

Features

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

Product Summary



BVDSS	RDSON	ID
120V	6mΩ	125A

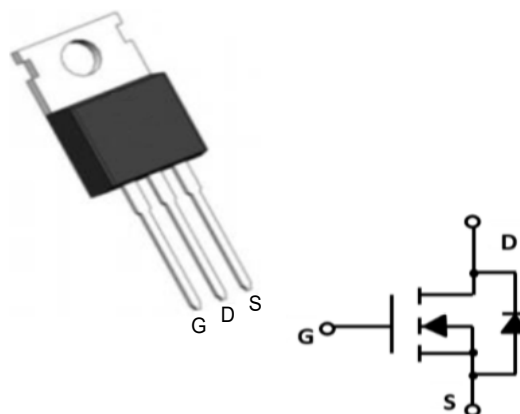
Applications

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

100% DVDS Tested

100% Avalanche Tested

TO-220AB Pin Configuration



Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		120	V
I_D	Continuous Drain Current	$T_C = 25\text{ }^{\circ}\text{C}$	125	A
	Continuous Drain Current	$T_C = 100\text{ }^{\circ}\text{C}$	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	$^{\circ}\text{C}$
T_L	Maximum Temperature for Soldering		260	$^{\circ}\text{C}$

Thermal Characteristics:

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

Electrical Characteristics (Tc= 25°C 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
t _r	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	--	

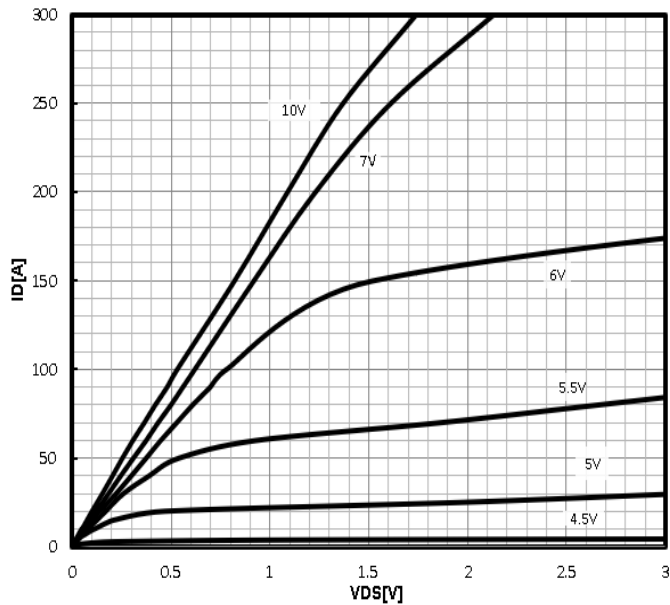
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I _S	Diode Forward Current	T _C =25 °C	--	--	95	A
V _{SD}	Diode Forward Voltage	I _S =20A, V _{GS} =0V	--	0.83	1.2	V
t _{rr}	Reverse Recovery time	I _S =40A, dI/dt=100A/μs	--	60	--	ns
Q _{rr}	Reverse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

a1: Repetitive rating; pulse width limited by maximum junction temperature

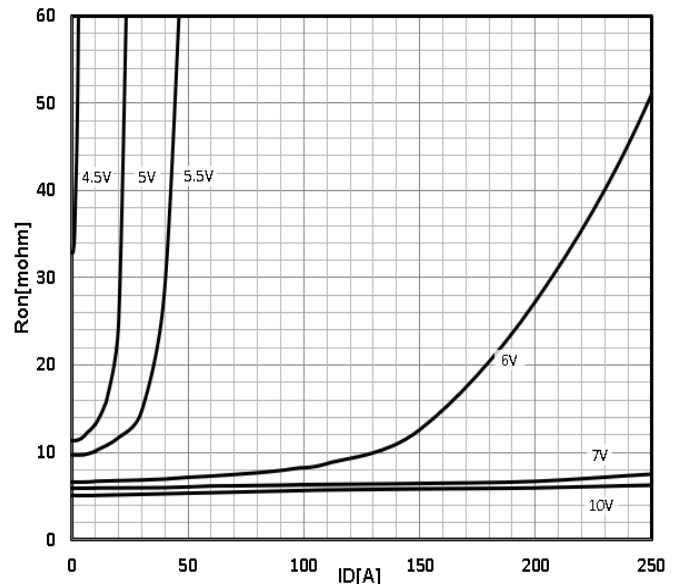
a2: VDD=60V, L=0.5mH, Rg=25Ω, Starting TJ=25 °C

