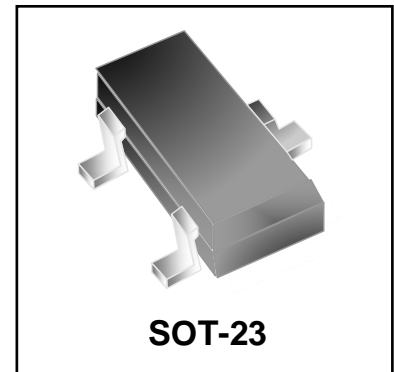# WM02P40ME

**P-Channel Enhancement MOSFET**

## Features

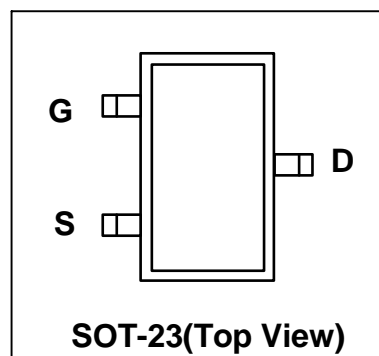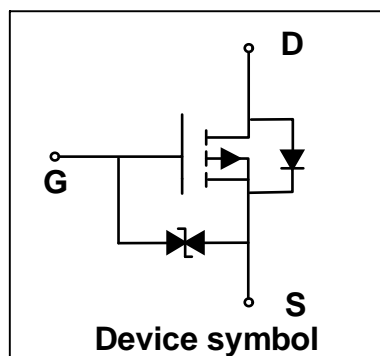- Way-on Small Signal MOSFETs
- $V_{DS}$= -20V, $I_D$ = -4A
  $R_{DS(on)}$ < 39mΩ @ $V_{GS}$ = -4.5V
  $R_{DS(on)}$ < 50mΩ @ $V_{GS}$ = -2.5V
- Trench LV MOSFET Technology
- ESD Protected

## Mechanical Characteristics

- SOT-23 Package
- Marking : Making Code
- RoHS Compliant

**SOT-23**

## Schematic & PIN Configuration

**Device symbol**

**SOT-23(Top View)**

## Absolute Maximum Rating (T$_A$=25°C unless otherwise noted)

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±10 | V |
| Continuous Drain Current | T$_A$ = 25°C | $I_D$ | -4 | A |
| Pulsed Drain Current[1] | | $I_{DM}$ | -16 | A |
| Power Dissipation | T$_A$ = 25°C | $P_D$ | 1.08 | W |
| Operating Junction and Storage Temperature Range | | $T_J$ ,$T_{STG}$ | -55 to 150 | °C |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance from Junction to Ambient[2] | $R_{θJA}$ | 115 | °C/W |

## Electrical Characteristics $(T_J = 25°C$ unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}= 0V$, $I_D= -250μA$ | -20 | - | - | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}= 0V$, $V_{GS}= ±10V$ | - | - | ±10 | μA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}= -20V$, $V_{GS}= 0V$ | - | - | -1 | μA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}= V_{GS}$, $I_D= -250μA$ | -0.35 | -0.65 | -0.9 | V |
| Drain-Source on-Resistance[3] | $R_{DS(on)}$ | $V_{GS}= -4.5V$,$I_D= -4A$ | - | 32 | 39 | mΩ |
| | | $V_{GS}= -2.5V$,$I_D= -3A$ | - | 42 | 50 | |
| | | $V_{GS}= -1.8V$,$I_D= -2A$ | - | 62 | 82 | |
| **Dynamic Characteristics[4]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS} = 0V$ ,$V_{DS} = -10V$, f=1MHz | - | 1022 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 123 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 105 | - | |
| **Switching Characteristics[4]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{GS}= -4.5V$ ,$V_{DS}= -10V$, $I_D= -4A$ | - | 9.5 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 1.2 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 2.3 | - | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{GS}= -4.5V$, $V_{DD}= -10V$, $R_G= 3Ω$, $I_D= -4A$ | - | 11 | - | ns |
| Rise Time | $t_r$ | | - | 9.5 | - | |
| Turn-off Delay Time | $t_{d(off)}$ | | - | 18 | - | |
| Fall Time | $t_f$ | | - | 24 | - | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Body Diode voltage[3] | $V_{DS}$ | $I_S= -1A$,$V_{GS}=0V$ | - | - | -1 | V |
| Continuous Source Current | $I_S$ | - | - | - | -4 | A |

**Notes:**

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150°C$.

2. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.

3. Pulse Test: Pulse width≤300μs, duty cycle≤2%.

4. This value is guaranteed by design hence it is not included in the production test.
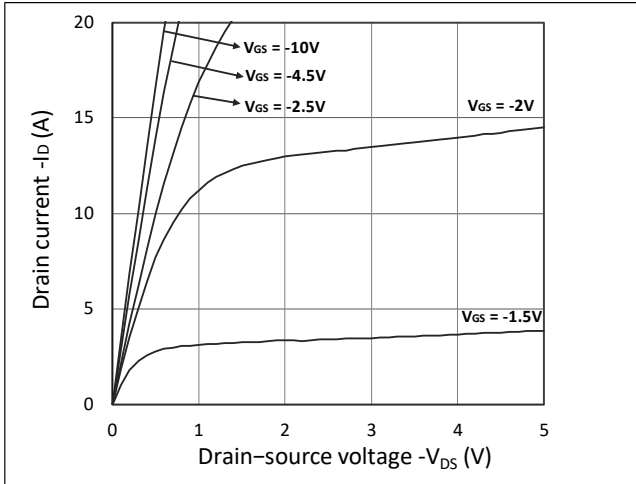
## Typical Characteristics
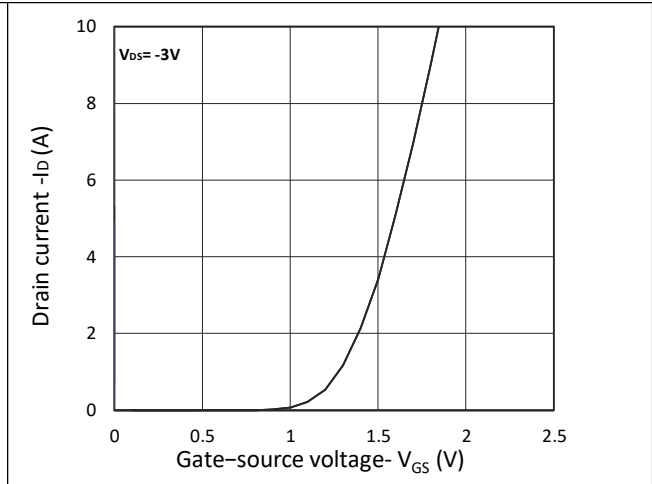


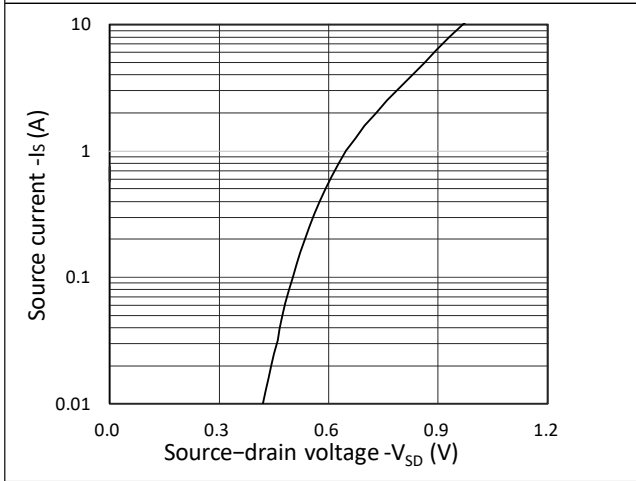Figure 1. Output Characteristics



Figure 2. Transfer Characteristics



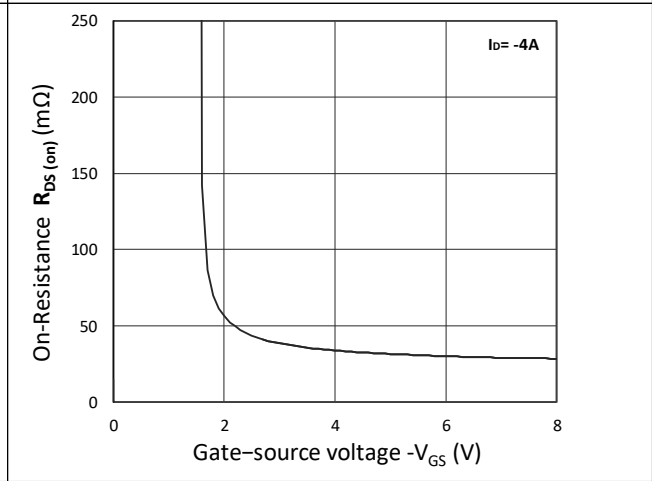Figure 3. Forward Characteristics of Reverse



