



SUPER-SEMI



SUPER-MOSFET

Super Gate Metal Oxide Semiconductor Field Effect Transistor

100V Super Gate Power MOSFET
SG*100N025

Rev. 1.1
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SGB100N025/SGP100N025/SGW100N025

100V N-Channel MOSFET

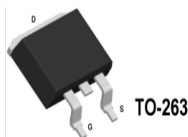
Description

The SG-MOSFET uses advanced trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of RDS(ON) and gate charge. This device is ideal for power switching applications, high frequency circuits and uninterruptible power supplies.

Features

- VDS 100V
- ID (at Vgs=10V) 180A
- Extremely low on-resistance RDS(on)
- Extremely Qg×RDS(on) product(FOM)
- 100% avalanche tested

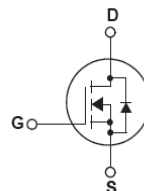
SGB100N025



SGP100N025



SGW100N025



Absolute Maximum Ratings

Symbol	Parameter	SGB_P_W100N025	Unit
V _{DS}	Drain-Source Voltage	100	V
I _D	Drain Current -Continuous (TC = 25°C) -Continuous (TC = 100°C)	180* 114*	A
I _{DM}	Drain Current - Pulsed (Note 1)	720*	A
V _{GS}	Gate-Source voltage	±20	V
I _{AS}	Avalanche Current, single pulse (Note 5)	55	A
E _{AS}	Avalanche Energy, single pulse, L=1mH (Note 5)	1512	mJ
P _D	Power Dissipation - TC = 25°C (Note 2)	175	W
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	SGB_P_W100N025	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case	0.7	°C/W
R _{θCS}	Thermal Resistance, Case-to-Sink Typ.	0.5	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62	°C/W

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA, T _J = 25°C	100	110	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =100V, V _{GS} =0V, T _J =25°C V _{DS} =80V, V _{GS} =0V, T _J =85°C	-	-	1 10	μA μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 20V, V _{DS} = 0V	-	-	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -20V, V _{DS} = 0V	-	-	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.0	2.7	3.5	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 60A - TO-263 - TO-220, TO-247	-	2.1 2.4	2.5 2.7	mΩ mΩ
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	1.8	-	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 50V, V _{GS} = 0V, f=1MHz	-	7790	-	pF
C _{oss}	Output Capacitance		-	1600	-	pF
C _{rss}	Reverse Transfer Capacitance		-	20	-	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} = 80V, R _G = 4.5Ω, I _D = 30A , V _{GS} = 10V (Note 3, 4)	-	26	-	ns
t _r	Turn-On Rise Time		-	27	-	ns
t _{d(off)}	Turn-Off Delay Time		-	73	-	ns
t _f	Turn-Off Fall Time		-	52	-	ns
Q _g	Total Gate Charge	V _{DS} = 80V, I _D = 30A, V _{GS} = 0~10V (Note 3, 4)	-	121	-	nC
Q _{gs}	Gate-Source Charge		-	27	-	nC
Q _{gd}	Gate-Drain Charge		-	30	-	nC
V _{plateau}	Gate plateau voltage		-	4	-	V
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		-	-	180	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	-	720	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0V, I _S = 60A	-	0.9	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, V _{DS} = 50V, I _S = 30A, dI _F /dt =100A/μs	-	134	-	ns
Q _{rr}	Reverse Recovery Charge		-	0.37	-	μC
I _{rrm}	Peak Reverse Recovery Current		-	5	-	A

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature T_J(MAX)=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J=25°C.
2. The power dissipation P_D is based on T_J(MAX)=150°C, using ≤ 10s junction-to-ambient thermal resistance.
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
4. Essentially Independent of Operating Temperature Typical Characteristics
5. V_{DS}=50V, L=1mH, R_G=25Ω, Starting T_J=25 °C

