

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

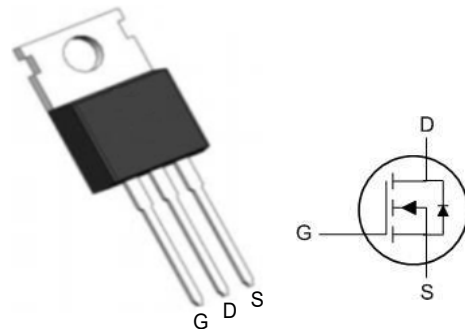
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Product Summary



BVDSS	RDSON	ID
100V	8.5mΩ	70A

TO220 Pin Configuration



Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		100	V
I_D	Continuous Drain Current	$T_C = 25\text{ }^\circ\text{C}$	70	A
	Continuous Drain Current	$T_C = 100\text{ }^\circ\text{C}$	45	A
I_{DM}^{a1}	Pulsed Drain Current		280	A
E_{AS}^{a2}	Single pulse avalanche energy		110	mJ
V_{GS}	Gate-to-Source Voltage		± 20	V
P_D	Power Dissipation		100	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	1.25	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	64	$^\circ\text{C/W}$

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Electrical Characteristics (TA= 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	100	--	--	V
I _{DSS}	Drain to Source Leakage Current	V _{DS} =100V, V _{GS} =0V	--	--	1	μA
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} =+20V, V _{DS} =0V	--	--	100	nA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} =-20V, V _{DS} =0V	--	--	-100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.3	1.8	2.3	V
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =10V, I _D =20A	--	8.5	10.5	mΩ
		V _{GS} =4.5V, I _D =15A		9.5	15	mΩ

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 50V f = 1.0MHz	--	1368	--	pF
C _{oss}	Output Capacitance		--	451	--	
C _{rss}	Reverse Transfer Capacitance		--	12.9	--	
R _g	Gate resistance	V _{GS} =0V, V _{DS} Open	--	0.48	--	Ω

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D = 10A V _{DS} = 50V V _{GS} = 10V R _G = 4Ω	--	16	--	ns
t _r	Rise Time		--	10	--	
t _{d(OFF)}	Turn-Off Delay Time		--	40	--	
t _f	Fall Time		--	6	--	
Q _g	Total Gate Charge	V _{GS} = 10V	--	31.3	--	nC
Q _{gs}	Gate Source Charge	V _{DS} = 50V	--	3.49	--	
Q _{gd}	Gate Drain Charge	I _D = 10A	--	7.63	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Value
			Min.	Typ.	Max.	
I _S	Diode Forward Current	T _C = 25 °C	--	--	70	A
V _{SD}	Diode Forward Voltage	I _S =10A, V _{GS} =0V	--	--	1.2	V
t _{rr}	Reverse Recovery time	I _S =10A, V _{DD} =50V dI/dt=100A/μs	--	103	--	ns
Q _{rr}	Reverse Recovery Charge		--	187	--	nC

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

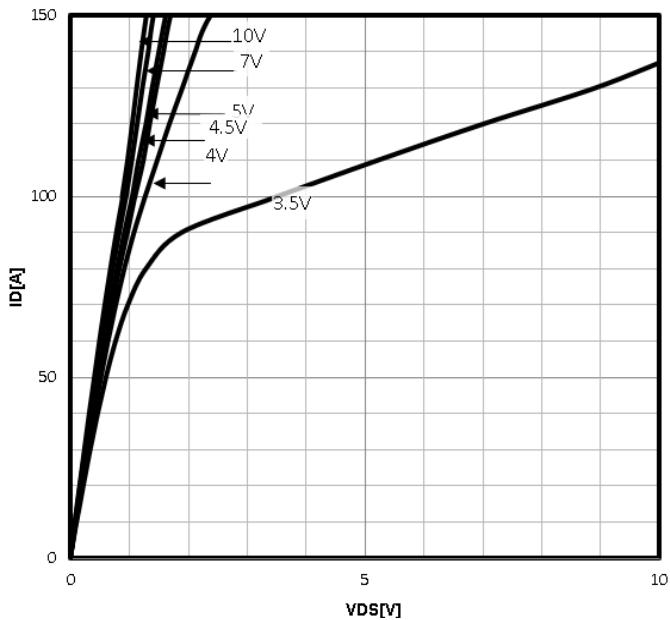
a₂: VDD=50V, L=0.3mH, R_g=25Ω, Starting T_J=25 °C



