Elektronische Bauelemente

# SGM161

**5.3A, 20V, $R_{DS(ON)}$ 50mΩ**

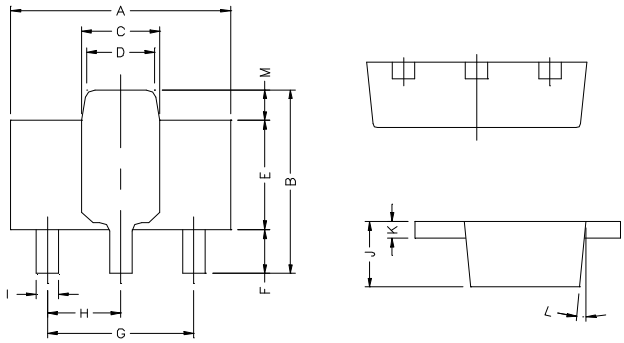
**N-Channel Enhancement Mode Power Mos.FET**

RoHS Compliant Product

SOT-89

## Description

The SGM161 utilized advanced processing techniques to achieve the lowest possible on-resistance, extremely efficient and cost-effectiveness device.



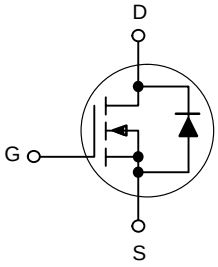

| REF. | Millimeter | | REF. | Millimeter | |
|---|---|---|---|---|---|
| | Min. | Max. | | Min. | Max. |
| A | 4.4 | 4.6 | G | 3.00 REF. | |
| B | 4.05 | 4.25 | H | 1.50 REF. | |
| C | 1.50 | 1.70 | I | 0.40 | 0.52 |
| D | 1.30 | 1.50 | J | 1.40 | 1.60 |
| E | 2.40 | 2.60 | K | 0.35 | 0.41 |
| F | 0.89 | 1.20 | L | 5° TYP. | |
| | | | M | 0.70 REF. | |

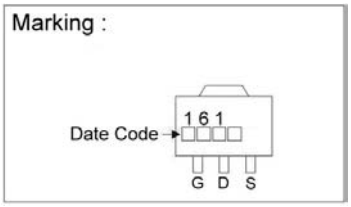
## Features

* Low On-Resistance
* Capable Of 2.5V Gate Drive
* Reliable And Rugged

## Applications

* Notebook PC
* Li-ion Battery Systems
* On-Board Power Supplies
* Cellular And Portable Phones




## Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±12 | V |
| Continuous Drain Current,[3] $V_{GS}$@4.5V | $I_D$@$T_A$=25°C | 5.3 | A |
| Continuous Drain Current,[3] $V_{GS}$@4.5V | $I_D$@$T_A$=70°C | 4.3 | A |
| Pulsed Drain Current | $I_{DM}$ | 10 | A |
| Total Power Dissipation | $P_D$@$T_A$=25°C | 2 | W |
| Linear Derating Factor | | 0.01 | W/°C |
| Operating Junction and Storage Temperature Range | Tj, Tstg | -55~+150 | °C |

## Thermal Data

| Parameter | | Symbol | Ratings | Unit |
|---|---|---|---|---|
| Thermal Resistance Junction-ambient [3] | Max. | Rthj-a | 90 | °C/W |

## Electrical Characteristics( Tj=25℃ Unless otherwise specified)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 20 | – | – | V | $V_{GS}$=0V, $I_D$=250uA |
| Breakdown Voltage Temp. Coefficient | $\triangle BV_{DS}/\triangle Tj$ | – | 0.1 | – | V/℃ | Reference to 25℃, $I_D$=1mA |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.5 | – | 1.2 | V | $V_{DS}$=$V_{GS}$, $I_D$=250uA |
| Gate-Source Leakage Current | $I_{GSS}$ | – | – | ±100 | nA | $V_{GS}$=±12V |
| Drain-Source Leakage Current (Tj=25℃) | $I_{DSS}$ | – | – | 1 | uA | $V_{DS}$=20V,$V_{GS}$=0 |
| Drain-Source Leakage Current (Tj=70℃) | | – | – | 10 | uA | $V_{DS}$=16V,$V_{GS}$=0 |
| Static Drain-Source On-Resistance[2] | $R_{DS(ON)}$ | – | – | 50 | mΩ | $V_{GS}$=4.5V, $I_D$=2A |
| | | – | – | 70 | | $V_{GS}$=2.5V, $I_D$=2A |
| | | – | – | 250 | | $V_{GS}$=1.5V, $I_D$=0.5A |
| Total Gate Charge[2] | Qg | – | 8.7 | – | nC | $I_D$=5.3A<br>$V_{DS}$=10V<br>$V_{GS}$=4.5V |
| Gate-Source Charge | Qgs | – | 1.5 | – | | |
| Gate-Drain ("Miller") Charge | Qgd | – | 3.6 | – | | |
| Turn-on Delay Time[2] | $Td_{(ON)}$ | – | 6 | – | nS | $V_{DD}$=15V<br>$I_D$=1A<br>$V_{GS}$=10V<br>$R_G$=2Ω<br>$R_D$=15Ω |
| Rise Time | Tr | – | 14 | – | | |
| Turn-off Delay Time | $Td_{(Off)}$ | – | 18.4 | – | | |
| Fall Time | Tf | – | 2.8 | – | | |
| Input Capacitance | Ciss | – | 603 | – | pF | $V_{GS}$=0V<br>$V_{DS}$=15V<br>f=1.0MHz |
| Output Capacitance | Coss | – | 144 | – | | |
| Reverse Transfer Capacitance | Crss | – | 111 | – | | |
| Forward Transconductance | Gfs | – | 13 | – | S | $V_{DS}$=5V, $I_D$=5.3A |

