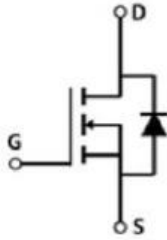


## N-Channel Enhancement Mode Field Effect Transistor



**TO-220**

### Product Summary

- $V_{DS}$  80V
- $I_D$  120A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ ) < 4.8mohm
- 100% UIS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

- Split gate trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$

### Applications

- Battery protection
- Load switch
- Uninterruptible power supply

### ■ Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	80	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	$T_C=25^\circ\text{C}$	$I_D$	120	A
	$T_C=100^\circ\text{C}$		76	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	480	A
Avalanche energy <sup>B</sup>		$E_{AS}$	702	mJ
Total Power Dissipation <sup>C</sup>	$T_C=25^\circ\text{C}$	$P_D$	190	W
	$T_C=100^\circ\text{C}$		75.8	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+150	$^\circ\text{C}$

### ■ Thermal resistance

Parameter		Symbol	Limit	Units
Thermal Resistance Junction-to-Ambient <sup>D</sup>	$t \leq 10S$	$R_{\theta JA}$	16	$^\circ\text{C/W}$
	Steady-State		51.78	
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	0.66	$^\circ\text{C/W}$

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
YJP120G08A	B1	YJP120G08A	50	/	5000	Tube



# YJP120G08A

## ■ Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	80	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =80V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	3.0	4.0	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	3.9	4.8	mΩ
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V	-	0.8	1.2	V
Maximum Body-Diode Continuous Current	I <sub>S</sub>		-	-	120	A
Gate resistance	R <sub>G</sub>	f=1MHz, Open drain	-	2	-	Ω
Transconductance	G <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =50A		71.5		S
<b>Dynamic Parameters</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, f=1MHZ	-	5666	-	pF
Output Capacitance	C <sub>OSS</sub>		-	860	-	
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	7.5	-	
<b>Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =10V, I <sub>D</sub> =50A	-	73	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	25	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	12	-	
Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =50A, di/dt=100A/us	-	50	-	ns
Reverse Recovery Time	t <sub>rr</sub>		-	44	-	
Turn-on Delay Time	t <sub>D(on)</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω, I <sub>D</sub> =50A	-	27	-	ns
Turn-on Rise Time	t <sub>r</sub>		-	32	-	
Turn-off Delay Time	t <sub>D(off)</sub>		-	54	-	
Turn-off fall Time	t <sub>f</sub>		-	17	-	

