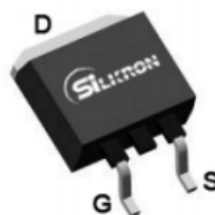
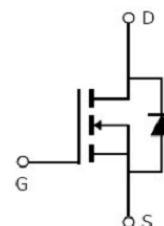


Main Product Characteristics

V_{DSS}	40V
$R_{DS(on)}$	1.5m Ω (typ.)
I_D	180A ①


TO-263

Schematic Diagram
Features and Benefits

- Advanced 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 @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V ①	180	A
I_{DM}	Pulsed Drain Current ②	390	
P_D @TC = 25°C	Power Dissipation ③	140	W
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.3mH	300	mJ
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

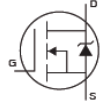
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
R _{θJC}	Junction-to-case ③	—	0.89	°C/W
R _{θJA}	Junction-to-ambient (t ≤ 10s) ④	—	62	°C/W

Electrical Characterizes @T_A=25°C unless otherwise specified

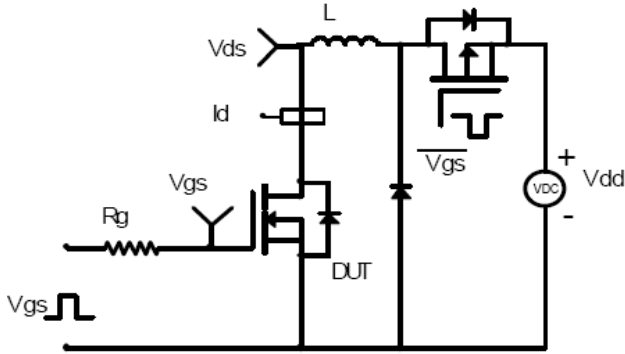
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source breakdown voltage	40	—	—	V	V _{GS} = 0V, I _D = 250μA
R _{DS(on)}	Static Drain-to-Source on-resistance	—	1.5	2	mΩ	V _{GS} =10V, I _D =55A
		—	2.5	3		V _{GS} =4.5V, I _D =55A
V _{GS(th)}	Gate threshold voltage	1.3	—	2.5	V	V _{DS} = V _{GS} , I _D =250μA
I _{DSS}	Drain-to-Source leakage current	—	—	1	μA	V _{DS} =40V, V _{GS} = 0V
I _{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V _{GS} =20V
		—	—	-100		V _{GS} = -20V
Q _g	Total gate charge	—	96.5	—	nC	I _D = 20A, V _{DS} =20V, V _{GS} = 10V
Q _{gs}	Gate-to-Source charge	—	14.3	—		
Q _{gd}	Gate-to-Drain("Miller") charge	—	18.2	—		
t _{d(on)}	Turn-on delay time	—	26.5	—	ns	V _{GS} =10V, V _{DD} =20V, R _{GEN} =2Ω I _D =20A
t _r	Rise time	—	9.1	—		
t _{d(off)}	Turn-Off delay time	—	96	—		
t _f	Fall time	—	39	—		
C _{iss}	Input capacitance	—	6585	—	pF	V _{GS} = 0V V _{DS} = 20V f = 100kHz
C _{oss}	Output capacitance	—	2535	—		
C _{rss}	Reverse transfer capacitance	—	175	—		

Source-Drain Ratings and Characteristics

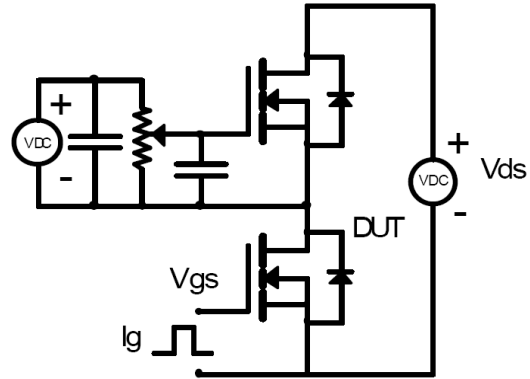
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode) ①	—	—	130	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	390	A	
V _{SD}	Diode Forward Voltage	—	—	1.3	V	I _S =20A, V _{GS} =0V, T _J = 25°C
t _{rr}	Reverse Recovery Time	—	205	—	ns	T _J = 25°C, I _F =20A, di/dt = 100A/μs
Q _{rr}	Reverse Recovery Charge	—	557	—	nC	

