



N-Channel JFETs

| | | |
|---------------|---------------|----------------|
| 2N4391 | PN4391 | SST4391 |
| 2N4392 | PN4392 | SST4392 |
| 2N4393 | PN4393 | SST4393 |

| PRODUCT SUMMARY | | | | |
|-----------------|-------------------|-------------------------------|-----------------------------|-------------------|
| Part Number | $V_{GS(off)}$ (V) | $r_{DS(on)}$ Max (Ω) | $I_{D(off)}$ Typ (μ A) | t_{ON} Typ (ns) |
| 2N/PN/SST4391 | -4 to -10 | 30 | 5 | 4 |
| 2N/PN/SST4392 | -2 to -5 | 60 | 5 | 4 |
| 2N/PN/SST4393 | -0.5 to -3 | 100 | 5 | 4 |

FEATURES

- Low On-Resistance: 4391 < 30 Ω
- Fast Switching— t_{ON} : 4 ns
- High Off-Isolation: $I_{D(off)}$ with Low Leakage
- Low Capacitance: < 3.5 pF
- Low Insertion Loss

BENEFITS

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

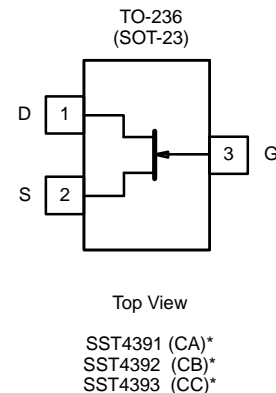
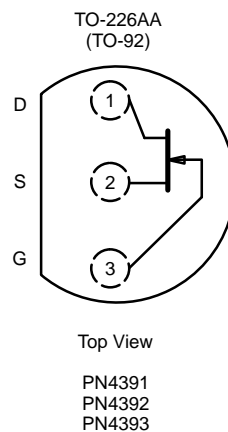
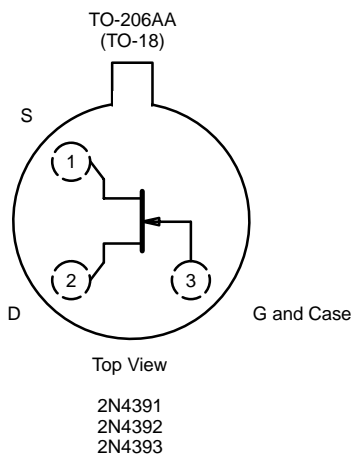
APPLICATIONS

- Analog Switches
- Choppers
- Sample-and-Hold
- Normally “On” Switches
- Current Limiters
- Commutators

DESCRIPTION

The 2N/PN/SST4391 series features many of the superior characteristics of JFETs which make it a good choice for demanding analog switching applications and for specialized amplifier circuits.

The 2N series hermetically-sealed TO-206AA (TO-18) can be available with processing per MIL-S-19500 (see Military Information). Both the PN, TO-226AA (TO-92), and SST, TO-236 (SOT-23), series are available in tape-and-reel for automated assembly (see Packaging Information). For similar dual products, see the 2N5564/5565/5566 data sheet.



*Marking Code for TO-236

For applications information see AN104 and AN106



ABSOLUTE MAXIMUM RATINGS

| | |
|----------------------------------|---------------------------------|
| Gate-Drain, Gate-Source Voltage: | |
| (2N/PN Prefixes) | −40 V |
| (SST Prefix) | −35 V |
| Gate Current | 50 mA |
| Lead Temperature | 300 °C |
| Storage Temperature : | (2N Prefix) −65 to 200 °C |
| | (PN/SST Prefixes) −55 to 150 °C |

| | |
|----------------------------------|---|
| Operating Junction Temperature : | |
| (2N Prefix) | −55 to 200 °C |
| (PN/SST Prefixes) | −55 to 150 °C |
| Power Dissipation : | (2N Prefix) ^a (T _C = 25 °C) 1800 mW |
| | (PN/SST Prefixes) ^b 350 mW |

