

## SOT-723 -20V 340mΩ P-Channel MOSFET

### MOSFET Product Summary

| $V_{DS}$ | $R_{DS(ON)}(Typ.)$     | $I_D$ |
|----------|------------------------|-------|
| -20V     | 340mΩ @ $V_{GS}=-4.5V$ | -0.7A |
|          | 450mΩ @ $V_{GS}=-2.5V$ |       |

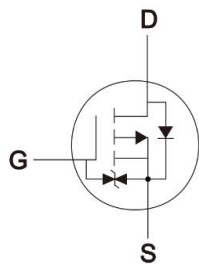
### Description

The PM3139M uses advanced Trench technology and designs to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

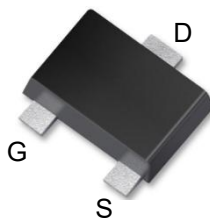
### Features

- Surface Mount Package
- P-Channel Switch with Low  $R_{DS(ON)}$
- Operated at Low Logic Level Gate Drive
- ESD Protected

### Dimensions and Pin Configuration



Circuit Diagram



SOT-723

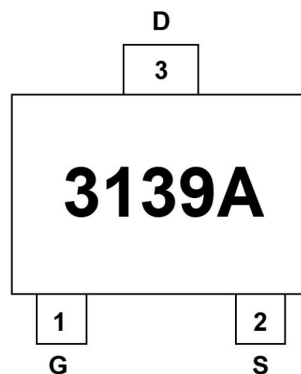
### Mechanical Characteristics

- Package: SOT-723
- Case Material: "Green" Molding Compound
- Marking Information: See Below

### Applications

- Load/Power Switching
- Interfacing Switching
- Battery Management for Ultra Small Portable Electronics
- Logic Level Shift

### Marking Information



**3139A** = Device Marking Code

### Ordering Information

| Part Number | Shipping         | Reel Size |
|-------------|------------------|-----------|
| PM3139M     | 8000/Tape & Reel | 7 inch    |

### Absolute Maximum Ratings<sup>(Note1)</sup> ( $T_A=25^{\circ}C$ unless otherwise specified)

| Parameter                                   | Symbol   | Value    | Unit |
|---------------------------------------------|----------|----------|------|
| Drain-Source Voltage                        | $V_{DS}$ | -20      | V    |
| Gate-Source Voltage                         | $V_{GS}$ | $\pm 10$ | V    |
| Continuous Drain Current <sup>(Note1)</sup> | $I_D$    | -0.7     | A    |
| Pulsed Drain Current <sup>(Note2)</sup>     | $I_{DM}$ | -1.2     | A    |
| Power Dissipation                           | $P_D$    | 0.15     | W    |

|                                                                |                 |           |      |
|----------------------------------------------------------------|-----------------|-----------|------|
| Thermal Resistance from Junction to Ambient <sup>(Note3)</sup> | $R_{\theta JA}$ | 850       | °C/W |
| Junction Temperature                                           | $T_J$           | -55~ +150 | °C   |
| Storage Temperature                                            | $T_{STG}$       | -55~ +150 | °C   |

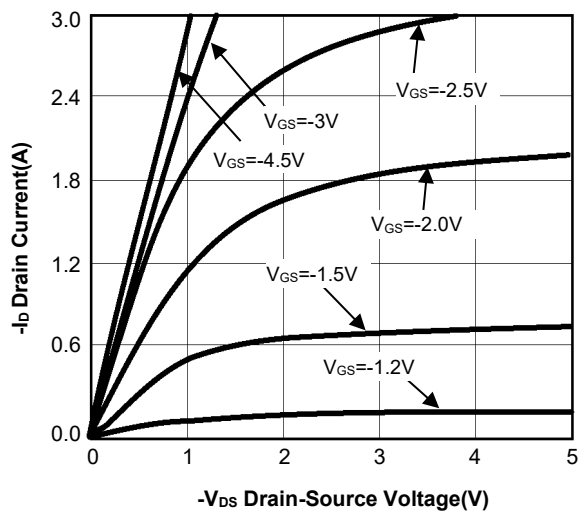
**Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise specified)**

