

Features

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

Product Summary

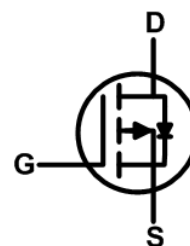
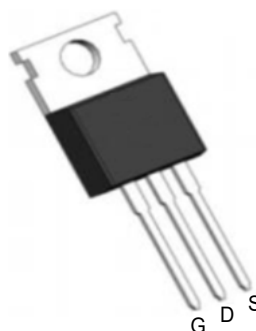


BVDSS	RDSON	ID
-100V	6mΩ	-150A

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
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	-150	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	-94	A
I_{DM}	Pulsed Drain Current ²	-600	A
EAS	Single Pulse Avalanche Energy ³	1232	mJ
I_{AS}	Avalanche Current	---	A
$P_D @ T_C = 25^\circ\text{C}$	Total Power Dissipation ⁴	305	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	0.4	$^\circ\text{C/W}$

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=-250\mu A$	-100	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	---	---	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-10V$, $I_D=-22A$	---	6	8	m Ω
		$V_{GS}=-4.5V$, $I_D=-22A$	---	---	---	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=-250\mu A$	-2	-3	-4	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	mV/ $^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-100V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=-100V$, $V_{GS}=0V$, $T_J=100^\circ\text{C}$	---	---	---	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=-10V$, $I_D=-5A$	---	---	---	S
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1MHz$	---	1.7	---	Ω
Q_g	Total Gate Charge	$V_{DS}=-50V$, $V_{GS}=-10V$, $I_D=-5A$	---	170	---	nC
Q_{gs}	Gate-Source Charge		---	45	---	
Q_{gd}	Gate-Drain Charge		---	31	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{GS}=-10V$, $V_{DS}=-50V$, $I_D=-22A$, $R_G=1\Omega$	---	15	---	ns
T_r	Rise Time		---	35	---	
$T_{d(off)}$	Turn-Off Delay Time		---	100	---	
T_f	Fall Time		---	35	---	
C_{iss}	Input Capacitance	$V_{DS}=-50V$, $V_{GS}=0V$, $f=1MHz$	---	11687	---	pF
C_{oss}	Output Capacitance		---	998	---	
C_{rss}	Reverse Transfer Capacitance		---	139	---	

Diode Characteristics

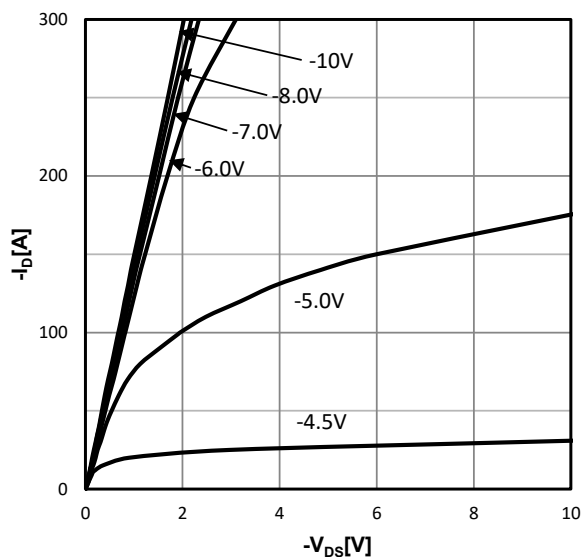
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	-150	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=-22A$, $T_J=25^\circ\text{C}$	---	---	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F=-22A$, $di/dt=100A/\mu s$,	---	86	---	nS
Q_{rr}	Reverse Recovery Charge	$T_J=25^\circ\text{C}$	---	271	---	nC

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

a2: $V_{DD}=-70V$, $L=0.1mH$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

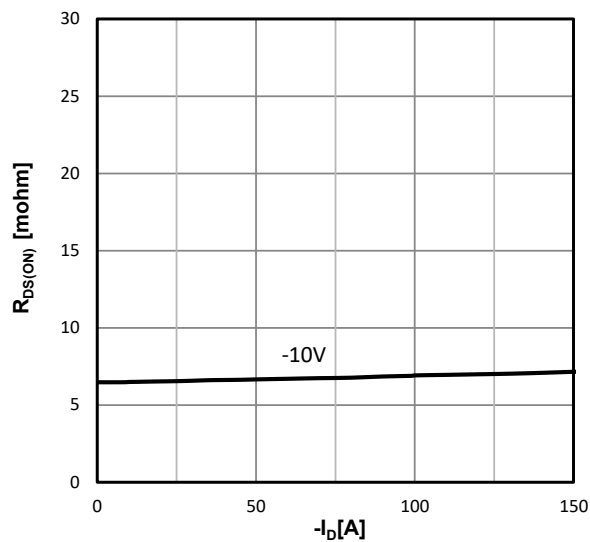
Characteristics Curve:

