N-Ch 120V Fast Switching MOSFETs

Features

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

Product Summary

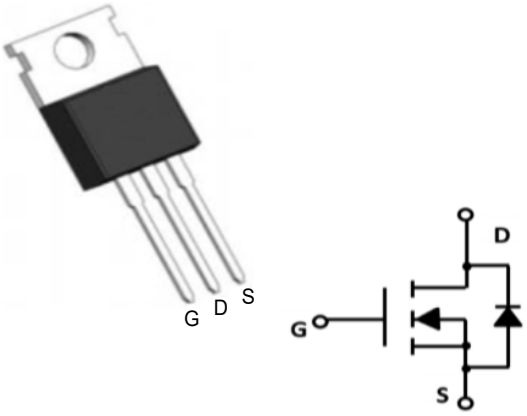
Green

BVDSS	RDSON	ID
120V	6mΩ	125A

Applications

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

TO220AB Pin Configuration



100% DVDS Tested
100% Avalanche Tested

Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		120	V
I_D	Continuous Drain Current	T_C = 25 °C	125	A
	Continuous Drain Current	T_C = 100 °C	80	A
I_{DM}[a1]	Pulsed Drain Current		320	A
E_{AS}[a2]	Single pulse avalanche energy		326	mJ
V_{GS}	Gate-to-Source Voltage		±20	V
P_D	Power Dissipation		119	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range		150, –55 to 150	℃
T_L	Maximum Temperature for Soldering		260	℃

Thermal Characteristics:

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.05	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	52	℃/W

Electrical Characteristics (Tc= 25℃ unless otherwise specified):

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	120	--	--	V
I_{DSS}	Drain to Source Leakage Current	V_{DS} = 120V, V_{GS}= 0V	--	--	1	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS} =+20V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS} =-20V	--	--	-100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D = 250μA	2.5	3	3.5	V
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=10V, I_D=20A	--	6	7.5	mΩ

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 60V f = 1.0MHz	--	3614	--	pF
C_{oss}	Output Capacitance		--	423	--	
C_{rss}	Reverse Transfer Capacitance		--	12	--	
R_g	Gate resistance		--	0.84	--	Ω

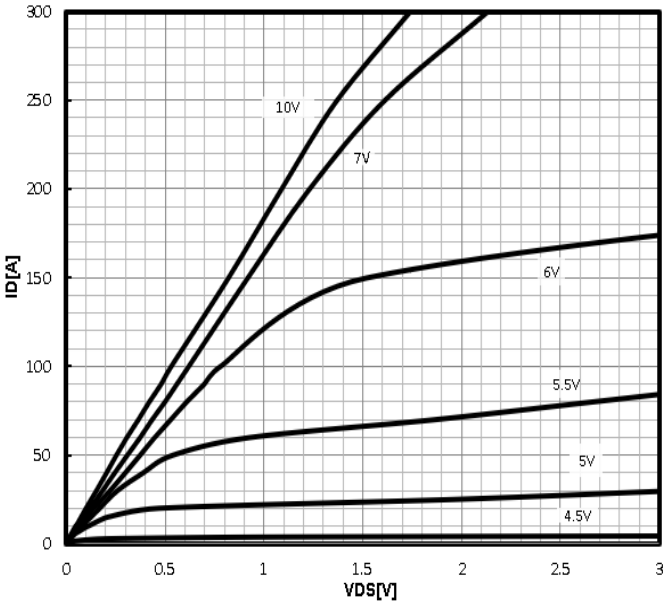
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D =20A V_{DS} = 60V V_{GS} = 10V R_G = 5Ω	--	20	--	ns
tr	Rise Time		--	65	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	32	--	
t_f	Fall Time		--	49	--	
Q_g	Total Gate Charge	V_{GS} =0~10V V_{DS} = 60V I_D =20A	--	60.8	--	nC
Q_{gs}	Gate Source Charge		--	18.8	--	
Q_{gd}	Gate Drain Charge		--	14.7	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	T_C =25 °C	--	--	95	A
V_{SD}	Diode Forward Voltage	I_S=20A, V_{GS}=0V	--	0.83	1.2	V
t_{rr}	Reverse Recovery time	I_S=40A, dI/dt=100A/μs	--	60	--	ns
Q_{rr}	Reverse Recovery Charge		--	109	--	nC

