# FMOSBSS138DW-Q1-H

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# FMOSBSS138DW-Q1-H

## 220mA 50V Dual N - Channel Enhancement Mode MOSFET

### Features

- $V_{DS}$=50V, $I_D$=220mA.
- $R_{DS(on)}$≤ 3.5Ω @$V_{GS}$=10V, $I_D$=220mA.
- $R_{DS(on)}$≤ 6.0Ω @$V_{GS}$=4.5V, $I_D$=220mA.
- High density cell design for extremely low $R_{DS(ON)}$.
- Rugged and reliable.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

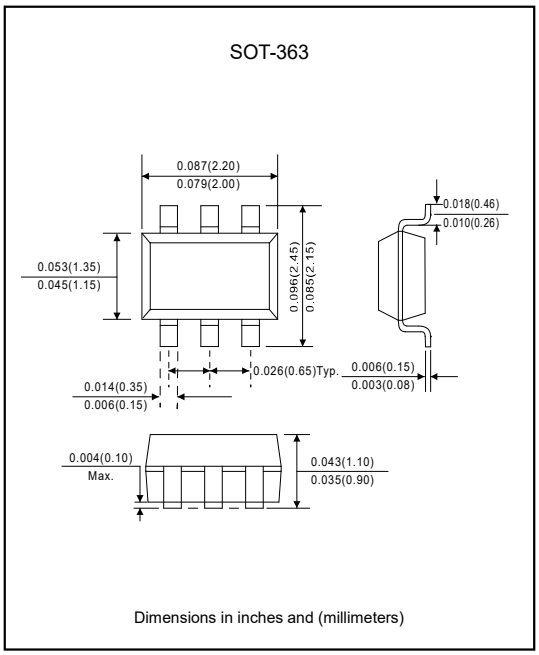
### Applications

- Direct logic- level interface: TTL/CMOS.
- Battery operated systems.
- Solid- state relays.

### Mechanical data

- Epoxy : UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-363.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Weight : Approximated 6.8mg.

### Package outline




### Maximum ratings ($T_A$=25°C unless otherwise noted)

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 50 | V |
| Gate-source voltage | $V_{GS}$ | ±20 | V |
| Continuous drain current | $I_D$ | 220 | mA |
| Power dissipation | $P_D$ | 150 | mW |
| Operating Junction temperature | $T_J$ | +150 | ℃ |
| Storage temperature range | $T_{STG}$ | -55 to +150 | ℃ |
| Thermal resistance Junction to ambient | $R_{\theta JA}$ | 833 | ℃/W |

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## Electrical characteristics (At $T_A$=25°C unless otherwise specified)

