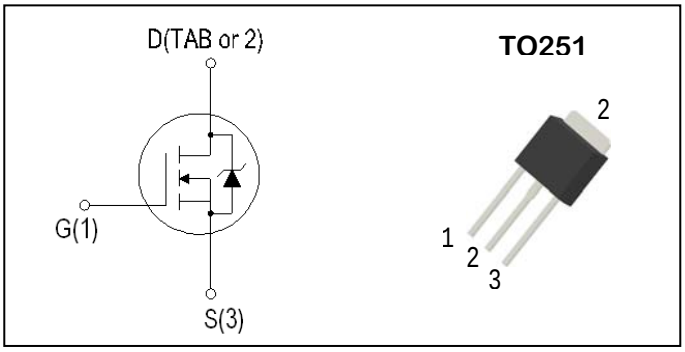
N-Channel Enhancement Mode Field Effect Transistor



PRODUCT SUMMARY

V_{DSS}	I_D	$R_{DS(ON)}$ (mΩ)
60V	23A	42mΩ

Absolute Maximum Ratings (T_A = 25°C unless otherwise specified)

Symbol	Parameter		Ratings	Unit
Common Ratings				
V_{DSS}	Drain-Source Voltage		60	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_S	Diode Continuous Forward Current	TC=25°C	23	A
Mounted on Large Heat Sink				
I_{DM}	300μs Pulse Drain Current Tested(1)	T_C=25°C	80	A
I_D	Continuous Drain Current	T_C=25°C	23	A
		T_C=70°C	18	A
P_D	Maximum Power Dissipation	T_C=25°C	50	W
		T_C=70°C	32	W

1. Pulse width limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
R_{thJC}	Thermal resistance junction-case max	2.5	°C/W
R_{thJA}	Thermal resistance junction-ambient max	100	°C/W

Electrical Characteristics (TA=25°C Unless Otherwise Noted)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
On/off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250uA	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= 48V, V_{GS}=0V	--	--	1	uA
		V_{DS}=40V, V_{GS}=0V T_J=55°C	--	--	10	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250uA	1	1.5	3.0	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	--	--	±250	nA
$R_{DS(ON)}$	Drain-SourceOn-stateResistance(2)	V_{GS}= 10V, I_{DS}=12A	--	28.2	42	mΩ
g_{FS}	Forward transconductance(2)	V_{DS}= 10V, I_{DS}=10A	--	14	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}= 30V, Frequency=1.0MHz	--	1062.8	--	pF
C_{oss}	Output Capacitance		--	157.2	--	
C_{rss}	Reverse Transfer Capacitance		--	56.5	--	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time(1)	V_{DD}=30V, I_D= 4.4A, V_{GS}= 4.5V, R_{GEN}=1Ω, R_L=6.8Ω	--	18.12	--	ns
t_r	Turn-on Rise Time(1)		--	17.68	--	
$t_{d(OFF)}$	Turn-off Delay Time(1)		--	25.00	--	
t_f	Turn-off Fall Time(1)		--	8.92	--	
Q_g	Total Gate Charge(1)	V_{DS}=30V, V_{GS}= 5V, I_{DS}=5.3A	--	11.26	--	nC
Q_{gs}	Gate-Source Charge(1)		--	3.77	--	
Q_{gd}	Gate-Drain Charge(1)		--	4.08	--	
Diode Characteristics						
V_{SD}	Diode Forward Voltage(2)	I_{SD} = 2A, V_{GS} = 0	--	--	1.2	V
t_{rr}	Reverse Recovery Time	I_{SD}=23A, dI_{SD}/dt=100A/μs	--	65	--	ns
q_{rr}	Reverse Recovery Charge		--	150	--	nC

NOTES:

