

P-Ch 100V Fast Switching MOSFETs

Features

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

Applications

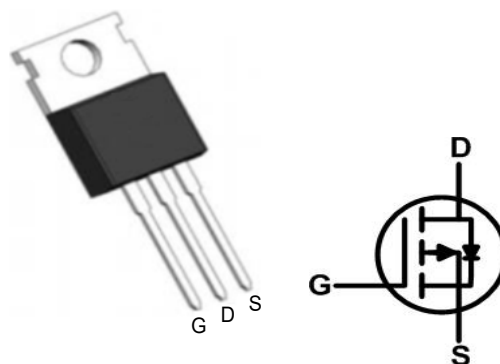
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Product Summary



BVDSS	RDSON	ID
-100V	22 mΩ	-80 A

TO220AB Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-100	V
V_{GS}	Gate-Source Voltage	±20	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	-80	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	-41	A
I_{DM}	Pulsed Drain Current ²	-260	A
EAS	Single Pulse Avalanche Energy ³	---	mJ
I_{AS}	Avalanche Current	---	A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation ⁴	250	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	0.5	°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	$V_{GS}=-10V$, $I_D=-15A$	---	22	25	$m\Omega$
		$V_{GS}=-4.5V$, $I_D=-3A$	---	---	---	
$V_{GS(th)}$	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
Q_g	Total Gate Charge	$V_{DS}=-30V$, $V_{GS}=-10V$, $I_D=-3A$	---	76	---	nC
Q_{gs}	Gate-Source Charge		---	13	---	
Q_{gd}	Gate-Drain Charge		---	12.4	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{GS}=-10V$, $V_{DD}=-50V$, $R_L=0.75\Omega$, $R_{GEN}=3\Omega$ $I_D=-15A$	---	13	---	ns
T_r	Rise Time		---	51	---	
$T_{d(off)}$	Turn-Off Delay Time		---	177	---	
T_f	Fall Time		---	82	---	
C_{iss}	Input Capacitance	$V_{DS}=-50V$, $V_{GS}=0V$, $f=1MHz$	---	4200	---	pF
C_{oss}	Output Capacitance		---	536	---	
C_{rss}	Reverse Transfer Capacitance		---	52	---	

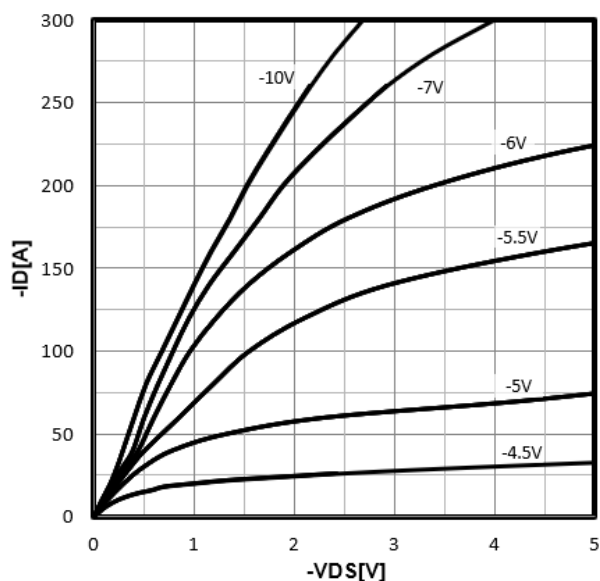
Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	-80	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=-15A$, $T_J=25^\circ\text{C}$	---	---	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F=-15A$, $di/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	110	---	nS
Q_{rr}	Reverse Recovery Charge		---	590	---	nC

