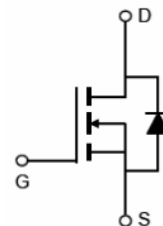


Main Product Characteristics:

V_{DSS}	40V
$R_{DS(on)}$	2.15m Ω (typ.)
I_D	172A



TO-220



Schematic Diagram

Features and Benefits:

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature


Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute Max Rating:

Symbol	Parameter	Max.	Units
$I_D @ T_c = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ①	172	A
$I_D @ T_c = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ ①	122	
I_{DM}	Pulsed Drain Current②	688	
$P_D @ T_c = 25^\circ\text{C}$	Power Dissipation③	119	W
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ $L=0.5\text{mH}$	719	mJ
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

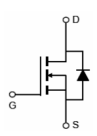
Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ③	—	1.05	°C/W

Electrical Characteristics @ $T_A=25^\circ\text{C}$ unless otherwise specified

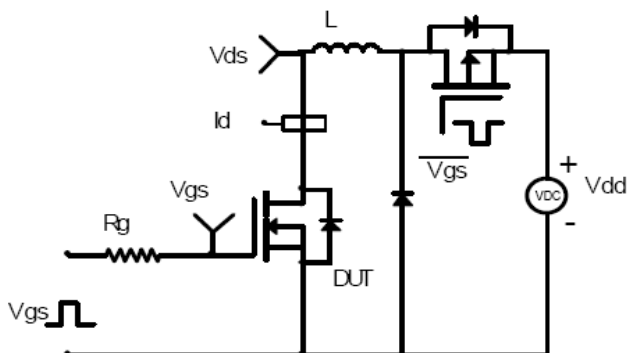
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	40	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	2.1	2.4	m Ω	$V_{GS}=10V, I_D=40A$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
I_{DSS}	Drain-to-Source leakage current $T_J=25^\circ\text{C}$	—	—	1	μA	$V_{DS}=40V, V_{GS}=0V,$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS}=20V, V_{DS}=0V$
		—	—	-100		$V_{GS}=-20V, V_{DS}=0V$
Q_g	Total gate charge	—	140	—	nC	$T_J=25^\circ\text{C}, V_{GS}=10V,$ $V_{DS}=20V, I_D=20A$
Q_{gs}	Gate-to-Source charge	—	26	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	35	—		
$t_{d(on)}$	Turn-on delay time	—	30	—	ns	$V_{GS}=10V$ $V_{DS}=20V$ $R_G=3.6\Omega$ $R_{L_1}=1\Omega$
t_r	Rise time	—	32	—		
$t_{d(off)}$	Turn-Off delay time	—	70	—		
t_f	Fall time	—	25	—		
C_{iss}	Input capacitance	—	10587	—	pF	$V_{GS}=0V$ $V_{DS}=40V$ $f=1\text{MHz}$
C_{oss}	Output capacitance	—	647	—		
C_{rss}	Reverse transfer capacitance	—	603	—		

Source-Drain Ratings and Characteristics

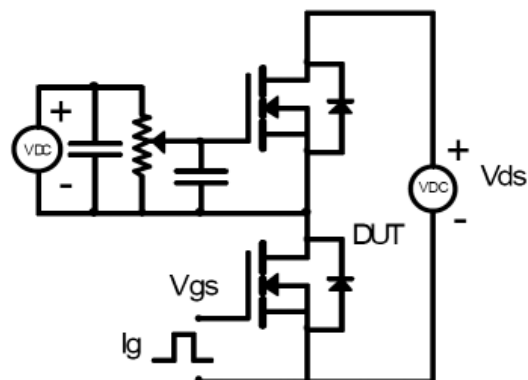
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	172	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	688	A	
V_{SD}	Diode Forward Voltage	—	—	1.2	V	$I_S=40A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	—	50	—	ns	$T_J = 25^\circ\text{C}, I_F = 20A, di/dt = 100A/\mu s$
Q_{rr}	Reverse Recovery Charge	—	75	—	nC	

Test Circuits and Waveforms

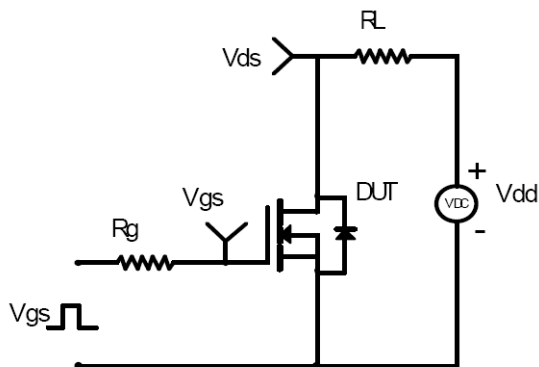
EAS Test Circuit:



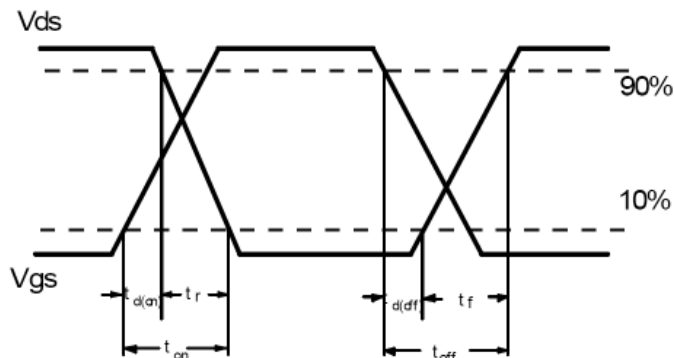
Gate Charge Test Circuit:



Switching Time Test Circuit:



Switching Waveforms:



Notes:

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation P_D is based on max. junction temperature, using junction-to-case thermal resistance.

Typical Electrical and Thermal Characteristics

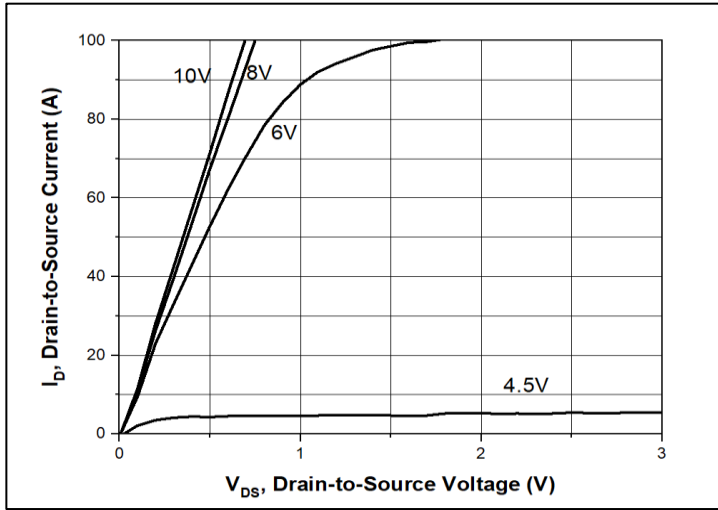


