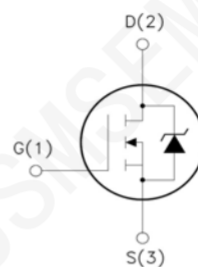
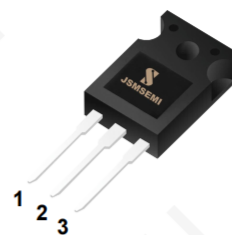


Features:

- ◆ Low Intrinsic Capacitances.
- ◆ Excellent Switching Characteristics.
- ◆ Extended Safe Operating Area.
- ◆ Unrivalled Gate Charge :Qg=50 nC (Typ.).
- ◆ $V_{DS}=500V, I_D=23A$
- ◆ $R_{DS(on)}:0.23\Omega$ (Max) @ $V_G=10V$
- ◆ 100% Avalanche Tested



TO-247S
 1.Gate (G)
 2.Drain (D)
 3.Source (S)

Absolute Maximum Ratings (Ta=25°C unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-Source Voltage		500	V
I_D	Drain Current	$T_C=25^\circ\text{C}$	23	A
		$T_C=100^\circ\text{C}$	12.9	
V_{GSS}	Gate- Source Voltage		± 30	V
E_{AS}	Single Pulse Avalanche Energy (note1)		980	mJ
I_{AR}	Avalanche Current (note2)		20	A
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)		200	W
T_j	Junction Temperature(Max)		150	°C
T_{stg}	Storage Temperature		-55~+150	
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		300	

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	-	0.62	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	

Electrical Characteristics (Ta=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0	500	-	-	V
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temperature Coefficient	I _D =250μA ,Reference to 25℃	-	0.53	-	V/℃
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =500V, V _{GS} =0V	-	-	1	μA
		V _{DS} =400V, T _c =125℃			10	
I _{GSSF}	Gate-body leakage Current, Forward	V _{GS} =+30V, V _{DS} =0V	-	-	100	nA
I _{GSSR}	Gate-body leakage Current, Reverse	V _{GS} =-30V, V _{DS} =0V	-	-	-100	
On Characteristics						
V _{GS(TH)}	Date Threshold Voltage	I _D =250μA, V _{DS} =V _{GS}	2.5	-	4.5	V
R _{DS(ON)}	Static Drain-Source On-Resistance	I _D =10A, V _{GS} =10V	-	0.23	-	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0, f=1.0MHz	-	3420	-	pF
C _{oss}	Output Capacitance		-	325	-	
C _{rss}	Reverse Transfer Capacitance		-	25	-	
Switching Characteristics						
T _{d(on)}	Turn-On Delay Time	V _{DD} =250V, I _D =20A R _G =25Ω (Note 3,4)	-	95	200	nS
Tr	Turn-On Rise Time		-	375	760	
T _{d(off)}	Turn-Off Delay Time		-	100	210	
T _f	Turn-Off Rise Time		-	105	220	
Q _g	Total Gate Charge	V _{DS} =400V, V _{GS} =10V, I _D =20A (Note 3,4)	-	50	65	nC
Q _{gs}	Gate-Source Charge		-	14.8	-	
Q _{gd}	Gate-Drain Charge		-	21.6	-	
Drain-Source Diode Characteristics and Maximum Ratings						
I _s	Max. Diode Forward Current	-	-	-	20	A
I _{SM}	Max. Pulsed Forward Current	-	-	-	80	
V _{SD}	Diode Forward Voltage	I _D =20A	-	-	1.5	V
T _{rr}	Reverse Recovery Time	I _S =20A, V _{GS} =0V	-	507	-	nS
Q _{rr}	Reverse Recovery Charge	diF/dt=100A/μs (Note3)	-	7.2	-	μC

Notes : 1, L=5.0mH, I_{AS}=20A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
 2, Repetitive Rating : Pulse width limited by maximum junction temperature
 3, Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
 4, Essentially Independent of Operating Temperature