Characteristics Curve:

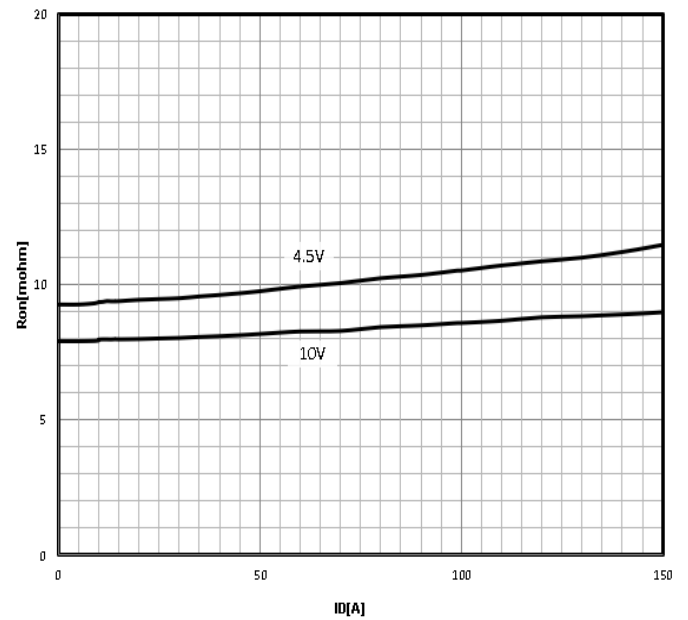
Typ. output characteristics

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



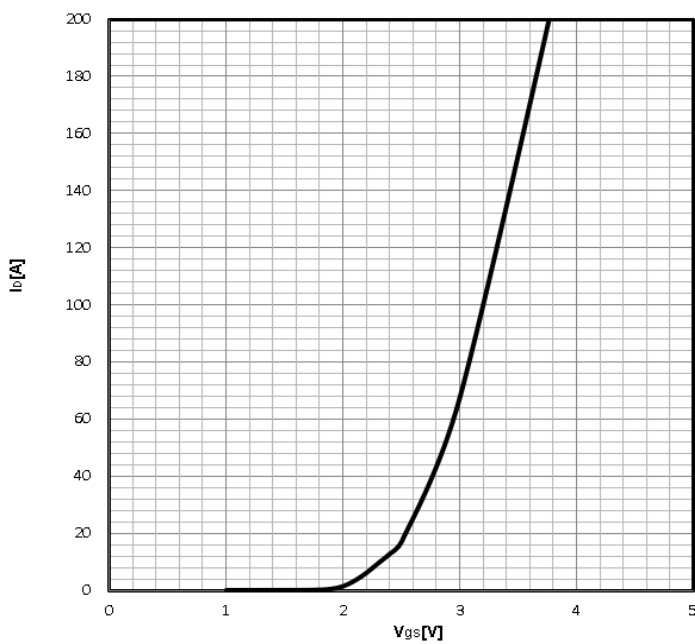
Typ. drain-source on resistance

$$R_{DS(on)} = f(I_D)$$



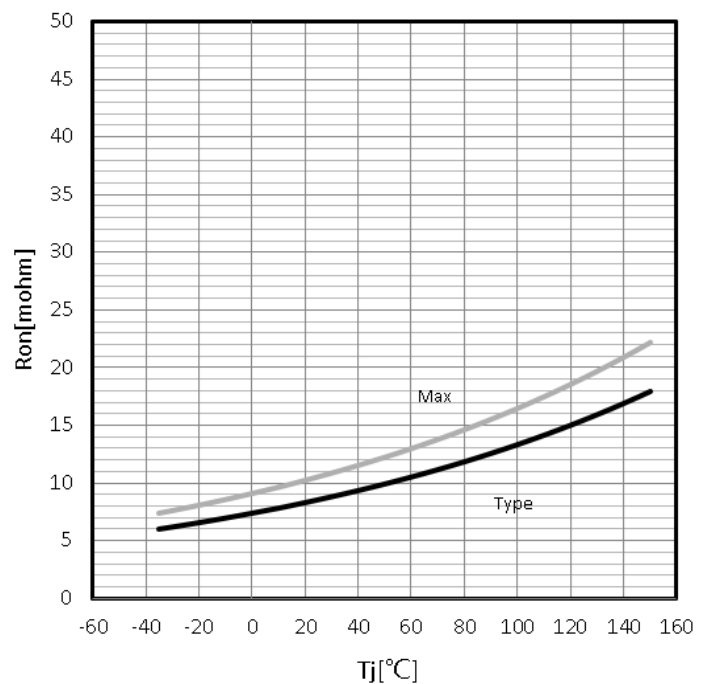
Typ. transfer characteristics