1. Independent of operating temperature.
2. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

Typical Performance Characteristics

Figure 1: On-Region Characteristics

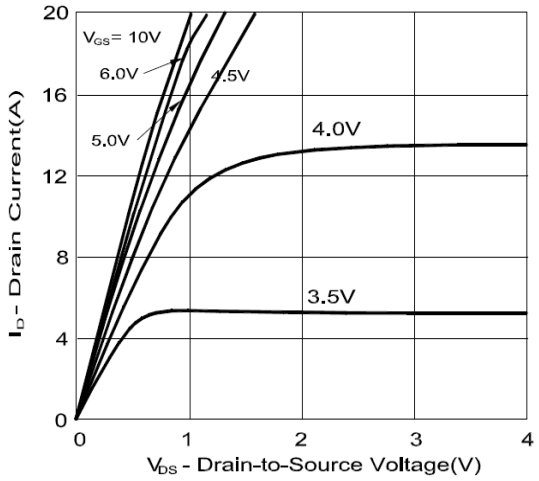


Figure 2: Transfer Characteristics

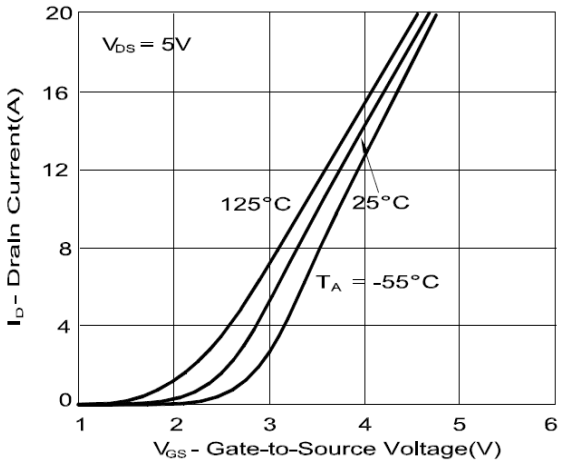


