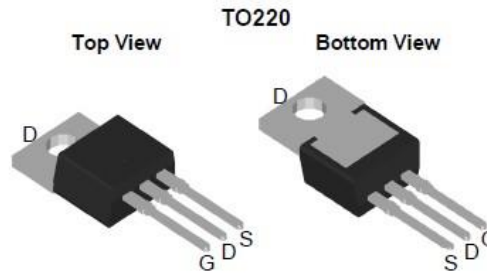
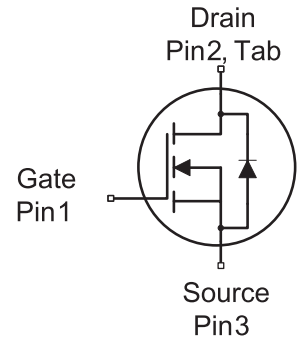


## Features

- Uses advanced SGTtechnology
- Extremely low  $R_{DS(on)}$ ,  $t_{yp}=4.4m\Omega@V_{GS}=10V$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)

## Application

- Motor control and drives
- Battery management
- DC/DC converter
- General purpose applications



## Product Summary

$V_{DS}$	85V
$R_{DS(on)}@V_{GS}=10V$	4.4m $\Omega$
$I_D$	120A

## Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	85	V
Continuous drain current	$I_D$	140	A
$T_C = 25^\circ C$ (Silicon limit)		120	
$T_C = 25^\circ C$ (Package limit)		100	
Pulsed drain current	$I_{Dpulse}$	480	
$T_C = 25^\circ C$ , $t_p$ limited by $T_{jmax}$			
Avalanche energy, single pulse ( $L=0.5mH, R_g=25\Omega$ )	$E_{AS}$	680	mJ
Gate-emitter voltage	$V_{GS}$	$\pm 20$	V
Power dissipation	$P_{tot}$	220	W
$T_C = 25^\circ C$			
Operating junction and storage temperature	$T_j, T_{stg}$	-55~175	$^\circ C$

**ThermalResistance**

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case.Max	$R_{thJC}$	0.70	°C/W
Thermal resistance, junction – ambient.Max	$R_{thJA}$	60	

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

Parameter	Symbol	TestCondition	Value			Unit
			min.	typ.	max.	

**StaticCharacteristic**

Drain-sourcebreakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	85	95	-	V
Gate thresholdvoltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$ $T_j=25^\circ C$ $T_j=125^\circ C$	2.0 -	3	4.0 -	
Zerogatevoltage draincurrent	$I_{DSS}$	$V_{DS}=85V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=125^\circ C$	- -	- 5	1 -	$\mu A$
Gate-source leakagecurrent	$I_{GSS}$	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
Drain-sourceon-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=50A,$ $T_j=25^\circ C$	-	4.4	5.5	m $\Omega$
Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=50A$	-	80	-	S

**DynamicCharacteristic**

InputCapacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=40V,$ $f=1MHz$	-	4032	-	pF
OutputCapacitance	$C_{oss}$		-	637	-	
Reverse TransferCapacitance	$C_{rssi}$		-	17	-	
Gate TotalCharge	$Q_G$	$V_{GS}=10V, V_{DS}=40V,$ $I_D=25A, f=1MHz$	-	65.7	-	nC
Gate-Sourcecharge	$Q_{gs}$		-	24.9	-	
Gate-Draincharge	$Q_{gd}$		-	13.9	-	
Turn-on delaytime	$t_{d(on)}$	$T_j=25^\circ C, V_{GS}=10V,$ $V_{DS}=40V, R_L=3\Omega$	-	20.1	-	ns
Risetime	$t_r$		-	38	-	
Turn-off delaytime	$t_{d(off)}$		-	45.1	-	
Falltime	$t_f$		-	21	-	
Gate resistance	$R_G$	$V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$	-	1.6	-	$\Omega$

**Body DiodeCharacteristic**

Body Diode ForwardVoltage	$V_{SD}$	$V_{GS}=0V, I_{SD}=50A$	-	0.85	1.4	V
Body Diode ReverseRecovery Time	$t_{rr}$	$I_F=20A,$ $dI/dt=500A/\mu s$	-	61	-	ns
Body Diode ReverseRecovery Charge	$Q_{rr}$	$I_F=20A,$ $dI/dt=500A/\mu s$	-	340	-	nC