- Notes
- Derate 10 mW/°C above 25 °C
 - Derate 2.8 mW/°C above 25 °C

| SPECIFICATIONS (T _A = 25 °C UNLESS OTHERWISE NOTED) | | | | | | | | | | | |
|--|------------------------------|---|------------------------------|--------|-------|------|-------|------|-------|------|----|
| Parameter | Symbol | Test Conditions | Typ ^a | Limits | | | | | | Unit | |
| | | | | 4391 | | 4392 | | 4393 | | | |
| | | | | 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} = 20 V | 2N/PN: I _D = 1 nA | −4 | −10 | −2 | −5 | −0.5 | −3 | V | |
| | | V _{DS} = 15 V | SST: I _D = 10 nA | | | | | | | | |
| Saturation Drain Current ^b | I _{DSS} | V _{DS} = 20 V, V _{GS} = 0 V | 2N | 50 | 150 | 25 | 75 | 5 | 30 | mA | |
| | | | PN | 50 | 150 | 25 | 100 | 5 | 60 | | |
| | | | SST | 50 | | 25 | | 5 | | | |
| Gate Reverse Current | I _{GSS} | V _{GS} = −20 V V _{DS} = 0 V | 2N/SST | −5 | −100 | | −100 | | −100 | pA | |
| | | | PN | −5 | −1000 | | −1000 | | −1000 | | |
| | | | 2N: T _A = 150 °C | −13 | −200 | | −200 | | −200 | nA | |
| | | | PN: T _A = 100 °C | −1 | −200 | | −200 | | −200 | | |
| SST: T _A = 125 °C | −3 | | | | | | | | | | |
| Gate Operating Current | I _G | V _{DG} = 15 V, I _D = 10 mA | −5 | | | | | | | | |
| Drain Cutoff Current | I _{D(off)} | V _{DS} = 20 V | 2N: V _{GS} = −5 V | 5 | | | | | 100 | pA | |
| | | | 2N: V _{GS} = −7 V | 5 | | | 100 | | | | |
| | | | 2N: V _{GS} = −12 V | 5 | | 100 | | | | | |
| | | | PN: V _{GS} = −5 V | 0.005 | | | | | 1 | nA | |
| | | | PN: V _{GS} = −7 V | 0.005 | | | | 1 | | | |
| | | | PN: V _{GS} = −12 V | 0.005 | | 1 | | | | | |
| | | SST V _{DS} = 10 V, V _{GS} = −10 V | 5 | | 100 | | 100 | | 100 | pA | |
| | | V _{DS} = 20 V T _A = 150 °C | 2N: V _{GS} = −5 V | 13 | | | | | | 200 | nA |
| | | | 2N: V _{GS} = −7 V | 13 | | | | 200 | | | |
| | | | 2N: V _{GS} = −12 V | 13 | | 200 | | | | | |
| V _{DS} = 20 V T _A = 100 °C | PN: V _{GS} = −5 V | 1 | | | | | | 200 | | | |
| | PN: V _{GS} = −7 V | 1 | | | | 200 | | | | | |
| | PN: V _{GS} = −12 V | 1 | | 200 | | | | | | | |
| V _{DS} = 10 V T _A = 125 °C | SST: V _{GS} = −10 V | 3 | | | | | | | | | |
| Drain-Source On-Voltage | V _{DS(on)} | V _{GS} = 0 V | I _D = 3 mA | 0.25 | | | | | 0.4 | V | |
| | | | I _D = 6 mA | 0.3 | | | | 0.4 | | | |
| | | | I _D = 12 mA | 0.35 | | 0.4 | | | | | |
| Drain-Source On-Resistance | r _{DS(on)} | V _{GS} = 0 V, I _D = 1 mA | | | 30 | | 60 | | 100 | Ω | |
| Gate-Source Forward Voltage | V _{GS(F)} | I _G = 1 mA V _{DS} = 0 V | 2N | 0.7 | | 1 | | 1 | | 1 | V |
| | | | PN/SST | 0.7 | | | | | | | |



