

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE SILICON P CHANNEL MOS TYPE

HN1L02FU

HIGH SPEED SWITCHING APPLICATIONS  
ANAROG SWITCH APPLICATIONS

Unit in mm

Q1, Q2 COMMON

- 2.5V Gate Drive
- Low Threshold Voltage  
Q1 :  $V_{th}=0.5\sim1.5V$     Q2 :  $V_{th}=-0.5\sim-1.5V$
- High Speed
- Small Package

Q1 MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC       | SYMBOL    | RATING | UNIT |
|----------------------|-----------|--------|------|
| Drain-Source Voltage | $V_{DS}$  | 20     | V    |
| Gate-Source Voltage  | $V_{GSS}$ | 10     | V    |
| Drain Current        | $I_D$     | 50     | mA   |

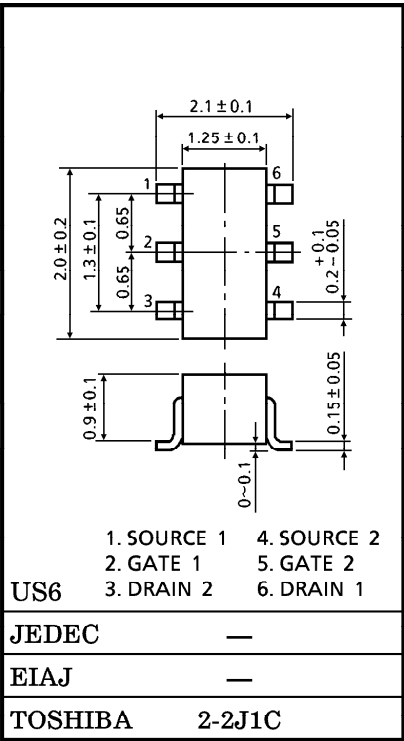
Q2 MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC       | SYMBOL    | RATING | UNIT |
|----------------------|-----------|--------|------|
| Drain-Source Voltage | $V_{DS}$  | -20    | V    |
| Gate-Source Voltage  | $V_{GSS}$ | -7     | V    |
| Drain Current        | $I_D$     | -50    | mA   |

MAXIMUM RATINGS (Q1, Q2 COMMON) (Ta = 25°C)

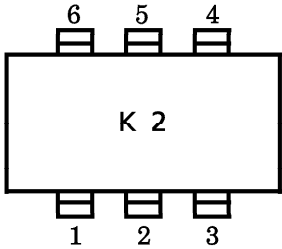
| CHARACTERISTIC            | SYMBOL    | RATING    | UNIT |
|---------------------------|-----------|-----------|------|
| Drain Power Dissipation   | $P_D$ ※   | 200       | mW   |
| Channel Temperature       | $T_{ch}$  | 150       | °C   |
| Storage Temperature Range | $T_{stg}$ | -55 ~ 150 | °C   |

※ Total Rating

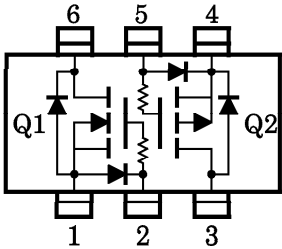


Weight : 6.8mg

MARKING



EQUIVALENT CIRCUIT (TOP VIEW)



