

Product Summary

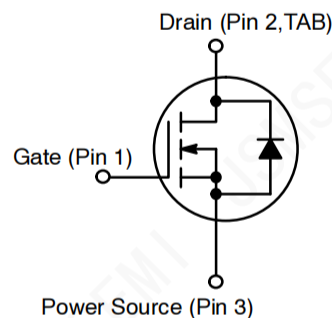
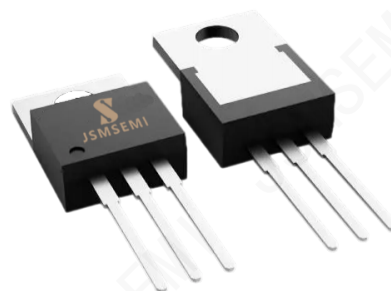
- V_{DS} 100V
- I_D 55A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $<25m\Omega$
- 100% EAS Tested
- 100% ∇V_{DS} Tested

General Description

- Vertical Double-diffused MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor
- Motor drivers



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

Parameter	Symbol	Value	Unit
		TO-220	
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	100	V
Continuous Drain Current	I_D	55	A
Pulsed Drain Current (note1)	I_{DM}	220	A
Gate-Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	1943	mJ
Avalanche Current (note1)	I_{AR}	32	A
Repetitive Avalanche Energy (note1)	E_{AR}	36	mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	200	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
		TO-220	
Thermal Resistance, Junction-to-Case	R_{thJC}	0.75	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62	

Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	100	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100V, V_{GS} = 0V, T_J = 25^{\circ}C$	--	--	1	μA
		$V_{DS} = 80V, V_{GS} = 0V, T_J = 125^{\circ}C$	--	--	100	
Gate-Source Leakage	I_{GSS}	$V_{GS} = +20V, V_{DS}=0V$	--	--	100	nA
		$V_{GS}=-20V, V_{DS}=0V$	--	--	-100	
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 (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 28A$	--	20	25	mΩ
Forward Transconductance	gfs	$V_{DS} = 10V, I_D = 28A$		85		S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0MHz$	--	2700	--	pF
Output Capacitance	C_{oss}		--	610	--	
Reverse Transfer Capacitance	C_{rss}		--	260	--	
Total Gate Charge	Q_g	$V_{DD}=50V, I_D = 28A,$ $V_{GS} = 0 \text{ to } 10V$	--	60	--	nC
Gate-Source Charge	Q_{gs}		--	15	--	
Gate-Drain Charge	Q_{gd}		--	45	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 50V,$ $I_D = 28A,$ $V_{GS}= 10V$ $R_G = 2.5 \Omega$	--	20	--	ns
Turn-on Rise Time	t_r		--	28	--	
Turn-off Delay Time	$t_{d(off)}$		--	65	--	
Turn-off Fall Time	t_f		--	15	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^{\circ}C$	--	--	55	A
Pulsed Diode Forward Current	I_{SM}		--	--	220	
Body Diode Voltage	V_{SD}	$T_J = 25^{\circ}C, I_{SD} = 28A, V_{GS} = 0V$	--	--	1.5	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 28A,$ $di_F/dt = 100A/\mu s$	--	195	--	ns
Reverse Recovery Charge	Q_{rr}		--	107	--	μC

- Notes**
1. Repetitive Rating: Pulse width limited by maximum junction temperature
 2. $I_{AS} = 30A, V_{DD} = 50V, R_G = 25 \Omega$, Starting $T_J = 25^\circ\text{C}$
 3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Ordering Information

Order number	Package	Marking	Operation Temperature Range	MSL Grade	Ship, Quantity	Green
FQP55N10-JSM	TO-220-3	FQP55N10	-55 to 175 $^\circ\text{C}$	1	TUBE,1000	Rohs

