Features

- Low gate charge
- 100% avalanche tested
- Improved dv/dt capability
- RoHS compliant
- Halogen free package
- JEDEC Qualification

Absolute Maximum Ratings

Parameter		Symbol	TMP9N50S(G)	TMPF9N50S(G)	Unit
Drain-Source Voltage		V_{DSS}	500		V
Gate-Source Voltage		V_{GS}	30		V
Continuous Drain Current	T_C = 25	I_D	8.5	8.5 *	A
	T_C = 100		4.87	4.87 *	A
Pulsed Drain Current (Note 1)		I_{DM}	34	34 *	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	439		mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	8.5		A
Repetitive Avalanche Energy (Note 1)		E_{AR}	12.7		mJ
Power Dissipation	T_C = 25	P_D	127	39	W
	Derate				

Electrical Characteristics : T_C=25 , unless otherwise noted

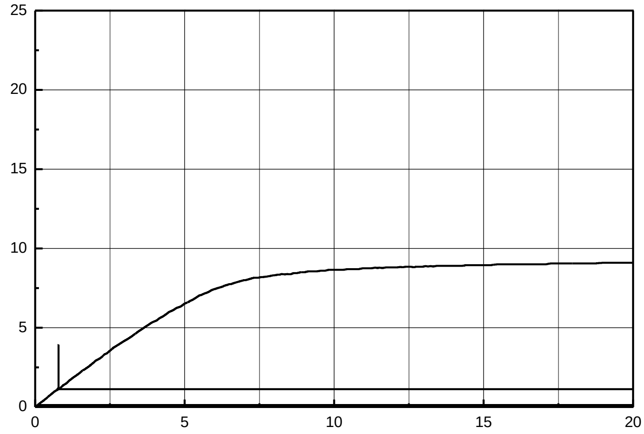
Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 400 V, T_C = 125°C	--	--	10	μA
Forward Gate-Source Leakage Current	I_{GSSF}	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
Reverse Gate-Source Leakage Current	I_{GSSR}	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
ON						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2	--	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 4.25 A	--	0.68	0.85	Ω
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 4.25 A	--	13	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1195	--	pF
Output Capacitance	C_{oss}		--	120	--	pF
Reverse Transfer Capacitance	C_{rss}		--	11	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 250 V, I_D = 8.5 A, R_G = 25	--	23	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	22	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	99	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	28	--	ns
Total Gate Charge (Note 4,5)	Q_g	V_{DS} = 400V, I_D = 8.5 A, V_{GS} = 10 V	--	24	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	4	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	9	--	nC
SOURCE DRAIN DIODE						
Maximum Continuous Drain-Source Diode Forward Current	I_S	----	--	--	8.5	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	----	--	--	34	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 8.5 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 8.5 A dI_F / dt = 100 A/μs	--	172	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}		--	0.6	--	μC

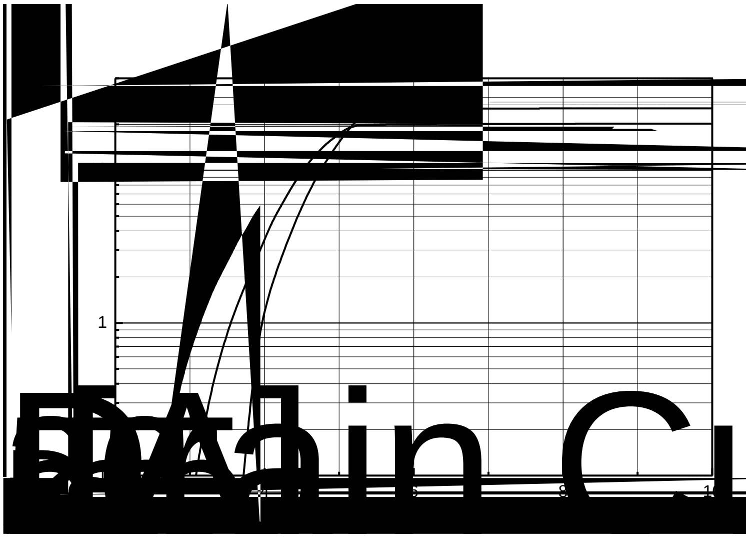
Note :

