

NTTS2P03R2

Power MOSFET -2.48 Amps, -30 Volts P-Channel Enhancement Mode Single Micro8™ Package

Features

- Ultra Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Miniature Micro8 Surface Mount Package
- Diode Exhibits High Speed, Soft Recovery
- Micro8 Mounting Information Provided

Applications

- Power Management in Portable and Battery-Powered Products, i.e.: Cellular and Cordless Telephones and PCMCIA Cards

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

| Rating | Symbol | Value | Unit |
|---|-----------------|----------------|--------------------|
| Drain-to-Source Voltage | V_{DSS} | -30 | V |
| Gate-to-Source Voltage - Continuous | V_{GS} | ± 20 | V |
| Thermal Resistance - Junction-to-Ambient (Note 1.) | $R_{\theta JA}$ | 160 | $^\circ\text{C/W}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ | P_D | 0.78 | W |
| Continuous Drain Current @ $T_A = 25^\circ\text{C}$ | I_D | -2.48 | A |
| Continuous Drain Current @ $T_A = 70^\circ\text{C}$ | I_D | -1.98 | A |
| Thermal Resistance - Junction-to-Ambient (Note 2.) | $R_{\theta JA}$ | 70 | $^\circ\text{C/W}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ | P_D | 1.78 | W |
| Continuous Drain Current @ $T_A = 25^\circ\text{C}$ | I_D | -3.75 | A |
| Continuous Drain Current @ $T_A = 70^\circ\text{C}$ | I_D | -3.0 | A |
| Thermal Resistance - Junction-to-Ambient (Note 3.) | $R_{\theta JA}$ | 210 | $^\circ\text{C/W}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ | P_D | 0.60 | W |
| Continuous Drain Current @ $T_A = 25^\circ\text{C}$ | I_D | -2.10 | A |
| Continuous Drain Current @ $T_A = 70^\circ\text{C}$ | I_D | -1.67 | A |
| Pulsed Drain Current (Note 5.) | I_{DM} | -17 | A |
| Thermal Resistance - Junction-to-Ambient (Note 4.) | $R_{\theta JA}$ | 100 | $^\circ\text{C/W}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ | P_D | 1.25 | W |
| Continuous Drain Current @ $T_A = 25^\circ\text{C}$ | I_D | -3.02 | A |
| Continuous Drain Current @ $T_A = 70^\circ\text{C}$ | I_D | -2.42 | A |
| Pulsed Drain Current (Note 5.) | I_{DM} | -24 | A |
| Operating and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

1. Minimum FR-4 or G-10 PCB, Time ≤ 10 Seconds.
2. Mounted onto a 2" square FR-4 Board (1" sq. 2 oz Cu 0.06" thick single sided), Time ≤ 10 Seconds.
3. Minimum FR-4 or G-10 PCB, Steady State.
4. Mounted onto a 2" square FR-4 Board (1" sq. 2 oz Cu 0.06" thick single sided), Steady State.
5. Pulse Test: Pulse Width = 300 μs , Duty Cycle = 2%.

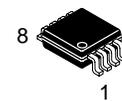
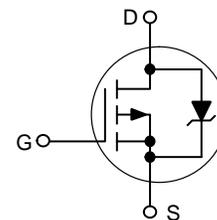


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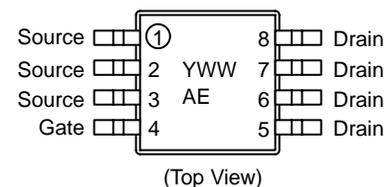
-2.48 AMPERES
-30 VOLTS
85 m Ω @ $V_{GS} = -10$ V

Single P-Channel



Micro8
CASE 846A
STYLE 1

MARKING DIAGRAM & PIN ASSIGNMENT



(Top View)

Y = Year
WW = Work Week
AE = Device Code

ORDERING INFORMATION

| Device | Package | Shipping† |
|------------|---------|------------------|
| NTTS2P03R2 | Micro8 | 4000/Tape & Reel |

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

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MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted) (continued)

| Rating | Symbol | Value | Unit |
|---|----------|-------|------------------|
| Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = -30\text{ Vdc}$, $V_{GS} = -10\text{ Vdc}$, Peak $I_L = -3.0\text{ Apk}$, $L = 65\text{ mH}$, $R_G = 25\ \Omega$) | E_{AS} | 292.5 | mJ |
| Maximum Lead Temperature for Soldering Purposes for 10 seconds | T_L | 260 | $^\circ\text{C}$ |

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted) (Note 6.)

