

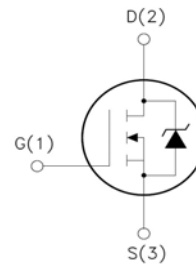
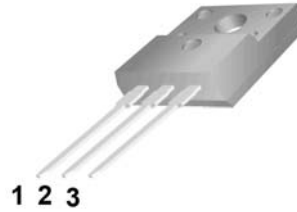
50N06

60V N-Channel MOSFET

Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge : $Q_g = 50\text{nC}$ (Typ.).
- $BVDSS=60\text{V}, I_D=50\text{A}$
- $R_{DS(on)} : 0.02\Omega$ (Max) @ $V_G=10\text{V}$
- 100% Avalanche Tested

TO-220F



- 1.Gate (G)
- 2.Drain (D)
- 3.Source (S)

Absolute Maximum Ratings* ($T_c=25^\circ\text{C}$ Unless otherwise noted)

Symbol	PARAMETER	Value	Unit
V_{DSS}	Drain-Source Voltage	60	V
I_D	Drain Current	$T_c=25^\circ\text{C}$	50
		$T_c=100^\circ\text{C}$	35.4
$V_{GS(TH)}$	Gate Threshold Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy (note1)	300	mJ
I_{AR}	Avalanche Current (note2)	50	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	50	W
T_j	Junction Temperature(MAX)	175	$^\circ\text{C}$
T_{stg}	Storage Temperature	-55~+175	$^\circ\text{C}$
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	PARAMETER	Typ.	MAX.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	-	2.8	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	-	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Thermal Resistance, Case to Sink	-	110	$^\circ\text{C}/\text{W}$

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.4	1.9	2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	14	20	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=20A$	18	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V,$ $F=1.0MHz$	-	2050	-	PF
Output Capacitance	C_{oss}		-	158	-	PF
Reverse Transfer Capacitance	C_{riss}		-	120	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, R_L=6.7\Omega$ $V_{GS}=10V, R_G=3\Omega$	-	7.4	-	nS
Turn-on Rise Time	t_r		-	5.1	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	28.2	-	nS
Turn-Off Fall Time	t_f		-	5.5	-	nS
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=20A,$ $V_{GS}=10V$	-	50	-	nC
Gate-Source Charge	Q_{gs}		-	6	-	nC
Gate-Drain Charge	Q_{gd}		-	15	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=20A$	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	50	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = 20A$ $di/dt = 100A/\mu s$ (Note 3)	-	28	-	nS
Reverse Recovery Charge	Q_{rr}		-	40	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ 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 : $T_J=25^\circ\text{C}, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$

