| | |
|---|---|
| $V_{DSS}$ | -60 V |
| $I_D$ | -170 mA |
| $R_{DS(ON)}$ | 4.8 Ω |

PD *

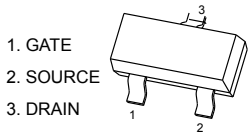
## Features

Advanced trench cell design.
High speed switch.
G-S ESD Protected: ±2000V
Pb-Free Package is available.
We declare that the material of product compliance with RoHS requirements and Halogen Free.

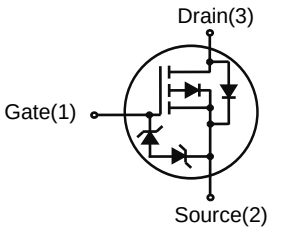
## Applications

Portable appliances.
Load switch appliances.

**SOT-23**




**Equivalent Circuit**




## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

### MAXIMUM RATINGS

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Drain–Source Voltage | VDSS | -60 | V |
| Gate–to–Source Voltage | VGSS | ±20 | V |
| Drain Current<br>– Continuous TA = 25°C<br>– Pulsed (tp≤10μs) | <br>ID<br>IDM | <br>-170<br>-520 | mA |

### THERMAL CHARACTERISTICS

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Total Device Dissipation,<br>FR−5 Board (Note 1) @ TA = 25ºC<br>Derate above 25ºC | PD | 225<br><br>1.8 | mW<br><br>mW/ºC |
| Thermal Resistance,<br>Junction–to–Ambient(Note 1) | RΘJA | 556 | ºC/W |
| Junction and Storage temperature | TJ,Tstg | −55~+150 | ºC |
| Maximum Lead Temperature for Soldering Purposes, for 10 seconds | TL | 260 | ºC |

1. FR–5 = 1.0×0.75×0.062 in.

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

OFF CHARACTERISTICS

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Drain–Source Breakdown Voltage (VGS = 0, ID = -250μA) | VBRDSS | -60 | - | - | V |
| Zero Gate Voltage Drain Current (VGS = 0, VDS = -25 V) (VGS = 0, VDS = -60 V) | IDSS | - - | - - | -0.1 -15 | μA |
| Gate–Body Leakage Current, Forward (VGS = 20 V) | IGSSF | - | - | 10 | μA |
| Gate–Body Leakage Current, Reverse (VGS = - 20 V) | IGSSR | - | - | -10 | μA |

ON CHARACTERISTICS (Note 2)

| | | | | | |
|---|---|---|---|---|---|
| Gate Threshold Voltage (VDS = VGS, ID = -250μA) | VGS(th) | -1.0 | - | -2.2 | V |
| Static Drain–Source On–State Resistance (VGS = -4.5 V, ID = -100 mA) (VGS = -10 V, ID = -100 mA) | RDS(on) | - - | 4.8 4 | 6.2 5.5 | Ω |
| Transfer Admittance (VDS = -25 V, ID = -100 mA, f = 1.0 kHz) | \|yfs\| | 50 | - | - | mS |

DYNAMIC CHARACTERISTICS

| | | | | | |
|---|---|---|---|---|---|
| Input Capacitance (VDS = - 25 V,VGS=0V,f=1MHz) | Ciss | - | 28.6 | - | pF |
| Output Capacitance (VDS = - 25 V,VGS=0V,f=1MHz) | Coss | - | 4 | - | pF |
| Reverse Transfer Capacitance (VDS = - 25 V,VGS=0V,f=1MHz) | Crss | - | 2.45 | - | pF |
| Total Gate Charge | Qg | - | 1.1 | - | nC |
| Gate-Source Charge (VDS = -25V, VGS = -4.5V, ID = -0.1A) | Qgs | - | 0.3 | - | |
| Gate-Drain Charge | Qgd | - | 0.2 | - | |

