

Power MOSFET

-25 A, -30 V, Logic Level P-Channel DPAK

Designed for low voltage, high speed switching applications and to withstand high energy in the avalanche and commutation modes. The source-to-drain diode recovery time is comparable to a discrete fast recovery diode.

Features

- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

Typical Applications

- PWM Motor Controls
- Power Supplies
- Converters
- Bridge Circuits

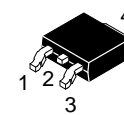
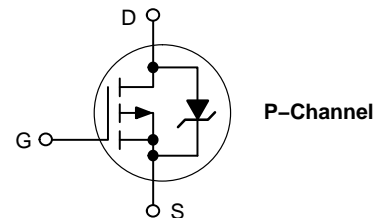
MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|--|-----------------------------------|-------------|-----------------|
| Drain-to-Source Voltage | V _{DSS} | -30 | V |
| Gate-to-Source Voltage | V _{GS} | ±15 | V |
| - Continuous | V _{GSM} | ±20 | V _{pk} |
| - Non-Repetitive (t _p ≤ 10 ms) | | | |
| Drain Current | I _D | -25 | A |
| - Continuous @ T _A = 25°C | I _{DM} | -75 | A _{pk} |
| - Single Pulse (t _p ≤ 10 μs) | | | |
| Total Power Dissipation @ T _A = 25°C | P _D | 75 | W |
| Operating and Storage Temperature Range | T _J , T _{stg} | -55 to +150 | °C |
| Single Pulse Drain-to-Source Avalanche Energy - Starting T _J = 25°C (V _{DD} = 25 Vdc, V _{GS} = 5.0 Vdc, Peak I _L = 20 A _{pk} , L = 1.0 mH, R _G = 25 Ω) | E _{AS} | 200 | mJ |
| Thermal Resistance | | | °C/W |
| - Junction-to-Case | R _{θJC} | 1.65 | |
| - Junction-to-Ambient (Note 1) | R _{θJA} | 67 | |
| - Junction-to-Ambient (Note 2) | R _{θJA} | 120 | |
| Maximum Lead Temperature for Soldering Purposes, (1/8 in from case for 10 seconds) | T _L | 260 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

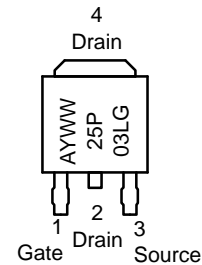
1. When surface mounted to an FR4 board using 0.5 sq in pad size.
2. When surface mounted to an FR4 board using the minimum recommended pad size.

| V _{(BR)DSS} | R _{DS(on)} TYP | I _D Max |
|----------------------|-------------------------|--------------------|
| -30 V | 51 mΩ @ 5.0 V | -25 A |



DPAK
CASE 369C
STYLE 2

MARKING DIAGRAM & PIN ASSIGNMENT



- A = Assembly Location*
- Y = Year
- WW = Work Week
- 25P03L = Device Code
- G = Pb-Free Package

* The Assembly Location code (A) is front side optional. In cases where the Assembly Location is stamped in the package, the front side assembly code may be blank.

NTD25P03L, STD25P03L

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | |
|--|----------------------|-----|-----|--------------|------------|
| Drain-to-Source Breakdown Voltage (Note 3) (V _{GS} = 0 Vdc, I _D = -250 μA) Temperature Coefficient (Positive) | V _{(BR)DSS} | -30 | -24 | | V mV/°C |
| Zero Gate Voltage Drain Current (V _{DS} = -30 Vdc, V _{GS} = 0 Vdc, T _J = 25°C) (V _{DS} = -30 Vdc, V _{GS} = 0 Vdc, T _J = 125°C) | I _{DSS} | | | -1.0 -100 | μA |
| Gate-Body Leakage Current (V _{GS} = ±15 Vdc, V _{DS} = 0 Vdc) | I _{GSS} | | | -100 | nA |