Typical Characteristics

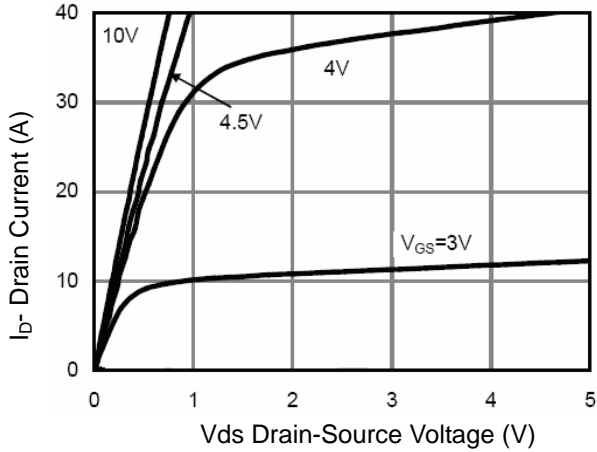


Figure 1 Output Characteristics

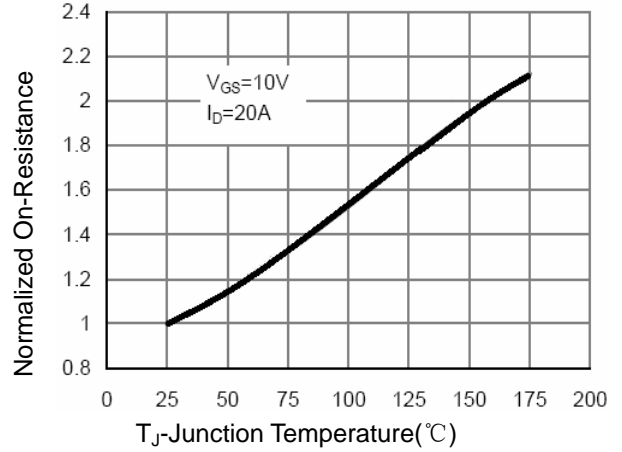


Figure 4 R_{dson} -Junction Temperature

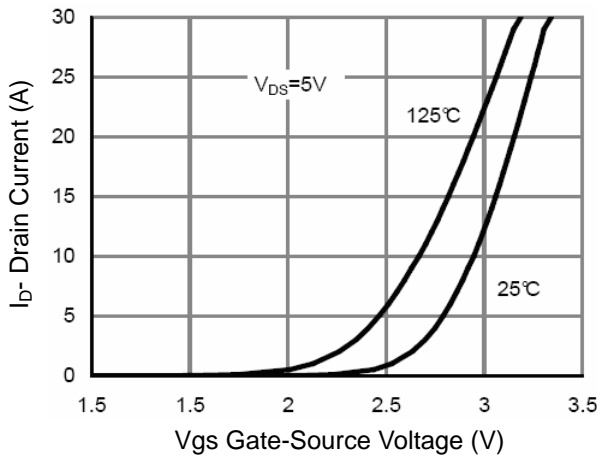


Figure 2 Transfer Characteristics

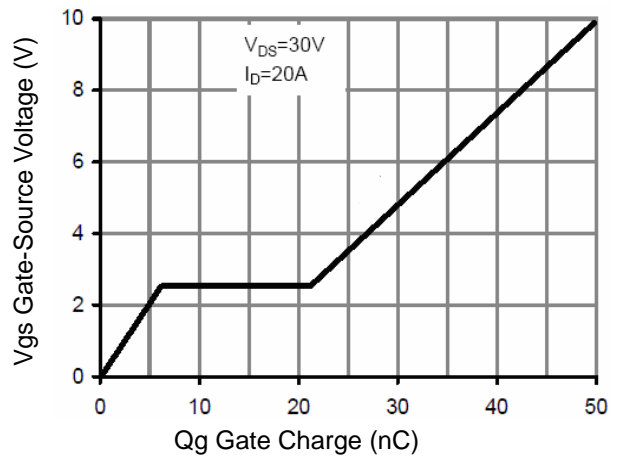


Figure 5 Gate Charge

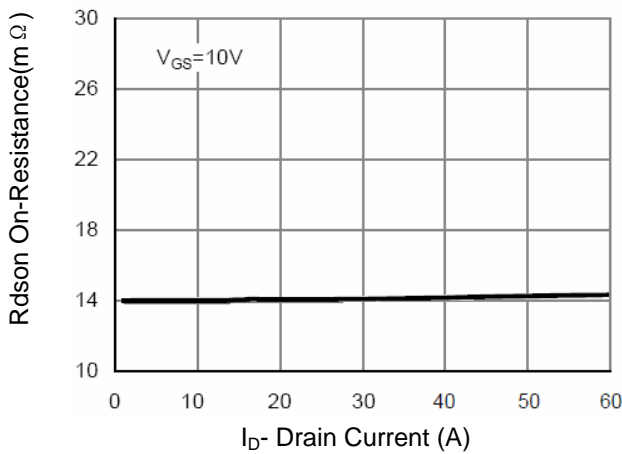


Figure 3 R_{dson} - Drain Current

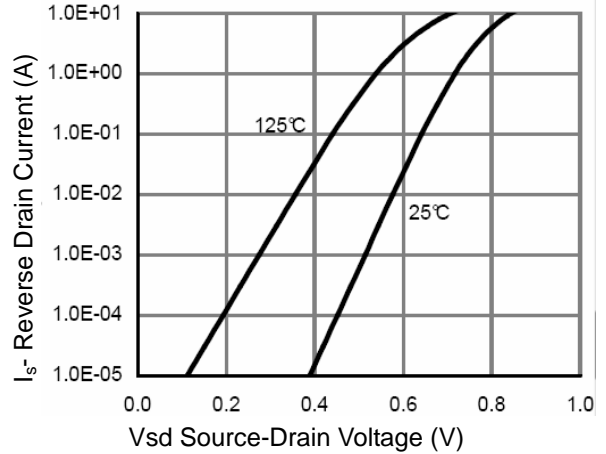


Figure 6 Source- Drain Diode Forward

Typical Characteristics (Continued)

