
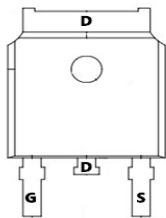


TM09N20D

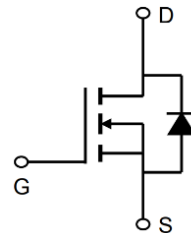
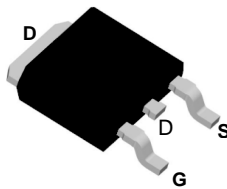
N-Channel Enhancement Mosfet

<p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM 	<p>General Features</p> <p>$V_{DS}=200V$ $I_D =9.0A$</p> <p>$R_{DS(ON)} = 260 m\Omega$ (typ.)@ $V_{GS}=10V$</p> <p>100% UIS Tested 100% R_g Tested</p> 
--	--

D:TO-252-3L



Marking:9N20



Absolute Maximum Ratings ($T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	200	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current- $T_C=25^\circ C$	9	A
	Continuous Drain Current- $T_C=100^\circ C$	6.6	
I_{DM}	Pulsed Drain Current	28	
P_D	Power Dissipation($T_C=25^\circ C$)	55	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristic

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case ²	2.3	$^\circ C/W$

TM09N20D

N-Channel Enhancement Mosfet

Electrical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu A$	200	215	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=200V$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage ³	$V_{GS}=V_{DS}, I_D=250\ \mu A$	1	1.7	2.5	V
$R_{DS(ON)}$	Drain-Source On Resistance ³	$V_{GS}=10V, I_D=4.5A$	---	260	300	m Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance ⁴	$V_{DS}=25V, V_{GS}=0V, f=1MHz$	---	639	---	pF
C_{oss}	Output Capacitance ⁴		---	89	---	
C_{rss}	Reverse Transfer Capacitance ⁴		---	34	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time ⁴	$V_{DD}=150V, I_D=4.5A,$ $R_{GEN}=5\ \Omega$	---	6.3	---	ns
t_r	Rise Time ⁴		---	10	---	ns
$t_{d(off)}$	Turn-Off Delay Time ⁴		---	19	---	ns
t_f	Fall Time ⁴		---	11	---	ns
Q_g	Total Gate Charge ⁴	$V_{GS}=10V, V_{DS}=160V,$ $I_D=4.5A$	---	15	---	nC
Q_{gs}	Gate-Source Charge ⁴		---	3.3	---	nC
Q_{gd}	Gate-Drain "Miller" Charge ⁴		---	5	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage	$V_{GS}=0V, I_D=4.5A$	---	---	1.2	V
I_S	Continuous Drain Current	$V_D=V_G=0V$	---	---	9	A
I_{SM}	Pulsed Drain Current	$V_D=V_G=0V$	---	---	20	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\ \mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production



Typical Characteristics: (T_C=25°C unless otherwise noted)