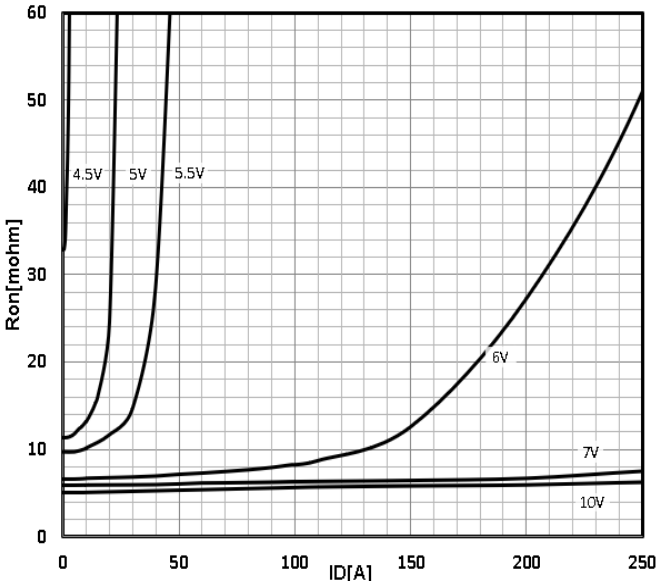
[a1]: Repetitive rating; pulse width limited by maximum junction temperature
[a2]: VDD=60V, L=0.5mH, Rg=25Ω, Starting TJ=25 ℃

Characteristics Curve:

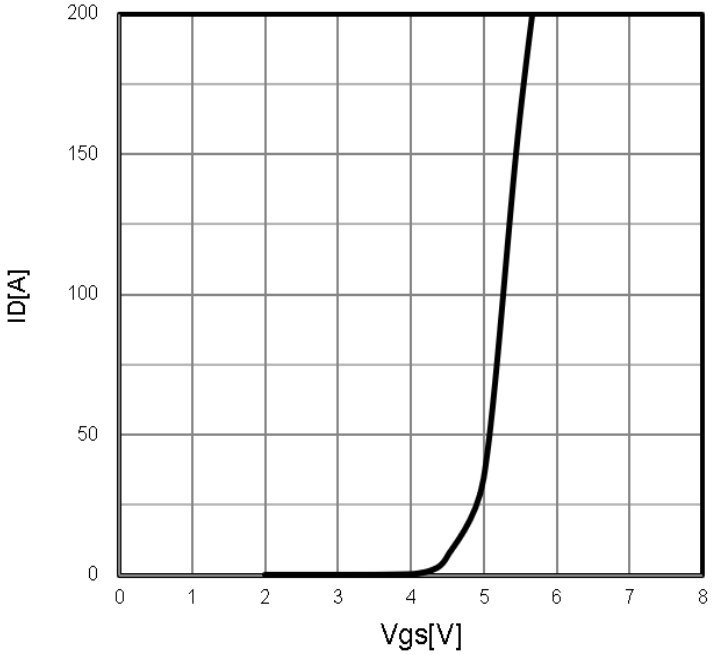
Typ. output characteristics
$I_D=f(V_{DS})$



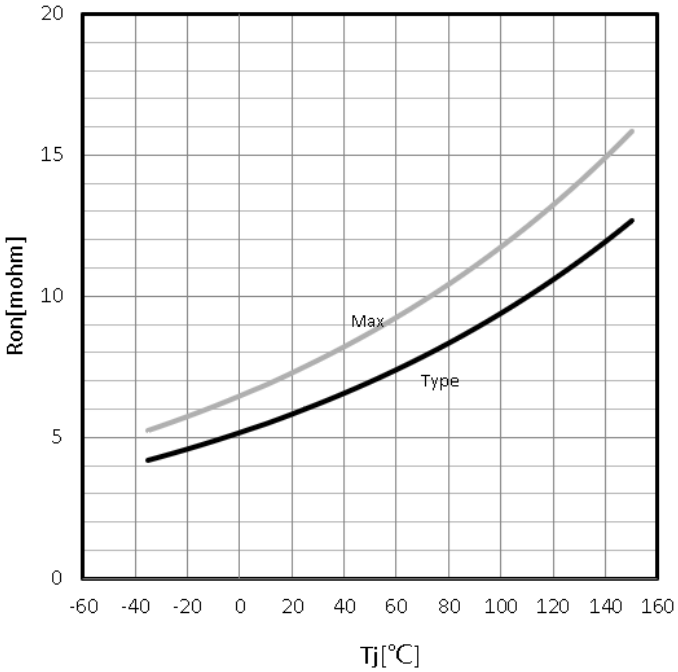
Typ. drain-source on resistance
$R_{DS(on)}=f(I_D)$



