

60V 50A N-Channel Enhancement Mode Power MOSFET

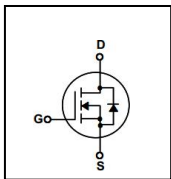
Features

- $R_{DS(on)} \leq 17m\Omega$ @ $V_{GS}=10V, I_D=30A$
- Advanced trench technology
- Excellent $R_{DS(on)}$ and Low Gate Charge
- Lead free product is acquired

Application

- Load Switch
- PWM Application
- Power management

SYMBOL


TO-252

ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXT170N06D	TO-252	Reel

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

Parameter		Symbol	Rating	Unit
			TO-252	
Drain-Source Voltage		V_{DSS}	60	V
Drain Current	Continuous ($T_C = 25^\circ C$)	I_D	50	A
	Continuous ($T_C = 100^\circ C$)		33	A
Drain Current	Pulsed (Note1)	I_{DM}	200	A
Single Pulsed Avalanche Energy		EAS	112	mJ
Gate-Source Voltage		V_{GSS}	± 20	V
Power Dissipation	$T_C = 25^\circ C$	P_D	94	W
Maximum Junction Temperature		T_J	175	$^\circ C$
Storage Temperature Range		T_{STG}	-55 to 175	$^\circ C$

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

THERMAL CHARACTERISTICS

Parameter	Symbol	Max.	Unit
		TO-252	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.6	$^\circ C / W$

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$			1	μA
Gate-Body Leakage Current, Forward	I_{GSS}	$V_{GS}=20V$			100	nA
Gate-Body Leakage Current, Reverse		$V_{GS}=-20V$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=15A$		12	17	$m\Omega$
		$V_{GS}=4.5V, I_D=20A$		16	25	$m\Omega$
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$		1980		μF
Output Capacitance	C_{OSS}			175		μF
Reverse Transfer Capacitance	C_{RSS}			150		μF
SWITCHING PARAMETERS						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=30V, I_D=30A, V_{GS} =$ $10V, R_G=1.8\Omega$		7.3		ns
Turn-ON Rise Time	t_R			5		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			28		ns
Turn-OFF Fall-Time	t_F			6		ns
Total Gate Charge(Note2)	Q_G	$V_{DS} =30V, V_{GS} =10V, I_D$ $=30A$		49		nC
Gate Source Charge	Q_{GS}			6.1		nC
Gate Drain Charge	Q_{GD}			14		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=30A, V_{GS}=0V$			1.2	V
Diode Continuous Forward Current	I_S				50	A
Maximum Pulsed Drain to Source Diode Forward Current	I_{SM}				200	A
Body Diode Reverse Recovery Time	t_{rr}	$I_F=30A, di/dt=100A/\mu s$		30		ns
Body Diode Reverse Recovery Charge	Q_{rr}			42		nC