ON CHARACTERISTICS (Note 3)

| | | | | | |
|--|---------------------|------|-------------------------|-------------------------|------------|
| Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = -250 μAdc) Temperature Coefficient (Negative) | V _{GS(th)} | -1.0 | -1.6 4.0 | -2.0 | V mV/°C |
| Static Drain-to-Source On-State Resistance (V _{GS} = -5.0 Vdc, I _D = -12.5 Adc) (V _{GS} = -5.0 Vdc, I _D = -25 Adc) (V _{GS} = -4.0 Vdc, I _D = -10 Adc) | R _{DS(on)} | | 0.051 0.056 0.065 | 0.072 0.080 0.090 | Ω |
| Forward Transconductance (V _{DS} = -8.0 Vdc, I _D = -12.5 Adc) | g _{FS} | | 13 | | Mhos |

DYNAMIC CHARACTERISTICS

| | | | | | |
|------------------------------|--|------------------|-----|------|----|
| Input Capacitance | (V _{DS} = -25 Vdc, V _{GS} = 0 Vdc, f = 1.0 MHz) | C _{iss} | 900 | 1260 | pF |
| Output Capacitance | | C _{oss} | 290 | 410 | |
| Reverse Transfer Capacitance | | C _{rss} | 105 | 210 | |

SWITCHING CHARACTERISTICS (Notes 3 & 4)

| | | | | | |
|---------------------|---|---------------------|-----|----|----|
| Turn-On Delay Time | (V _{DD} = -15 Vdc, I _D = -25 A, V _{GS} = -5.0 V, R _G = 1.3 Ω) | t _{d(on)} | 9.0 | 20 | ns |
| Rise Time | | t _r | 37 | 75 | |
| Turn-Off Delay Time | | t _{d(off)} | 15 | 30 | |
| Fall Time | | t _f | 16 | 55 | |
| Gate Charge | (V _{DS} = -24 Vdc, V _{GS} = -5.0 Vdc, I _D = -25 A) | Q _T | 15 | 20 | nC |
| | | Q ₁ | 3.0 | | |
| | | Q ₂ | 9.0 | | |
| | | Q ₃ | 7.0 | | |

BODY-DRAIN DIODE RATINGS (Note 3)

| | | | | | |
|--------------------------------|--|-----------------|--------------|------|----|
| Diode Forward On-Voltage | (I _S = -25 Adc, V _{GS} = 0 V) (I _S = -25 Adc, V _{GS} = 0 V, T _J = 125°C) | V _{SD} | -1.0 -0.9 | -1.5 | V |
| Reverse Recovery Time | (I _S = -25 A, V _{GS} = 0 V, di _S /dt = 100 A/μs) | t _{rr} | 35 | | ns |
| | | t _a | 20 | | |
| | | t _b | 14 | | |
| Reverse Recovery Stored Charge | | Q _{RR} | 0.035 | | μC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

