

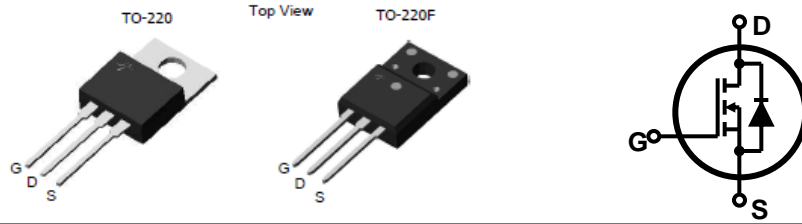
Features

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

$$V_{DSS} = 990 \text{ V @ } T_{jmax}$$

$$I_D = 9 \text{ A}$$

$$R_{DS(ON)} = 1.4 \Omega(\text{max}) @ V_{GS} = 10 \text{ V}$$



Device	Package	Marking	Remark
TMP9N90 / TMPF9N90	TO-220 / TO-220F	TMP9N90 / TMPF9N90	RoHS
TMP9N90G / TMPF9N90G	TO-220 / TO-220F	TMP9N90G / TMPF9N90G	Halogen Free

Absolute Maximum Ratings

Parameter	Symbol	TMP9N90(G)	TMPF9N90(G)	Unit	
Drain-Source Voltage	V_{DSS}	900		V	
Gate-Source Voltage	V_{GS}	±30		V	
Continuous Drain Current	I_D	$T_C = 25 \text{ }^\circ\text{C}$	9	9 *	A
		$T_C = 100 \text{ }^\circ\text{C}$	5.7	5.7 *	A
Pulsed Drain Current (Note 1)	I_{DM}	36	36*	A	
Single Pulse Avalanche Energy (Note 2)	E_{AS}	221		mJ	
Repetitive Avalanche Current (Note 1)	I_{AR}	9		A	
Repetitive Avalanche Energy (Note 1)	E_{AR}	29		mJ	
Power Dissipation	P_D	$T_C = 25 \text{ }^\circ\text{C}$	290	48	W
		Derate above 25 °C	2.32	0.38	W/°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		°C	
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300		°C	

* Limited only by maximum junction temperature

Thermal Characteristics

Parameter	Symbol	TMP9N90(G)	TMPF9N90(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	0.43	2.6	°C/W
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	°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}	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	900	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 900\text{ V}, V_{GS} = 0\text{ V}$	--	--	10	μA
		$V_{DS} = 720\text{ V}, T_C = 125^\circ\text{C}$	--	--	100	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	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 4.5\text{ A}$	--	1.13	1.4	Ω
Forward Transconductance ^(Note 4)	g_{FS}	$V_{DS} = 30\text{ V}, I_D = 4.5\text{ A}$	--	10	--	S

DYNAMIC

Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	2324	--	pF
Output Capacitance	C_{oss}		--	184	--	pF
Reverse Transfer Capacitance	C_{rss}		--	29	--	pF