961001EAA2

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## Q1 ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                 |               | SYMBOL         | TEST CONDITION                                       | MIN. | TYP. | MAX. | UNIT     |
|--------------------------------|---------------|----------------|------------------------------------------------------|------|------|------|----------|
| Gate Leakage Current           |               | $I_{GSS}$      | $V_{GS} = 10V, V_{DS} = 0$                           | —    | —    | 1    | $\mu A$  |
| Drain-Source Breakdown Voltage |               | $V_{(BR) DSS}$ | $I_D = 100\mu A, V_{GS} = 0$                         | 20   | —    | —    | V        |
| Drain Cut-off Current          |               | $I_{DSS}$      | $V_{DS} = 20V, V_{GS} = 0$                           | —    | —    | 1    | $\mu A$  |
| Gate Threshold Voltage         |               | $V_{th}$       | $V_{DS} = 3V, I_D = 0.1mA$                           | 0.5  | —    | 1.5  | V        |
| Forward Transfer Admittance    |               | $ Y_{fs} $     | $V_{DS} = 3V, I_D = 10mA$                            | 20   | —    | —    | mS       |
| Drain-Source ON Resistance     |               | $R_{DS(ON)}$   | $I_D = 10mA, V_{GS} = 2.5V$                          | —    | 20   | 40   | $\Omega$ |
| Input Capacitance              |               | $C_{iss}$      | $V_{DS} = 3V, V_{GS} = 0,$<br>$f = 1MHz$             | —    | 5.5  | —    | pF       |
| Reverse Transfer Capacitance   |               | $C_{rss}$      | $V_{DS} = 3V, V_{GS} = 0,$<br>$f = 1MHz$             | —    | 1.6  | —    | pF       |
| Output Capacitance             |               | $C_{oss}$      | $V_{DS} = 3V, V_{GS} = 0,$<br>$f = 1MHz$             | —    | 6.5  | —    | pF       |
| Switching Time                 | Turn-on Time  | $t_{on}$       | $V_{DD} = 3V, I_D = 10mA,$<br>$V_{GS} = 0 \sim 2.5V$ | —    | 0.14 | —    | $\mu s$  |
|                                | Turn-off Time | $t_{off}$      | $V_{DD} = 3V, I_D = 10mA,$<br>$V_{GS} = 0 \sim 2.5V$ | —    | 0.14 | —    | $\mu s$  |

