

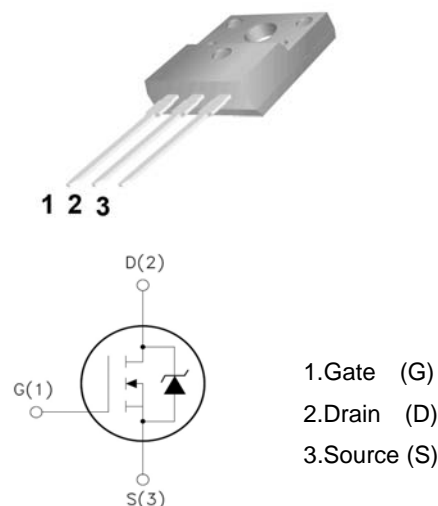
40N15

150V N-Channel MOSFET

Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge :Qg= 105nC (Typ.).
- BVDSS=150V, I_D=40A
- R_{DS(on)} : 45mΩ (Max) @V_G=10V
- 100% Avalanche Tested

TO-220F



Absolute Maximum Ratings* (T_c=25°C Unless otherwise noted)

Symbol	PARAMETER	Value	Unit
V _{DSS}	Drain-Source Voltage	150	V
I _D	Drain Current	T _C =25°C	40
		T _C =100°C	29
V _{GS(TH)}	Gate Threshold Voltage	±20	V
E _{AS}	Single Pulse Avalanche Energy (note1)	310	mJ
I _{AR}	Avalanche Current (note2)	40	A
P _D	Power Dissipation (T _c =25°C)	72	W
T _j	Junction Temperature(MAX)	175	°C
T _{stg}	Storage Temperature	-55~+175	°C
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	300	°C

Thermal Characteristics

Symbol	PARAMETER	Typ.	MAX.	Unit
R _{θJC}	Thermal Resistance, Junction to Case	-	2.07	°C/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}	$V_{GS}=0V, I_D=250\mu A$	150	170	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=150V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3.2	4.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=18A$	-	35	45	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=15V, I_D=18A$	38	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$	-	4200	-	PF
Output Capacitance	C_{oss}		-	203	-	PF
Reverse Transfer Capacitance	C_{rss}		-	96	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=2A, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$	-	17.8	-	nS
Turn-on Rise Time	t_r		-	11.8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	56	-	nS
Turn-Off Fall Time	t_f		-	14.6	-	nS
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=30A,$ $V_{GS}=10V$	-	105	-	nC
Gate-Source Charge	Q_{gs}		-	21	-	nC
Gate-Drain Charge	Q_{gd}		-	31.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=18A$	-	0.82	1.2	V
Diode Forward Current	I_S		-	-	40	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = 18A$ $di/dt = 100A/\mu s$ (Note3)	-	70	-	nS
Reverse Recovery Charge	Q_{rr}		-	230	-	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: $T_J=25^\circ\text{C}, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$

Typical Electrical and Thermal Characteristics (Curves)

