

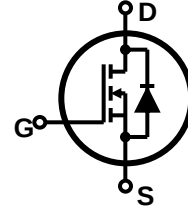
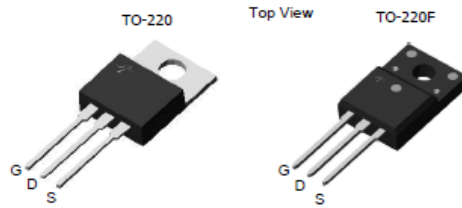
Features

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

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

$$I_D = 18 \text{ A}$$

$$R_{DS(on)} = 0.3 \Omega(\text{max}) @ V_{GS} = 10 \text{ V}$$



Device	Package	Marking	Remark
TMP20N50 / TMPF20N50	TO-220 / TO-220F	TMP20N50 / TMPF20N50	RoHS
TMP20N50G / TMPF20N50G	TO-220 / TO-220F	TMP20N50G / TMPF20N50G	Halogen Free

Absolute Maximum Ratings

Parameter		Symbol	TMP20N50(G)	TMPF20N50(G)	Unit
Drain-Source Voltage		V_{DS}	500		V
Gate-Source Voltage		V_{GS}	± 30		V
Continuous Drain Current	$T_C = 25^\circ \text{C}$	I_D	18	18*	A
	$T_C = 100^\circ \text{C}$		13.1	13.1*	A
Pulsed Drain Current (Note 1)		I_{DM}	72	72*	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	954		mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	18		A
Repetitive Avalanche Energy (Note 1)		E_{AR}	29		mJ
Power Dissipation	$T_C = 25^\circ \text{C}$	P_D	290	48	W
	Derate above 25°C		2.32	0.38	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}	$-55 \sim 150$		$^\circ \text{C}$
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	TMP20N50(G)	TMPF20N50(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	0.43	2.6	$^\circ \text{C/W}$
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	$^\circ \text{C/W}$

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}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	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	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2	--	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 9\text{ A}$	--	0.25	0.3	Ω
Forward Transconductance (Note 4)	g_{FS}	$V_{DS} = 30\text{ V}, I_D = 9\text{ A}$	--	11	--	S

DYNAMIC

Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	3094	--	pF
Output Capacitance	C_{oss}		--	296	--	pF
Reverse Transfer Capacitance	C_{rss}		--	9.2	--	pF