| Parameter                         | Symbol        | Test Condition                                       | Min. | Typ.  | Max.     | Unit       |
|-----------------------------------|---------------|------------------------------------------------------|------|-------|----------|------------|
| Static Characteristics            |               |                                                      |      |       |          |            |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=-250\mu A$                           | -20  | -     | -        | V          |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{DS}=-20V, V_{GS}=0V$                             | -    | -     | -1       | $\mu A$    |
| Gate-to-Source Leakage Current    | $I_{GSS}$     | $V_{GS}=\pm 10V, V_{DS}=0V$                          | -    | -     | $\pm 10$ | $\mu A$    |
| Gate Threshold Voltage            | $V_{GS(TH)}$  | $V_{DS}=V_{GS}, I_D=-250\mu A$                       | -0.4 | -0.65 | -1.0     | V          |
| Drain-to-Source On-Resistance     | $R_{DS(ON)}$  | $V_{GS}=-4.5V, I_D=-0.5A$                            | -    | 340   | 410      | m $\Omega$ |
|                                   |               | $V_{GS}=-2.5V, I_D=-0.5A$                            | -    | 450   | 680      |            |
| Diode Forward Voltage             | $V_{SD}$      | $I_S=-1A, V_{GS}=0V$                                 | -    | -0.95 | -1.25    | V          |
| Dynamic Characteristics           |               |                                                      |      |       |          |            |
| Input Capacitance                 | $C_{iss}$     | $V_{DS}=-10V, V_{GS}=0V, f=1MHz$                     | -    | 12    | -        | pF         |
| Output Capacitance                | $C_{oss}$     |                                                      | -    | 2.5   | -        |            |
| Reverse Transfer Capacitance      | $C_{rss}$     |                                                      | -    | 0.8   | -        |            |
| Switching Characteristics         |               |                                                      |      |       |          |            |
| Gate Total Charge                 | $Q_g$         | $V_{GS}=-4.5V, V_{DS}=-10V, I_D=-0.45A$              | -    | 1.0   | -        | nC         |
| Gate-to-Source Charge             | $Q_{gs}$      |                                                      | -    | 0.2   | -        |            |
| Gate-to-Drain Charge              | $Q_{gd}$      |                                                      | -    | 0.3   | -        |            |
| Turn-On Delay Time                | $t_{d(on)}$   | $V_{GS}=-4.5V, V_{DS}=-10V, I_D=-0.45A, R_L=6\Omega$ | -    | 885   | -        | ns         |
| Turn-On Rise Time                 | $t_r$         |                                                      | -    | 2313  | -        |            |
| Turn-Off Delay Time               | $t_{d(off)}$  |                                                      | -    | 9500  | -        |            |
| Turn-Off Fall Time                | $t_f$         |                                                      | -    | 6620  | -        |            |

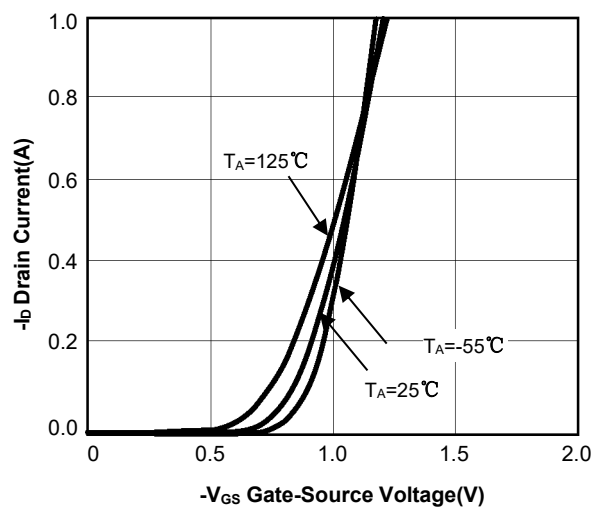
Notes:

1. This current is chip limited, which is calculated based on  $R_{\theta JA}$ .
2. This current is calculated on single pulse with 10 $\mu s$  Pulse & Duty Cycle = 1%.
3. The value of  $R_{\theta JA}$ , which is steady state, is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, with  $T_A=25^{\circ}\text{C}$ .

