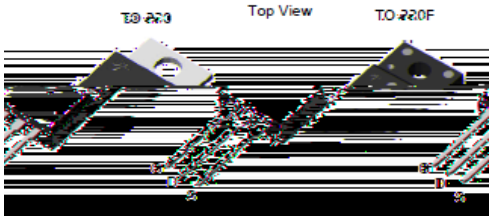
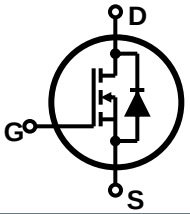
TMP9N50/TMPF9N50
TMP9N50G/TMPF9N50G

Features

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

V_{DSS} = 550 V @T_{jmax}
I_D = 9A
$R_{DS(on)}$ = 0.85 (max) @ V_{GS}= 10 V





Device	Package	Marking	Remark
TMP9N50 / TMPF9N50	TO-220 / TO-220F	TMP9N50 / TMPF9N50	RoHS
TMP9N50G / TMPF9N50G	TO-220 / TO-220F	TMP9N50G / TMPF9N50G	Halogen Free

Absolute Maximum Ratings

Parameter		Symbol	TMP9N50(G)	TMPF9N50(G)	Unit
Drain-Source Voltage		V_{DSS}	500		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	T_C = 25 ℃	I_D	9	9 *	A
	T_C = 100 ℃		5.3	5.3 *	A
Pulsed Drain Current (Note 1)		I_{DM}	36	36*	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	364		mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	9		A
Repetitive Avalanche Energy (Note 1)		E_{AR}	14.3		mJ
Power Dissipation	T_C = 25 ℃	P_D	143	46.6	W
	Derate above 25 ℃		1.16	0.37	W/℃
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5		V/ns
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~150		℃
Maximum lead temperature for soldering purposes,		T_L	300		℃

