P-Ch 60V Fast Switching MOSFETs

Green

Features

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

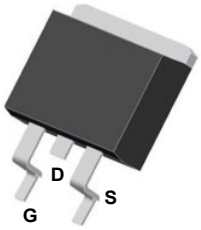
Product Summary

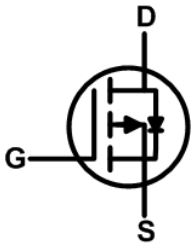
BVDSS	RDSON	ID
-60V	5.4 mΩ	-110A

Applications

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

TO263 Pin Configuration





Absolute Maximum Ratings (T_C= 25℃ unless otherwise specified):

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		-60	V
I_D	Continuous Drain Current	T_C = 25 °C	-110	A
	Continuous Drain Current	T_C = 100 °C	-70	A
I_{DM}[a1]	Pulsed Drain Current		-440	A
V_{GS}	Gate-to-Source Voltage		±20	V
P_D	Power Dissipation		180	W
E_{AS} [a2]	Single pulse avalanche energy		960	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range		150, –55 to 150	℃
T_L	Maximum Temperature for Soldering		260	℃

Thermal Characteristics:

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance,Junction-to-Case	0.69	℃/W
$R_{\theta JA}$	Thermal Resistance,Junction-to-Ambient	60	℃/W

Electrical Characteristics (T_J= 25℃ 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	-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=-250μA	-1.6	-2.0	-2.4	V
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=-10V,I_D=-15A	--	5.4	7.0	mΩ

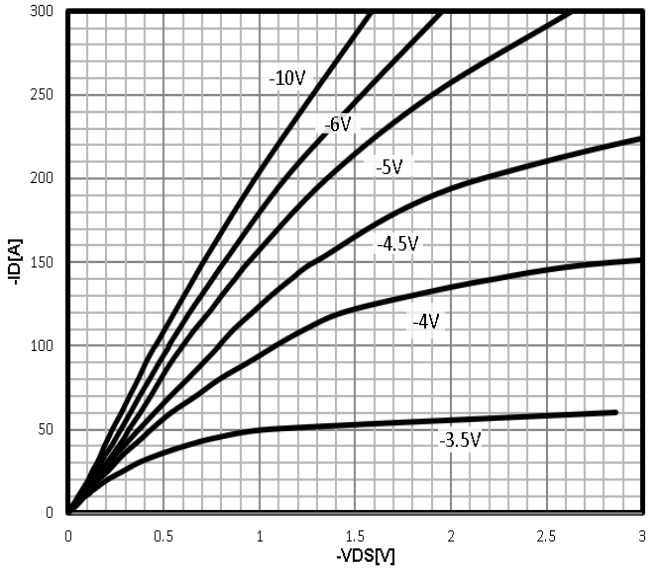
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=-30V f=1.0MHz	--	5403	--	pF
C_{oss}	Output Capacitance		--	941	--	
C_{rss}	Reverse Transfer Capacitance		--	48	--	
R_g	Gate resistance	V_{GS}=0V, V_{DS}Open	--	2.0	--	Ω

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D=-15A, R_L=0.75Ω V_{DS}= -30V V_{GS}= -10V R_G= 3Ω	--	4.5	--	ns
tr	Rise Time		--	2.5	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	14.5	--	
t_f	Fall Time		--	3.5	--	
Q_g	Total Gate Charge	V_{GS}=-10V V_{DS}=-30V I_D=-15A	--	80.2	--	nC
Q_{gs}	Gate Source Charge		--	15.2	--	
Q_{gd}	Gate Drain Charge		--	11	--	