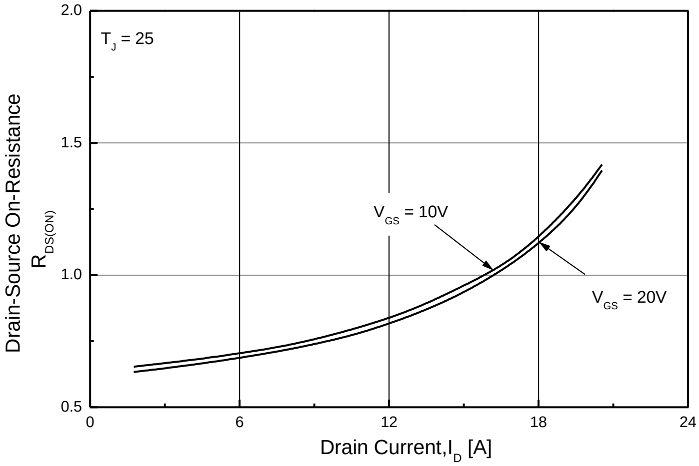
1. Repeated rating : Pulse width limited by safe operating area
2. L=10.9mH, I_{AS} = 8.5A, V_{DD} = 50V, R_G = 25 , Starting T_J= 25
3 I_{SD} 8.5A, di/dt μs , V_{DD} $_{DS}$, Starting T_J= 25

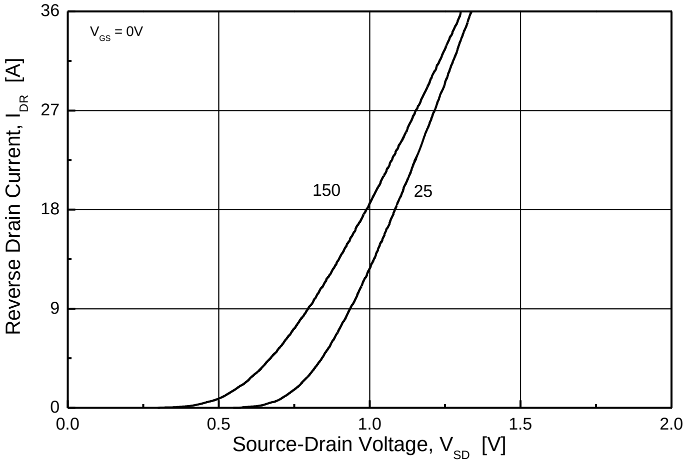
μ

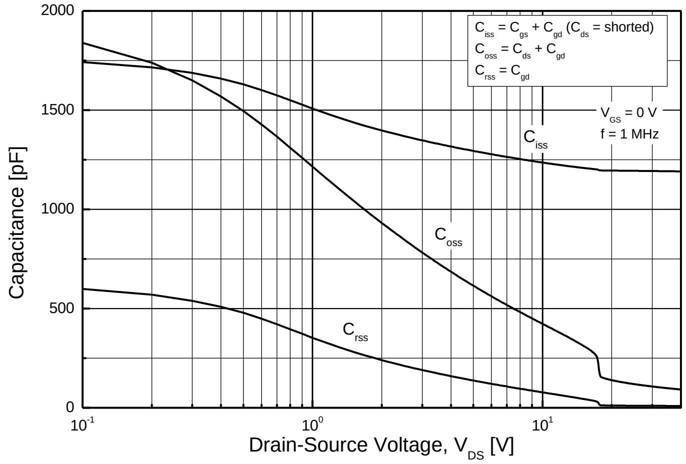
5. Essentially Independent of Operating Temperature Typical Characteristics

