

Features

- Uses advanced SGT technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)

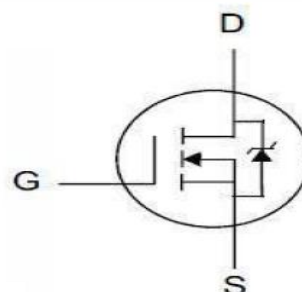
Application

- Motor control and drive
- Battery management
- DC/DC

Product Summary

Package	TO-220
V_{DS}	60V
$R_{DS(on)}@V_{GS}=10V$	1.5mΩ
I_D	259A

Package Marking



Type	Package	Marking	Reel Size	Packing	Qty
LR019N06SM3	TO-220	LR019N06SM3	-	Tube	50

Maximum Ratings (TC=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous drain current $T_c=25^\circ\text{C}$ (Silicon limit) $T_c=100^\circ\text{C}$ (Silicon limit)	I_D	259 164	A
Pulsed Drain Current	I_{DM}	788	A
Maximum Power Dissipation	P_d	212	W
Single pulse avalanche energy	E_{AS}	1122	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance,Junction-to-Case	R_{thJC}	0.59	°C/W
Thermal Resistance,Junction-to-ambient	R_{thJA}	42	

Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	min	typ	max	Unit
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Static Characteristic

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	69	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	2.9	4.0	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$I_D=50A, V_{GS}=10V$	-	1.5	1.9	mΩ
Transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$	-	150	-	S

Dynamic Characteristic

Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V,$ $f=1\text{MHz}$	-	6970	-	pF
Output Capacitance	C_{oss}		-	1397	-	
Reverse Transfer Capacitance	C_{rss}		-	58	-	
Gate Total Charge	Q_G	$V_{DS}=30V, I_D=50A,$ $V_{GS}=10V$	-	102	-	nC
Gate-Source charge	Q_{gs}		-	36	-	
Gate-Drain charge	Q_{gd}		-	15	-	
Turn-on delay time	$t_{d(on)}$	$V_{GS}=10V, V_{DS}=50V,$ $R_G=6\Omega$	-	27	-	ns
Rise time	t_r		-	34	-	
Turn-off delay time	$t_{d(off)}$		-	65	-	
Fall time	t_f		-	27	-	
Gate resistance	R_g	$V_{GS}=0V, V_{DS}=0V,$ $f=1\text{MHz}$	-	1.8	-	Ω

Body Diode Characteristic

Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=50A$	-	0.8	1.2	v
Reverse Recovery Time	t_{rr}	$I_F=50A$ $di/dt=100A/\mu s$	-	51	-	ns
Reverse Recovery Charge	Q_{rr}		-	63	-	nC

Typical Performance Characteristics

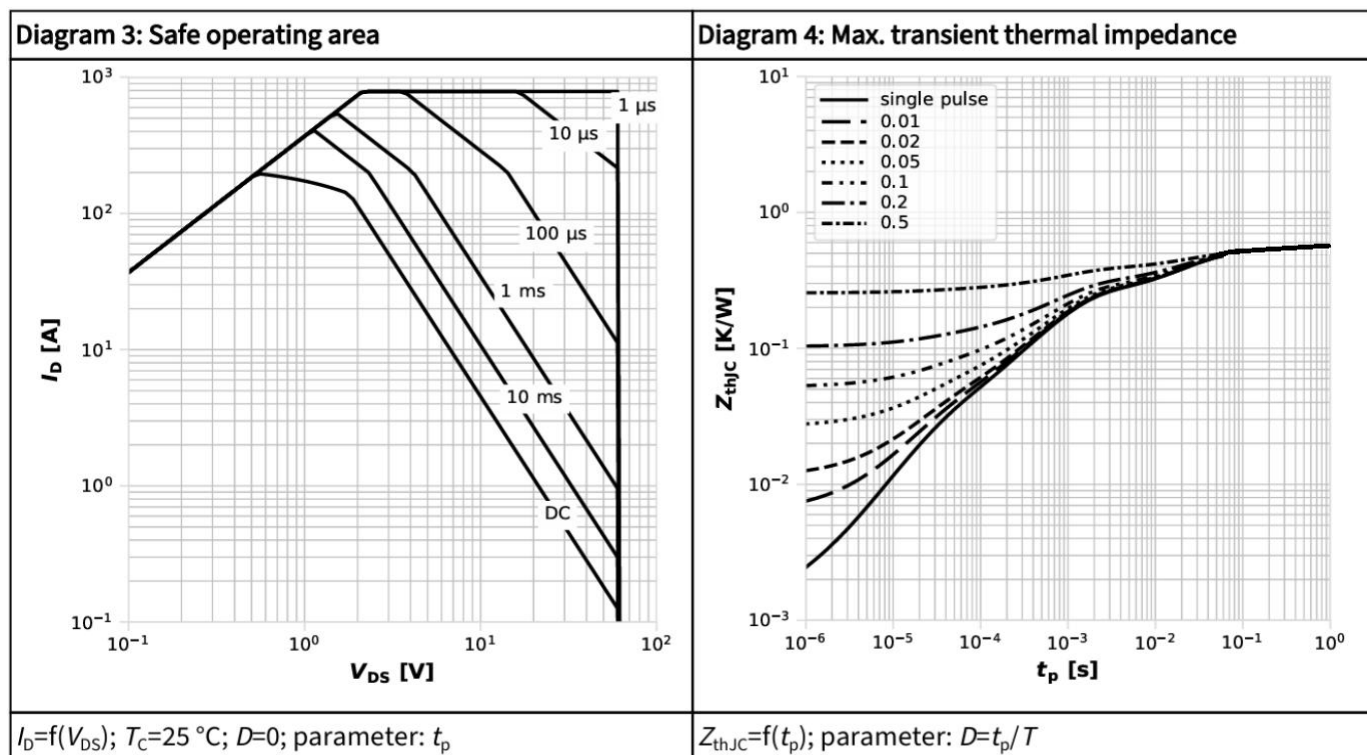
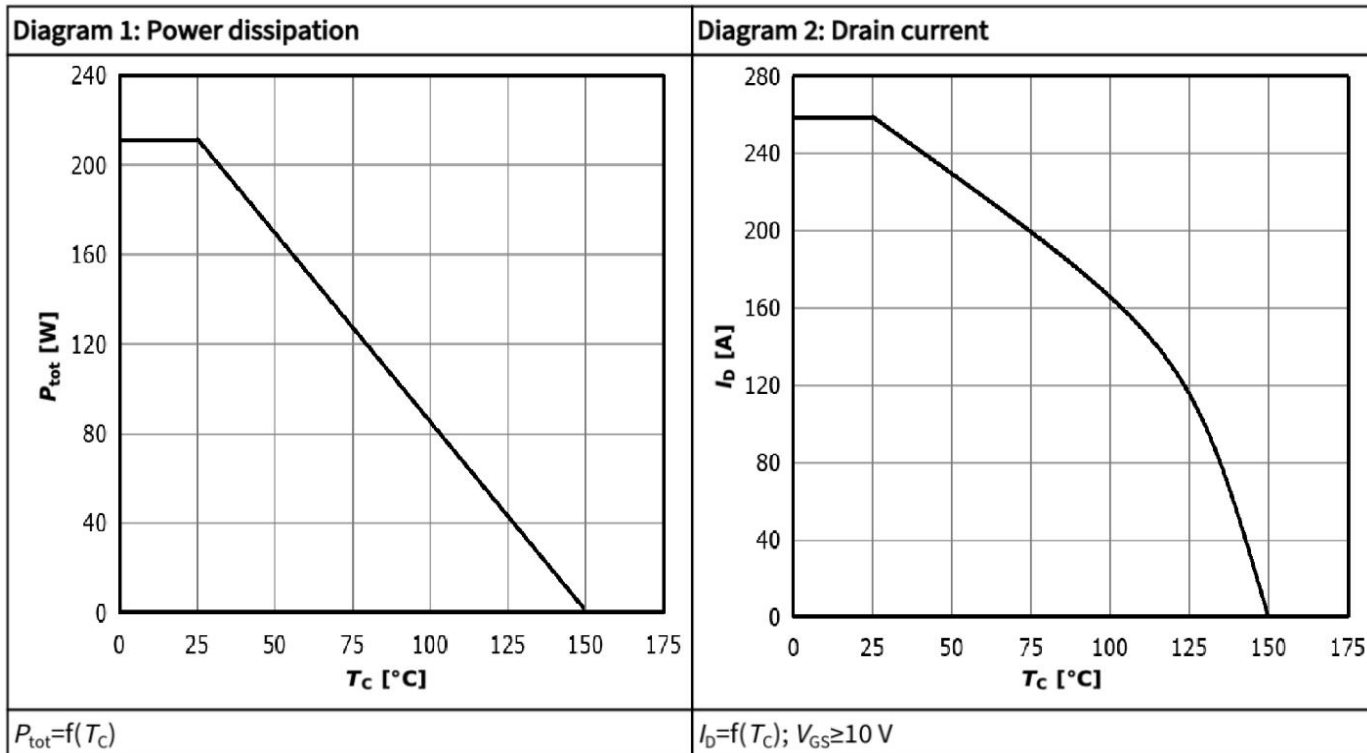
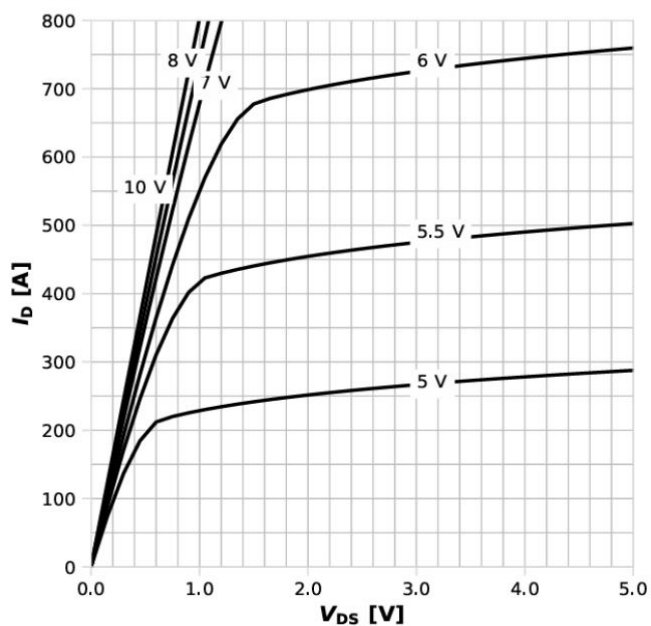
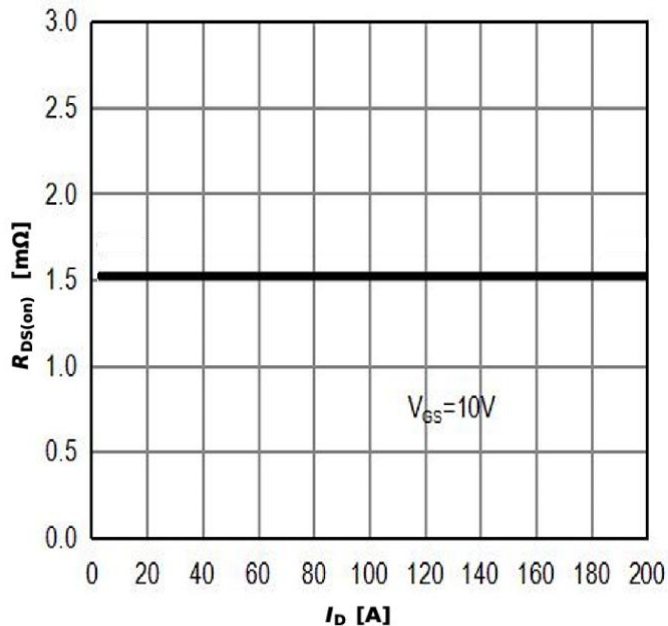