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



Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = 20A; V_{GS} = 10V$$

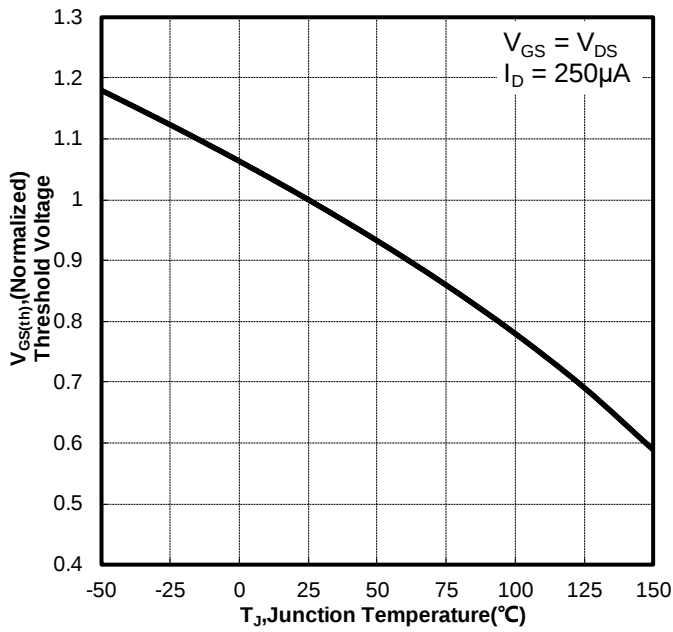




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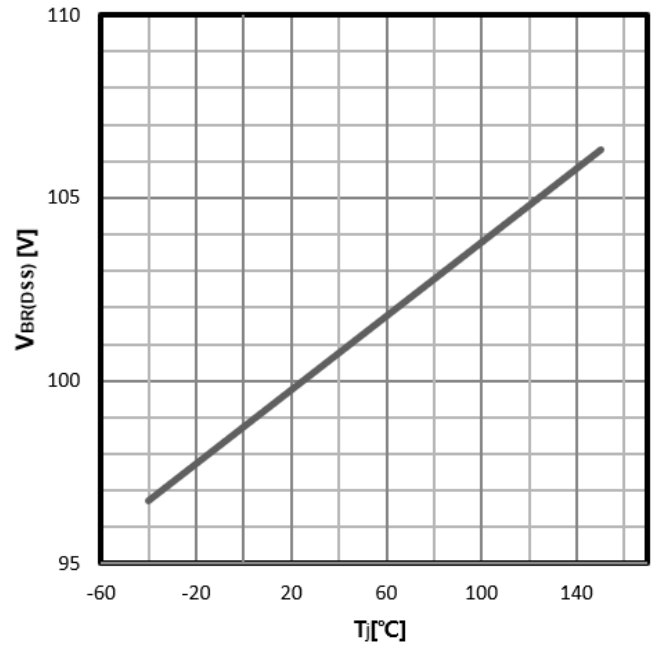
Gate Threshold Voltage