A. Repetitive rating; pulse width limited by max. junction temperature.

B. T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>GS</sub>=10V, L=2mH I<sub>as</sub>=26.5A.

C. P<sub>d</sub> is based on max. junction temperature, using junction-case thermal resistance.

D. The value of R<sub>θJA</sub> is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub> =25° C.



## ■ Typical Performance Characteristics

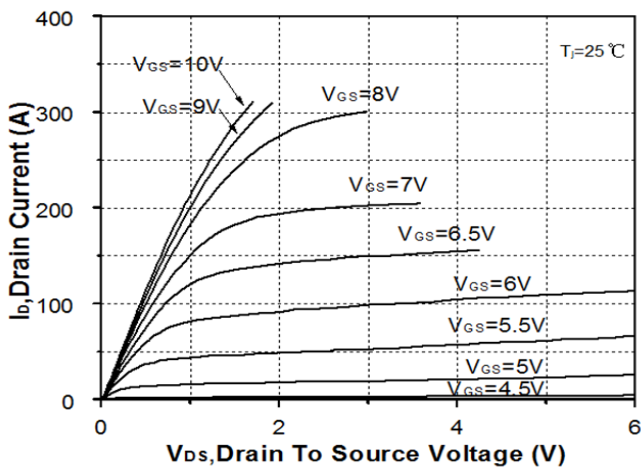


Figure1. Output Characteristics