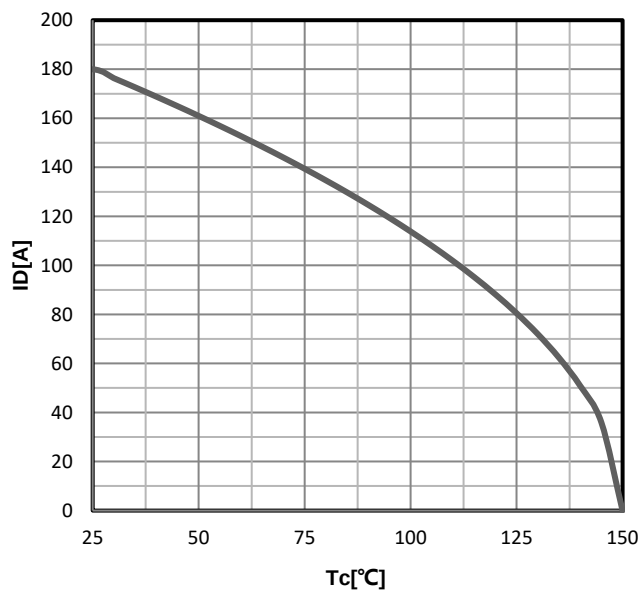


Figure 1: Continuous Drain Current vs Temperature

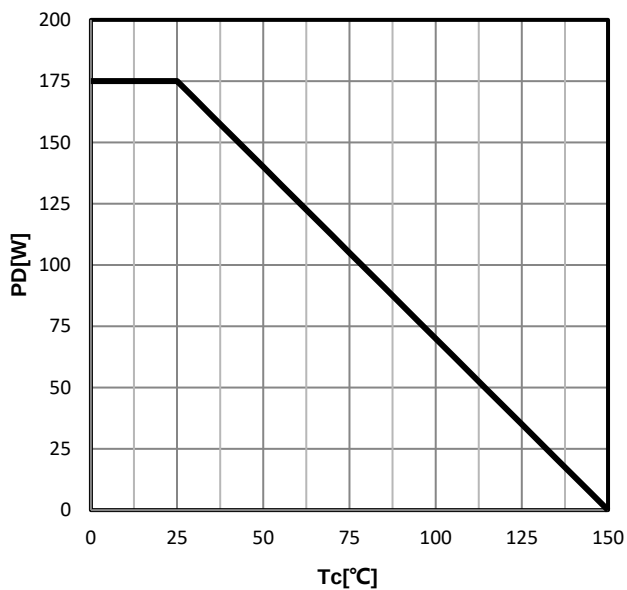


Figure 2: Power Dissipation

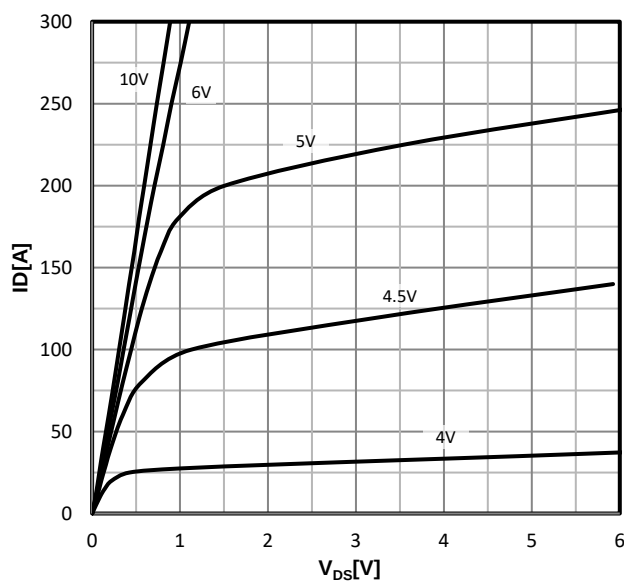


Figure 3: Typ. output characteristics
Parameter: Vgs

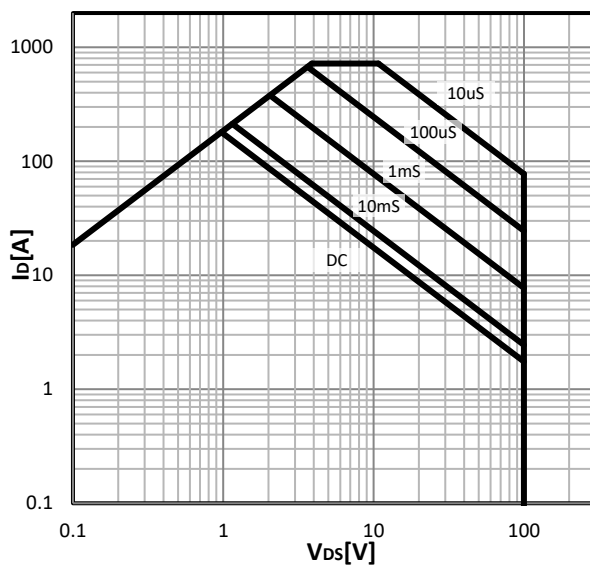


