



TMG50N10AD

N-Channel Enhancement Mosfet

General Description

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

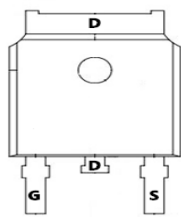
Applications

- Load switch
- PWM

General Features

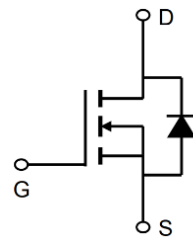
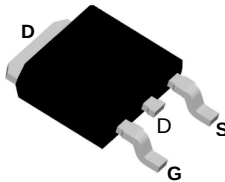
$V_{DS} = 100V$ $I_D = 48A$
 $R_{DS(ON)} = 20\text{ m}\Omega(\text{typ.}) @ V_{GS} = 10V$

100% UIS Tested

100% R_g Tested

Marking: G50N10

D:TO-252-3L

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

Symbol	Parameter		Max.	Units
V_{DS}	Drain-Source Voltage		100	V
V_{GS}	Gate-Source Voltage		± 20	V
I_D	Continuous Drain Current ^{note5}	$T_C = 25^\circ\text{C}$	48	A
I_D	Continuous Drain Current ^{note5}	$T_C = 100^\circ\text{C}$	31	A
I_{DM}	Pulsed Drain Current ^{note3}		177	A
P_D	Power Dissipation ^{note2}	$T_C = 25^\circ\text{C}$	27	W
I_{AS}	Avalanche Current ^{note3,6}		8	A
E_{AS}	Single Pulse Avalanche Energy ^{note3,6}		16	mJ
$R_{\theta JC}$	Thermal Resistance, Junction to Case		4.65	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ^{note1,4}		62	$^\circ\text{C/W}$
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	$^\circ\text{C}$



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Electrical Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	100	-	-	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} = 80V, V _{GS} = 0V	-	-	1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1.2	1.8	2.6	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 15A	-	20	23	mΩ
		V _{GS} = 4.5V, I _D = 10A	-	23	26	mΩ
g _{fs}	Forward Threshold Voltage	V _{DS} = 10V, I _D = 20A	-	22	-	S
R _g	Gate Resistance	V _{DS} = V _{GS} =0V, f = 1.0MHz	-	1.62	-	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 50V, V _{GS} = 0V, f = 1.0MHz	-	1822	-	pF
C _{oss}	Output Capacitance		-	310	-	pF
C _{rss}	Reverse Transfer Capacitance		-	23.5	-	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} = 50V, I _D = 20A, V _{GS} = 10V	-	22.7	-	nC
Q _{gs}	Gate-Source Charge		-	6.2	-	
Q _{gd}	Gate-Drain("Miller") Charge		-	5.3	-	
t _{d(on)}	Turn-On Delay Time	V _{DS} = 50V, I _D = 20A, R _G = 3Ω, V _{GS} =10V	-	15	-	ns
t _r	Turn-On Rise Time		-	3.2	-	
t _{d(off)}	Turn-Off Delay Time		-	30	-	
t _f	Turn-Off Fall Time		-	7.6	-	
Diode Characteristics						
I _S	Continuous Source Current		-	-	48	A
V _{SD}	Diode Forward Voltage	I _S =20A . V _{GS} = 0V	-	0.88	1.0	V
t _{rr}	Reverse Recovery Time	I _{SD} =20A,	-	45	-	ns
Q _{rr}	Reverse Recovery Charge	dI _{SD} /dt=100A/μs	-	59	-	nC

Notes:

1. The value of $R_{\theta JC}$ is measured in a still air environment with $T_A = 25^{\circ}\text{C}$ and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design.
2. The power dissipation P_D is based on $T_{J(MAX)} = 150^{\circ}\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
3. Single pulse width limited by junction temperature $T_{J(MAX)} = 150^{\circ}\text{C}$.
4. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
5. The maximum current rating is package limited.
6. The EAS data shows Max. rating. The test condition is $V_{DS} = 50V, V_{GS} = 10V, L = 0.5mH$



