

TOSHIBA Multichip Discrete Device

# HN7G02FE

Power Management Switch Applications, Inverter Circuit Applications, Driver Circuit Applications and Interface Circuit Applications

Unit: mm

Q1 (transistor): RN2110 equivalent  
 Q2 (MOSFET): SSM3K03FE equivalent

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

Characteristic	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-50	V
Collector-emitter voltage	$V_{CEO}$	-50	V
Emitter-base voltage	$V_{EBO}$	-5	V
Collector current	$I_C$	-100	mA

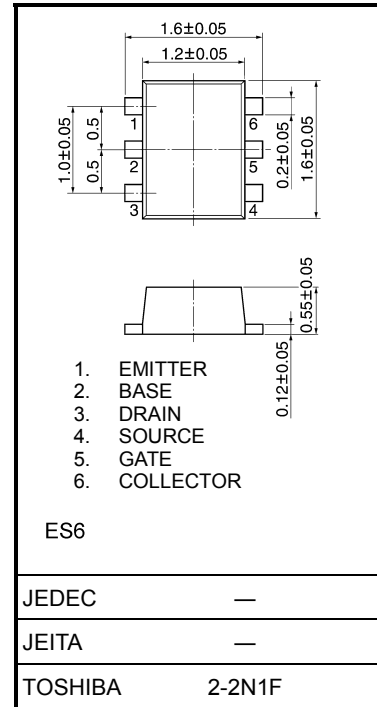
### Q2 (MOSFET) Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Drain-source voltage	$V_{DS}$	20	V
Gate-source voltage	$V_{GSS}$	10	V
DC drain current	$I_D$	50	mA

### Q1, Q2 Common Ratings (Ta = 25°C)

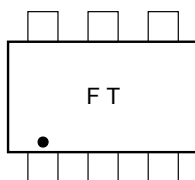
Characteristic	Symbol	Rating	Unit
Power dissipation	P (Note)	100	mW
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55~150	°C

Note: Total rating

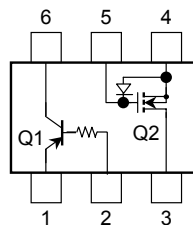


Weight:0.003g (typ.)

### Marking



### Equivalent Circuit (top view)



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

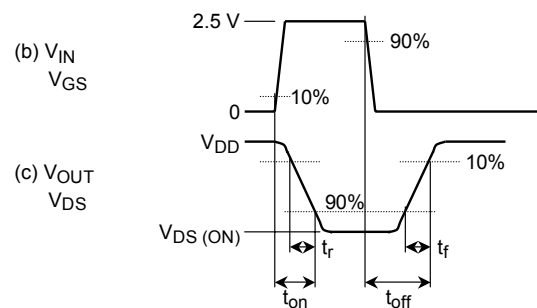
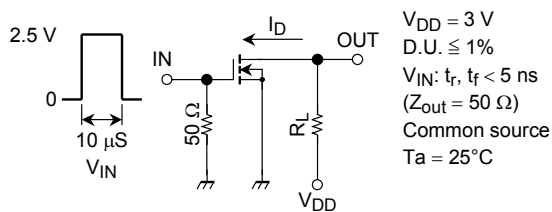
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current	$I_{CBO}$	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-100	nA
Emitter cutoff current	$I_{EBO}$	$V_{EB} = -5\text{ V}, I_C = 0$	—	—	-100	nA
DC current gain	$h_{FE}$	$V_{CE} = -5\text{ V}, I_C = -1\text{ mA}$	120	—	400	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input resistor	R1	—	3.29	4.7	6.11	kΩ

