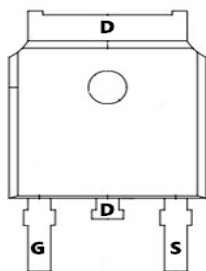# TMN10020D

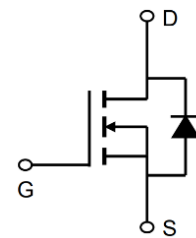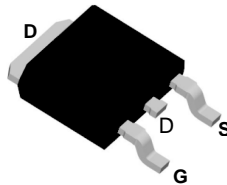## N-Channel Enhancement Mosfet

General Description

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

Applications

• Load switch
• PWM

General Features

V_{DS} =100V I_D = 20A

$R_{DS(ON)}$= 65mΩ(typ.) @ V_{GS}= 10V

100% UIS Tested
100% R_g Tested

Green
Product

D:TO-252-3L

Marking:20N10

Absolute Maximum Ratings (T_C=25℃ unless otherwise noted)

Symbol		ng	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	20	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	12	A
I_{DM}	Pulsed Drain Current[2]	20	A
EAS	Single Pulse Avalanche Energy[3]	4.1	mJ
I_{AS}	Avalanche Current	10	A
P_D@T_C=25℃	Total Power Dissipation[3]	41.7	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction-ambient [1]	---	50	℃/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	---	3.0	℃/W

Electrical Characteristics（T_J = 25°C, unless otherwise noted）

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250µA	100	-	-	V
Gate-body Leakage current		I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T_J=25°C	I_{DSS}	V_{DS} =100V, V_{GS} = 0V	-	-	1	µA
	T_J=100°C			-	-	100	
Gate-Threshold Voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250µA	1.2	-	2.5	V
Drain-Source on-Resistance[4]		$R_{DS(on)}$	V_{GS} = 10V, I_D = 5A	-	65	90	mΩ
			V_{GS} = 4.5V, I_D = 3A	-	75	105	
Forward Transconductance[4]		g_{fs}	V_{DS}=5V , I_D=5A	-	12	-	S
Dynamic Characteristics[5]							
Input Capacitance		C_{iss}	V_{DS} = 15V, V_{GS} =0V, f =1MHz	-	1220	-	pF
Output Capacitance		C_{oss}		-	53	-	
Reverse Transfer Capacitance		C_{rss}		-	42	-	
Gate Resistance		R_g	f =1MHz	-	1.3	-	Ω
Switching Characteristics[5]							
Total Gate Charge		Q_g	V_{GS} = 10V, V_{DS} = 50V, I_D=5A	-	20.6	-	nC
Gate-Source Charge		Q_{gs}		-	4	-	
Gate-Drain Charge		Q_{gd}		-	3.7	-	
Turn-On Delay Time		$t_{d(on)}$	V_{GS} =10V, V_{DD} =50V, R_G = 3Ω, I_D= 5A	-	4.7	-	ns
Rise Time		t_r		-	21	-	
Turn-Off Delay Time		$t_{d(off)}$		-	20	-	
Fall Time		t_f		-	16	-	
Drain-Source Body Diode Characteristics							
Diode Forward Voltage[4]		V_{SD}	I_S = 1A, V_{GS} = 0V	-	-	1.2	V
Continuous Source Current	T_C=25°C	I_s	-	-	-	20	A

Notes:
1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.