## Q2 ELECTRICAL CHARACTERISTICS (Ta = 25°C)

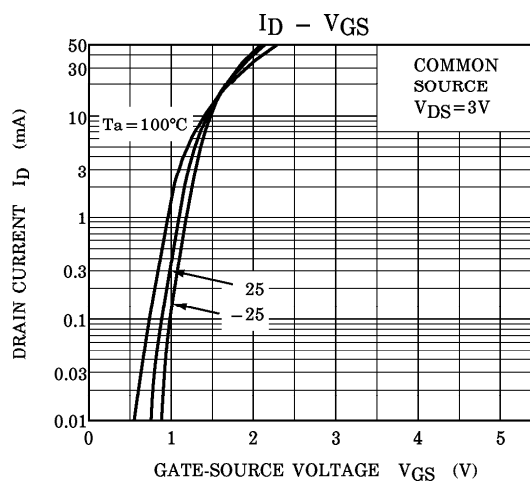
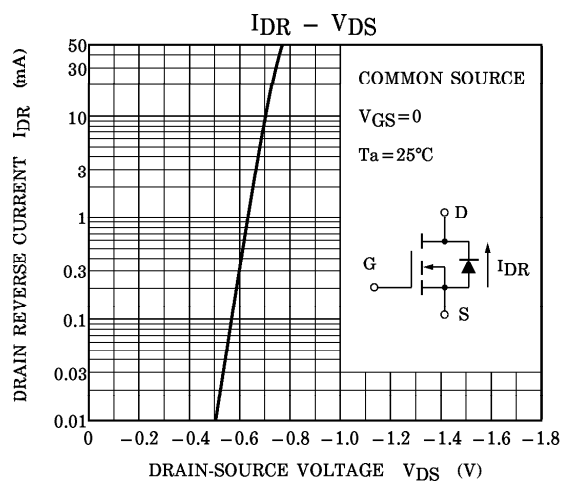
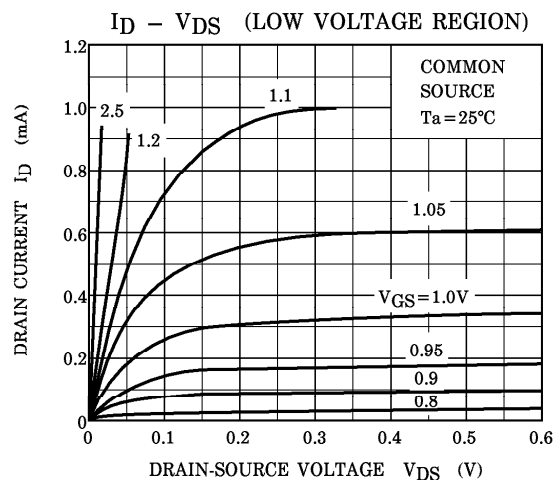
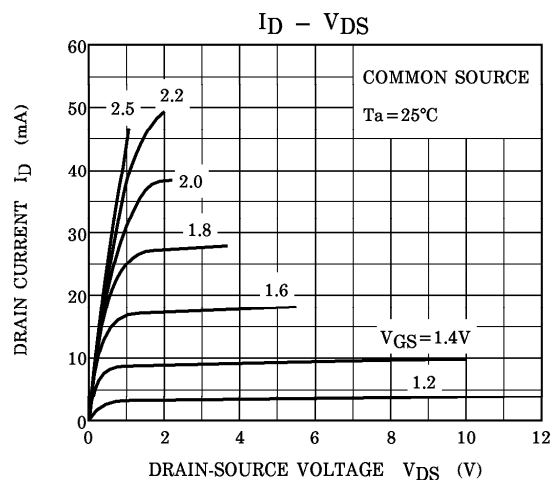
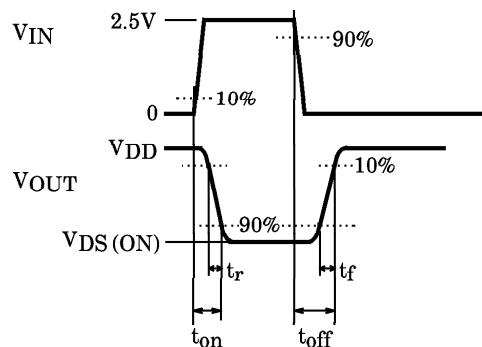
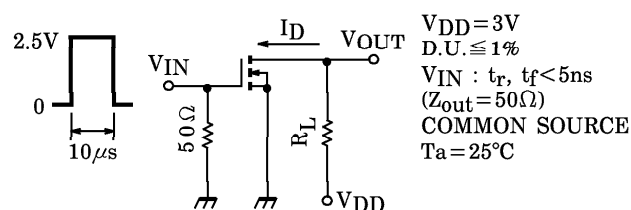
| CHARACTERISTIC                 |               | SYMBOL         | TEST CONDITION                                          | MIN. | TYP. | MAX. | UNIT     |
|--------------------------------|---------------|----------------|---------------------------------------------------------|------|------|------|----------|
| Gate Leakage Current           |               | $I_{GSS}$      | $V_{GS} = -7V, V_{DS} = 0$                              | —    | —    | -1   | $\mu A$  |
| Drain-Source Breakdown Voltage |               | $V_{(BR) DSS}$ | $I_D = -100\mu A, V_{GS} = 0$                           | -20  | —    | —    | V        |
| Drain Cut-off Current          |               | $I_{DSS}$      | $V_{DS} = -20V, V_{GS} = 0$                             | —    | —    | -1   | $\mu A$  |
| Gate Threshold Voltage         |               | $V_{th}$       | $V_{DS} = -3V, I_D = -0.1mA$                            | -0.5 | —    | -1.5 | V        |
| Forward Transfer Admittance    |               | $ Y_{fs} $     | $V_{DS} = -3V, I_D = -10mA$                             | 15   | —    | —    | mS       |
| Drain-Source ON Resistance     |               | $R_{DS(ON)}$   | $I_D = -10mA, V_{GS} = -2.5V$                           | —    | 20   | 40   | $\Omega$ |
| Input Capacitance              |               | $C_{iss}$      | $V_{DS} = -3V, V_{GS} = 0,$<br>$f = 1MHz$               | —    | 10.4 | —    | pF       |
| Reverse Transfer Capacitance   |               | $C_{rss}$      | $V_{DS} = -3V, V_{GS} = 0,$<br>$f = 1MHz$               | —    | 2.8  | —    | pF       |
| Output Capacitance             |               | $C_{oss}$      | $V_{DS} = -3V, V_{GS} = 0,$<br>$f = 1MHz$               | —    | 8.4  | —    | pF       |
| Switching Time                 | Turn-on Time  | $t_{on}$       | $V_{DD} = -3V, I_D = -10mA,$<br>$V_{GS} = 0 \sim -2.5V$ | —    | 0.15 | —    | $\mu s$  |
|                                | Turn-off Time | $t_{off}$      | $V_{DD} = -3V, I_D = -10mA,$<br>$V_{GS} = 0 \sim -2.5V$ | —    | 0.13 | —    | $\mu s$  |