Diagram 5: Typ. output characteristics



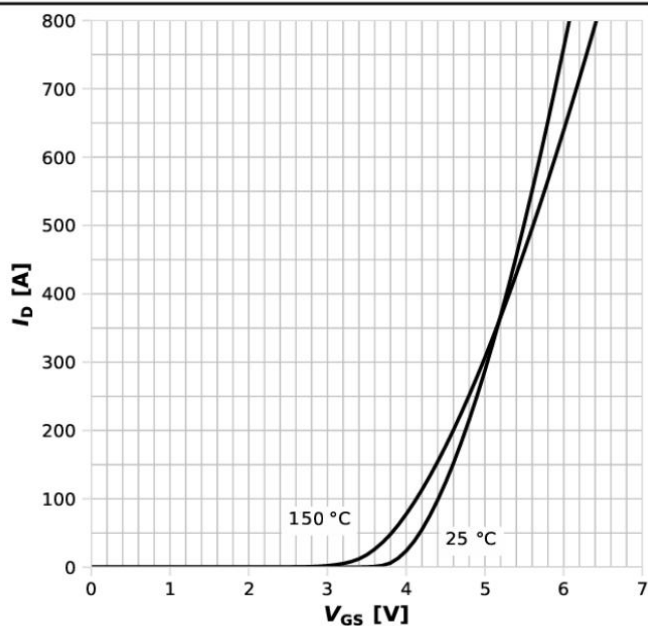
$I_D = f(V_{DS})$, $T_j = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



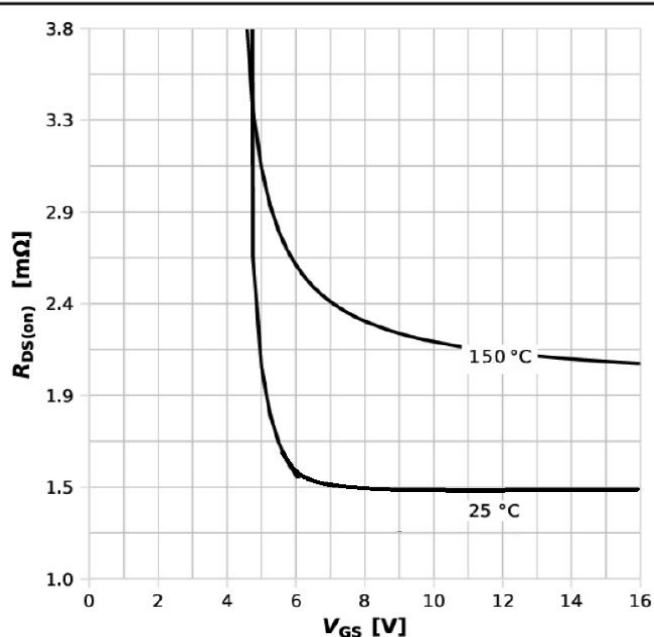
$R_{DS(on)} = f(I_D)$, $T_j = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



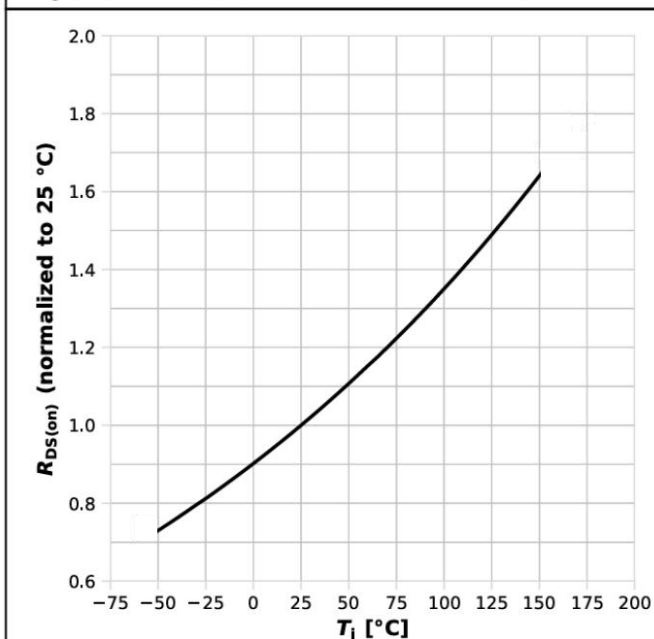
$I_D = f(V_{GS})$, $|V_{DS}| > 2|I_D|/R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. drain-source on resistance



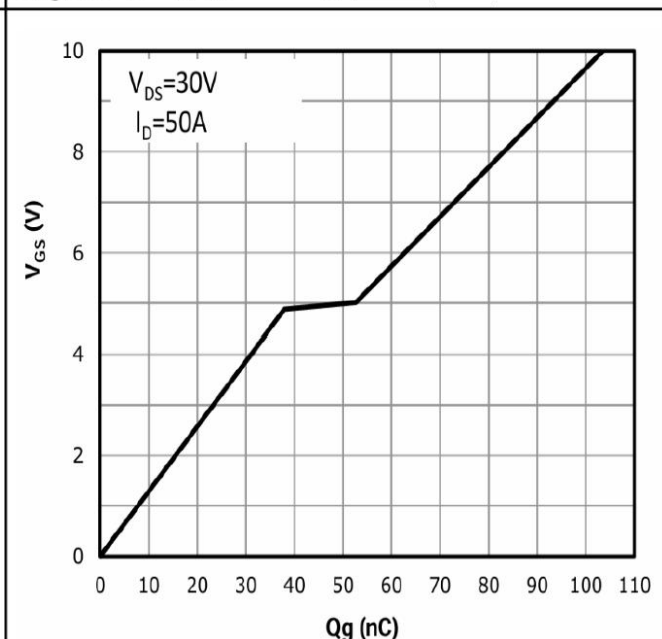
$R_{DS(on)} = f(V_{GS})$, $I_D = 100\text{ A}$; parameter: T_j

Diagram 9: Normalized drain-source on resistance



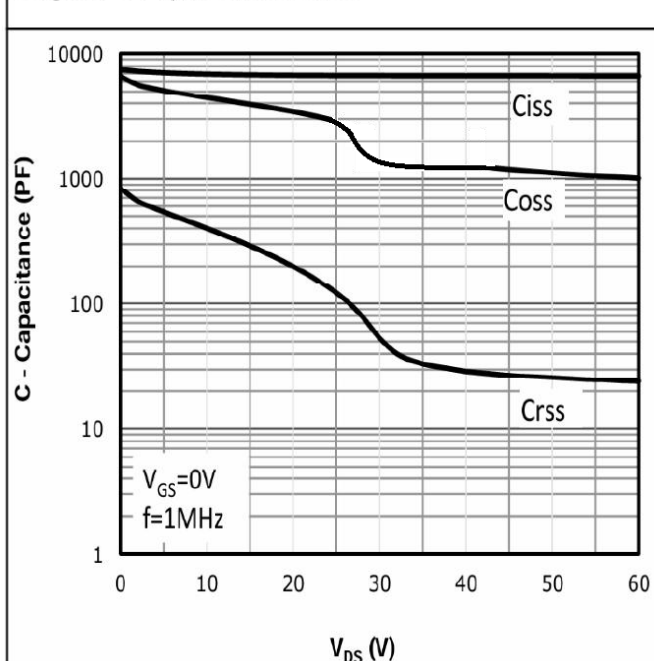
$$R_{DS(on)} = f(T_j), I_D = 100 \text{ A}, V_{GS} = 10 \text{ V}$$

Diagram 10: Typ. gate charge



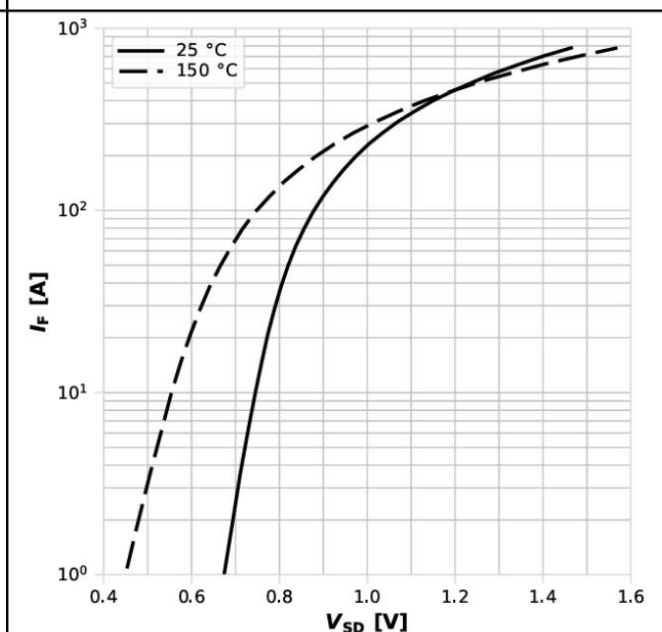
$$V_{GS} = f(Q_{gate}), I_D = 100 \text{ A pulsed}, T_j = 25 \text{ °C}; \text{ parameter: } V_{DD}$$