## Source-Drain Diode

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Forward On Voltage[2] | $V_{DS}$ | – | – | 1.2 | V | $I_S$=1.2A, $V_{GS}$=0V. |
| Reverse Recovery Time | Trr | – | 16.8 | – | nS | $I_S$=5A,$V_{GS}$=0<br>dI/dt=100A/us |
| Reverse Recovery Charge | Qrr | – | 11 | – | nC | |

Notes: 1.Pulse width limited by Max. junction temperature.

2.Pulse width≦300us, dutycycle≦2%.

3.Surface mounted on 1 inch$^2$ copper pad of FR4 board; 270°C/W when mounted on min. copper pad.

## Characteristics Curve

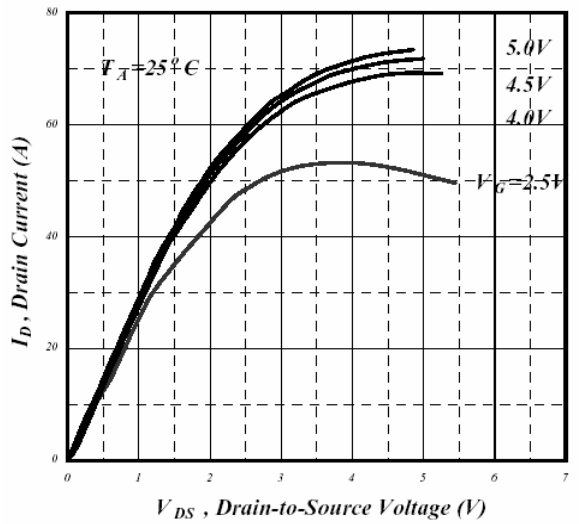



Fig 1. Typical Output Characteristics

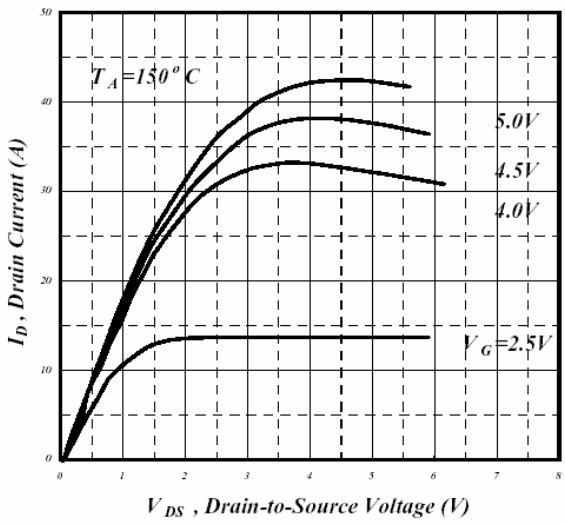



Fig 2. Typical Output Characteristics

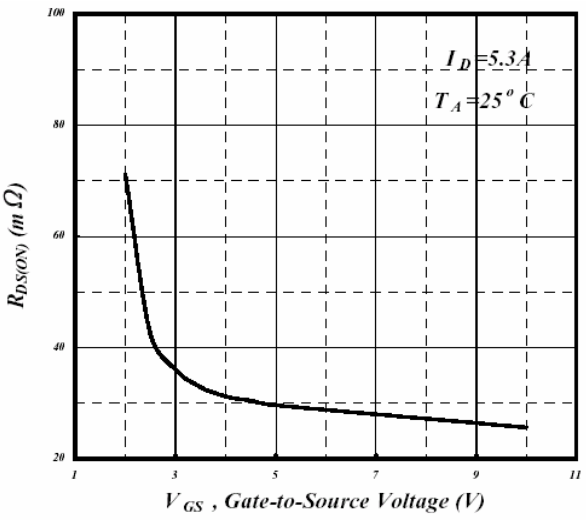



Fig 3. On-Resistance v.s. Gate Voltage

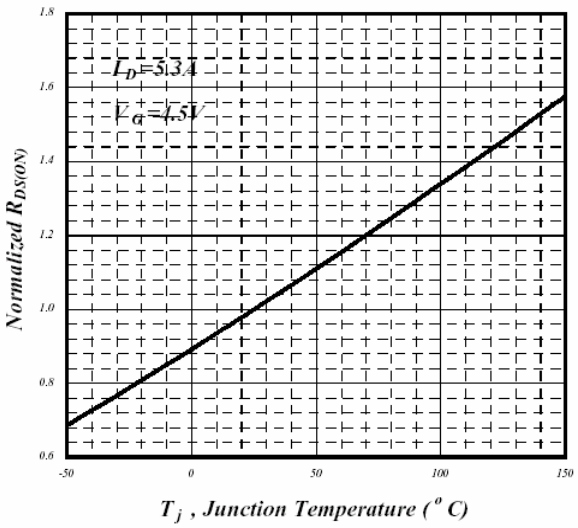



Fig 4. Normalized On-Resistance v.s. Junction Temperature

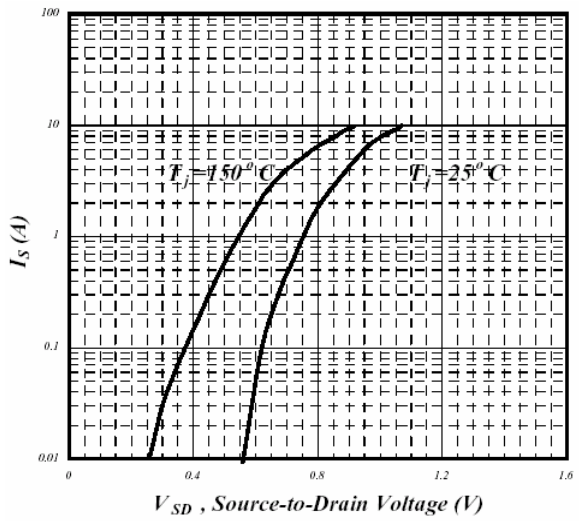



**Fig 5. Forward Characteristic of Reverse Diode**

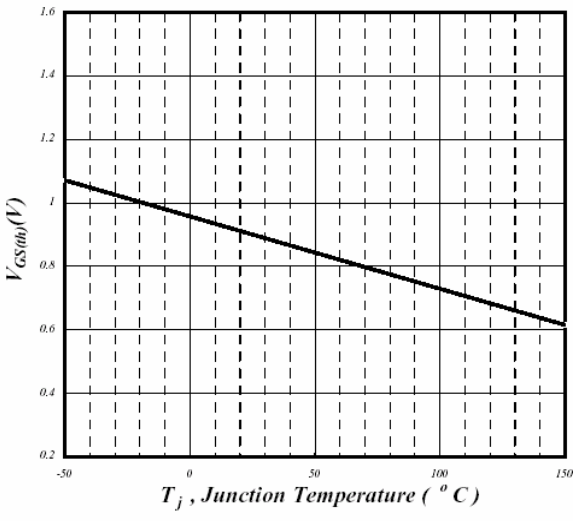



