P-Ch 100V Fast Switching MOSFETs

Features

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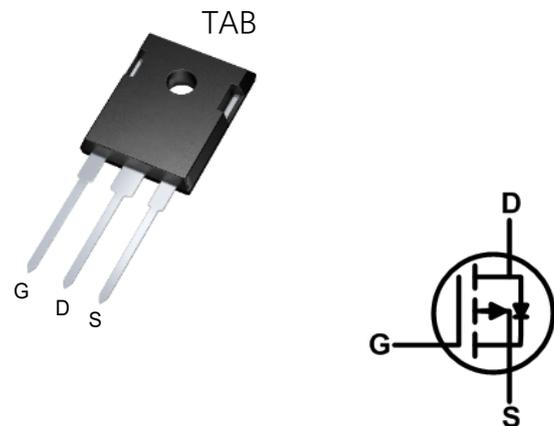- High density cell design for low $R_{DS(ON)}$

Product Summary

BVDSS	RDSON	ID
-100V	11mΩ	-120A

Green

Applications

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

TO247 Pin Configuration

TAB

G D S

D
G
S

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˚C	Continuous Drain Current, V_{GS} @ 10V[1,6]	-120	A
I_D@T_C=100˚C	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˚C	Total Power Dissipation[4]	300	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
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	---	65	˚C/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	---	0.50	˚C/W

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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	15	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
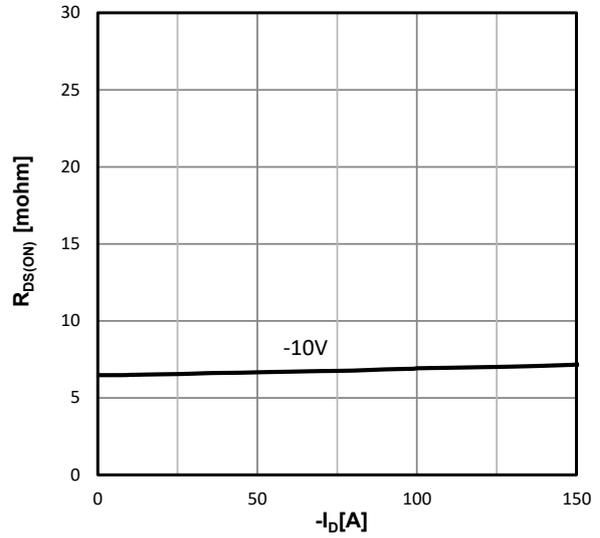temperature a2： V_{DD}=-50V,L=1mH, R_G=25Ω, Starting T_j=25℃
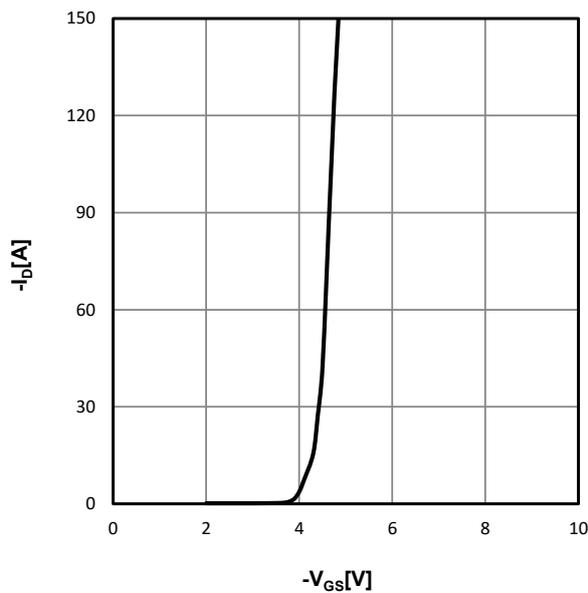
Characteristics Curve：

Figure 1: Typ. output characteristics
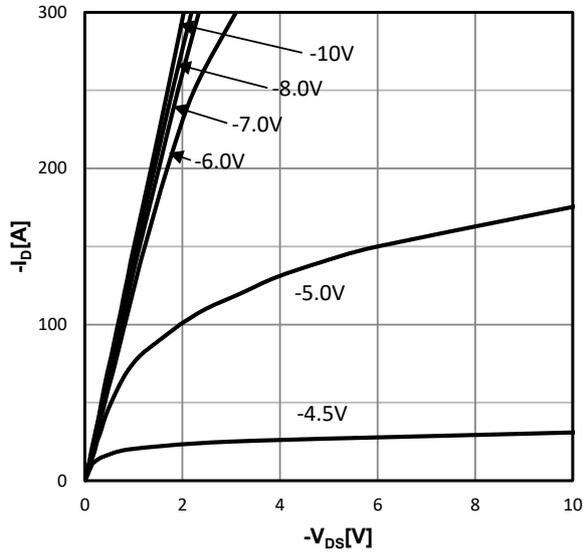
$I_D=f(V_{DS})$, $T_j=25$ °C; parameter: V_{GS}

