

TMN6050F

N-Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

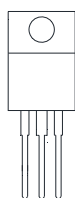
General Features

$V_{DS} = 60V$ $I_D = 50A$

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

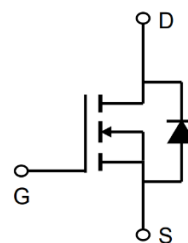
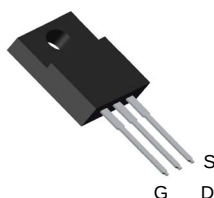
100% UIS Tested

100% R_g Tested



Marking: 50N06 OR 018

F:TO-220F



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 (Note 5)	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 (Note 2)	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-Sourctce Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	60	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =60V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics (Note3)						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	1.4	1.9	2.5	V
R _{DS(ON)}	Drain-Source On Resistance	V _{GS} =10V, I _D =20A	---	14	18	m Ω
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=1MHz	---	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 Ω R _G =3 Ω, 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 Curren	VD=VG=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℃	---	28	---	NS
Q _{rr}	Reverse Recovery Charge	dI/dt=100A/us	---	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 $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_G=10V, L=0.5mH, R_G=25\Omega$



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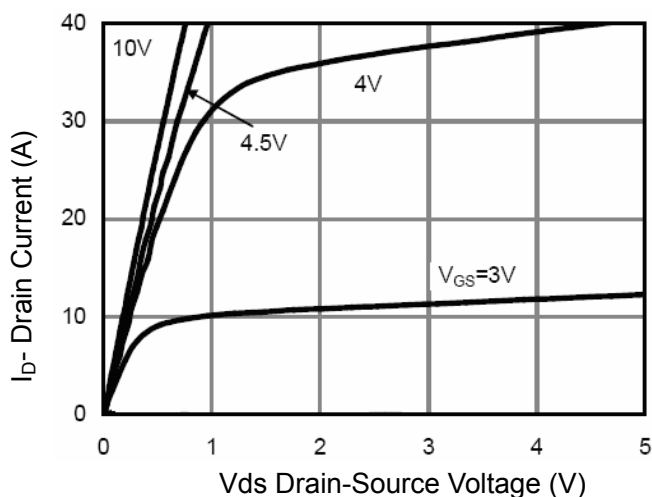
Typical Characteristics: ($T_c=25^\circ\text{C}$ unless otherwise noted)

