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100V Power MOSFET
SSP1991

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SSP1991

100V Single N-Channel Trench MOSFET

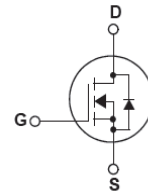
Description

The SSP1991 MOSFET uses advanced trench MOSFET technology, that is uniquely optimized to provide the most efficient high frequency switching performance and low on-state resistance. This device is ideal for DC/DC converters and general purpose applications.

Features

- VDS 100V
- ID (at Vgs=10V) 120A
- RDS(on) (at Vgs=10V) <4.5mΩ
- 100% avalanche tested

SSP1991



Absolute Maximum Ratings

Symbol	Parameter	SSP1991	Unit
V _{DS}	Drain-Source Voltage	100	V
I _D	Drain Current -Continuous (T _c = 25°C) -Continuous (T _c = 100°C)	120* 76*	A
I _{DM}	Drain Current - Pulsed (Note 1)	480*	A
V _{GS}	Gate-Source voltage	±20V	V
I _{AS}	Avalanche Current (Note 2)	28	A
E _{AS}	Single Pulse Avalanche Energy (Note 2)	609	mJ
P _D	Power Dissipation - T _c = 25°C - T _c = 100°C	223 89	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	SSP1991	Unit
R _{θJA}	Thermal Resistance Junction-to-Ambient	62	°C/W
R _{θJC}	Thermal Resistance Junction-to-Case	0.56	°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	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 80V, V _{GS} = 0V	-	-	1	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	3.0	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 50A	-	3.8	4.5	mΩ
g _{FS}	Forward Transconductance	V _{DS} = 10V, I _D = 50A	-	120	-	S
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	2.5	-	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 40V, V _{GS} = 0V, f=1MHz	-	6750	-	pF
C _{oss}	Output Capacitance		-	1300	-	pF
C _{rss}	Reverse Transfer Capacitance		-	50	-	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} = 50V, R _G = 3Ω, V _{GS} = 10V, I _D = 50A (Note 3, 4)	-	30.4	-	ns
t _r	Turn-On Rise Time		-	28.8	-	ns
t _{d(off)}	Turn-Off Delay Time		-	93	-	ns
t _f	Turn-Off Fall Time		-	34.2	-	ns
Q _g	Total Gate Charge	V _{DS} = 50V, I _D = 50A, V _{GS} = 10V (Note 3, 4)	-	100	-	nC
Q _{gs}	Gate-Source Charge		-	27	-	nC
Q _{gd}	Gate-Drain Charge		-	26	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0V, I _S = 50A	-	0.9	1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _S = 50A, dI _F /dt = 100A/μs	-	73	-	ns
Q _{rr}	Reverse Recovery Charge		-	150	-	μC

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. V_{GS}=10V, R_G=25 Ω, L=1.0mH, Starting T_J=25°C.
3. Pulse Test: Pulse width ≤ 300us, Duty Cycle ≤ 2%
4. Essentially Independent of Operating Temperature Typical Characteristics