Figure 4: Maximum Forward Biased Safe Operating Area
Parameter: Tp

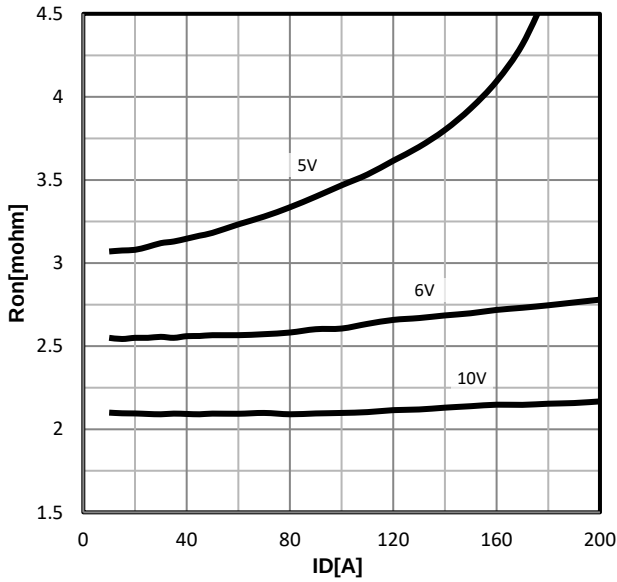


Figure 5: Typ. drain-source on resistance
Parameter: Vgs

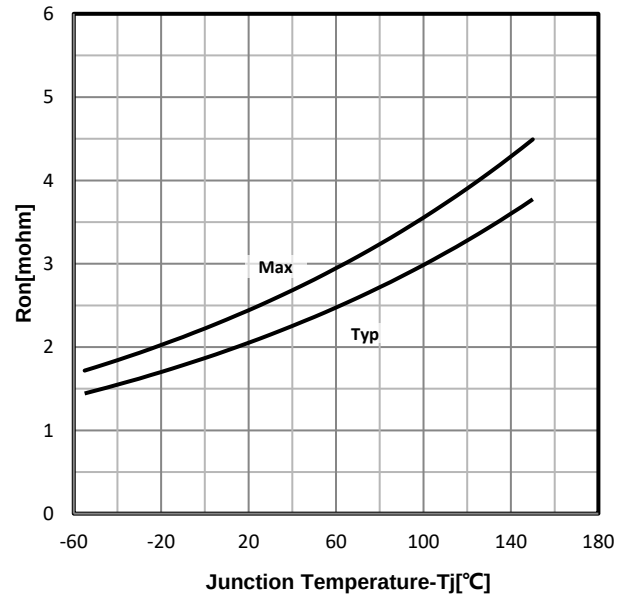


Figure 6: On-Resistance vs Junction Temperature

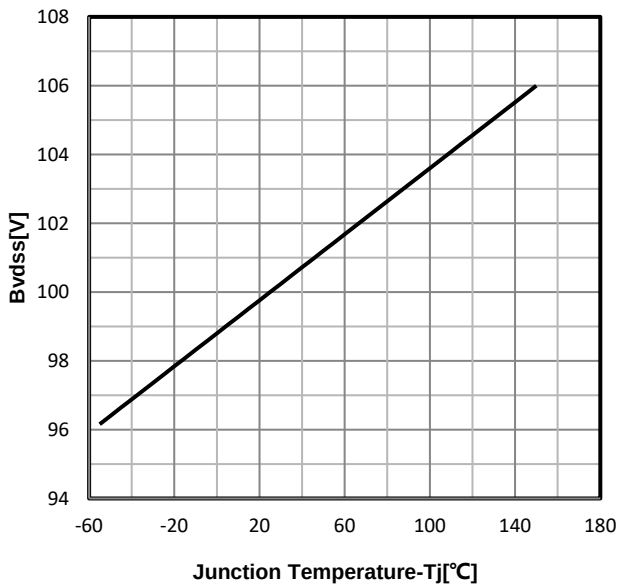


