

TOSHIBA Multichip Discrete Device

# HN7G10FE

Power Management Switch Applications

Driver Circuit Applications

Interface Circuit Applications

- Q1 (transistor): 2SC5376F equivalent
- Q2 (MOSFET): SSM3K03FE equivalent

### Q1 (transistor) Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V <sub>CB0</sub>	15	V
Collector-emitter voltage	V <sub>CEO</sub>	12	V
Emitter-base voltage	V <sub>EBO</sub>	5	V
Collector current	I <sub>C</sub>	400	mA
Base current	I <sub>B</sub>	50	mA

### Q2 (MOSFET) Maximum Ratings (Ta = 25°C)

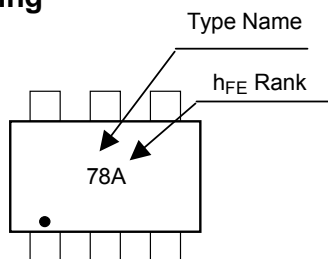
Characteristic	Symbol	Rating	Unit
Drain-source voltage	V <sub>DS</sub>	20	V
Gate-source voltage	V <sub>GSS</sub>	10	V
Drain current	I <sub>D</sub>	50	mA

### Q1, Q2 Common Ratings (Ta = 25°C)

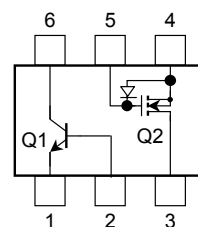
Characteristic	Symbol	Rating	Unit
Power dissipation	P <sub>C</sub> (Note 1)	100	mW
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature range	T <sub>stg</sub>	-55~150	°C

Note 1: Total rating

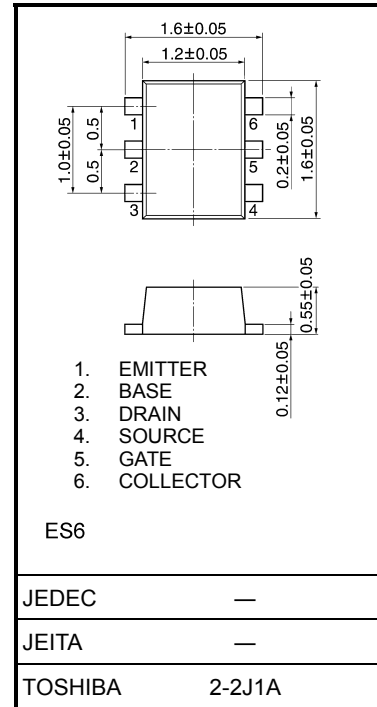
### Marking



### Pin Assignment (top view)



Unit: mm



Weight: 0.003 g (typ.)

## 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	$\mu\text{A}$
Emitter cutoff current	$I_{EBO}$	$V_{EB} = 5 \text{ V}, I_C = 0$	—	—	0.1	$\mu\text{A}$
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

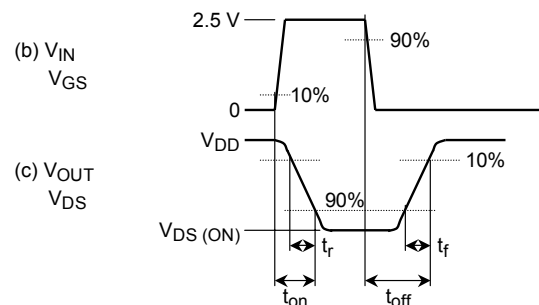
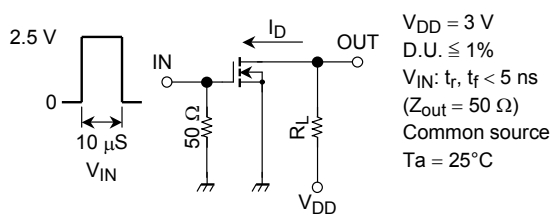
Note 2:  $h_{FE}$  classification A: 300~600, B: 500~1000

