

Product Summary

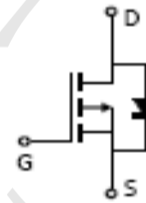
- $V_{DS} = -20V, I_D = -4.1A$
 $R_{DS(ON)} < 75m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 52m\Omega @ V_{GS} = -4.5V$
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

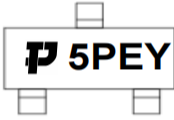
Package and Pin Configuration

SOT-23



Circuit diagram



Marking: 

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit | |
|--|----------------|--------------------|------------|---|
| Drain-Source Voltage | V_{DS} | -20 | V | |
| Gate-Source Voltage | V_{GS} | ± 12 | V | |
| Continuous Drain Current | I_D | $T_C = 25^\circ C$ | -4.1 | A |
| | | $T_C = 70^\circ C$ | -3.2 | |
| | | $T_A = 25^\circ C$ | -3 | |
| | | $T_A = 70^\circ C$ | -2.3 | |
| Drain Current -Pulsed (Note 1) | I_{DM} | -15 | A | |
| Maximum Power Dissipation | P_D | 1.7 | W | |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ | |

Thermal Characteristic

| | | | |
|--|-----------------|----|--------------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 74 | $^\circ C/W$ |
|--|-----------------|----|--------------|



Electrical Characteristics (T_A=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|---|-------|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{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} =±12V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =-250μA | -0.45 | -0.7 | -1.0 | V |
| Drain-Source On-State Resistance | R _{DS(on)} | V _{GS} =-4.5V, I _D =-4.1A | - | 39 | 52 | mΩ |
| | | V _{GS} =-2.5V, I _D =-3A | - | 58 | 75 | |
| Forward Transconductance | g _{FS} | V _{DS} =-5V, I _D =-2A | 6 | - | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =-4V, V _{GS} =0V, F=1.0MHz | - | 740 | - | PF |
| Output Capacitance | C _{oss} | | - | 290 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 190 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =-4V, I _D =-3.3A , R _L =-1.2Ω, V _{GEN} =-4.5V, R _g =1Ω | - | 12 | - | nS |
| Turn-on Rise Time | t _r | | - | 35 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 30 | - | nS |
| Turn-Off Fall Time | t _f | | - | 10 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =-4V, I _D =-4.1A, V _{GS} =-4.5V | - | 7.8 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 1.2 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 1.6 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V _{SD} | V _{GS} =0V, I _S =-1.6A | - | - | -1.2 | V |
| Diode Forward Current (Note 2) | I _S | | - | - | 1.6 | A |



