

N-Ch 150V Fast Switching MOSFETs

Features

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

Applications

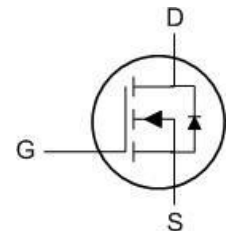
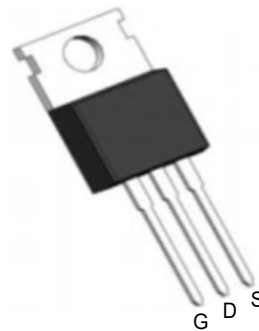
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Product Summary



BVDSS	RDSON	ID
150V	4mΩ	180A

TO220AB Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	150	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, $V_{GS} @ 10V^{1,6}$	125	A
I_{DM}	Pulsed Drain Current ²	800	A
EAS	Single Pulse Avalanche Energy ³	1155	mJ
I_{AS}	Avalanche Current	68	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	320	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	---	64	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	0.40	$^\circ C/W$

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	150	---	---	V
ΔBV _{DSS} /ΔT _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} =10V, I _D =90A	---	4	4.8	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	2	3	4	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	---	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =150V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =150V, V _{GS} =0V, T _J =100°C	---	---	100	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =90A	---	145.7	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	4	---	Ω
Q _g	Total Gate Charge	V _{DS} =75V, V _{GS} =10V, I _D =90A	---	19.9	---	nC
Q _{gs}	Gate-Source Charge		---	32.1	---	
Q _{gd}	Gate-Drain Charge		---	19	---	
T _{d(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DD} =75V, R _G =2.7Ω, I _D =60A	---	24.6	---	ns
T _r	Rise Time		---	111.1	---	
T _{d(off)}	Turn-Off Delay Time		---	58.3	---	
T _f	Fall Time		---	109.5	---	
C _{iss}	Input Capacitance	V _{DS} =75V, V _{GS} =0V, f=1MHz	---	4930	---	pF
C _{oss}	Output Capacitance		---	722	---	
C _{rss}	Reverse Transfer Capacitance		---	21	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	180	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =60A, T _J =25°C	---	---	1.4	V
t _{rr}	Reverse Recovery Time	I _F =90A, di/dt=100A/μs	---	97.9	---	nS
Q _{rr}	Reverse Recovery Charge	μs, T _J =25°C	---	326.0	---	nC

Notes:

1. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C
2. The EAS data shows Max. rating. The test condition is V_{DD}=75V, V_{GS}=10V, L=0.5mH, I_{AS}=68A.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Performance Characteristics

