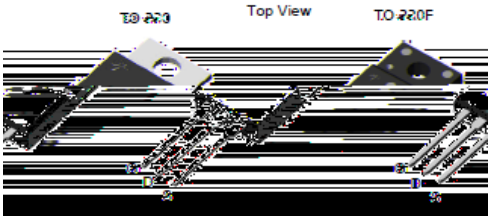
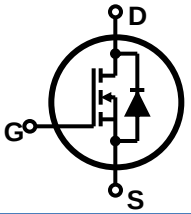
TMP13N50/TMPF13N50
TMP13N50G/TMPF13N50G

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 = 13A
$R_{DS(on)}$ = 0.48 (max) @ V_{GS}= 10 V





Device	Package	Marking	Remark
TMP13N50 / TMPF13N50	TO-220 / TO-220F	TMP13N50 / TMPF13N50	RoHS
TMP13N50G / TMPF13N50G	TO-220 / TO-220F	TMP13N50G / TMPF13N50G	Halogen Free

Absolute Maximum Ratings

Parameter		Symbol	TMP13N50(G)	TMPF13N50(G)	Unit
Drain-Source Voltage		V_{DS}	500		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	T_C = 25 ℃	I_D	13	13*	A
	T_C = 100 ℃		8.2	8.2*	A
Pulsed Drain Current (Note 1)		I_{DM}	52	52*	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	563		mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	13		A
Repetitive Avalanche Energy (Note 1)		E_{AR}	18.3		mJ
Power Dissipation	T_C = 25 ℃	P_D	183	52	W
	Derate above 25 ℃		1.46	0.41	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, 1/8" from case for 5 seconds		T_L	300		℃

* Limited only by maximum junction temperature

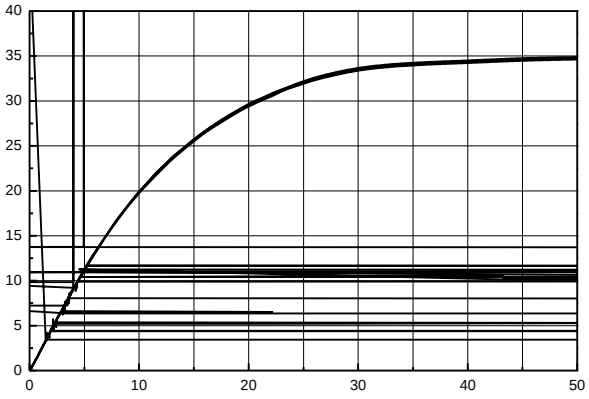
Thermal Characteristics

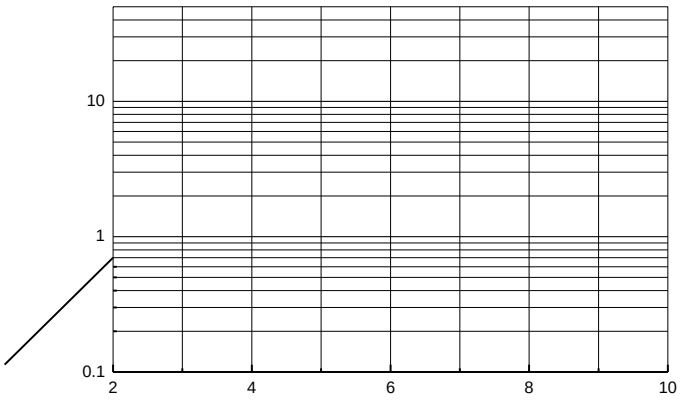
Parameter	Symbol	TMP13N50(G)	TMPF13N50(G)	Unit
Maximum Thermal resistance, Junction-to-Case	R_{JC}	0.63	2.4	℃/W
Maximum Thermal resistance, Junction-to-Ambient	R_{JA}	62.5	62.5	℃/W