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

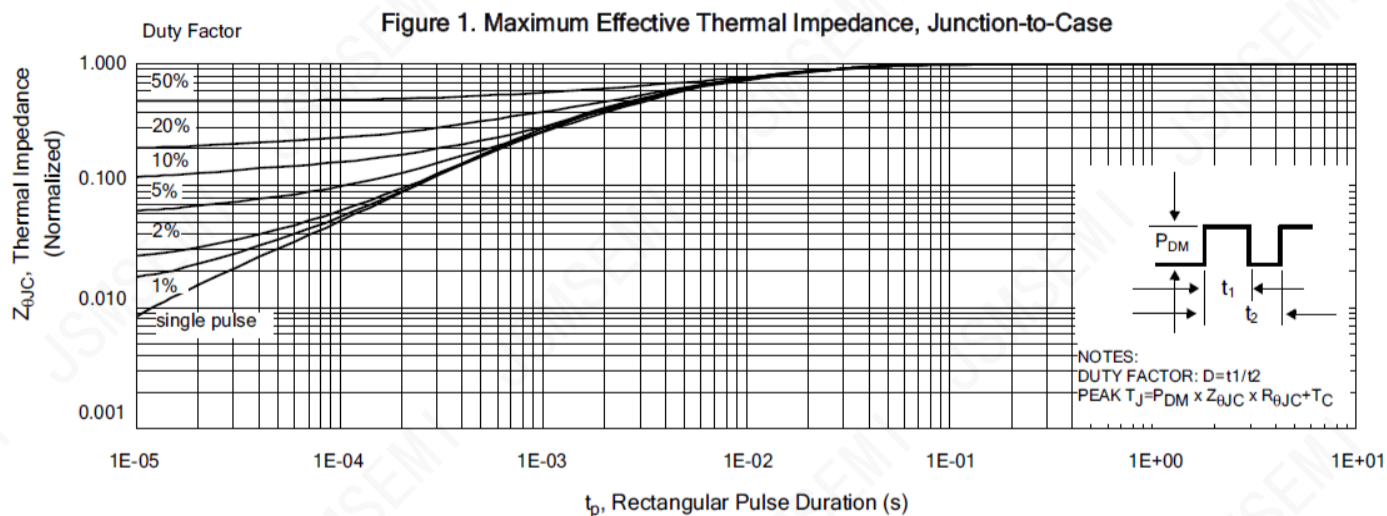


Figure 2. Maximum Power Dissipation vs Case Temperature

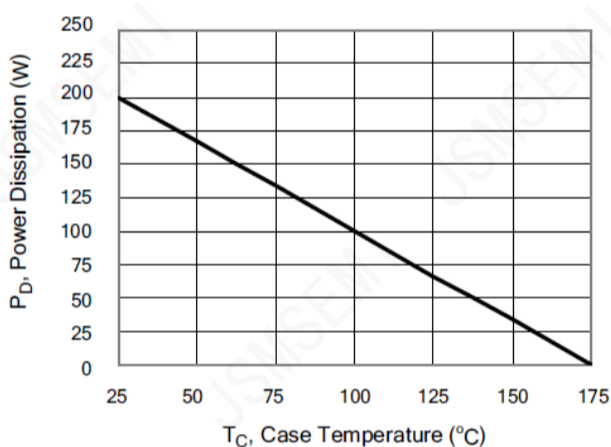


Figure 3. Maximum Continuous Drain Current vs Case Temperature

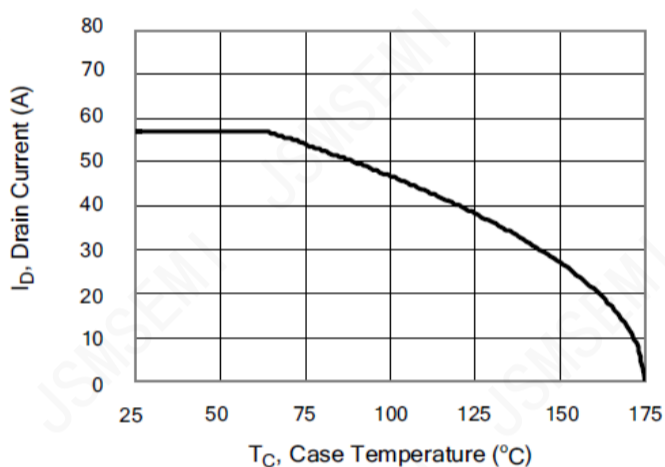


Figure 4. Typical Output Characteristics

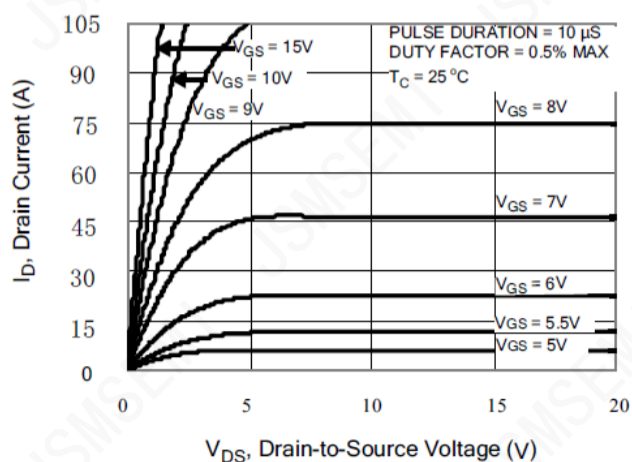
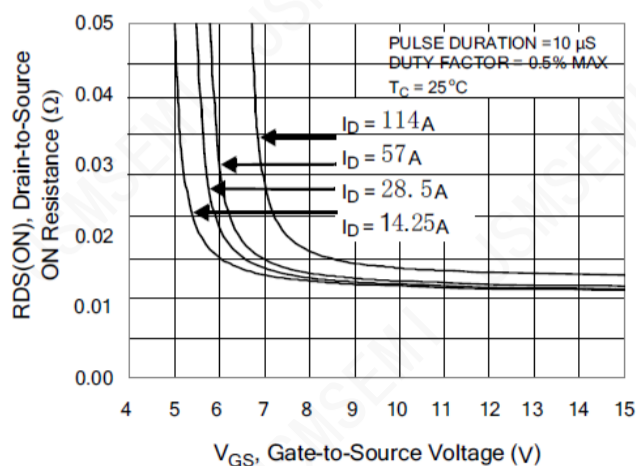


Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current



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

Figure 6. Maximum Peak Current Capability

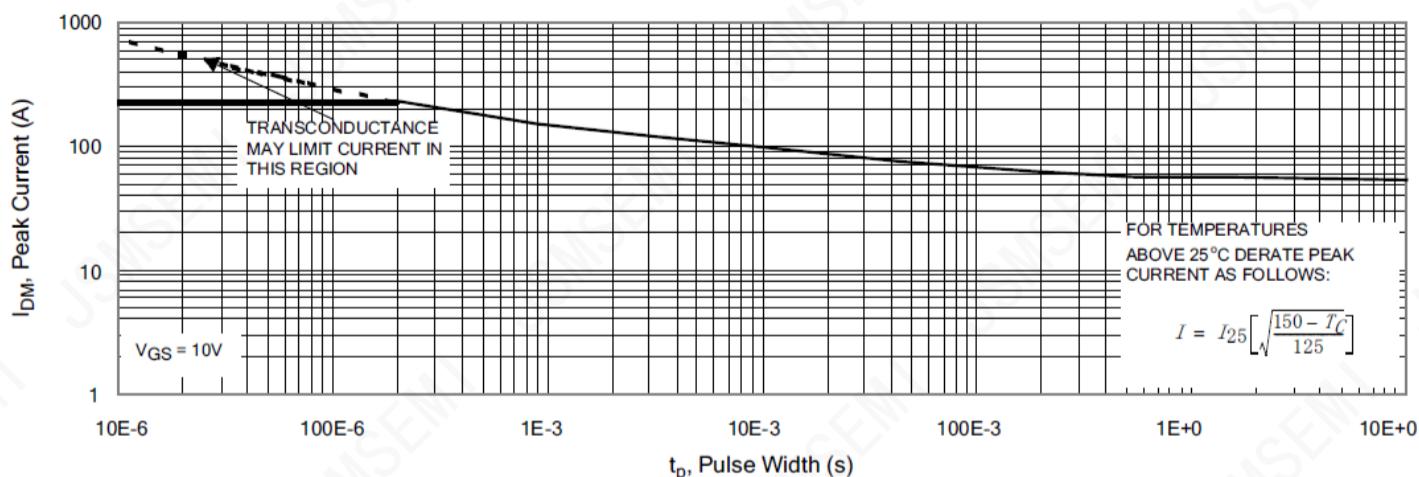


Figure 7. Typical Transfer Characteristics

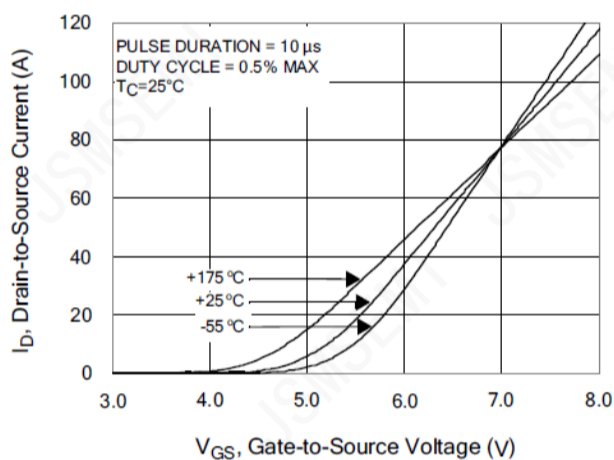


Figure 8. Unclamped Inductive Switching Capability

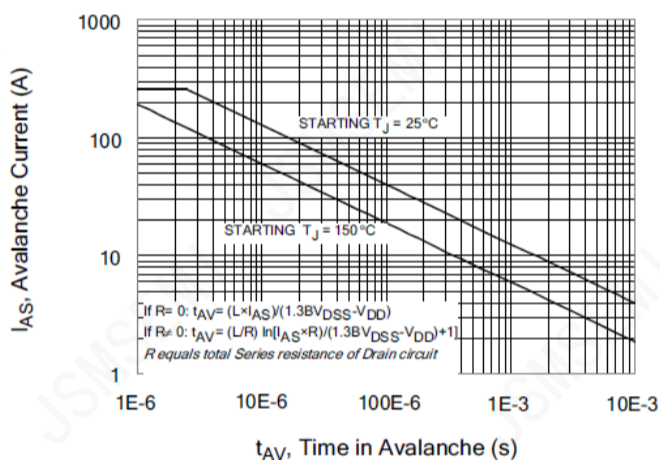


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

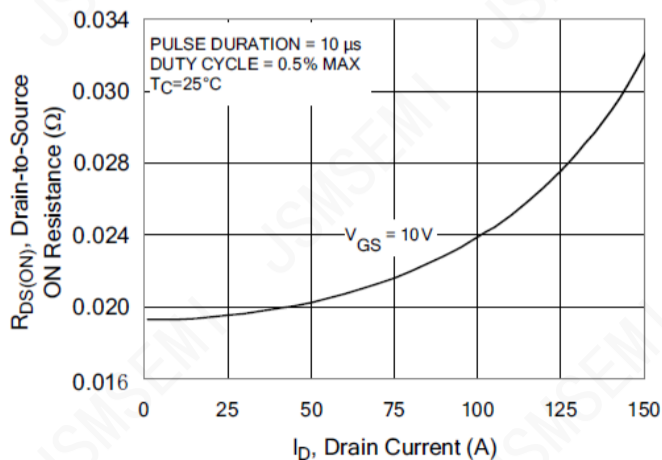
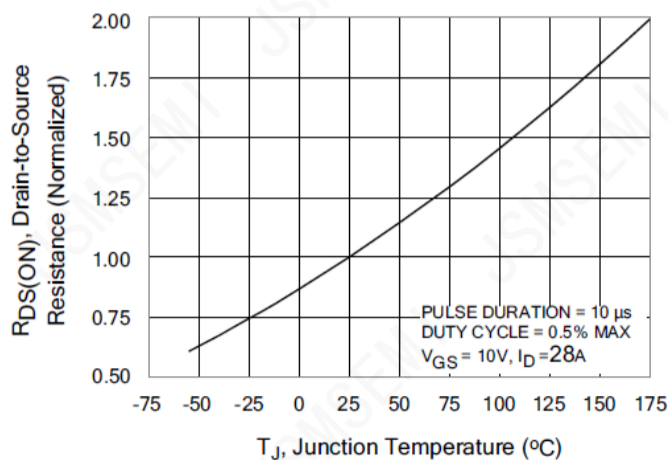