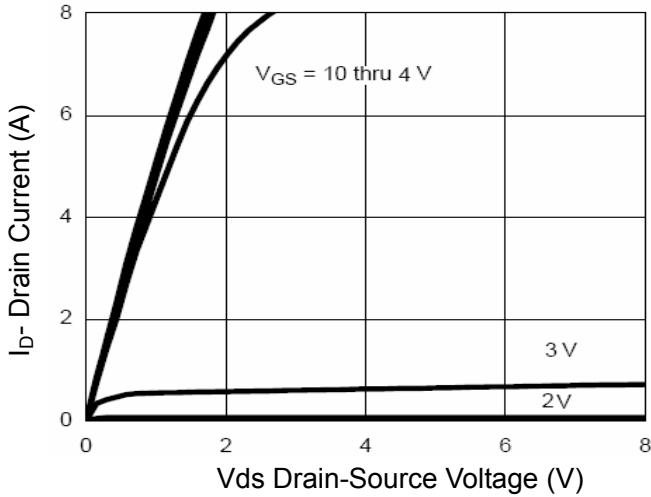


Figure 1 Output Characteristics

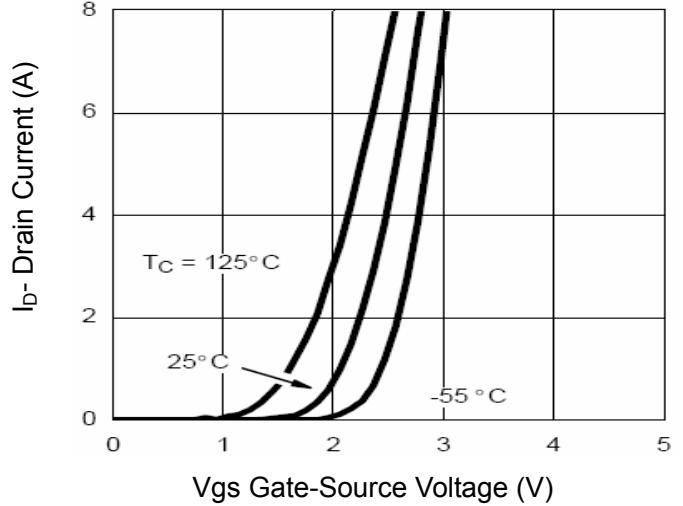


Figure 2 Transfer Characteristics

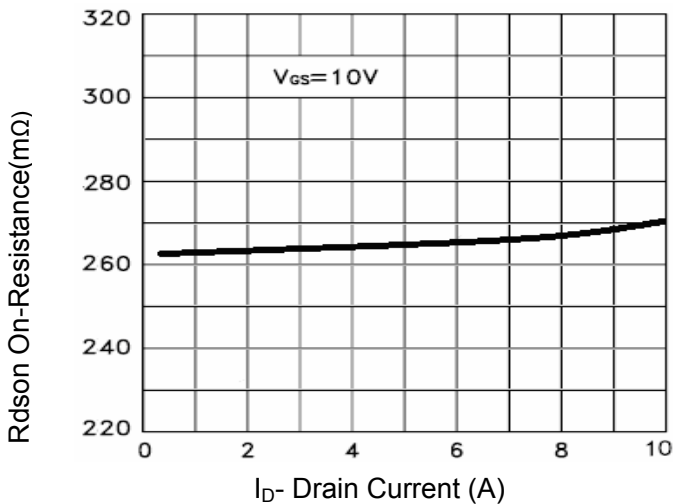


Figure 3 Rds(on)- Drain Current

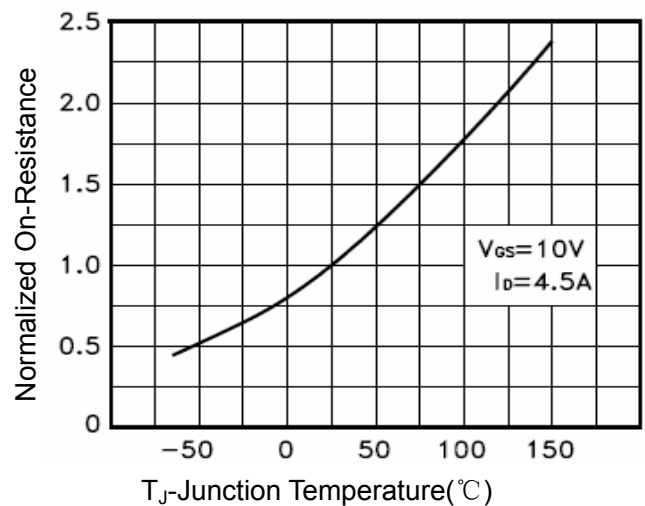


Figure 4 Rds(on)-Junction Temperature

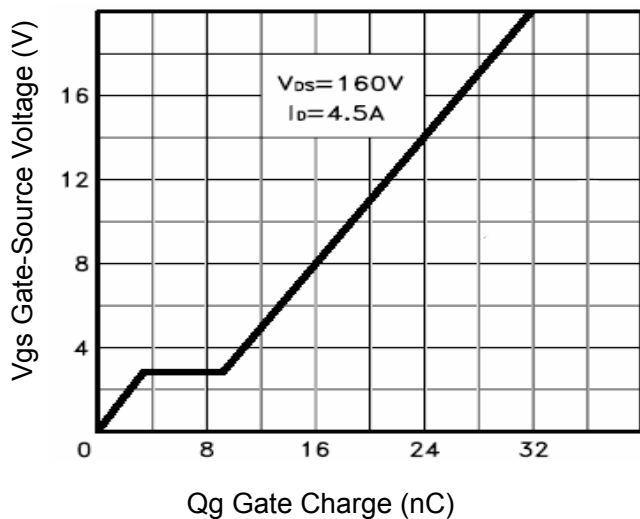


