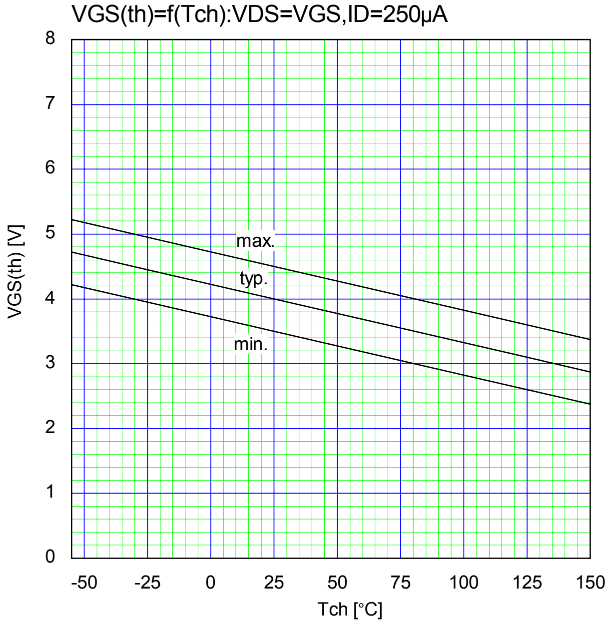
Typical Drain-Source on-state Resistance
RDS(on)=f(ID):80 μs pulse test,Tch=25 °C



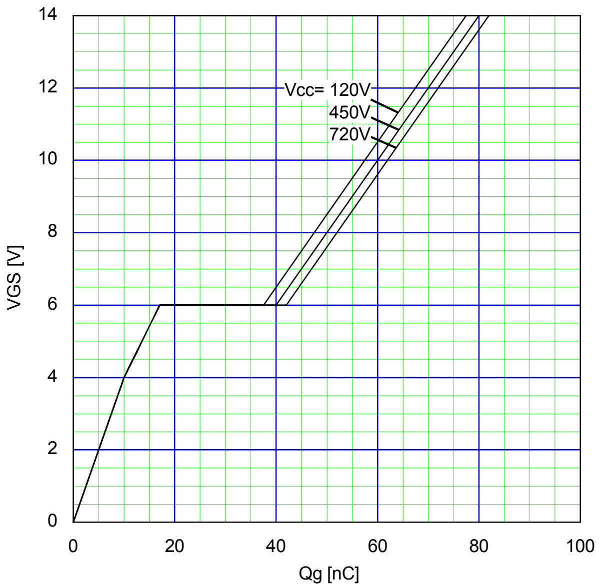
Drain-Source On-state Resistance
RDS(on)=f(Tch):ID=5.5A,VGS=10V



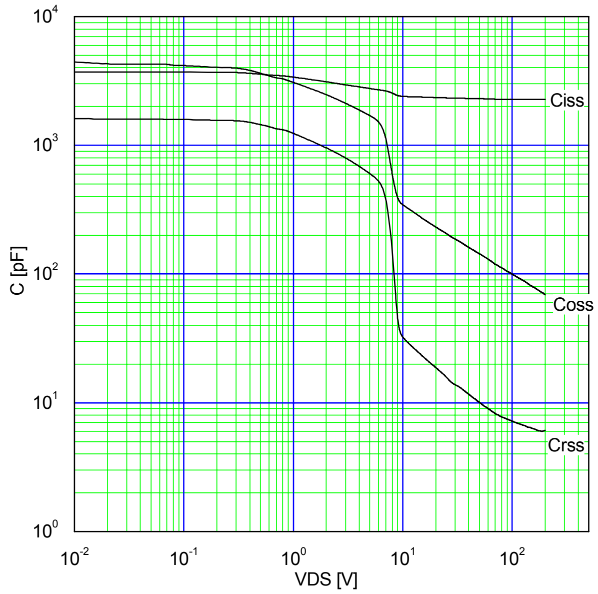
Gate Threshold Voltage vs. Tch
VGS(th)=f(Tch):VDS=VGS,ID=250μA



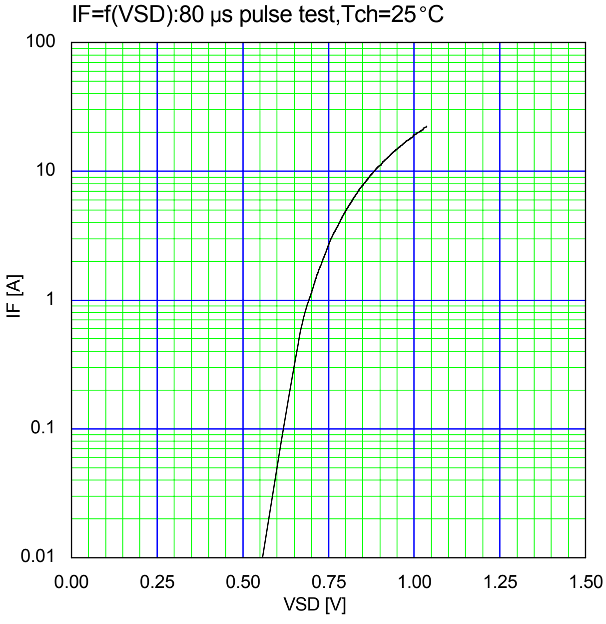
Typical Gate Charge Characteristics
VGS=f(Qg):ID=11A,Tch=25 °C