Figure 7: Drain-Source Breakdown Voltage

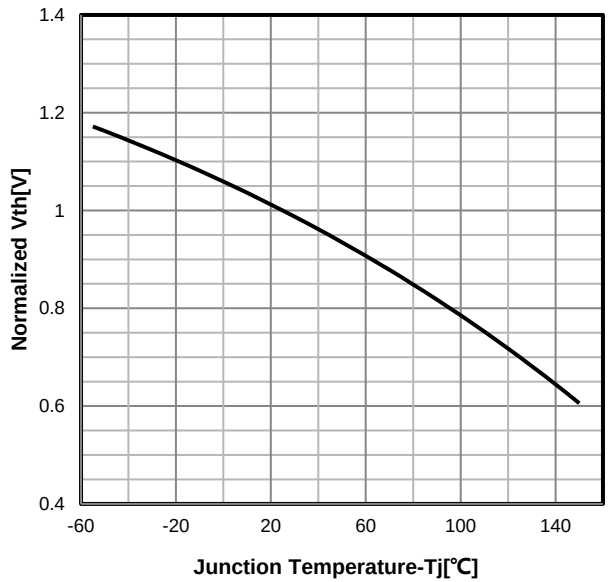


Figure 8: Vth vs Junction Temperature

Typical Performance Characteristics

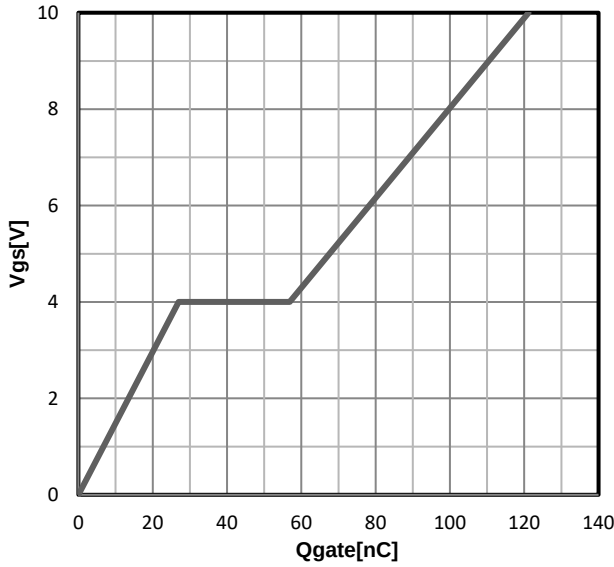


Figure 9: Gate-Charge Characteristics

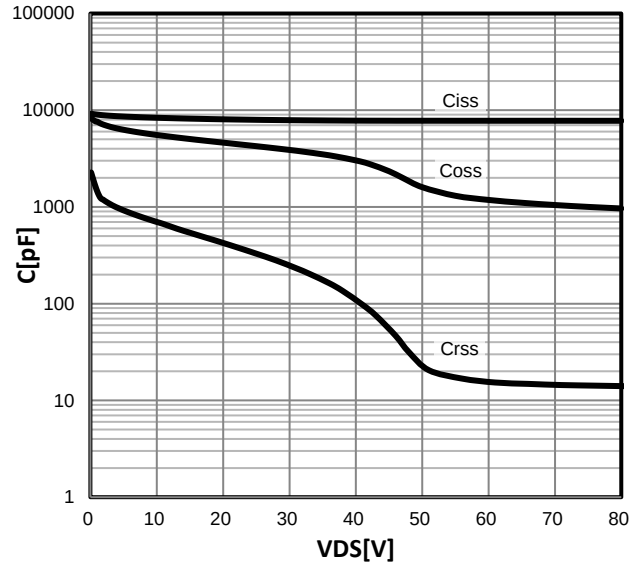


Figure 10: Capacitance Characteristics

