

SuperMOS - PDFN5X6-8L -30V V_{DSS} , 13m Ω $R_{DS(on)}$, -31A I_D P-channel MOSFET

1. Description

The ESN6435 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product ESN6435 is Pb-free.

2. Features

- -30V, $R_{DS(ON)}=13m\Omega(Typ)$, $V_{GS}=-10V$
- $R_{DS(ON)}=18m\Omega(Typ)$, $V_{GS}=-4.5V$
- Fast Switching
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications


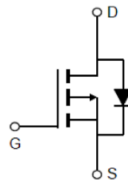
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED!

4. Ordering Information

| Part Number | Package | Marking | Material | Quantity per reel | Flammability Rating |
|-------------|------------|-------------|--------------|-------------------|---------------------|
| ESN6435 | PDFN5X6-8L | .ES6435/lot | Halogen free | 5,000 PCS | UL 94V-0 |

5. Pin Configuration and Functions

| Pin | Function | Outline | Circuit Diagram |
|---------|----------|---|---|
| 4 | Gate |  |  |
| 1/2/3 | Source | | |
| 5/6/7/8 | Drain | | |

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

| Parameter | | Symbol | Limit | Unit |
|---|------------------------|------------|-------------|------|
| Drain-Source Voltage | | BV_{DSS} | -30 | V |
| Gate-Source Voltage | | V_{GS} | ±25 | V |
| Continuous Drain Current | $T_C=25^\circ\text{C}$ | I_D | -31 | A |
| | $T_C=75^\circ\text{C}$ | | -24 | |
| Maximum Power Dissipation | $T_C=25^\circ\text{C}$ | P_D | 31.3 | W |
| | $T_C=75^\circ\text{C}$ | | 18.8 | |
| Pulsed Drain Current ^a | | I_{DM} | -120 | A |
| Avalanche Current, Single Pulsed ^b | | I_{AS} | 22 | A |
| Avalanche Energy, Single Pulsed ^b | | E_{AS} | 72.6 | mJ |
| Operating Junction Temperature | | T_J | 150 | °C |
| Storage Temperature Range | | T_{stg} | -55 to +150 | °C |

Thermal resistance ratings

| Single Operation | | | | |
|--|-----------------------|-----------------|---------|------|
| Parameter | | Symbol | Typical | Unit |
| Junction-to-Ambient Thermal Resistance | $t \leq 10 \text{ s}$ | $R_{\theta JA}$ | 40 | °C/W |
| Junction-to-Case Thermal Resistance | Steady State | $R_{\theta JC}$ | 4.0 | |

Note:

a: Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

b: EAS condition: $T_J=25^\circ\text{C}$, $V_{DD}=-30\text{V}$, $V_G=-10\text{V}$, $L=0.3\text{mH}$, $R_g=25\Omega$

Electrical Characteristics

At TA = 25°C unless otherwise specified

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|--|--------------|---|------|------|-----------|------------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-to-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -30 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS}=0V, V_{DS}=-30V$ | | | -1 | μA |
| Gate-to-source Leakage Current | I_{GSS} | $V_{GS}=\pm 25V, V_{DS}=0V$ | | | ± 100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -1.0 | -1.5 | -2.0 | V |
| Drain-to-source On-resistance | $R_{DS(on)}$ | $V_{GS}=-10V, I_D=-20A$ | | 13 | 21 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-15A$ | | 18 | 27 | |
| CHARGES, CAPACITANCES AND GATE RESISTANCE | | | | | | |
| Input Capacitance | C_{ISS} | $V_{GS}=0V, V_{DS}=-15V,$ $f=1MHz$ | | 1150 | | pF |
| Output Capacitance | C_{OSS} | | | 260 | | |
| Reverse Transfer Capacitance | C_{RSS} | | | 145 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}=-10V, V_{DS}=-15V,$ $I_D=-20A$ | | 24 | | nC |
| Gate-to-Source Charge | Q_{GS} | | | 6 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 6.3 | | |
| SWITCHING CHARACTERISTICS | | | | | | |
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{GS}=-10V, V_{DS}=-15V,$ $R_L=1\Omega, R_G=3\Omega$ | | 10 | | ns |
| Rise Time | t_r | | | 10 | | |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | 15 | | |
| Fall Time | t_f | | | 10 | | |
| BODY DIODE CHARACTERISTICS | | | | | | |
| Forward Voltage | V_{SD} | $V_{GS}=0V, I_{SD}=-10A$ | | | -1.2 | V |