Figure 1 Output Characteristics

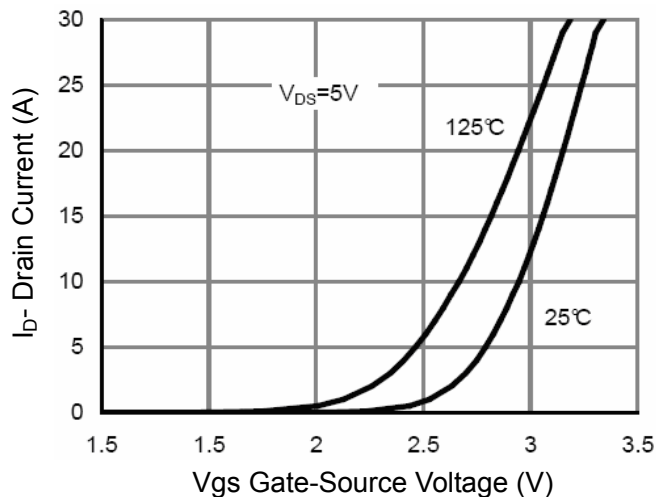


Figure 2 Transfer Characteristics

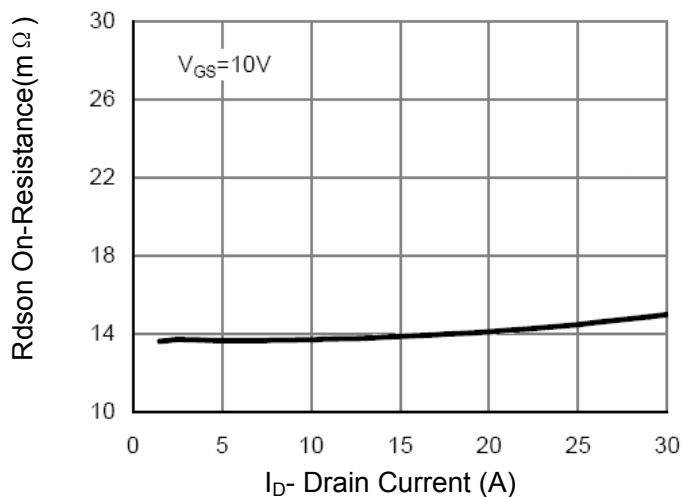


Figure 3 Rdson- Drain Current

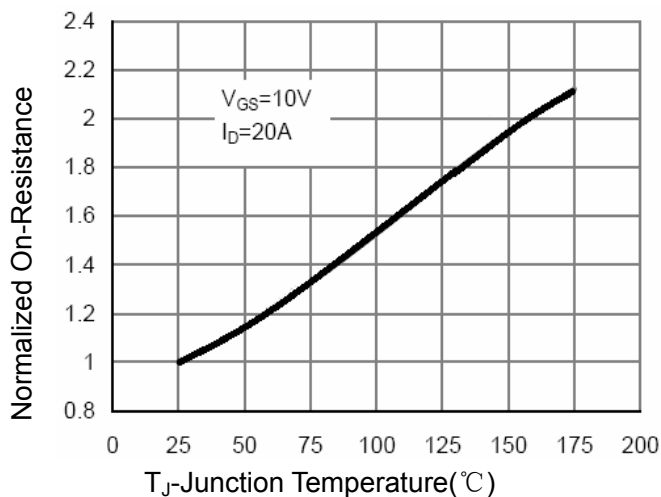


Figure 4 Rdson-Junction Temperature

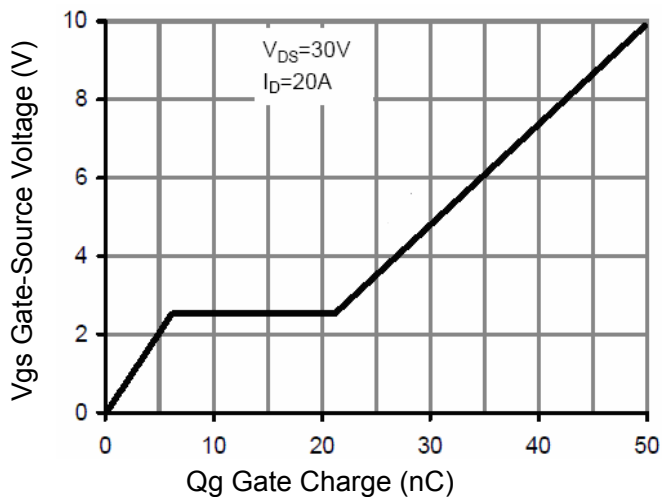


Figure 5 Gate Charge

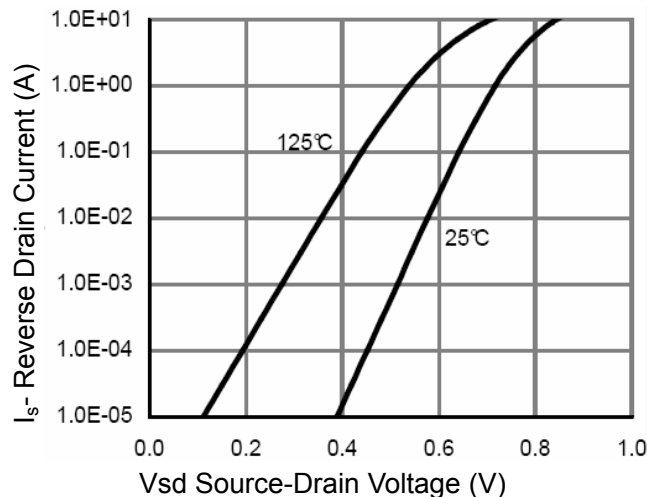


Figure 6 Source- Drain Diode Forward



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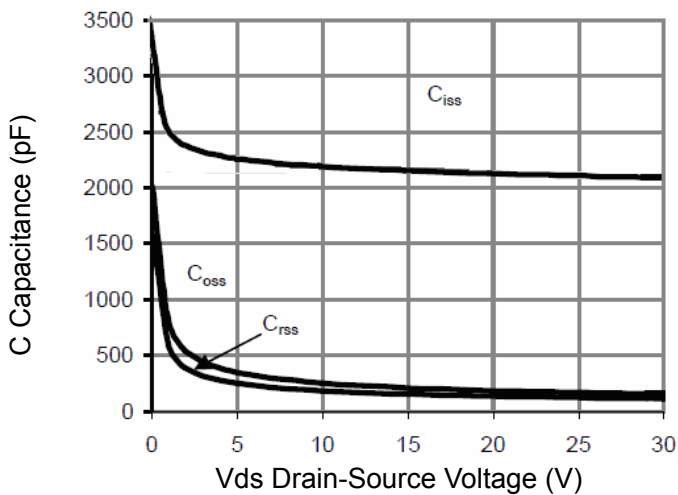