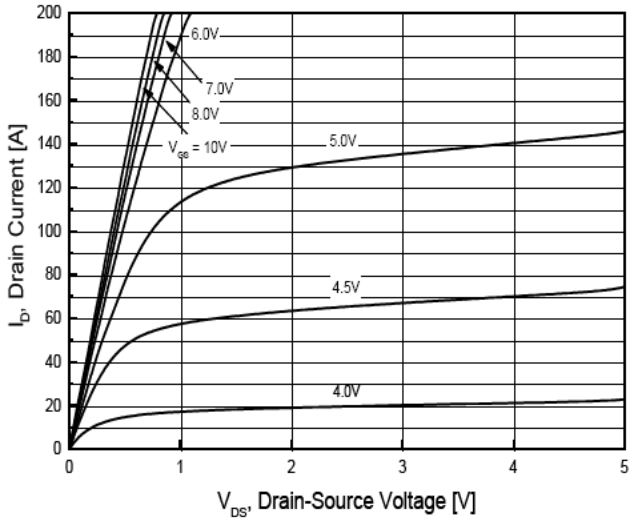


Figure 1: On-region characteristics

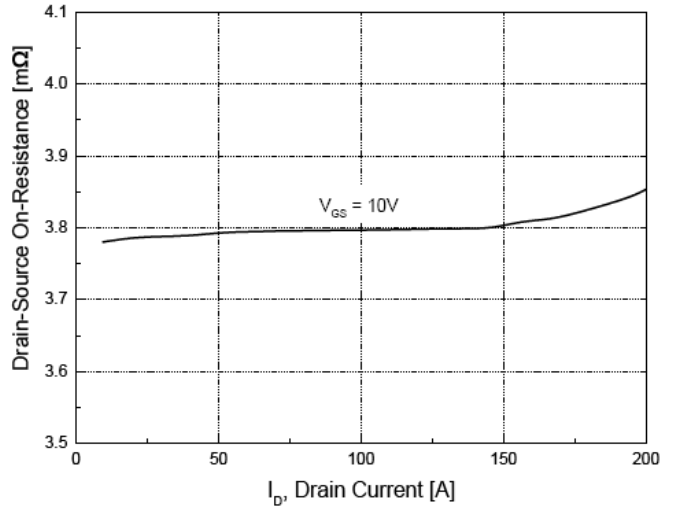


Figure 2: Typ. drain-source on-state resistance

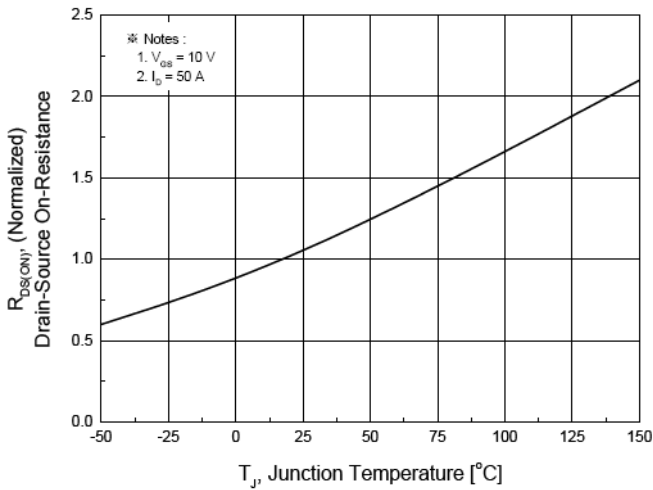


Figure 3: Normalized on resistance vs. temperature