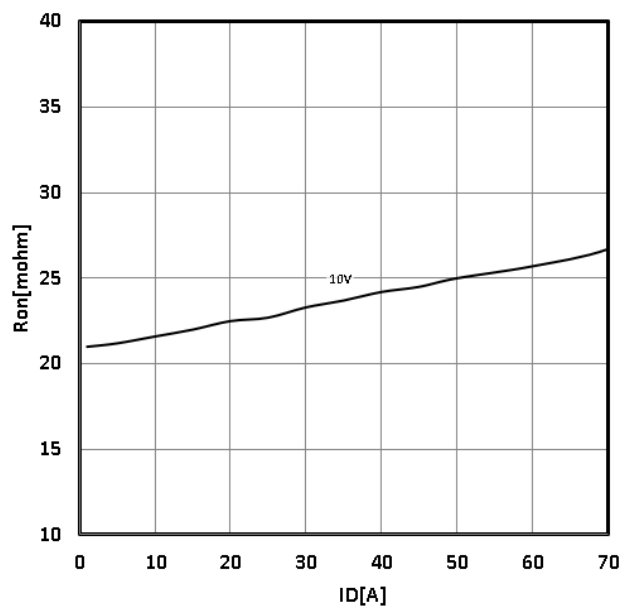
^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

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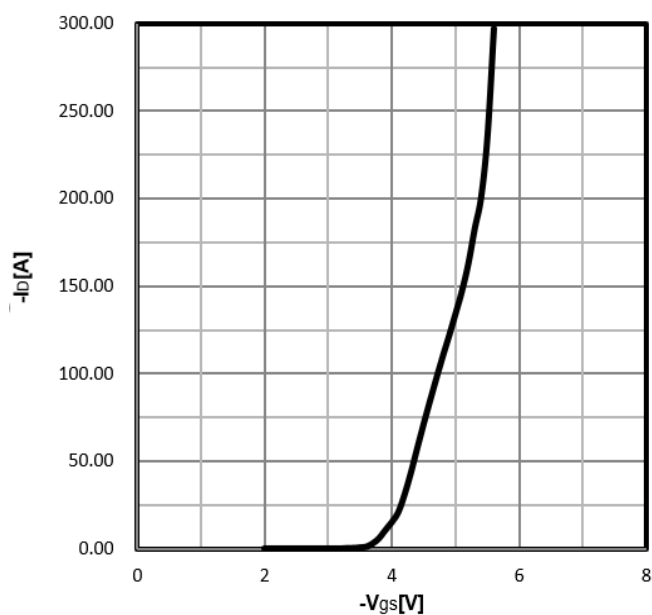
Typ. output characteristics
 $I_D = f(V_{DS})$



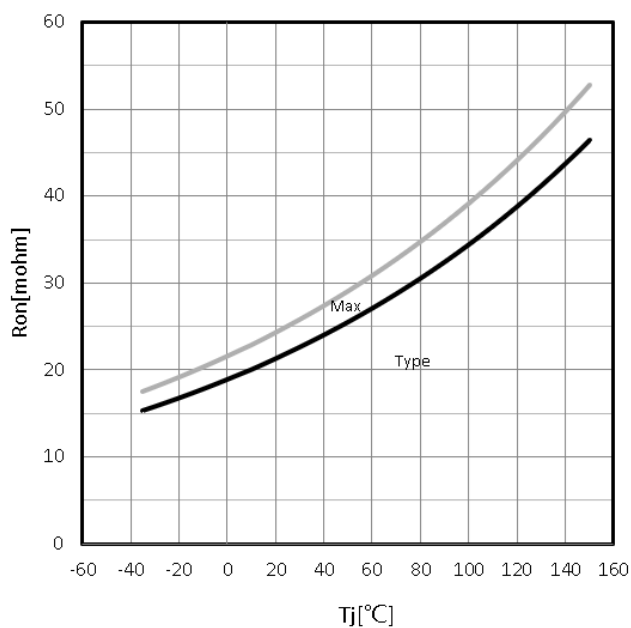
Typ. drain-source on resistance
 $R_{DS(on)} = f(I_D)$