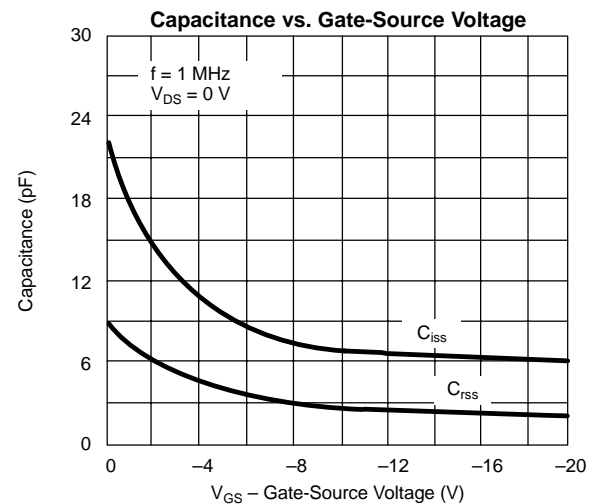
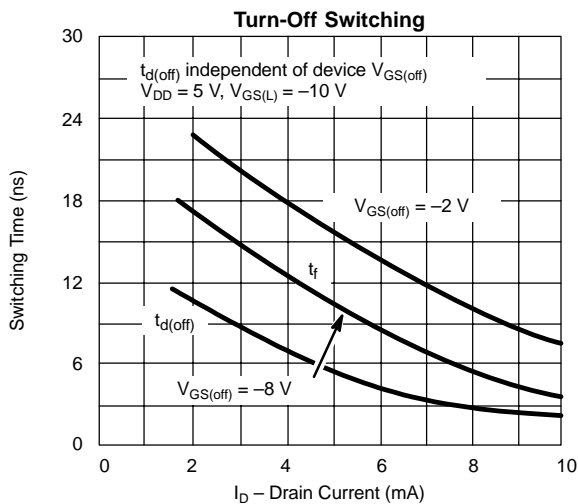
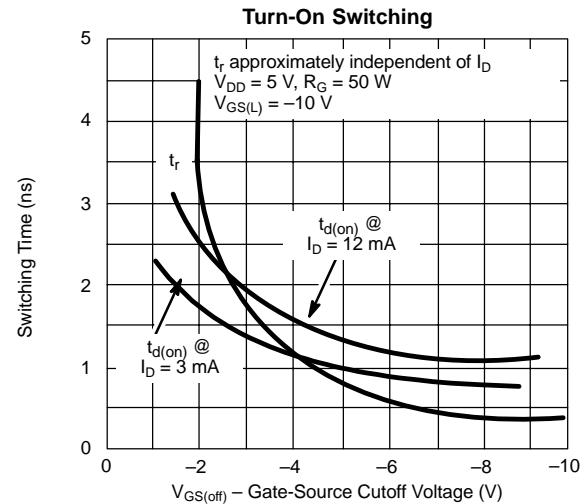
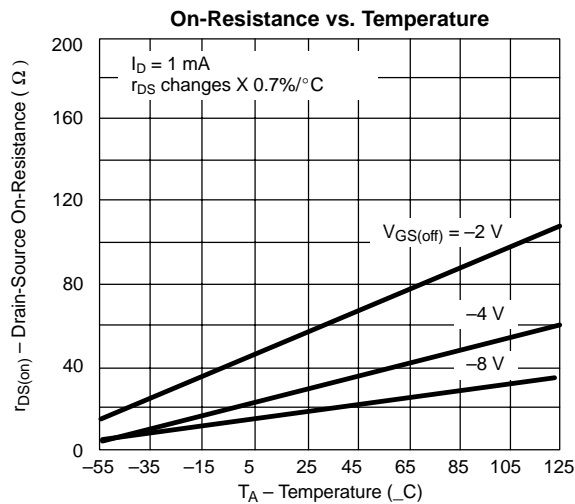
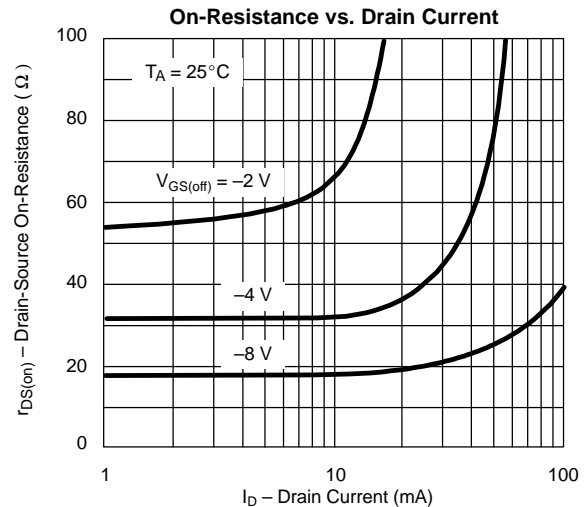
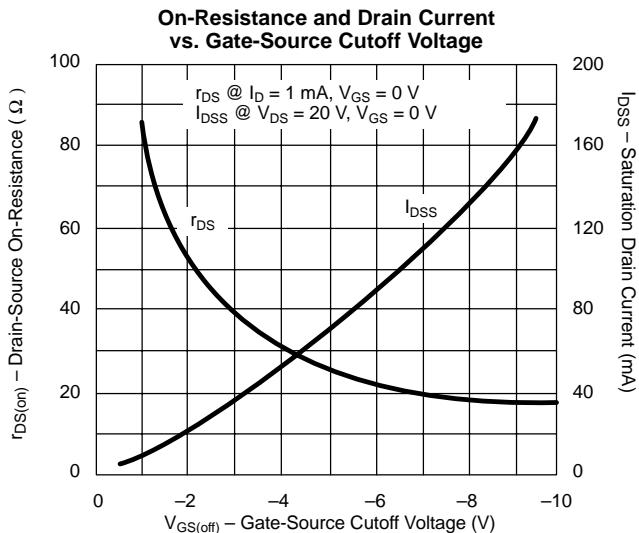
| SPECIFICATIONS (T _A = 25°C UNLESS OTHERWISE NOTED) | | | | | | | | | | | |
|---|---------------------|---|-----------------------------|--------|-----|------|-----|------|-----|------------|----|
| Parameter | Symbol | Test Conditions | Typ ^a | Limits | | | | | | Unit | |
| | | | | 4391 | | 4392 | | 4393 | | | |
| | | | | Min | Max | Min | Max | Min | Max | | |
| Dynamic | | | | | | | | | | | |
| Common-Source Forward Transconductance | g _{fs} | V _{DS} = 20 V, I _D = 1 mA, f = 1 kHz | 6 | | | | | | | mS | |
| Common-Source Output Conductance | g _{os} | | 25 | | | | | | | μS | |
| Drain-Source On-Resistance | r _{DS(on)} | V _{GS} = 0 V, I _D = 0 mA, f = 1 kHz | | | 30 | | 60 | | 100 | Ω | |
| Common-Source Input Capacitance | C _{iss} | V _{DS} = 20 V, V _{GS} = 0 V f = 1 MHz | 2N | 12 | | 14 | | 14 | | 14 | |