Figure 1: Typ. output characteristics



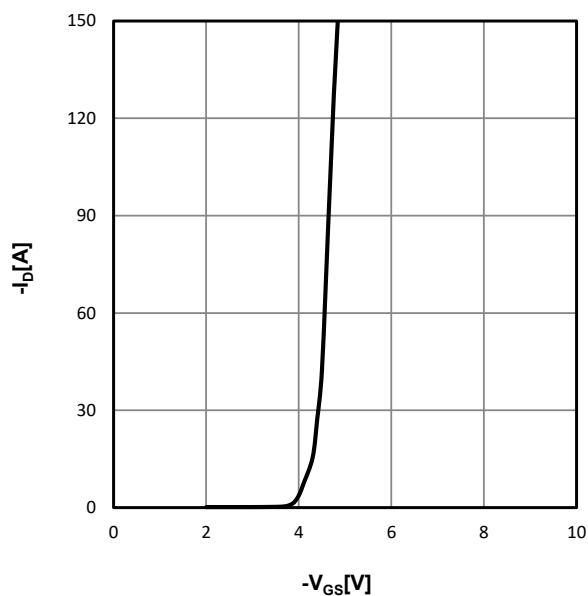
$$I_D = f(V_{DS}), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$$

Figure 2: Typ. drain-source on resistance



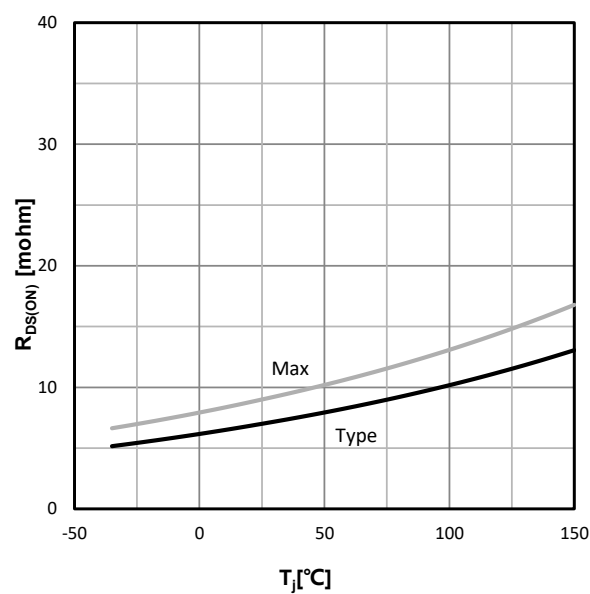
$$R_{DS(on)} = f(I_D), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$$

Figure 3: Typ. transfer characteristics



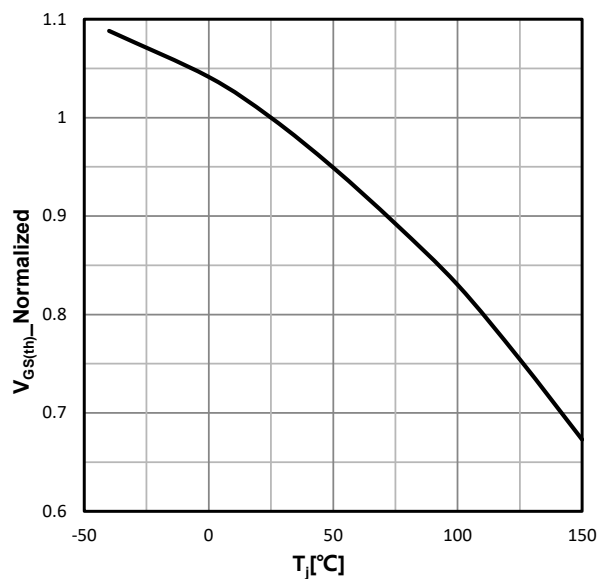
$$I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)max};$$

