XRS10P10K

P-Ch 100V Fast Switching MOSFETs

Features

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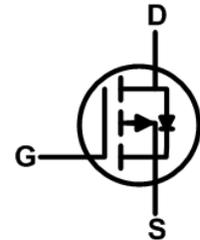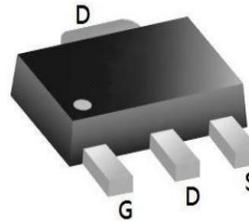- High density cell design for low $R_{DS(ON)}$

Product Summary

Green

BVDSS	RDSON	ID
-100V	115mΩ	-10A

Applications

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

SOT89-3L Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25°C$	Continuous Drain Current, V_{GS} @ 10V[1,6]	-10	A
$I_D@T_C=100°C$	Continuous Drain Current, V_{GS} @ 10V[1,6]	-6	A
I_{DM}	Pulsed Drain Current[2]	-38	A
EAS	Single Pulse Avalanche Energy[3]	---	mJ
I_{AS}	Avalanche Current	---	A
$P_D@T_C=25°C$	Total Power Dissipation[4]	69	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]	---	75	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	1.8	°C/W

1

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=-3A	---	115	150	mΩ
		V_{GS}=-4.5V , I_D=-3A	---	130	165	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.7	-2.2	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=-3A	---	---	---	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=-3A	---	12.7	---	nC
Q_{gs}	Gate-Source Charge		---	2.1	---	
Q_{gd}	Gate-Drain Charge		---	2.3	---	
$T_{d(on)}$	Turn-On Delay Time	V_{GS}=-10V, V_{DS}=-50V, I_D=-3A, R_G=5Ω	---	5.9	---	ns
T_r	Rise Time		---	3.7	---	
$T_{d(off)}$	Turn-Off Delay Time		---	39.5	---	
T_f	Fall Time		---	24.6	---	
C_{iss}	Input Capacitance	V_{DS}=-50V , V_{GS}=0V , f=1MHz	---	700	---	pF
C_{oss}	Output Capacitance		---	56	---	
C_{rss}	Reverse Transfer Capacitance		---	8.6	---	

Diode Characteristics

| Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_s	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	-10	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_s=-3A , T_J=25℃	---	---	-1.2	V
t_{rr}	Reverse Recovery Time	IF=-3A , di/dt=100A/μs , T_J=25℃	---	66	---	nS
Q_{rr}	Reverse Recovery Charge		---	214	---	nC

Notes:

1. Repetitive rating; pulse width limited by maximum junction temperature
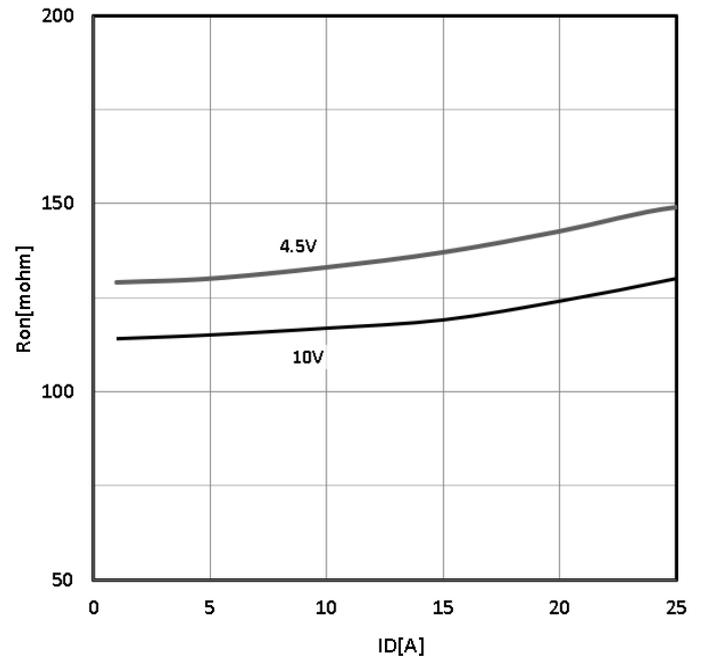
Characteristics Curve：