Figure 2: Typ. drain-source on resistance

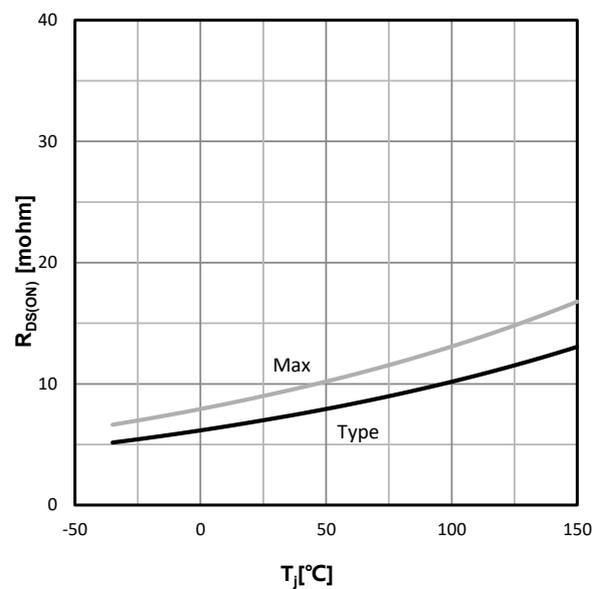$R_{DS(on)}=f(I_D)$, $T_j=25$ °C; parameter: V_{GS}
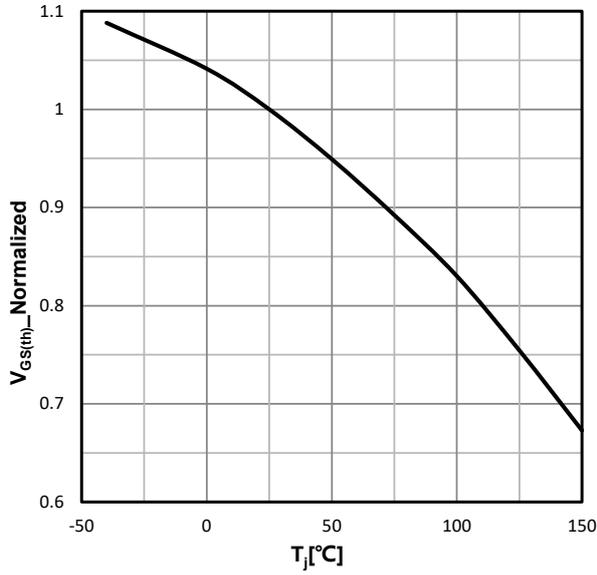
Figure 3: Typ. transfer characteristics