Figure 4: drain-source on resistance



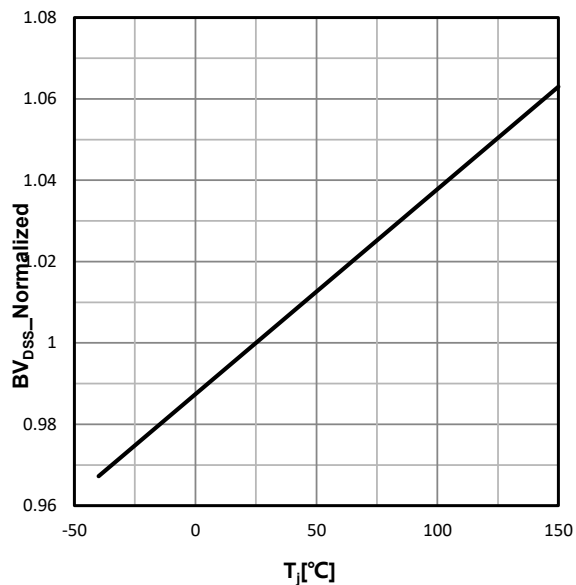
$$R_{DS(on)} = f(T_j), I_D = -20\text{A}, V_{GS} = -10\text{V};$$

Figure 5: Typ. gate threshold voltage



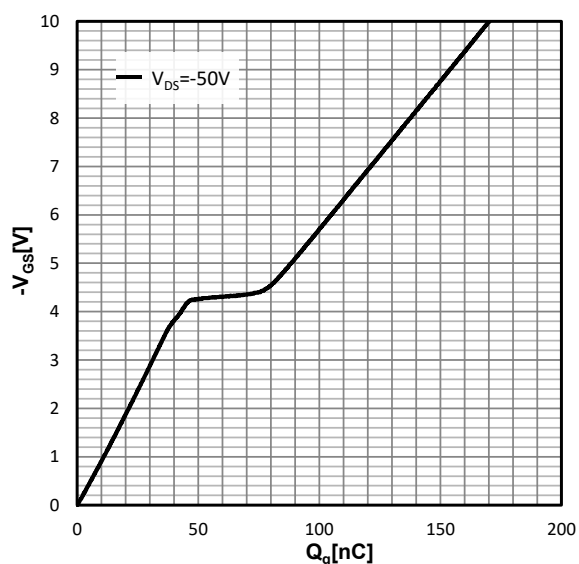
$$V_{GS}=f(T_j), V_{GS}=V_{DS}, I_D=-250\mu A;$$

Figure 6: Drain-source breakdown voltage



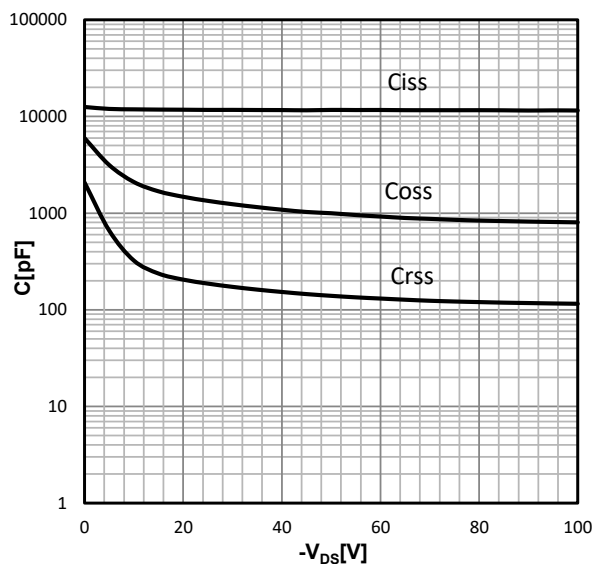
$$V_{BR(DSS)}=f(T_j); I_D=-250\mu A;$$

Figure 7: Typ. gate charge



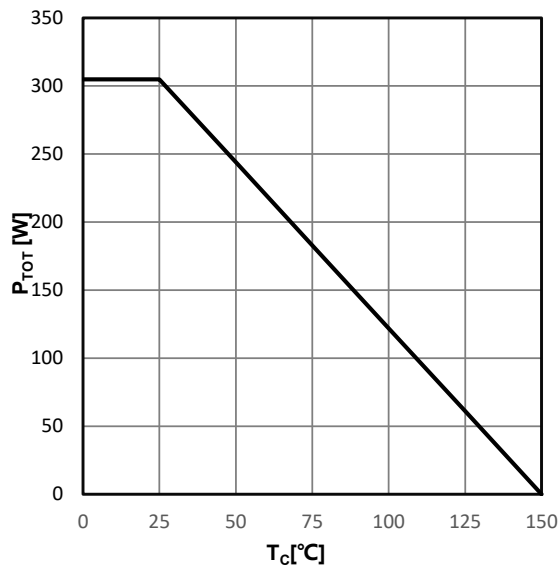
$$V_{GS}=f(Q_g), I_D=-20A, T_j=25^{\circ}C; \text{parameter: } V_{DS}$$