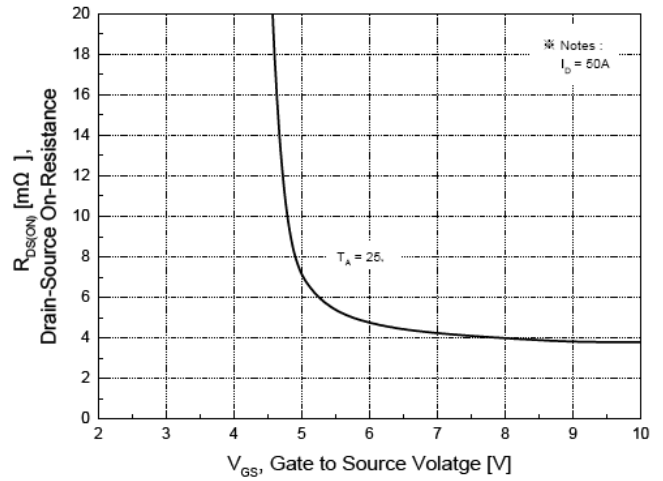


Figure 4: On-resistance vs. VGS voltage

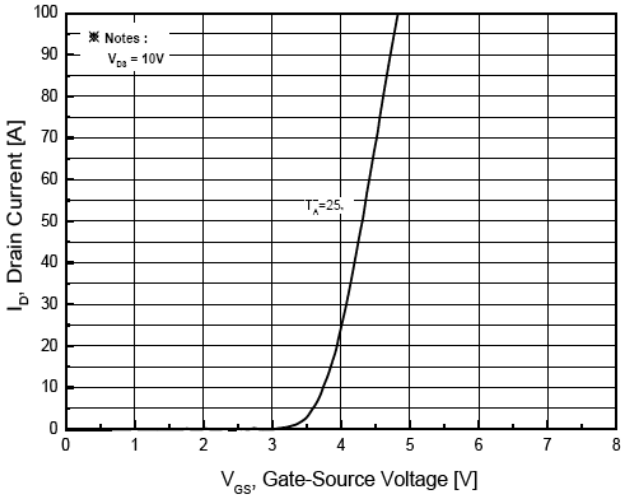


Figure 5: Typ. transfer characteristics

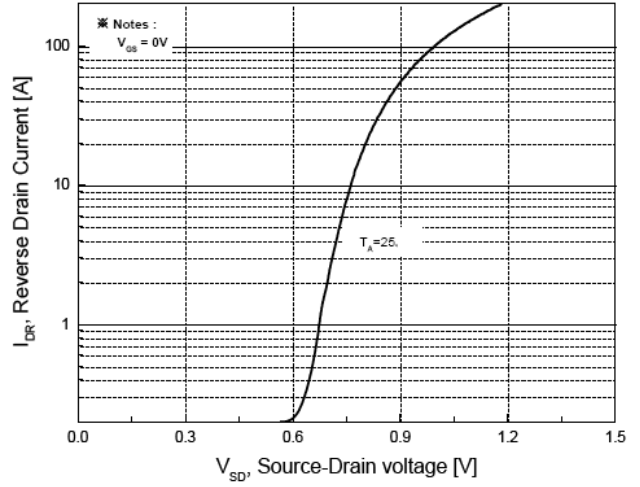


Figure 6: Forward characteristics of reverse diode