| | | | PN | 12 | | 16 | | 16 | | 16 | |
| | | | SST | 13 | | | | | | | |
| Common-Source Reverse Transfer Capacitance | C _{rss} | V _{DS} = 0 V f = 1 MHz | 2N: V _{GS} = -5 V | 3.3 | | | | | | 3.5 | pF |
| | | | 2N: V _{GS} = -7 V | 3.2 | | | | 3.5 | | | |
| | | | 2N: V _{GS} = -12 V | 2.8 | | 3.5 | | | | | |
| | | | PN: V _{GS} = -5 V | 3.5 | | | | | | 5 | |
| | | | PN: V _{GS} = -7 V | 3.4 | | | | 5 | | | |
| | | | PN: V _{GS} = -12 V | 3.0 | | 5 | | | | | |
| | | | SST: V _{GS} = -5 V | 3.6 | | | | | | | |
| | | | SST: V _{GS} = -7 V | 3.5 | | | | | | | |
| SST: V _{GS} = -12 V | 3.1 | | | | | | | | | | |
| Equivalent Input Noise Voltage | 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 _{GS(H)} = 0 V See Switching Circuit | 2N/PN | 2 | | 15 | | 15 | | 15 | ns |
| | t _r | | SST | 2 | | | | | | | |
| Turn-Off Time | t _{d(off)} | | 2N/PN | 2 | | 5 | | 5 | | 5 | |
| | | | SST | 2 | | | | | | | |
| | t _f | | 2N/PN | 6 | | 20 | | 35 | | 50 | |
| | | | SST | 6 | | | | | | | |
| | | 2N/PN | 13 | | 15 | | 20 | | 30 | | |
| | | SST | 13 | | | | | | | | |

