# 3439KDW
## 20V N-Channel +P-Channel MOSFET

| | | |
|---|---|---|
| $V_{DSS}$ | -20/20 | V |
| $I_D$ | -0.66/0.66 | A |
| $R_{DS(ON)}$ | 450/190 | mΩ |

## Features

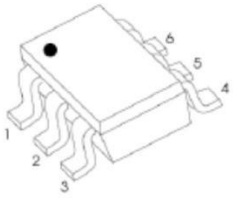
Surface Mount Package
Low $R_{DS(on)}$
Operated at Low Logic Level Gate Drive
ESD Protected Gate

49K

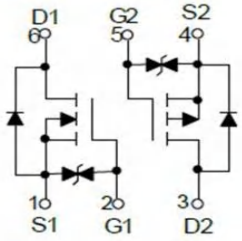
## Applications

Load/ Power Switching
Interfacing Switching
Battery Management for Ultra Small Portable Electronics

SOT-363




**Equivalent Circuit**




## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

**Absolute Maximum Ratings** (@ $T_a$ = 25°C unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| **P-MOSFET** | | | |
| Drain-Source Voltage | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±12 | V |
| Continuous Drain Current(1) | $I_D$ | -0.66 | A |
| Pulsed Drain Current ($t_p$=10μs) | $I_{DM}$ | -1.2 | A |
| **N-MOSFET** | | | |
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±8 | V |
| Continuous Drain Current(1) | $I_D$ | 0.75 | A |
| Pulsed Drain Current(tp=10μs) | $I_{DM}$ | 1.8 | A |
| **Temperature and Thermal Resistance** | | | |
| Thermal Resistance from Junction to Ambient(1) | $R_{\theta JA}$ | 833 | ℃/W |
| Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature | $T_{STG}$ | -55~ +150 | ℃ |
| Lead Temperature for Soldering Purposes(1/8” from case for 10s) | $T_L$ | 260 | ℃ |

## Electrical Characteristics ($T_a$=25℃unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ =-250μA | -20 | | | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ =-20V,$V_{GS}$ = 0V | | | -1 | μA |
| Gate-body leakage current | $I_{GSS}$ | $V_{GS}$ =±10V, $V_{DS}$ = 0V | | | ±20 | μA |
| Gate threshold voltage(2) | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =-250μA | -0.35 | -0.60 | -1.1 | V |
| Drain-source on-resistance(2) | $R_{DS(on)}$ | $V_{GS}$ =-4.5V, $I_D$ =-1A | | 450 | 520 | mΩ |
| | | $V_{GS}$ =-2.5V, $I_D$ =-0.8A | | 650 | 780 | |
| | | $V_{GS}$ =-1.8V, $I_D$ =-0.5A | | 950 | | |
| Forward tranconductance(2) | $g_{FS}$ | $V_{DS}$ =-10V, $I_D$ =-0.54A | | 1.2 | | S |
| Diode forward voltage | $V_{DS}$ | $I_S$=-0.5A, $V_{GS}$ = 0V | | | -1.2 | V |
| **Dynamic characteristics**(4) | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =-16V,$V_{GS}$ =0V,f =1MHz | | 113 | | pF |
| Output Capacitance | $C_{oss}$ | | | 15 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 9 | | |
| **Switching Characteristics**(3,4) | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DS}$=-10V,$I_D$=-200mA, $V_{GS}$=-4.5V,$R_G$=10Ω | | 9 | | ns |
| Turn-on rise time | $t_r$ | | | 5.7 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 32.6 | | |
| Turn-off fall time | $t_f$ | | | 20.3 | | |