### Typical Performance Characteristics

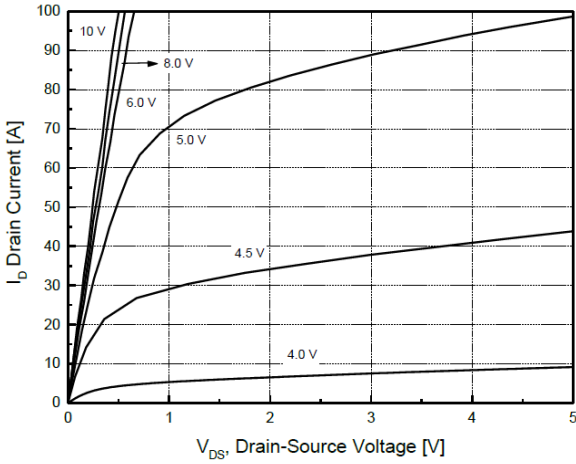


Figure 1. Typ. Output Characteristics ( $T_j=25^\circ\text{C}$ )

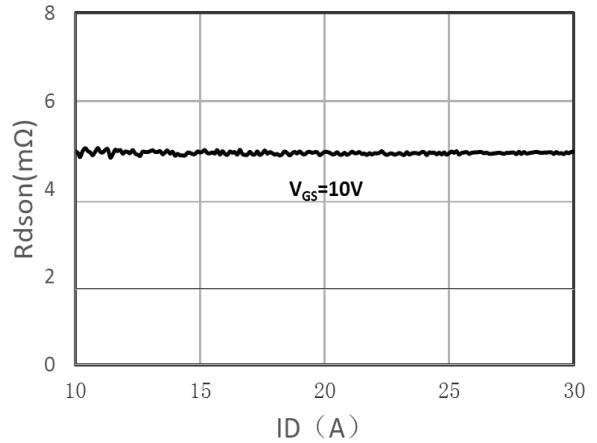


Figure 2.  $R_{DS(on)}$  vs Drain Current and Gate Voltage

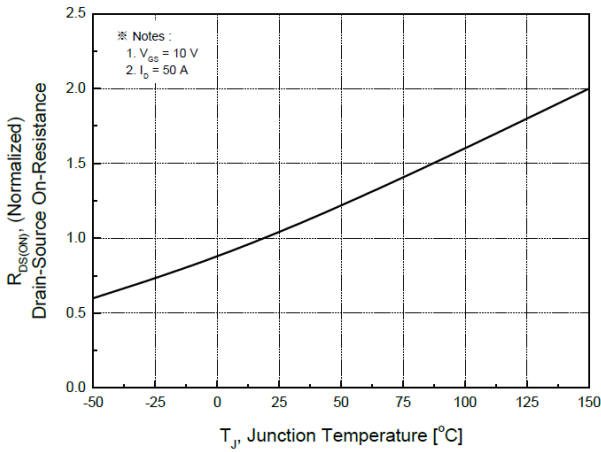


Figure 3. On-Resistance Variation with Temperature

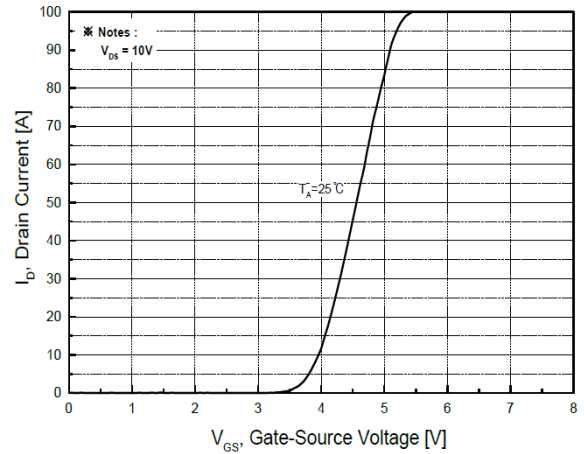


Figure 4. Transfer Characteristics

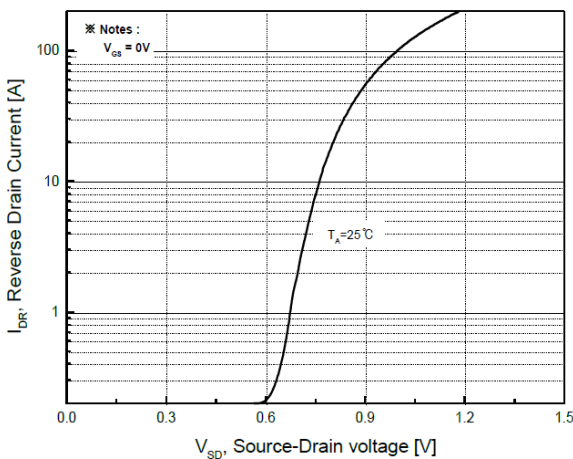


Figure 5. Body Diode Forward Voltage Variation with Source Current and Temperature