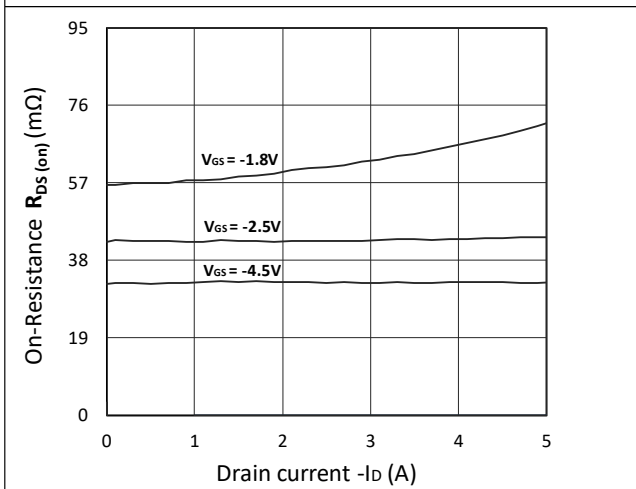Figure 4. $R_{DS(ON)}$ vs. $V_{GS}$



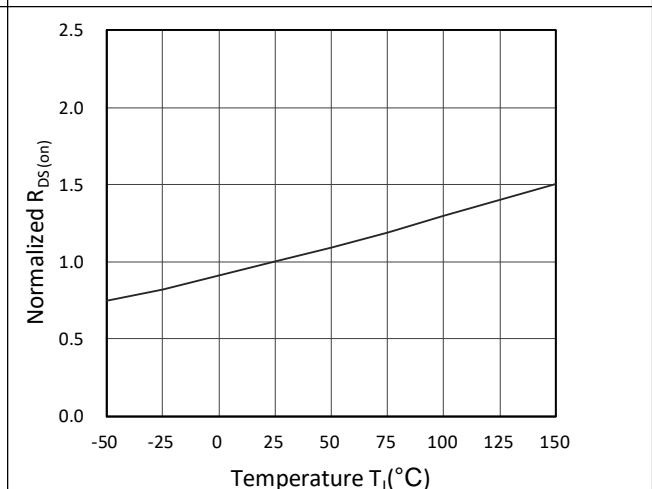Figure 5. $R_{DS(ON)}$ vs. $I_D$



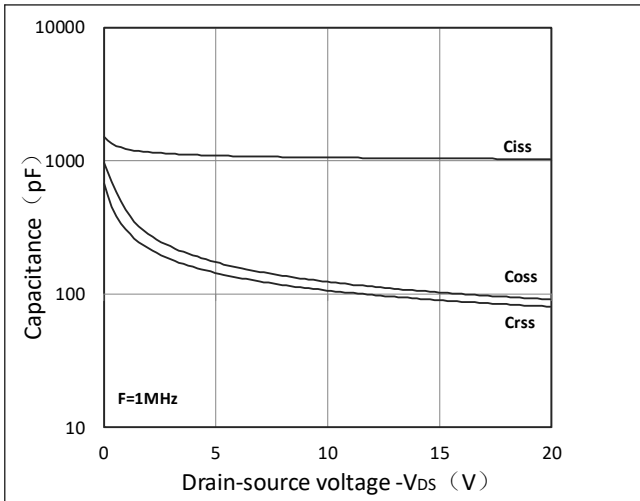Figure 6. Normalized $R_{DS(on)}$ vs. Temperature
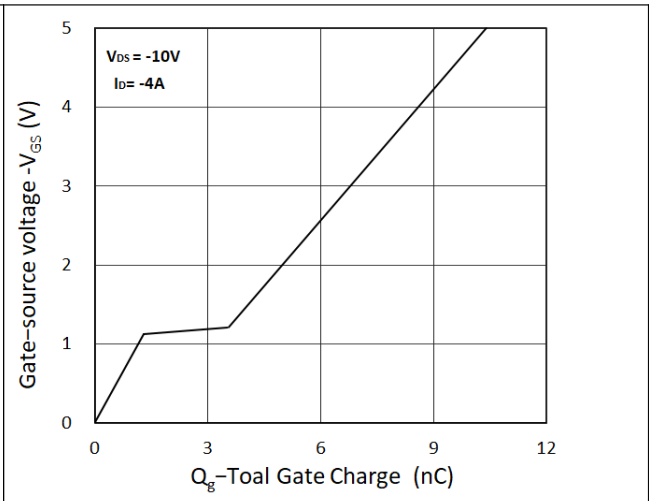
Figure 7. Capacitance Characteristics