Figure 8: Typ. Capacitances



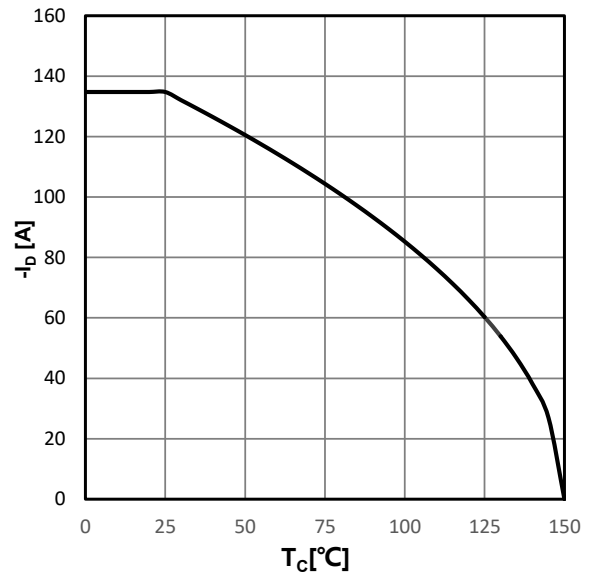
$$C=f(V_{DS}); V_{GS}=0V; f=1.0\text{ MHz};$$

