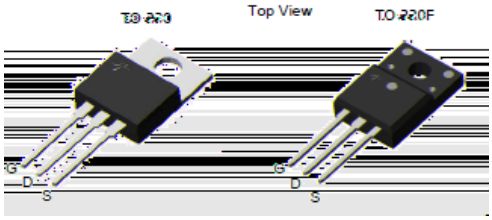
Features

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

BV_{DSS}		



Device	Package	Marking	Remark
TMP20N50A / TMPF20N50A	TO-220 / TO-220F	TMP20N50A / TMPF20N50A	RoHS
TMP20N50AG / TMPF20N50AG	TO-220 / TO-220F	TMP20N50AG / TMPF20N50AG	Halogen Free

Absolute Maximum Ratings

Parameter		Symbol	TMP20N50A(G)	TMPF20N50A(G)	Unit
Drain-Source Voltage		V_{DSS}	500		V
Gate-Source Voltage		V_{GS}	30		V
Continuous Drain Current	T_C = 25	I_D	18	18 *	A
	T_C = 100		12.4	12.4 *	A
Pulsed Drain Current (Note 1)		I_{DM}	72	72 *	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	705		mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	18		A
Repetitive Avalanche Energy (Note 1)		E_{AR}	29		mJ
Power Dissipation	T_C = 25	P_D	290	48	W
	Derate above 25		2.32	0.38	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

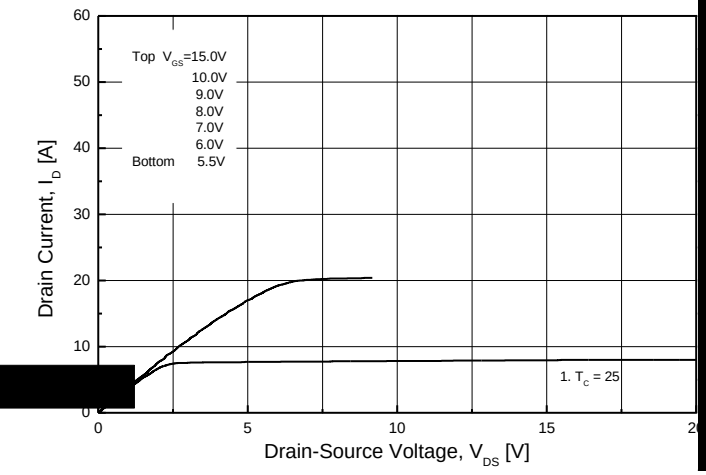
Parameter	Symbol	TMP20N50A(G)	TMPF20N50A(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	0.43	2.6	/W
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	/W

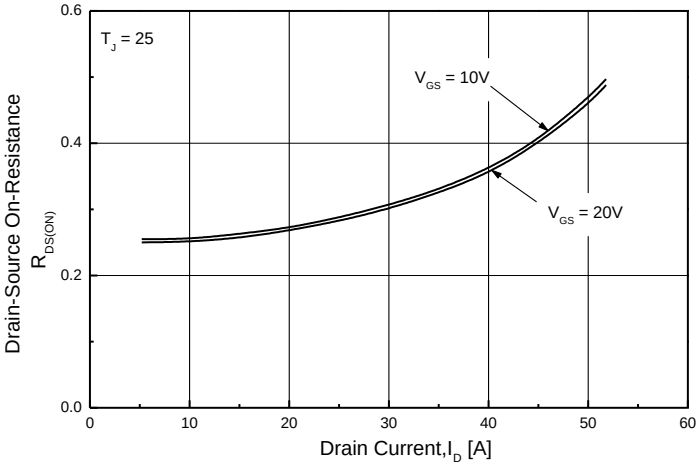
Electrical Characteristics : T_C=25 , unless otherwise noted

