TOSHIBA Multichip Discrete Device

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HN7G08FE

General-Purpose Amplifier Applications
Switching and Muting Switch Applications

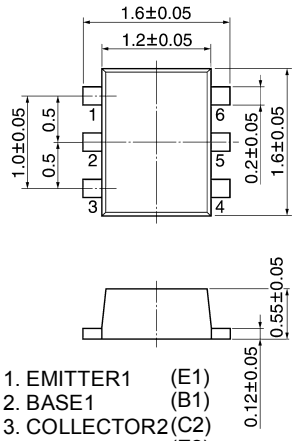
Q1

Low saturation voltage: $V_{CE\ (sat)}$ (1) = −15 mV (typ.)
@I_C = −10 mA/I_B = −0.5 mA

Large collector current: I_C = −400 mA (max)

Q1: 2SA1955F
Q2: RN1106F

Unit: mm



1. EMITTER1 (E1)
2. BASE1 (B1)
3. COLLECTOR2 (C2)
4. EMITTER2 (E2)
5. BASE2 (B2)
6. COLLECTOR1 (C1)

ES6

JEDEC	—
JEITA	—
TOSHIBA	2-2J1E

Weight: 0.003 g (typ.)

Q1 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	−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 Absolute 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

Q1, Q2 Common Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector power dissipation	P_C*	100	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	−55~150	°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).

* Total rating.

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Q1 Electrical Characteristics (Ta = 25°C)

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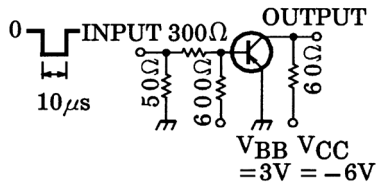
Characteristic		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current		I_{CBO}	—	V_{CB} = −15 V, I_E = 0	—	—	−100	nA
Emitter cutoff current		I_{EBO}	—	V_{EB} = − 5 V, I_C = 0	—	—	−100	nA
DC current gain (Note)		h_{FE}	—	V_{CE} = − 2 V, I_C = − 10 mA	300	—	1000	
Collector-emitter saturation voltage		$V_{CE(sat)}$ (1)	—	I_C = − 10 mA, I_B = − 0.5 mA	—	−15	−30	mV
		$V_{CE(sat)}$ (2)	—	I_C = − 200 mA, I_B = − 10 mA	—	−110	−250	
Base-emitter saturation voltage		$V_{BE(sat)}$	—	I_C = − 200 mA, I_B = − 10 mA	—	−0.87	−1.2	V
Transition frequency		f_T	—	V_{CE} = − 2 V, I_C = − 10 mA	—	130	—	MHz
Collector output capacitance		C_{ob}	—	V_{CB} = − 10 V, I_E = 0, f = 1 MHz	—	4.2	—	pF
Switching time	Turn-on time	t_{on}	—		—	40	—	ns
	Storage time	t_{stg}	—		—	280	—	
	Fall time	t_f	—	I_{B1} = −I_{B2} = 5 mA	—	65	—	

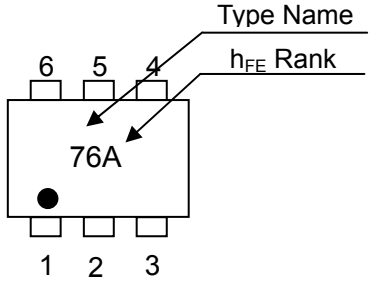
Note: h_{FE} classification A(A): 300~600, B(B): 500~1000

( ) marking symbol

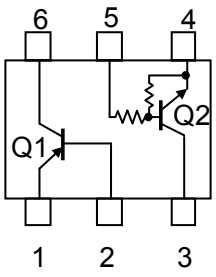
Q2 Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current	I_{CBO}	—	V_{CB} = 50 V, I_E = 0	—	—	100	nA
	I_{CEO}	—	V_{CE} = 50 V, I_B = 0	—	—	500	
Emitter cutoff current	I_{EBO}	—	V_{EB} = 5 V, I_C = 0	0.074	—	0.138	mA
DC current gain	h_{FE}	—	V_{CE} = 5 V, I_C = 10 mA	80	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	I_C = 5 mA, I_B = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	$V_{I\ (ON)}$	—	V_{CE} = 0.2 V, I_C = 5 mA	0.7	—	1.3	V
Input voltage (OFF)	$V_{I\ (OFF)}$	—	V_{CE} = 5 V, I_C = 0.1 mA	0.5	—	0.8	V
Transition frequency	f_T	—	V_{CE} = 10 V, I_C = 5 mA	—	250	—	MHz
Collector output capacitance	C_{ob}	—	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	3	—	pF
Input resistor	R1	—	—	3.29	4.7	6.11	kΩ
Resistor ratio	R1/R2	—	—	0.09	0.1	0.11	

Marking



Equivalent Circuit (Top View)



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Q1

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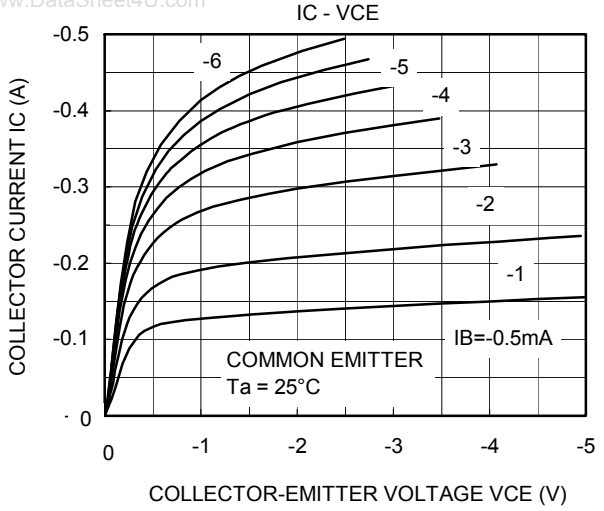
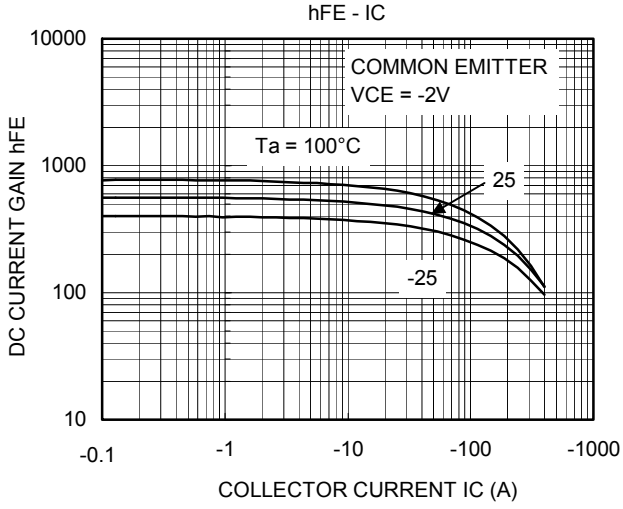
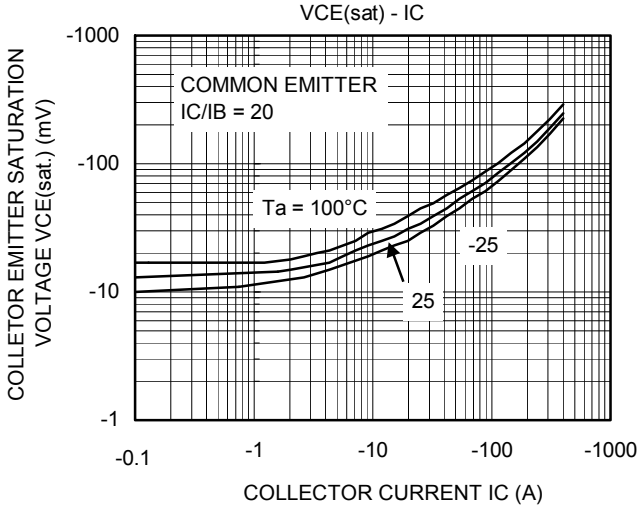
IC - VCE