Typical Performance Characteristics

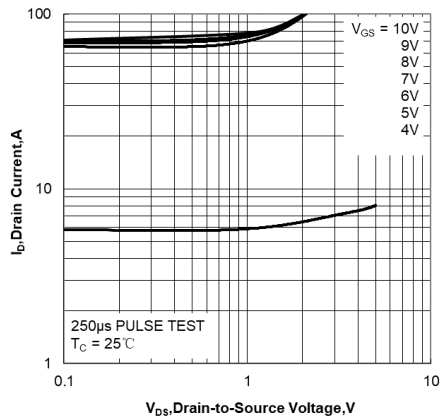


Figure 1. Output Characteristics

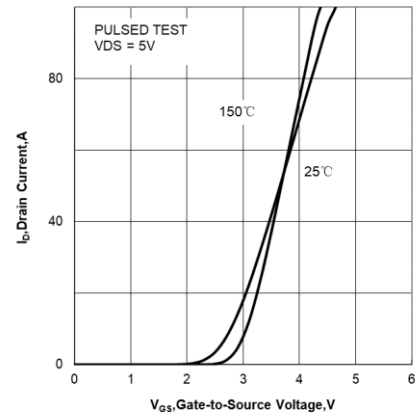


Figure 2. Transfer Characteristics

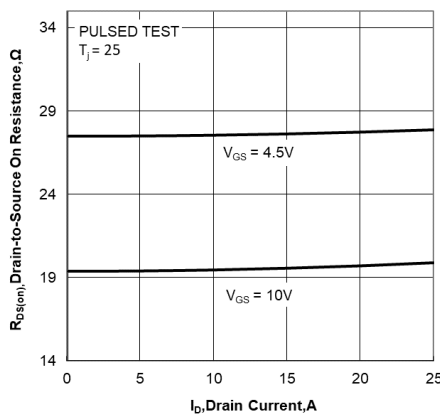
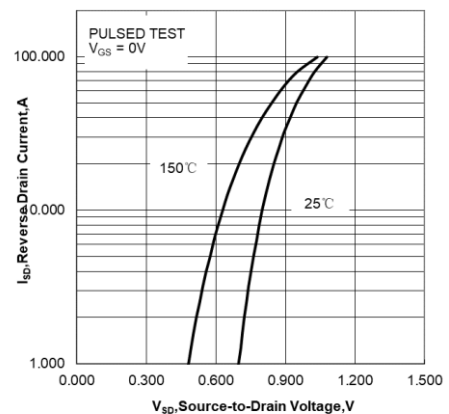
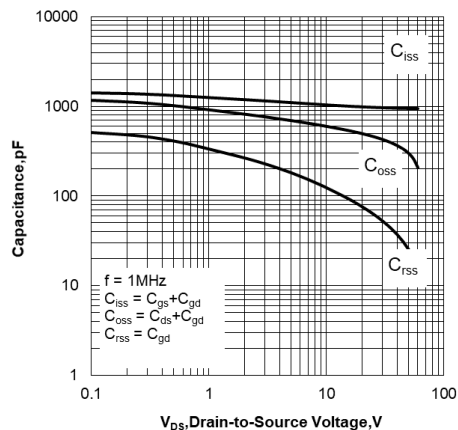
Figure 3. Drain-to-Source On Resistance
vs Drain CurrentFigure 4. Body Diode Forward Voltage
vs Source Current and Temperature

