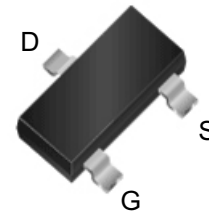
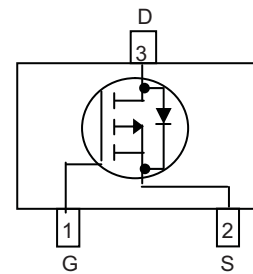
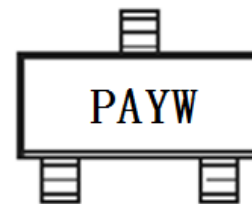


WPM3020
Single P-Channel, -30V, -3.8A, Power MOSFET
[Http://www.sh-willsemi.com](http://www.sh-willsemi.com)

| V_{DS} (V) | Typical $R_{DS(on)}$ (m Ω) |
|--------------|------------------------------------|
| -30 | 43 @ $V_{GS}=-10V$ |
| | 48 @ $V_{GS}=-4.5V$ |


SOT-23

Pin configuration (Top view)


PA = Device Code
 Y = Year
 W = Week(A~z)

Marking
Descriptions

The WPM3020 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM3020 is Pb-free.

Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- Small package SOT-23

Applications

- DC/DC converters
- Power supply converters circuit
- Load/Power Switching for portable device

Order information

| Device | Package | Shipping |
|--------------|---------|----------------|
| WPM3020-3/TR | SOT-23 | 3000/Tape&Reel |

Absolute Maximum ratings

| Parameter | Symbol | 10 s | Steady State | Unit | |
|--|-----------|------------------------|--------------|------------------|---|
| Drain-Source Voltage | V_{DS} | -30 | | V | |
| Gate-Source Voltage | V_{GS} | ± 12 | | | |
| Continuous Drain Current ^{a d} | I_D | $T_A=25^\circ\text{C}$ | -3.8 | -3.2 | A |
| | | $T_A=70^\circ\text{C}$ | -3.0 | -2.5 | |
| Maximum Power Dissipation ^{a d} | P_D | $T_A=25^\circ\text{C}$ | 1.2 | 0.9 | W |
| | | $T_A=70^\circ\text{C}$ | 0.8 | 0.5 | |
| Continuous Drain Current ^{b d} | I_D | $T_A=25^\circ\text{C}$ | -3.0 | -2.8 | A |
| | | $T_A=70^\circ\text{C}$ | -2.4 | -2.2 | |
| Maximum Power Dissipation ^{b d} | P_D | $T_A=25^\circ\text{C}$ | 0.8 | 0.7 | W |
| | | $T_A=70^\circ\text{C}$ | 0.5 | 0.4 | |
| Pulsed Drain Current ^c | I_{DM} | -15 | | A | |
| Operating Junction Temperature | T_J | -55 to 150 | | $^\circ\text{C}$ | |
| Lead Temperature | T_L | 260 | | $^\circ\text{C}$ | |
| Storage Temperature Range | T_{stg} | -55 to 150 | | $^\circ\text{C}$ | |

Thermal resistance ratings

| Single Operation | | | | | |
|---|-----------------|-----------------------|---------|------|--------------------|
| Parameter | Symbol | Typical | Maximum | Unit | |
| Junction-to-Ambient Thermal Resistance ^a | $R_{\theta JA}$ | $t \leq 10 \text{ s}$ | 84 | 102 | $^\circ\text{C/W}$ |
| | | Steady State | 120 | 145 | |
| Junction-to-Ambient Thermal Resistance ^b | $R_{\theta JA}$ | $t \leq 10 \text{ s}$ | 130 | 160 | |
| | | Steady State | 145 | 190 | |
| Junction-to-Case Thermal Resistance | $R_{\theta JC}$ | 60 | 75 | | |

a Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

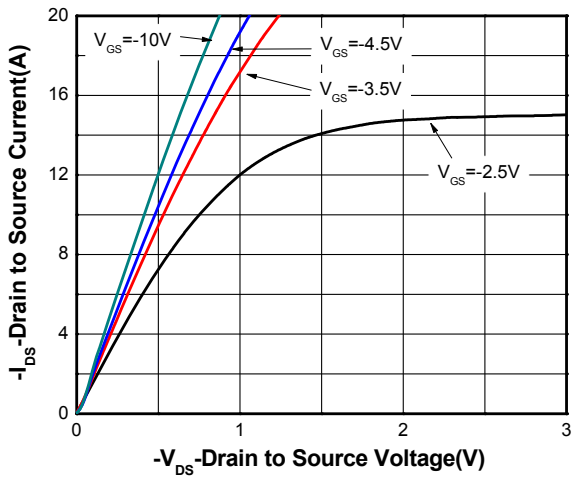
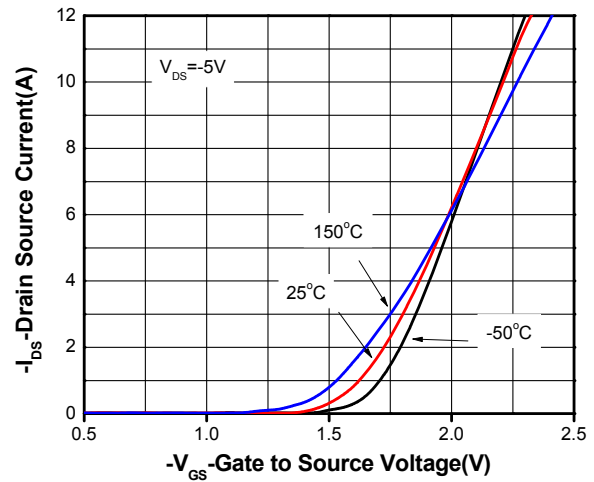
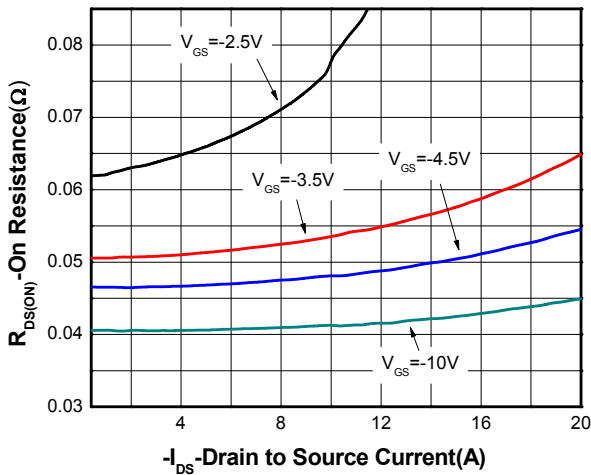
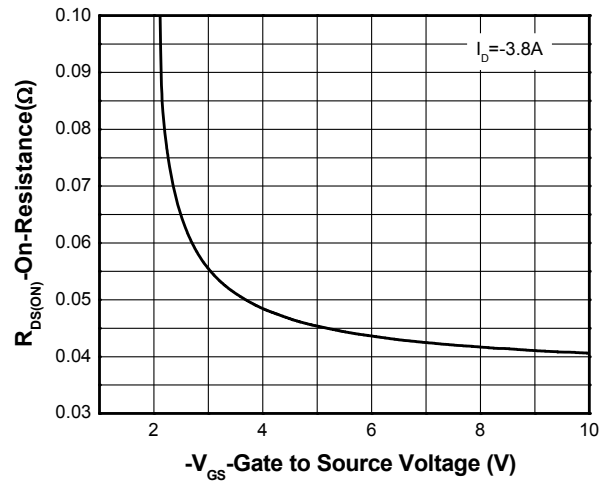
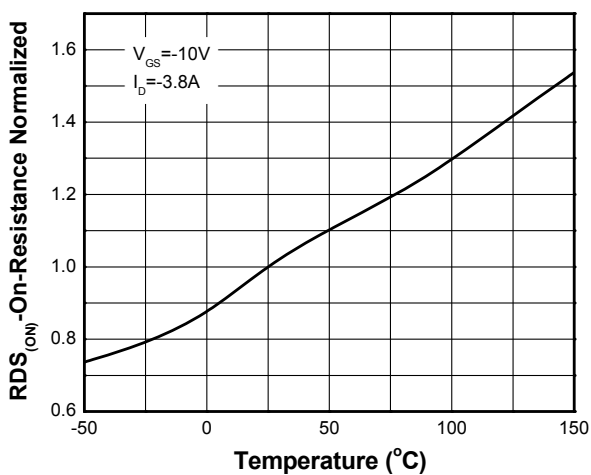
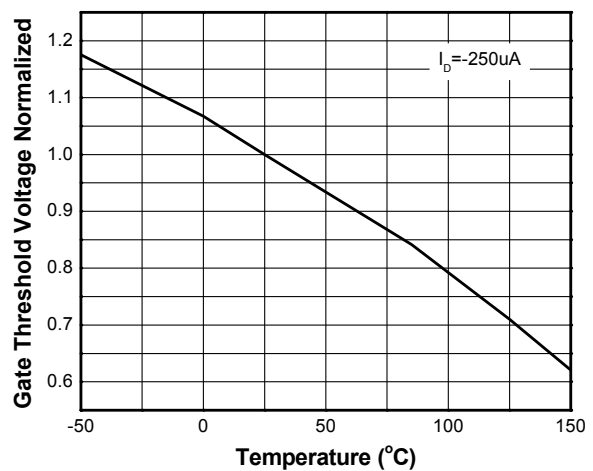
b Surface mounted on FR4 board using minimum pad size, 1oz copper

