



## N-Channel JFETs

### PRODUCT SUMMARY

| Part Number | $V_{GS(off)}$ (V) | $V_{(BR)GSS}$ Min (V) | $g_{fs}$ Min (mS) | $I_{DSS}$ Min (mA) |
|-------------|-------------------|-----------------------|-------------------|--------------------|
| 2N4416      | $-\leq 6$         | -30                   | 4.5               | 5                  |
| 2N4416A     | -2.5 to -6        | -35                   | 4.5               | 5                  |
| SST4416     | $-\leq 6$         | -30                   | 4.5               | 5                  |

### FEATURES

- Excellent High-Frequency Gain: 2N4416/A,  $G_{ps}$  13 dB (typ) @ 400 MHz
- Very Low Noise: 3 dB (typ) @ 400 MHz
- Very Low Distortion
- High AC/DC Switch Off-Isolation

### BENEFITS

- Wideband High Gain
- Very High System Sensitivity
- High Quality of Amplification
- High-Speed Switching Capability
- High Low-Level Signal Amplification

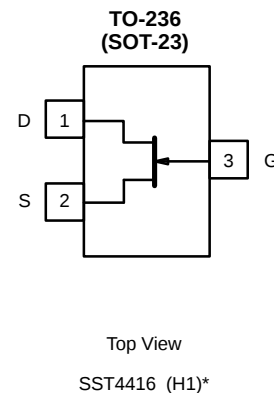
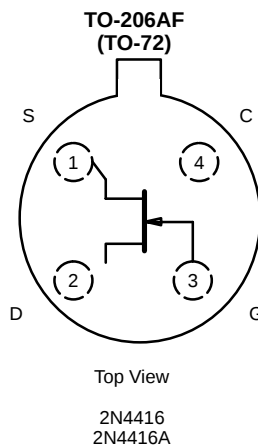
### APPLICATIONS

- High-Frequency Amplifier/Mixer
- Oscillator
- Sample-and-Hold
- Very Low Capacitance Switches

### DESCRIPTION

The 2N4416/2N4416A/SST4416 n-channel JFETs are designed to provide high-performance amplification at high frequencies.

The TO-206AF (TO-72) hermetically-sealed package is available with full military processing (see Military Information.) The TO-236 (SOT-23) package provides a low-cost option and is available with tape-and-reel options (see Packaging Information). For similar products in the TO-226AA (TO-92) package, see the J304/305 data sheet.



\*Marking Code for TO-236

For applications information see AN104.

**ABSOLUTE MAXIMUM RATINGS**

Gate-Drain, Gate-Source Voltage :  
     (2N/SST4416) ..... -30 V  
     (2N4416A) ..... -35 V  
 Gate Current ..... 10 mA  
 Lead Temperature ..... 300 °C  
 Storage Temperature :     (2N Prefix) ..... -65 to 200 °C  
                                   (SST Prefix) ..... -65 to 150 °C

Operating Junction Temperature ..... -55 to 150 °C

Power Dissipation :         (2N Prefix)<sup>a</sup> ..... 300 mW  
                                   (SST Prefix)<sup>b</sup> ..... 350 mW

