TSP50N20M

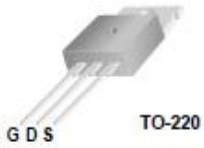
200V N-Channel MOSFET

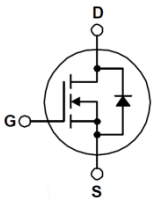
General Description

This Power MOSFET is produced using Truesemi's advanced planar stripe DMOS technology.
This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

Features

- 50A,200V,Max.$R_{DS(on)}$=0.046Ω @ V_{GS} =10V
- Low gate charge
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability





Absolute Maximum Ratings

T_J=25℃ unless otherwise specified

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted				
Parameter		**Symbol**	**Value**	**Unit**
Drain-Source Voltage	(note1)	V_{DSS}	200	V
Continuous Drain Current		I_D	50	A
Pulsed Drain Current	(note2)	I_{DM}	200	
Gate-Source Voltage		V_{GSS}	±20	V
Single Pulse Avalanche Energy	(note2)	E_{AS}	1700	mJ
Power Dissipation		P_D	250	W
Derating Factor above 25°C			2.4	W/ºC
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	ºC

Thermal Resistance Characteristics

Thermal Resistance			
Parameter	**Symbol**	**Value**	**Unit**
Thermal Resistance, Junction-to-Case	R_{thJC}	0.5	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	

Electrical Characteristics T_J=25℃ unless otherwise specified

Specifications T_J = 25℃, 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
Gate-Source Leakage	I_{GSS}	V_{GS} = ±20V， V_{DS} = 0V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2	--	4	V
Drain-Source On-Resistance (Note4)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 25A	--	0.041	0.046	Ω
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz	--	4010	--	pF
Output Capacitance	C_{oss}		--	437	--	
Reverse Transfer Capacitance	C_{rss}		--	280	--	
Total Gate Charge	Q_g	V_{DD} = 160V, I_D = 50A, V_{GS} 0 to 10V	--	244	--	nC
Gate-Source Charge	Q_{gs}		--	16	--	
Gate-Drain Charge	Q_{gd}		--	144	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 100V, I_D = 50A, VGS =10V.RG = 25Ω	--	53	--	ns
Turn-on Rise Time	t_r		--	65	--	
Turn-off Delay Time	$t_{d(off)}$		--	429	--	
Turn-off Fall Time	t_f		--	230	--	
Drain-Source Body Diode Characteristics						
Continuous Source Current	I_{SD}	Integral PN-diode in MOSFET	--	--	50	A
Pulsed Source Current	I_{SM}		--	--	200	
Body Forward Voltage	V_{SD}	I_S = 20A, V_{GS} = 0V	--	--	1.5	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V,I_F = 10A, di_F/dt =100A /μs	--	261	--	ns
Reverse Recovery Charge	Q_{rr}		--	2.04	--	μC

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 10mH, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25 ℃
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics (T_J = 25ºC)