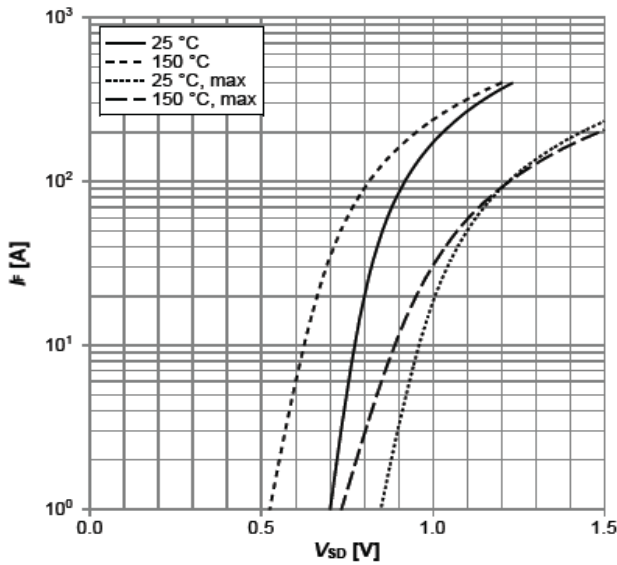


Figure 11: Body-Diode Characteristics

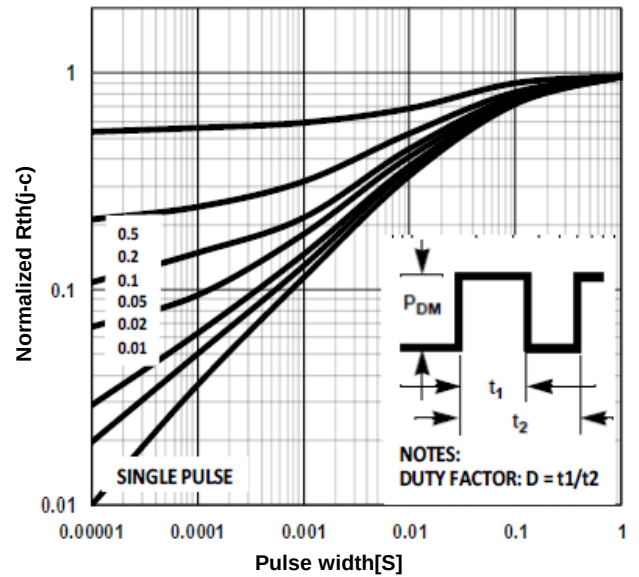
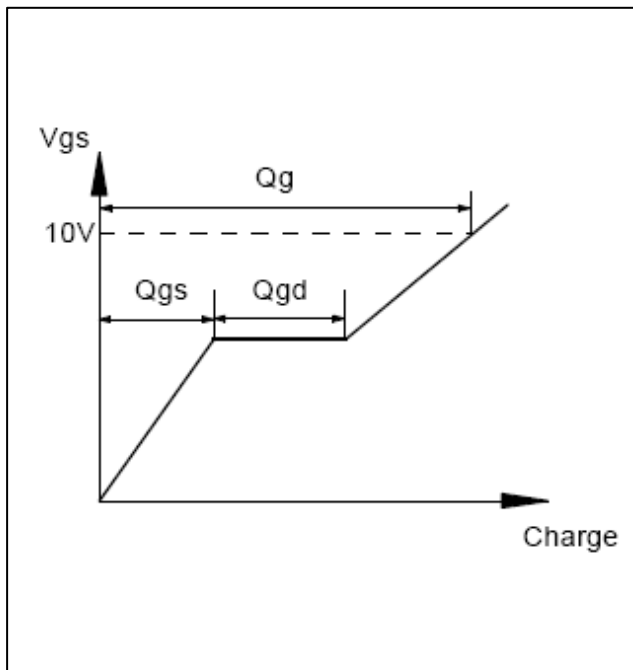
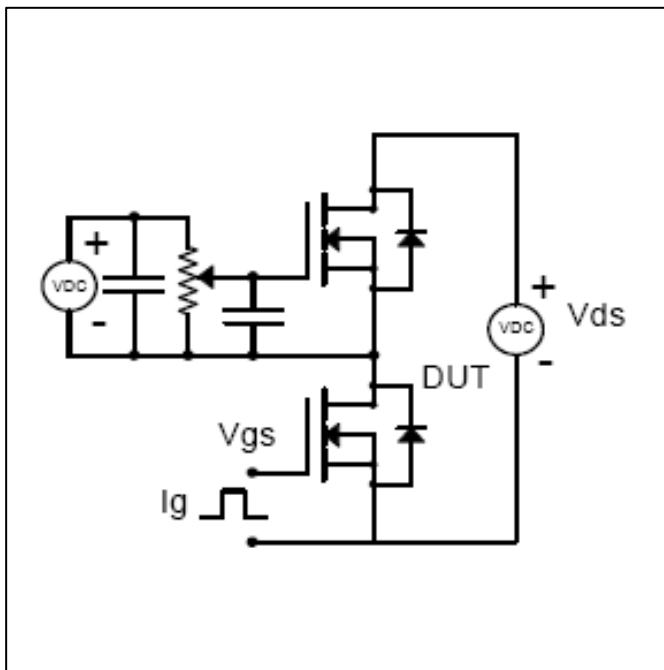
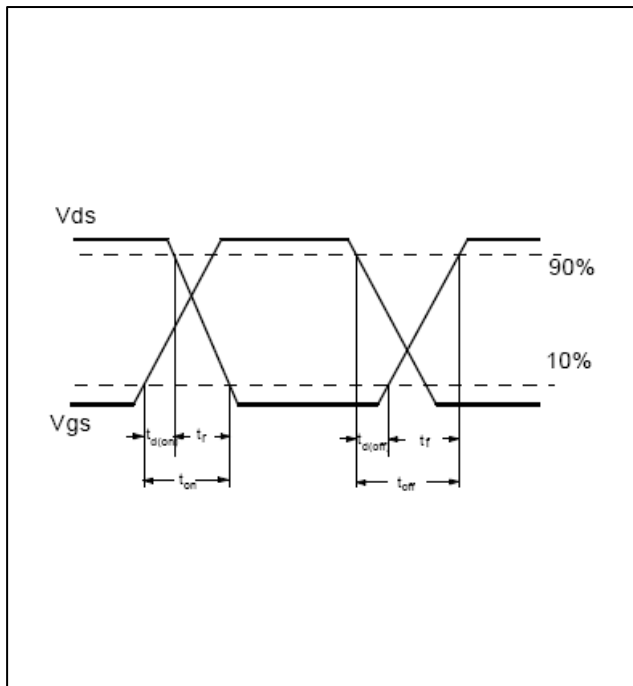
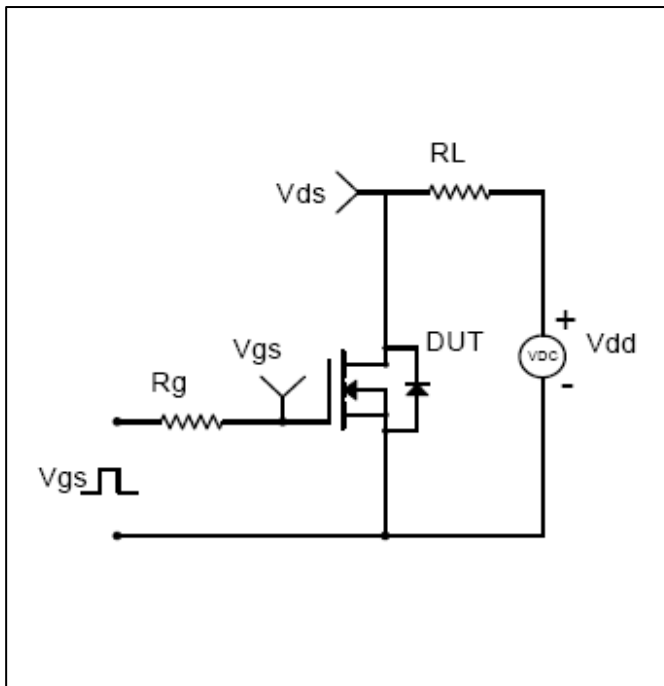