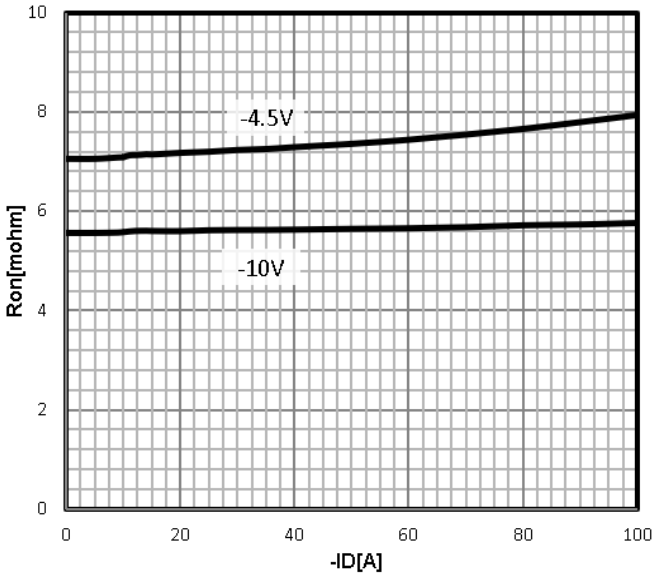
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	T_C=25 ℃	--	--	-110	A
V_{SD}	Diode Forward Voltage	I_S=-15A,V_{GS}=0V	--	--	-1.2	V
t_{rr}	Reverse Recovery time	I_S=-15A,V_{DD}=-30V dI/dt=100A/μs	--	60	--	ns
Q_{rr}	Reverse Recovery Charge		--	105	--	nC

Characteristics Curve:

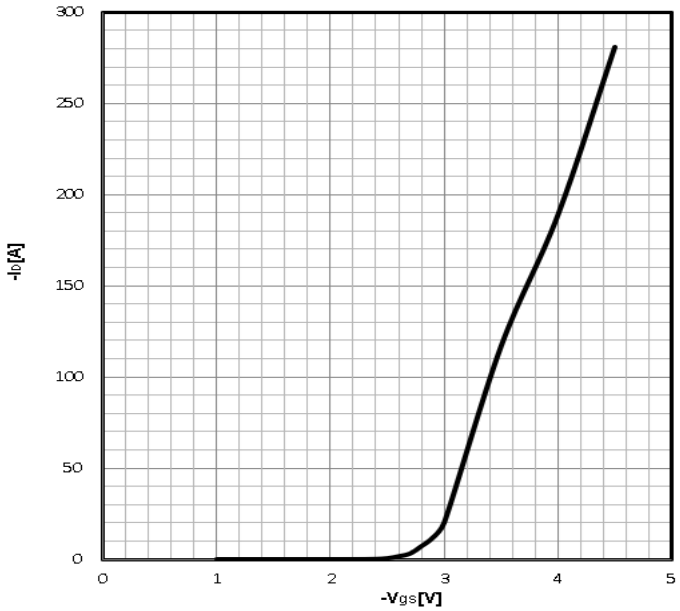
Typ. output characteristics
$I_D=f(V_{DS})$



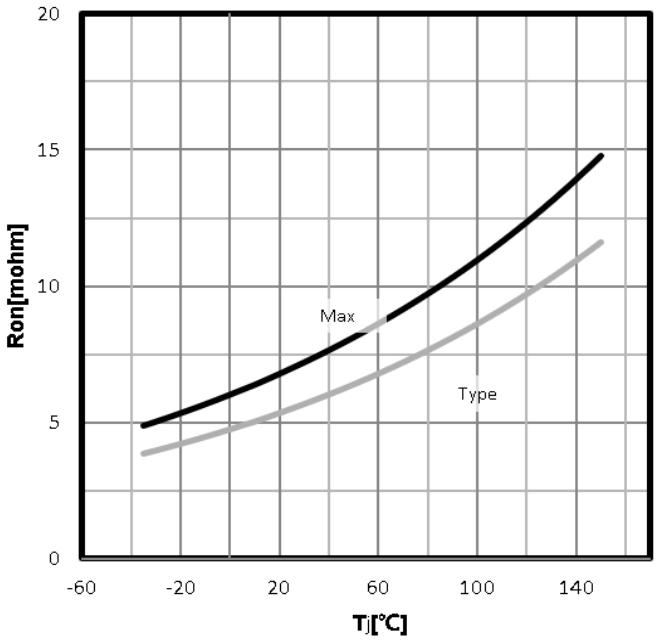
Typ. drain-source on resistance
$R_{DS(on)}=f(I_D)$