Note: 2. Essentially independent of operating temperature

TYPICAL CHARACTERISTICS

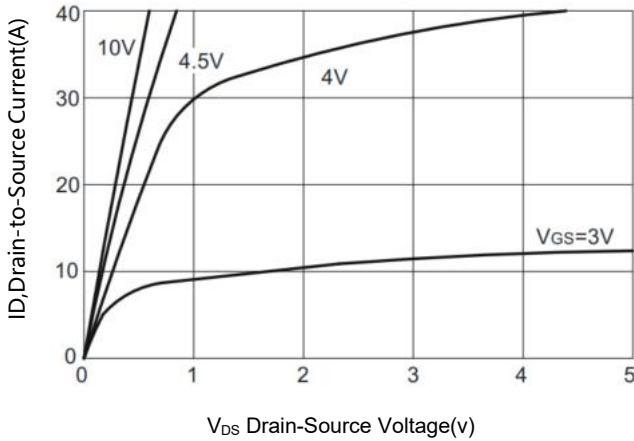


Figure1. Typical Output Characteristics

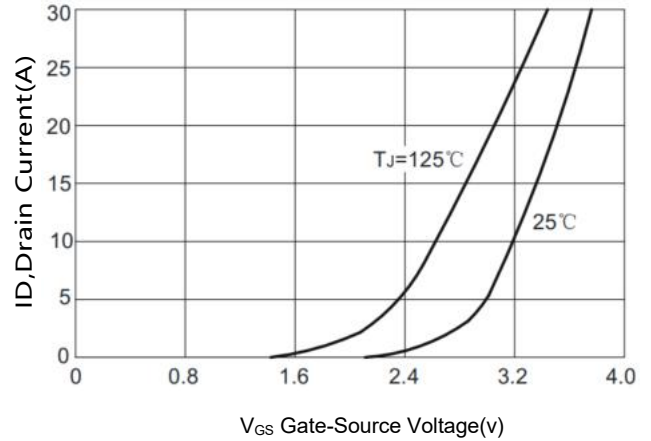


Figure2. Typical Transfer Characteristics

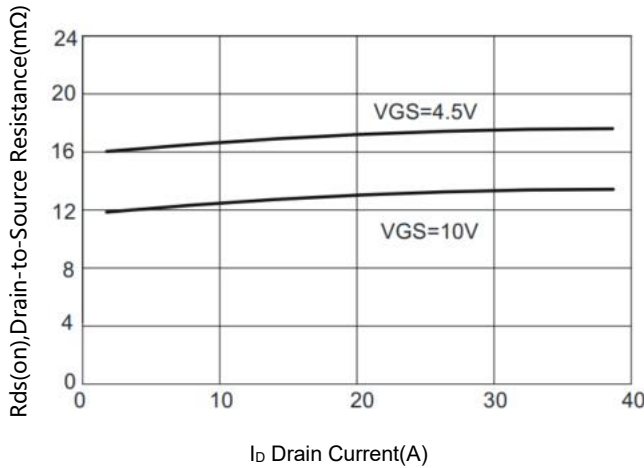


Figure3. On-Resistance versus Drain Current

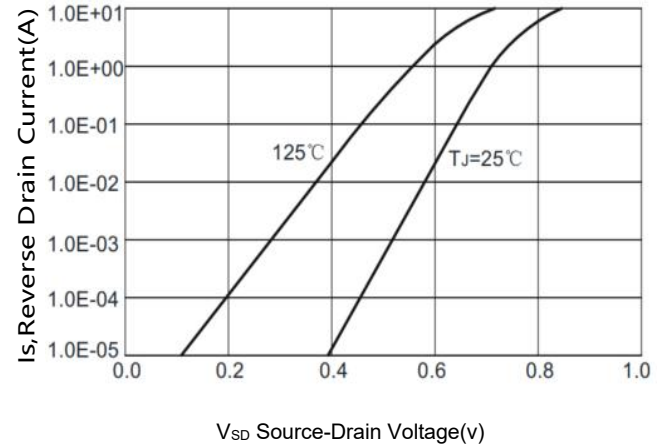


Figure4. Diode forward voltage versus Current

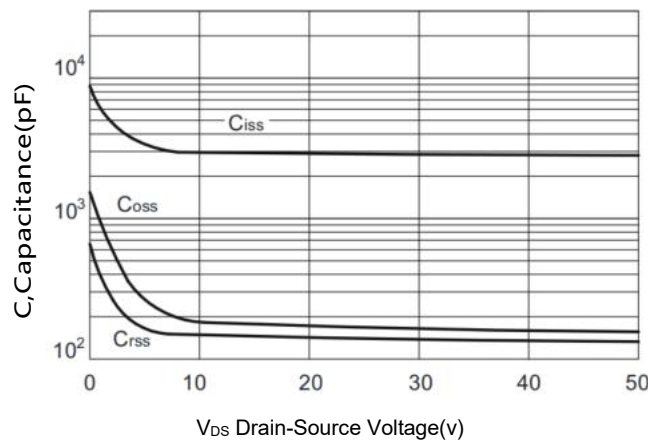


Figure5. Typical Capacitance versus VDS

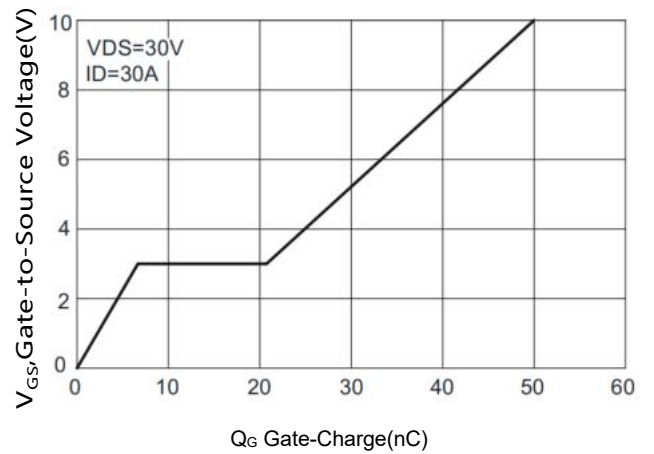


Figure6. Typical Gate Charge versus VGS

TYPICAL CHARACTERISTICS(Cont.)