Figure1. Typical Output Characteristics

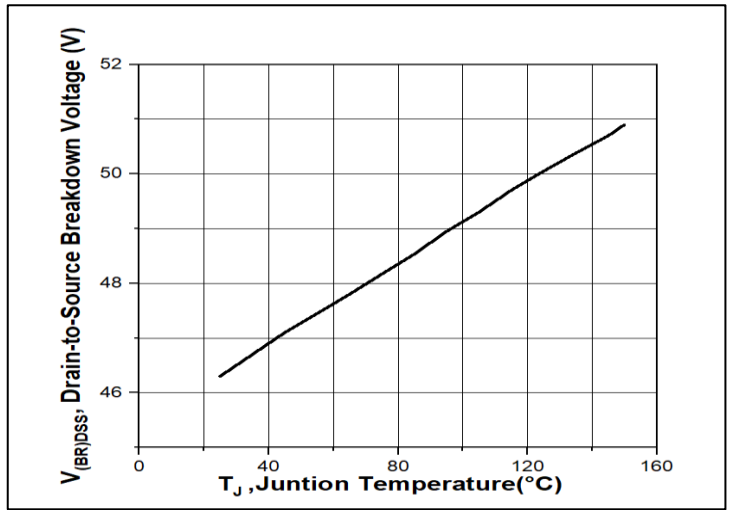


Figure2. Drain-to-Source Breakdown Voltage vs. Junction Temperature

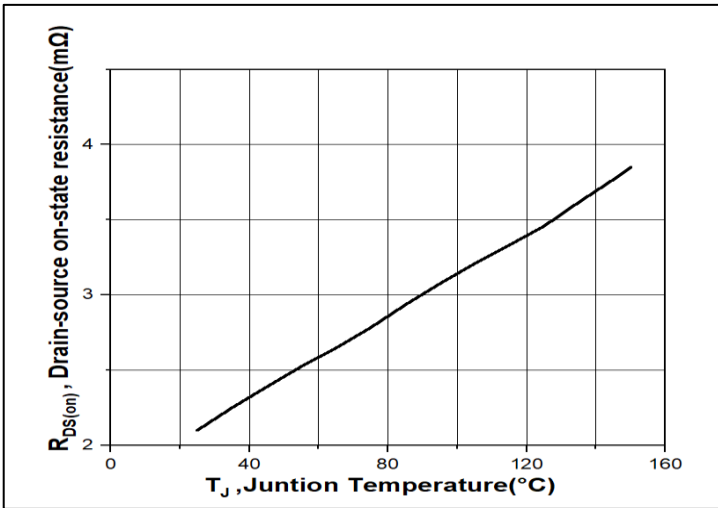


Figure3. RDS(on) vs. Junction Temperature

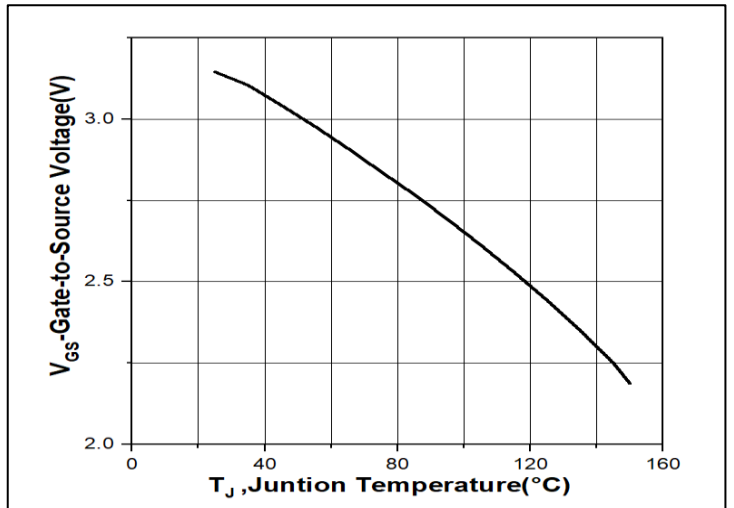


Figure4. Vth vs. Junction Temperature

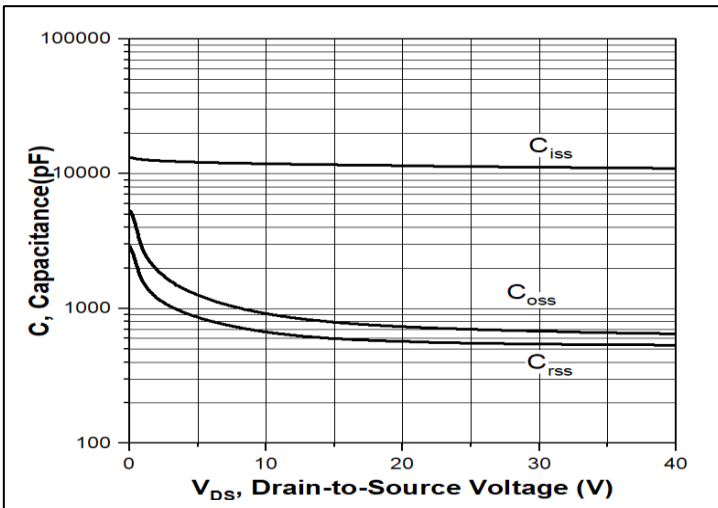


Figure5. Capacitance