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



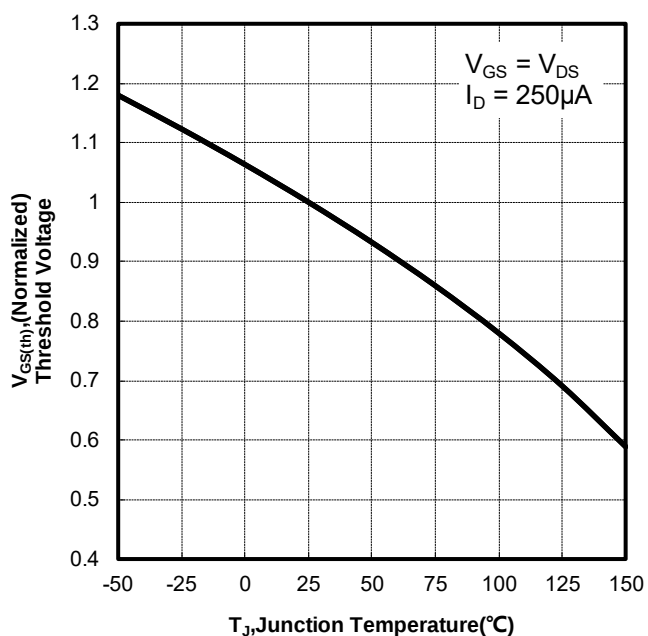
Drain-source on-state resistance
 $R_{DS(on)} = f(T_j); I_D = -15A; V_{GS} = -10V$



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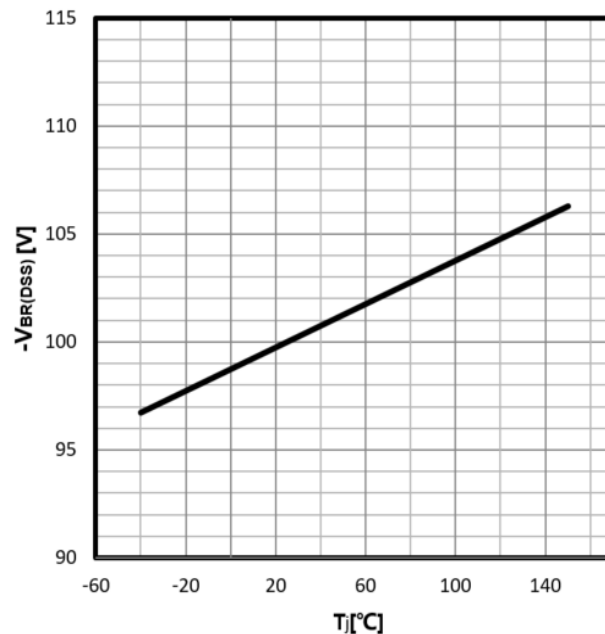
Gate Threshold Voltage