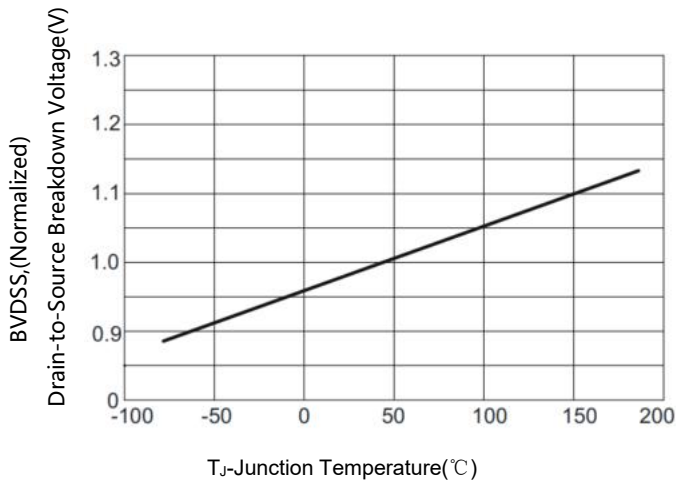


Figure7. BV_{DSS} Variation with Temperature

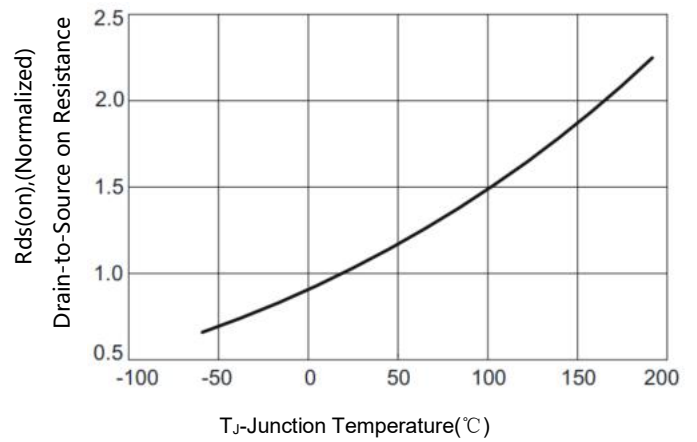


Figure8. On-Resistance Variation with Temperature

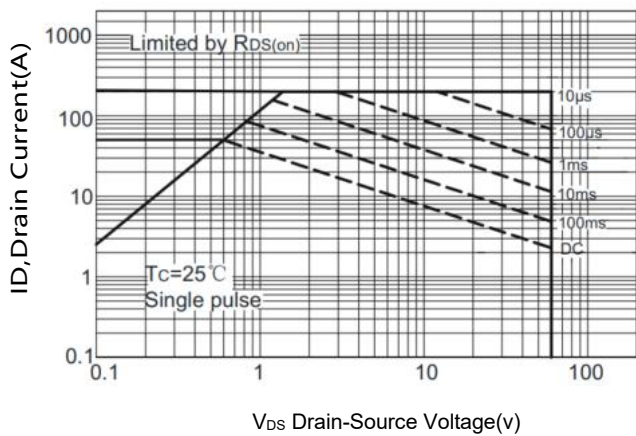


Figure9. Maximum Safe Operating Area

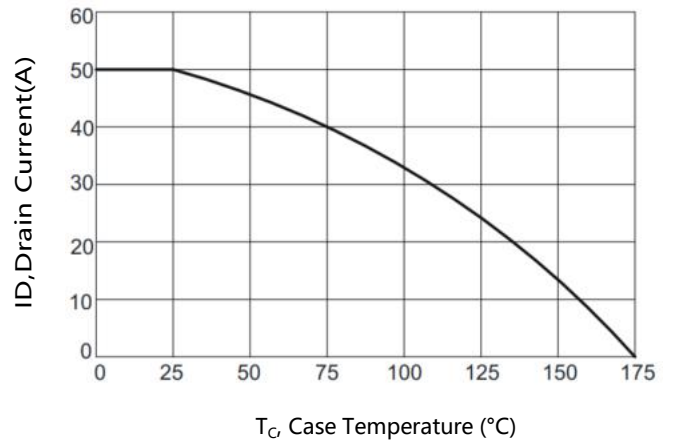
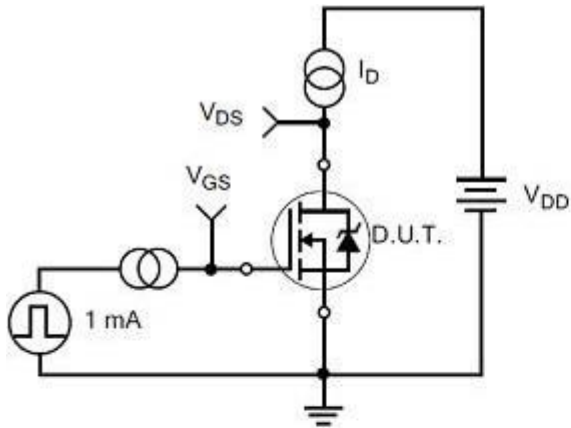
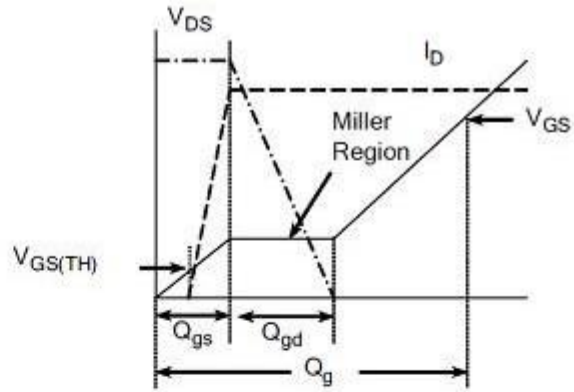


