

## SOT-89 Plastic-Encapsulate Transistors

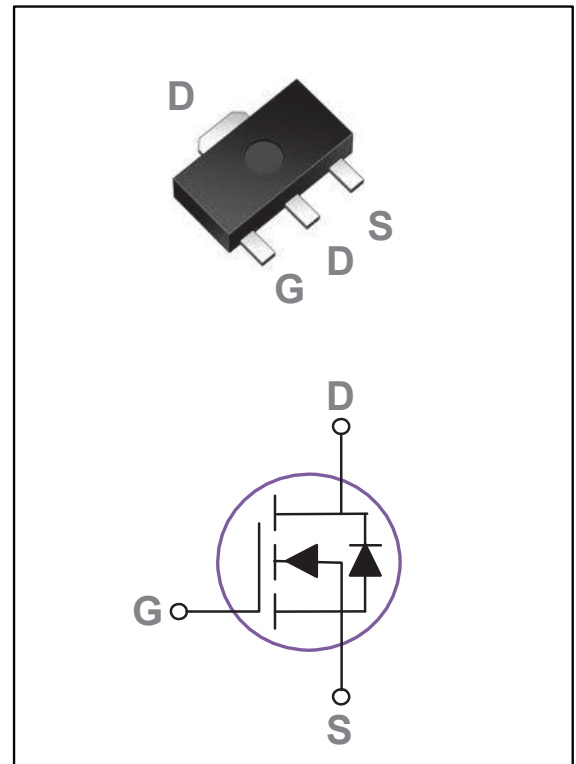
BVDSS	R <sub>DS(ON)</sub>	I <sub>D</sub>
100V	350mΩ	3A

### Features

- 100V, 3A ,  $R_{DS(ON)}=350m\Omega@V_{GS}=10V$
- Improved  $dv/dt$  capability
- Fast switching
- Green Device Available

### Applications

- Networking
- Load Switch
- LED applications



## MAXIMUM RATINGS AND CHARACTERISTICS

@ 25°C Ambient Temperature (unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current – Continuous ( $T_C=25^\circ C$ )	$I_D$	3	A
Drain Current – Continuous ( $T_C=100^\circ C$ )		1.9	A
Drain Current – Pulsed <sup>1</sup>	$I_{DM}$	12	A
Single Pulse Avalanche Energy <sup>2</sup>	EAS	6	mJ
Single Pulse Avalanche Current <sup>2</sup>	IAS	11	A
Power Dissipation ( $T_C=25^\circ C$ )	$P_D$	6.9	W
Power Dissipation – Derate above 25°C		0.06	W/°C
Storage Temperature Range	$T_{STG}$	-50 to 150	°C
Operating Junction Temperature Range	$T_J$	-50 to 150	°C

### Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to ambient	$R_{\theta JA}$	---	80	°C/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	18	°C/W

## MOSFET ELECTRICAL CHARACTERISTICS $T_A=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	---	---	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^{\circ}\text{C}, I_D=1\text{mA}$	---	0.09	---	$\text{V}/^{\circ}\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	$\mu\text{A}$
		$V_{DS}=80V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	---	---	10	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

### On Characteristics

Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2A$	---	280	350	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=1A$	---	290	360	$\text{m}\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.8	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	-4.4	---	$\text{mV}/^{\circ}\text{C}$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=2A$	---	3	---	S

### Dynamic and switching Characteristics

Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=50V, V_{GS}=10V, I_D=1A$	---	5.8	11	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		---	0.7	3	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		---	2.5	5	
Turn-On Delay Time <sup>3,4</sup>	$T_{d(on)}$	$V_{DD}=50V, V_{GS}=10V, R_G=3.3\Omega, I_D=1A$	---	5.2	10	ns
Rise Time <sup>3,4</sup>	$T_r$		---	6.8	12	
Turn-Off Delay Time <sup>3,4</sup>	$T_{d(off)}$		---	14.5	28	
Fall Time <sup>3,4</sup>	$T_f$		---	2.1	5	
Input Capacitance	$C_{iss}$	$V_{DS}=50V, V_{GS}=0V, F=1\text{MHz}$	---	480	960	pF
Output Capacitance	$C_{oss}$		---	25	50	
Reverse Transfer Capacitance	$C_{rss}$		---	14	28	
Gate resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	2	4	$\Omega$

### Drain-Source Diode Characteristics and Maximum Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	$I_S$	$V_G=V_D=0V, \text{Force Current}$	---	---	3	A
Pulsed Source Current	$I_{SM}$		---	---	6	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	---	---	1	V
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_S=1A, di/dt=100A/\mu\text{s}, T_J=25^{\circ}\text{C}$	---	70	---	ns
Reverse Recovery Charge	$Q_{rr}$		---	114	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=11A, R_G=25\Omega, \text{Starting } T_J=25^{\circ}\text{C}$ .
3. The data tested by pulsed , pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