Fig 1: Output Characteristics

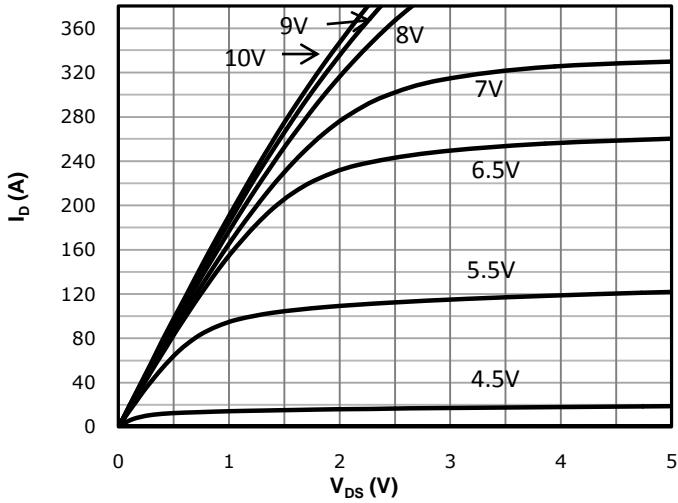


Fig 2: Transfer Characteristics

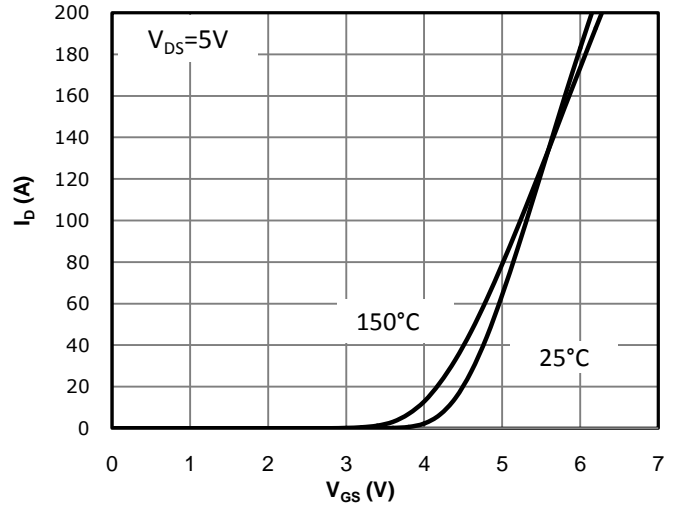


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