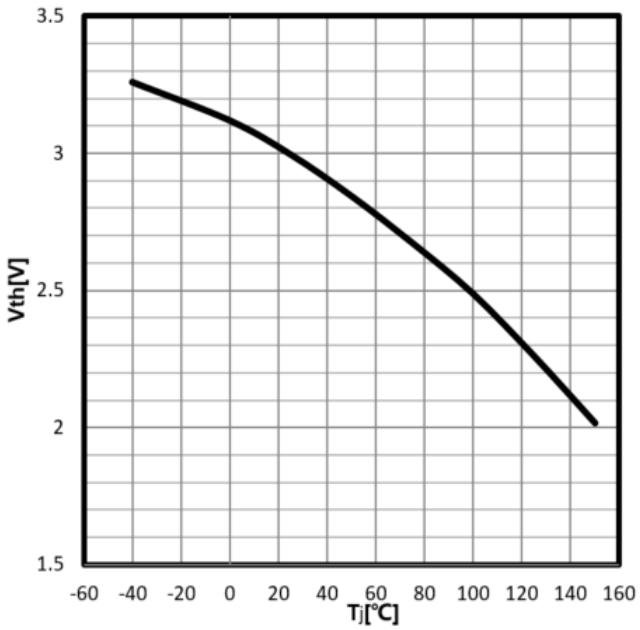
Typ. transfer characteristics
$I_D=f(V_{GS})$



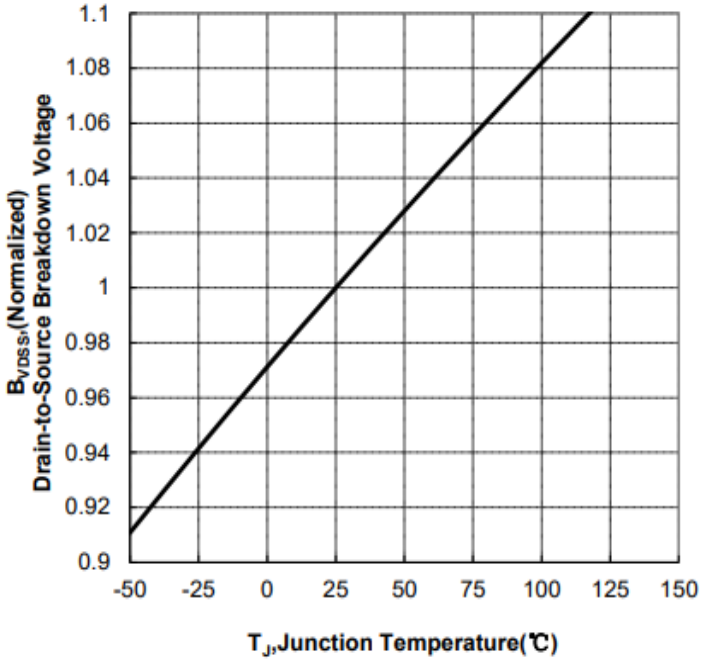
Drain-source on-state resistance
$R_{DS(on)}=f(T_j)$; $I_D=20A$; $V_{GS}=10V$