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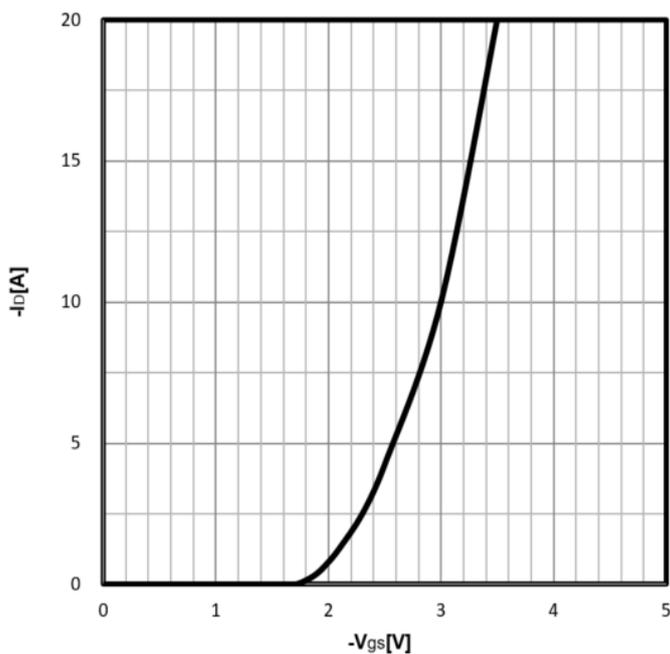$-I_D = f(-V_{DS})$
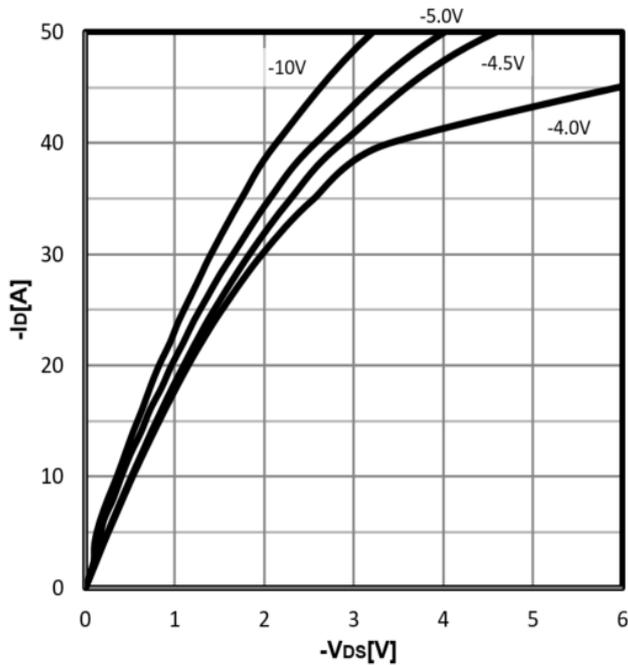
Typ. drain-source on resistance
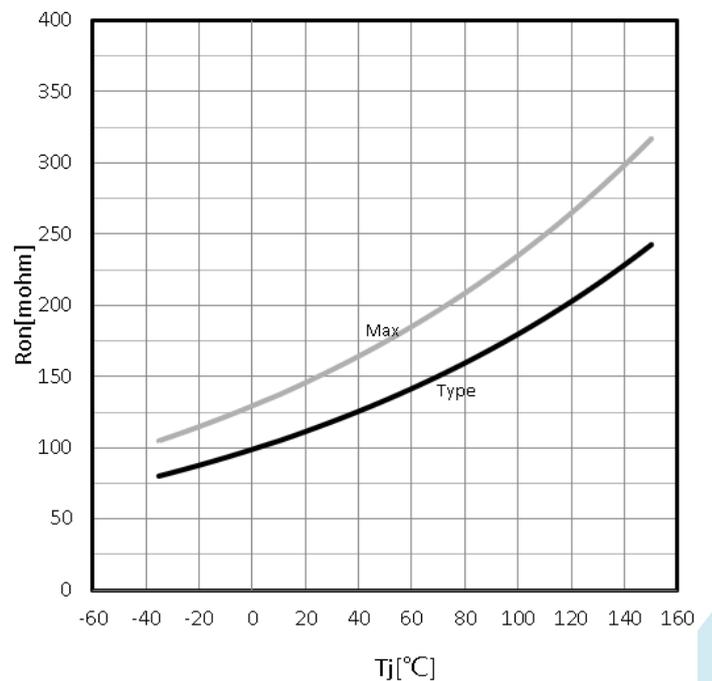$R_{DS(on)} = f(-I_D)$

