

NCE P-Channel Enhancement Mode Power MOSFET

Description

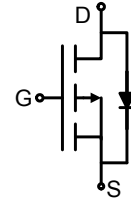
The 1481 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages. This device is suitable for use as a load switching application and a wide variety of other applications.

General Features

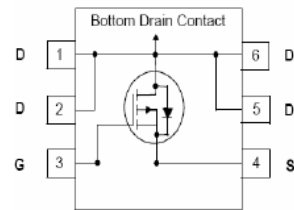
- $V_{DS} = -12V, I_D = -5.5A$
 $R_{DS(ON)} < 38m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 26m\Omega @ V_{GS} = -4.5V$
- Advanced trench MOSFET process technology
- Ultra low on-resistance with low gate charge

Application

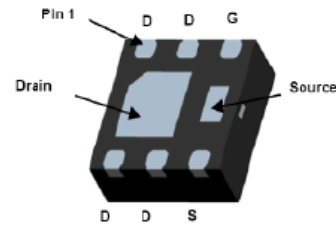
- PWM applications
- Load switch
- Battery charge in cellular handset



Schematic diagram



Pin assignment



DFN2X2-6L bottom view

Package marking and ordering information

| Device Marking | Device | Device Package | Reel Size | Tape Width | Quantity |
|----------------|--------|----------------|-----------|------------|----------|
| 1481 | 1481 | DFN2X2-6L | - | - | - |

Absolute maximum ratings (TA=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--------------------------------------------------|----------------|------------|------|
| Drain-Source Voltage | V_{DS} | -12 | V |
| Gate-Source Voltage | V_{GS} | ± 8 | V |
| Drain Current-Continuous | I_D | -5.5 | A |
| Drain Current -Pulsed (Note 1) | I_{DM} | -65 | A |
| Maximum Power Dissipation | P_D | 2.5 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | °C |

Thermal Characteristic

| | | | |
|--------------------------------------------------|-----------------|-----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 50 | °C/W |
| Thermal Resistance, Junction-to-Case (Note 2) | $R_{\theta JC}$ | 6.9 | °C/W |

Electrical characteristics (TA=25°C unless otherwise noted)



| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|-------------------------------------------|---------------|------------------------------------------------------------|------|------|-----------|------------|
| Off Characteristics | | | | | | |
| 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 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 8V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics (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 | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-5.5A$ | - | 22 | 26 | m Ω |
| | | $V_{GS}=-2.5V, I_D=-4.0A$ | - | 30 | 38 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=-10V, I_D=-5.5A$ | - | 23 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=-10V, V_{GS}=0V,$ $F=1.0MHz$ | - | 2700 | - | PF |
| Output Capacitance | C_{oss} | | - | 680 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 590 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=-10V, I_D=-1A$ $V_{GS}=-4.5V, R_{GEN}=10\Omega$ | - | 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 | $V_{DS}=-6V, I_D=-10A,$ $V_{GS}=-4.5V$ | - | 35 | 48 | nC |
| Gate-Source Charge | Q_{gs} | | - | 5 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 10 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| 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