**Notes**

- a. Derate 2.4 mW/°C above 25 °C  
 b. Derate 2.8 mW/°C above 25 °C

**SPECIFICATIONS (T<sub>A</sub> = 25 °C UNLESS NOTED)**

| Parameter                                           | Symbol               | Test Conditions                                            | Typ <sup>a</sup> | Limits |      |         |      |         |     | Unit       |
|-----------------------------------------------------|----------------------|------------------------------------------------------------|------------------|--------|------|---------|------|---------|-----|------------|
|                                                     |                      |                                                            |                  | 2N4416 |      | 2N4416A |      | SST4416 |     |            |
|                                                     |                      |                                                            |                  | Min    | Max  | Min     | Max  | Min     | Max |            |
| Static                                              |                      |                                                            |                  |        |      |         |      |         |     |            |
| Gate-Source Breakdown Voltage                       | V <sub>(BR)GSS</sub> | I <sub>G</sub> = -1 μA , V <sub>DS</sub> = 0 V             | -36              | -30    |      | -35     |      | -30     |     | V          |
| Gate-Source Cutoff Voltage                          | V <sub>GS(off)</sub> | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 1 nA              | -3               |        | -6   | -2.5    | -6   |         | -6  |            |
| Saturation Drain Current <sup>b</sup>               | I <sub>DSS</sub>     | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V              | 10               | 5      | 15   | 5       | 15   | 5       | 15  | mA         |
| Gate Reverse Current                                | I <sub>GSS</sub>     | V <sub>GS</sub> = -20 V, V <sub>DS</sub> = 0 V (2N)        | -2               |        | -100 |         | -100 |         |     | pA         |
|                                                     |                      | T <sub>A</sub> = 150°C                                     | -4               |        | -100 |         | -100 |         |     |            |
|                                                     |                      | V <sub>GS</sub> = -15 V, V <sub>DS</sub> = 0 V (SST)       | -0.002           |        |      |         |      |         | -1  | nA         |
|                                                     |                      | T <sub>A</sub> = 125°C                                     | -0.6             |        |      |         |      |         |     |            |
| Gate Operating Current                              | I <sub>G</sub>       | V <sub>DG</sub> = 10 V, I <sub>D</sub> = 1 mA              | -20              |        |      |         |      |         |     | pA         |
| Drain Cutoff Current <sup>c</sup>                   | I <sub>D(off)</sub>  | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = -6 V             | 2                |        |      |         |      |         |     |            |
| Drain-Source On-Resistance <sup>c</sup>             | r <sub>DS(on)</sub>  | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 1 mA               | 150              |        |      |         |      |         |     | Ω          |
| Gate-Source Forward Voltage <sup>c</sup>            | V <sub>GS(F)</sub>   | I <sub>G</sub> = 1 mA , V <sub>DS</sub> = 0 V              | 0.7              |        |      |         |      |         |     | V          |
| Dynamic                                             |                      |                                                            |                  |        |      |         |      |         |     |            |
| Common-Source Forward Transconductance <sup>b</sup> | g <sub>fs</sub>      | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V<br>f = 1 kHz | 6                | 4.5    | 7.5  | 4.5     | 7.5  | 4.5     | 7.5 | mS         |
| Common-Source Output Conductance <sup>b</sup>       | g <sub>os</sub>      |                                                            | 15               |        | 50   |         | 50   |         | 50  | μS         |
| Common-Source Input Capacitance                     | C <sub>iss</sub>     | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V<br>f = 1 MHz | 2.2              |        | 4    |         | 4    |         |     | pF         |
| Common-Source Reverse Transfer Capacitance          | C <sub>rss</sub>     |                                                            | 0.7              |        | 0.8  |         | 0.8  |         |     |            |
| Common-Source Output Capacitance                    | C <sub>oss</sub>     |                                                            | 1                |        | 2    |         | 2    |         |     |            |
| Equivalent Input Noise Voltage <sup>c</sup>         | $\bar{e}_n$          | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V<br>f = 1 kHz | 6                |        |      |         |      |         |     | nV/<br>√Hz |