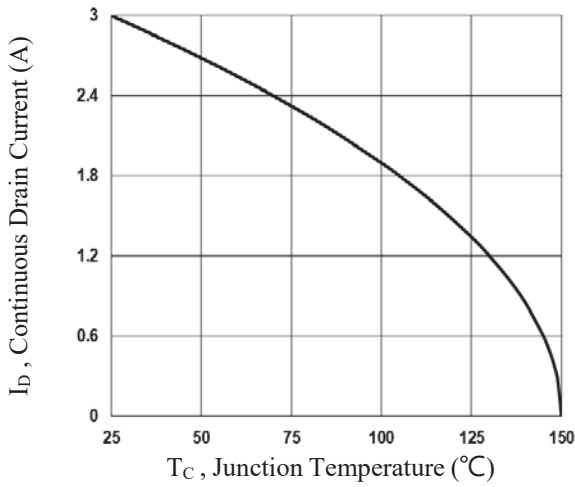


Fig.1 Continuous Drain Current vs.  $T_c$

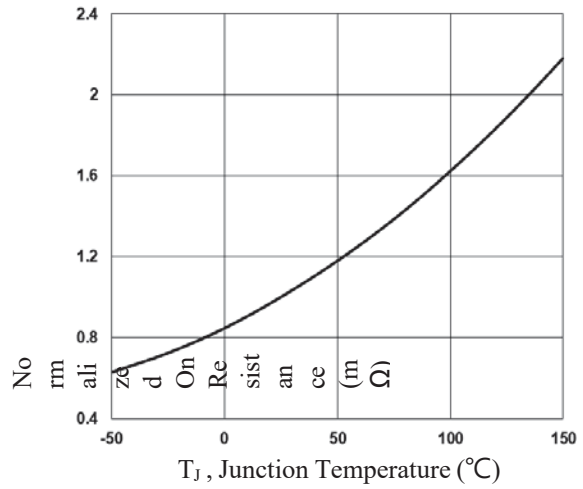


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$

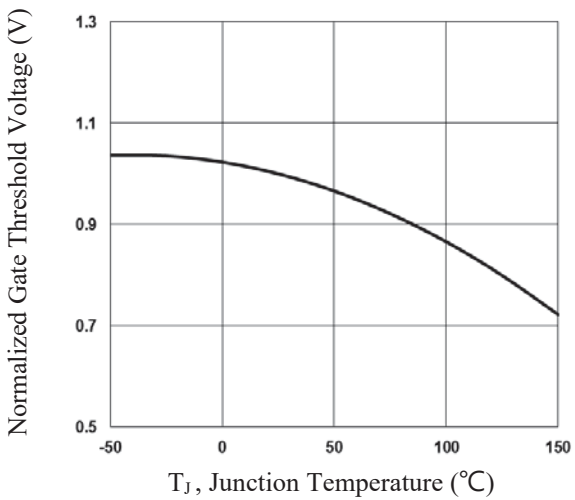


Fig.3 Normalized  $V_{th}$  vs.  $T_j$