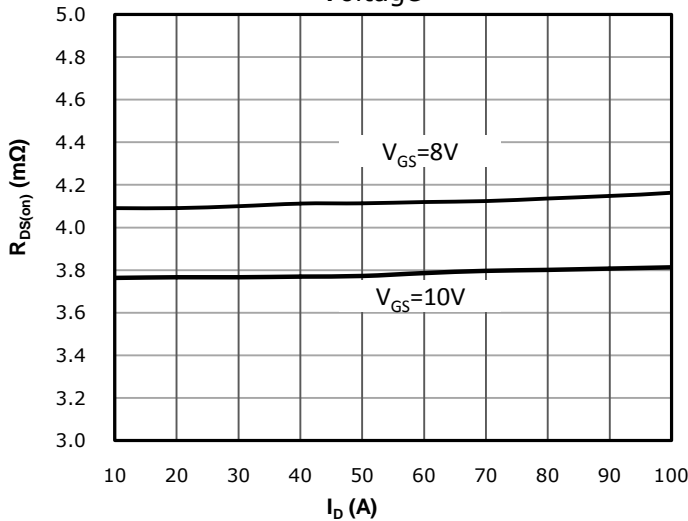


Fig 4: $R_{DS(on)}$ vs Gate Voltage

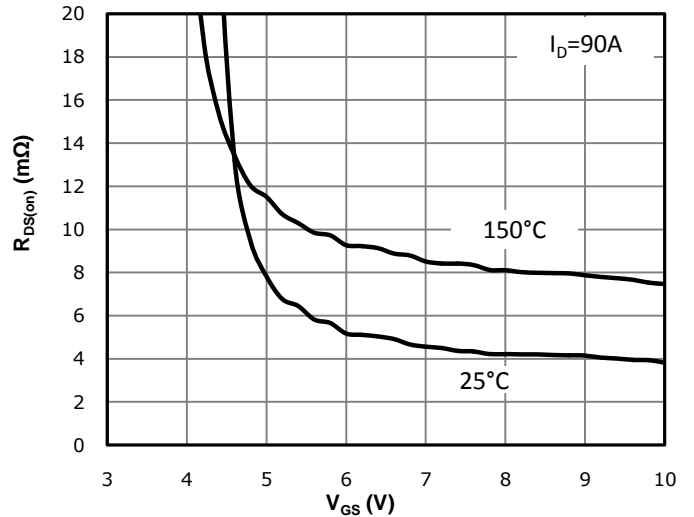


Fig 5: $R_{DS(on)}$ vs. Temperature

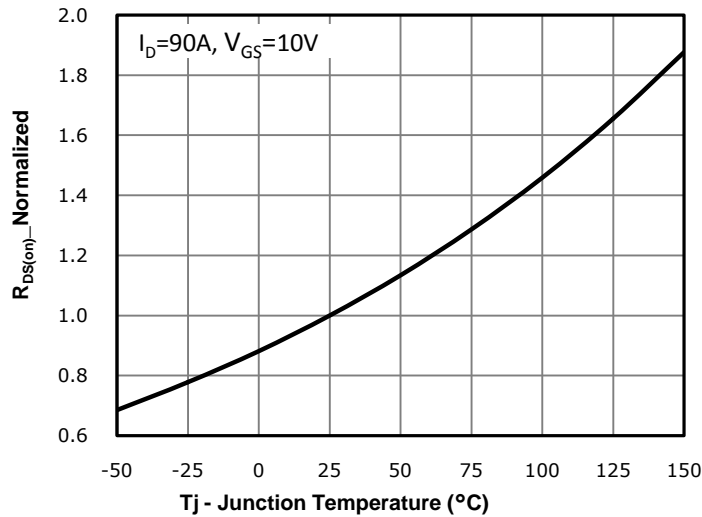


Fig 6: $V_{GS(th)}$ vs. Temperature