SWITCHING CHARACTERISTICS

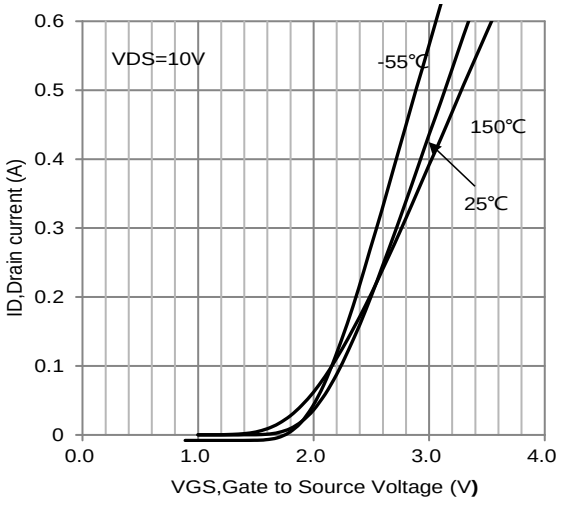
| | | | | | | |
|---|---|---|---|---|---|---|
| Turn-On Delay Time | (VDS = –25 V,VGEN =-10V,IDS = –0.1 A,RL =250Ω,RG=6Ω) | td(on) | - | 4.8 | - | ns |
| Rise Time | | tr | - | 19 | - | |
| Turn-Off Delay Time | | td(off) | - | 52 | - | |
| Fall Time | | tf | - | 32 | - | |

SOURCE–DRAIN DIODE CHARACTERISTICS

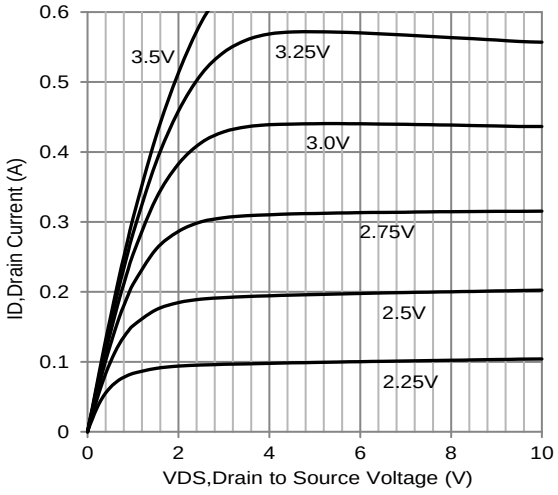
| | | | | | |
|---|---|---|---|---|---|
| Continuous Current | IS | - | - | -0.17 | A |
| Pulsed Current | ISM | - | - | -0.52 | A |
| Forward Voltage | VSD | - | -2.2 | - | V |

2.Pulse Test: Pulse Width ≤300 μs, Duty Cycle ≤2.0%.