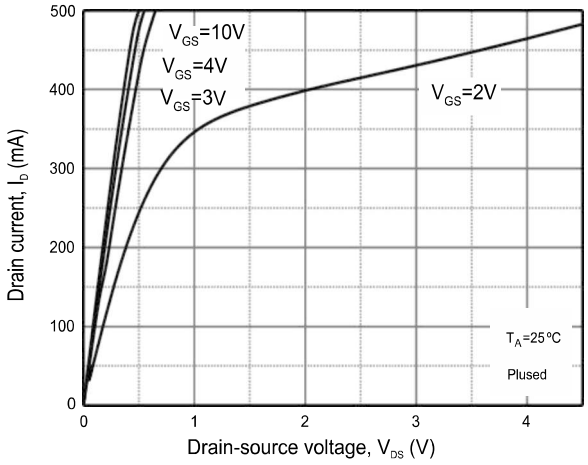
| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Off characteristics** | | | | | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | $I_D$=250μA, $V_{GS}$=0V | 50 | | | V |
| Drain-source leakage current | $I_{DSS}$ | $V_{DS}$=50V, $V_{GS}$=0V | | | 0.5 | μA |
| Gate-source leakage current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | | | ±100 | nA |
| **On characteristics** | | | | | | |
| Gate threshold voltage (Note 1) | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=1mA | 0.8 | 1.2 | 1.5 | V |
| Static drain-source on-resistance (Note 1) | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=220mA | | 1.0 | 3.5 | Ω |
| | | $V_{GS}$=4.5V, $I_D$=220mA | | 1.1 | 6.0 | |
| Forward transconductance (Note 1) | $g_{FS}$ | $V_{DS}$=10V, $I_D$=220mA | | 0.15 | | S |
| **Dynamic Parameters** (Note 2) | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0MHZ | | 26.5 | | pF |
| Output capacitance | $C_{oss}$ | | | 12.9 | | |
| Reverse transfer capacitance | $C_{rss}$ | | | 5.9 | | |
| **Switching parameters** (Note 1, 2) | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=30V, $V_{GS}$=10V, $I_D$=0.29A, $R_G$=6Ω | | | 5 | ns |
| Rise time | $t_r$ | | | | 18 | |
| Turn-off delay time | $t_{d(off)}$ | | | | 36 | |
| Fall time | $t_f$ | | | | 14 | |
| **Source-drain diode ratings and characteristics** | | | | | | |
| Drain - source diode forward voltage (Note 1) | $V_{SD}$ | $I_S$=440mA, $V_{GS}$=0V | | | 1.4 | V |

Note : 1. Pulse Test : Pulse width < 300μs, Duty cycle ≤ 2%.
2. These parameters have no way to verify.