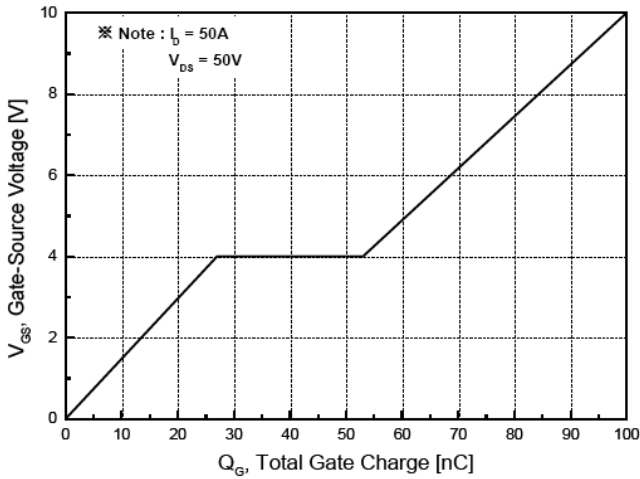


Figure 7: Typ. gate charge characteristics

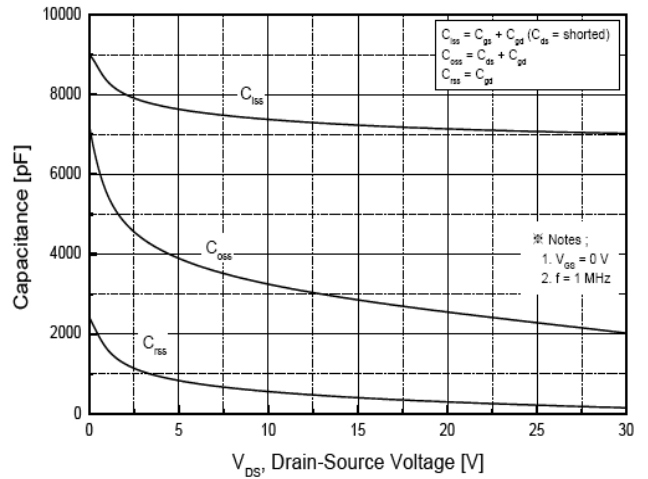


Figure 8: Capacitance characteristics

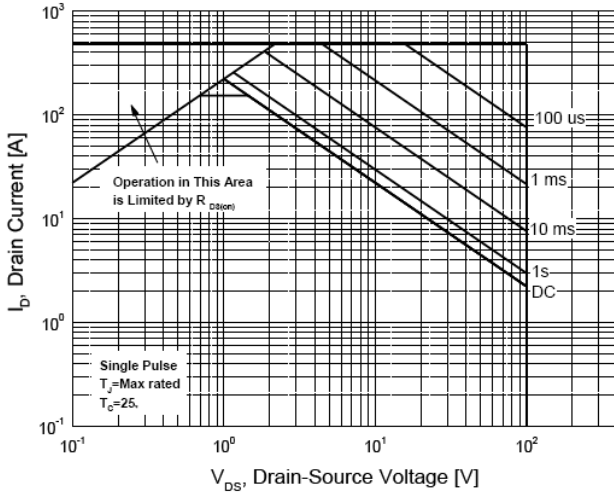


Figure 9: Maximum safe operating area

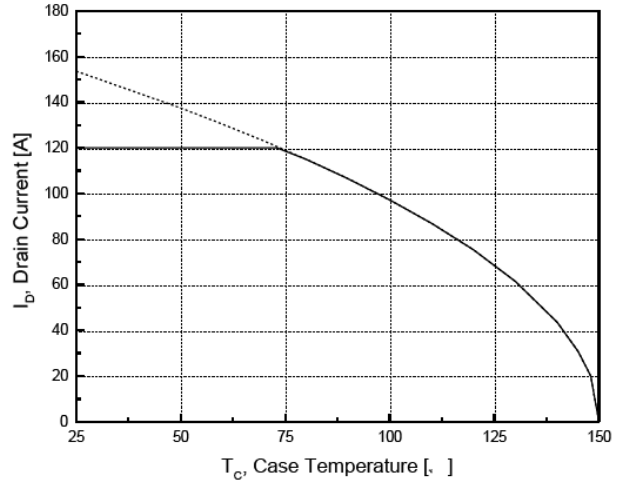