Characteristics Curve:

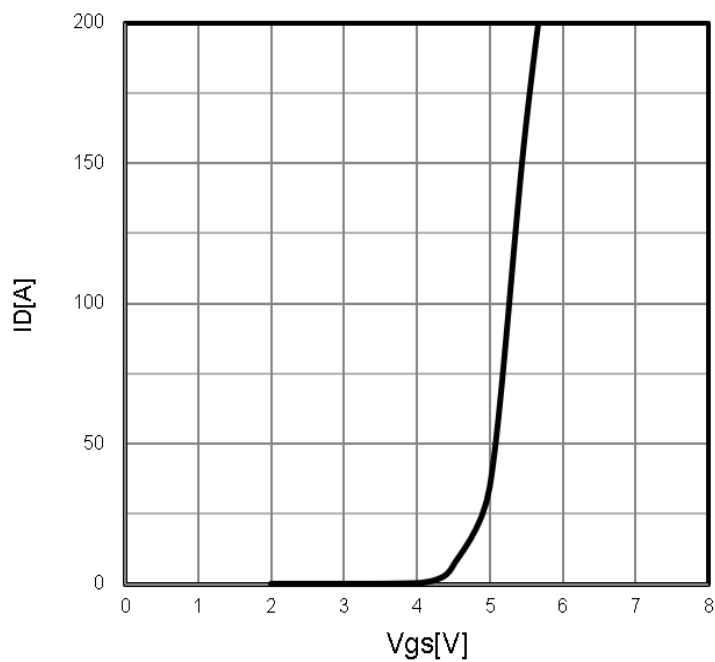
Typ. output characteristics
 $I_D = f(V_{DS})$



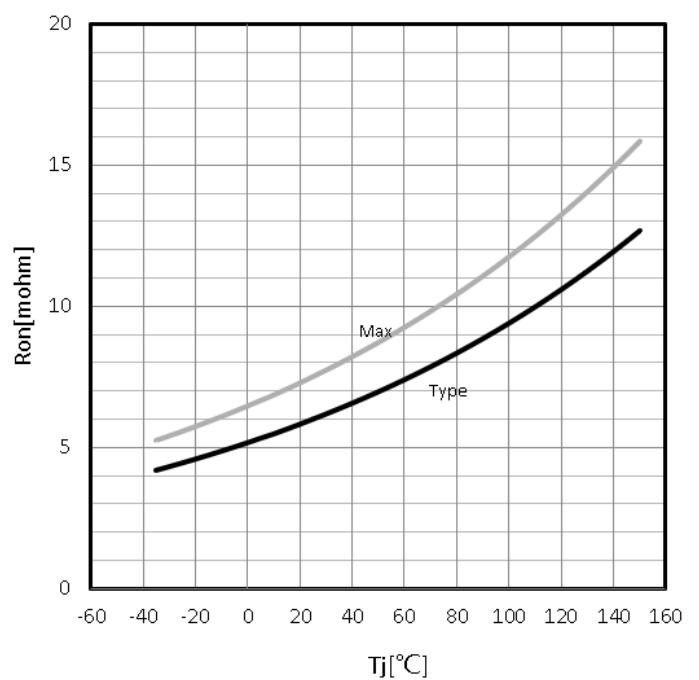
Typ. drain-source on resistance
 $R_{DS(on)} = f(I_D)$