Notes

- a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- b. Pulse test: PW ≤ 300 μs duty cycle ≤ 3%.

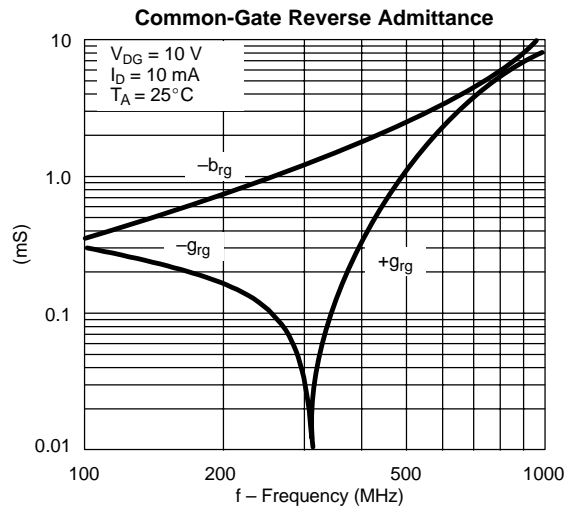
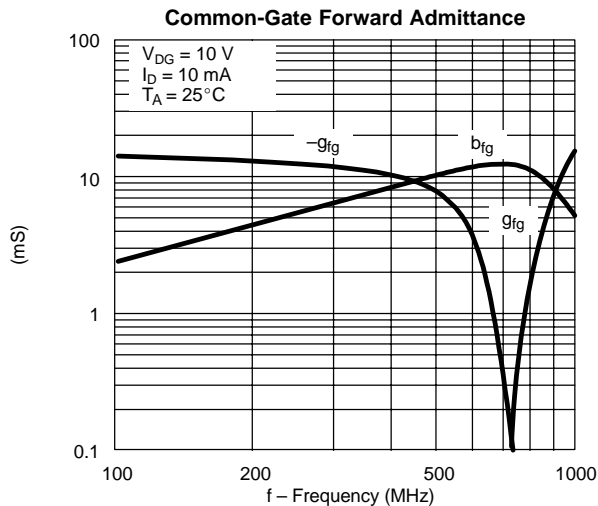
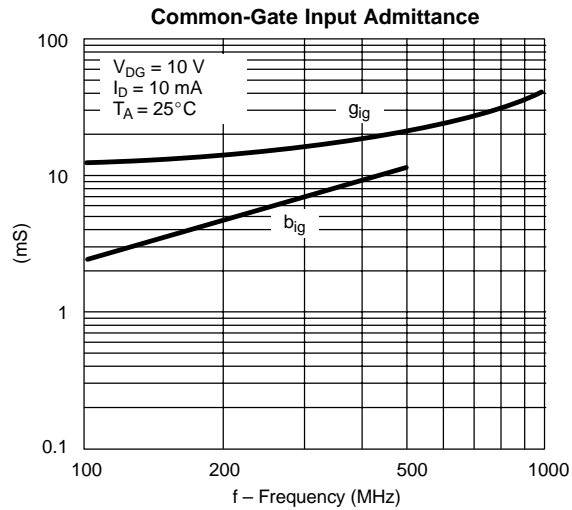
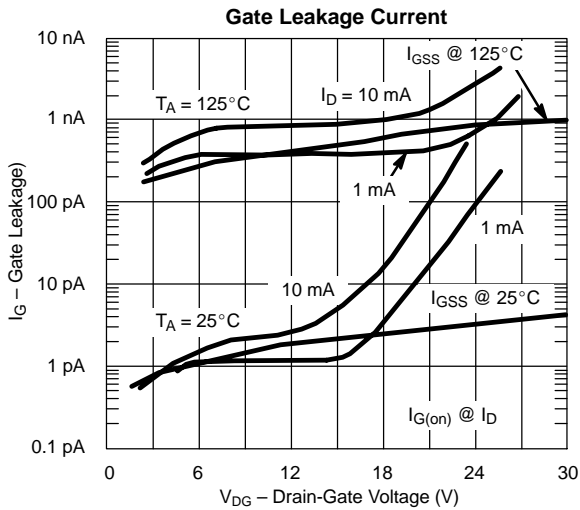
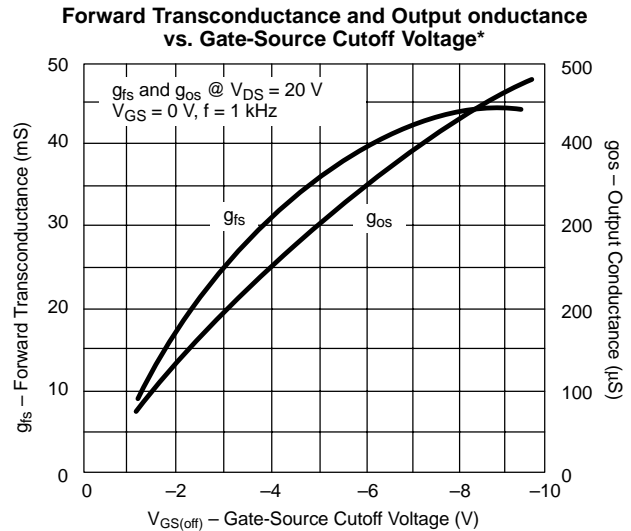
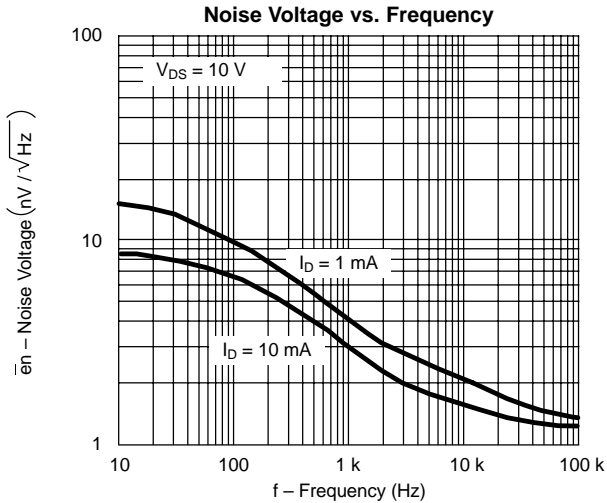
NCB

