

|            |      |      |               |
|------------|------|------|---------------|
| APT802R4AN | 800V | 5.0A | 2.40 $\Omega$ |
| APT752R4AN | 750V | 5.0A | 2.40 $\Omega$ |
| APT802R8AN | 800V | 4.5A | 2.80 $\Omega$ |
| APT752R8AN | 750V | 4.5A | 2.80 $\Omega$ |

## POWER MOS IV™

### N - CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS

#### MAXIMUM RATINGS

All Ratings:  $T_C = 25^\circ\text{C}$  unless otherwise specified.

| Symbol                            | Parameter                                                             | APT         |         |         |         | UNIT  |
|-----------------------------------|-----------------------------------------------------------------------|-------------|---------|---------|---------|-------|
|                                   |                                                                       | 752R4AN     | 802R4AN | 752R8AN | 802R8AN |       |
| V <sub>DSS</sub>                  | Drain-Source Voltage                                                  | 750         | 800     | 750     | 800     | Volts |
| I <sub>D</sub>                    | Continuous Drain Current                                              | 5.0         |         | 4.5     |         | Amps  |
| I <sub>DM</sub>                   | Pulsed Drain Current <sup>1</sup>                                     | 20          |         | 18      |         | Amps  |
| V <sub>GS</sub>                   | Gate-Source Voltage                                                   | ±30         |         |         |         | Volts |
| P <sub>D</sub>                    | Total Power Dissipation @ T <sub>C</sub> = 25°C,<br>Derate Above 25°C | 150         |         |         |         | Watts |
| T <sub>J</sub> , T <sub>STG</sub> | Operating and Storage Junction Temperature Range                      | - 55 to 150 |         |         |         | °C    |

#### STATIC ELECTRICAL CHARACTERISTICS

| Symbol       | Characteristic / Test Conditions / Part Number                                                              |                         | MIN | TYP | MAX       | UNIT          |
|--------------|-------------------------------------------------------------------------------------------------------------|-------------------------|-----|-----|-----------|---------------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage<br>( $V_{GS} = 0V, I_D = 250 \mu\text{A}$ )                                  | APT802R4AN / APT802R8AN | 800 |     |           | Volts         |
|              |                                                                                                             | APT752R4AN / APT752R8AN | 750 |     |           | Volts         |
| $I_{DSS}$    | Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )                                         |                         |     |     | 250       | $\mu\text{A}$ |
|              | ( $V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )                                            |                         |     |     | 1000      |               |
| $I_{GSS}$    | Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )                                             |                         |     |     | $\pm 100$ | nA            |
| $I_{D(ON)}$  | On State Drain Current <sup>2</sup><br>( $V_{DS} > I_{D(ON)} \times R_{DS(ON)} \text{ Max}, V_{GS} = 10V$ ) | APT802R4AN / APT752R4AN | 5.0 |     |           | Amps          |
|              |                                                                                                             | APT802R8AN / APT752R8AN | 4.5 |     |           | Amps          |
| $V_{GS(TH)}$ | Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 1\text{mA}$ )                                              |                         | 2   |     | 4         | Volts         |
| $R_{DS(ON)}$ | Static Drain-Source On-State Resistance <sup>2</sup><br>( $V_{GS} = 10V, I_D = 0.5 I_D [\text{Cont.}]$ )    | APT802R4AN / APT752R4AN |     |     | 2.40      | Ohms          |
|              |                                                                                                             | APT802R8AN / APT752R8AN |     |     | 2.80      | Ohms          |

#### THERMAL CHARACTERISTICS

| Symbol          | Characteristic                                                         | MIN | TYP | MAX  | UNIT               |
|-----------------|------------------------------------------------------------------------|-----|-----|------|--------------------|
| $R_{\theta JC}$ | Junction to Case                                                       |     |     | 0.85 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Junction to Ambient                                                    |     |     | 30   | $^\circ\text{C/W}$ |
| $T_L$           | Max. Lead Temp. for Soldering Conditions: 0.063" from Case for 10 Sec. |     |     | 300  | $^\circ\text{C}$   |

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| Symbol       | Characteristic                 | Test Conditions                                                                         | MIN | TYP | MAX | UNIT |
|--------------|--------------------------------|-----------------------------------------------------------------------------------------|-----|-----|-----|------|
| $C_{iss}$    | Input Capacitance              | $V_{GS} = 0V$<br>$V_{DS} = 25V$<br>$f = 1 \text{ MHz}$                                  |     | 790 | 950 | pF   |
| $C_{oss}$    | Output Capacitance             |                                                                                         |     | 116 | 163 | pF   |
| $C_{rss}$    | Reverse Transfer Capacitance   |                                                                                         |     | 44  | 66  | pF   |
| $Q_g$        | Total Gate Charge <sup>3</sup> | $V_{GS} = 10V, I_D = I_D [\text{Cont.}]$<br>$V_{DD} = 0.5 V_{DSS}$                      |     | 38  | 55  | nC   |
| $Q_{gs}$     | Gate-Source Charge             |                                                                                         |     | 4.5 | 7   | nC   |
| $Q_{gd}$     | Gate-Drain ("Miller") Charge   |                                                                                         |     | 16  | 24  | nC   |
| $t_{d(on)}$  | Turn-on Delay Time             | $V_{DD} = 0.5 V_{DSS}$<br>$I_D = I_D [\text{Cont.}], V_{GS} = 15V$<br>$R_G = 1.8\Omega$ |     | 10  | 20  | ns   |
| $t_r$        | Rise Time                      |                                                                                         |     | 11  | 21  | ns   |
| $t_{d(off)}$ | Turn-off Delay Time            |                                                                                         |     | 35  | 53  | ns   |
| $t_f$        | Fall Time                      |                                                                                         |     | 13  | 26  | ns   |

### SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol   | Characteristic / Test Conditions / Part Number                                  | MIN                     | TYP | MAX | UNIT    |
|----------|---------------------------------------------------------------------------------|-------------------------|-----|-----|---------|
| $I_S$    | Continuous Source Current (Body Diode)                                          | APT802R4AN / APT752R4AN |     | 5.0 | Amps    |
|          |                                                                                 | APT802R8AN / APT752R8AN |     | 4.5 | Amps    |
| $I_{SM}$ | Pulsed Source Current <sup>1</sup> (Body Diode)                                 | APT802R4AN / APT752R4AN |     | 20  | Amps    |
|          |                                                                                 | APT802R8AN / APT752R8AN |     | 18  | Amps    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup> ( $V_{GS} = 0V, I_S = -I_D [\text{Cont.}]$ ) |                         |     | 1.3 | Volts   |
| $t_{rr}$ | Reverse Recovery Time ( $I_S = -I_D [\text{Cont.}], di_S/dt = 100A/\mu s$ )     | 160                     | 320 | 640 | ns      |
| $Q_{rr}$ | Reverse Recovery Charge                                                         | 1.5                     | 3.0 | 6.0 | $\mu C$ |

### SAFE OPERATING AREA CHARACTERISTICS

| Symbol   | Characteristic            | Test Conditions / Part Number                                                        | MIN | TYP | MAX | UNIT  |
|----------|---------------------------|--------------------------------------------------------------------------------------|-----|-----|-----|-------|
| SOA1     | Safe Operating Area       | $V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 \text{ Sec.}$               | 150 |     |     | Watts |
| SOA2     | Safe Operating Area       | $I_{DS} = I_D [\text{Cont.}], V_{DS} = P_D / I_D [\text{Cont.}], t = 1 \text{ Sec.}$ | 150 |     |     | Watts |
| $I_{LM}$ | Inductive Current Clamped | APT802R4AN / APT752R4AN                                                              | 20  |     |     | Amps  |
|          |                           | APT802R8AN / APT752R8AN                                                              | 18  |     |     | Amps  |

1.) Repetitive Rating: Pulse width limited by maximum junction temperature. See Transient Thermal Impedance Curve. (Fig.1)

2.) Pulse Test: Pulse width < 380  $\mu s$   
Duty Cycle < 2%  
3.) See MIL-STD-750 Method 3471

