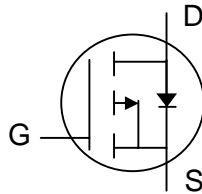


## P-channel Enhancement-mode Power MOSFET

Low gate-charge  
Simple drive requirement  
Fast switching

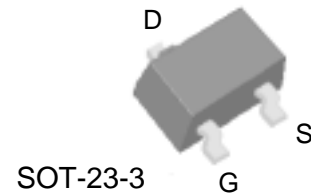
 **Pb-free; RoHS compliant.**



$BV_{DSS}$       -20V  
 $R_{DS(ON)}$     120mΩ  
 $I_D$             -2.5A

### DESCRIPTION

The SSM2313GN is in a SOT-23-3 package, which is widely used for lower power commercial and industrial surface mount applications. This device is suitable for low-voltage applications such as DC/DC converters and general switching applications.



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D @ T_A=25^\circ\text{C}$	Continuous Drain Current <sup>3</sup>	-2.5	A
$I_D @ T_A=70^\circ\text{C}$	Continuous Drain Current <sup>3</sup>	-1.97	A
$I_{DM}$	Pulsed Drain Current <sup>1,2</sup>	-10	A
$P_D @ T_A=25^\circ\text{C}$	Total Power Dissipation	1.38	W
	Linear Derating Factor	0.01	W/°C
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

### THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	90	°C/W

**ELECTRICAL CHARACTERISTICS (at T<sub>j</sub> = 25°C unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, $I_D=-1mA$	-	-0.01	-	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=-10V, I_D=-2.8A$	-	-	120	mΩ
		$V_{GS}=-4.5V, I_D=-2.5A$	-	-	160	mΩ
		$V_{GS}=-2.5V, I_D=-2A$	-	-	300	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-	-	-1.2	V
$g_{fs}$	Forward Transconductance	$V_{DS}=-5V, I_D=-2A$	-	4	-	S
$I_{DSS}$	Drain-Source Leakage Current (T <sub>j</sub> =25°C)	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	μA
	Drain-Source Leakage Current (T <sub>j</sub> =70°C)	$V_{DS}=-16V, V_{GS}=0V$	-	-	-25	μA
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 12V$	-	-	±100	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=-2A$	-	5	8	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=-16V$	-	1	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	2	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>2</sup>	$V_{DS}=-10V$	-	6	-	ns
$t_r$	Rise Time	$I_D=-1A$	-	17	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=-10V$	-	16	-	ns
$t_f$	Fall Time	$R_D=10\Omega$	-	5	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	270	430	pF
$C_{oss}$	Output Capacitance	$V_{DS}=-20V$	-	70	-	pF
$C_{riss}$	Reverse Transfer Capacitance	f=1.0MHz	-	55	-	pF

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Forward On Voltage <sup>2</sup>	$I_S=-1.2A, V_{GS}=0V$	-	-	-1.2	V
$t_{rr}$	Reverse Recovery Time <sup>2</sup>	$I_S=-2A, V_{GS}=0V,$	-	20	-	ns
$Q_{rr}$	Reverse Recovery Charge	dI/dt=100A/μs	-	15	-	nC

**Notes:**

1. Pulse width limited by maximum junction temperature.
2. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
3. Surface-mounted on 1 in<sup>2</sup> copper pad on FR4 board,  $t \leq 10\text{sec}$ ; 270°C/W when mounted on minimum copper pad.