2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤2%

3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=8A

4.The power dissipation is limited by 150°C junction temperature

5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

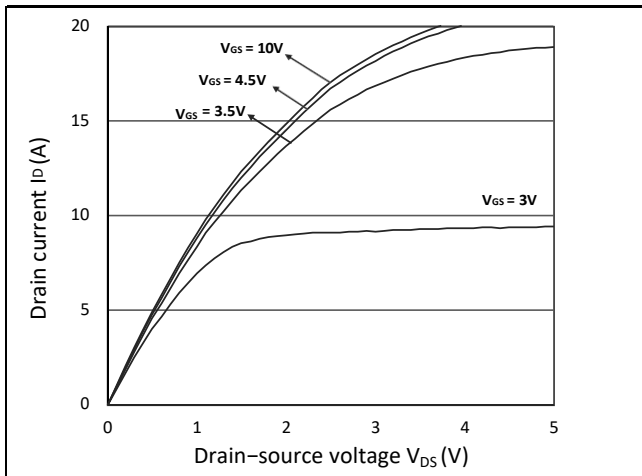## Typical Characteristics

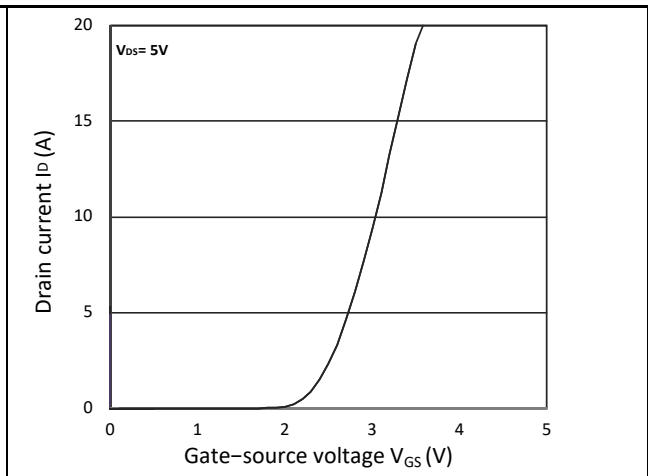Figure 1. Output Characteristics
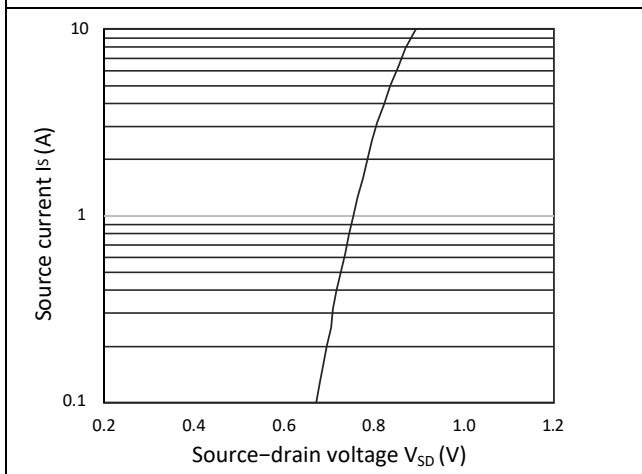

Figure 2. Transfer Characteristics
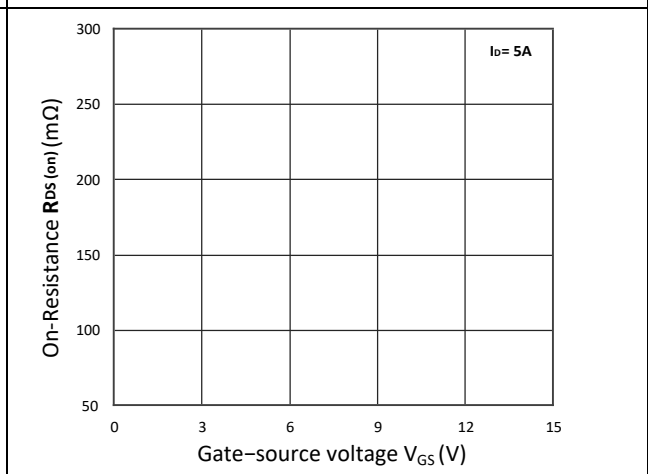

Figure 3. Forward Characteristics of Reverse

Figure 4. $R_{DS(ON)}$ vs. V_{GS}

Figure 5. $R_{DS(ON)}$ vs. I_D
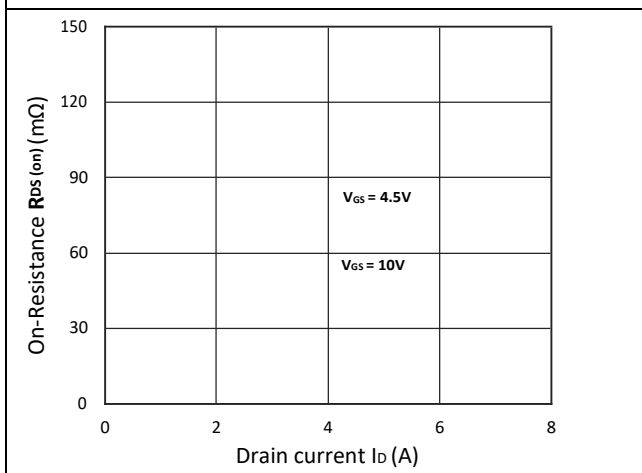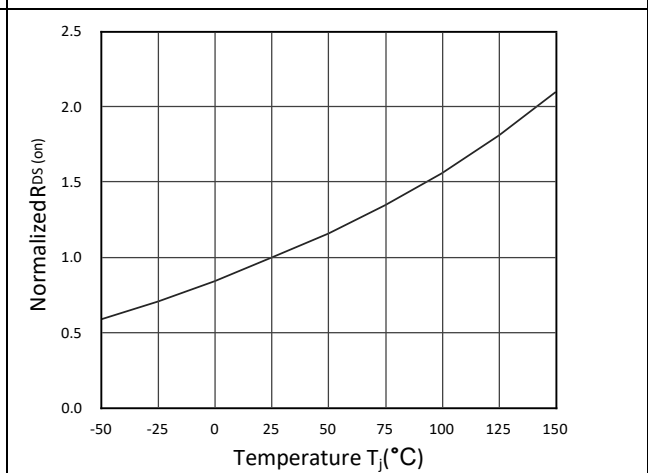