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

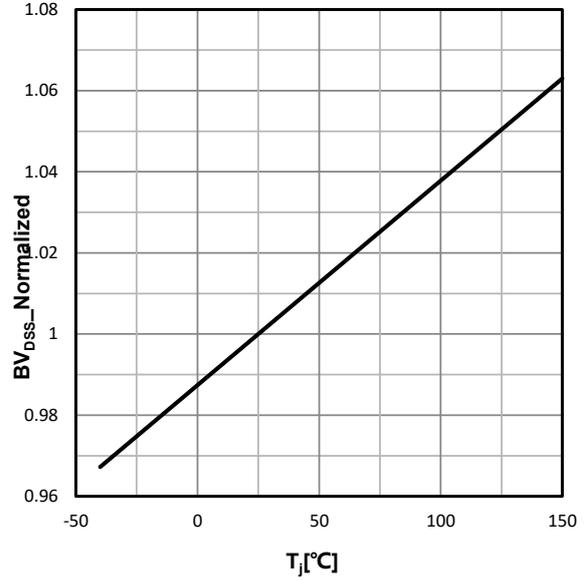### Figure 4: drain-source on resistance

$R_{DS(on)}=f(T_j)$, $I_D=-20A$, $V_{GS}=-10V$;
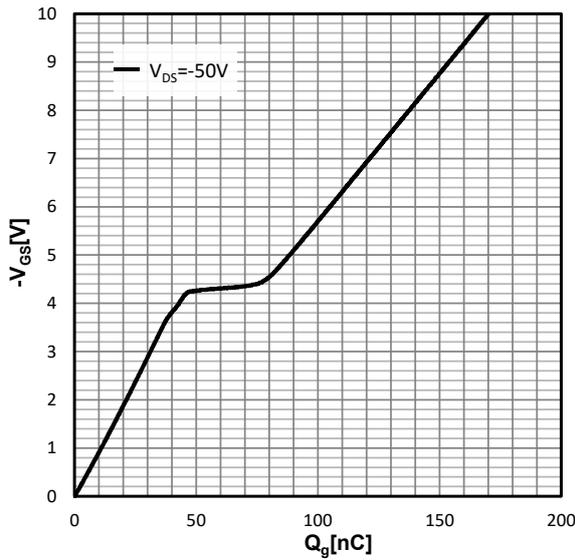
Figure 5: Typ. gate threshold voltage

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

Figure 6: Drain-source breakdown voltage

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

Figure 7: Typ. gate charge

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

Figure 8: Typ. Capacitances
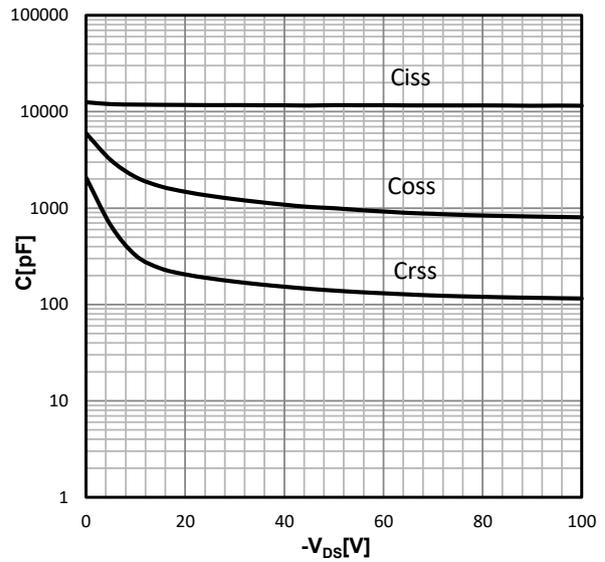
$C=f(V_{DS})$; $V_{GS}=0V$; $f=1.0$ MHz;

Figure 9: Power dissipation

$P_{tot}=f(T_C);$
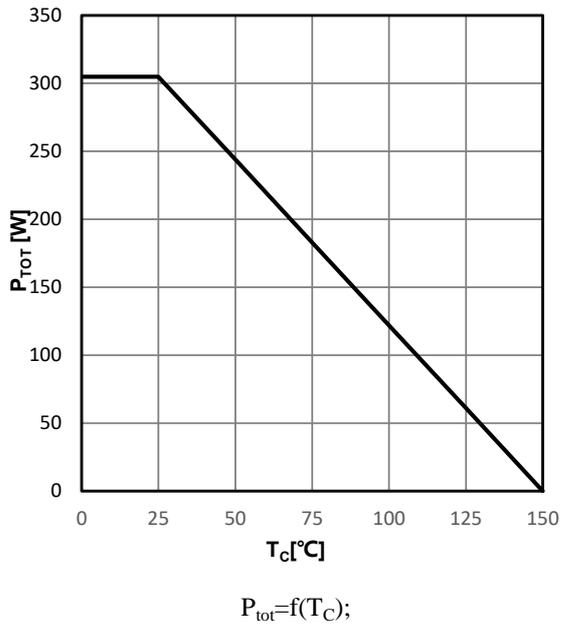
Figure 10:Drain current

