

## P-Channel Enhancement Mode Power MOSFET

### Description

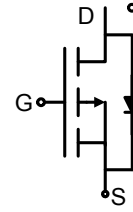
The HM4437 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages. This device is suitable for use as a load switching application and a wide variety of other applications.

### General Features

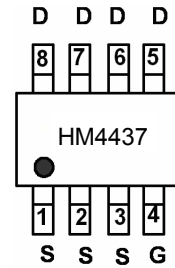
- $V_{DS} = -12V, I_D = -16A$   
 $R_{DS(ON)} < 22m\Omega @ V_{GS} = -2.5V$   
 $R_{DS(ON)} < 18m\Omega @ V_{GS} = -4.5V$
- Advanced trench MOSFET process technology
- Ultra low on-resistance with low gate charge

### Application

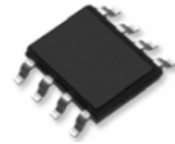
- PWM applications
- Load switch
- Battery charge in cellular handset



Schematic diagram



Marking and pin Assignment



SOP-8 top view

### Package marking and ordering information

| Device Marking | Device | Device Package | Reel Size | Tape Width | Quantity |
|----------------|--------|----------------|-----------|------------|----------|
| PT11H          | HM4437 | SOP8           | -         | -          | -        |

### Absolute maximum ratings ( $T_C = 25^\circ C$ unless otherwise noted)

| Parameter  | Symbol         | Limit      | Unit       |
|--|----------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$       | -12        | V          |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 12$   | V          |
| Drain Current-Continuous                         | $I_D$          | -16        | A          |
| Drain Current -Pulsed (Note 1)                   | $I_{DM}$       | -65        | A          |
| Maximum Power Dissipation                        | $P_D$          | 18         | W          |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | $^\circ C$ |

### Thermal Characteristic

|   |                 |     |              |
|---|-----------------|-----|--------------|
| Thermal Resistance, Junction-to-Case (Note 2) | $R_{\theta JC}$ | 6.9 | $^\circ C/W$ |
|---|-----------------|-----|--------------|

Electrical characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

| Parameter                                 | Symbol        | Condition  | Min  | Typ  | Max       | Unit       |
|---|---------------|--|------|------|-----------|------------|
| <b>Off Characteristics</b>                |               |  |      |      |           |            |
| Drain-Source Breakdown Voltage            | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=-250\mu A$                                 | -12  | -    | -         | V          |
| Zero Gate Voltage Drain Current           | $I_{DSS}$     | $V_{DS}=-12V, V_{GS}=0V$                                   | -    | -    | -1        | $\mu A$    |
| Gate-Body Leakage Current                 | $I_{GSS}$     | $V_{GS}=\pm 12V, V_{DS}=0V$                                | -    | -    | $\pm 100$ | nA         |
| <b>On Characteristics</b> (Note 3)        |               |  |      |      |           |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=-250\mu A$                             | -0.4 | -0.7 | -1        | V          |
| Drain-Source On-State Resistance          | $R_{DS(on)}$  | $V_{GS}=-4.5V, I_D=-6.7A$                                  | -    | 11.5 | 18        | m $\Omega$ |
|   |               | $V_{GS}=-2.5V, I_D=-6.2A$                                  | -    | 14   | 22        | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$      | $V_{DS}=-5V, I_D=-6.7A$                                    | 20   | -    | -         | S          |
| <b>Dynamic Characteristics</b> (Note 4)   |               |  |      |      |           |            |
| Input Capacitance                         | $C_{iss}$     | $V_{DS}=-10V, V_{GS}=0V,$<br>$F=1.0MHz$                    | -    | 2700 | -         | PF         |
| Output Capacitance                        | $C_{oss}$     |  | -    | 680  | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$     |  | -    | 590  | -         | PF         |
| <b>Switching Characteristics</b> (Note 4) |               |  |      |      |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$   | $V_{DD}=-10V, I_D=-1A$<br>$V_{GS}=-4.5V, R_{GEN}=10\Omega$ | -    | 11   | -         | 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                         | $Q_g$         | $V_{DS}=-6V, I_D=-10A,$<br>$V_{GS}=-4.5V$                  | -    | 35   | 48        | nC         |
| Gate-Source Charge                        | $Q_{gs}$      |  | -    | 5    | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$      |  | -    | 10   | -         | nC         |
| <b>Drain-Source Diode Characteristics</b> |               |  |      |      |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$      | $V_{GS}=0V, I_S=-8A$                                       | -    | -    | -1.2      | V          |
| Diode Forward Current (Note 2)            | $I_S$         |  | -    | -    | -16       | A          |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

