RST020N09XD10

N-MOSFET TOLL 90V,240A,1.67mΩ

Features

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

Application

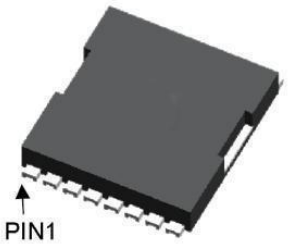
- Motor control and drive
- Battery management
- DC/DC

Product Summary

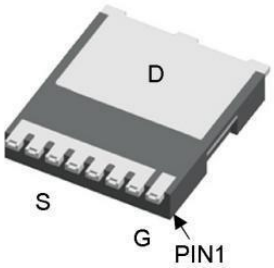
Package	TOLL
V_{DS}	90V
$R_{DS(on)@VGS=10V}$	1.67mΩ
I_D	240A

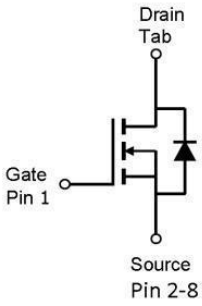
Package Marking

TOLL Top View



TOLL Bottom View





Type	Package	Marking	Reel Size	Tape Width	Packing	Qty
RST020N09XD10	TOLL	LR020N09XD10	330*28.5mm	24mm	Reel&Tape	2000

Maximum Ratings (TC=25℃unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	90	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous drain current T_c=25℃（Silicon limit） T_A=25℃（Package limit） T_c=100℃（Silicon limit）	I_D	 268 240 172	A
Pulsed Drain Current	I_{DM}	960	A
Maximum Power Dissipation	P_d	250	W
Single pulse avalanche energy	E_{AS}	1406	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	R_{thJC}	0.5	℃/W
Thermal Resistance,Junction-to-Ambient	R_{thJA}	52	

Electrical Characteristics (T_C=25℃unless otherwise noted)

Parameter	Symbol	Condition	min	typ	max	Unit
Static Characteristic						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250uA	90	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	2.0	3.0	4.0	
Zero gate voltage drain current	I_{DSS}	V_{DS}=80V,V_{GS}=0V	-	-	1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
Drain-source on-state resistance	$R_{DS(on)}$	I_D=90A,V_{GS}=10V	-	1.67	2.0	mΩ
Transconductance	g_{FS}	V_{DS}=5V, I_D=90A	-	227	-	S
Dynamic Characteristic						
Input Capacitance	C_{iss}	V_{DS}=40V,V_{GS}=0V, f=1MHz	-	7732	-	pF
Output Capacitance	C_{oss}		-	3233	-	
Reverse Transfer Capacitance	C_{rss}		-	212	-	
Gate resistance	Rg	f=1MHz	-	2	-	Ω
Gate Total Charge	Q_G	V_{DS}=40V,I_D=50A, V_{GS}=10V	-	109	-	nC
Gate-Source charge	Q_{gs}		-	32	-	
Gate-Drain charge	Q_{gd}		-	27	-	
Turn-on delay time	$t_{d(on)}$	V_{GS}=10V, V_{DS}=40V, R_G=3Ω	-	18	-	ns
Rise time	t_r		-	10	-	
Turn-off delay time	$t_{d(off)}$		-	30	-	
Fall time	t_f		-	12	-	

Body Diode Characteristic

Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=30A	-	-	1.4	v
Reverse Recovery Time	t_{rr}	I_F =30A di/dt = 100A/μs	-	50	-	ns
Reverse Recovery Charge	Q_{rr}		-	75	-	nC

