

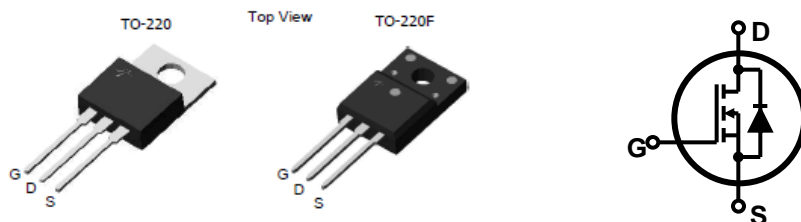
## Features

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

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

$$I_D = 4 \text{ A}$$

$$R_{DS(ON)} = 4.0 \Omega(\text{max}) @ V_{GS} = 10 \text{ V}$$



Device	Package	Marking	Remark
TMP4N90 / TMPF4N90	TO-220 / TO-220F	TMP4N90 / TMPF4N90	RoHS
TMP4N90G / TMPF4N90G	TO-220 / TO-220F	TMP4N90G / TMPF4N90G	Halogen Free

## Absolute Maximum Ratings

Parameter	Symbol	TMP4N90(G)	TMPF4N90(G)	Unit
Drain-Source Voltage	$V_{DSS}$	900		V
Gate-Source Voltage	$V_{GS}$	±30		V
Continuous Drain Current	$T_C = 25 \text{ }^\circ\text{C}$	4	4 *	A
	$T_C = 100 \text{ }^\circ\text{C}$	2.22	2.22 *	A
Pulsed Drain Current (Note 1)	$I_{DM}$	16	16*	A
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	17.8		mJ
Repetitive Avalanche Current (Note 1)	$I_{AR}$	4		A
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	12.3		mJ
Power Dissipation	$T_C = 25 \text{ }^\circ\text{C}$	123	38.7	W
	Derate above 25 °C	0.98	0.30	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	TMP4N90(G)	TMPF4N90(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	1.01	3.23	°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
<b>OFF</b>						
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	$\mu\text{A}$
		$V_{DS} = 720\text{ V}, T_C = 125^\circ\text{C}$	--	--	100	$\mu\text{A}$
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	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 2\text{ A}$	--	3.2	4.0	$\Omega$
Forward Transconductance <sup>(Note 4)</sup>	$g_{FS}$	$V_{DS} = 30\text{ V}, I_D = 2\text{ A}$	--	6	--	S

**DYNAMIC**

Input Capacitance	$C_{iss}$	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	955	--	pF
Output Capacitance	$C_{oss}$		--	80	--	pF
Reverse Transfer Capacitance	$C_{rss}$		--	13	--	pF

**SWITCHING**

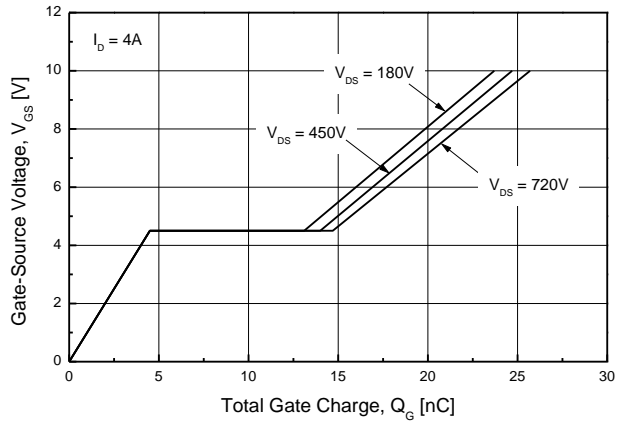
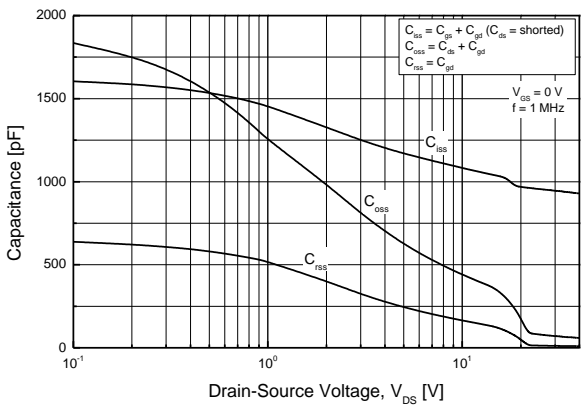
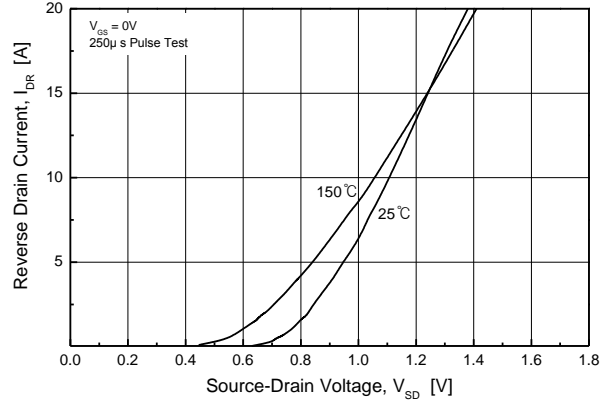
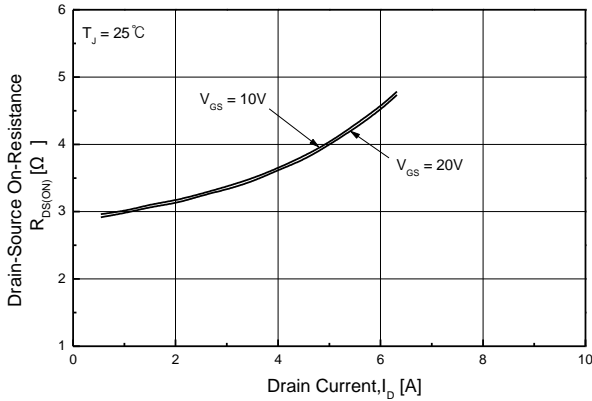
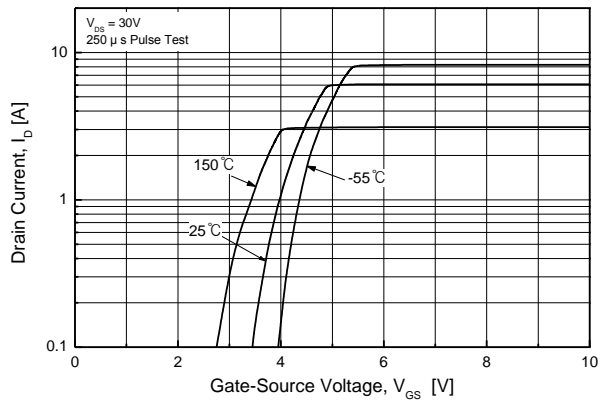
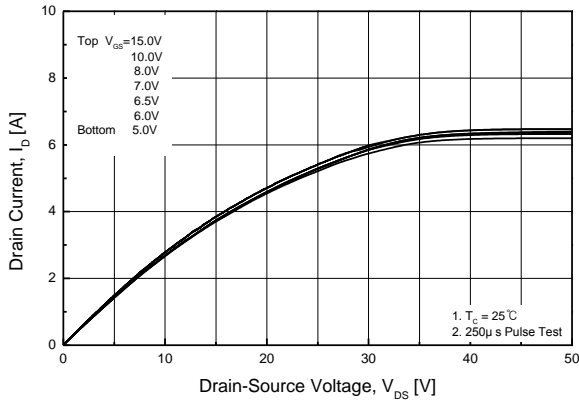
Turn-On Delay Time <sup>(Note 4,5)</sup>	$t_{d(on)}$	$V_{DD} = 450\text{ V}, I_D = 4\text{ A},$ $R_G = 25\ \Omega$	--	49	--	ns
Turn-On Rise Time <sup>(Note 4,5)</sup>	$t_r$		--	38	--	ns
Turn-Off Delay Time <sup>(Note 4,5)</sup>	$t_{d(off)}$		--	146	--	ns
Turn-Off Fall Time <sup>(Note 4,5)</sup>	$t_f$		--	50	--	ns
Total Gate Charge <sup>(Note 4,5)</sup>	$Q_g$	$V_{DS} = 720\text{ V}, I_D = 4\text{ A},$ $V_{GS} = 10\text{ V}$	--	25	--	nC
Gate-Source Charge <sup>(Note 4,5)</sup>	$Q_{gs}$		--	4.8	--	nC
Gate-Drain Charge <sup>(Note 4,5)</sup>	$Q_{gd}$		--	10.2	--	nC

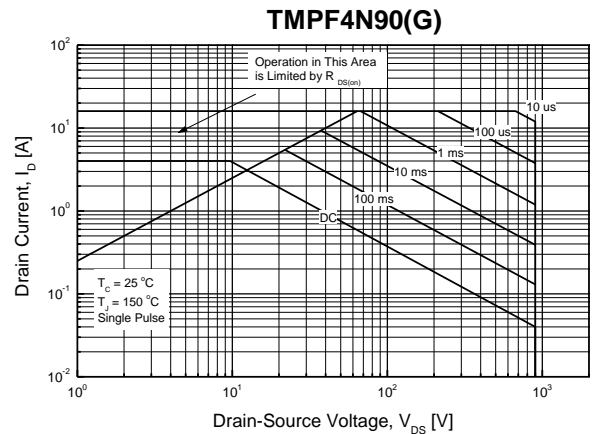
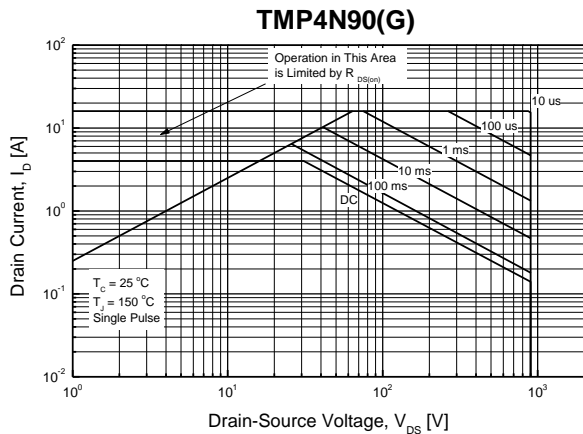
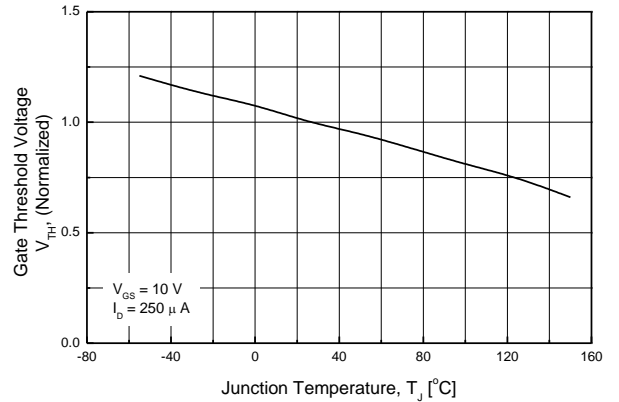
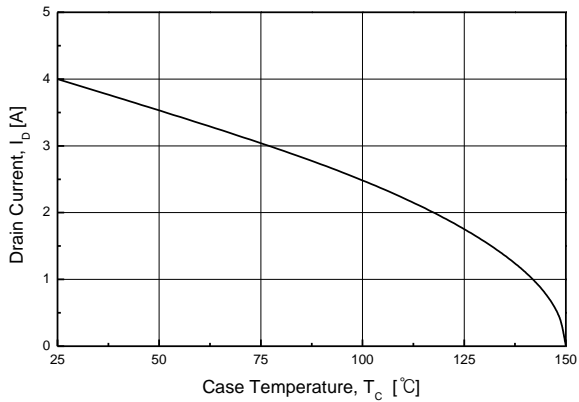
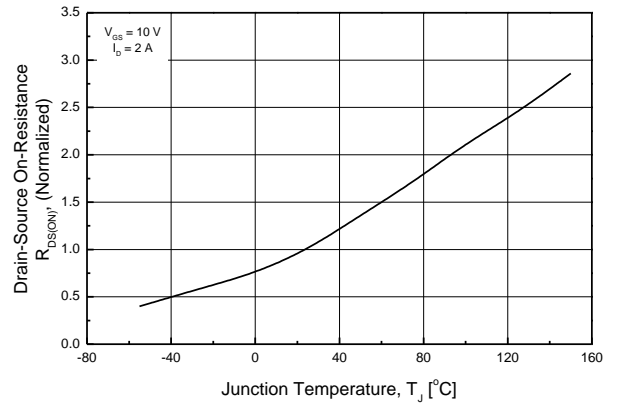
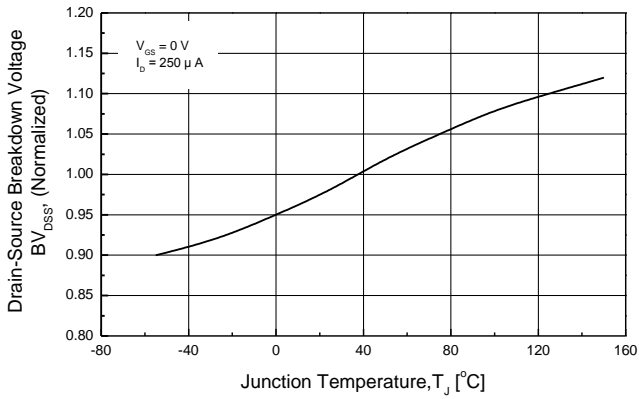
**SOURCE DRAIN DIODE**