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



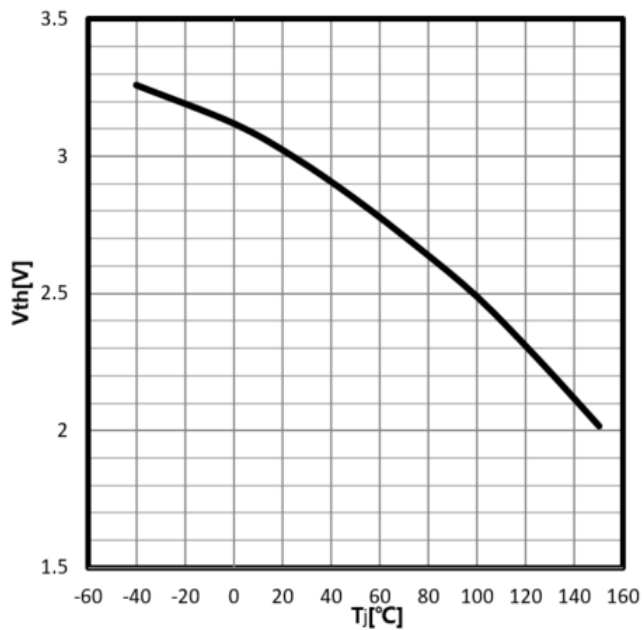
Drain-source on-state resistance
 $R_{DS(on)} = f(T_j); I_D = 20A; V_{GS} = 10V$