**N-channel MOSFET ELECTRICAL CHARACTERISTICS($T_a$=25℃ unless otherwise noted)**

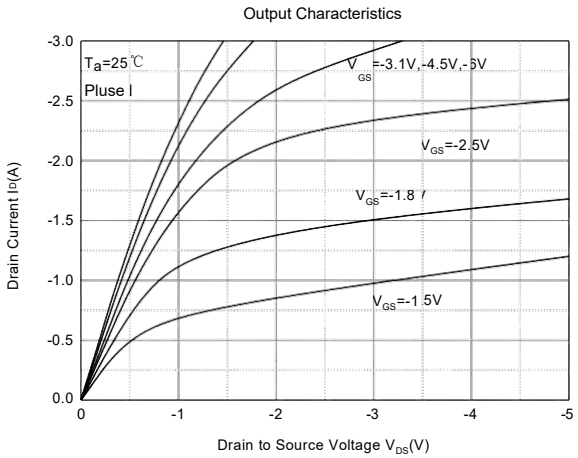
| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ =250μA | 20 | | | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ =20V,$V_{GS}$ = 0V | | | 1 | μA |
| Gate-body leakage current | $I_{GSS}$ | $V_{GS}$ =±10V, $V_{DS}$ = 0V | | | ±20 | μA |
| Gate threshold voltage(2) | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250μA | 0.35 | 0.75 | 1.1 | V |
| Drain-source on-resistance(2) | $R_{DS(on)}$ | $V_{GS}$ =4.5V, $I_D$ =650mA | | 190 | 380 | mΩ |
| | | $V_{GS}$ =2.5V, $I_D$ =550mA | | 260 | 450 | |
| | | $V_{GS}$ =1.8V, $I_D$ =450mA | | 390 | 800 | |
| Forward tranconductance | $g_{FS}$ | $V_{DS}$ =10V, $I_D$ =800mA | | 1.6 | | S |
| Diode Forward voltage(3) | $V_{DS}$ | $I_S$=0.15A, $V_{GS}$ = 0V | | | 1.2 | V |
| **Dynamic characteristics**(4) | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=16V,$V_{GS}$=0V,f=1MHz | | 79 | 120 | pF |
| Output Capacitance | $C_{oss}$ | | | 13 | 20 | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 9 | 15 | |
| **Switching Characteristics**(3,4) | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DS}$=10V,$I_D$=500mA, $V_{GS}$=4.5V,$R_G$=10Ω | | 6.7 | | ns |
| Turn-on rise time | $t_r$ | | | 4.8 | | ns |
| Turn-off delay time | $t_{d(off)}$ | | | 17.3 | | ns |
| Turn-off fall time | $t_f$ | | | 7.4 | | ns |

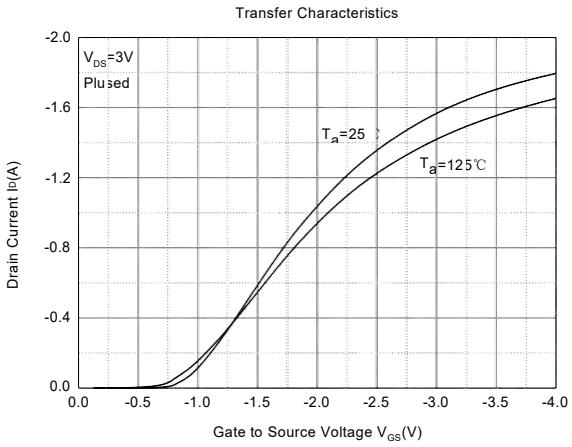
**Notes:**

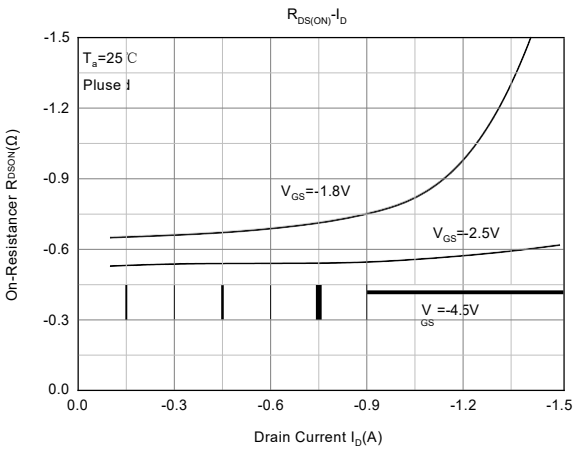
1. Surface mounted on FR4 board using the minimum recommended pad size.
2. Pulse Test : Pulse Width=300μs, Duty Cycle=2%.
3. Switching characteristics are independent of operating junction temperatures.
4. Guaranteed by design, not subject to producting.