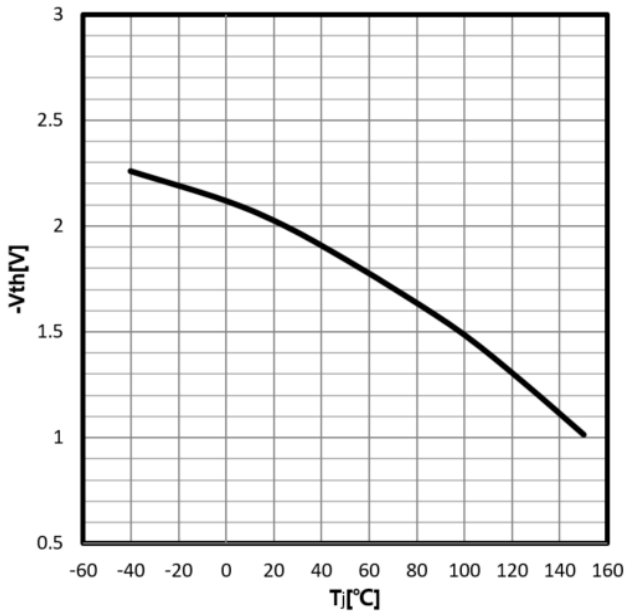
Typ. transfer characteristics
$I_D=f(V_{GS})$



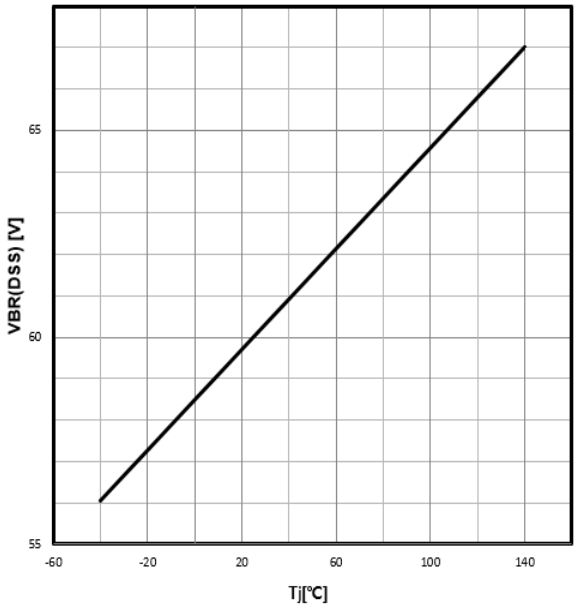
Drain-source on-state resistance
$R_{DS(on)}=f(T_j);I_D=-15A;\ V_{GS}=-10V$



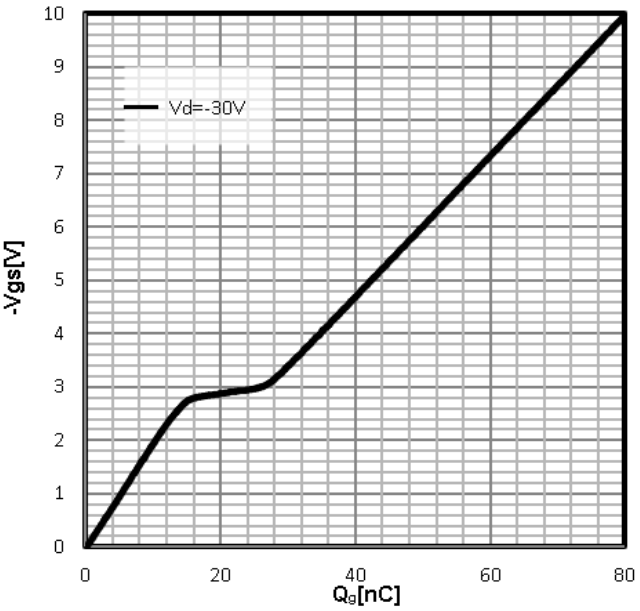
Gate Threshold Voltage
$-V_{TH}=f(T_j)$; I_D=-250uA