Figure 5 Gate Charge

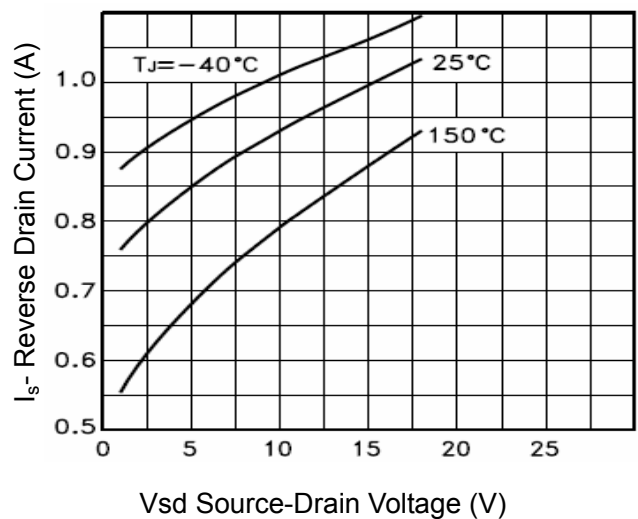


Figure 6 Source- Drain Diode Forward



TM09N20D

N-Channel Enhancement Mosfet

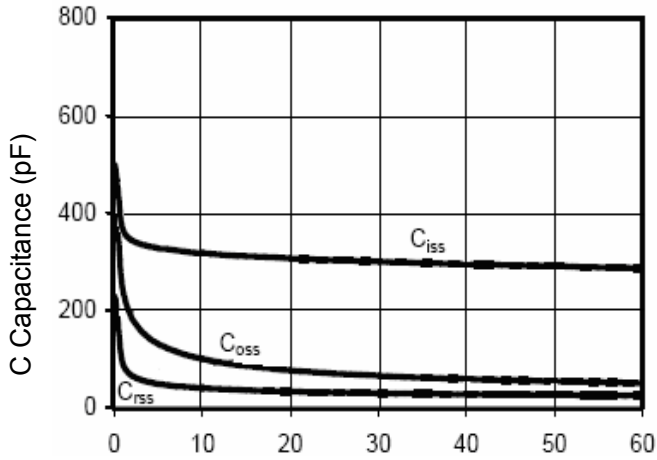


Figure 7 Capacitance vs Vds

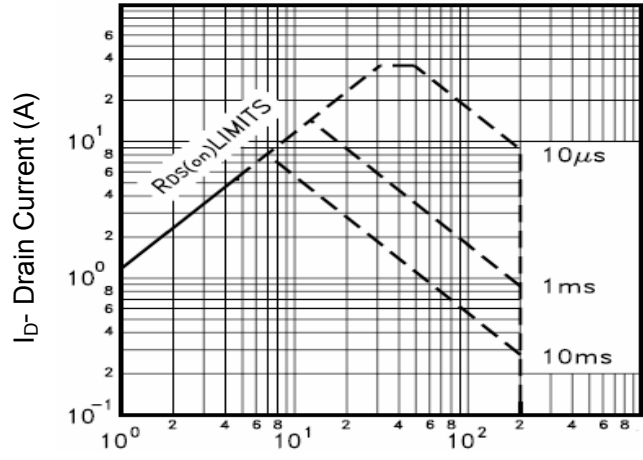


Figure 8 Safe Operation Area

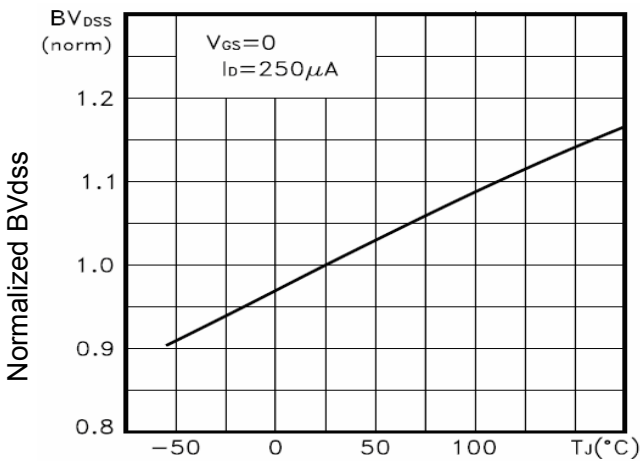