Figure 10: Continuous drain current vs. case temperature

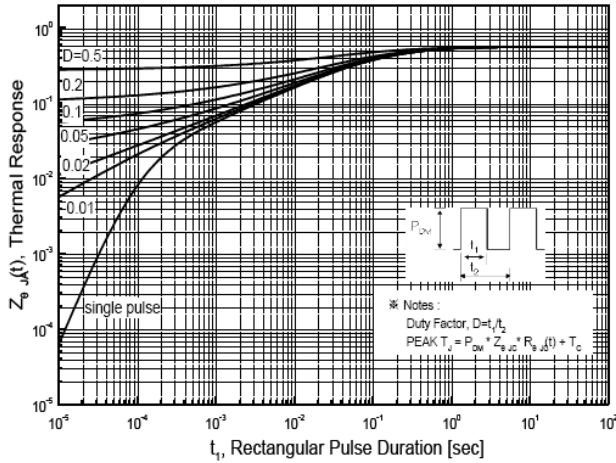
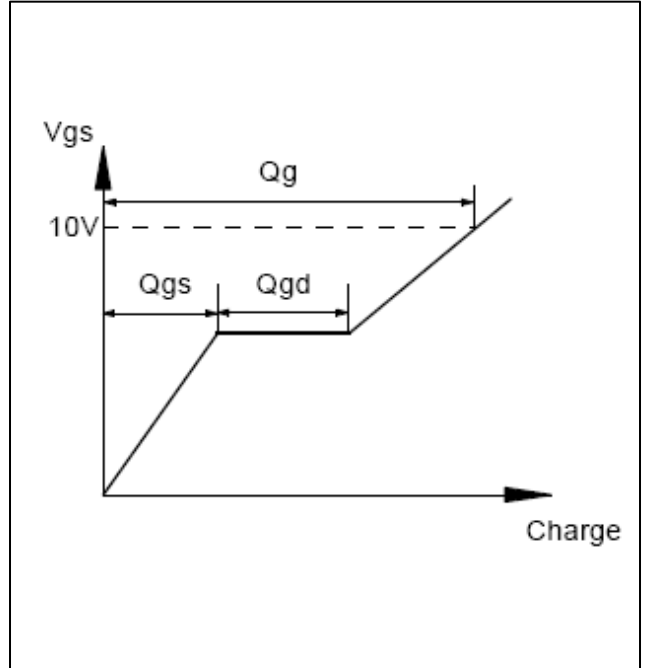
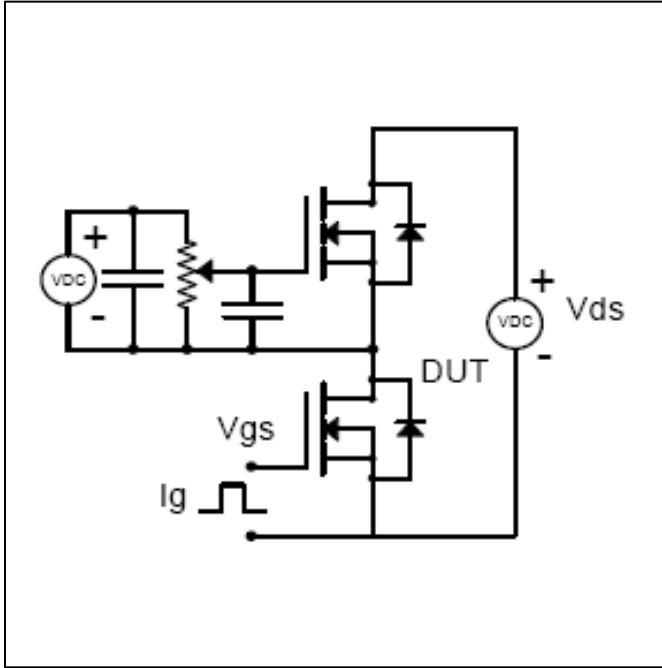
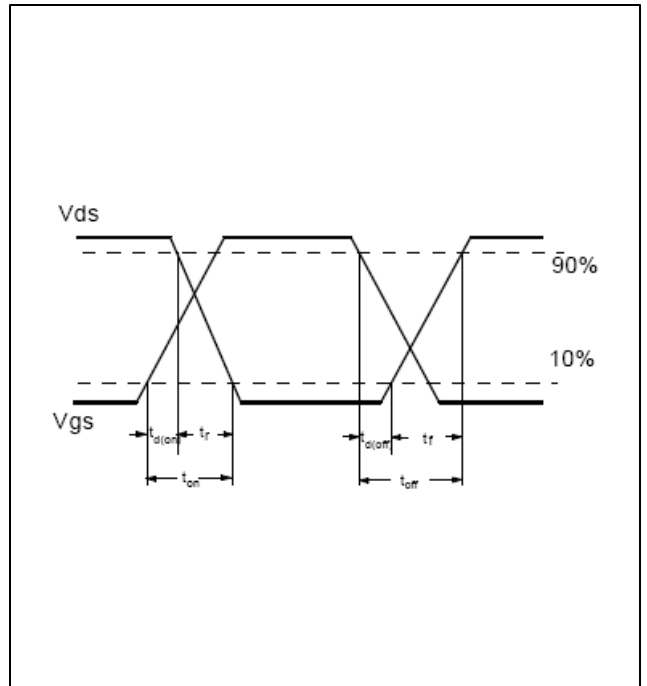
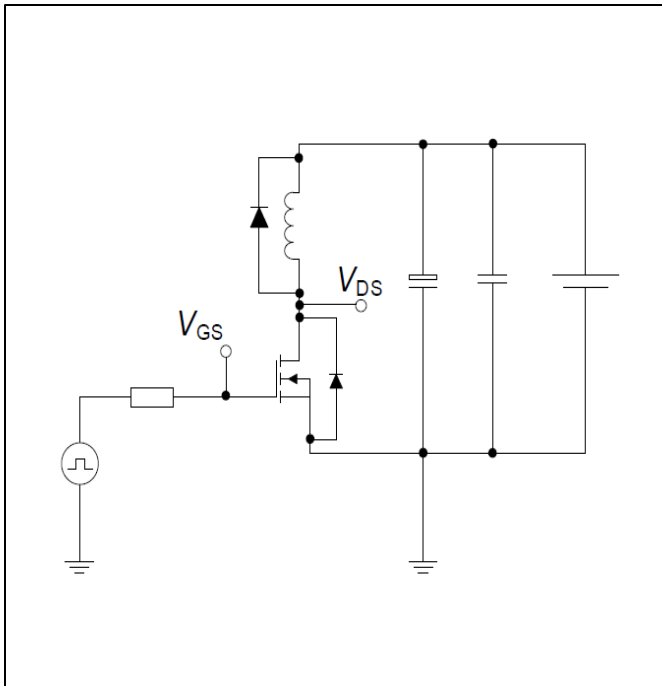