Diagram 11: Typ. capacitances



$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$

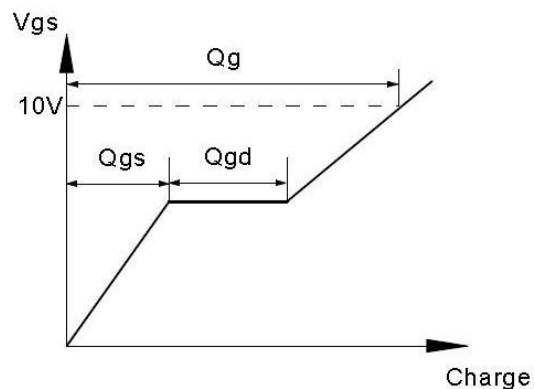
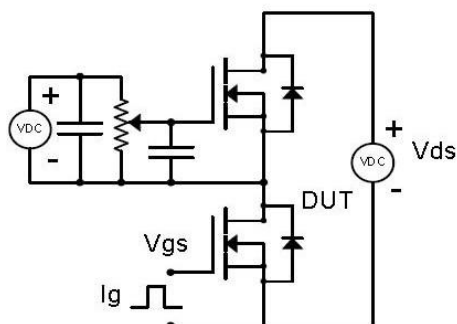
Diagram 12: Typ. forward characteristics of reverse diode



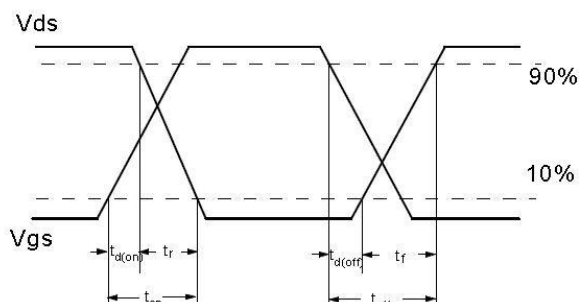
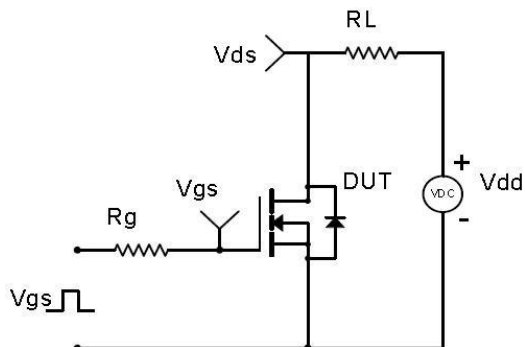
$$I_F = f(V_{SD}); \text{ parameter: } T_j$$

Test Circuit & Waveform

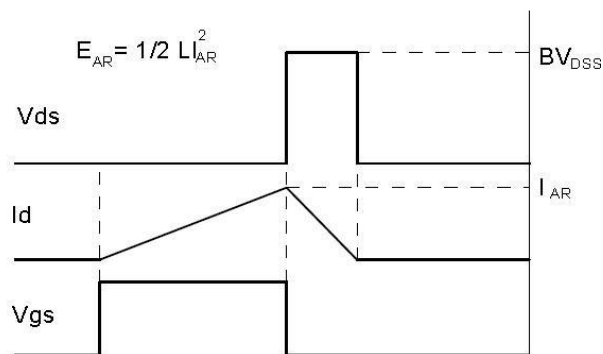
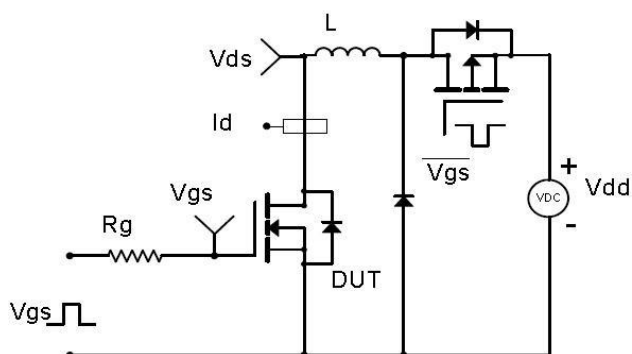
Gate Charge Test Circuit & Waveform