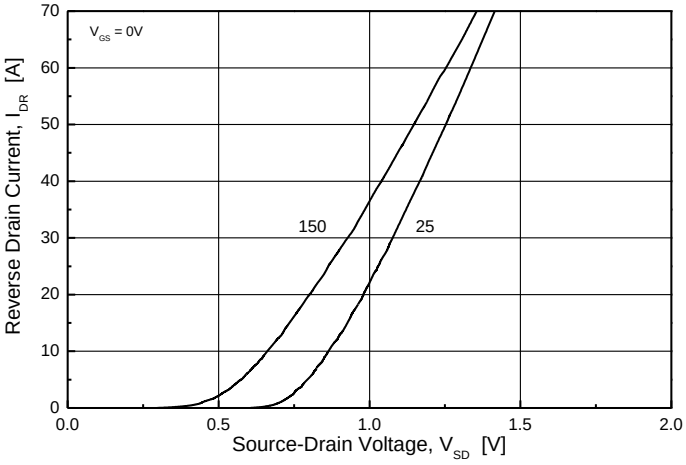
Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 µA	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	µA
		V_{DS} = 400 V, T_C = 125°C	--	--	10	µA
Forward Gate-Source Leakage Current	I_{GSSF}	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	3	--	5	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 9 A	--	0.25	0.30	Ω
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 9 A	--	14	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	2880	--	pF
Output Capacitance	C_{oss}		--	283	--	pF
Reverse Transfer Capacitance	C_{rss}		--	10	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 250 V, I_D = 18 A, R_G = 25	--	64	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	61	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	123	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	38	--	ns
Total Gate Charge (Note 4,5)	Q_g	V_{DS} = 400 V, I_D = 18 A, V_{GS} = 10 V	--	44	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	14	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	13	--	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 V, I_S = 18 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 18 A	--	421	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}	dI_F / dt = 100 A/µs	--	5.9	--	µC

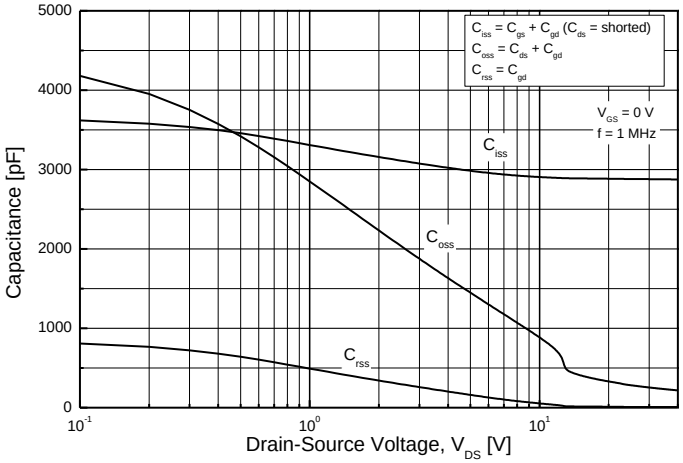
Note :

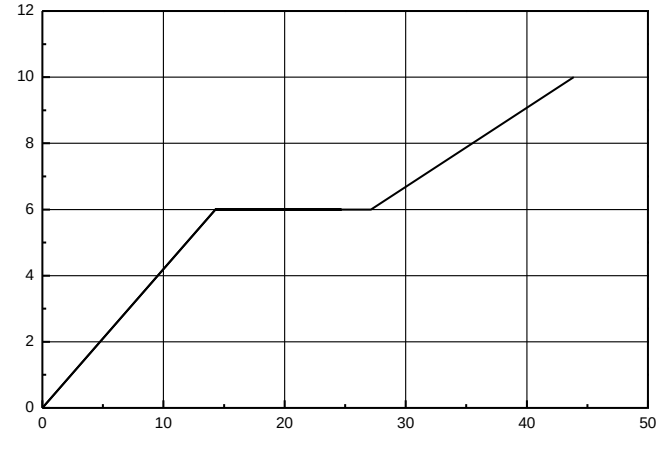
1. Repeated rating : Pulse width limited by safe operating area
2. L=4.6mH, I_{AS} = 18A, V_{DD} = 50V, R_G = 25 , Starting T_J= 25
3 I_{SD} 18A, di/dt µs , V_{DD} $_{DS}$, Starting T_J= 25
µ
5. Essentially Independent of Operating Temperature Typical Characteristics