SWITCHING

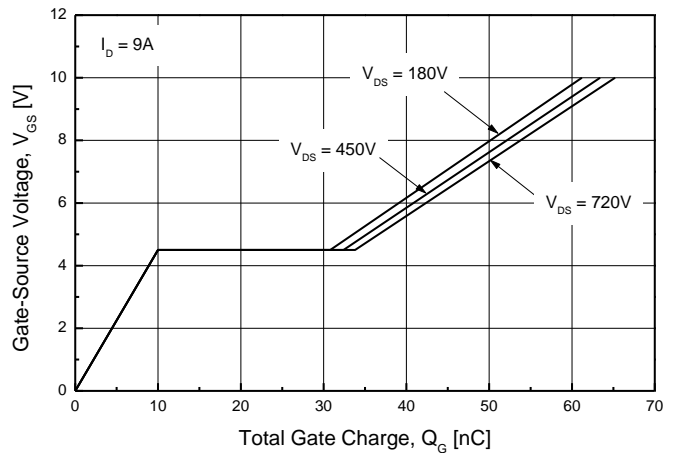
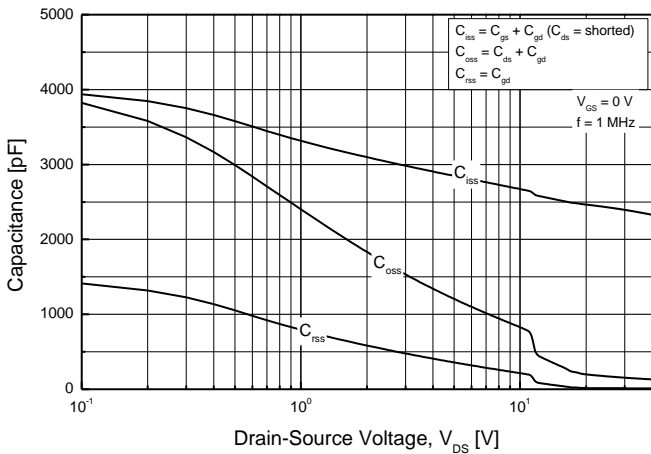
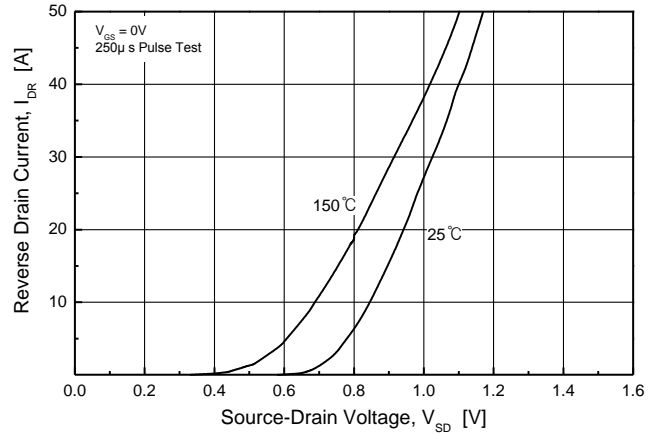
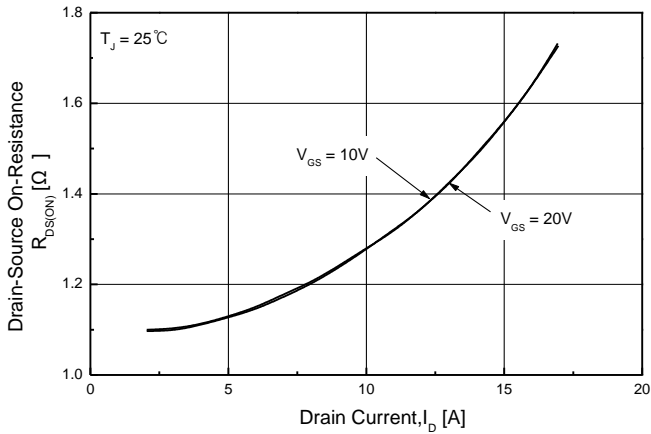
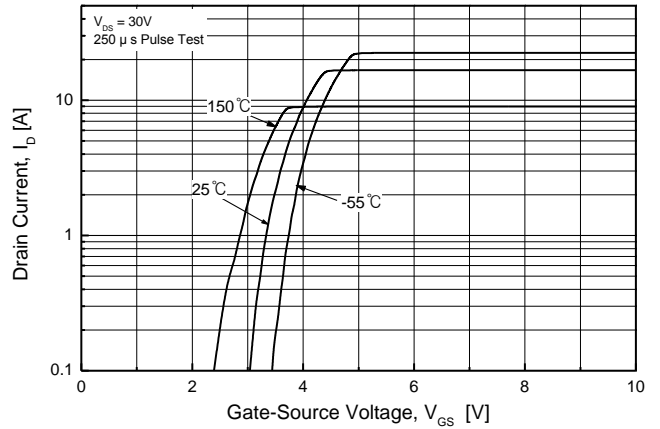
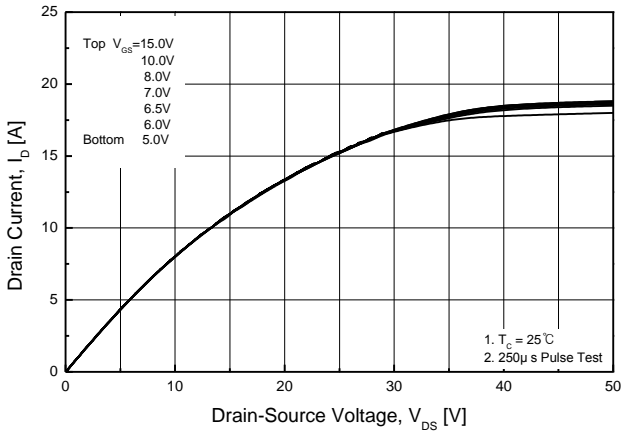
Turn-On Delay Time ^(Note 4,5)	$t_{d(on)}$	$V_{DD} = 450\text{ V}, I_D = 9\text{ A},$ $R_G = 25\ \Omega$	--	61	--	ns
Turn-On Rise Time ^(Note 4,5)	t_r		--	49	--	ns
Turn-Off Delay Time ^(Note 4,5)	$t_{d(off)}$		--	318	--	ns
Turn-Off Fall Time ^(Note 4,5)	t_f		--	100	--	ns
Total Gate Charge ^(Note 4,5)	Q_g	$V_{DS} = 720\text{ V}, I_D = 9\text{ A},$ $V_{GS} = 10\text{ V}$	--	65	--	nC
Gate-Source Charge ^(Note 4,5)	Q_{gs}		--	11	--	nC
Gate-Drain Charge ^(Note 4,5)	Q_{gd}		--	23	--	nC