7. Typical Characteristic

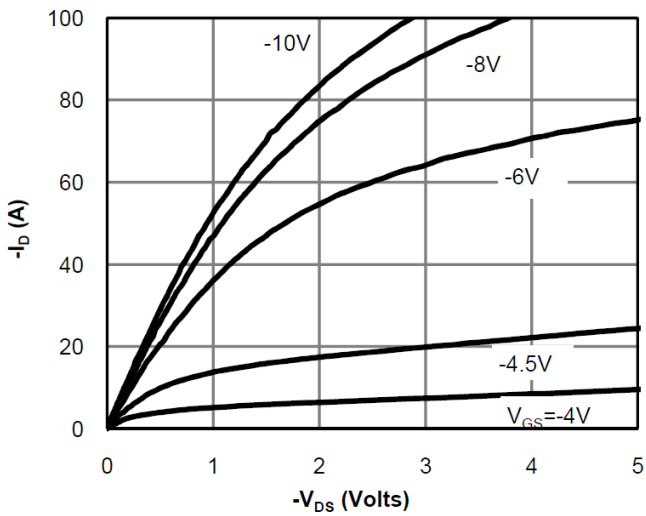


Fig 1: On-Region Characteristics

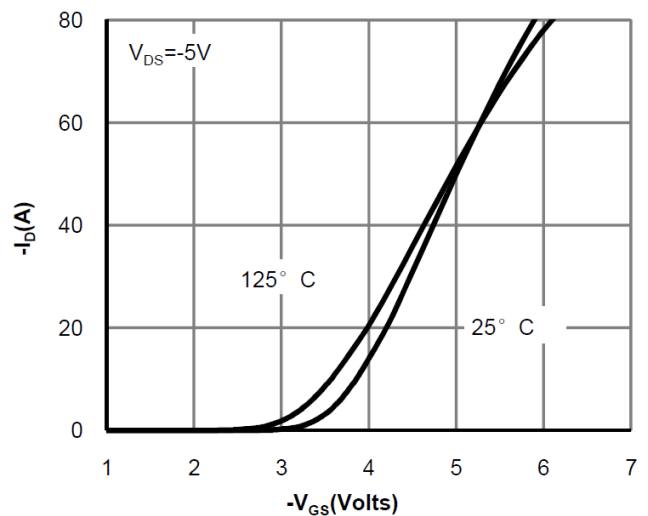


Figure 2: Transfer Characteristics

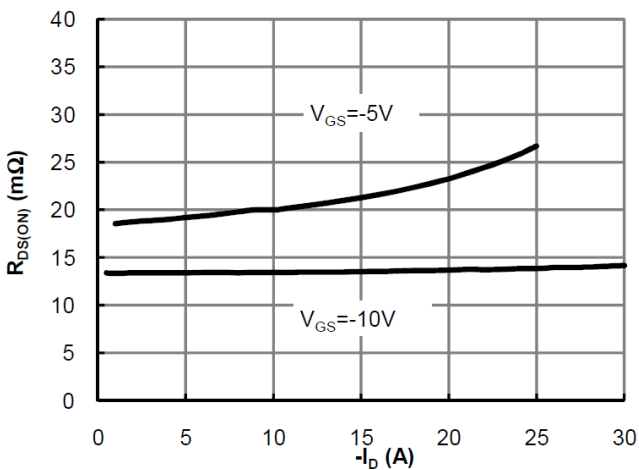


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

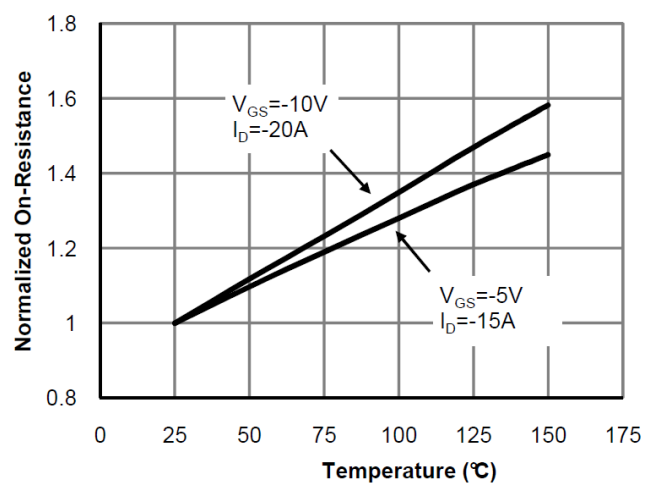


Figure 4: On-Resistance vs. Junction Temperature

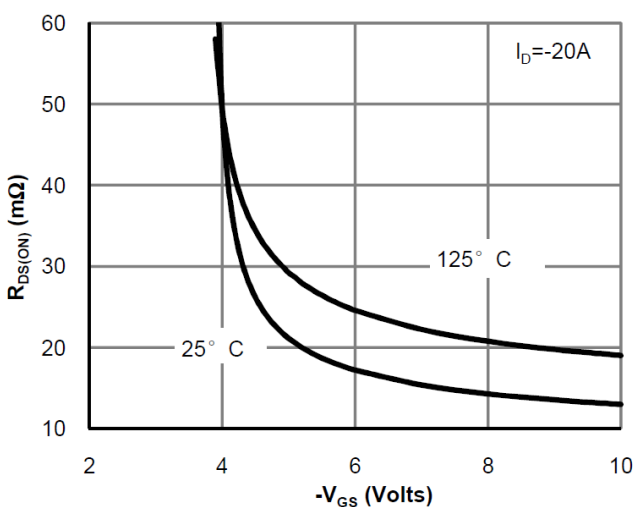


Figure 5: On-Resistance vs. Gate-Source Voltage