SWITCHING

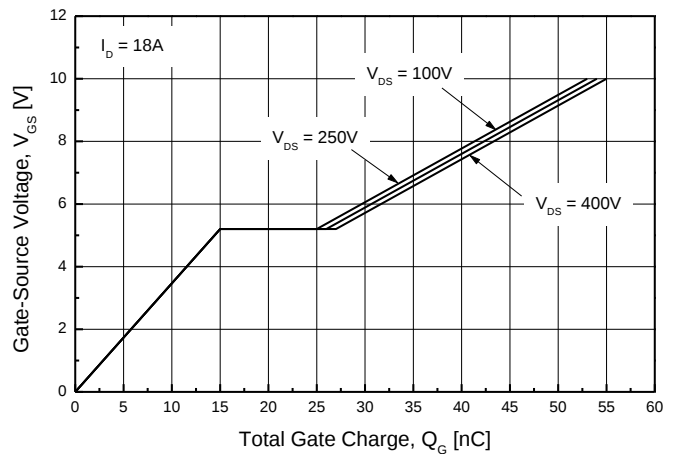
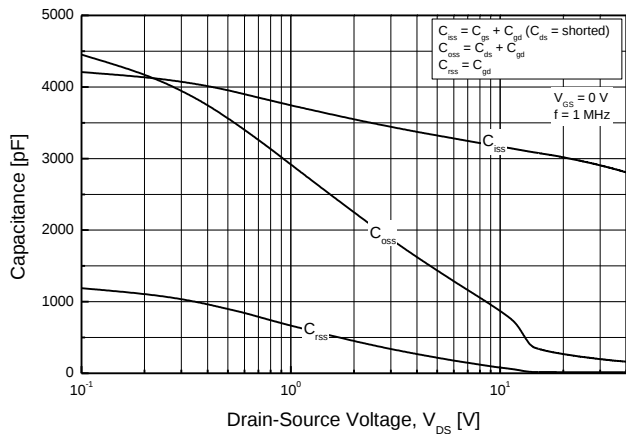
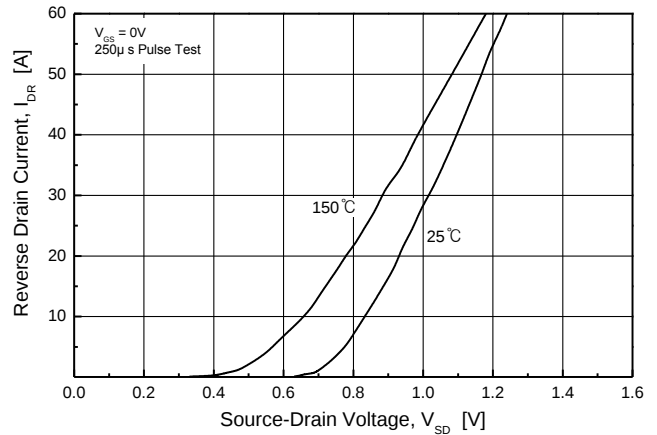
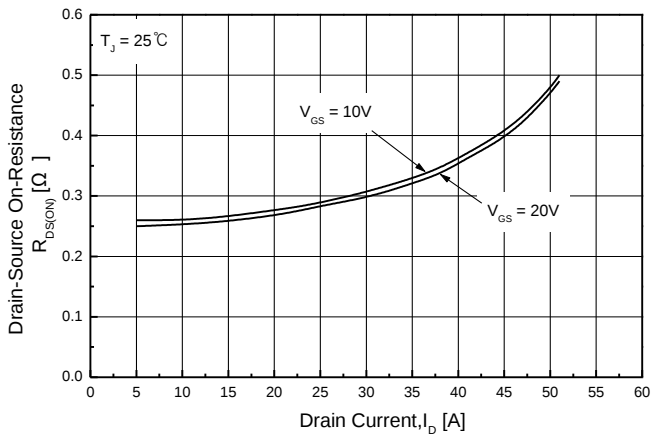
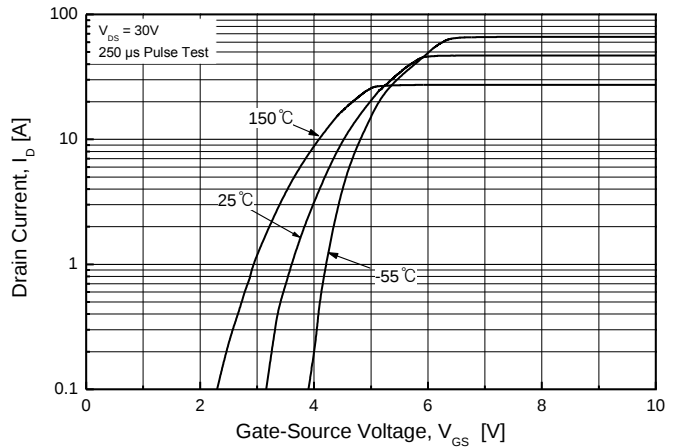
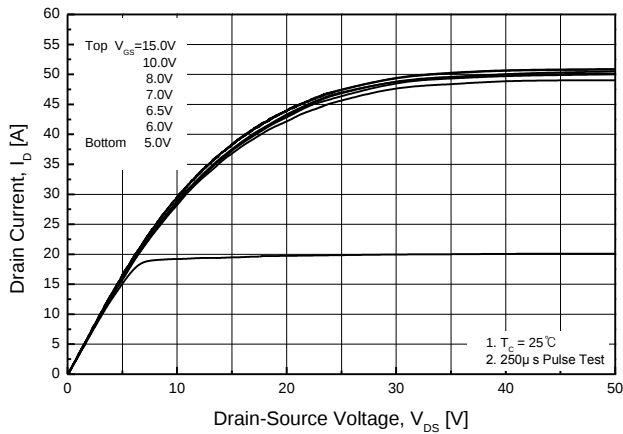
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	$V_{DD} = 250\text{ V}, I_D = 18\text{ A},$ $R_G = 25\text{ }\Omega$	--	78	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	72	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	184	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	68	--	ns
Total Gate Charge (Note 4,5)	Q_g	$V_{DS} = 400\text{ V}, I_D = 18\text{ A},$ $V_{GS} = 10\text{ V}$	--	54	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	15	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	12.5	--	nC