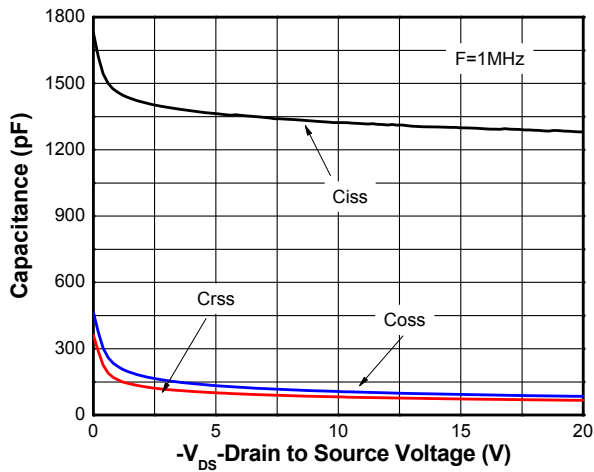
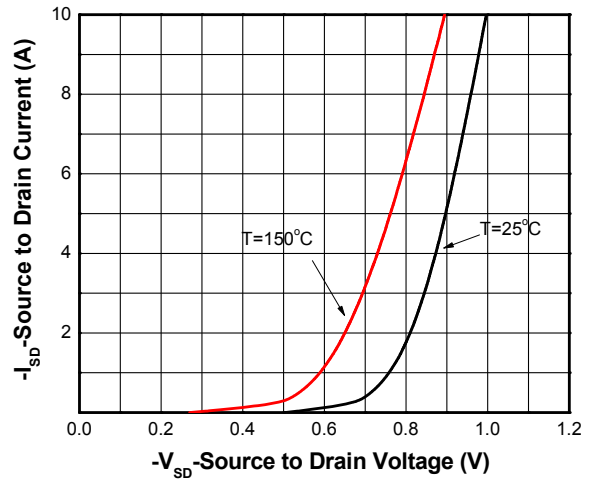
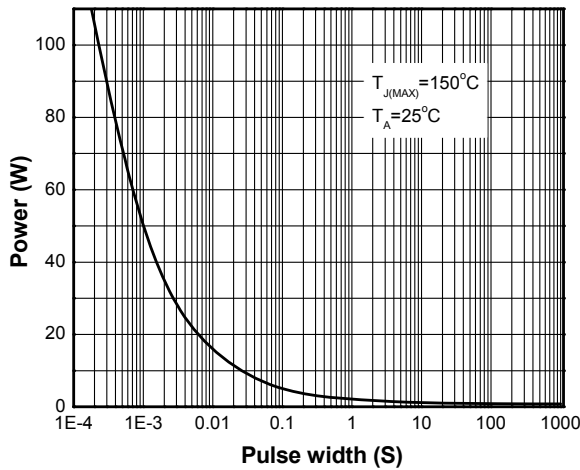
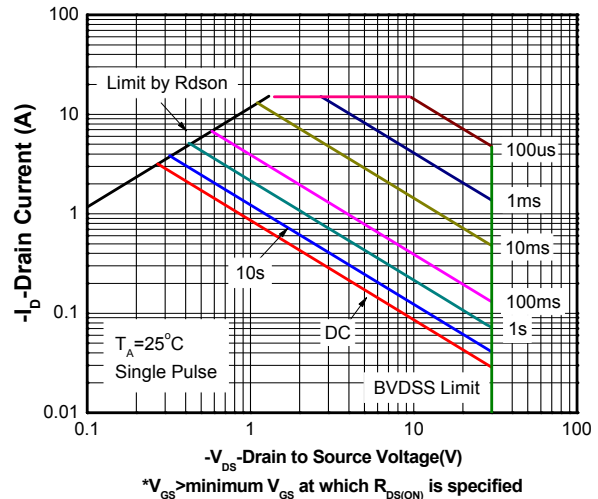
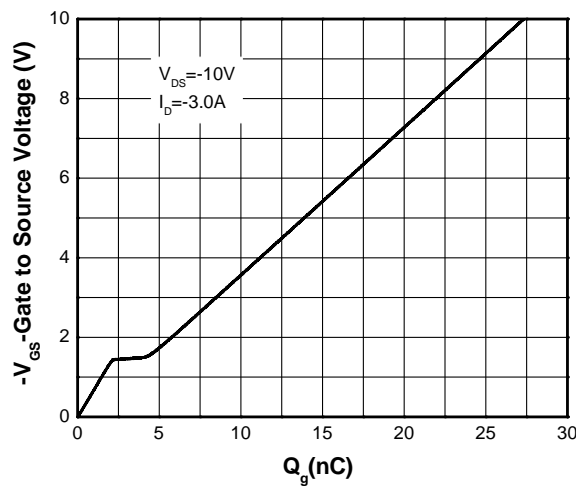
c Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