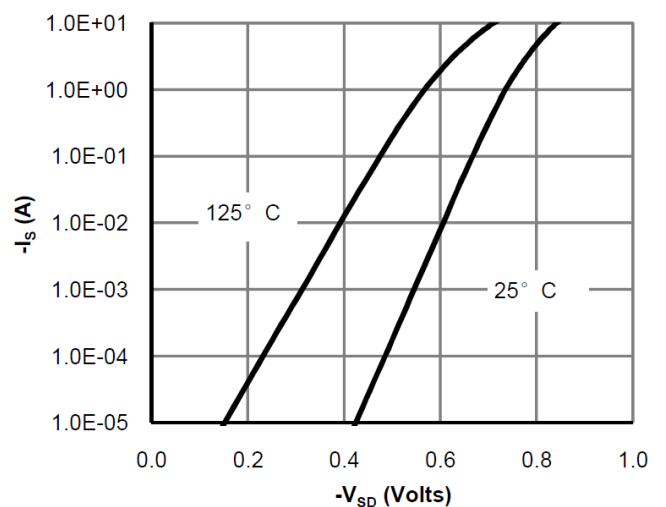


Figure 6: Body-Diode Characteristics

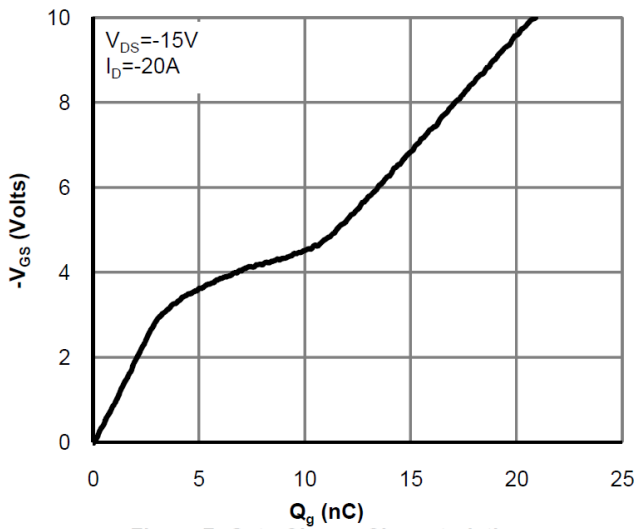


Figure 7: Gate-Charge Characteristics

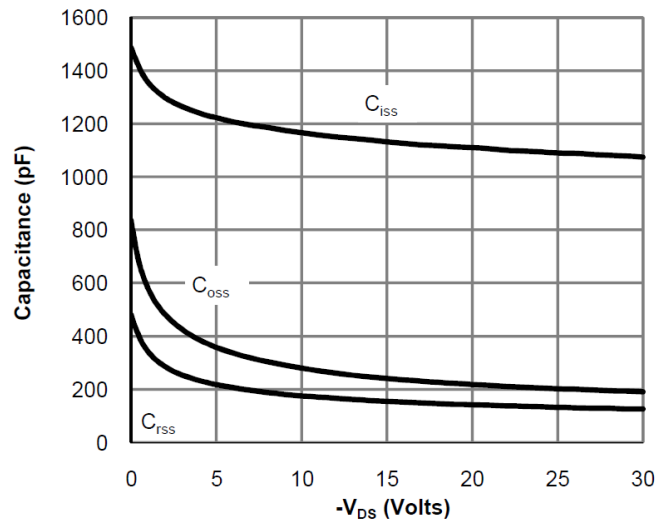


Figure 8: Capacitance Characteristics

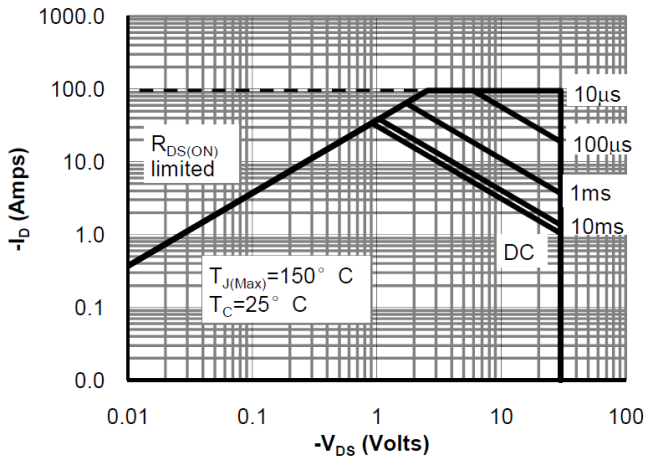


Figure 9: Maximum Forward Biased Safe Operating Area

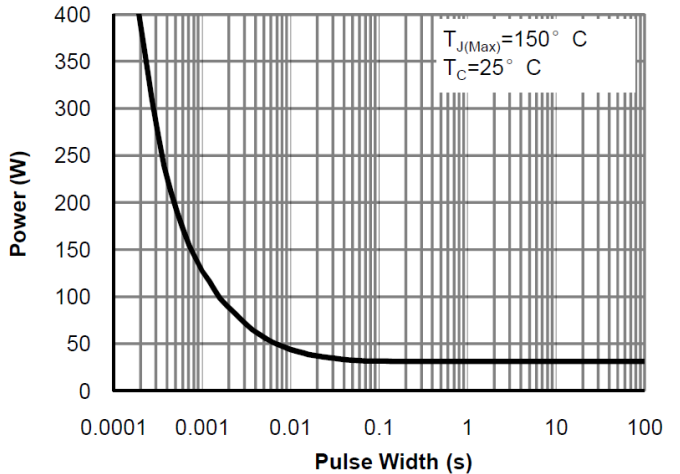


Figure 10: Single Pulse Power Rating Junction-to-Case

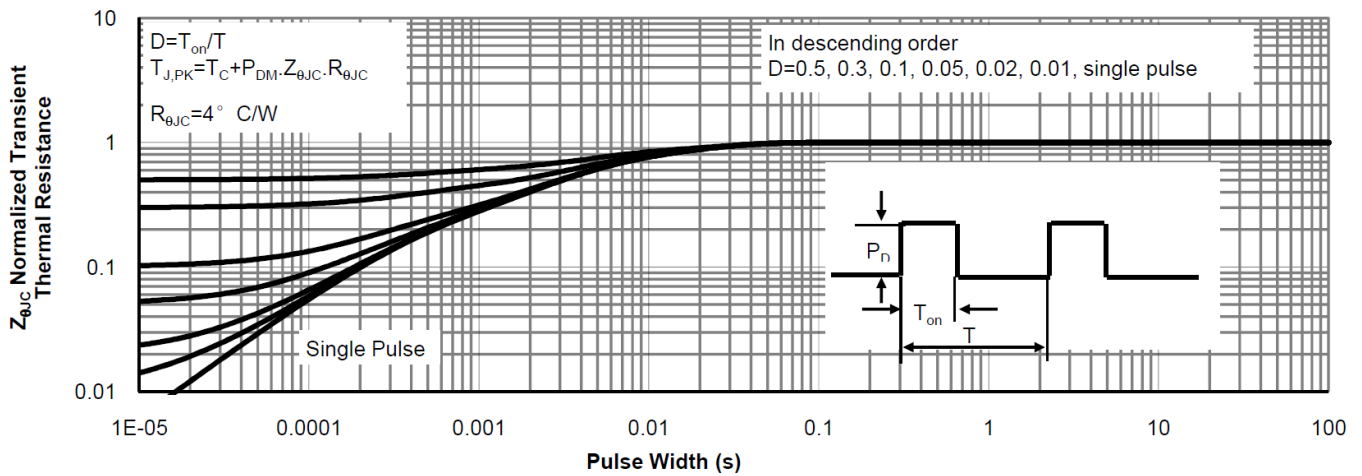
