

N-Ch 100V Fast Switching MOSFETs

Features

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

Applications

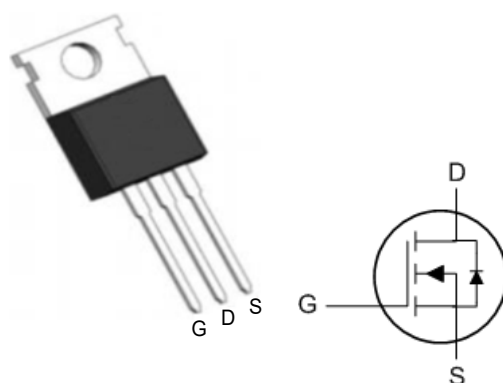
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Product Summary



BVDSS	RDSON	ID
100V	5mΩ	80A

TO220AB Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	80	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	56	A
I_{DM}	Pulsed Drain Current ²	320	A
EAS	Single Pulse Avalanche Energy ³	238	mJ
I_{AS}	Avalanche Current	---	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	111	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	1.1	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	40	$^\circ\text{C/W}$

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	100	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	---	---	V/°C
R _{DS(on)}	Static Drain-Source On-Resistance ²	V _{GS} =10 V, I _D =18A	---	5	6.3	mΩ
		V _{GS} =4.5V, I _D =18A	---	7	8.5	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.7	2.5	V
$\Delta V_{GS(th)}$	V _{GS(th)} Temperature Coefficient		---	---	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =80V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =80V, V _{GS} =0V, T _J =100°C	---	---	---	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =10V, I _D =15A	---	---	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	---	---	Ω
Q _g	Total Gate Charge	V _{DS} =50V, V _{GS} =10V, I _D =18A	---	44	---	nC
Q _{gs}	Gate-Source Charge		---	9	---	
Q _{gd}	Gate-Drain Charge		---	9	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =50V, I _D =18A, R _G =6.2Ω, V _{GS} =10V	---	11	---	ns
T _r	Rise Time		---	18	---	
T _{d(off)}	Turn-Off Delay Time		---	50	---	
T _f	Fall Time		---	40	---	
C _{iss}	Input Capacitance	V _{DS} =50V, V _{GS} =0V, f=1MHz	---	2615	---	pF
C _{oss}	Output Capacitance		---	806	---	
C _{rss}	Reverse Transfer Capacitance		---	22	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	80	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =18A, T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	IF=18A, di/dt=100A / μs,	---	49	---	nS
Q _{rr}	Reverse Recovery Charge	T _J = 25 °C	---	67	---	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting T_J=25°C, V_{DD}=50V, V_G=10V, R_G=25ohm, L=3mH, I_{AS}=12A, V_{DD}=0V during time in avalanche.
 3. R_{θJA} is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB.
 4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%.

