

P-Ch 60V 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

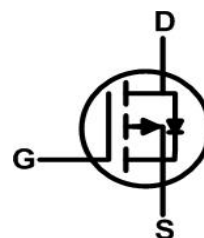
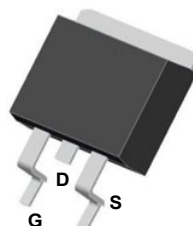


BVDSS	RDSON	ID
-60V	3.4 mΩ	-150A

Applications

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

TO263 Pin Configuration

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified):

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		-60	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	-150	A
	Continuous Drain Current	$T_C = 100^\circ\text{C}$	-91.7	A
I_{DM}^{a1}	Pulsed Drain Current		-580	A
V_{GS}	Gate-to-Source Voltage		± 20	V
E_{AS}^{a2}	Single pulse avalanche energy		2058	mJ
P_D	Power Dissipation		183	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	0.68	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	60	$^\circ\text{C/W}$

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

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-60	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS} = -60V, V_{GS}= 0V$	--	--	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	$V_{DS}=V_{GS}, I_D=-250\mu A$	-2	-2.4	-2.8	V
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-20A$	--	3.4	4.1	$m\Omega$

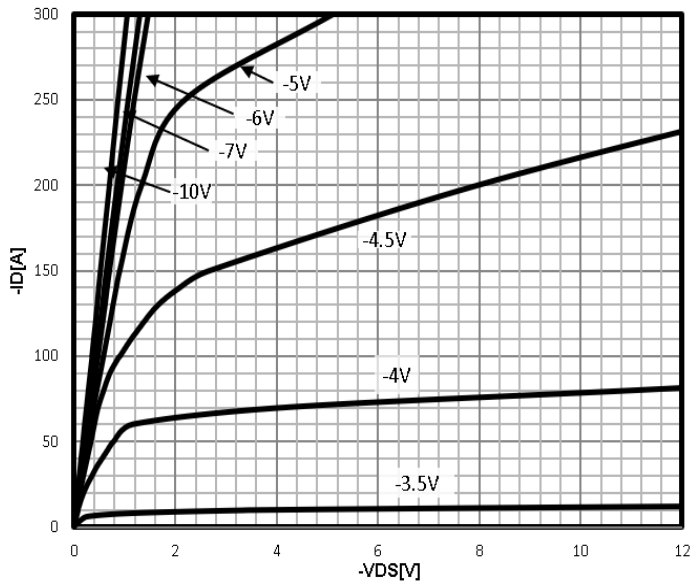
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=-30V$ $f=1.0MHz$	--	9123	--	pF
C_{oss}	Output Capacitance		--	1583	--	
C_{rss}	Reverse Transfer Capacitance		--	85.6	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=-10A,$ $V_{DS}= -30V$ $V_{GS}= -10V$ $R_G= 3\Omega$	--	70	--	ns
t_r	Rise Time		--	45	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	165	--	
t_f	Fall Time		--	50	--	
Q_g	Total Gate Charge	$V_{GS}=-10V$ $V_{DS}=-30V$ $I_D=-10A$	--	135	--	nC
Q_{gs}	Gate Source Charge		--	28	--	
Q_{gd}	Gate Drain Charge		--	22.4	--	

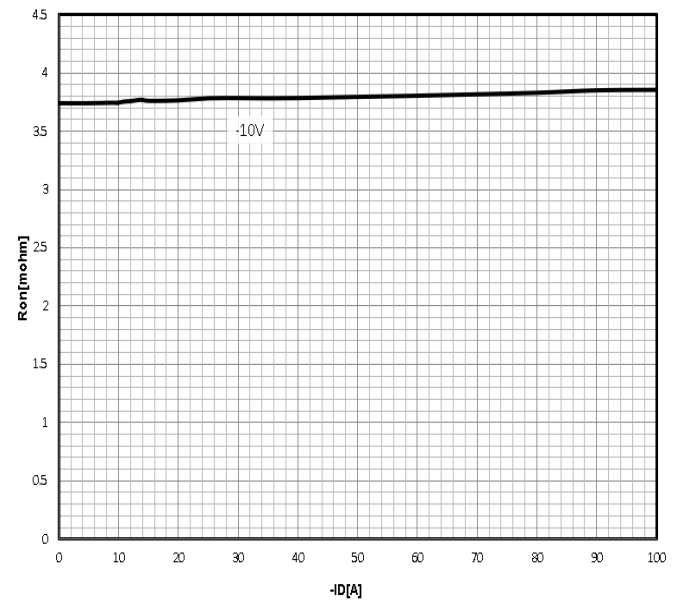
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C=25^\circ C$	--	--	-150	A
V_{SD}	Diode Forward Voltage	$I_S=-20A, V_{GS}=0V$	--	--	-1.2	V
t_{rr}	Reverse Recovery time	$I_S=-10A, V_{DD}=-30V$ $dI/dt=100A/\mu s$	--	45	--	ns
Q_{rr}	Reverse Recovery Charge		--	100	--	nC

