P-Ch 100V Fast Switching MOSFETs

Features

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

Product Summary

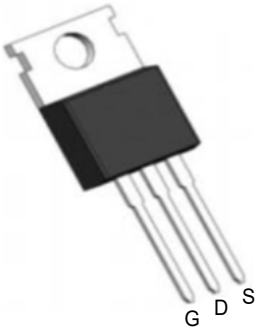
Green

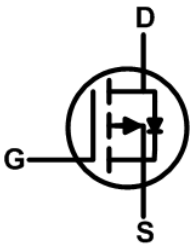
BVDSS	RDSON	ID
-100V	12.5mΩ	-120A

Applications

- Battery switching application
- Hard switched and high frequency circuits
- Power management

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℃	Continuous Drain Current, V_{GS} @ 10V[1,6]	-120	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1,6]	-64	A
I_{DM}	Pulsed Drain Current[2]	-600	A
EAS	Single Pulse Avalanche Energy[3]	1458	mJ
I_{AS}	Avalanche Current	---	A
P_D@T_C=25℃	Total Power Dissipation[4]	300	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	60	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	0.45	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-100	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	---	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-22A	---	12.5	15.6	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-2	-3	-4	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-100V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-100V, V_{GS}=0V , T_J=100℃	---	---	---	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-10V , I_D=-5A	---	---	---	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=-5A	---	136	---	nC
Q_{gs}	Gate-Source Charge		---	36	---	
Q_{gd}	Gate-Drain Charge		---	24.8	---	
$T_{d(on)}$	Turn-On Delay Time	V_{GS}=-10V, V_{DS}=-50V, I_D=-22A, R_G=1Ω	---	18	---	ns
T_r	Rise Time		---	43	---	
$T_{d(off)}$	Turn-Off Delay Time		---	125	---	
T_f	Fall Time		---	43	---	
C_{iss}	Input Capacitance	V_{DS}=-50V , V_{GS}=0V , f=1MHz	---	9349	---	pF
C_{oss}	Output Capacitance		---	798	---	
C_{rss}	Reverse Transfer Capacitance		---	111.2	---	

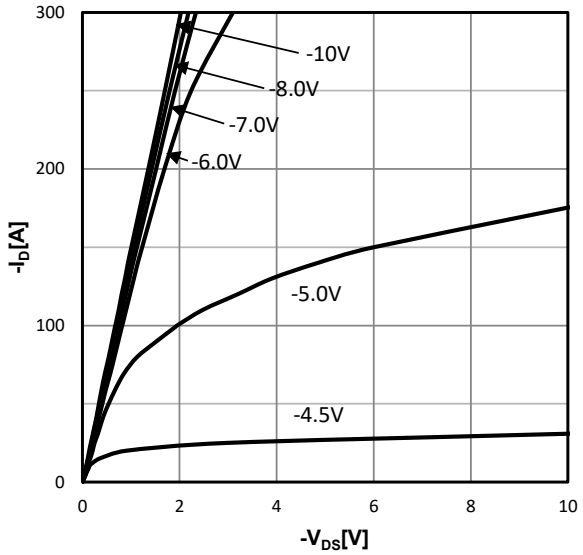
Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	-120	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-20A , T_J=25℃	---	---	-1.2	V
t_{rr}	Reverse Recovery Time	IF=-20A , di/dt=100A/μs , T_J=25℃	---	107	---	nS
Q_{rr}	Reverse Recovery Charge		---	216.8	---	nC

a1：Repetitive rating; pulse width limited by maximum junction temperature a2：V_{DD}=-50V,L=1mH, R_G=25Ω, Starting T_j=25℃

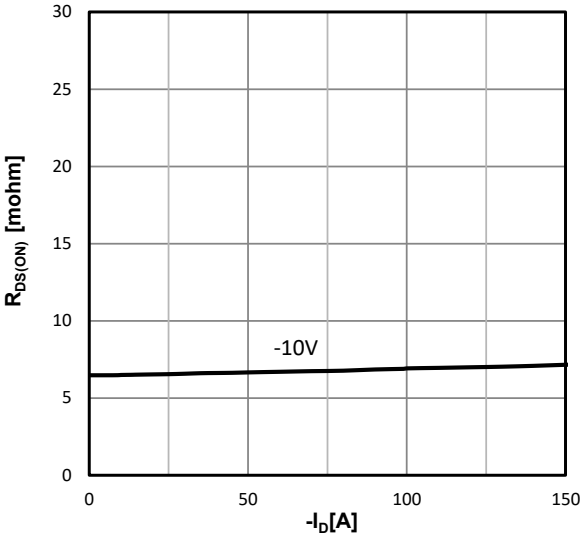
Characteristics Curve:

Figure 1: Typ. output characteristics



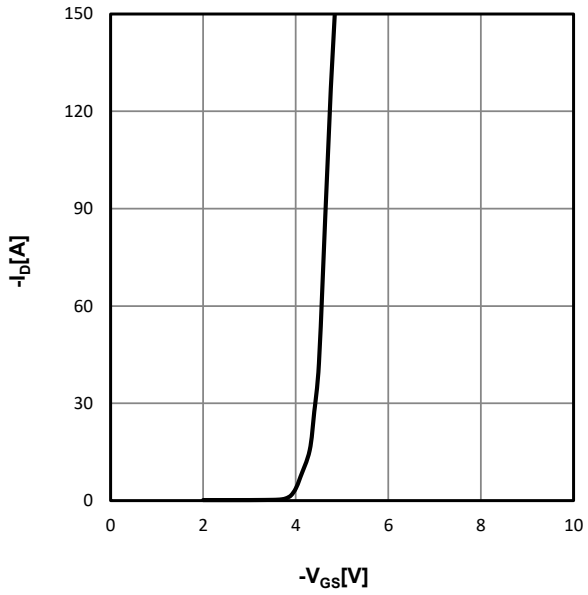
$I_D=f(V_{DS})$, T_j=25 °C; parameter: V_{GS}

Figure 2: Typ. drain-source on resistance



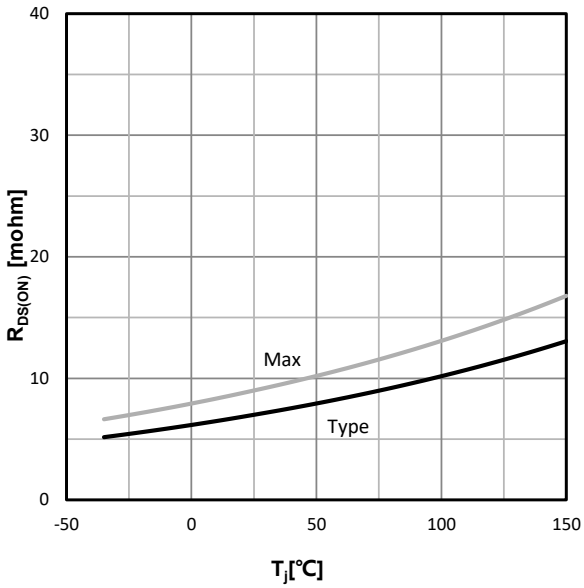
$R_{DS(on)}=f(I_D)$, T_j=25 °C; parameter: V_{GS}

Figure 3: Typ. transfer characteristics



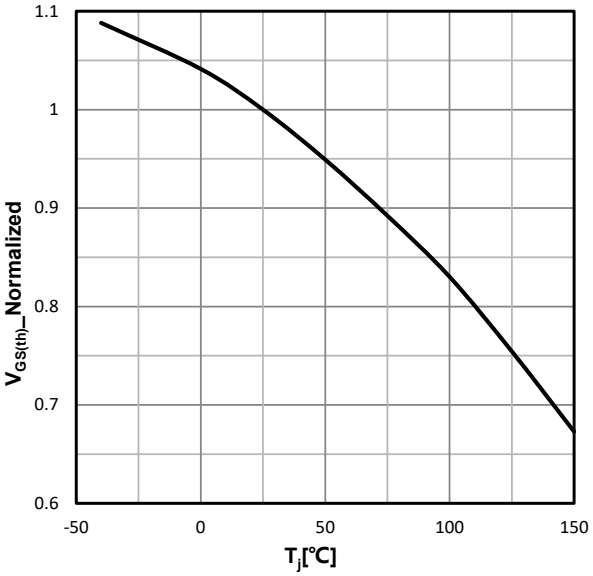
$I_D=f(V_{GS})$, $|V_{DS}|>2|I_D|R_{DS}(on)max$;

