

## 60V P-Channel MOSFETS

### SOT-23-3S Pin Configuration

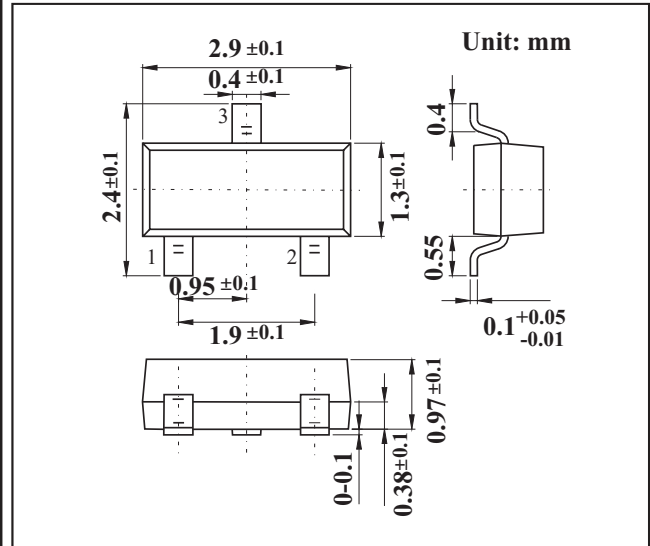
BVDSS	RDSON	ID
-60V	190mΩ	-2A

**Feature**

- -60V, -2A,  $R_{DS(ON)} = 190m\Omega @ V_{GS} = -10V$
- Improved  $dv/dt$  capability
- Fast switching
- Green Device Available

**Applications**

- Motor Drive
- Power Tools
- LED Lighting


**MAXIMUM RATINGS AND CHARACTERISTICS**

@ 25°C Ambient Temperature (unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-60	V
$V_{GS}$	Gate-Source Voltage	±20	V
$I_D$	Drain Current – Continuous ( $T_C=25^\circ C$ )	-2	A
	Drain Current – Continuous ( $T_C=100^\circ C$ )	-1.25	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	-8	A
$P_D$	Power Dissipation ( $T_C=25^\circ C$ )	1.56	W
	Power Dissipation – Derate above 25°C	0.012	W/°C
$T_{STG}$	Storage Temperature Range	-50 to 150	°C
$T_J$	Operating Junction Temperature Range	-50 to 150	°C

**Thermal Characteristics**

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



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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-60	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^{\circ}\text{C}, I_D=-1\text{mA}$	---	-0.05	---	$\text{V}/^{\circ}\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-60V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	-1	$\mu A$
		$V_{DS}=-48V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	---	---	-10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

### On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-2A$	---	160	190	m $\Omega$
		$V_{GS}=-4.5V, I_D=-1.5A$	---	200	240	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.2	-1.9	-2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	5	---	$\text{mV}/^{\circ}\text{C}$
gfs	Forward Transconductance	$V_{DS}=-10V, I_D=-2A$	---	3.5	---	S

### Dynamic and switching Characteristics

$Q_g$	Total Gate Charge <sup>2,3</sup>	$V_{DS}=-30V, V_{GS}=-10V, I_D=-2A$	---	8.2	12	nC
$Q_{gs}$	Gate-Source Charge <sup>2,3</sup>		---	1.8	3.6	
$Q_{gd}$	Gate-Drain Charge <sup>2,3</sup>		---	1.5	3	
$T_{d(on)}$	Turn-On Delay Time <sup>2,3</sup>	$V_{DD}=-30V, V_{GS}=-10V, R_G=6\Omega$ $I_D=-1A$	---	5.2	10	ns
$T_r$	Rise Time <sup>2,3</sup>		---	19	36	
$T_{d(off)}$	Turn-Off Delay Time <sup>2,3</sup>		---	35	67	
$T_f$	Fall Time <sup>2,3</sup>		---	10.6	20	
$C_{iss}$	Input Capacitance	$V_{DS}=-30V, V_{GS}=0V, F=1\text{MHz}$	---	425	615	pF
$C_{oss}$	Output Capacitance		---	35	50	
$C_{riss}$	Reverse Transfer Capacitance		---	20	30	

