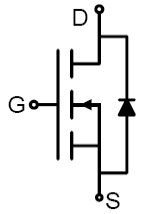
60V/50A N-Channel MOSFET

Features

- 60V, 50A, $R_{DS(ON),max.}$ =13mΩ@VGS=10V
- Reliable and Rugged
- Advanced trench process technology High Density Cell Design For Ultra Low On-Resistance

RoHS COMPLIANT

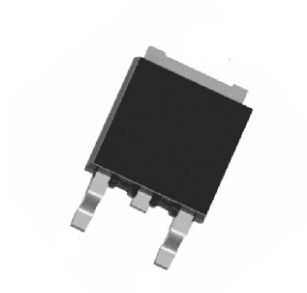


Application

- Battery protection
- Power management

Product Summary

V_{DS}	60V
$R_{DS(on),max@VGS=10V}$	13mΩ
I_D	50A



TO-252

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	60	V
Continuous drain current T_C = 25°C (Silicon limit) T_C = 25°C (Package limit) T_C = 100°C (Silicon limit)	I_D	- 50 37.5	A
Pulsed drain current T_C = 25°C, t_p limited by T_{jmax}	$I_{D\ pulse}$	175	
Avalanche energy, single pulse (L=0.5mH,Rg=25Ω)	E_{AS}	150	mJ
Gate-emitter voltage	V_{GS}	±20	V
Power dissipation T_C = 25° C	P_{tot}	115	W
Operating junction and storage temperature	T_j , T_{stg}	-55~175	℃

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.72	℃/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Electrical Characteristic, at Tj = 25 °C, unless otherwise specified

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250uA	60	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA T_j=25° C T_j=125° C	1.2	1.8	2.5	
Zero gate voltage drain current	I_{DSS}	V_{DS}=60V, V_{GS}=0V T_j=25° C T_j=125° C	- -	- -	1 50	μA
Gate-source leakage current	I_{GSS}	V_{GS}=± 20V, V_{DS}=0V	-100	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=50A, T_j=25° C	-	9.5	13	mΩ
Transconductance	g_{fs}	V_{DS}=10V, I_D=50A	-	100	-	S
Dynamic Characteristic						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	4203	-	pF
Output Capacitance	C_{oss}		-	262	-	
Reverse Transfer Capacitance	C_{rss}		-	187	-	
Gate Total Charge	Q_G	V_{GS}=10V, V_{DS}=25V, I_D=30A, f=1MHz	-	84	-	nC
Gate-Source charge	Q_{gs}		-	14	-	
Gate-Drain charge	Q_{gd}		-	30	-	
Turn-on delay time	$t_{d(on)}$	T_j=25° C,V_{DD}=25V, I_{DS}=30A, R_L=3Ω	-	10	-	ns
Rise time	t_r		-	13	-	
Turn-off delay time	$t_{d(off)}$		-	20	-	
Fall time	t_f		-	30	-	
Gate resistance	R_G	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	1.8	-	Ω

Body Diode Characteristic

Maximum Continuous Drain to Source Diode Forward Current	I_S		-	-	50	A
Maximum Pulsed Drain to Source Diode Forward Current	I_{SM}		-	-	175	A
Drain to Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=30A	-	0.8	1.0	V
Body Diode Reverse Recovery Time	trr	I_F=20A, dI/dt=100A/μs	-	35	-	ns
Body Diode Reverse Recovery Charge	Qrr		-	60	-	nC