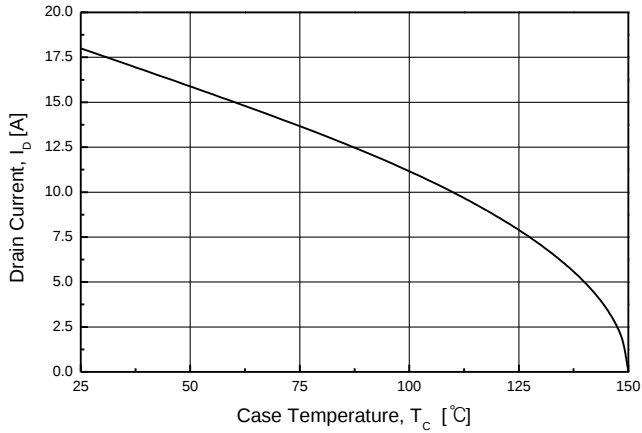
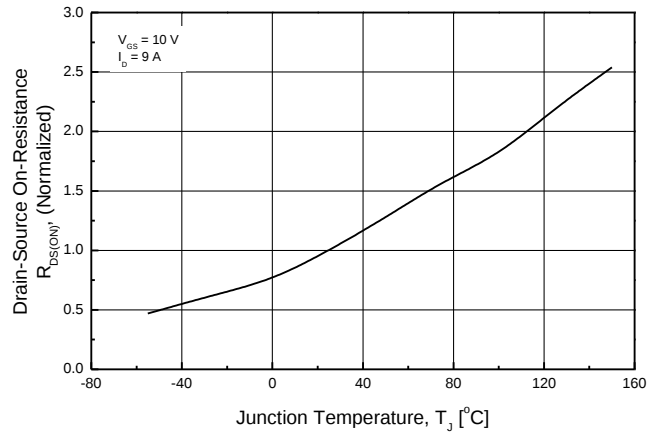
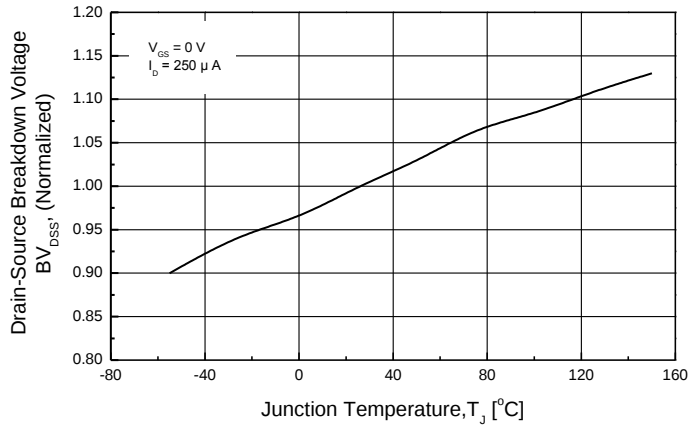
SOURCE DRAIN DIODE

Maximum Continuous Drain-Source Diode Forward Current	I_S	---	--	--	18	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	--	--	72	A
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 18\text{ A}$	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 18\text{ A}$ $dI_F / dt = 100\text{ A}/\mu\text{s}$	--	426	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}		--	6	--	μC

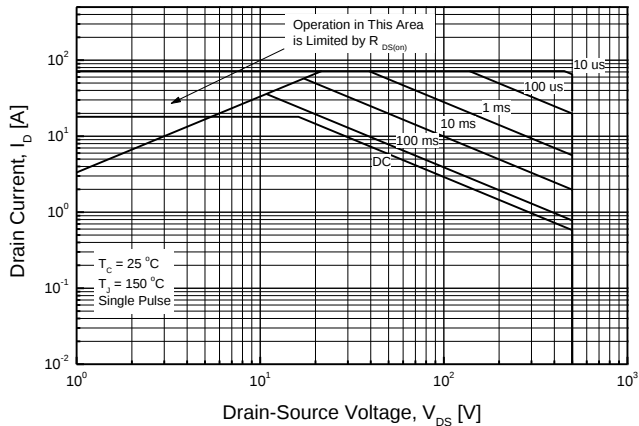
Note :

1. Repeated rating : Pulse width limited by safe operating area
2. $L=5.3\text{mH}$, $I_{AS} = 18\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 18\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DS}$, 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





TMP20N50(G)



TMPF20N50(G)