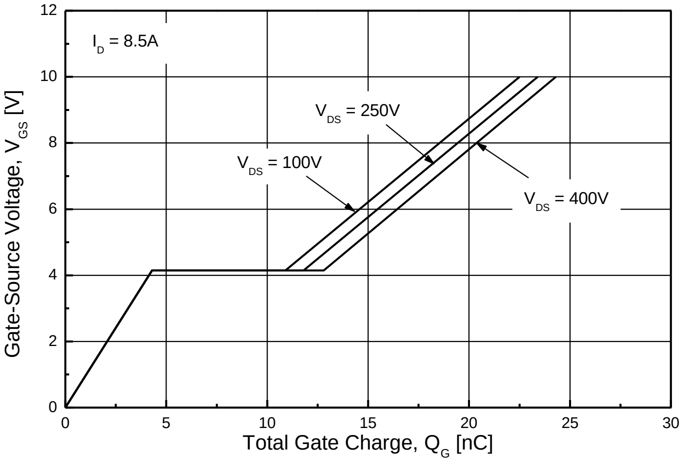

25
20
15
10
5
0
0
5
10
15
20

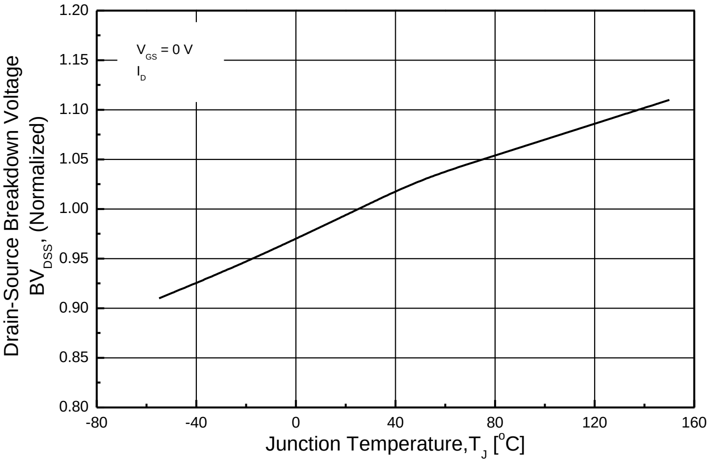

1
Drain Cu

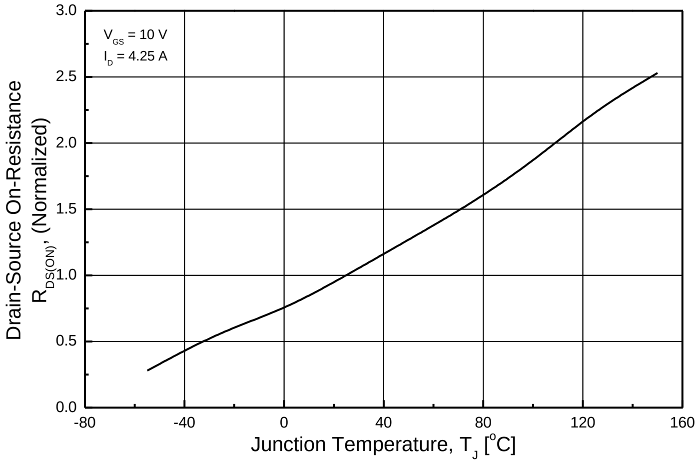

T$_J$ = 25
V$_{GS}$ = 10V
V$_{GS}$ = 20V
2.0
1.5
1.0
0.5
0
6
12
18
24
Drain-Source On-Resistance R$_{DS(ON)}$
Drain Current,I$_D$ [A]

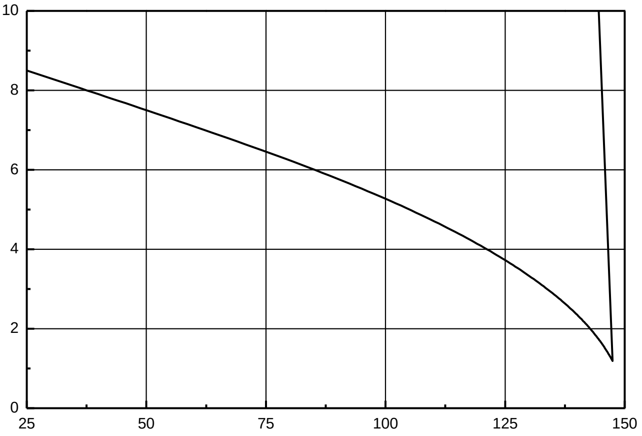

V$_{GS}$ = 0V
150
25
36
27
18
9
0
0.0
0.5
1.0
1.5
2.0
Reverse Drain Current, I$_{DR}$ [A]
Source-Drain Voltage, V$_{SD}$ [V]

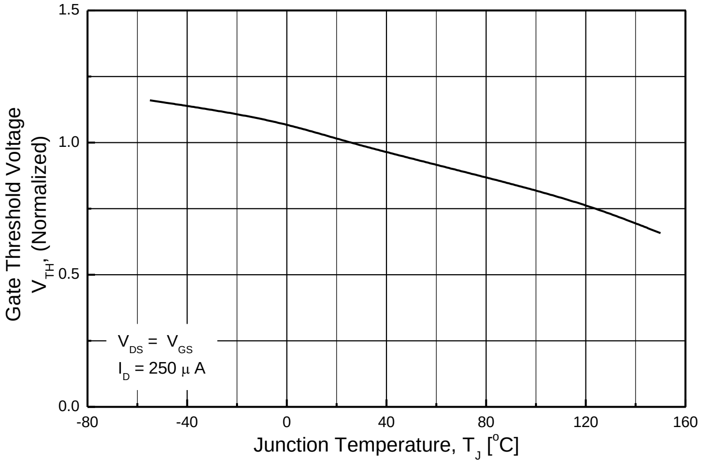

C$_{iss}$ = C$_{gs}$ + C$_{gd}$ (C$_{ds}$ = shorted)
C$_{oss}$ = C$_{ds}$ + C$_{gd}$
C$_{rss}$ = C$_{gd}$
V$_{GS}$ = 0 V
f = 1 MHz
C$_{iss}$
C$_{oss}$
C$_{rss}$
2000
1500
1000
500
0
10^{-1}
10^{0}
10^{1}
Capacitance [pF]
Drain-Source Voltage, V$_{DS}$ [V]