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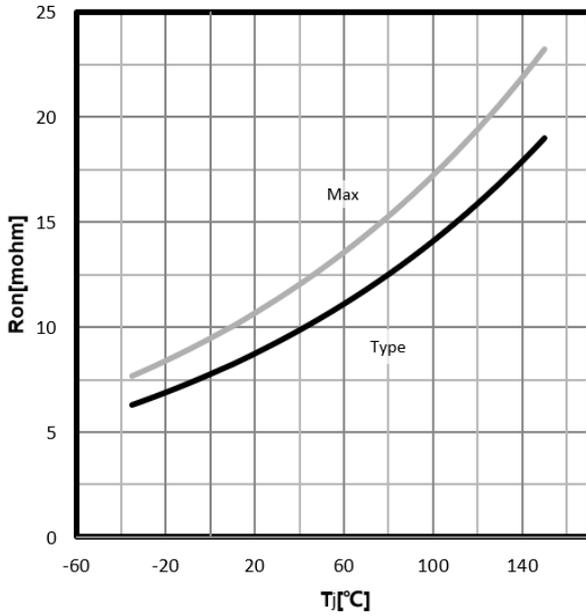$-I_D = f(-V_{GS})$

Drain-source on-state resistance
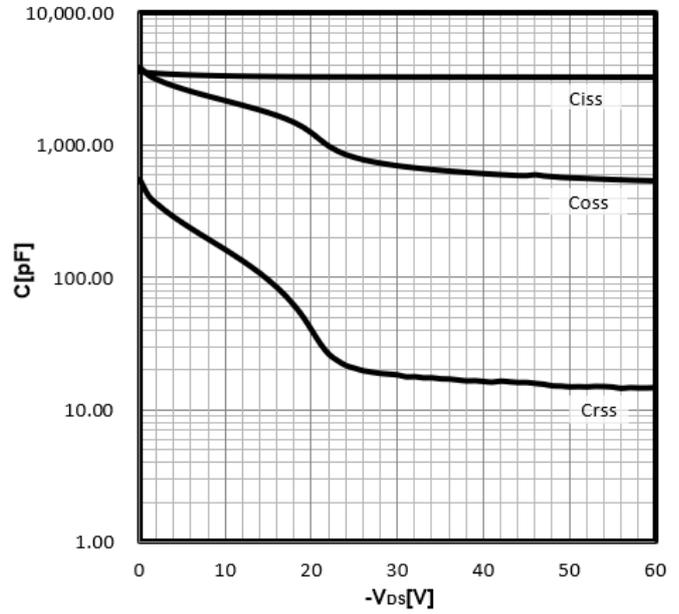$R_{DS(on)} = f(T_j); I_D = -5A; V_{GS} = -10V$

3

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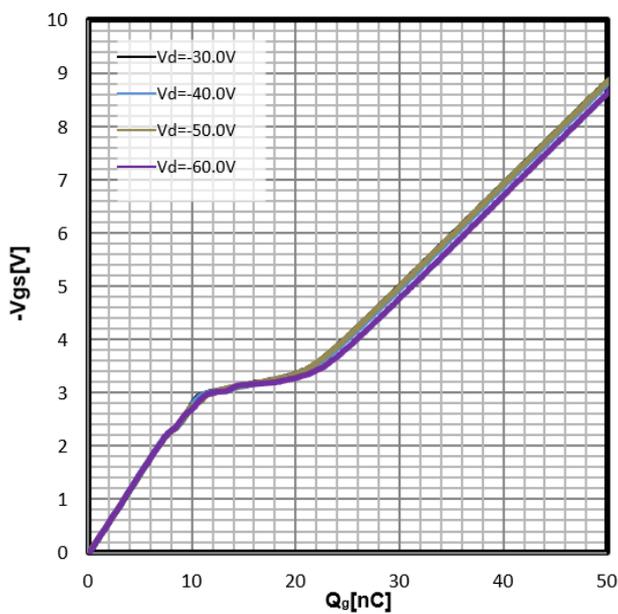$R_{DS(on)}=f(T_j)$; $I_D=-20A$; $V_{GS}=-10V$

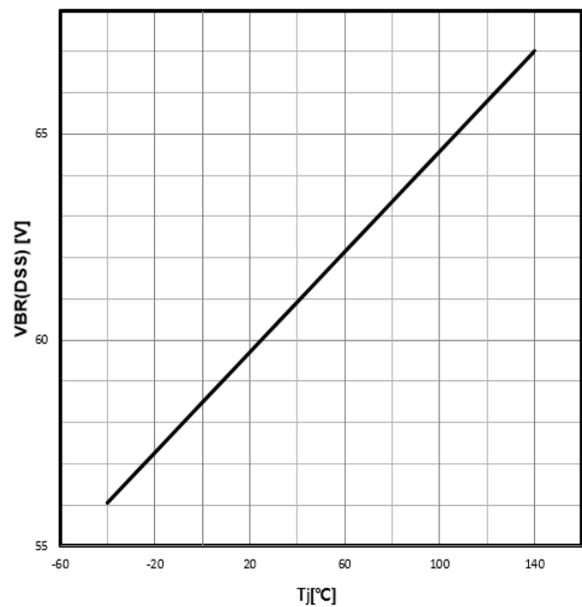
Typ. capacitances
$C=f(V_{DS})$; $V_{GS}=0V$; $f=1MHz$

