

-30V P-Channel Enhancement Mode MOSFET

DESCRIPTION

The STP3401A is the P-Channel logic enhancement mode power field effect transistor is produced using high cell density, advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation gate as 2.5V. This device is suitable for use as a load switch or other general applications.

STP3401AS-TRG ROHS Compliant This is Halogen Free

FEATURE

- ◆ -30V/-4.3A, $R_{DS(ON)} = 50m\Omega (typ.) @ V_{GS} = -10V$
- ◆ -30V/-3.5A, $R_{DS(ON)} = 58m\Omega (typ.) @ V_{GS} = -4.5V$
- ◆ -30V/-2.5A, $R_{DS(ON)} = 73m\Omega (typ.) @ V_{GS} = -2.5V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and Maximum DC current capability

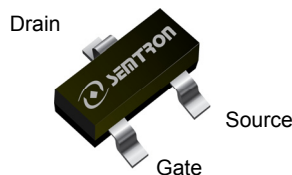
APPLICATIONS

- ◆ High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- ◆ DC/DC Converter
- ◆ Load Switch

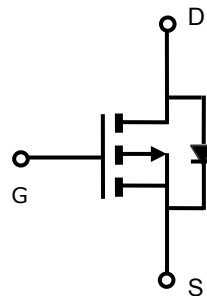


P-Channel Enhancement Mode MOSFET

PIN CONFIGURATION



SOT-23
Top View



PART NUMBER INFORMATION

| | |
|--|---|
| <p>ST P 3401A S - TR G</p> <p>a b c d e f</p> | <p>a : Company name. b : Channel type. c : Product Serial number. d : Package Code e : Handling Code f : Lead Plating Code G : Lead-free product.</p> <p><i>This product is Halogen Free</i></p> |
|--|---|

ORDERING INFORMATION

| Part Number | Package Code | Handling Code | Shipping |
|---------------|--------------|----------------|----------|
| STP3401AS-TRG | S : SOT-23 | TR : Tape&Reel | 3K/Reel |

- ※ Year Code : 0 ~ 9, 2010 : 0
- ※ Week Code : A(1~2) ~ Z(53~54)
- ※ SOT-23 : Only available in tape and reel packaging.

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ Unless otherwise noted)

| Symbol | Parameter | Typical | Unit | |
|-----------|--|------------------------|------------------|---|
| V_{DSS} | Drain-Source Voltage | -30 | V | |
| V_{GSS} | Gate-Source Voltage | ± 12 | V | |
| I_D | Continuous Drain Current ($T_C=25^\circ\text{C}$) ^A | $V_{GS}=-12\text{V}$ | -4.3 | A |
| | Continuous Drain Current ($T_C=70^\circ\text{C}$) ^A | | -3.8 | A |
| I_{DM} | Pulsed Drain Current ^B | -20 | A | |
| P_D | Power Dissipation | $T_A=25^\circ\text{C}$ | 1.25 | W |
| | | $T_A=70^\circ\text{C}$ | 0.8 | |
| T_J | Operation Junction Temperature | -55 to 150 | $^\circ\text{C}$ | |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ | |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
 Absolute maximum ratings are stress ratings only and functional device operation is not implied.

THERMAL DATA

| Symbol | Parameter | Typ | Max | Unit | |
|-----------------|---|--------------|-----|------|---------------------------|
| $R_{\theta JA}$ | Thermal Resistance-Junction to Ambient ^A | Steady-State | - | 120 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JL}$ | Thermal Resistance Junction to Lead ^A | Steady-State | - | 80 | $^\circ\text{C}/\text{W}$ |

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ Unless otherwise noted)