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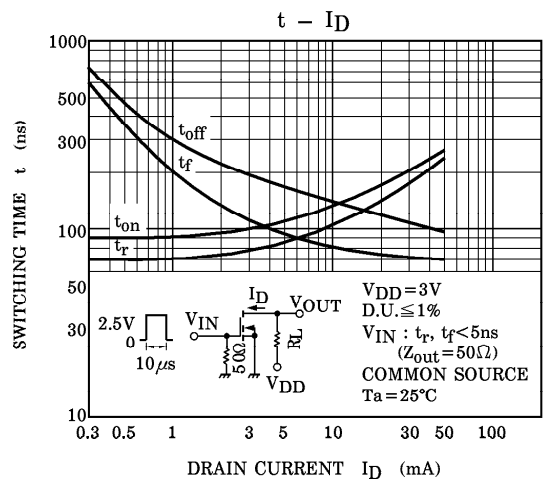
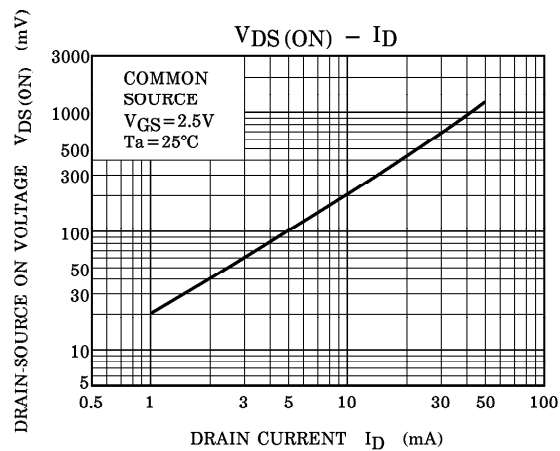
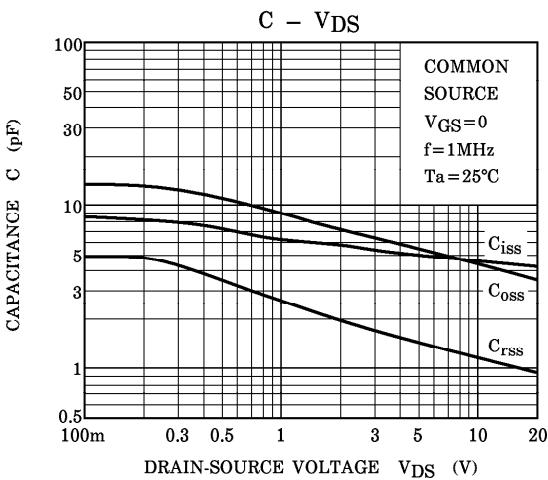
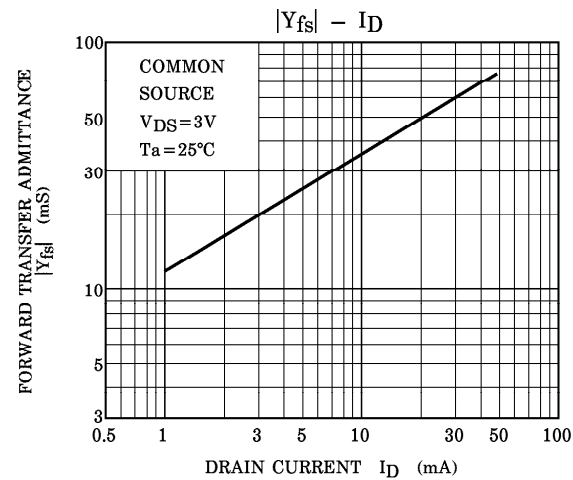
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## Q1 (Nch MOS FET)

