



TM9968

N-Channel Enhancement Mosfet

General Description

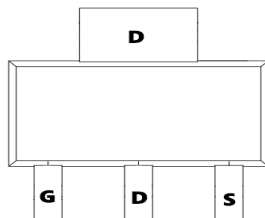
- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

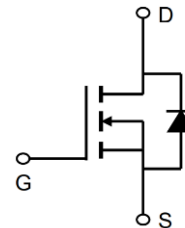
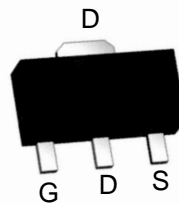
- Load switch
- PWM

General Features $V_{DS}=100V$ $I_D=15A$ $R_{DS(ON)} = 80m\Omega(\text{typ.}) @ V_{GS} = 10V$

100% UIS Tested

100% R_g Tested

SI:SOT-89-3L



Marking: 15N10 OR 9968

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit	
Common Ratings				
V_{DSS}	Drain-Source Voltage	100	V	
V_{GSS}	Gate-Source Voltage	± 20		
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150		
I_S	Diode Continuous Forward Current	$T_A=25^\circ$	A	
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	15	A
		$T_C=70^\circ\text{C}$	13	
I_{DM}^a	Pulsed Drain Current	$T_C=25^\circ\text{C}$	26	A
P_D	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	3.5	W
		$T_A=70^\circ\text{C}$	2.2	
$R_{\theta JA}^c$	Thermal Resistance-Junction to Ambient	$t \leq 10s$	35	$^\circ\text{C/W}$
		Steady State	70	$^\circ\text{C/W}$
I_{AS}^b	Avalanche Current, Single pulse (L=0.5mH)	7	A	
E_{AS}^b	Avalanche Energy, Single pulse (L=0.5mH)	12	mJ	

Note a : Pulse width limited by max. junction temperature.

Note b : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature $T_j=25^\circ\text{C}$).Note c : Surface Mounted on 1in^2 pad area.