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature



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

Figure 11. Typical Breakdown Voltage vs Junction Temperature

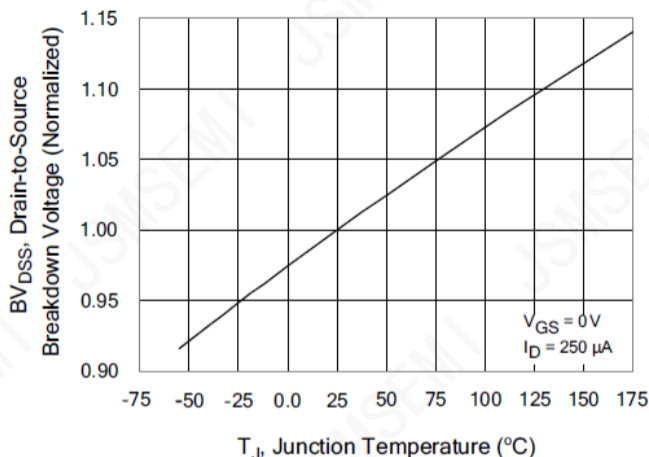


Figure 13. Maximum Forward Bias Safe Operating Area

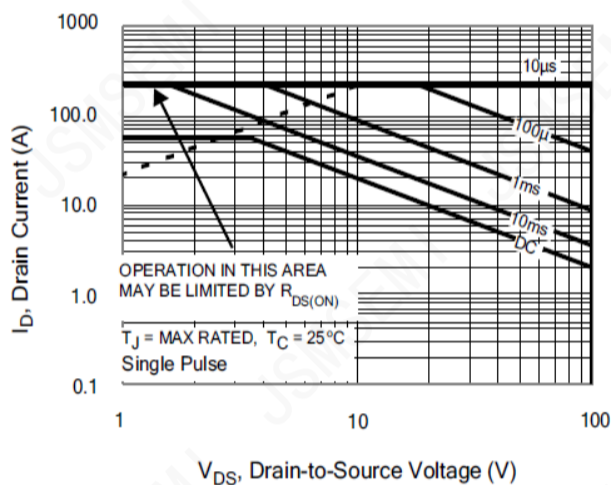


Figure 15. Typical Gate Charge

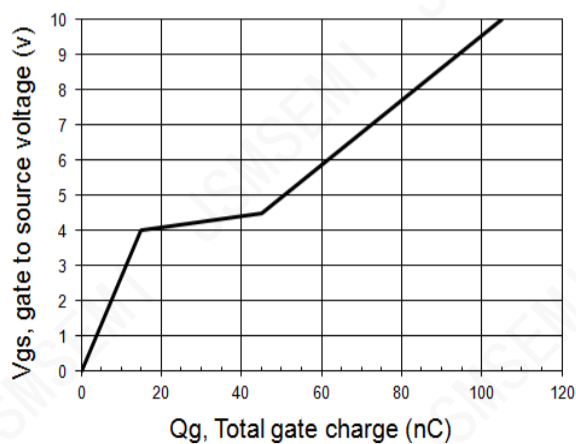