Typical Performance Characteristics

Fig 1: Output Characteristics

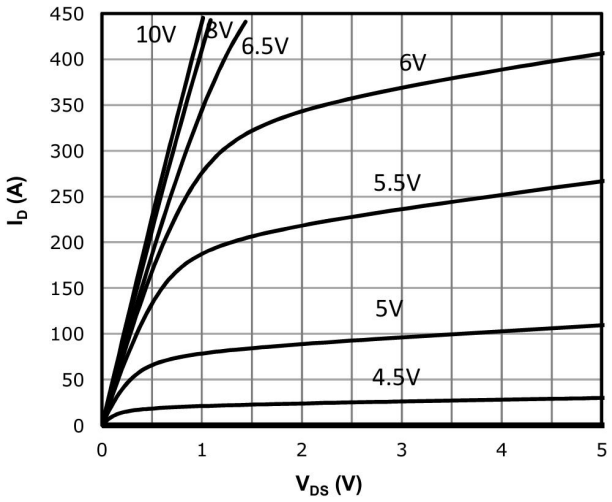


Fig 2: Transfer Characteristics

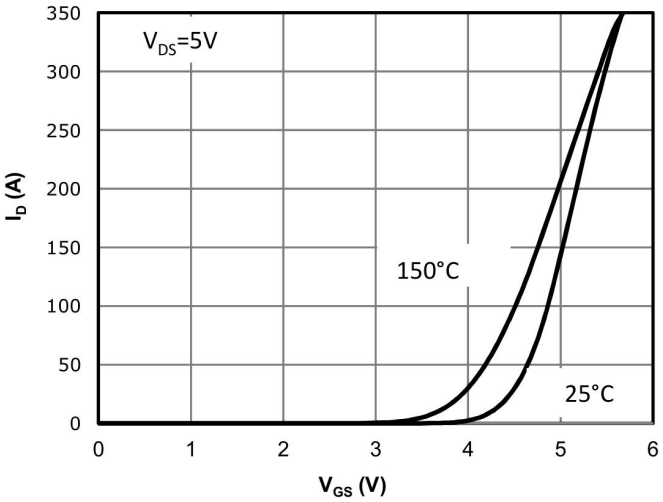


Fig 3: Rds(on) vs Drain Current

