

# HN1K04FU

High Speed Switching Applications  
 Analog Switch Applications

- High input impedance and extremely low drive current.
- $V_{th}$  is low and it is possible to drive directly at low-voltage CMOS.  
 :  $V_{th} = 0.8$  to  $2.5$  V
- Switching speed is fast.
- Suitable for high-density mounting because of a compact package.

### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ ) (Q1, Q2 common)

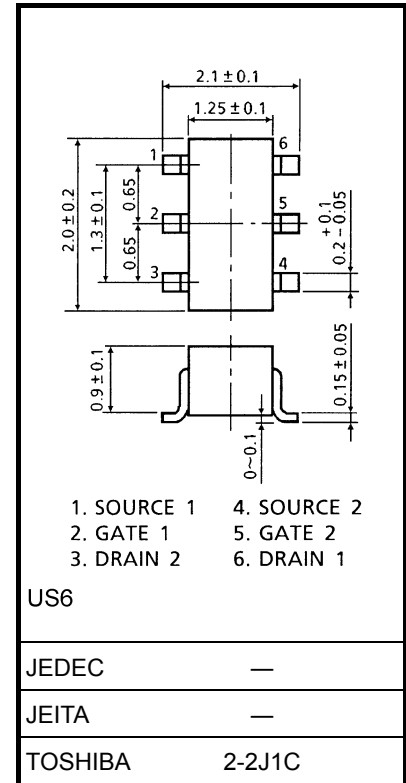
Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DS}$	50	V
Gate-source voltage	$V_{GSS}$	10	V
DC drain current	$I_D$	50	mA
Drain power dissipation	$P_D$ (Note 1)	200	mW
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55 to 150	$^\circ\text{C}$

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

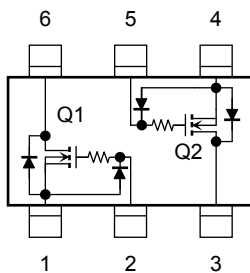


Weight: 6.8 mg

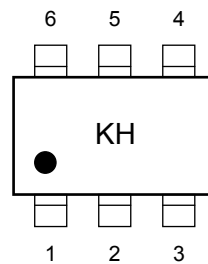
## Electrical Characteristics (Ta = 25°C) (Q1, Q2 common)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	$I_{GSS}$	$V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$	—	—	1	$\mu\text{A}$
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 100\ \mu\text{A}, V_{GS} = 0\text{ V}$	50	—	—	V
Drain cut-off current	$I_{DSS}$	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$	—	—	1	$\mu\text{A}$
Gate threshold voltage	$V_{th}$	$V_{DS} = 5\text{ V}, I_D = 0.1\text{ mA}$	0.8	—	2.5	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 5\text{ V}, I_D = 10\text{ mA}$	20	—	—	mS
Drain-source ON resistance	$R_{DS(ON)}$	$I_D = 10\text{ mA}, V_{GS} = 4.0\text{ V}$	—	20	50	$\Omega$
Input capacitance	$C_{iss}$	$V_{DS} = 5\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	6.3	—	pF
Reverse transfer capacitance	$C_{rss}$	$V_{DS} = 5\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1.3	—	pF
Output capacitance	$C_{oss}$	$V_{DS} = 5\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	5.7	—	pF
Switching time	$t_{on}$	$V_{DD} = 5\text{ V}, I_D = 10\text{ mA}, V_{GS} = 0\text{ to }4.0\text{ V}$	—	0.11	—	$\mu\text{s}$
	$t_{off}$	$V_{DD} = 5\text{ V}, I_D = 10\text{ mA}, V_{GS} = 0\text{ to }4.0\text{ V}$	—	0.15	—	

### Equivalent Circuit (top view)



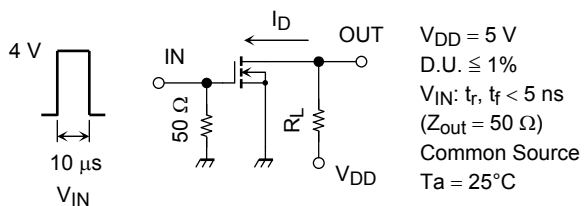
### Marking



(Q1, Q2 common)

