# HT9435

## DESCRIPTION

The HT9435 uses advanced technology to provide excellent Rds (on), low switching loss and reasonable price.

This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application such as cellular phone and notebook computer power management and other battery powered circuits, and low in-line power loss are needed in a very small outline surface mount package.

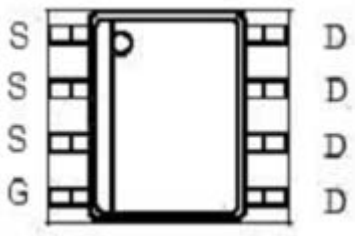
## FEATURES

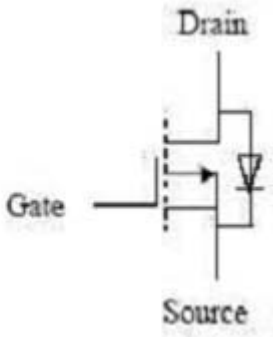
- -30V/-5.1A, $R_{DS}$(ON) = 50mΩ @ $V_{GS}$ = -10V
- -30V/-3.6A, $R_{DS}$(ON) = 95mΩ @ $V_{GS}$ = -4.5V
- Super high dense cell design for low $R_{DS}$(ON)
- Rugged and reliable
- SOP-8 package design

## APPLICATIONS

- POWER Management in Note
- Portable Equipment
- Battery Powered System
- DC/DC Converter
- LCD Display

## PIN CONFIGURATION




## ABSOLUTE MAXIMUM RATINGS

(TA=25 °C Unless Otherwise Noted)

| Parameter | | Symbol | Maximum | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±25 | V |
| Drain Current | Continuous (1) | $I_D$ | -5.1 | A |
| | Pulse (2) | $I_{DM}$ | -20 | |
| Drain-Source Diode Forward Current(1) | | $I_s$ | -2.6 | A |
| Maximum Power Dissipation (1) | | $P_D$ | 2.5 | W |
| Operating junction temperature range | | $T_J$ | 150 | ℃ |
| Storage temperature range | | $T_{STG}$ | -55 to 150 | ℃ |

## THERMAL RESISTANCE RATINGS

| Thermal Resistance | Symbol | Maximum | Unit |
|---|---|---|---|
| Junction-to-Ambient | $R\theta_{JA}$ | 50 | ℃/W |

**Note :**

1. Surface Mounted on FR4 Board , t ≤ 10sec
2. Pulse Test：Pulse width ≤ 300us , Duty Cycle ≤ 2%

## ELECTRICAL CHARACTERISTICS

(TA=25 ℃Unless Otherwise Noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = -250μA | -30 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = -24V, $V_{GS}$ = 0 V | - | - | -1 | μA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ± 25V | - | - | ±100 | nA |
| **On Characteristics (1)** | | | | | | |
| Gate Threshold Voltage | $V_{GS}$(th) | $V_{GS}$ = $V_{DS}$, $I_D$= -250μA | -1.2 | -1.8 | -2.4 | V |
| Drain-Source On State Resistance | $R_{DS}$(ON) | $V_{GS}$ = -10V, $I_D$= -5.1A | - | 40 | 50 | mΩ |
| | | $V_{GS}$ = -4.5V, $I_D$= -3.6A | - | 67 | 95 | |
| **Drain-Source Diode Characteristics (1)** | | | | | | |
| Diode Forward Voltage | VSD | $I_S$ = -1.0A, $V_{GS}$ = 0V | - | - | -1.0 | V |
| **Dynamic Parameters (2)** | | | | | | |
| Input Cap. | Ciss | $V_{DS}$ = -15V, $V_{GS}$ = 0V f = 1MHz | - | 910 | - | pF |
| Output Cap. | Coss | | - | 170 | - | |
| Reverse Transfer Cap | Crss | | - | 120 | - | |
| **Switching Parameters (2)** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = -15V, $V_{GS}$ = -10V, $I_D$ = -1A | - | 17.4 | - | nC |
| | | $V_{DS}$ = -15V, $V_{GS}$ = -4.5V, $I_D$ = -1A | | 9.1 | - | |
| Gate-Source Charge | $Q_{gs}$ | $V_{DS}$ = -15V, $V_{GS}$ = -10V, $I_D$ = -1A | - | 3.1 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 3.5 | - | |
| Turn-On Time | TD(on) | $V_{DS}$ = -15V, $R_L$= 15Ω $I_D$ = -1A, $V_{GEN}$ = -10V, $R_G$=10Ω | - | 5.36 | - | nS |
| | Tr | | - | 7.76 | - | |
| Turn-Off Time | TD(off) | | - | 15.84 | - | |
| | Tf | | - | 9.84 | - | |