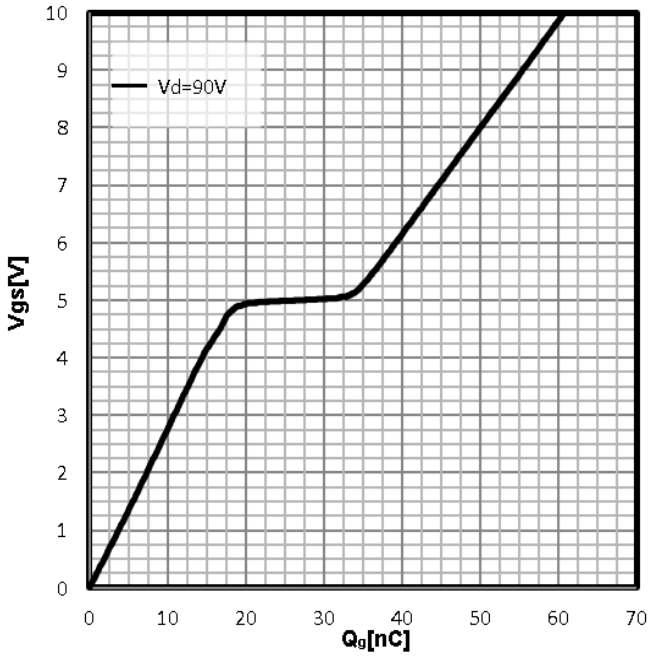
Gate Threshold Voltage
$V_{TH}=f(T_j)$; $I_D=250uA$



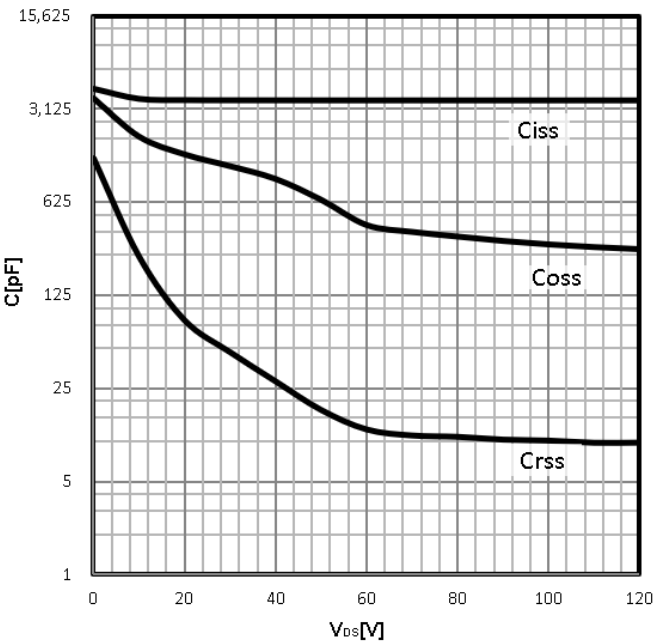
Drain-source breakdown voltage
$V_{BR(DSS)}=f(T_j)$; $I_D=250uA$