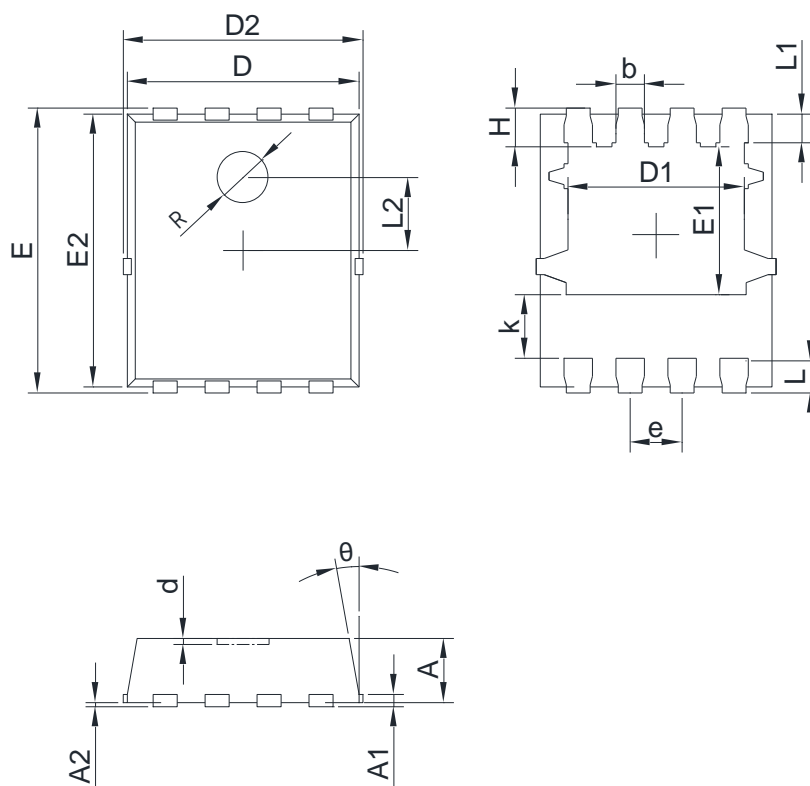


Figure 11: Normalized Maximum Transient Thermal Impedance

8. Dimension (PDFN5x6-8L)



Unit: mm

COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

| SYMBOL | MILLIMETER | | | SYMBOL | MILLIMETER | | |
|--------|------------|-------|-------|--------|------------|-------|-------|
| | MIN | Typ. | MAX | | MIN | Typ. | MAX |
| A | 0.900 | 1.000 | 1.100 | e | 1.270 TYP. | | |
| A1 | 0.254 REF | | | l | 0.534 | 0.610 | 0.686 |
| A2 | 0~0.05 | | | L1 | 0.424 | 0.500 | 0.576 |
| D | 4.824 | 4.900 | 4.976 | L2 | 1.800 REF. | | |
| D1 | 3.910 | 4.010 | 4.110 | k | 1.190 | 1.290 | 1.390 |
| D2 | 4.924 | 5.000 | 5.076 | H | 0.549 | 0.625 | 0.701 |
| E | 5.924 | 6.000 | 6.076 | θ | 8° | 10° | 12° |
| E1 | 3.375 | 3.475 | 3.575 | R | 1.100 | 1.200 | 1.300 |
| E2 | 5.674 | 5.750 | 5.826 | d | | | 0.100 |
| b | 0.350 | 0.400 | 0.450 | | | | |

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