

**ADVANCED  
POWER  
TECHNOLOGY**

T-39-15

APT40M42BFN 400V 95.0A 0.042  
APT35M42BFN 350V 95.0A 0.042

## 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                                                                            | APT35M42BFN | APT40M42BFN | UNIT             |
|----------------|--------------------------------------------------------------------------------------|-------------|-------------|------------------|
| $V_{DSS}$      | Drain-Source Voltage                                                                 | 350         | 400         | Volt             |
| $I_D$          | Continuous Drain Current                                                             | 95          |             | Amps             |
| $I_{DM}$       | Pulsed Drain Current <sup>1</sup>                                                    | 380         |             | Amps             |
| $V_{GS}$       | Gate-Source Voltage                                                                  | $\pm 30$    |             | Volt             |
| $P_D$          | Total Power Dissipation @ $T_C = 25^\circ\text{C}$ , Derate Above $25^\circ\text{C}$ | 830         |             | Watts            |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range                                     | -55 to 150  |             | $^\circ\text{C}$ |

#### STATIC ELECTRICAL CHARACTERISTICS

| Symbol       | Characteristic / Test Conditions                                                                     | MIN                               | TYP | MAX       | UNIT          |
|--------------|------------------------------------------------------------------------------------------------------|-----------------------------------|-----|-----------|---------------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250 \mu\text{A}$ )                              | APT40M42BFN 400<br>APT35M42FN 350 |     |           | Volt          |
| $I_{DSS}$    | Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )                                  |                                   |     | 250       | $\mu\text{A}$ |
|              | ( $V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 25^\circ\text{C}$ )                                      |                                   |     | 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> ( $V_{DS} > I_D(ON) \times R_{DS(ON)}$ Max, $V_{GS} = 10V$ )     | 95                                |     |           | 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> ( $V_{GS} = 10V, I_D = 0.5 I_D(\text{Cont.})$ ) |                                   |     | 0.042     | Ohms          |

#### THERMAL CHARACTERISTICS

| Symbol          | Characteristic                                                         | MIN | TYP | MAX  | UNIT               |
|-----------------|------------------------------------------------------------------------|-----|-----|------|--------------------|
| $R_{\theta JC}$ | Junction to Case                                                       |     |     | 0.15 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Junction to Ambient                                                    |     |     | 20   | $^\circ\text{C/W}$ |
| $T_L$           | Max. Lead Temp. for Soldering Conditions: 0.063" from Case for 10 Sec. |     |     | 300  | $^\circ\text{C}$   |

405 S.W. COLUMBIA STREET  
BEND, OREGON 97702-1035  
U.S.A.

PHONE ... (503) 382-8028

FAX ..... (503) 388-0344

# DYNAMIC CHARACTERISTICS

APT40M42/35M42BFN

| Symbol       | Characteristic                 | Test Conditions                                                                   | MIN | TYP   | MAX   | UNIT |
|--------------|--------------------------------|-----------------------------------------------------------------------------------|-----|-------|-------|------|
| $C_{iss}$    | Input Capacitance              | $V_{GS} = 0V$<br>$V_{DS} = 25V$<br>$f = 1 \text{ MHz}$                            |     | 11176 | 13000 | pF   |
| $C_{oss}$    | Output Capacitance             |                                                                                   |     | 2520  | 3528  | pF   |
| $C_{res}$    | Reverse Transfer Capacitance   |                                                                                   |     | 996   | 1494  | pF   |
| $Q_g$        | Total Gate Charge <sup>3</sup> | $V_{GS} = 10V, I_D = I_D [\text{Cont}]$<br>$V_{DD} = 0.5 V_{DSS}$                 |     | 476   | 675   | nC   |
| $Q_{gs}$     | Gate-Source Charge             |                                                                                   |     | 60    | 90    | nC   |
| $Q_{gd}$     | Gate-Drain ("Miller") Charge   |                                                                                   |     | 243   | 364   | 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>$R_G = 0.6$ |     | 20    | 40    | ns   |
| $t_r$        | Rise Time                      |                                                                                   |     | 46    | 92    | ns   |
| $t_{d(off)}$ | Turn-off Delay Time            |                                                                                   |     | 123   | 184   | ns   |
| $t_f$        | Fall Time                      |                                                                                   |     | 66    | 132   | ns   |

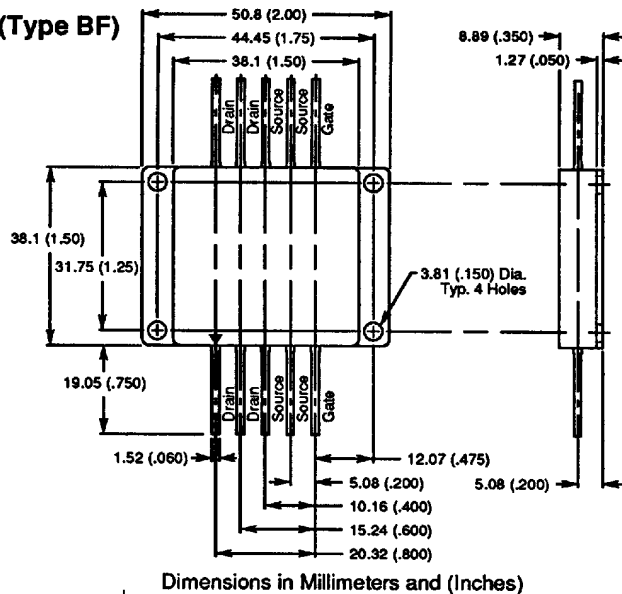
## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Symbol   | Characteristic / Test Conditions                                                | MIN | TYP | MAX  | UNIT    |
|----------|---------------------------------------------------------------------------------|-----|-----|------|---------|
| $I_S$    | Continuous Source Current (Body Diode)                                          |     |     | 95   | Amps    |
| $I_{SM}$ | Pulsed Source Current <sup>1</sup> (Body Diode)                                 |     |     | 380  | Amps    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup> ( $V_{GS} = 0V, I_S = -I_D [\text{Cont.}]$ ) |     |     | 1.8  | Volts   |
| $t_{rr}$ | Reverse Recovery Time ( $I_S = -I_D [\text{Cont.}]$ $dI_S/dt = 100A/\mu s$ )    | 345 | 695 | 1200 | ns      |
| $Q_{rr}$ | Reverse Recovery Charge                                                         | 14  | 28  | 56   | $\mu C$ |

## FE OPERATING AREA CHARACTERISTICS

| Symbol   | Characteristic            | Test Conditions                                                                      | MIN | TYP | MAX | UNIT  |
|----------|---------------------------|--------------------------------------------------------------------------------------|-----|-----|-----|-------|
| SOA1     | Safe Operating Area       | $V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 \text{ Sec.}$               | 830 |     |     | Watts |
| SOA2     | Safe Operating Area       | $I_{DS} = I_D [\text{Cont.}], V_{DS} = P_D / I_D [\text{Cont.}], t = 1 \text{ Sec.}$ | 830 |     |     | Watts |
| $I_{LM}$ | Inductive Current Clamped |                                                                                      | 380 |     |     | Amps  |

## F-pack Package Outline (Type BF)



- 1.) Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2.) Pulse Test: Pulse width < 380  $\mu s$   
Duty Cycle < 2%
- 3.) See MIL-STD-750 Method 3471