Figure 4: drain-source on resistance



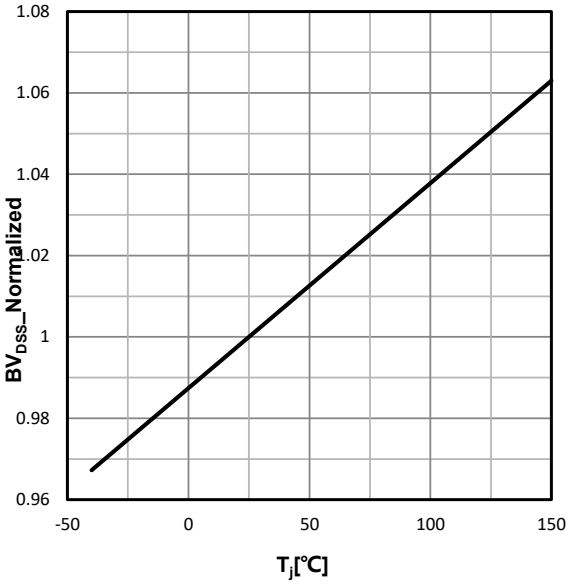
$R_{DS(on)}=f(T_j)$, I_D=-20A, V_{GS}=-10V;

Figure 5: Typ. gate threshold voltage



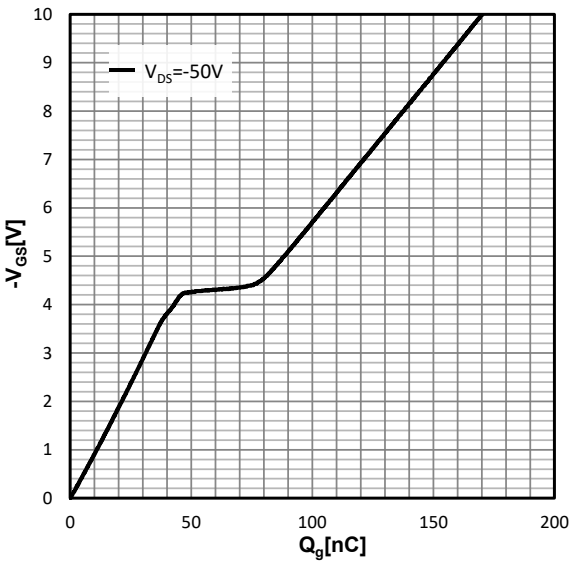
$V_{GS}=f(T_j)$, $V_{GS}=V_{DS,}$ I_D=-250μA;

Figure 6: Drain-source breakdown voltage



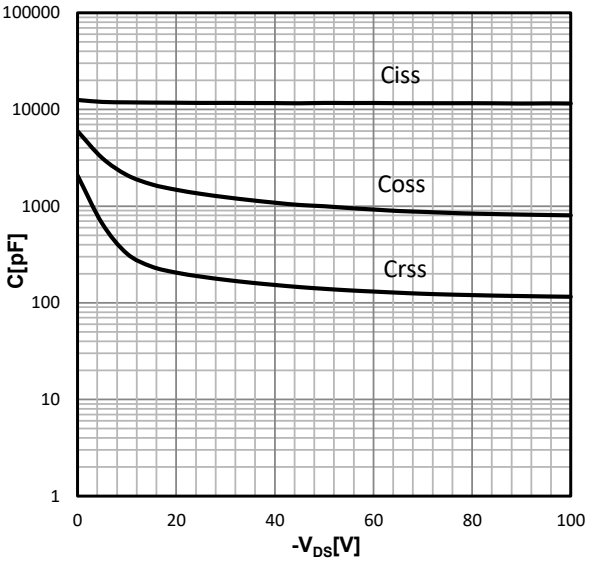
$V_{BR(DSS)}=f(T_j)$; I_D=-250μA;

Figure 7: Typ. gate charge



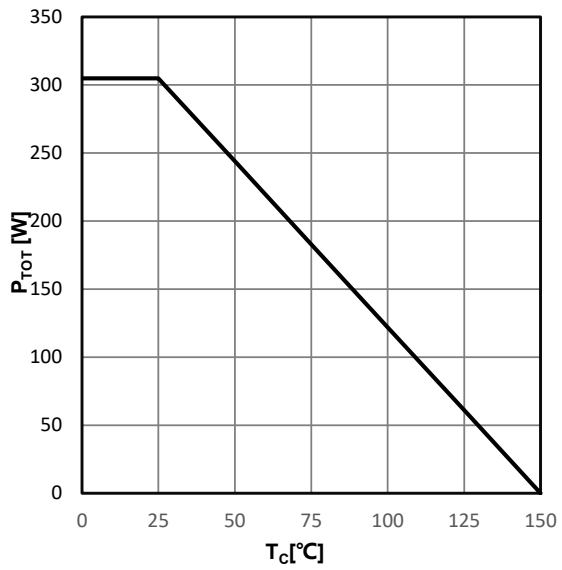
$V_{GS}=f(Q_g)$, I_D=-20A, T_j=25 °C; parameter: V_{DS}

