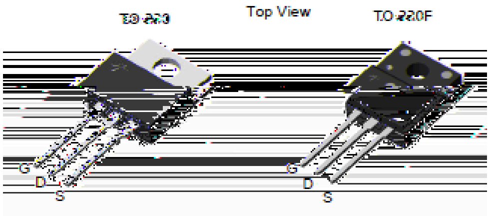
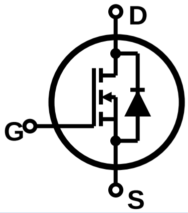
TMP11N50SG/TMPF11N50SG

Features

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

V_{DSS} = 550 V @T_{jmax}
I_D = 10A
$R_{DS(ON)}$ = 0.7 (max) @ V_{GS}= 10 V





Device	Package	Marking	Remark
TMP11N50SG / TMPF11N50SG	TO-220 / TO-220F	TMP11N50SG / TMPF11N50SG	Halogen Free

Absolute Maximum Ratings

Parameter		Symbol	TMP11N50SG	TMPF11N50SG	Unit
Drain-Source Voltage		V_{DSS}	500		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	T_C = 25 ℃	I_D	10	10 *	A
	T_C = 100 ℃		6	6 *	A
Pulsed Drain Current (Note 1)		I_{DM}	40	40*	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	500		mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	10		A
Repetitive Avalanche Energy (Note 1)		E_{AR}	15.8		mJ
Power Dissipation	T_C = 25 ℃	P_D	158	51.4	W
	Derate above 25 ℃		1.26	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,		T_L	300		℃

* Limited only by maximum junction temperature

Thermal Characteristics

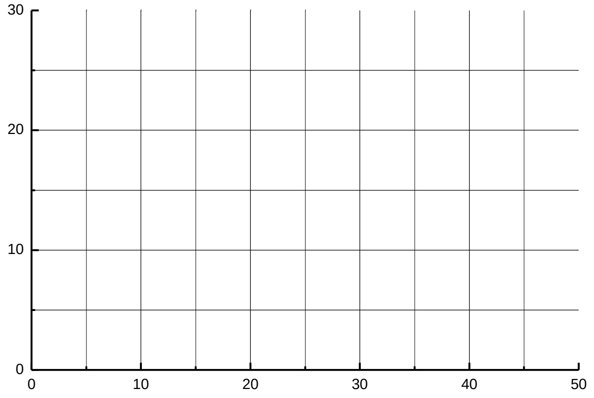
Parameter	Symbol	TMP11N50SG	TMPF11N50SG	Unit
Maximum Thermal resistance, Junction-to-Case	R_{JC}	0.79	2.43	℃/W
Maximum Thermal resistance, Junction-to-Ambient	R_{JA}	62.5	62.5	℃/W

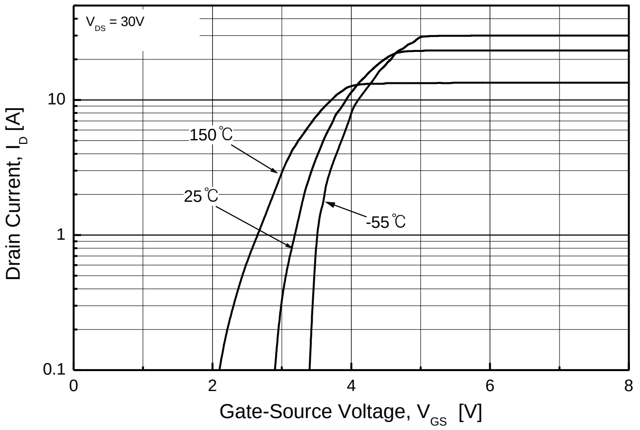
Electrical Characteristics : T_C=25℃, unless otherwise noted