Typ. gate charge
$V_{GS}=f(Q_{gate})$; $I_D=-20A$

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

4

Gate Threshold Voltage
$-V_{TH}=f(T_j)$; $I_D=-250uA$
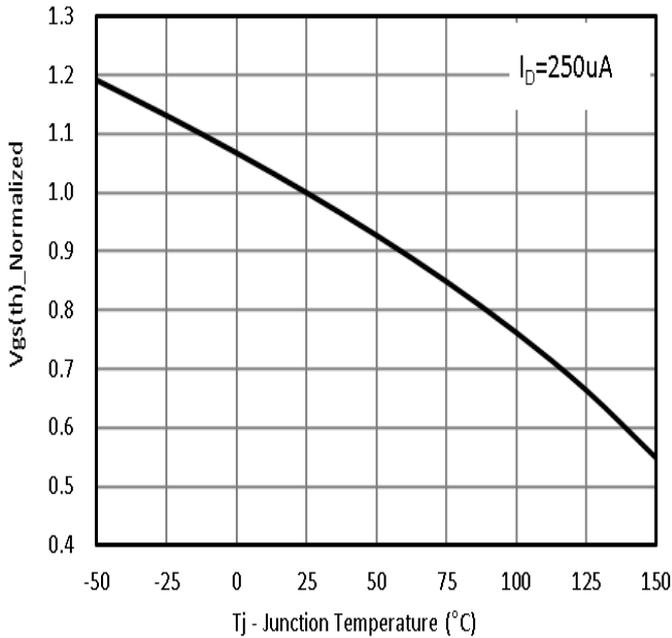
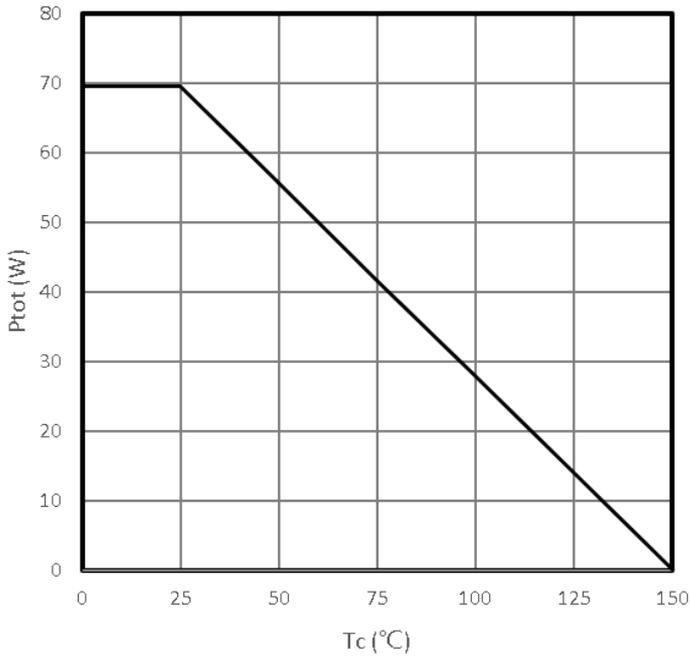**Drain-source breakdown voltage**
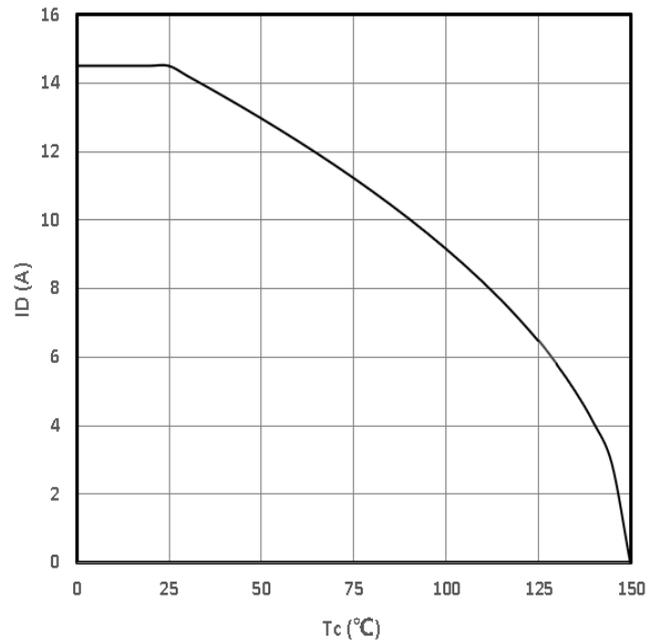$-V_{BR(DSS)}=f(T_j)$; $I_D=-250uA$