Figure 12. Typical Threshold Voltage vs Junction Temperature

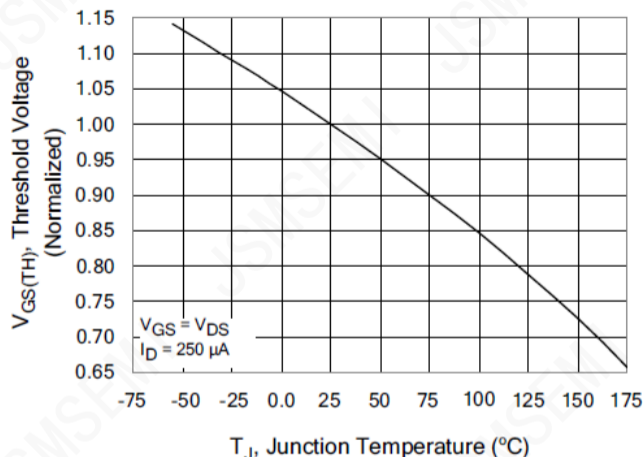


Figure 14. Capacitance vs Vds

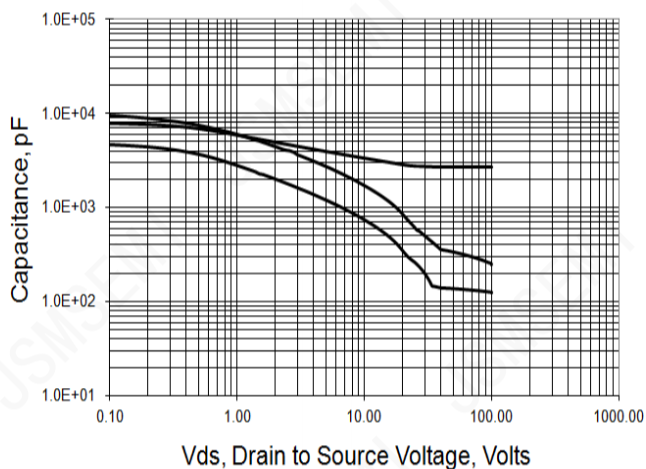
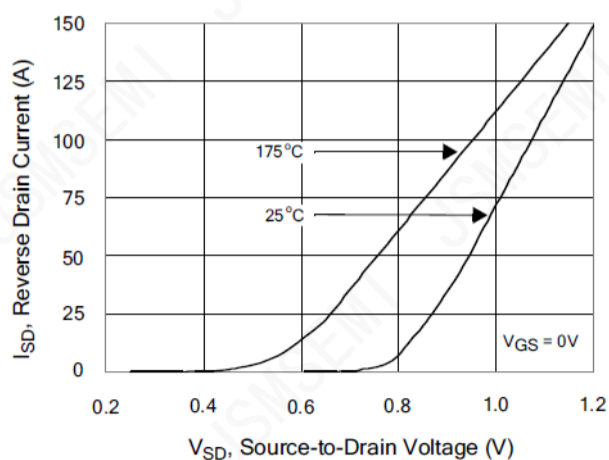
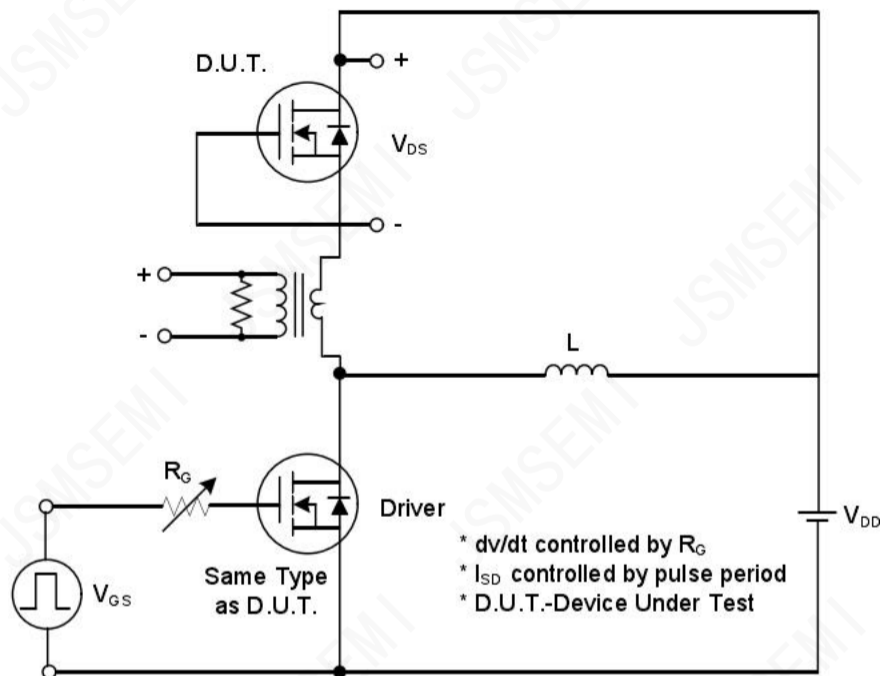


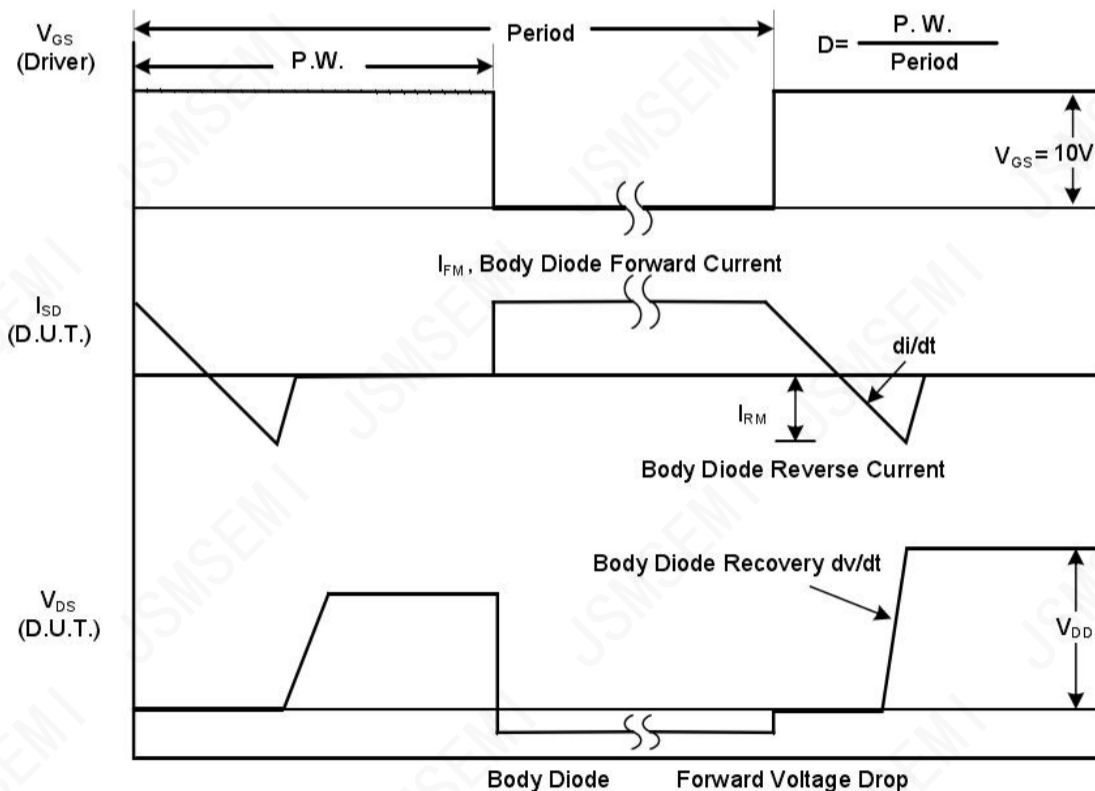
Figure 16. Typical Body Diode Transfer Characteristics