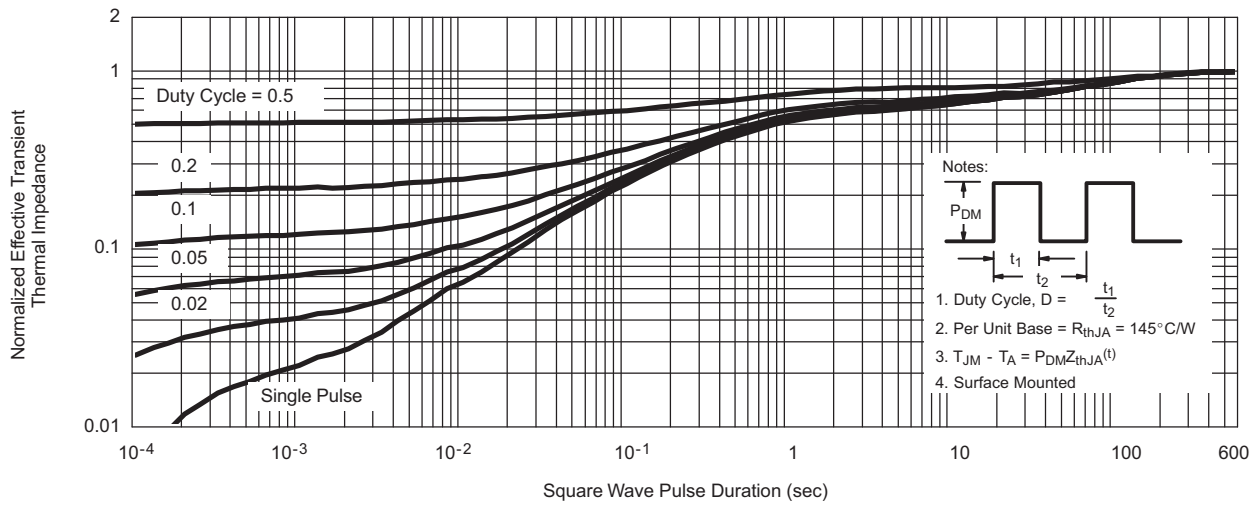
d Repetitive rating, pulse width limited by junction temperature $T_J=150^\circ\text{C}$.