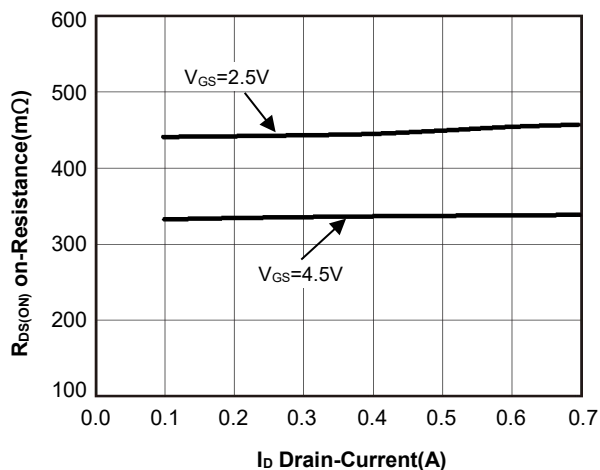
**Typical Characteristics ( $T_A=25^\circ\text{C}$  unless otherwise specified)**



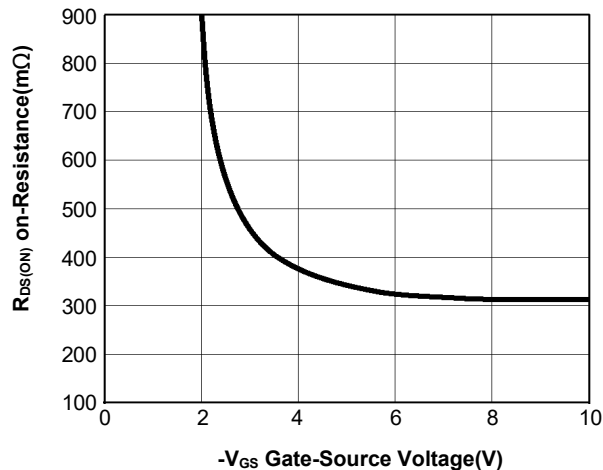
Drain Current vs. Drain-Source Voltage



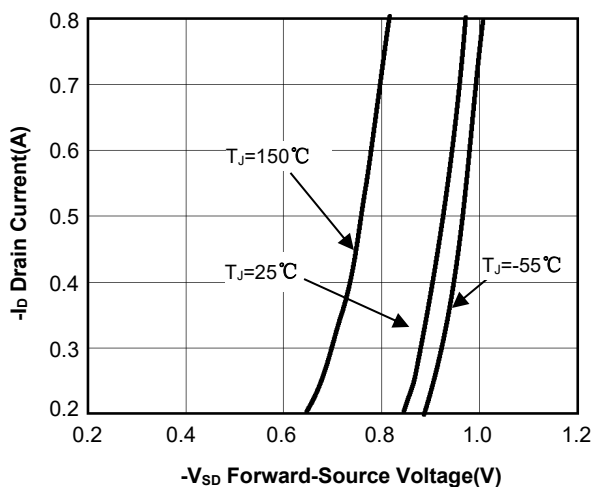
Drain Current vs. Gate-Source Voltage



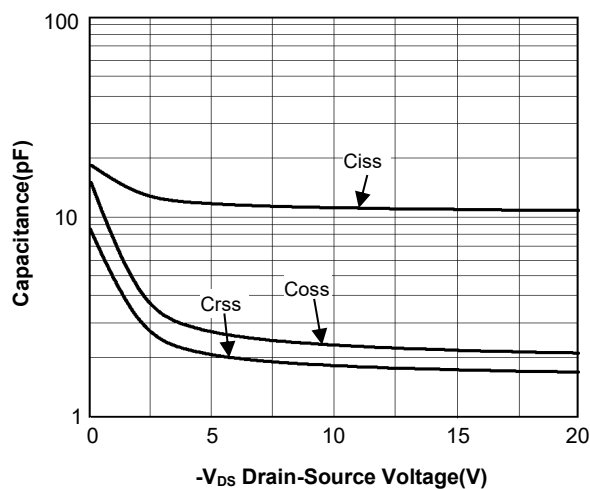
$R_{DS(ON)}$  On-Resistance vs. Drain-Current



