

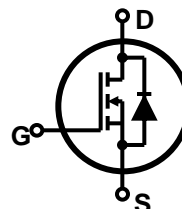
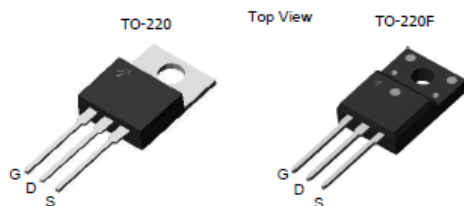
Features

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

$$V_{DSS} = 550 \text{ V} @ T_{jmax}$$

$$I_D = 13 \text{ A}$$

$$R_{DS(on)} = 0.48 \Omega(\text{max}) @ V_{GS} = 10 \text{ V}$$



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	I_D	$T_C = 25 \text{ }^\circ\text{C}$	13	13*	A
		$T_C = 100 \text{ }^\circ\text{C}$	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	P_D	$T_C = 25 \text{ }^\circ\text{C}$	183	52	W
		Derate above 25 $^\circ\text{C}$	1.46	0.41	W/ $^\circ\text{C}$
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		$^\circ\text{C}$	
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300		$^\circ\text{C}$	

* Limited only by maximum junction temperature

Thermal Characteristics

Parameter	Symbol	TMP13N50(G)	TMPF13N50(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	0.63	2.4	$^\circ\text{C}/\text{W}$
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	$^\circ\text{C}/\text{W}$

Electrical Characteristics : $T_C=25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 400\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	μA
Forward Gate-Source Leakage Current	I_{GSSF}	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
Reverse Gate-Source Leakage Current	I_{GSSR}	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

ON

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2	--	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 6.5\text{ A}$	--	0.38	0.48	Ω
Forward Transconductance ^(Note 4)	g_{FS}	$V_{DS} = 30\text{ V}, I_D = 6.5\text{ A}$	--	14	--	S

DYNAMIC

Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	1918	--	pF
Output Capacitance	C_{oss}		--	187	--	pF
Reverse Transfer Capacitance	C_{rss}		--	7.7	--	pF