## SWITCHING TIME TEST CIRCUIT

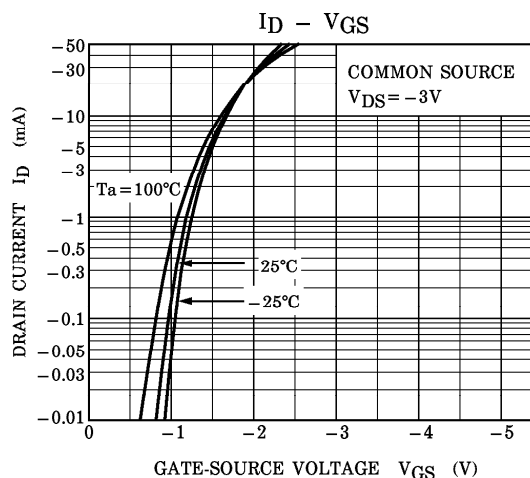
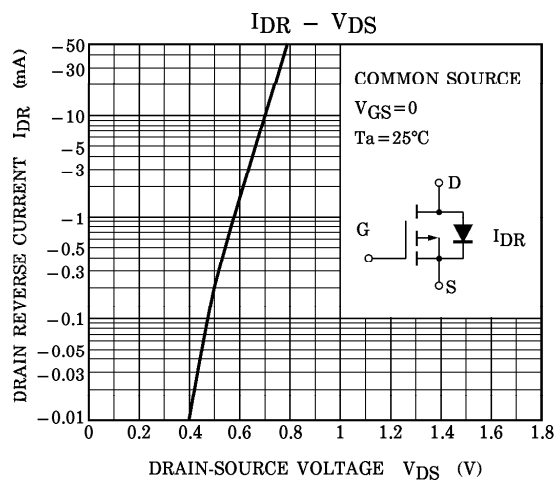
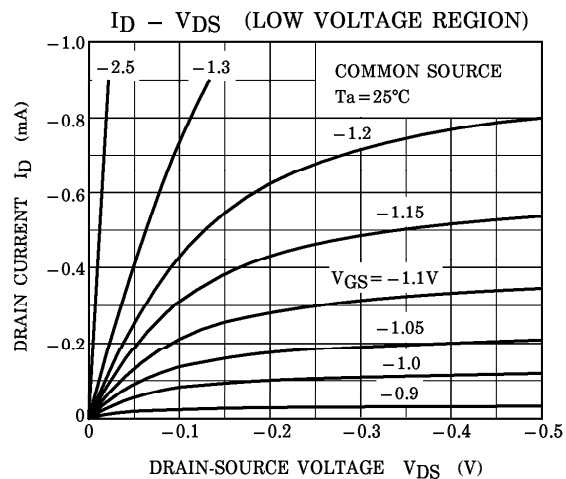
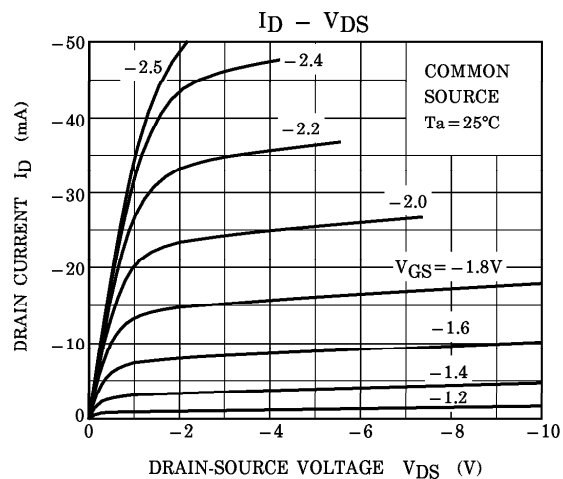
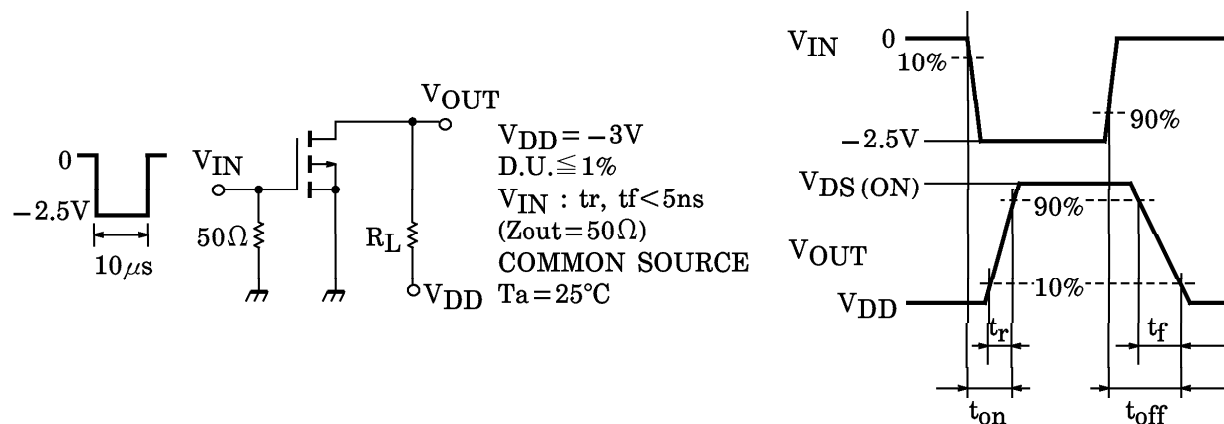


