

N-Ch 120V Fast Switching MOSFETs

Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$

Applications

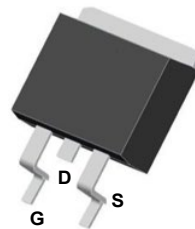
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Product Summary

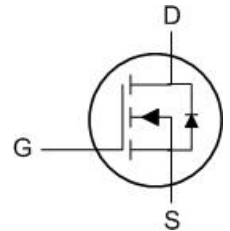


BVDSS	RDSON	ID
120V	2.4mΩ	200A

TO263Pin Configuration



TO-263



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	120	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	200	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	127	A
I_{DM}	Pulsed Drain Current ²	655	A
EAS	Single Pulse Avalanche Energy ³	1479	mJ
I_{AS}	Avalanche Current	---	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation ⁴	300	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	0.42	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	120	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	---	---	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V$, $I_D=84A$	---	2.4	3.3	$m\Omega$
		$V_{GS}=4.5V$, $I_D=84A$	---	---	---	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	2.0	3.0	4.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	$mV/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=120V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=120V$, $V_{GS}=0V$, $T_J=125^\circ\text{C}$	---	---	100	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=5V$, $I_D=84A$	---	195	---	S
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1MHz$	---	2.7	---	Ω
Q_g	Total Gate Charge	$V_{DS}=60V$, $V_{GS}=10V$, $I_D=84A$	---	146.9	---	nC
Q_{gs}	Gate-Source Charge		---	57.7	---	
Q_{gd}	Gate-Drain Charge		---	32.3	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=60V$, $R_{G_ext}=2.7\Omega$, $V_{GS}=10V$	---	32.7	---	ns
T_r	Rise Time		---	80.3	---	
$T_{d(off)}$	Turn-Off Delay Time		---	78.7	---	
T_f	Fall Time		---	47.3	---	
C_{iss}	Input Capacitance	$V_{DS}=60V$, $V_{GS}=0V$, $f=1MHz$	---	9560	---	pF
C_{oss}	Output Capacitance		---	1220	---	
C_{rss}	Reverse Transfer Capacitance		---	42	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	200	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=84A$, $T_J=25^\circ\text{C}$	---	---	1.4	V
t_{rr}	Reverse Recovery Time	$I_F=84A$, $di/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	90.2	---	nS
Q_{rr}	Reverse Recovery Charge		---	239.9	---	nC