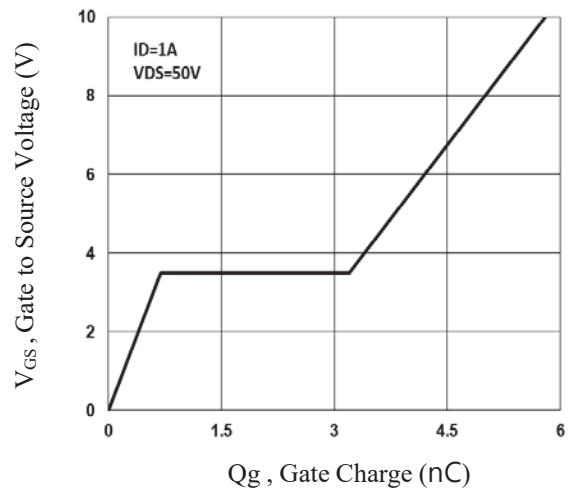


Fig.4 Gate Charge Waveform

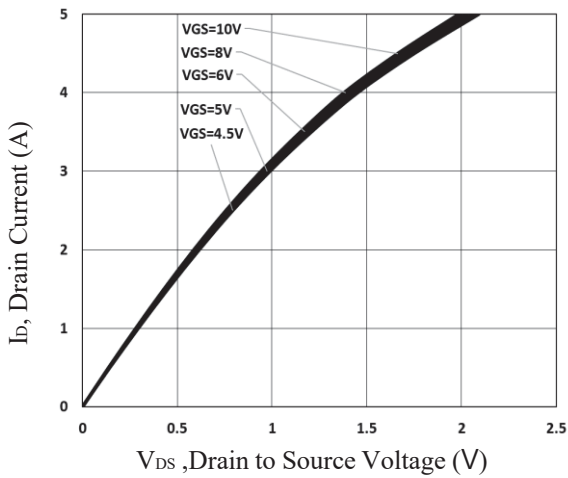


Fig.5 Typical Output Characteristics

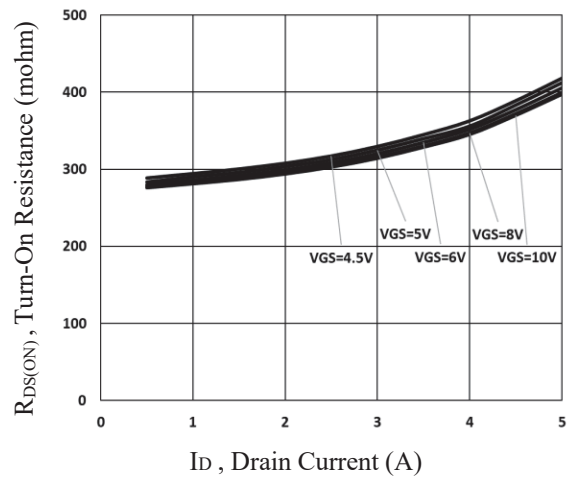
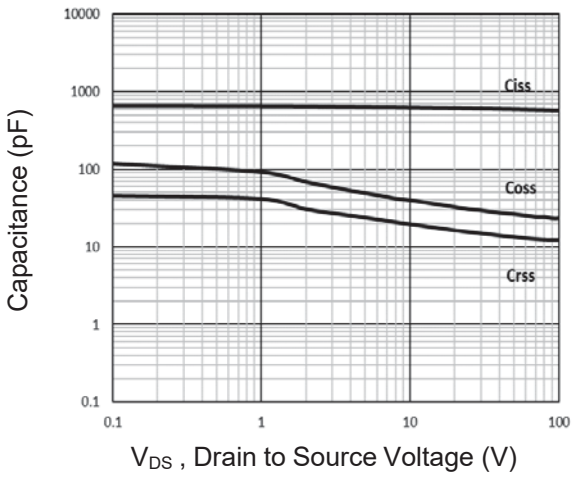
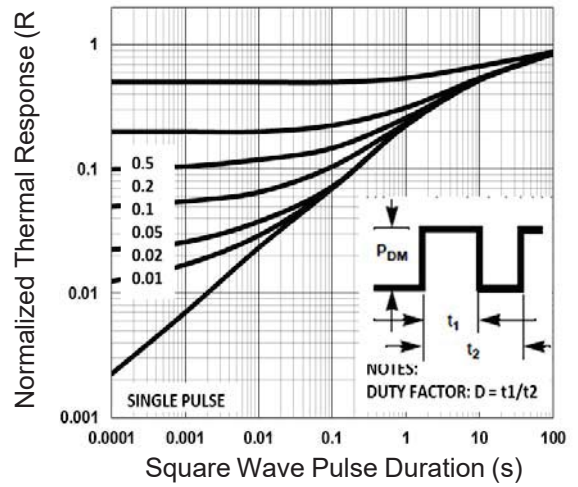


