



TMN6050F

N-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

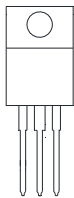
Applications

- Load switch
- PWM

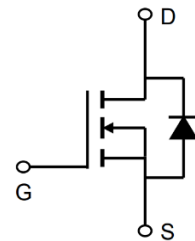
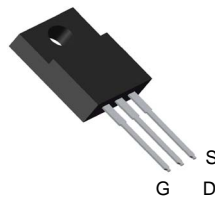
General Features

$V_{DS} = 60V$ $I_D = 50A$
 $R_{DS(ON)} = 14m\Omega$ (typ.) @ $V_{GS} = 10V$

100% UIS Tested
 100% R_g Tested



F:TO-220F



Marking: 50N06 OR 018

Absolute Maximum Ratings: ($T_C = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current	50	A
	Continuous Drain Current- $T_C = 100^\circ C$	35.4	
I_{DM}	Pulsed Drain Current	90	
P_D	Power Dissipation	85	W
E_{AS}	Single pulse avalanche energy <small>(Note 5)</small>	245	mJ
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55-+175	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case <small>(Note 2)</small>	3.3	$^\circ C/W$



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Electrical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	60	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=60V$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics (Note 3)						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	1.4	1.9	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS}=10V, I_D=20A$	---	14	18	$m\ \Omega$
G_{FS}	Forward Transconductance	$V_{DS}=5V, I_D=20A$	18	---	---	S
Dynamic Characteristics (Note 4)						
C_{iss}	Input Capacitance	$V_{DS}=30V, V_{GS}=0V, f=1\text{MHz}$	---	2000	---	pF
C_{oss}	Output Capacitance		---	150	---	
C_{rss}	Reverse Transfer Capacitance		---	110	---	
Switching Characteristics (Note 4)						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=30V, R_L=6.7\ \Omega$ $R_G=3\ \Omega, V_{GS}=10V$	---	7.2	---	ns
t_r	Rise Time		---	4.9	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	27.8	---	ns
t_f	Fall Time		---	5.2	---	ns
Q_g	Total Gate Charge	$V_{GS}=10V, V_{DS}=30V,$ $I_D=20A$	---	48	---	nC
Q_{gs}	Gate-Source Charge		---	5	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	13	---	nC
Drain-Source Diode Characteristics						
I_S	Continuous Drain Current	$V_D=V_G=0V$	---	---	50	A
V_{SD}	Diode Forward Voltage (Note 3)	$V_{GS}=0V, I_{SD}=20A$	---	---	1.2	V
T_{rr}	Reverse Recovery Time	$I_F=20A, T_J=25^\circ\text{C}$	---	28	---	NS
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu\text{s}$	---	40	---	NC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10\ \text{sec}$.
3. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^\circ\text{C}, V_{DD}=30V, V_G=10V, L=0.5\text{mH}, R_G=25\ \Omega$

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Typical Characteristics: ($T_c=25^\circ\text{C}$ unless otherwise noted)

