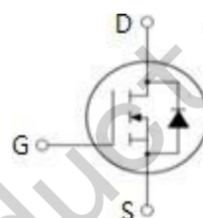
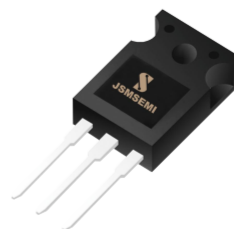


## FEATURES

- Proprietary New Planar Technology
- $R_{DS(ON),typ.}=50m\ \Omega@V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

## APPLICATIONS

- DC-DC Converters
- DC-AC Inverters for UPS
- SMPS and Motor controls



### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Value		Unit
		TO-220F	TO-220	
Drain-Source Voltage	$V_{DSS}$	200		V
Continuous Drain Current	$I_D$	40		A
Pulsed Drain Current (note1)	$I_{DM}$	160		A
Gate-Source Voltage	$V_{GSS}$	$\pm 20$		V
Single Pulse Avalanche Energy (note1)	$E_{AS}$	191		mJ
Avalanche Current (note1)	$I_{AS}$	31		A
Repetitive Avalanche Energy (note1)	$E_{AR}$	124		mJ
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	63.7	104	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150		$^\circ\text{C}$

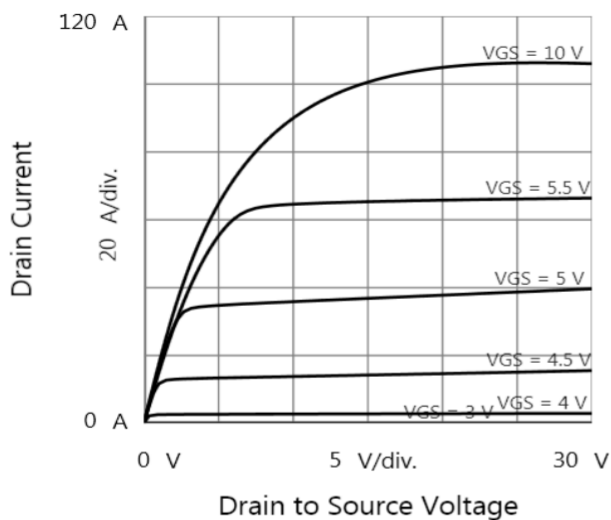
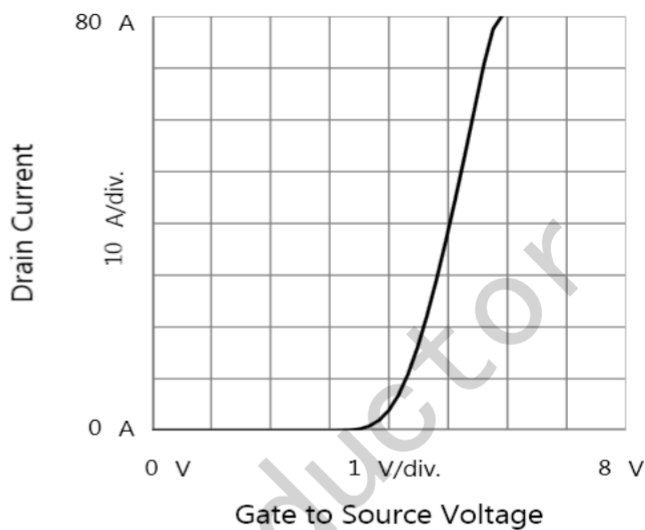
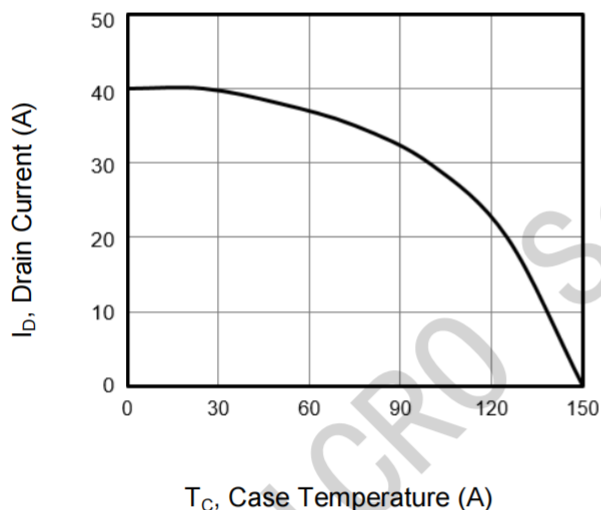
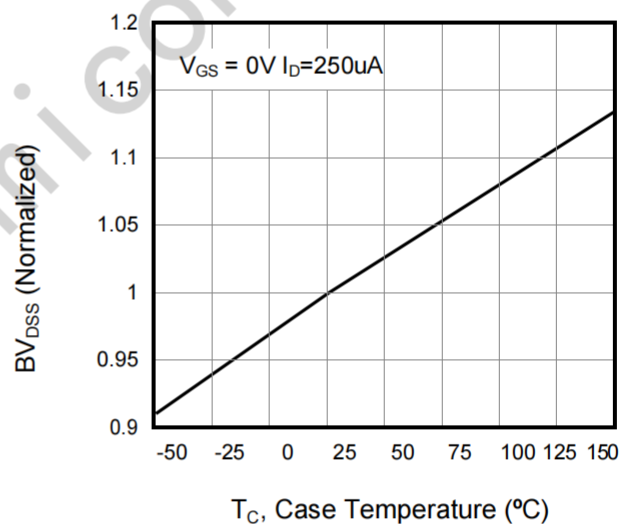
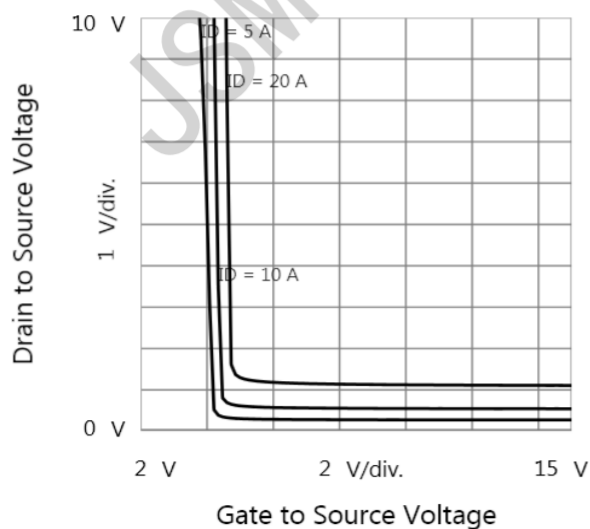
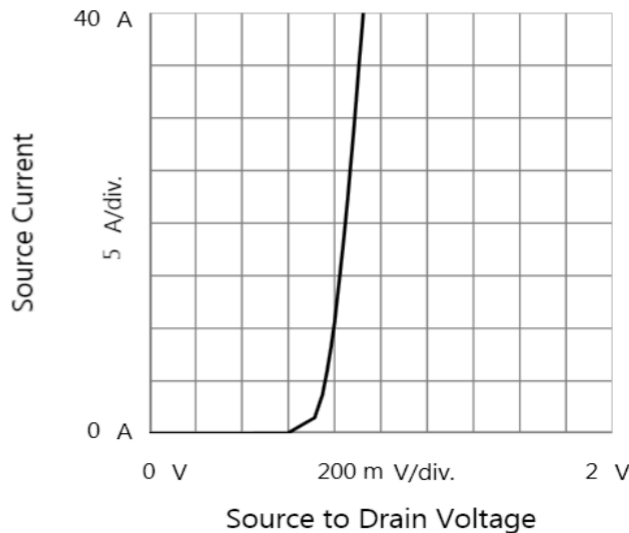
### Thermal Resistance

Parameter	Symbol	Value		Unit
		TO-220F	TO-220	
Thermal Resistance, Junction-to-Case	$R_{thJC}$	1.96	1.2	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	62.5	60	

Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	200	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 200V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	$\mu A$
		$V_{DS} = 200V, V_{GS} = 0V, T_J = 125^\circ\text{C}$	--	--	100	
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
Drain-Source On-Resistance (Note4)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	--	0.05	0.06	$\Omega$
Forward Transconductance (Note4)	gfs	$V_{DS} = 25V, I_D = 20A$	--	16	--	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	2800	--	$\mu F$
Output Capacitance	$C_{oss}$		--	355	--	
Reverse Transfer Capacitance	$C_{rss}$		--	101	--	
Total Gate Charge	$Q_g$	$V_{DD} = 160V, I_D = 40A,$	--	154	--	nC
Gate-Source Charge	$Q_{gs}$		--	13	--	
Gate-Drain Charge	$Q_{gd}$		--	58	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 160V, I_D = 40A,$ $V_{GS} = 15V, R_G = 25\Omega$	--	46	--	ns
Turn-on Rise Time	$t_r$		--	54	--	
Turn-off Delay Time	$t_{d(off)}$		--	360	--	
Turn-off Fall Time	$t_f$		--	96	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source Current	$I_{SD}$	Integral PN-diode in MOSFET	--	--	40	A
Pulsed Source Current	$I_{SM}$		--	--	160	
Body Forward Voltage	$V_{SD}$	$I_S = 20A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_F = 10A,$ $di_F/dt = 100A/\mu s$	--	152	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	1	--	$\mu C$