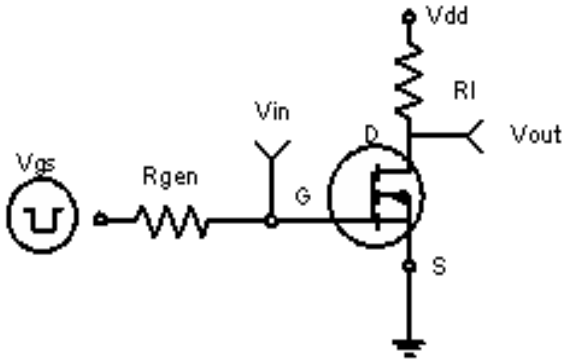


Figure 1: Switching Test Circuit

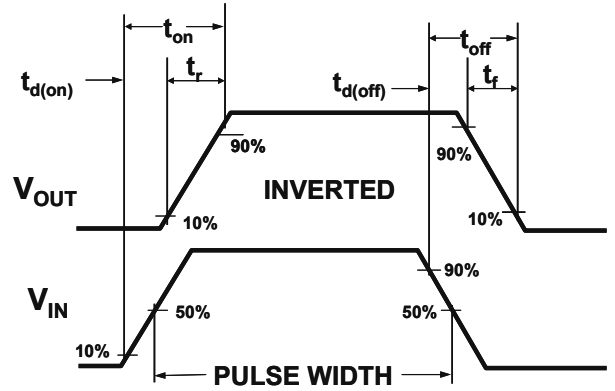


Figure 2: Switching Waveforms

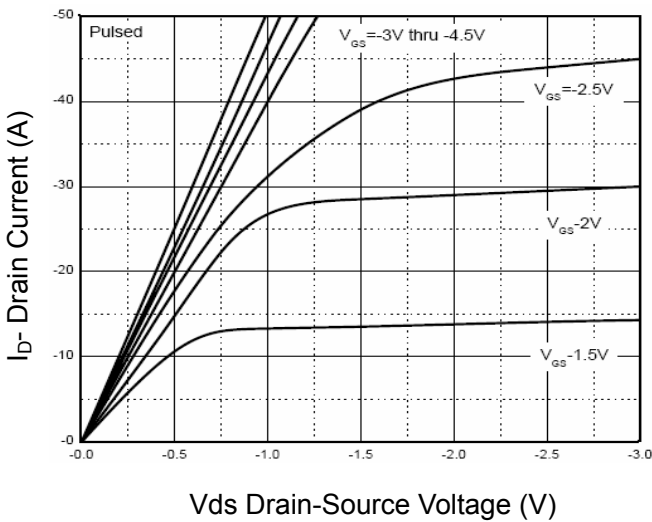


Figure 3 Output Characteristics