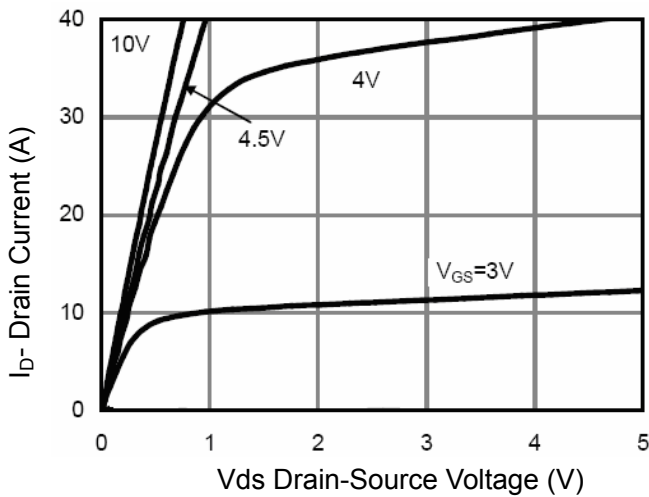


Figure 1 Output Characteristics

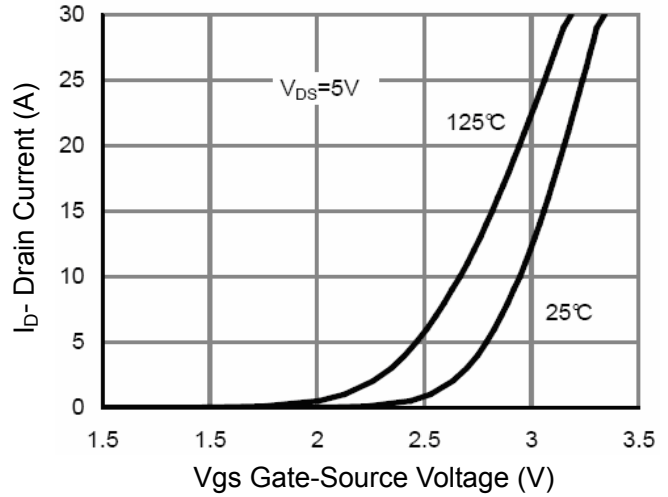


Figure 2 Transfer Characteristics

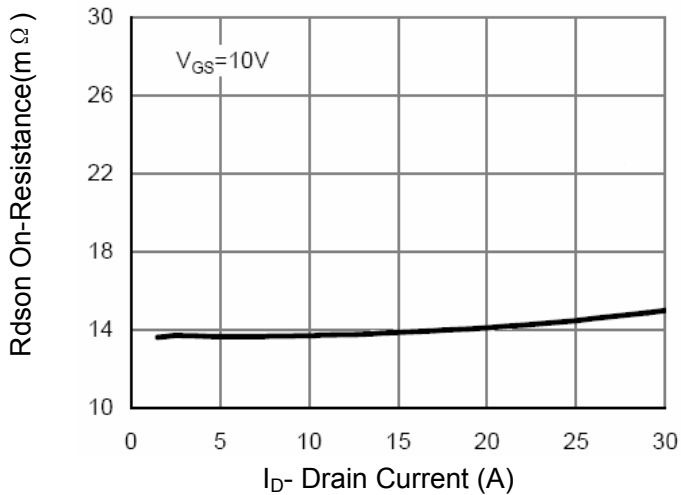


Figure 3 Rdson- Drain Current

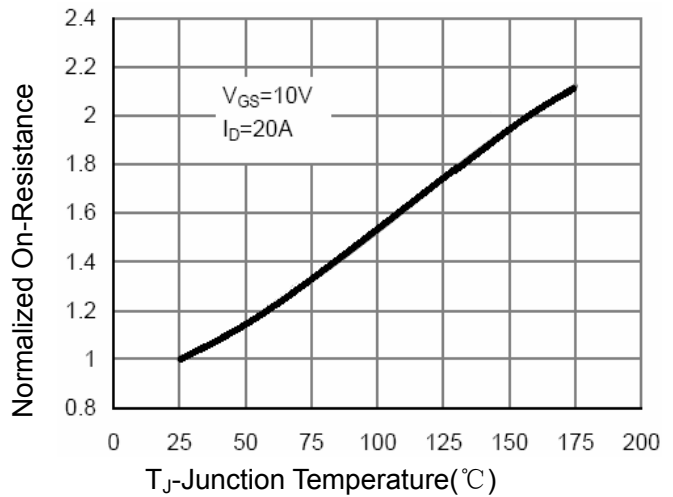