Typical Electrical and Thermal Characteristics

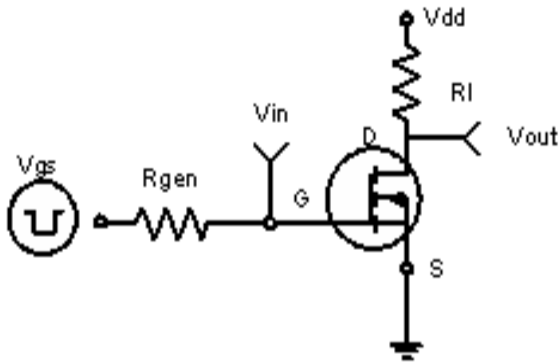


Figure 1: Switching Test Circuit

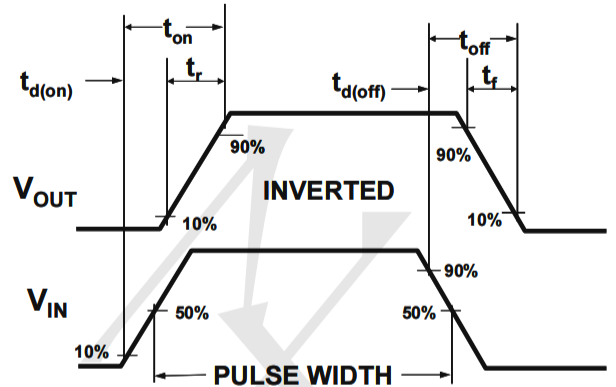


Figure 2: Switching Waveforms

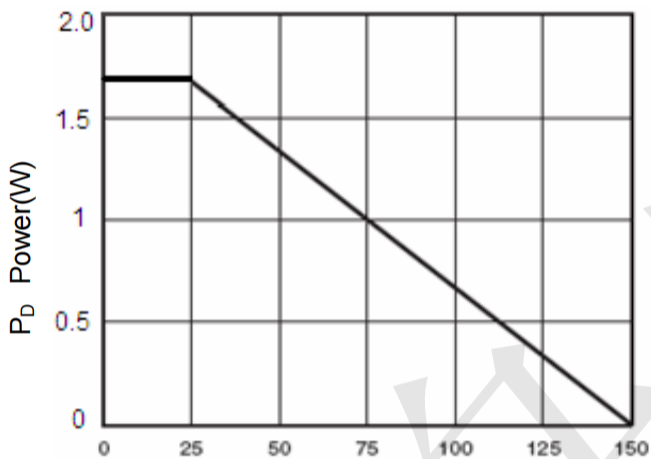


Figure 3 Power Dissipation

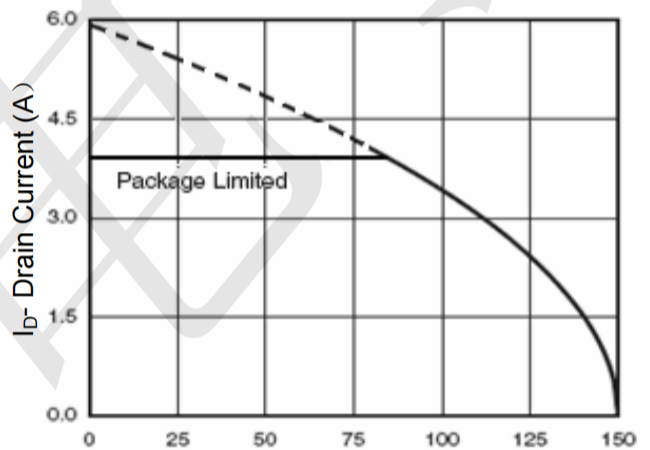


Figure 4 Drain Current

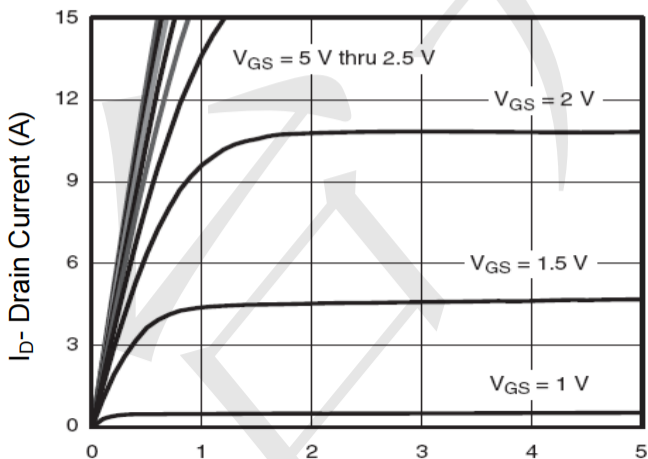