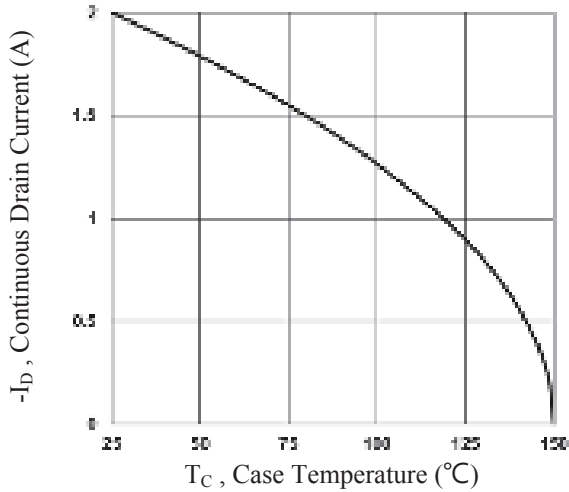
### Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	-2	A
$I_{SM}$	Pulsed Source Current		---	---	-4	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	---	---	-1	V

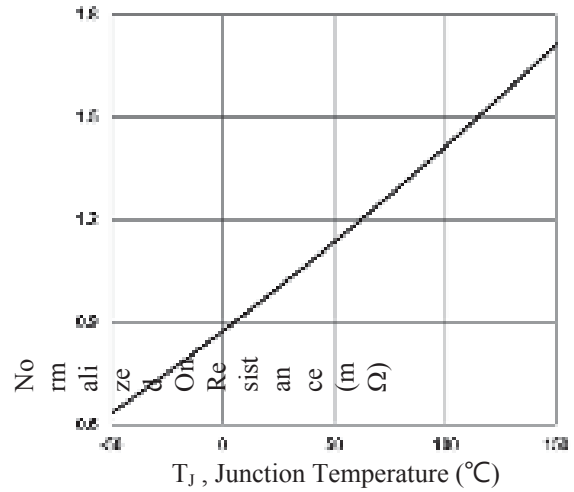
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$  .
3. Essentially independent of operating temperature.

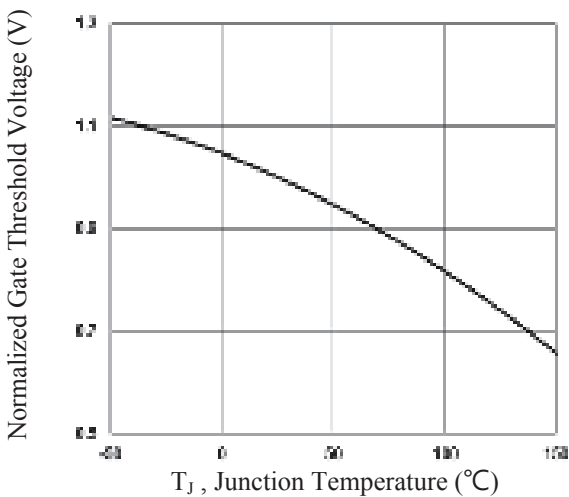
## RATINGS AND CHARACTERISTIC CURVES



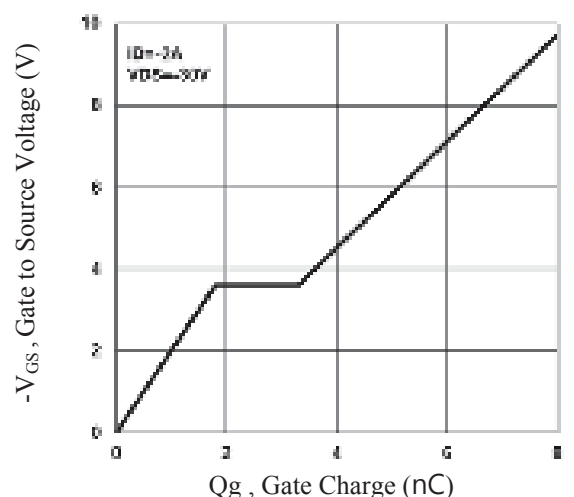
**Fig.1 Continuous Drain Current vs.  $T_c$**