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

OFF CHARACTERISTICS

| | | | | | |
|--|---------------|----------|----------|-------------|-----------------------------|
| Drain-to-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = -250\ \mu\text{Adc}$) Temperature Coefficient (Positive) | $V_{(BR)DSS}$ | -30 - | - -30 | - - | Vdc mV/ $^\circ\text{C}$ |
| Zero Gate Voltage Drain Current ($V_{GS} = 0\text{ Vdc}$, $V_{DS} = -30\text{ Vdc}$, $T_J = 25^\circ\text{C}$) ($V_{GS} = 0\text{ Vdc}$, $V_{DS} = -30\text{ Vdc}$, $T_J = 125^\circ\text{C}$) | I_{DSS} | - - | - - | -1.0 -25 | μAdc |
| Gate-Body Leakage Current ($V_{GS} = -20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$) | I_{GSS} | - | - | -100 | nAdc |
| Gate-Body Leakage Current ($V_{GS} = +20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$) | I_{GSS} | - | - | 100 | nAdc |

ON CHARACTERISTICS

| | | | | | |
|---|--------------|-----------|----------------|----------------|----------|
| Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = -250\ \mu\text{Adc}$) Temperature Coefficient (Negative) | $V_{GS(th)}$ | -1.0 - | -1.7 3.6 | -3.0 - | Vdc |
| Static Drain-to-Source On-State Resistance ($V_{GS} = -10\text{ Vdc}$, $I_D = -2.48\text{ Adc}$) ($V_{GS} = -4.5\text{ Vdc}$, $I_D = -1.24\text{ Adc}$) | $R_{DS(on)}$ | - - | 0.063 0.100 | 0.085 0.135 | Ω |
| Forward Transconductance ($V_{DS} = -15\text{ Vdc}$, $I_D = -1.24\text{ Adc}$) | g_{FS} | - | 3.1 | - | Mhos |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|------------------------------|--|-----------|---|-----|---|----|
| Input Capacitance | $(V_{DS} = -24\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$) | C_{iss} | - | 500 | - | pF |
| Output Capacitance | | C_{oss} | - | 160 | - | |
| Reverse Transfer Capacitance | | C_{rss} | - | 65 | - | |

SWITCHING CHARACTERISTICS (Notes 7. & 8.)

| | | | | | | |
|---------------------|---|--------------|---|-----|----|----|
| Turn-On Delay Time | $(V_{DD} = -24\text{ Vdc}$, $I_D = -2.48\text{ Adc}$, $V_{GS} = -10\text{ Vdc}$, $R_G = 6.0\ \Omega$) | $t_{d(on)}$ | - | 10 | - | ns |
| Rise Time | | t_r | - | 20 | - | |
| Turn-Off Delay Time | | $t_{d(off)}$ | - | 40 | - | |
| Fall Time | | t_f | - | 35 | - | |
| Turn-On Delay Time | $(V_{DD} = -24\text{ Vdc}$, $I_D = -1.24\text{ Adc}$, $V_{GS} = -4.5\text{ Vdc}$, $R_G = 6.0\ \Omega$) | $t_{d(on)}$ | - | 16 | - | ns |
| Rise Time | | t_r | - | 40 | - | |
| Turn-Off Delay Time | | $t_{d(off)}$ | - | 30 | - | |
| Fall Time | | t_f | - | 30 | - | |
| Total Gate Charge | $(V_{DS} = -24\text{ Vdc}$, $V_{GS} = -4.5\text{ Vdc}$, $I_D = -2.48\text{ Adc}$) | Q_{tot} | - | 15 | 22 | nC |
| Gate-Source Charge | | Q_{gs} | - | 3.2 | - | |
| Gate-Drain Charge | | Q_{gd} | - | 4.0 | - | |