Figure 5 Output Characteristics

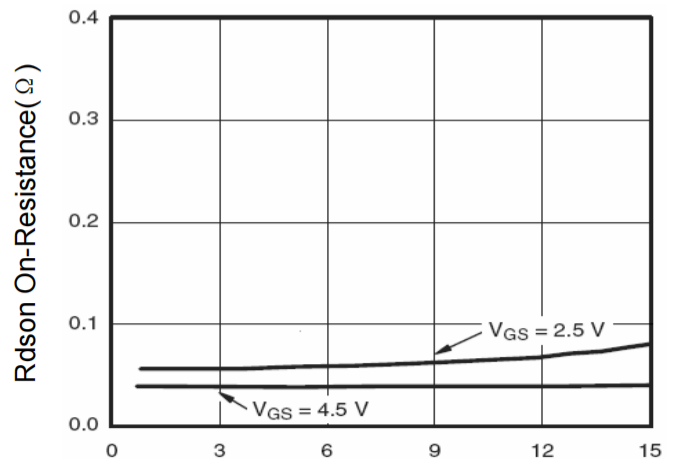
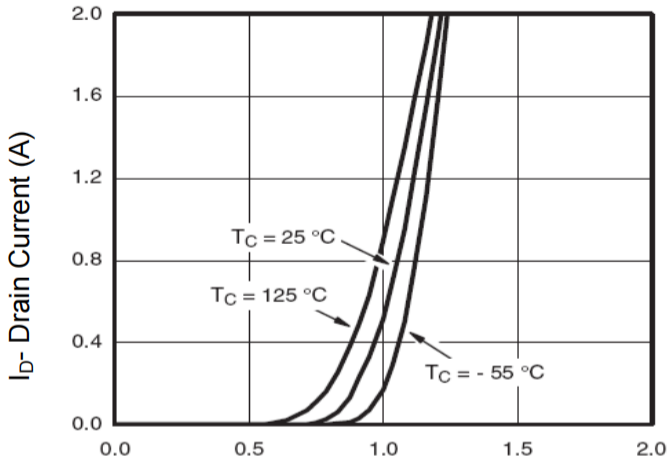
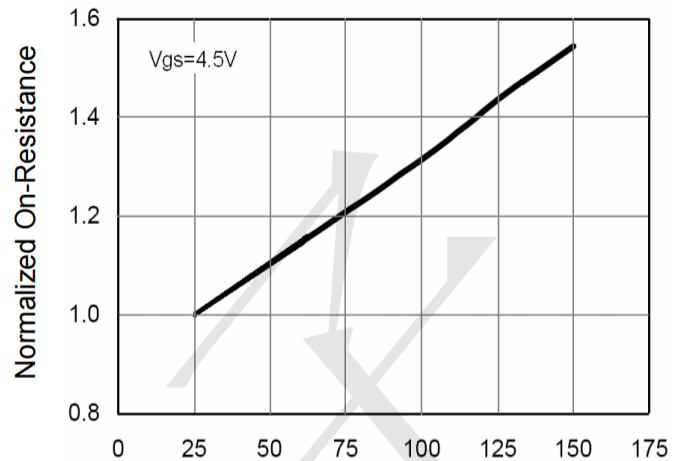


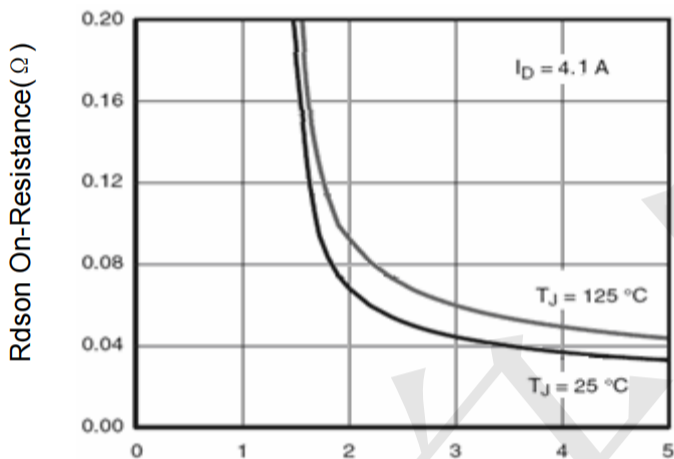
Figure 6 Drain-Source On-Resistance



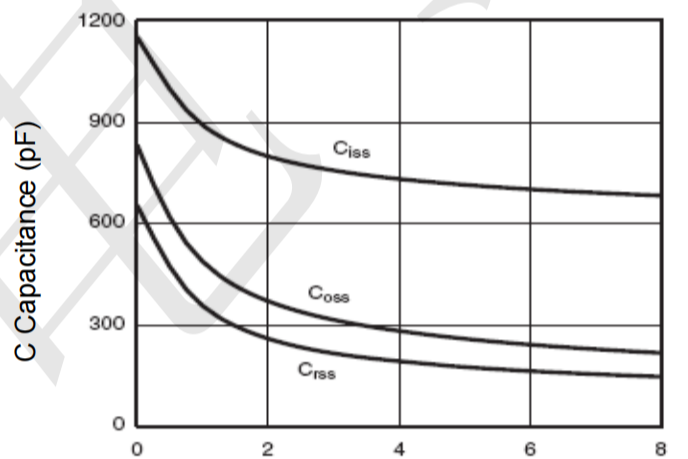
Vgs Gate-Source Voltage (V)
Figure 7 Transfer Characteristics