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



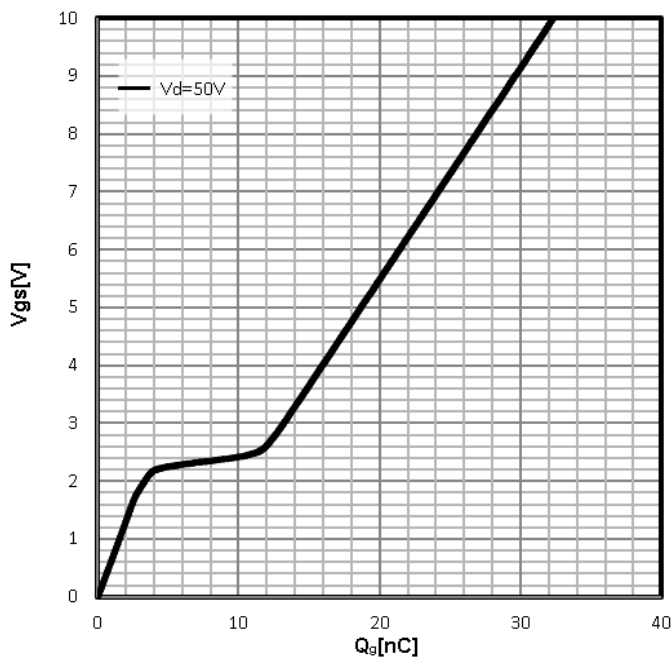
Drain-source breakdown voltage

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



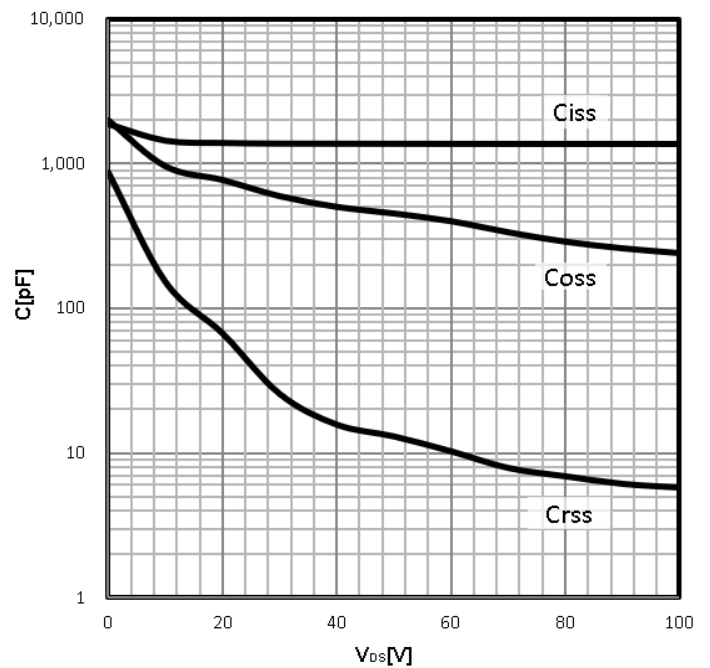
Typ. gate charge

$$V_{GS}=f(Q_g); I_D=10A$$



Typ. capacitances

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

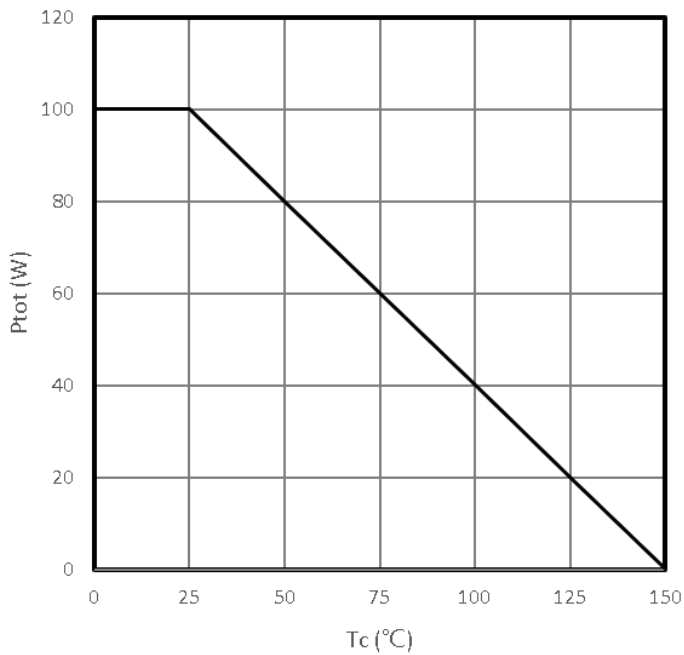




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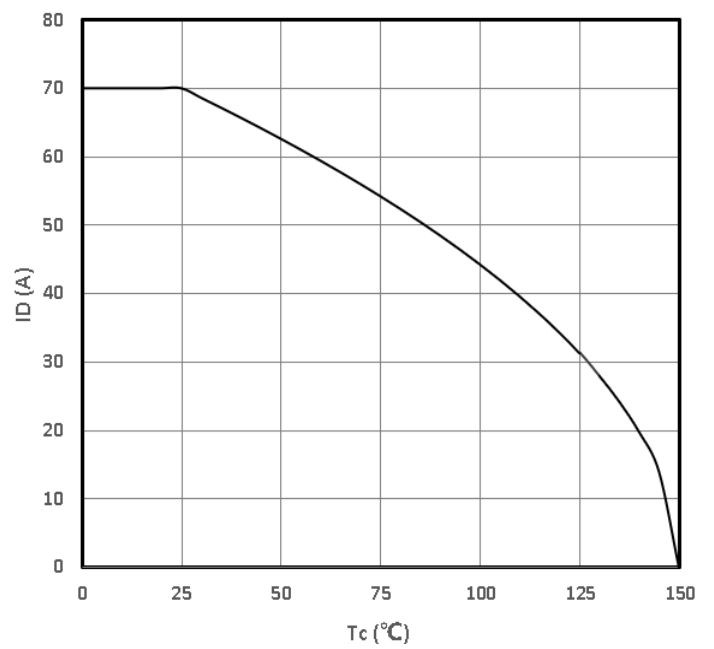
Power Dissipation