Q1 (Nch MOS FET)

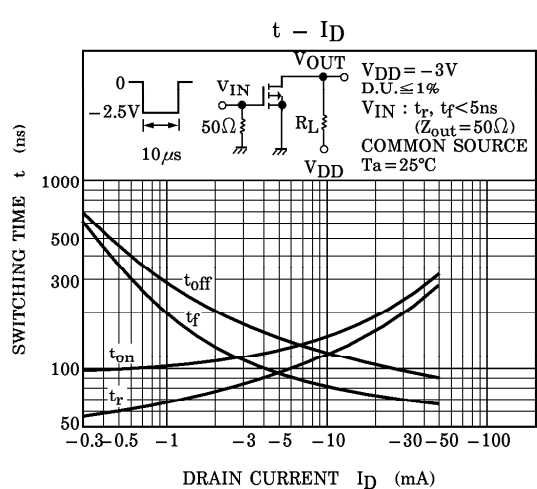
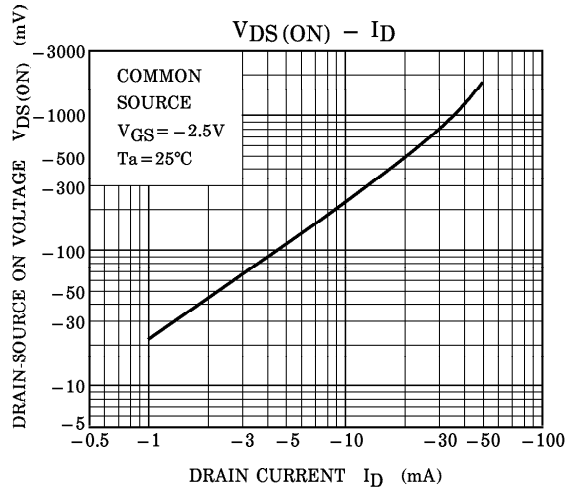
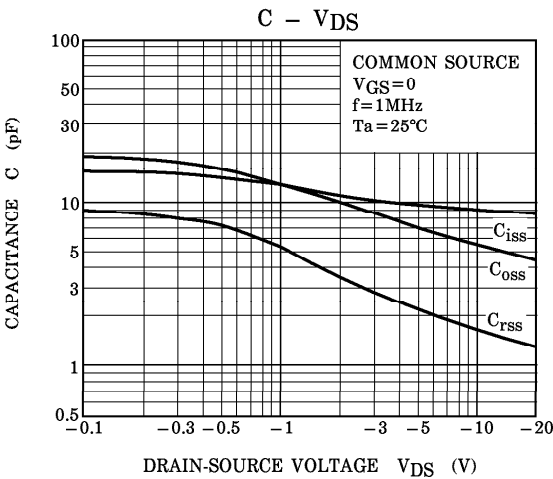
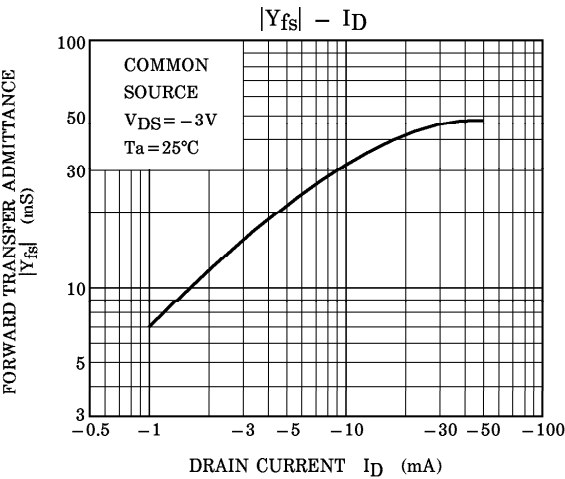


## Q2 (Pch MOS FET)

## SWITCHING TIME TEST CIRCUIT



Q2 (Pch MOS FET)



(Q1, Q2 COMMON)