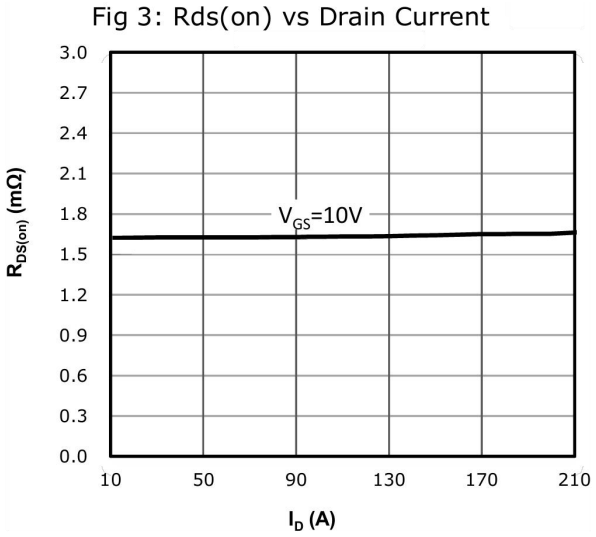


Fig 4: Rds(on) vs Gate Voltage

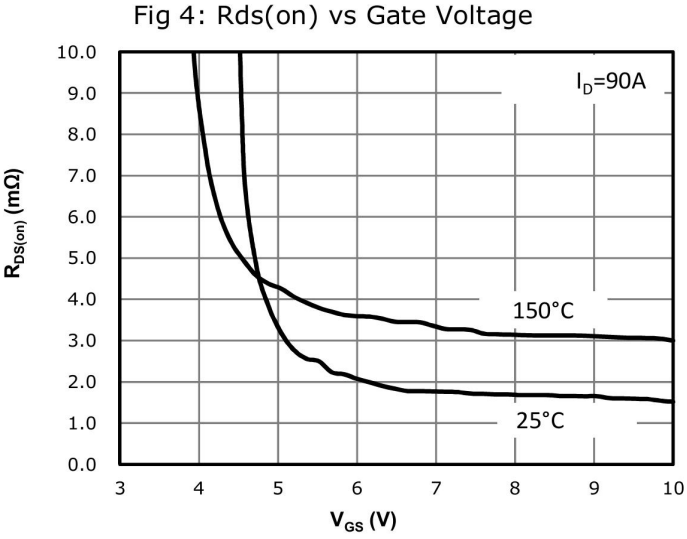


Fig 5: Rds(on) vs. Temperature

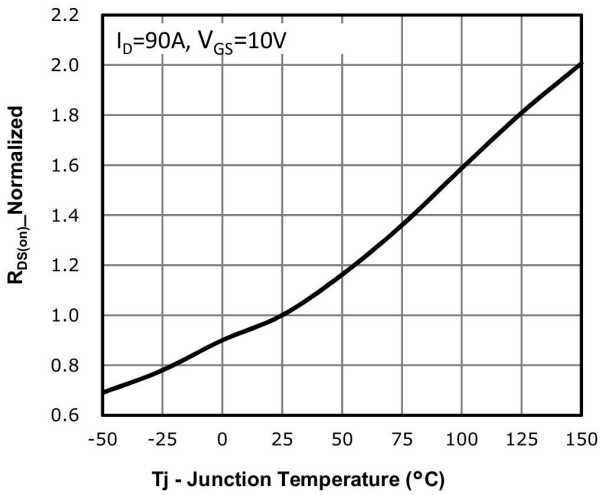


Fig 6: Capacitance Characteristics