**Note :**

1. Pulse Test：Pulse width ≤ 300us , Duty Cycle ≤ 2%
2. Guaranteed by design, not subject to production testing

## TYPICAL CHARACTERICTICS

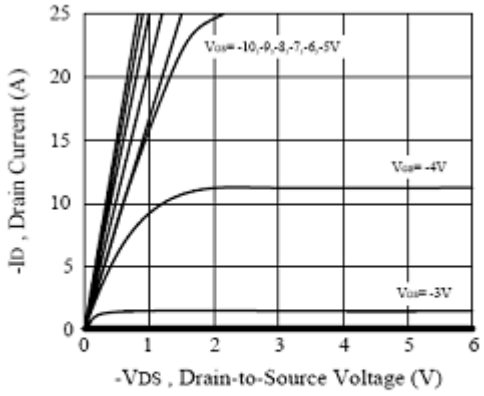



Figure 1. Output Characteristics

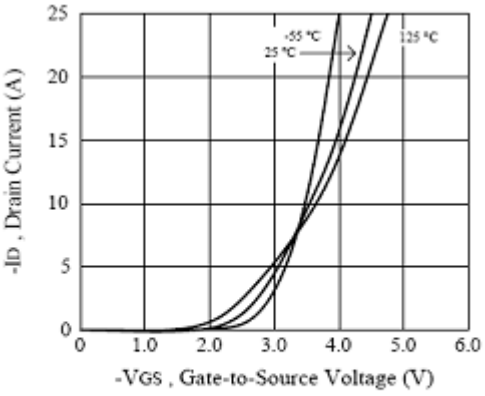



Figure 2. Transfer Characteristics

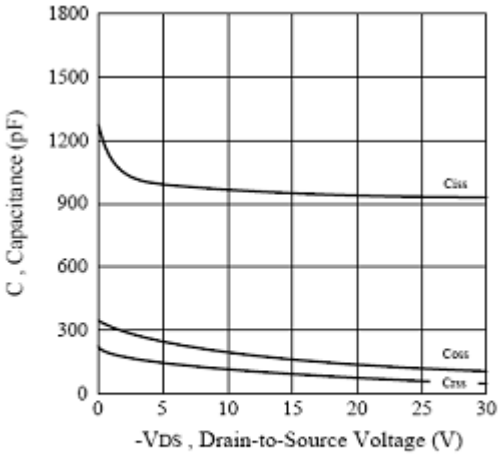



Figure 3. Capacitance

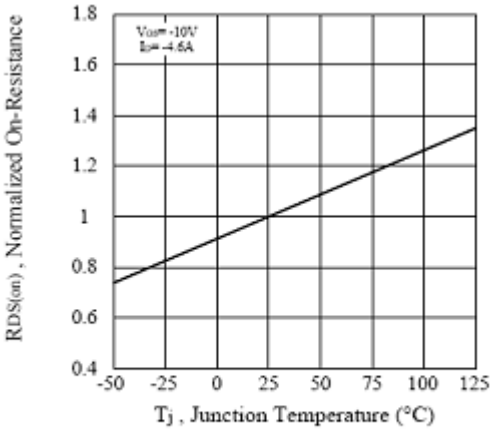



Figure 4. On-Resistance Variation with Temperature