Figure 9: Power dissipation



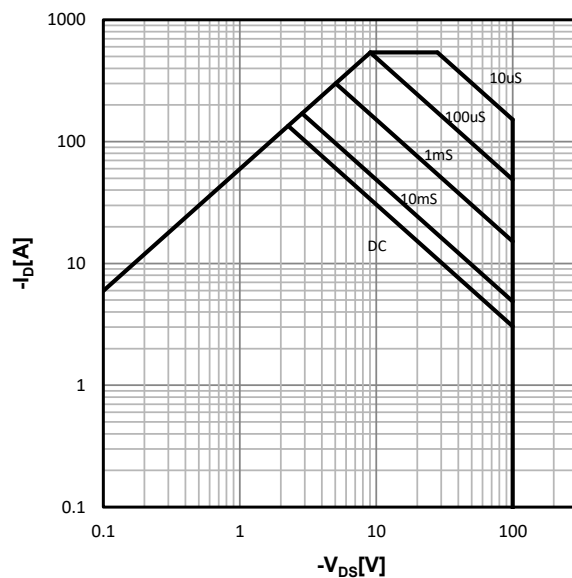
$$P_{\text{tot}}=f(T_C);$$

Figure 10: Drain current



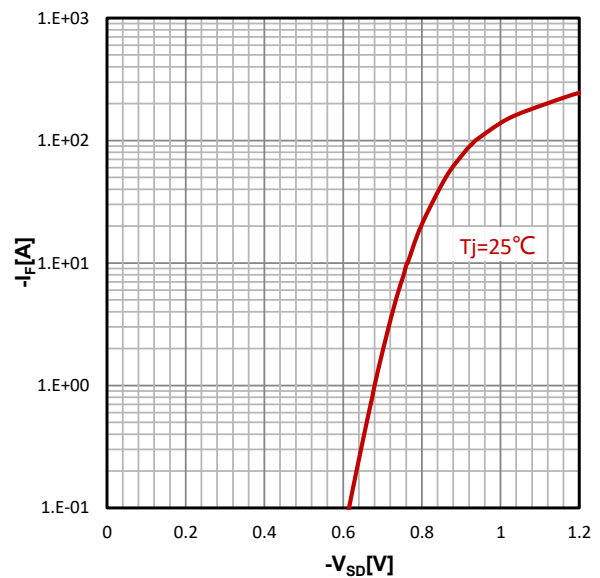
$$I_D=f(T_C);$$

Figure 11: Safe operating area



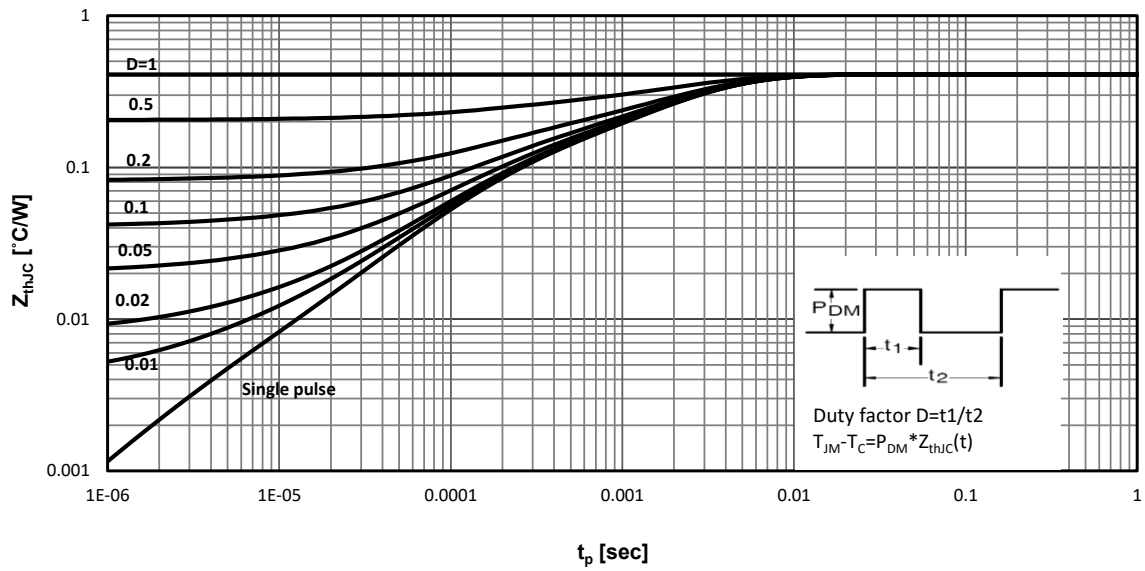
$$I_D=f(V_{\text{DS}}); T_C=25^{\circ}\text{C}; D=0; \text{parameter: tp}$$

Figure 12: Typ. forward characteristics



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

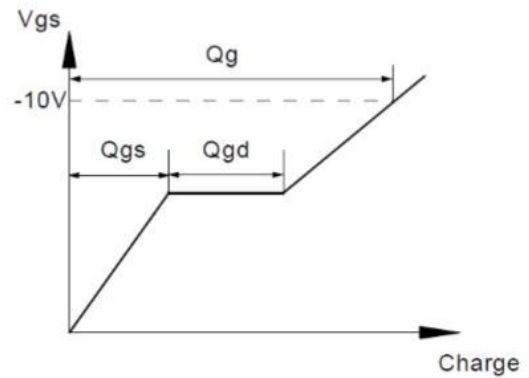
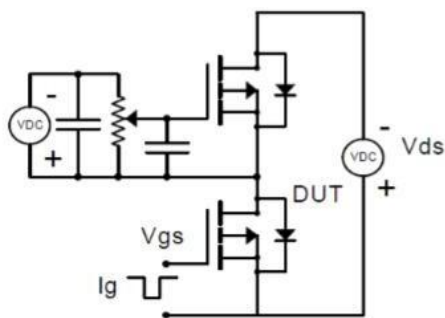
Figure 13: Max. Transient Thermal Impedance



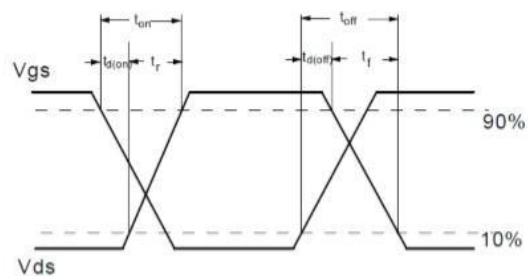
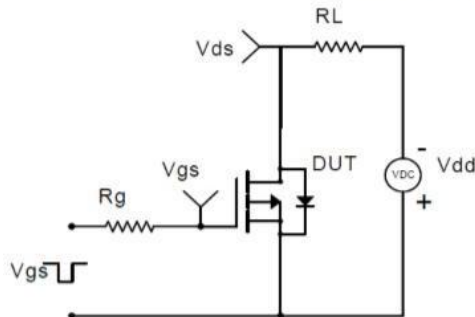
$$Z_{thJC} = f(t_p); \text{ parameter: } D$$