BODY-DRAIN DIODE RATINGS (Note 7.)

| | | | | | | |
|--------------------------------|---|----------|--------|----------------|-----------|---------------|
| Diode Forward On-Voltage | $(I_S = -2.48\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) $(I_S = -2.48\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$) | V_{SD} | - - | -0.92 -0.72 | -1.3 - | Vdc |
| Reverse Recovery Time | $(I_S = -1.45\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $di_S/dt = 100\text{ A}/\mu\text{s}$) | t_{rr} | - | 38 | - | ns |
| | | t_a | - | 20 | - | |
| | | t_b | - | 18 | - | |
| Reverse Recovery Stored Charge | | Q_{RR} | - | 0.04 | - | μC |

- Handling precautions to protect against electrostatic discharge is mandatory.
- Indicates Pulse Test: Pulse Width = 300 μsec max, Duty Cycle = 2%.
- Switching characteristics are independent of operating junction temperature.

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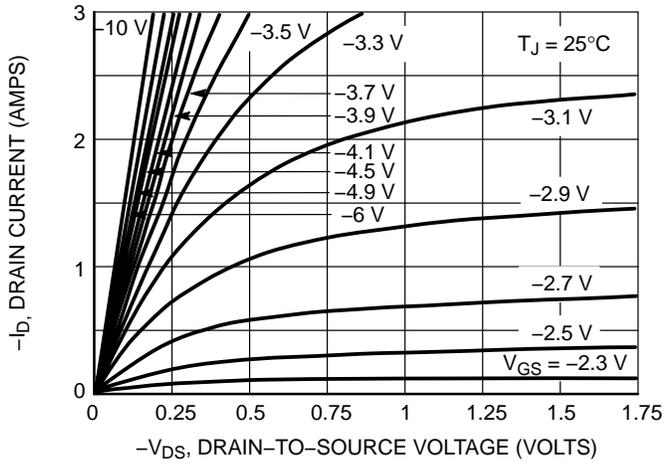