Typical Performance Characteristics

Figure 1: Power De-rating

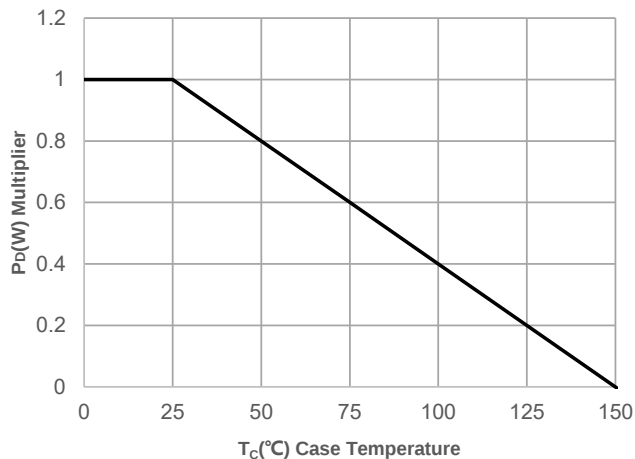


Figure 2: Current De-rating

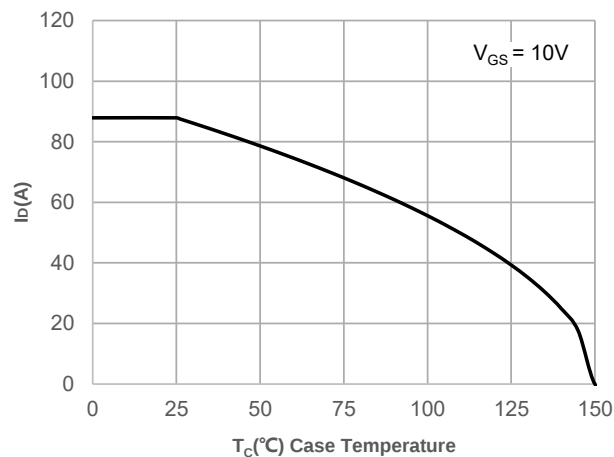


Figure 3: Normalized Maximum Transient Thermal Impedance

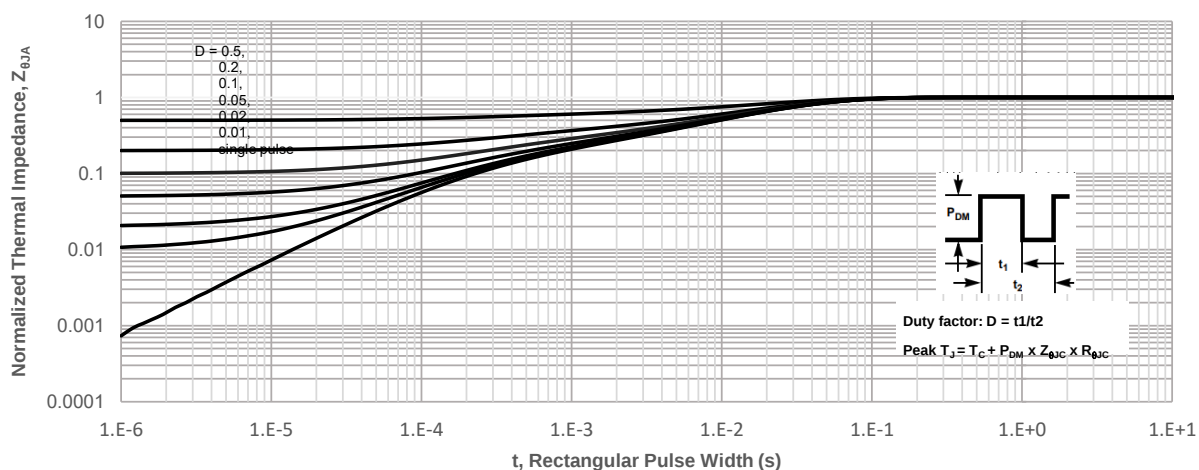
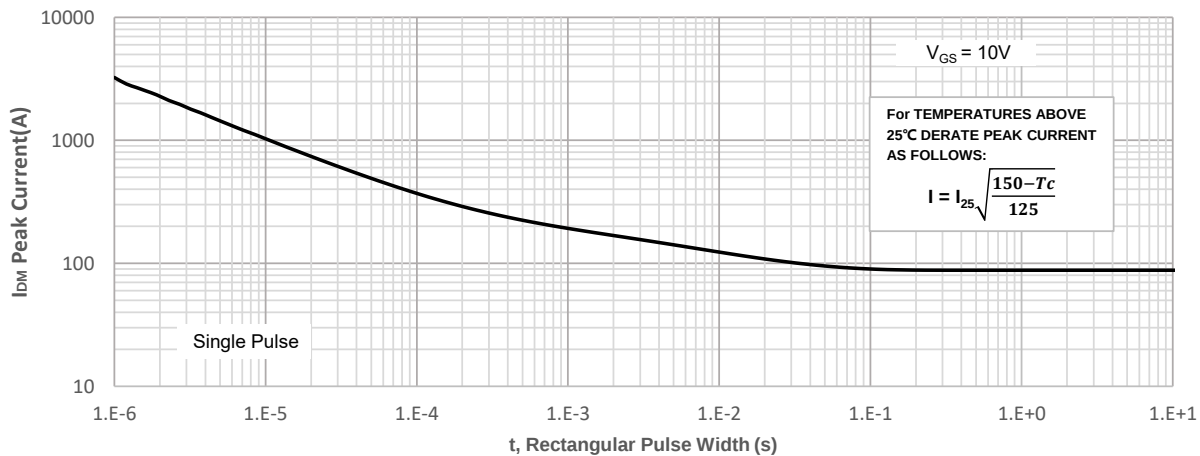