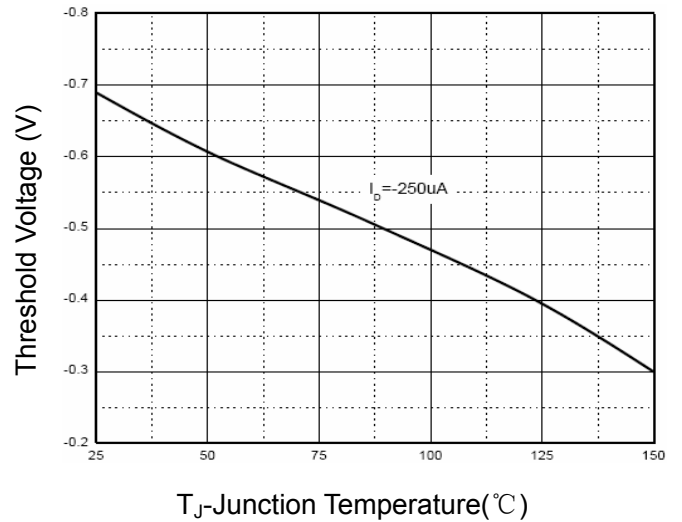


Figure 4 Drain Current

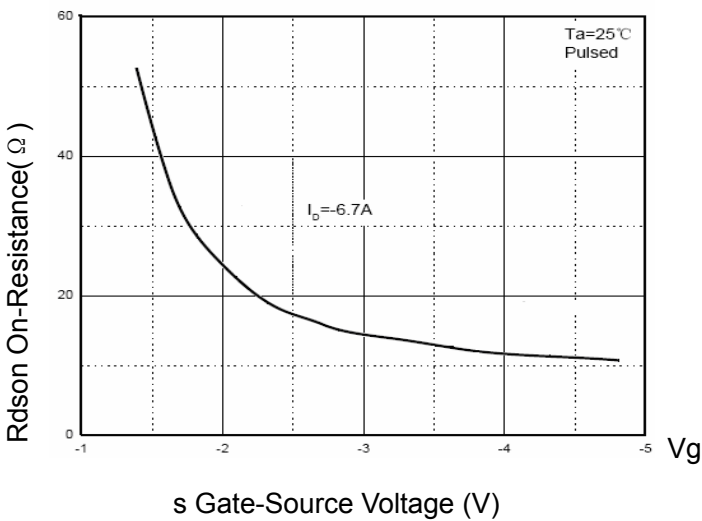


Figure 5 Rds(on) vs Vgs

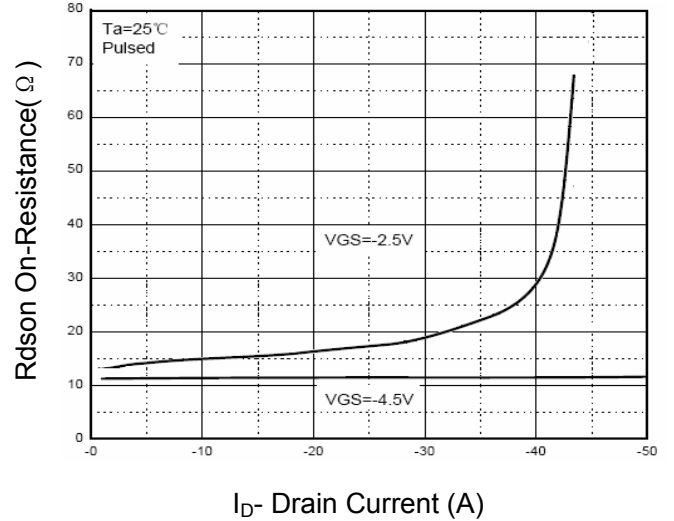
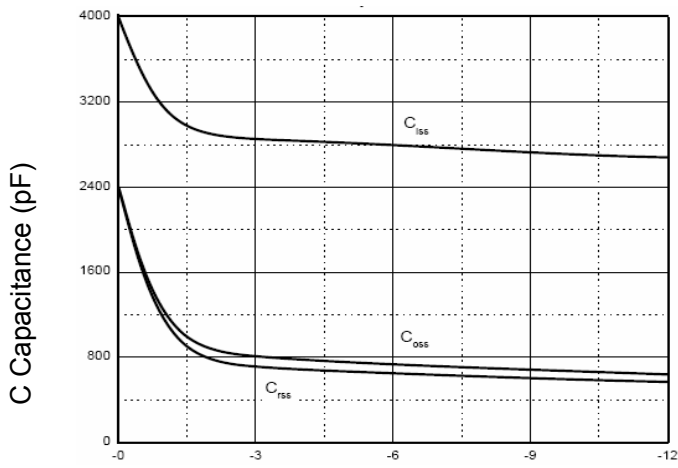
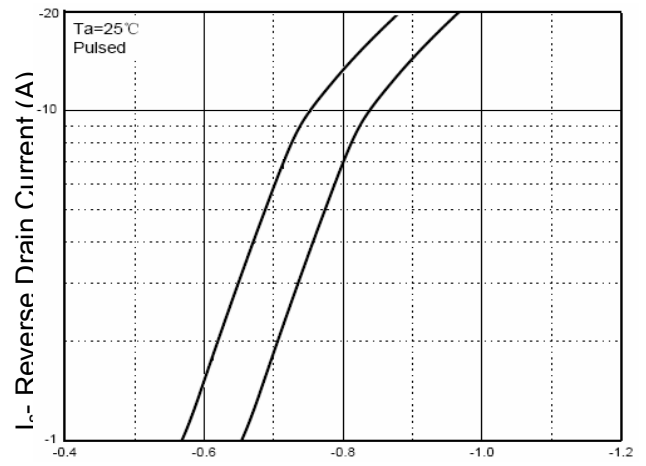