Figure 1. On-Region Characteristics

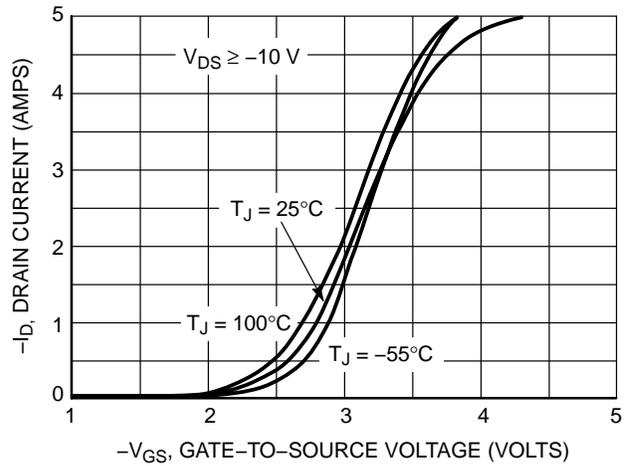


Figure 2. Transfer Characteristics

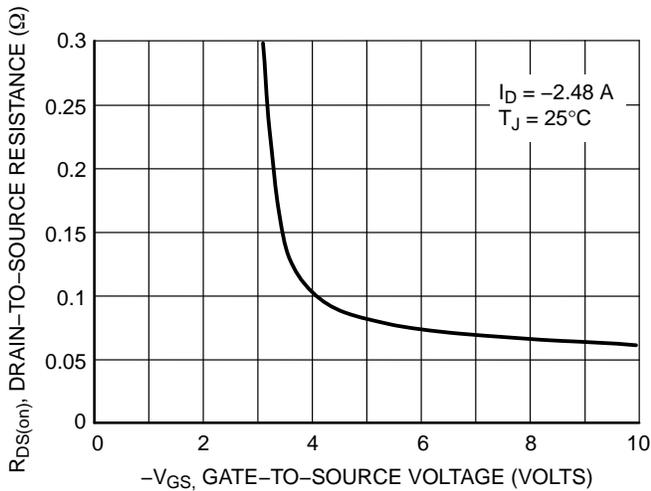


Figure 3. On-Resistance versus Gate-to-Source Voltage

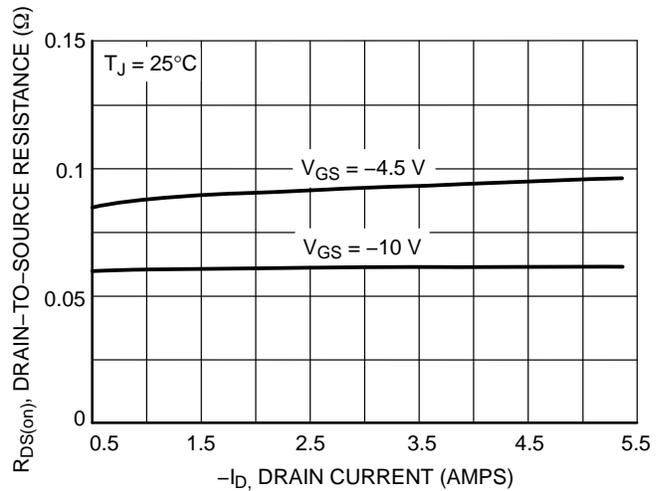


Figure 4. On-Resistance versus Drain Current and Gate Voltage

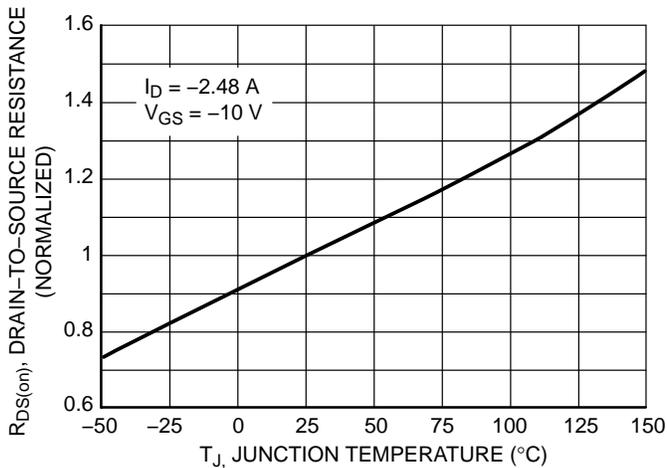


Figure 5. On-Resistance Variation with Temperature

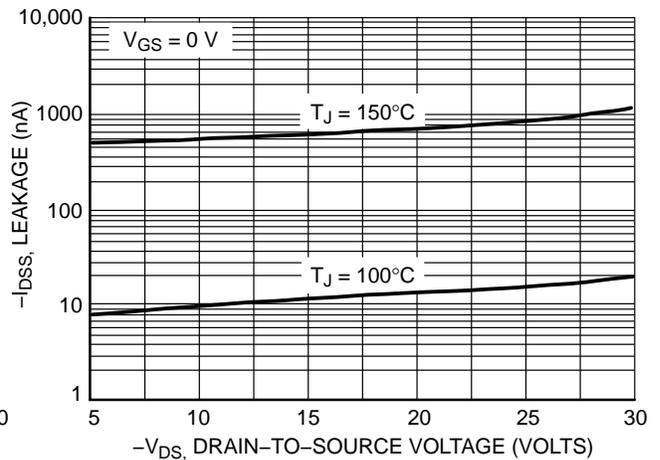


Figure 6. Drain-to-Source Leakage Current versus Voltage

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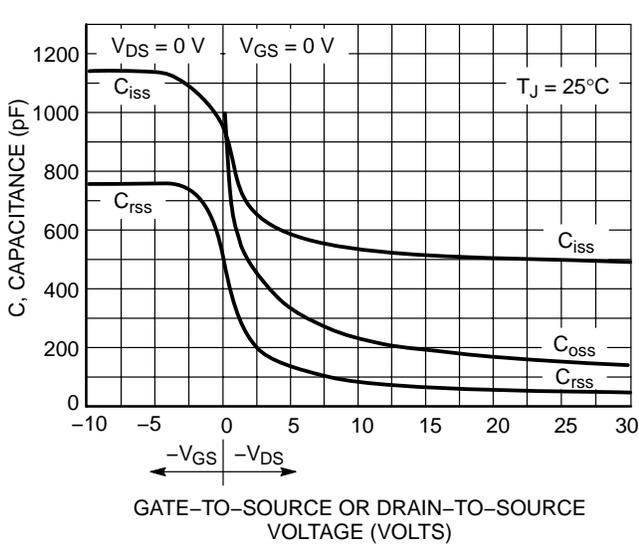