Typical Performance Characteristics

Fig 1: Output Characteristics

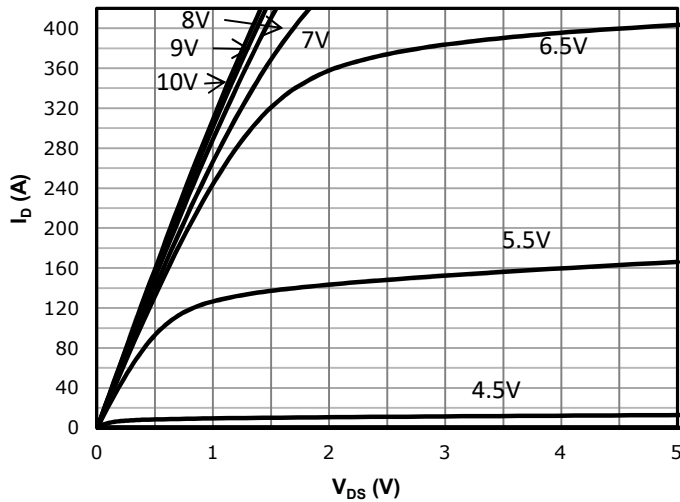


Fig 2: Transfer Characteristics

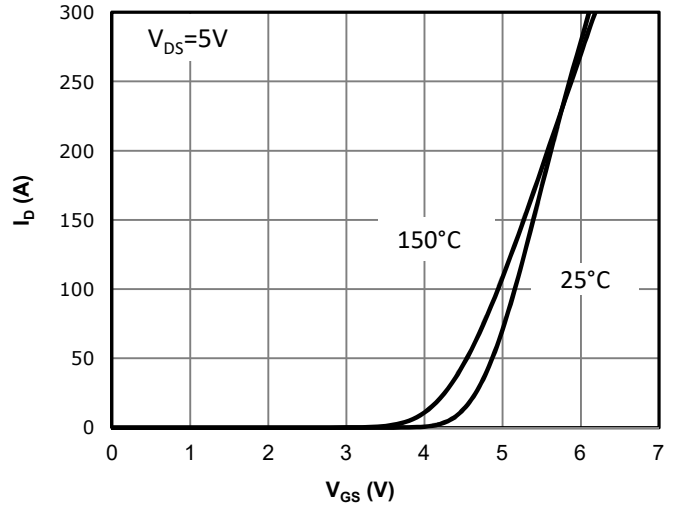


Fig 3: Rds(on) vs Drain Current and Gate Voltage

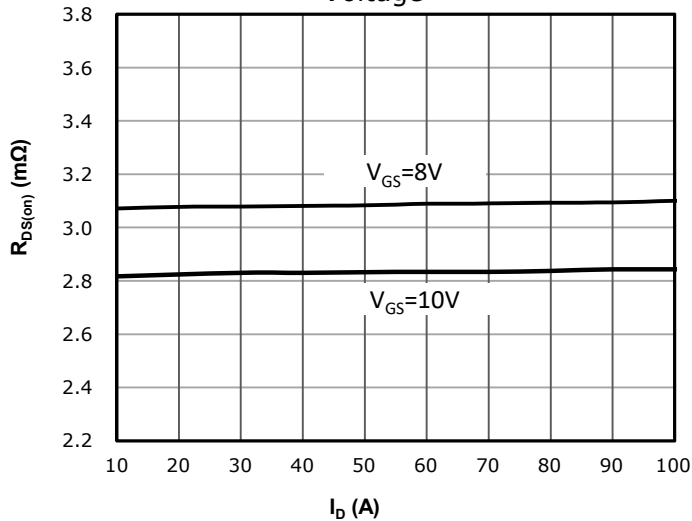