Typical Characteristics

Figure 1. On-Region Characteristics

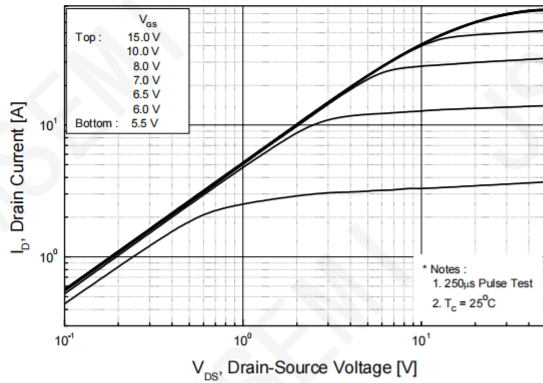


Figure 2. Transfer Characteristics

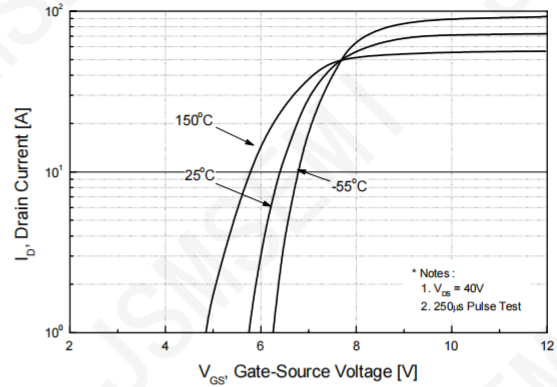


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

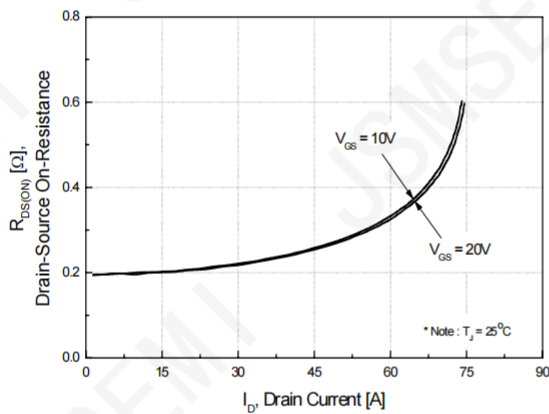


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

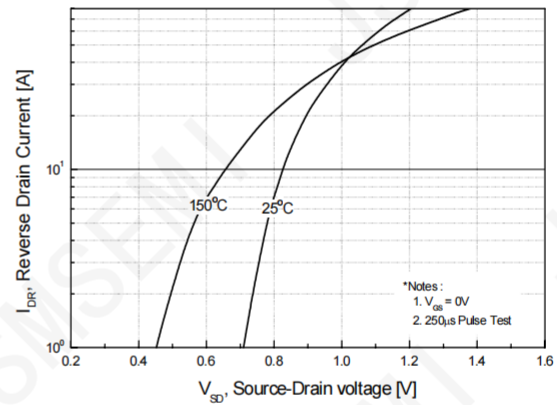


Figure 5. Capacitance Characteristics

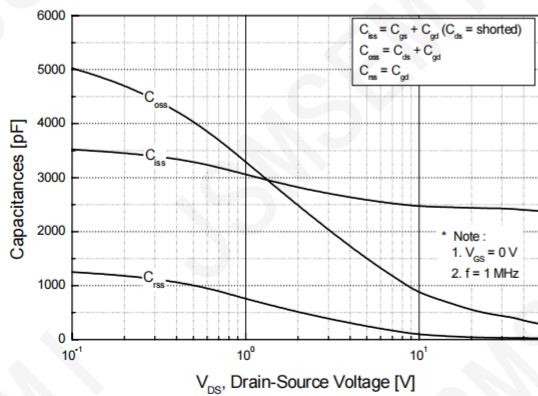
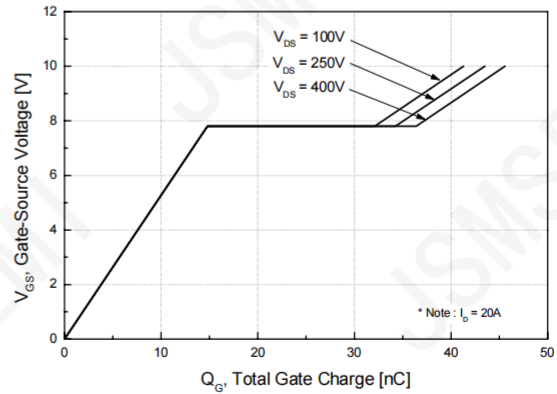