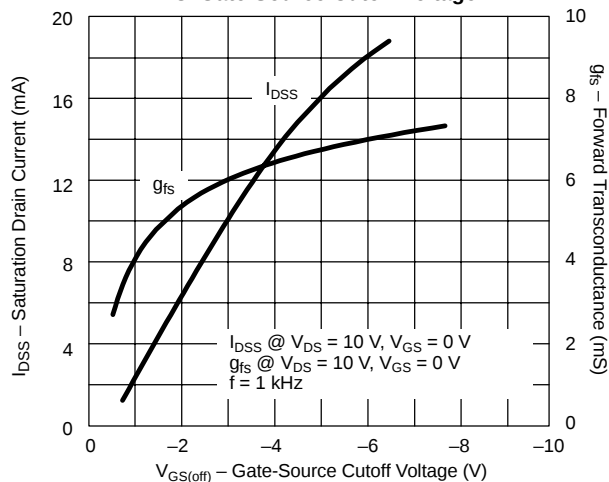
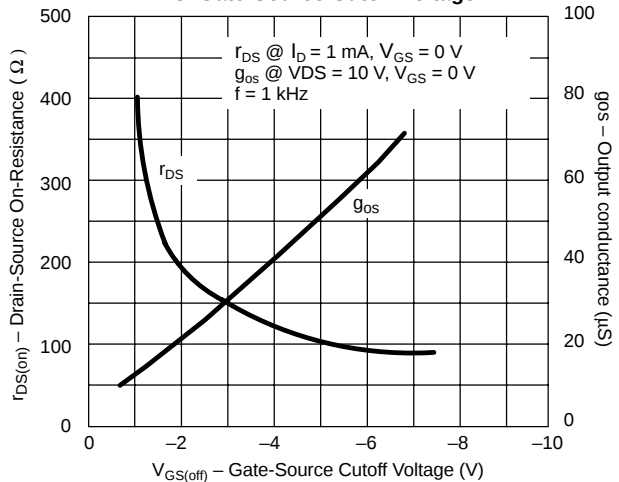
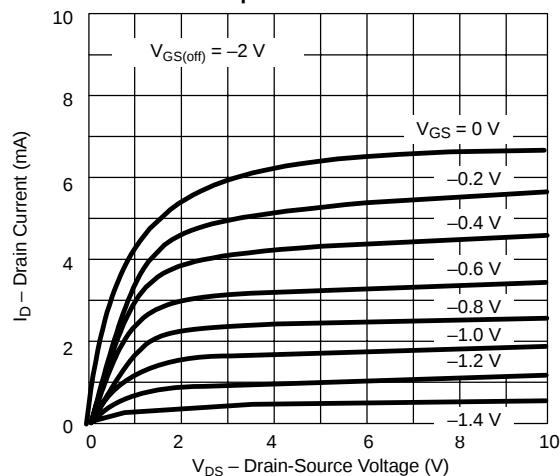
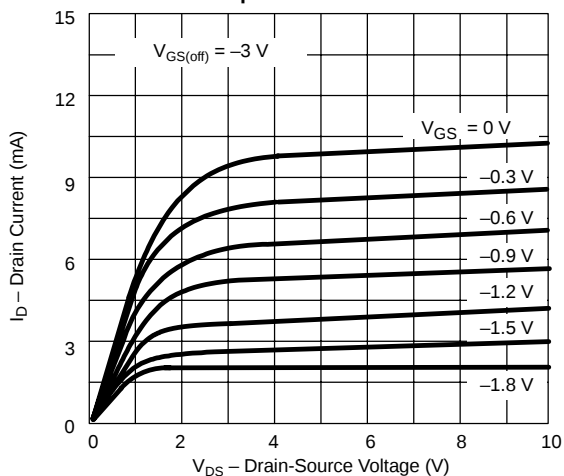
**HIGH-FREQUENCY SPECIFICATIONS FOR 2N4416/2N4416A ( $T_A = 25^\circ\text{C}$  UNLESS NOTED)**

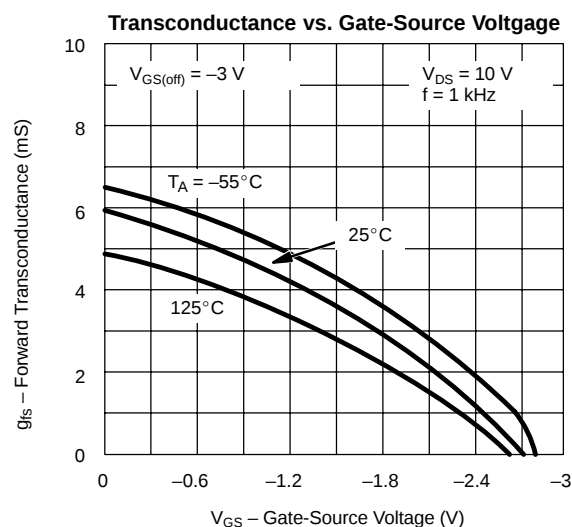
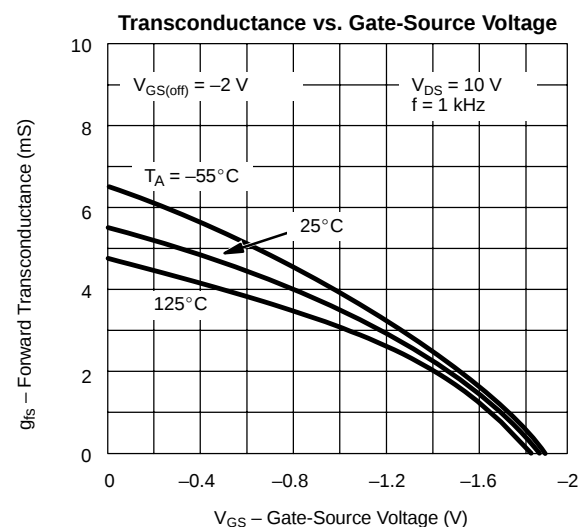
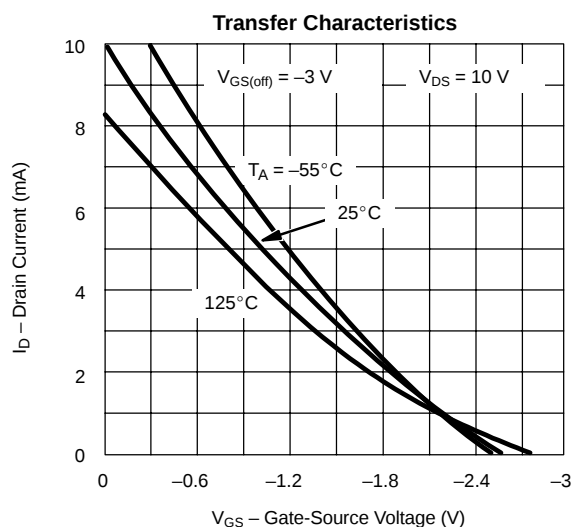
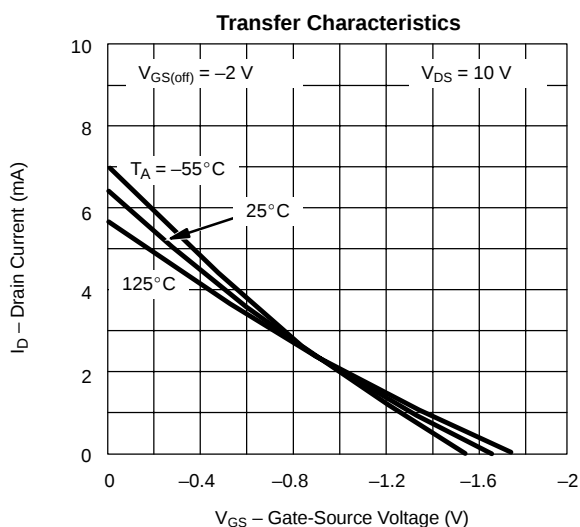
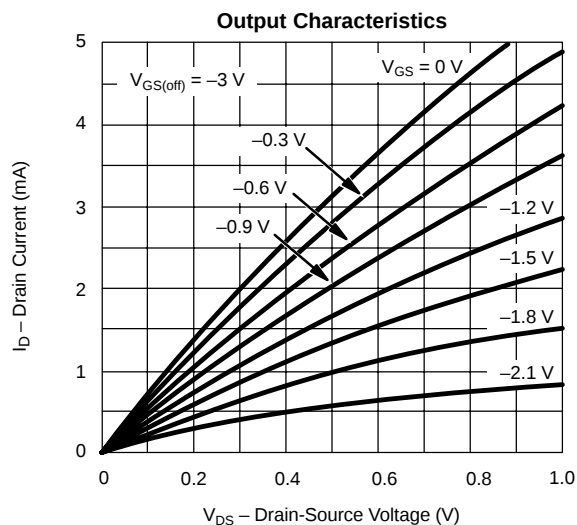
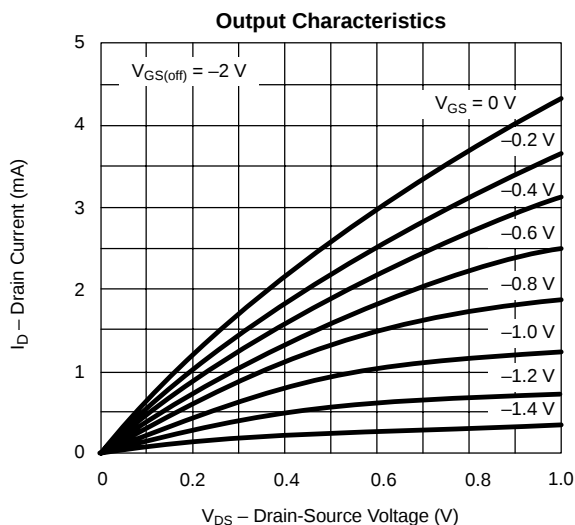
| Parameter                              | Symbol    | Test Conditions                             | Limits  |       |         |        | Unit          |
|----------------------------------------|-----------|---------------------------------------------|---------|-------|---------|--------|---------------|
|                                        |           |                                             | 100 MHz |       | 400 MHz |        |               |
|                                        |           |                                             | Min     | Max   | Min     | Max    |               |
|                                        |           |                                             |         |       |         |        |               |
| Common Source Input Conductance        | $g_{iss}$ | $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}$ |         | 100   |         | 1,000  | $\mu\text{S}$ |
| Common Source Input Susceptance        | $b_{iss}$ |                                             |         | 2,500 |         | 10,000 |               |
| Common Source Output Conductance       | $g_{oss}$ |                                             |         | 75    |         | 100    |               |
| Common Source Output Susceptance       | $b_{oss}$ |                                             |         | 1,000 |         | 4,000  |               |
| Common Source Forward Transconductance | $g_{fs}$  |                                             |         |       | 4,000   |        |               |
| Common-Source Power Gain               | $G_{ps}$  | $V_{DS} = 15\text{ V}, I_D = 5\text{ mA}$   | 18      |       | 10      |        | dB            |
| Noise Figure                           | NF        | $R_G = 1\text{ k}\Omega$                    |         | 2     |         | 4      |               |

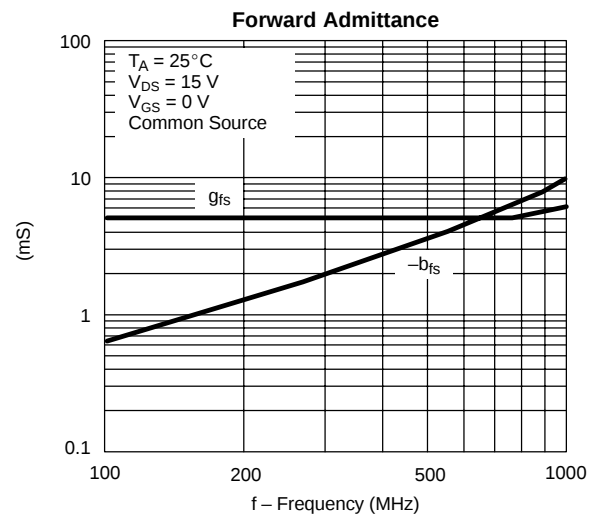
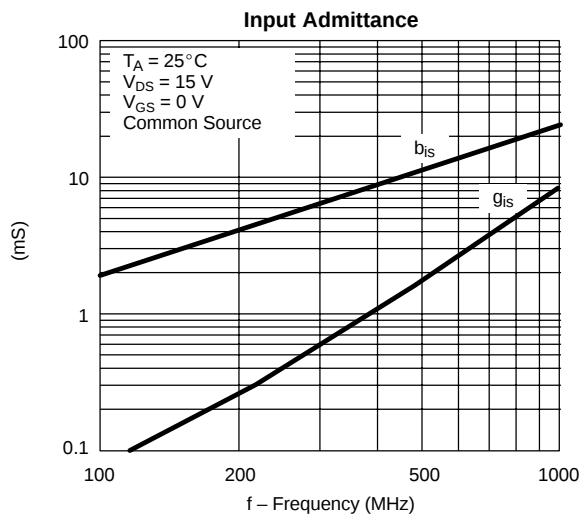
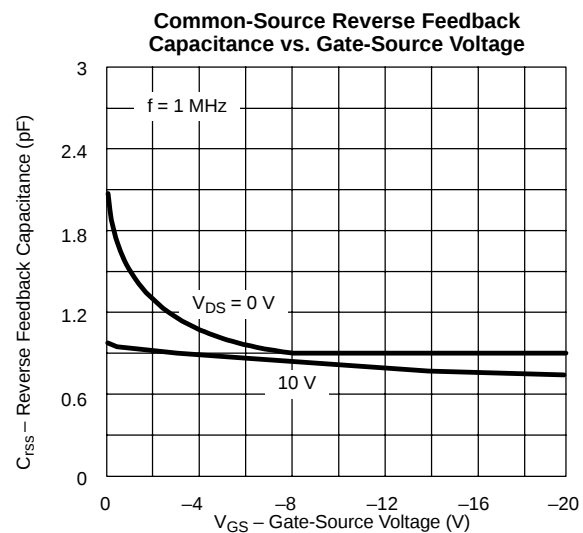
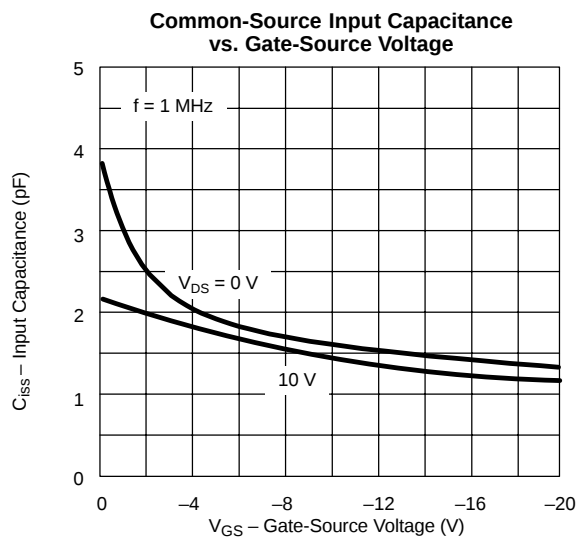
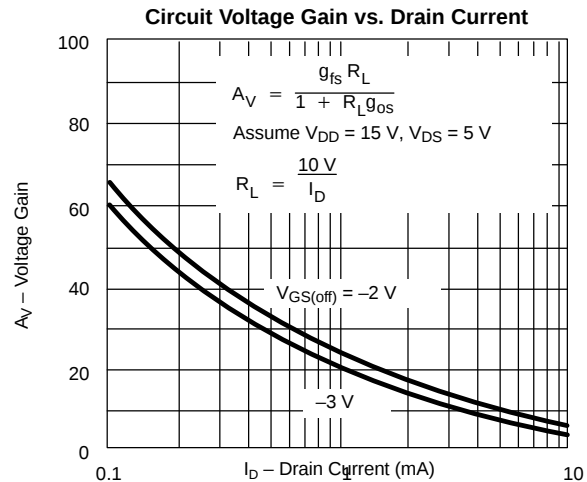
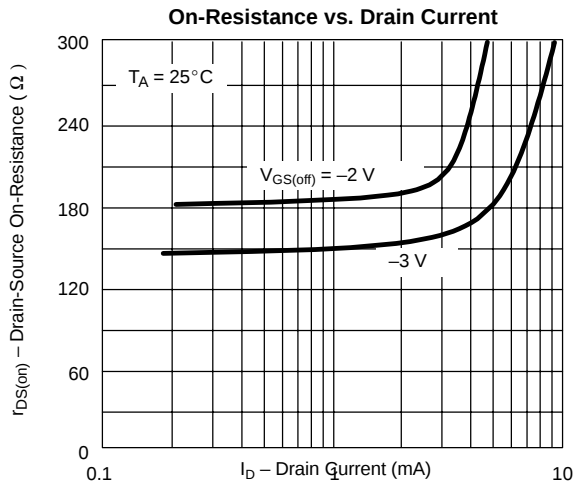
## Notes

- a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.  
b. Pulse test:  $PW \leq 300\text{ }\mu\text{s}$  duty cycle  $\leq 3\%$ .  
c. This parameter not registered with JEDEC.

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**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)****Drain Current and Transconductance  
vs. Gate-Source Cutoff Voltage****On-Resistance and Output Conductance  
vs. Gate-Source Cutoff Voltage****Output Characteristics****Output Characteristics**

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