Fig 4: Rds(on) vs Gate Voltage

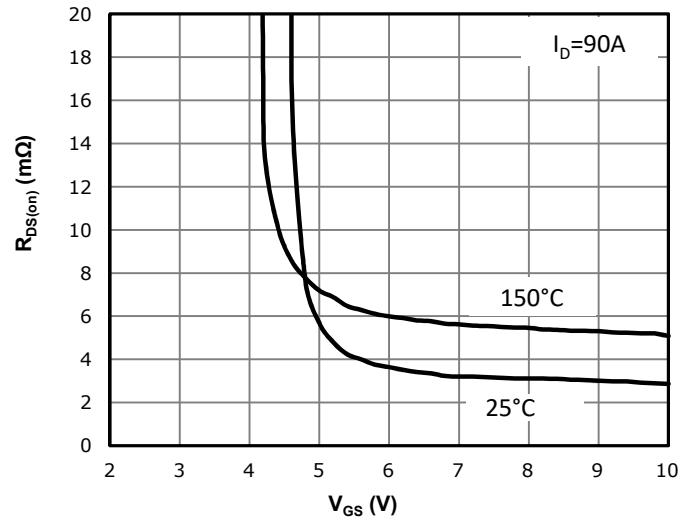


Fig 5: Rds(on) vs. Temperature

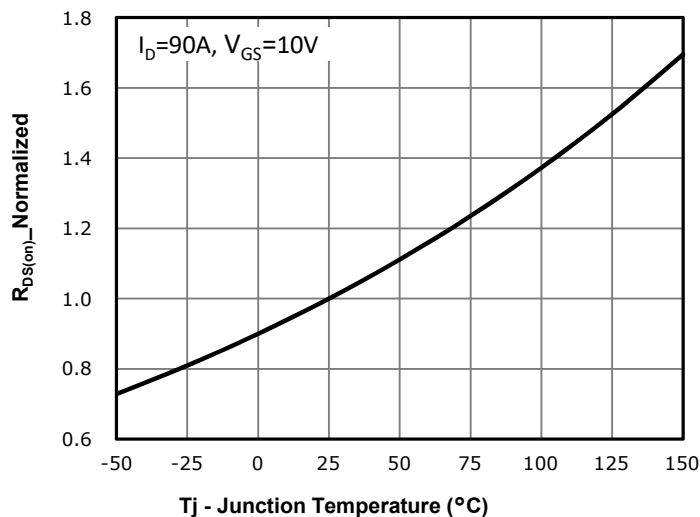


Fig 6: Vgs(th) vs. Temperature

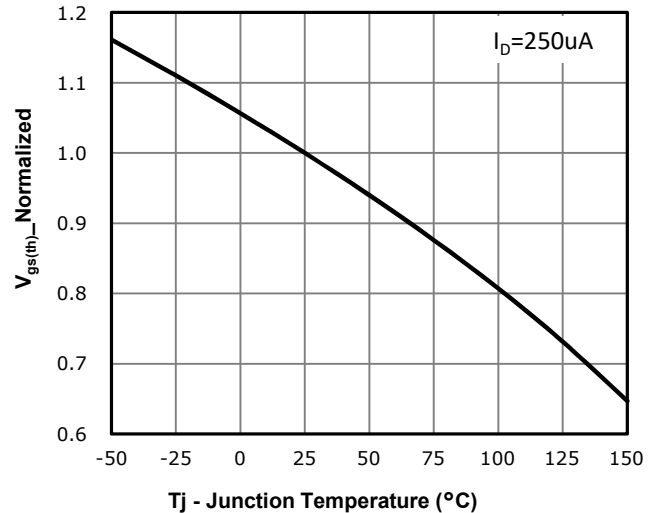


Fig 7: BVdss vs. Temperature