$R_{DS(ON)}$  On-Resistance vs. Gate-Source Voltage

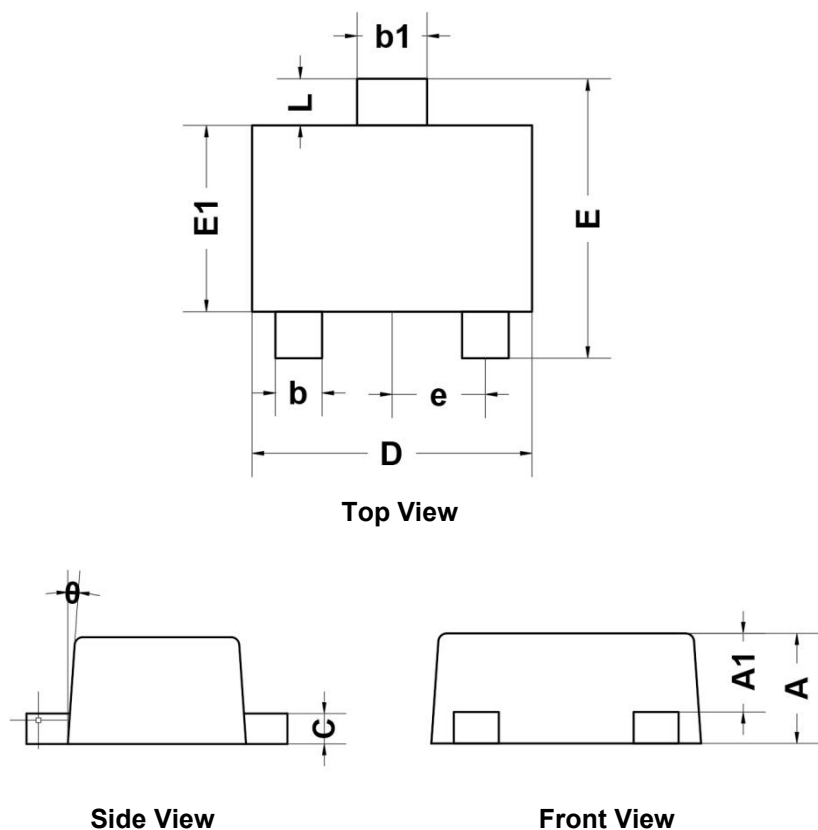


Drain Current vs. Forward-Source Voltage



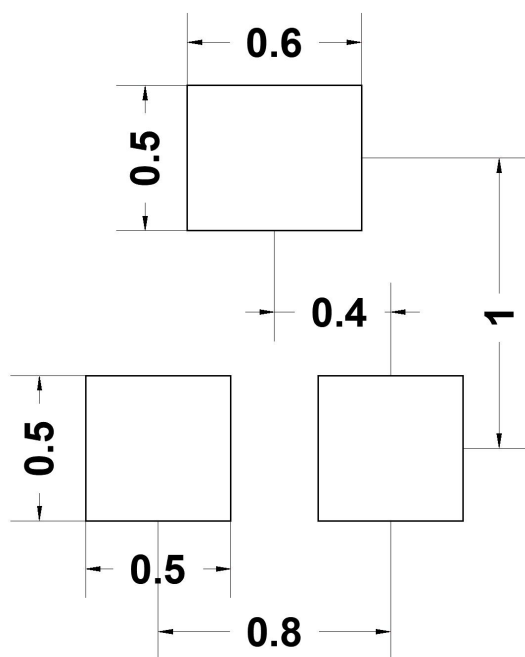
Capacitance vs. Drain-Source Voltage

# **SOT-723 Package Outline Drawing**



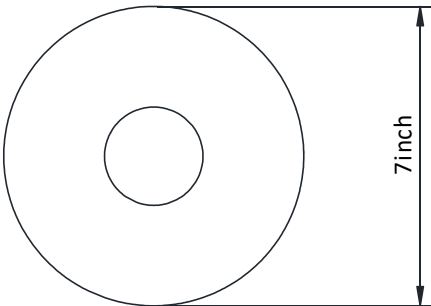
| Symbol   | Dimensions In Millimeters |       |       |
|----------|---------------------------|-------|-------|
|          | Min.                      | Typ.  | Max.  |
| A        | 0.44                      | 0.49  | 0.54  |
| A1       | 0.30                      | 0.35  | 0.40  |
| b        | 0.15                      | 0.20  | 0.25  |
| b1       | 0.25                      | 0.30  | 0.35  |