Characteristics Curve:

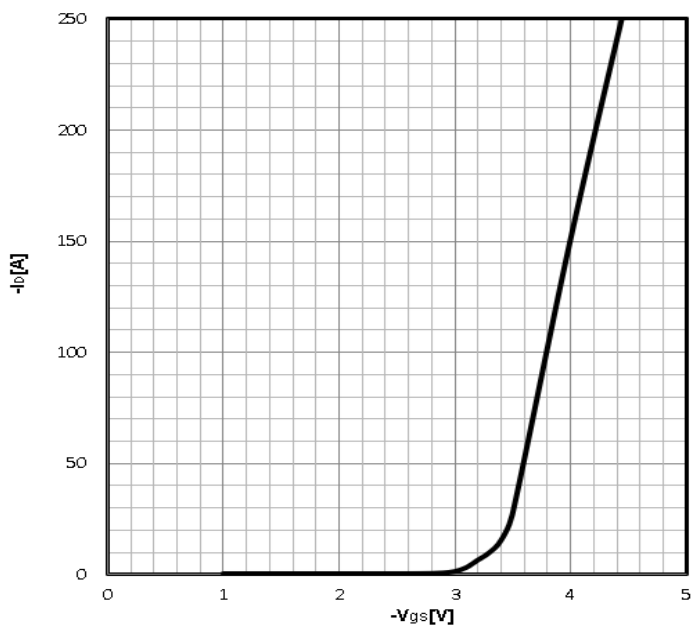
Typ. output characteristics
 $I_D = f(V_{DS})$



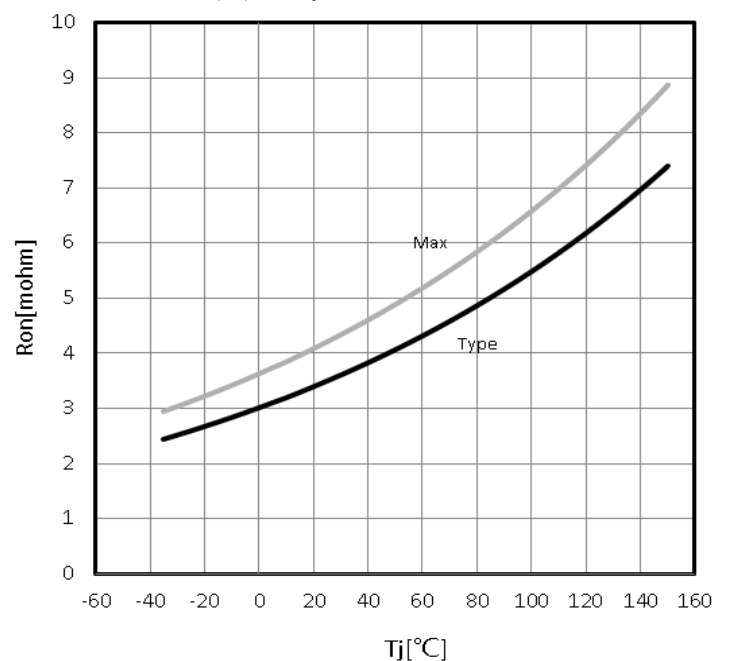
Typ. drain-source on resistance
 $R_{DS(on)} = f(I_D)$