Electrical Characteristics : T_C=25℃, unless otherwise noted

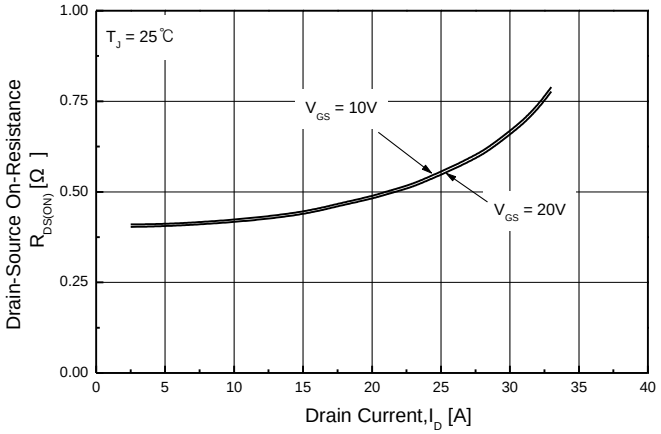
Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 µA	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	µA
		V_{DS} = 400 V, T_C = 125°C	--	--	10	µA
Forward Gate-Source Leakage Current	I_{GSSF}	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 = 6.5 A	--	0.38	0.48	
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 6.5 A	--	14	--	S

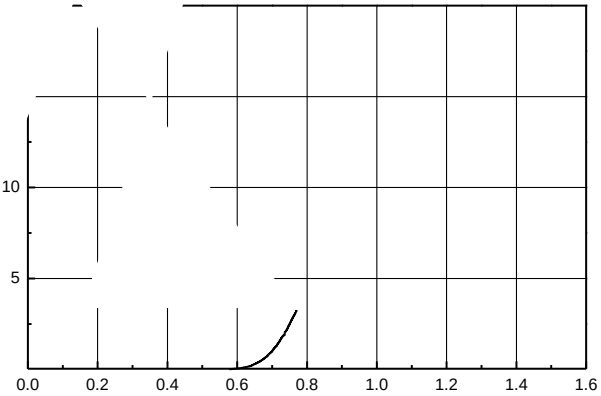
Note :
1. Repeated rating : Pulse width limited by safe operating area
2. L=6mH, I_{AS} = 13A, V_{DD} = 50V, R_G = 25Ω, Starting T_J= 25 ℃
3 I_{SD} ≤ 13A, di/dt ≤ 200A/µs , V_{DD} ≤ BV_{DS}, Starting T_J= 25 ℃
4. Pulse Test :Pulse width ≤ 300µs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