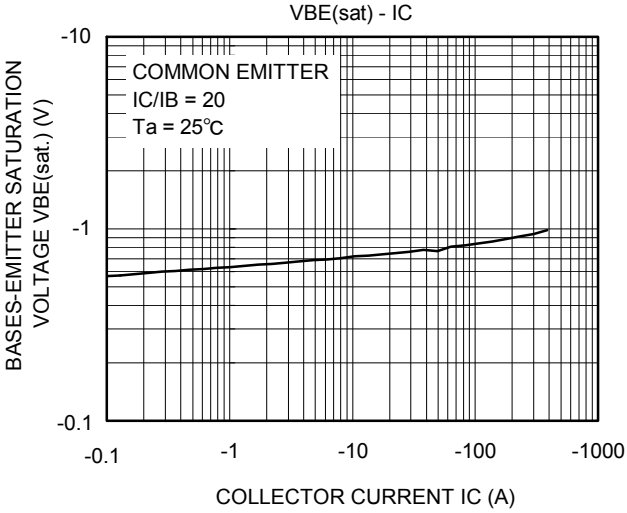
hFE - IC



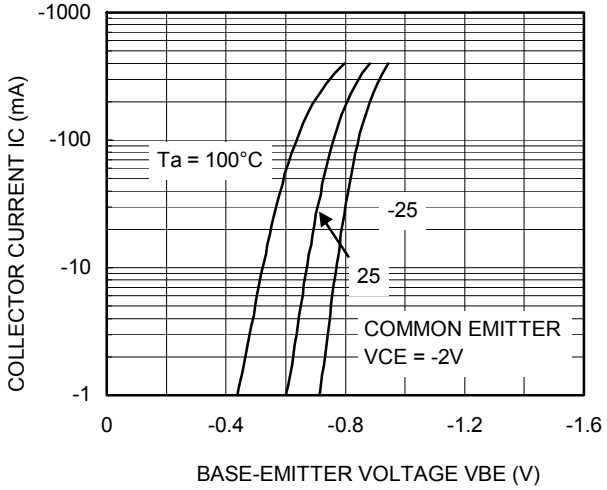
VCE(sat) - IC



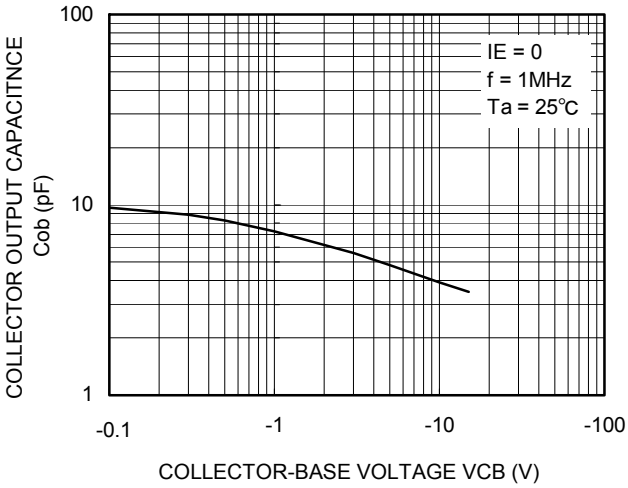
VBE(sat) - IC



IC - VBE



Cob - VCB



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Q2

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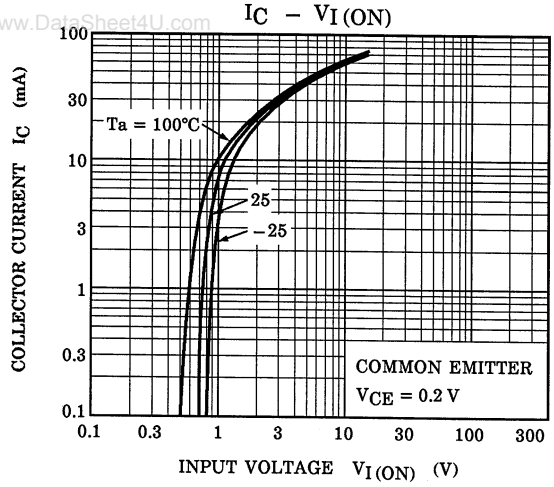
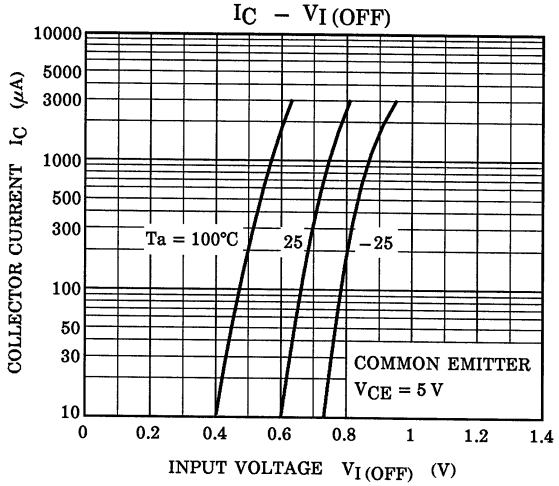