SWITCHING

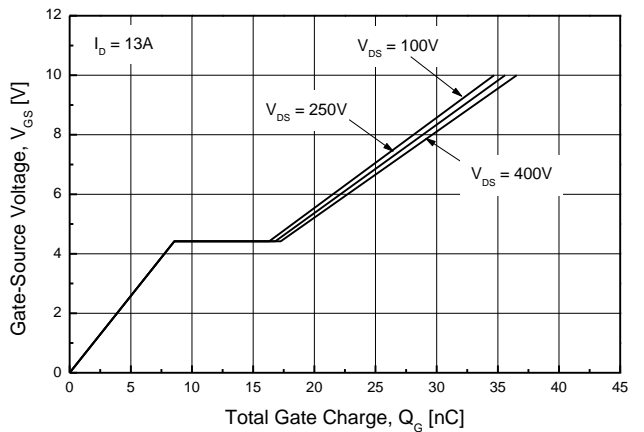
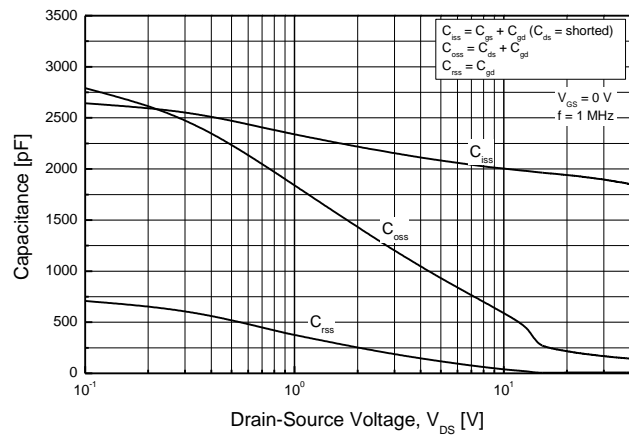
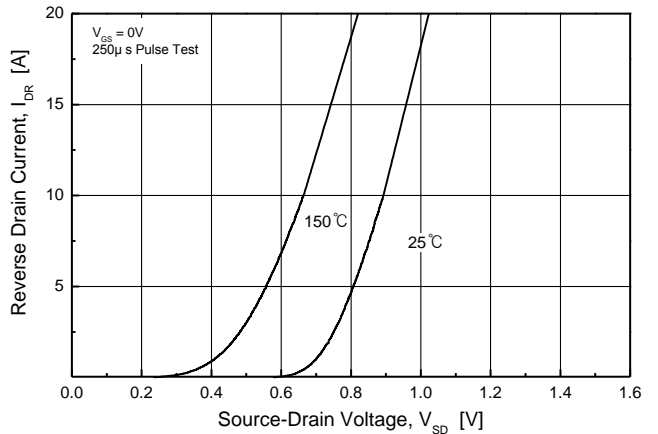
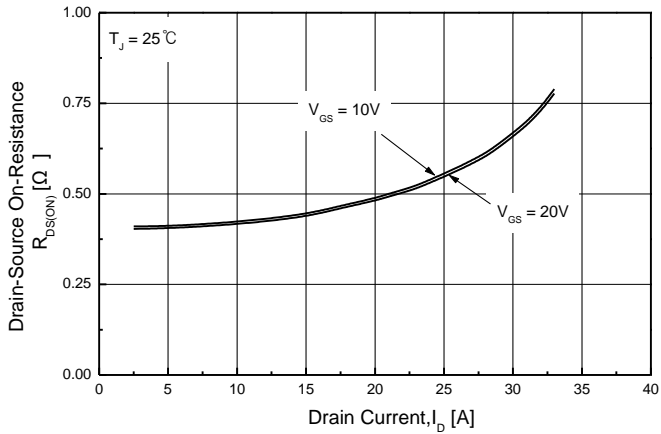
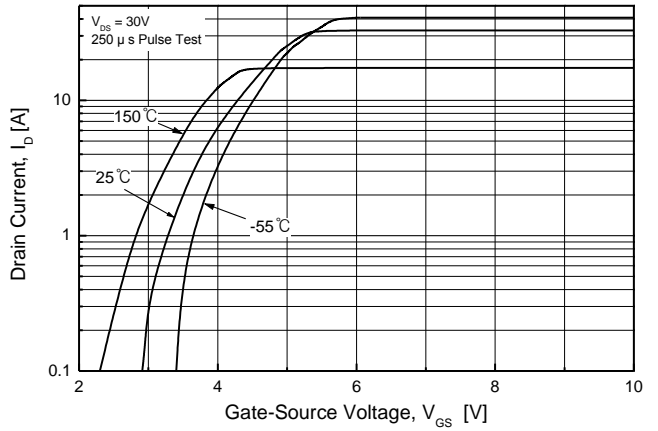
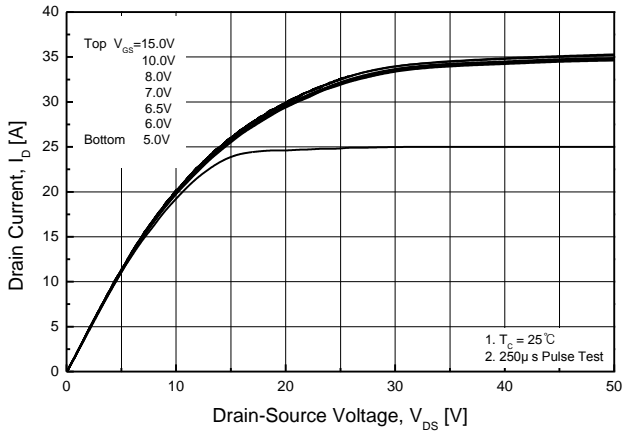
Turn-On Delay Time ^(Note 4,5)	$t_{d(on)}$	$V_{DD} = 250\text{ V}, I_D = 13\text{ A},$ $R_G = 25\ \Omega$	--	53	--	ns
Turn-On Rise Time ^(Note 4,5)	t_r		--	45	--	ns
Turn-Off Delay Time ^(Note 4,5)	$t_{d(off)}$		--	156	--	ns
Turn-Off Fall Time ^(Note 4,5)	t_f		--	59	--	ns
Total Gate Charge ^(Note 4,5)	Q_g	$V_{DS} = 400\text{ V}, I_D = 13\text{ A},$ $V_{GS} = 10\text{ V}$	--	36	--	nC
Gate-Source Charge ^(Note 4,5)	Q_{gs}		--	8.5	--	nC
Gate-Drain Charge ^(Note 4,5)	Q_{gd}		--	8.7	--	nC