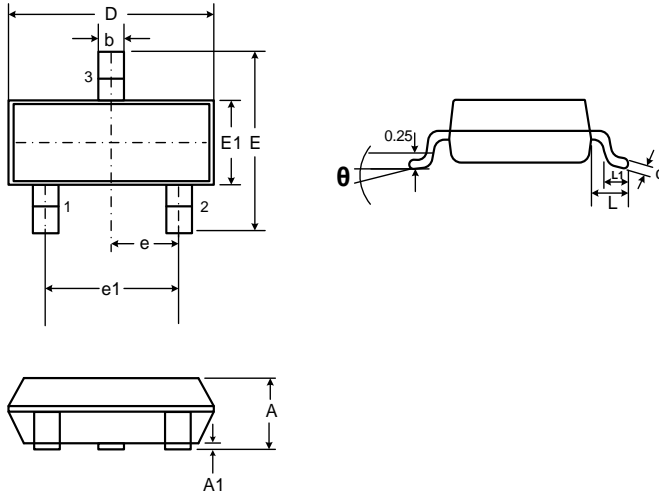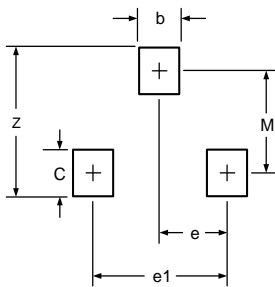Figure 8. Gate Charge Characteristics

## Outline Drawing – SOT-23

### PACKAGE OUTLINE
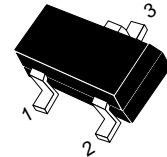
**SOT-23**

| SYMBOL | MILLIMETER | | INCHES | |
|--------|-----|-----|-----|-----|
| | MIN | MAX | MIN | MAX |
| A | 0.90 | 1.15 | 0.035 | 0.045 |
| A1 | 0.00 | 0.10 | 0.000 | 0.004 |
| b | 0.30 | 0.50 | 0.012 | 0.020 |
| c | 0.08 | 0.15 | 0.003 | 0.006 |
| D | 2.80 | 3.00 | 0.110 | 0.118 |
| E | 2.25 | 2.55 | 0.089 | 0.100 |
| E1 | 1.20 | 1.40 | 0.047 | 0.055 |
| e | 0.95 BSC | | 0.037BSC | |
| e1 | 1.80 | 2.00 | 0.071 | 0.079 |
| L | 0.55REF | | 0.022REF | |
| L1 | 0.30 | 0.50 | 0.012 | 0.020 |
| θ | 0˙ | 8˙ | 0˙ | 8˙ |

| DIMENSIONS | | |
|-----|-----|-----|
| DIM | INCHES | MILLIMETERS |
| M | 0.080 | 2.02 |
| C | 0.032 | 0.80 |
| Z | 0.111 | 2.82 |
| e | 0.037 BSC | 0.95 BSC |
| e1 | 0.075 BSC | 1.90 BSC |
| b | 0.032 | 0.80 |

**Notes**

**1**. Dimensioning and tolerances per ANSI Y14.5M, 1985.

**2**. Controlling Dimension: Inches

**3**. Pin 3 is the cathode (Unidirectional Only).

**4**. Dimensions are exclusive of mold flash and metal burrs.

## Marking Codes

| Part Number | WM02P40ME |
|-------------|-----------|
| Marking Code | 3415E |

## Package Information

Qty：3k/Reel

## CONTACT INFORMATION

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