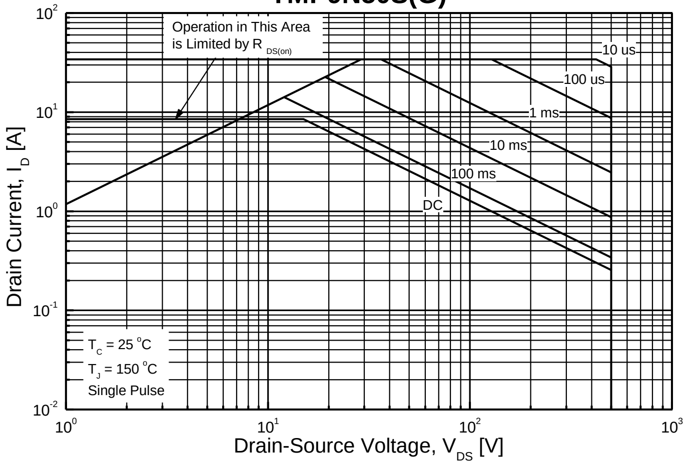

I$_D$ = 8.5A
V$_{DS}$ = 250V
V$_{DS}$ = 100V
V$_{DS}$ = 400V
12
10
8
6
4
2
0
0
5
10
15
20
25
30
Gate-Source Voltage, V$_{GS}$ [V]
Total Gate Charge, Q$_G$ [nC]



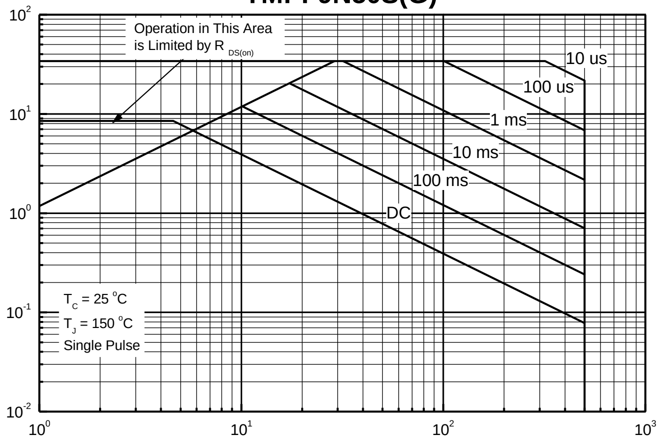








TMP9N50S(G)