| L        | 0.10                      | 0.20  | 0.30  |
| C        | 0.117                     | 0.147 | 0.177 |
| D        | 1.10                      | 1.20  | 1.30  |
| E        | 1.10                      | 1.20  | 1.30  |
| E1       | 0.70                      | 0.80  | 0.90  |
| e        | 0.4BSC                    |       |       |
| $\theta$ | 0°                        | 4°    | 7°    |

## **Recommended PCB Layout (Unit: mm)**

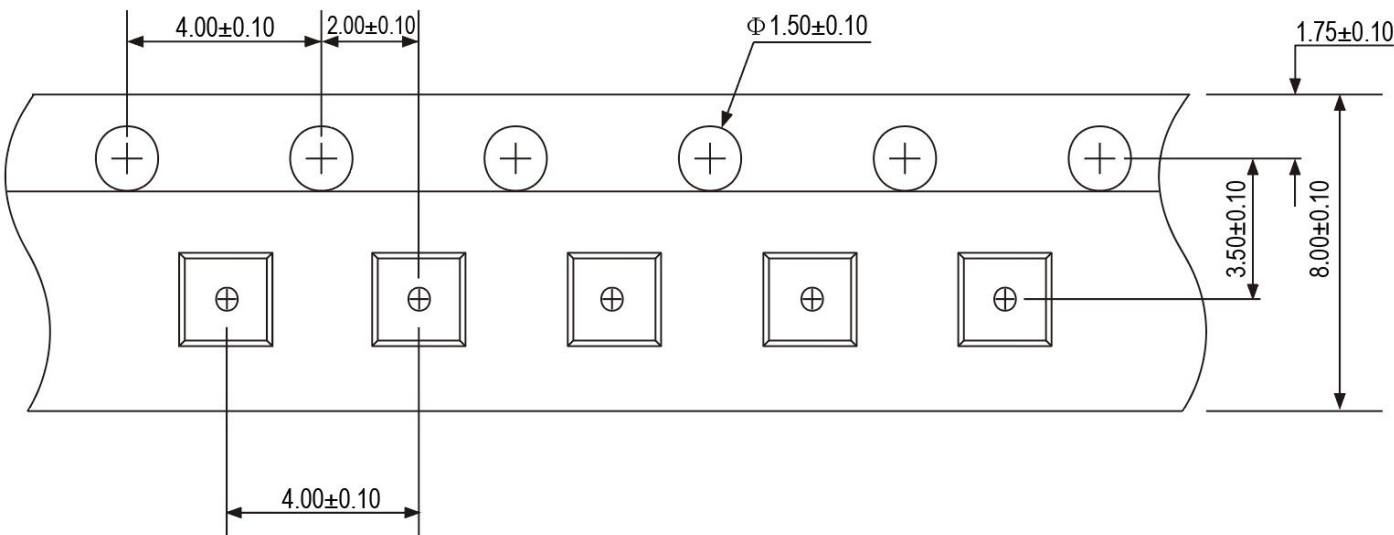


TAPE AND REEL INFORMATION

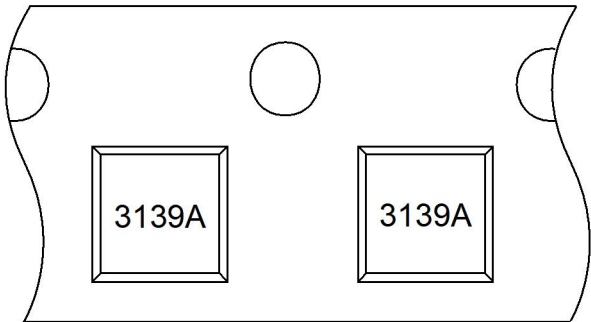
Reel Dimensions



Tape Dimensions



Unit:mm



User Direction of Feed

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