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---------------------------|---|--|------|------|-----------|------------|
| Static Parameters | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$ | -30 | | | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -0.6 | | -1.0 | V |
| I_{GSS} | Gate Leakage Current | $V_{DS}=0V, V_{GS}=\pm 12V$ | | | ± 100 | nA |
| I_{DSS} | Zero Gate Voltage, Drain-Source Leakage Current | $V_{DS}=-24V, V_{GS}=0V$ $T_J=25^\circ\text{C}$ | | | -1 | μA |
| | | $V_{DS}=-24V, V_{GS}=0V$ $T_J=55^\circ\text{C}$ | | | -5 | |
| $R_{DS(ON)}$ | Drain-source On-Resistance ^B | $V_{GS}=-10V, I_D=-4.3A$ | | 50 | 56 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-3.5A$ | | 58 | 65 | |
| | | $V_{GS}=-2.5V, I_D=-2.5A$ | | 73 | 80 | |
| G_{fs} | Forward Transconductance | $V_{DS}=-5V, I_D=-4.0A$ | | 10 | | S |
| Source-Drain Diode | | | | | | |
| V_{SD} | Diode Forward Voltage | $I_S=-1.0A, V_{GS}=0V$ | | -0.7 | -1.0 | V |
| I_S | Continuous Source Current ^{AD} | | | | -5.6 | A |
| Dynamic Parameters | | | | | | |
| $Q_g (-4.5V)$ | Total Gate Charge | $V_{DS}=-20V$ | | 6.8 | | nC |
| Q_{gs} | Gate-Source Charge | $V_{GS}=-4.5V$ | | 3.0 | | |
| Q_{gd} | Gate-Drain Charge | $I_D=-4.0A$ | | 3.3 | | |
| C_{iss} | Input Capacitance | $V_{DS}=-12V$ | | 681 | | pF |
| C_{oss} | Output Capacitance | $V_{GS}=0V$ | | 290 | | |
| C_{rss} | Reverse Transfer Capacitance | $f=1\text{MHz}$ | | 112 | | |
| $t_{d(on)}$ | Turn-On Time | $V_{DD}=-12V$ $I_D=-4A$ | | 10 | | nS |
| t_r | | | | 16 | | |
| $t_{d(off)}$ | Turn-Off Time | $V_{GEN}=-10V$ $R_G=3.3\Omega$ | | 24 | | |
| t_f | | | | 22 | | |

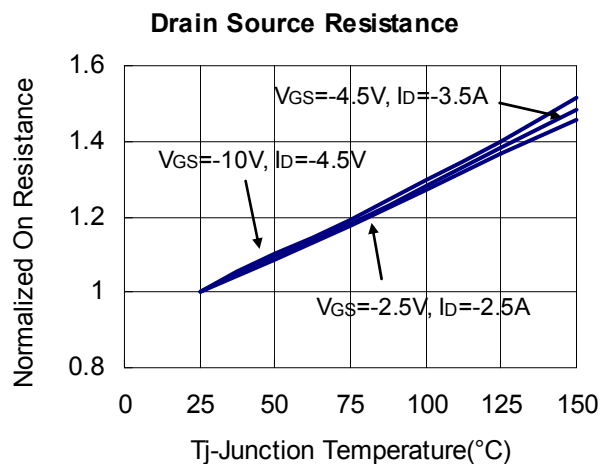
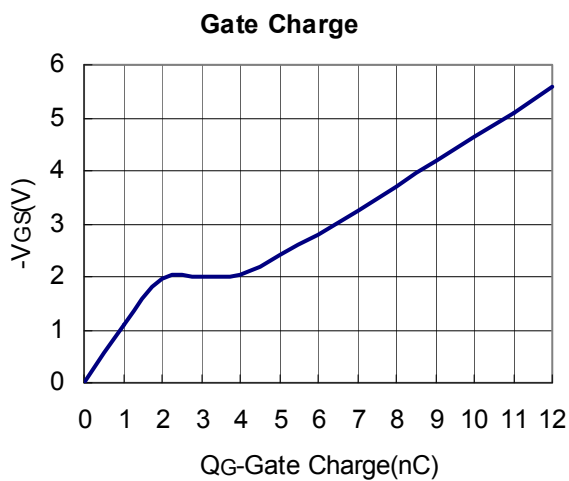
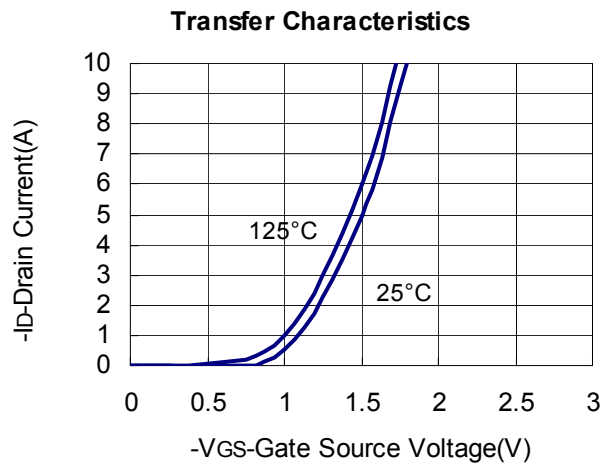
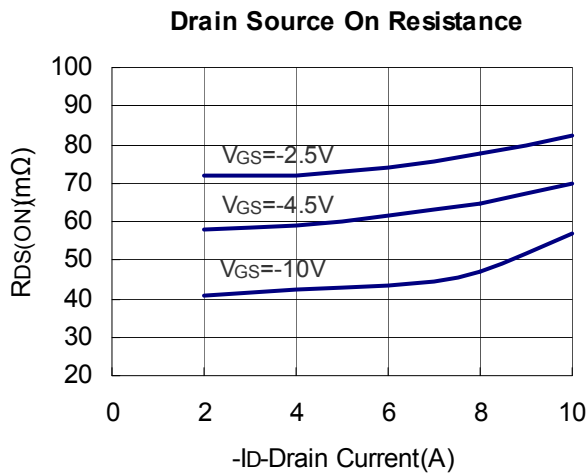
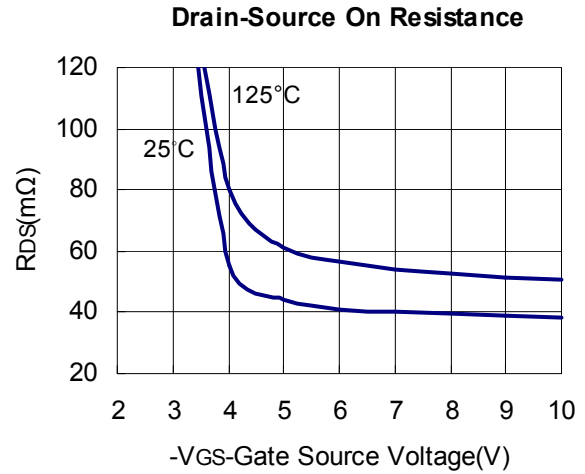
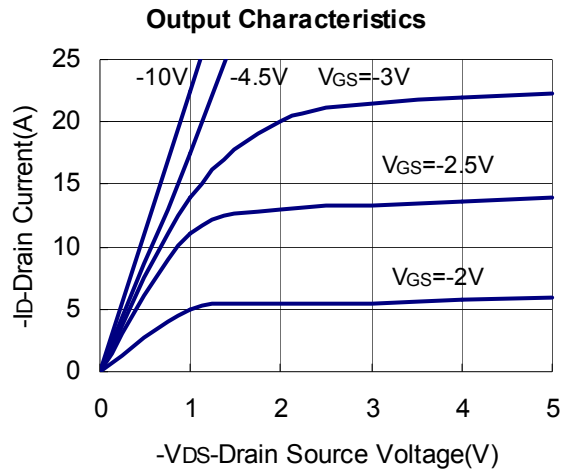
Note:

- The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.
- The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
- The EAS data shows Max. rating. The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}$.
- The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

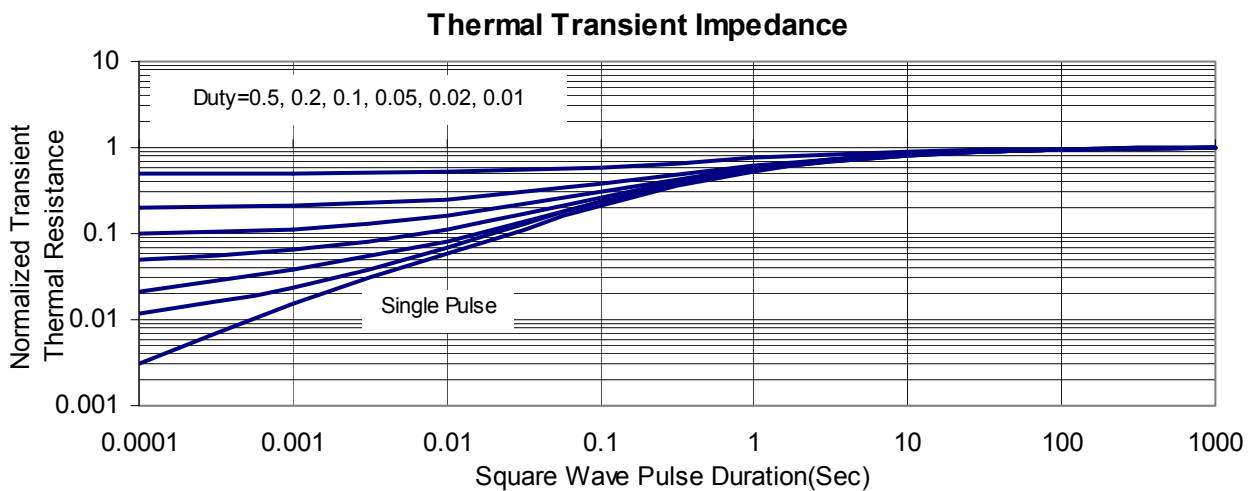
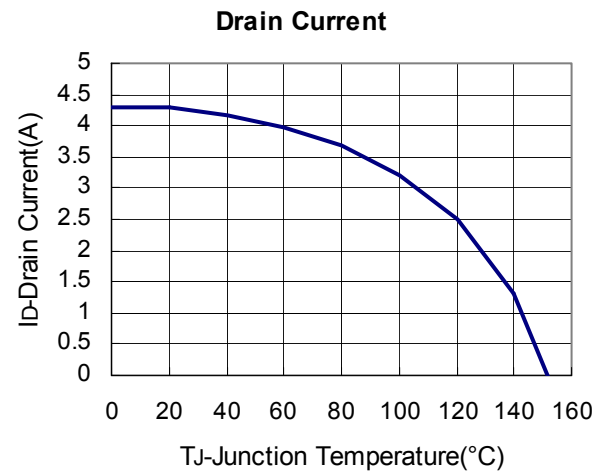
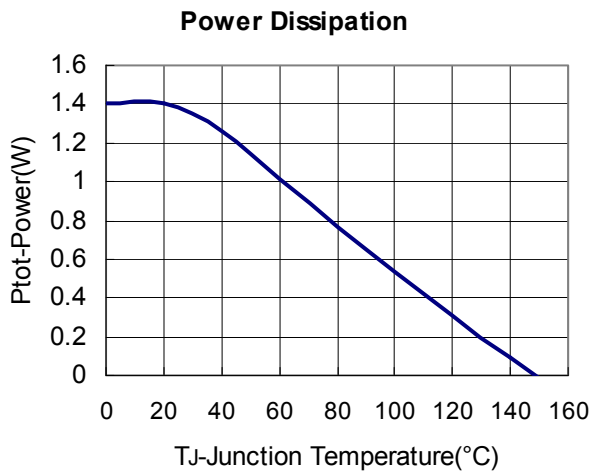
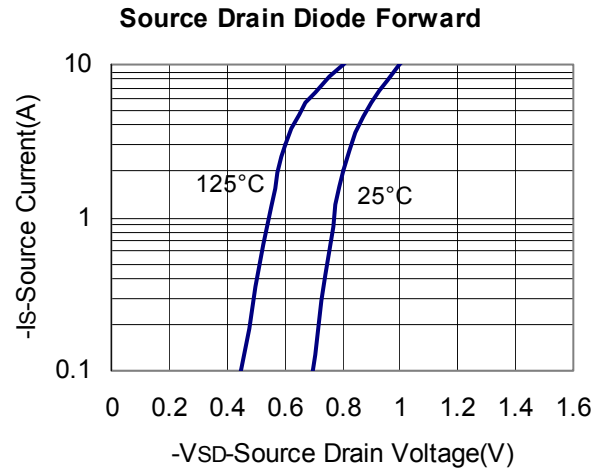
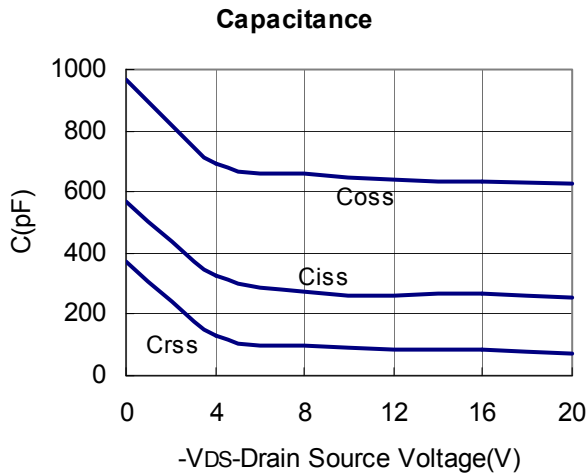
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TYPICAL CHARACTERISTICS (25°C Unless Note)



TYPICAL CHARACTERISTICS (25°C Unless Note)



SOT-23 PACKAGE DIMENSIONS

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP. | | 0.037 TYP | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L1 | 0.550 REF. | | 0.022 REF. | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 0° | 8° | 0° | 8° |