* Limited only by maximum junction temperature

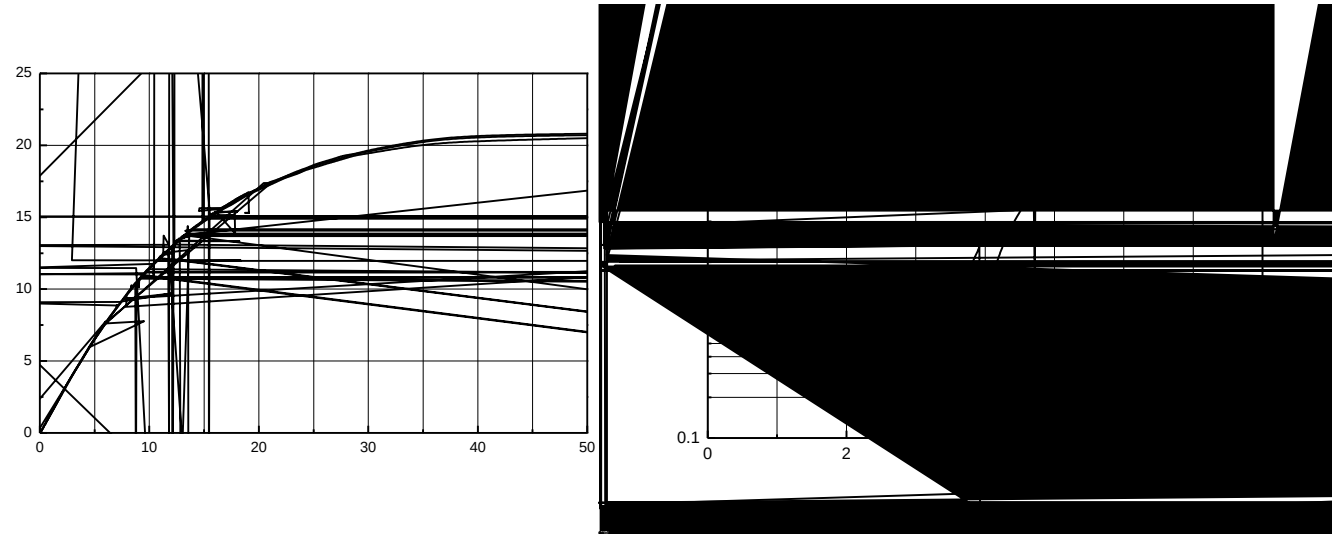
Thermal Characteristics

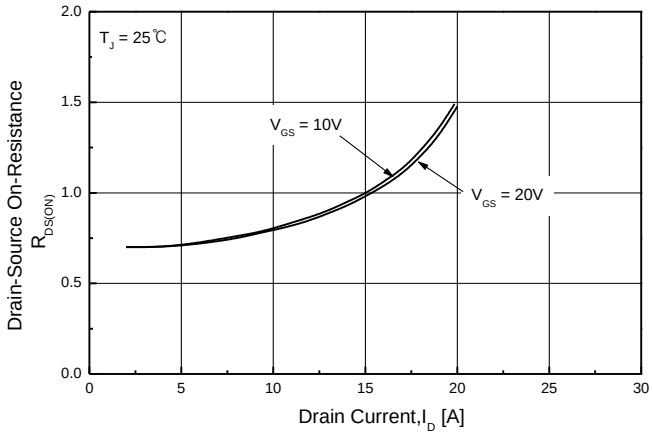
Parameter	Symbol	TMP9N50(G)	TMPF9N50(G)	Unit
Maximum Thermal resistance, Junction-to-Case	R_{JC}	0.87	2.68	℃/W
Maximum Thermal resistance, Junction-to-Ambient	R_{JA}	62.5	62.5	℃/W

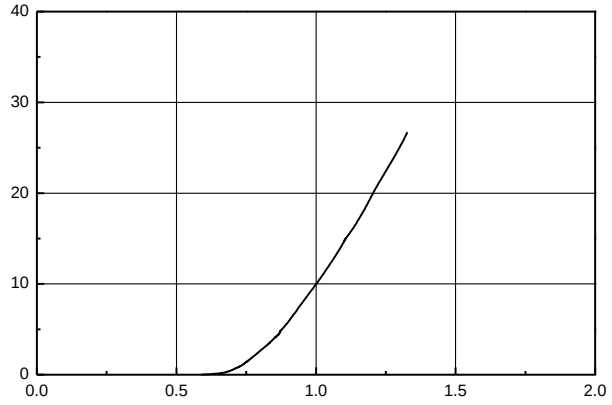
Electrical Characteristics : T_C=25℃, unless otherwise noted

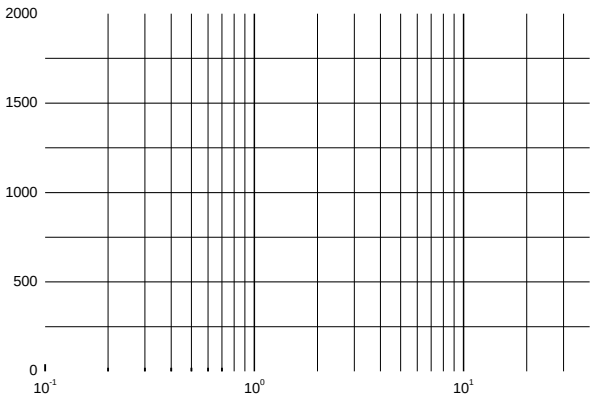
Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	µA
		V_{DS} = 400 V, T_C = 125°C	--	--	10	µA
Forward Gate-Source Leakage Current	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 = 4.5 A	--	0.68	0.85	
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 4.5 A	--	9	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1107	--	pF
Output Capacitance	C_{oss}		--	111	--	pF
Reverse Transfer Capacitance	C_{rss}		--	7.6	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 250 V, I_D = 9 A, R_G = 25	--	46	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	43	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	105	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	44	--	ns
Total Gate Charge (Note 4,5)	Q_g	V_{DS} = 400V, I_D = 9 A, V_{GS} = 10 V	--	21	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	5.5	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	5	--	nC
SOURCE DRAIN DIODE						
Maximum Continuous Drain-Source Diode Forward Current	I_S	---	--	---	9	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	--	--	36	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 9 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 9 A	--	287	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}	dI_F / dt = 100 A/µs	--	2.3	--	µC

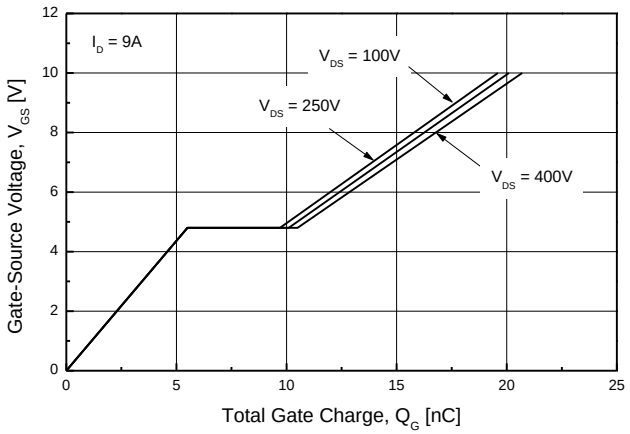
Note :
1. Repeated rating : Pulse width limited by safe operating area
2. L=8.1mH, I_{AS} =9A, V_{DD} = 50V, R_G = 25 , Starting T_J= 25 ℃
3 I_{SD} µs , V_{DD} $_{DS}$, Starting T_J= 25 ℃
µ
5. Essentially Independent of Operating Temperature Typical Characteristics