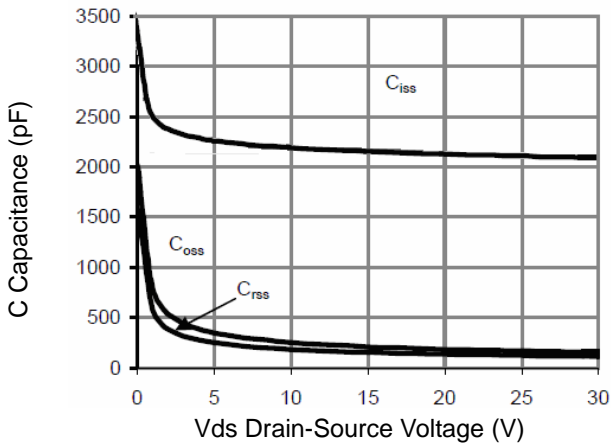


Figure 7 Capacitance vs Vds

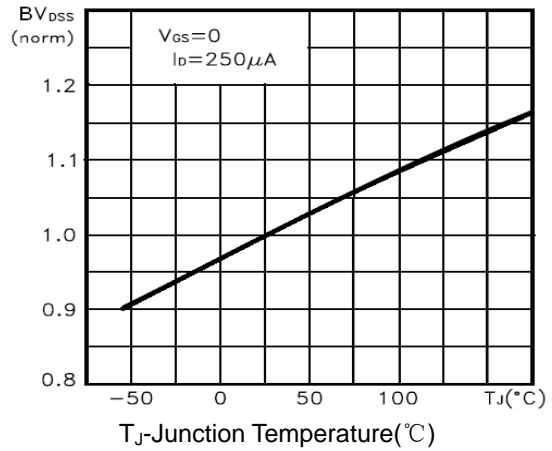


Figure 9 BV_{DSS} vs Junction Temperature

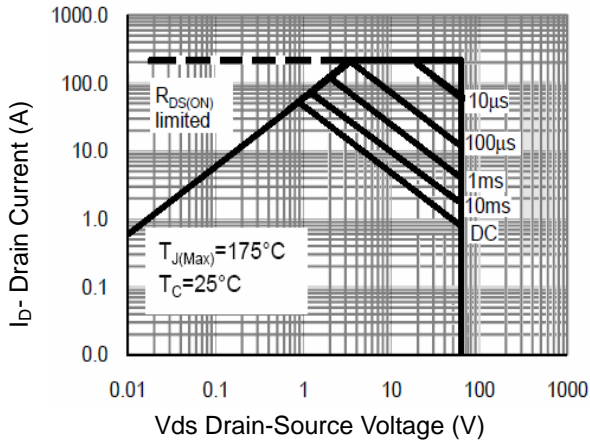


Figure 8 Safe Operation Area