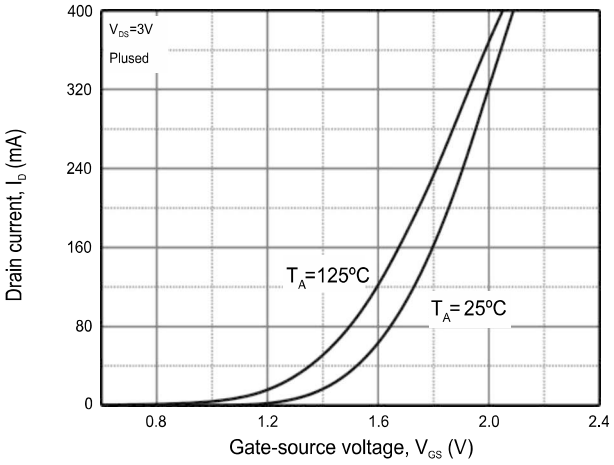
# FMOSBSS138DW-Q1-H

## Rating and characteristic curves

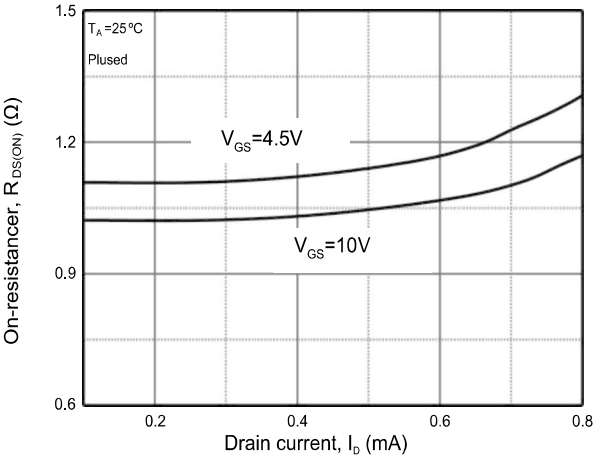
Output characteristics



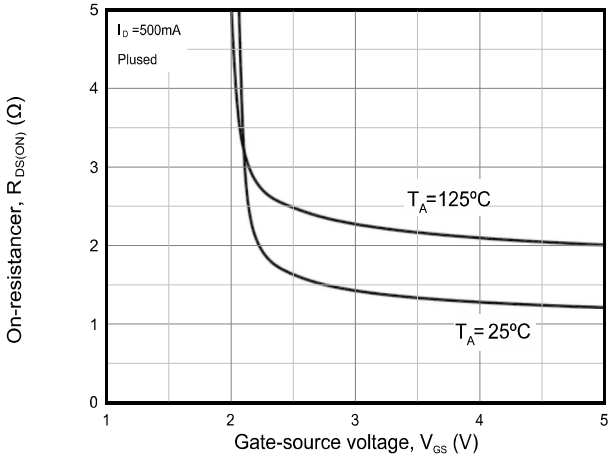

Transfer c haracteristics



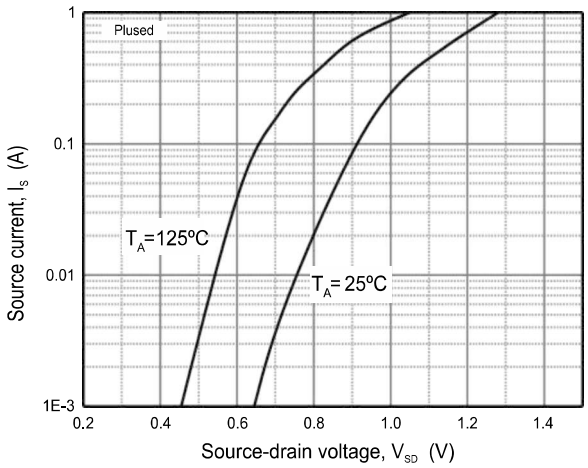

On-resistance vs. Drain current



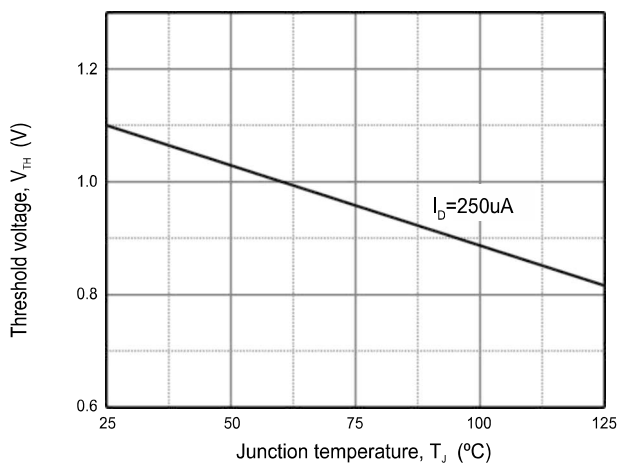

On-resistance vs. Gate-source voltage




Source-drain voltage vs. Source current

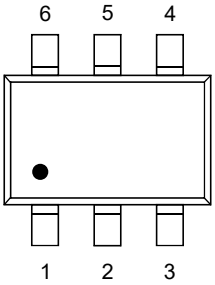
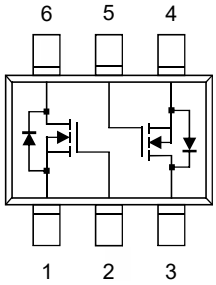



Threshold voltage

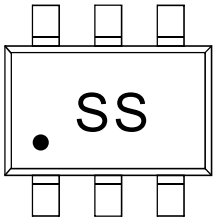


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## Pinning information

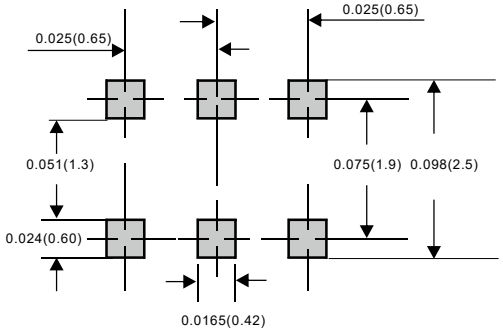
| Pin | Simplified outline | Symbol |
|---|---|---|
| Pin1 Source 1<br>Pin2 Gate 1<br>Pin3 Drain 2<br>Pin4 Source 2<br>Pin5 Gate 2<br>Pin6 Drain 1 |  |  |