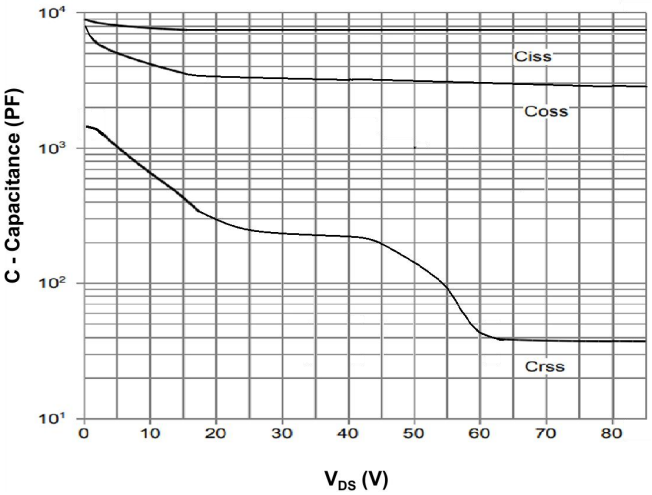


Fig 7: Vgs(th) vs. Temperature

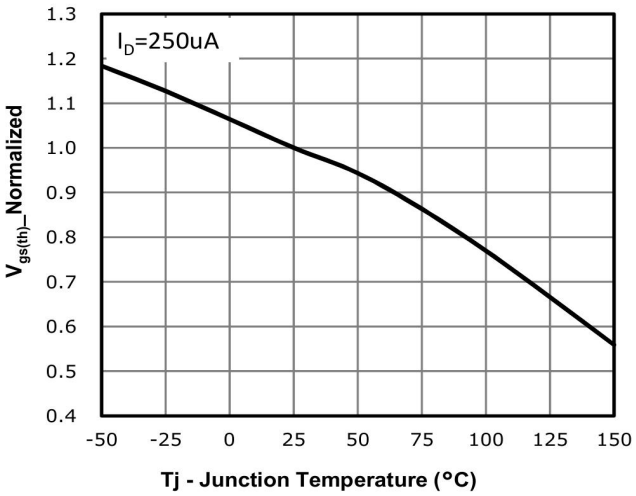


Fig 8: BVdss vs. Temperature

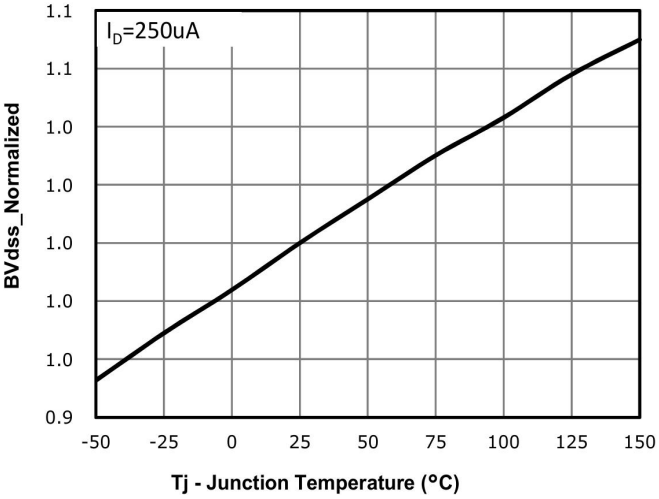


Fig 9: Gate Charge Characteristics