4. Switching characteristics are independent of operating junction temperature.

NTD25P03L, STD25P03L

TYPICAL MOSFET ELECTRICAL CHARACTERISTICS

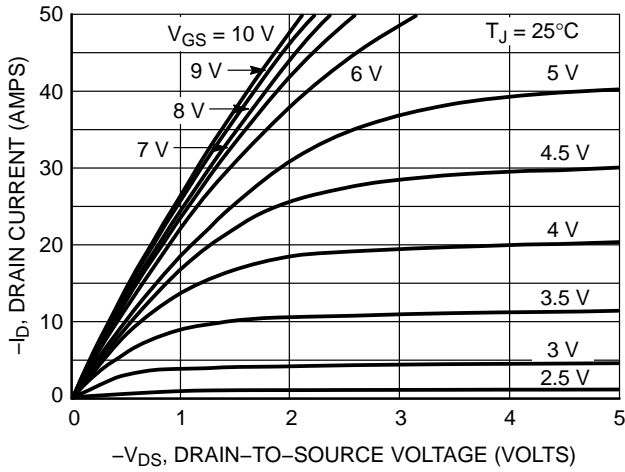


Figure 1. On-Region Characteristics

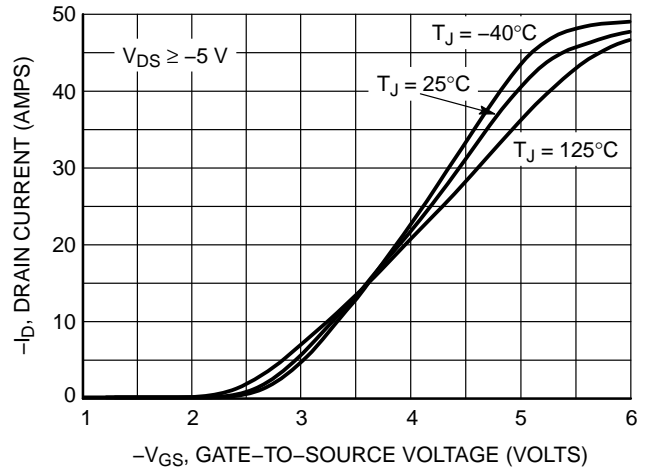


Figure 2. Transfer Characteristics

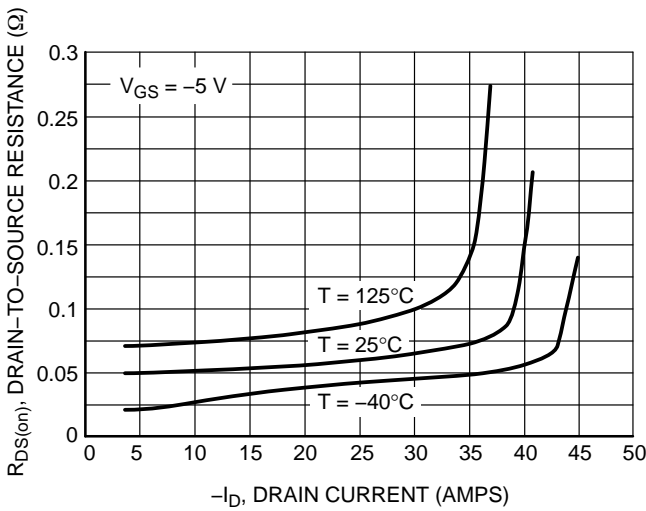


Figure 3. On-Resistance versus Drain Current and Temperature

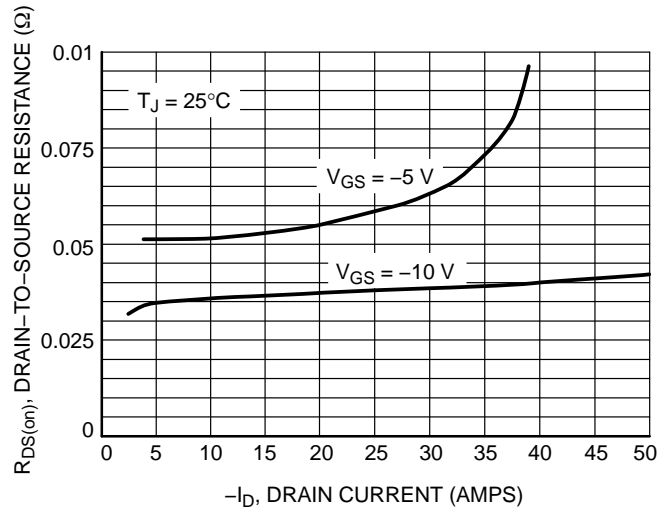


Figure 4. On-Resistance versus Drain Current and Gate Voltage

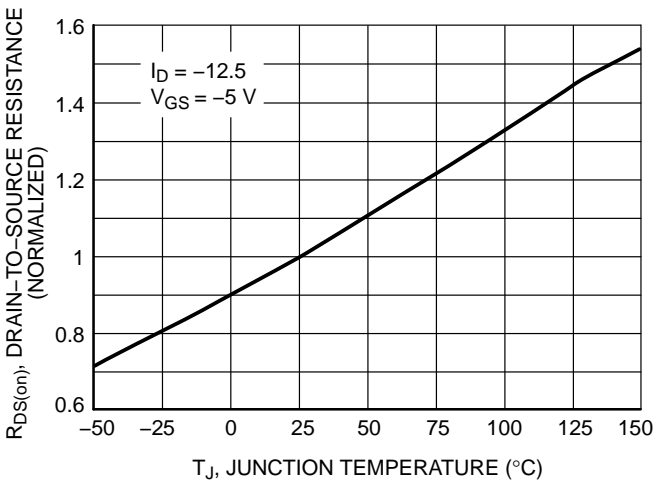


Figure 5. On-Resistance Variation with Temperature