Figure10. Maximum Continuous Drain Current versus Case Temperature

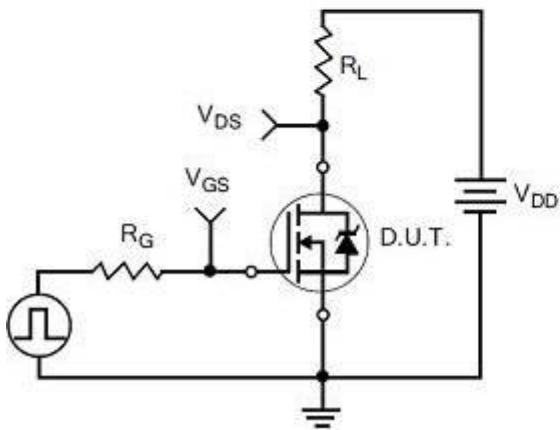
TEST CIRCUITS AND WAVEFORMS



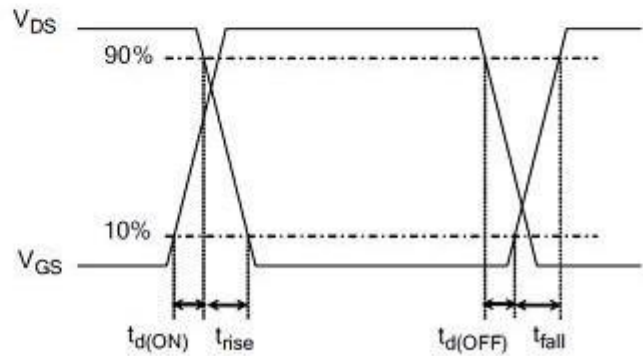
Gate Charge Test Circuit



Gate Charge Waveform

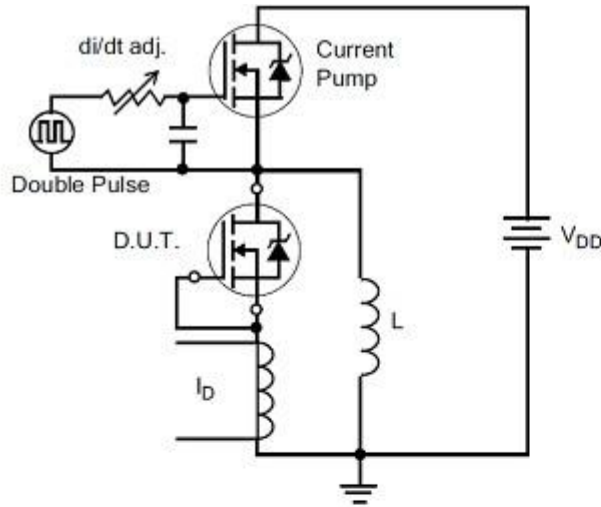


Resistive Switching Test Circuit

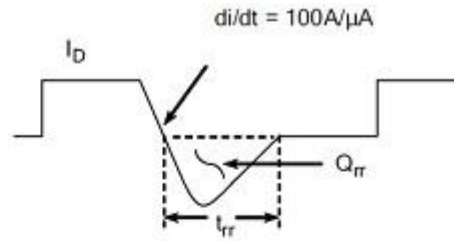


Resistive Switching Waveforms

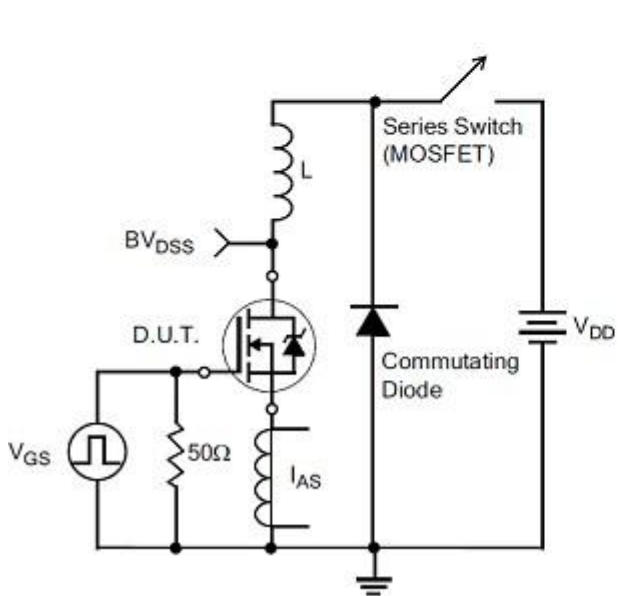