Figure 12: Maximum Transient Thermal Impedance

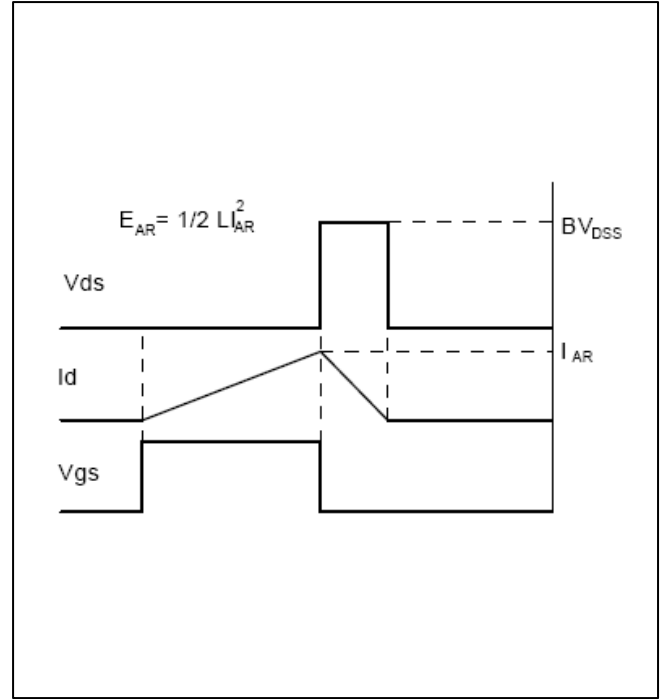
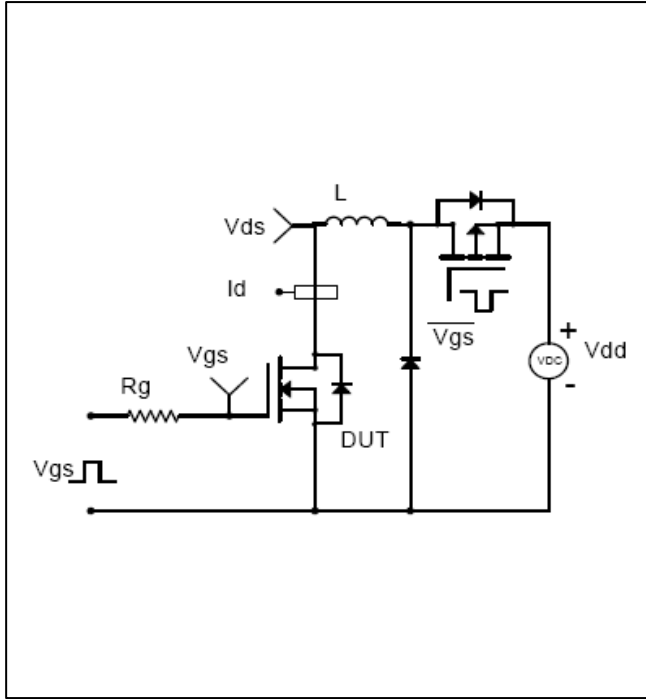
Gate Charge Test Circuit and Waveform



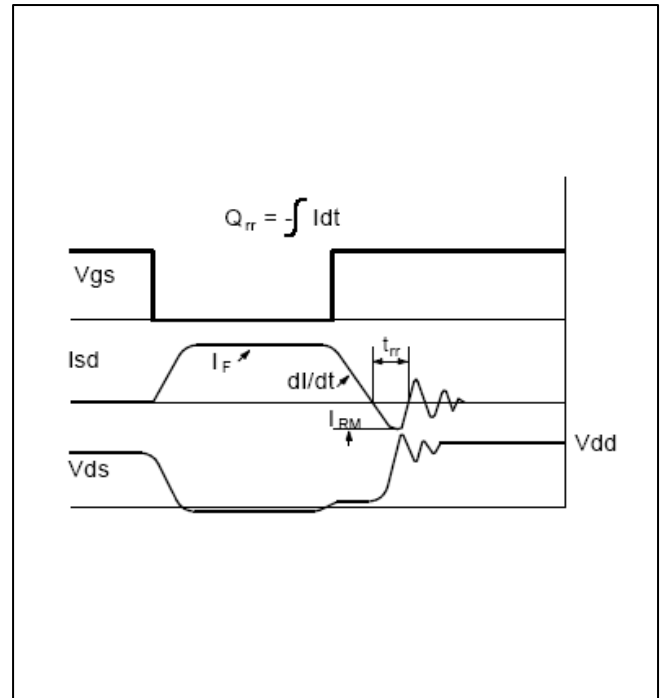
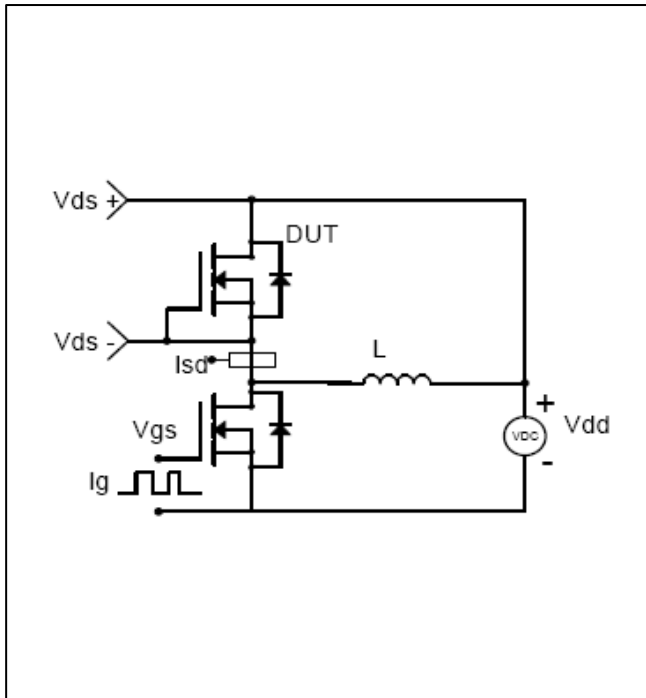
Resistive Switching Test Circuit and Waveforms