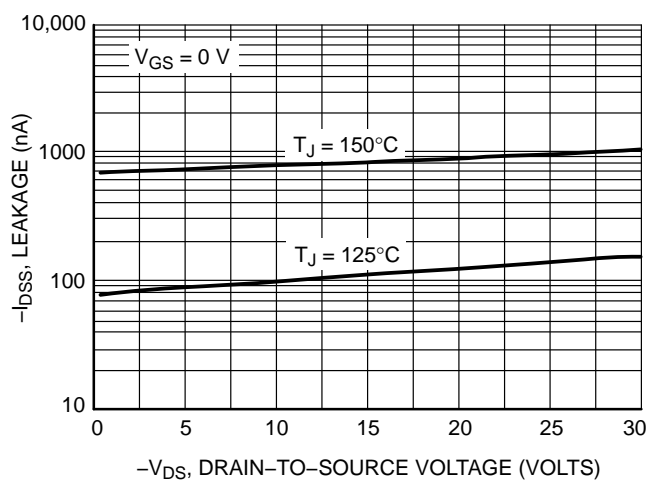


Figure 6. Drain-to-Source Leakage Current versus Voltage

NTD25P03L, STD25P03L

TYPICAL ELECTRICAL CHARACTERISTICS

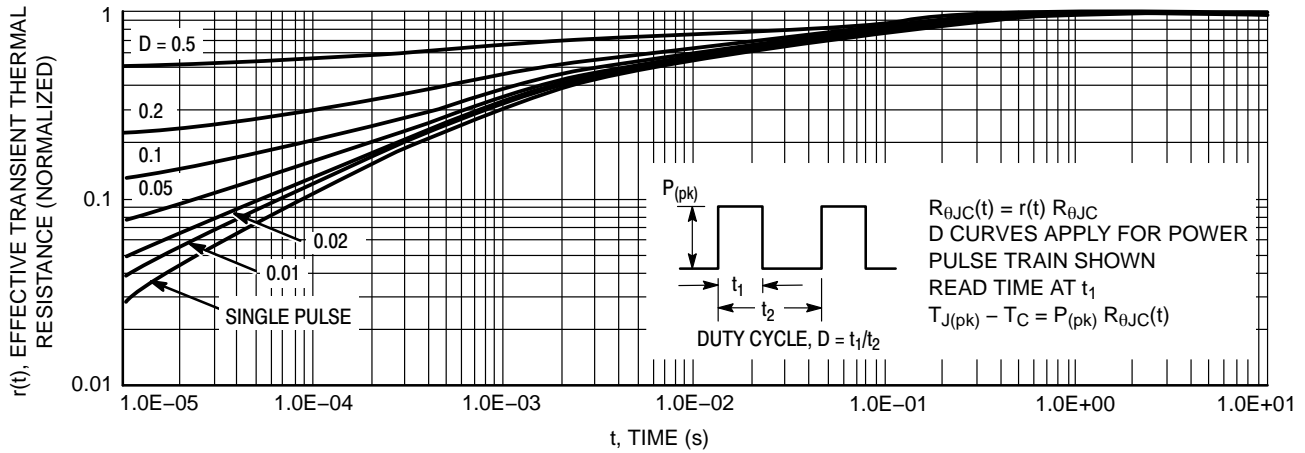


Figure 13. Thermal Response

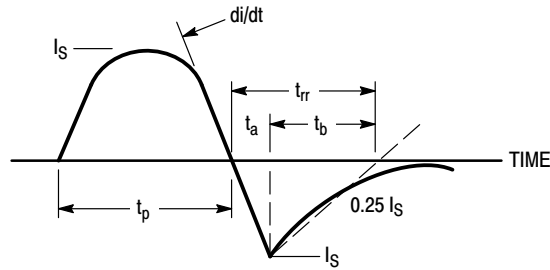


Figure 14. Diode Reverse Recovery Waveform

ORDERING INFORMATION

| Device | Package | Shipping† |
|---------------|-------------------|--------------------|
| NTD25P03LT4G | DPAK (Pb-Free) | 2500 / Tape & Reel |
| STD25P03LT4G* | DPAK (Pb-Free) | 2500 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.