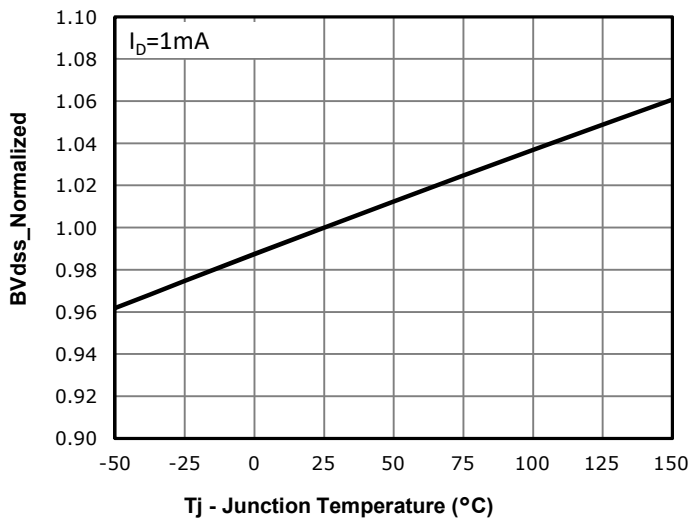


Fig 8: Capacitance Characteristics

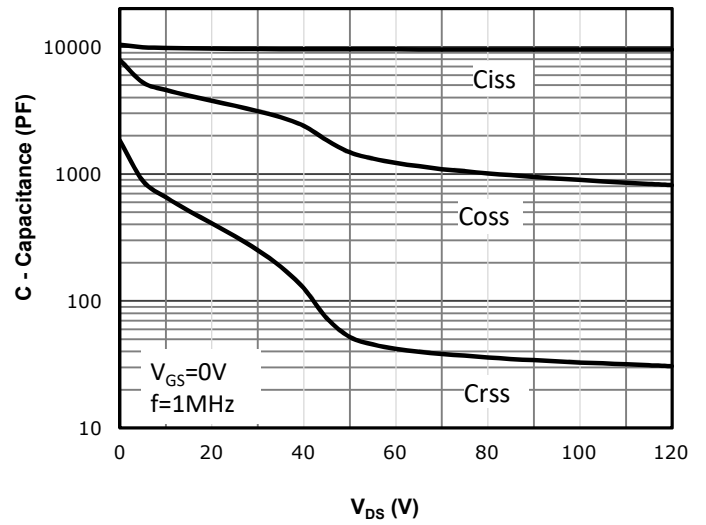


Fig 9: Gate Charge Characteristics

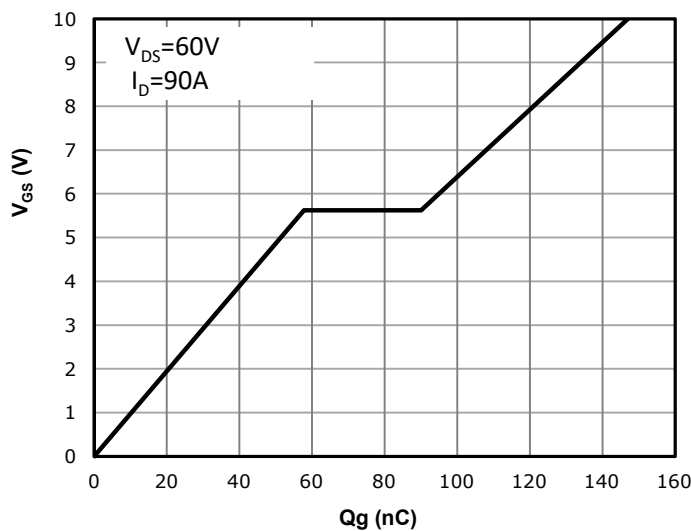


Fig 10: Body-diode Forward Characteristics

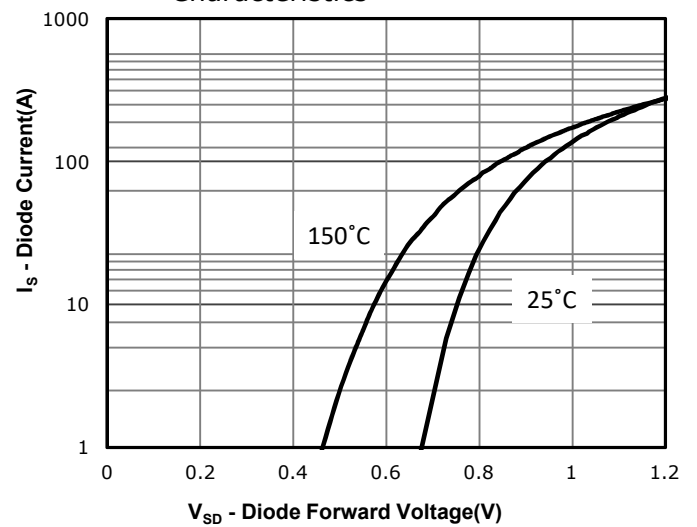