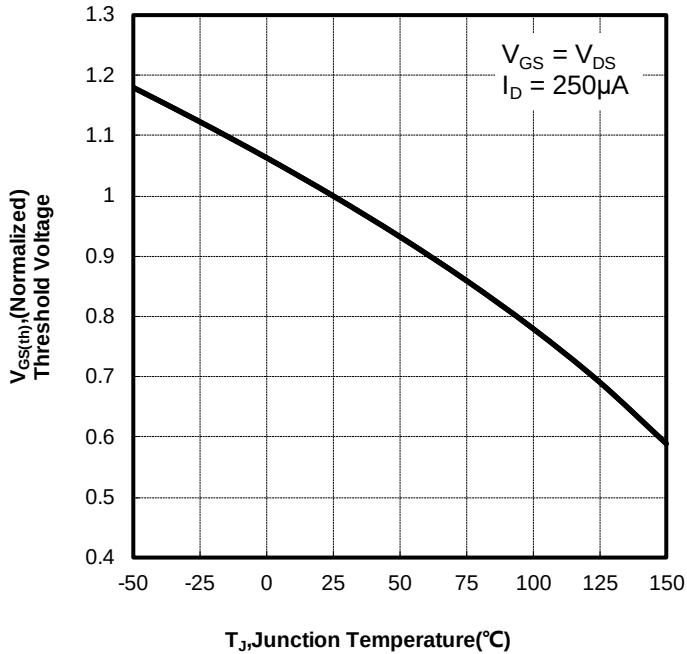
Typ. transfer characteristics
 $I_D = f(V_{GS})$



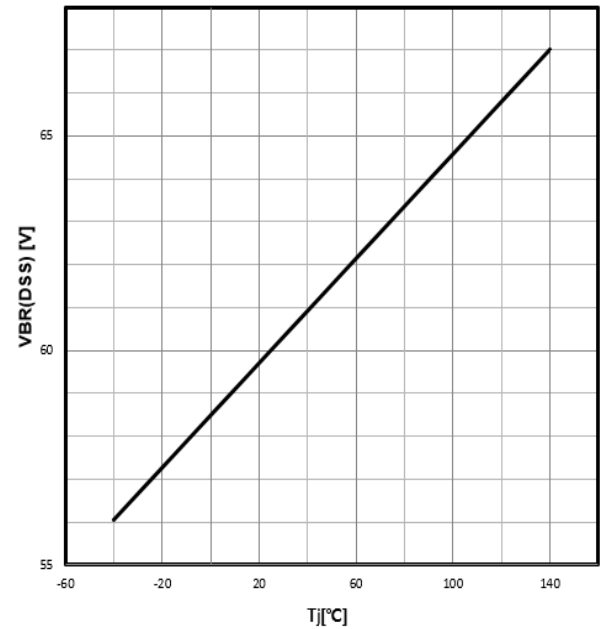
Drain-source on-state resistance
 $R_{DS(on)} = f(T_j); I_D = -20A; V_{GS} = -10V$



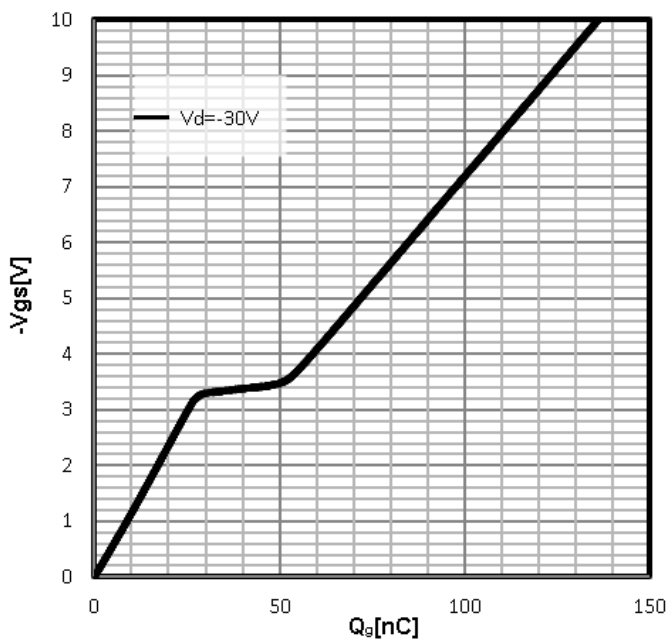
Gate Threshold Voltage
 $-V_{TH}=f(T_j)$; $I_D=-250\mu A$