$I_D=f(T_C);$
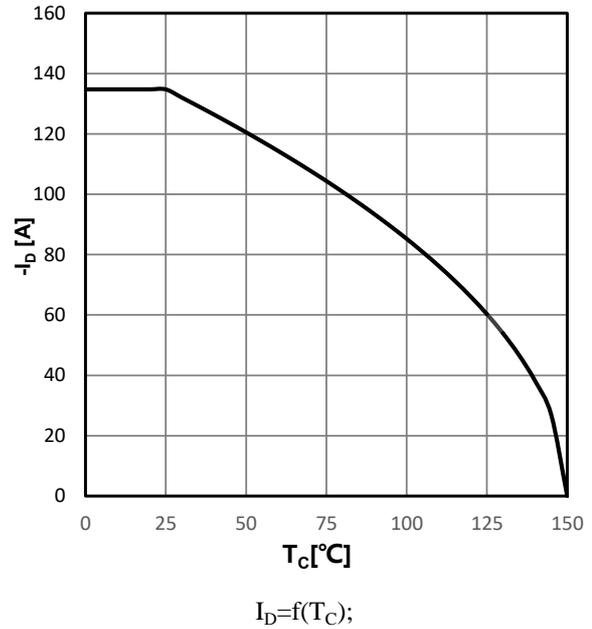
Figure 11: Safe operating area

$I_D=f(V_{DS}); T_C=25\ °C; D=0;$ parameter: tp
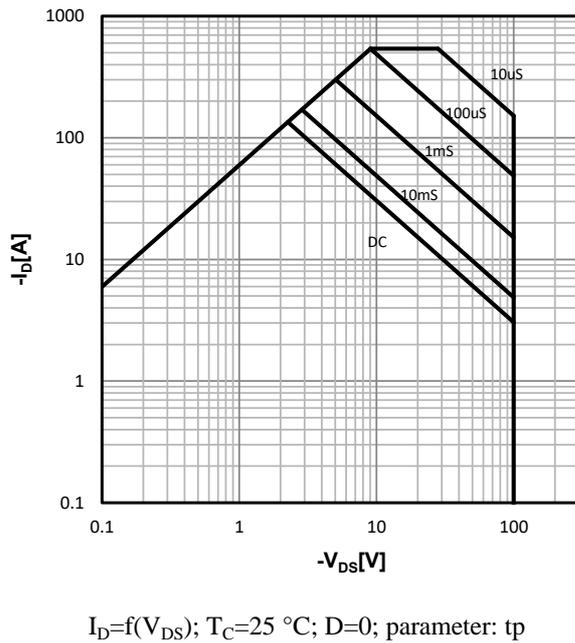