Figure 4: Peak Current Capacity



Typical Performance Characteristics

Figure 5: Output Characteristics

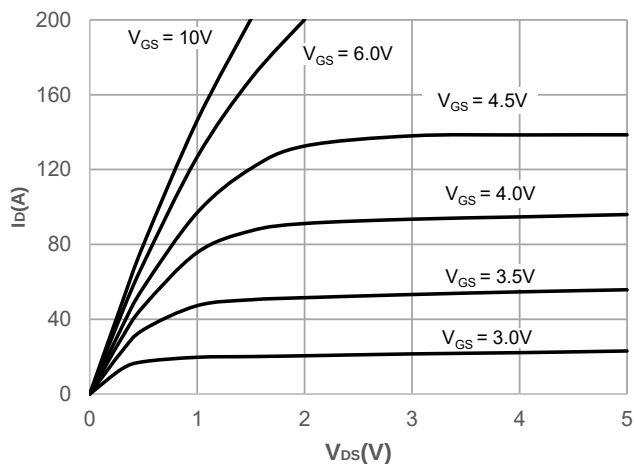


Figure 6: Typical Transfer Characteristics

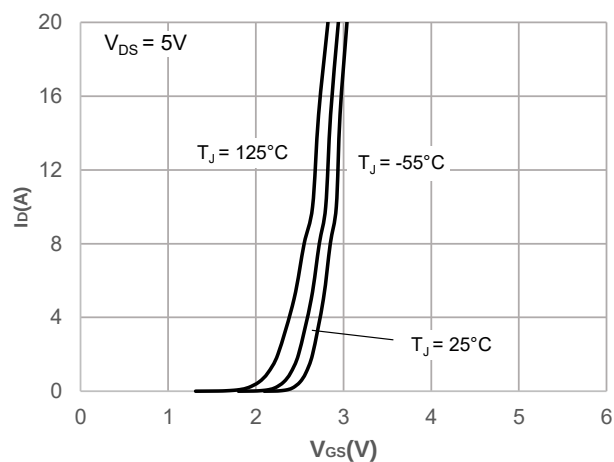


Figure 7: On-resistance vs. Drain Current

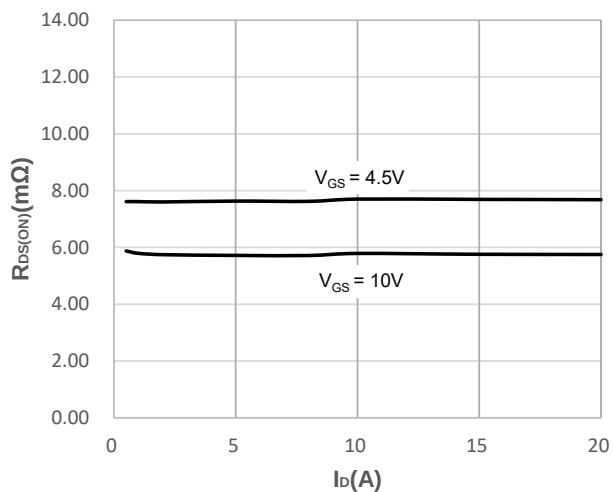


Figure 8: Body Diode Characteristics

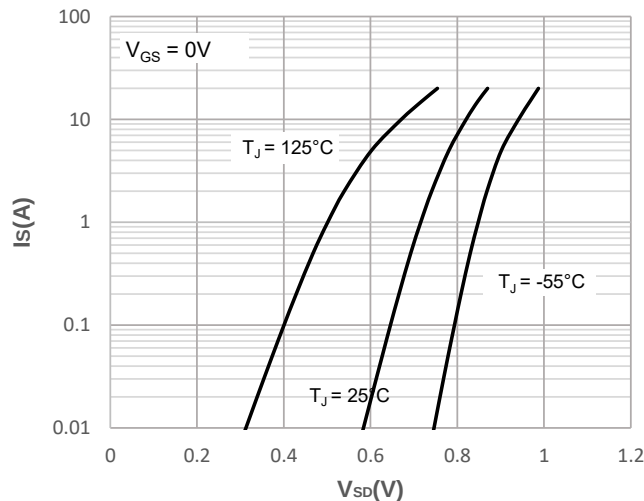


Figure 9: Gate Charge Characteristics

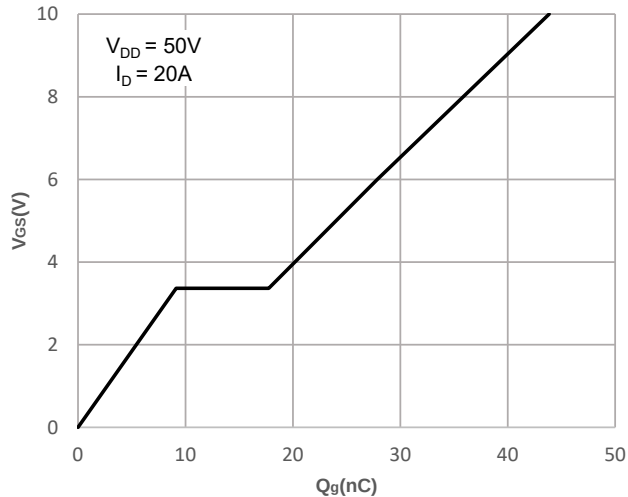
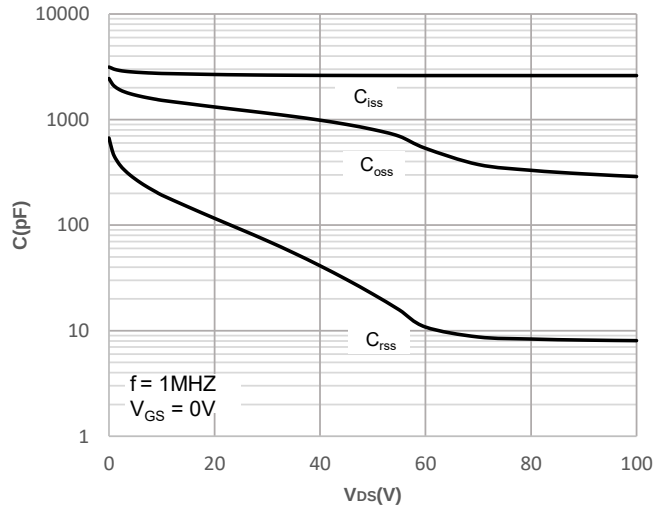