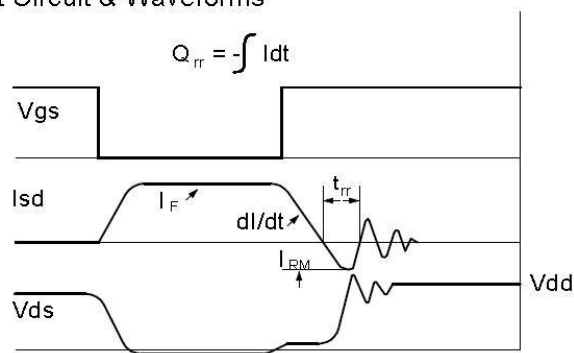
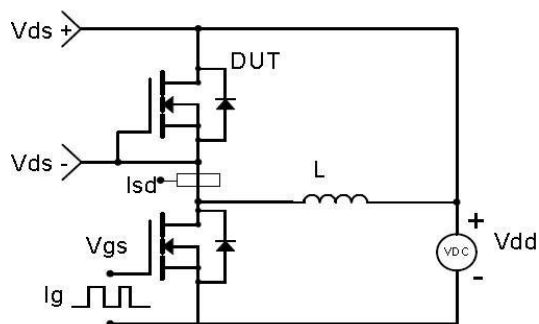
Resistive Switching Test Circuit & Waveforms



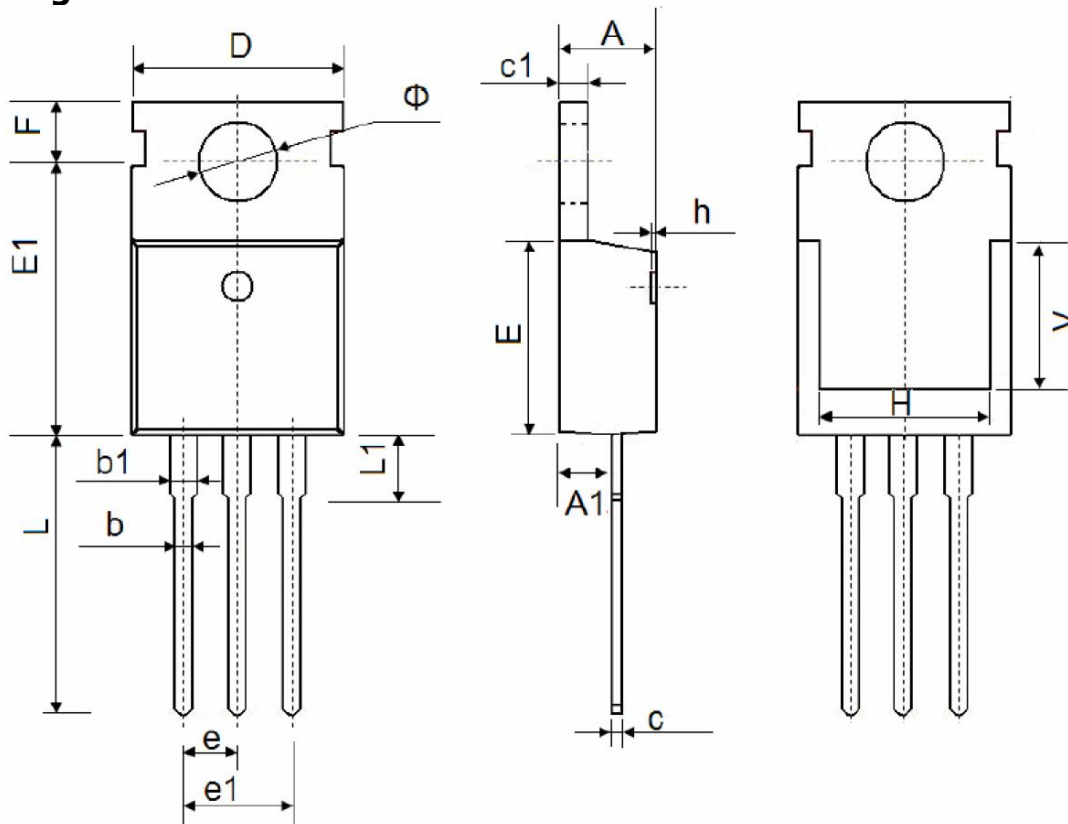
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline:TO-220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 Typ.		0.100 Typ.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 Ref.		0.295 Ref.	
Φ	3.400	3.800	0.134	0.150

Revision History:

Revision	Date	Major changes
1.0	2025/6/07	Release of Preliminary version.