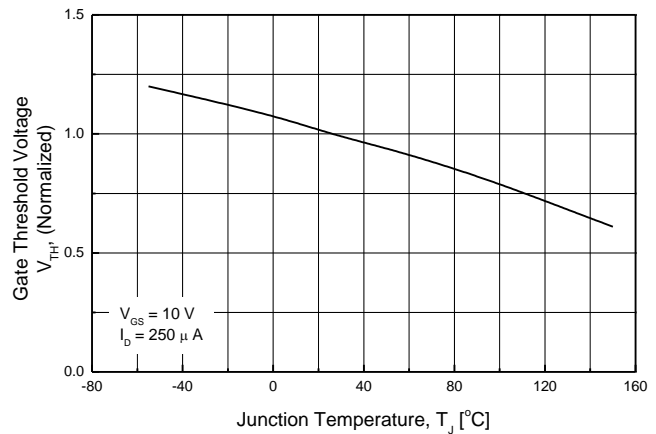
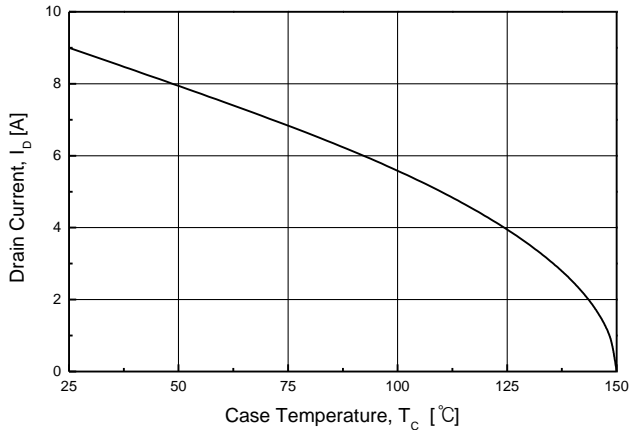
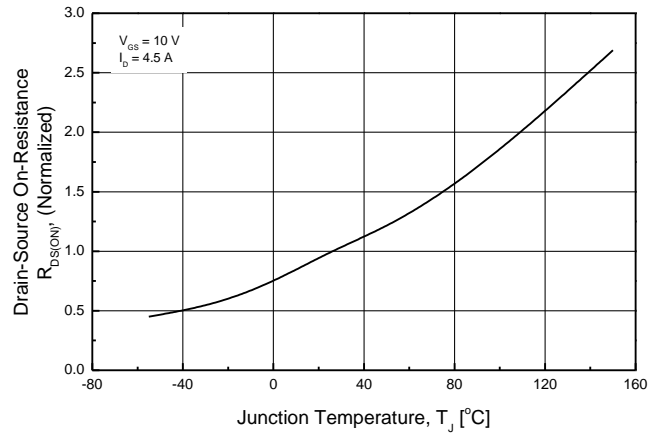
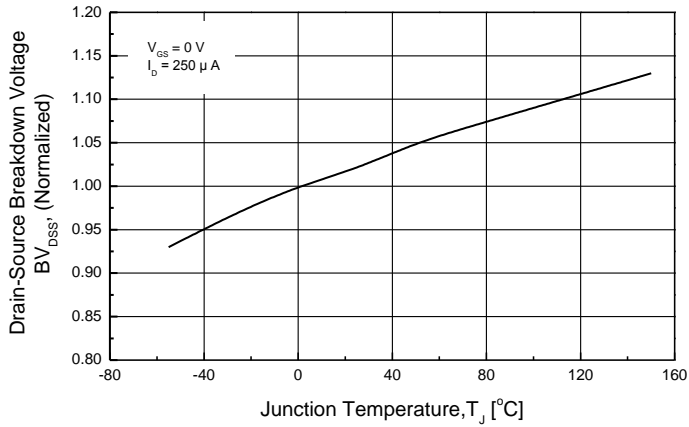
SOURCE DRAIN DIODE