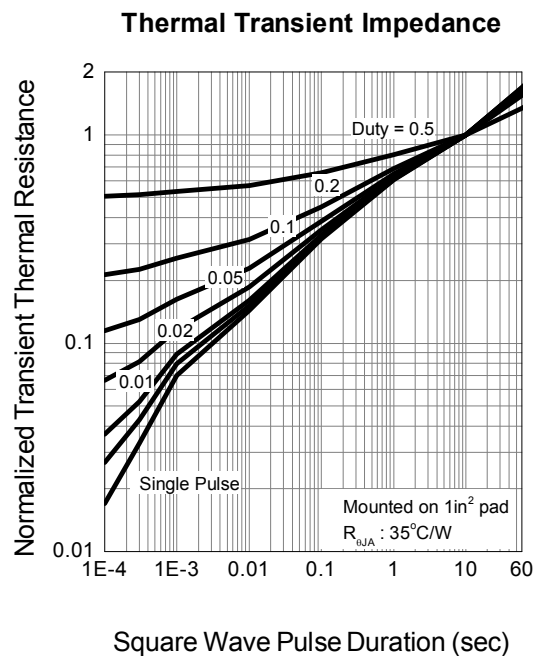
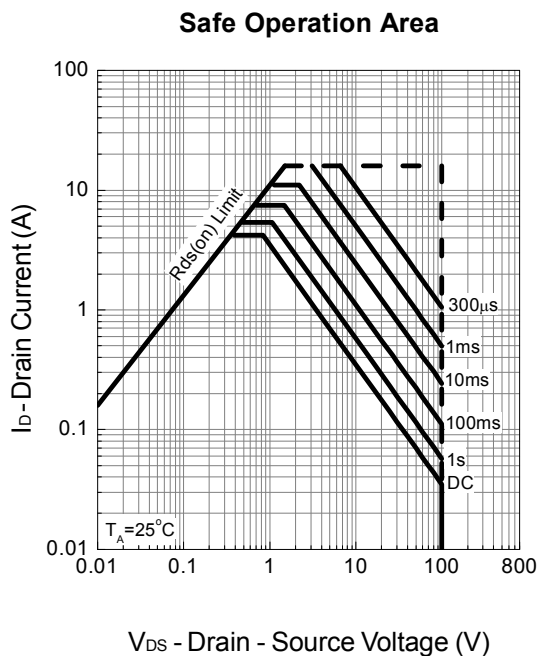
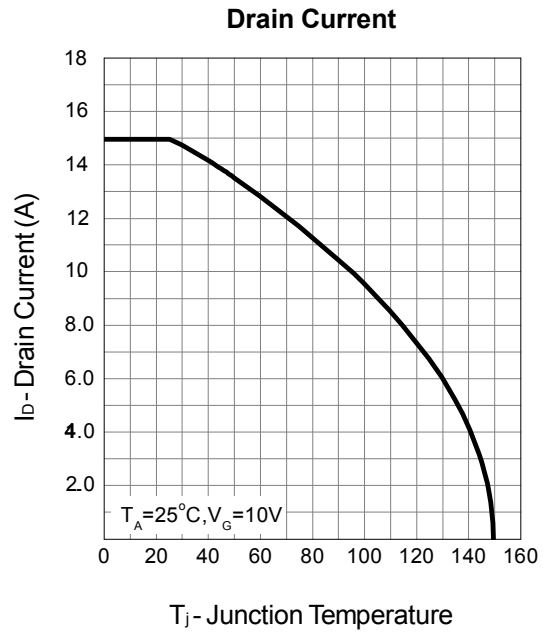
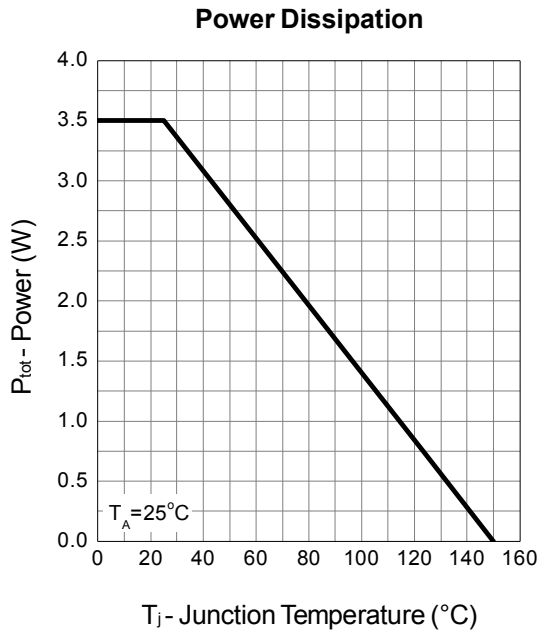
Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=80V, V_{GS}=0V$ $T_J=85^\circ\text{C}$	-	-	1	μA
			-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1	2	3	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
$R_{DS(ON)}^d$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=4A$	-	80	100	$m\Omega$
		$V_{GS}=4.5V, I_{DS}=3.5A$	-	85	110	$m\Omega$
Diode Characteristics						
V_{SD}^d	Diode Forward Voltage	$I_{SD}=3A, V_{GS}=0V$	-	0.8	1.3	V
t_{rr}	Reverse Recovery Time	$I_{SD}=3A, dI_{SD}/dt=100A/\mu s$	-	27	-	ns
Q_{rr}	Reverse Recovery Charge		-	36	-	nC
Dynamic Characteristics^e						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	-	2.5	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=30V,$ Frequency=1.0MHz	-	740	960	μF
C_{oss}	Output Capacitance		-	45	-	
C_{rss}	Reverse Transfer Capacitance		-	24	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=30V, R_L=30\Omega,$ $I_{DS}=1A, V_{GEN}=10V,$ $R_G=6\Omega$	-	11	20	ns
t_r	Turn-on Rise Time		-	6	11	
$t_{d(OFF)}$	Turn-off Delay Time		-	27	49	
t_f	Turn-off Fall Time		-	5	10	
Gate Charge Characteristics^e						
Q_g	Total Gate Charge	$V_{DS}=30V, V_{GS}=4.5V,$ $I_{DS}=4A$	-	7.7	-	nC
Q_g	Total Gate Charge	$V_{DS}=30V, V_{GS}=10V,$ $I_{DS}=4A$	-	16	23	
Q_{gs}	Gate-Source Charge		-	2.5	-	
Q_{gd}	Gate-Drain Charge		-	3	-	

Note d : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

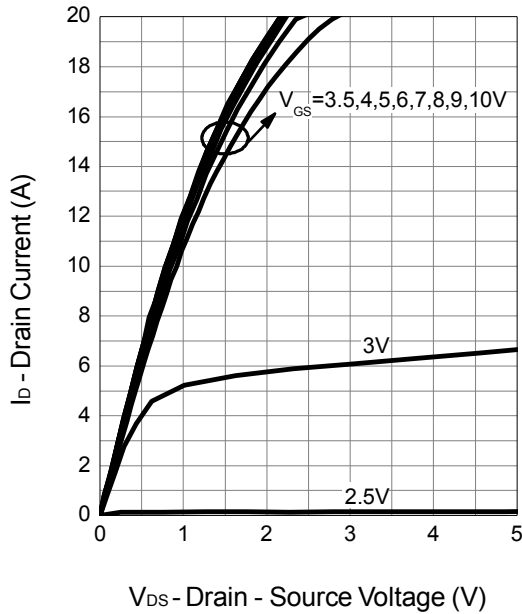
Note e : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

