FEATURES
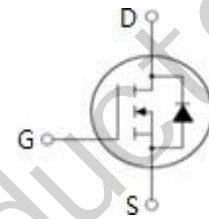
- Proprietary New Planar Technology
- RDS(ON),typ.=50m Ω@VGS=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

APPLICATIONS

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

TO-220

Absolute Maximum Ratings $T_C = 25^oC$, unless otherwise noted

Parameter	Symbol	Value TO-220	Unit
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}	± 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 ($T_C = 25^oC$)	P_D	104	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	^oC

Thermal Resistance

Parameter	Symbol	Value TO-220	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	1.2	$^oC/W$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60	$^oC/W$

Specifications T_J = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250µA	200	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 200V, V_{GS} = 0V, T_J = 25ºC	--	--	1	µA
		V_{DS} = 200V, V_{GS} = 0V, TJ = 125ºC	--	--	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 = 250µA	2.0	--	4.0	V
Drain-Source On-Resistance (Note4)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 20A	--	0.05	0.06	Ω
Forward Transconductance (Note4)	gfs	VDS = 25V, ID = 20A	--	16	--	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz	--	2800	--	pF
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, VGS =15V.RG = 25Ω	--	46	--	ns
Turn-on Rise Time	t_r		--	54	--	
Turn-off Delay Time	$t_{d(off)}$		--	360	--	
Turn-off Fall Time	t_f		--	96	--	
Drain-Source Body Diode Characteristics						
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 /µs	--	152	--	ns
Reverse Recovery Charge	Q_{rr}		--	1	--	µC

Notes：

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

2. L = 1mH, V_{DD} = 30V, R_G = 25 Ω, Starting T_J = 25 ºC

3. Pulse Test: Pulse width ≤ 300µs, Duty Cycle ≤ 1%

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Typical Characteristics T_J = 25⁰C, unless otherwise noted

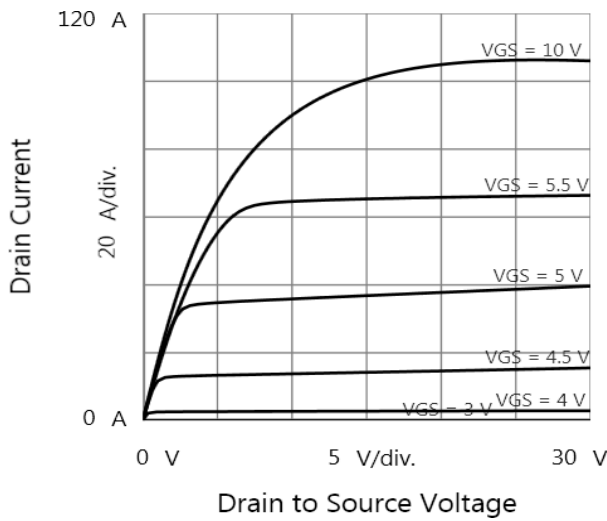### Figure 1. Output Characteristics (T_J= 25⁰C)
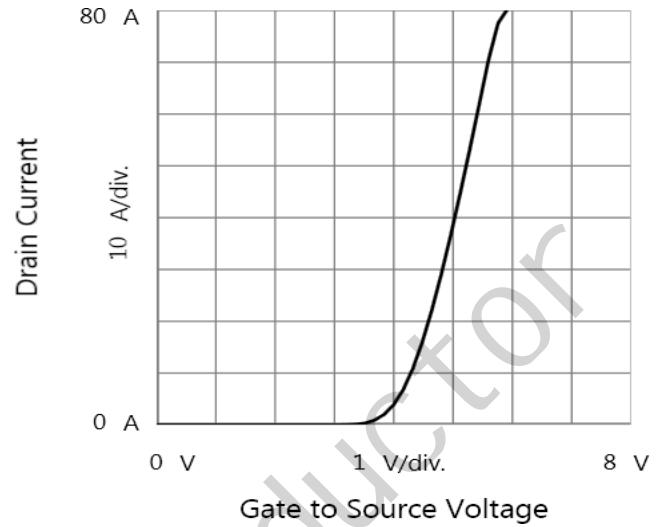