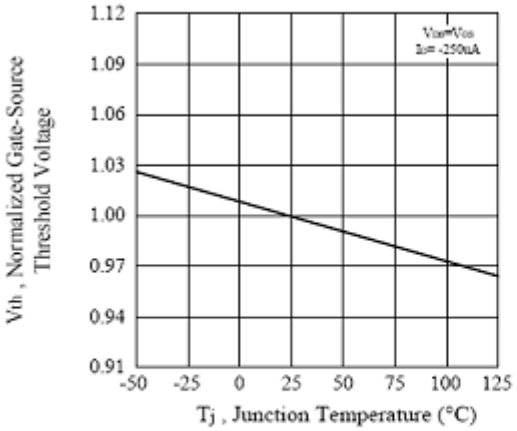



Figure 5. Gate Threshold Variation with Temperature

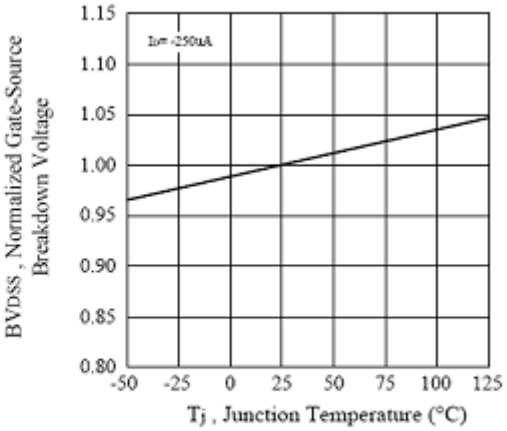



Figure 6. Breakdown Voltage Variation with Temperature

## TYPICAL CHARACTERICTICS

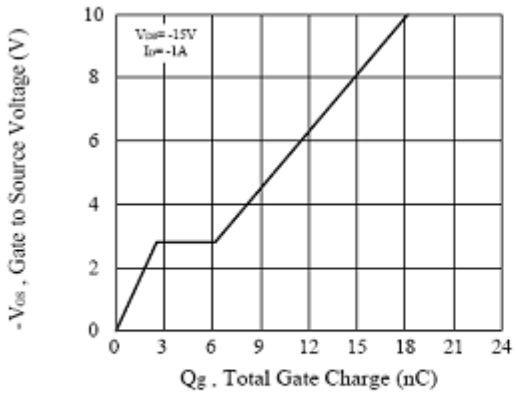



Figure 7. Gate Charge

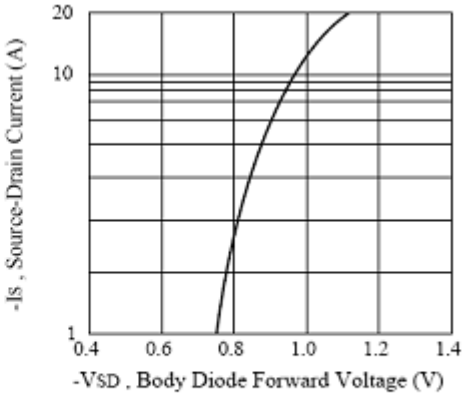



Figure 8. Body Diode Forward Voltage Variation with Source Current

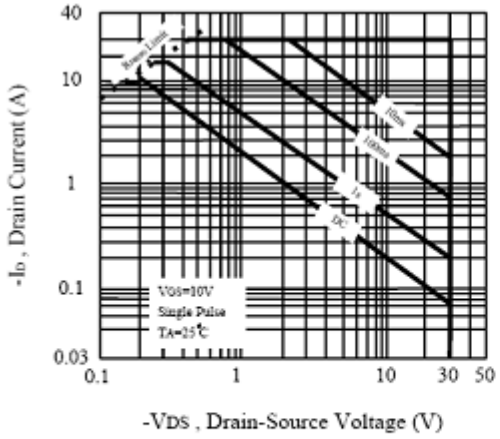