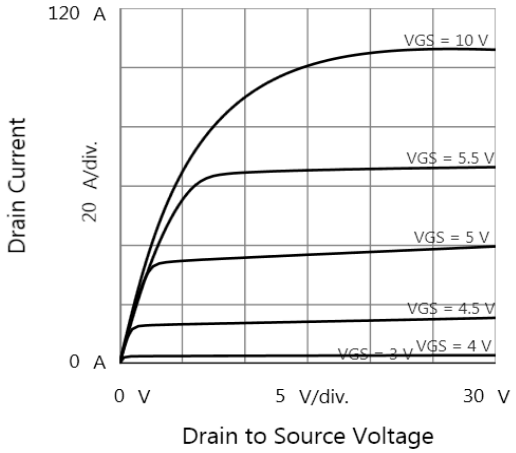


Figure 2. Transfer Characteristics

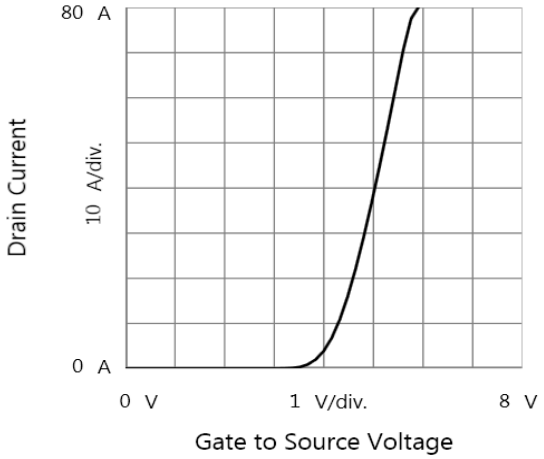


Figure 3. Drain to Source Resistance vs. Drain Current

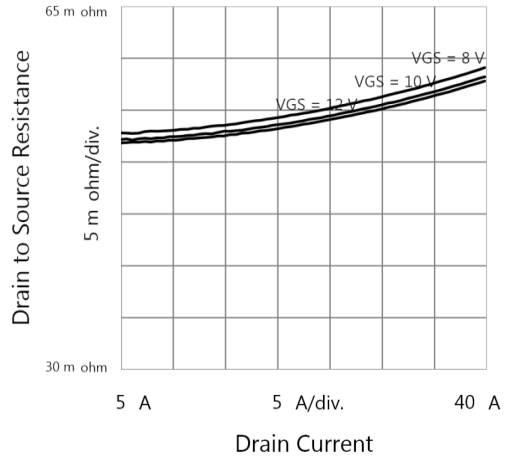


Figure 4. Drain to Source Resistance vs. Gate to Source Voltage

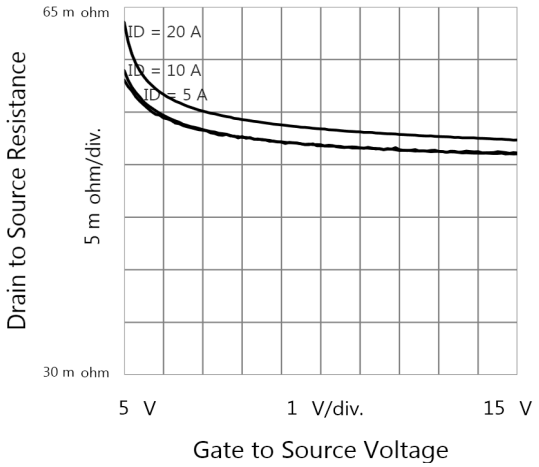


Figure 5. Drain to Source Voltage vs. Gate to Source Voltage

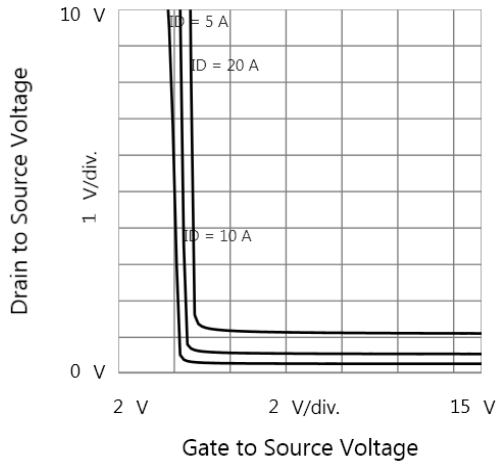
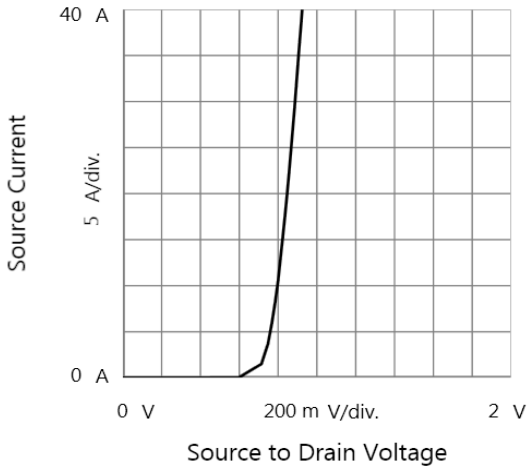


Figure 6. Body Diode Forward Characteristics



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Capacitance

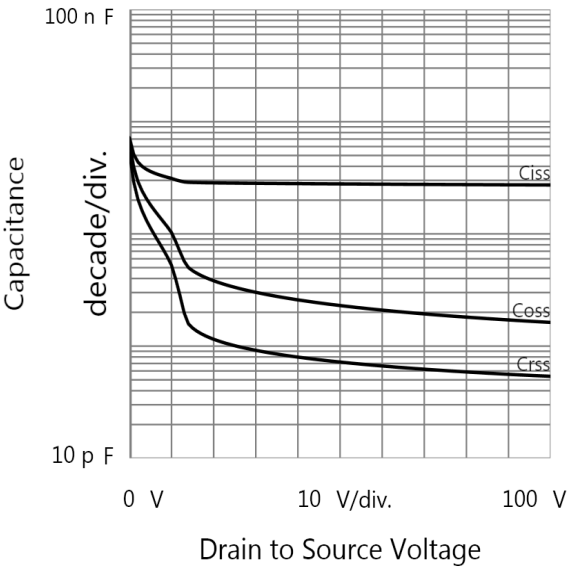


Figure 8. Gate Charge

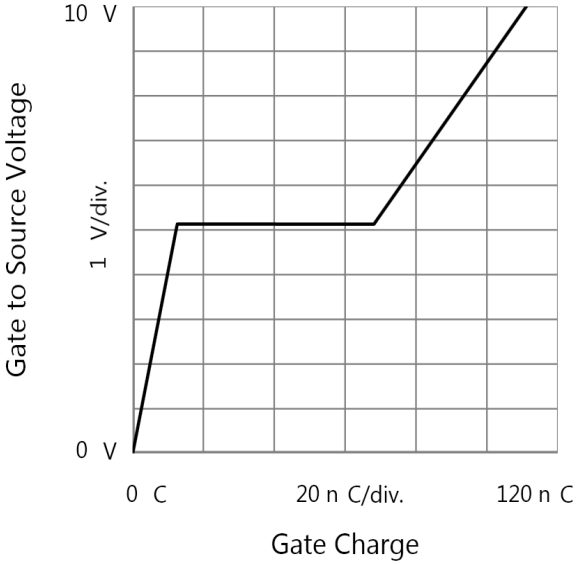


Figure 9. Transient Thermal Impedance

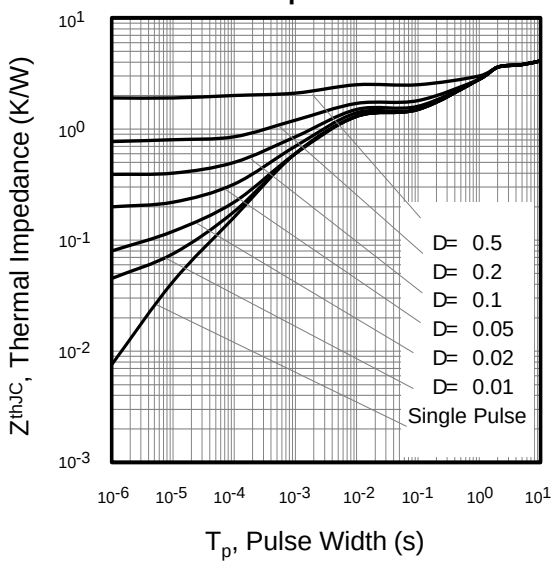
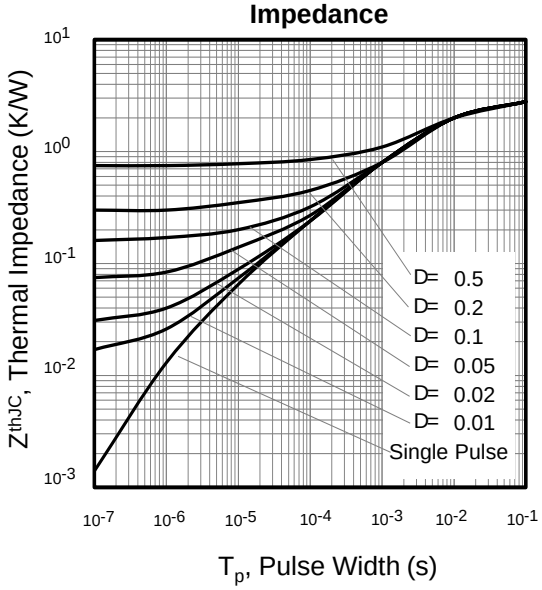