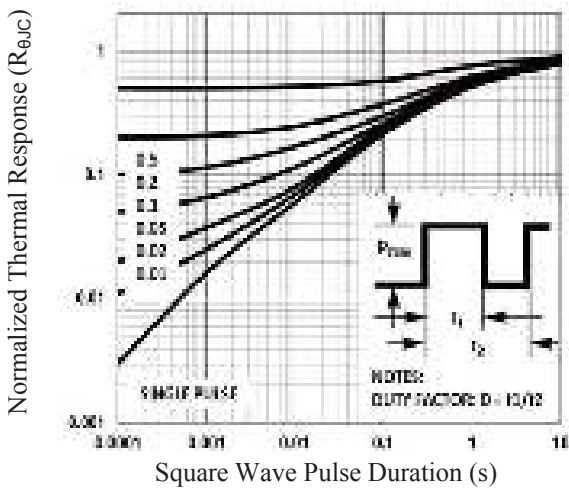
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



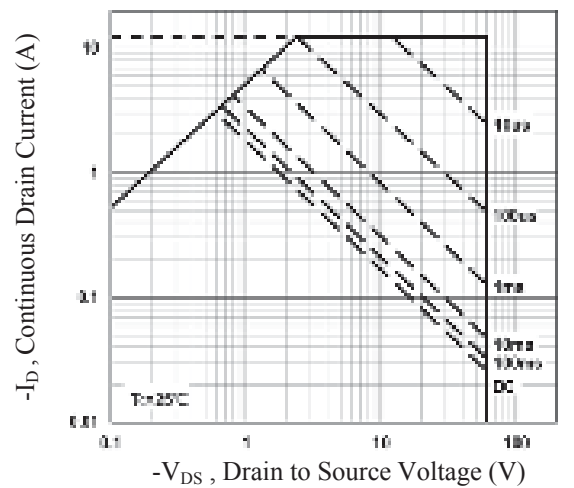
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.4 Gate Charge Waveform**

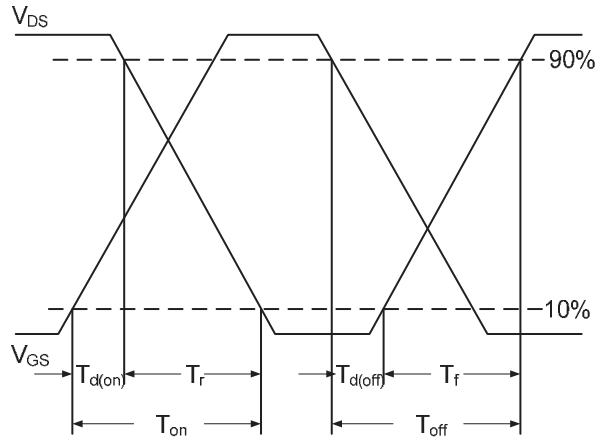


**Fig.5 Normalized Transient Impedance**

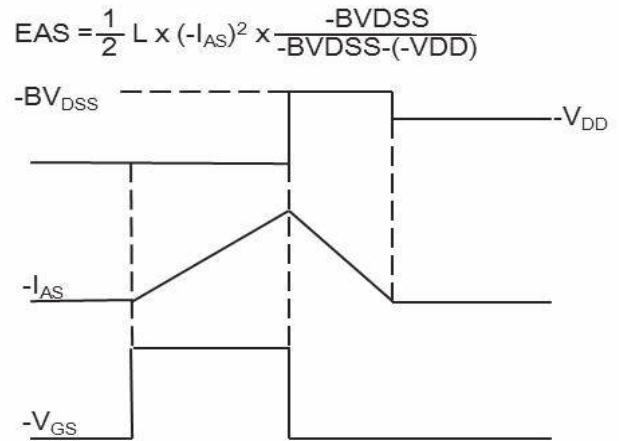


**Fig.6 Maximum Safe Operation Area**

## RATINGS AND CHARACTERISTIC CURVES



**Fig.7 Switching Time Waveform**



**Fig.8 EAS Waveform**