## Marking

| Type number | Marking Code |
|---|---|
| FMOSBSS138DW-Q1-H |  |

## Suggested solder pad layout

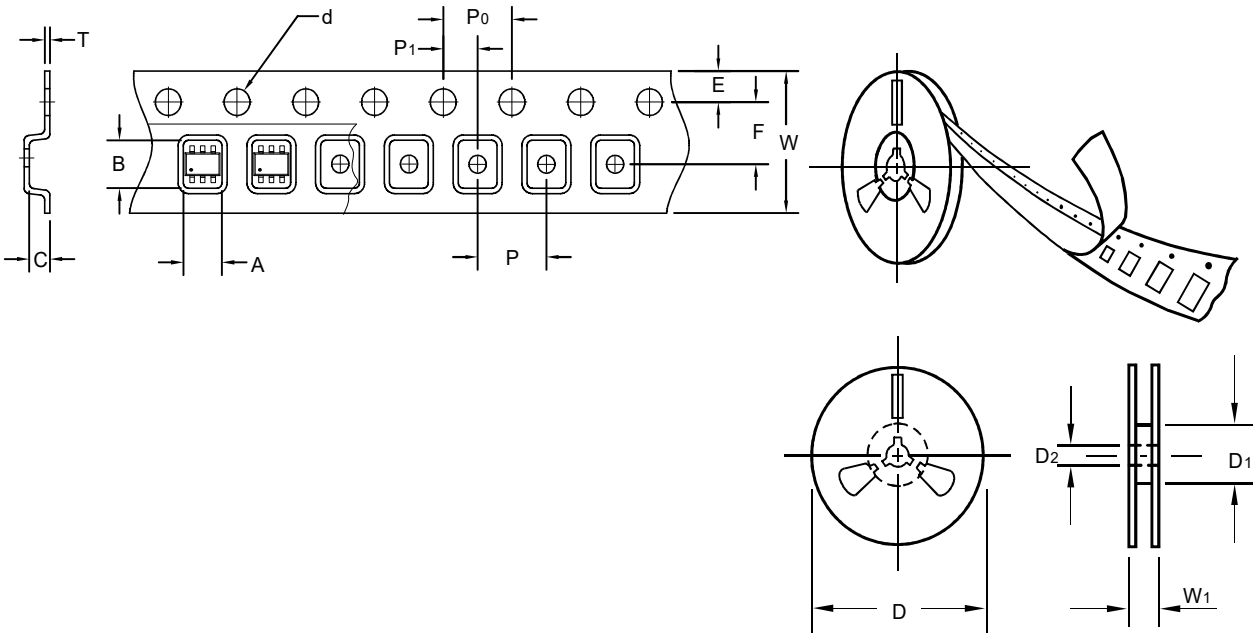
SOT-363




Dimensions in inches and (millimeters)

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## Packing information




unit:mm

| Item | Symbol | Tolerance | SOT-363 |
|---|---|---|---|
| Carrier width | A | 0.5 | 2.25 |
| Carrier length | B | 0.5 | 2.55 |
| Carrier depth | C | 0.5 | 1.20 |
| Sprocket hole | d | 0.5 | 1.50 |
| 13" Reel outside diameter | D | 2.0 | - |
| 13" Reel inner diameter | $D_1$ | min | - |
| 7" Reel outside diameter | D | 2.0 | 178.00 |
| 7" Reel inner diameter | $D_1$ | min | 62.00 |
| Feed hole diameter | $D_2$ | 0.5 | 13.00 |
| Sprocket hole position | E | 0.1 | 1.75 |
| Punch hole position | F | 0.1 | 3.50 |
| Punch hole pitch | P | 0.1 | 4.00 |
| Sprocket hole pitch | $P_0$ | 0.1 | 4.00 |
| Embossment center | $P_1$ | 0.1 | 2.00 |
| Overall tape thickness | T | 0.5 | 0.23 |
| Tape width | W | 0.5 | 8.00 |
| Reel width | $W_1$ | 5.0 | 11.40 |