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

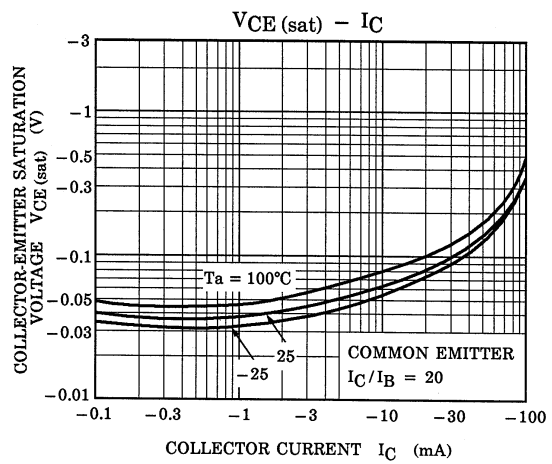
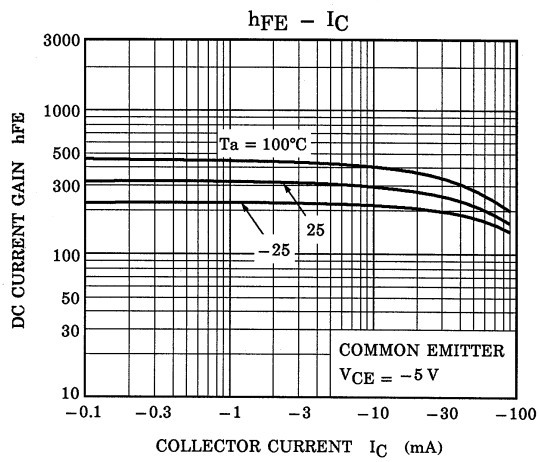
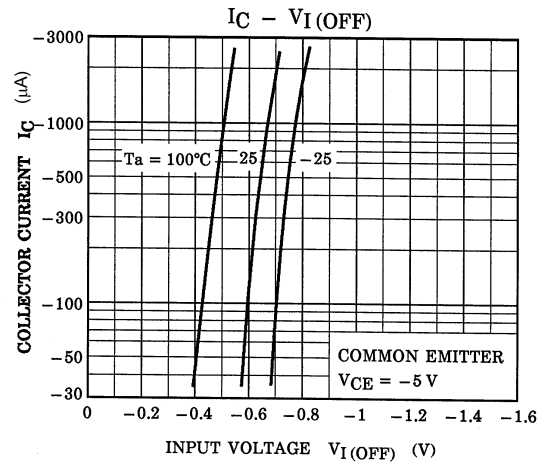
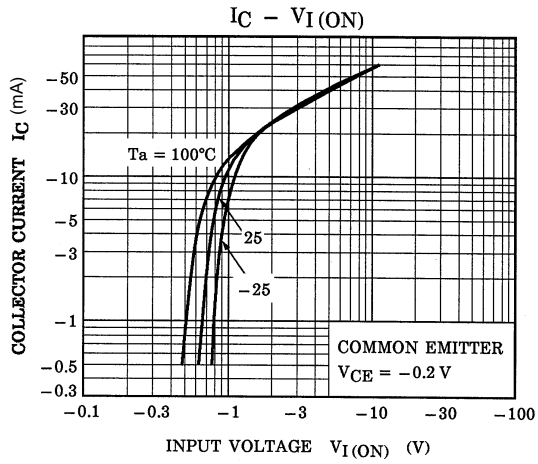
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	$I_{GSS}$	$V_{GS} = 10\text{ V}, V_{DS} = 0$	—	—	1	μA	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 100\text{ μA}, V_{GS} = 0$	20	—	—	V	
Drain cutoff current	$I_{DSS}$	$V_{DS} = 20\text{ V}, V_{GS} = 0$	—	—	1	μA	
Gate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