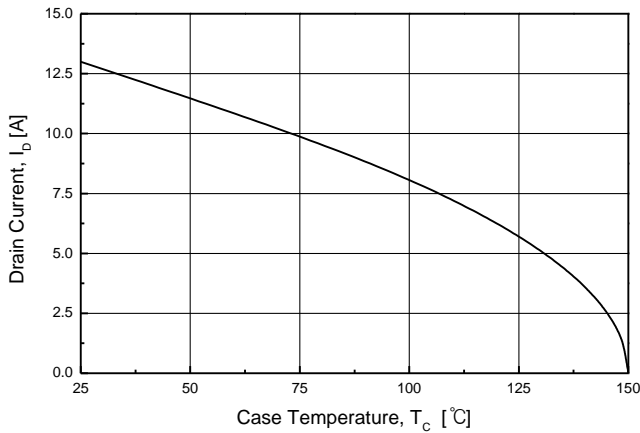
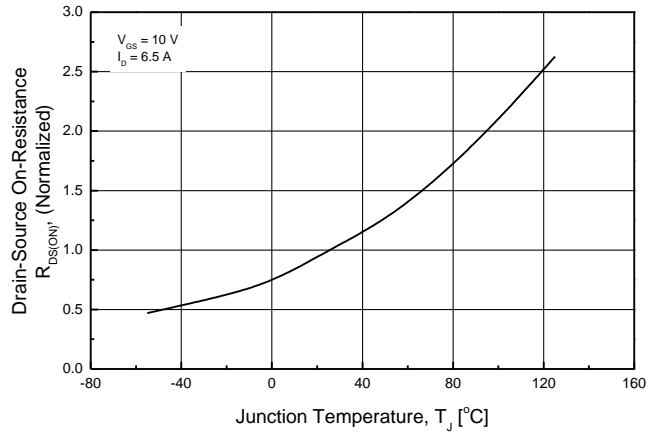
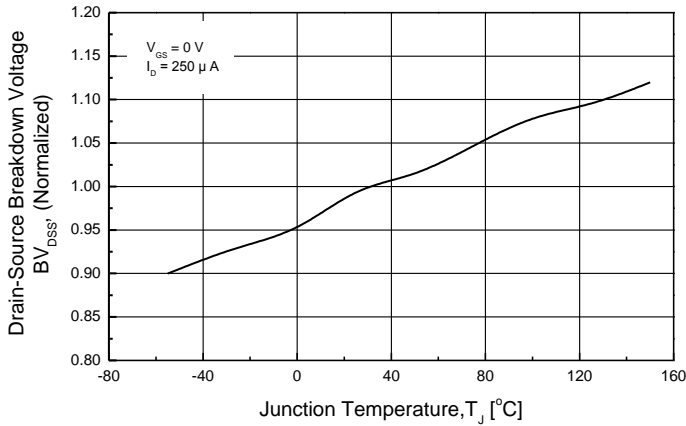
SOURCE DRAIN DIODE