Figure 3: Drain-Source On Resistance

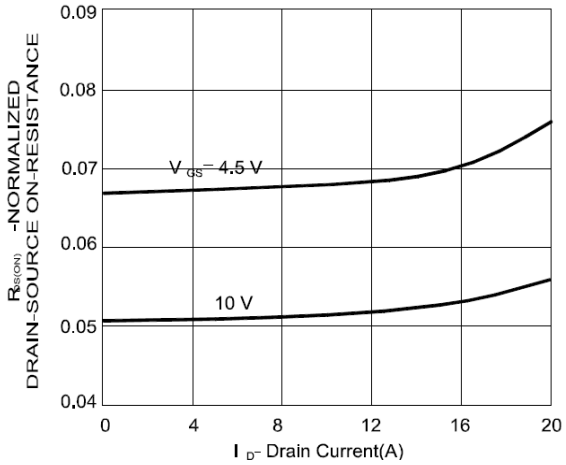


Figure 4: On-Resistance with Gate-to-source Voltage

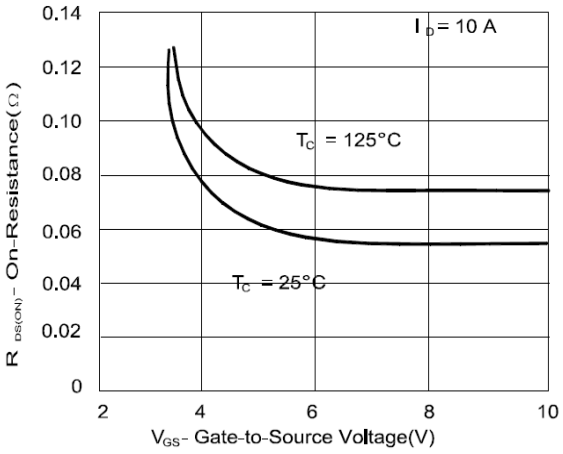


Figure 5: Maximum Safe Operating Area

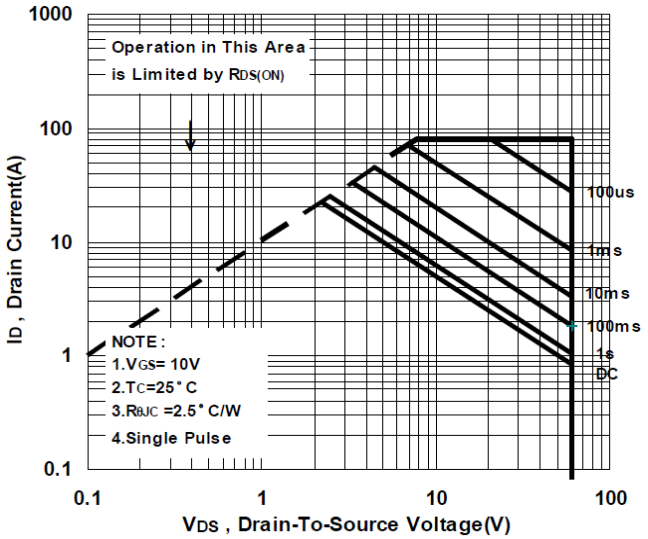


Figure 6: Gate Charge Characteristics

