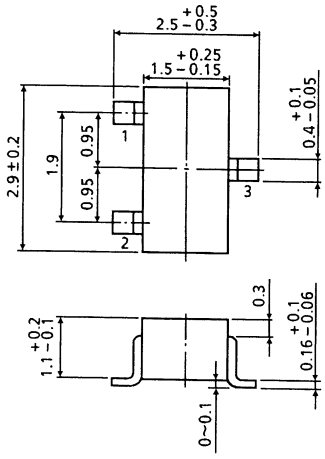
TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process)

2SC2716

High Frequency Amplifier Applications
AM High Frequency Amplifier Applications
AM Frequency Converter Applications

- Low noise figure: NF = 3.5dB (max) (f = 1 MHz)

Unit: mm



JEDEC	—
JEITA	SC-59
TOSHIBA	2-3F1A

Weight: 0.012 g (typ.)

Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	35	V
Collector-emitter voltage	V_{CEO}	30	V
Emitter-base voltage	V_{EBO}	4	V
Collector current	I_C	100	mA
Emitter current	I_E	−100	mA
Collector power dissipation	P_C	150	wW
Junction temperature	T_j	125	°C
Storage temperature range	T_{stg}	−55~125	°C

Electrical Characteristics (Ta = 25°C)

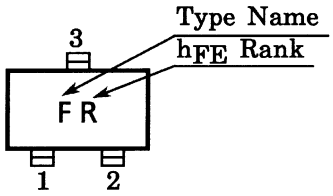
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 20 V, I_E = 0	—	—	0.1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 2 V, I_C = 0	—	—	1.0	μA
DC current gain	h_{FE} (Note)	V_{CE} = 12 V, I_C = 2 mA	40	—	240	
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	I_C = 10 mA, I_B = 1 mA	—	—	0.4	V
Base-emitter saturation voltage	$V_{BE\ (sat)}$	I_C = 10 mA, I_B = 1 mA	—	—	1.0	V
Transition frequency	f_T	V_{CE} = 10 V, I_C = 2 mA	80	120	—	MHz
Reverse transfer capacitance	C_{re}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	2.2	3.0	pF
Collector-base time constant	C_c.rbb'	V_{CE} = 10 V, I_E = −1 mA, f = 30 MHz	—	30	50	ps
Noise figure	NF	V_{CE} = 10 V, I_E = −1 mA, f = 1 MHz R_g = 50 Ω	—	2.0	3.5	dB

Note: h_{FE} classification R: 40~80, O: 70~140, Y: 120~240

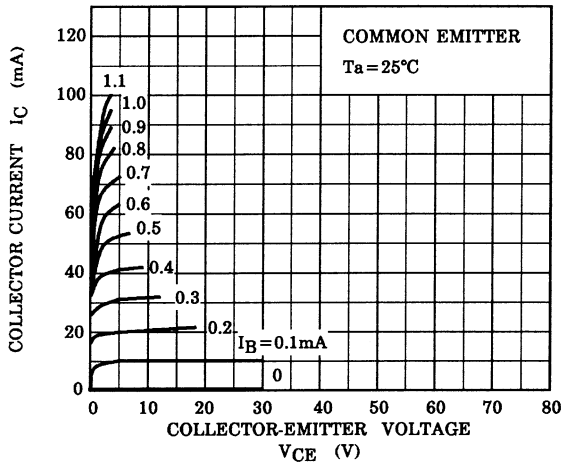
y Parameter (typ.) (common emitter VCE = 6 V, IE = −1 mA, f = 1 MHz)

Characteristics	Symbol	2SC2716-R	2SC2716-O	2SC2716-Y	Unit
Input conductance	g_{ie}	0.5	0.35	0.22	mS
Input capacitance	C_{ie}	50	48	46	pF
Output conductance	g_{oe}	4	5	6.5	μS
Output capacitance	C_{oe}	3.7	3.4	3.2	pF
Forward transfer admittance	$\|y_{fe}\|$	36	36	36	mS
Phase angle of forward transfer admittance	θ_{fe}	−1.6	−1.6	−1.6	°
Reverse transfer admittance	$\|y_{re}\|$	14	14	14	μS
Phase angle of reverse transfer admittance	θ_{re}	−90	−90	−90	°