Typical Performance Characteristics

Figure 1: Power Dissipation

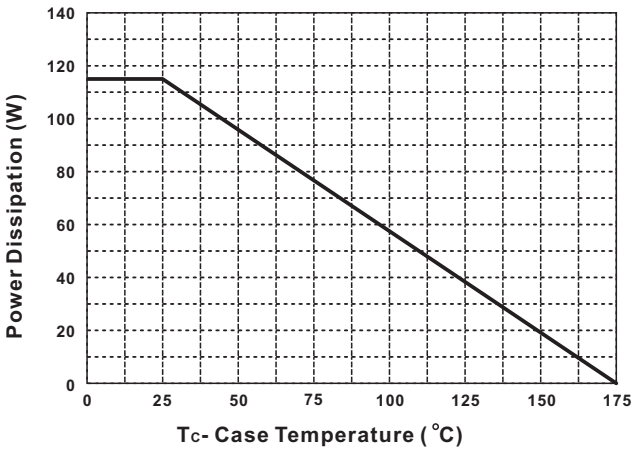


Figure 2: Drain Current

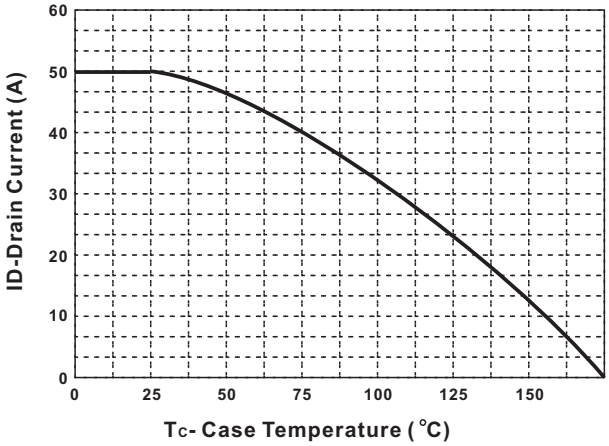


Figure 3: Safe Operation Area

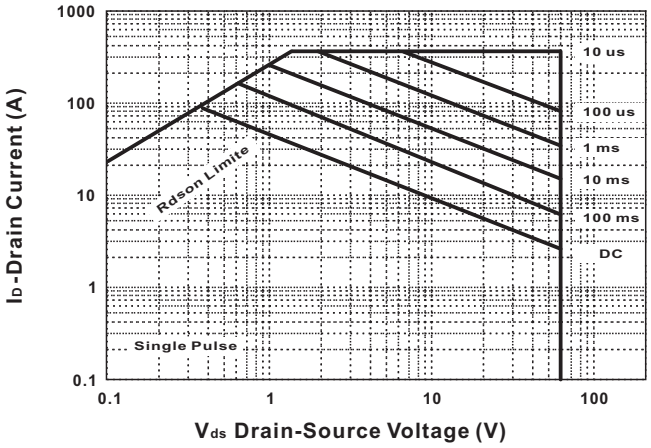


Figure 4: Thermal Transient Impedance

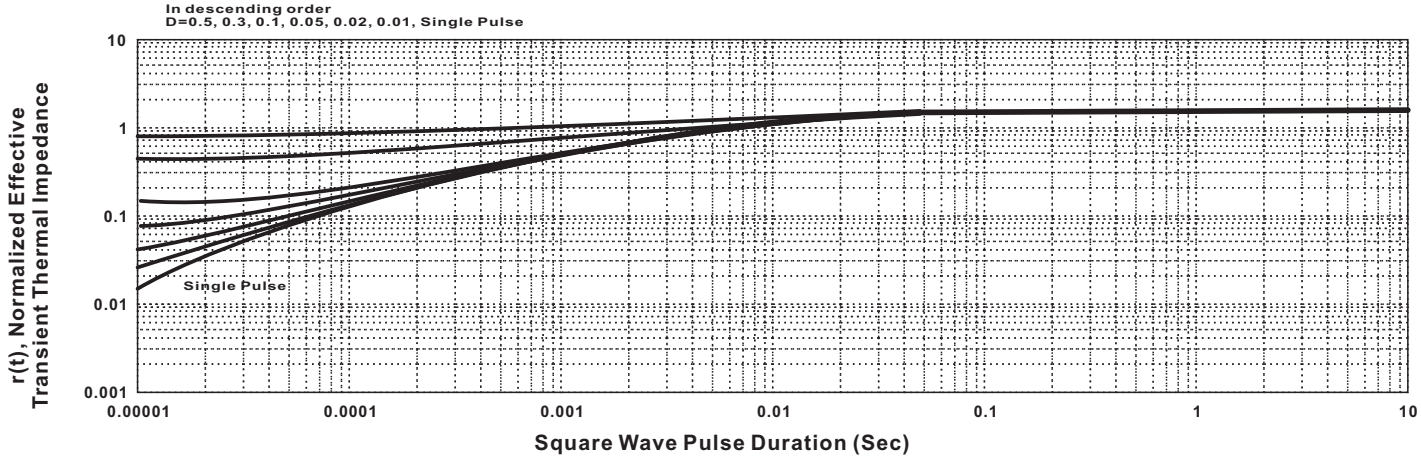


Figure 5: Output Characteristics