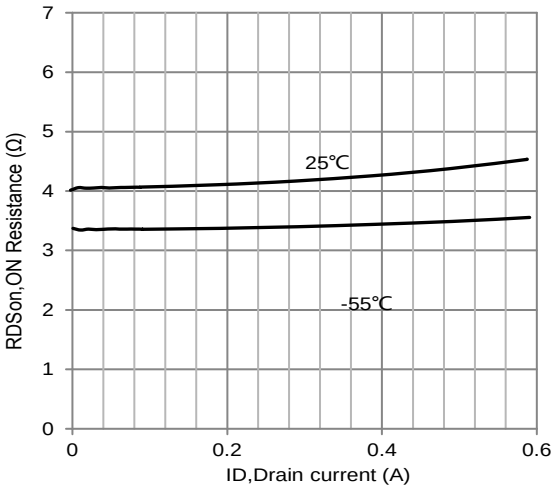
## RATING AND CHARACTERISTIC CURVES



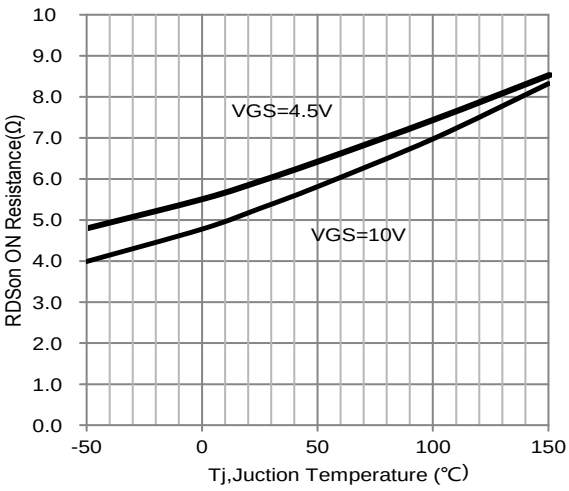
ID vs. VGS



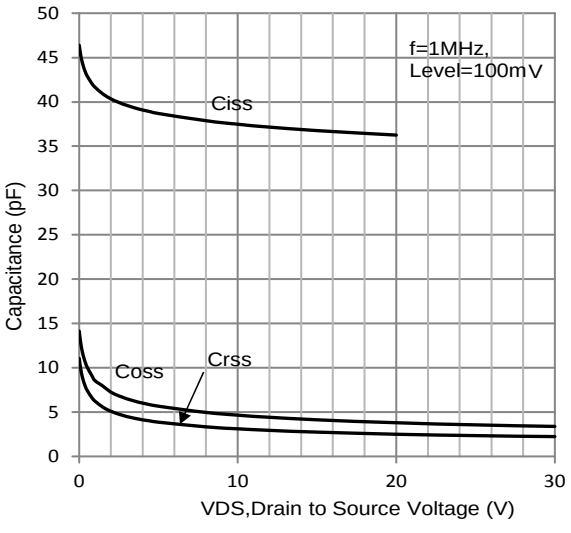
ID vs. VDS



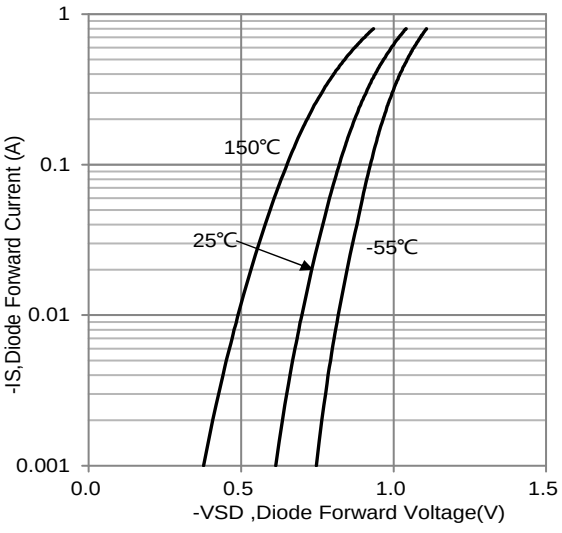
RDSon vs. ID



RDSon vs. Tj



Capacitance

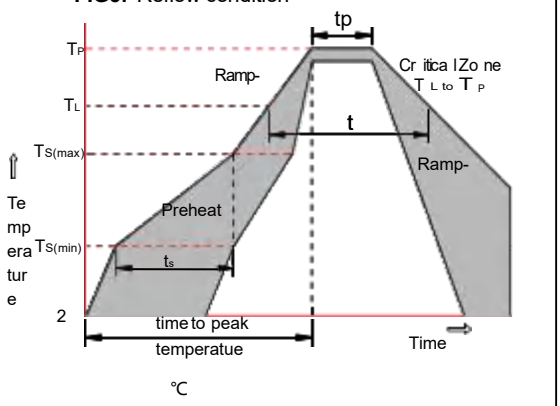


IS vs. VSD

## Soldering parameters

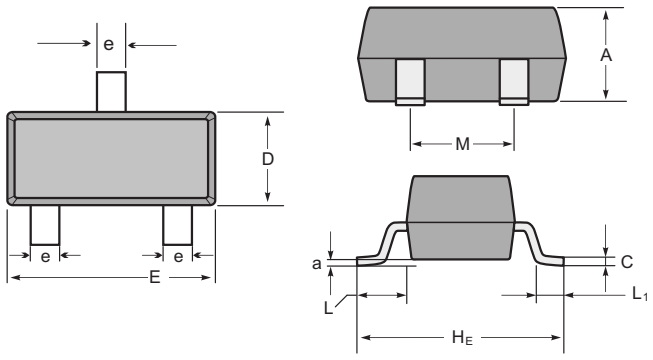
| Reflow Condition | | Pb-Free assembly (see as bellow) |
|---|---|---|
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150℃ |
| | -Temperature Max($T_{s(max)}$) | +200℃ |
| | -Time (Min to Max) (ts) | 60-180 secs. |
| Average ramp up rate (Liquid us Temp ($T_L$) to peak) | | 3℃/sec. Max |
| $T_{s(max)}$ 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℃ |

