

TOSHIBA Multichip Discrete Device

HN7G01FE

Power Management Switch Applications

Driver Circuit Applications

Interface Circuit Applications

- Q1 (transistor): 2SA1955 equivalent
- Q2 (MOSFET): SSM3K03FE equivalent

Q1 (Transistor) Absolute Maximum Ratings (Ta = 25°C)

| Characteristic | Symbol | Rating | Unit |
|---------------------------|------------------|--------|------|
| Collector-base voltage | V _{CB0} | -15 | V |
| Collector-emitter voltage | V _{CEO} | -12 | V |
| Emitter-base voltage | V _{EBO} | -5 | V |
| Collector current | I _C | -400 | mA |
| Base current | I _B | -50 | mA |

Q2 (MOSFET) Absolute 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 |

Q1, Q2 Common Ratings (Ta = 25°C)

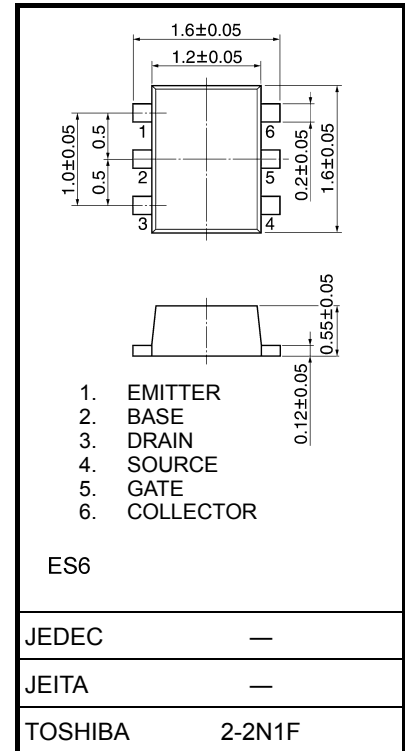
| Characteristic | Symbol | Rating | Unit |
|---------------------------|------------------|---------|------|
| Power dissipation | P (Note 1) | 100 | mW |
| Junction temperature | T _j | 125 | °C |
| Storage temperature range | T _{stg} | -55~125 | °C |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

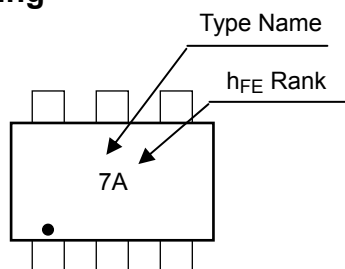
Note 1: Total rating

Unit: mm

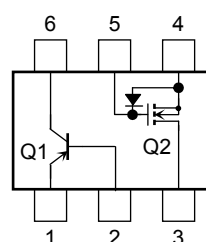


Weight: 0.003 g (typ.)

Marking



Pin Assignment (top view)



Q1 (Transistor) Electrical Characteristics (Ta = 25°C)

| Characteristic | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|-------------------|---|-----|-------|------|---------------|
| Collector cutoff current | I_{CBO} | $V_{CB} = -15\text{ V}, I_E = 0$ | — | — | -0.1 | μA |
| Emitter cutoff current | I_{EBO} | $V_{EB} = -5\text{ V}, I_C = 0$ | — | — | -0.1 | μA |
| DC current gain | h_{FE} (Note 2) | $V_{CE} = -2\text{ V}, I_C = -10\text{ mA}$ | 300 | — | 1000 | |
| Collector-emitter saturation voltage | $V_{CE(sat)}(1)$ | $I_C = -10\text{ mA}, I_B = -0.5\text{ mA}$ | — | -15 | -30 | mV |
| | $V_{CE(sat)}(2)$ | $I_C = -200\text{ mA}, I_B = -10\text{ mA}$ | — | -110 | -250 | |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | $I_C = -200\text{ mA}, I_B = -10\text{ mA}$ | — | -0.87 | -1.2 | V |

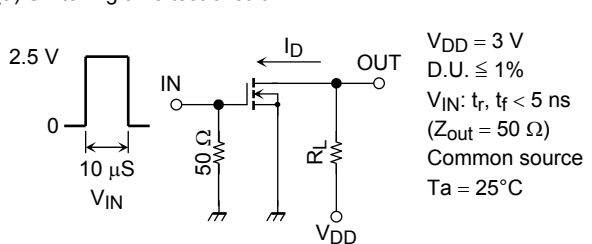
Note 2: h_{FE} classification A: 300~600, B: 500~1000

Q2 (MOSFET) Electrical Characteristics (Ta = 25°C)

| Characteristic | Symbol | Test Condition | Min | Typ. | Max | Unit | |
|--------------------------------|---------------|---|--|------|------|---------------|---------------|
| Gate leakage current | I_{GSS} | $V_{GS} = 10\text{ V}, V_{DS} = 0$ | — | — | 1 | μA | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $I_D = 100\text{ }\mu\text{A}, V_{GS} = 0$ | 20 | — | — | V | |
| Drain cutoff current | I_{DSS} | $V_{DS} = 20\text{ V}, V_{GS} = 0$ | — | — | 1 | μA | |
| Gate threshold voltage | V_{th} | $V_{DS} = 3\text{ V}, I_D = 0.1\text{ mA}$ | 0.7 | — | 1.3 | V | |
| Forward transfer admittance | $ Y_{fs} $ | $V_{DS} = 3\text{ V}, I_D = 10\text{ mA}$ | 25 | 50 | — | mS | |
| Drain-source ON-resistance | $R_{DS(ON)}$ | $I_D = 10\text{ mA}, V_{GS} = 2.5\text{ V}$ | — | 4 | 12 | Ω | |
| Input capacitance | C_{iss} | $V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ | — | 11.0 | — | pF | |
| Reverse transfer capacitance | C_{rss} | $V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ | — | 3.3 | — | pF | |
| Output capacitance | C_{oss} | $V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ | — | 9.3 | — | pF | |
| Switching time | Turn-on time | t_{on} | $V_{DD} = 3\text{ V}, I_D = 10\text{ mA}, V_{GS} = 0\sim 2.5\text{ V}$ | — | 0.16 | — | μs |
| | Turn-off time | t_{off} | $V_{DD} = 3\text{ V}, I_D = 10\text{ mA}, V_{GS} = 0\sim 2.5\text{ V}$ | — | 0.19 | — | |