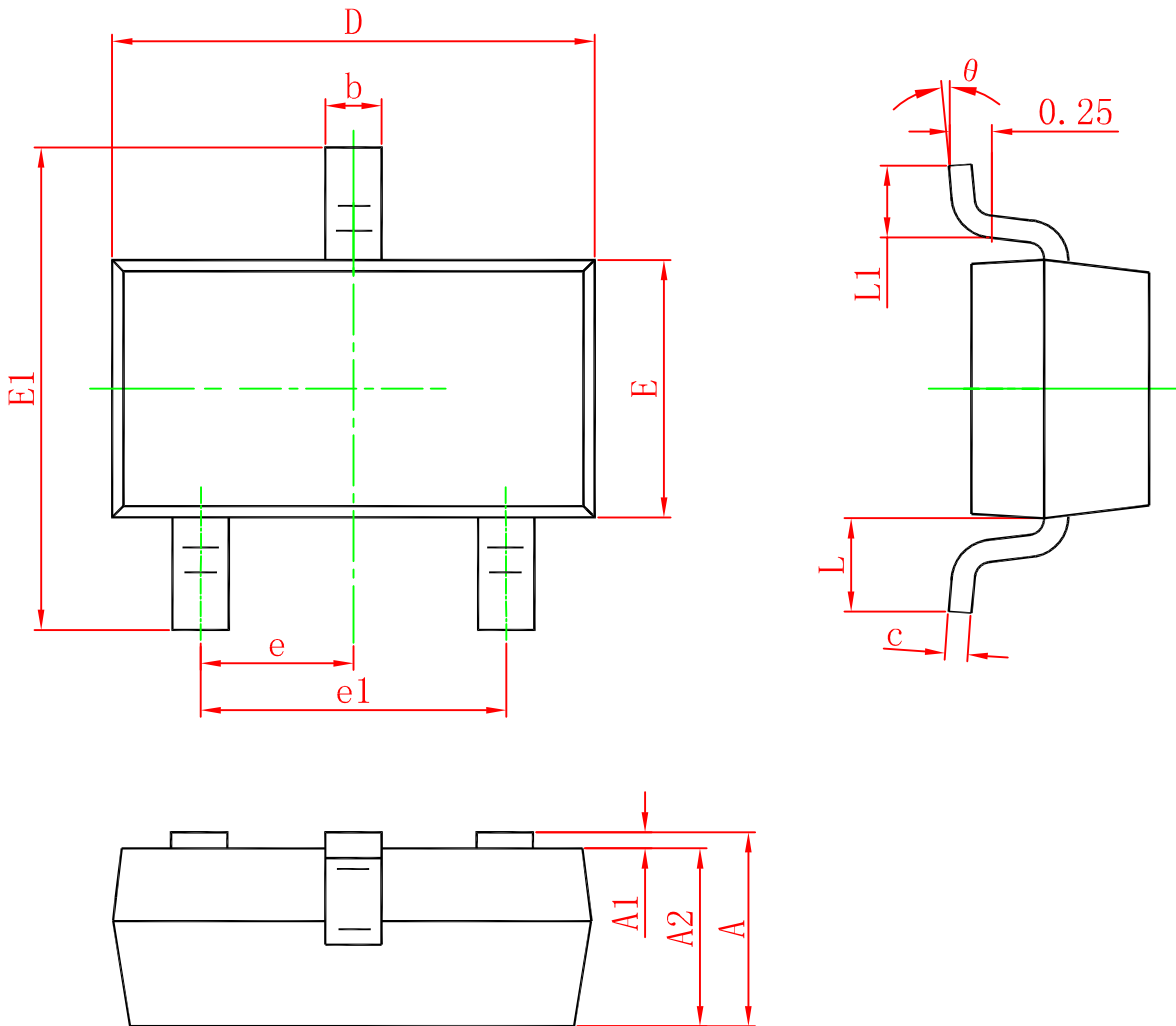
Electronics Characteristics (Ta=25°C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|--|--------------|--|------|------|-----------|---------------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-to-Source Breakdown Voltage | BV_{DSS} | $V_{GS} = 0\text{ V}, I_D = -250\mu\text{A}$ | -30 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}$ | | | -1 | μA |
| Gate-to-source Leakage Current | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$ | | | ± 100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = -250\mu\text{A}$ | -0.5 | -1.0 | -1.5 | V |
| Drain-to-source On-resistance | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -3.8\text{ A}$ | | 43 | 57 | m Ω |
| | | $V_{GS} = -4.5\text{ V}, I_D = -2.5\text{ A}$ | | 48 | 71 | |
| | | $V_{GS} = -2.5\text{ V}, I_D = -2.0\text{ A}$ | | 65 | 115 | |
| Forward Transconductance | g_{FS} | $V_{DS} = -5\text{ V}, I_D = -3.8\text{ A}$ | | 6 | 16 | S |
| CHARGES, CAPACITANCES AND GATE RESISTANCE | | | | | | |
| Input Capacitance | C_{ISS} | $V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = -15\text{ V}$ | | 1300 | | pF |
| Output Capacitance | C_{OSS} | | | 93 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 73 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = -10\text{ V}, V_{DS} = -10\text{ V}, I_D = -3.0\text{ A}$ | | 27 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 1.1 | | |
| Gate-to-Source Charge | Q_{GS} | | | 2.2 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 2.0 | | |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Delay Time | $t_d(ON)$ | $V_{GS} = -10\text{ V}, V_{DS} = -15\text{ V}, I_D = -2\text{ A}, R_G = 6\Omega$ | | 11 | | ns |
| Rise Time | t_r | | | 4.4 | | |
| Turn-Off Delay Time | $t_d(OFF)$ | | | 78.8 | | |
| Fall Time | t_f | | | 6 | | |
| BODY DIODE CHARACTERISTICS | | | | | | |
| Forward Voltage | V_{SD} | $V_{GS} = 0\text{ V}, I_S = -1\text{ A}$ | | -0.8 | -1.5 | V |