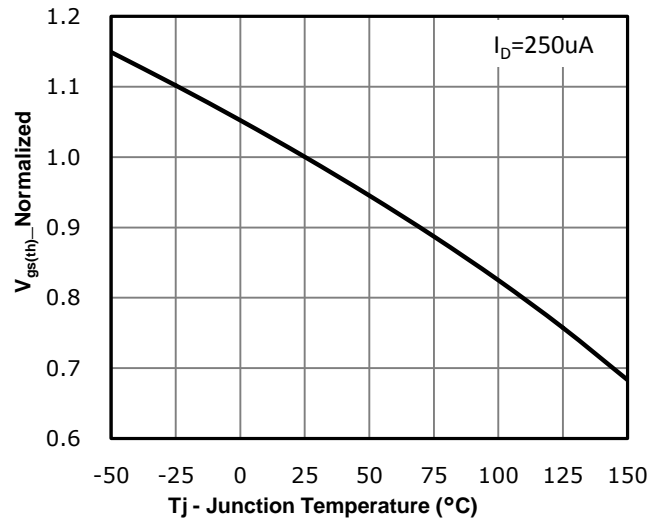


Fig 7: BVdss vs. Temperature

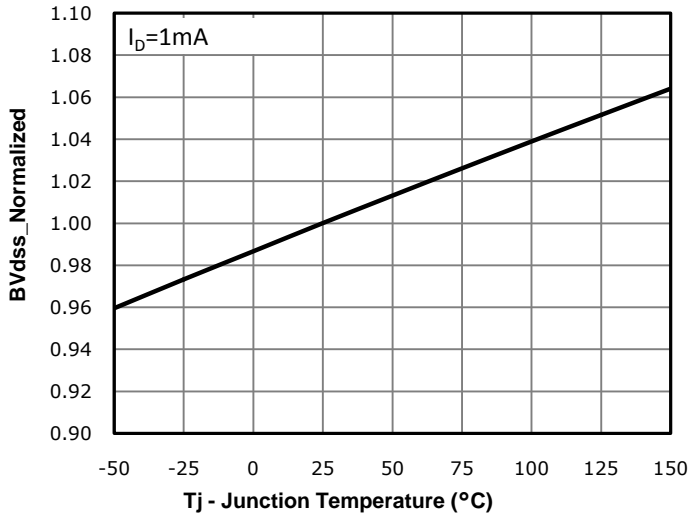


Fig 8: Capacitance Characteristics

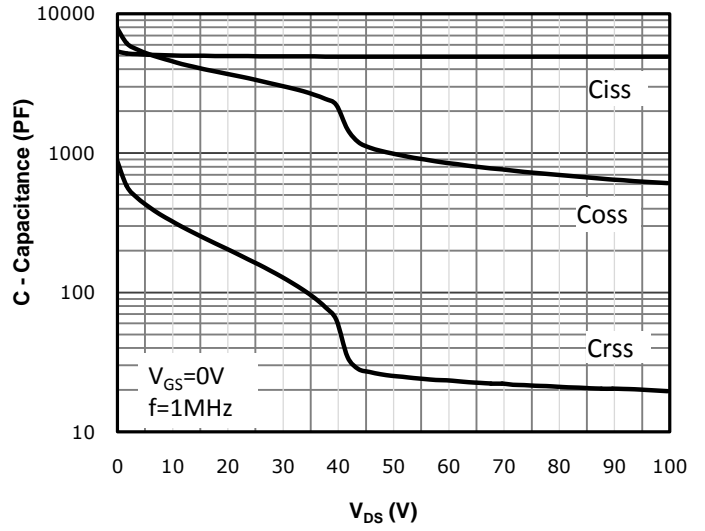


Fig 9: Gate Charge Characteristics