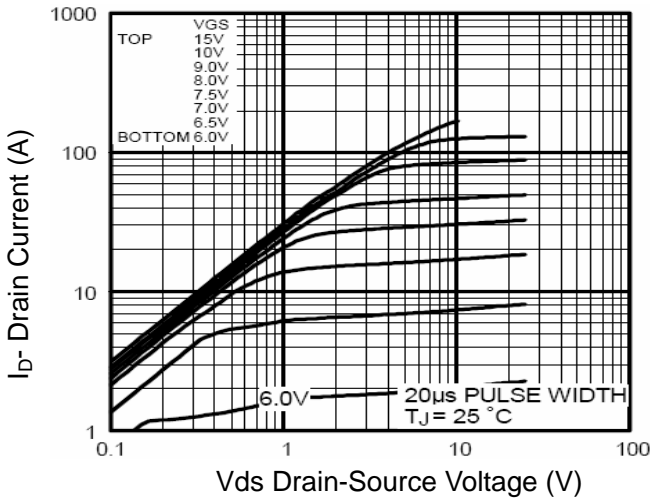


Figure 1 Output Characteristics

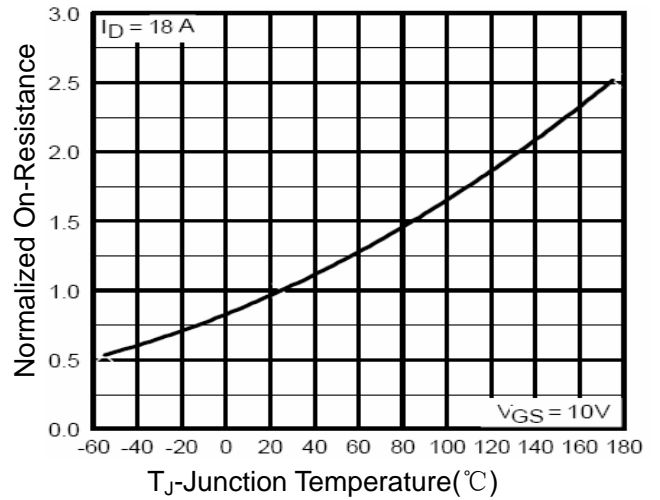


Figure 4 Rdson-Junction Temperature

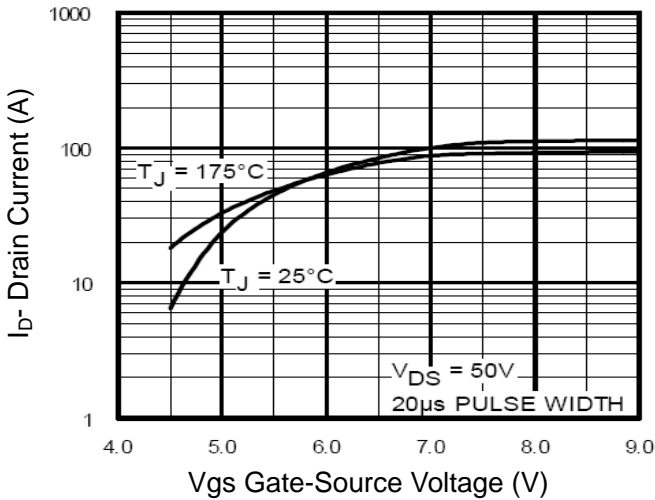


Figure 2 Transfer Characteristics

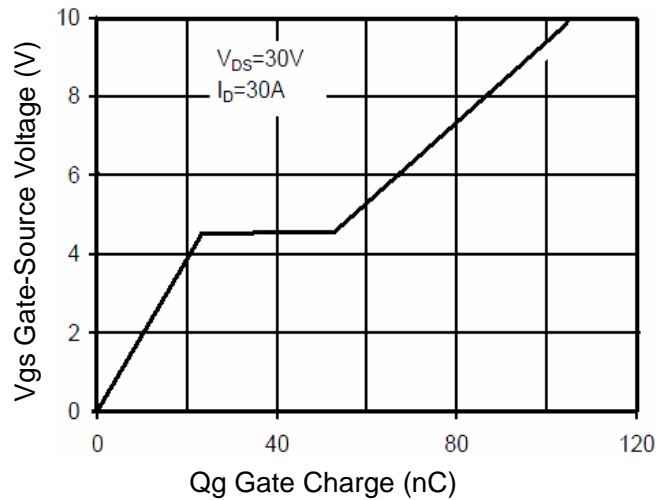


Figure 5 Gate Charge

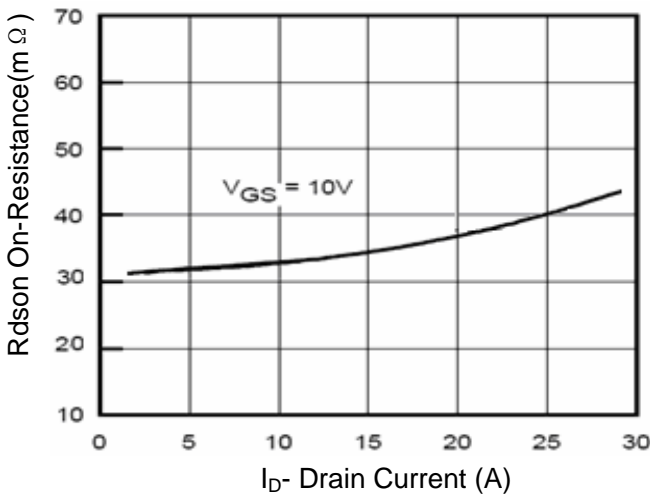