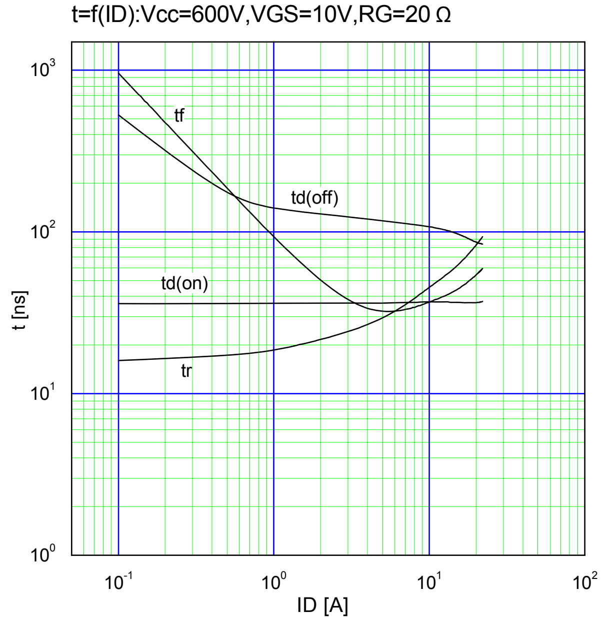
Typical Capacitance
C=f(VDS):VGS=0V,f=1MHz

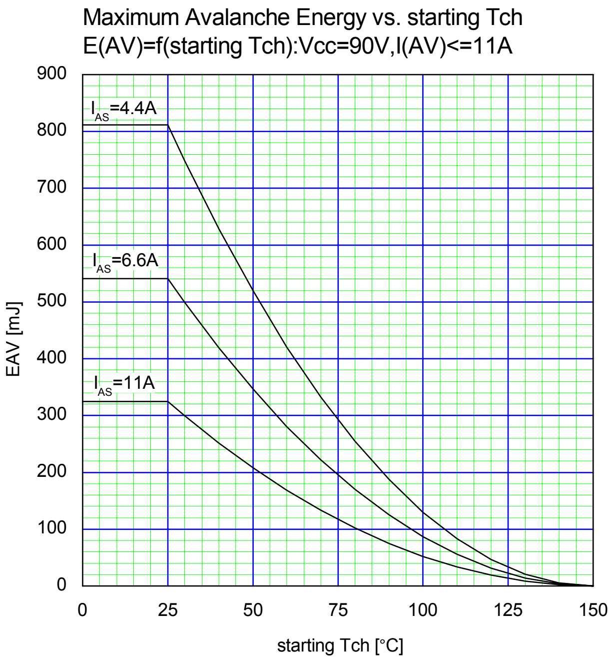


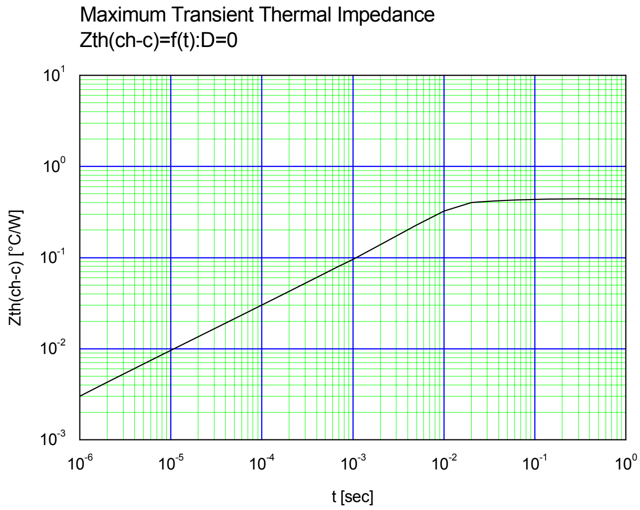
Typical Forward Characteristics of Reverse Diode
IF=f(VSD):80 μs pulse test,Tch=25 °C



Typical Switching Characteristics vs. ID
t=f(ID):Vcc=600V,VGS=10V,RG=20 Ω




Maximum Avalanche Energy vs. starting Tch
E(AV)=f(starting Tch):Vcc=90V,I(AV)<=11A
I_AS=4.4A
I_AS=6.6A
I_AS=11A
EAV [mJ]
0
100
200
300
400
500
600
700
800
900
0
25
50
75
100
125
150
starting Tch [°C]


Maximum Transient Thermal Impedance
Zth(ch-c)=f(t):D=0
Zth(ch-c) [°C/W]
10^1
10^0
10^-1
10^-2
10^-3
10^-6
10^-5
10^-4
10^-3
10^-2
10^-1
10^0
t [sec]

WARNING

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   - OA equipment
   - Communications equipment (terminal devices)
   - Measurement equipment
   - Machine tools
   - Audiovisual equipment
   - Electrical home appliances
   - Personal equipment
   - Industrial robots etc.

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   - Traffic-signal control equipment
   - Gas leakage detectors with an auto-shut-off feature
   - Emergency equipment for responding to disasters and anti-burglary devices
   - Safety devices
   - Medical equipment

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