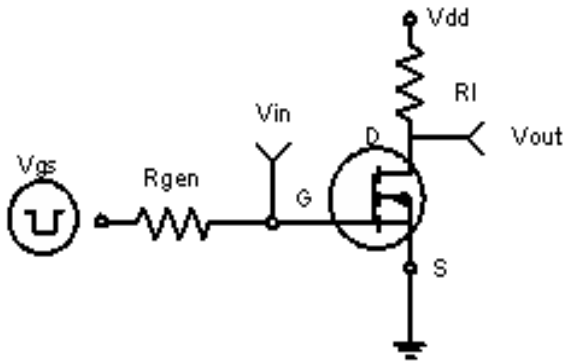


Figure 1: Switching Test Circuit

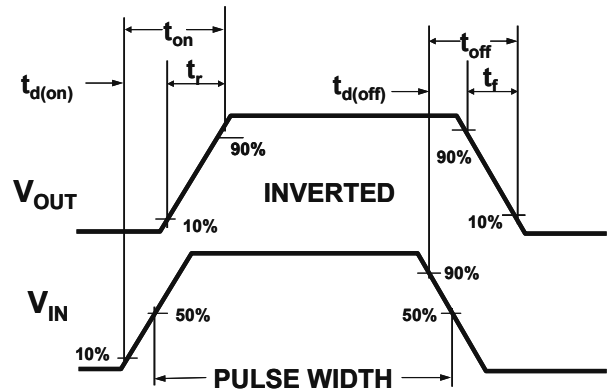


Figure 2: Switching Waveforms

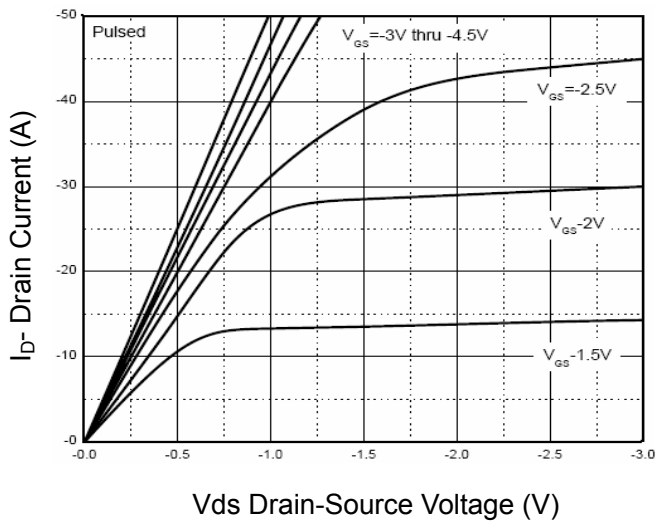


Figure 3 Output Characteristics

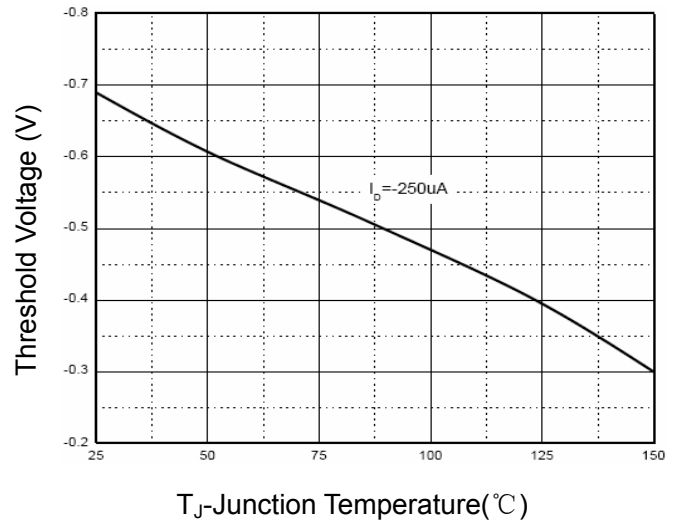


Figure 4 Drain Current

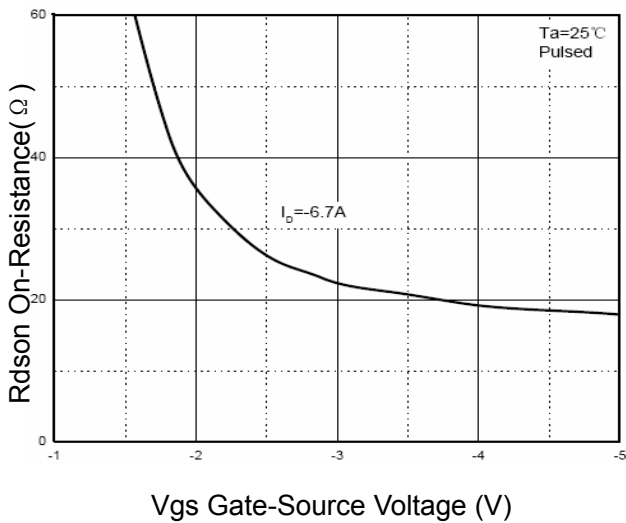


Figure 5 Rdson vs Vgs

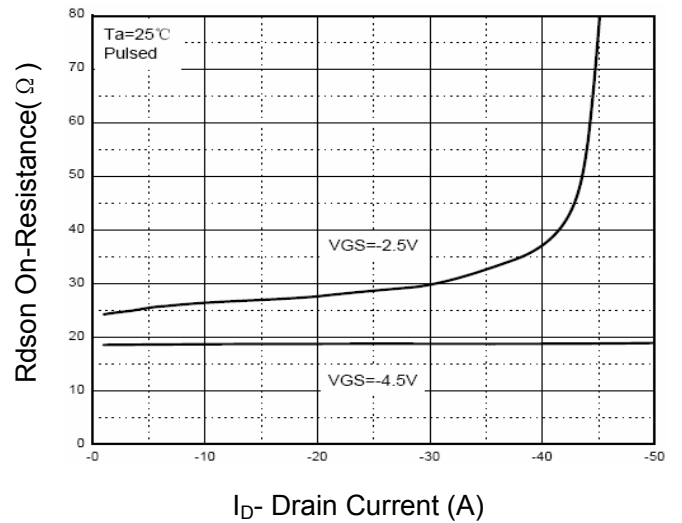
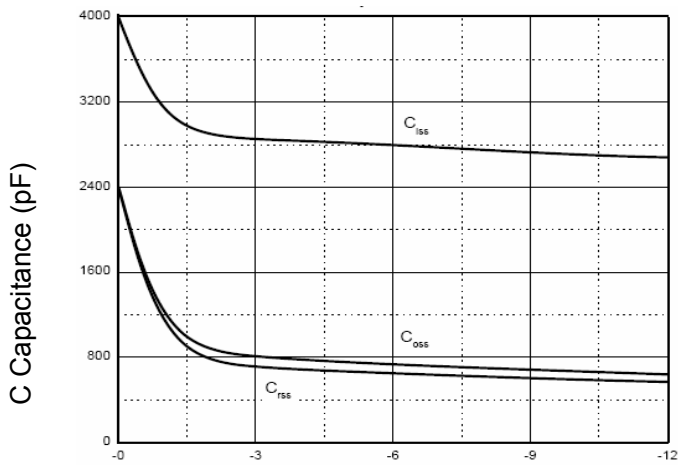
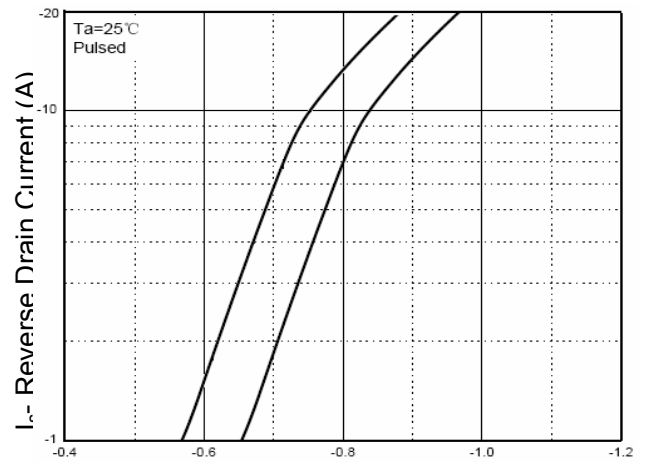


Figure 6 Drain-Source On-Resistance

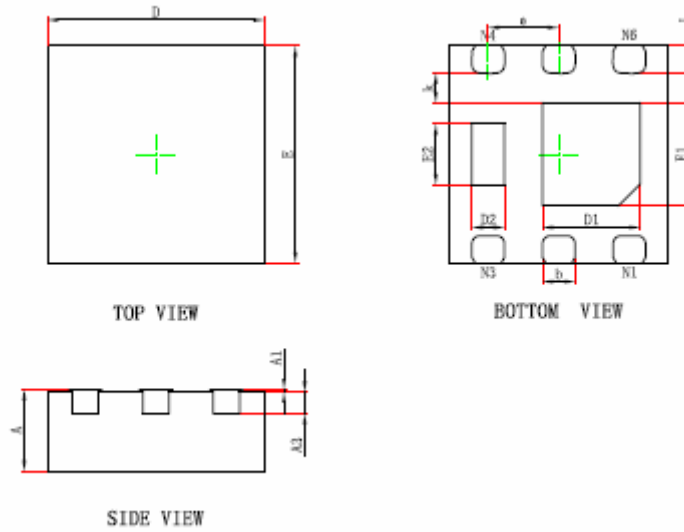


V_{ds} Drain-Source Voltage (V)
Figure 7 Capacitance vs V_{ds}



V_{sd} Source-Drain Voltage (V)
Figure 8 Source- Drain Diode Forward

DFN2X2-6L Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.700 | 0.800 | 0.028 | 0.031 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A3 | 0.203REF. | | 0.008REF. | |
| D | 1.924 | 2.076 | 0.076 | 0.082 |
| E | 1.924 | 2.076 | 0.076 | 0.082 |
| D1 | 0.800 | 1.000 | 0.031 | 0.039 |
| E1 | 0.850 | 1.050 | 0.033 | 0.041 |
| D2 | 0.200 | 0.400 | 0.008 | 0.016 |
| E2 | 0.460 | 0.660 | 0.018 | 0.026 |
| k | 0.200MIN. | | 0.008MIN. | |
| b | 0.250 | 0.350 | 0.010 | 0.014 |
| e | 0.650TYP. | | 0.026TYP. | |
| L | 0.174 | 0.326 | 0.007 | 0.013 |

Notes

1. All dimensions are in millimeters.
2. Tolerance $\pm 0.10\text{mm}$ (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.