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



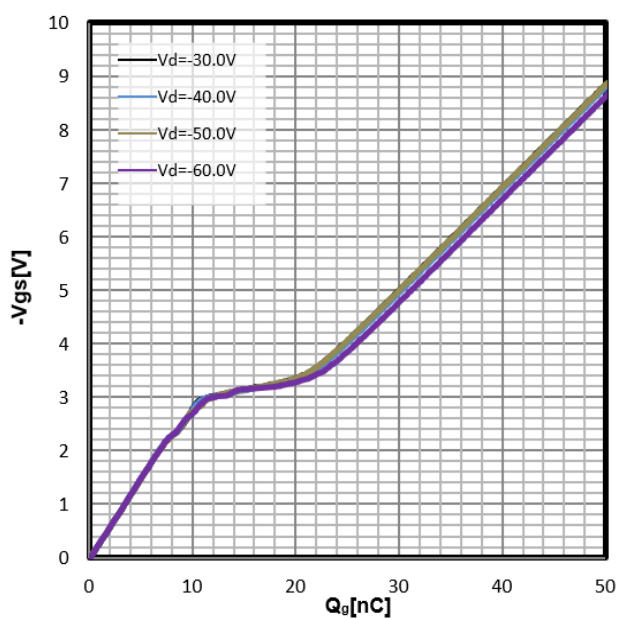
Drain-source breakdown voltage

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

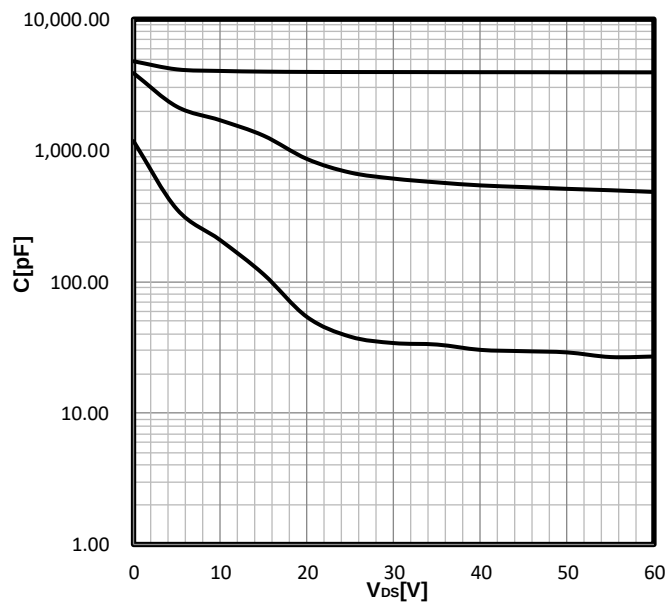


Typ. gate charge