$$P_{\text{tot}} = f(T_C)$$



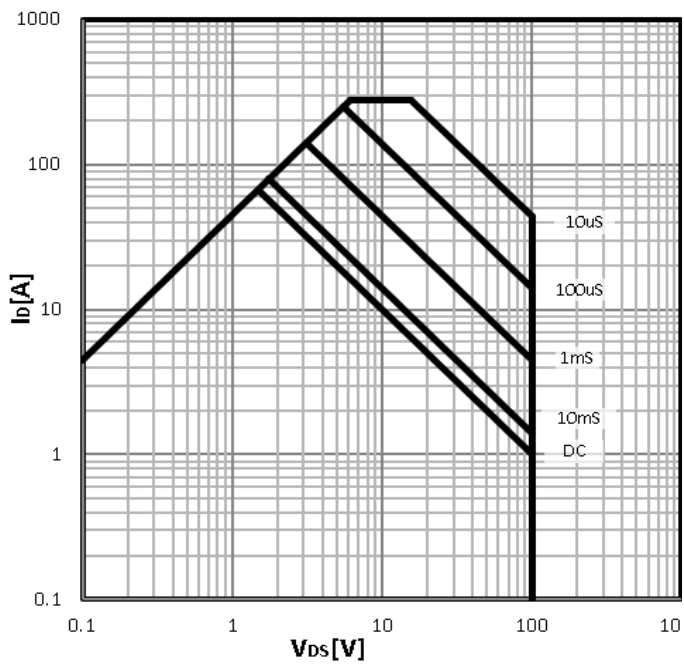
Maximum Drain Current

$$I_D = f(T_C)$$



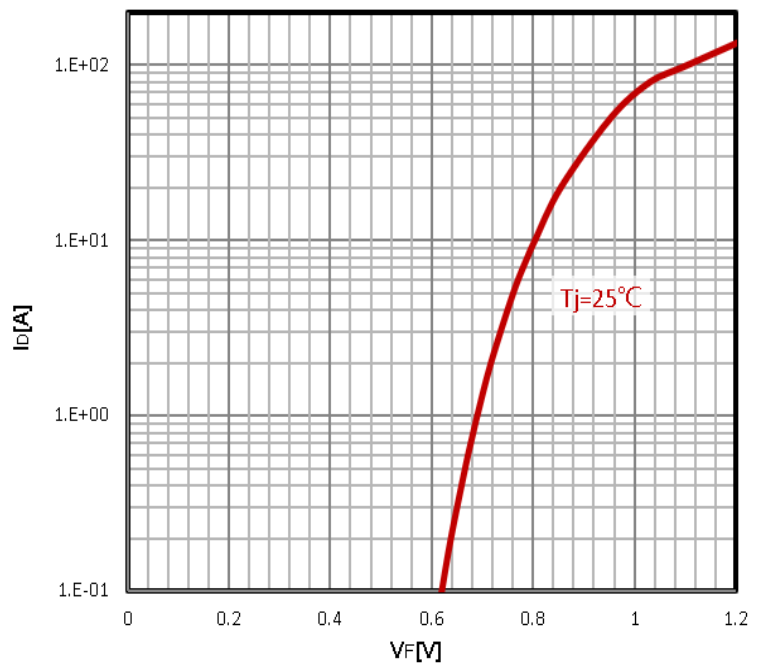
Safe operating area

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



Body Diode Forward Voltage Variation