Figure 10. Transient Thermal Impedance



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

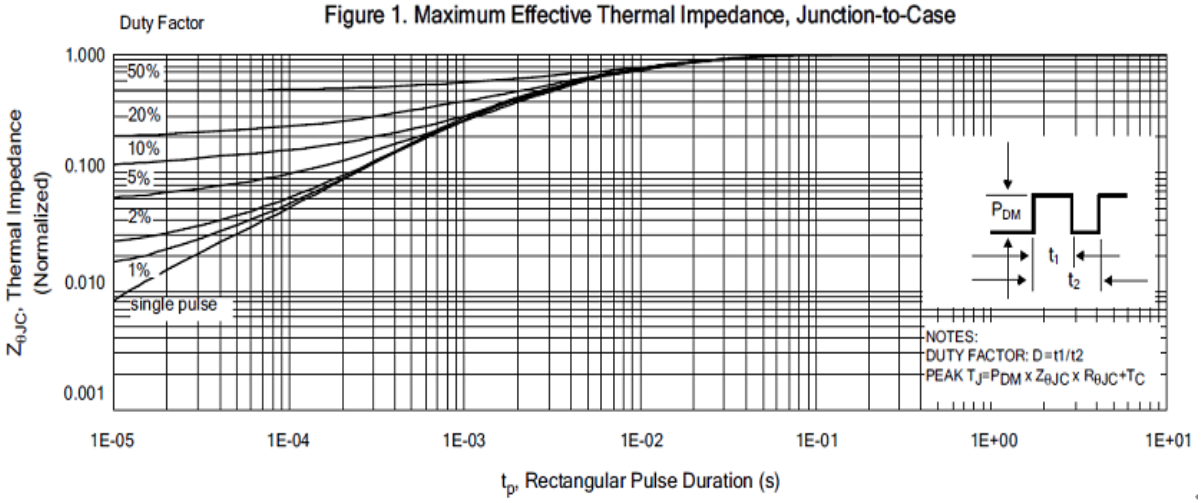


Figure 2. Maximum Power Dissipation vs Case Temperature

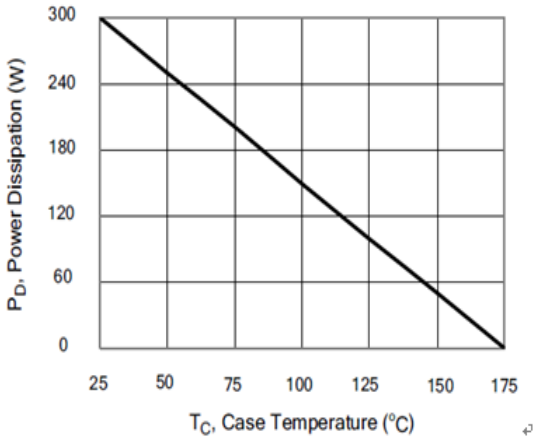


Figure3. Maximum Continuous Drain Current vs Case Temperature

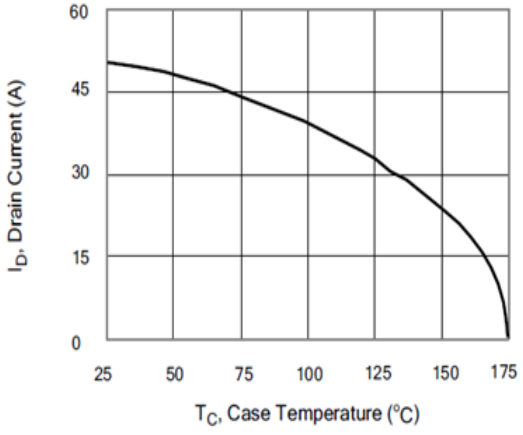


Figure 4. Typical Output Characteristics

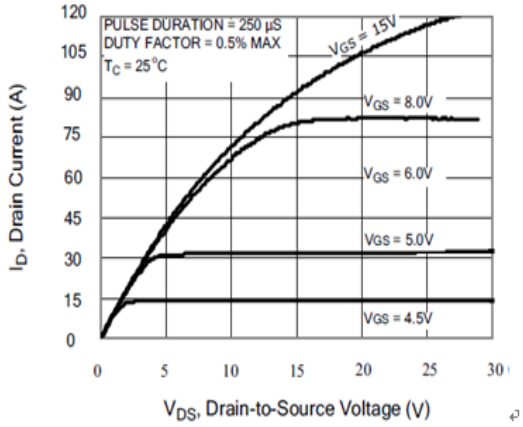
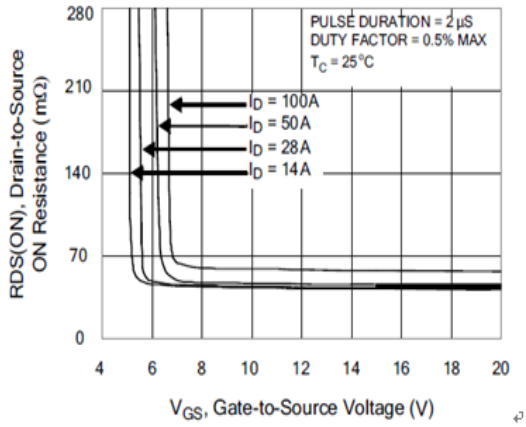


Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current



Typical Characteristics T_J = 25ºC, unless

Figure 6. Maximum Peak Current Capability

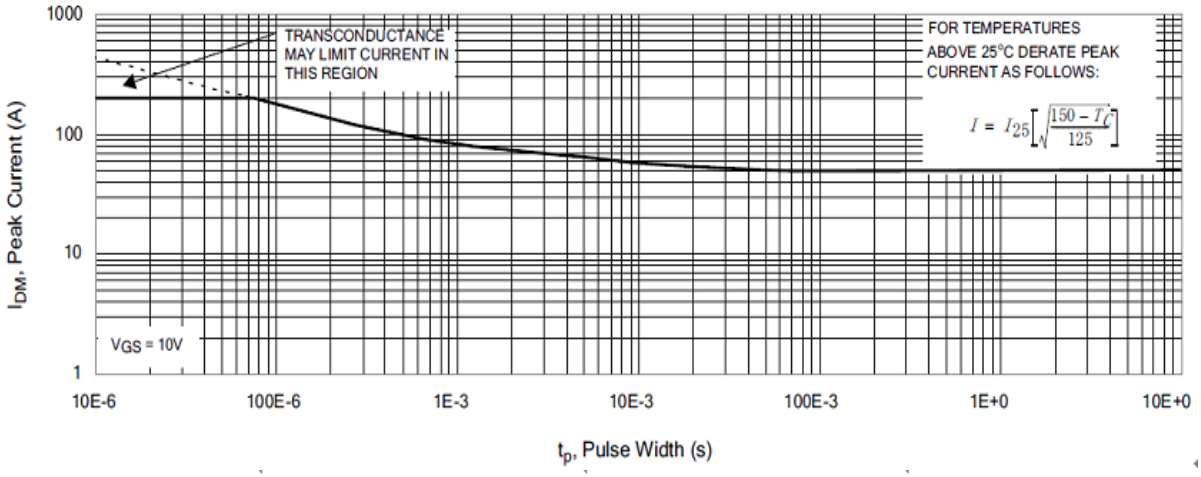


Figure 7. Typical Transfer Characteristics

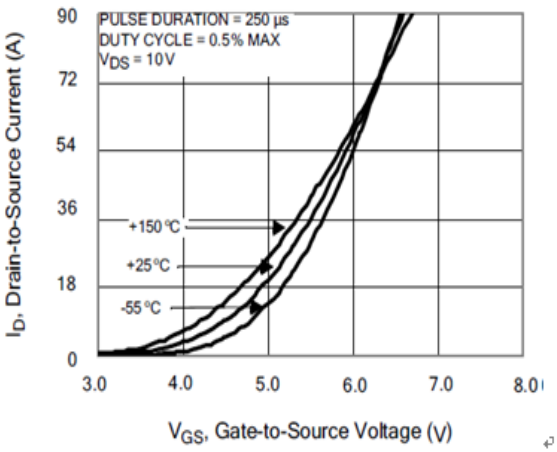


Figure 8. Unclamped Inductive Switching Capability

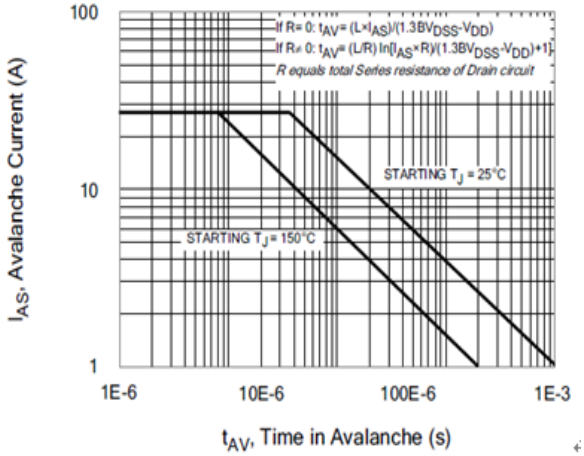