Figure 5. Capacitance Characteristics

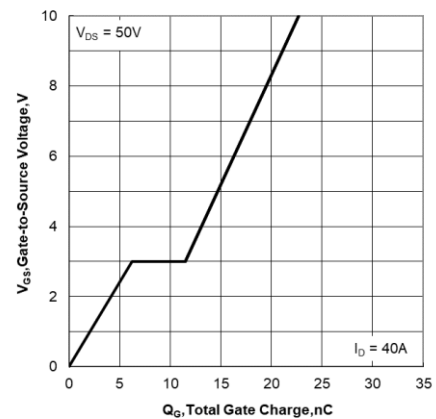


Figure 6. Gate Charge Characteristics

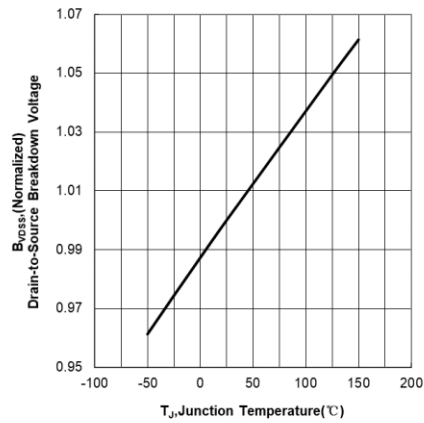


Figure 7. Normalized Breakdown Voltage vs Junction Temperature

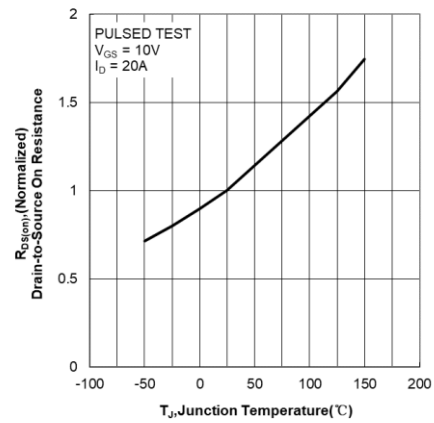


Figure 8. Normalized On Resistance vs Junction Temperature

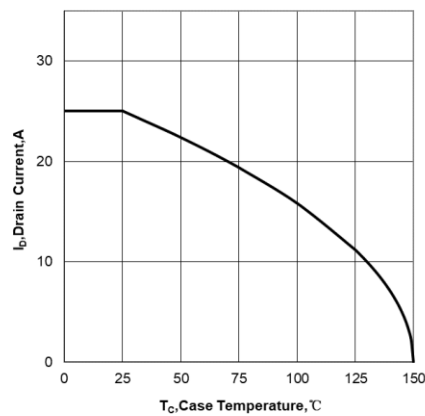


Figure 9. Maximum Continuous Drain Current vs Case Temperature