Test Circuits and Waveforms

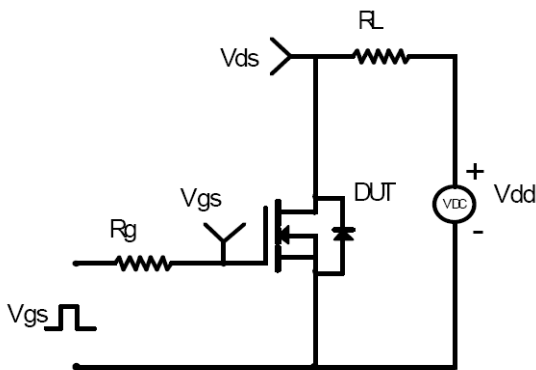
EAS Test Circuit:



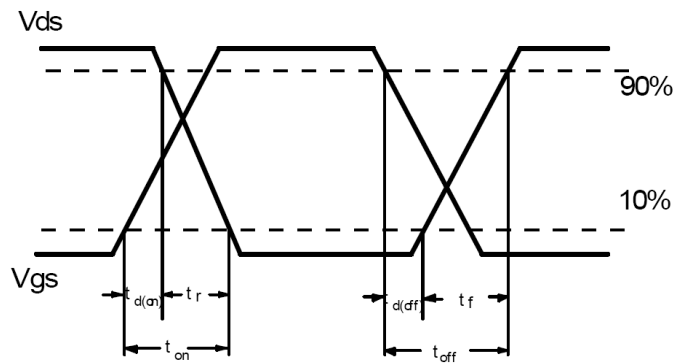
Gate Charge Test Circuit:



Switching Time Test Circuit:

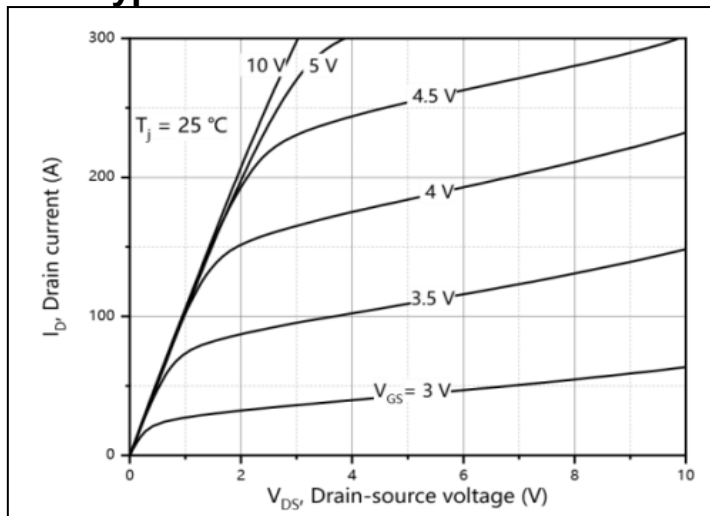
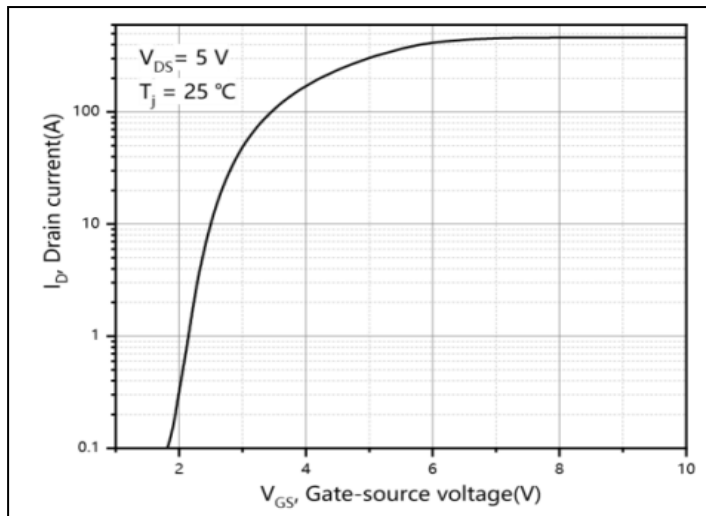
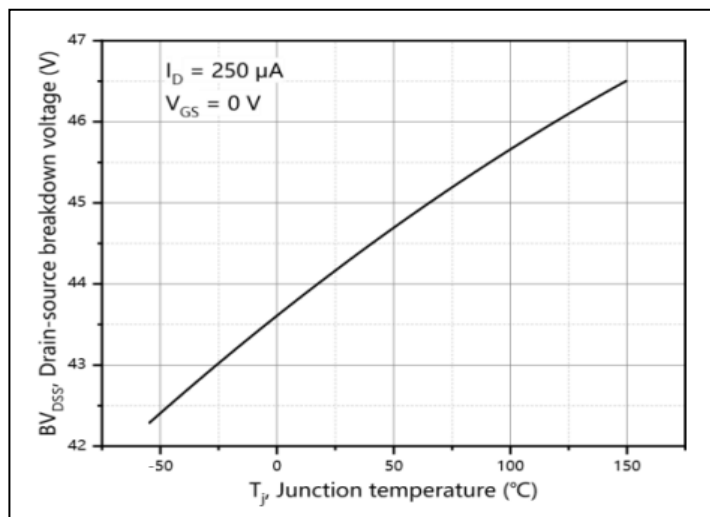
