



# POWER-MOS FET

## FIELD EFFECT POWER TRANSISTOR

**VN40AFA**  
**Series**

**1.2 AMPERES**  
**40-80 VOLTS**  
**R<sub>DS(ON)</sub> = 3.5-5.0 Ω**

This series of N-Channel Enhancement-mode Power MOSFETs utilizes GE's advanced Power DMOS technology to achieve low on-resistance with excellent device ruggedness and reliability.

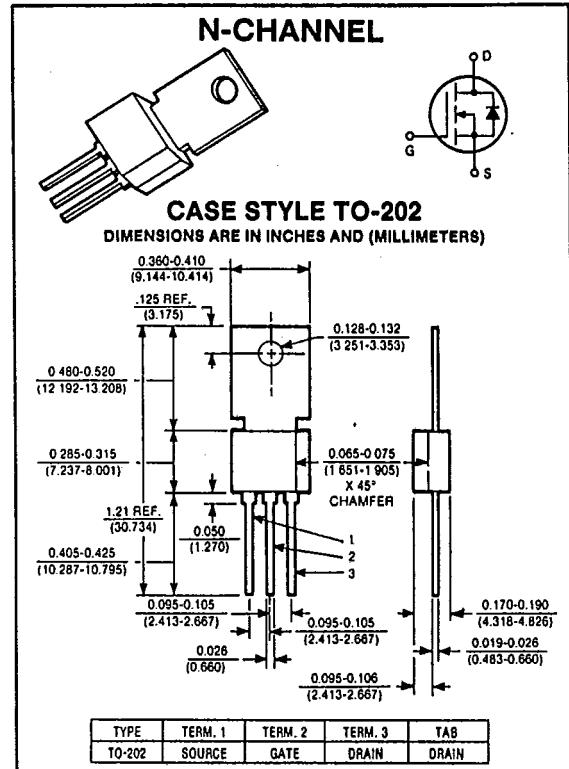
This design has been optimized to give superior performance in most switching applications including: switching power supplies, inverters, converters and solenoid/relay drivers. Also, the extended safe operating area with good linear transfer characteristics makes it well suited for many linear applications such as audio amplifiers and servo motors.

### Applications

- Switching power supplies
- DC to DC inverters
- CMOS and TTL to high current interface
- Line drivers
- Logic buffers
- Pulse amplifiers

### Features

- High speed, high current switching
- Current sharing capability when paralleled
- Directly interface to CMOS, DTL, TTL logic
- Simple DC biasing
- Extended safe operating area
- Inherently temperature stable



maximum ratings ( $T_A = 25^\circ\text{C}$ ) (unless otherwise specified)

| RATING  | SYMBOL         | VN40AFA    | VN67AFA    | VN89AFA    | UNITS                         |
|---|----------------|------------|------------|------------|-------------------------------|
| Drain-Source Voltage  | $V_{DSS}$      | 40         | 60         | 80         | Volts                         |
| Drain-Gate Voltage, $R_{GS} = 1M\Omega$   | $V_{DGR}$      | 40         | 60         | 80         | Volts                         |
| Continuous Drain Current @ $T_A = 25^\circ\text{C}$                                   | $I_D$          | 1.2        | 1.2        | 1.2        | A                             |
| Peak Drain Current <sup>(1)</sup>   | $I_{DM}$       | 3.0        | 3.0        | 3.0        | A                             |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 30$   | $\pm 30$   | $\pm 30$   | Volts                         |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate Above $25^\circ\text{C}$ | $P_D$          | 12<br>96   | 12<br>96   | 12<br>96   | Watts<br>mW/ $^\circ\text{C}$ |
| Operating and Storage<br>Junction Temperature Range                                   | $T_J, T_{STG}$ | -40 to 150 | -40 to 150 | -40 to 150 | $^\circ\text{C}$              |

### thermal characteristics

| Parameter  | Symbol          | VN40AFA | VN67AFA | VN89AFA | Units              |
|--|-----------------|---------|---------|---------|--------------------|
| Thermal Resistance, Junction to Ambient  | $R_{\theta JA}$ | 10.4    | 10.4    | 10.4    | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering<br>Purposes: 1/16" from Case for 10 Seconds | $T_L$           | 300     | 300     | 300     | $^\circ\text{C}$   |

(1) Repetitive Rating: Pulse width limited by max. junction temperature.