Fig 11: Power Dissipation

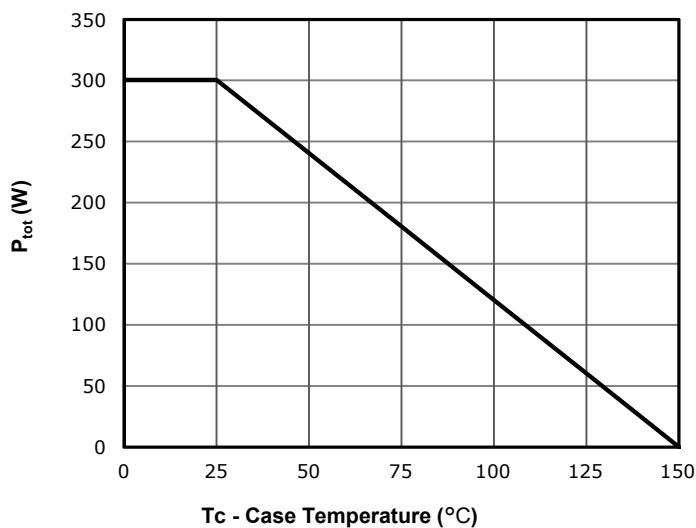


Fig 12: Drain Current Derating

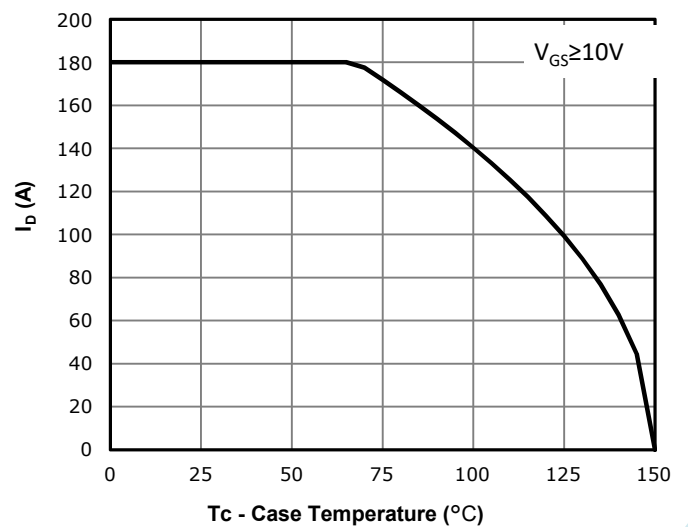


Fig 13: Safe Operating Area

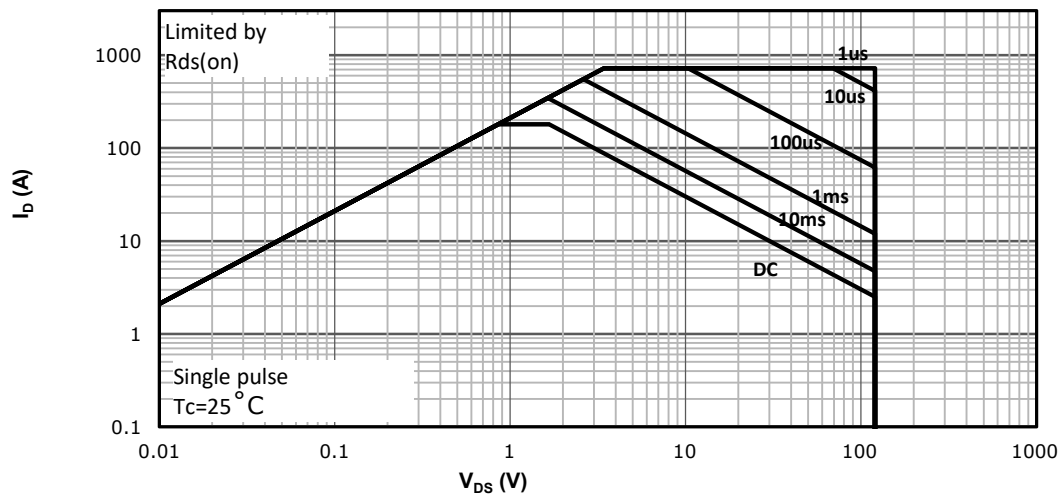
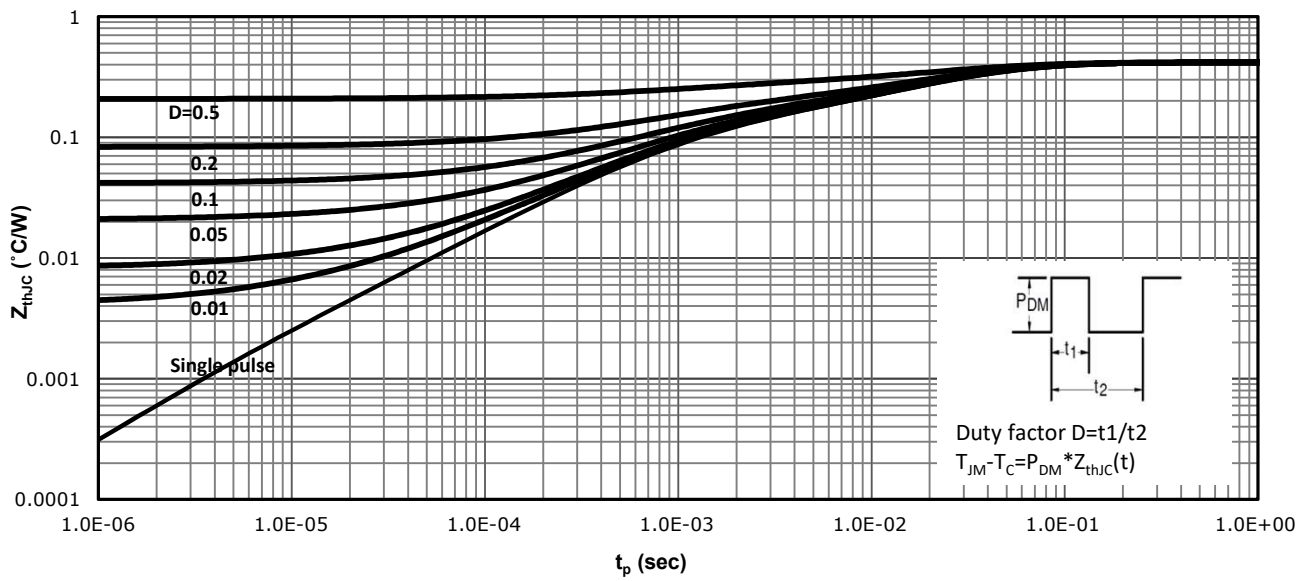