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

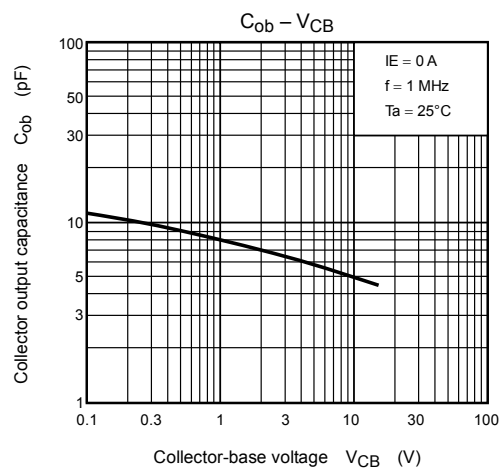
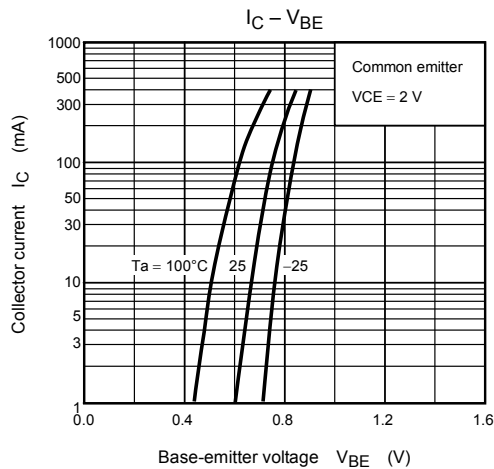
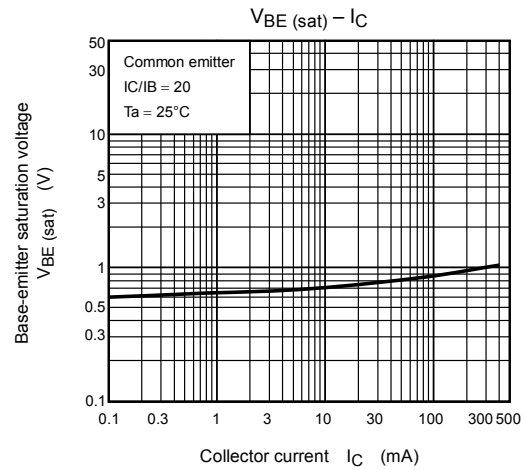
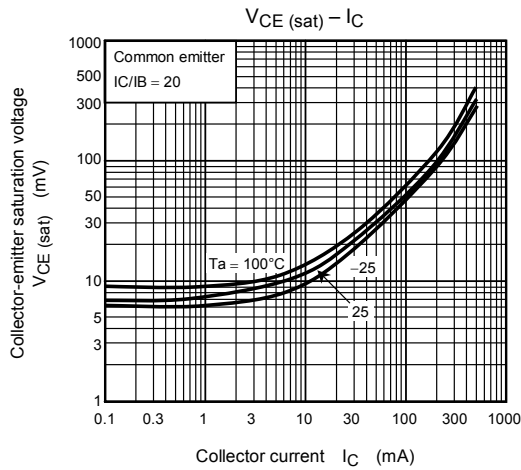
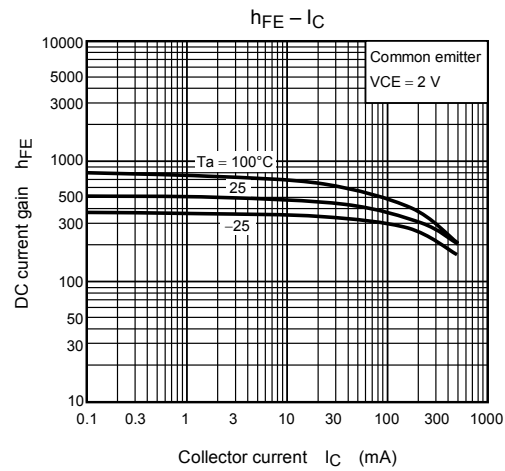
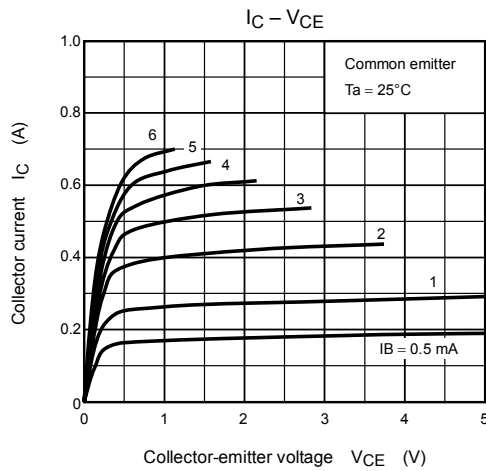
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	$I_{GSS}$	$V_{GS} = 10 \text{ V}, V_{DS} = 0$	—	—	1	$\mu\text{A}$	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 100 \mu\text{A}, V_{GS} = 0$	20	—	—	V	
Drain cutoff current	$I_{DSS}$	$V_{DS} = 20 \text{ V}, V_{GS} = 0$	—	—	1	$\mu\text{A}$	
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	$\Omega$	
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	—	$\mu\text{s}$
	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