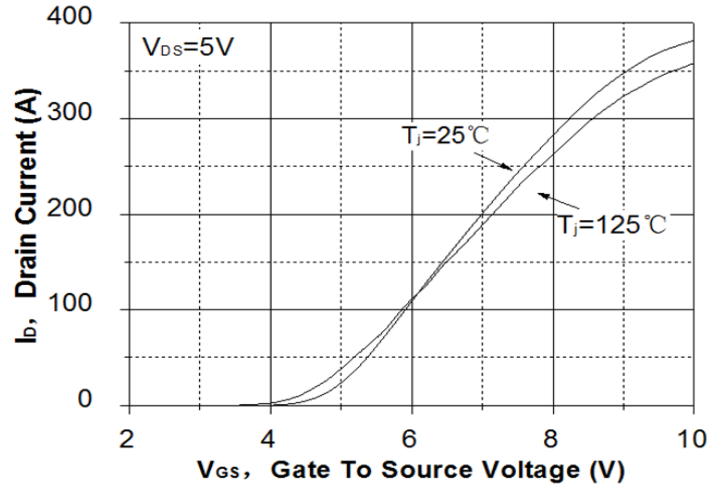


Figure2. Transfer Characteristics

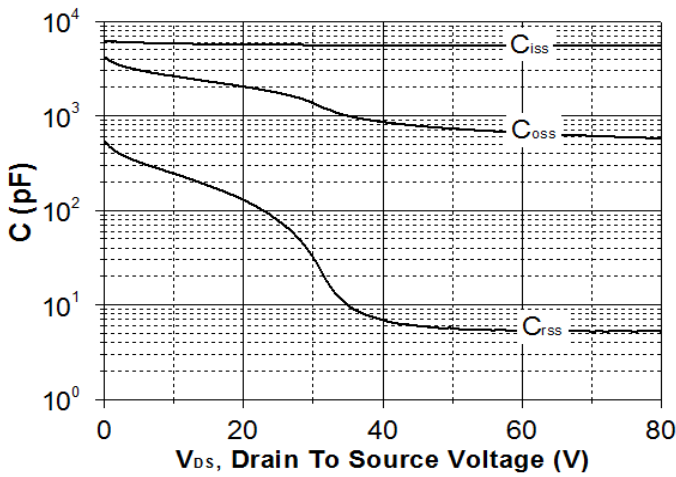


Figure3. Capacitance Characteristics

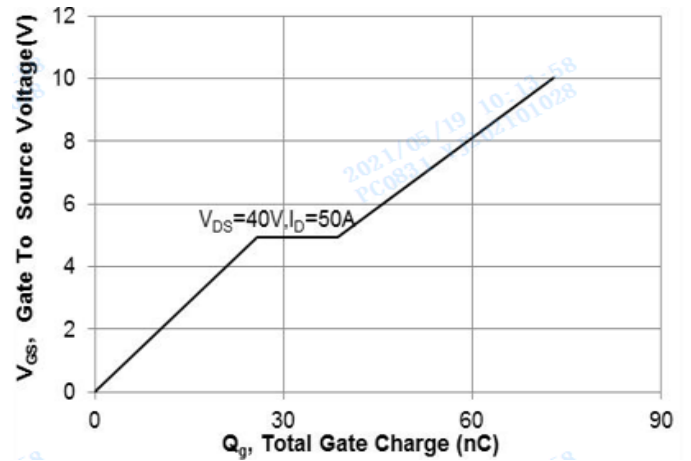


Figure4. Gate Charge

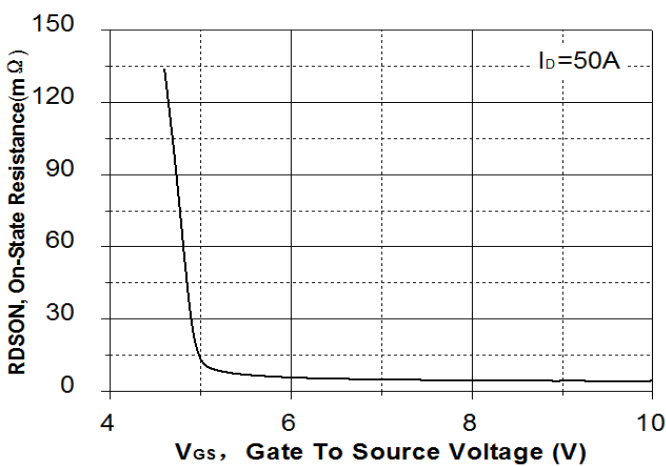


Figure5. On-Resistance vs. Gate to Source Voltage

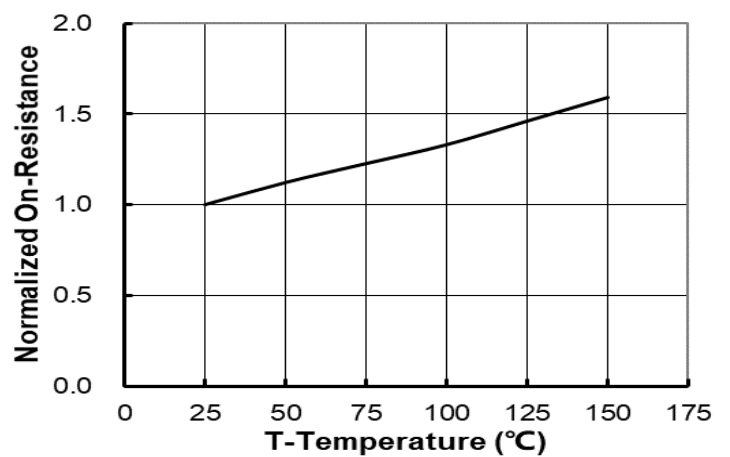


Figure6. Normalized On-Resistance



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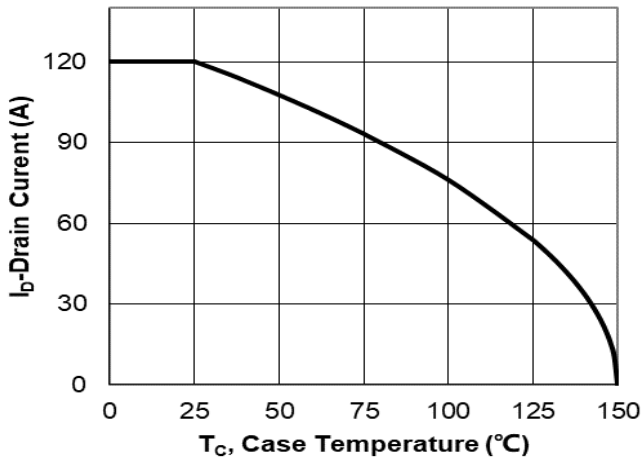