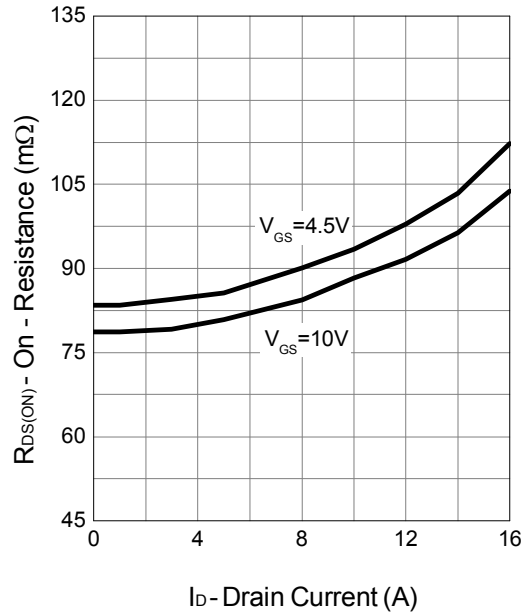




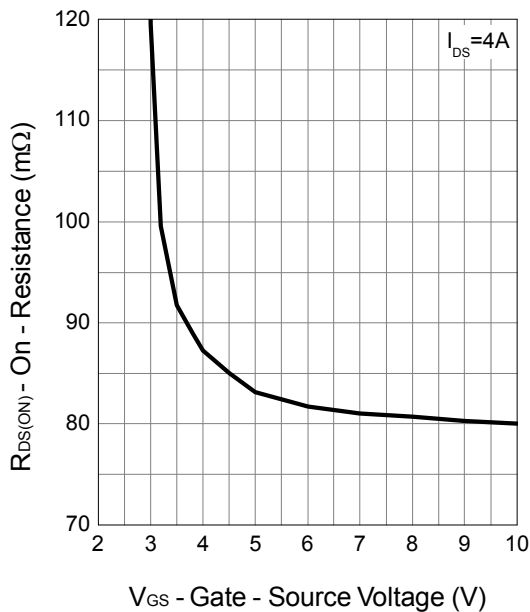
Output Characteristics



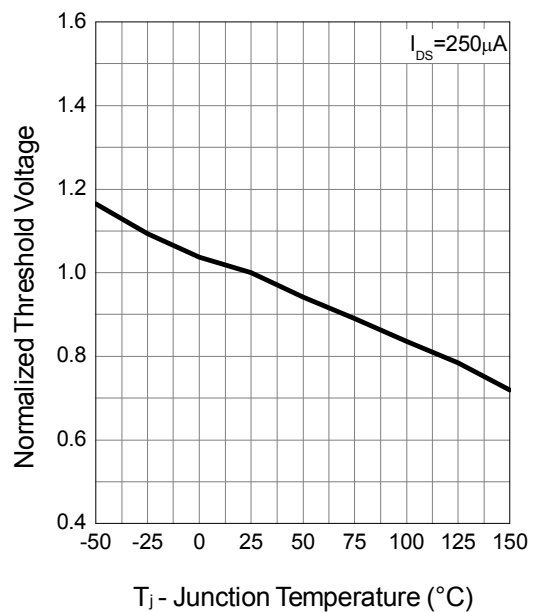
Drain-Source On Resistance



Gate-Source On Resistance

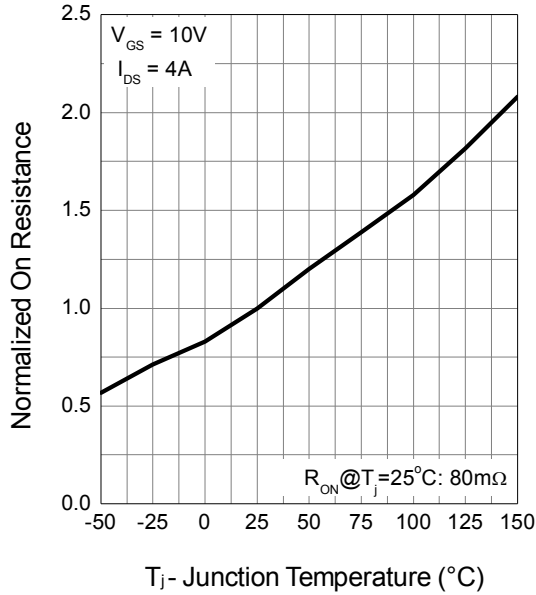


Gate Threshold Voltage

