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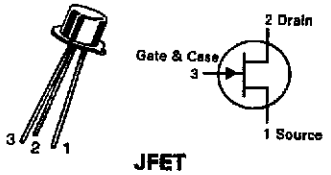
# 2N4856, A thru 2N4861, A

**2N4856, 2N4857, 2N4858**
**JAN, JTX, JTXV AVAILABLE**

**CASE 22-03, STYLE 4**
**TO-18 (TO-206AA)**




**JFET**
**SWITCHING**

**N-CHANNEL — DEPLETION**

**MAXIMUM RATINGS**

| Rating | Symbol | 2N4856,A 2N4857,A 2N4858,A | 2N4859,A 2N4860,A 2N4861,A | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | +40 | +30 | Vdc |
| Drain-Gate Voltage | $V_{DG}$ | +40 | +30 | Vdc |
| Reverse Gate-Source Voltage | $V_{GSR}$ | −40 | −30 | Vdc |
| Forward Gate Current | $I_{GF}$ | 50 | | mAdc |
| Total Device Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 360<br>2.4 | | mW<br>mW/°C |
| Storage Temperature Range | $T_{stg}$ | −65 to +175 | | °C |

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted.)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Gate-Source Breakdown Voltage ($I_G$ = 1.0 μAdc, $V_{DS}$ = 0) | 2N4856,A, 2N4857,A, 2N4858,A | $V_{(BR)GSS}$ | −40 | — | Vdc |
| | 2N4859,A, 2N4860,A, 2N4861,A | | −30 | — | |
| Gate Reverse Current | | $I_{GSS}$ | | | |
| ($V_{GS}$ = −20 Vdc, $V_{DS}$ = 0) | 2N4856,A 2N4857,A, 2N4858,A | | — | 0.25 | nAdc |
| ($V_{GS}$ = −15 Vdc, $V_{DS}$ = 0) | 2N4859,A, 2N4860,A, 2N4861,A | | — | 0.25 | |
| ($V_{GS}$ = −20 Vdc, $V_{DS}$ = 0, $T_A$ = 150°C) | 2N4856,A, 2N4857,A, 2N4858,A | | — | 0.5 | μAdc |
| ($V_{GS}$ = −15 Vdc, $V_{DS}$ = 0, $T_A$ = 150°C) | 2N4859,A, 2N4860,A, 2N4861,A | | — | 0.5 | |
| Gate Source Cutoff Voltage ($V_{DS}$ = 15 Vdc, $I_D$ = 0.5 nAdc) | 2N4856,A, 2N4859,A | $V_{GS(off)}$ | −4.0 | −10 | Vdc |
| | 2N4857,A, 2N4860,A | | −2.0 | −6.0 | |
| | 2N4858,A, 2N4861,A | | −0.8 | −4.0 | |
| Drain Cutoff Current | | $I_{D(off)}$ | | | |
| ($V_{DS}$ = 15 Vdc, $V_{GS}$ = −10 Vdc) | | | — | 0.25 | nAdc |
| ($V_{DS}$ = 15 Vdc, $V_{GS}$ = −10 Vdc, $T_A$ = 150°C) | | | — | 0.5 | μAdc |
| **ON CHARACTERISTICS** | | | | | |
| Zero-Gate-Voltage Drain Current(1) ($V_{DS}$ = 15 Vdc, $V_{GS}$ = 0) | 2N4856,A, 2N4859,A | $I_{DSS}$ | 50 | — | mAdc |
| | 2N4857,A, 2N4860,A | | 20 | 100 | |
| | 2N4858,A, 2N4861,A | | 8.0 | 80 | |
| Drain-Source On-Voltage | | $V_{DS(on)}$ | | | Vdc |
| ($I_D$ = 20 mAdc, $V_{GS}$ = 0) | 2N4856,A, 2N4859,A | | — | 0.75 | |
| ($I_D$ = 10 mAdc, $V_{GS}$ = 0) | 2N4857,A, 2N4860,A | | — | 0.5 | |
| ($I_D$ = 5.0 mAdc, $V_{GS}$ = 0) | 2N4858,A, 2N4861,A | | — | 0.5 | |
| **SMALL-SIGNAL CHARACTERISTICS** | | | | | |
| Drain-Source "ON" Resistance ($V_{GS}$ = 0, $I_D$ = 0, f = 1.0 kHz) | 2N4856,A, 2N4859,A | $r_{ds(on)}$ | — | 25 | Ohms |
| | 2N4857,A, 2N4860,A | | — | 40 | |
| | 2N4858,A, 2N4861,A | | — | 60 | |
| Input Capacitance ($V_{DS}$ = 0, $V_{GS}$ = −10 Vdc, f = 1.0 MHz) | 2N4856 thru 2N4861 | $C_{iss}$ | — | 18 | pF |
| | 2N4856A thru 2N4861A | | — | 10 | |
| Reverse Transfer Capacitance ($V_{DS}$ = 0, $V_{GS}$ = −10 Vdc, f = 1.0 MHz) | 2N4856 thru 2N4861 | $C_{rss}$ | — | 8.0 | pF |
| | 2N4856A, 2N4859A | | — | 4.0 | |
| | 2N4857A, 2N4858A, 2N4860A, 2N4861A | | — | 3.5 | |