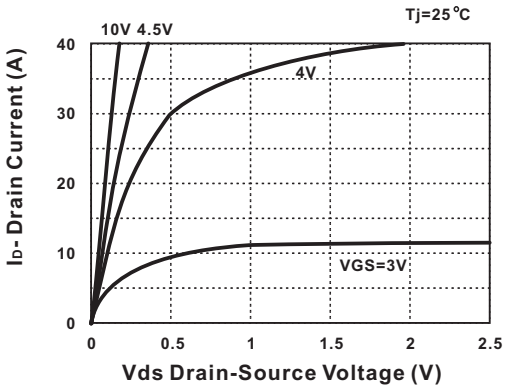


Figure 6: Drain-Source On Resistance

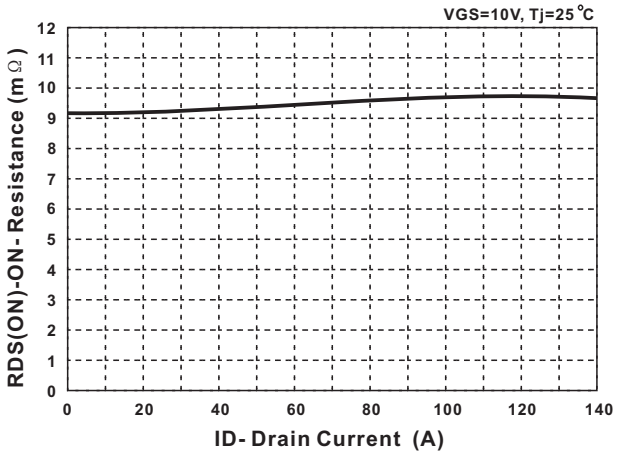


Figure 7: On-Resistance vs. Temperature

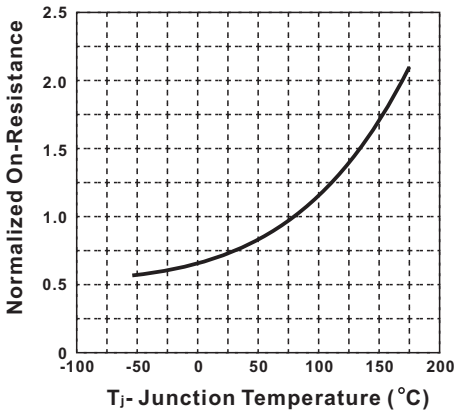


Figure 8: Source-Drain Diode Forward

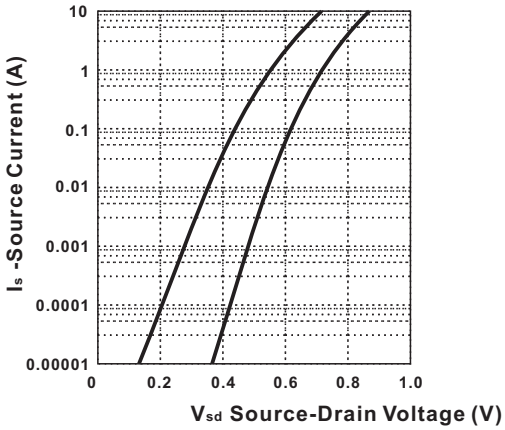


Figure 9: Capacitance Characteristics

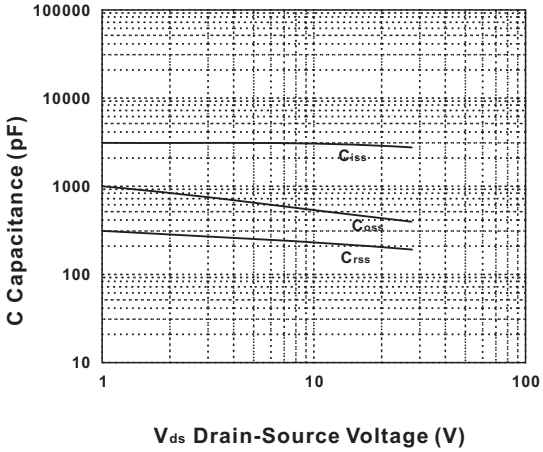
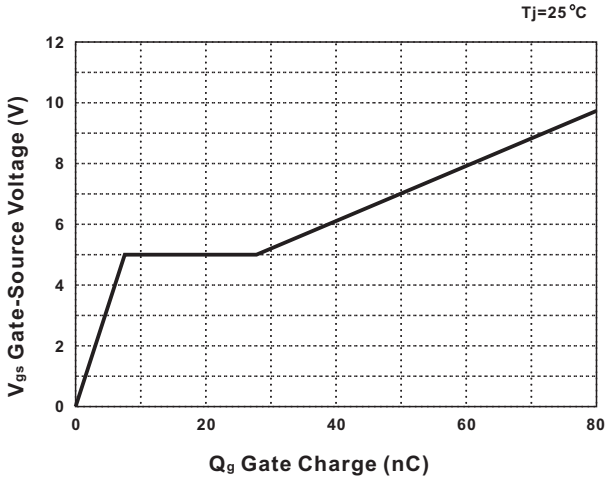