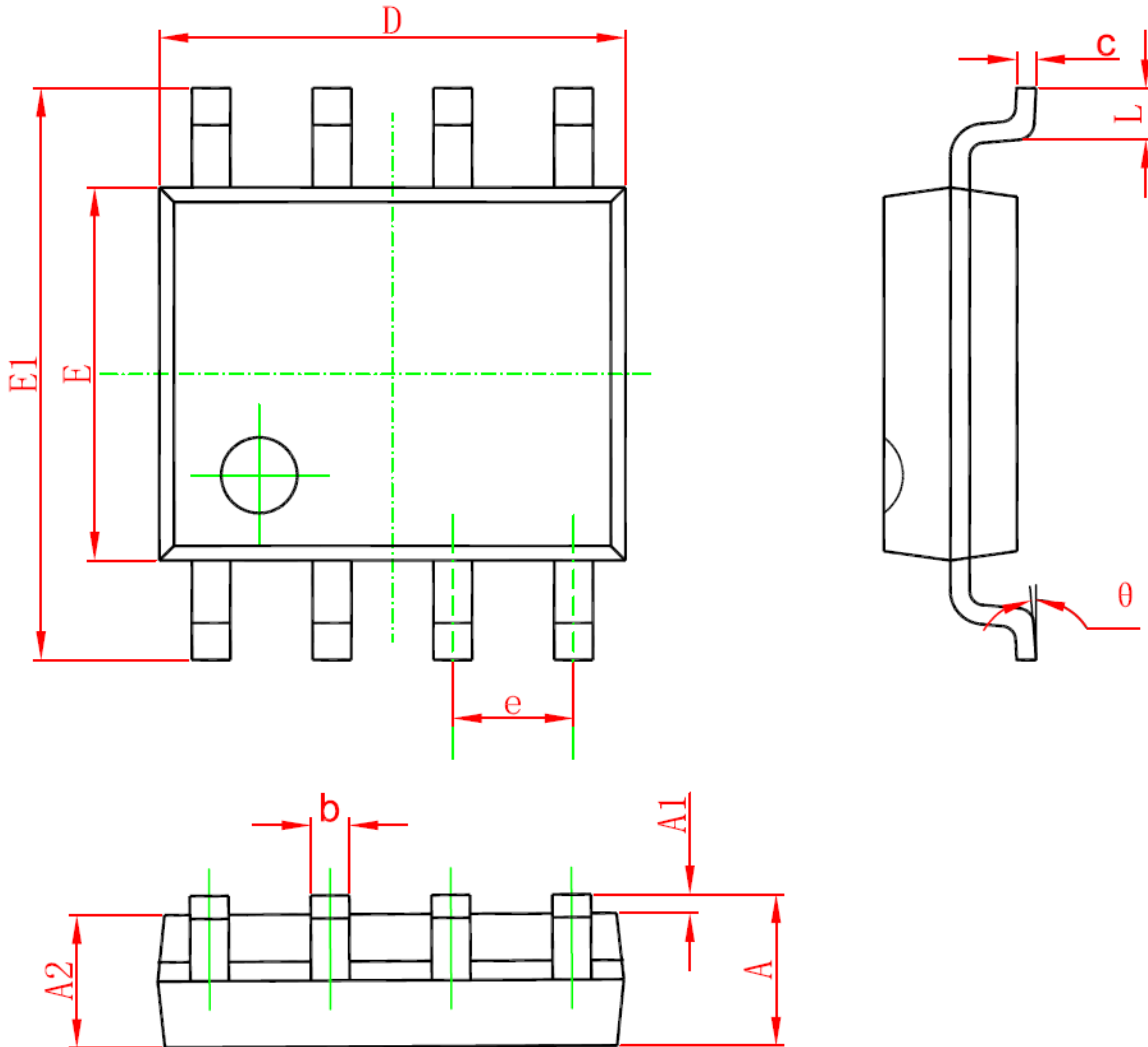
Figure 6 Drain-Source On-Resistance



Vds Drain-Source Voltage (V)  
**Figure 7 Capacitance vs Vds**



Vsd Source-Drain Voltage (V)  
**Figure 8 Source- Drain Diode Forward**



| 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°    |