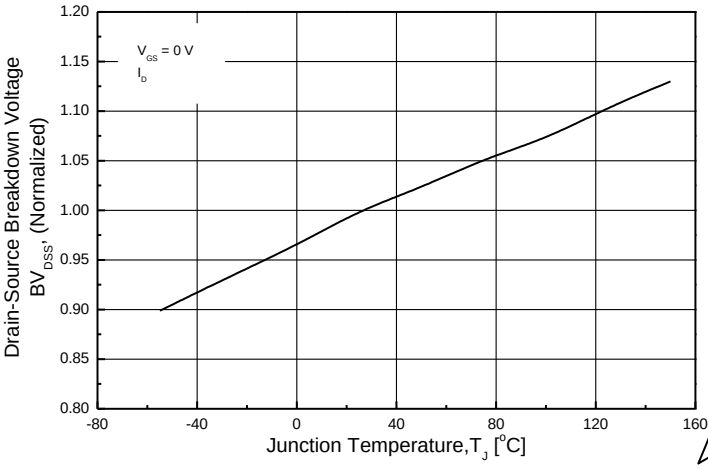

Top V_GS=15.0V
10.0V
9.0V
8.0V
7.0V
6.0V
Bottom 5.5V
1. T_C = 25
Drain Current, I_D [A]
Drain-Source Voltage, V_DS [V]

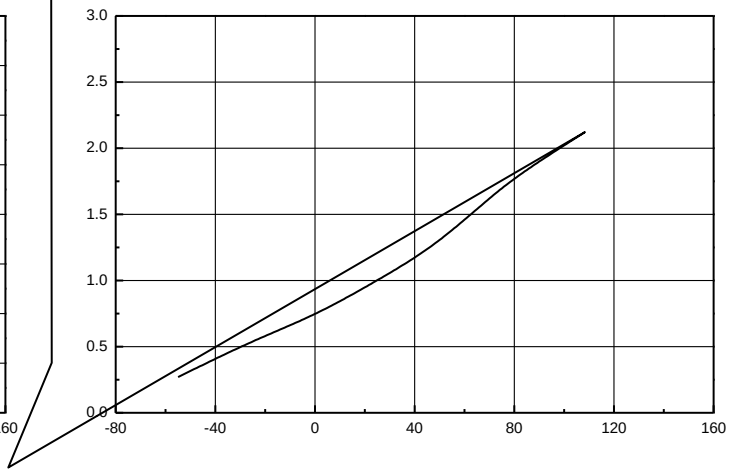

T_J = 25
V_GS = 10V
V_GS = 20V
Drain-Source On-Resistance
R_DS(ON)
Drain Current,I_D [A]

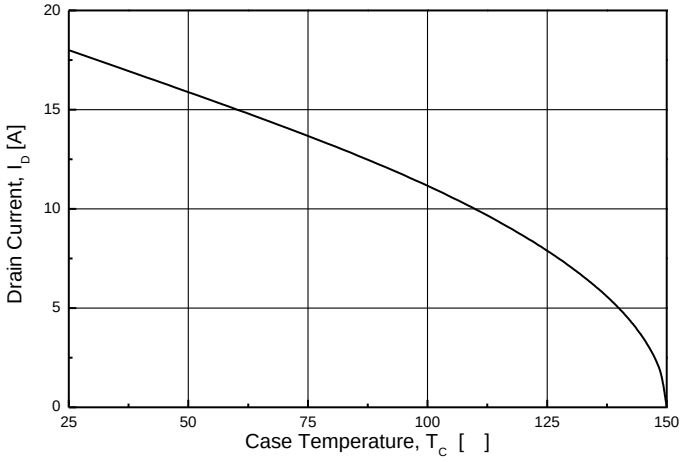

V_GS = 0V
150
25
Reverse Drain Current, I_DR [A]
Source-Drain Voltage, V_SD [V]

