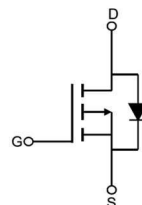


# AP4435C

## P-Channel Enhancement Mosfet

### Feature

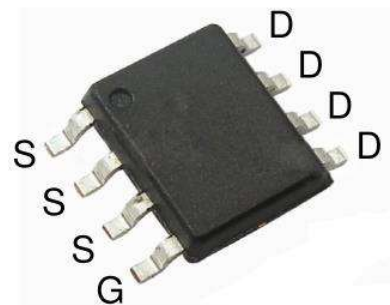
- -30V,-10A  
 $R_{DS(ON)} < 23m\Omega @ V_{GS} = -10V$   
 $R_{DS(ON)} < 34m\Omega @ V_{GS} = -4.5V$
- Trench DMOS Power MOSFET
- Fast Switching
- Exceptional on-resistance and maximum DC current capability



Schematic diagram

### Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch



SOP-8

### Package Marking and Ordering Information

| Device Marking | Device  | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|---------|----------------|-----------|------------|----------------|
| 4435           | AP4435C | SOP-8          | 13 inch   | -          | 4000           |

### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ unless otherwise noted)

| Parameter                                              | Symbol          | Value     | Unit               |
|--------------------------------------------------------|-----------------|-----------|--------------------|
| Drain-Source Voltage                                   | $V_{DS}$        | -30       | V                  |
| Gate-Source Voltage                                    | $V_{GS}$        | $\pm 20$  | V                  |
| Continuous Drain Current ( $T_a = 25^\circ\text{C}$ )  | $I_D$           | -10       | A                  |
| Continuous Drain Current ( $T_a = 100^\circ\text{C}$ ) | $I_D$           | -7        | A                  |
| Pulsed Drain Current <sup>(1)</sup>                    | $I_{DM}$        | -40       | A                  |
| Singel Pulsed Avalanche Energy                         | $E_{AS}$        | -         | mJ                 |
| Power Dissipation                                      | $P_D$           | 3.7       | W                  |
| Thermal Resistance from Junction to Ambient            | $R_{\theta JA}$ | 33.8      | $^\circ\text{C/W}$ |
| Junction Temperature                                   | $T_J$           | 150       | $^\circ\text{C}$   |
| Storage Temperature                                    | $T_{STG}$       | -55~ +150 | $^\circ\text{C}$   |

MOSFET ELECTRICAL CHARACTERISTICS( $T_a=25^{\circ}\text{C}$  unless otherwise noted)