Figure 7 Capacitance vs Vds

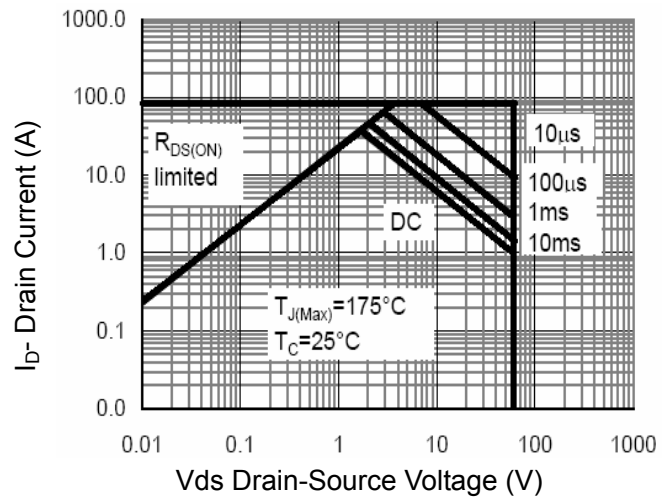


Figure 8 Safe Operation Area

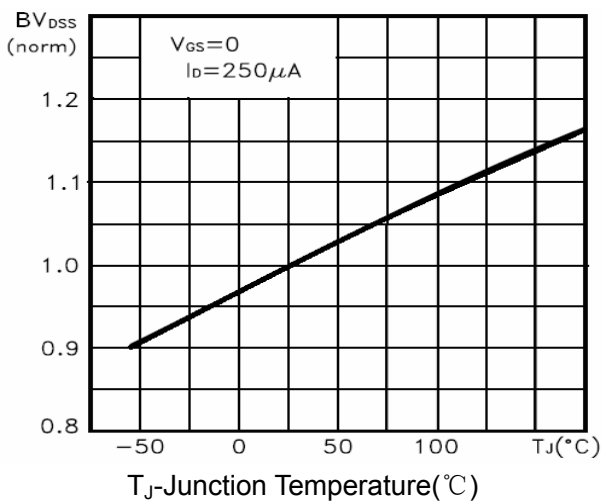


Figure 9 BV_{DS} vs Junction Temperature

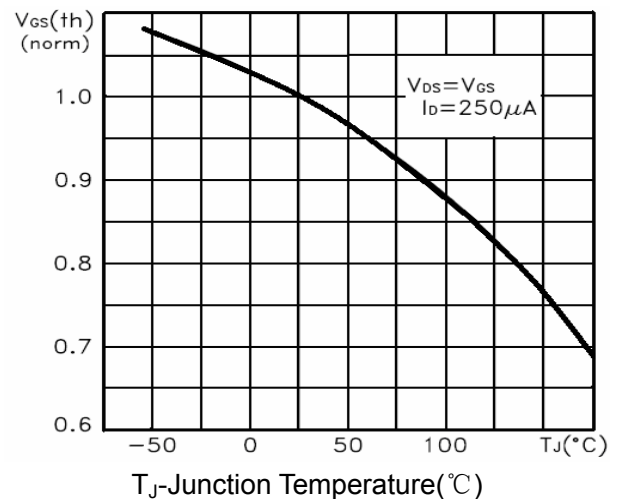