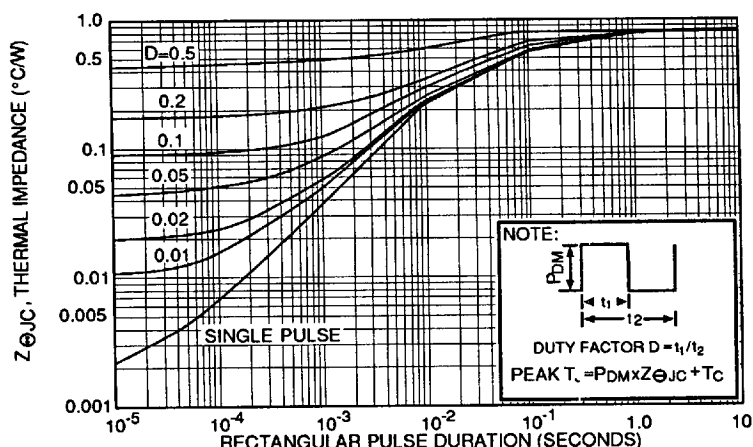


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

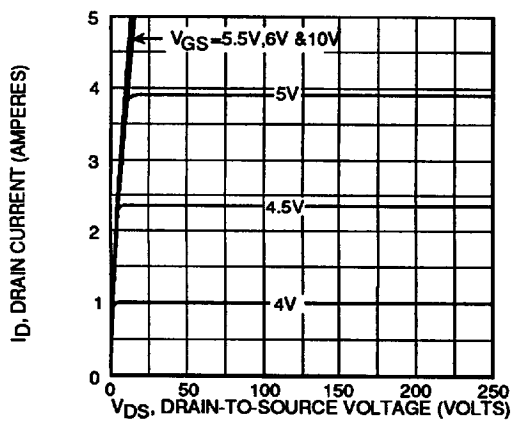


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

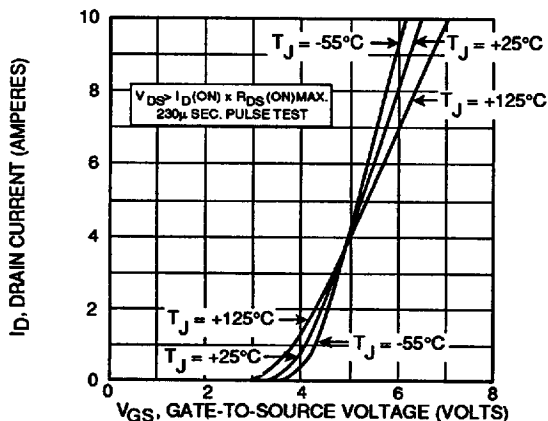


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

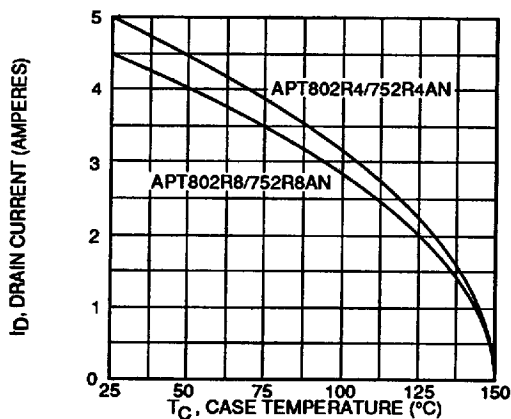


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