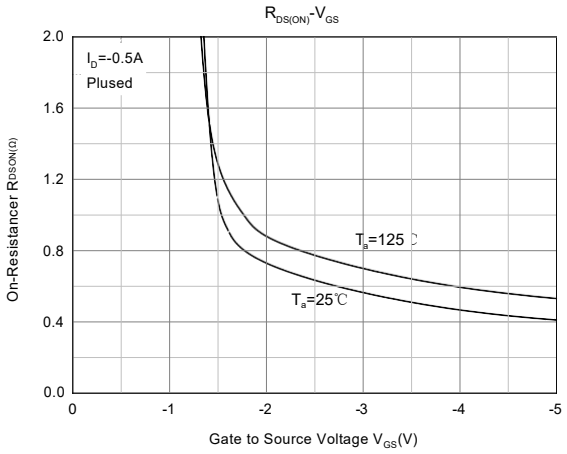
## RATING AND CHARACTERISTIC CURVES

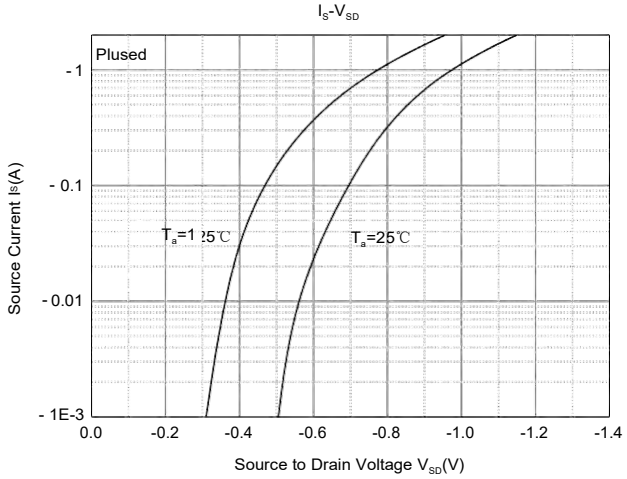
### P-Channel MOS

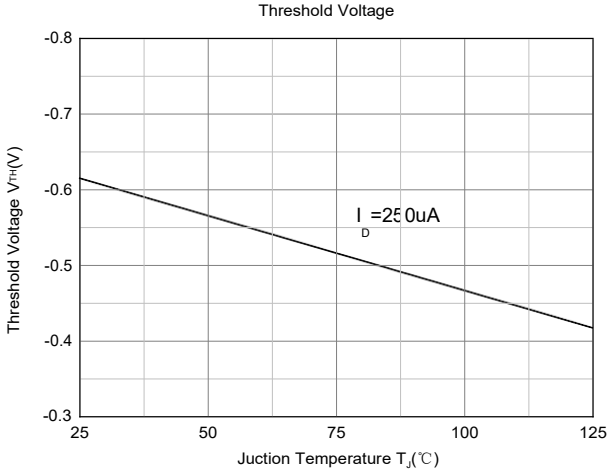


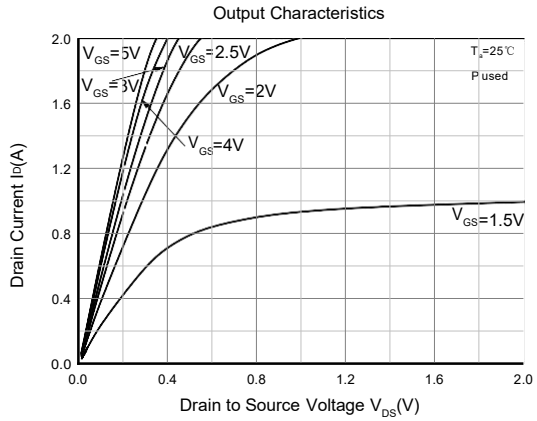



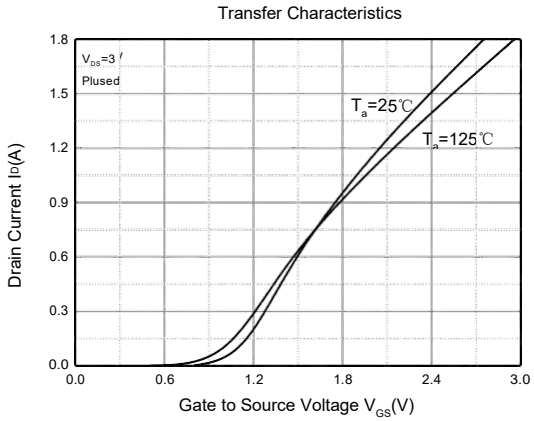



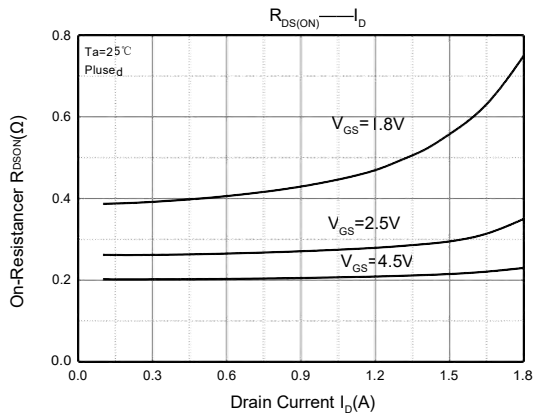



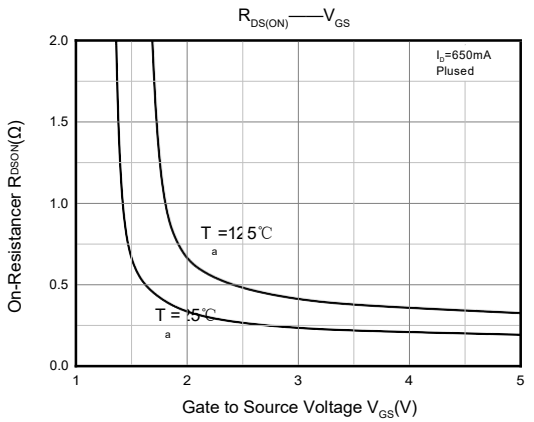
## RATING AND CHARACTERISTIC CURVES

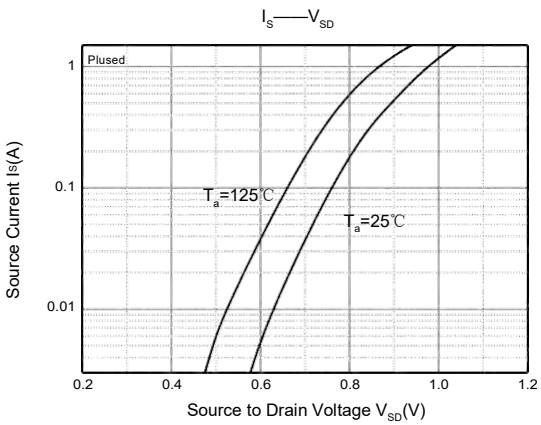
### N-Channel MOS

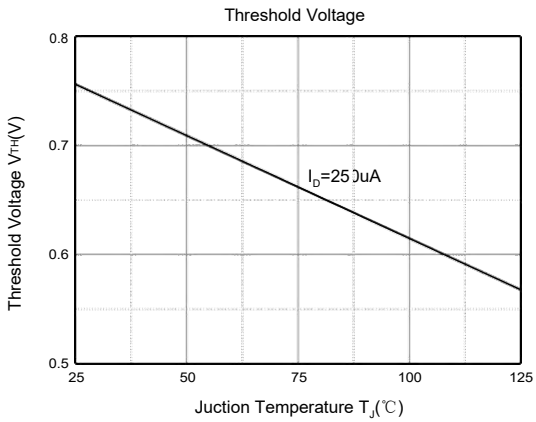


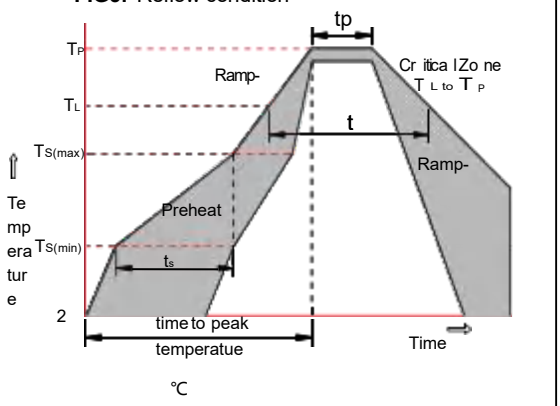



## Soldering parameters

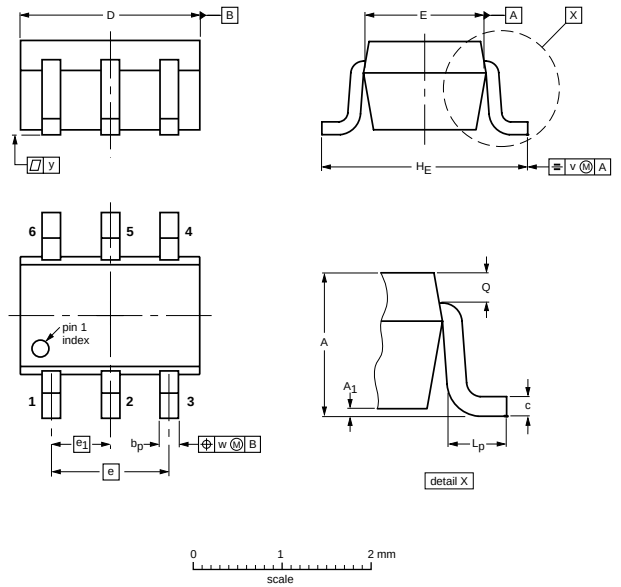
| Reflow Condition | | Pb-Free assembly (see as bellow) |
|---|---|---|
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150℃ |
| | -Temperature Max($T_{s(max)}$) | +200℃ |