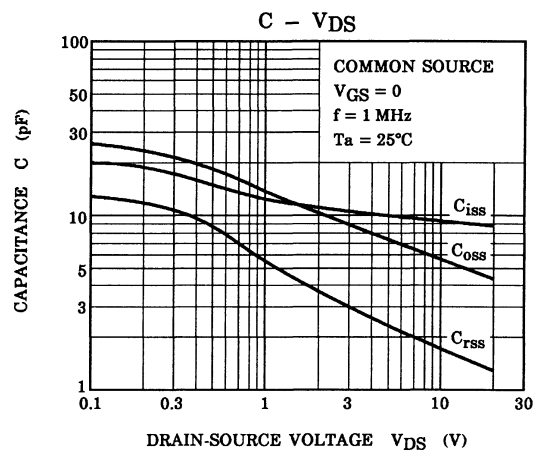
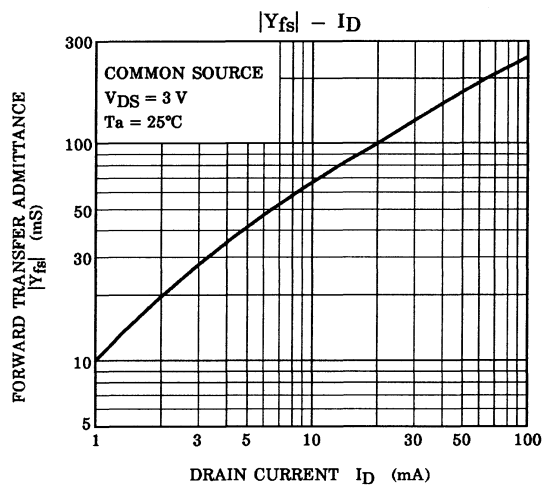
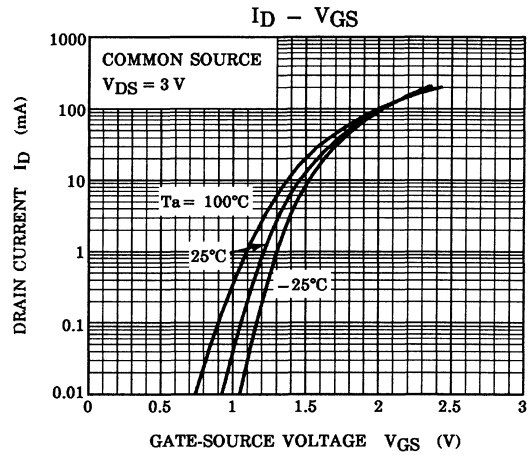
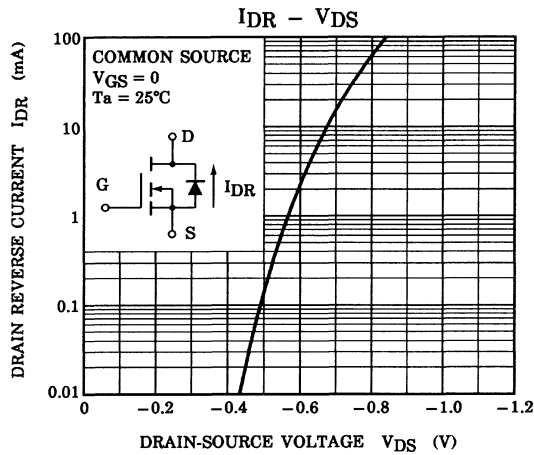
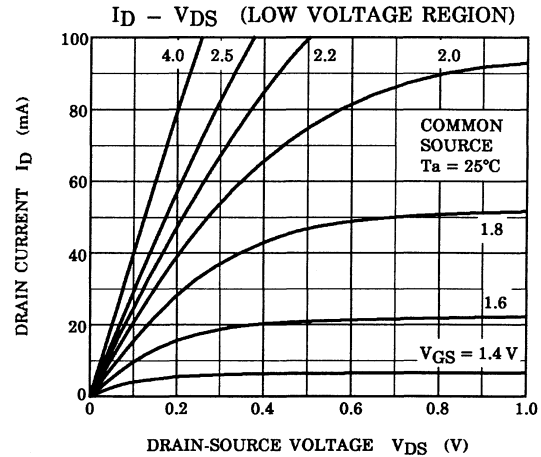
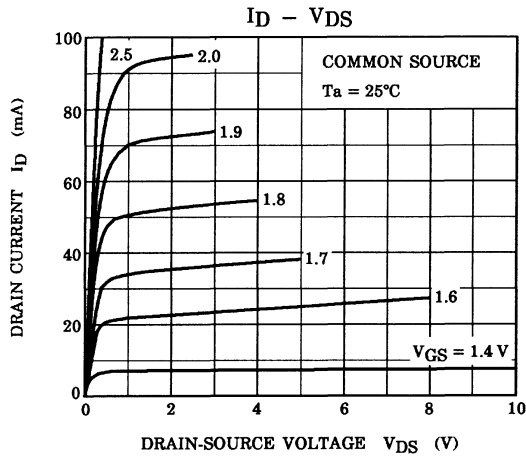
(a) Switching time test circuit