Figure 2. Transfer Characteristics

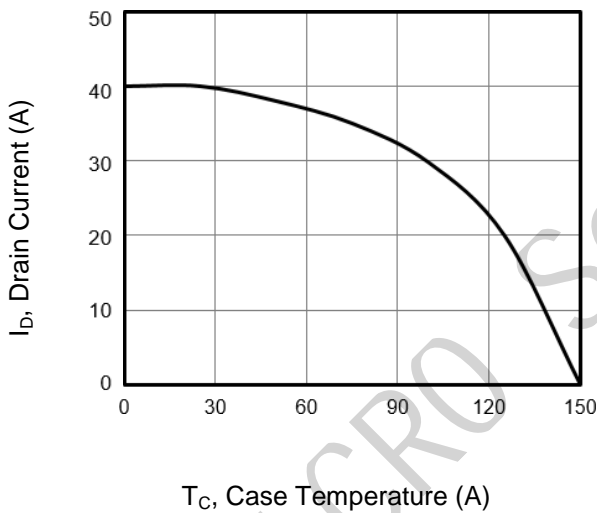### Figure 3. Drain to Source Resistance vs. Drain Current

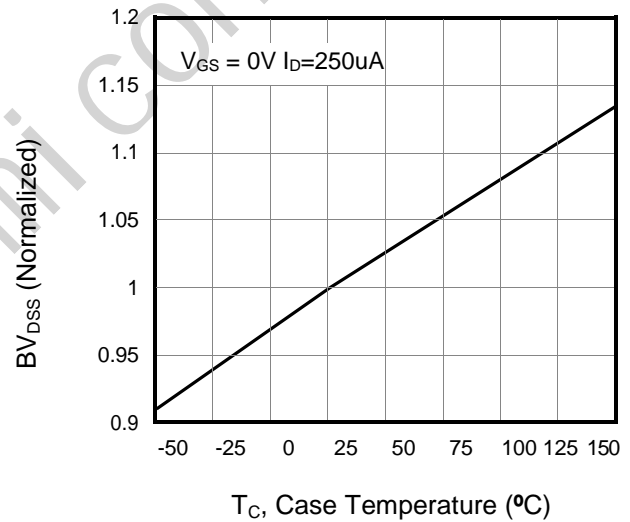### Figure 4. BV$_{DSS}$ Variation vs. Temperature

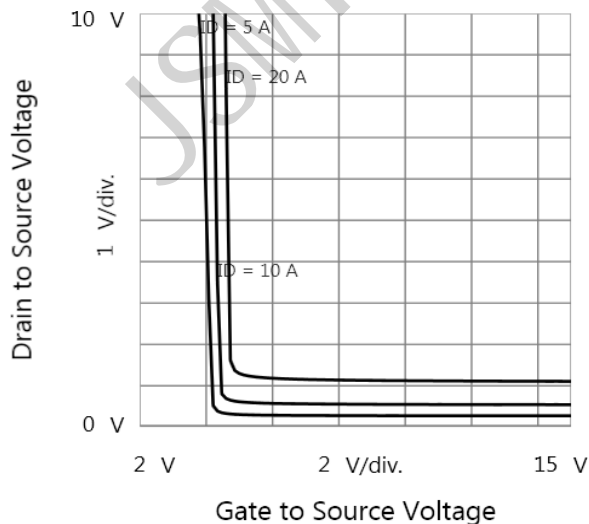### Figure 5. Drain to Source Voltage vs. Gate to Source Voltage