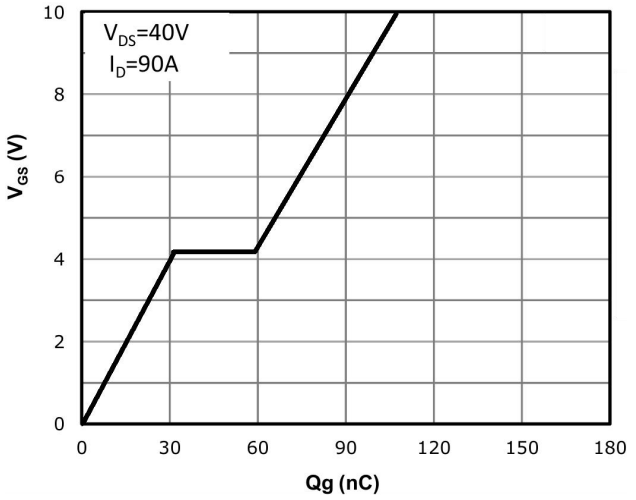


Fig 10: Body-diode Forward Characteristics

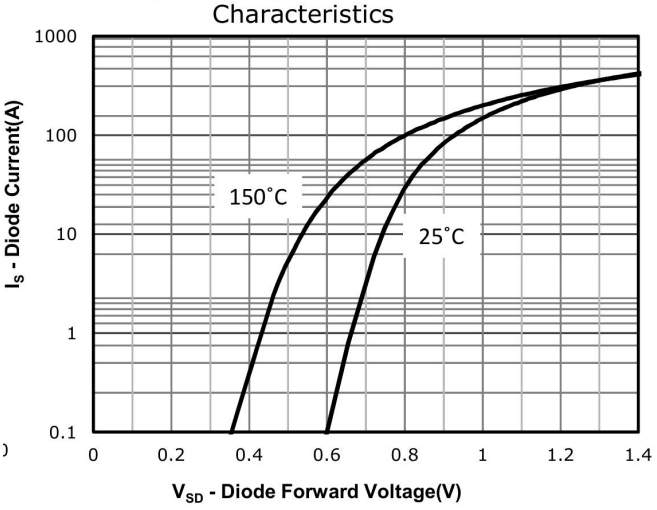


Fig 11: Power Dissipation

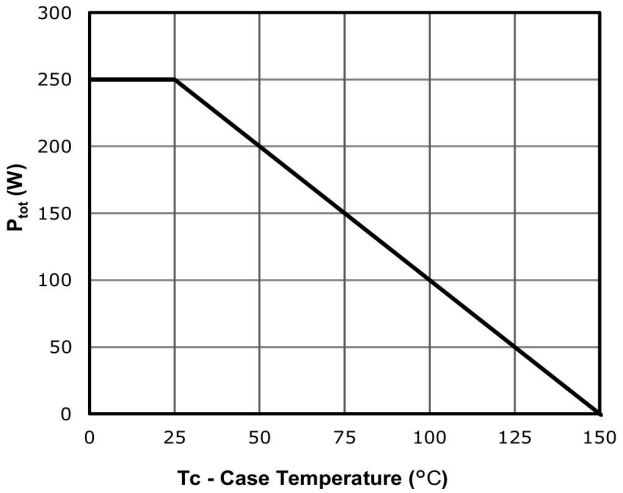