Figure 10: Capacitance Characteristics



Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

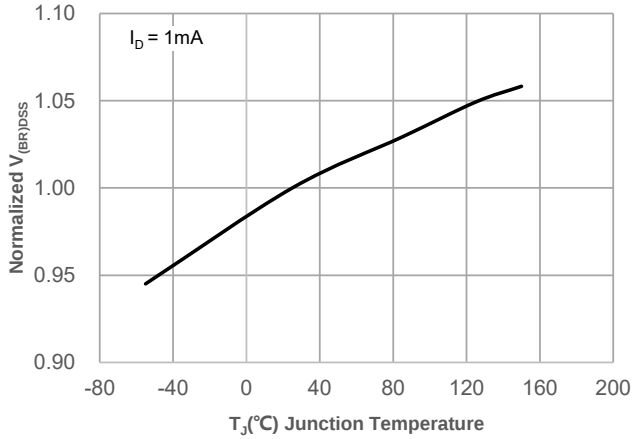


Figure 12: Normalized on Resistance vs. Junction Temperature

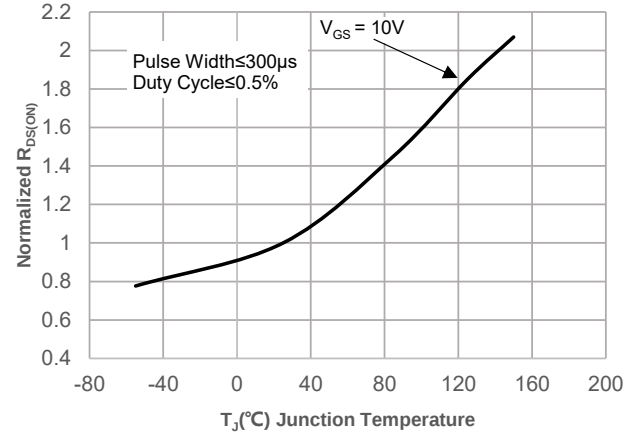


