

XP161A0390PR



Power MOS FET

- ◆N-Channel Power MOS FET
- ◆DMOS Structure
- ◆Low On-State Resistance: 0.09Ω (max)
- ◆Ultra High-Speed Switching
- ◆SOT-89 Package

General Description

The XP161A0390PR is an N-Channel Power MOS FET with low on-state resistance and ultra high-speed switching characteristics.

Because high-speed switching is possible, the IC can be efficiently set thereby saving energy.

The small SOT-89 package makes high density mounting possible.

Applications

- Notebook PCs
- Cellular and portable phones
- On-board power supplies
- Li-ion battery systems

Features

Low on-state resistance: $R_{ds(on)}=0.09\Omega(V_{gs}=4.5V)$

$R_{ds(on)}=0.13\Omega(V_{gs}=2.5V)$

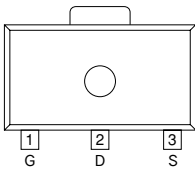
$R_{ds(on)}=0.3\Omega(V_{gs}=1.5V)$

Ultra high-speed switching

Operational Voltage : 1.5V

High density mounting : SOT-89

Pin Configuration



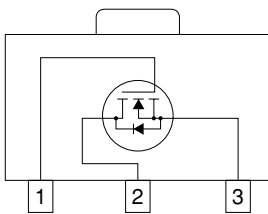
SOT-89
(TOP VIEW)

Pin Assignment

| PIN NUMBER | PIN NAME | FUNCTION |
|------------|----------|----------|
| 1 | G | Gate |
| 2 | D | Drain |
| 3 | S | Source |

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Equivalent Circuit



N-Channel MOS FET
(1 device built-in)

Absolute Maximum Ratings

$T_a=25^\circ\text{C}$

| PARAMETER | SYMBOL | RATINGS | UNITS |
|---|-----------|---------|------------------|
| Drain-Source Voltage | V_{dss} | 20 | V |
| Gate-Source Voltage | V_{gss} | ± 8 | V |
| Drain Current (DC) | I_d | 3 | A |
| Drain Current (Pulse) | I_{dp} | 9 | A |
| Reverse Drain Current | I_{dr} | 3 | A |
| Continuous Channel Power Dissipation (note) | P_d | 2 | W |
| Channel Temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55~150 | $^\circ\text{C}$ |

Note: When implemented on a ceramic PCB

Electrical Characteristics

DC Characteristics

T_a=25°C

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|----------------------|---|-----|------|------|-------|
| Drain Cut-off Current | I _{dss} | V _{ds} =20V, V _{gs} =0V | | | 10 | μA |
| Gate-Source Leakage Current | I _{gss} | V _{gs} =±8V, V _{ds} =0V | | | ±10 | μA |
| Gate-Source Cut-off Voltage | V _{gs(off)} | I _d =1mA, V _{ds} =10V | 0.5 | | | V |
| Drain-Source On-state Resistance (note) | R _{ds(on)} | I _d =1.5A, V _{gs} =4.5V | | 0.07 | 0.09 | Ω |
| | | I _d =1.5A, V _{gs} =2.5V | | 0.1 | 0.13 | Ω |
| | | I _d =1.5A, V _{gs} =1.5V | | 0.17 | 0.3 | Ω |
| Forward Transfer Admittance (note) | Y _{fs} | I _d =1.5A, V _{ds} =10V | | 6 | | S |
| Body Drain Diode Forward Voltage | V _f | I _f =3A, V _{gs} =0V | | 0.85 | 1.1 | V |

Note: Effective during pulse test.

Dynamic Characteristics

T_a=25°C

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|----------------------|------------------|---|-----|-----|-----|-------|
| Input Capacitance | C _{iss} | V _{ds} =10V, V _{gs} =0V f=1MHz | | 380 | | pF |
| Output Capacitance | C _{oss} | | | 170 | | pF |
| Feedback Capacitance | C _{rss} | | | 60 | | pF |