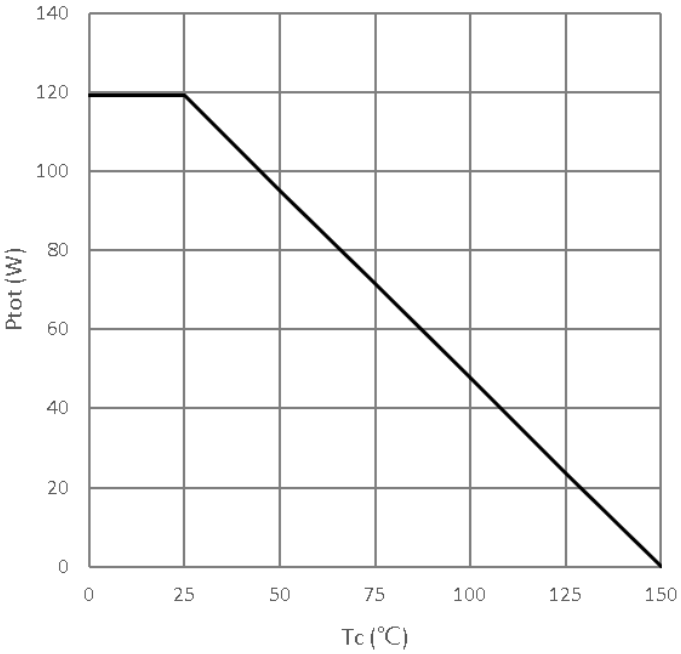
Typ. gate charge
$V_{GS}=f(Q_{gate})$



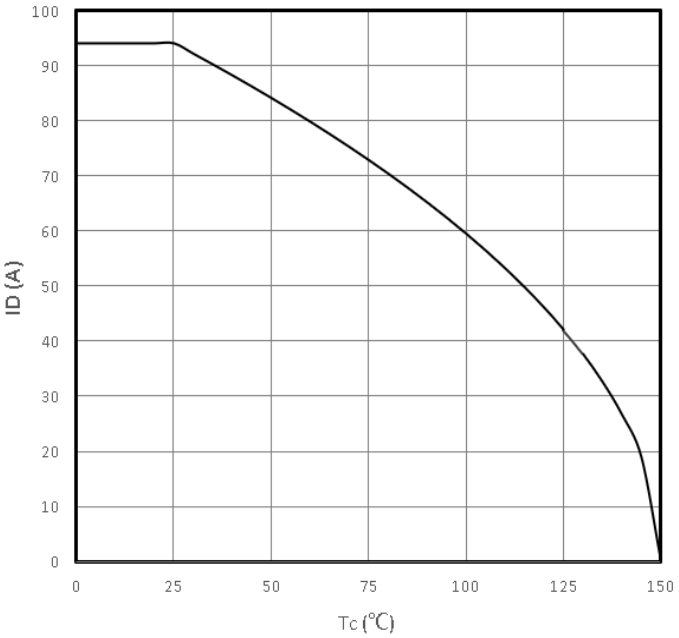
Typ. capacitances
C =f(V_{DS}); V_{GS}=0V; f =1MHz