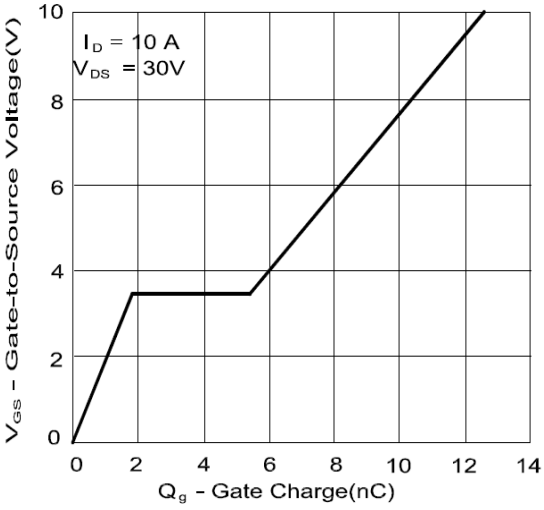


Figure 7: On-Resistance Variation vs.Temperature

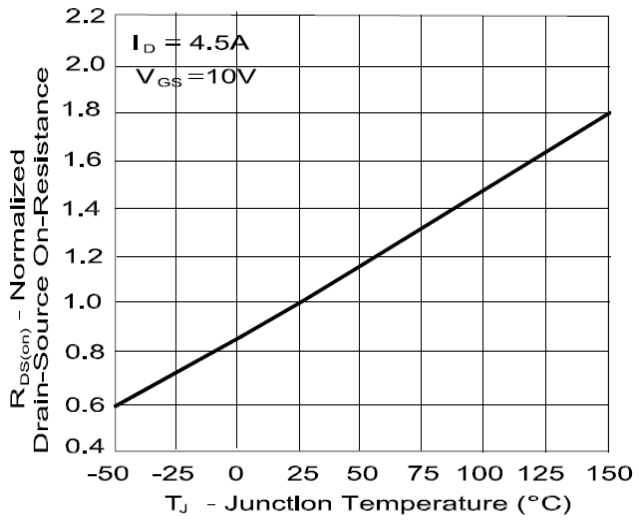


Figure 8: Pulse Maximum Power Disspation

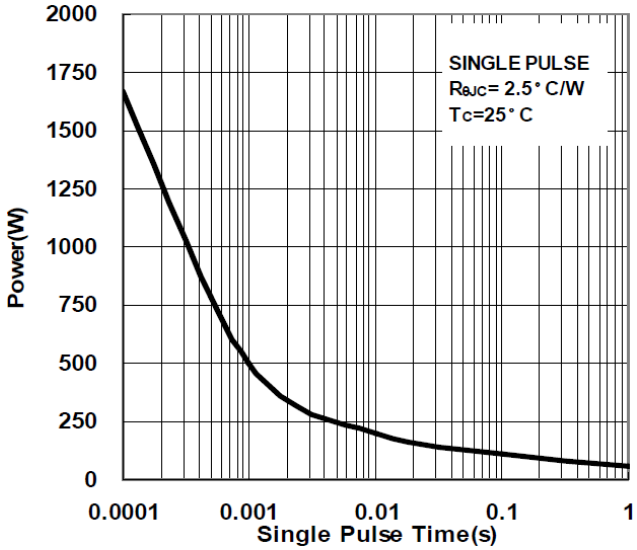
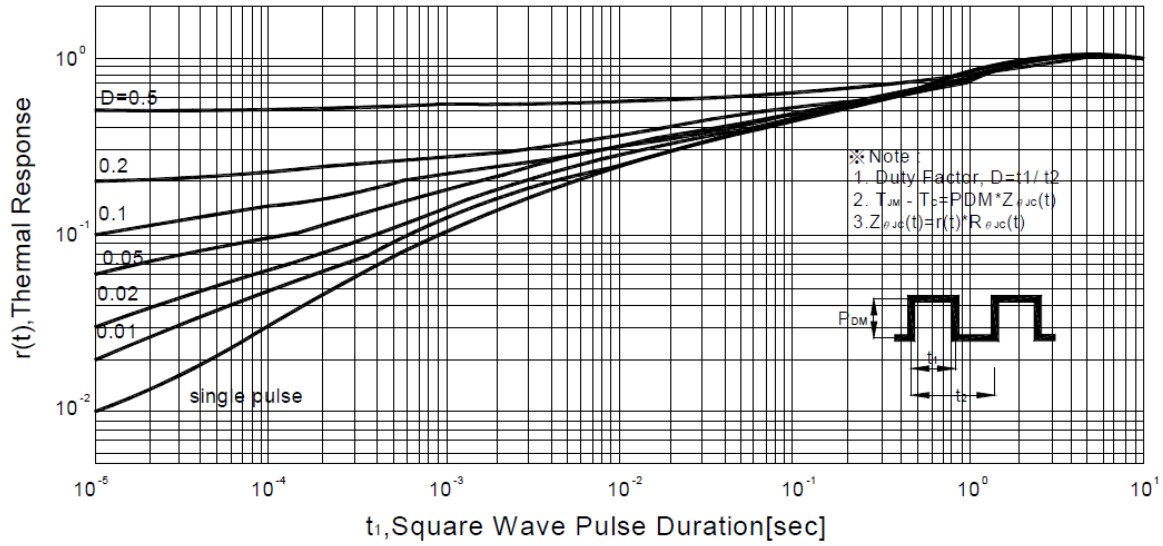
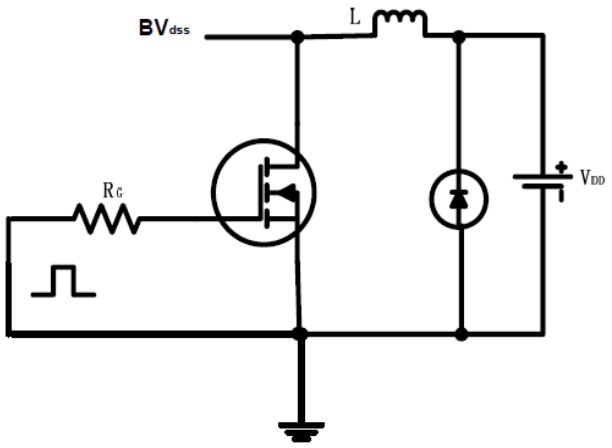