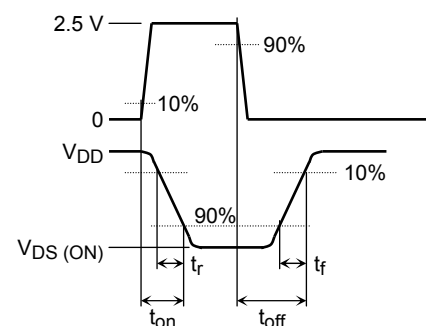
Switching Time Test Circuit

(a) Switching time test circuit

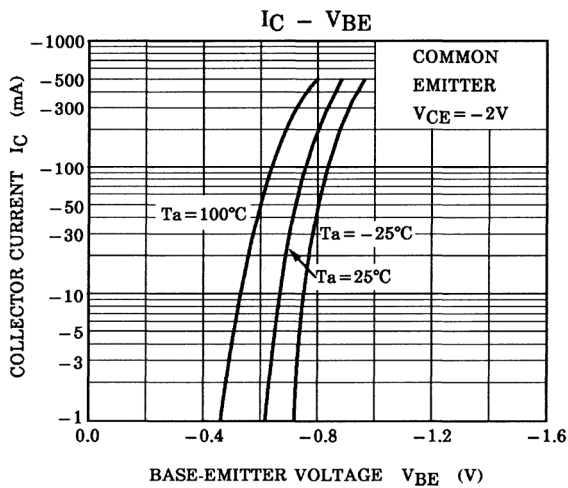
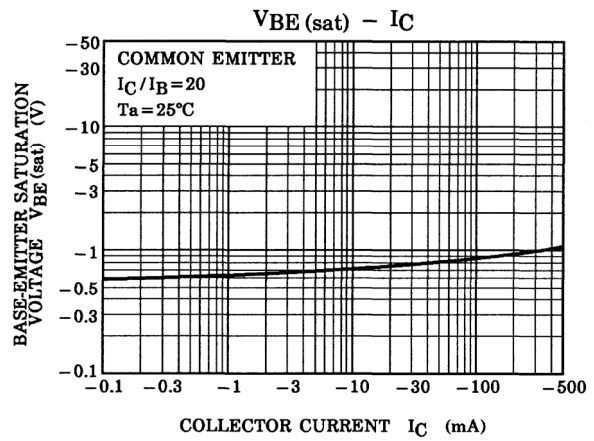
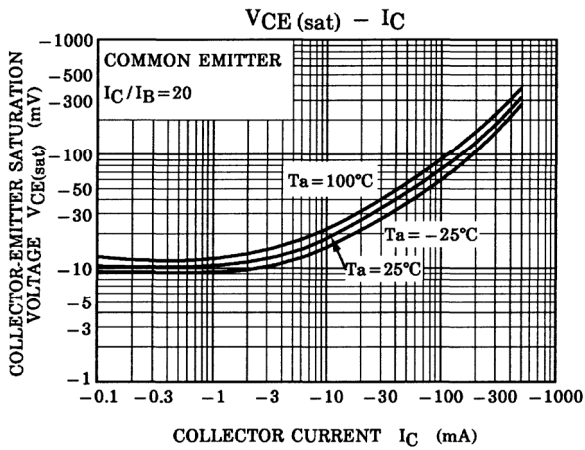
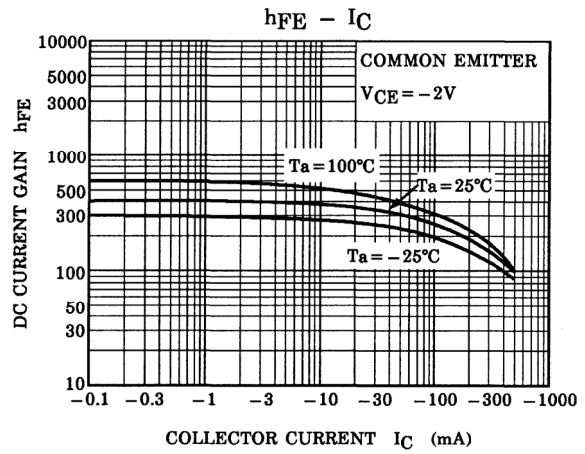
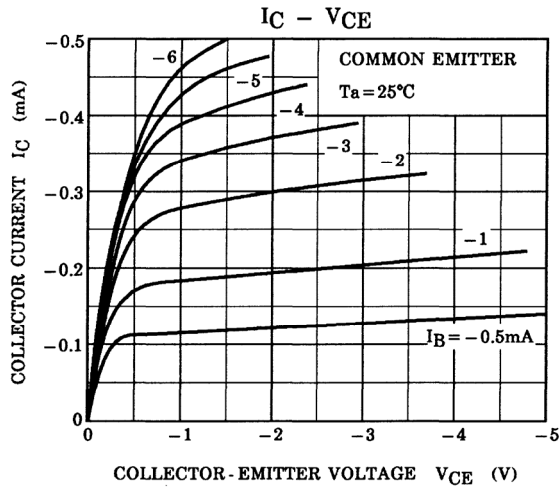


(b) V_{IN}
 V_{GS}

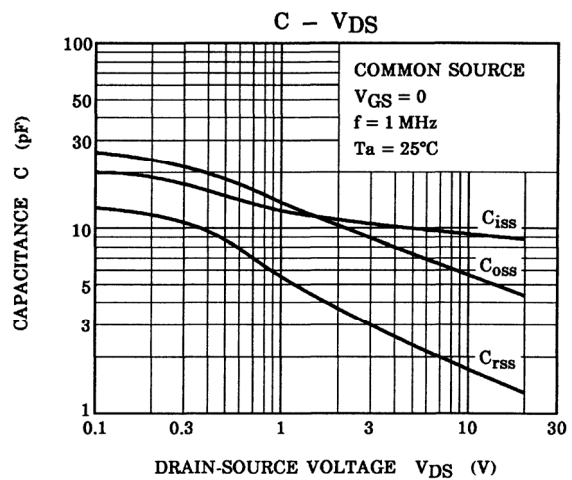
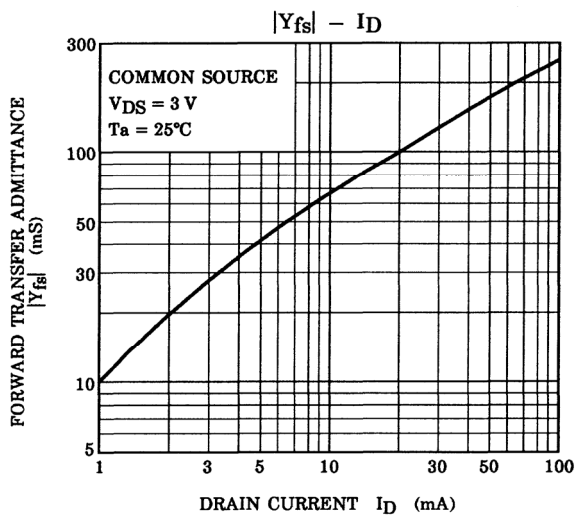
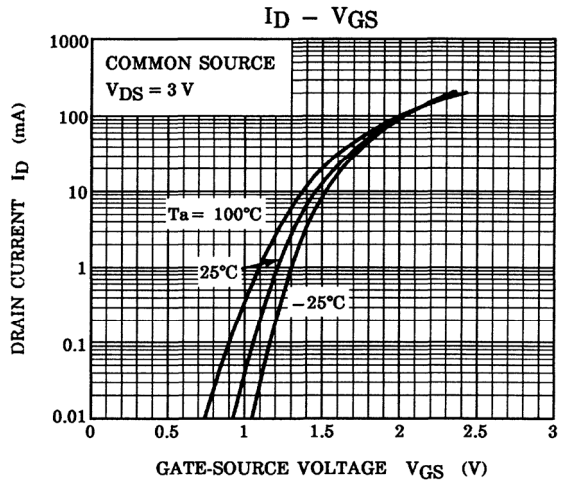
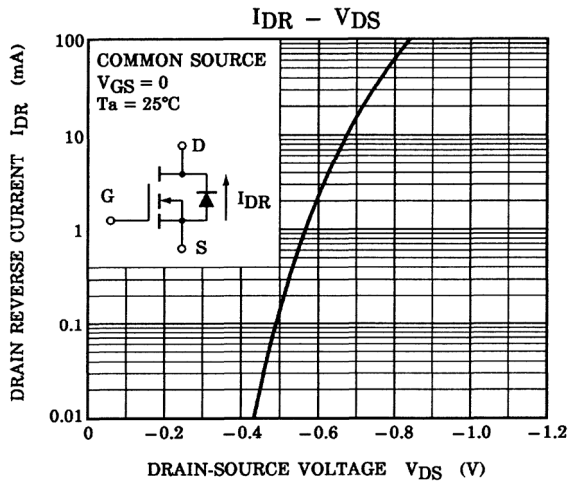
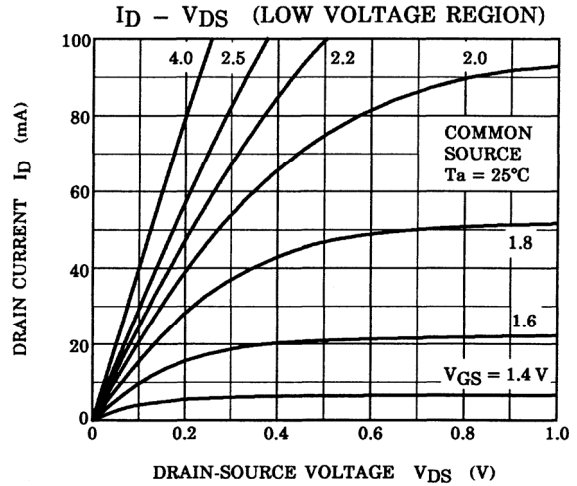
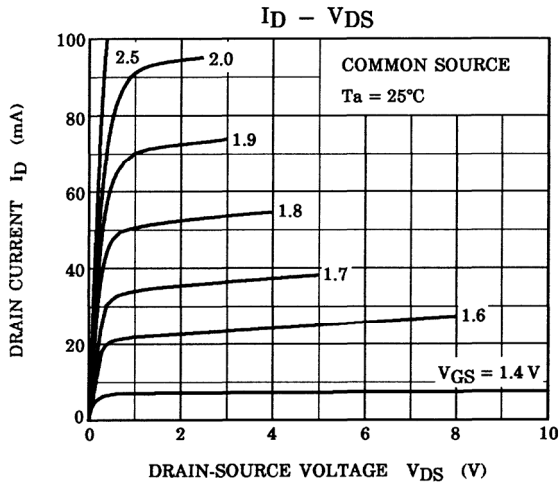
(c) V_{OUT}
 V_{DS}