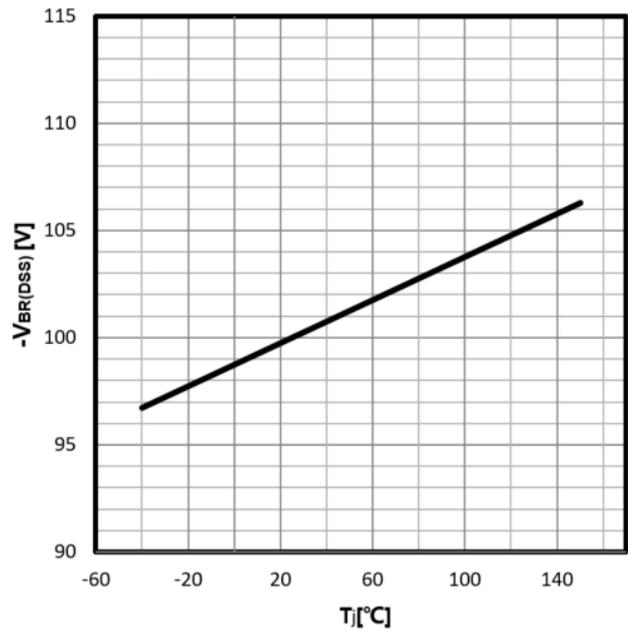
Typ. gate charge
$-V_{GS}=f(Q_g)$; $I_D=-5A$
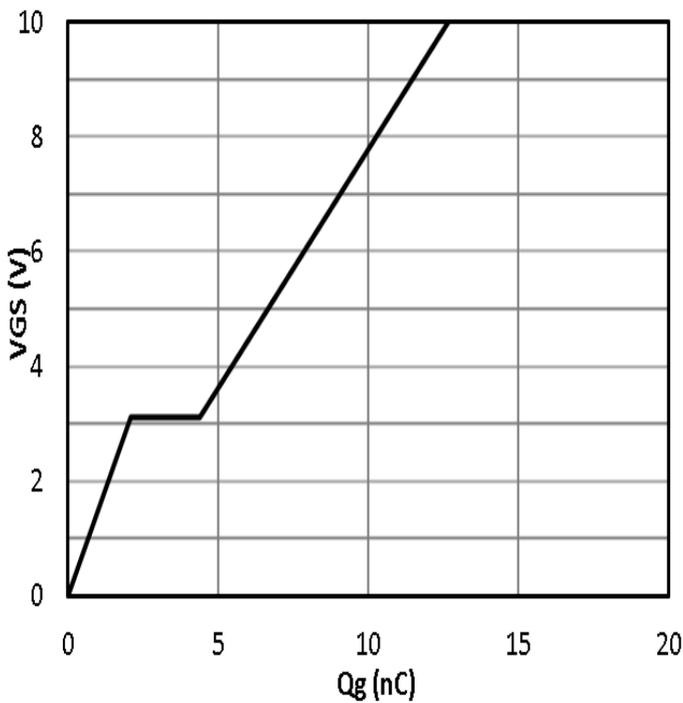
Typ. capacitances
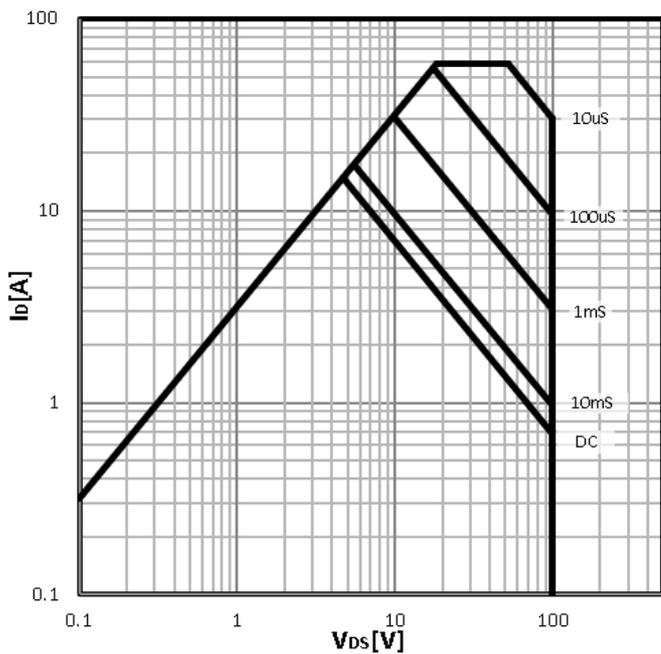$C=f(-V_{DS})$; $V_{GS}=0V$; $f=1MHz$
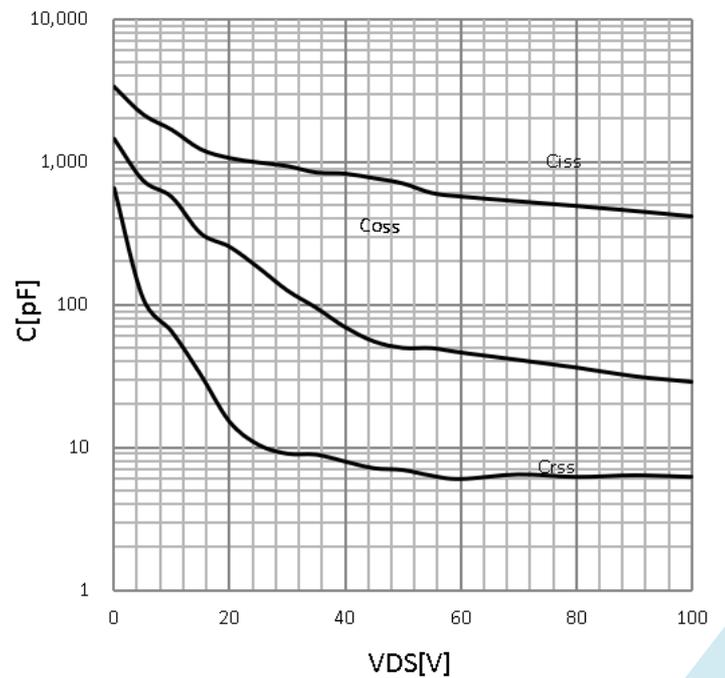
Power Dissipation
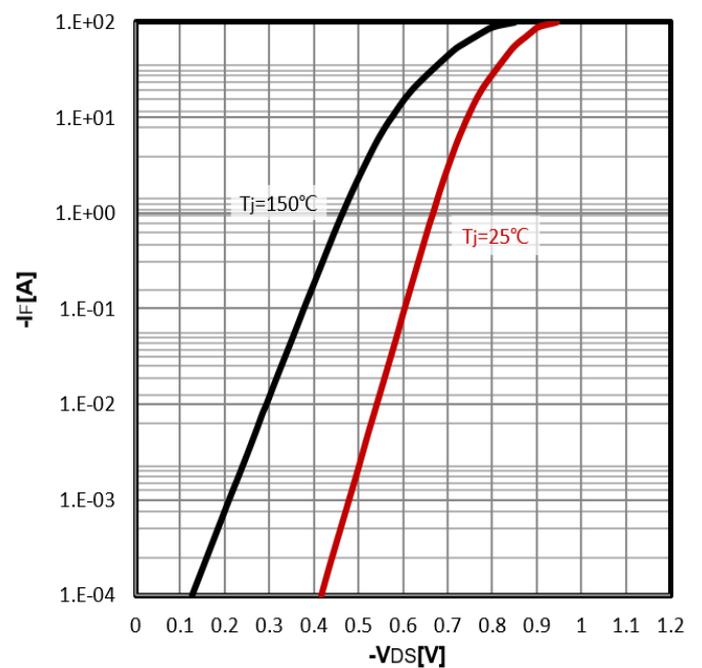$P_{tot}=f(T_C)$