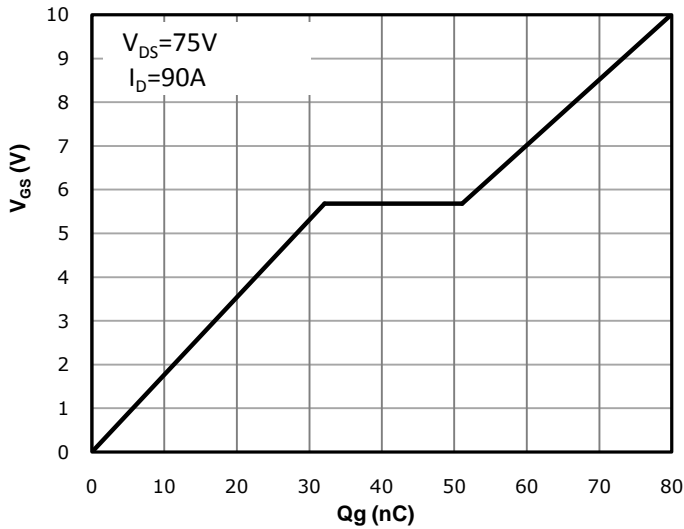


Fig 10: Body-diode Forward Characteristics

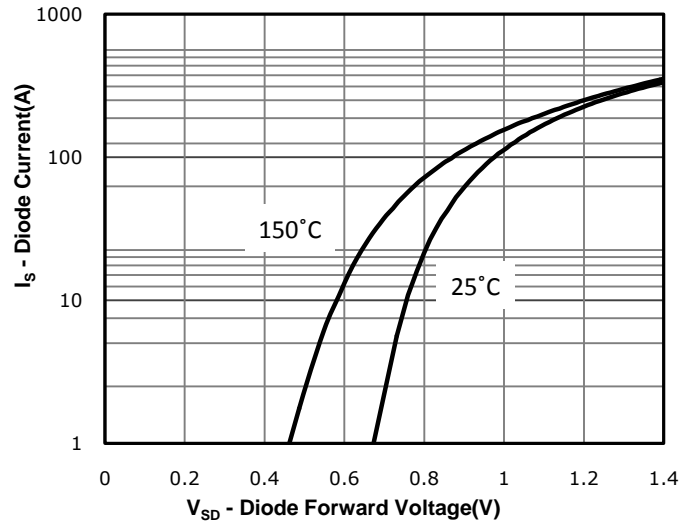


Fig 11: Power Dissipation

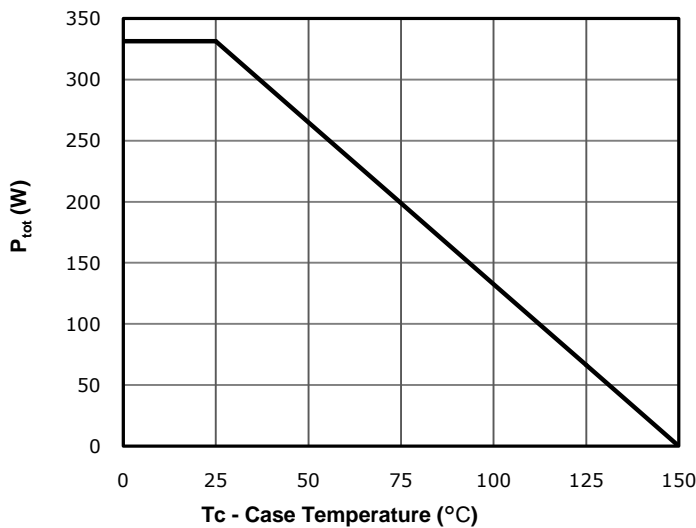