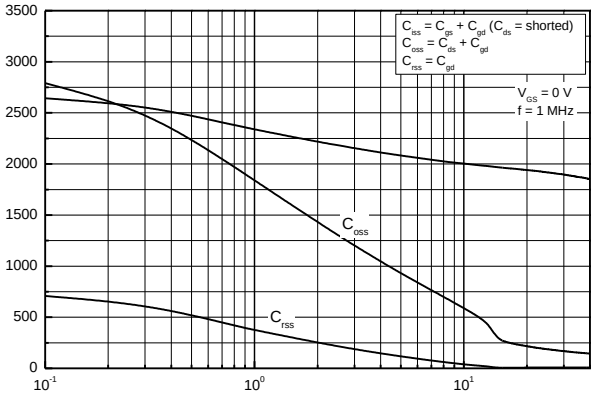

40
35
30
25
20
15
10
5
0
0
10
20
30
40
50

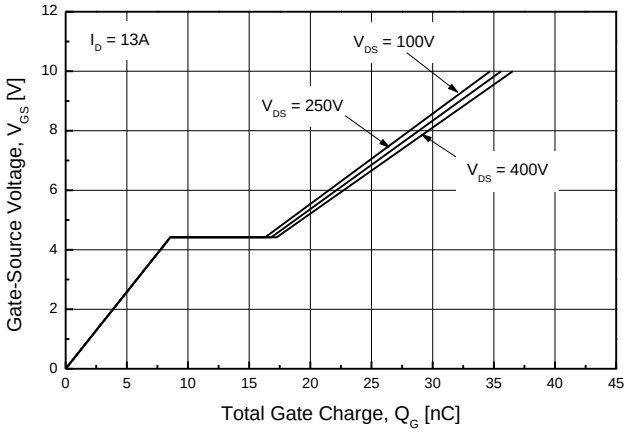

10
1
0.1
2
4
6
8
10

Test

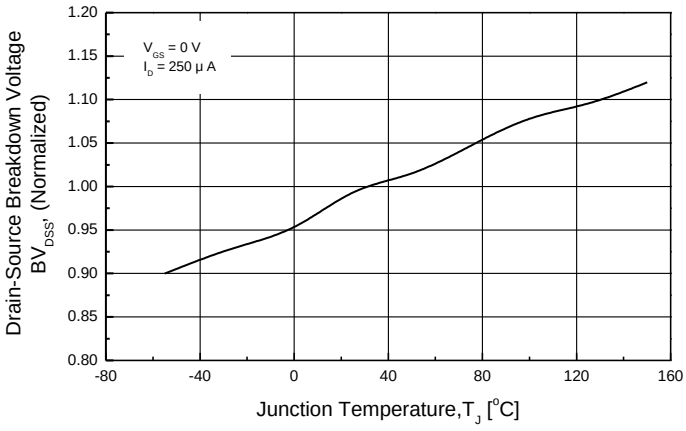

1.00
0.75
0.50
0.25
0.00
T_J = 25℃
V_{GS} = 10V
V_{GS} = 20V
Drain-Source On-Resistance
$R_{DS(ON)}$ [Ω]
0
5
10
15
20
25
30
35
40
Drain Current,I_D [A]

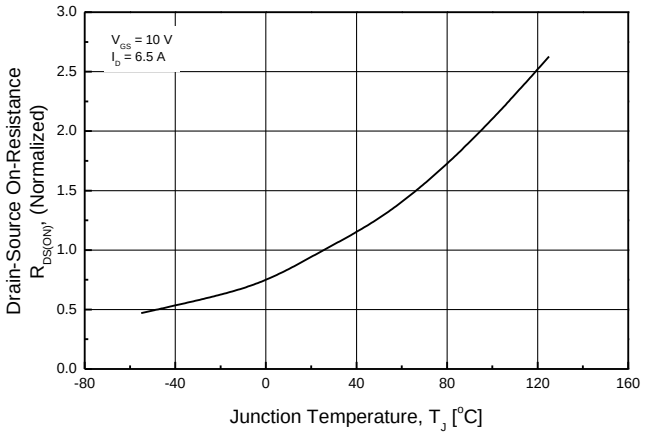

10
5
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

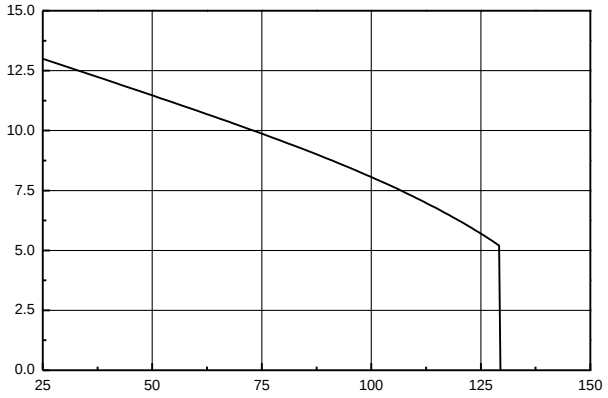

3500
3000
2500
2000
1500
1000
500
0
C_{iss} = C_{gs} + C_{gd} (C_{ds} = shorted)
C_{oss} = C_{ds} + C_{gd}
C_{rss} = C_{gd}
V_{GS} = 0 V
f = 1 MHz
C_{oss}
C_{rss}
10^{-1}
10^{0}
10^{1}


12
10
8
6
4
2
0
I_D = 13A
V_{DS} = 100V
V_{DS} = 250V
V_{DS} = 400V
Gate-Source Voltage, V_{GS} [V]
0
5
10
15
20
25
30
35
40
45
Total Gate Charge, Q_G [nC]

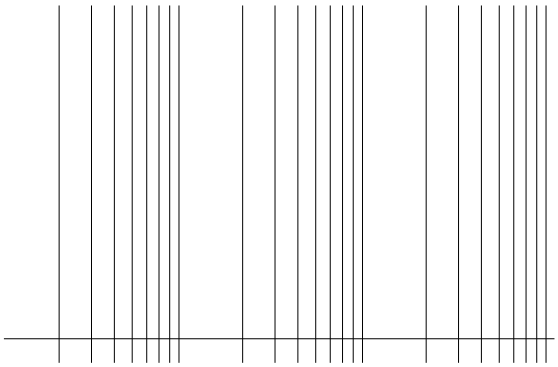
s







TMP13N50(G)



TMPF13N50(G)