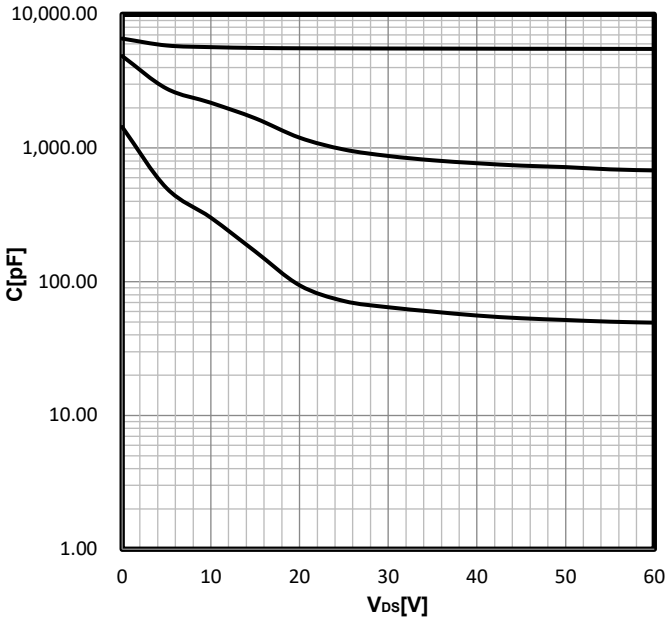
Drain-source breakdown voltage
$V_{BR(DSS)}=f(T_j)$; I_D=-250uA