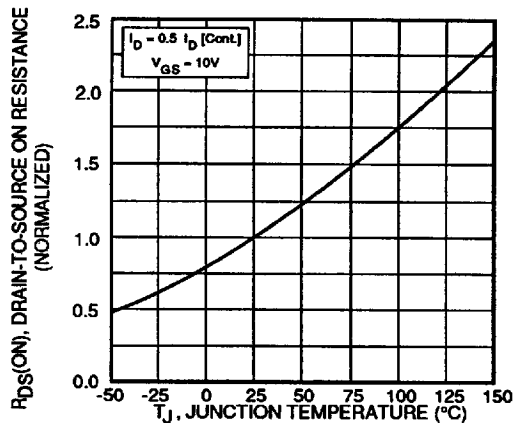


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

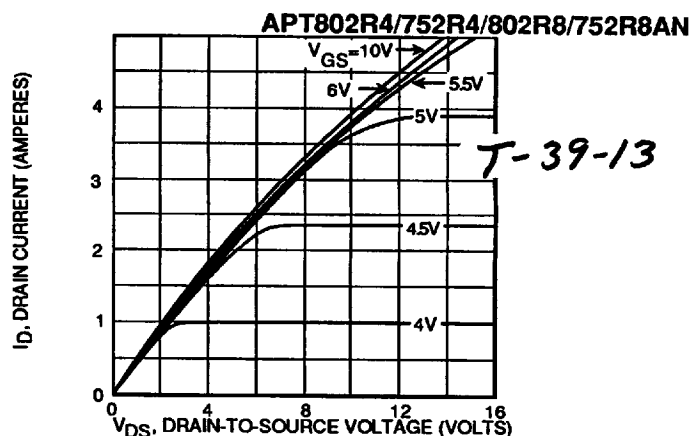


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

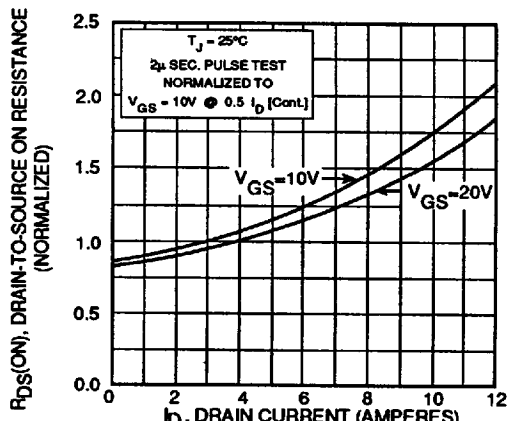


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

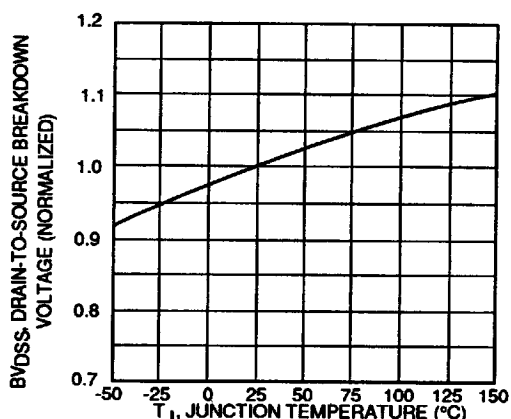


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