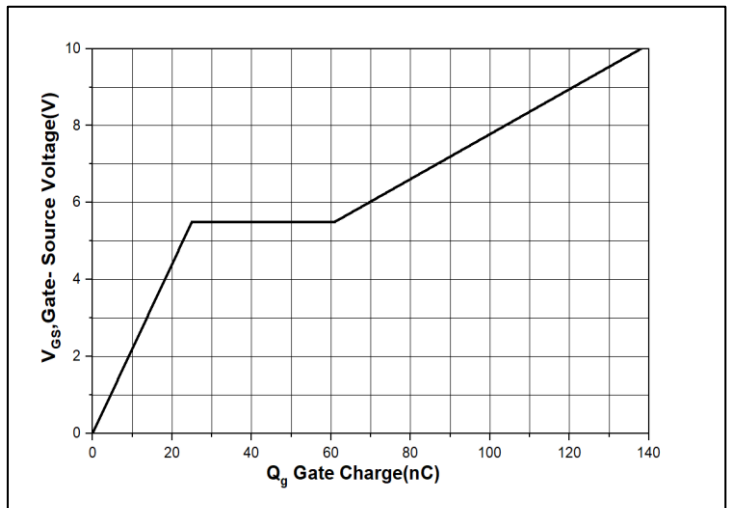


Figure6. Gate Charge

Typical Electrical and Thermal Characteristics

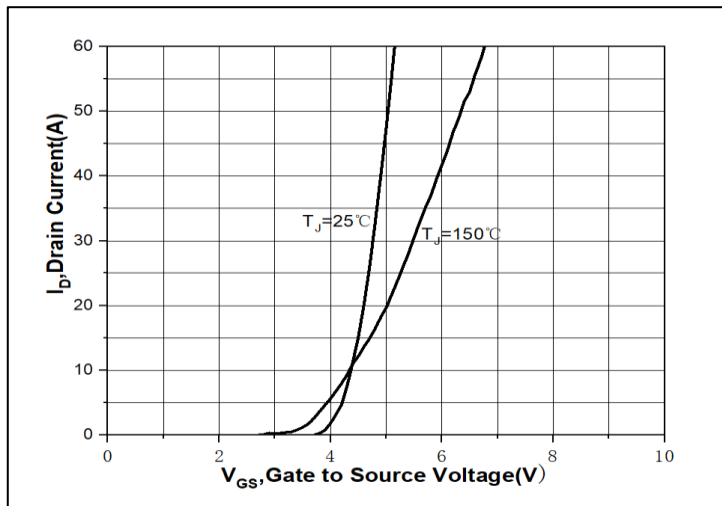


Figure7. Transfer Characteristics

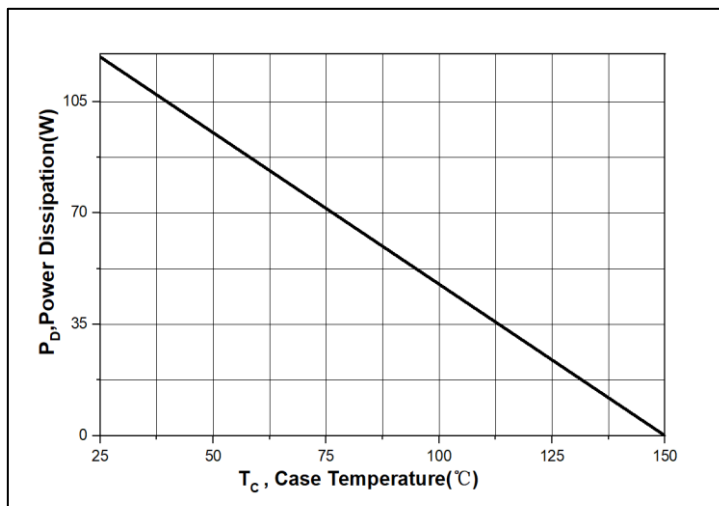
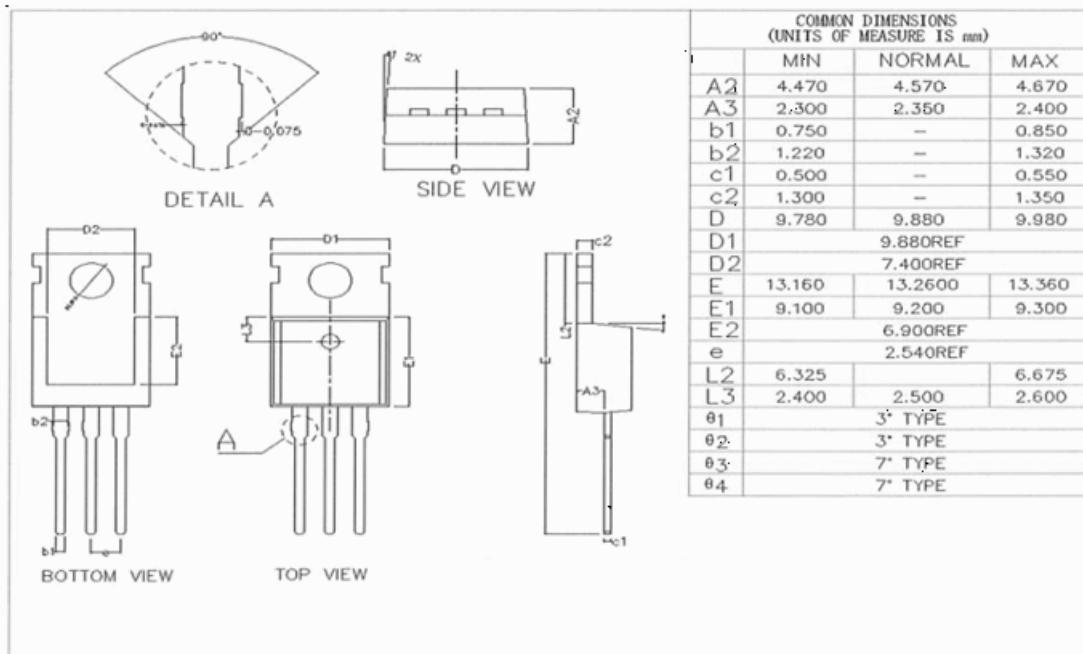


Figure8. Power Dissipation

Mechanical Data:

Unit:mm



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