Test Circuit and Waveform:

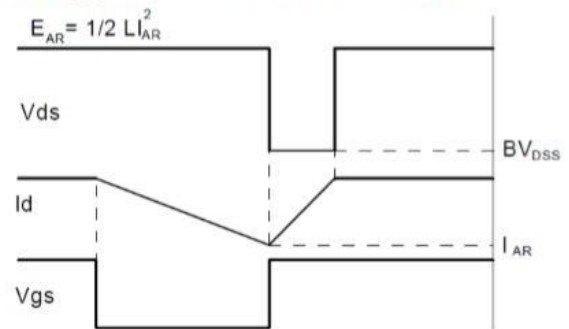
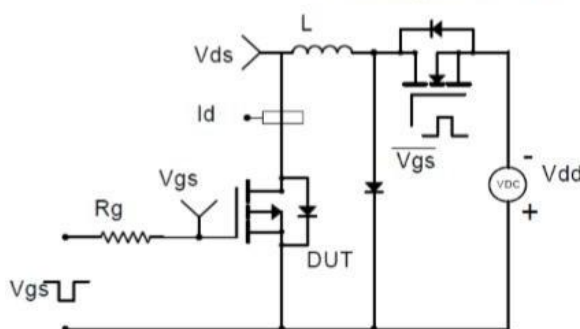
Gate Charge Test Circuit & Waveform



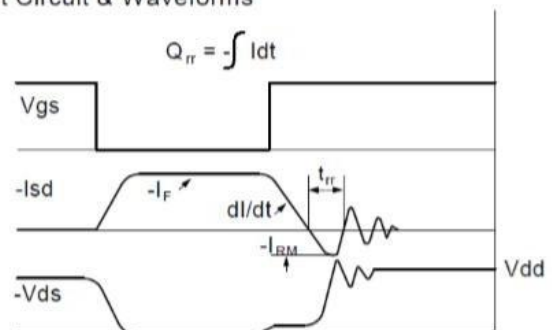
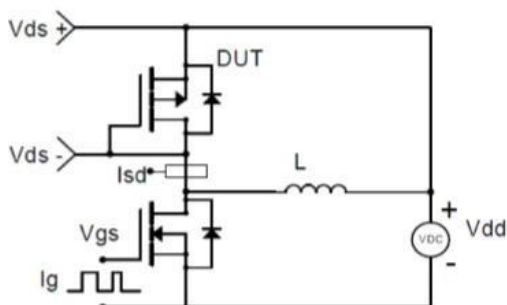
Resistive Switching Test Circuit & Waveforms



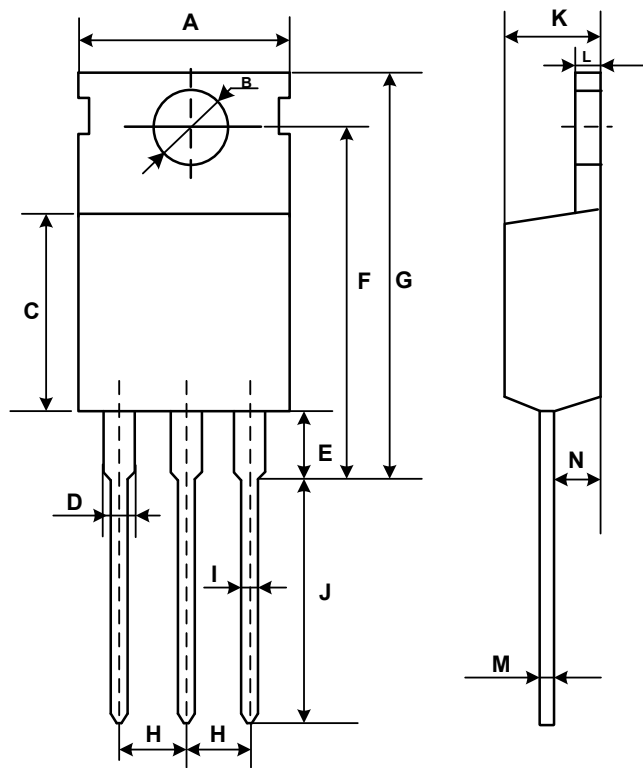
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Mechanical Dimensions for TO-220



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