Figure 6. Gate Charge Characteristics



Typical Characteristics (Continued)

**Figure 8. On-Resistance Variation
vs. Temperature**

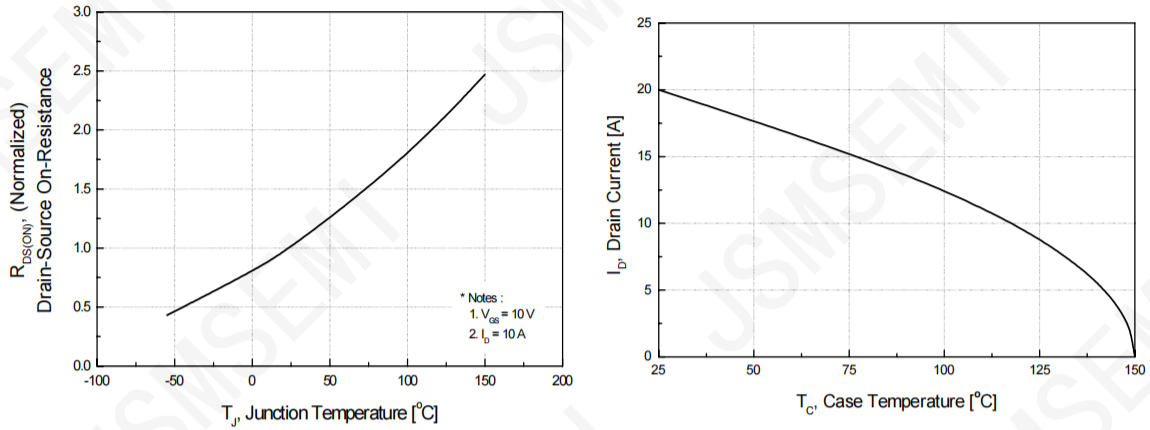


Figure 9-2. Maximum Safe Operating Area

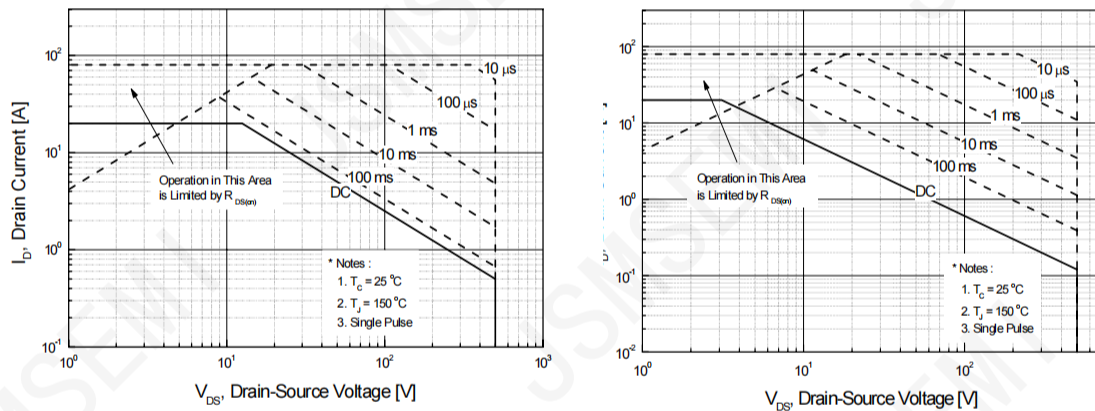
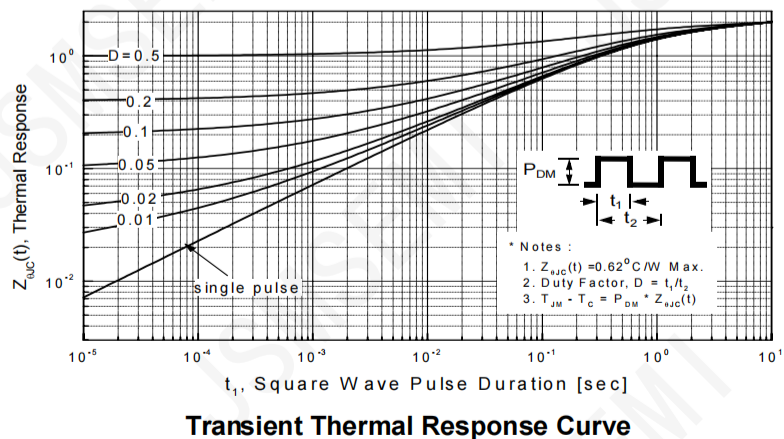
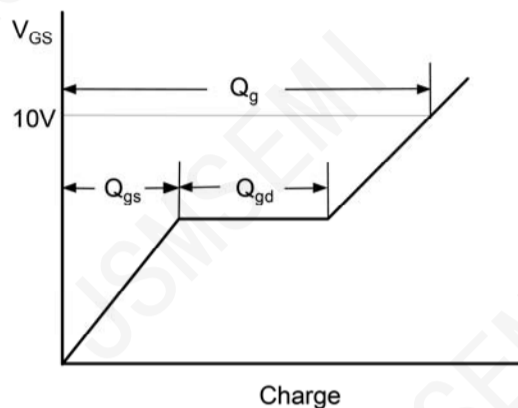
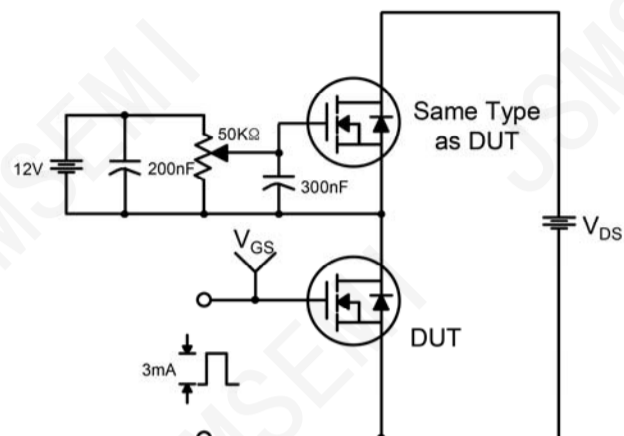


