

N-Channel JFETs

| PRODUCT SUMMARY | | | | | | |
|------------------------|-------------------|-----------------------|--------------------|-------------------------------|-----------------------------|-------------------|
| Part Number | $V_{GS(off)}$ (V) | $V_{(BR)GSS}$ Min (V) | I_{DSS} Min (mA) | $r_{DS(on)}$ Max (Ω) | $I_{D(off)}$ Typ (μ A) | t_{ON} Typ (ns) |
| 2N4856A | -4 to -10 | -40 | 50 | 25 | 5 | 4 |
| 2N4857A | -2 to -6 | -40 | 20 | 40 | 5 | 4 |
| 2N4858A | -0.8 to -4 | -40 | 8 | 60 | 5 | 4 |

FEATURES

- Low On-Resistance: 2N4856A <math><25 \Omega</math>
- Fast Switching— t_{ON} : 4 ns
- High Off-Isolation— $I_{D(off)}$: 5 μ A
- Low Capacitance: 3 pF
- Low Insertion Loss

BENEFITS

- Low Error Voltage
- High-Speed Analog Circuit Performance
- Negligible "Off-Error," Excellent Accuracy
- Good Frequency Response
- Eliminates Additional Buffering

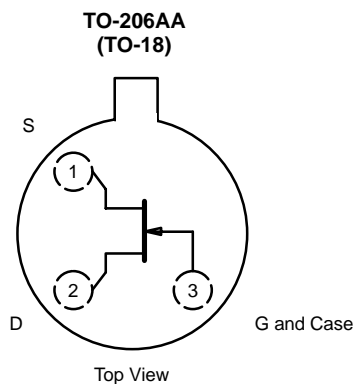
APPLICATIONS

- Analog Switches
- Choppers
- Sample-and-Hold
- Normally "On" Switches
- Current Limiters

DESCRIPTION

The 2N4856A/4857A/4858A all-purpose JFET analog switches offer low on-resistance, low capacitance, good isolation, and fast switching.

Hermetically-sealed TO-206AA (TO-18) packaging allows full military processing (see Military Information). For similar products in TO-226AA (TO-92) and SOT-23 packages, see the J/SST111 series data sheet. For similar duals, see the 2N5564/5565/5566 data sheet.





ABSOLUTE MAXIMUM RATINGS

Gate-Drain, Gate-Source Voltage : (2N4856A-58A) -40 V
 Gate Current 50 mA
 Lead Temperature (¹/₁₆" from case for 10 seconds) 300 °C
 Storage Temperature -65 to 200 °C

Operating Junction Temperature -55 to 200 °C
 Power Dissipation^a 1.8 W

Notes

a. Derate 10 mW/°C for T_C > 25 °C

| SPECIFICATIONS (T _A = 25 °C UNLESS OTHERWISE NOTED) | | | | | | | | | | |
|--|----------------------|---|-------------------------|---------|------|---------|------|---------|------|------------|
| Parameter | Symbol | Test Conditions | Typ ^a | Limits | | | | | | Unit |
| | | | | 2N4856A | | 2N4857A | | 2N4858A | | |
| | | | | Min | Max | Min | Max | Min | Max | |
| Static | | | | | | | | | | |
| Gate-Source Breakdown Voltage | V _{(BR)GSS} | I _G = -1 μA, V _{DS} = 0 V | -55 | -40 | | -40 | | -40 | | V |
| Gate-Source Cutoff Voltage | V _{GS(off)} | V _{DS} = 15 V, I _D = 0.5 nA | | -4 | -10 | -2 | -6 | -0.8 | -4 | |
| Saturation Drain Current ^b | I _{DSS} | V _{DS} = 15 V, V _{GS} = 0 V | | 50 | | 20 | 100 | 8 | 80 | mA |
| Gate Reverse Current | I _{GSS} | V _{GS} = -20 V, V _{DS} = 0 V | -5 | | -250 | | -250 | | -250 | pA |
| | | | T _A = 150 °C | -13 | | -500 | | -500 | | -500 |
| Gate Operating Current ^c | I _G | V _{DG} = 15 V, I _D = 10 mA | -5 | | | | | | | pA |
| Drain Cutoff Current | I _{D(off)} | V _{DS} = 15 V, V _{GS} = -10 V | 5 | | 250 | | 250 | | 250 | |
| | | | T _A = 150 °C | 13 | | 500 | | 500 | | 500 |
| Drain-Source On-Voltage | V _{DS(on)} | V _{GS} = 0 V | I _D = 5 mA | 0.25 | | | | | 0.5 | |
| | | | I _D = 10 mA | 0.35 | | | 0.5 | | | |
| | | | I _D = 20 mA | 0.5 | | 0.75 | | | | |
| Drain-Source On-Resistance ^c | r _{DS(on)} | V _{GS} = 0 V, I _D = 1 mA | | | 25 | | 40 | | 60 | Ω |
| Gate-Source Forward Voltage ^c | V _{GS(F)} | I _G = 1 mA, V _{DS} = 0 V | 0.7 | | | | | | | V |
| Dynamic | | | | | | | | | | |
| Common-Source Forward Transconductance ^c | g _{fs} | V _{DS} = 20 V, I _D = 1 mA f = 1 kHz | 6 | | | | | | | mS |
| Common-Source Output Conductance ^c | g _{os} | | 25 | | | | | | | μS |
| Drain-Source On-Resistance | r _{ds(on)} | V _{GS} = 0 V, I _D = 0 mA f = 1 kHz | | | 25 | | 40 | | 60 | Ω |
| Common-Source Input Capacitance | C _{iss} | V _{DS} = 0 V, V _{GS} = -10 V f = 1 MHz | 7 | | 10 | | 10 | | 10 | pF |
| Common-Source Reverse Transfer Capacitance | C _{rss} | | 3 | | 4 | | 3.5 | | 3.5 | |
| Equivalent Input Noise Voltage ^c | e _n | V _{DS} = 10 V, I _D = 10 mA f = 1 kHz | 3 | | | | | | | nV/ √Hz |
| Switching | | | | | | | | | | |
| Turn-On Time | t _{d(on)} | V _{DD} = 10 V, V _{GSH} = 0 V See Switching Circuit | 2 | | 5 | | 6 | | 8 | ns |
| | t _r | | 2 | | 3 | | 4 | | 8 | |
| Turn-Off Time | t _{OFF} | | 12 | | 20 | | 40 | | 80 | |

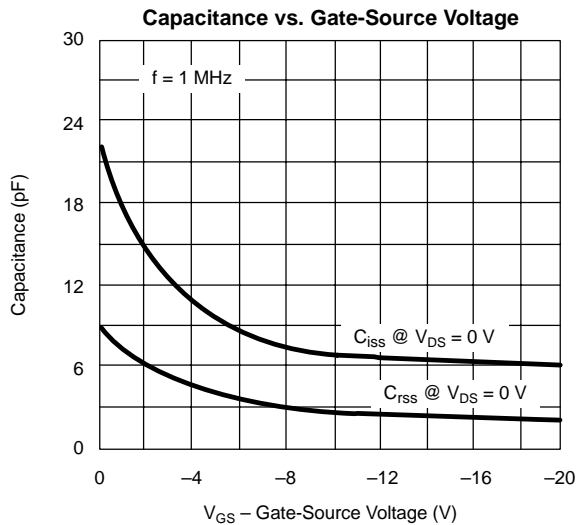
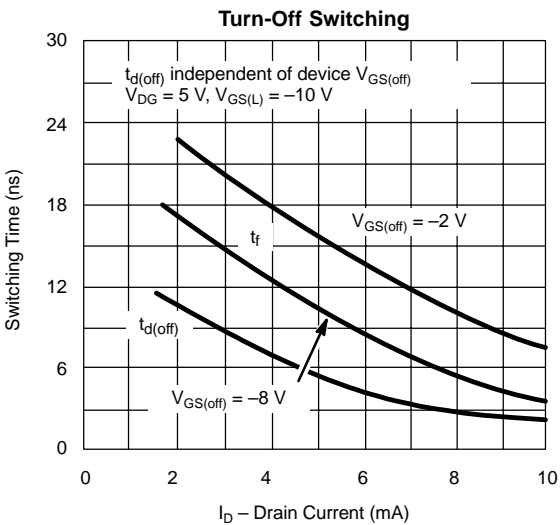
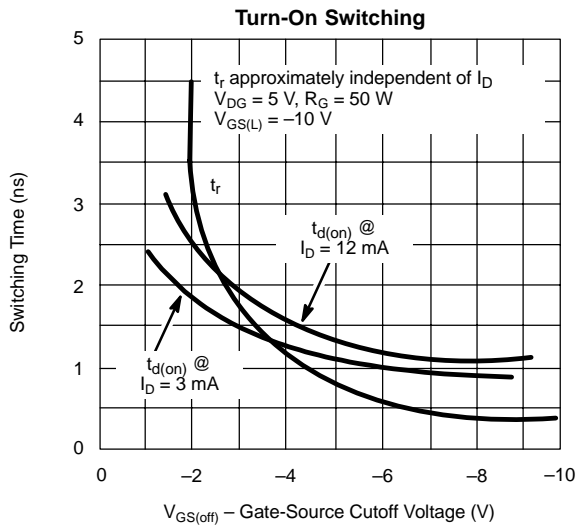
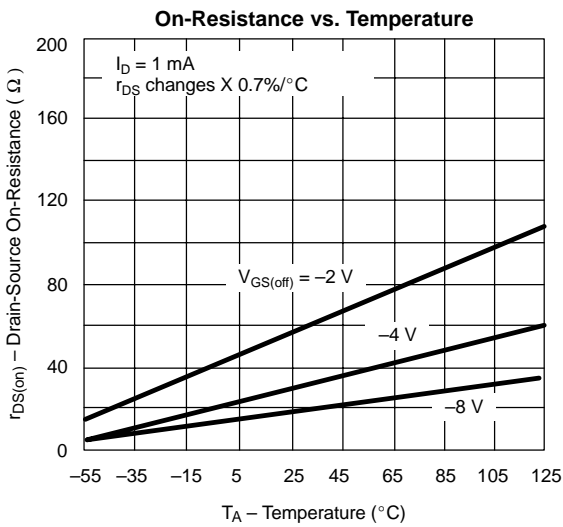
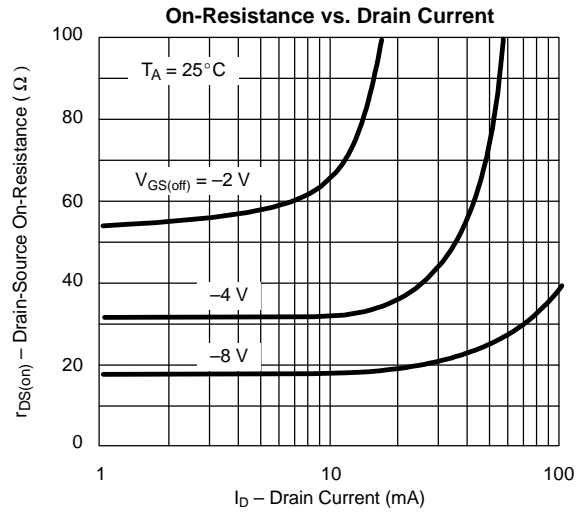
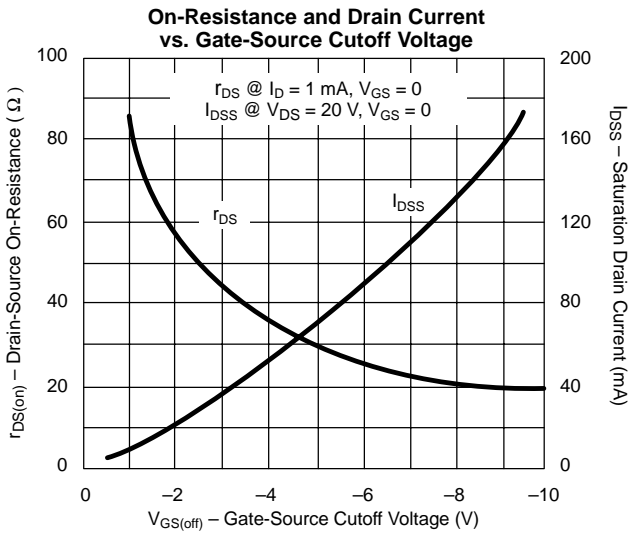
Notes

- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- Pulse test: PW ≤ 100 μs duty cycle ≤ 10%.
- This parameter not registered with JEDEC.

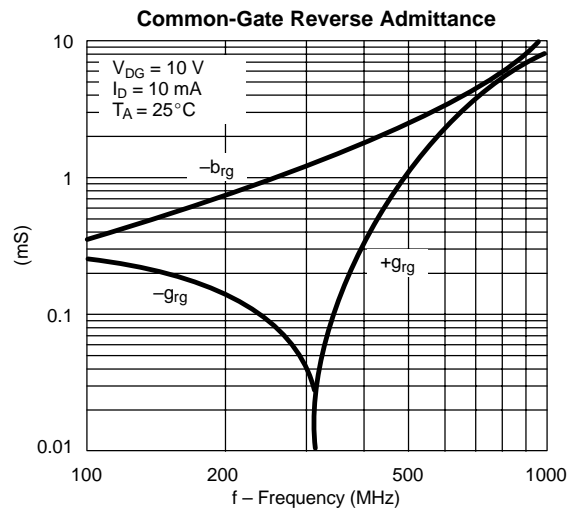
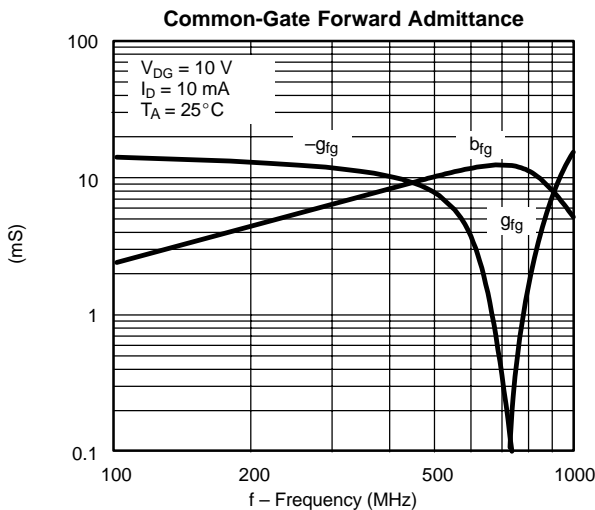
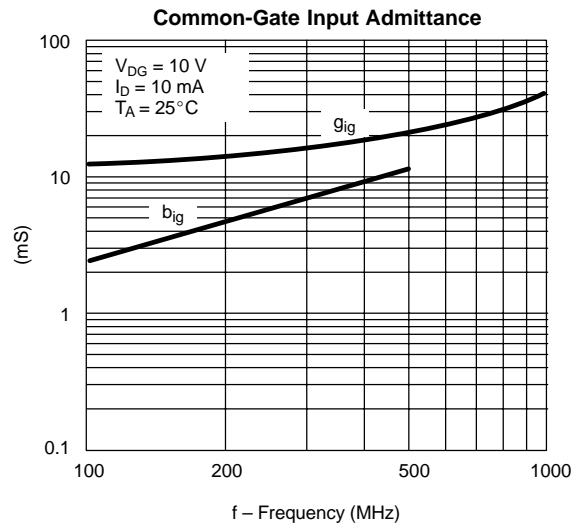
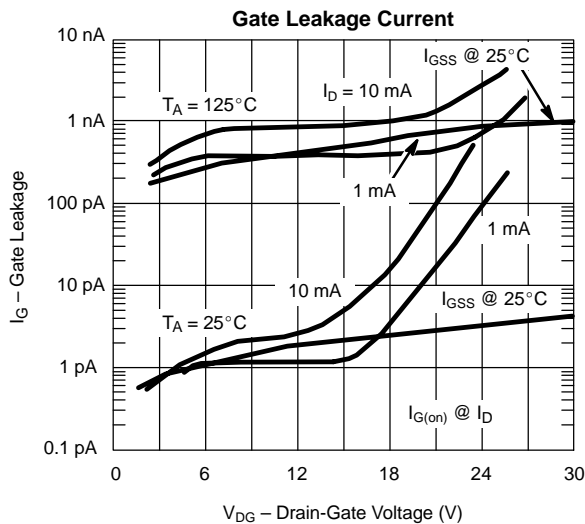
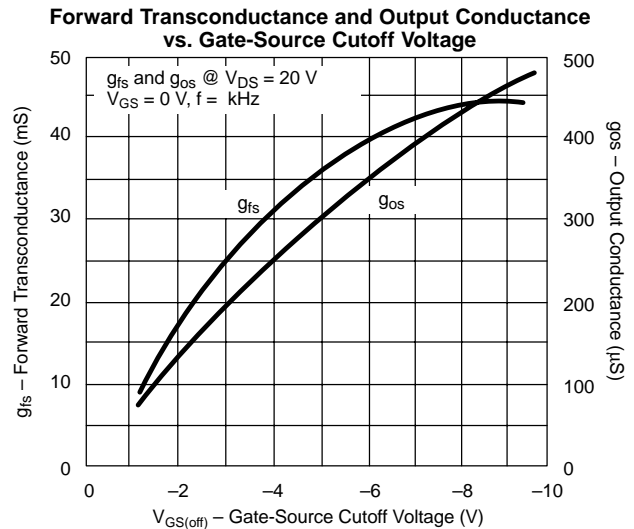
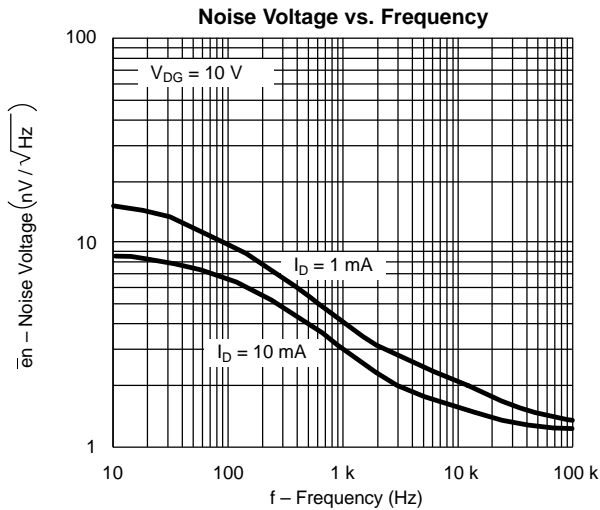
NCB