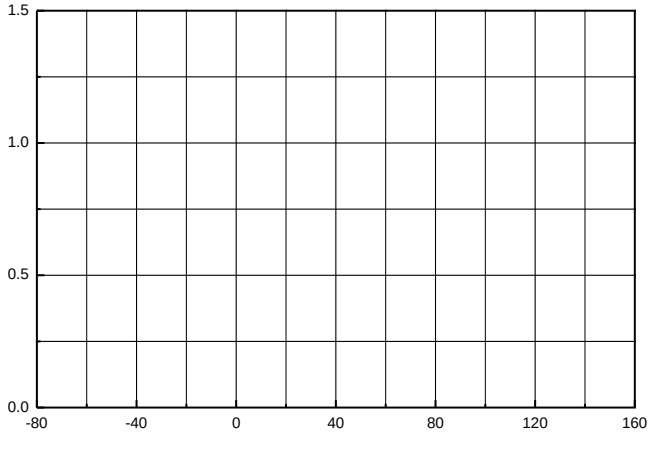

C_iss = C_gs + C_gd (C_ds = shorted)
C_oss = C_ds + C_gd
C_rss = C_gd
V_GS = 0 V
f = 1 MHz
C_iss
C_oss
C_rss
Capacitance [pF]
Drain-Source Voltage, V_DS [V]











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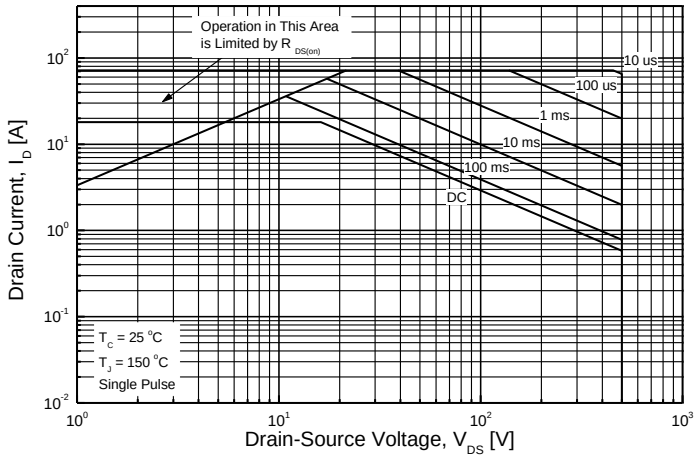

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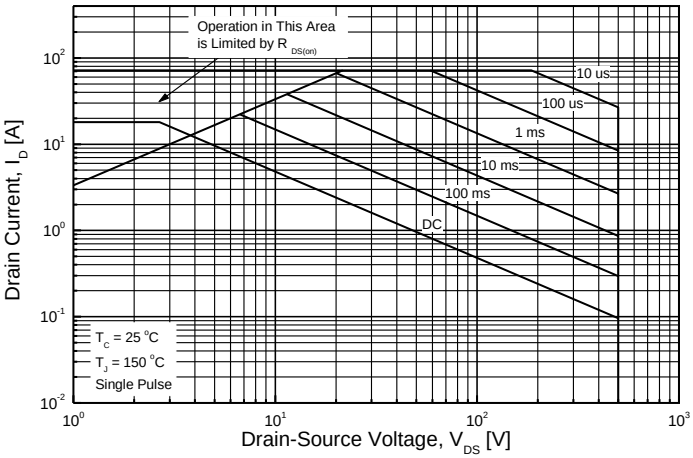
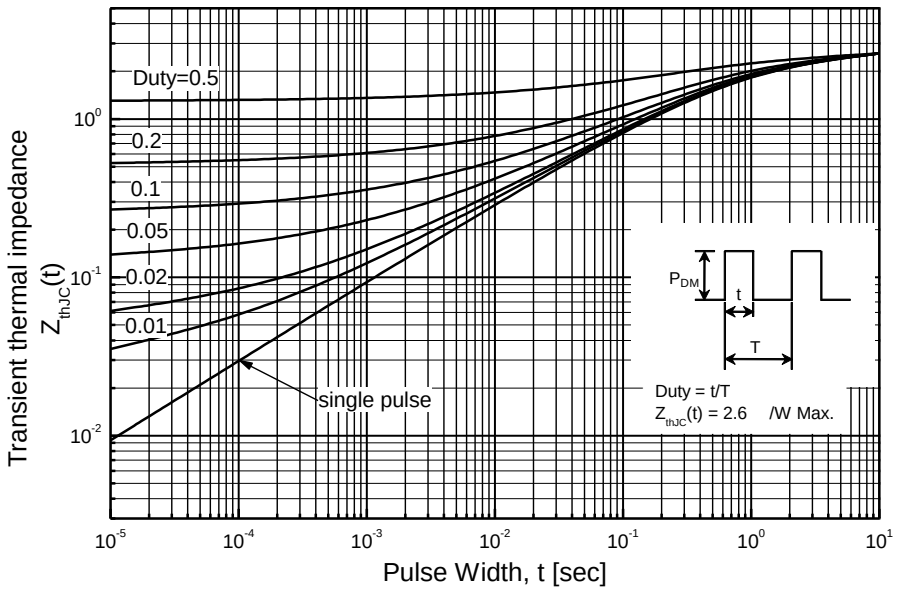