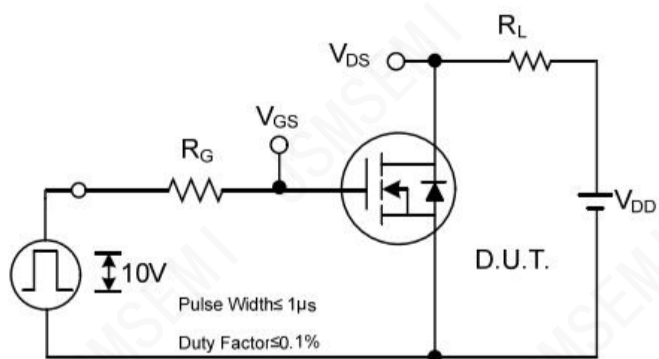
■ RATING AND CHARACTERISTIC CURVES



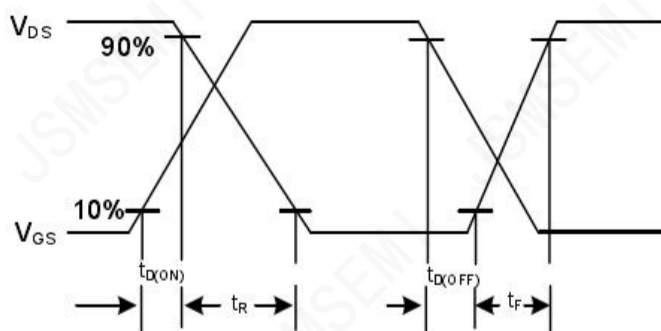
Peak Diode Recovery dv/dt Test Circuit



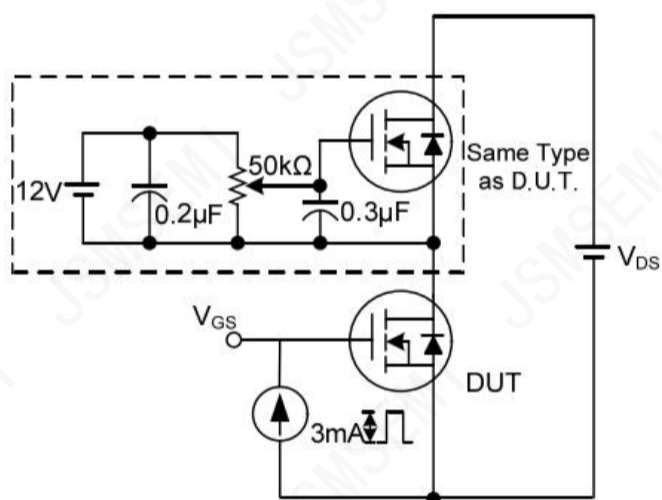
Peak Diode Recovery dv/dt Waveforms



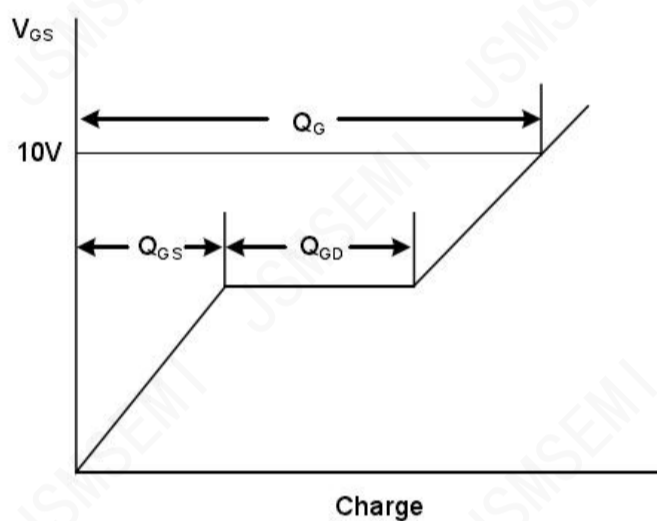
Switching Test Circuit



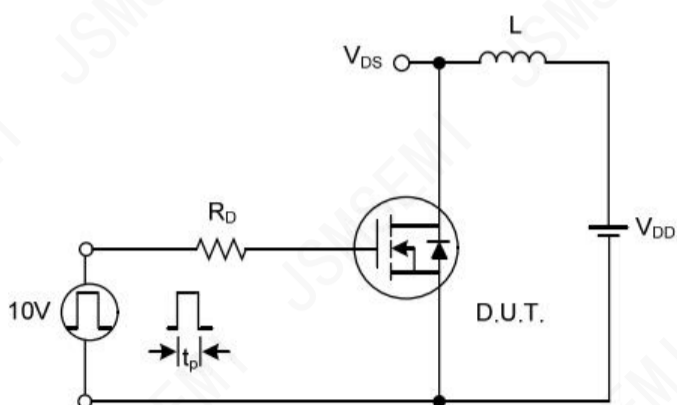
Switching Waveforms



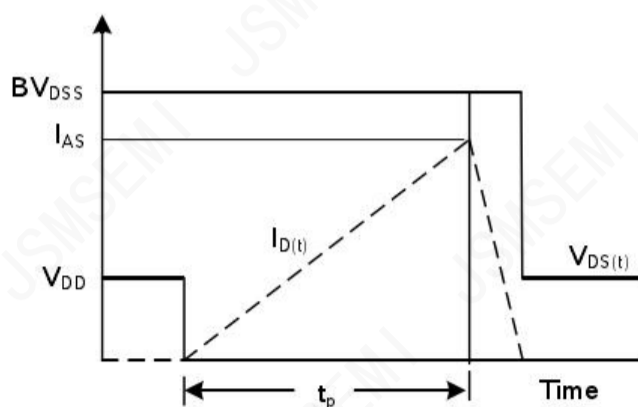
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