| | -Time (Min to Max) (ts) | 60-180 secs. |
| Average ramp up rate (Liquid us Temp ($T_L$) to peak) | | 3℃/sec. Max |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate | | 3℃/sec. Max |
| Reflow | -Temperature($T_L$)(Liquid us) | +217℃ |
| | -Temperature($t_L$) | 60-150 secs. |
| Peak Temp ($T_p$) | | +260(+0/-5)℃ |
| Time within 5℃ of actual Peak Temp ($t_p$) | | 30 secs. Max |
| Ramp-down Rate | | 6℃/sec. Max |
| Time 25℃ to Peak Temp ($T_P$) | | 8 min. Max |
| Do not exceed | | +260℃ |

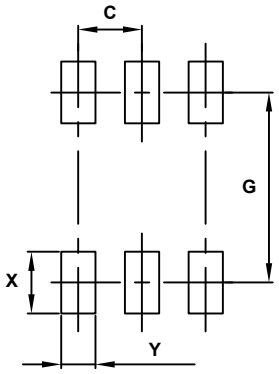
**FIG5:** Reflow condition




## Package Dimensions & Suggested Pad Layout

**SOT-363**



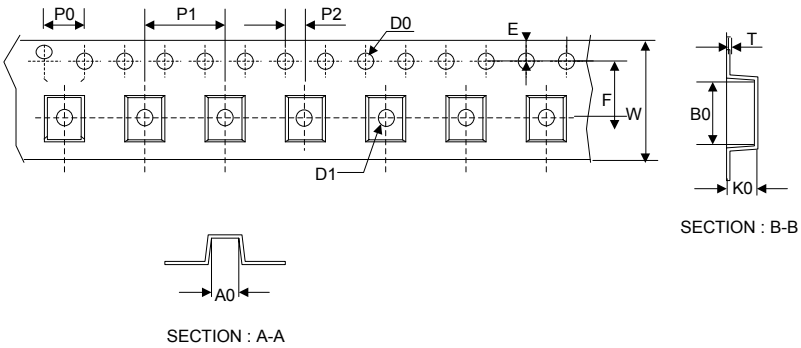

| Dimensions | Value (in mm) |
|---|---|
| C | 0.65 |
| G | 1.90 |
| X | 0.85 |
| Y | 0.40 |

DIMENSIONS (mm are the original dimensions)