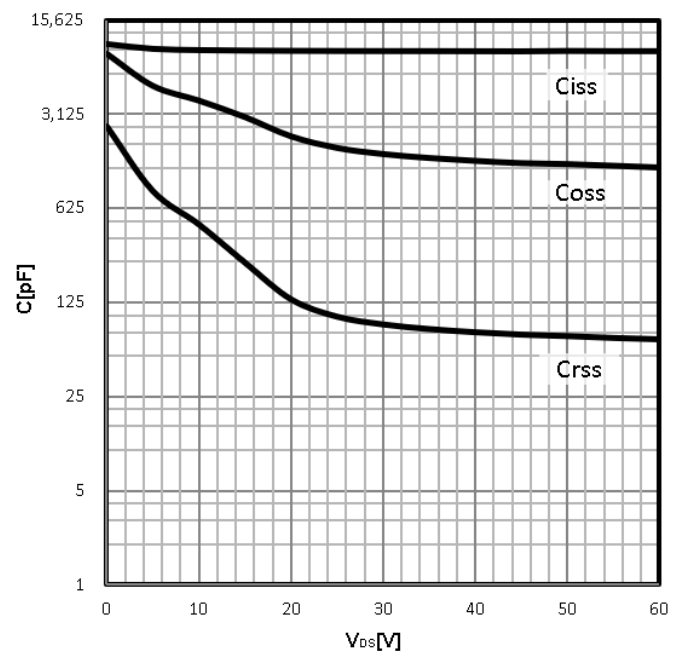
Drain-source breakdown voltage
 $V_{BR(DSS)}=f(T_j)$; $I_D=-250\mu A$



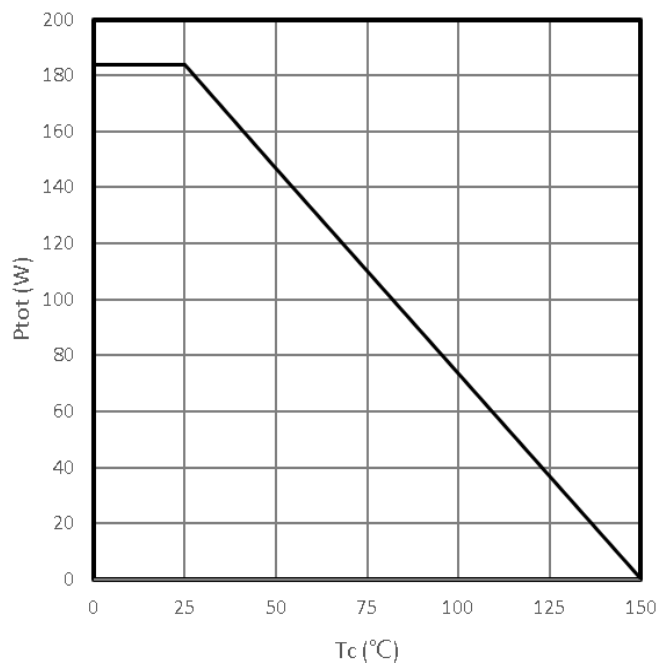
Typ. gate charge
 $V_{GS}=f(Q_{gate})$; $I_D=-10A$



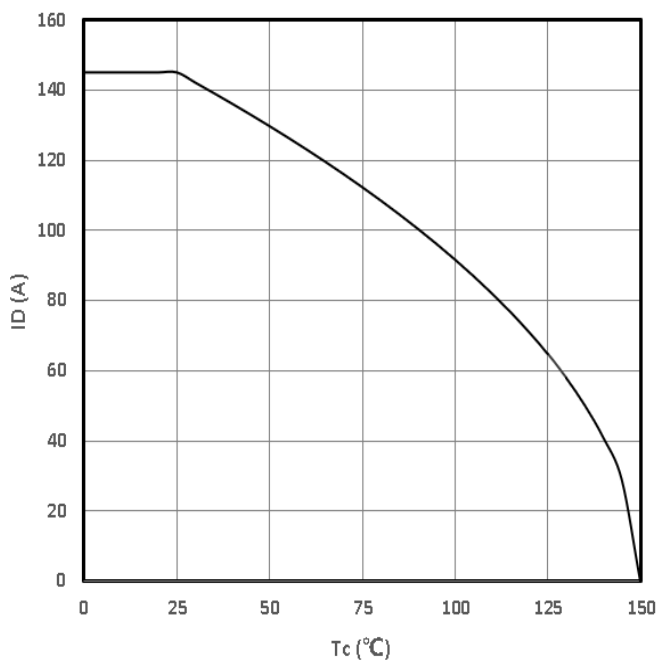
Typ. capacitances
 $C=f(V_{DS})$; $V_{GS}=0V$; $f=1MHz$