Figure 7. Capacitance Variation

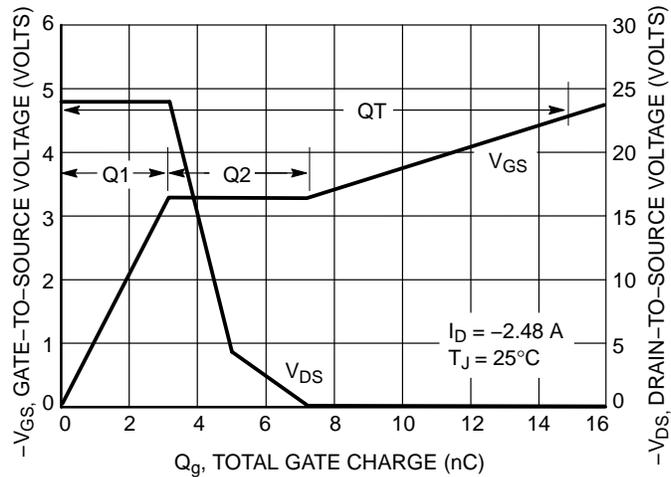


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

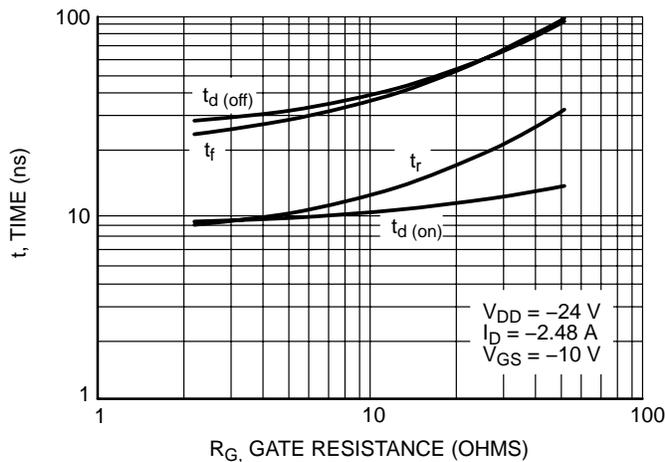


Figure 9. Resistive Switching Time Variation versus Gate Resistance

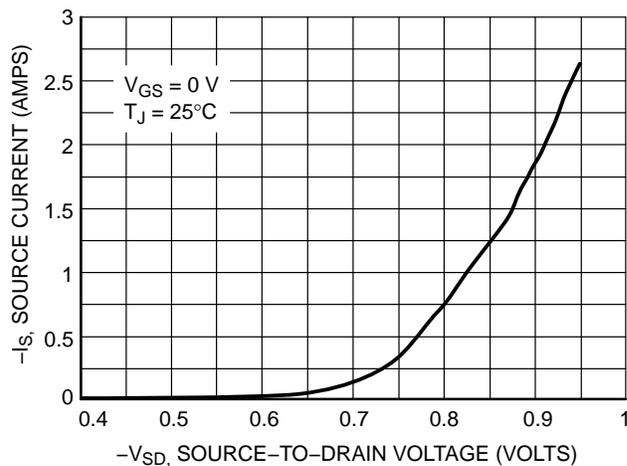


Figure 10. Diode Forward Voltage versus Current