Switching Characteristics

T_a=25°C

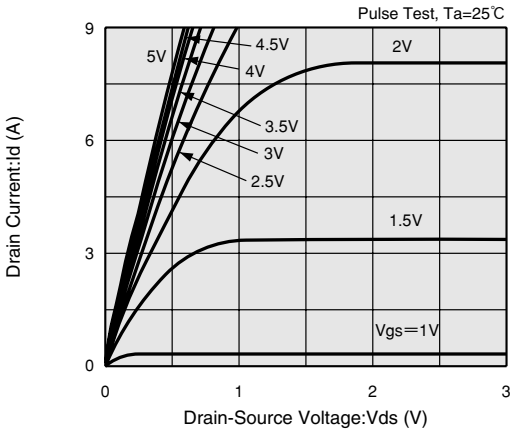
| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---------------------|----------------------|---|-----|-----|-----|-------|
| Turn-on Delay Time | t _{d (on)} | V _{gs} =5V, I _d =1.5A V _{dd} =10V | | 10 | | ns |
| Rise Time | t _r | | | 15 | | ns |
| Turn-off Delay Time | t _{d (off)} | | | 70 | | ns |
| Fall Time | t _f | | | 40 | | ns |

Thermal Characteristics

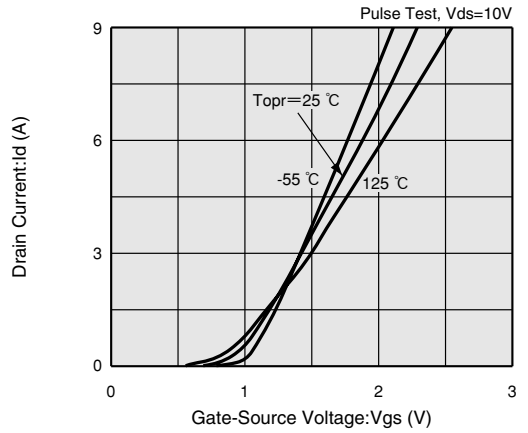
| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---------------------------------------|------------------------|----------------------------|-----|------|-----|-------|
| Thermal Resistance (channel-ambience) | R _{th (ch-a)} | Implement on a ceramic PCB | | 62.5 | | °C/W |

Typical Performance Characteristics

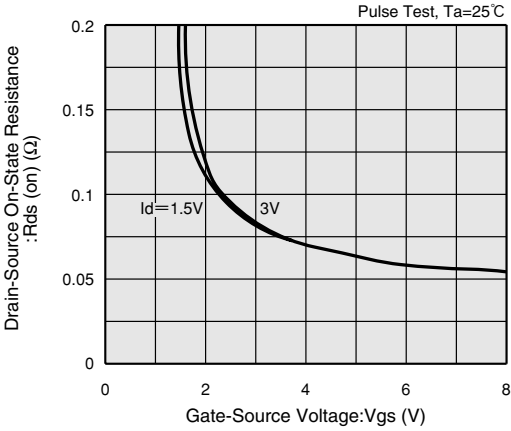
DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE



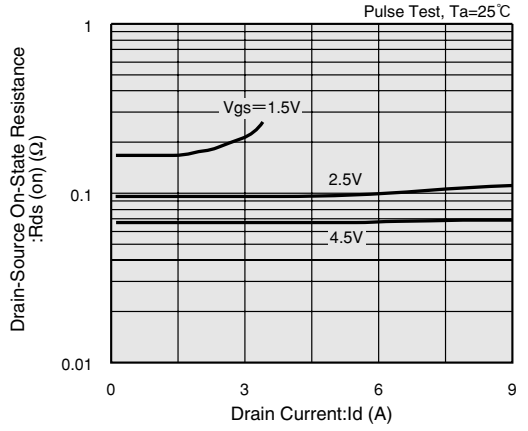
DRAIN CURRENT vs. GATE-SOURCE VOLTAGE



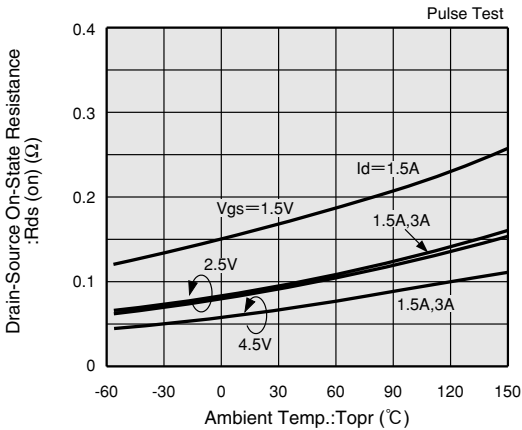
DRAIN-SOURCE ON-STATE RESISTANCE vs. GATE-SOURCE VOLTAGE