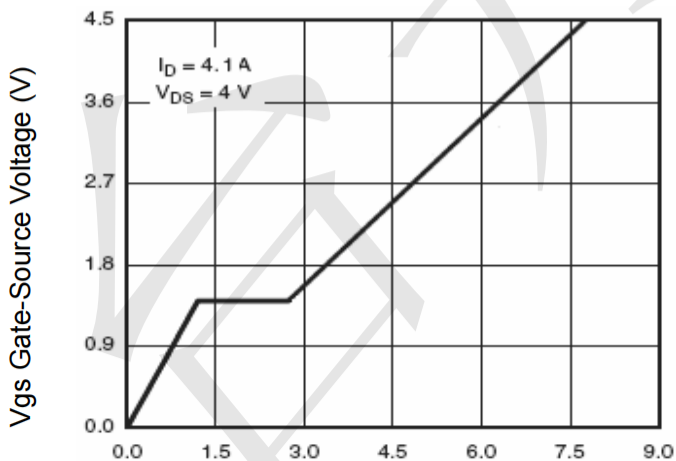
TJ-Junction Temperature(°C)
Figure 8 Drain-Source On-Resistance



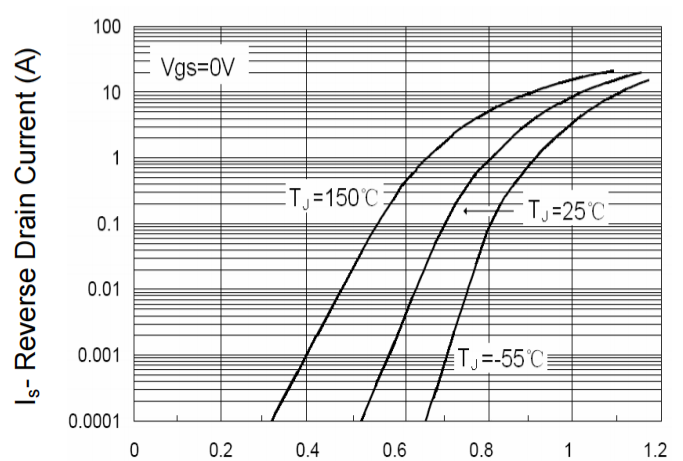
Vgs Gate-Source Voltage (V)
Figure 9 Rdson vs Vgs



Vds Drain-Source Voltage (V)
Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)
Figure 11 Gate Charge