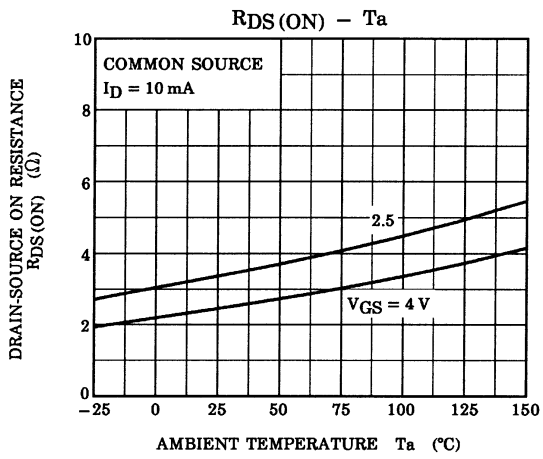
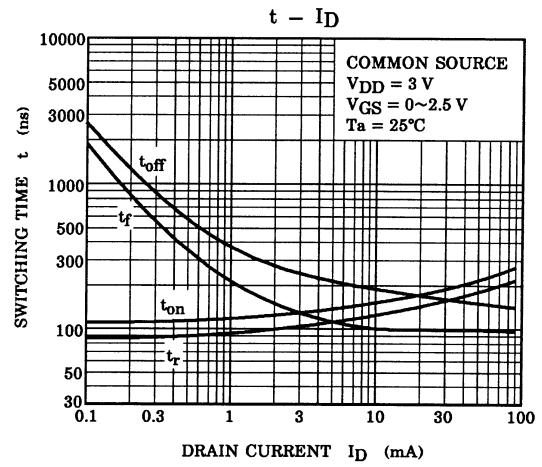
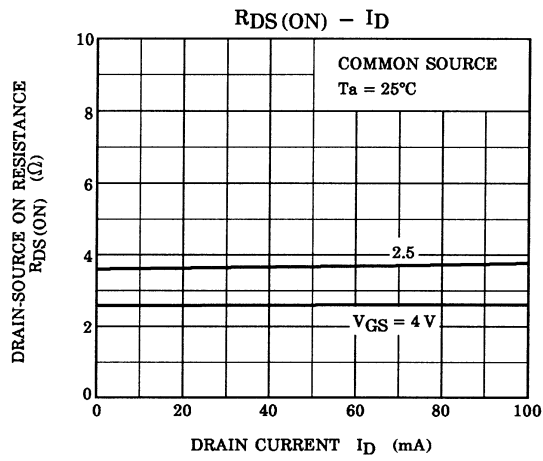
## Q1 (Transistor)



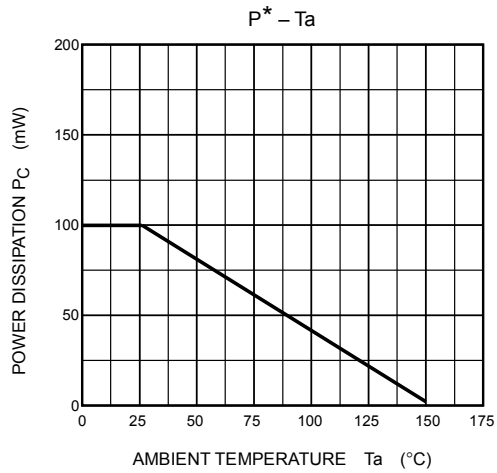
## Q2 (S-MOS)



**Q2 (S-MOS)**



## Q1, Q2 Common



\*:Total rating

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