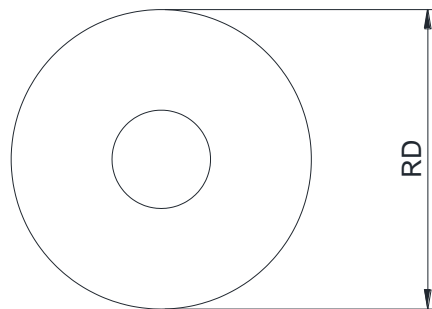
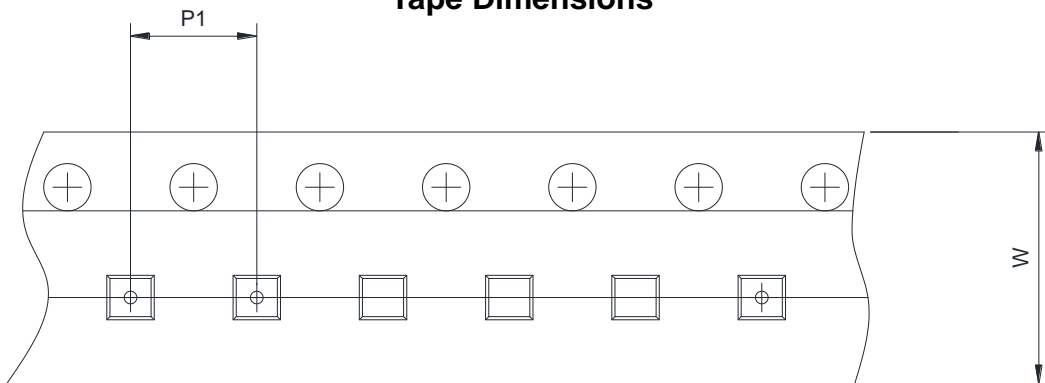
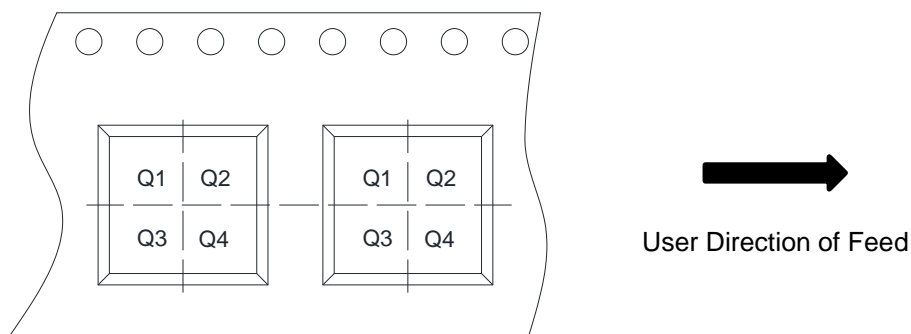
Typical Characteristics (Ta=25°C, unless otherwise noted)

