

|            |      |      |       |
|------------|------|------|-------|
| APT801R2BN | 800V | 9.0A | 1.20Ω |
| APT751R2BN | 750V | 9.0A | 1.20Ω |
| APT801R4BN | 800V | 8.5A | 1.40Ω |
| APT751R4BN | 750V | 8.5A | 1.40Ω |

## 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  |
|-----------------------------------|-----------------------------------------------------------------------|-------------|---------|---------|---------|-------|
|                                   |                                                                       | 751R2BN     | 801R2BN | 751R4BN | 801R4BN |       |
| V <sub>DSS</sub>                  | Drain-Source Voltage                                                  | 750         | 800     | 750     | 800     | Volts |
| I <sub>D</sub>                    | Continuous Drain Current                                              | 9.0         |         | 8.5     |         | Amps  |
| I <sub>DM</sub>                   | Pulsed Drain Current ①                                                | 36          |         | 34      |         | 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 | 240         |         |         |         | 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>( $V_{GS} = 0V, I_D = 250 \mu A$ )                                | APT801R2BN / APT801R4BN | 800 |           | Volts   |
|              |                                                                                                     | APT751R2BN / APT751R4BN | 750 |           | Volts   |
| $I_{DSS}$    | Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )                                 |                         |     | 250       | $\mu A$ |
|              | ( $V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )                                    |                         |     | 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>( $V_{DS} > I_D(ON) \times R_{DS(ON)}$ Max, $V_{GS} = 10V$ ) | APT801R2BN / APT751R2BN | 9.0 |           | Amps    |
|              |                                                                                                     | APT801R4BN / APT751R4BN | 8.5 |           | Amps    |
| $V_{GS(TH)}$ | Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 1mA$ )                                             | 2                       |     | 4         | Volts   |
| $R_{DS(ON)}$ | Static Drain-Source On-State Resistance <sup>②</sup><br>( $V_{GS} = 10V, I_D = 0.5 I_D(ON)$ )       | APT801R2BN / APT751R2BN |     | 1.20      | Ohms    |
|              |                                                                                                     | APT801R4BN / APT751R4BN |     | 1.40      | Ohms    |

#### THERMAL CHARACTERISTICS

| Symbol          | Characteristic                                                         | MIN | TYP | MAX  | UNIT               |
|-----------------|------------------------------------------------------------------------|-----|-----|------|--------------------|
| $R_{\theta JC}$ | Junction to Case                                                       |     |     | 0.51 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Junction to Ambient                                                    |     |     | 40   | $^\circ\text{C/W}$ |
| $T_L$           | Max. Lead Temp. for Soldering Conditions: 0.063" from Case for 10 Sec. |     |     | 300  | $^\circ\text{C}$   |



**CAUTION:** These Devices are Sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

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Page 152

0257909 0001556 616

# DYNAMIC CHARACTERISTICS

APT801R2/751R2/801R4/751R4BN

| Symbol            | Characteristic                 | Test Conditions                                                                         | MIN | TYP  | MAX  | UNIT |
|-------------------|--------------------------------|-----------------------------------------------------------------------------------------|-----|------|------|------|
| $C_{iss}$         | Input Capacitance              | $V_{GS} = 0V$<br>$V_{DS} = 25V$<br>$f = 1 \text{ MHz}$                                  |     | 1500 | 1800 | pF   |
| $C_{oss}$         | Output Capacitance             |                                                                                         |     | 235  | 330  | pF   |
| $C_{rss}$         | Reverse Transfer Capacitance   |                                                                                         |     | 85   | 127  | pF   |
| $Q_g$             | Total Gate Charge <sup>③</sup> | $V_{GS} = 10V, I_D = I_D [\text{Cont.}]$<br>$V_{DD} = 0.5 V_{DSS}$                      |     | 68   | 105  | nC   |
| $Q_{gs}$          | Gate-Source Charge             |                                                                                         |     | 7.6  | 11   | nC   |
| $Q_{gd}$          | Gate-Drain ("Miller") Charge   |                                                                                         |     | 33   | 49   | nC   |
| $t_d(\text{on})$  | Turn-on Delay Time             | $V_{DD} = 0.5 V_{DSS}$<br>$I_D = I_D [\text{Cont.}], V_{GS} = 15V$<br>$R_G = 1.8\Omega$ |     | 13   | 26   | ns   |
| $t_r$             | Rise Time                      |                                                                                         |     | 15   | 29   | ns   |
| $t_d(\text{off})$ | Turn-off Delay Time            |                                                                                         |     | 54   | 81   | ns   |
| $t_f$             | Fall Time                      |                                                                                         |     | 20   | 39   | ns   |

# SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol   | Characteristic / Test Conditions / Part Number                                  | MIN                     | TYP | MAX | UNIT    |
|----------|---------------------------------------------------------------------------------|-------------------------|-----|-----|---------|
| $I_S$    | Continuous Source Current (Body Diode)                                          | APT801R2BN / APT751R2BN |     | 9.0 | Amps    |
|          |                                                                                 | APT801R4BN / APT751R4BN |     | 8.5 | Amps    |
| $I_{SM}$ | Pulsed Source Current <sup>①</sup> (Body Diode)                                 | APT801R2BN / APT751R2BN |     | 36  | Amps    |
|          |                                                                                 | APT801R4BN / APT751R4BN |     | 34  | 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 ( $I_S = -I_D [\text{Cont.}], di_S/dt = 100A/\mu s$ )     | 240                     | 480 | 960 | ns      |
| $Q_{rr}$ | Reverse Recovery Charge                                                         | 1.7                     | 3.4 | 7   | $\mu C$ |

# SAFE OPERATING AREA CHARACTERISTICS

| Symbol   | Characteristic            | Test Conditions / Part Number                                                        | MIN | TYP | MAX | UNIT  |
|----------|---------------------------|--------------------------------------------------------------------------------------|-----|-----|-----|-------|
| SOA1     | Safe Operating Area       | $V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 \text{ Sec.}$               | 240 |     |     | Watts |
| SOA2     | Safe Operating Area       | $I_{DS} = I_D [\text{Cont.}], V_{DS} = P_D / I_D [\text{Cont.}], t = 1 \text{ Sec.}$ | 240 |     |     | Watts |
| $I_{LM}$ | Inductive Current Clamped | APT801R2BN / APT751R2BN                                                              | 36  |     |     | Amps  |
|          |                           | APT801R4BN / APT751R4BN                                                              | 34  |     |     | 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

APT Reserves the right to change, without notice, the specifications and information contained herein.

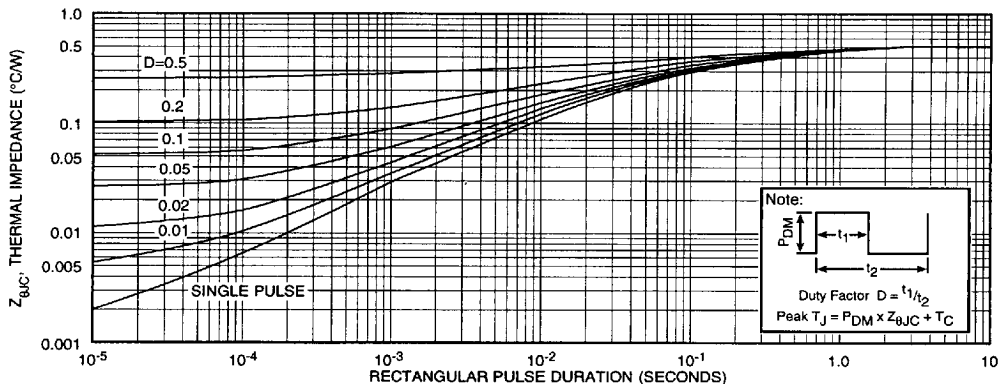


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Page 153

0257909 0001557 552

# APT801R2/751R2/801R4/751R4BN

$I_D$ , DRAIN CURRENT (AMPERES)

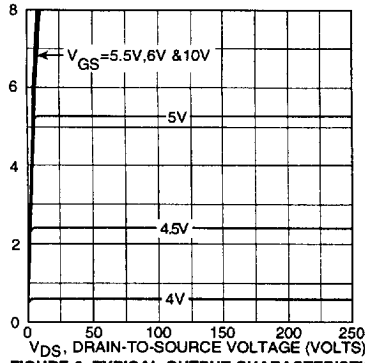


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

$I_D$ , DRAIN CURRENT (AMPERES)