| UNIT | A | $A_1$ max | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.8 | 0.1 | 0.30<br>0.20 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65 | 2.2<br>2.0 | 0.45<br>0.15 | 0.25<br>0.15 | 0.2 | 0.2 | 0.1 |

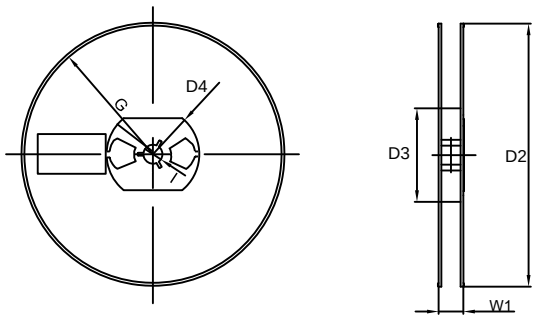
## Tape & rell specification

Tape




| Symbol | Dimension (mm) |
|---|---|
| P0 | 4.00±0.20 |
| P1 | 4.00±0.20 |
| P2 | 2.00±0.20 |
| D0 | 1.55±0.20 |
| D1 | 1.00±0.20 |
| E | 1.55±0.25 |
| F | 3.60±0.20 |
| W | 8.00±0.20 |
| A0 | 3.00±0.20 |
| B0 | 3.00±0.20 |
| K0 | 1.30±0.20 |
| T | 0.20±0.20 |

7” Reel




| | |
|---|---|
| D2 | 177.0±5.0 |
| D3 | 55Min. |
| D4 | R24.6±2.0 |
| G | R82.0±2.0 |
| I | 13.0±2.0 |
| W1 | 10.20±3.0 |
| Quantity: 3000PCS | |

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