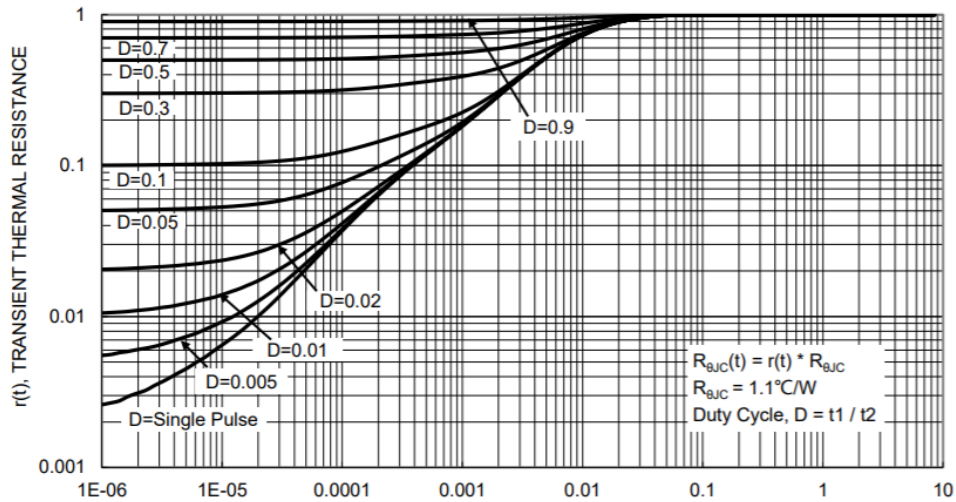
$$I_F = f(V_{GS})$$





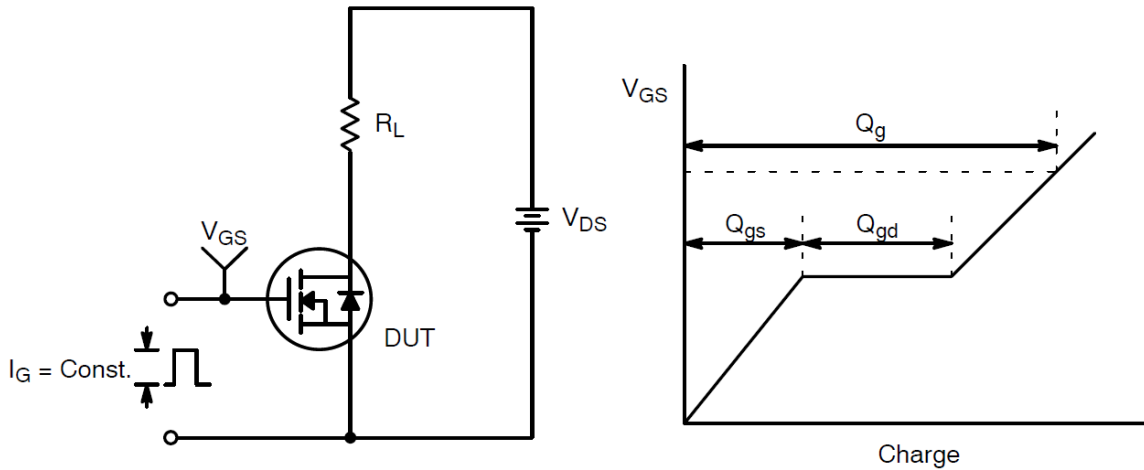
Max. transient thermal impedance

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

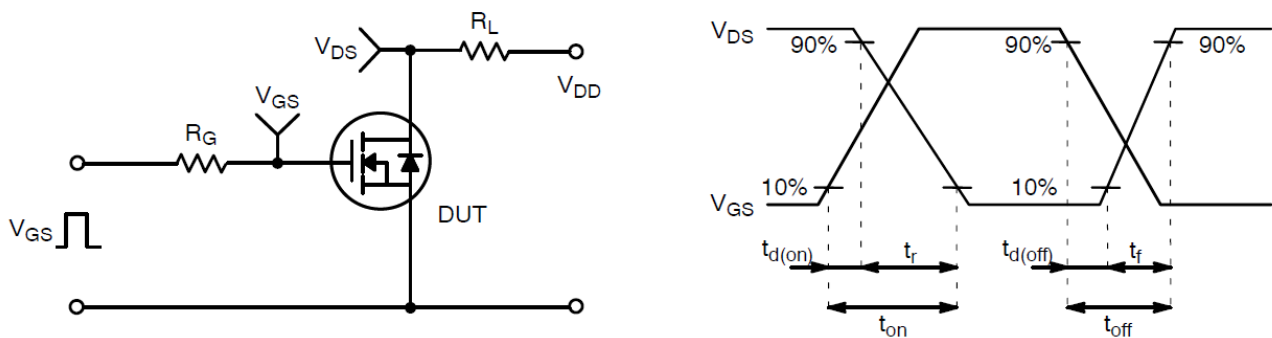