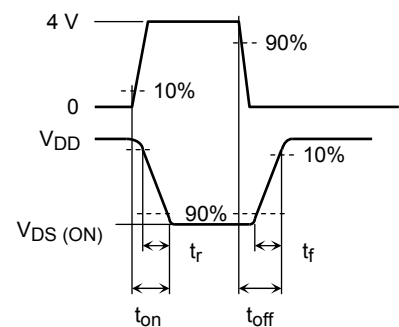
### Switching Time Test Circuit

#### (a) Test circuit



#### (b) $V_{IN}$

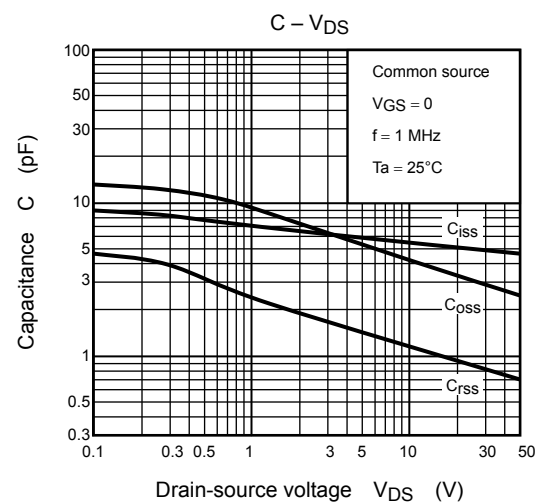
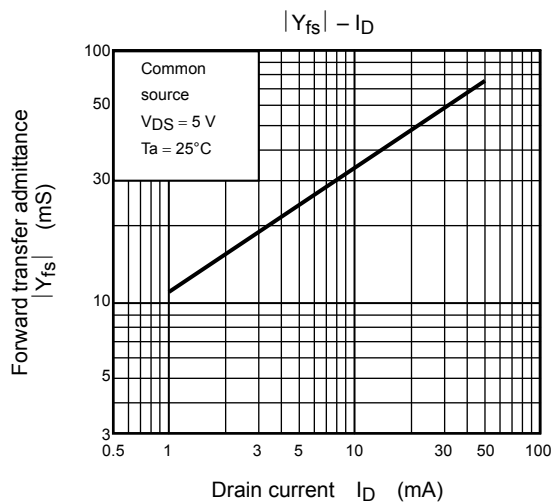
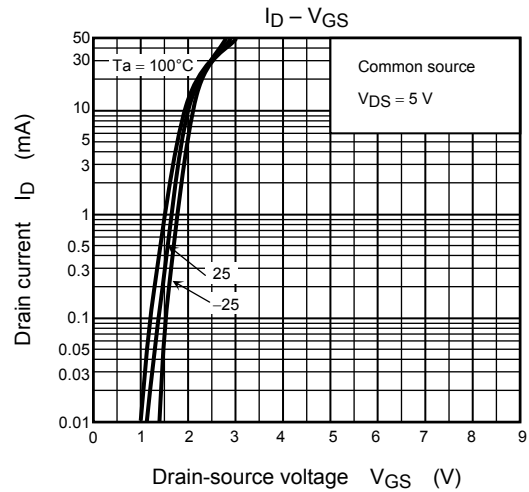
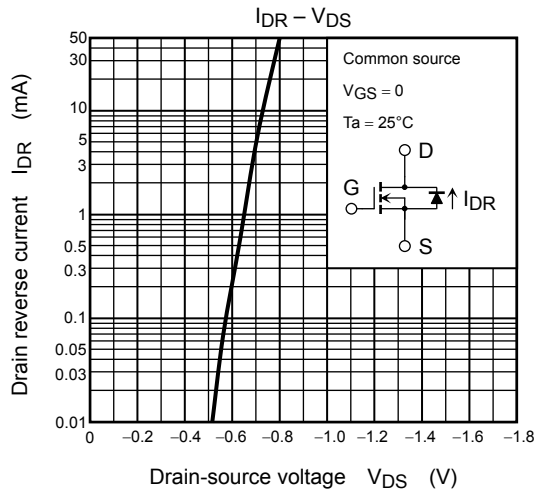
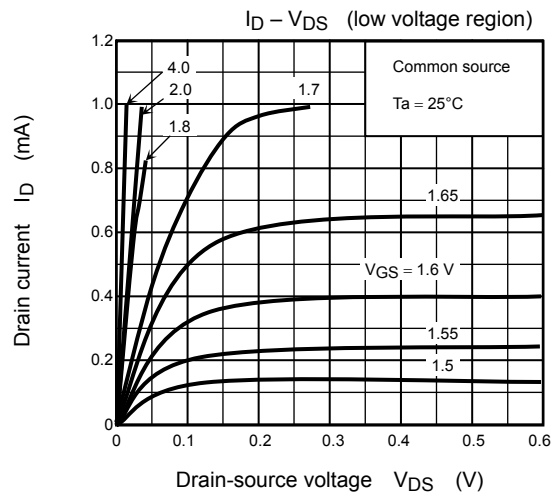
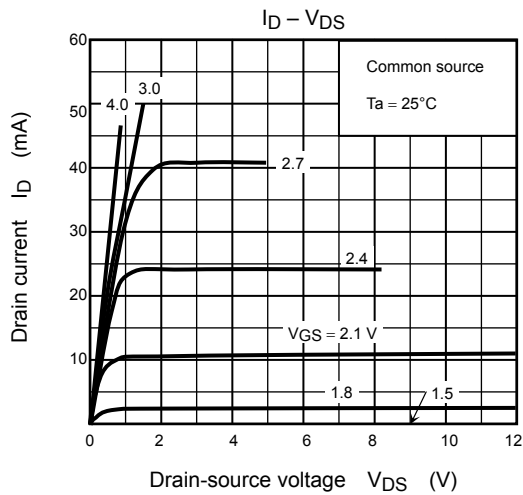
$V_{GS}$