$$V_{GS}=f(Q_{gate}); I_D=-15A$$

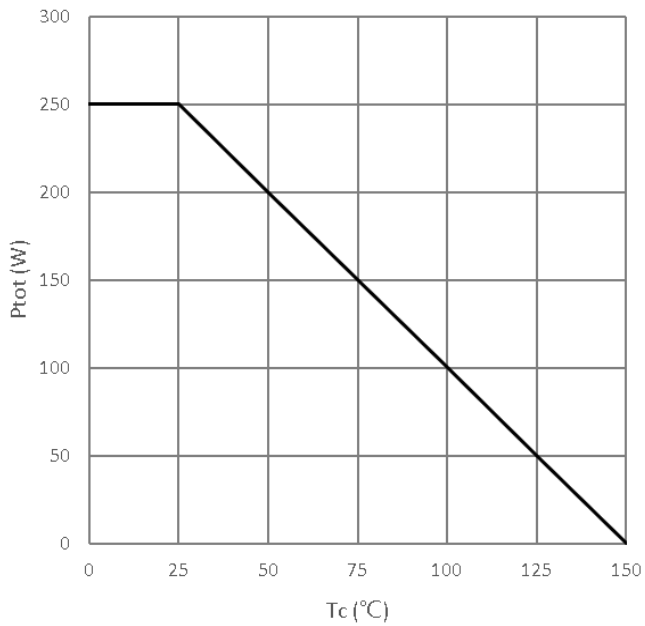


Typ. capacitances

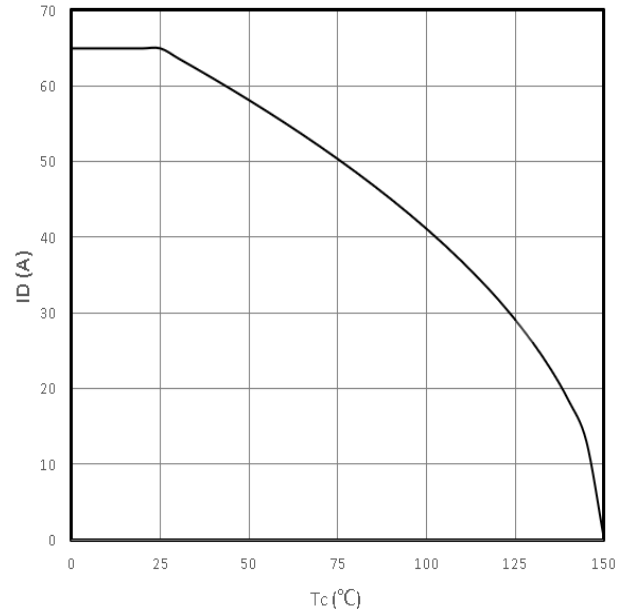


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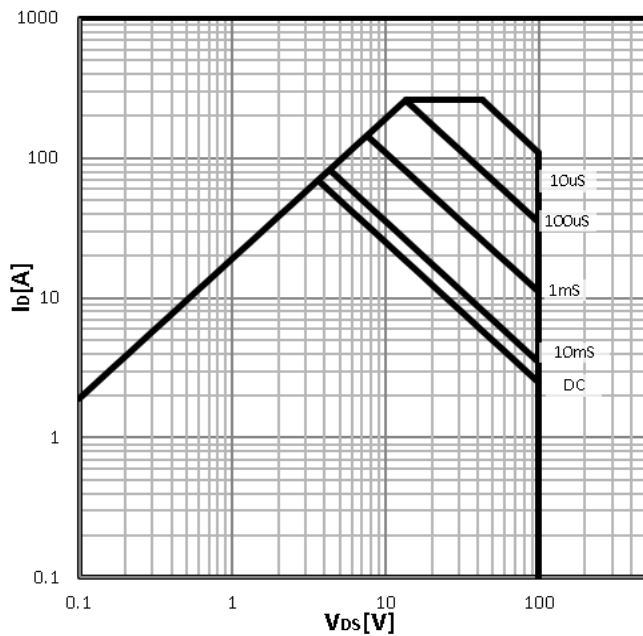
Power Dissipation
 $P_{tot}=f(T_C)$