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

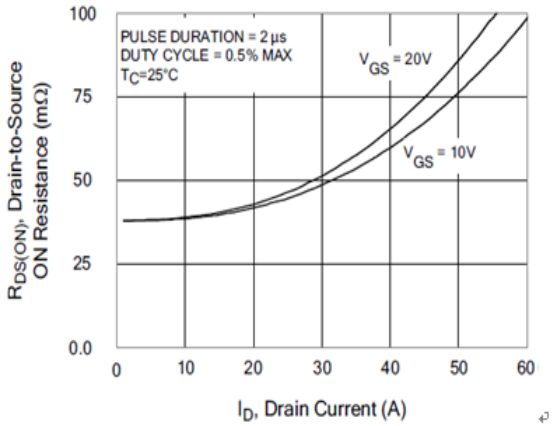


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature

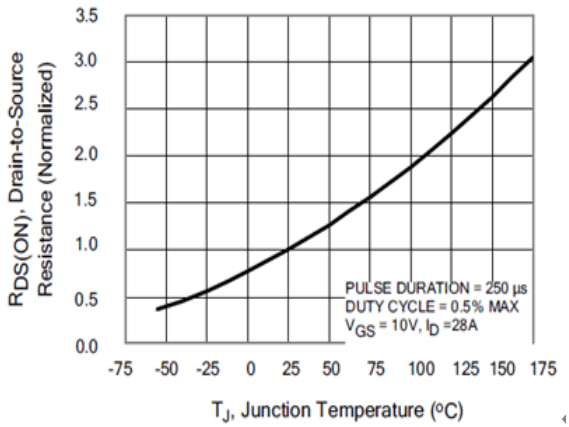


Figure 11. Typical Breakdown Voltage vs Junction Temperature

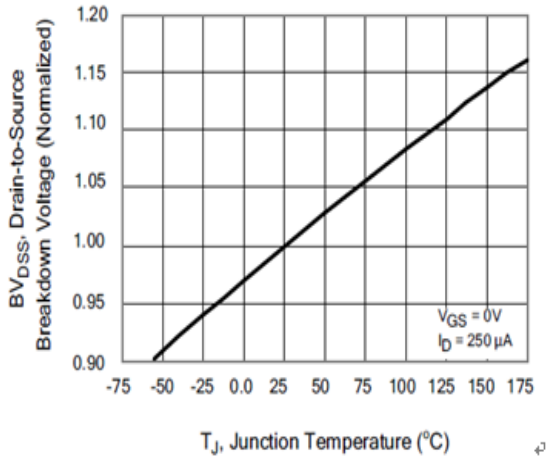


Figure 12. Typical Threshold Voltage vs Junction Temperature