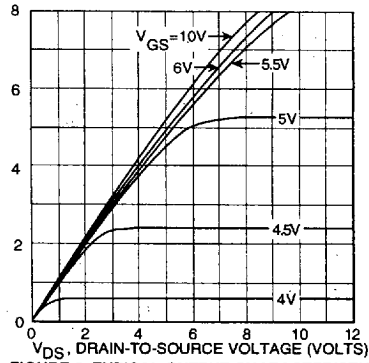


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

$I_D$ , DRAIN CURRENT (AMPERES)

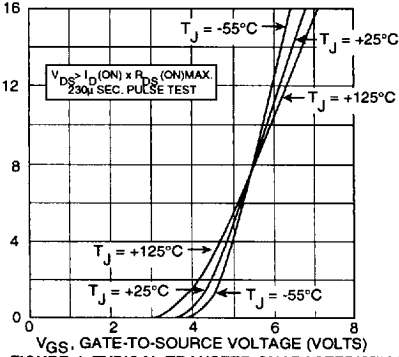


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

$R_{DS(ON)}$ , DRAIN-TO-SOURCE ON RESISTANCE (NORMALIZED)

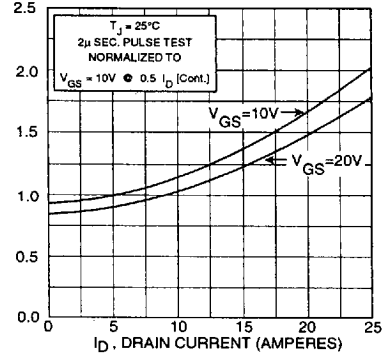


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

$I_D$ , DRAIN CURRENT (AMPERES)

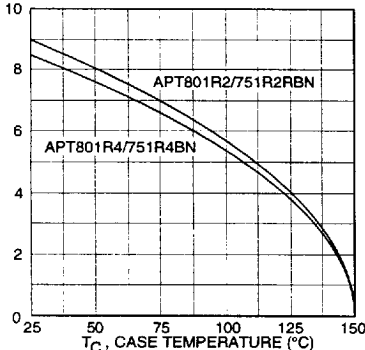


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

$BV_{DSS}$ , DRAIN-TO-SOURCE BREAKDOWN VOLTAGE (NORMALIZED)

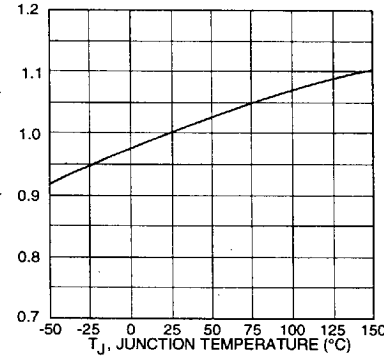


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

$R_{DS(ON)}$ , DRAIN-TO-SOURCE ON RESISTANCE (NORMALIZED)

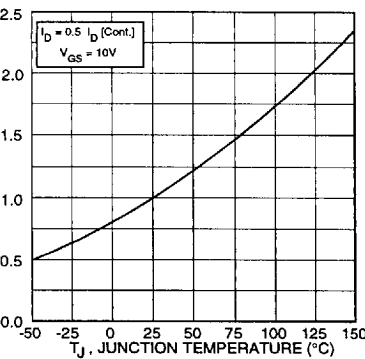


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

$V_{GS(TH)}$ , THRESHOLD VOLTAGE (NORMALIZED)