Maximum Drain Current
$-I_D=f(T_C)$
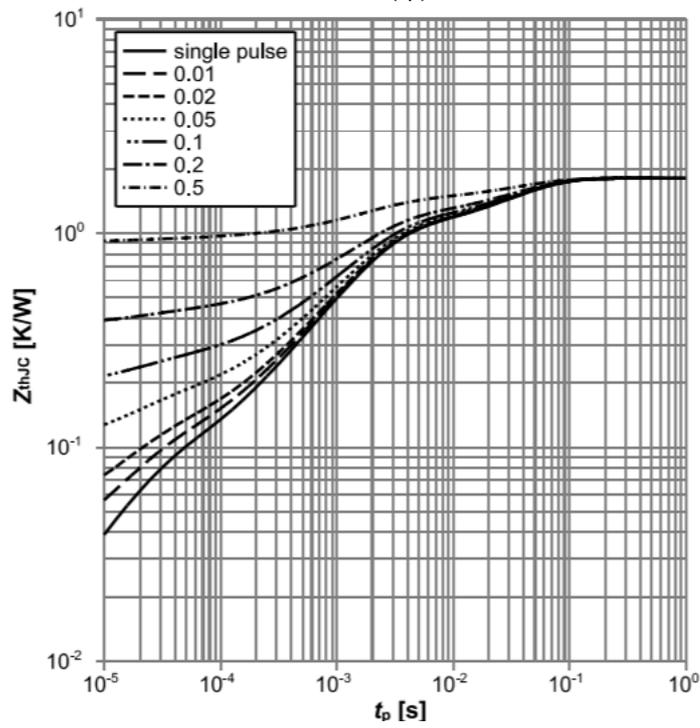
Safe operating area
$-I_D=f(-V_{DS})$
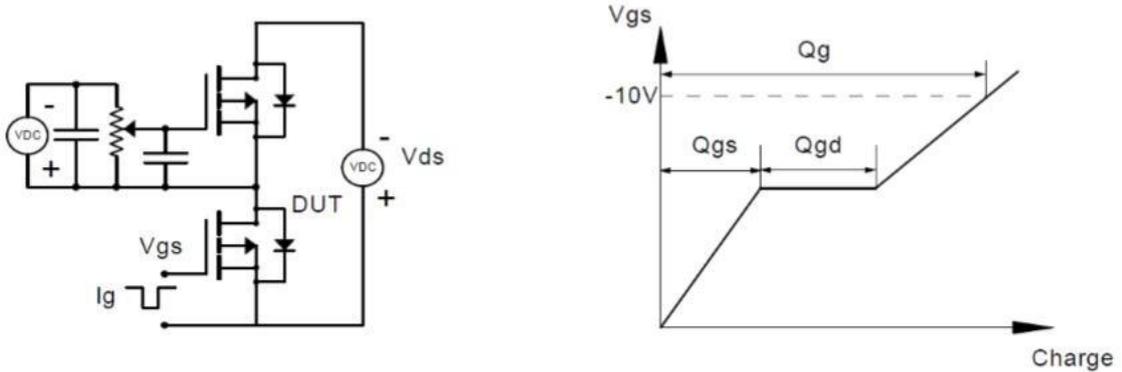
Body Diode Forward Voltage Variation
$-I_F=f(-V_{DS})$