Figure 6. Body Diode Forward Characteristics

Typical Characteristics $T_J = 25^0C$, unless otherwise noted
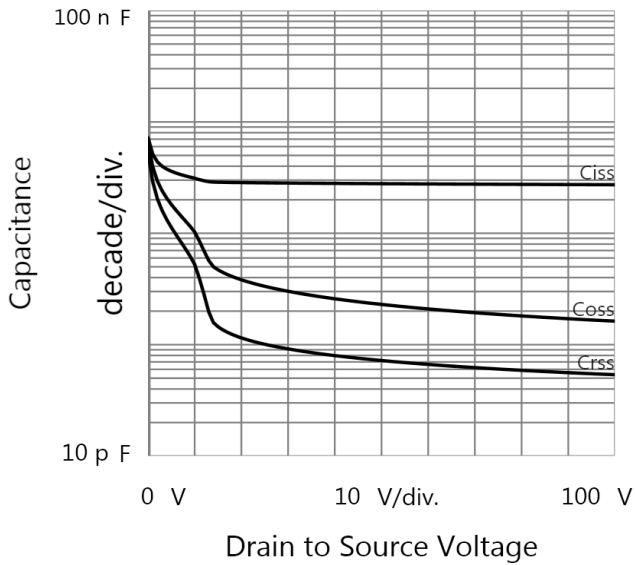
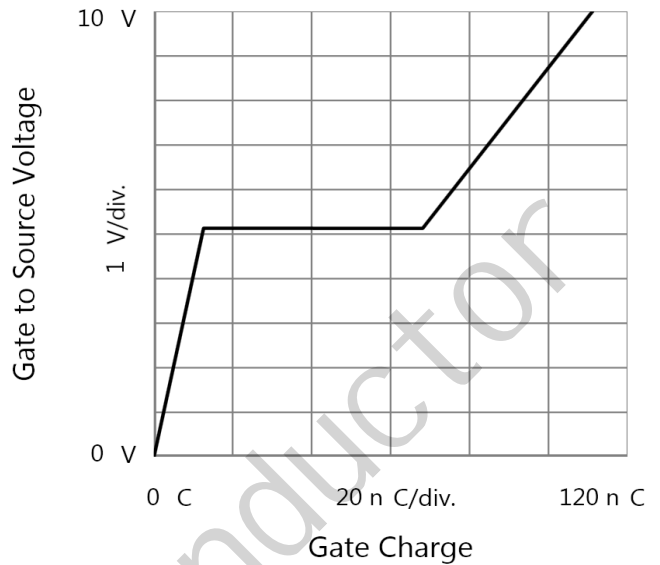**Figure 7. Capacitance**

Figure 8. Gate Charge

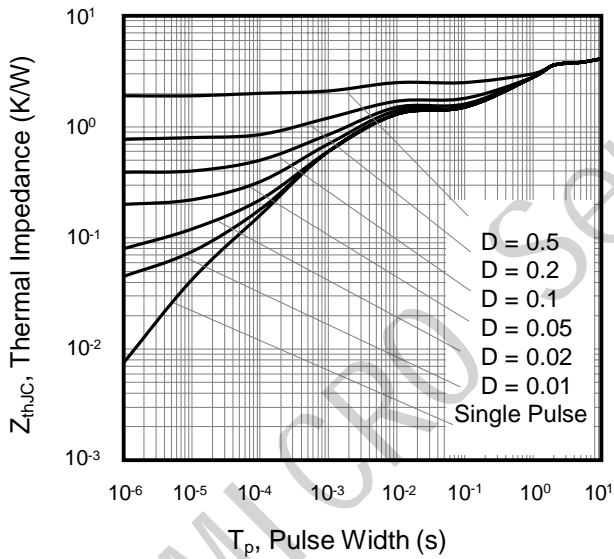**Figure 9. Transient Thermal Impedance TO-220**