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

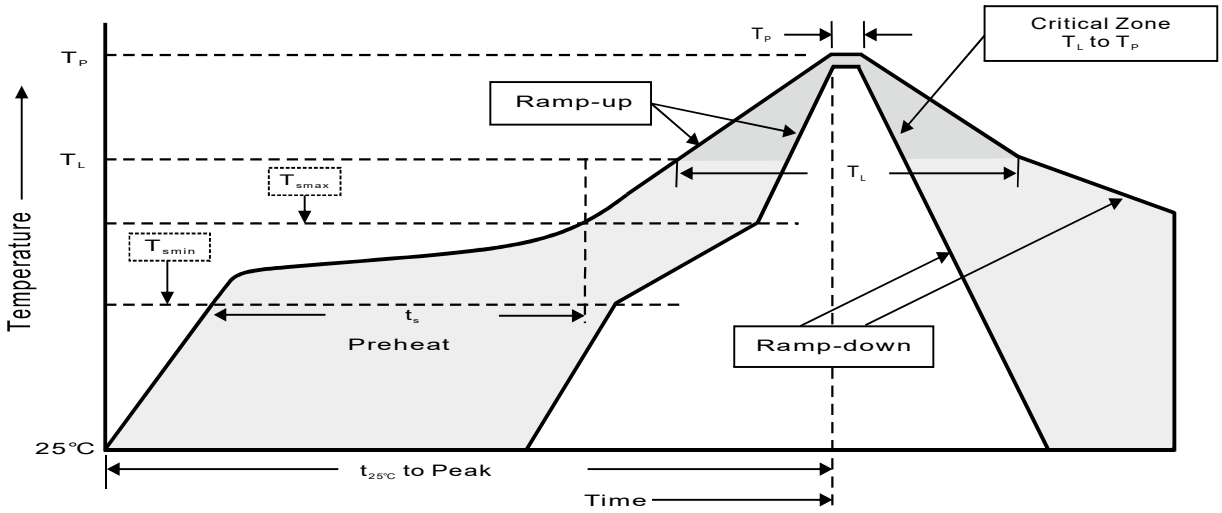
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## Reel packing

| PACKAGE | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA, (m/m) | CARTON SIZE (m/m) | CARTON (pcs) |
|---|---|---|---|---|---|---|---|---|
| SOT-363 | 7" | 3,000 | 4.0 | 30,000 | 183*123*183 | 178 | 382*257*387 | 240,000 |

## Suggested thermal profiles for soldering processes

1.Storage environment: Temperature = 5°C ~ 40°C Humidity = 55%, ±25%
2.Reflow soldering of surface-mount devices




3.Reflow soldering

| Profile feature | Soldering condition |
|---|---|
| Average ramp-up rate ($T_L$ to $T_P$) | < 3 ℃/sec |
| Preheat<br>- Temperature Min ($T_{smin}$)<br>- Temperature Max ($T_{smax}$)<br>- Time (Min to Max) ($t_s$) | <br>150℃<br>200℃<br>60 ~ 120 sec |
| $T_{smax}$ to $T_L$<br>- Ramp-up rate | <br>< 3 ℃/sec |
| Time maintained above :<br>- Temperature ($T_L$)<br>- Time ($T_L$) | <br>217℃<br>60 ~ 260 sec |
| Peak temperature ($T_P$) | 255 ℃ -0/+5℃ |
| Time with 5℃ of actual peak temperature ($T_P$) | 10 ~30 sec |
| Ramp-down rate | < 6 ℃/sec |
| Time 25℃ to peak temperature | < 6 minutes |