Maximum Continuous Drain-Source Diode Forward Current	I_S	---	--	--	9	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	--	--	36	A
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 9\text{ A}$	--	--	1.5	V
Reverse Recovery Time ^(Note 4)	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 9\text{ A}$ $di_F / dt = 100\text{ A}/\mu\text{s}$	--	469	--	ns
Reverse Recovery Charge ^(Note 4)	Q_{rr}		--	4.9	--	μC

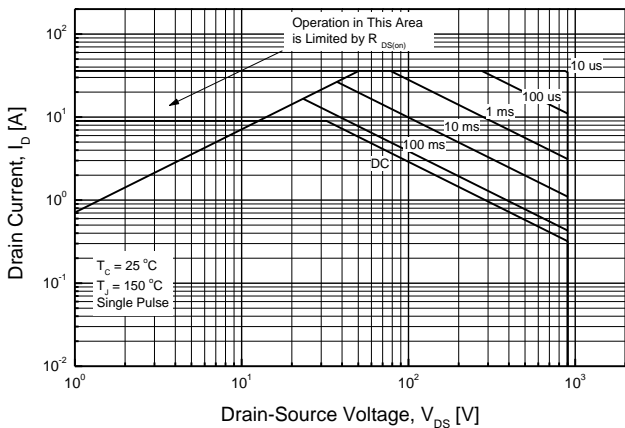
Note :

1. Repeated rating : Pulse width limited by safe operating area
2. $L=5.16\text{mH}, I_{AS} = 9\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 9\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DS}$, 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

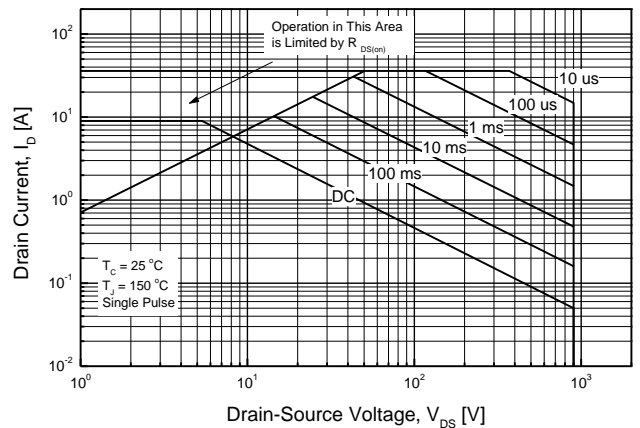




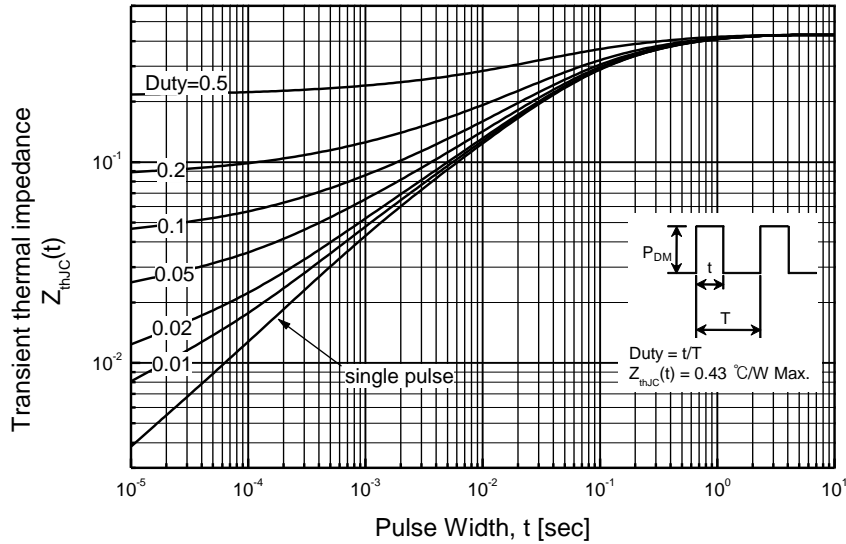
TMP9N90(G)



TMPF9N90(G)



TMP9N90(G)



TMPF9N90(G)