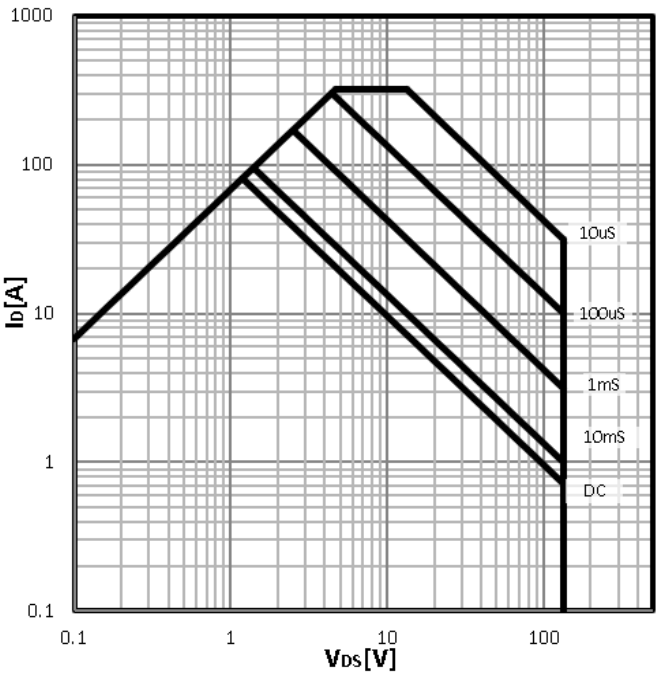
Power Dissipation
$P_{tot}=f(T_j)$



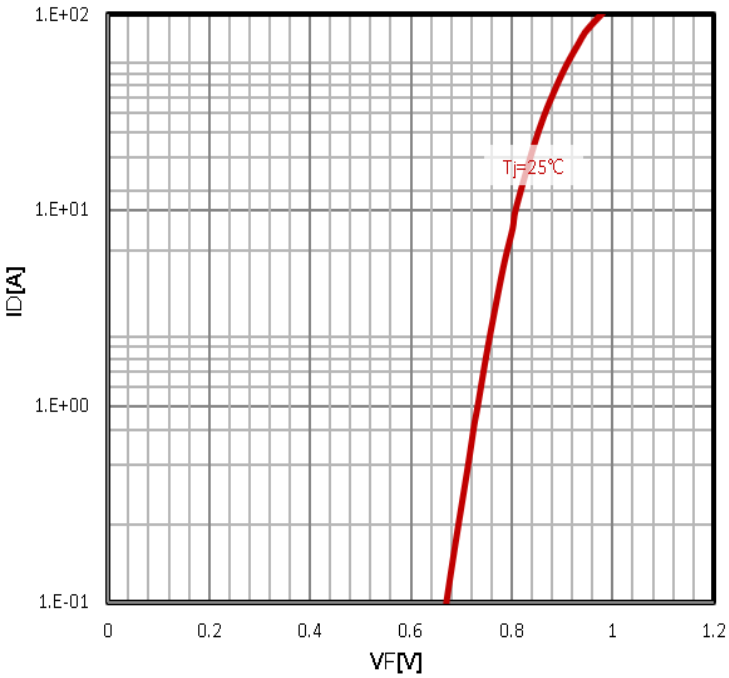
Maximum Drain Current
$I_D=f(T_C)$



Safe operating area
$I_D=f(V_{DS})$

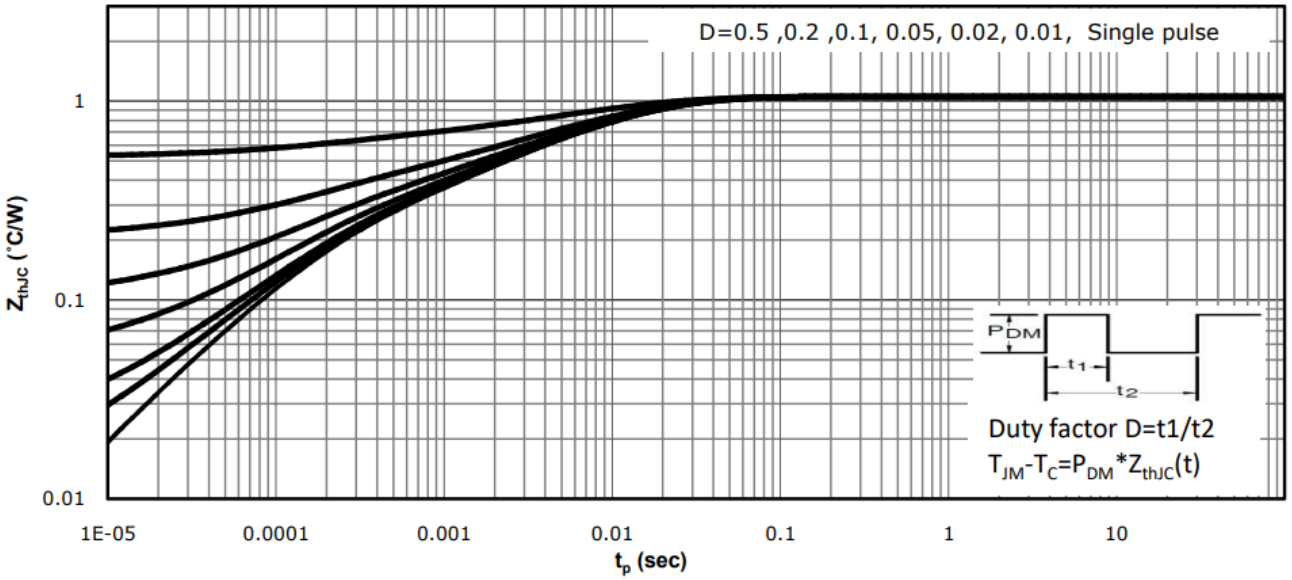


Body Diode Forward Voltage Variation