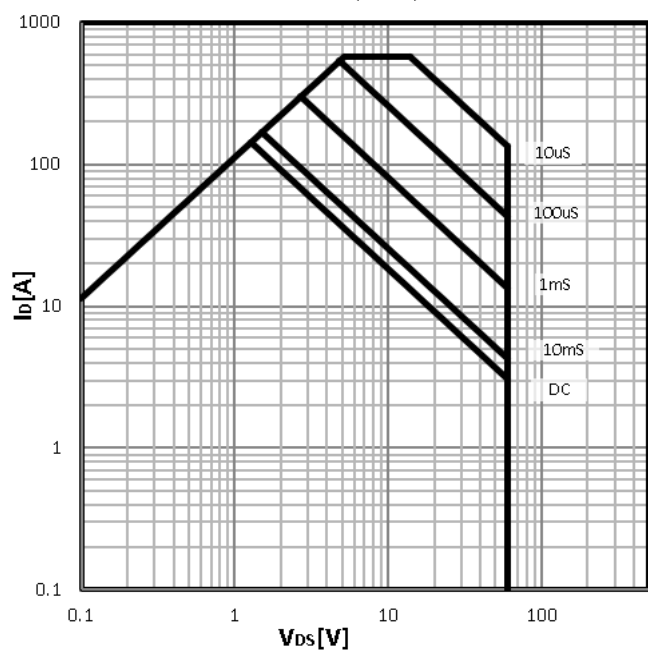
Power Dissipation
 $P_{tot}=f(T_C)$



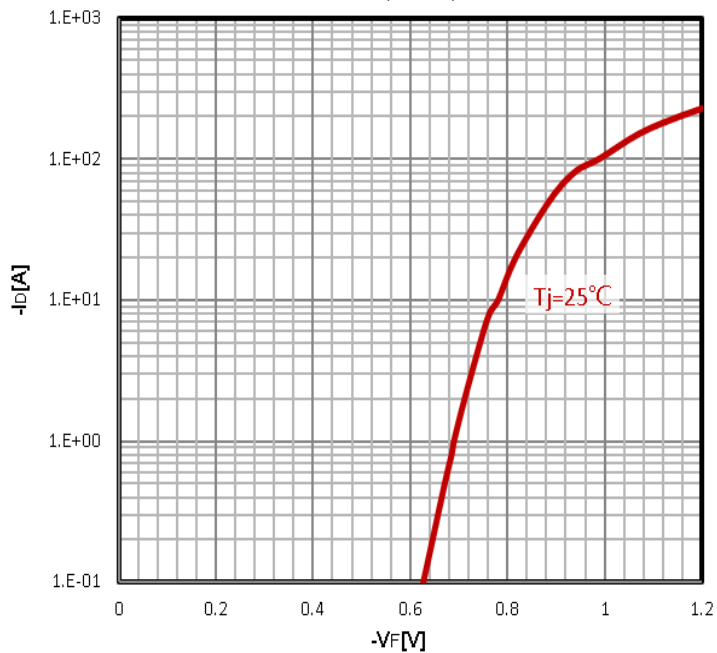
Maximum Drain Current
 $-I_D=f(T_C)$



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

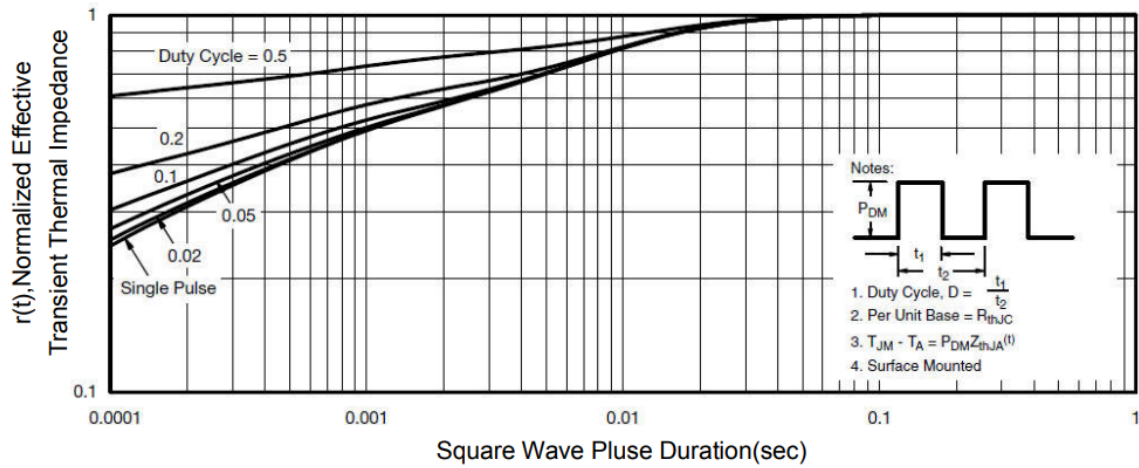


Body Diode Forward Voltage Variation
 $-I_F=f(-V_{DS})$