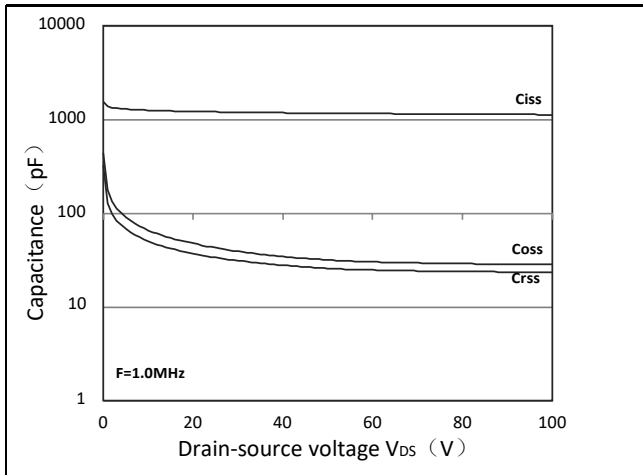Figure 6. Normalized $R_{DS(on)}$ vs. Temperature
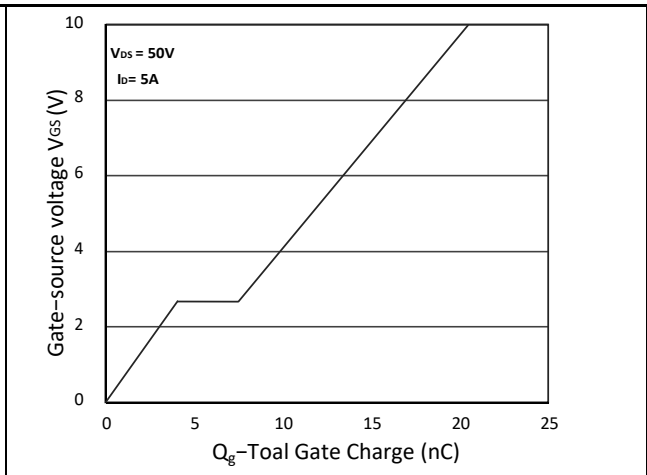
Figure 7. Capacitance Characteristics