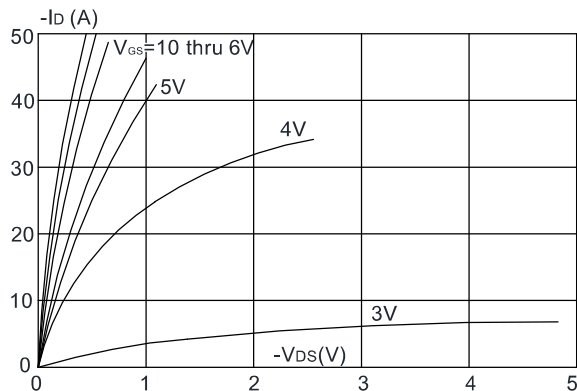
| Parameter                                 | Symbol               | Test Condition                                                                            | Min | Type | Max  | Unit |
|-------------------------------------------|----------------------|-------------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics                    |                      |                                                                                           |     |      |      |      |
| Drain-source breakdown voltage            | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> =-250μA                                              | -30 | -    | -    | V    |
| Zero gate voltage drain current           | I <sub>DSS</sub>     | V <sub>DS</sub> =-30V, V <sub>GS</sub> = 0V                                               | -   | -    | -1   | μA   |
| Gate-body leakage current                 | I <sub>GSS</sub>     | V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V                                               | -   | -    | ±100 | nA   |
| Gate threshold voltage <sup>(2)</sup>     | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                 | -1  | -1.5 | -2.5 | V    |
| Drain-source on-resistance <sup>(2)</sup> | R <sub>DS(on)</sub>  | V <sub>GS</sub> =-10V, I <sub>D</sub> =-10A                                               | -   | 16   | 23   | mΩ   |
|                                           |                      | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A                                              | -   | 25   | 34   |      |
| Dynamic characteristics                   |                      |                                                                                           |     |      |      |      |
| Input Capacitance                         | C <sub>iss</sub>     | V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f =1MHz                                       | -   | 1550 | -    | pF   |
| Output Capacitance                        | C <sub>oss</sub>     |                                                                                           | -   | 327  | -    |      |
| Reverse Transfer Capacitance              | C <sub>rss</sub>     |                                                                                           | -   | 278  | -    |      |
| Switching characteristics                 |                      |                                                                                           |     |      |      |      |
| Turn-on delay time                        | t <sub>d(on)</sub>   | V <sub>DD</sub> =-15V, I <sub>D</sub> =-6A<br>V <sub>GS</sub> =-10V, R <sub>G</sub> =2.5Ω | -   | 14   | -    | ns   |
| Turn-on rise time                         | t <sub>r</sub>       |                                                                                           | -   | 20   | -    |      |
| Turn-off delay time                       | t <sub>d(off)</sub>  |                                                                                           | -   | 95   | -    |      |
| Turn-off fall time                        | t <sub>f</sub>       |                                                                                           | -   | 65   | -    |      |
| Total Gate Charge                         | Q <sub>g</sub>       | V <sub>DS</sub> =-15V, I <sub>D</sub> =-10A,<br>V <sub>GS</sub> =-10V                     | -   | 30   | -    | nC   |
| Gate-Source Charge                        | Q <sub>gs</sub>      |                                                                                           | -   | 5.3  | -    |      |
| Gate-Drain Charge                         | Q <sub>gd</sub>      |                                                                                           | -   | 7.6  | -    |      |
| Source-Drain Diode characteristics        |                      |                                                                                           |     |      |      |      |
| Diode Forward voltage <sup>(2)</sup>      | V <sub>DS</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =--10A                                                | -   | -    | -1.2 | V    |
| Diode Forward current <sup>(3)</sup>      | I <sub>S</sub>       |                                                                                           | -   | -    | -10  | A    |

**Notes:**

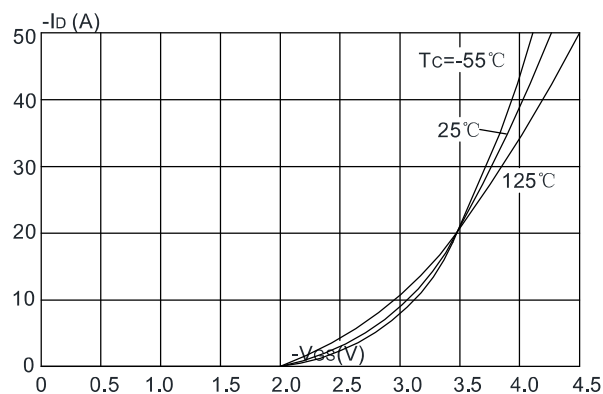
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. Surface Mounted on FR4 Board,  $t \leq 10$  sec

## Typical Performance Characteristics

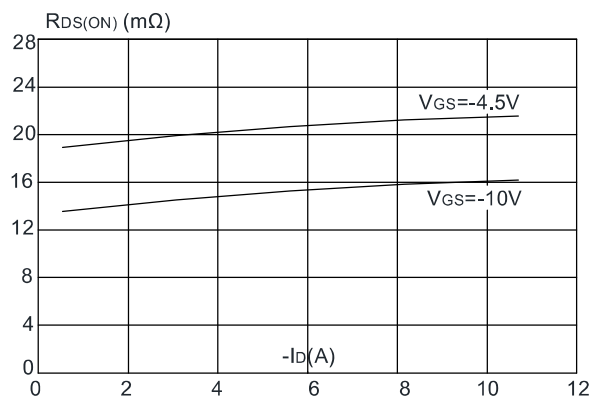
**Figure1: Output Characteristics**



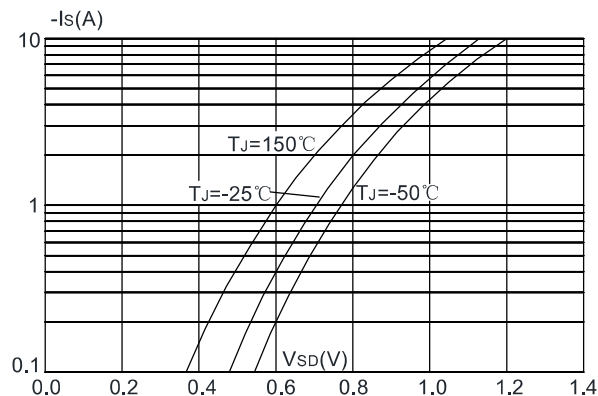
**Figure 2: Typical Transfer Characteristics**



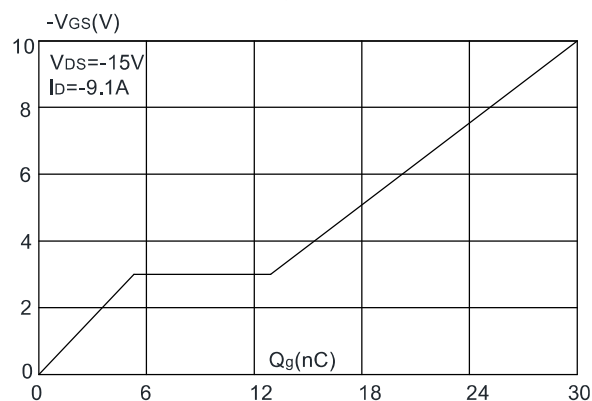
**Figure 3: On-resistance vs. Drain Current**



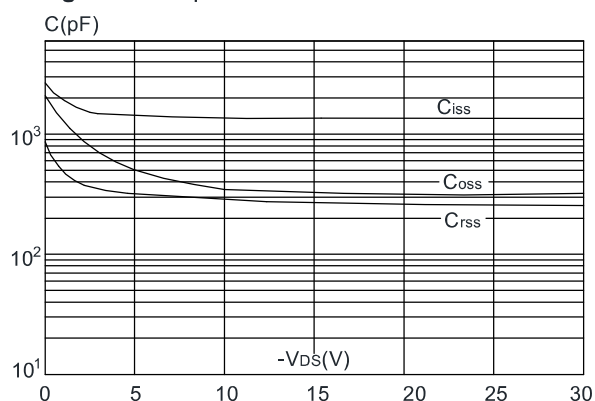
**Figure 4: Body Diode Characteristics**



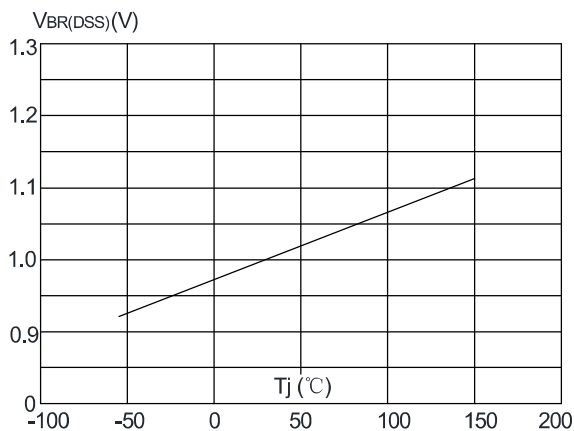
**Figure 5: Gate Charge Characteristics**



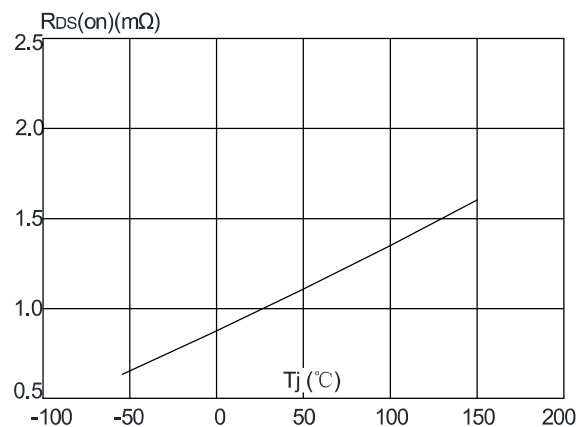
**Figure 6: Capacitance Characteristics**



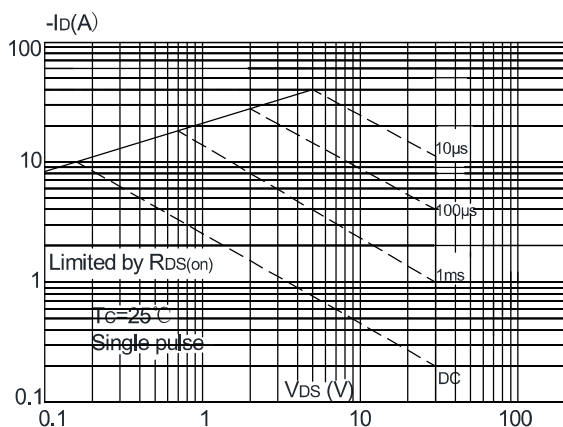
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