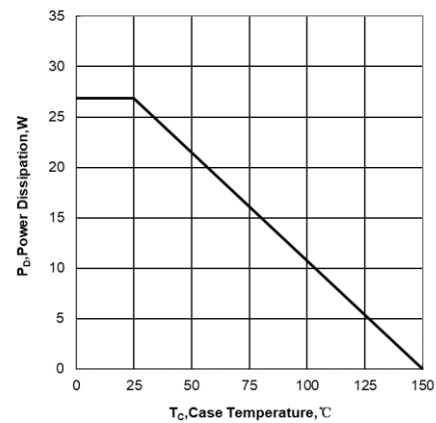


Figure 10. Maximum Power Dissipation vs Case Temperature

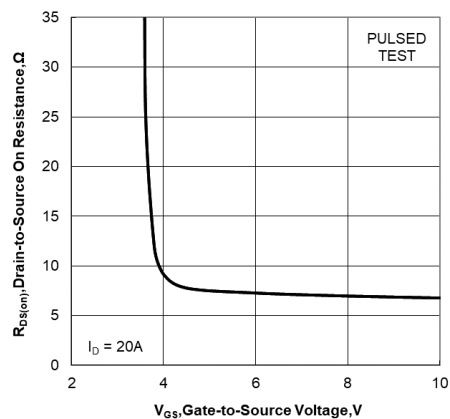


Figure 11. Drain-to-Source On Resistance vs Gate

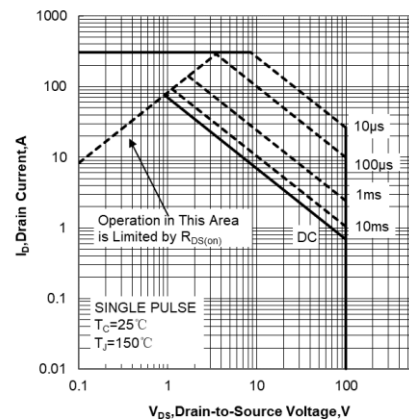


Figure 12. Maximum Safe Operating Area

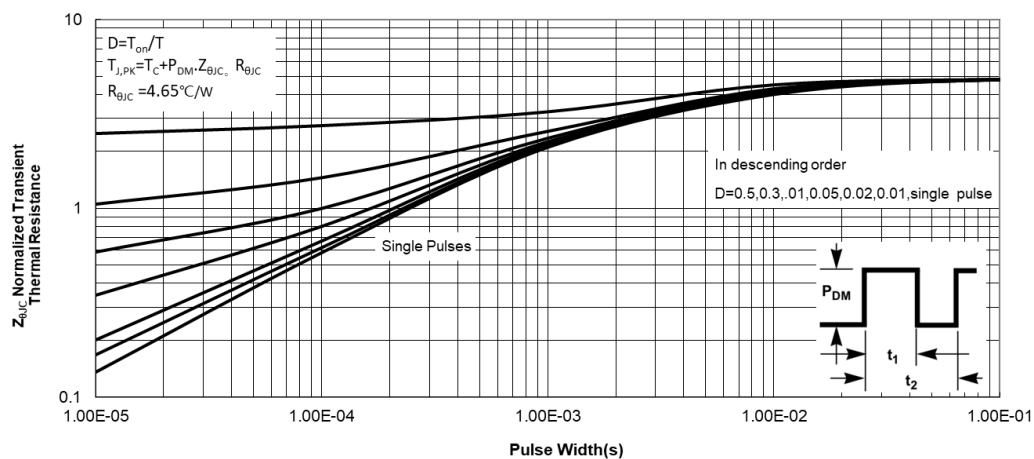
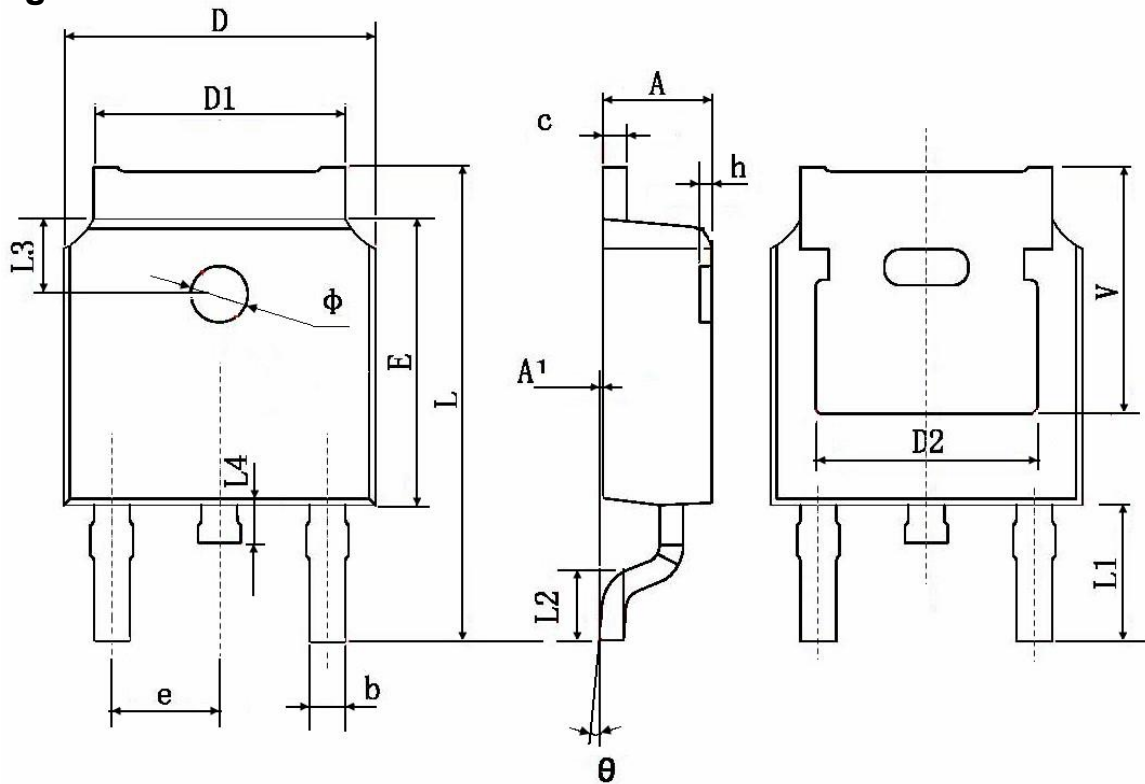


Figure 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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.	