Fig 12: Drain Current Derating

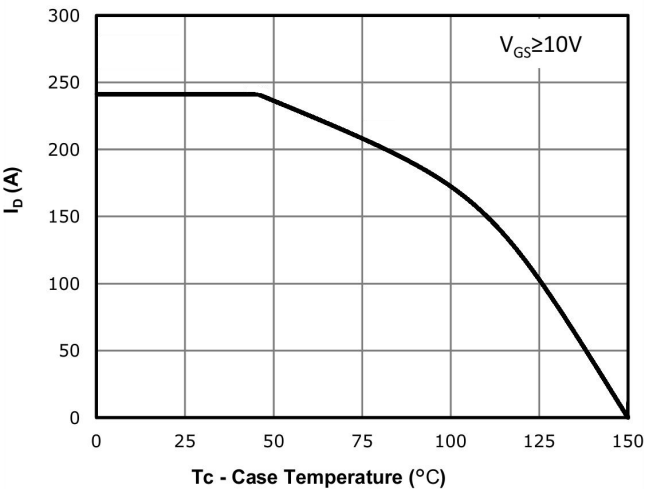


Fig 13: Safe Operating Area

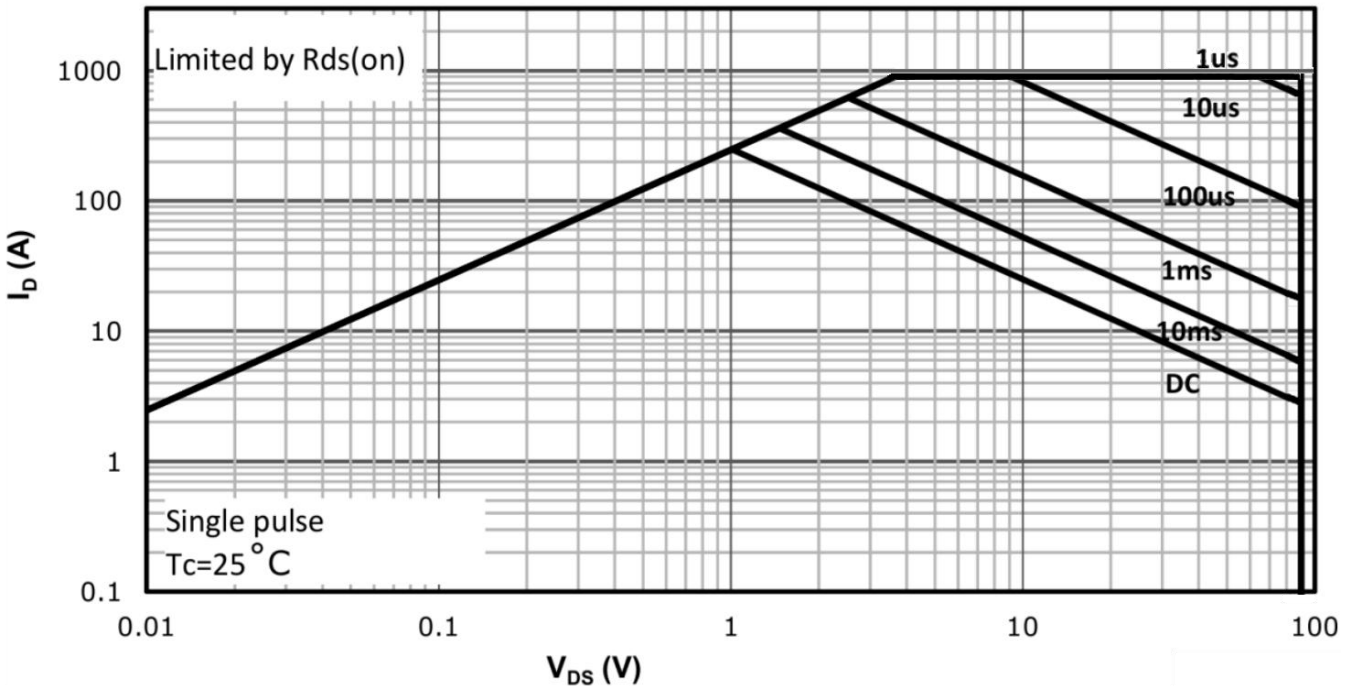
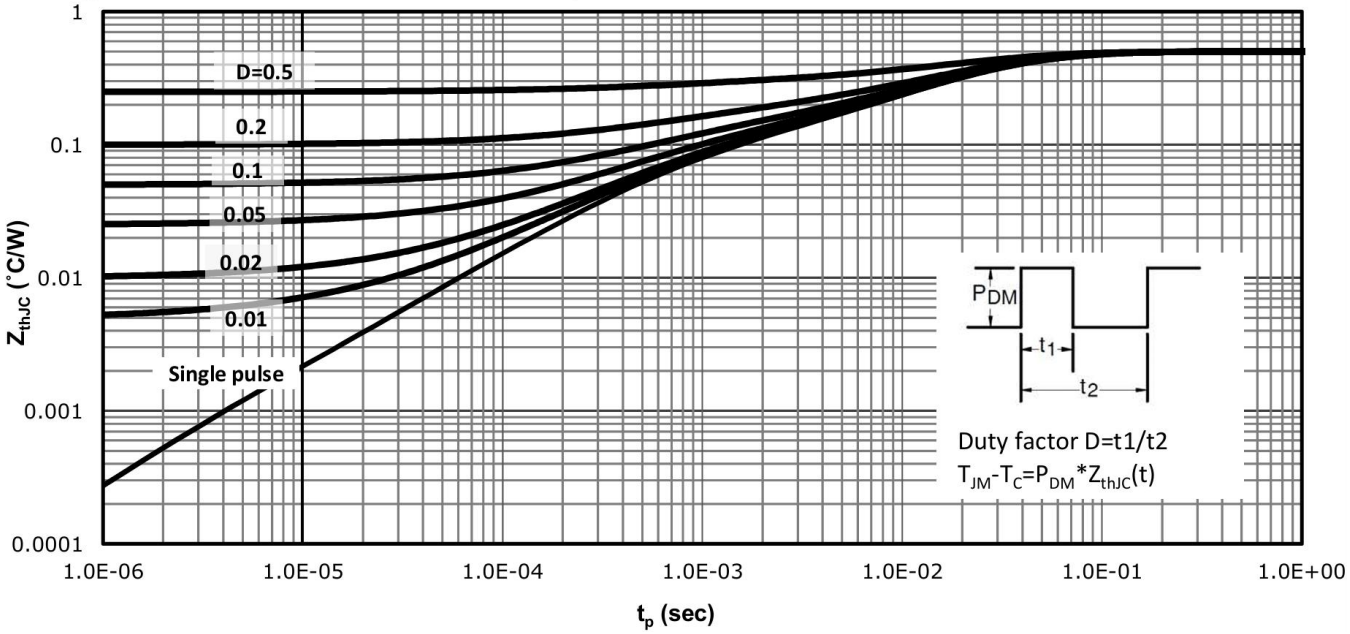
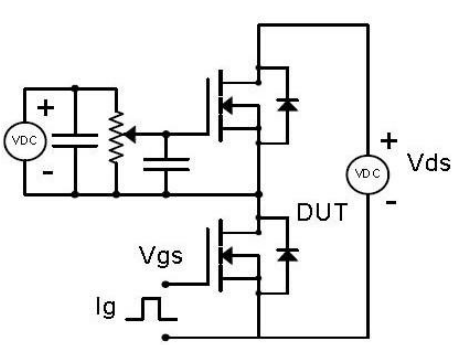