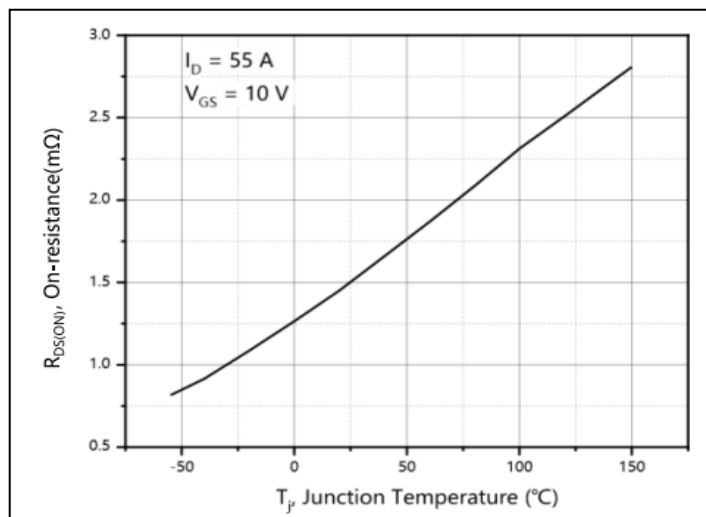
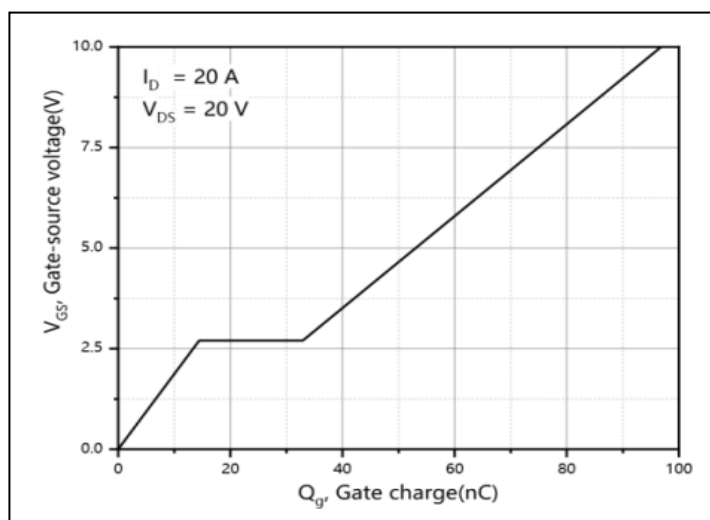
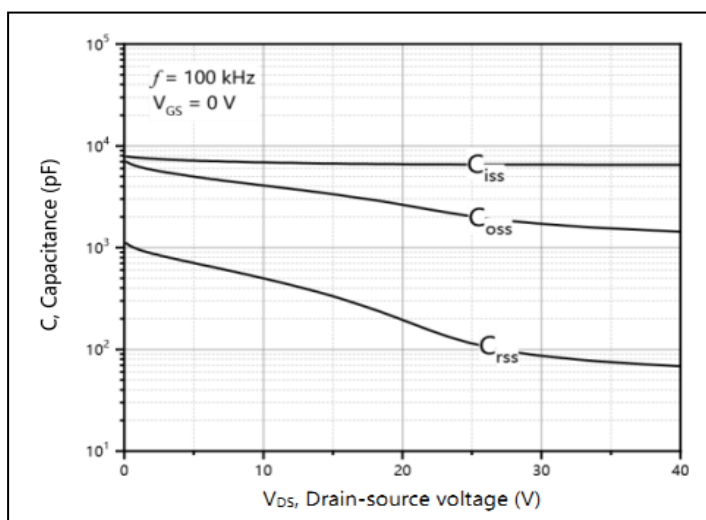