N-Ch 120V Fast Switching MOSFETs

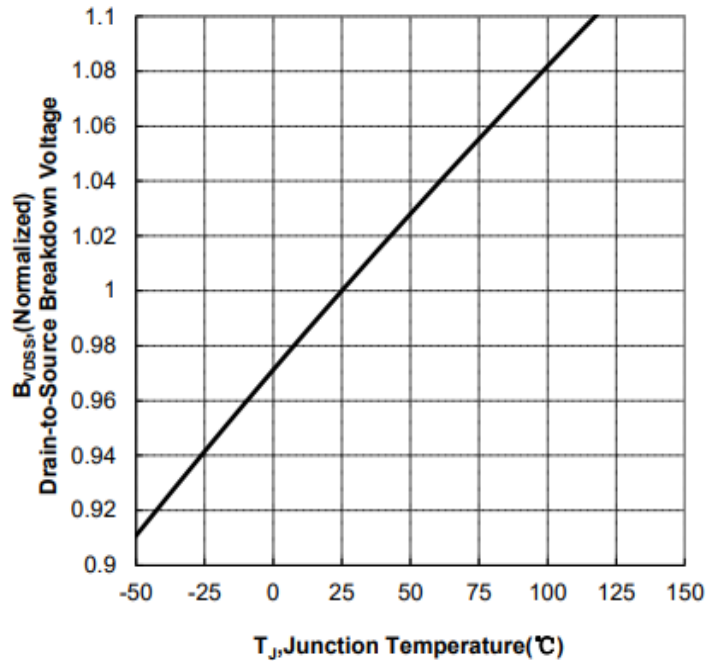
Gate Threshold Voltage

$$V_{TH}=f(T_j); I_D=250\mu A$$



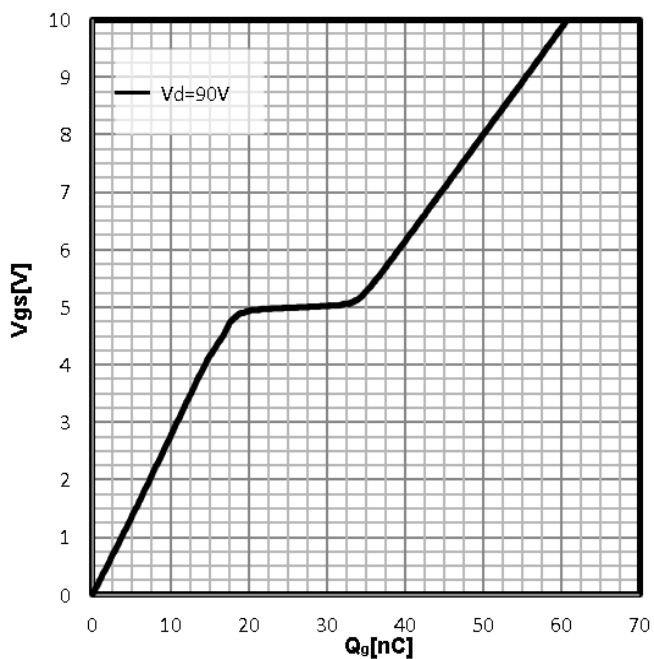
Drain-source breakdown voltage

$$V_{BR(DSS)}=f(T_j); I_D=250\mu A$$



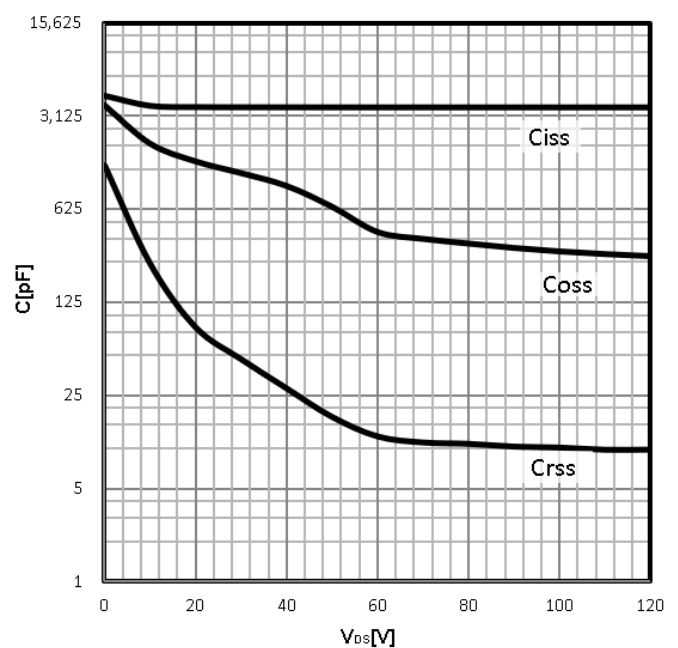