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

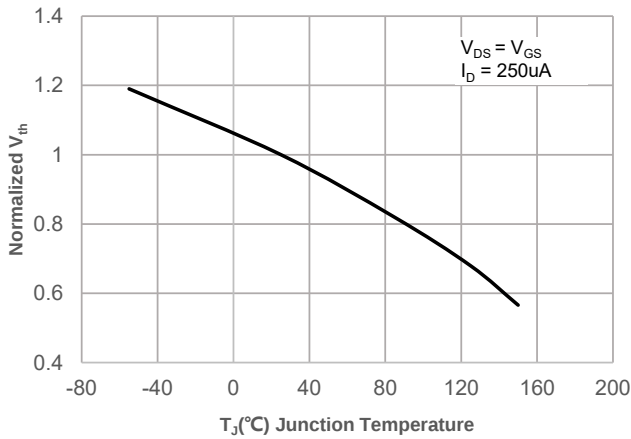


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

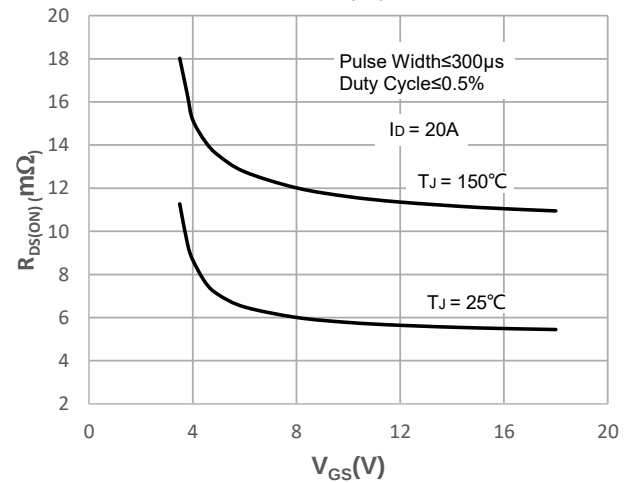
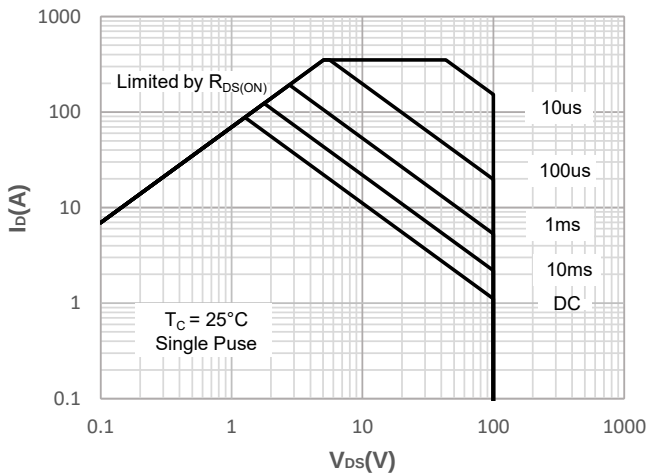
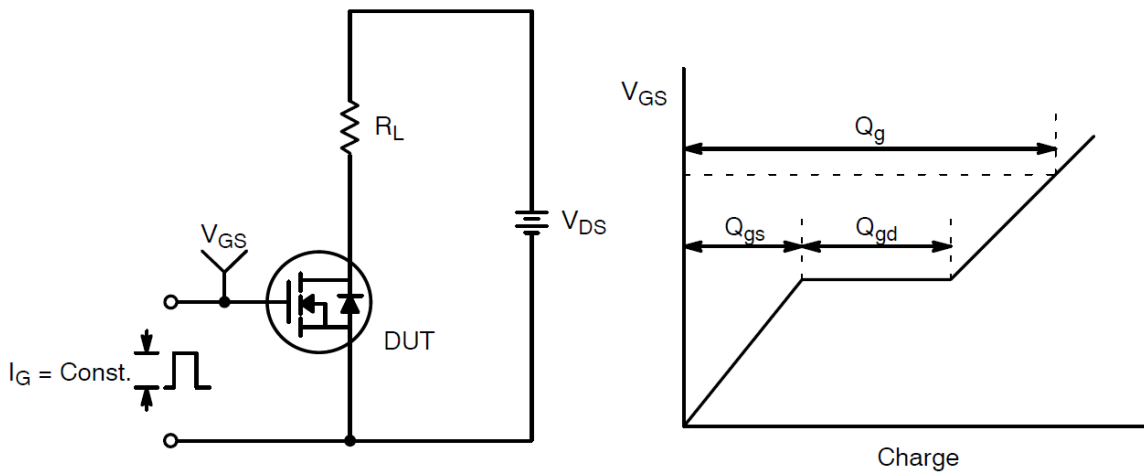