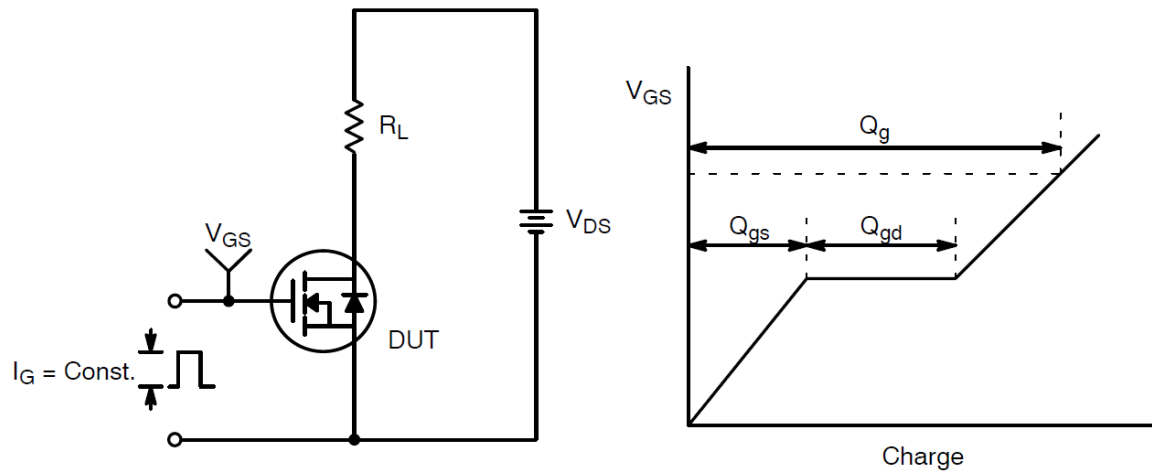


Max. transient thermal impedance

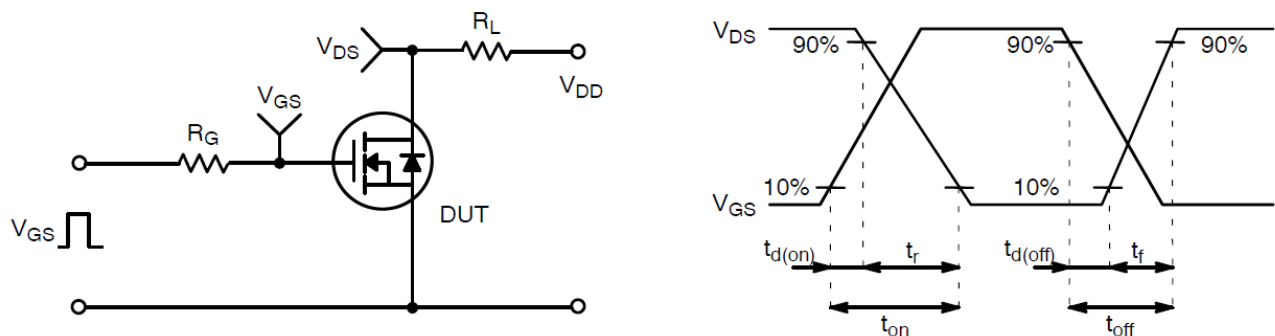
$$Z_{thJC}=f(t_p)$$



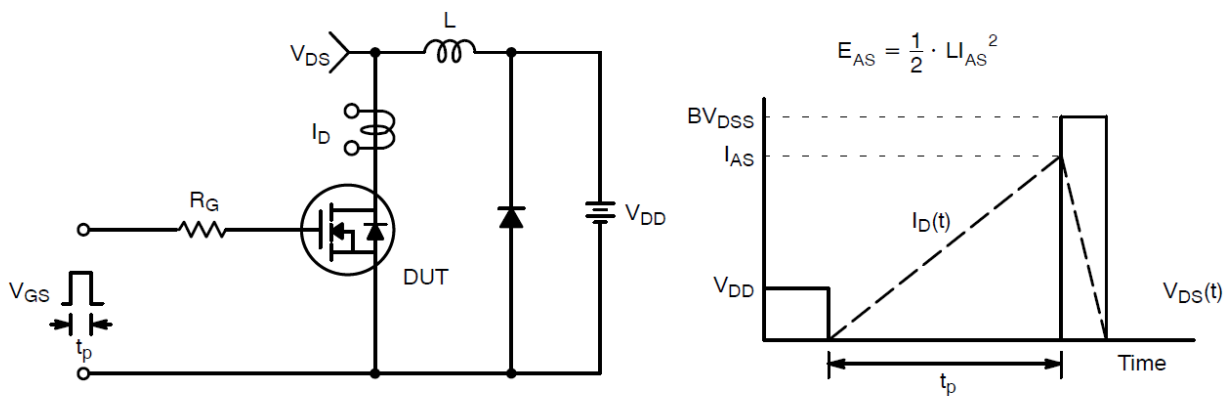
Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform

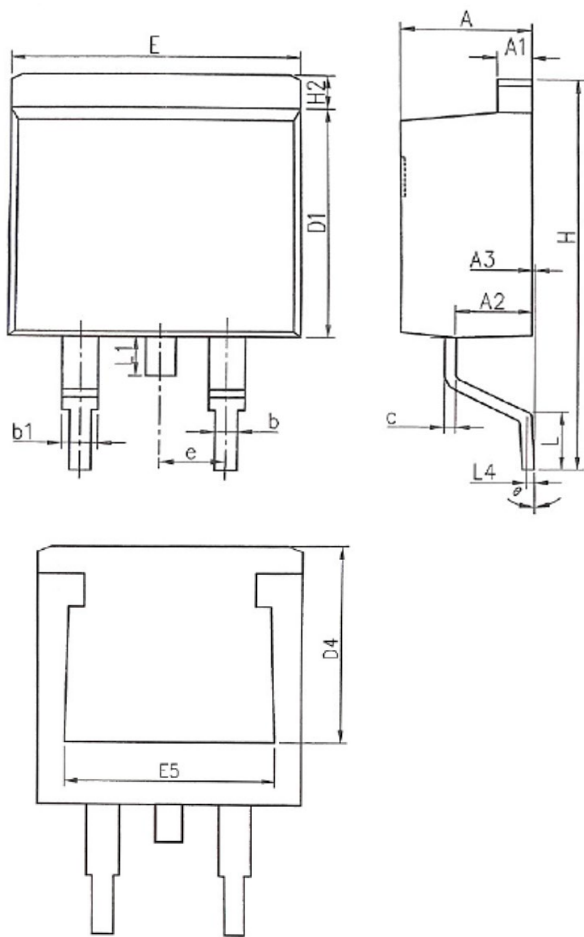


Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

Mechanical Dimensions for TO-263



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.37	4.89
A1	1.17	1.42
A2	2.20	2.90
A3	0.00	0.25
b	0.70	0.96
b1	1.17	1.47
c	0.28	0.60
D1	8.45	9.30
D4	6.60	-
E	9.80	10.40
E5	7.06	-
e	2.54BSC	
H	14.70	15.70
H2	1.07	1.47
L	2.00	2.80
L1	-	1.75
L4	0.254BSC	
θ	0°	9°