Figure 11: Transient thermal impedance

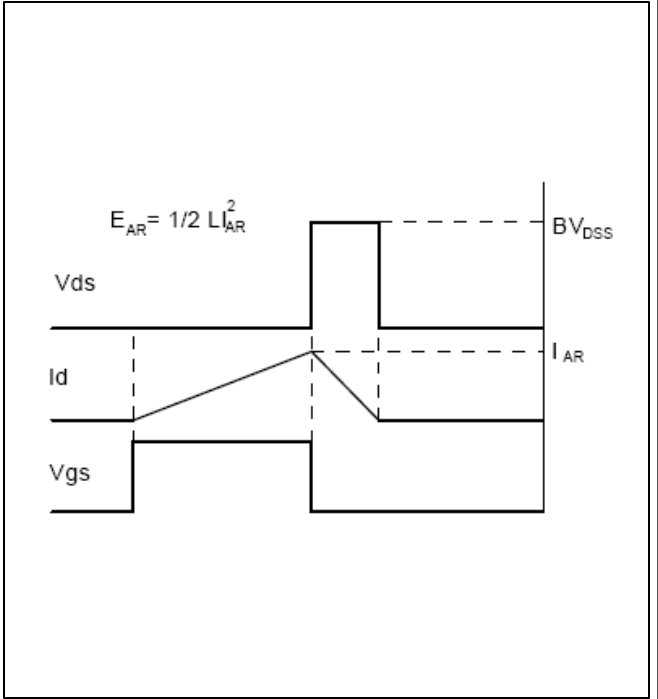
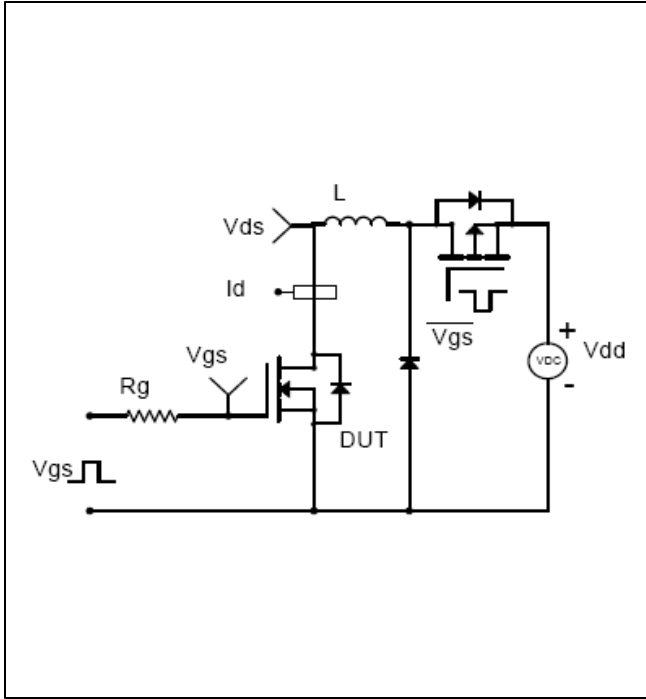
Gate Charge Test Circuit and Waveform