Figure 4 Rdson-Junction Temperature

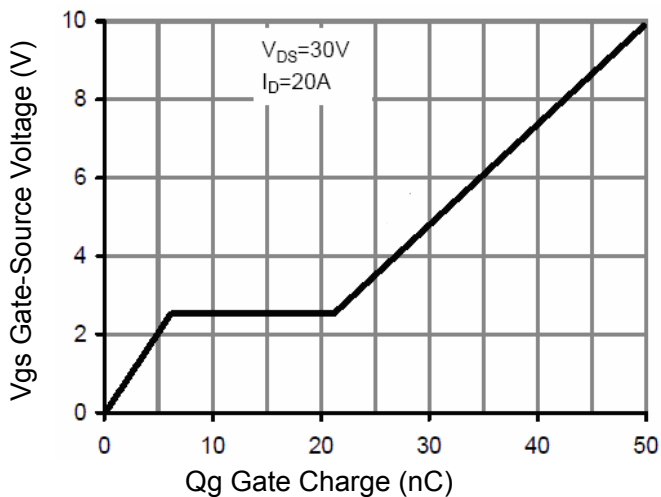


Figure 5 Gate Charge

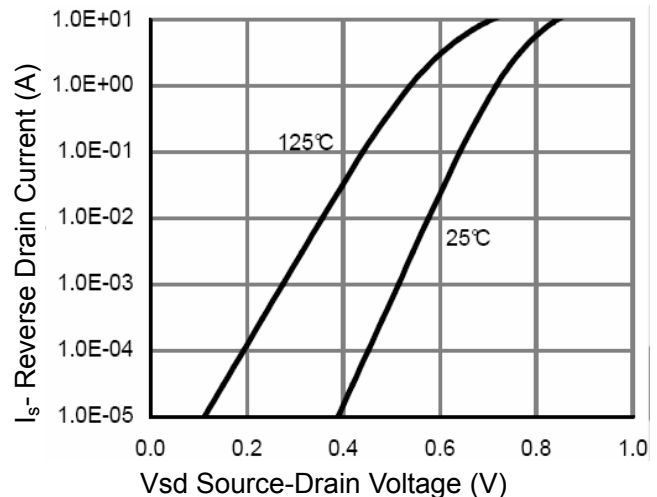


Figure 6 Source- Drain Diode Forward

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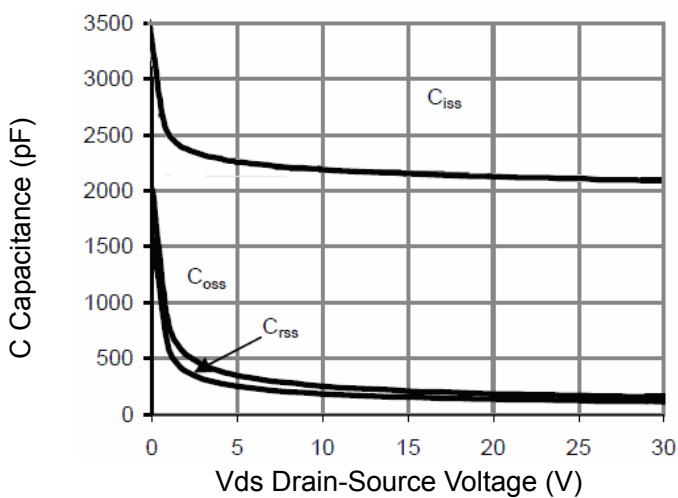