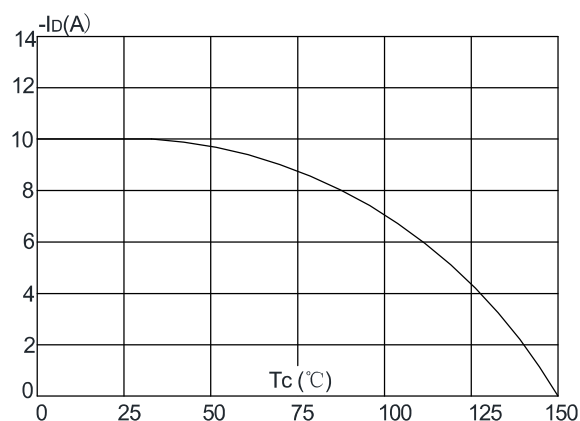
**Figure 8:** Normalized on Resistance vs. Junction Temperature



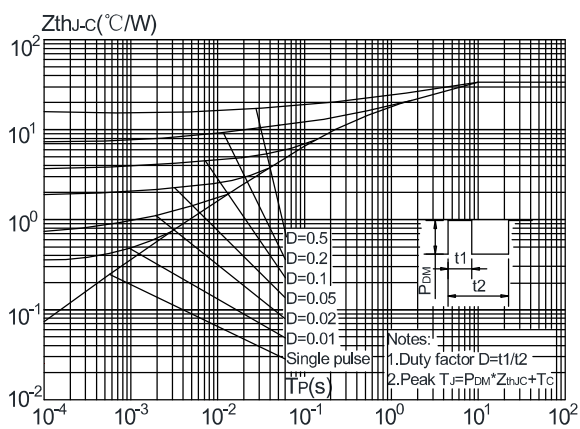
**Figure 9:** Maximum Safe Operating Area



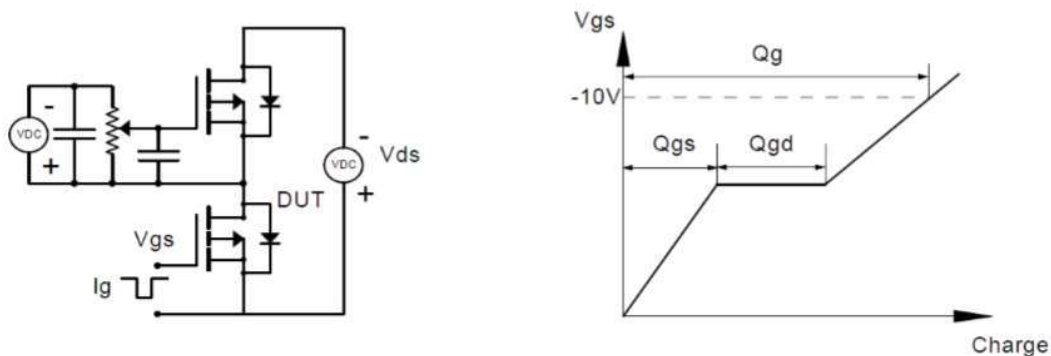
**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



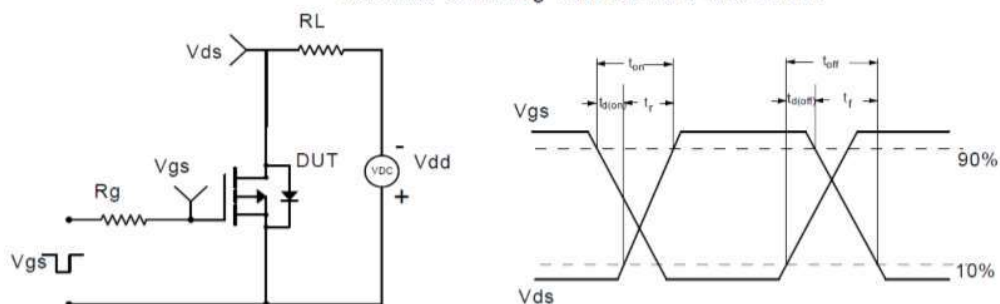
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