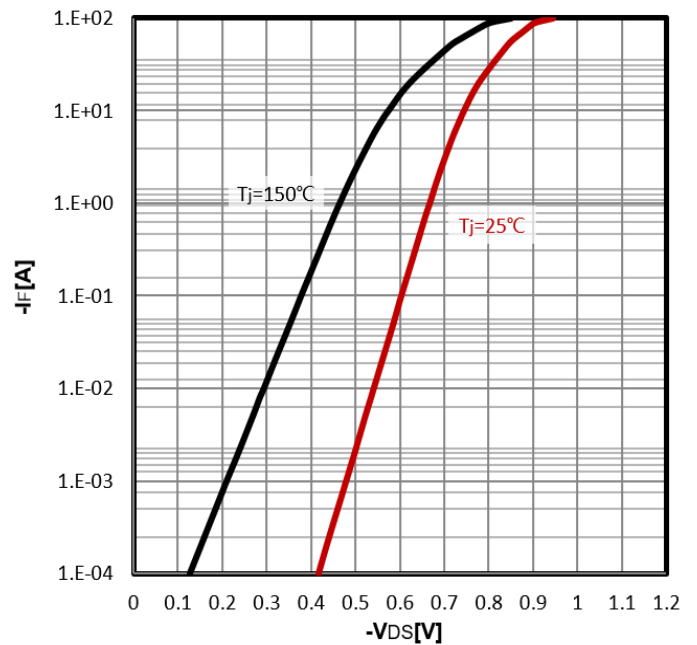
Maximum Drain Current
 $-I_D=f(T_C)$



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



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

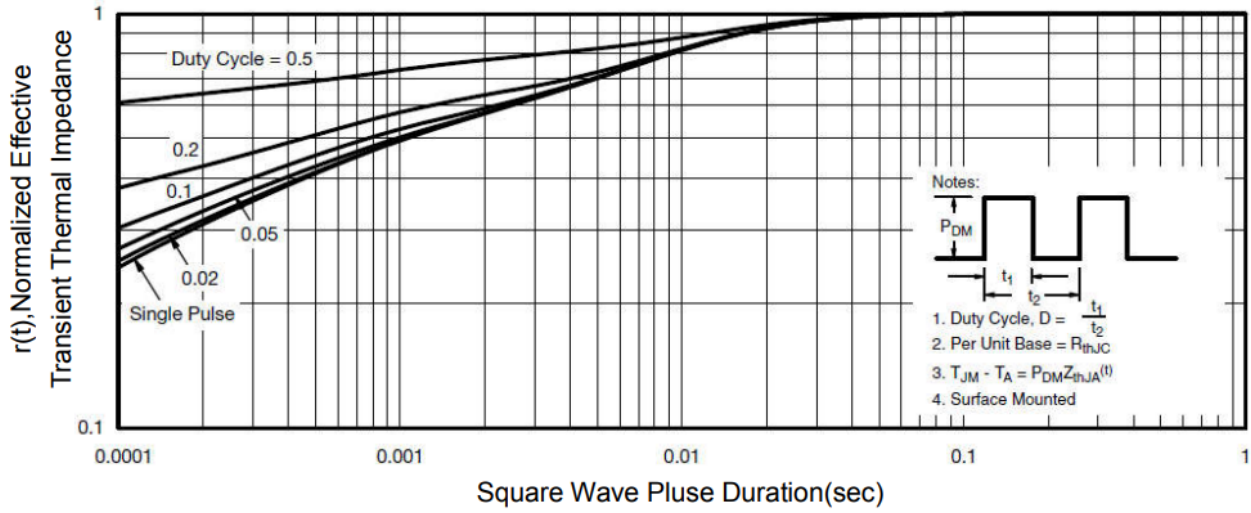




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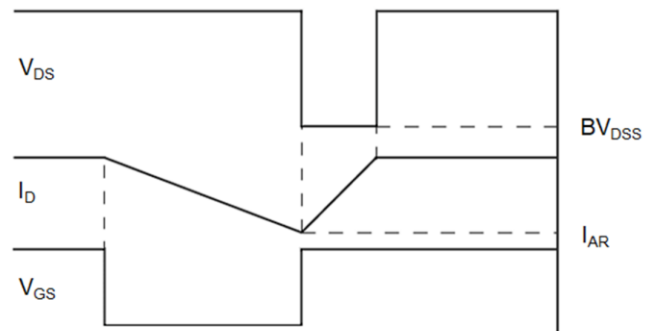
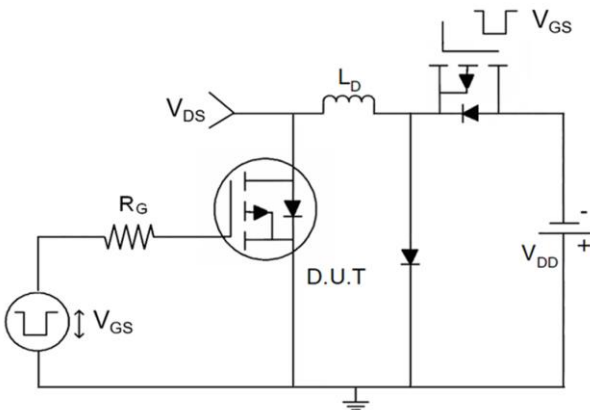
Max. transient thermal impedance