TMP20N50A(G)

TMPF20N50A(G)



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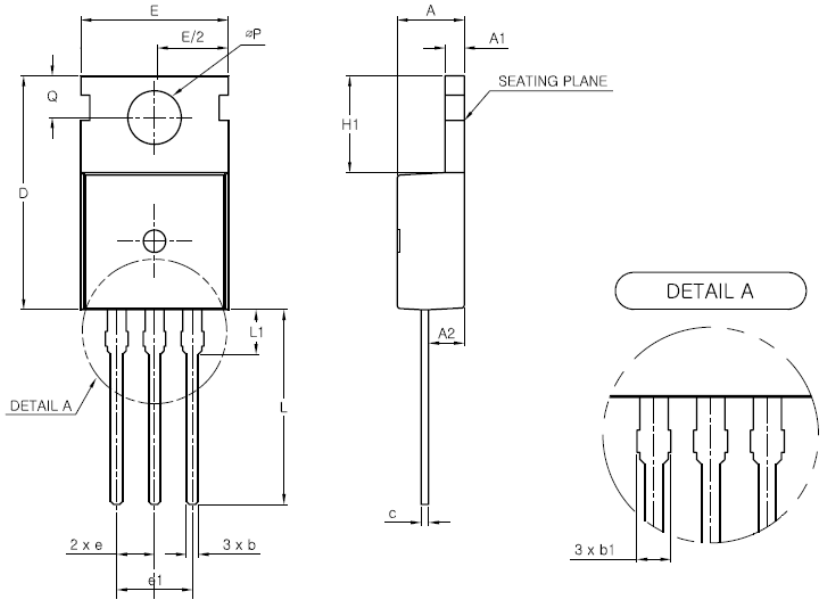
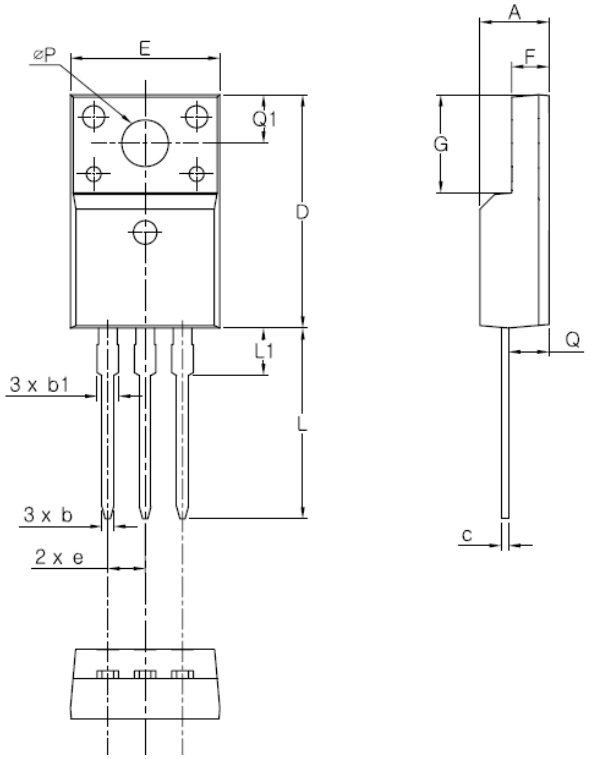


SYMBOL	MIN	MAX
A	4.30	4.70
A1	1.22	1.40
A2	2.20	2.79
b	0.70	0.91
b1	1.15	1.62
c	0.36	0.60
D	14.99	15.90
E	9.70	10.41
e	2.54 TYP	
e1	5.08 BSC	
H1	5.97	6.70
L	12.88	13.97
L1	3.31	3.81
ØP	3.40	3.88
Q	2.60	2.90

TO-220F-3L MECHANICAL DATA



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