Figure7. Drain current

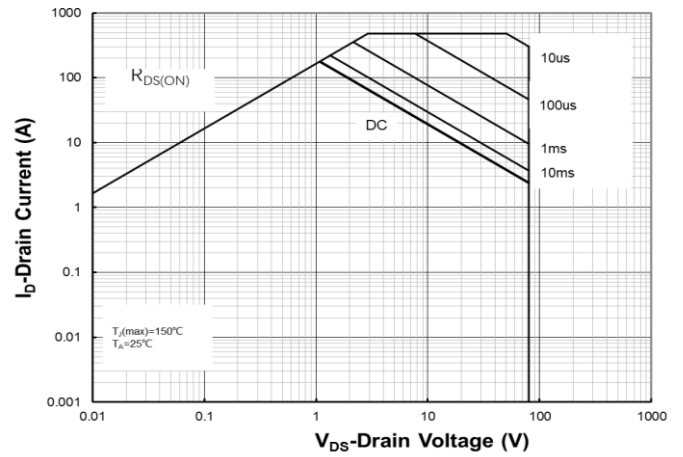


Figure8.Safe Operation Area

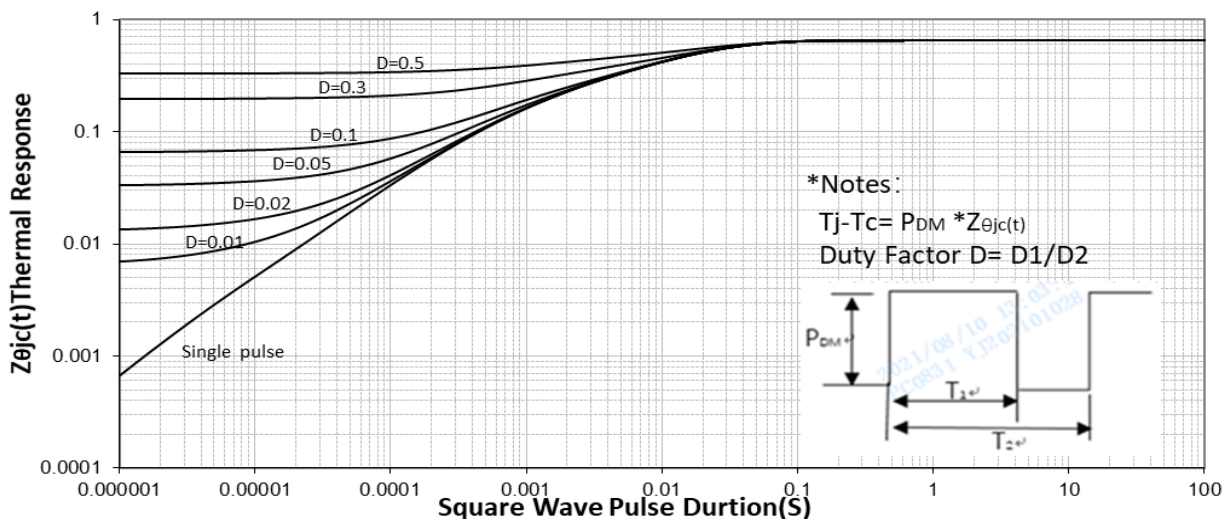
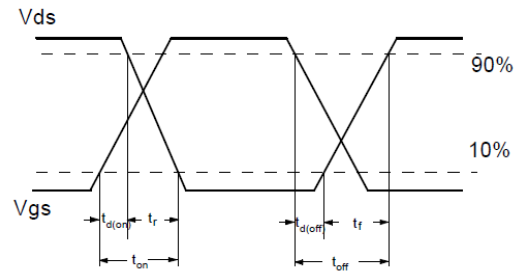
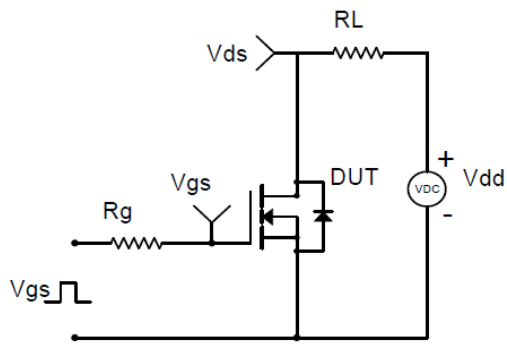
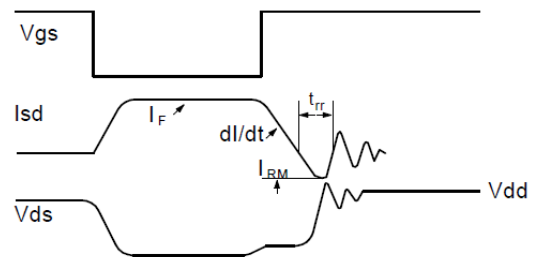
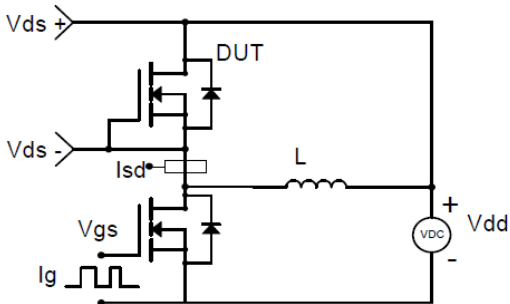


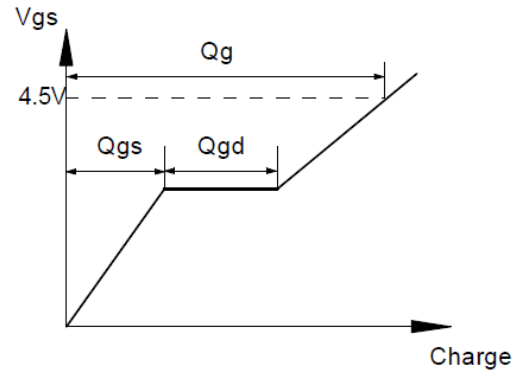
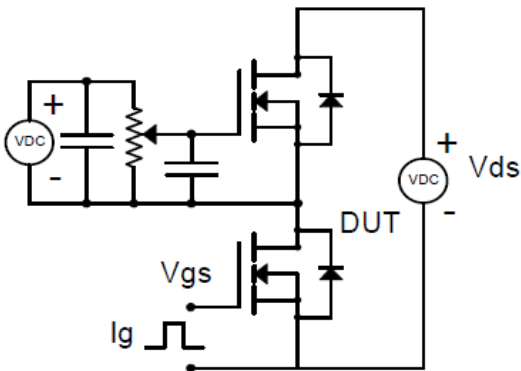
Figure9.Normalized Maximum Transient thermal impedance