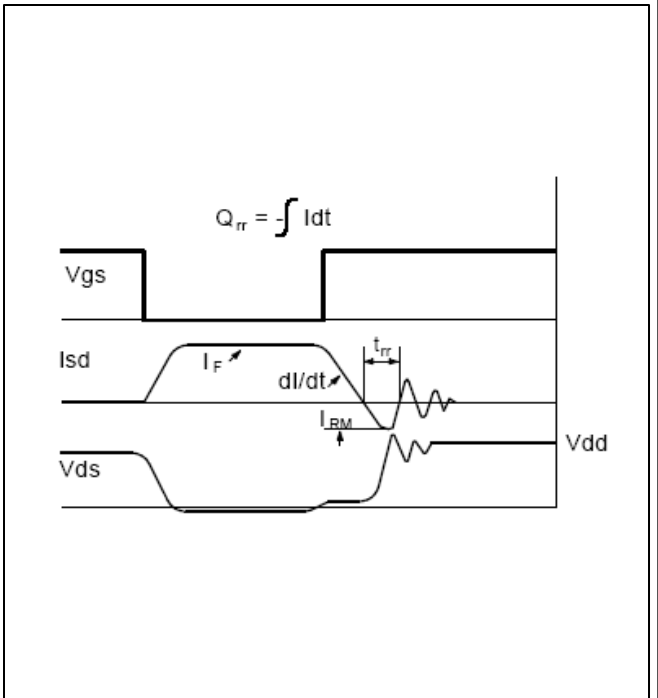
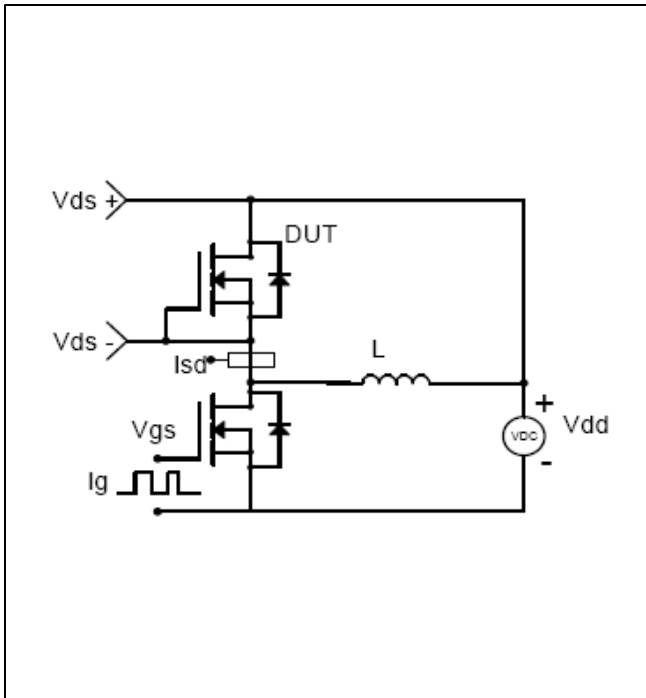
Inductive Switching Test Circuit and Waveforms

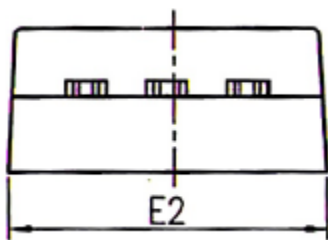
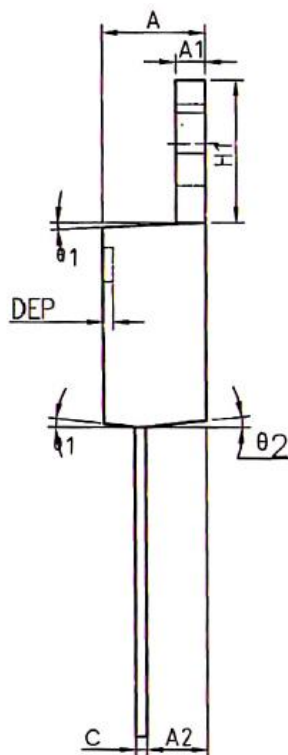
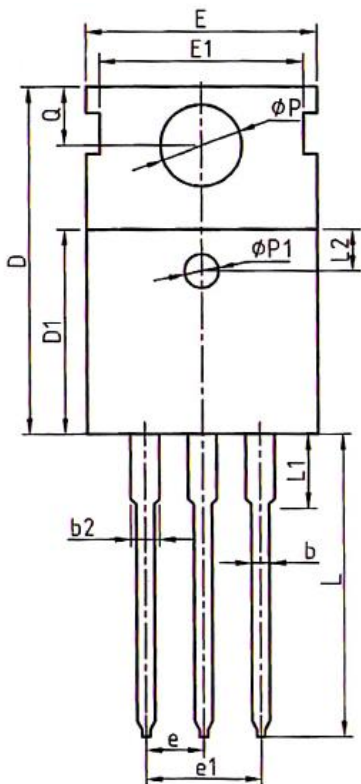


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms





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
phi P1	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		
phi P	3.50	3.60	3.63
Q	2.73	2.80	2.87
theta 1	5°	7°	9°
theta 2	1°	3°	5°
theta 3	1°	3°	5°



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