Typ. gate charge

$$V_{GS}=f(Q_{gate})$$



Typ. capacitances

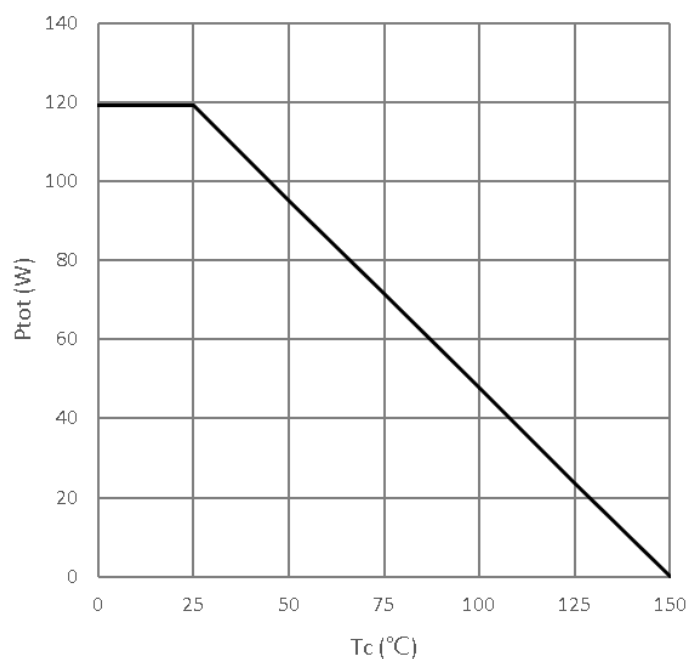
$$C=f(V_{DS}); V_{GS}=0V; f=1MHz$$



N-Ch 120V Fast Switching MOSFETs

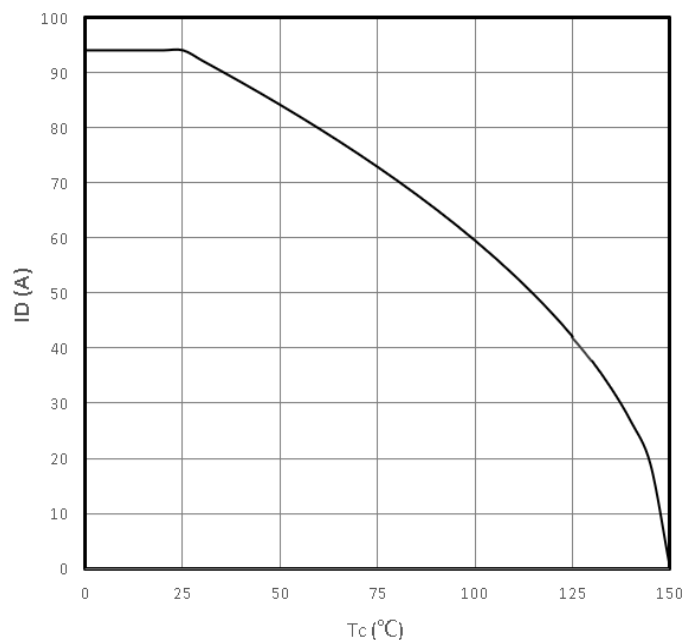
Power Dissipation