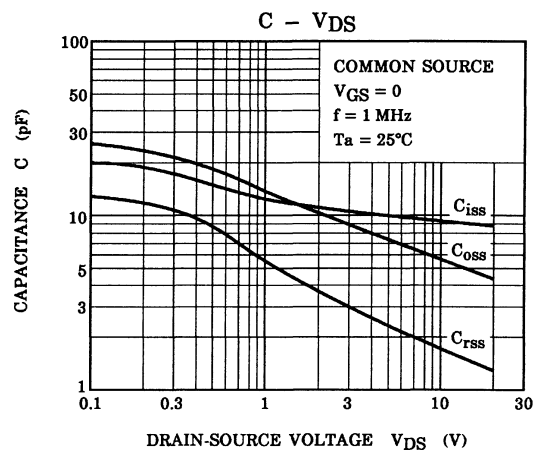
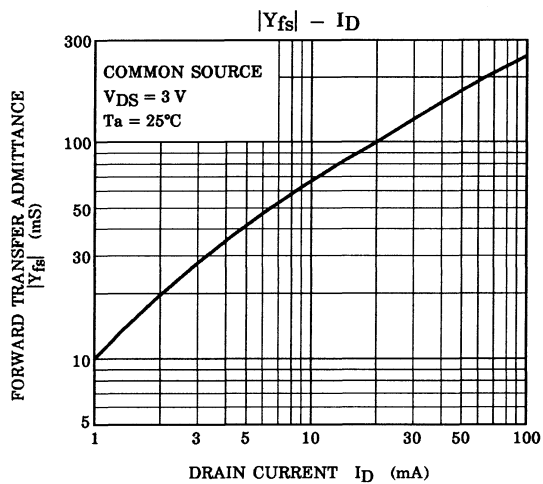
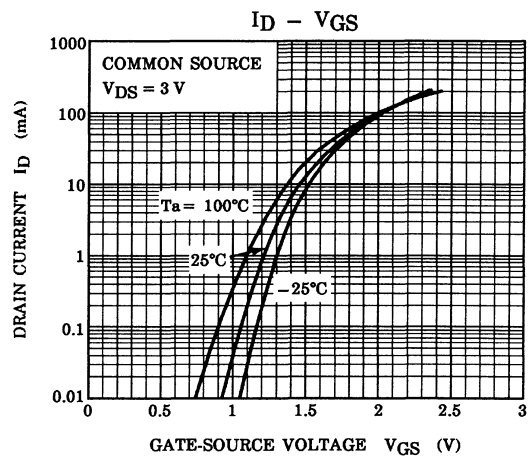
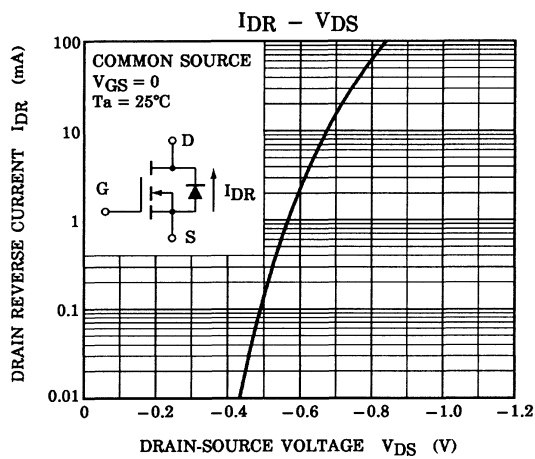
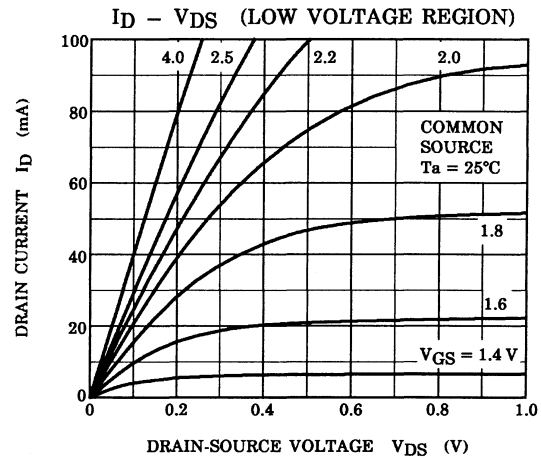
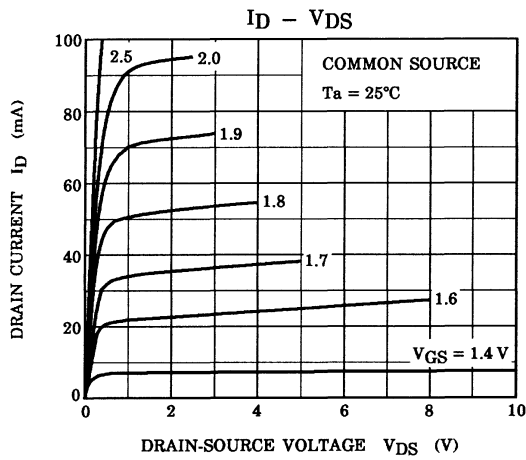
(a) Switching time test circuit