Figure 9. Maximum Safe Operating Area

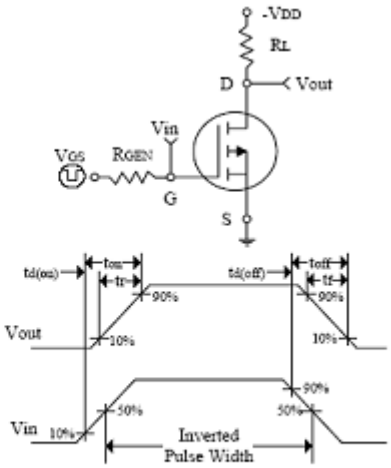



Figure 10. Switching Test Circuit and Switching Waveforms

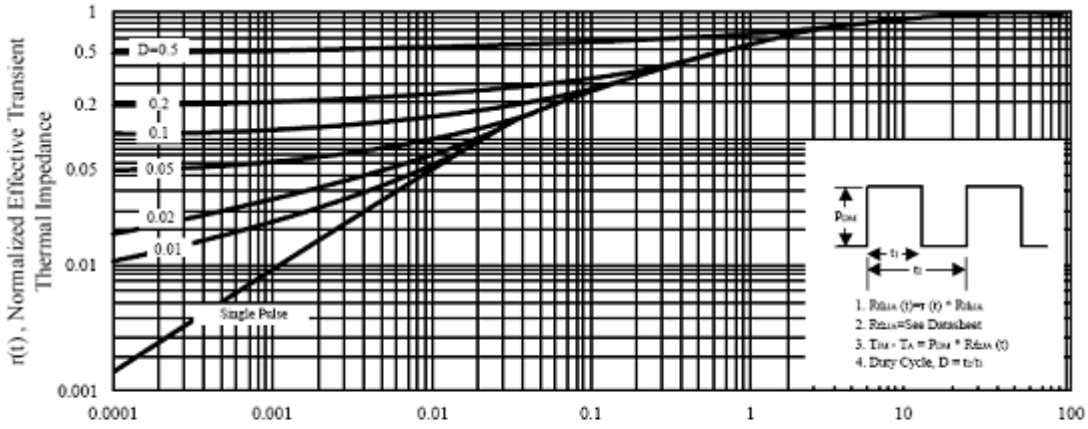
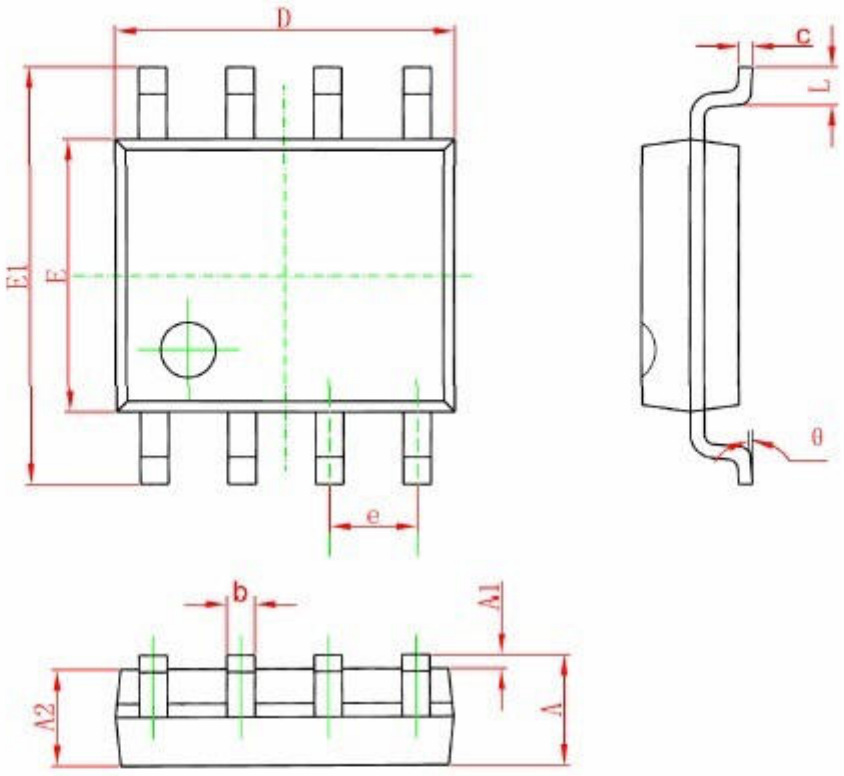



Figure 11. Normalized Thermal Transient Impedance Curve

## PACKAGE DESCRIPTION

SOP8 PACKAGE OUTLINE DIMENSIONS




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270 (BSC) | | 0.050 (BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |