

# TMP10N60/TMPF10N60 TMP10N60G/TMPF10N60G

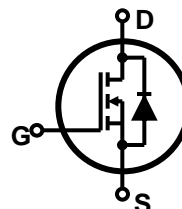
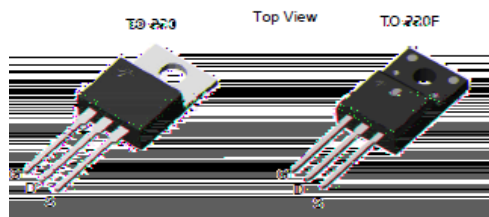
## Features

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

$$V_{DSS} = 660 \text{ V} @ T_{jmax}$$

$$I_D = 10 \text{ A}$$

$$R_{DS(on)} = 0.75 \text{ (max) } @ V_{GS} = 10 \text{ V}$$



Device	Package	Marking	Remark
TMP10N60 / TMPF10N60	TO-220 / TO-220F	TMP10N60 / TMPF10N60	RoHS
TMP10N60G / TMPF10N60G	TO-220 / TO-220F	TMP10N60G / TMPF10N60G	Halogen Free

## Absolute Maximum Ratings

Parameter	Symbol	TMP10N60(G)	TMPF10N60(G)	Unit	
Drain-Source Voltage	$V_{DS}$	600		V	
Gate-Source Voltage	$V_{GS}$	±30		V	
Continuous Drain Current	$I_D$	$T_C = 25 \text{ }^\circ\text{C}$	10	10*	A
		$T_C = 100 \text{ }^\circ\text{C}$	6.5	6.5*	A
Pulsed Drain Current (Note 1)	$I_{DM}$	40	40*	A	
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	758		mJ	
Repetitive Avalanche Current (Note 1)	$I_{AR}$	10		A	
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	19.8		mJ	
Power Dissipation	$P_D$	$T_C = 25 \text{ }^\circ\text{C}$	198	52	W
		Derate above 25 $^\circ\text{C}$	1.58	0.41	W/ $^\circ\text{C}$
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5		V/ns	
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~150		$^\circ\text{C}$	
Maximum lead temperature for soldering purposes,	$T_L$	300		$^\circ\text{C}$	

\* Limited only by maximum junction temperature

## Thermal Characteristics

Parameter	Symbol	TMP10N60(G)	TMPF10N60(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{JC}$	0.63	2.4	$^\circ\text{C}/\text{W}$
Maximum Thermal resistance, Junction-to-Ambient	$R_{JA}$	62.5	62.5	$^\circ\text{C}/\text{W}$

## 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	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	600	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
		$V_{DS} = 480\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	$\mu\text{A}$
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	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 5\text{ A}$	--	0.59	0.75	
Forward Transconductance <sup>(Note 4)</sup>	$g_{FS}$	$V_{DS} = 30\text{ V}, I_D = 5\text{ A}$	--	9	--	S

### DYNAMIC

Input Capacitance	$C_{iss}$	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	1891	--	pF
Output Capacitance	$C_{oss}$		--	160	--	pF
Reverse Transfer Capacitance	$C_{rss}$		--	5.8	--	pF

### SWITCHING

Turn-On Delay Time <sup>(Note 4,5)</sup>	$t_{d(on)}$	$V_{DD} = 300\text{ V}, I_D = 10\text{ A},$ $R_G = 25$	--	55	--	ns
Turn-On Rise Time <sup>(Note 4,5)</sup>	$t_r$		--	39	--	ns
Turn-Off Delay Time <sup>(Note 4,5)</sup>	$t_{d(off)}$		--	156	--	ns
Turn-Off Fall Time <sup>(Note 4,5)</sup>	$t_f$		--	53	--	ns
Total Gate Charge <sup>(Note 4,5)</sup>	$Q_g$	$V_{DS} = 480\text{ V}, I_D = 10\text{ A},$ $V_{GS} = 10\text{ V}$	--	36	--	nC
Gate-Source Charge <sup>(Note 4,5)</sup>	$Q_{gs}$		--	8.3	--	nC
Gate-Drain Charge <sup>(Note 4,5)</sup>	$Q_{gd}$		--	8.3	--	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	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 10\text{ A}$	--	--	1.5	V
Reverse Recovery Time <sup>(Note 4)</sup>	$t_{rr}$	$V_{GS} = 0\text{ V}, I_S = 10\text{ A}$ $dl_F / dt = 100\text{ A}/\mu\text{s}$	--	344	--	ns
Reverse Recovery Charge <sup>(Note 4)</sup>	$Q_{rr}$		--	3.6	--	$\mu\text{C}$

Note :

1. Repeated rating : Pulse width limited by safe operating area
2.  $L=13.9\text{mH}, I_{AS} = 10\text{A}, V_{DD} = 50\text{V}, R_G = 25$  , Starting  $T_J = 25^\circ\text{C}$
- 3  $I_{SD}$   $\mu\text{s}, V_{DD}$   $\mu\text{s}, V_{DS}$ , Starting  $T_J = 25^\circ\text{C}$

5. Essentially Independent of Operating Temperature Typical Characteristics



# TMP10N60/TMPF10N60 TMP10N60G/TMPF10N60G

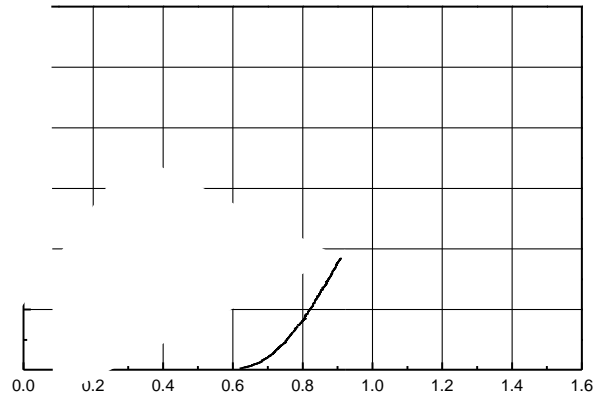
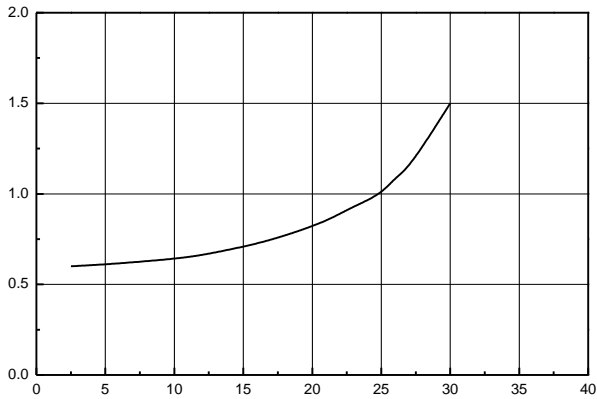
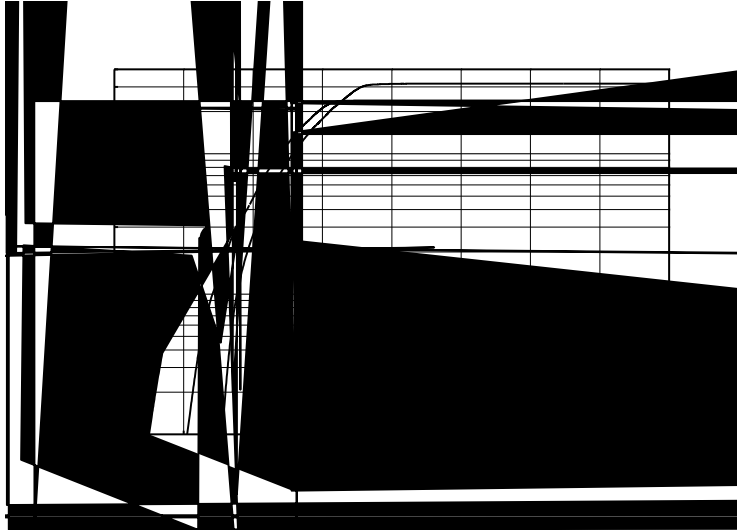
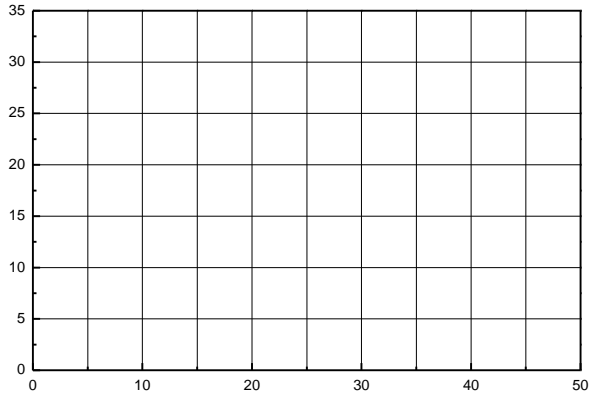
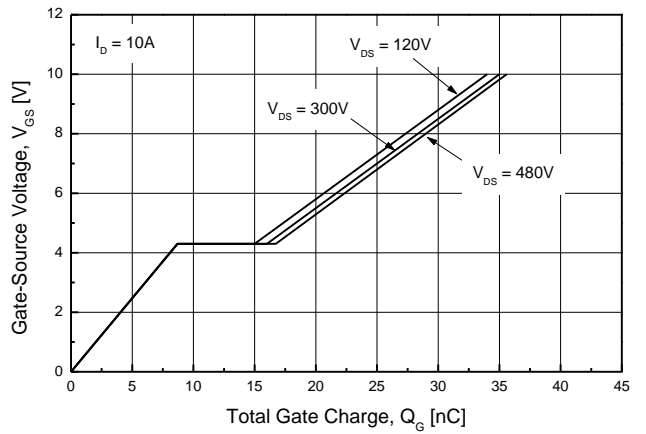
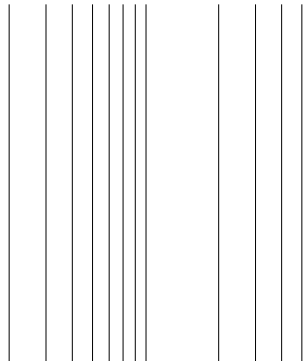
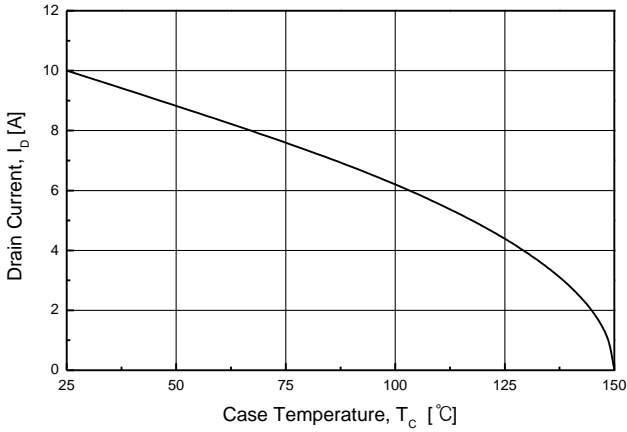
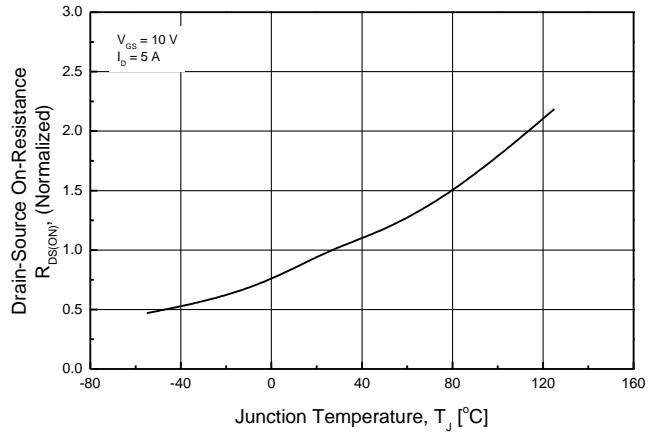
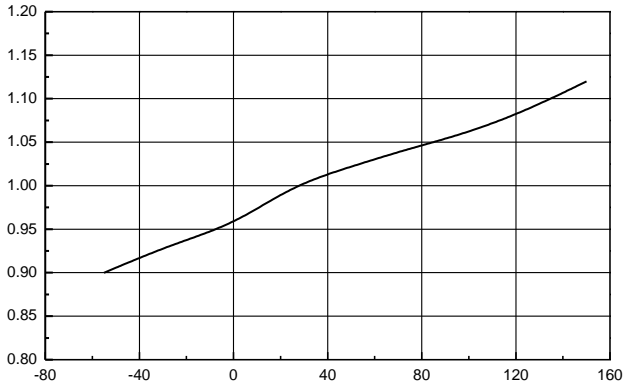


Figure 5: ~~Measured Drain Current~~

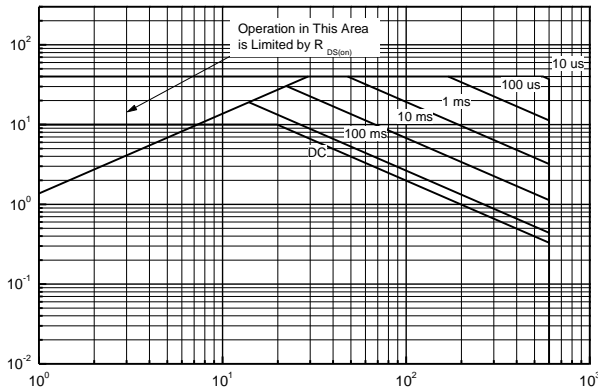


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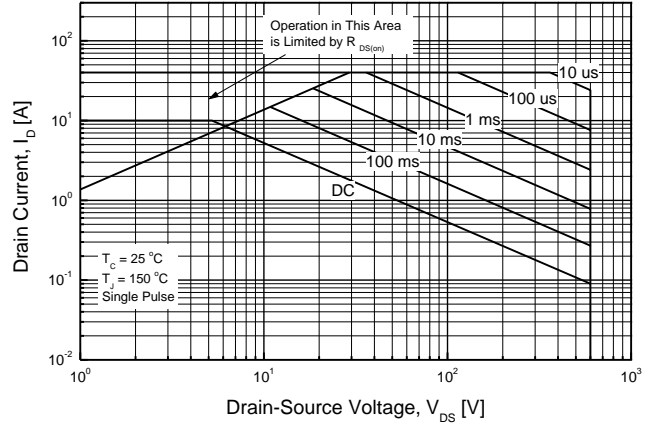
## TMP10N60G/TMPF10N60G



### TMP10N60(G)

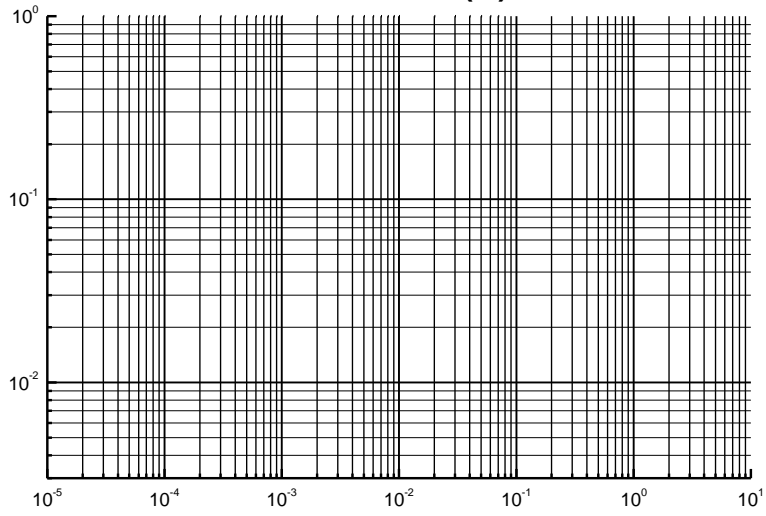


### TMPF10N60(G)





TMP10N60(G)



TMPF10N60(G)