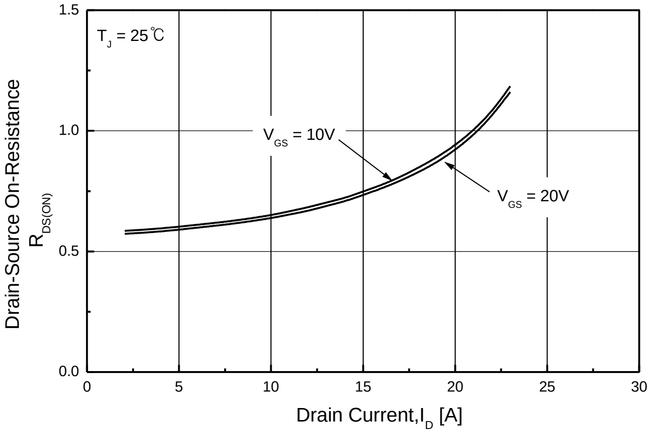
Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 400 V, T_C = 125°C	--	--	10	μA
Forward Gate-Source Leakage Current	I_{GSSF}	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	1.5	--	3.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 5 A	--	0.56	0.7	
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 5 A	--	10	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1546	--	pF
Output Capacitance	C_{oss}		--	374	--	pF
Reverse Transfer Capacitance	C_{rss}		--	9.6	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 250 V, I_D = 10 A, R_G = 25	--	45	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	40	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	144	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	53	--	ns
Total Gate Charge (Note 4,5)	Q_g	V_{DS} = 400V, I_D = 10 A, V_{GS} = 10 V	--	28	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	6.4	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	5.9	--	nC
SOURCE DRAIN DIODE						
Maximum Continuous Drain-Source Diode Forward Current	I_S	----	--	--	10	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	----	--	--	40	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 10 A dI_F / dt = 100 A/μs	--	126	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}		--	0.38	--	C

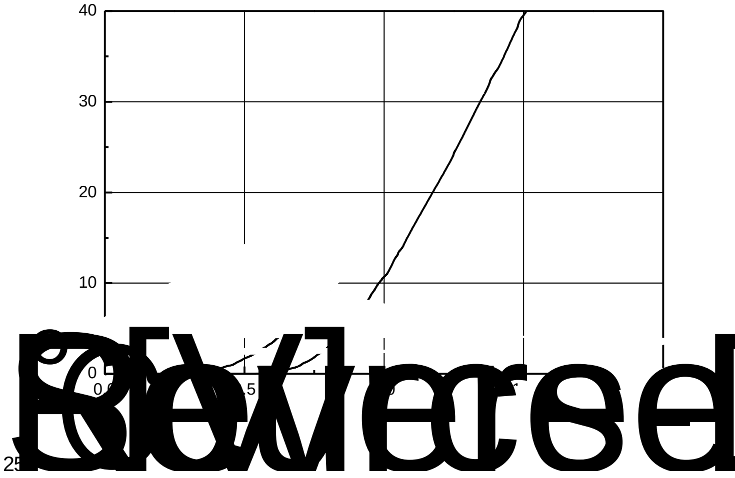
Note :

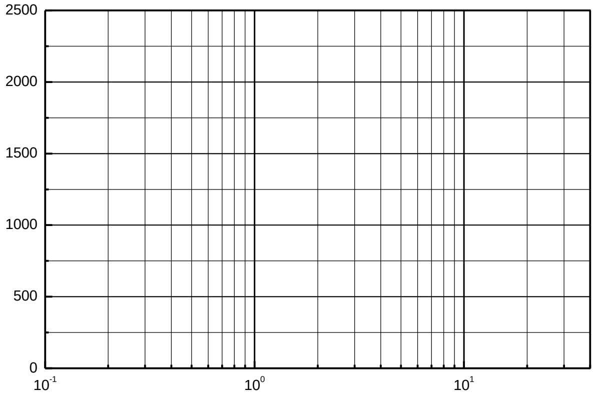
1. Repeated rating : Pulse width limited by safe operating area
2. L=9mH, I_{AS} = 10A, V_{DD} = 50V, R_G = 25 , Starting T_J= 25 ℃
3 I_{SD} μs , V_{DD} $_{DS}$, Starting T_J= 25 ℃
μ
5. Essentially Independent of Operating Temperature Typical Characteristics