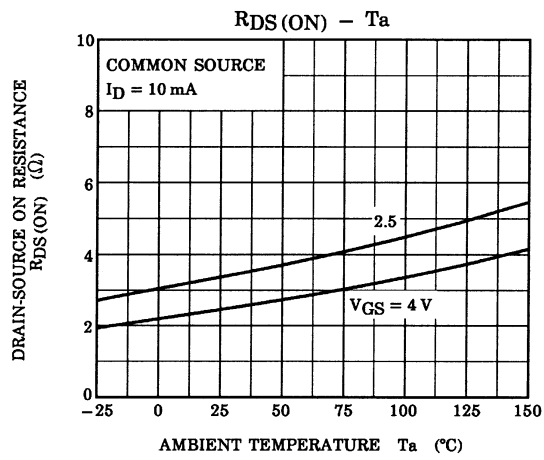
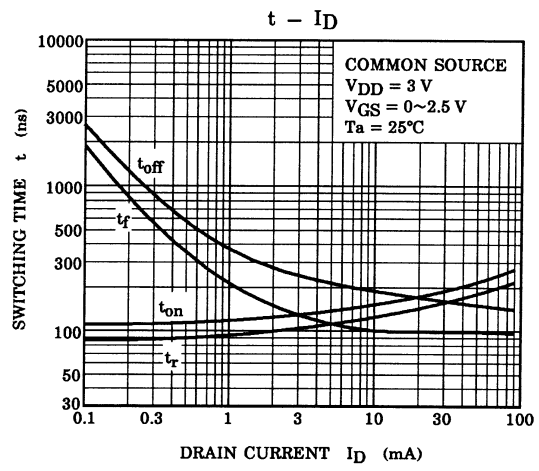
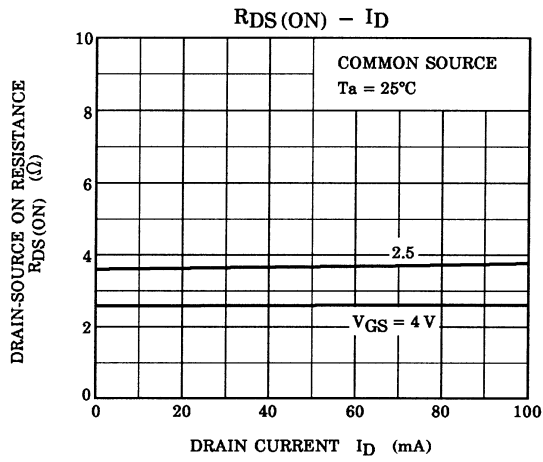
## Q1 (Transistor)



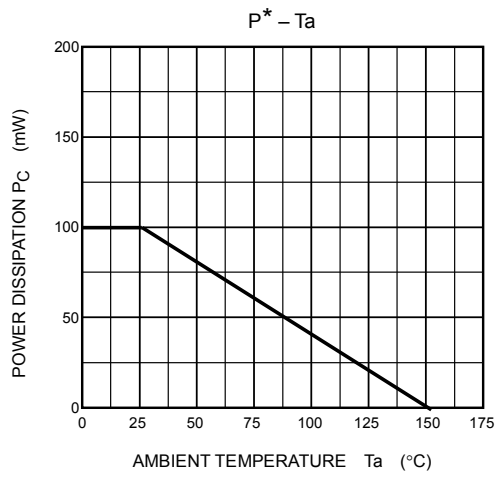
## Q2 (MOSFET)



## Q2 (MOSFET)



## Q1, Q2 Common



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