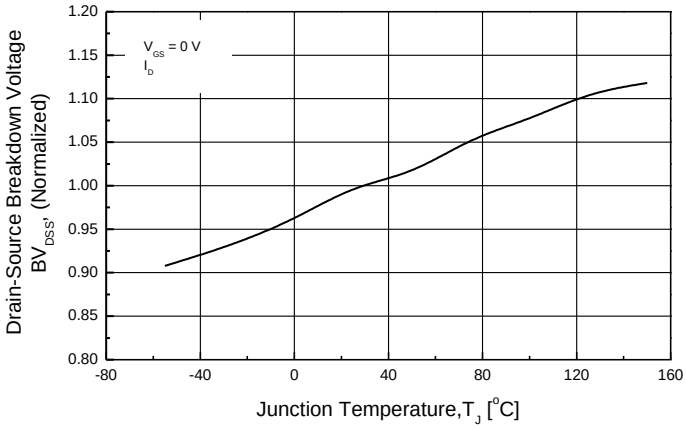

25
20
15
10
5
0
0
10
20
30
40
50
0.1
0
2

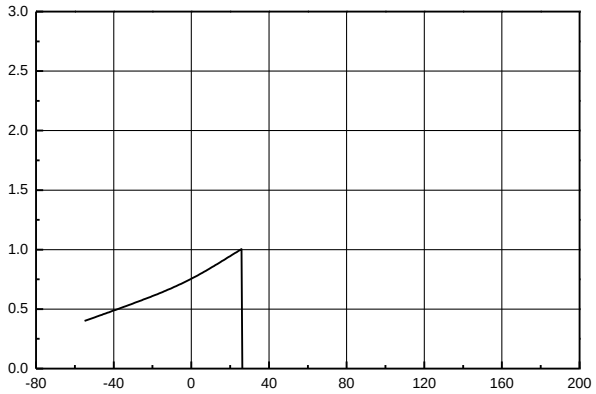

Drain-Source On-Resistance
$R_{DS(ON)}$
T_J = 25℃
V_{GS} = 10V
V_{GS} = 20V
2.0
1.5
1.0
0.5
0.0
0
5
10
15
20
25
30
Drain Current,I_D [A]

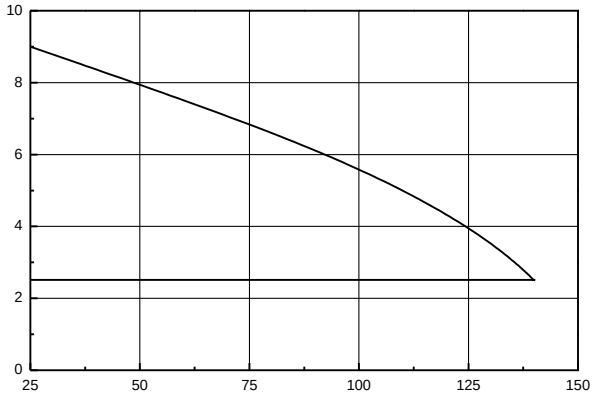

40
30
20
10
0
0.0
0.5
1.0
1.5
2.0


2000
1500
1000
500
0
10^{-1}
10^{0}
10^{1}

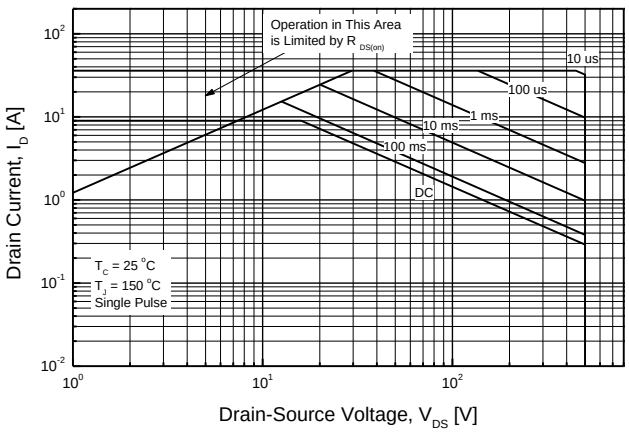

Gate-Source Voltage, V_{GS} [V]
I_D = 9A
V_{DS} = 100V
V_{DS} = 250V
V_{DS} = 400V
12
10
8
6
4
2
0
0
5
10
15
20
25
Total Gate Charge, Q_G [nC]