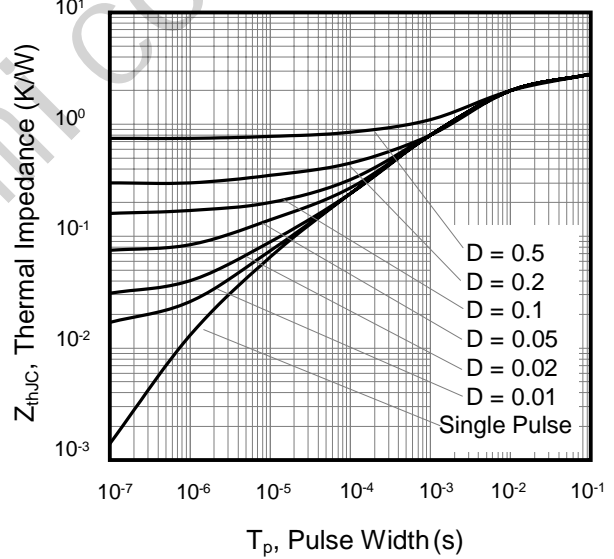**Figure 10. Transient Thermal Impedance TO-220**
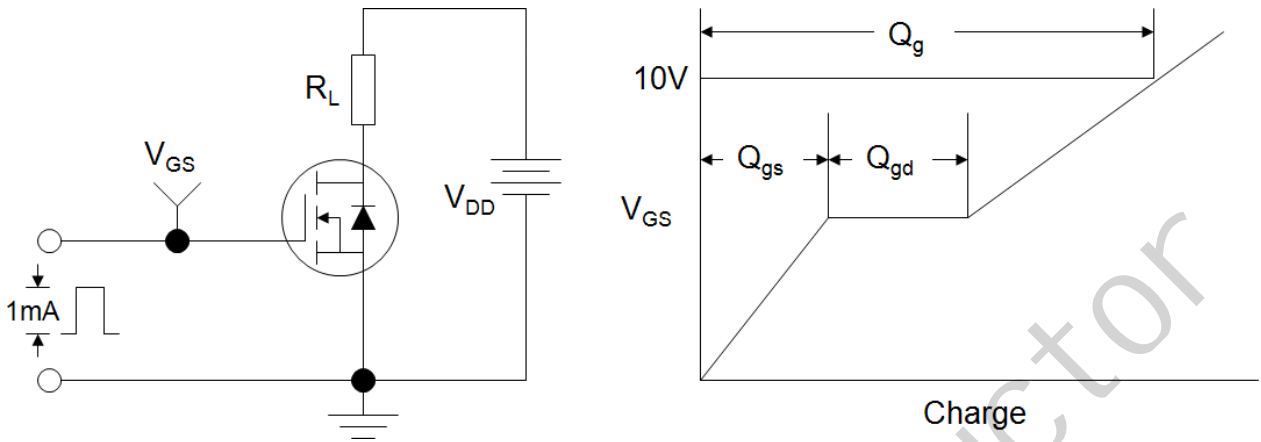
Figure A：Gate Charge Test Circuit and Waveform