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



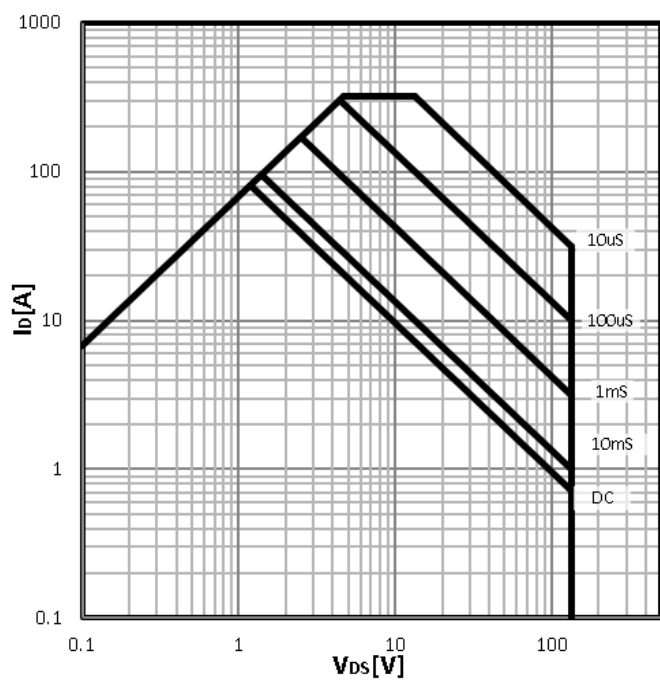
Maximum Drain Current

$$I_D=f(T_c)$$



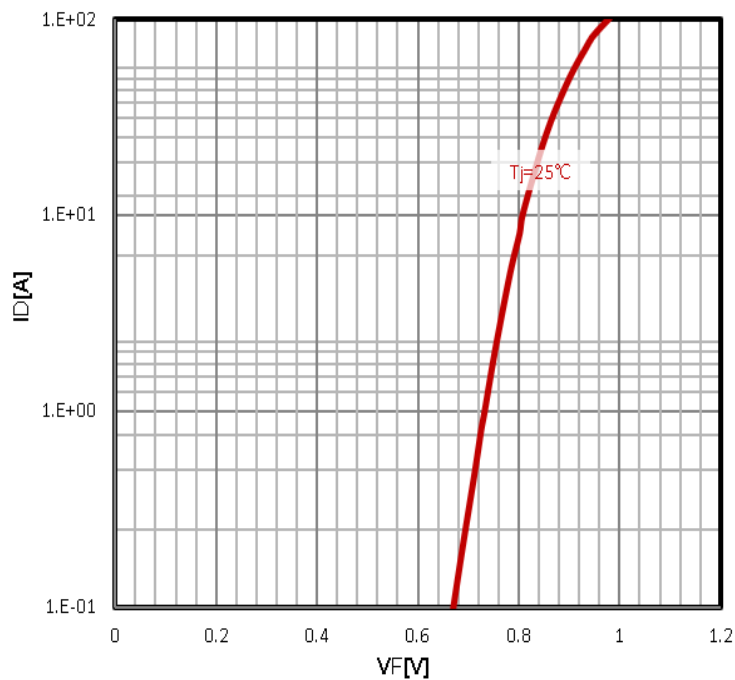
Safe operating area

$$I_D=f(V_{DS})$$



Body Diode Forward Voltage Variation

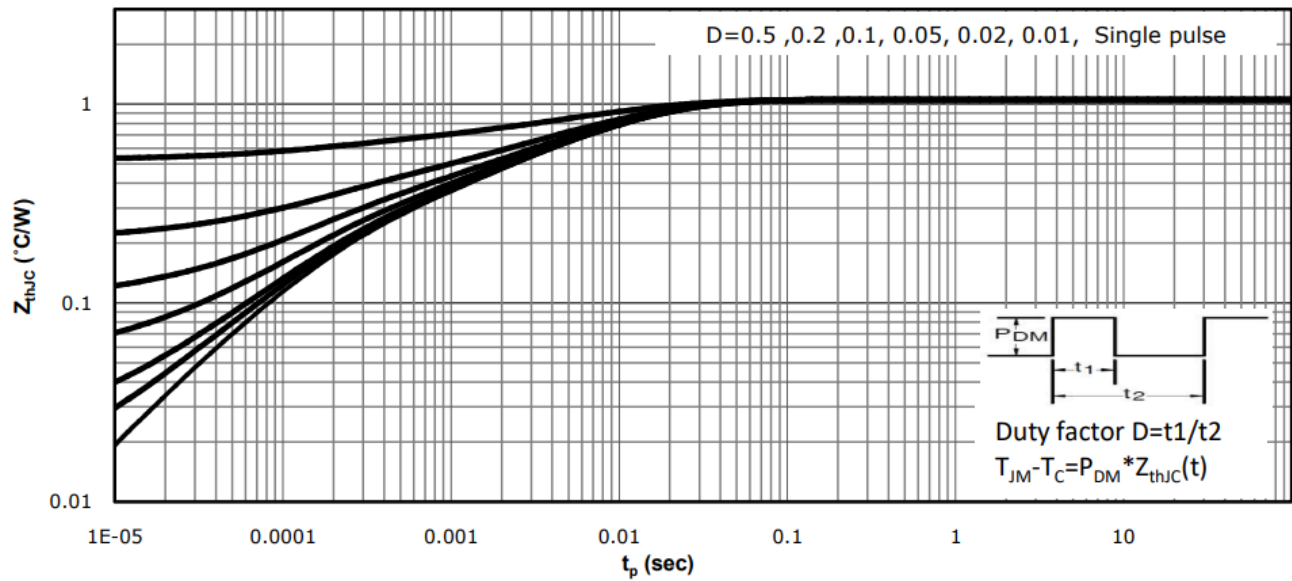