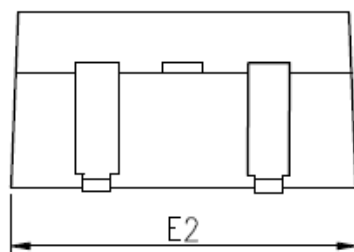
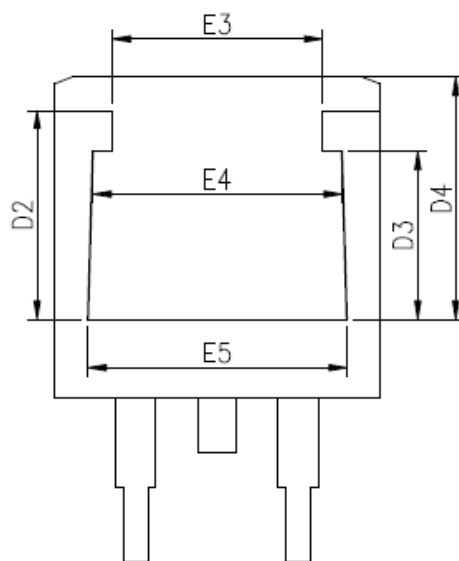
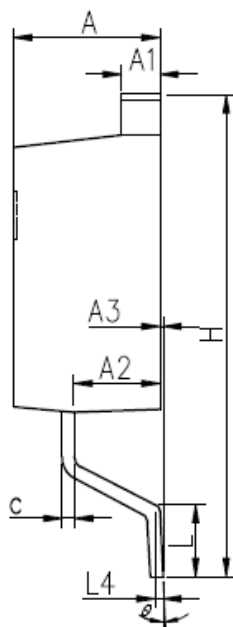
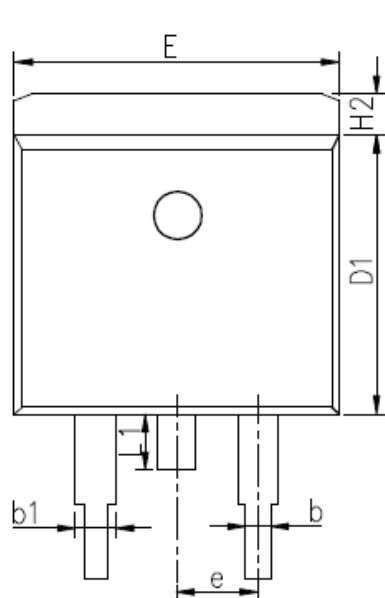


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



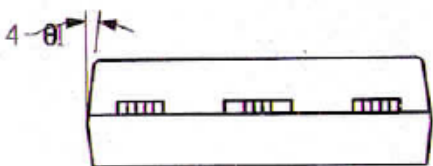
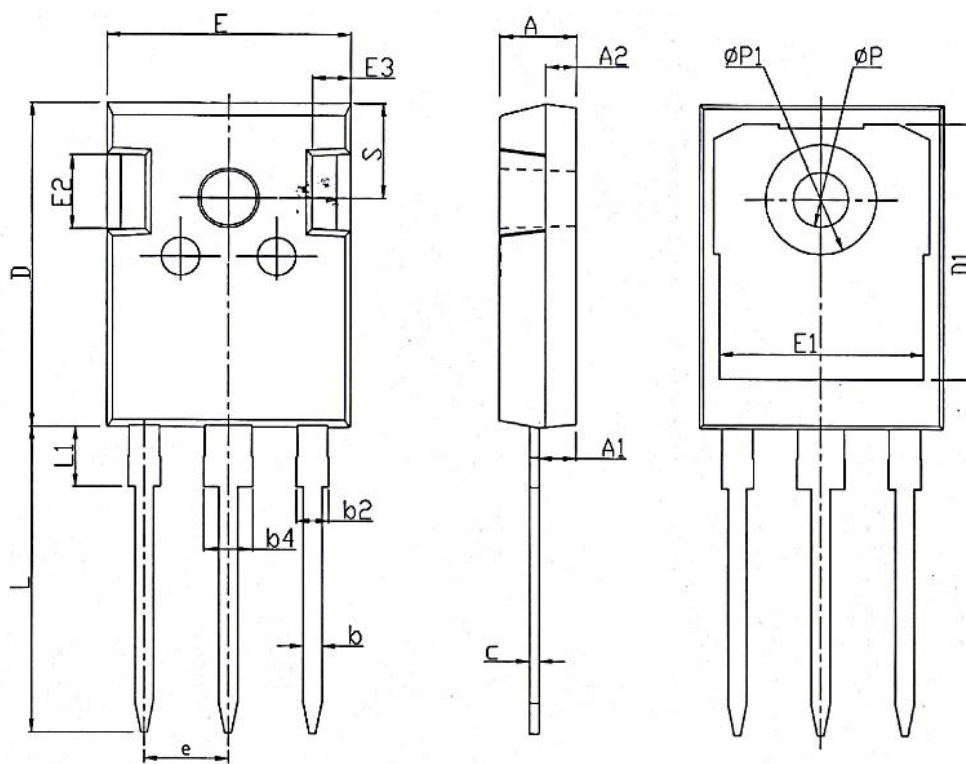
Diode Recovery Test Circuit & Waveforms