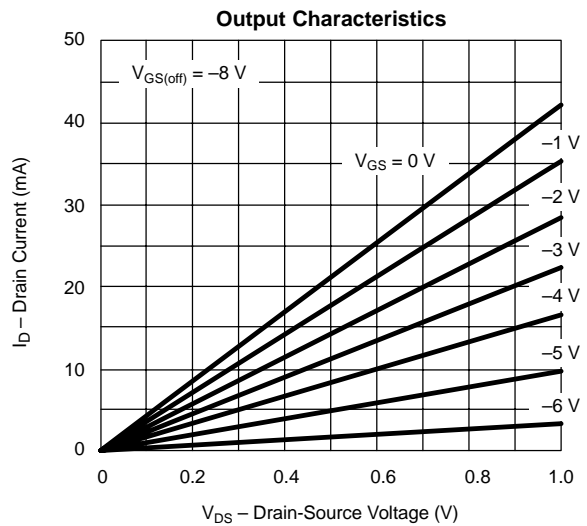
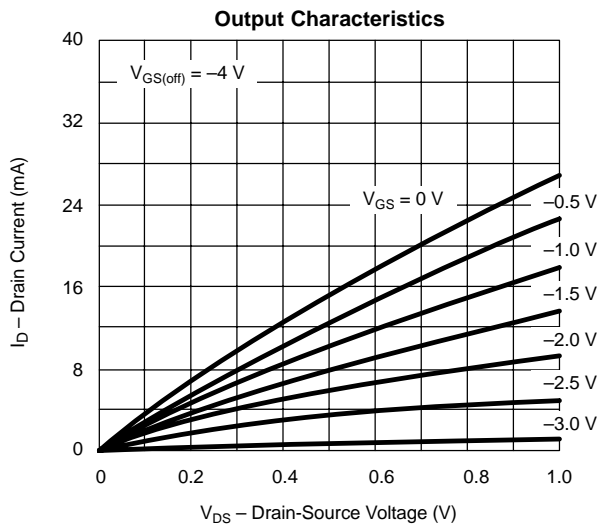
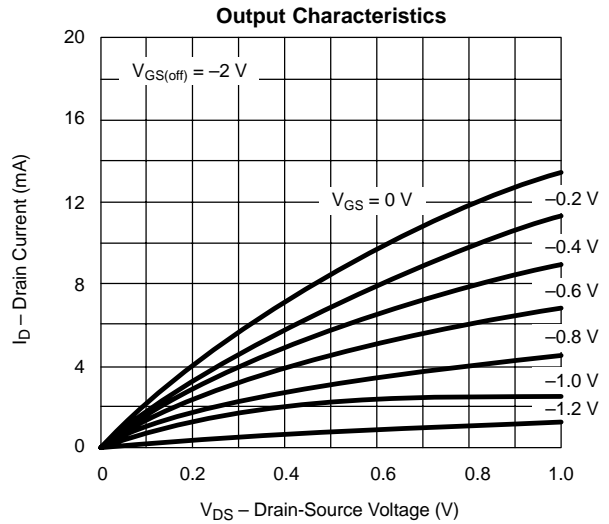
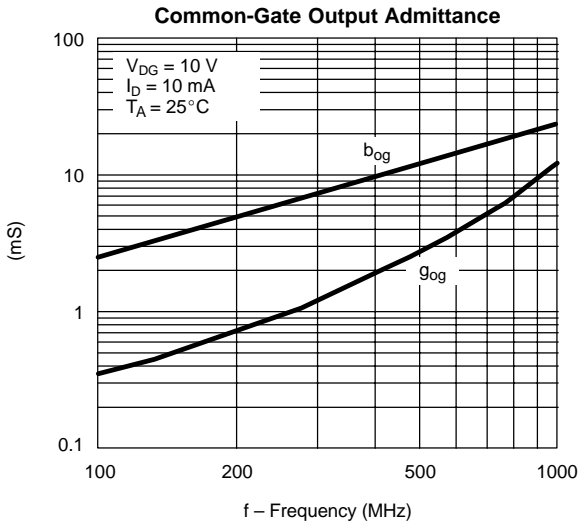
TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)



TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)



TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)



| SWITCHING TIME TEST CIRCUIT | | | |
|------------------------------------|--------------|--------------|---------------|
| | 2N4856A | 2N4857A | 2N4858A |
| $V_{GS(L)}$ | -10 V | -6 V | -4 V |
| R_L^* | 464 Ω | 953 Ω | 1910 Ω |
| $I_{D(on)}$ | 20 mA | 10 mA | 5 mA |

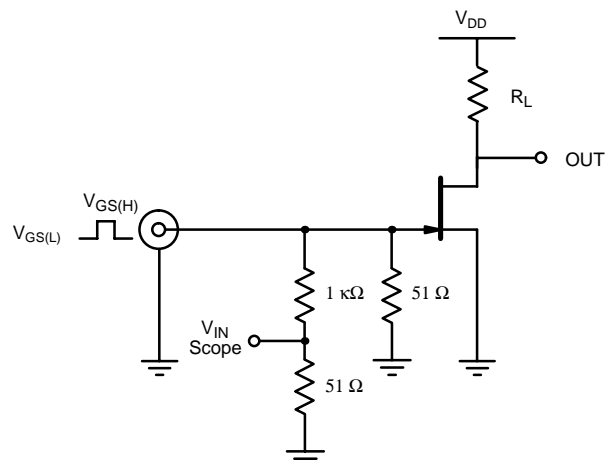
*Non-inductive

INPUT PULSE

Rise Time < 1 ns
 Fall Time < 1 ns
 Pulse Width 100 ns
 PRF 1 MHz

SAMPLING SCOPE

Rise Time 0.4 ns
 Input Resistance 10 M Ω
 Input Capacitance 1.5 pF





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