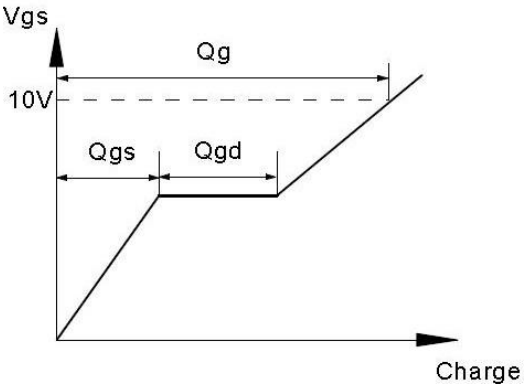
Fig 12: Max. Transient Thermal Impedance



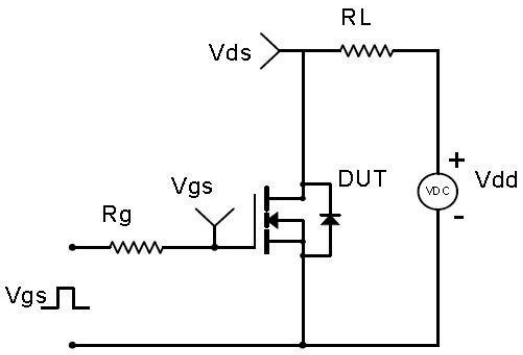
Test Circuit & Waveform

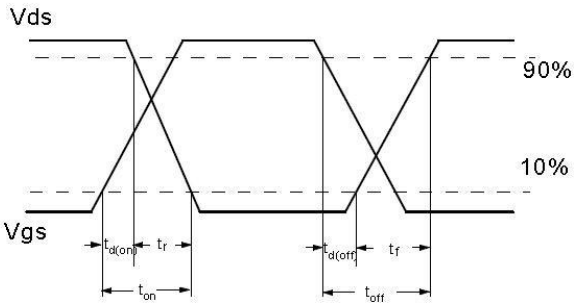
Gate Charge Test Circuit & Waveform



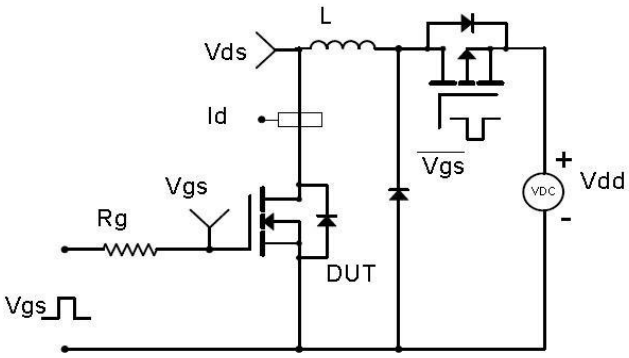


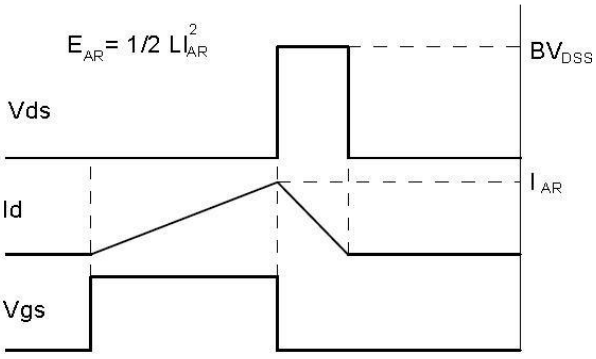
Resistive Switching Test Circuit & Waveforms