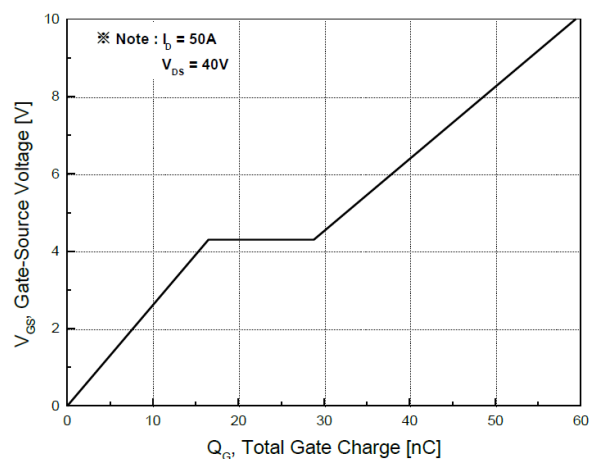


Figure 6 Gate Charge Characteristics

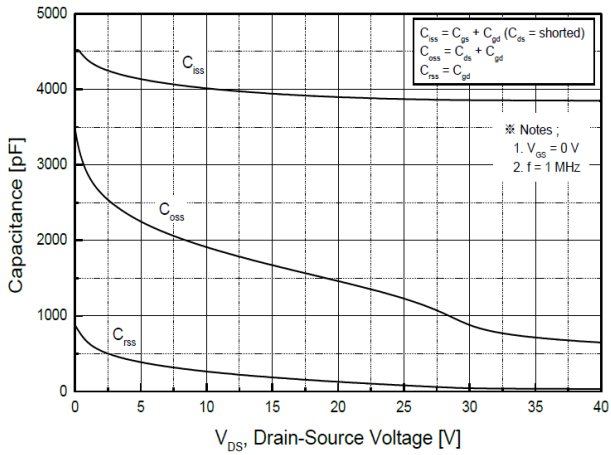


Figure 7. Capacitance Characteristics

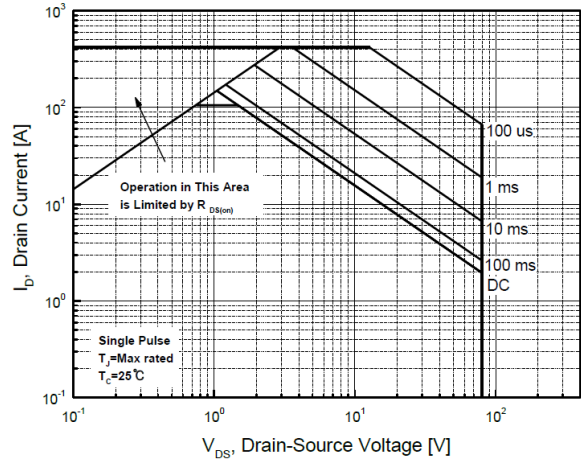