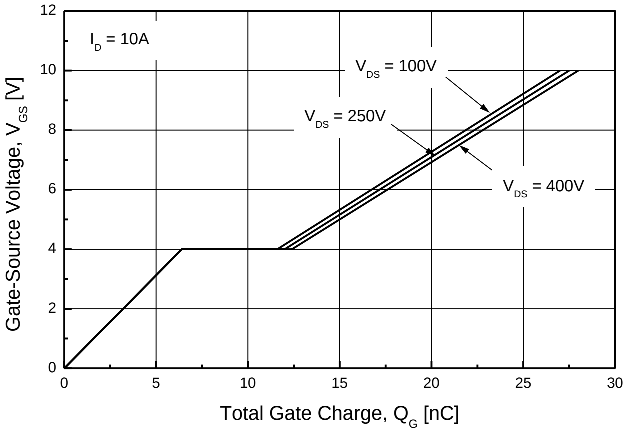

30
20
10
0
0
10
20
30
40
50

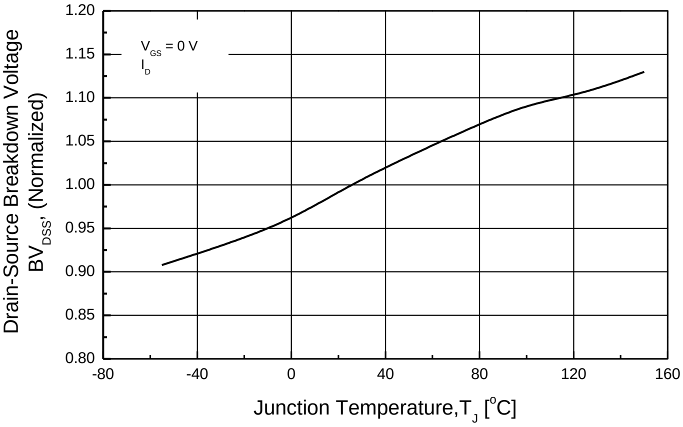

V$_{DS}$ = 30V
10
1
0.1
150℃
25℃
-55℃
Drain Current, I$_D$ [A]
0
2
4
6
8
Gate-Source Voltage, V$_{GS}$ [V]

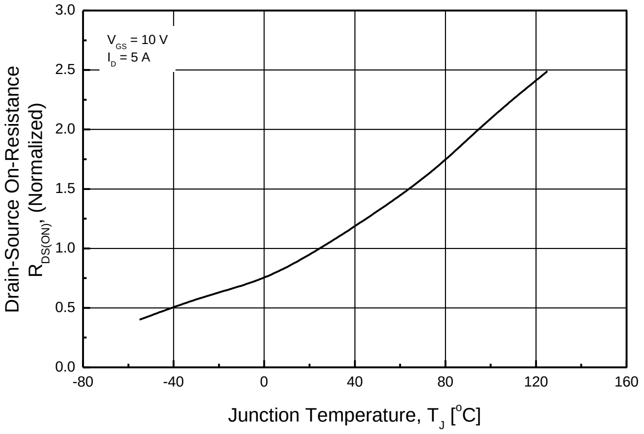

T$_J$ = 25℃
1.5
1.0
0.5
0.0
V$_{GS}$ = 10V
V$_{GS}$ = 20V
Drain-Source On-Resistance R$_{DS(ON)}$
0
5
10
15
20
25
30
Drain Current, I$_D$ [A]

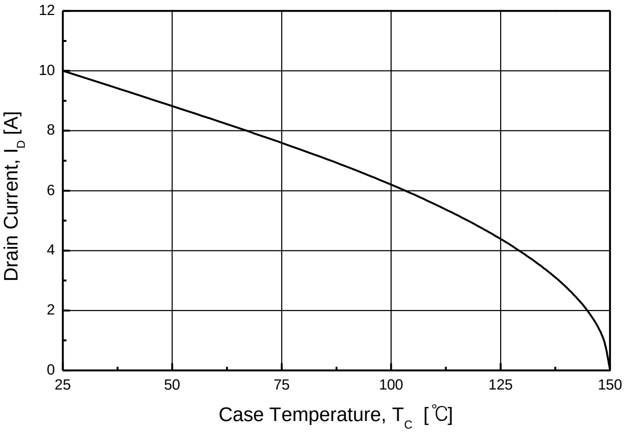

40
30
20
10
0


2500
2000
1500
1000
500
0
10^{-1}
10^0
10^1

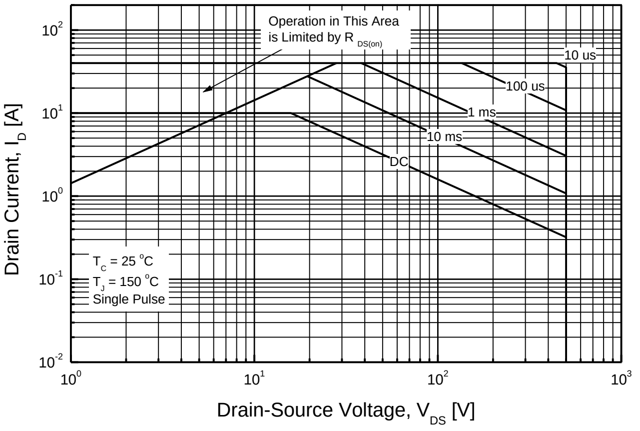

I$_D$ = 10A
V$_{DS}$ = 100V
V$_{DS}$ = 250V
V$_{DS}$ = 400V
12
10
8
6
4
2
0
Gate-Source Voltage, V$_{GS}$ [V]
0
5
10
15
20
25
30
Total Gate Charge, Q$_G$ [nC]