Figure 10 $V_{GS(th)}$ vs Junction Temperature

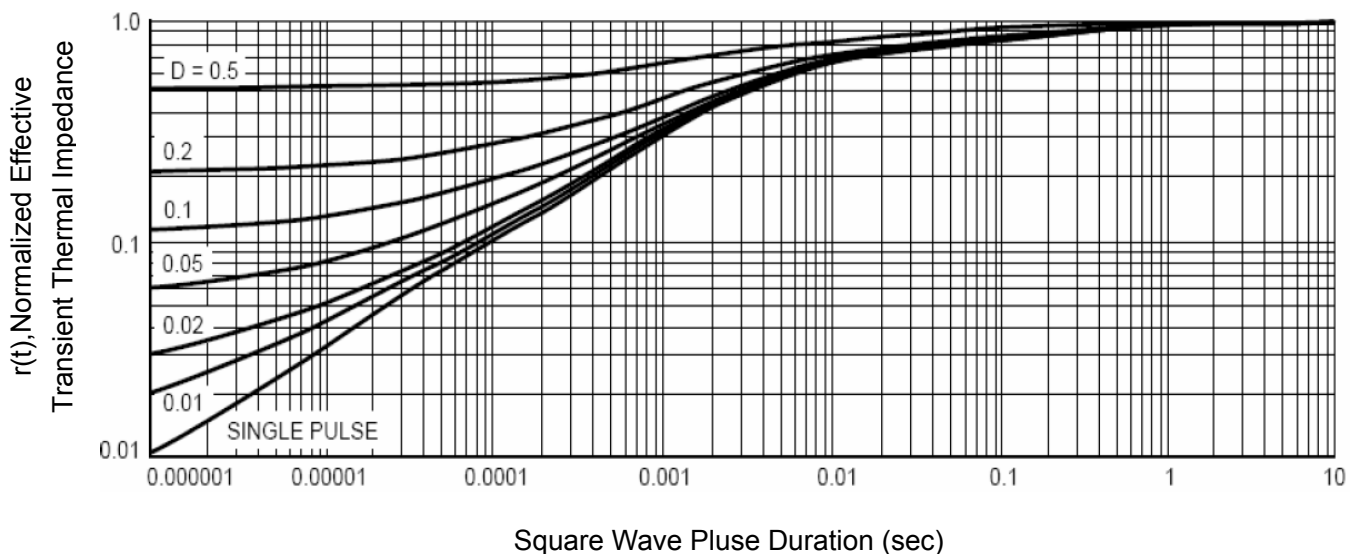
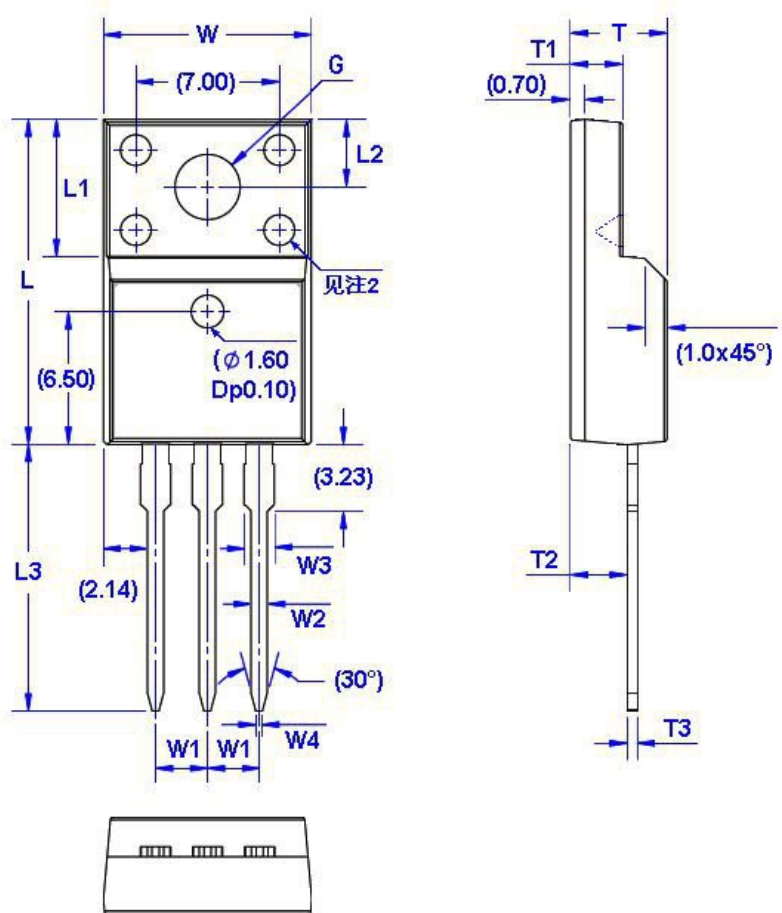


Figure 11 Normalized Maximum Transient Thermal Impedance

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			