Figure 8. Gate Charge Characteristics

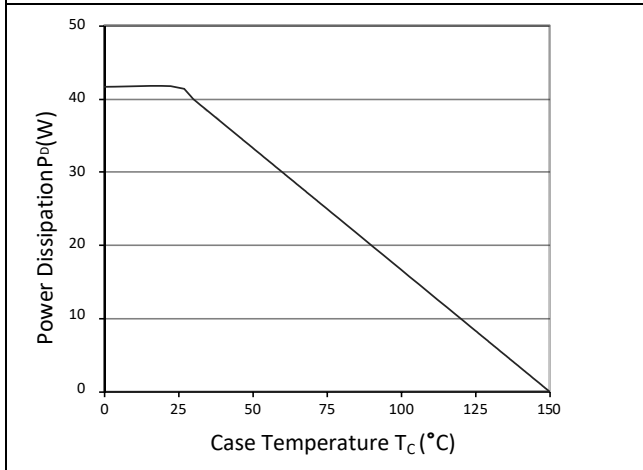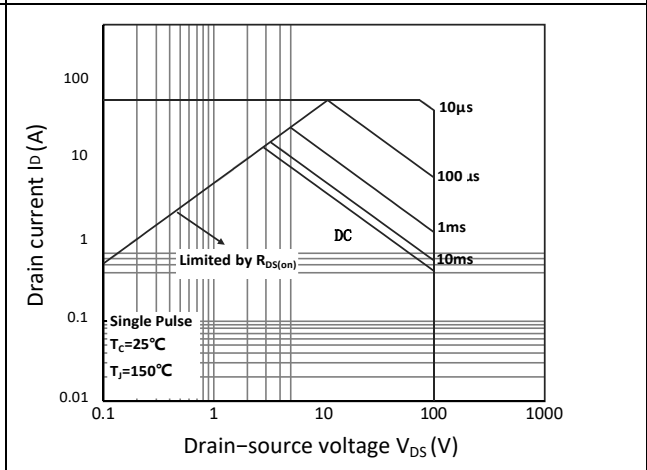
Figure 9. Power Dissipation
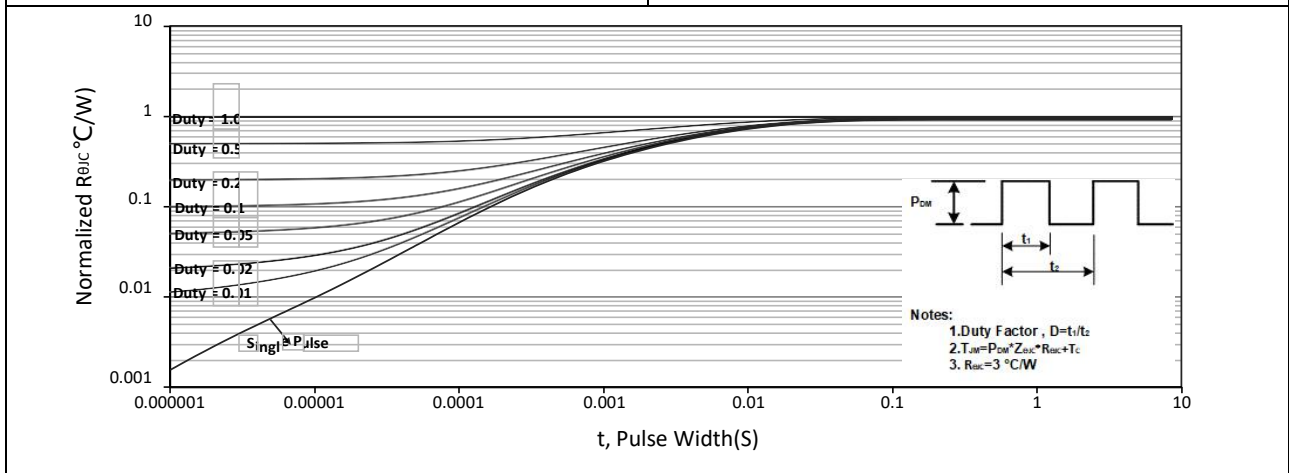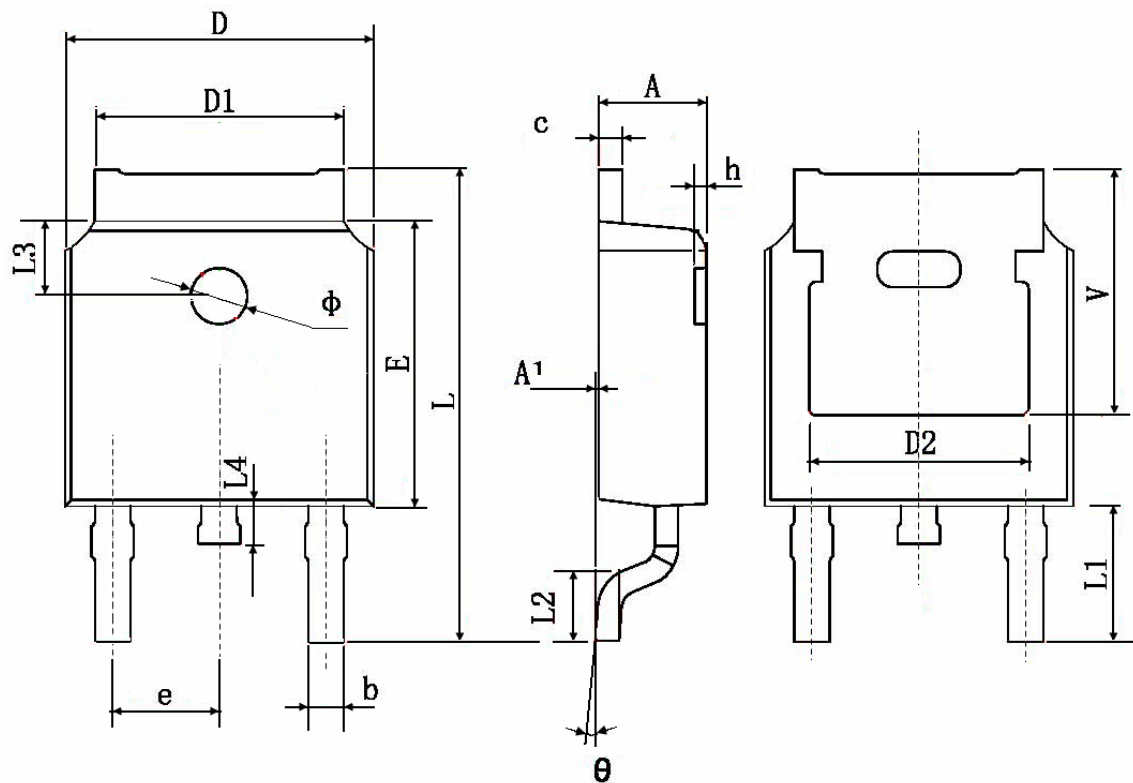

Figure10. Safe Operating Area

Figure 11. Normalized Maximum Transient Thermal Impedance

Package Information: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.	