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

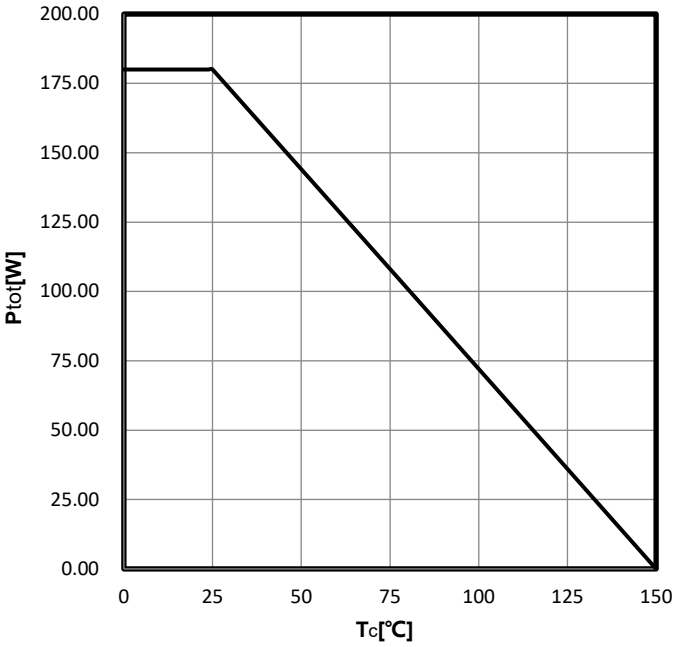


Typ. capacitances
C =f(V_{DS}); V_{GS}=0V; f =1MHz



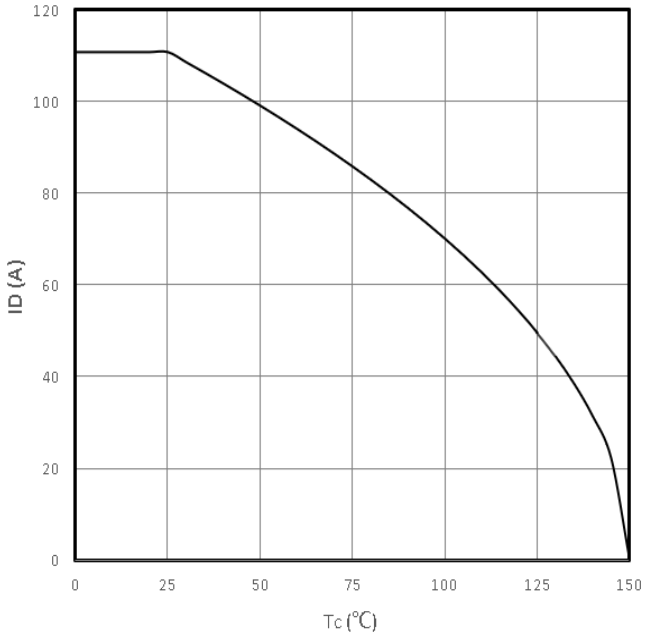
Power Dissipation

$P_{tot}=f(T_C)$



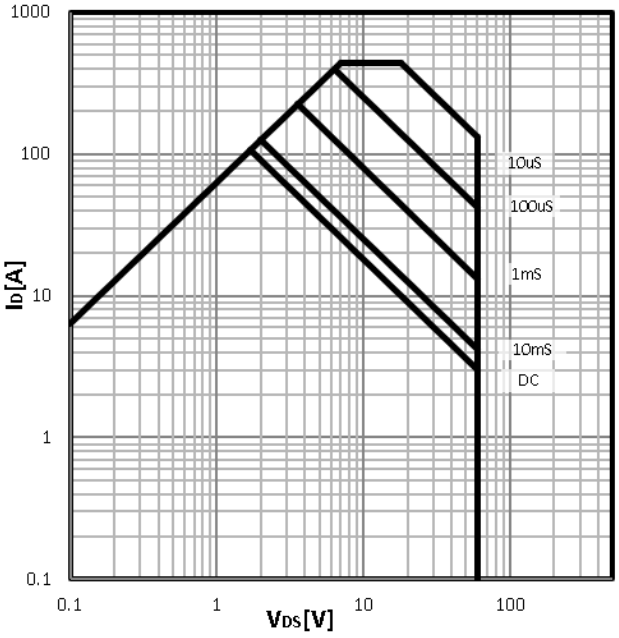
Maximum Drain Current

$-I_D=f(T_C)$