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

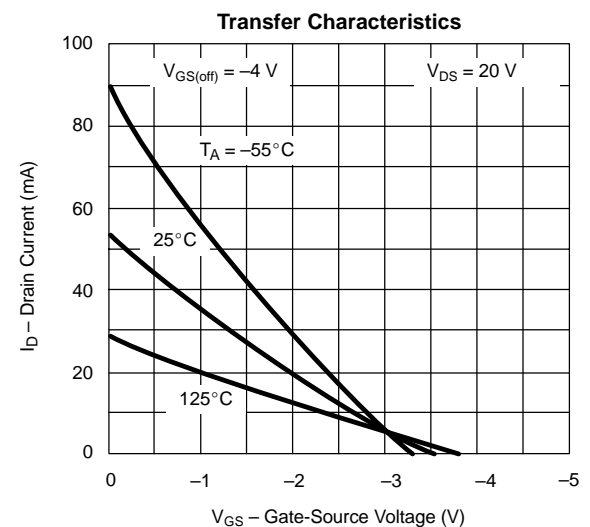
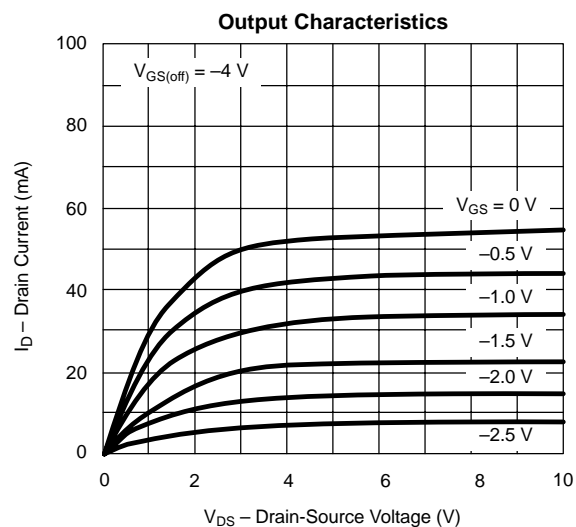
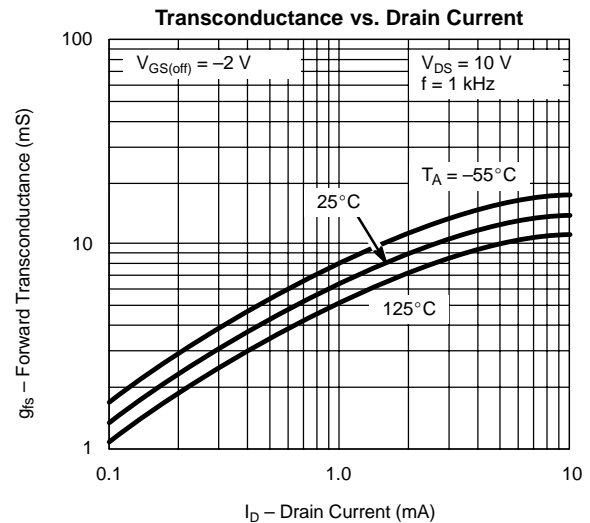
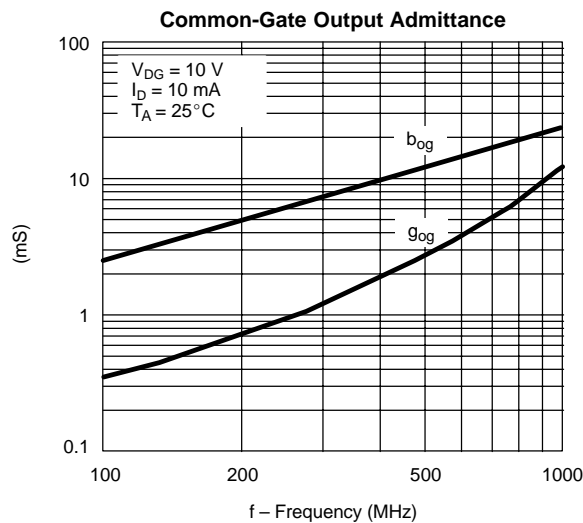




TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)



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



| SWITCHING TIME TEST CIRCUIT | | | |
|-----------------------------|--------------|---------------|---------------|
| | 4391 | 4392 | 4393 |
| $V_{GS(L)}$ | -12 V | -7 V | -5 V |
| R_L^* | 800 Ω | 1600 Ω | 3000 Ω |
| $I_{D(on)}$ | 12 mA | 6 mA | 3 mA |

*Non-inductive

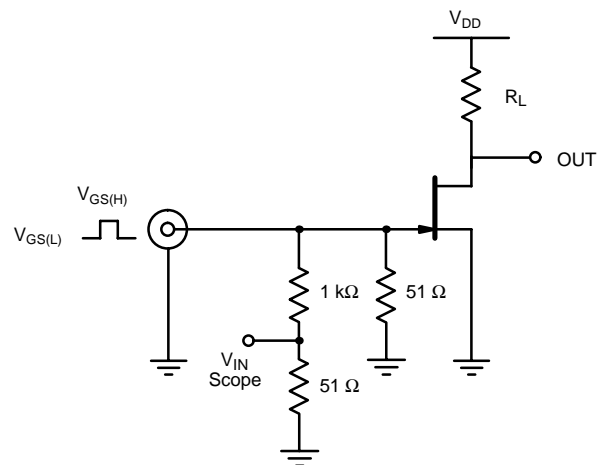
INPUT PULSE

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

See Typical Characteristics curves for changes.





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