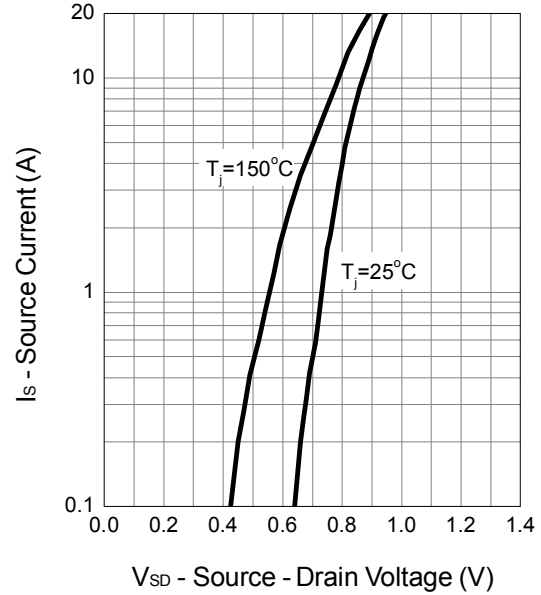




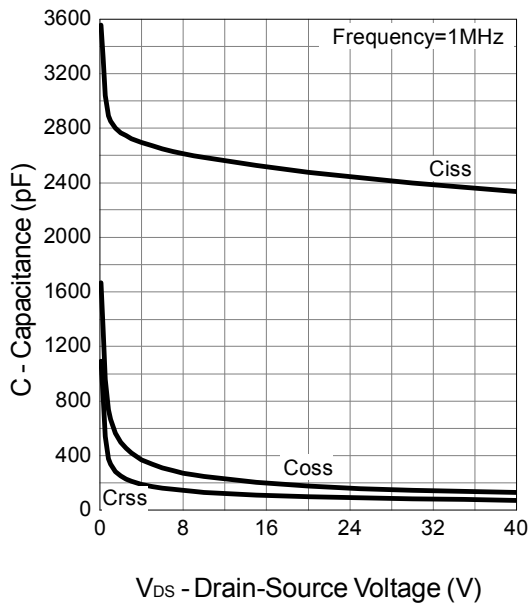
Drain-Source On Resistance



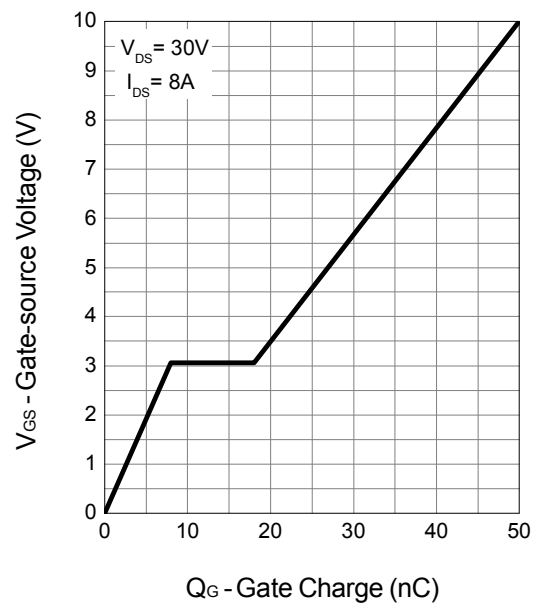
Source-Drain Diode Forward



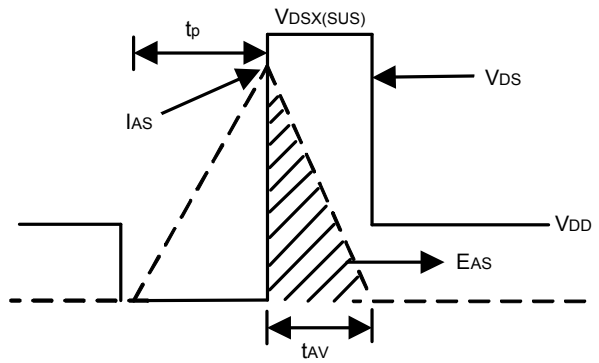
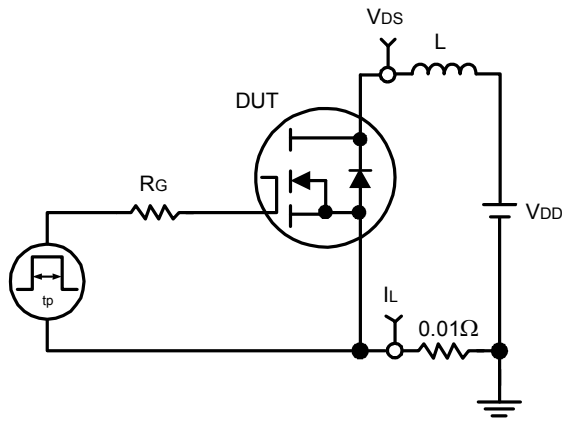
Capacitance