Figure 3 Rdson- Drain Current

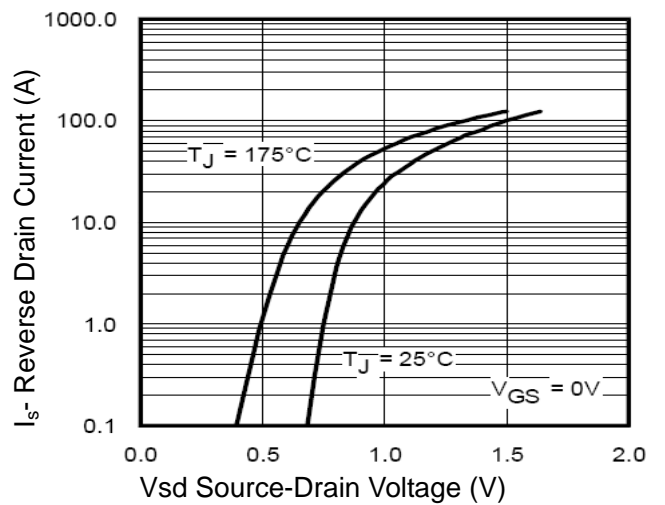


Figure 6 Source- Drain Diode Forward

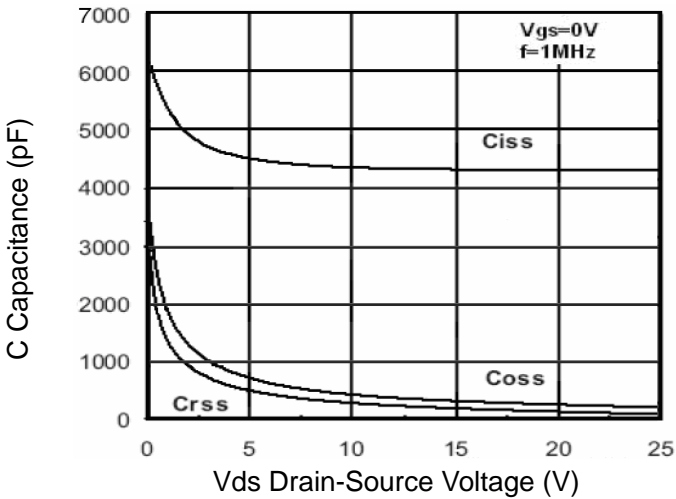


Figure 7 Capacitance vs Vds

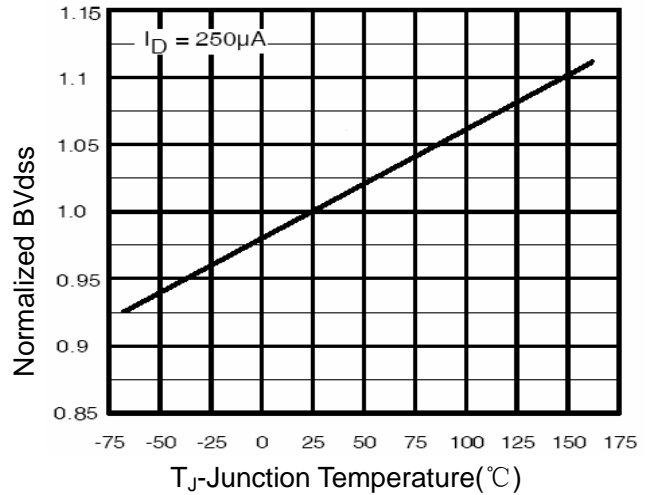


Figure 9 BV_{DSS} vs Junction Temperature

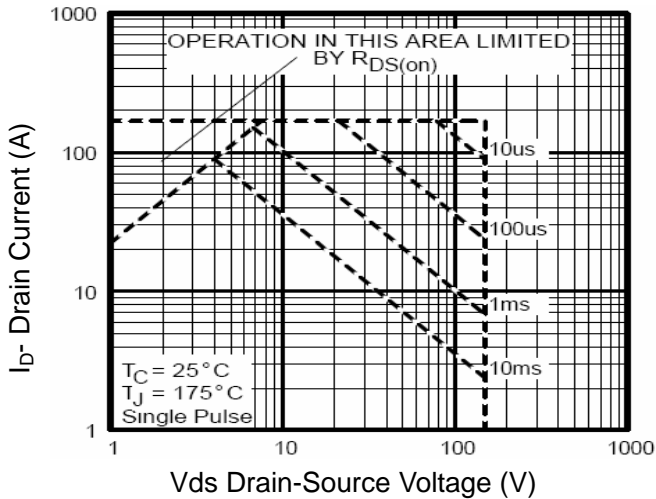


Figure 8 Safe Operation Area