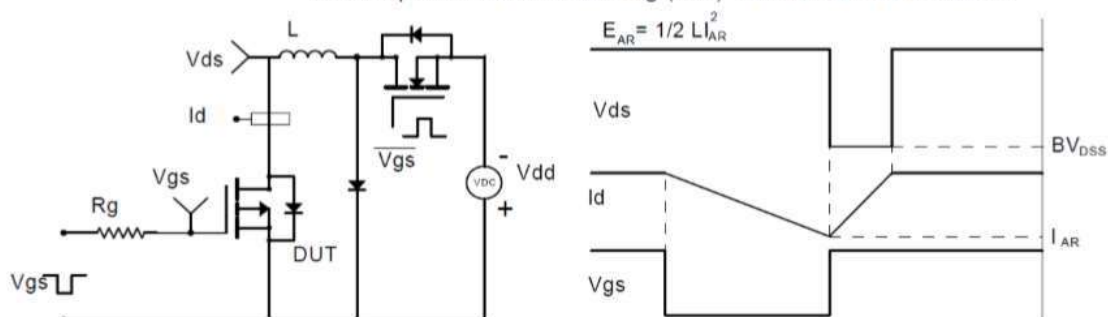
Gate Charge Test Circuit & Waveform



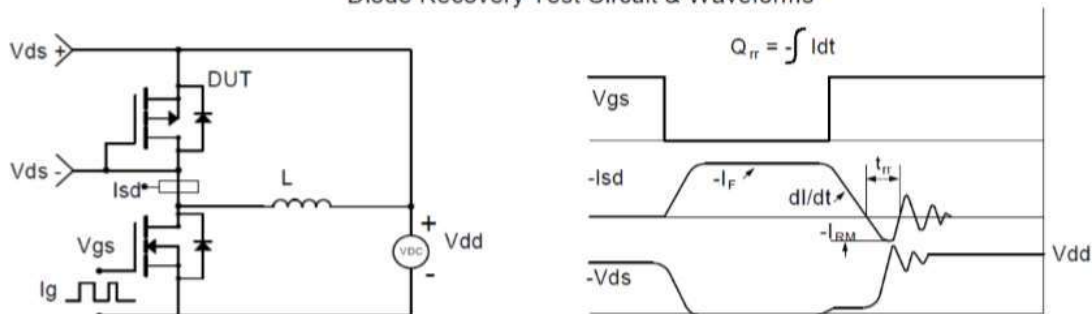
Resistive Switching Test Circuit & Waveforms



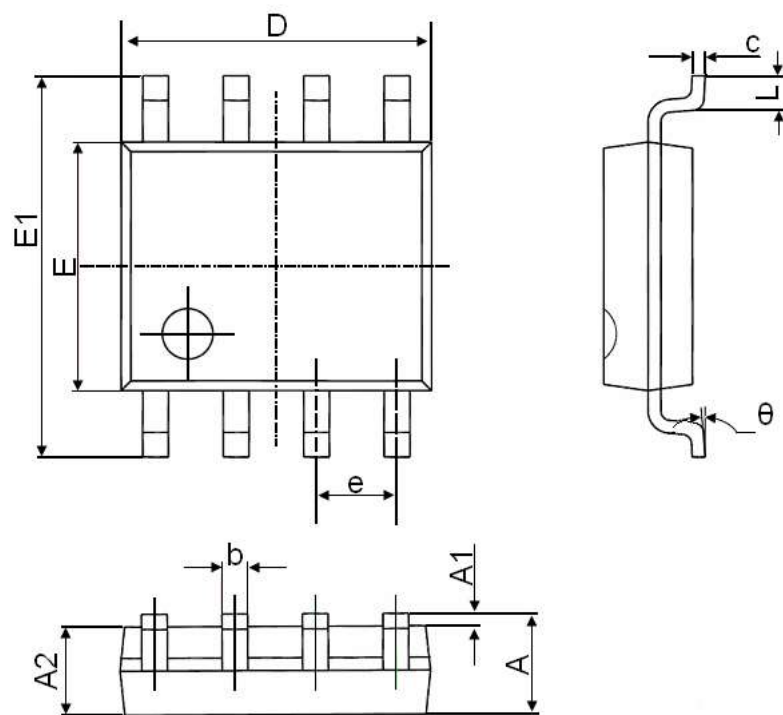
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



SOP-8 Package Information



| 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°    |