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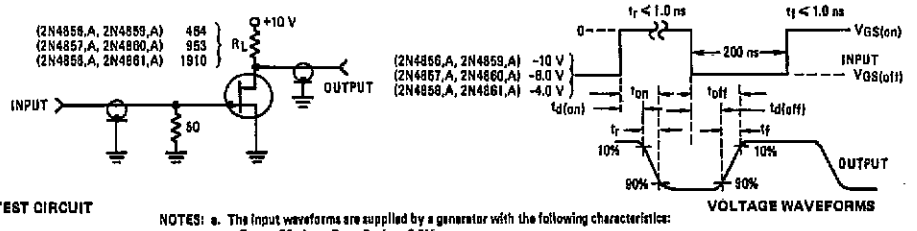
**ELECTRICAL CHARACTERISTICS** (continued) ($T_A$ = 25°C unless otherwise noted.)

| Characteristic | | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|---|
| **SWITCHING CHARACTERISTICS (See Figure 1) (2)** | | | | | | |
| Turn-On Delay Time | Conditions for 2N4856,A, 2N4859,A: | 2N4856, 2N4859 | $t_{d(on)}$ | — | 6.0 | ns |
| | | 2N4856A, 2N4859A | | — | 5.0 | |
| | ($V_{DD}$ = 10 Vdc, $I_{D(on)}$ = 20 mAdc, | 2N4857, 2N4860 | | — | 6.0 | |
| | $V_{GS(on)}$ = 0, $V_{GS(off)}$ = −10 Vdc) | 2N4857A, 2N4860A | | — | 6.0 | |
| | | 2N4858, 2N4861 | | — | 10 | |
| | | 2N4858A, 2N4861A | | — | 8.0 | |
| Rise Time | Conditions for 2N4857,A, 2N4860,A: | 2N4856,A, 2N4859,A | $t_r$ | — | 3.0 | ns |
| | | 2N4857,A, 2N4860,A | | — | 4.0 | |
| | ($V_{DD}$ = 10 Vdc, $I_{D(on)}$ = 10 mAdc, | 2N4858, 2N4861 | | — | 10 | |
| | $V_{GS(on)}$ = 0, $V_{GS(off)}$ = −6.0 Vdc) | 2N4858A, 2N4861A | | — | 8.0 | |
| Turn-Off Time | | 2N4856, 2N4859 | $t_{off}$ | — | 25 | ns |
| | Conditions for 2N4858,A, 2N4861,A: | 2N4856A, 2N4859A | | — | 20 | |
| | | 2N4857, 2N4860 | | — | 50 | |
| | ($V_{DD}$ = 10 Vdc, $I_{D(on)}$ = 5.0 mAdc, | 2N4857A, 2N4860A | | — | 40 | |
| | $V_{GS(on)}$ = 0, $V_{GS(off)}$ = −4.0 Vdc) | 2N4858, 2N4861 | | — | 100 | |
| | | 2N4858A; 2N4861A | | — | 80 | |

(1) Pulse Test: Pulse Width = 100 ms, Duty Cycle ≤ 10%.
(2) The $I_{D(on)}$ values are nominal; exact values vary slightly with transistor parameters.

**FIGURE 1 – SWITCHING TIMES TEST CIRCUIT**




NOTES: a. The input waveforms are supplied by a generator with the following characteristics:
$Z_{out}$ = 50 ohms, Duty Cycle ≈ 2.0%.
b. Waveforms are monitored on an oscilloscope with the following characteristics:
$t_r$ ≤ 0.75 ns, $R_{in}$ ≥ 1.0 megohm, $C_{in}$ ≤ 2.5 pF.