Fig 14: Max. Transient Thermal Impedance



Test Circuit

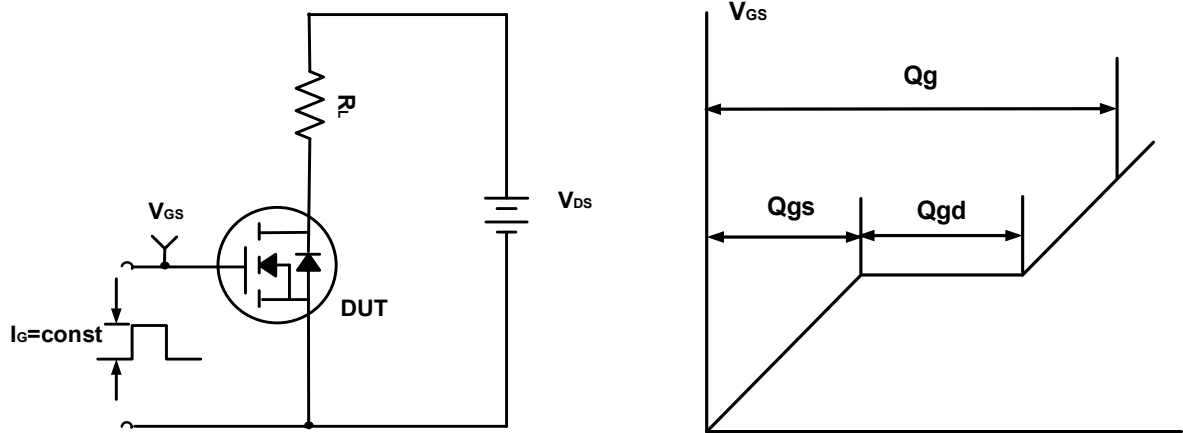


Figure A. Gate Charge Test Circuit & Waveforms

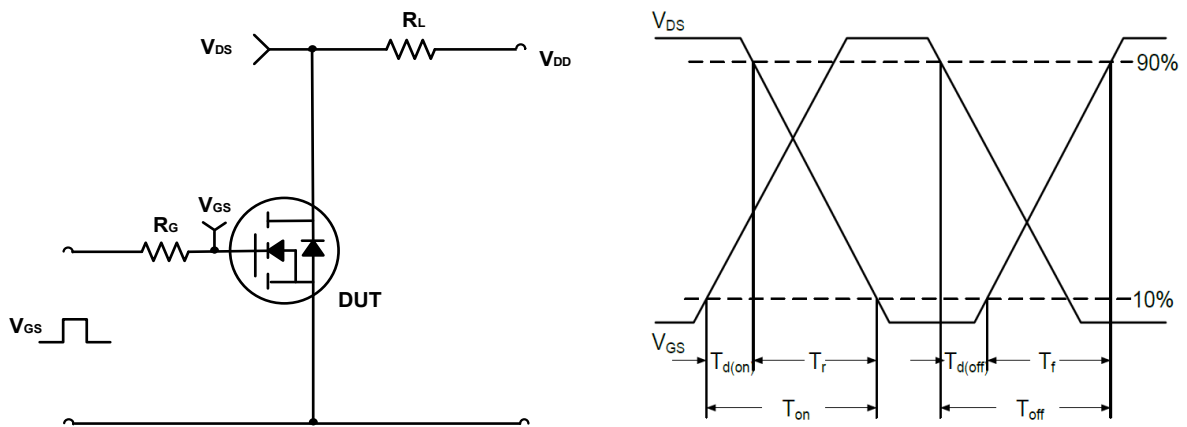


Figure B. Switching Test Circuit & Waveforms

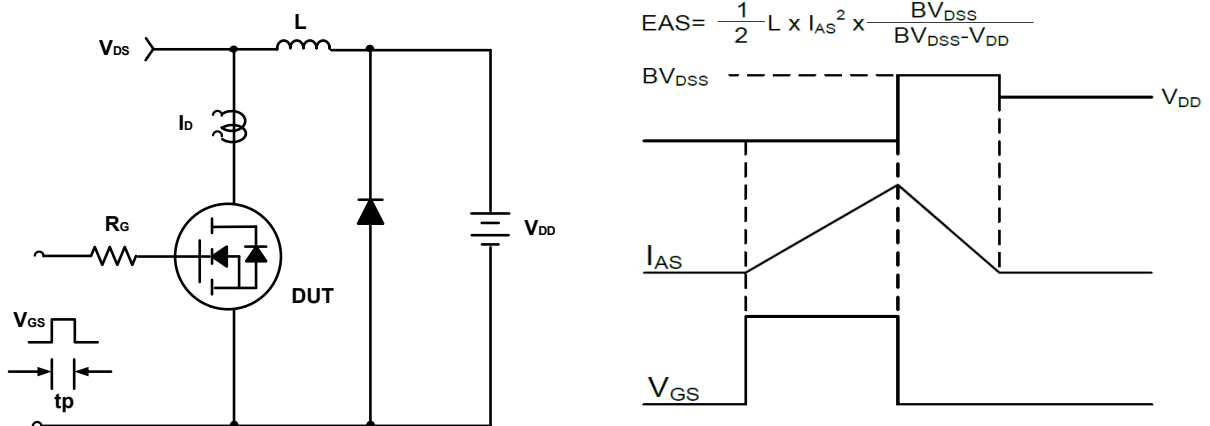
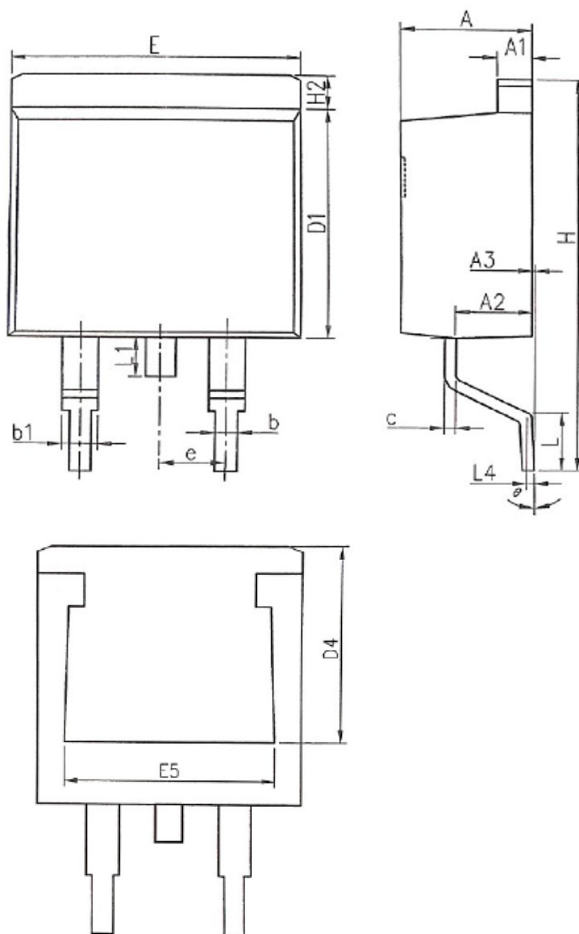


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for TO-263



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.37	4.89
A1	1.17	1.42
A2	2.20	2.90
A3	0.00	0.25
b	0.70	0.96
b1	1.17	1.47
c	0.28	0.60
D1	8.45	9.30
D4	6.60	-
E	9.80	10.40
E5	7.06	-
e	2.54BSC	
H	14.70	15.70
H2	1.07	1.47
L	2.00	2.80
L1	-	1.75
L4	0.254BSC	
θ	0°	9°