Fig 12: Drain Current Derating

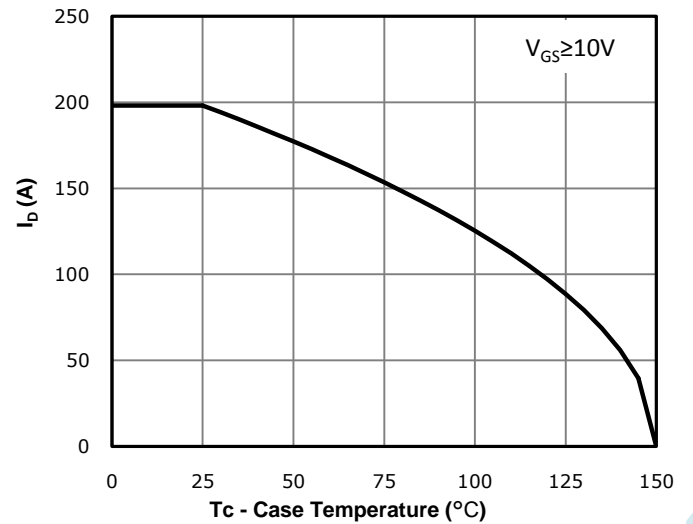


Fig 13: Safe Operating Area

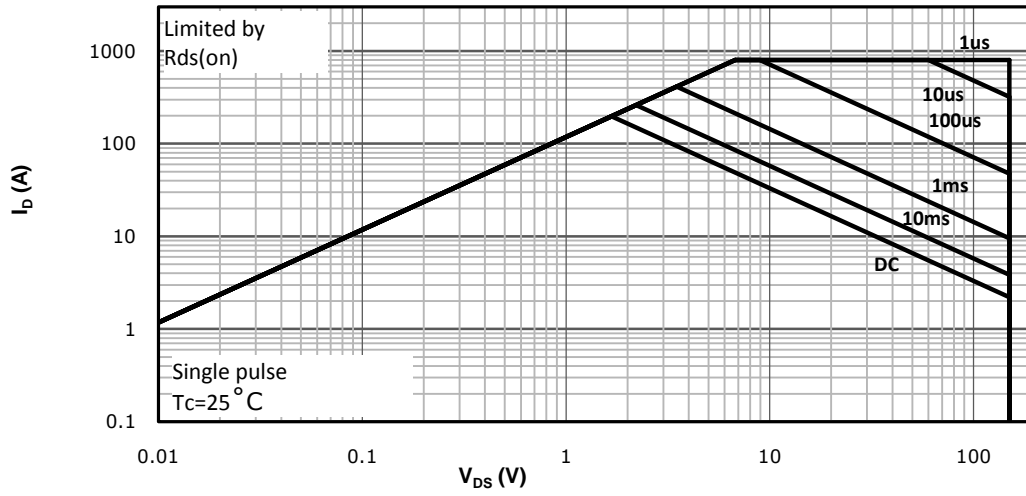
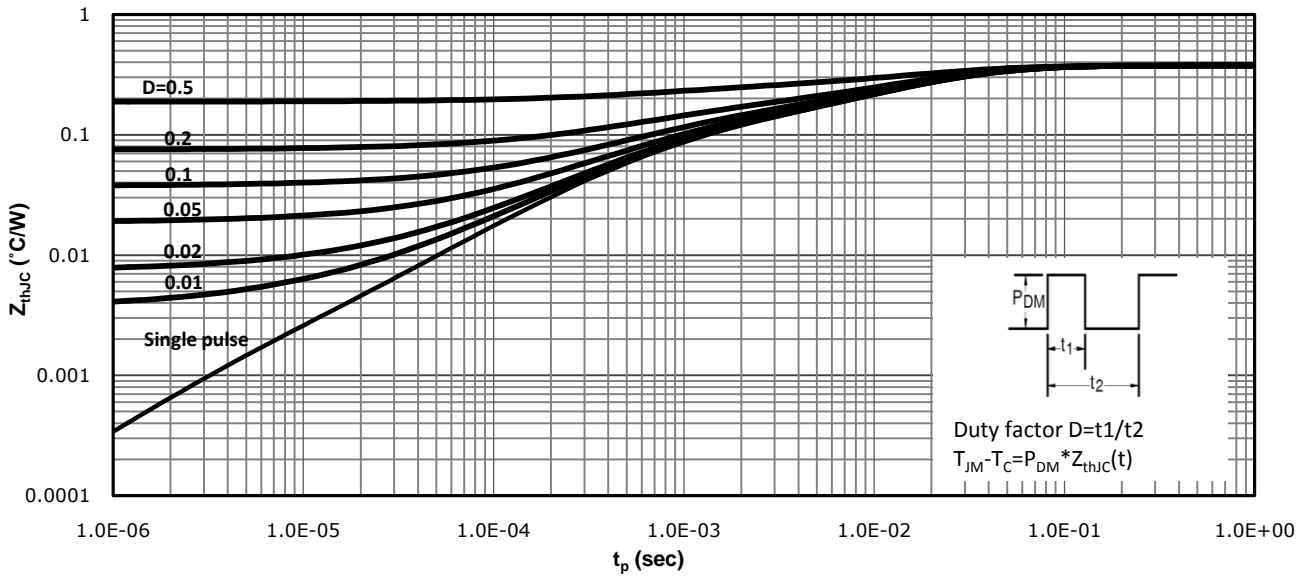
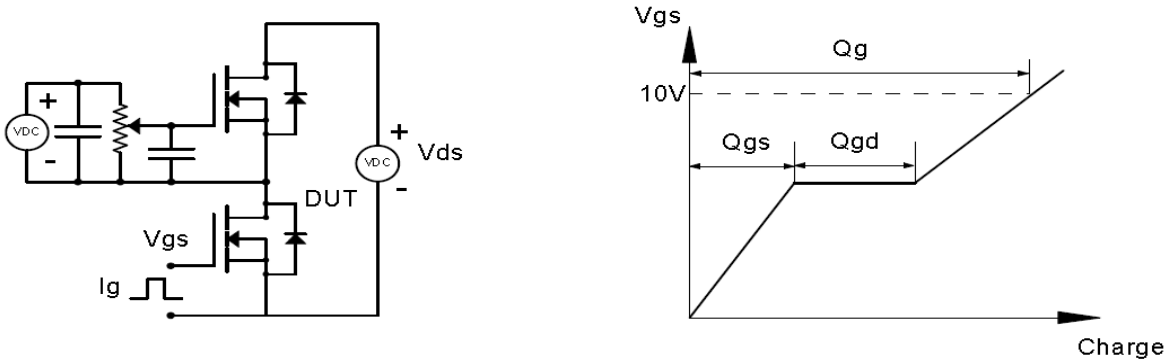