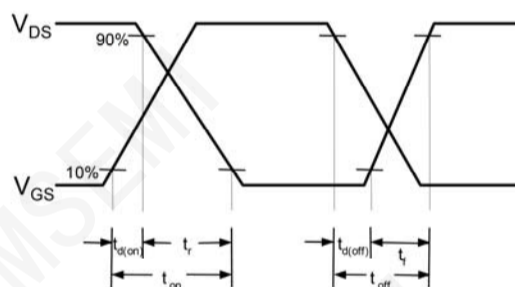
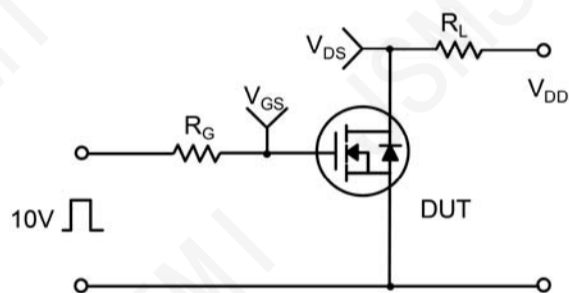
Figure 10. Maximum Drain Current vs. Case Temperature



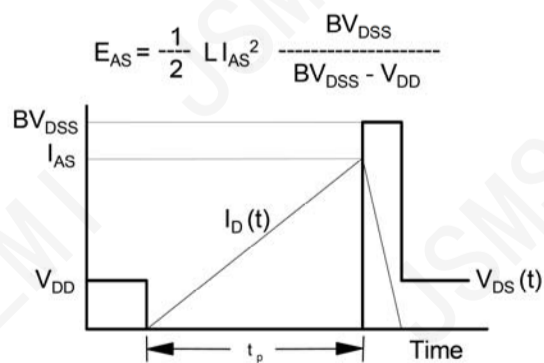
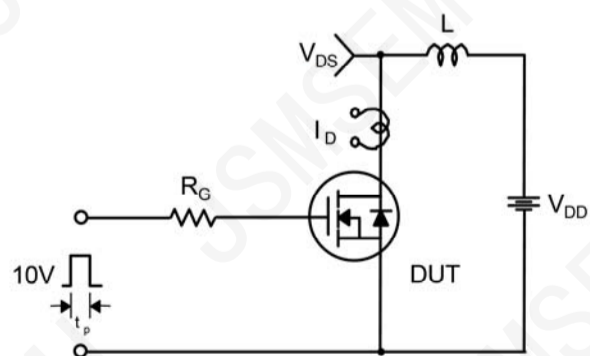
Gate Charge Test Circuit & Waveform