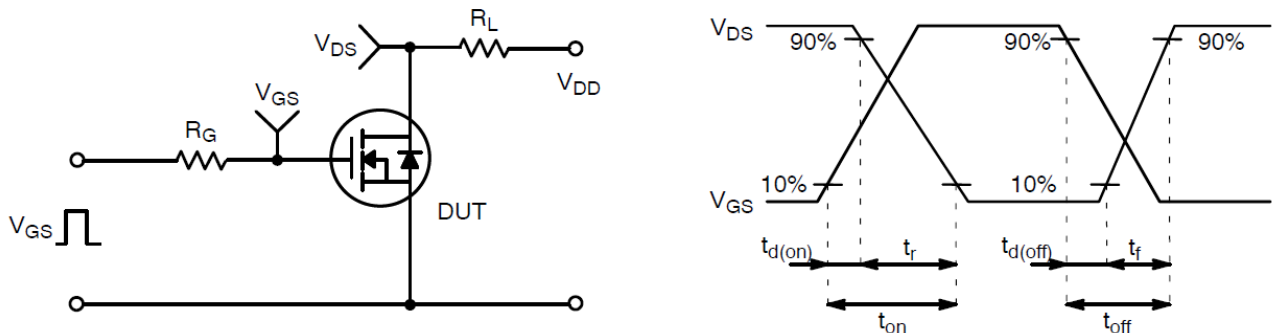
Figure 15: Maximum Safe Operating Area



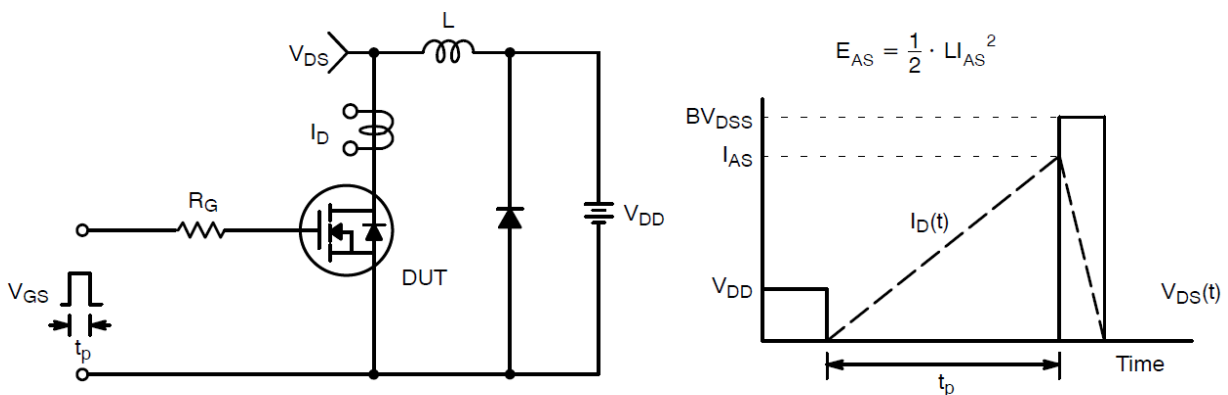
Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform

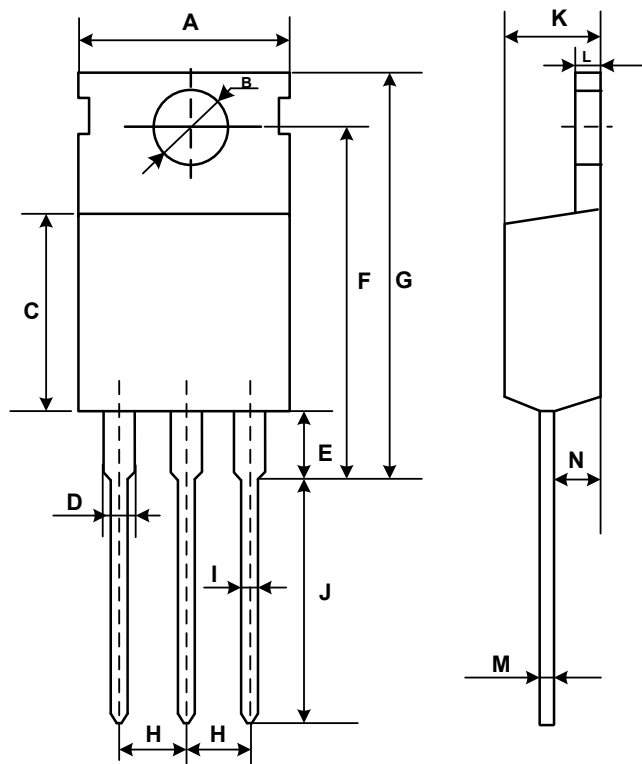


Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

Mechanical Dimensions for TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.70	10.30
B	3.40	3.80
C	8.80	9.40
D	1.17	1.47
E	2.60	3.50
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60