Fig 14: Max. Transient Thermal Impedance

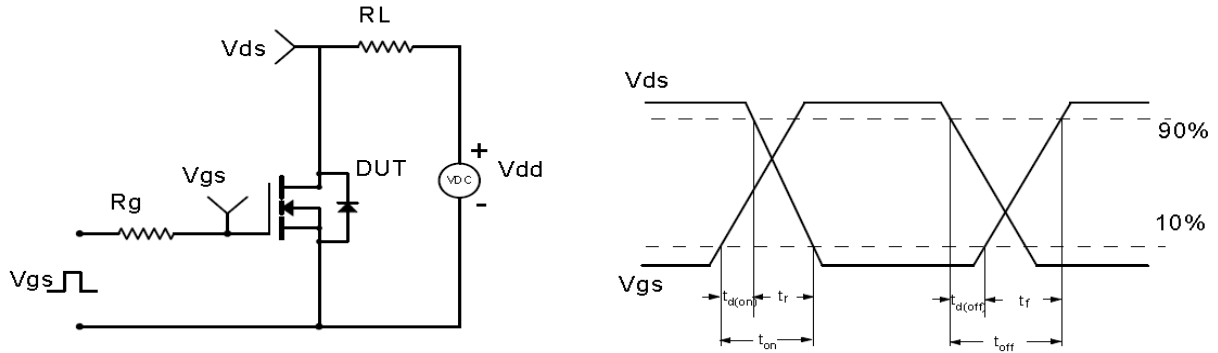


Test Circuit & Waveform

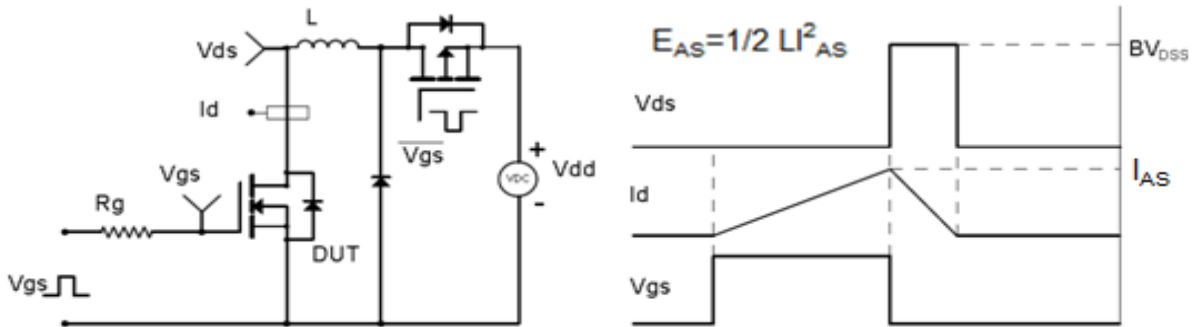
Gate Charge Test Circuit & Waveform



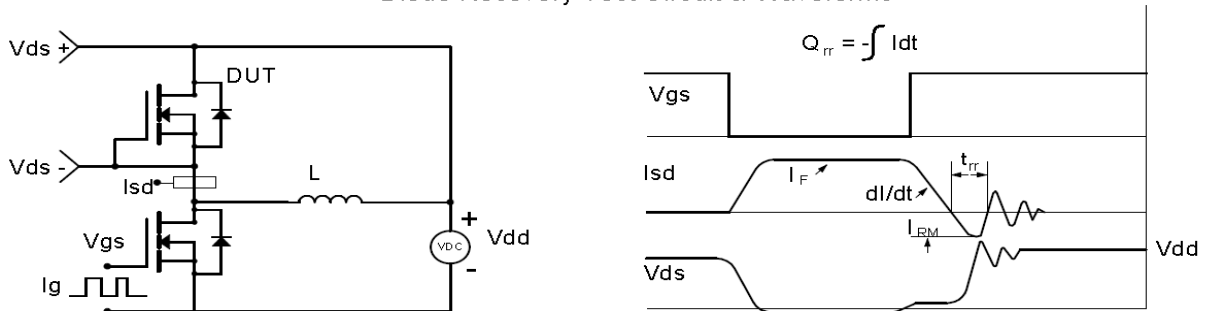
Resistive Switching Test Circuit & Waveforms



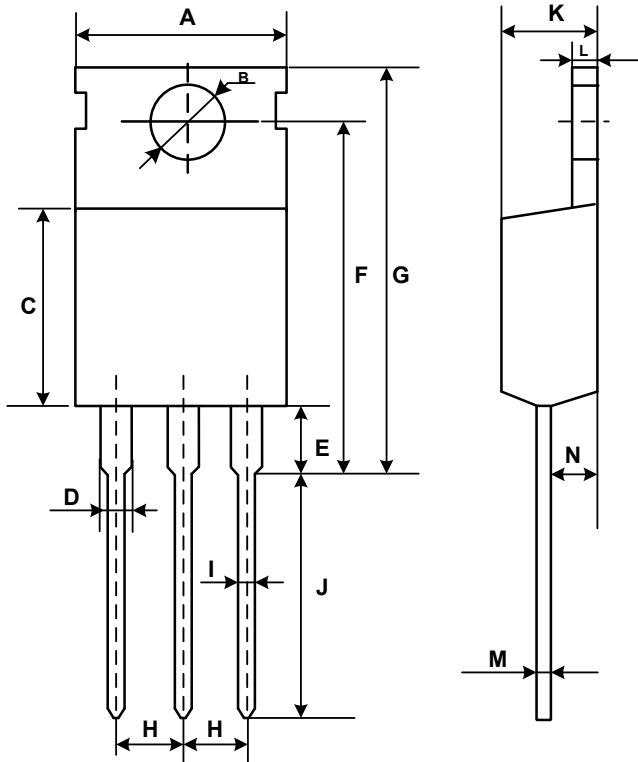
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery 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