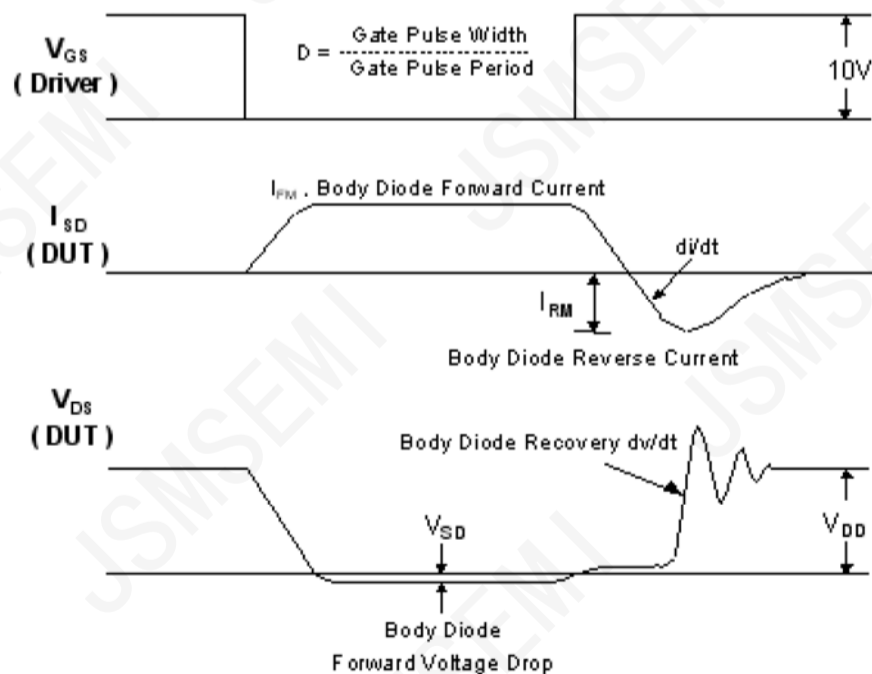
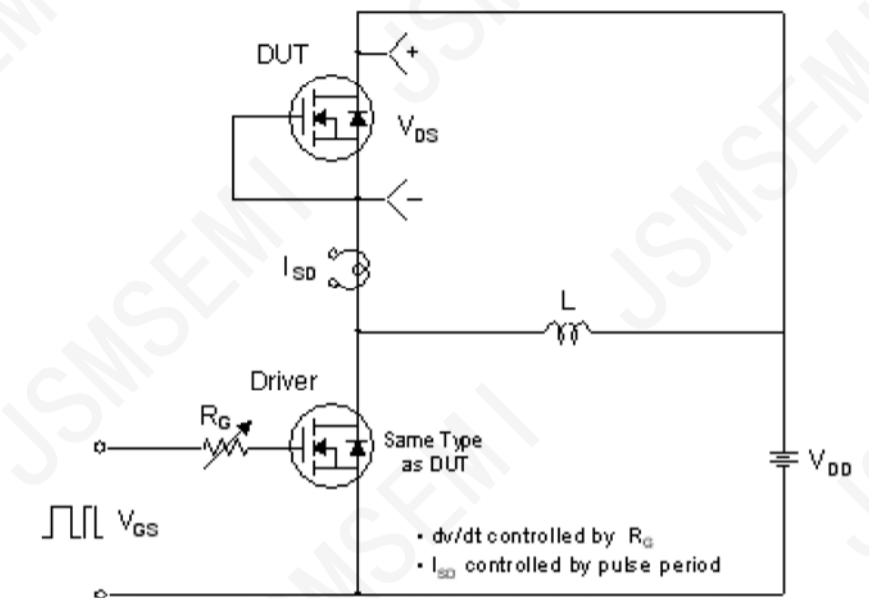
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveform



Package Dimension

TO-247S

Unit: mm