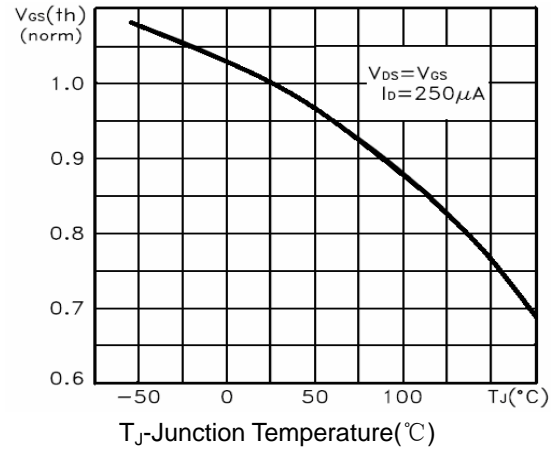


Figure 10 $V_{GS(th)}$ vs Junction Temperature

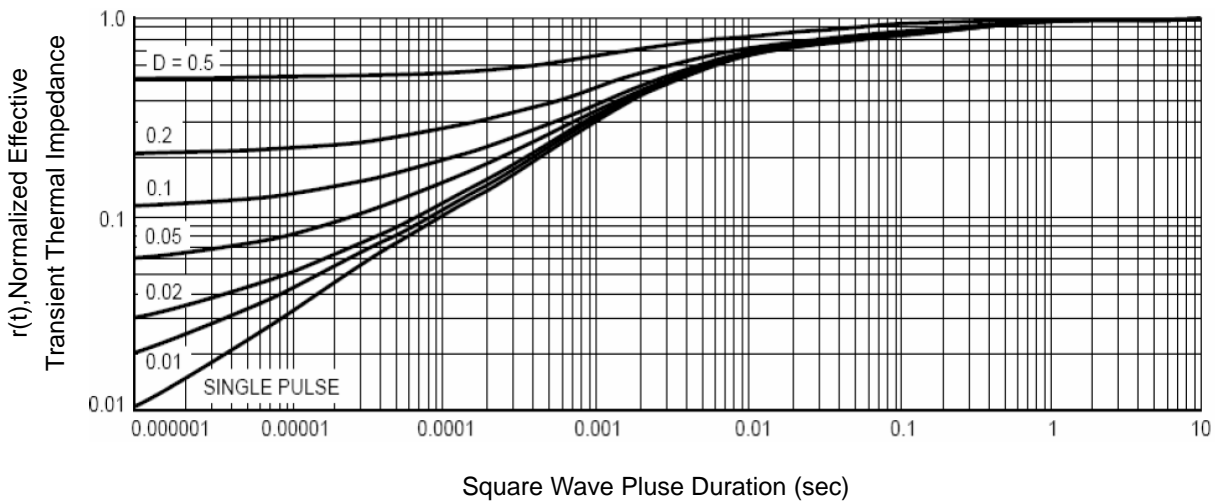
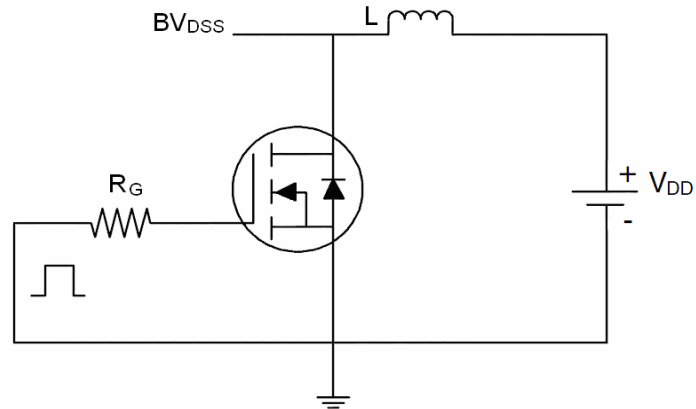


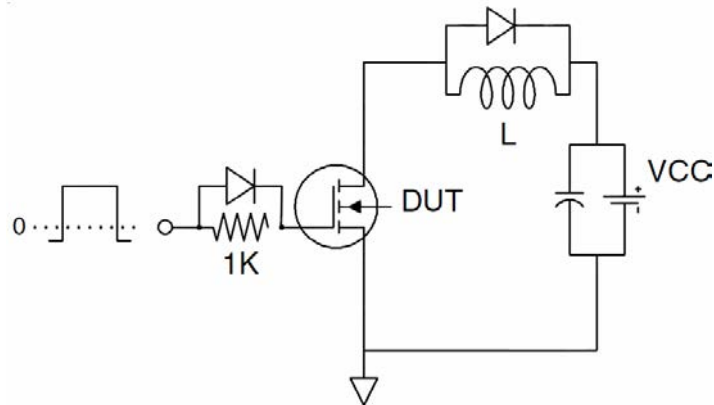
Figure 11 Normalized Maximum Transient Thermal Impedance