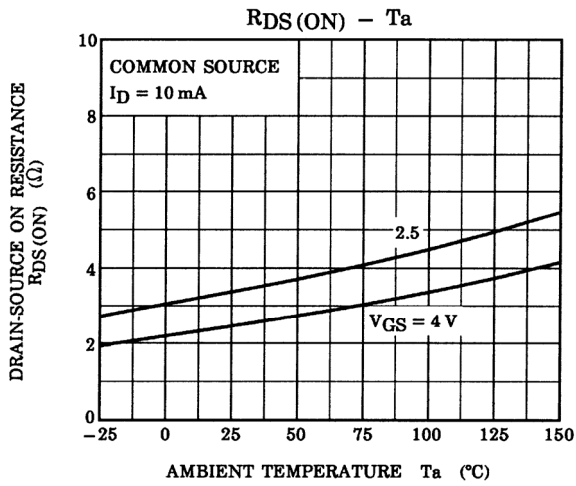
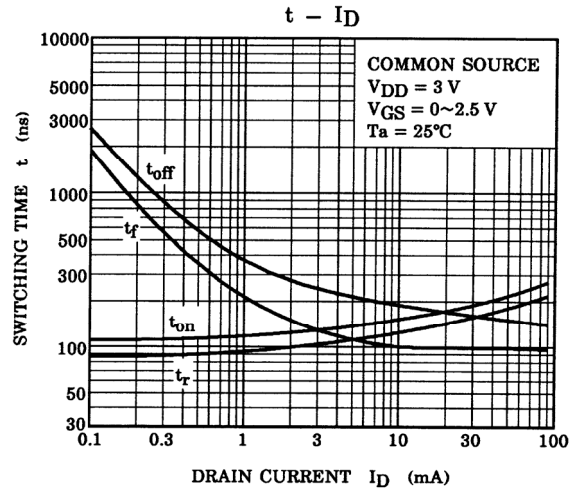
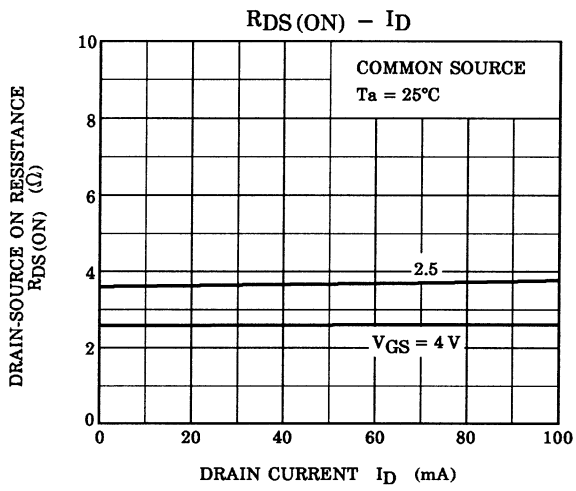
Q1 (Transistor)



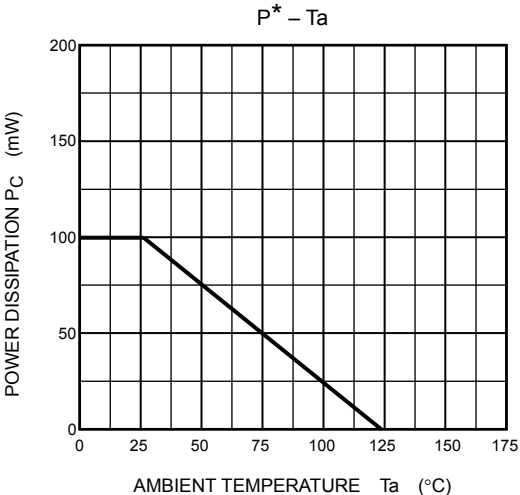
Q2 (S-MOS)



Q2 (S-MOS)



Q1, Q2 Common



*:Total rating

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20070701-EN GENERAL

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