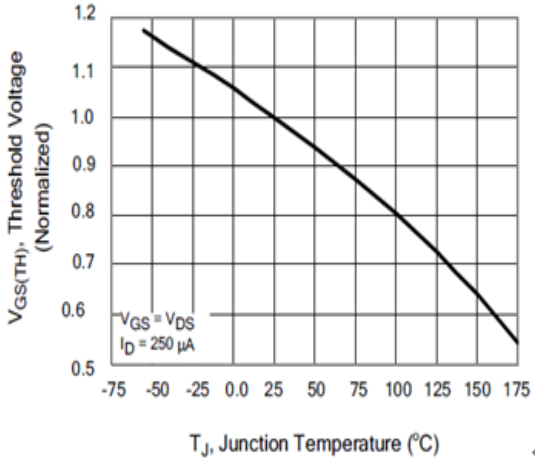


Figure 13. Maximum Forward Bias Safe Operating Area

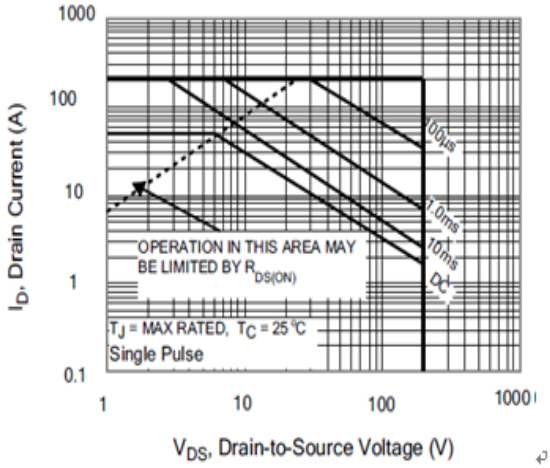


Figure 14. Capacitance vs Vds

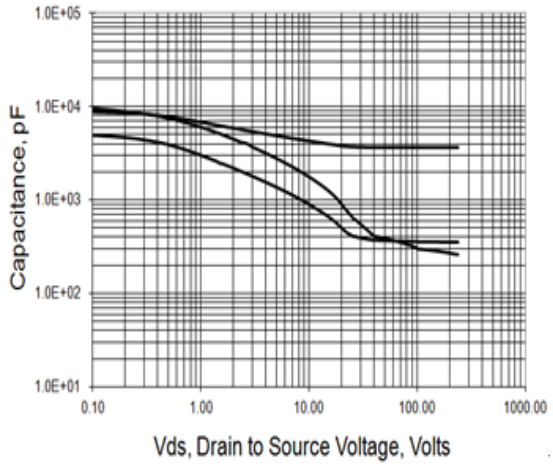


Figure 15 . Typical Gate Charge

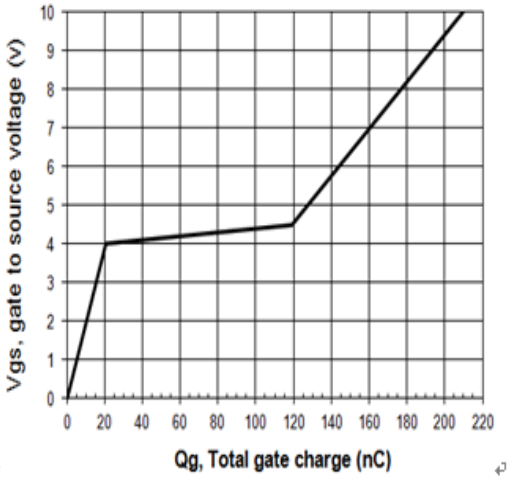


Figure 16. Typical Body Diode Transfer Characteristics