Figure A: Gate Charge Test Circuit and Waveform

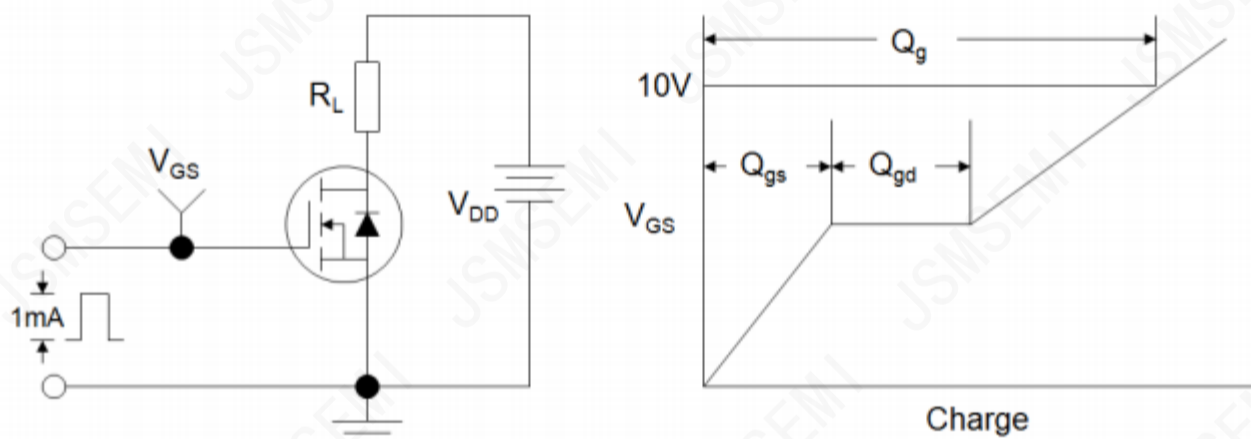


Figure B: Resistive Switching Test Circuit and Waveform

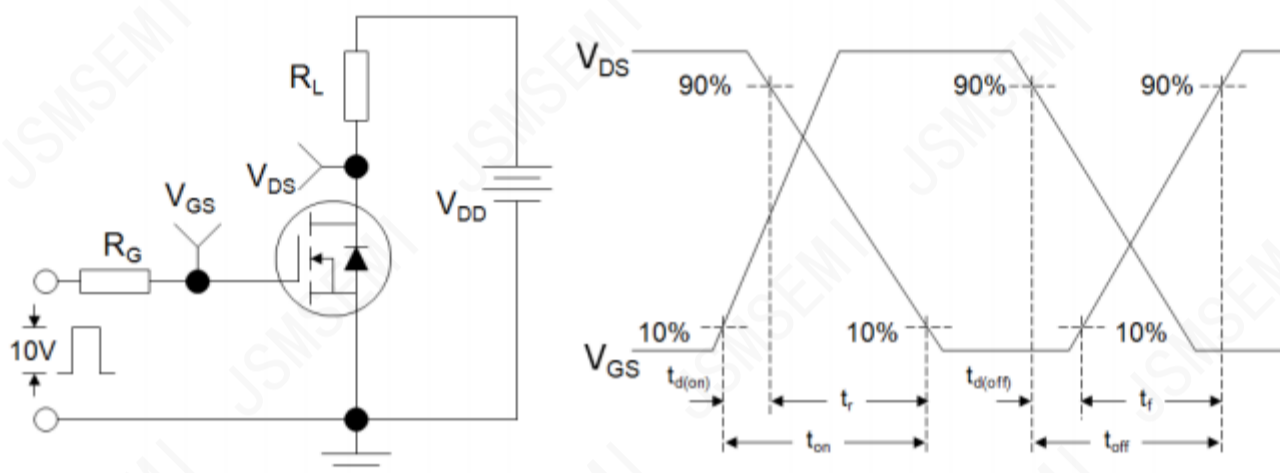
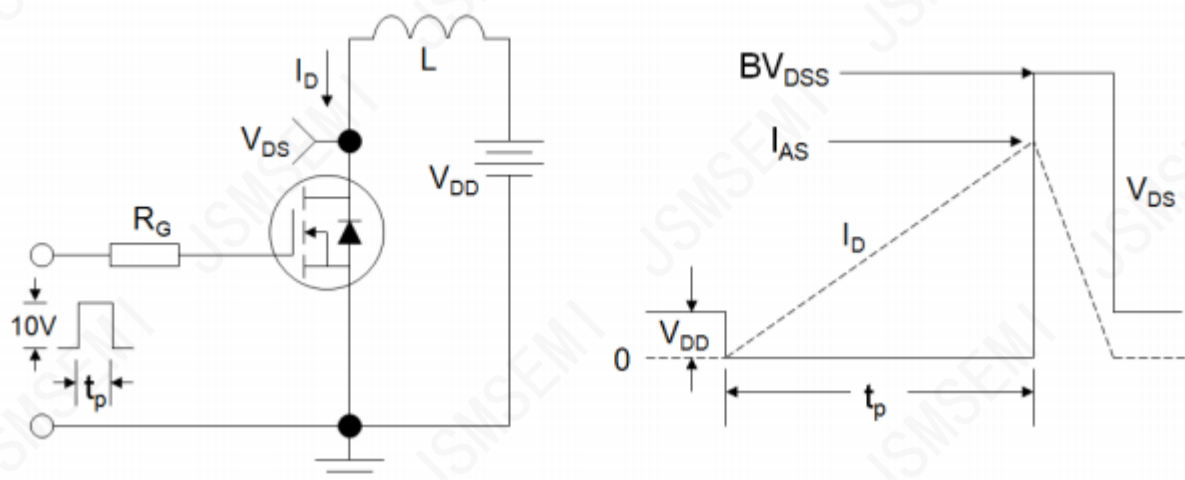
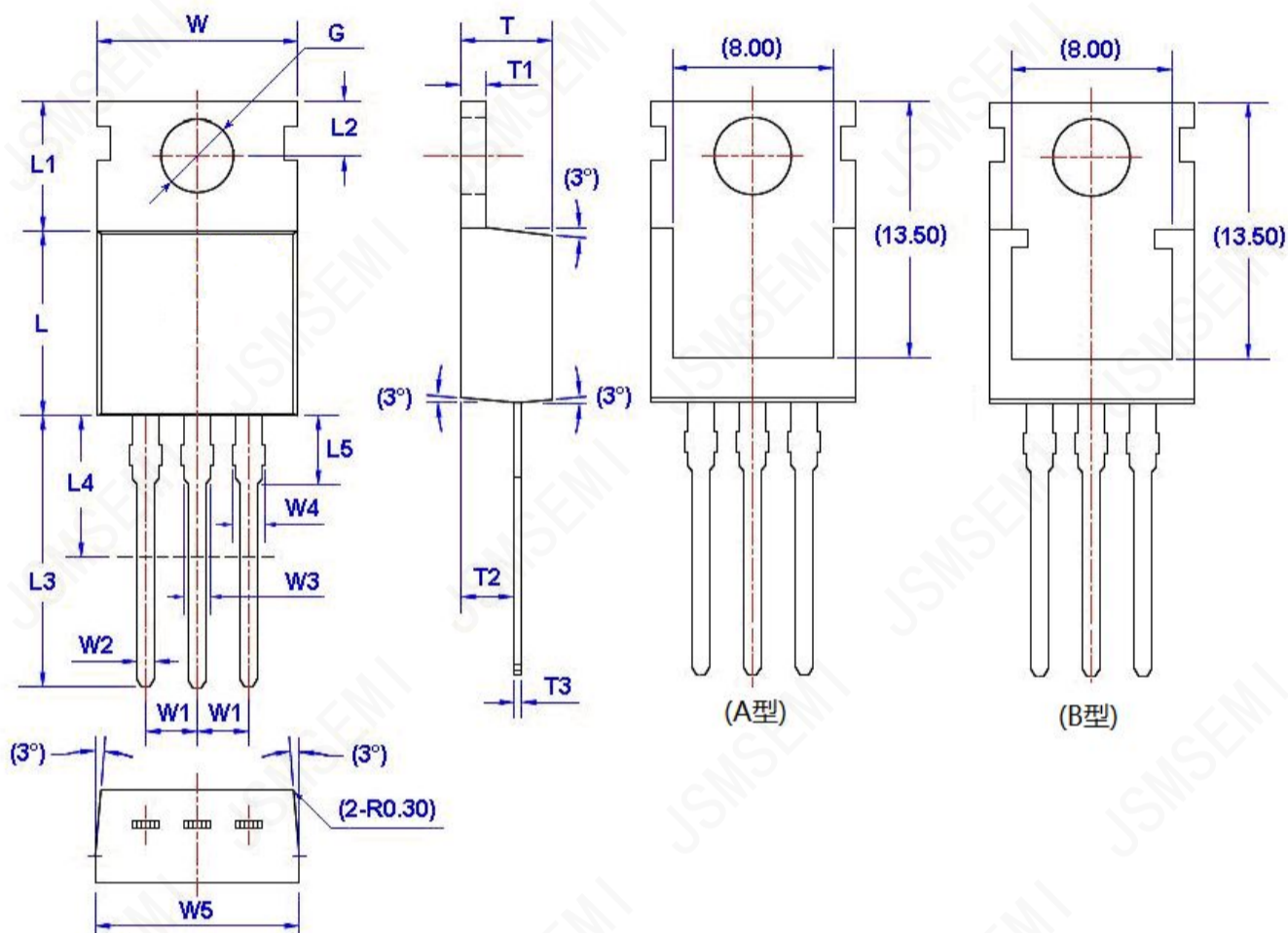


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



Package Information

TO-220-3



Unit: mm

Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.66	10.28	W5	9.80	10.20	L4**	6.20	6.60	T3	0.45	0.60
W1	2.54 (TYP)		L	9.00	9.40	L5	2.79	3.30	G(Φ)	3.50	3.70
W2	0.70	0.95	L1	6.40	6.80	T	4.30	4.70			
W3	1.17	1.37	L2	2.70	2.90	T1	1.15	1.40			
W4*	1.32	1.72	L3	12.70	14.27	T2	2.20	2.60			

Revision History

Rev.	Change	Date
V1.0	Initial version	3/11/2019
V1.1	Data update	6/27/2021

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