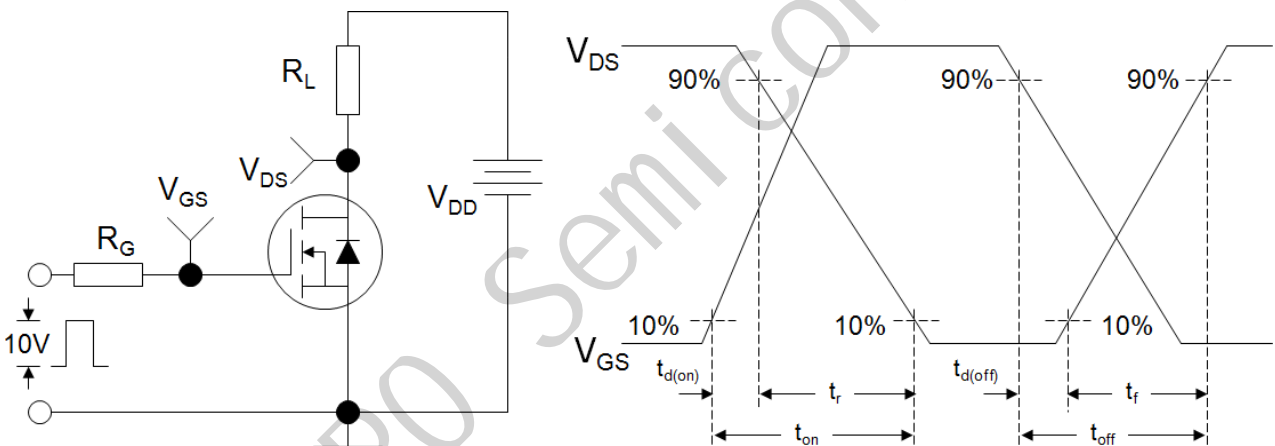**Figure B：Resistive Switching Test Circuit and Waveform**
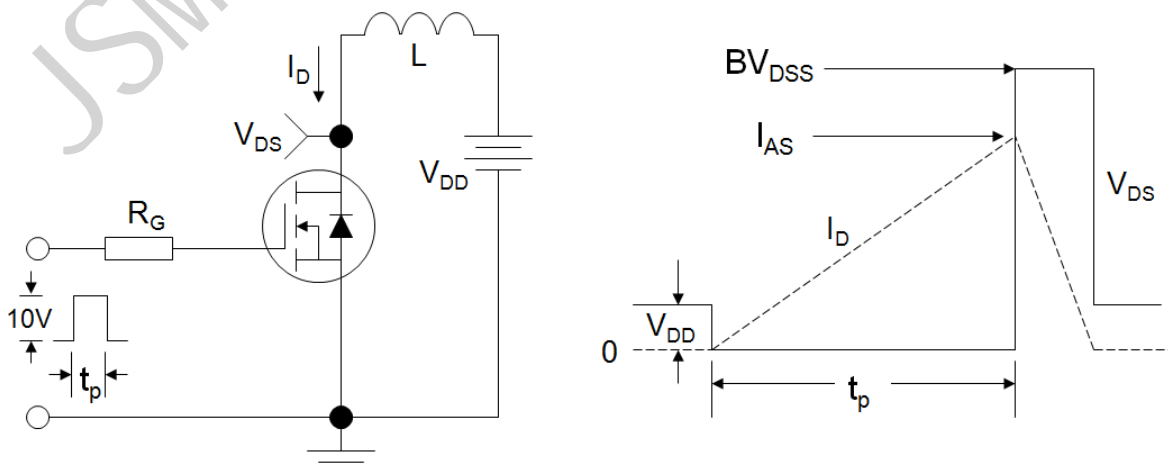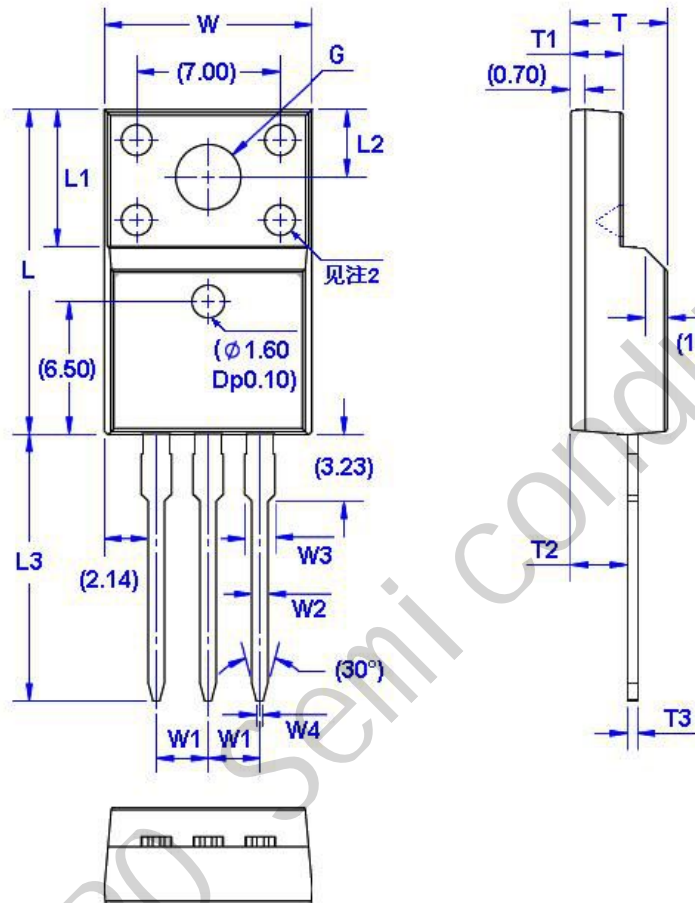

Figure C：Unclamped Inductive Switching Test Circuit and Waveform

Package Outline: TO-220

Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.96	10.36	W4	0.25	0.45	L3	12.78	13.18	T3	0.45	0.60
W1	2.54 (TYP)		L	15.67	16.07	T	4.50	4.90	G(Φ)	3.08	3.28
W2	0.70	0.90	L1	6.48	6.88	T1	2.34	2.74			
W3	1.24	1.47	L2	3.20	3.40	T2	2.56	2.96			

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