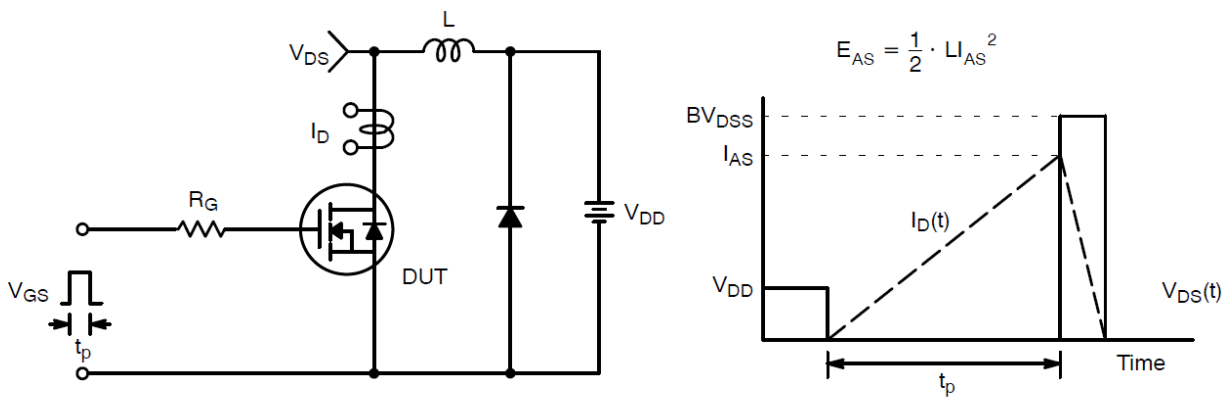
Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform

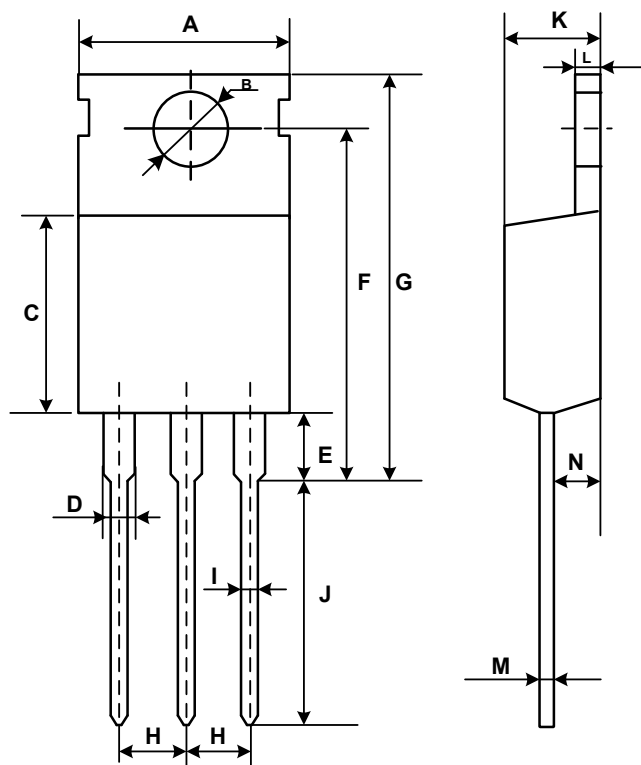


Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

Mechanical Dimensions for TO-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