Max. transient thermal impedance
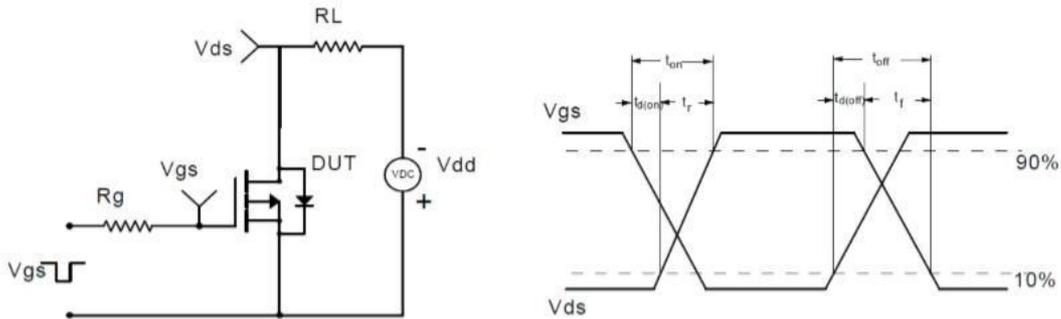$$Z_{thJC}=f(t_p)$$
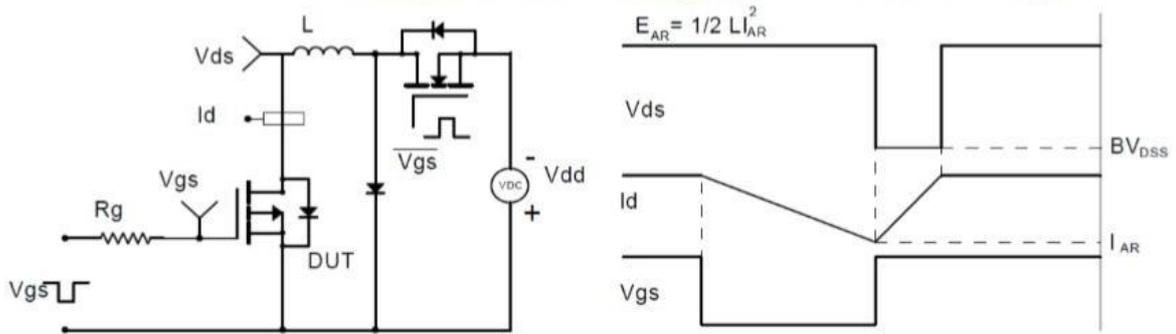
Test Circuit and Waveform:

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = \frac{1}{2} LI_{AR}^2$$

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = \int Idt$$
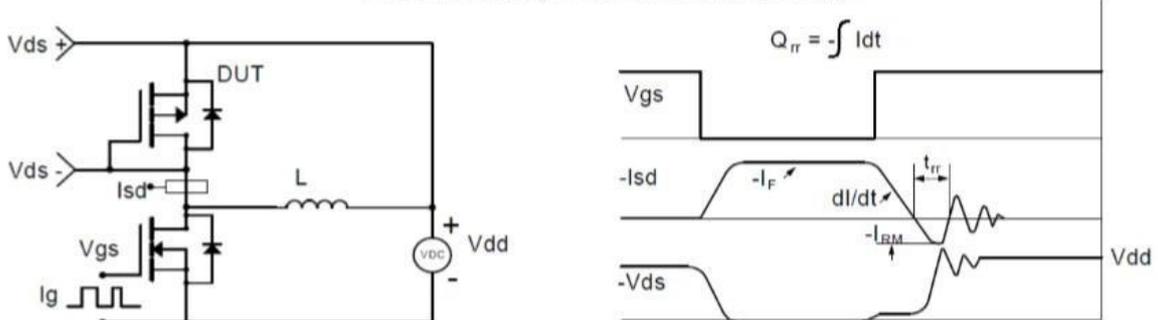
SOT-89-3L Package Information
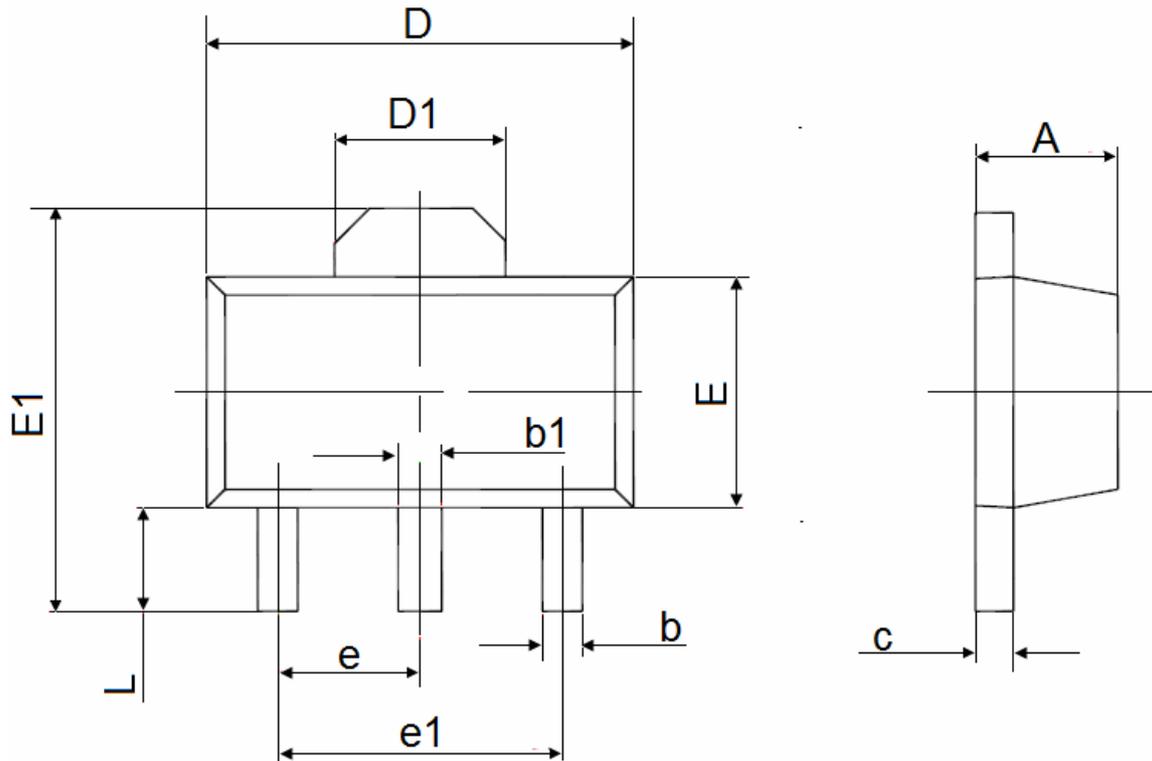
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047