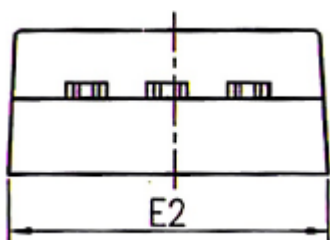
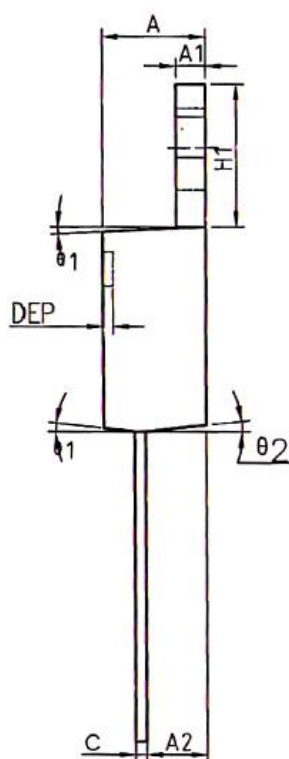
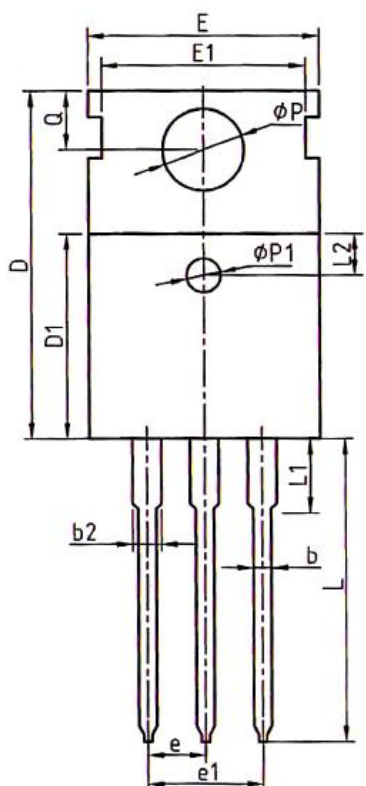
COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.27	4.57	4.87
A1	1.22	1.27	1.42
A2	2.39	2.69	2.99
A3	0.00	0.13	0.20
b	0.70	0.81	1.01
b1	1.17	1.27	1.50
c	0.30	0.38	0.53
D1	8.40	8.70	9.00
D2	5.33	6.33	6.63
D3	4.54	5.54	5.84
D4	6.60	7.60	8.00
E	9.88	10.16	10.50
E2	9.80	10.10	10.40
E3	4.94	5.94	6.24
E4	6.67	7.67	7.97
E5	7.06	8.06	8.36
e	2.54 BSC		
H	14.70	15.10	15.50
H2	1.00	1.27	1.50
L	2.00	2.30	2.60
L1	1.35	1.55	1.75
L4	0.25 BSC		
θ	0°	5°	9°



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NDM	MAX
A	4.40	4.57	4.70
A1	1.27	1.30	1.37
A2	2.35	2.40	2.50
b	0.77	0.80	0.90
b2	1.17	1.27	1.36
c	0.48	0.50	0.56
D	15.40	15.60	15.80
D1	9.00	9.10	9.20
DEP	0.05	0.10	0.20
E	9.80	10.00	10.20
E1	—	8.70	—
E2	9.80	10.00	10.20
φP1	1.40	1.50	1.60
e	2.54BSC		
e1	5.08BSC		
H1	6.40	6.50	6.60
L	12.75	13.50	13.65
L1	—	3.10	3.30
L2	2.50REF		
φP	3.50	3.60	3.63
Q	2.73	2.80	2.87
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	1°	3°	5°



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