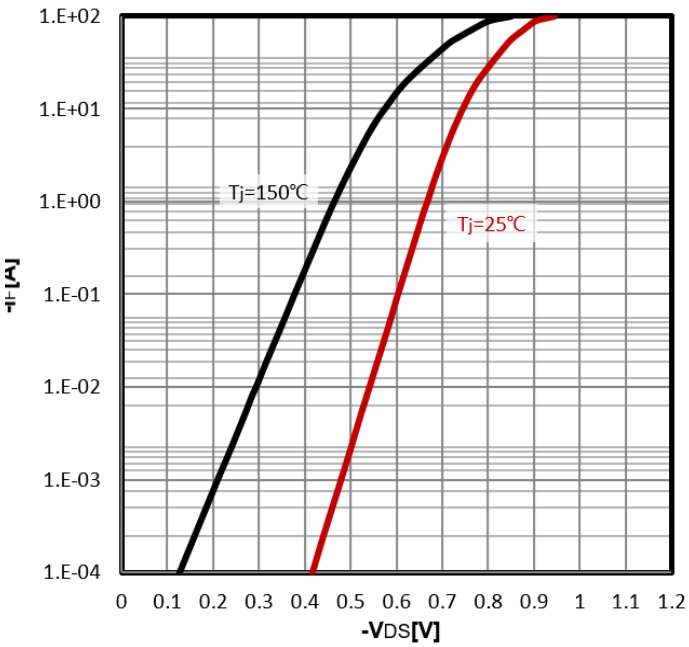
Safe operating area

$I_D=f(V_{DS})$



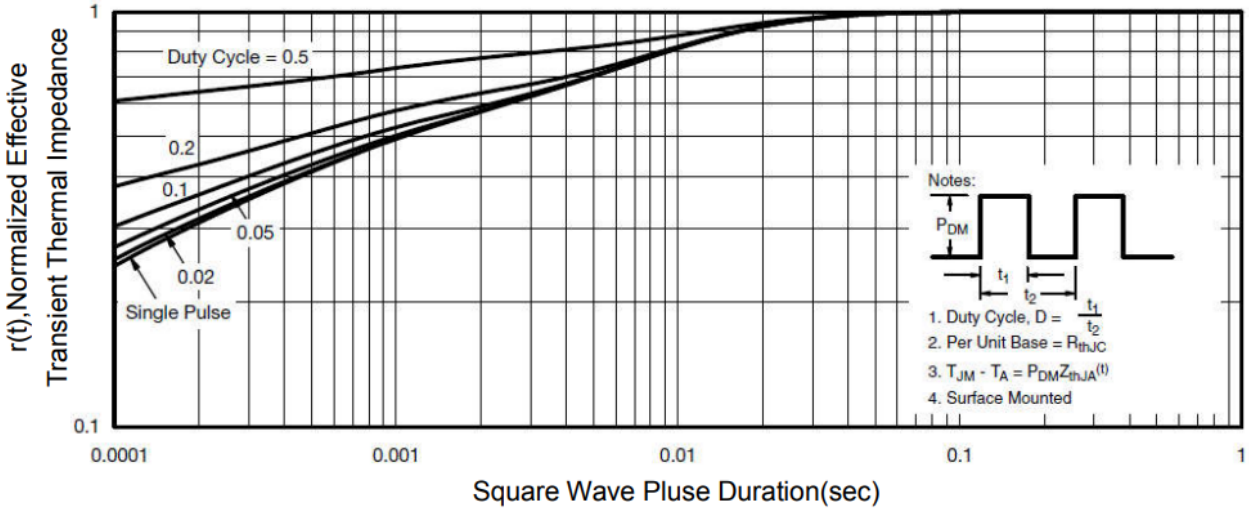
Body Diode Forward Voltage Variation

$-I_F=f(-V_{DS})$



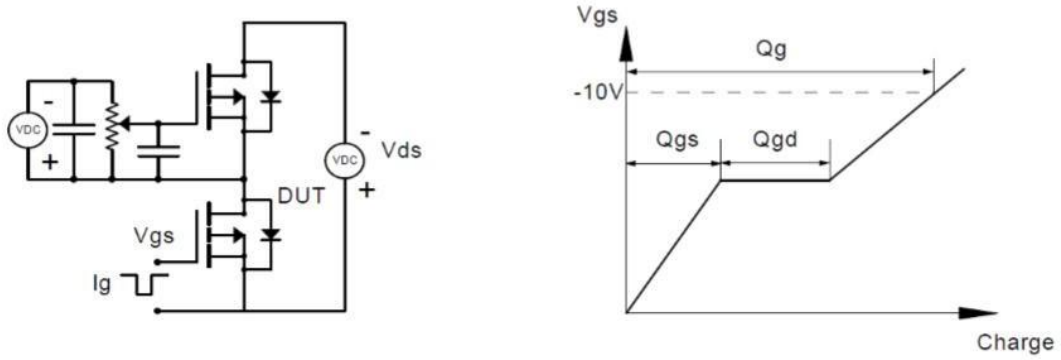
Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

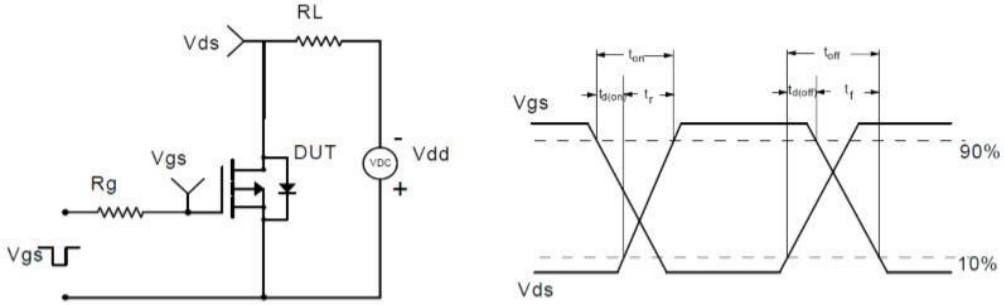


Test Circuit and Waveform:

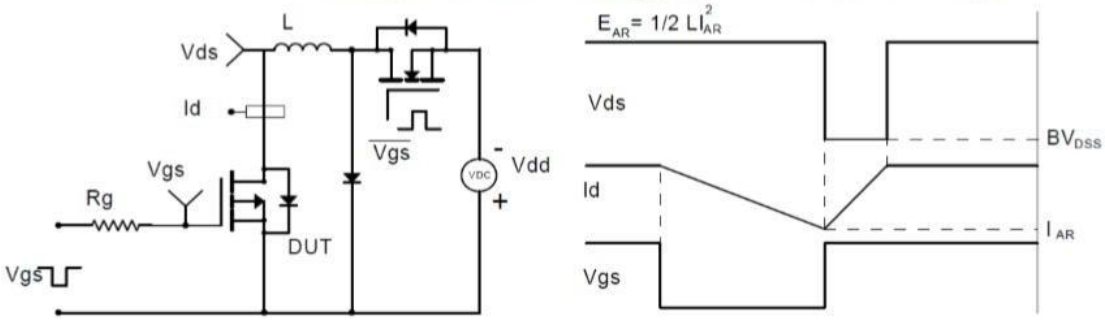
Gate Charge Test Circuit & Waveform



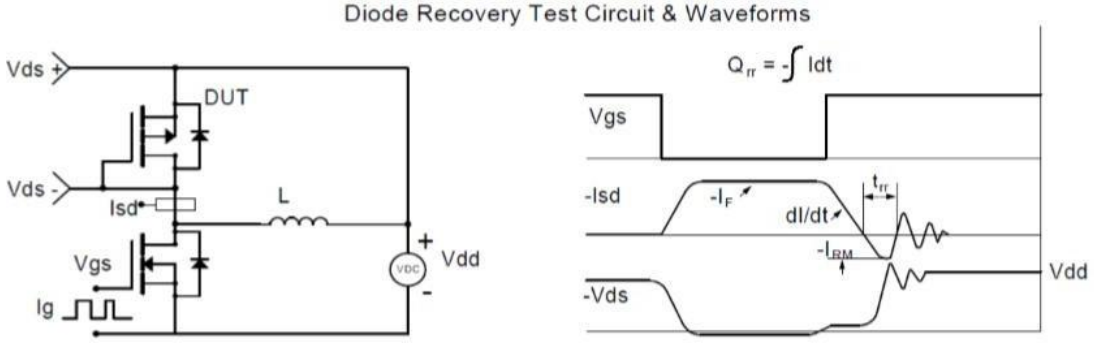
Resistive Switching Test Circuit & Waveforms



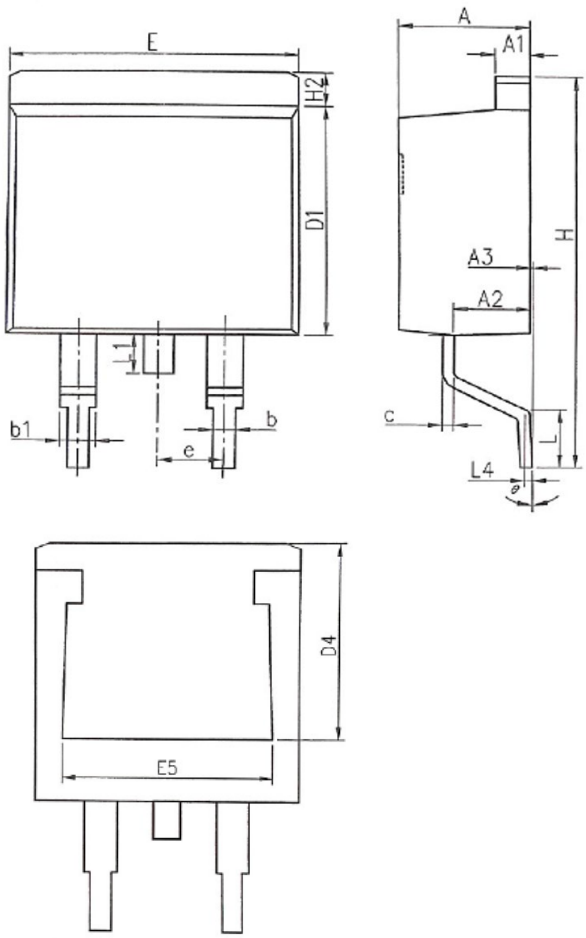
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery 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°