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

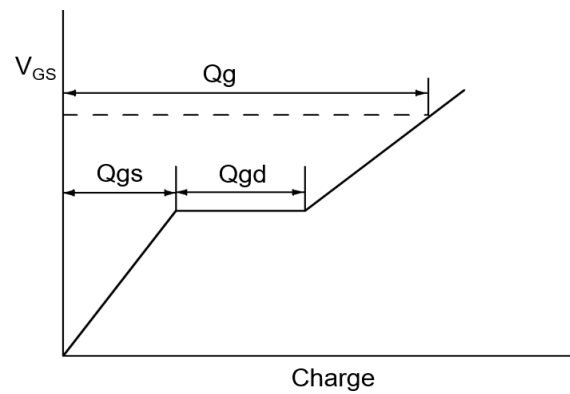
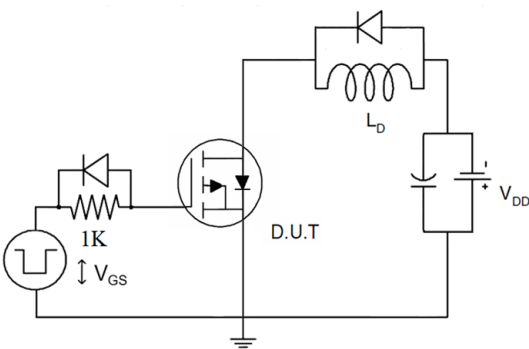


Test Circuit

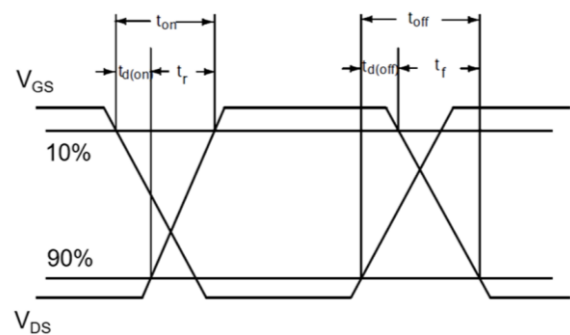
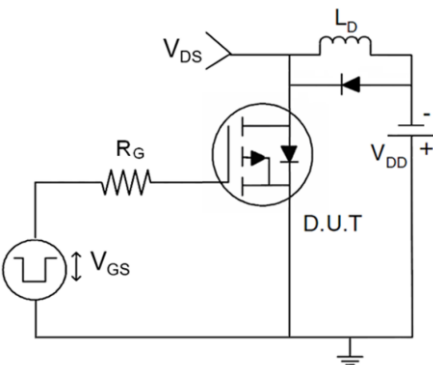
1) E_{AS} Test Circuits



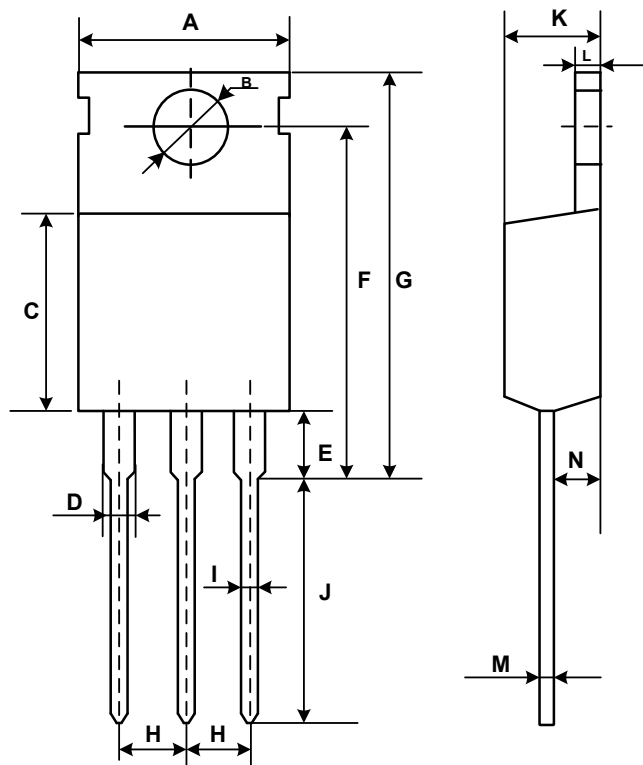
2) Gate Charge Test Circuit



3) Switch Time Test Circuit



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