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L = 1\text{mH}, V_{DD} = 30V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$

**Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted**
**Figure 1. Output Characteristics ( $T_J = 25^\circ\text{C}$ )**

**Figure 2. Transfer Characteristics**

**Figure 3. Drain to Source Resistance vs. Drain Current**

**Figure 4.  $BV_{DSS}$  Variation vs. Temperature**

**Figure 5. Drain to Source Voltage vs. Gate to Source Voltage**

**Figure 6. Body Diode Forward Characteristics**


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

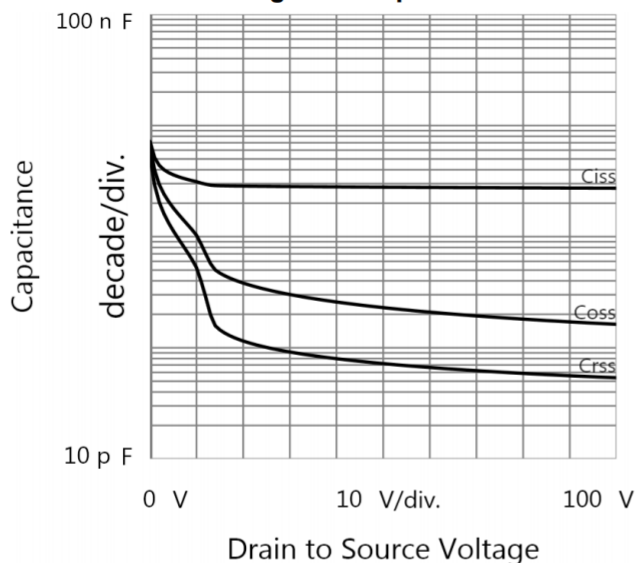
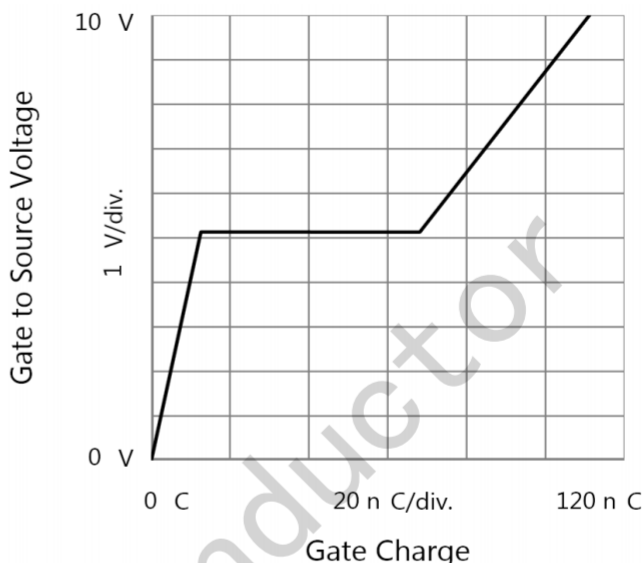
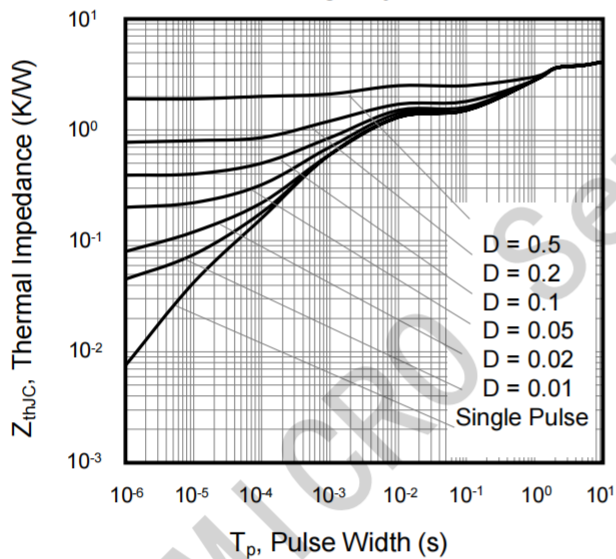
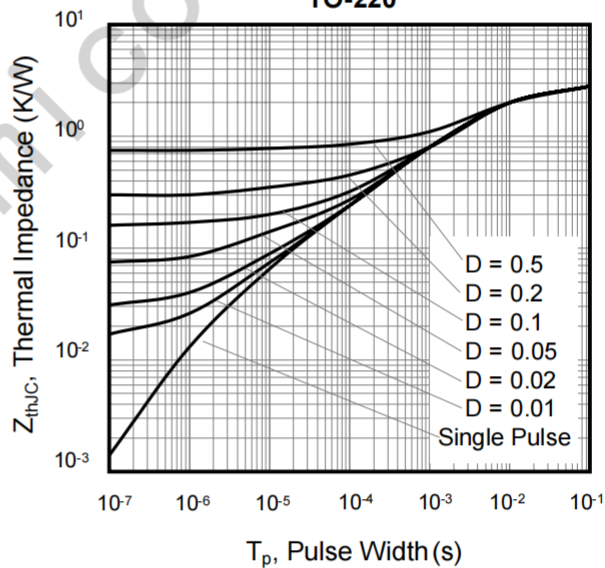
**Figure 7. Capacitance**