$I_F=f(V_{GS})$

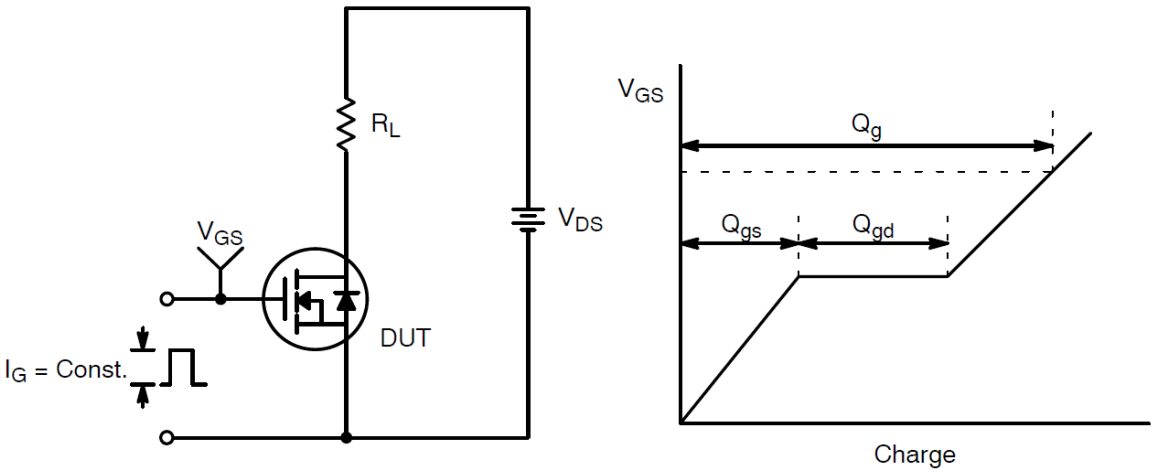


Max. transient thermal impedance

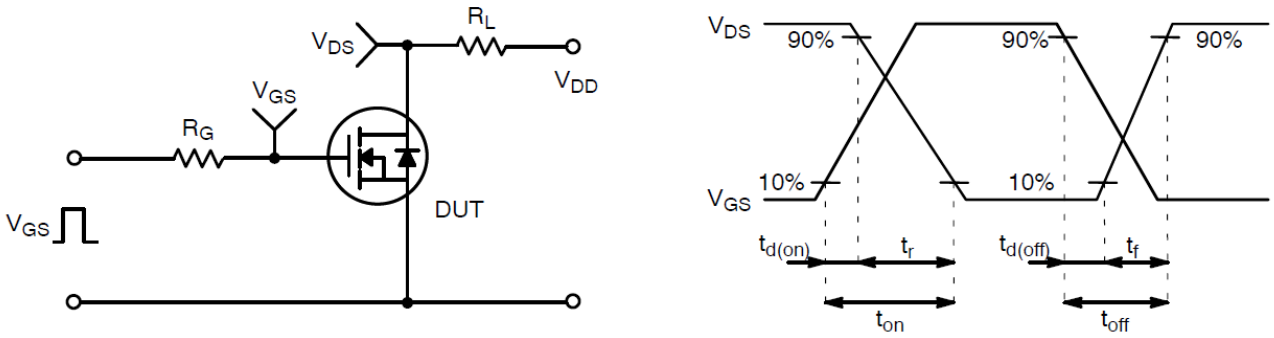
$Z_{thJC}=f(t_p)$



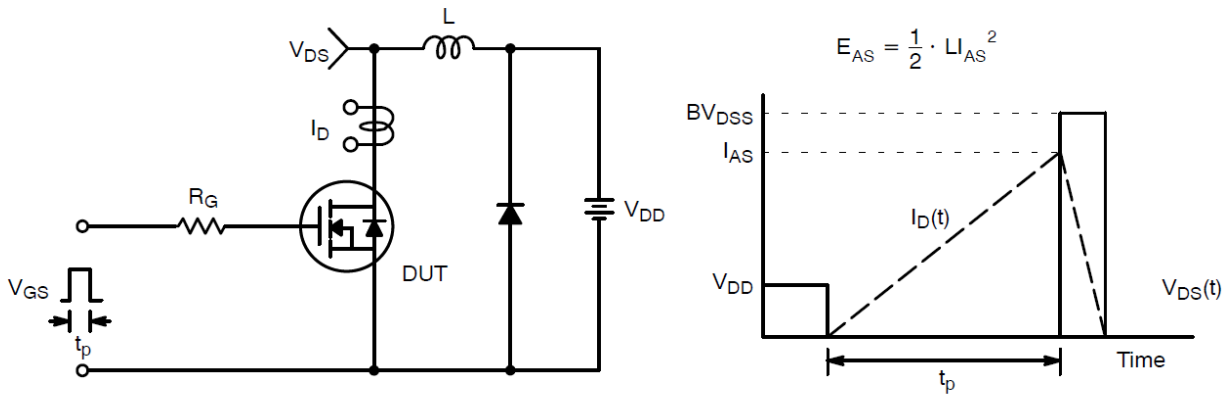
Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform

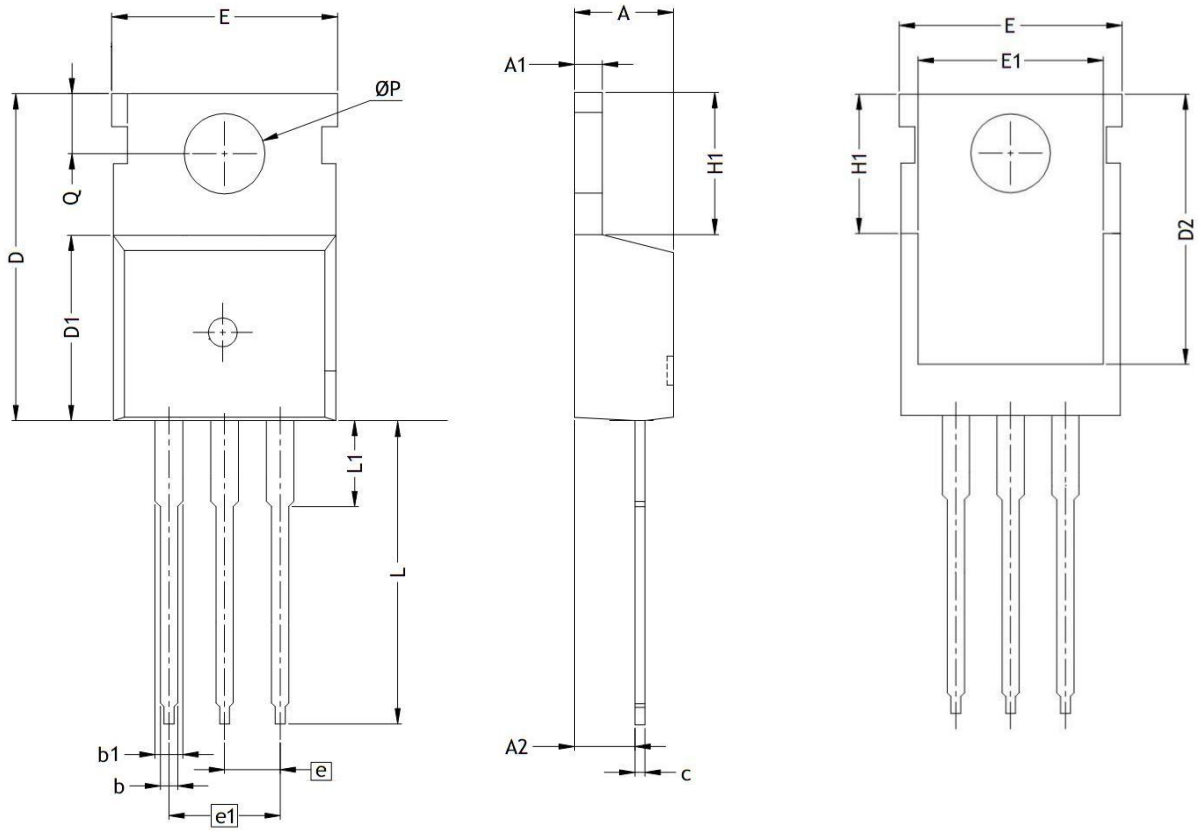


Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

Mechanical Dimensions for TO-220AB



UNIT：mm

SYMBOLS	A	A1	A2	b	b1	c	D	D1	D2	E	E1	e
MIN	4.25	1.25	2.35	0.7	1.15	0.45	14.35	8.80	13.05	9.90	7.85	2.540
MAX	4.65	1.35	2.55	0.9	1.75	0.60	15.95	9.50	13.65	10.35	8.85	BSC
SYMBOLS	e1	H1	L	L1	Q	ϕP						
MIN	5.080	6.30	12.85	2.85	2.70	3.50						
MAX	BSC	6.65	13.50	3.25	2.90	3.70						