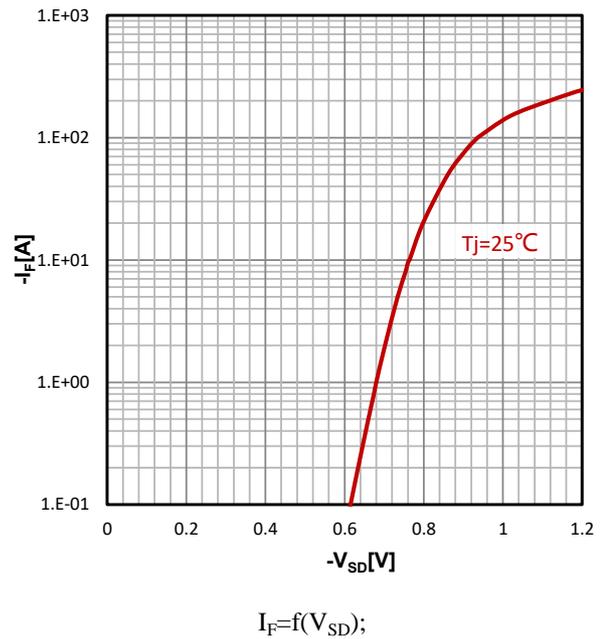
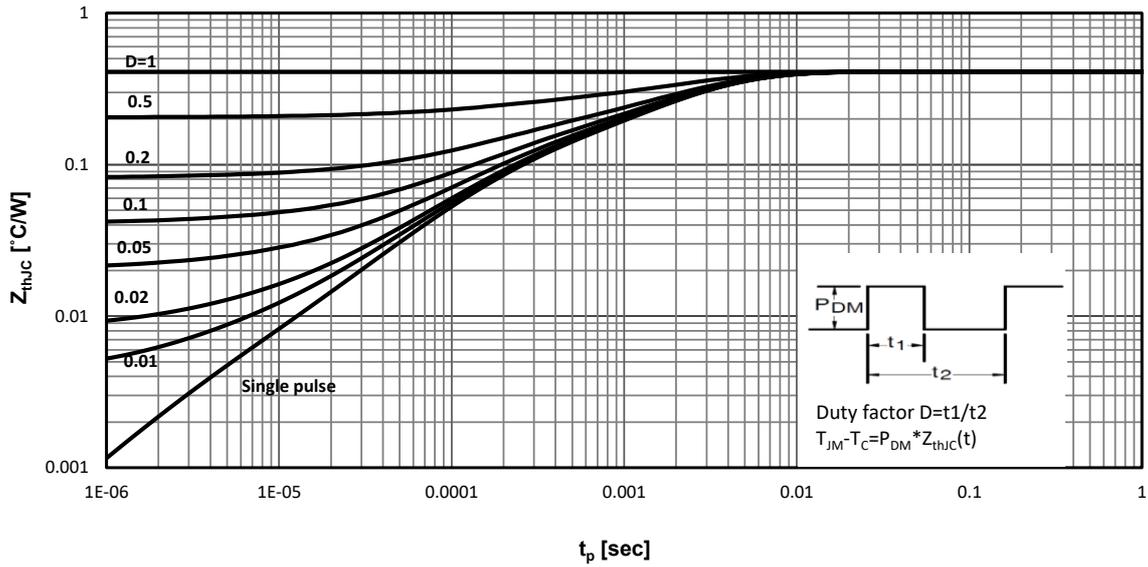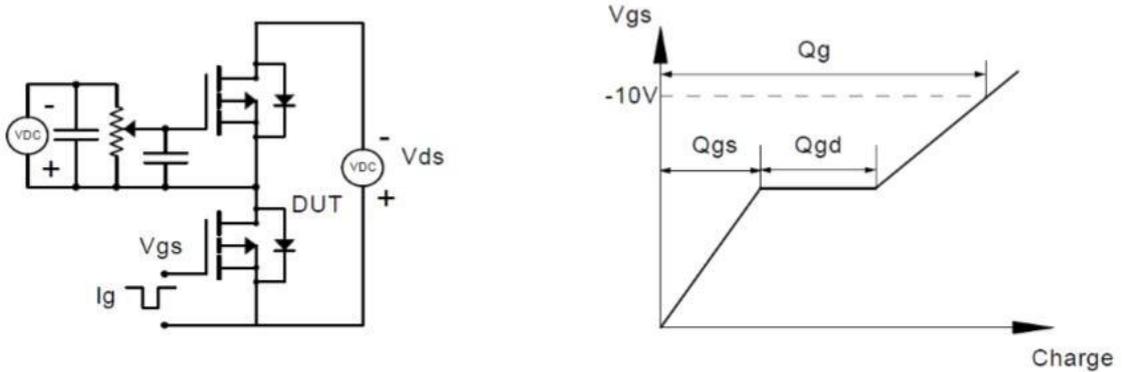**Figure 12: Typ. forward characteristics**