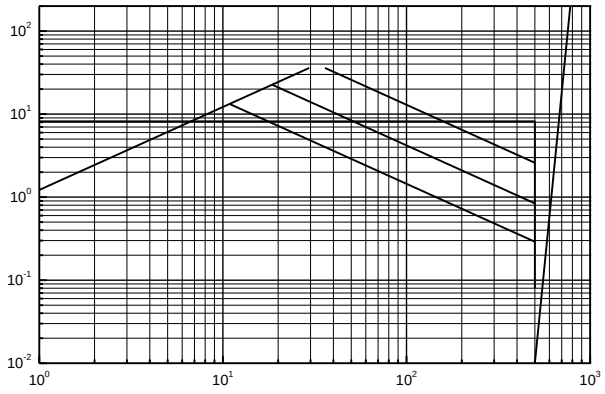




TMP9N50(G)



TMPF9N50(G)



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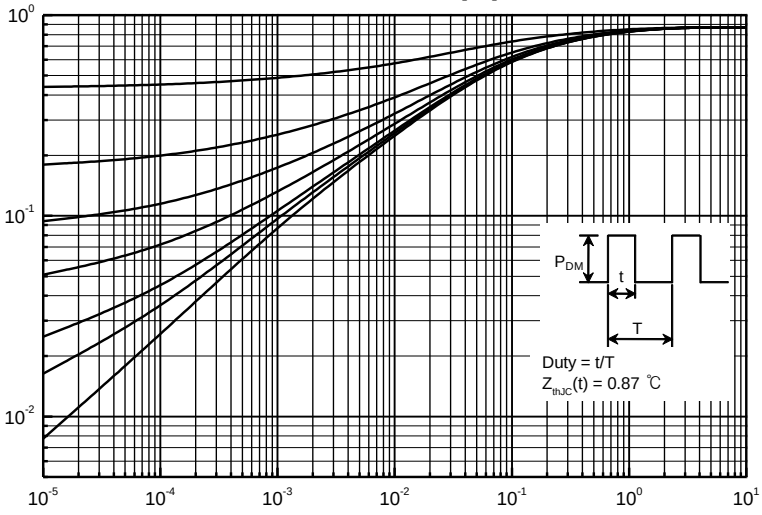
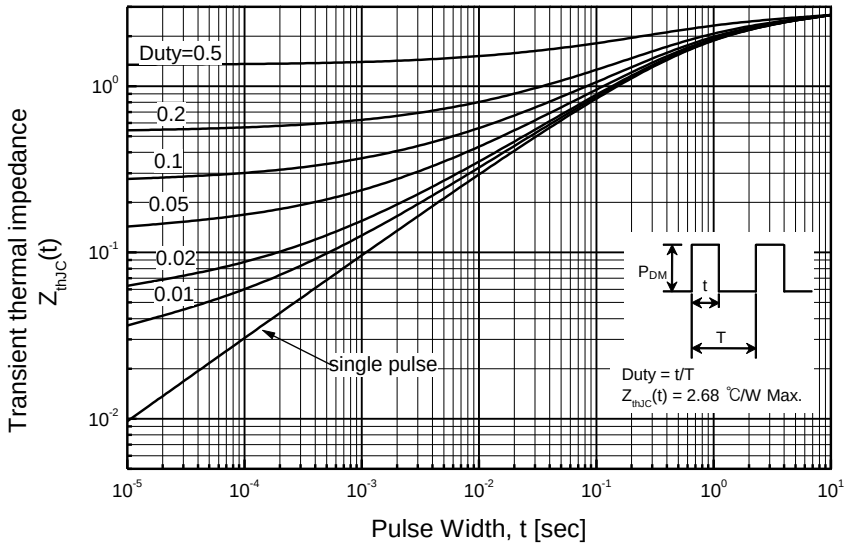
TMPF9N50(G)