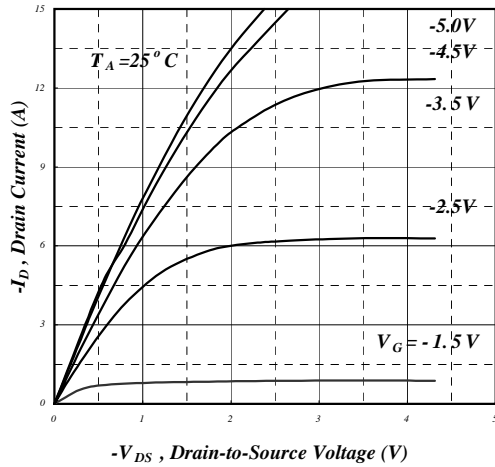


Fig 1. Typical Output Characteristics

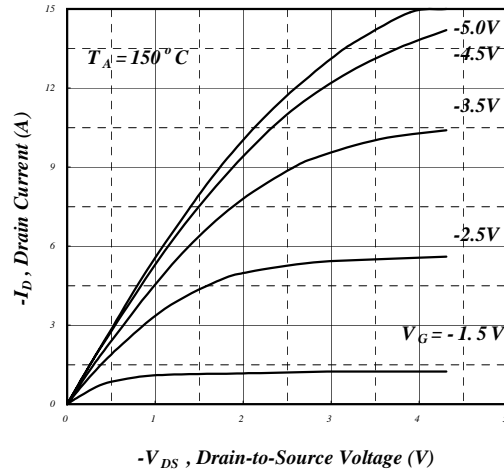


Fig 2. Typical Output Characteristics

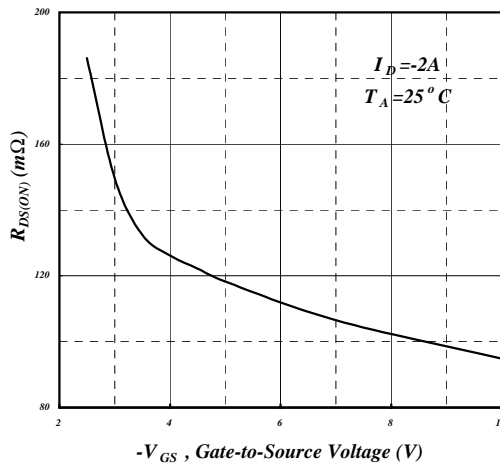


Fig 3. On-Resistance vs. Gate Voltage

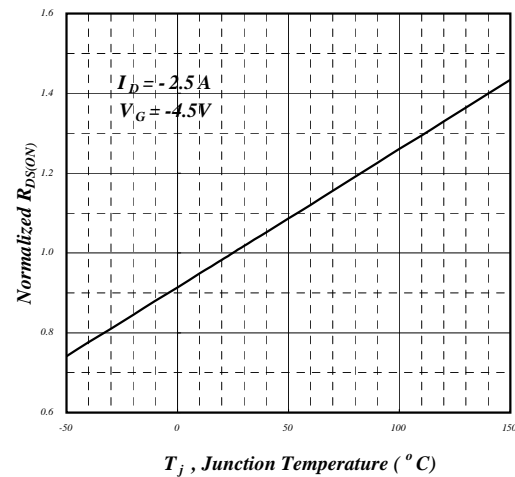


Fig 4. Normalized On-Resistance vs. Junction Temperature

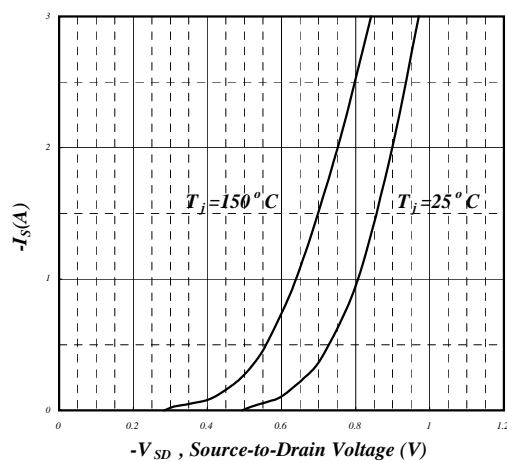


Fig 5. Forward Characteristic of Reverse Diode

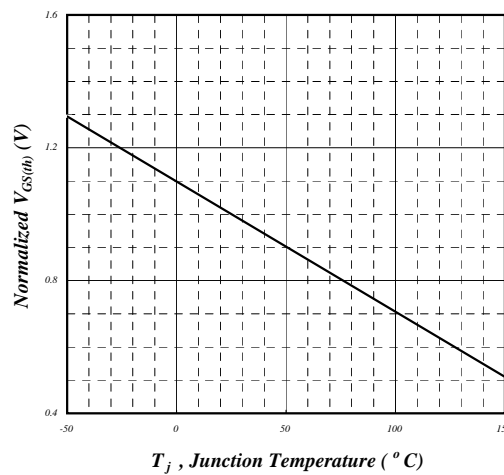


Fig 6. Gate Threshold Voltage vs. Junction Temperature