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

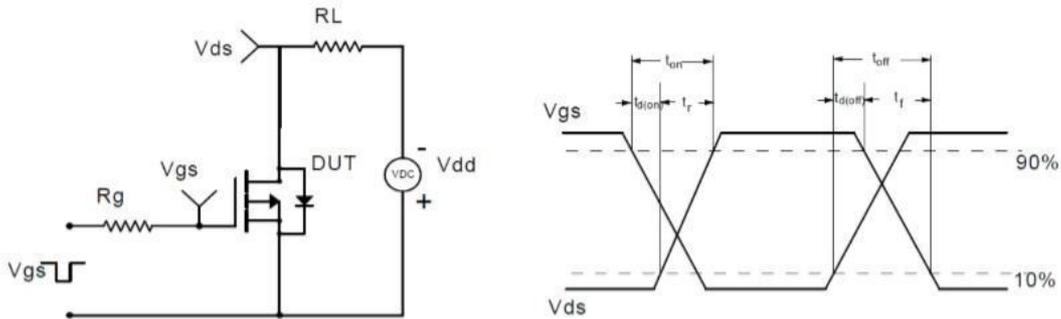**Figure 13: Max. Transient Thermal Impedance**

$Z_{thJC}=f(t_p)$; parameter: D
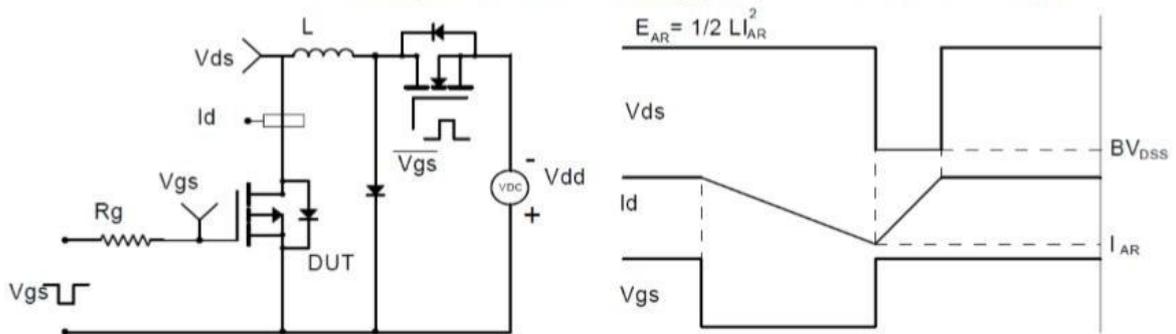
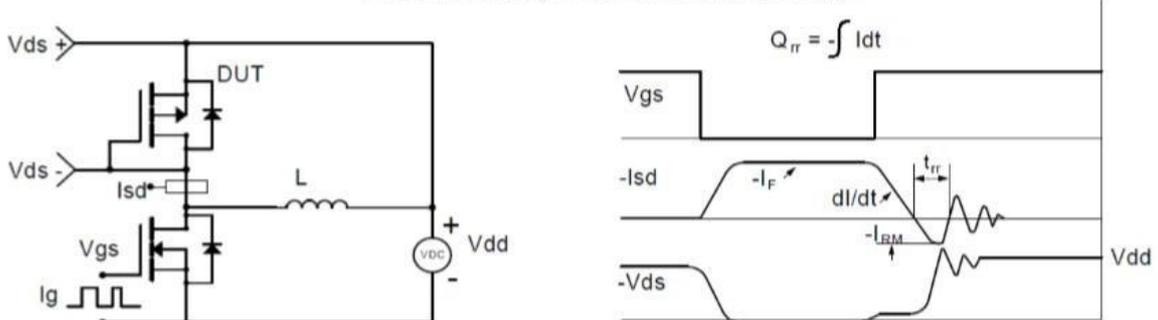## Test Circuit and Waveform:

Gate Charge Test Circuit & Waveform

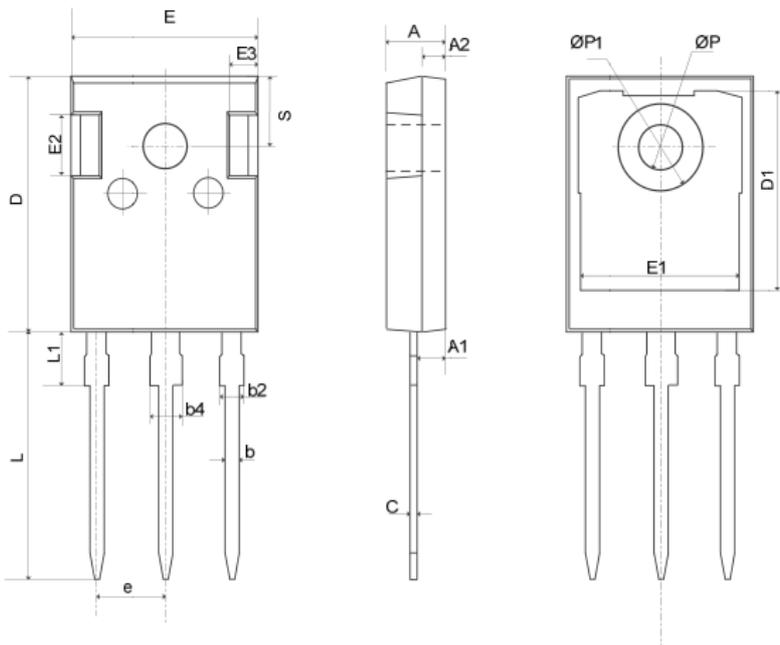### Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2\, LI_{AR}^2$$

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int Idt$$

Mechanical Dimensions for TO-247

COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.11	1.36
b2	1.91	2.21
b4	2.91	3.21
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.00	13.60
E2	4.80	5.20
E3	2.30	2.70
e	5.44BSC	
L	19.62	20.22
L1	—	4.30
ØP	3.40	3.80
ØP1	—	7.30
S	6.15BSC	

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