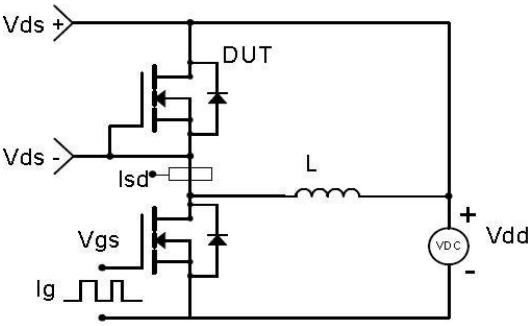


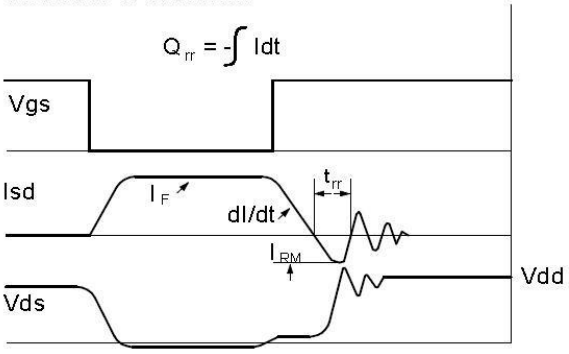
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



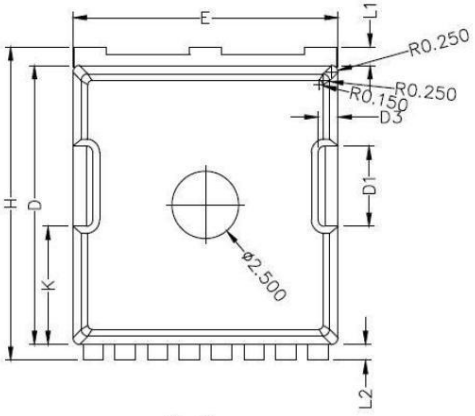


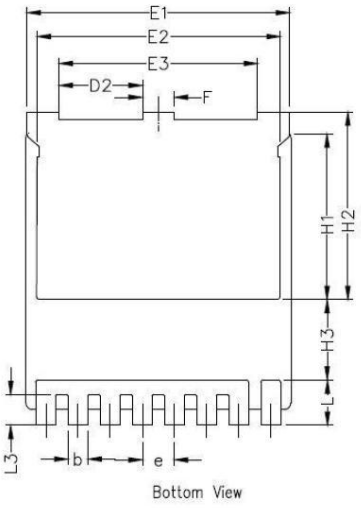
Diode Recovery Test Circuit & Waveforms

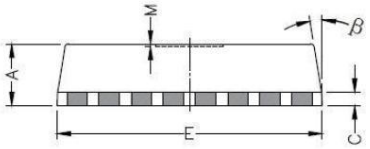




Package Outline:TOLL







Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
b	0.65	0.75	0.85
C	0.508 REF		
D	10.25	10.40	10.55
D1	2.85	3.00	3.15
D2	2.95	3.10	3.25
D3	0.75 REF		
E	9.75	9.90	10.05
E1	9.65	9.80	9.95
E2	8.95	9.10	9.25
E3	7.25	7.40	7.55
e	1.20 BSC		
F	1.05	1.20	1.35
H	11.55	11.70	11.85
H1	6.03	6.18	6.33
H2	6.85	7.00	7.15
H3	3.00 BSC		
L	1.55	1.70	1.85
L1	0.55	0.70	0.85
L2	0.45	0.60	0.75
L3	1.00	1.15	1.30
M	0.08 REF		
β	8°	10°	12°
K	4.25	4.40	4.55

Revision History:

Revision	Date	Major changes
1.0	2025/10/29	Release of Preliminary version.
2.0	2025/11/20	Updated Typical Performance Characteristics.