$$I_F=f(V_{GS})$$



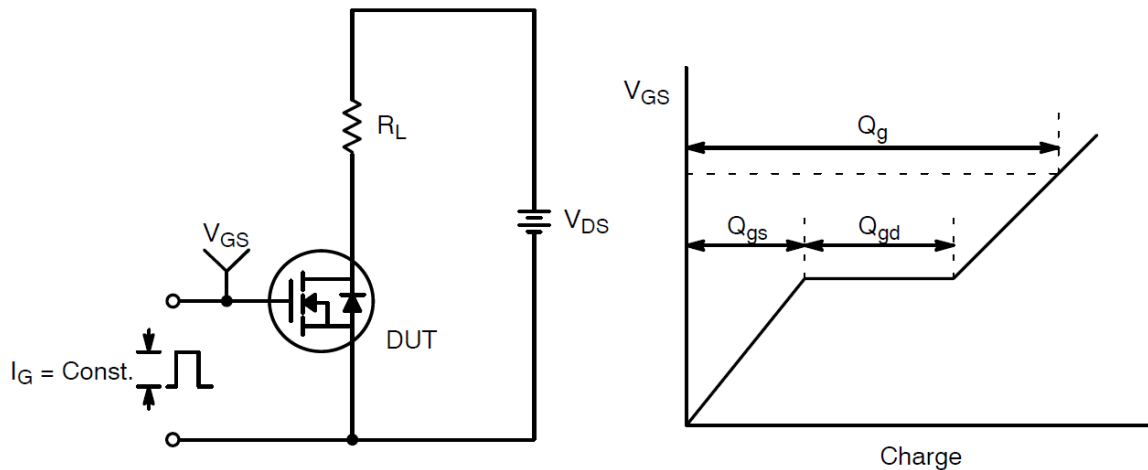


Max. transient thermal impedance

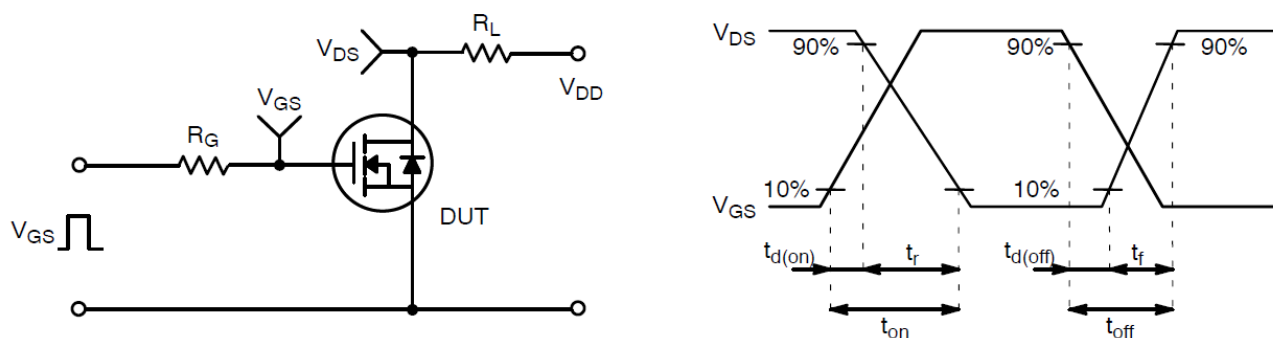
$$Z_{thJC}=f(t_p)$$



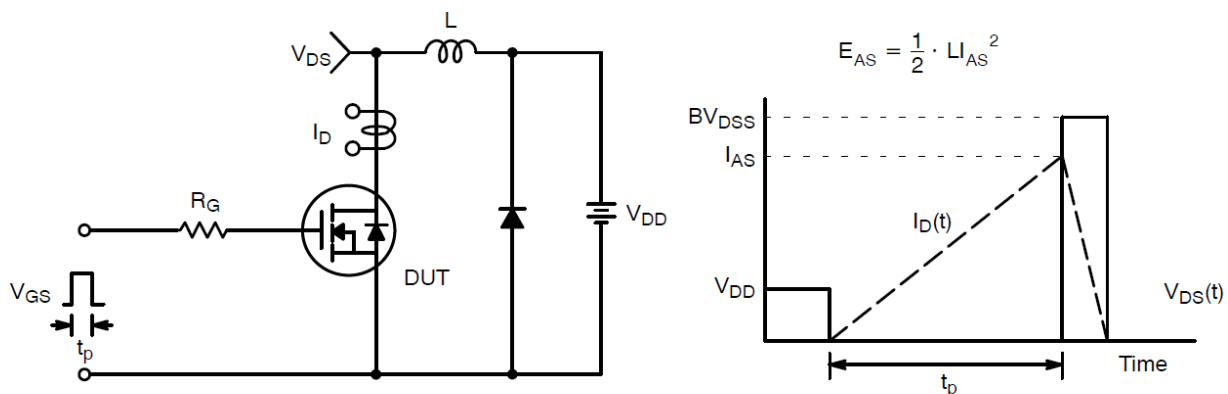
Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform

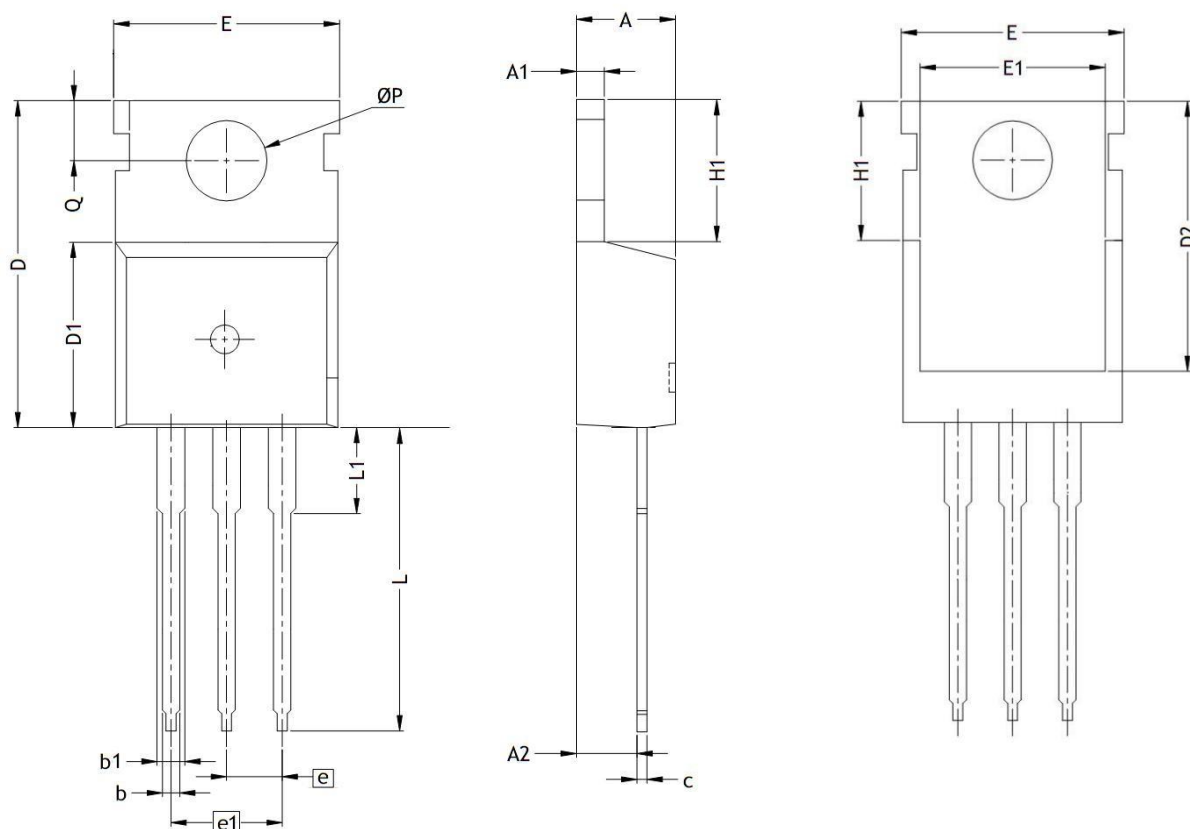


Resistive Switching Test Circuit & Waveforms



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						