off characteristics

|  |                               |            |                |             |             |         |
|--|-------------------------------|------------|----------------|-------------|-------------|---------|
| Drain-Source Breakdown Voltage<br>( $V_{GS} = 0V, I_D = 10 \mu A$ )  | VN40AFA<br>VN67AFA<br>VN89AFA | $BV_{DSS}$ | 40<br>60<br>80 | —<br>—<br>— | —<br>—<br>— | Volts   |
| Zero Gate Voltage Drain Current<br>( $V_{DS} = \text{Max Rating}, V_{GS} = 0V$ )<br>( $V_{DS} = \text{Max Rating}, \times 0.8, V_{GS} = 0V, T_A = 125^\circ C$ ) |                               | $I_{DSS}$  | —<br>—         | —<br>—      | 10<br>100   | $\mu A$ |
| Gate-Source Leakage Current<br>( $V_{GS} = 15V, V_{DS} = 0V$ )<br>( $V_{GS} = 15V, V_{DS} = 0V - T_A = 125^\circ C$ )  |                               | $I_{GSS}$  | —<br>—         | —<br>—      | 100<br>500  | nA      |

on characteristics\*

|   |                               |              |                   |                   |                   |       |
|---|-------------------------------|--------------|-------------------|-------------------|-------------------|-------|
| Gate Threshold Voltage<br>( $V_{DS} = V_{GS}, I_D = 1 \text{ mA}$ )           | VN40AFA<br>VN67AFA<br>VN89AFA | $V_{GS(TH)}$ | 0.6<br>0.8<br>0.8 | 1.2<br>1.2<br>1.2 | —<br>—<br>—       | Volts |
| Drain-Source Saturation Voltage<br>( $V_{GS} = 5V, I_D = 0.3A$ )              | VN40AFA<br>VN67AFA<br>VN89AFA | $V_{DS(ON)}$ | —<br>—<br>—       | —<br>—<br>—       | 2.0<br>1.7<br>1.9 | V     |
| Drain-Source Saturation Voltage<br>( $V_{GS} = 10V, I_D = 1.0A$ )             | VN40AFA<br>VN67AFA<br>VN89AFA | $V_{DS(ON)}$ | —<br>—<br>—       | —<br>—<br>—       | 5.0<br>3.5<br>4.5 | V     |
| On-State Drain Current<br>( $V_{DS} = 25V, V_{GS} = 10V$ )                    |                               | $I_{D(ON)}$  | 1                 | —                 | —                 | A     |
| Forward Transconductance<br>( $V_{DS} = 24V, I_D = 0.5A, f = 1 \text{ KHz}$ ) |                               | $g_{fs}$     | —                 | .25               | —                 | mhos  |

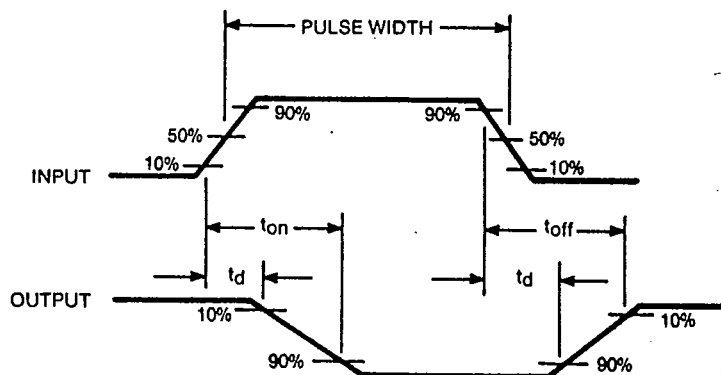
dynamic characteristics

|                              |                     |           |   |   |    |    |
|------------------------------|---------------------|-----------|---|---|----|----|
| Input Capacitance            | $V_{GS} = 0V$       | $C_{iss}$ | — | — | 50 | pF |
| Output Capacitance           | $V_{DS} = 25V$      | $C_{oss}$ | — | — | 50 | pF |
| Reverse Transfer Capacitance | $f = 1 \text{ MHz}$ | $C_{rss}$ | — | — | 10 | pF |

switching characteristics\*

|                     |                                    |              |   |   |   |    |
|---------------------|------------------------------------|--------------|---|---|---|----|
| Turn-on Delay Time  | See switching times waveform below | $t_{d(on)}$  | — | 2 | 5 | ns |
| Rise Time           |                                    | $T_r$        | — | 2 | 5 | ns |
| Turn-off Delay Time |                                    | $t_{d(off)}$ | — | 2 | 5 | ns |
| Fall Time           |                                    | $t_f$        | — | 2 | 5 | ns |

\*Pulse Test: Pulse width  $\leq 300 \mu s$ , duty cycle  $\leq 2\%$



SWITCHING TIME TEST WAVEFORMS