Switching Waveforms:



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 PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$

Typical Electrical and Thermal Characteristics

Figure1. Typical Output Characteristics

Figure2. Typical Transfer Characteristics

Figure3. Breakdown Voltage vs. Junction Temperature

Figure4. On-Resistance vs. Junction Temperature

Figure5. Gate Charge Characteristics

Figure6. Capacitance

Typical Electrical and Thermal Characteristics

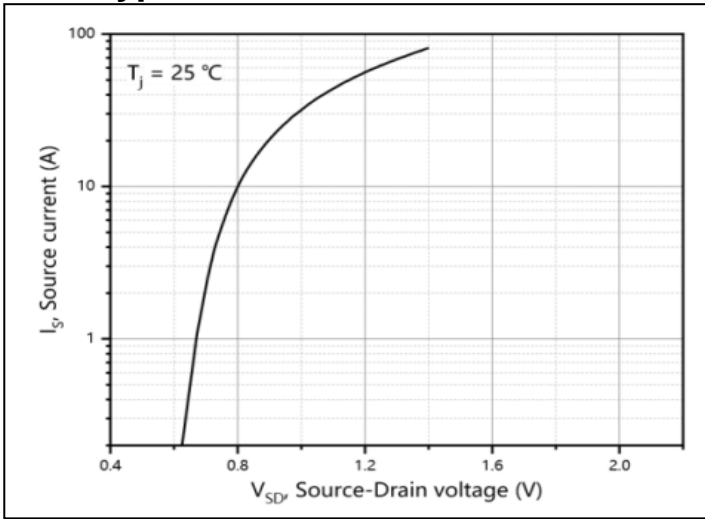


Figure7. Forward Characteristics of Body Diode

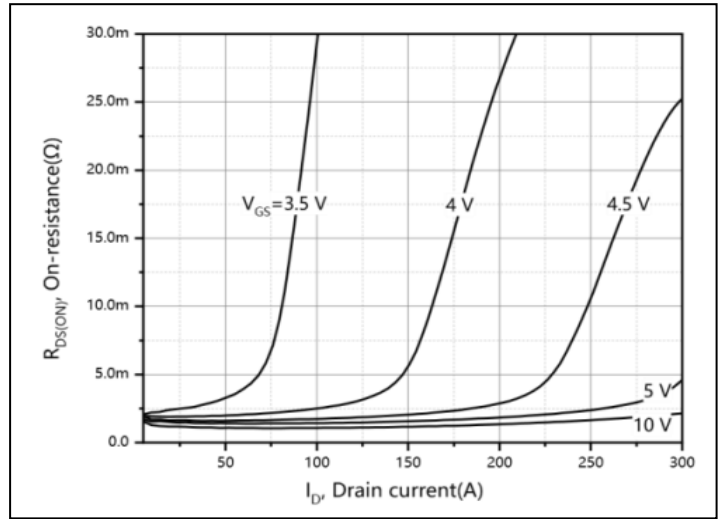


Figure8. Drain-source on-state Resistance

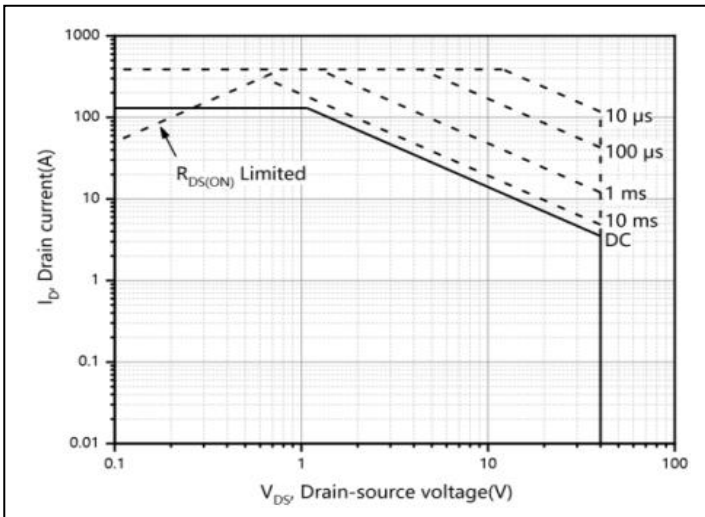
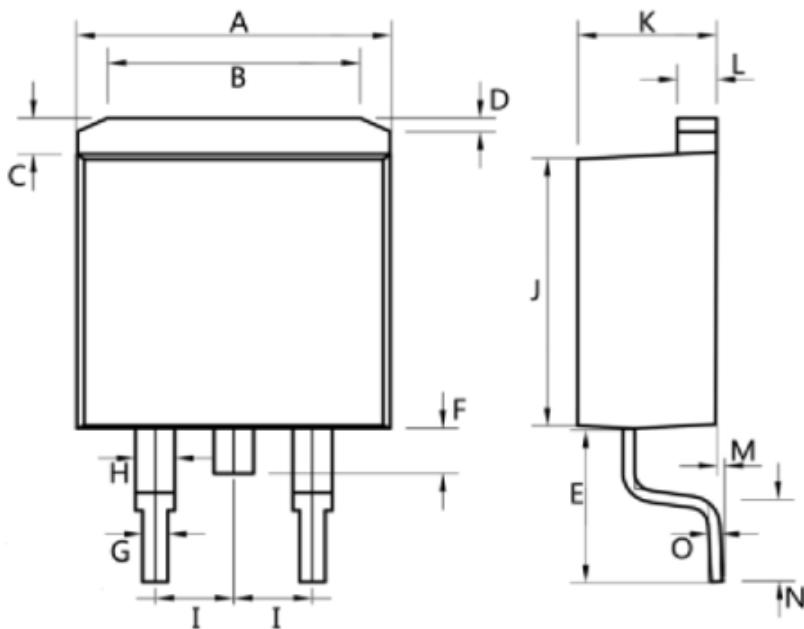


Figure9. Safe Operation Area

Mechanical Data:


Dim.	Min.	Max.
A	10.0	10.5
B	7.25	7.75
C	1.3	1.5
D	0.55	0.75
E	5.0	6.0
F	1.4	1.6
G	0.75	0.95
H	1.15	1.35
I	Typ 2.54	
J	8.4	8.6
K	4.4	4.6
L	1.25	1.45
M	0.02	0.1
N	2.4	2.8
O	0.35	0.45
All Dimensions in millimeter		

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