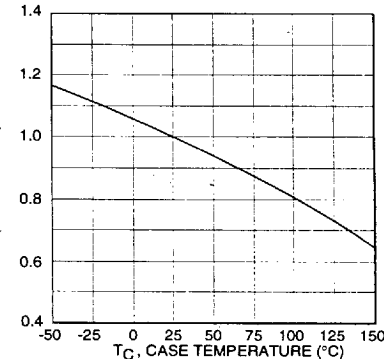
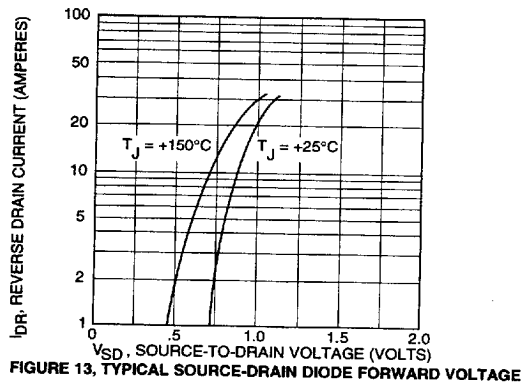
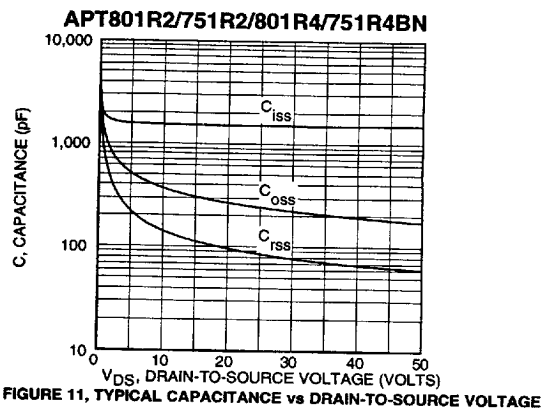
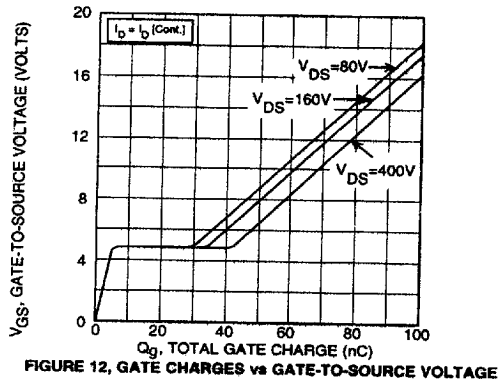
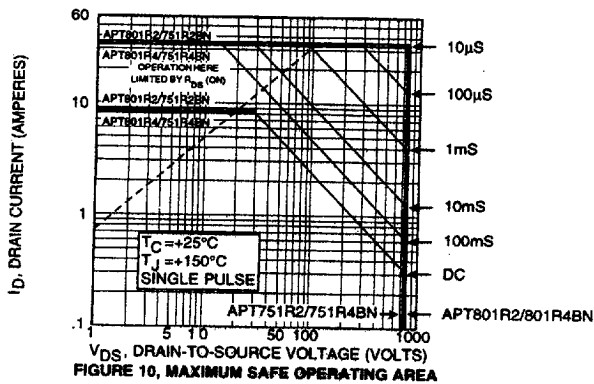
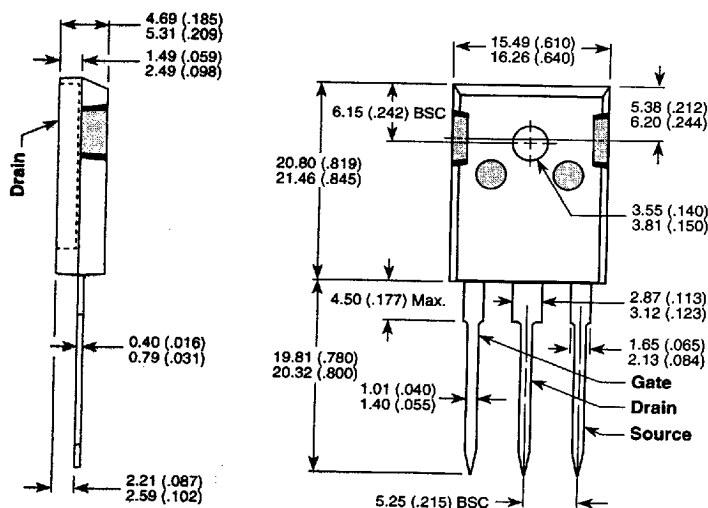


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE



### TO-247AD Package Outline



Dimensions in Millimeters and (Inches)  
Page 155

0257909 0001559 325