Figure 9: Transient Thermal Response Curve

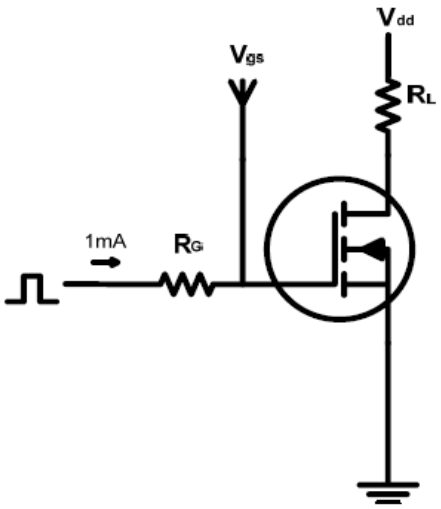


Test circuits and Waveforms

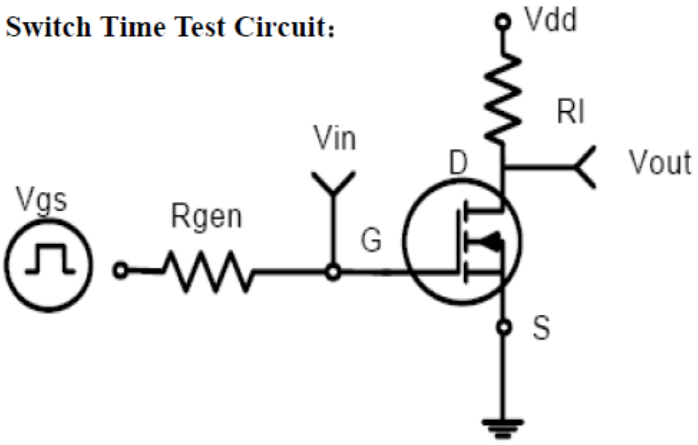
EAS test circuits:



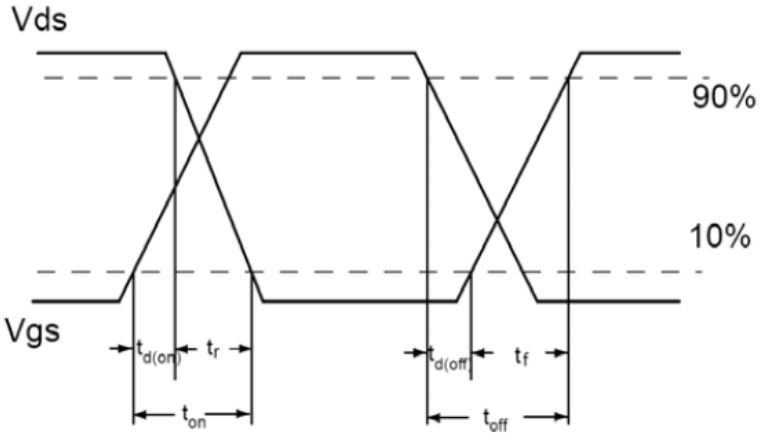
Gate charge test circuit:



Switch Time Test Circuit:

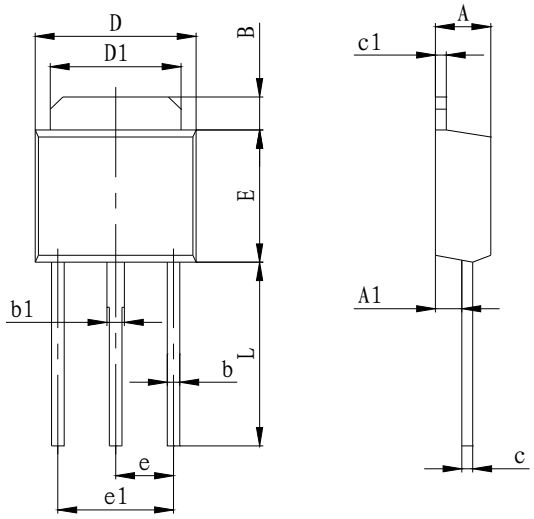


Switch Waveforms:



PACKAGE MECHANICAL DATA

TO-251 Package Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.200	2.400	0.087	0.094
A1	0.970	1.170	0.038	0.046
B	0.880	1.250	0.035	0.049
b	0.680	0.900	0.027	0.035
b1	0.760	1.100	0.029	0.043
c	0.430	0.630	0.017	0.025
c1	0.430	0.630	0.017	0.025
D	6.350	6.800	0.250	0.267
D1	5.200	5.500	0.205	0.216
E	5.980	6.220	0.235	0.245
e	2.286TYP		0.089TYP	
e1	4.500	4.700	0.177	0.185
L	3.900	4.300	0.153	0.169