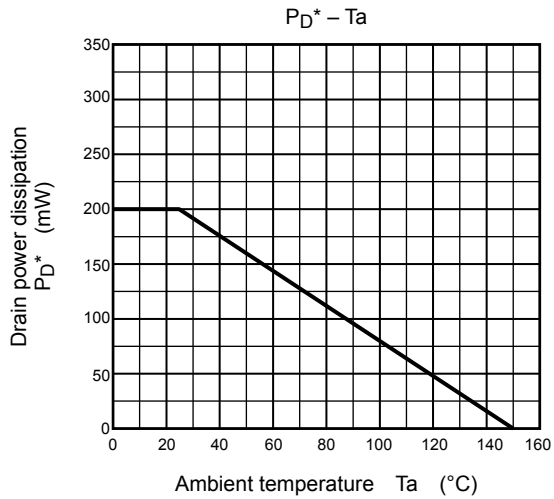
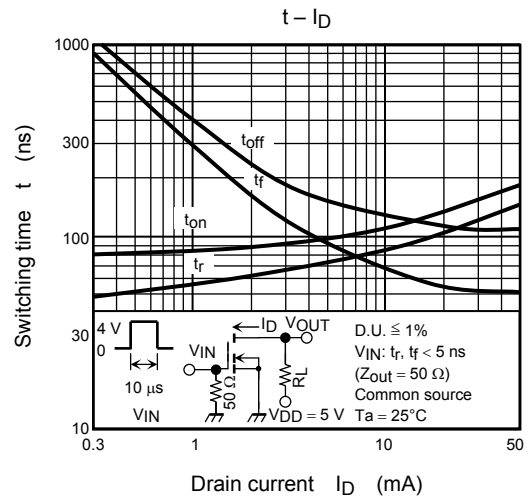
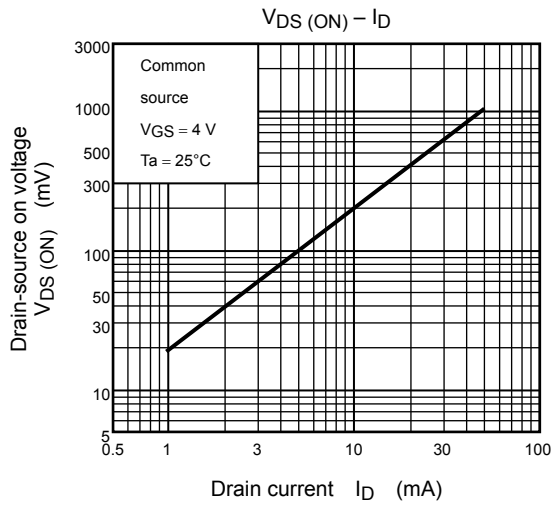
#### (c) $V_{OUT}$

$V_{DS}$

(Q1, Q2 common)



(Q1, Q2 common)



\*: TOTAL rating

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20070701-EN GENERAL

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