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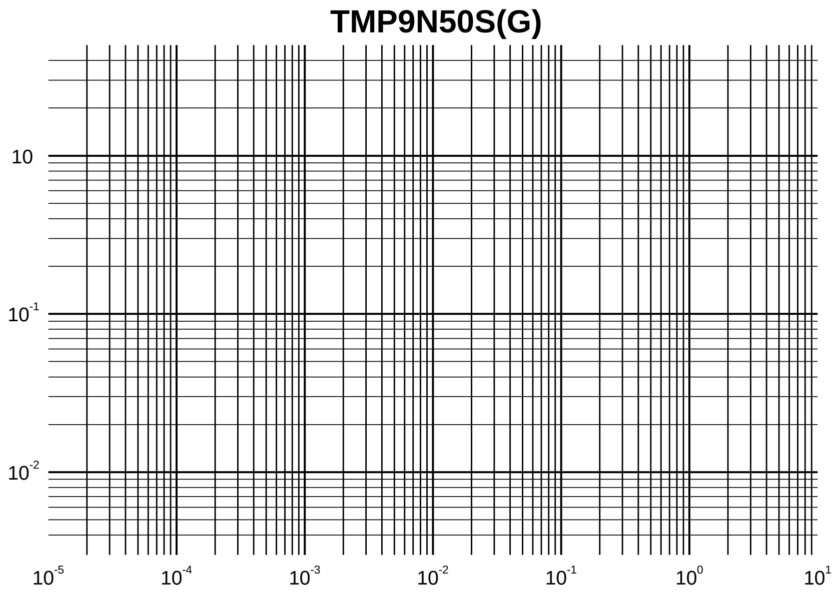
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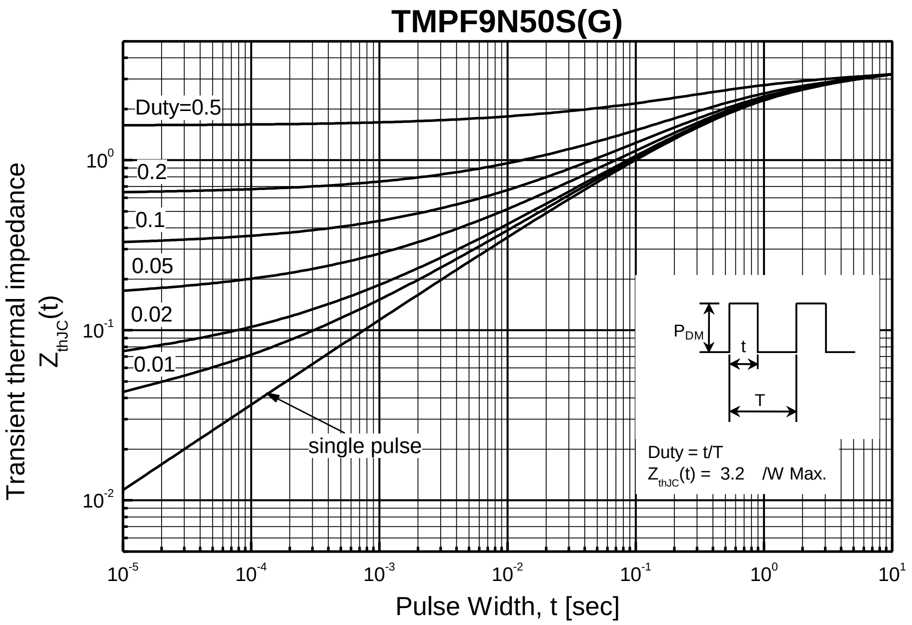
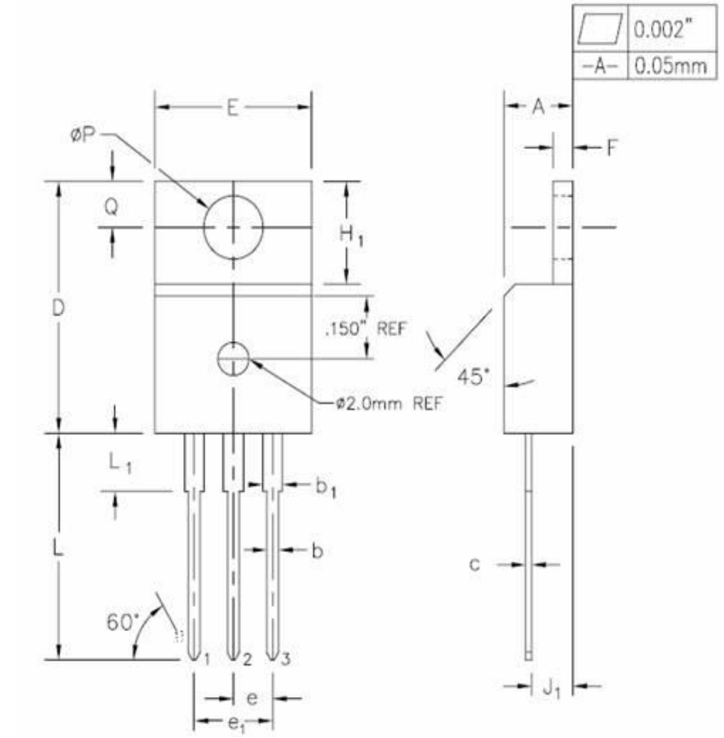

TMPF9N50S(G)

TO-220AB-3L MECHANICAL DATA



SYMBOL	INCHES MIN.	INCHES MAX.	MILLIMETERS MIN.	MILLIMETERS MAX.	NOTES
A	0.170	0.180	4.32	4.57	
b	0.028	0.036	0.71	0.91	
b1	0.045	0.055	1.15	1.39	
c	0.014	0.021	0.36	0.53	
D	0.590	0.610	14.99	15.49	
E	0.395	0.410	10.04	10.41	
e	0.100 TYP.		2.54 TYP.		
e1	0.200 BSC		5.08 BSC		
F	0.048	0.054	1.22	1.37	
H1	0.235	0.255	5.97	6.47	
J1	0.100	0.110	2.54	2.79	
L	0.530	0.550	13.47	13.97	
L1	0.130	0.150	3.31	3.81	2
ØP	0.149	0.153	3.79	3.88	
Q	0.102	0.112	2.60	2.84	

TO-220F-3L MECHANICAL DATA