Figure 9 BV_{DSS} vs Junction Temperature

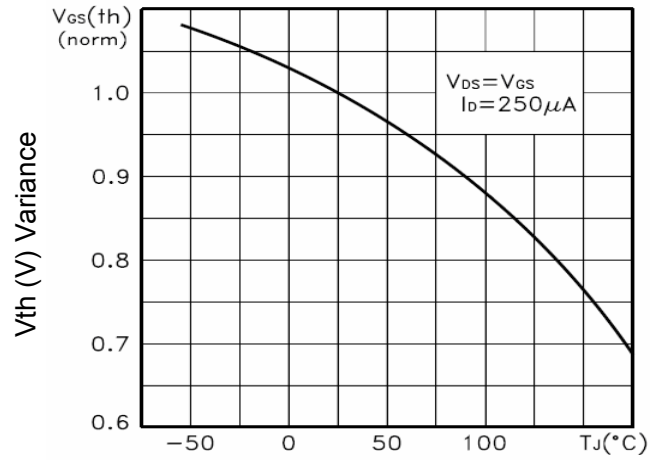


Figure 10 $V_{GS(th)}$ vs Junction Temperature

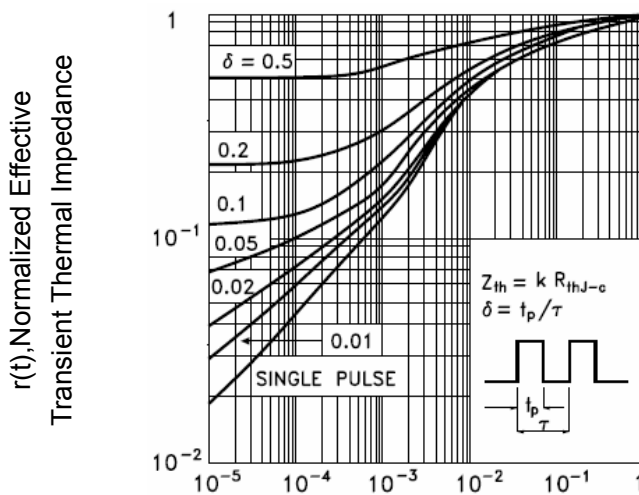
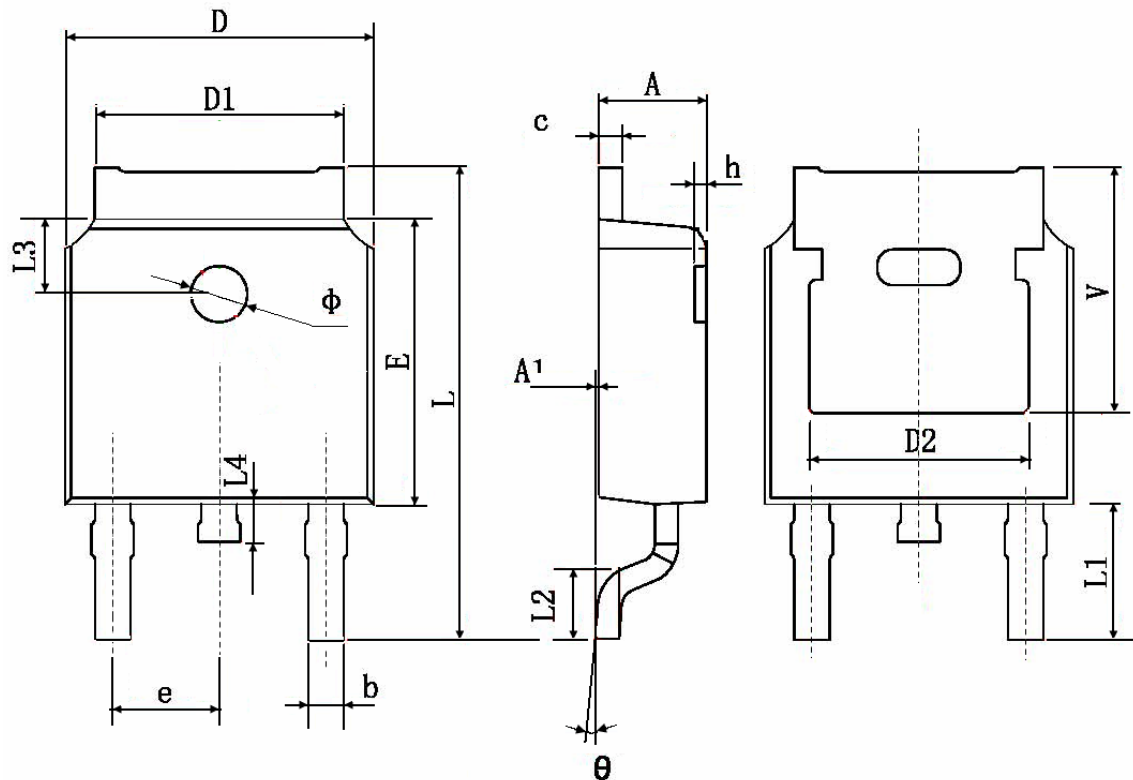


Figure 11 Normalized Maximum Transient Thermal Impedance

Package Mechanical Data: TO-252-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	