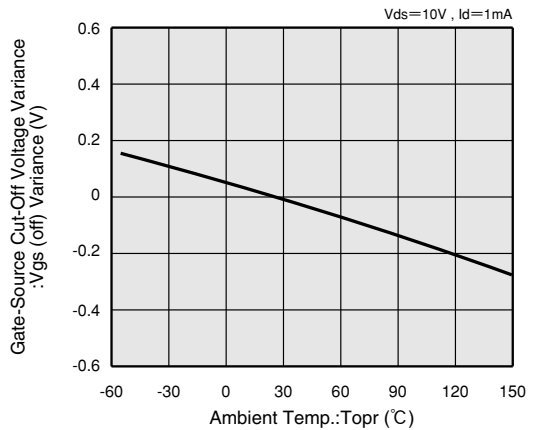
DRAIN-SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



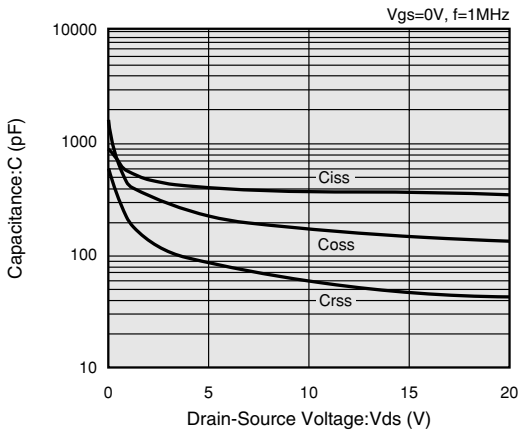
DRAIN-SOURCE ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



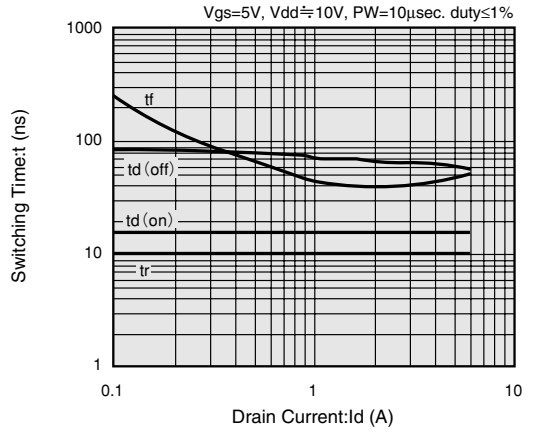
GATE-SOURCE CUT-OFF VOLTAGE VARIANCE vs. AMBIENT TEMPERATURE



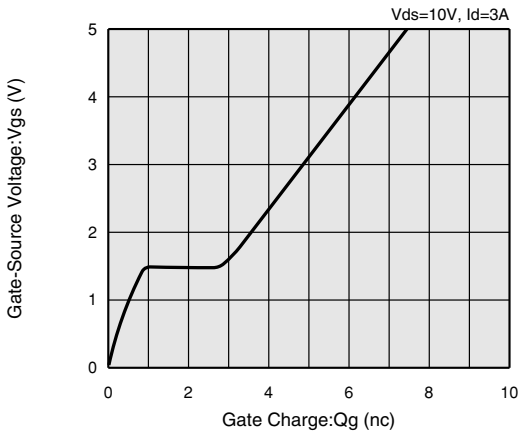
CAPACITANCE vs. DRAIN-SOURCE VOLTAGE



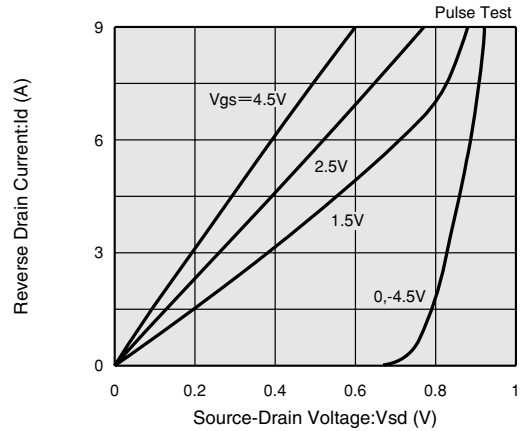
SWITCHING TIME vs. DRAIN CURRENT



GATE-SOURCE VOLTAGE vs. GATE CHARGE



REVERSE DRAIN CURRENT vs. SOURCE-DRAIN VOLTAGE



STANDARDIZED TRANSITION THERMAL RESISTANCE vs. PULSE WIDTH