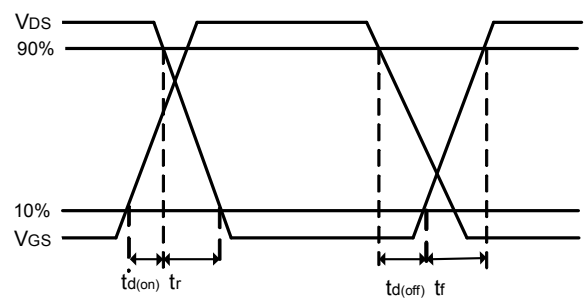
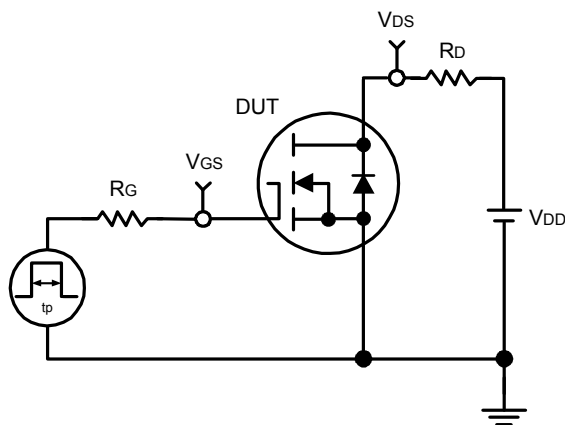
Gate Charge



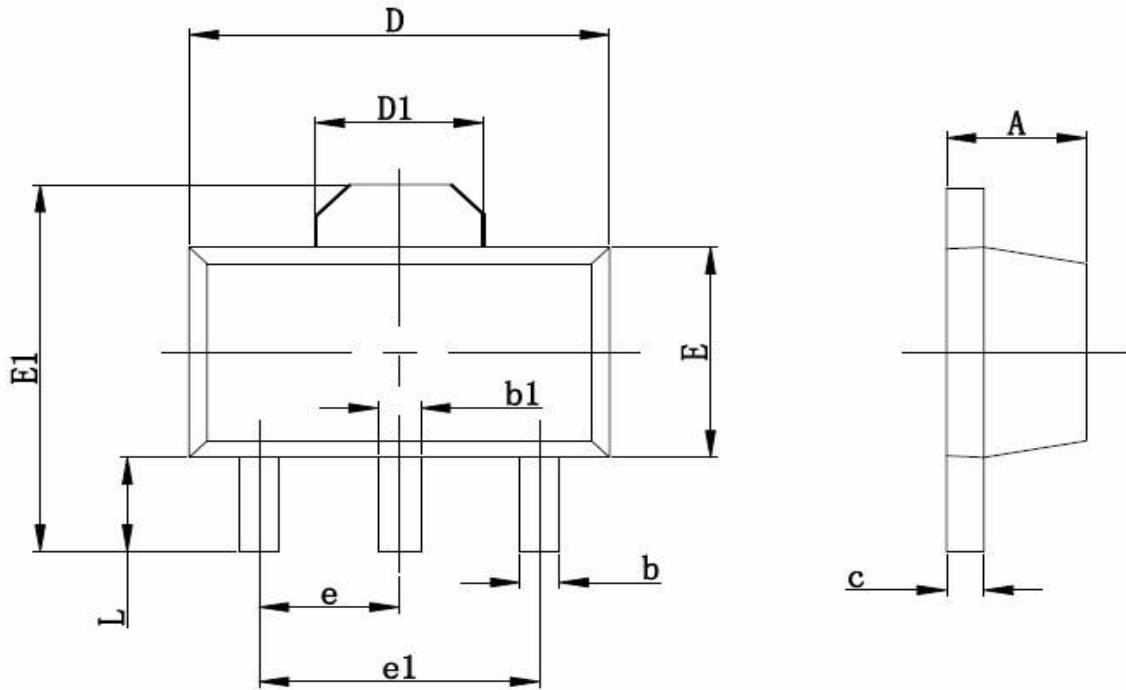
Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



Package Mechanical Data:SOT-89-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.350	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.350	2.550	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.100	0.035	0.047

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