Figure 8: Typ. Capacitances



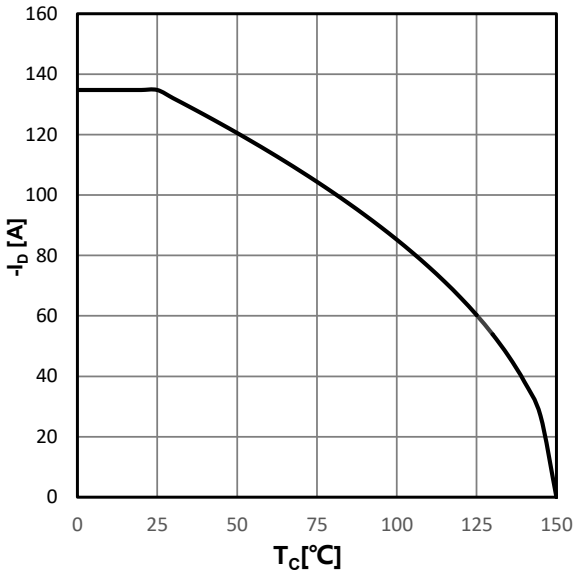
$C=f(V_{DS})$; V_{GS}=0V; f=1.0 MHz;

Figure 9: Power dissipation



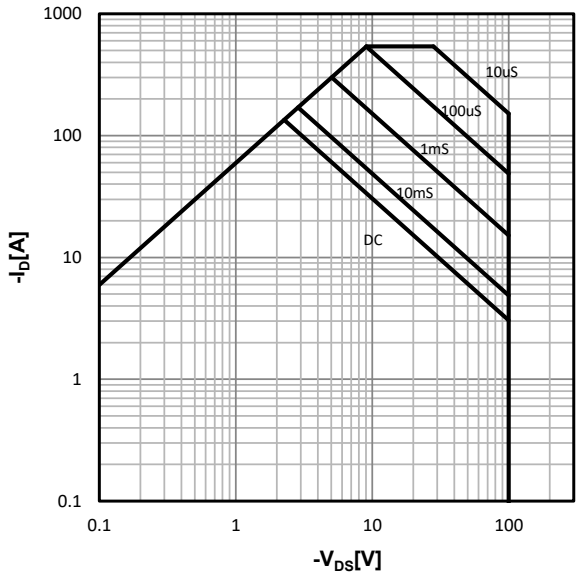
$P_{tot}=f(T_C)$;

Figure 10:Drain current



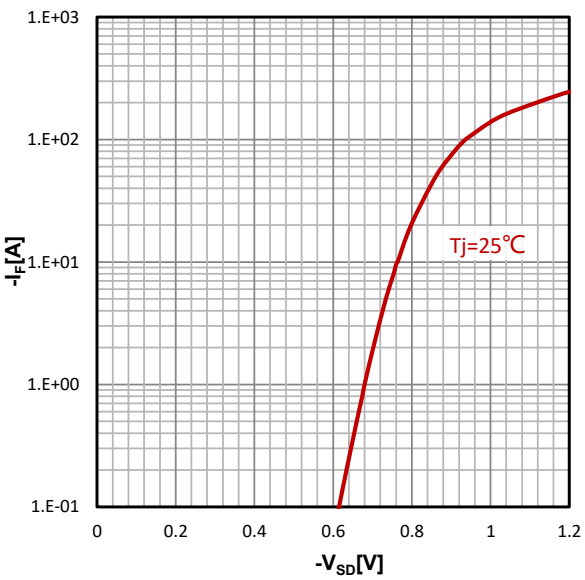
$I_D=f(T_C)$;