Vsd Source-Drain Voltage (V)
Figure 12 Source- Drain Diode Forward

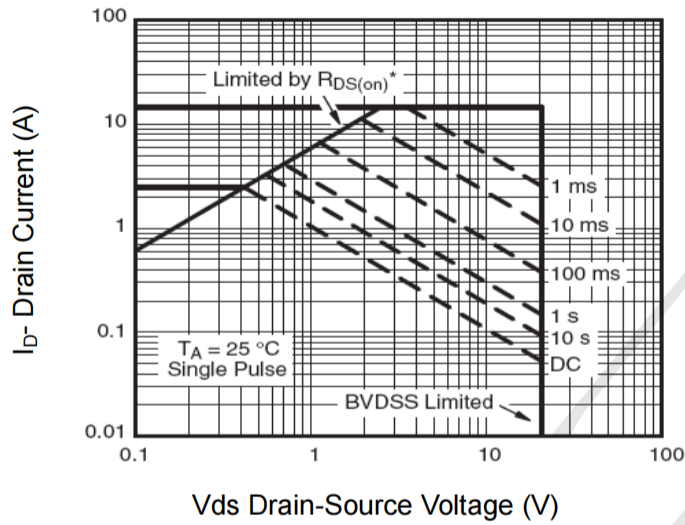


Figure 13 Safe Operation Area

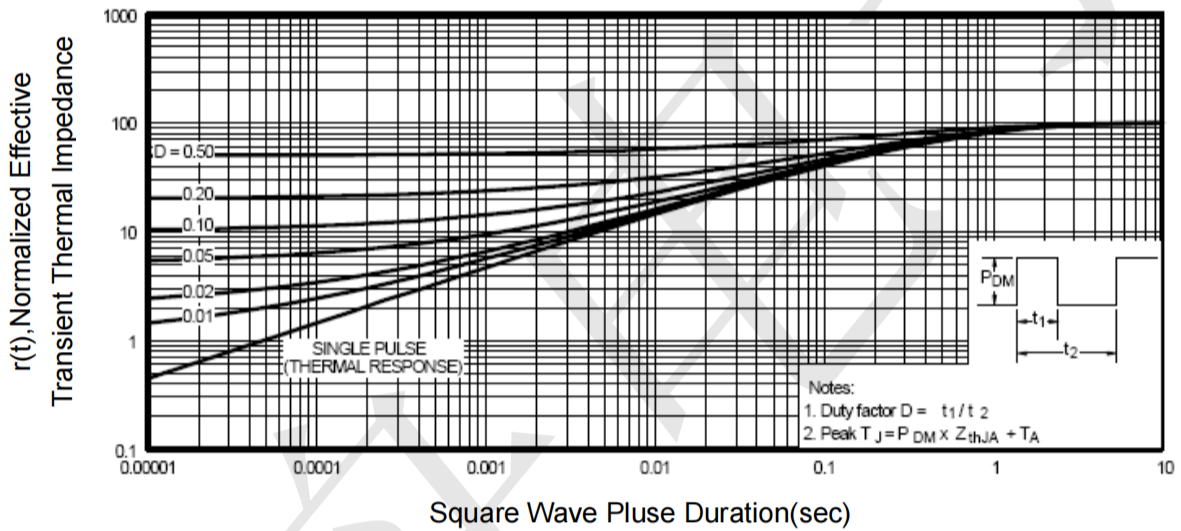
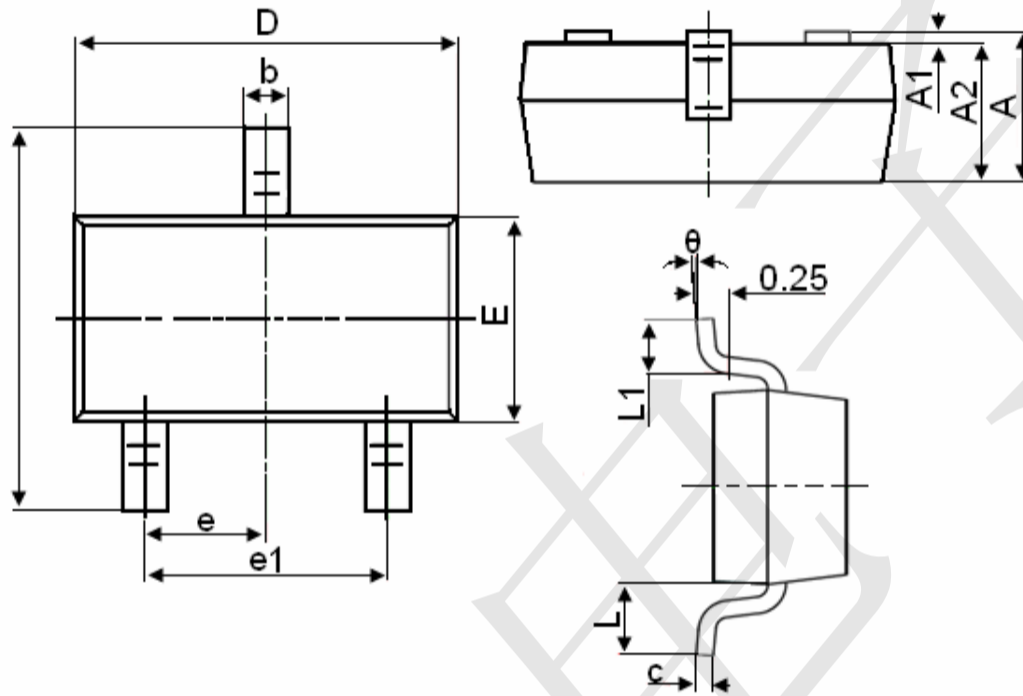


Figure 14 Normalized Maximum Transient Thermal Impedance



SOT-23 Package Information



| 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 | 0.950TYP | |
| e1 | 1.800 | 2.000 |
| L | 0.550REF | |
| L1 | 0.300 | 0.500 |
| θ | 0° | 8° |