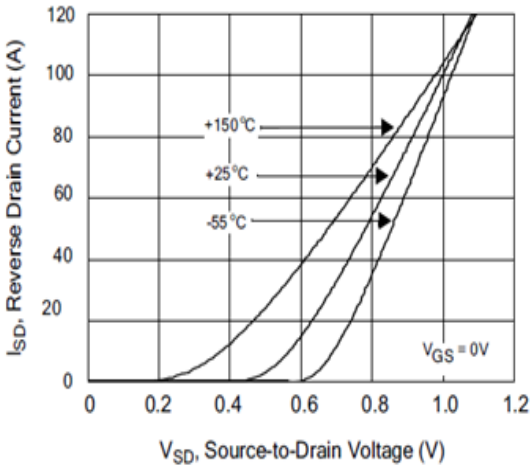


Figure A：Gate Charge Test Circuit and

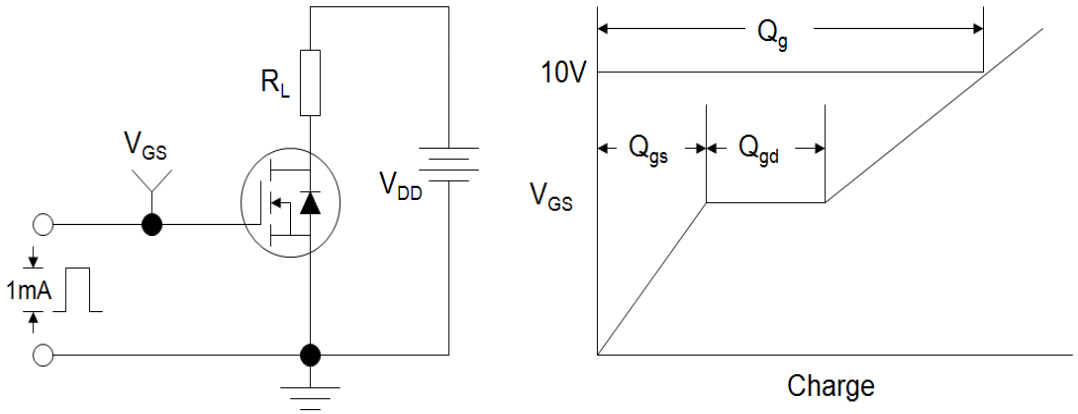


Figure B：Resistive Switching Test Circuit and Waveform

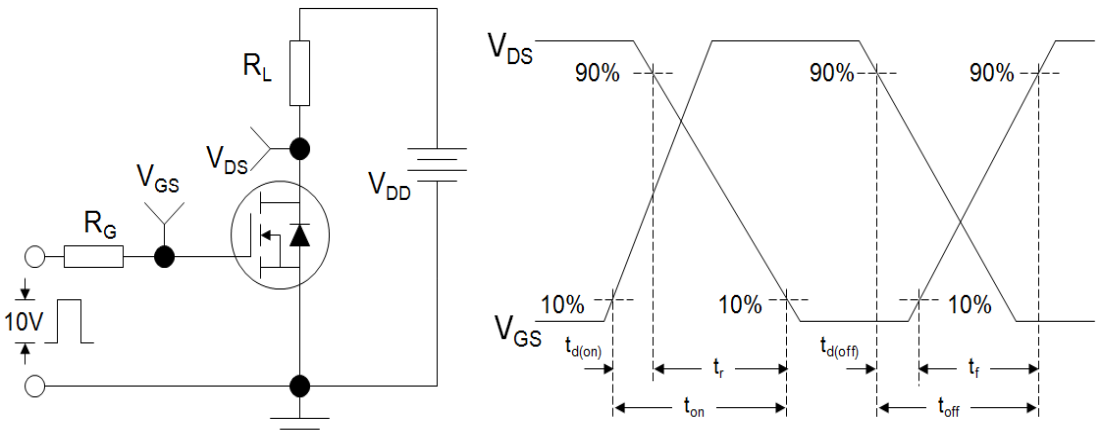
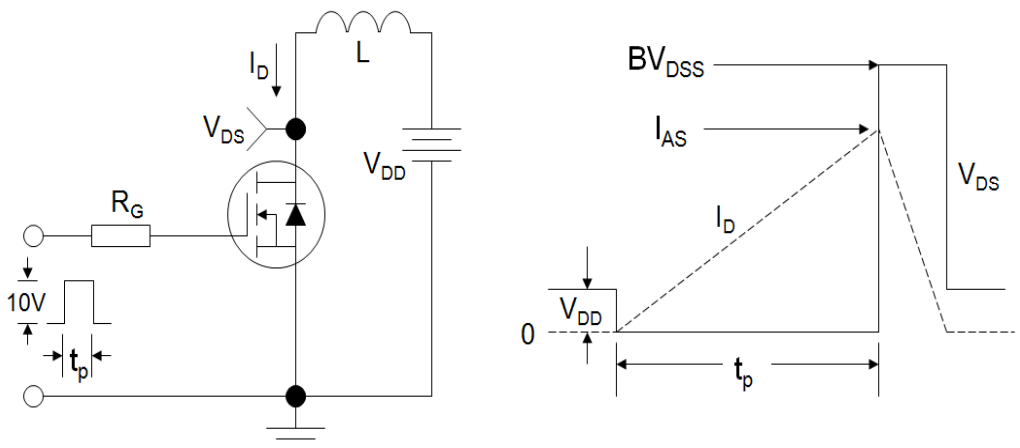


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



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