Maximum Continuous Drain-Source Diode Forward Current	$I_S$	---	--	--	4	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$	---	--	--	16	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 4\text{ A}$	--	--	1.5	V
Reverse Recovery Time <sup>(Note 4)</sup>	$t_{rr}$	$V_{GS} = 0\text{ V}, I_S = 4\text{ A}$	--	487	--	ns
Reverse Recovery Charge <sup>(Note 4)</sup>	$Q_{rr}$	$di_F / dt = 100\text{ A}/\mu\text{s}$	--	2.8	--	$\mu\text{C}$

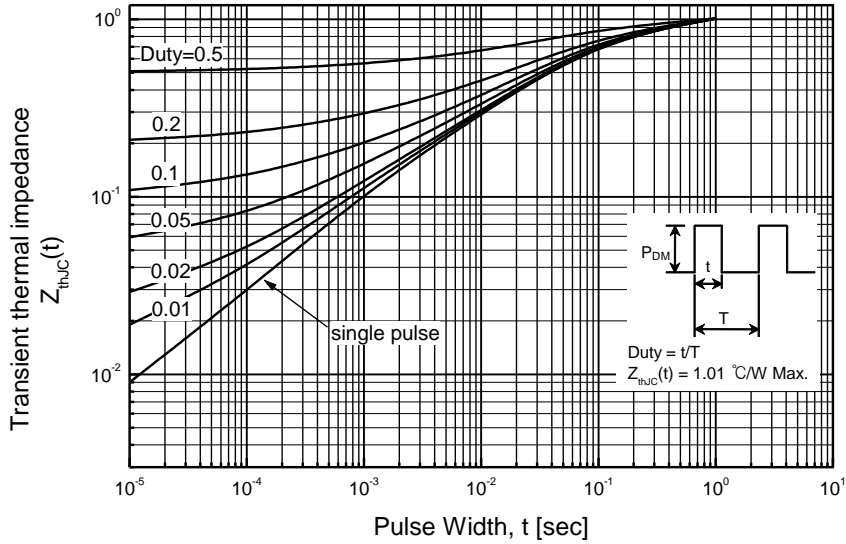
Note :

1. Repeated rating : Pulse width limited by safe operating area
2.  $L=2.1\text{mH}, I_{AS} = 4\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega,$  Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 4\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DS},$  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





**TMP4N90(G)**



**TMPF4N90(G)**