Test Circuit

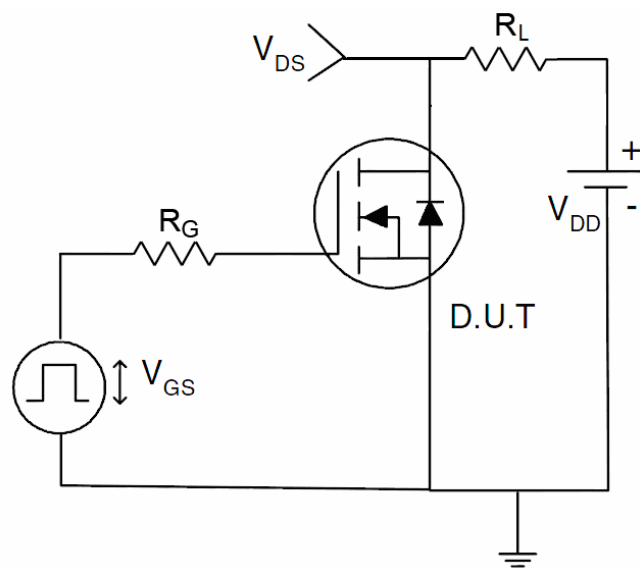
1) A_S test Circuit



2) Gate charge test Circuit



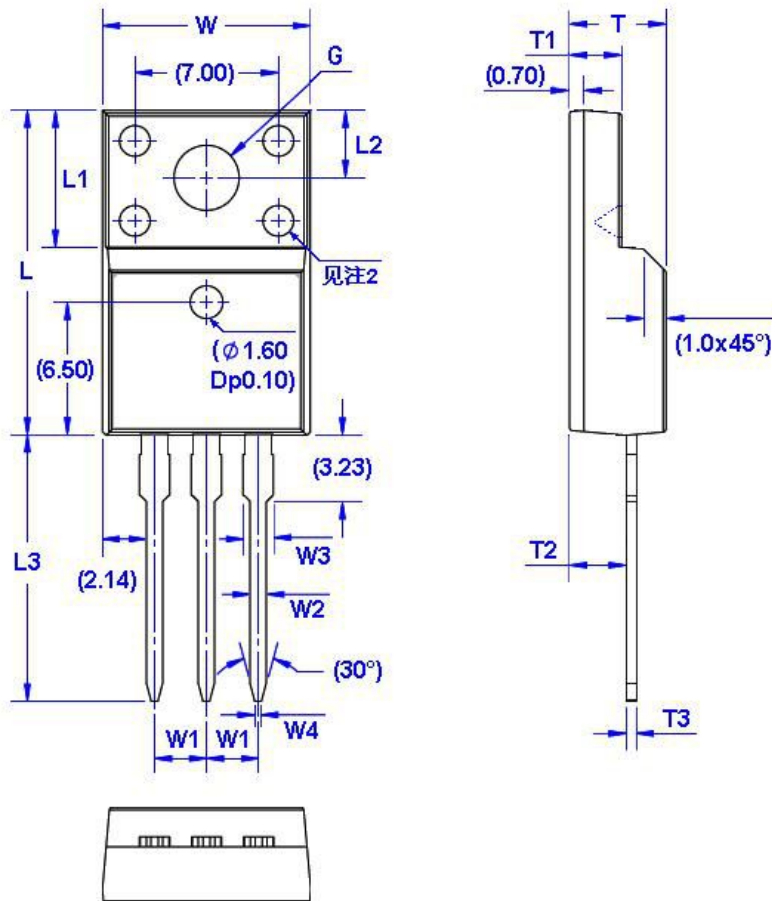
3) Switch Time Test Circuit



Package Dimension

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			