**Figure 8. Gate Charge**

**Figure 9. Transient Thermal Impedance TO-220F**

**Figure 10. Transient Thermal Impedance TO-220**


Figure A: Gate Charge Test Circuit and Waveform

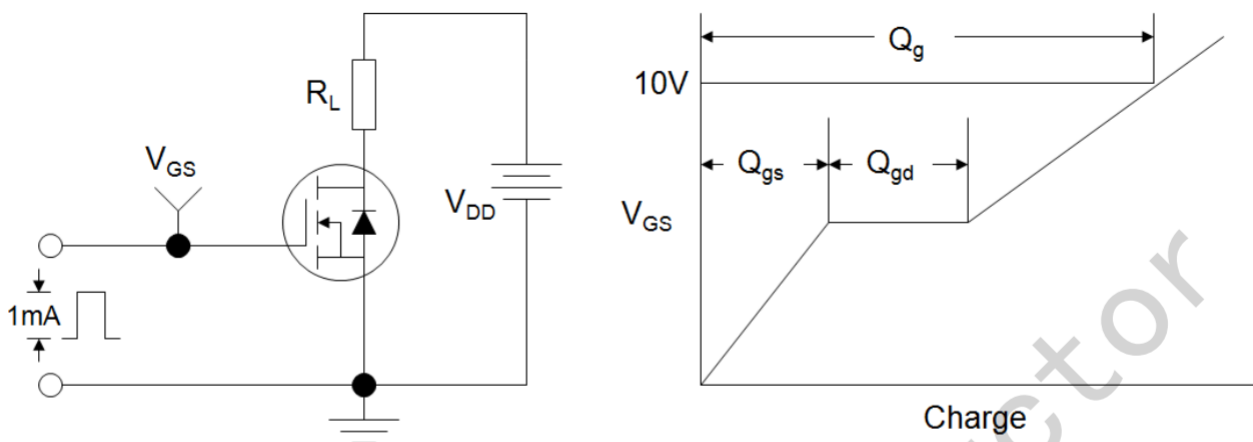


Figure B: Resistive Switching Test Circuit and Waveform

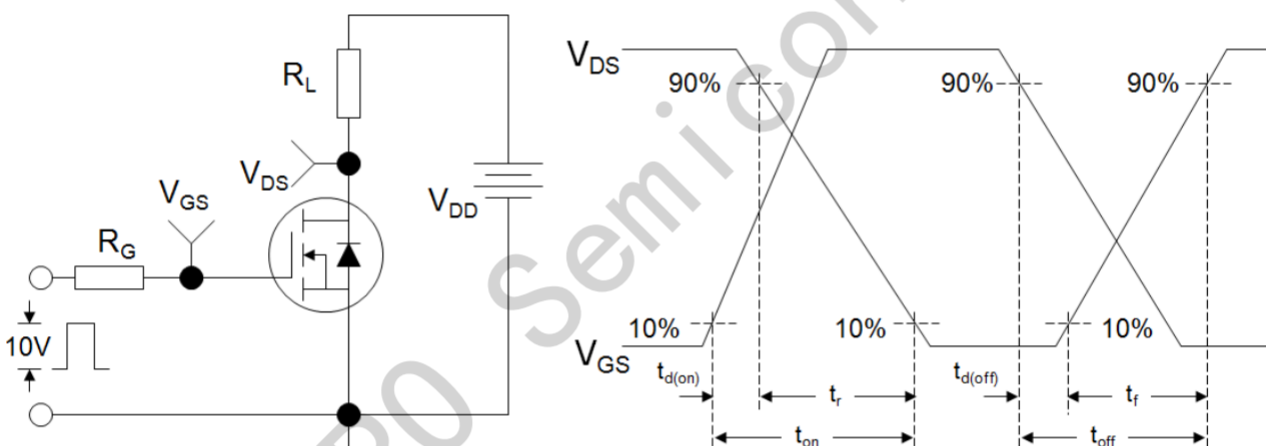
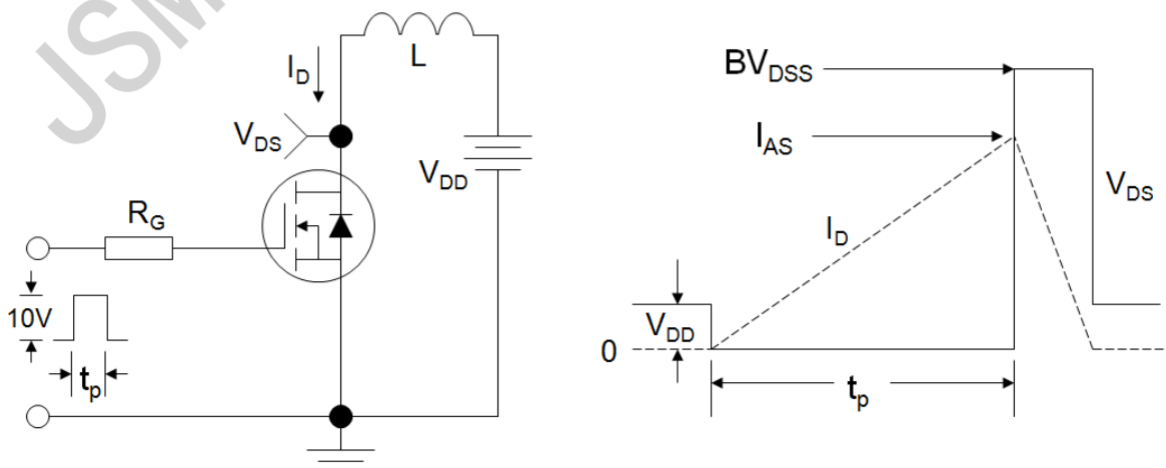
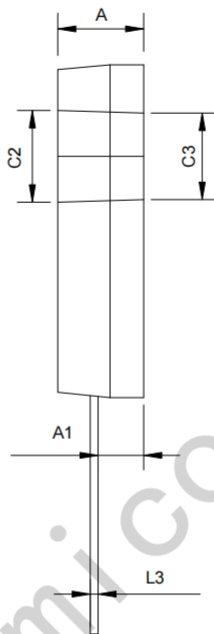
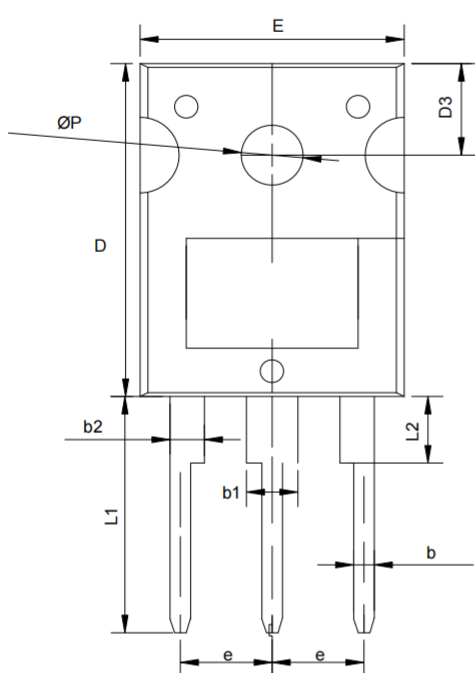


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



## Package Information

TO-247



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.30	2.50	2.70
b	1.10	1.20	1.30
b1	2.90	3.10	3.30
b2	1.90	2.10	2.30
c2	5.50	6.00	6.50
c3	4.95	5.10	5.25
D	19.00	20.00	21.00
D3	5.30	5.50	5.70
e	5.34	5.44	5.54
E	15.40	15.60	15.80
L1	14.40	14.60	14.80
L2	3.85	4.00	4.15
L3	0.35	0.50	0.65
ØP	3.40	3.60	3.80

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