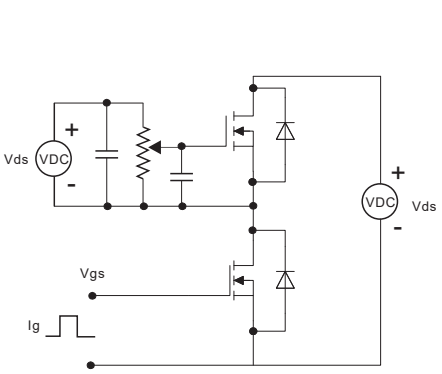


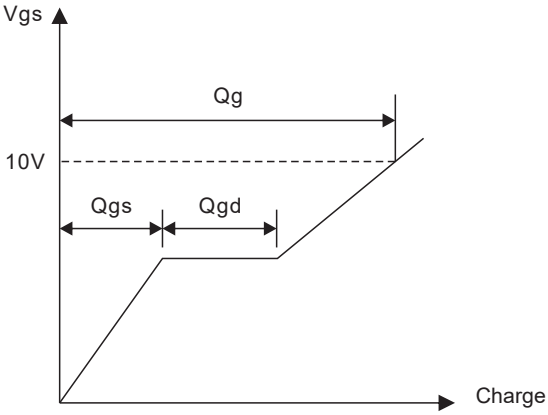
Figure 10: Gate Charge Charaterisitcs



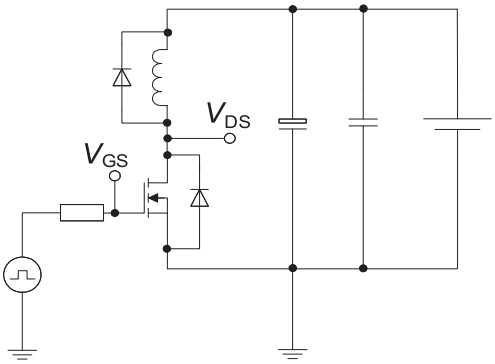
Test Circuit & Waveform

Gate Charge Test Circuit & Waveform

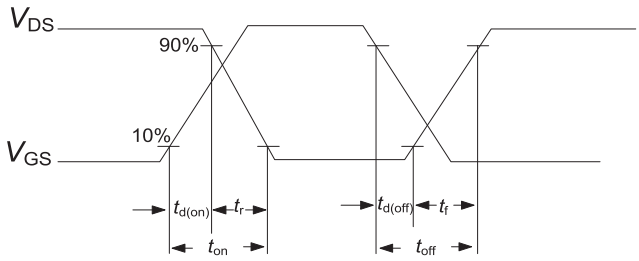




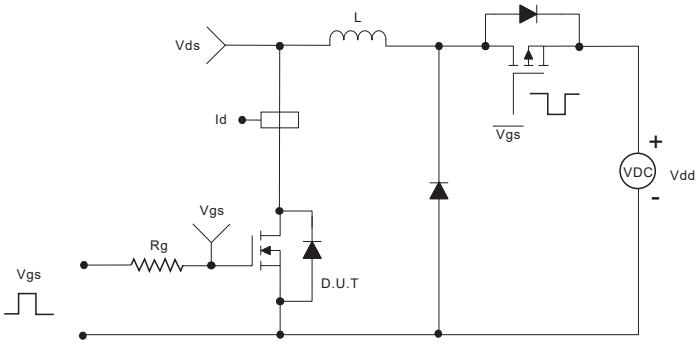
Switching Times Test Circuit for Inductive Load