TEST CIRCUITS AND WAVEFORMS(Cont.)



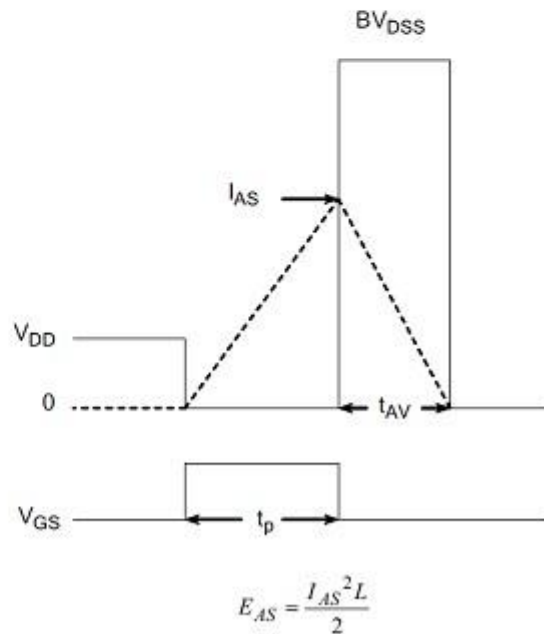
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform

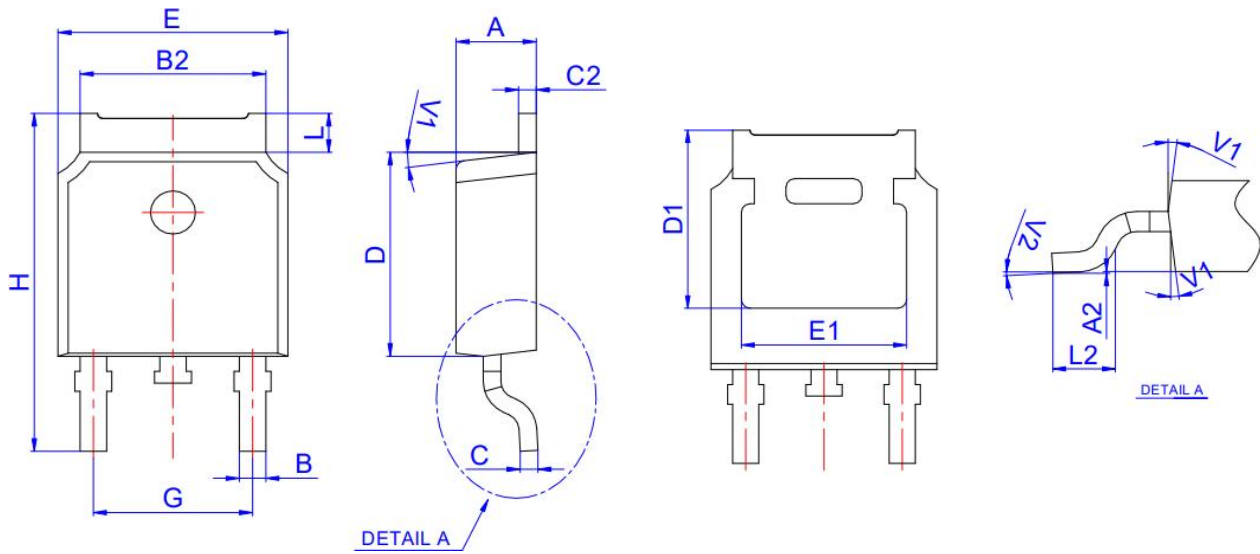


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

TO-252 Package



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Revision history

Document revision history

Date	Revision	Changes
25-Oct-2021	1.0	First release

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