Figure 8. Maximum Safe Operating Area

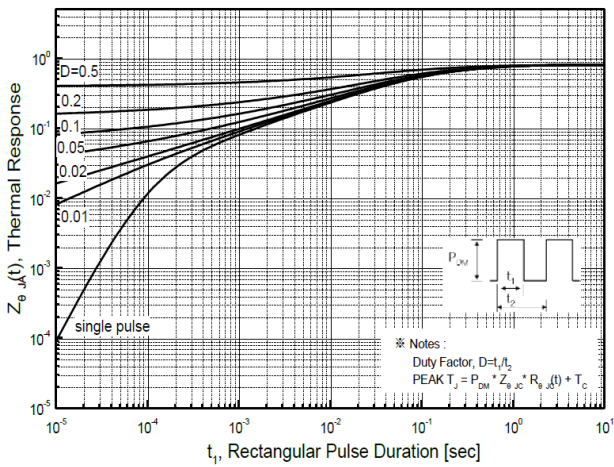
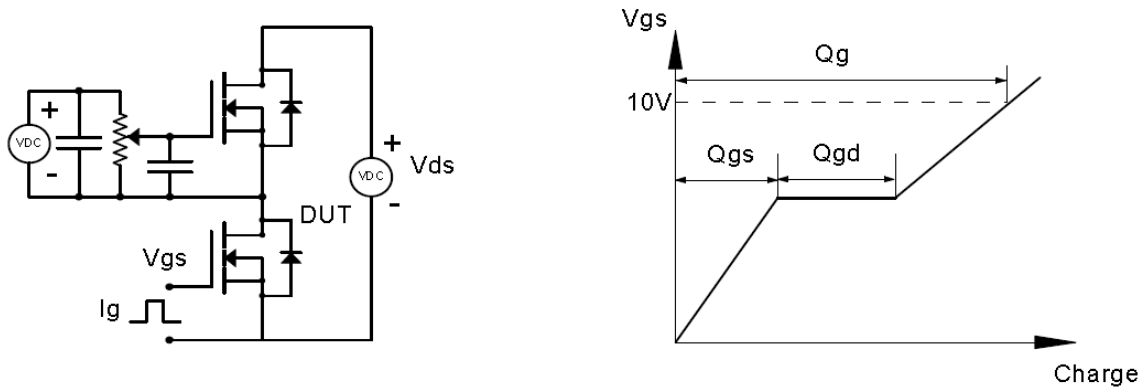


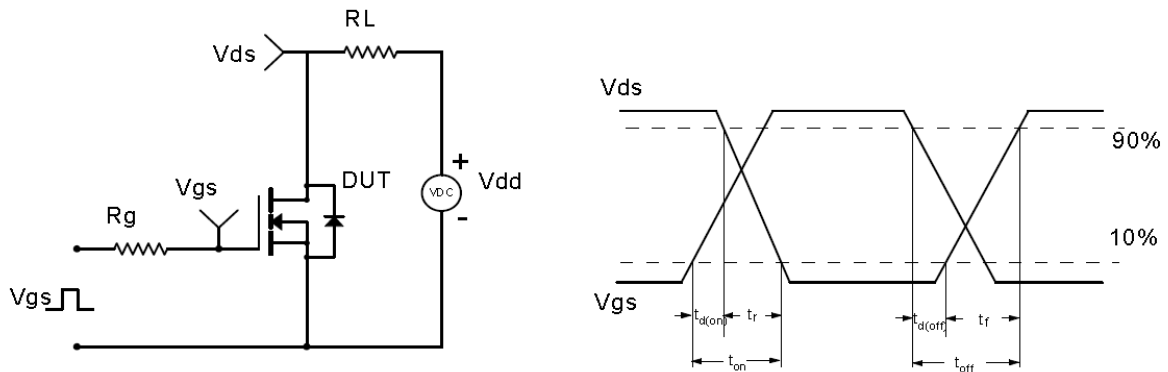
Figure 9: Transient Thermal Response Curve