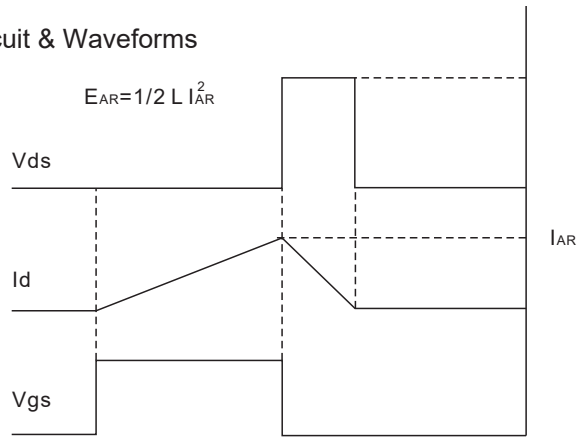


Switching Times Waveform

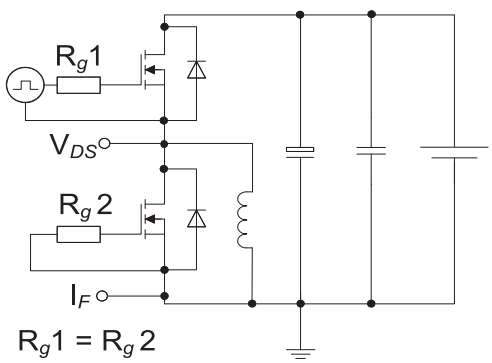


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

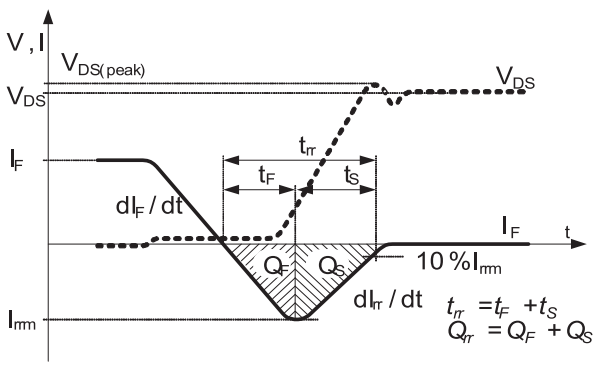




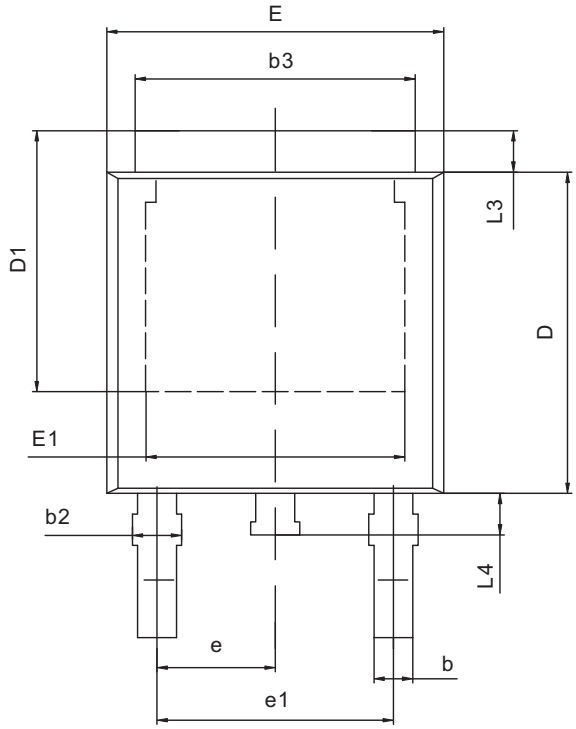
Test Circuit for Diode Characteristics

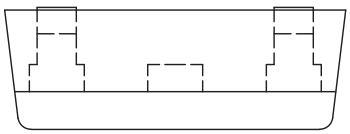


Diode Recovery Waveform



TO-252 Package Information





Dimension	Millimeters	
	Min.	Max.
A	2.16	2.41
A1	0.00	0.15
b	0.64	0.89
b2	0.65	1.15
b3	4.95	5.50
c	0.46	0.61
c2	0.40	0.98
D	5.97	6.22
D1	5.02	5.84
E	6.35	6.73
E1	4.32	5.50
e	2.29 (BSC)	
e1	4.57	
H	9.40	10.48
L	1.18	1.78
L3	0.89	1.27
L4	0.51	1.02

Revision history

Date	Revision	Changes
28-May-2020	1.0	Initial release

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