**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

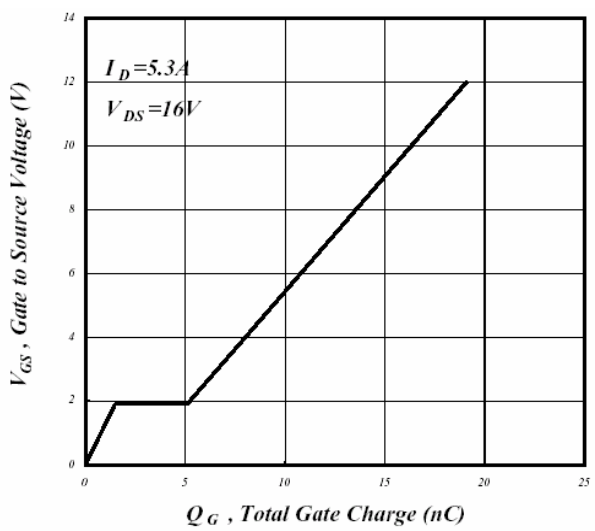



**Fig 7. Gate Charge Characteristics**

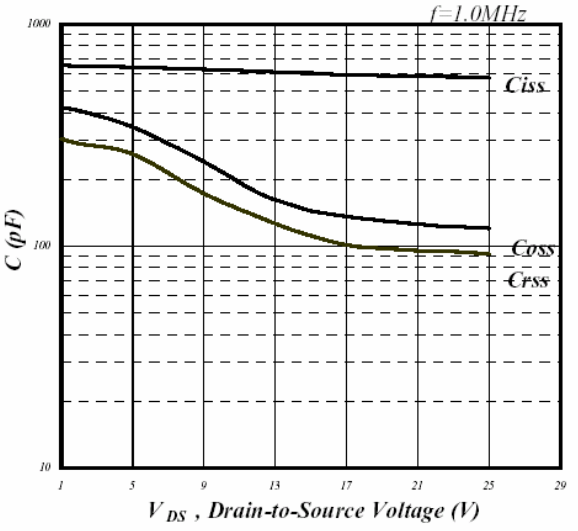



**Fig 8. Typical Capacitance Characteristics**

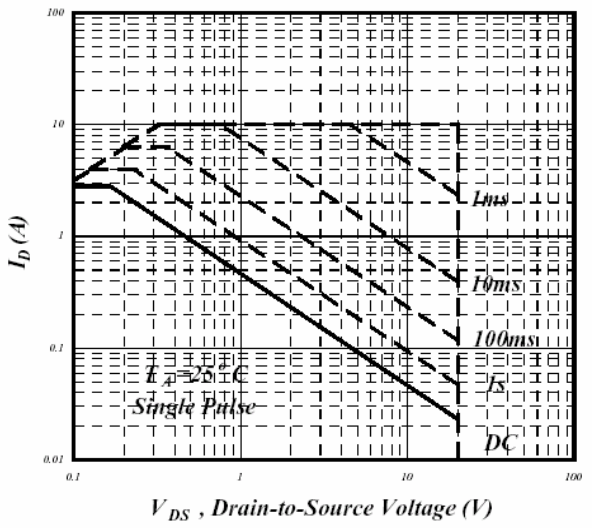



Fig 9. Maximum Safe Operating Area

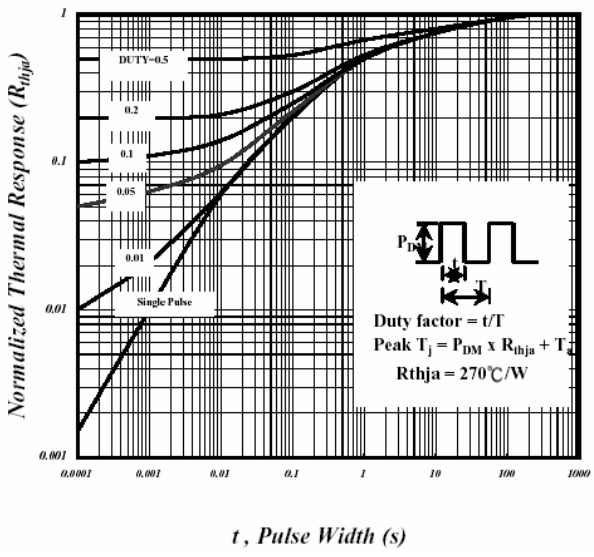



Fig10. Effective Transient Thermal Impedance

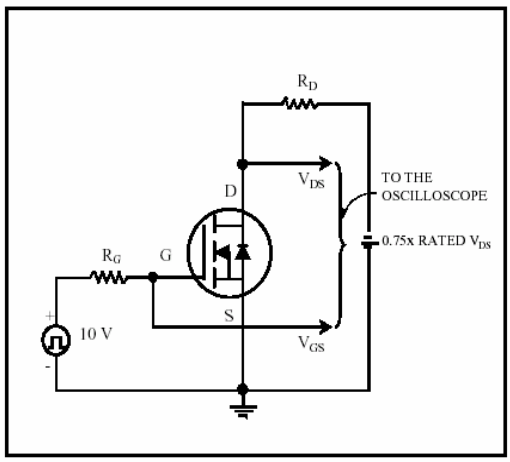



Fig 11. Switching Time Circuit

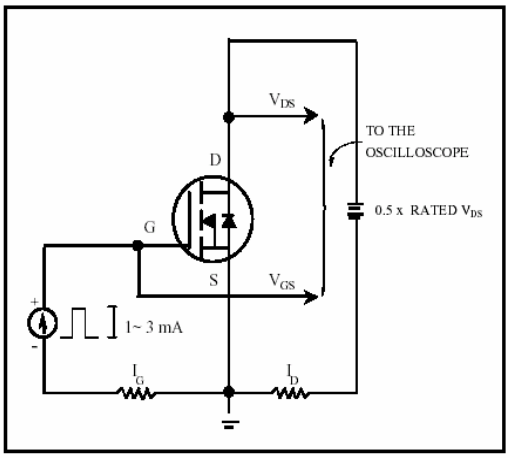



Fig 12. Gate Charge Circuit