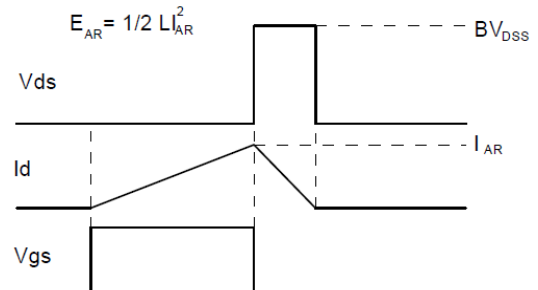
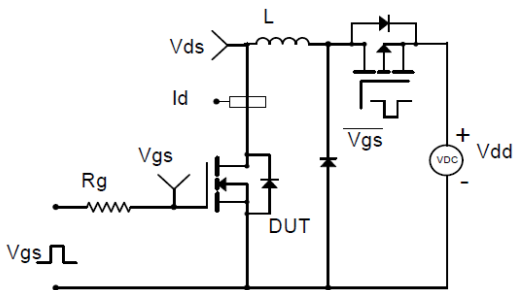
**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**



**Gate Charge Test Circuit & Waveform**

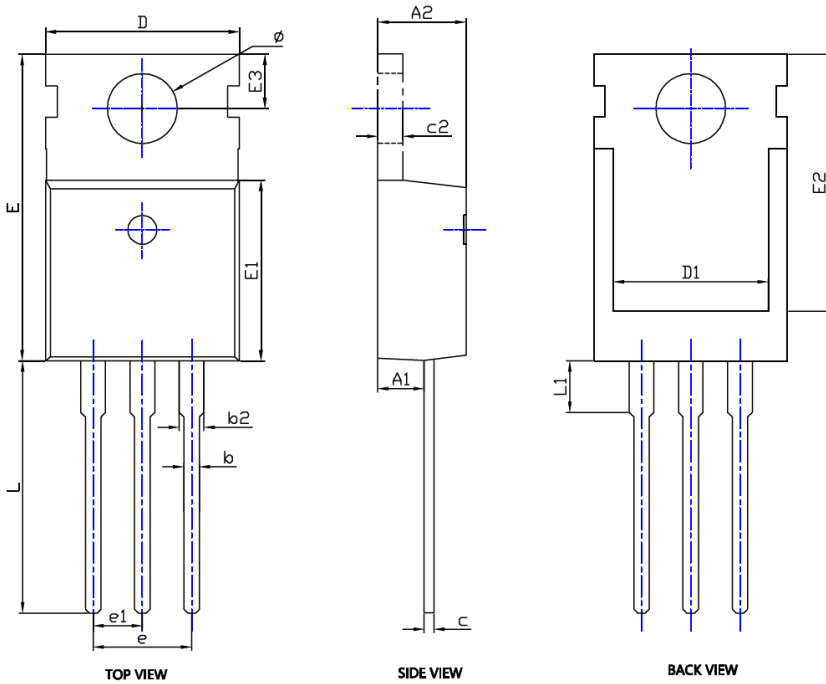


**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**



# YJP120G08A

## ■ TO-220AB-D Package information



SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A1	0.091	0.098	2.300	2.500
A2	0.175	0.183	4.450	4.650
b	0.030	0.033	0.750	0.850
b2	0.048	0.052	1.220	1.320
c	0.018	0.022	0.450	0.550
c2	0.050	0.052	1.270	1.330
D	0.386	0.402	9.800	10.200
D1	0.303	0.327	7.700	8.300
E	0.614	0.630	15.600	16.000
E1	0.360	0.372	9.150	9.450
E2	0.510	0.533	12.950	13.550
E3	0.110BSC		2.800BSC	
e	0.200BSC		5.080BSC	
e1	0.100BSC		2.540BSC	
L	0.506	0.518	12.850	13.150
L1	0.093	0.117	2.360	2.960
φ	0.138	0.146	3.500	3.700

**NOTE:**  
 1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.  
 2. TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.



## YJP120G08A

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