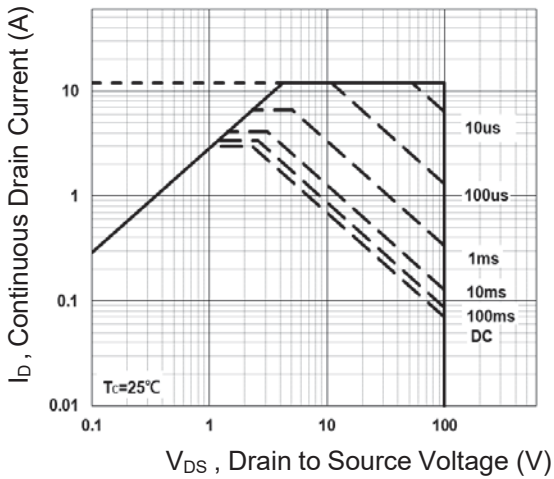
Fig.6 Turn-On Resistance vs.  $I_D$



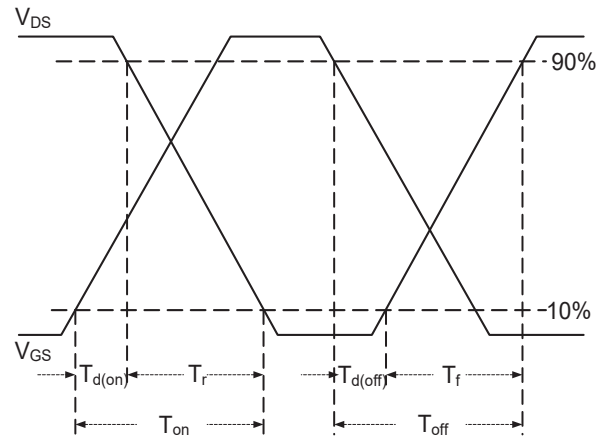
**Fig.7 Capacitance Characteristics**



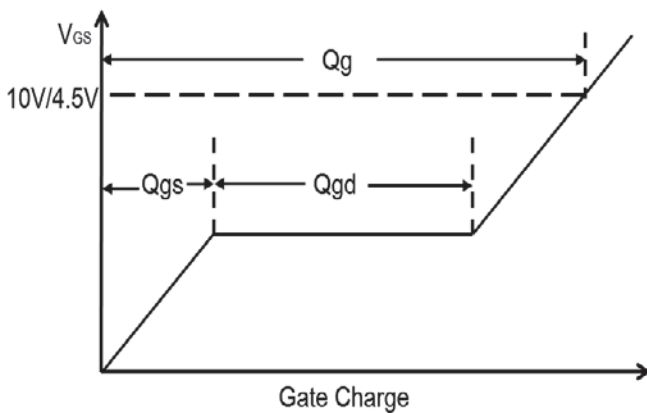
**Fig.8 Normalized Transient Impedance**



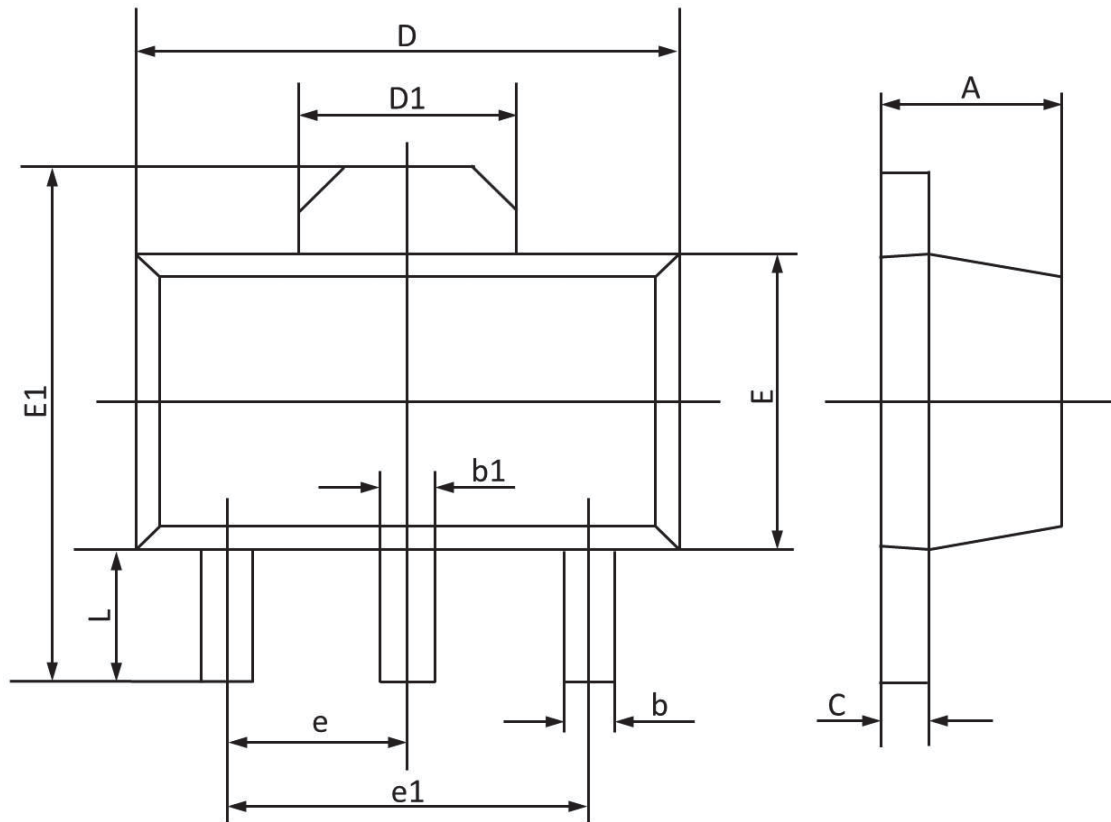
**Fig.9 Maximum Safe Operation Area**



**Fig.10 Switching Time Waveform**



**Fig.11 Gate Charge Waveform**

**SOT89 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