Maximum Continuous Drain-Source Diode Forward Current	I_S	---	--	--	13	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	--	--	52	A
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 13\text{ A}$	--	--	1.5	V
Reverse Recovery Time ^(Note 4)	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 13\text{ A}$ $di_F / dt = 100\text{ A}/\mu\text{s}$	--	325	--	ns
Reverse Recovery Charge ^(Note 4)	Q_{rr}		--	3.3	--	μC

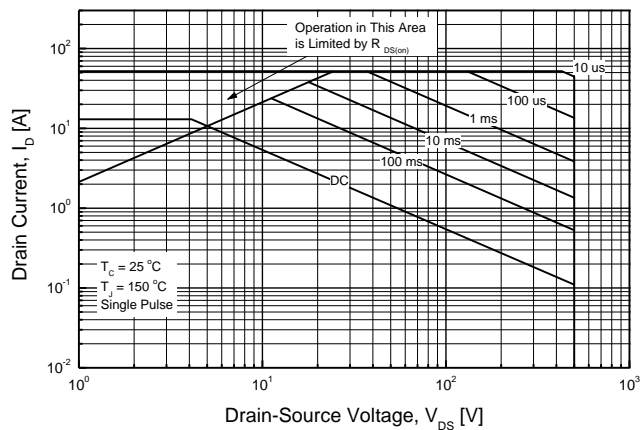
Note :

1. Repeated rating : Pulse width limited by safe operating area
2. $L=6\text{mH}, I_{AS} = 13\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 13\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

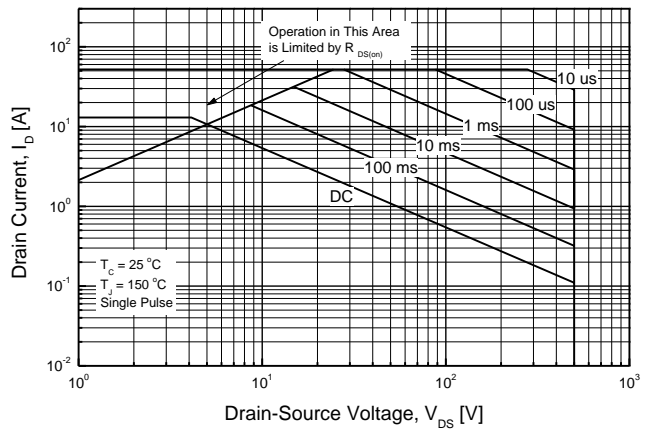




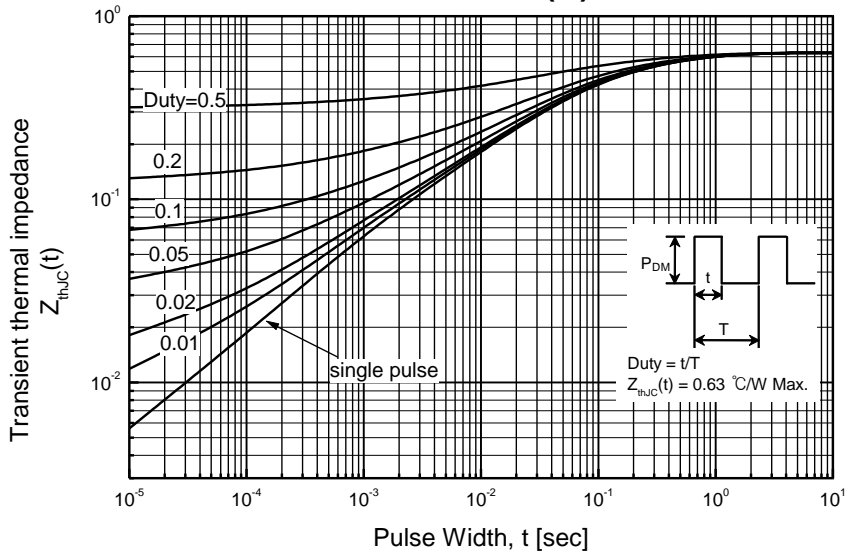
TMP13N50(G)



TMPF13N50(G)



TMP13N50(G)



TMPF13N50(G)