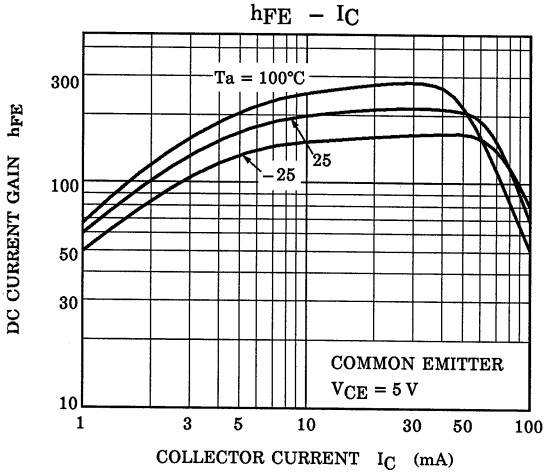
$I_C - V_{I(ON)}$



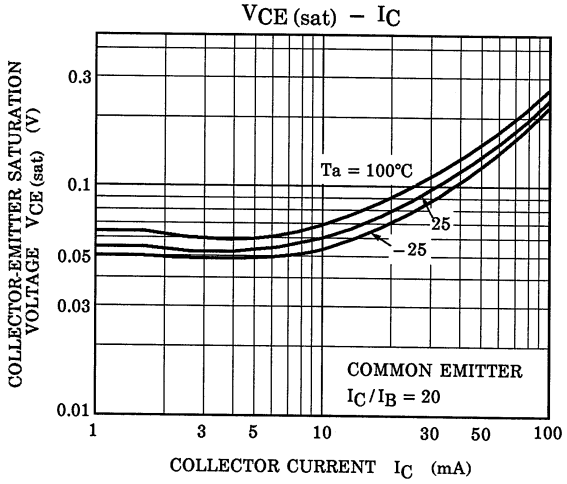
$I_C - V_{I(OFF)}$



$h_{FE} - I_C$



$V_{CE(sat)} - I_C$



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(Q1, Q2 common)

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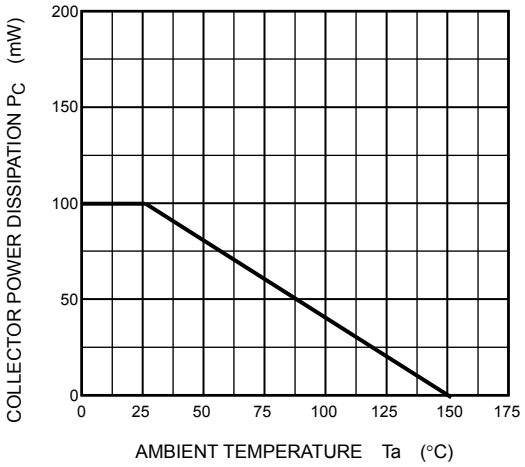
P_C* – Ta



*:Total rating

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