## Test Circuit & Waveform

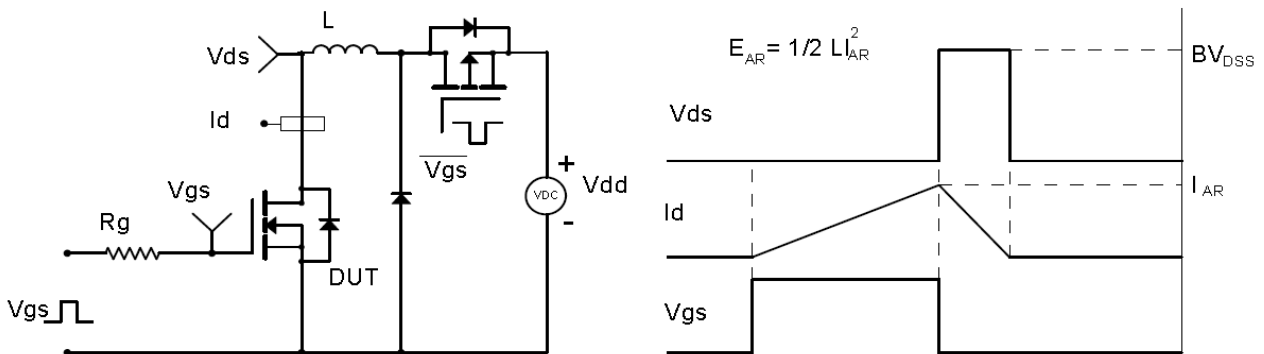
Gate Charge Test Circuit & Waveform



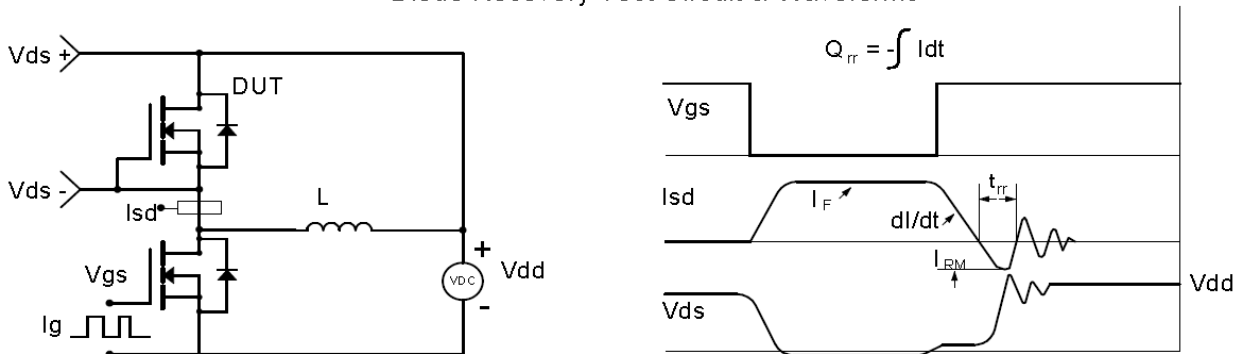
Resistive Switching Test Circuit & Waveforms



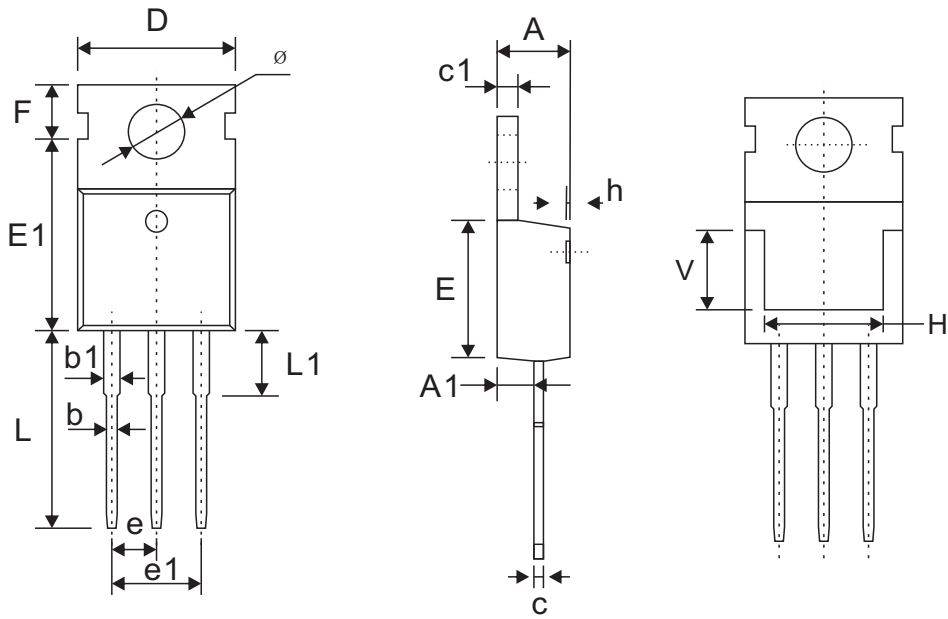
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



**TO-220 Package Information**



Dimension	Millimeters	
	Min.	Max.
A	4.40	4.60
A1	2.25	2.55
b	0.71	0.91
b1	1.17	1.37
c	0.33	0.65
c1	1.20	1.40
D	9.91	10.25
E	8.95	9.75
E1	12.65	12.95
e	2.54 (Typ.)	
e1	4.98	5.18
F	2.65	2.95
H	7.90	8.10
h	0.00	0.30
L	12.90	13.40
L1	2.85	3.25
V	7.50 (Ref.)	
ø	3.40	3.80

**Revision history**

Date	Revision	Changes
28-May-2020	1.0	Initial release

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