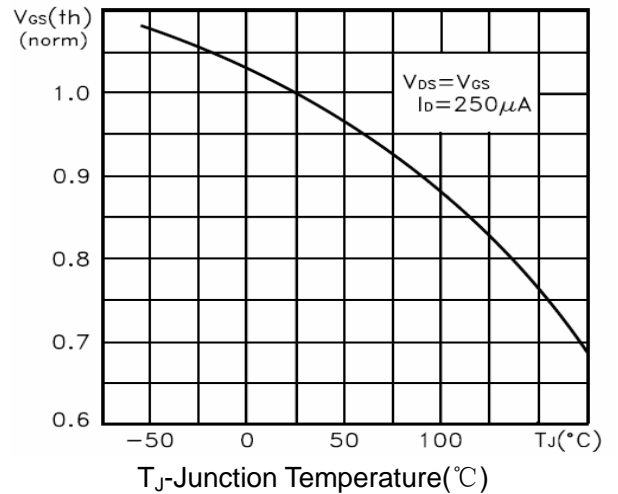


Figure 10 $V_{GS(th)}$ vs Junction Temperature

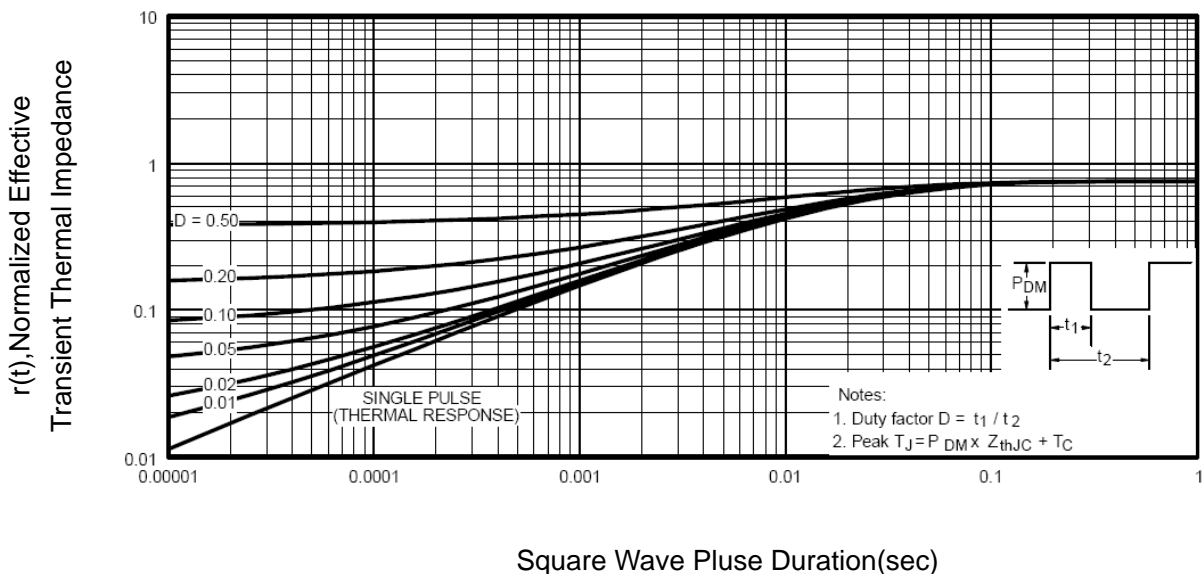
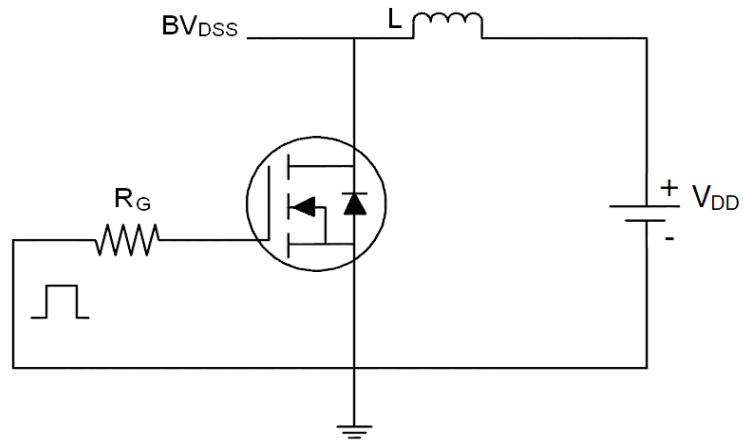


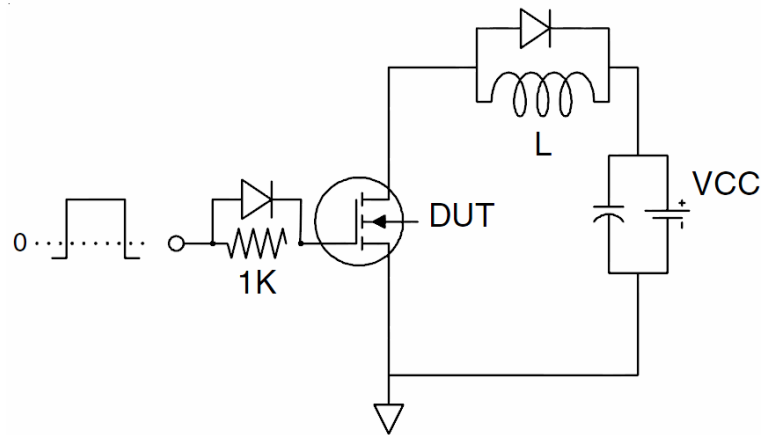
Figure 11 Normalized Maximum Transient Thermal Impedance

Test Circuit

1) AS test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit