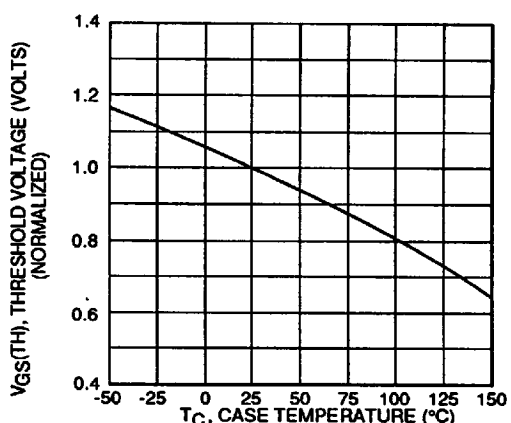
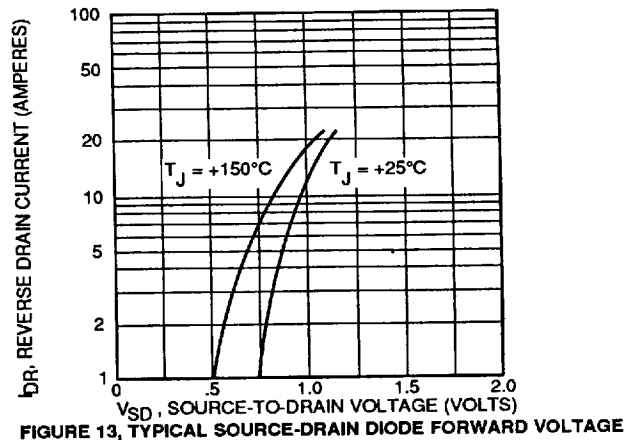
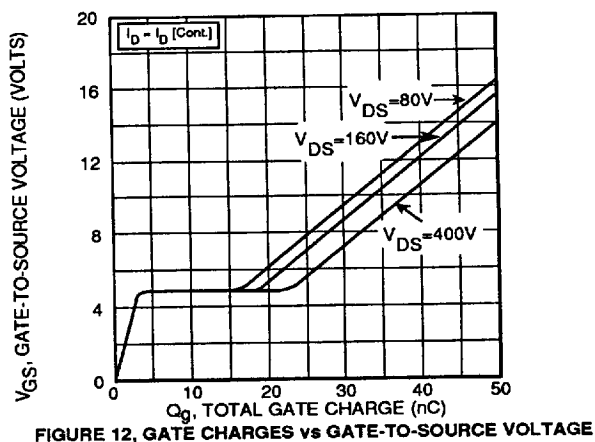
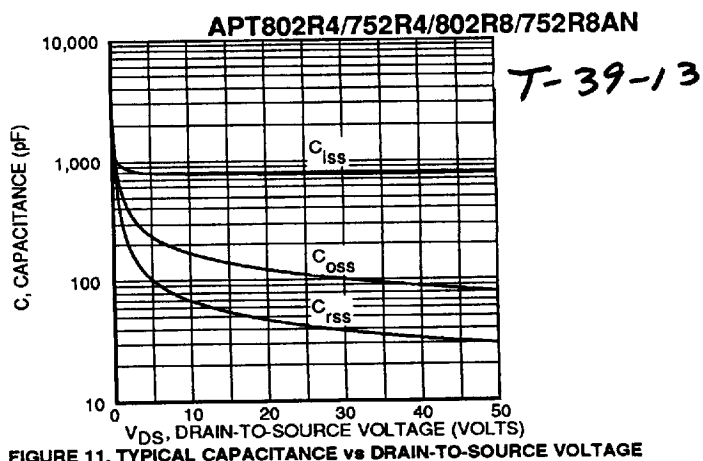
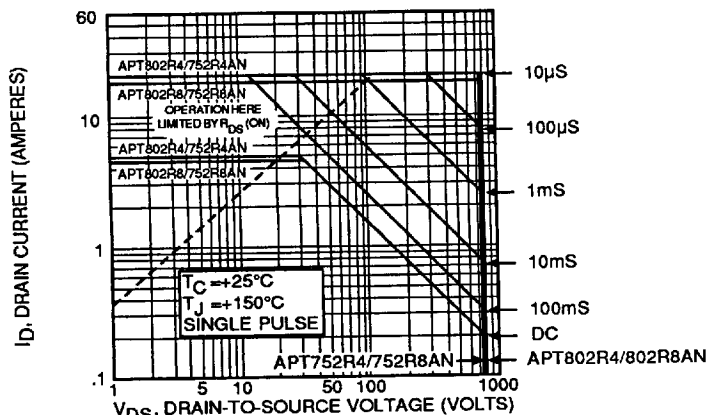
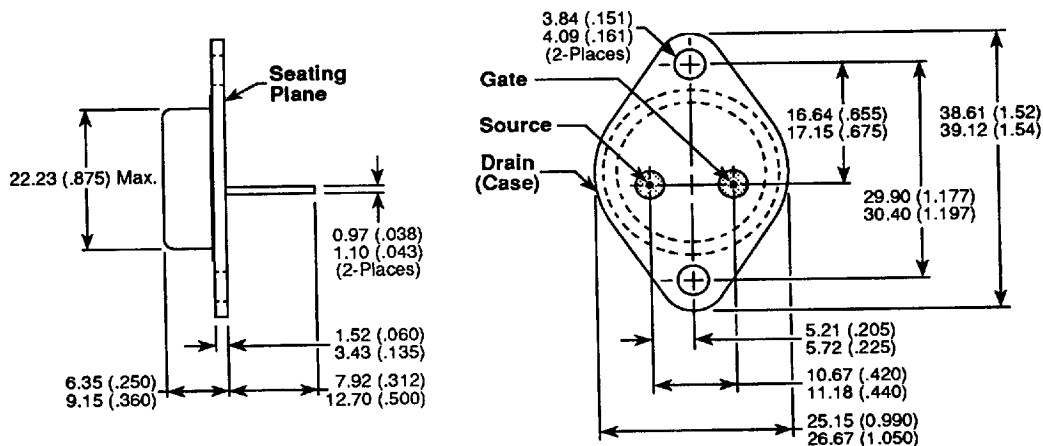


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE



### TO-3 Package Outline (TO-204AA)



Dimensions in Millimeters and (Inches)