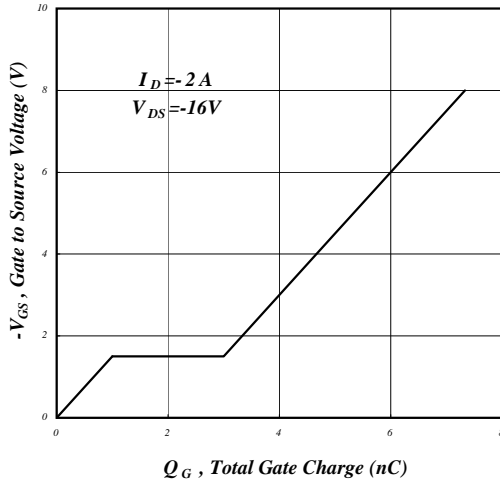


Fig 7. Gate Charge Characteristics

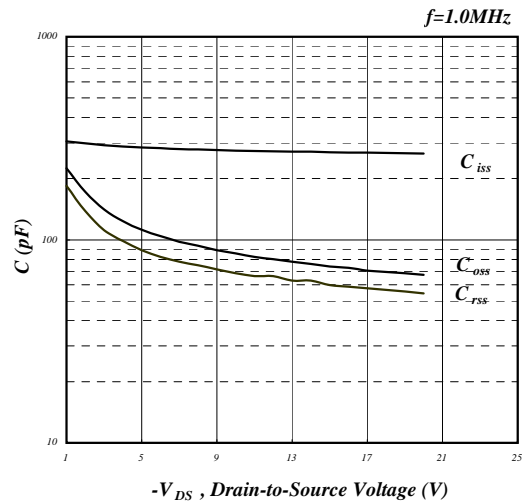


Fig 8. Typical Capacitance Characteristics

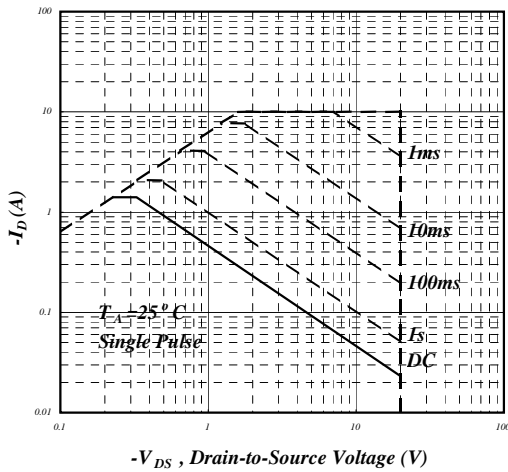


Fig 9. Maximum Safe Operating Area

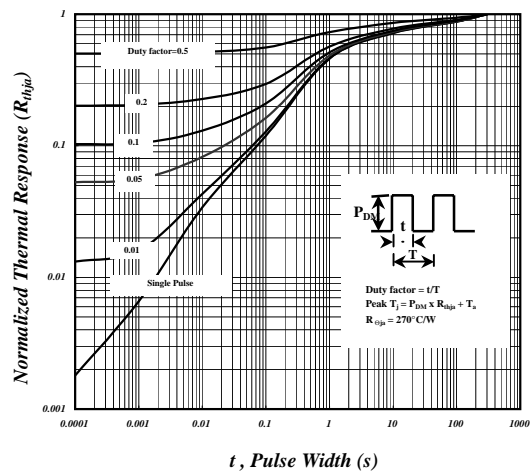


Fig 10. Effective Transient Thermal Impedance

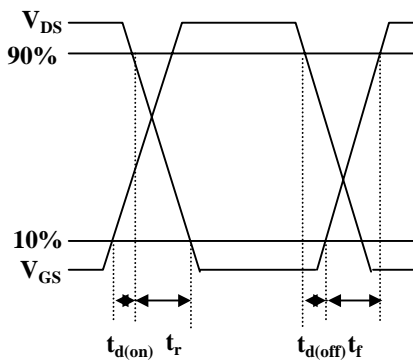


Fig 11. Switching Time Circuit

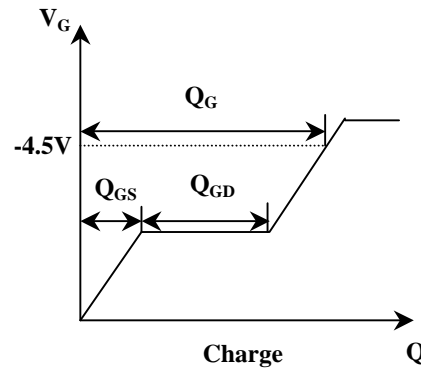


Fig 12. Gate Charge Circuit

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