Figure 11: Safe operating area



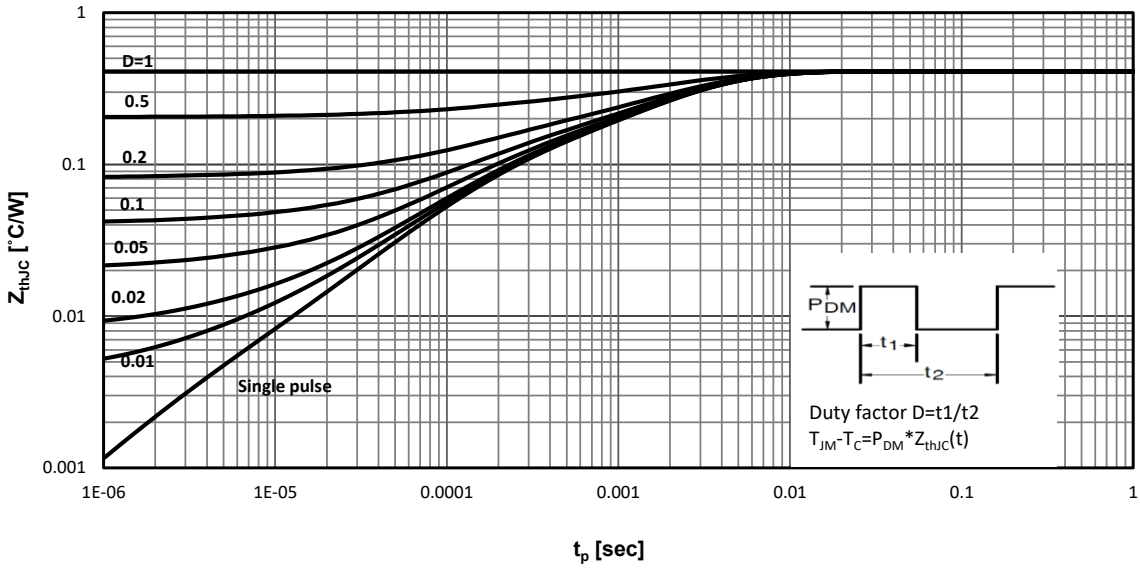
$I_D=f(V_{DS})$; T_C=25 °C; D=0; parameter: tp

Figure 12: Typ. forward characteristics



$I_F=f(V_{SD})$;

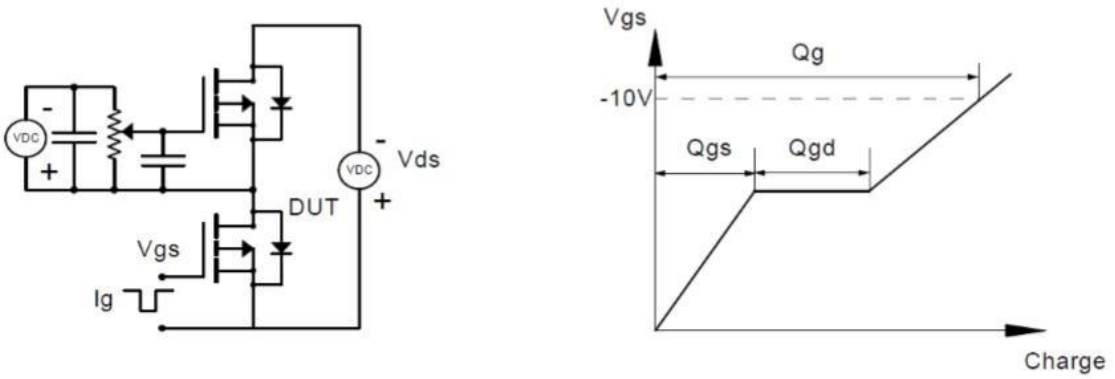
Figure 13: Max. Transient Thermal Impedance



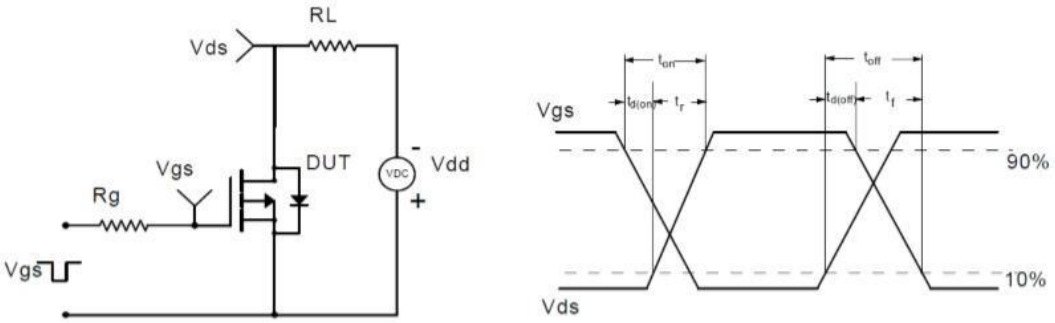
$Z_{thJC}=f(t_p)$; parameter: D

Test Circuit and Waveform:

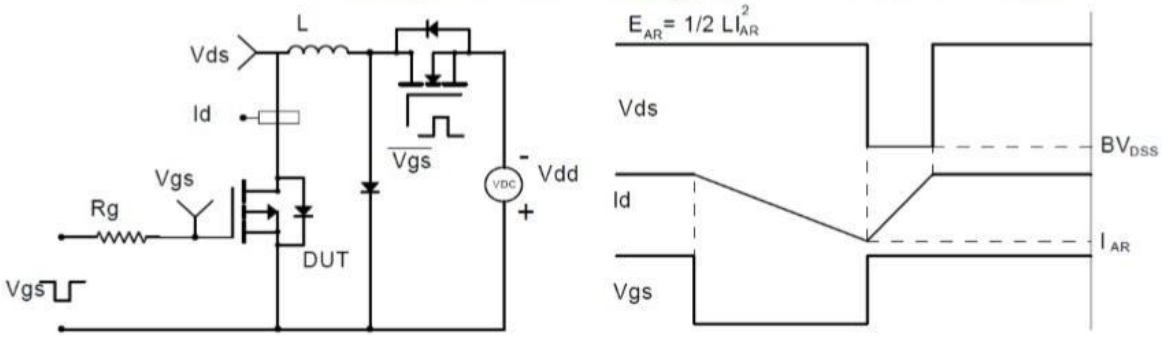
Gate Charge Test Circuit & Waveform



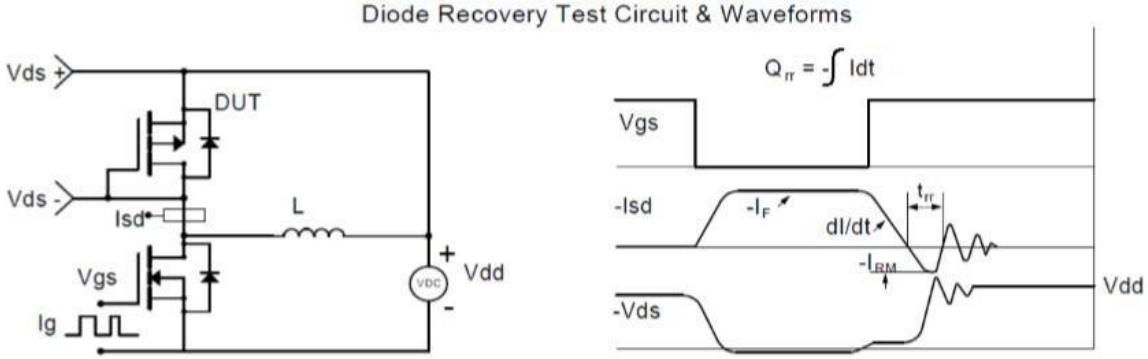
Resistive Switching Test Circuit & Waveforms



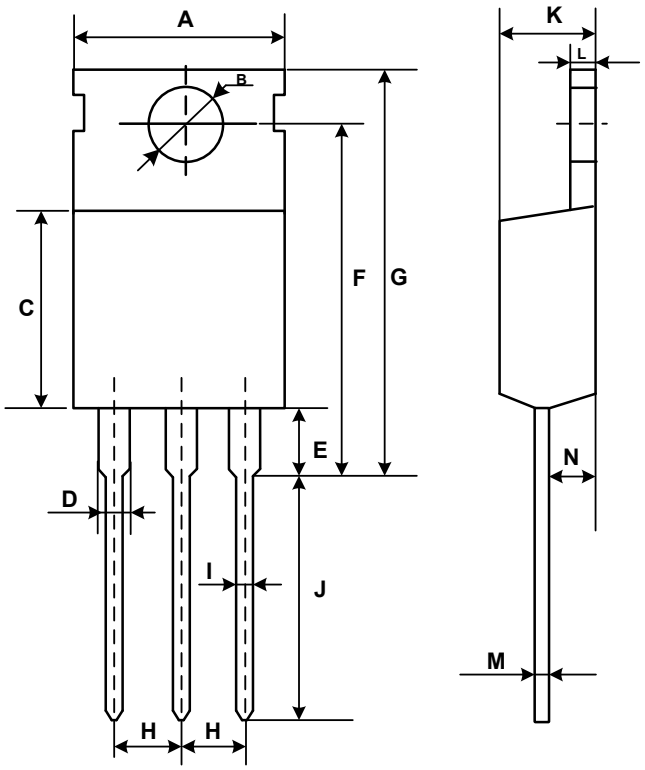
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Mechanical Dimensions for TO-220



OMMON 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