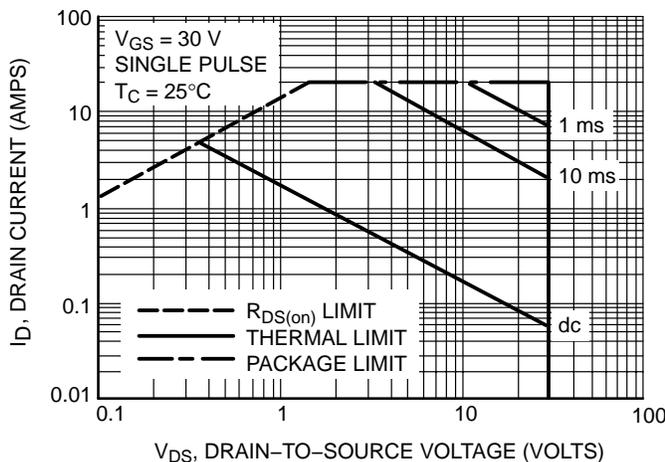


Figure 11. Maximum Rated Forward Biased Safe Operating Area

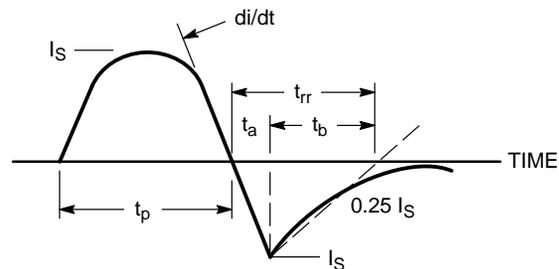


Figure 12. Diode Reverse Recovery Waveform

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TYPICAL ELECTRICAL CHARACTERISTICS

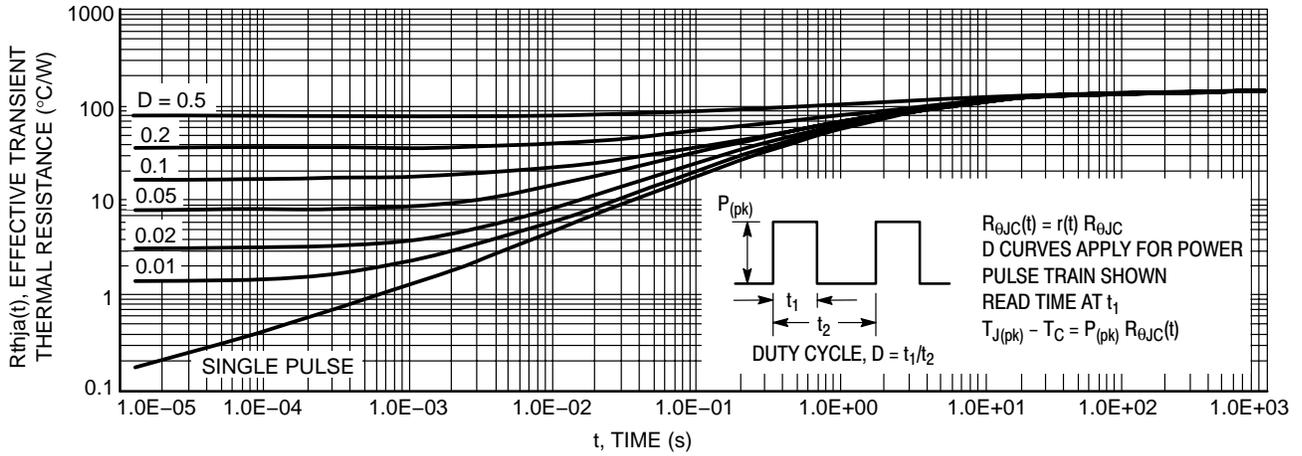


Figure 13. Thermal Response