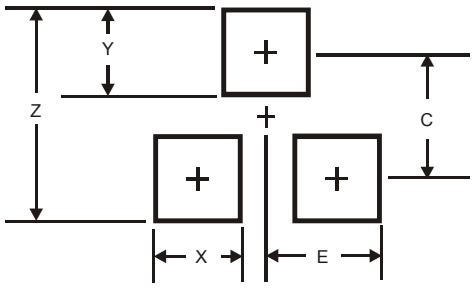
**FIG5:** Reflow condition




## Package Dimensions & Suggested Pad Layout

**SOT23**



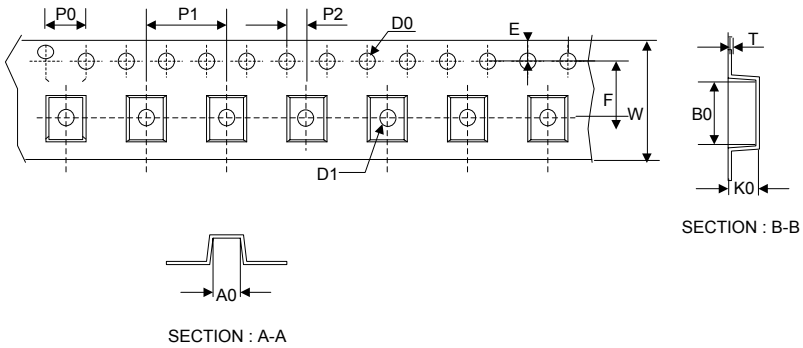

SOT-23 mechanical data

| UNIT | | A | C | D | E | $H_E$ | e | M | L | $L_1$ | a |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1.1 | 0.15 | 1.4 | 3.0 | 2.6 | 0.5 | 1.95 | 0.55 (ref) | 0.36 (ref) | 0.0 |
| | min | 0.9 | 0.08 | 1.2 | 2.8 | 2.2 | 0.3 | 1.7 | | | 0.15 |
| mil | max | 43 | 6 | 55 | 118 | 102 | 20 | 77 | 22 (ref) | 14 (ref) | 0.0 |
| | min | 35 | 3 | 47 | 110 | 87 | 12 | 67 | | | 6 |

| Dimensions | SOT23 |
|---|---|
| Z | 2.9 |
| X | 0.8 |
| Y | 0.9 |
| C | 2.0 |
| E | 1.35 |

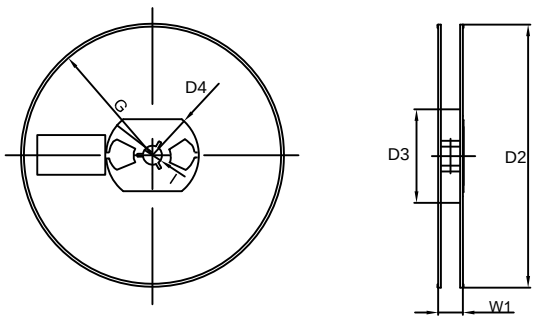
## Tape & rell specification

Tape




| Symbol | Dimension (mm) |
|---|---|
| P0 | 4.00±0.10 |
| P1 | 4.00±0.10 |
| P2 | 2.00±0.10 |
| D0 | 1.55±0.10 |
| D1 | 1.05±0.10 |
| E | 1.55±0.10 |
| F | 3.60±0.10 |
| W | 8.00±0.10 |
| A0 | 3.80±0.20 |
| B0 | 3.25±0.20 |
| K0 | 1.45±0.10 |
| T | 0.25±0.05 |

7” Reel




| | |
|---|---|
| D2 | 178.0±3.0 |
| D3 | 55Min. |
| D4 | R24.0±3.0 |
| G | R82.0±3.0 |
| I | 13.0±2.0 |
| W1 | 11.0±3.0 |

Quantity: 3000PCS