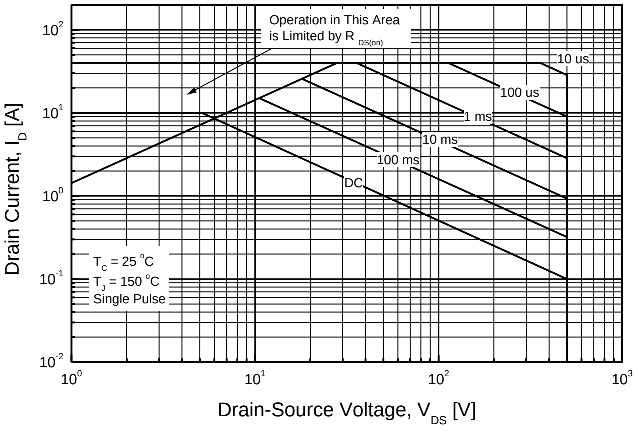


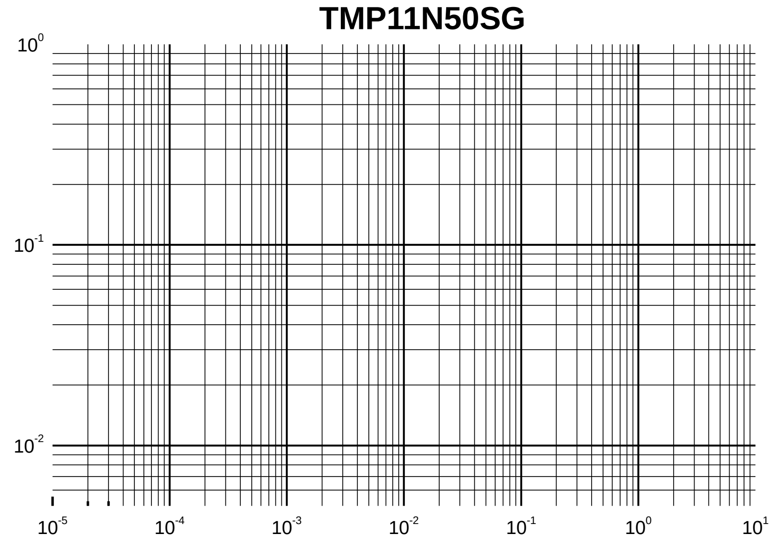


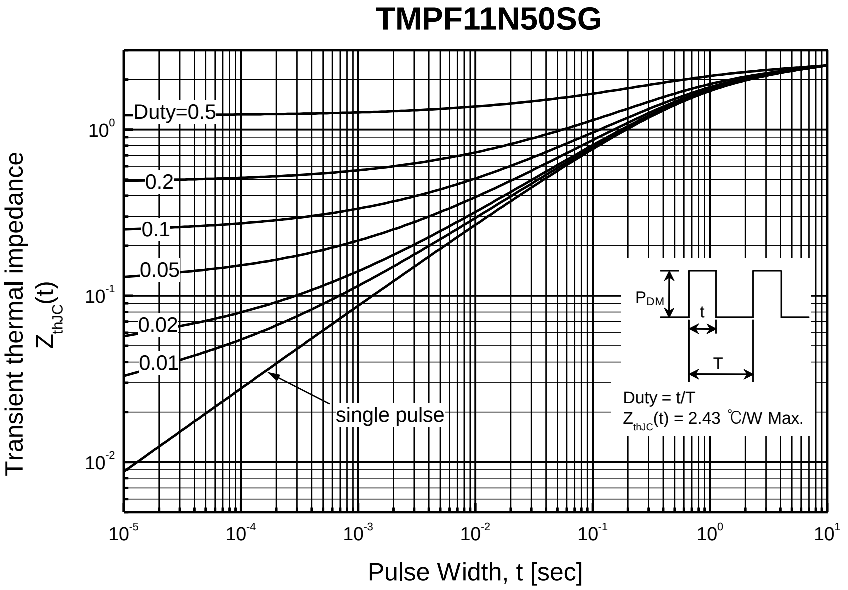
TMP11N50SG



TMPF11N50SG




TMP11N50SG
10^0
10^{-1}
10^{-2}
10^{-5}
10^{-4}
10^{-3}
10^{-2}
10^{-1}
10^0
10^1


TMPF11N50SG
Duty=0.5
0.2
0.1
0.05
0.02
0.01
single pulse
P_{DM}
t
T
Duty = t/T
$Z_{thJC}(t)$ = 2.43 ℃/W Max.
Transient thermal impedance
$Z_{thJC}(t)$
10^0
10^{-1}
10^{-2}
10^{-5}
10^{-4}
10^{-3}
10^{-2}
10^{-1}
10^0
10^1
Pulse Width, t [sec]