Figure 7 Capacitance vs Vds

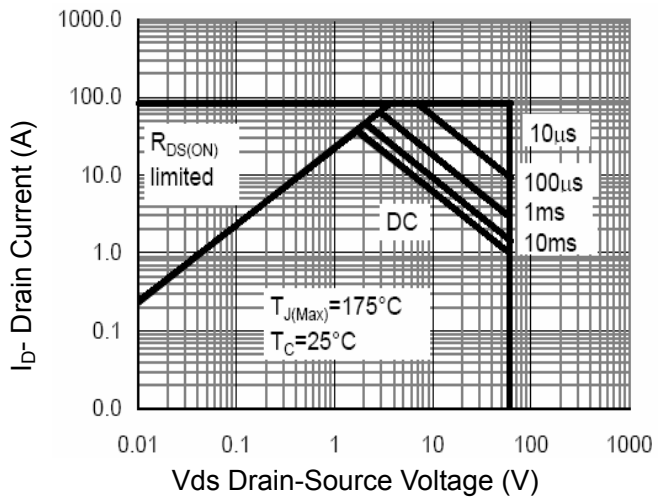


Figure 8 Safe Operation Area

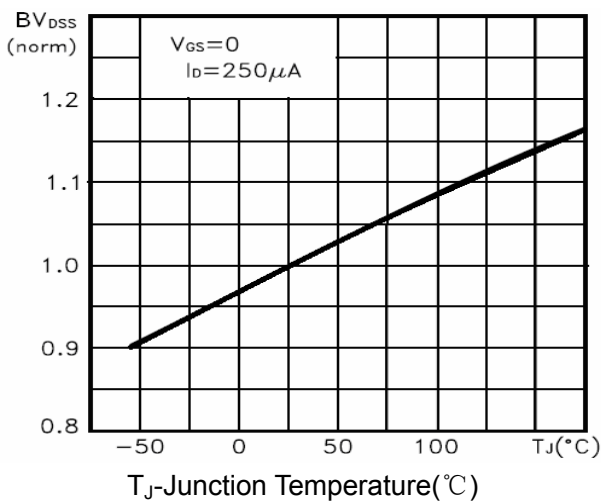


Figure 9 BV_{DSS} vs Junction Temperature

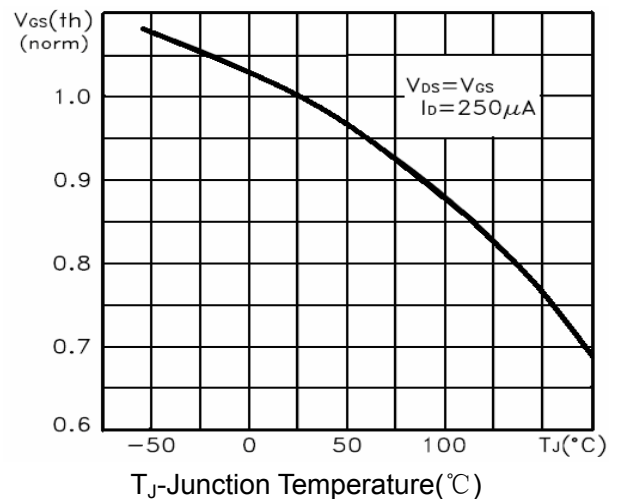


Figure 10 $V_{GS(th)}$ vs Junction Temperature

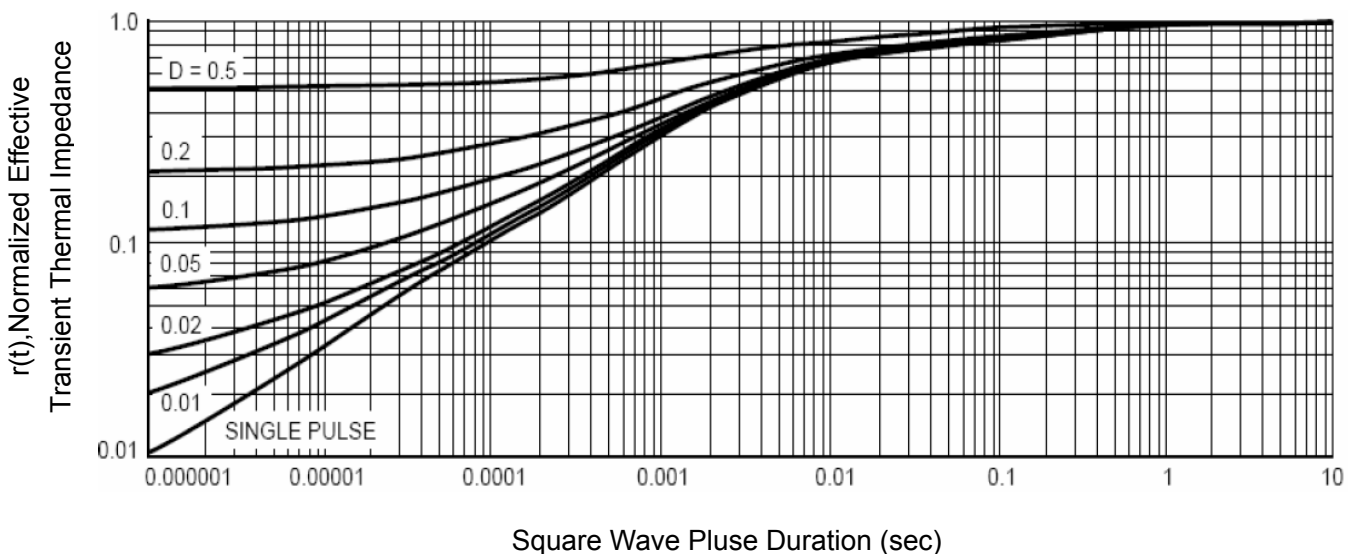
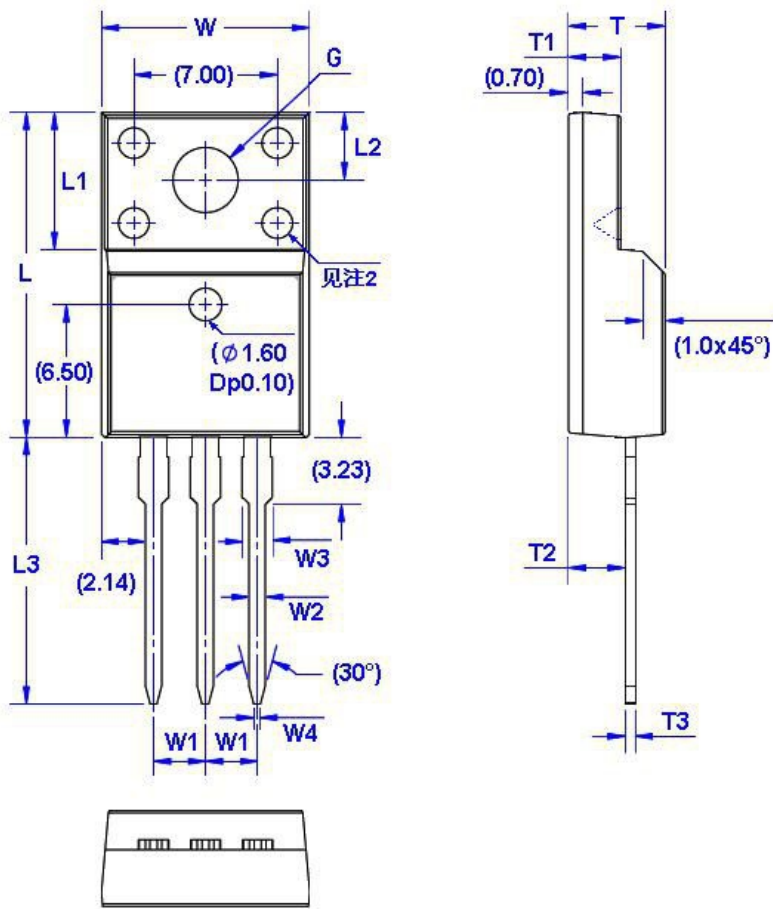


Figure 11 Normalized Maximum Transient Thermal Impedance

Package Information: TO-220F

Unit: mm



Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.96	10.36	W4	0.25	0.45	L3	12.78	13.18	T3	0.45	0.60
W1	2.54 (TYP)		L	15.67	16.07	T	4.50	4.90	G(ϕ)	3.08	3.28
W2	0.70	0.90	L1	6.48	6.88	T1	2.34	2.74			
W3	1.24	1.47	L2	3.20	3.40	T2	2.56	2.96			

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