Output characteristics

Transfer characteristics

On-Resistance vs. Drain current

On-Resistance vs. Gate-to-source voltage

On-Resistance vs. Junction temperature

Threshold voltage vs. Temperature


Capacitance

Body diode forward voltage

Single pulse power

Safe operating power

Gate Charge Characteristics

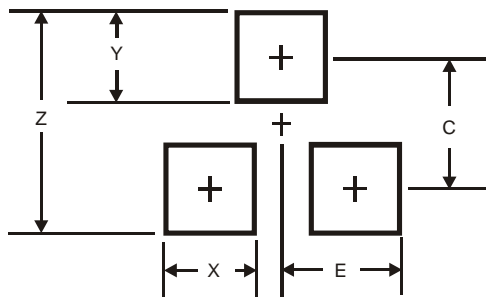
Transient thermal response (Junction-to-Ambient)


Package outline dimensions
SOT-23


| Symbol | Dimensions In Millimeters | |
|----------|---------------------------|-------|
| | Min. | Max. |
| A | 0.900 | 1.150 |
| A1 | 0.000 | 0.100 |
| A2 | 0.900 | 1.050 |
| b | 0.300 | 0.500 |
| c | 0.080 | 0.150 |
| D | 2.800 | 3.000 |
| E | 1.200 | 1.400 |
| E1 | 2.250 | 2.550 |
| e | 0.950 (Typ.) | |
| e1 | 1.800 | 2.000 |
| L | 0.550 (Typ.) | |
| L1 | 0.300 | 0.500 |
| θ | 0° | 8° |

TAPE AND REEL INFORMATION
Reel Dimensions

Tape Dimensions

Quadrant Assignments For PIN1 Orientation In Tape


| | | | |
|------|---|---|--|
| RD | Reel Dimension | <input checked="" type="checkbox"/> 7inch | <input type="checkbox"/> 13inch |
| W | Overall width of the carrier tape | <input checked="" type="checkbox"/> 8mm | <input type="checkbox"/> 12mm <input type="checkbox"/> 16mm |
| P1 | Pitch between successive cavity centers | <input type="checkbox"/> 2mm | <input checked="" type="checkbox"/> 4mm <input type="checkbox"/> 8mm |
| Pin1 | Pin1 Quadrant | <input type="checkbox"/> Q1 | <input type="checkbox"/> Q2 <input checked="" type="checkbox"/> Q3 <input type="checkbox"/> Q4 |

Suggested Land Pattern
SOT-23


| Dimensions | Value (mm) |
|------------|------------|
| Z | 2.9 |
| X | 0.8 |
| Y | 0.9 |
| C | 2.0 |
| E | 1.35 |