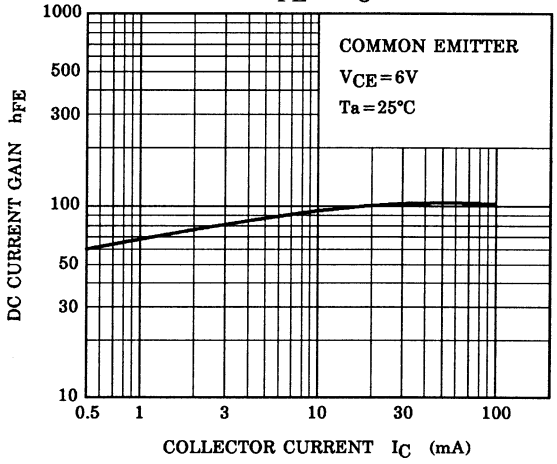
Marking



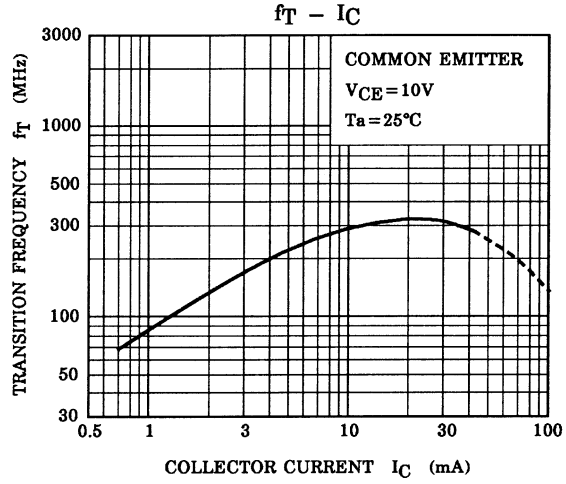
$I_C - V_{CE}$



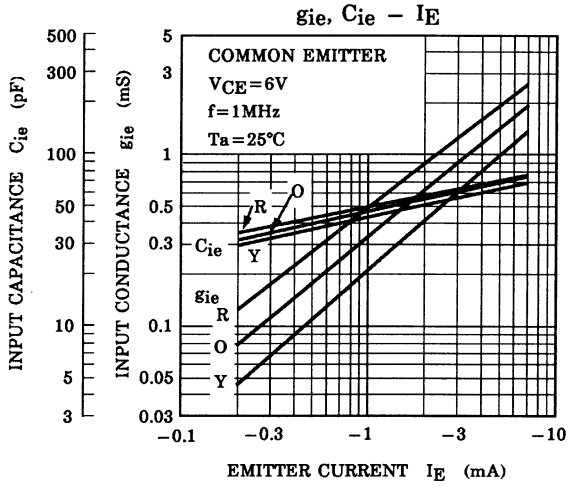
$h_{FE} - I_C$



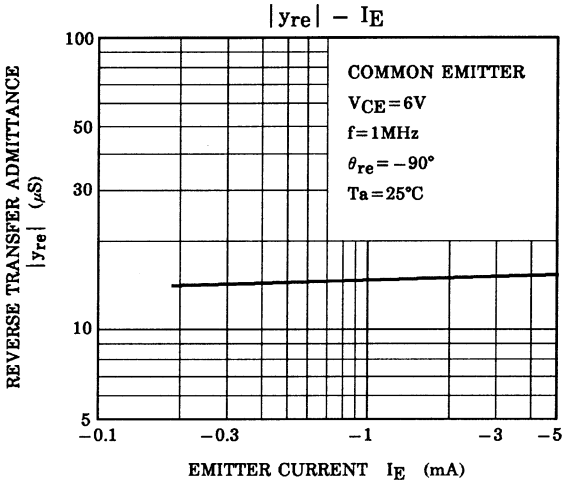
$f_T - I_C$



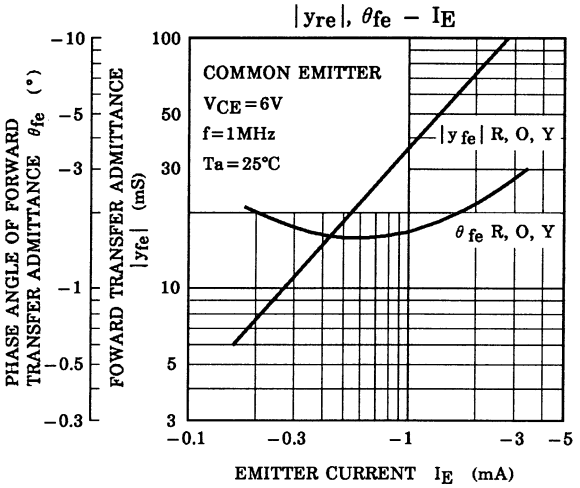
g_{ie}, $C_{ie} - I_E$

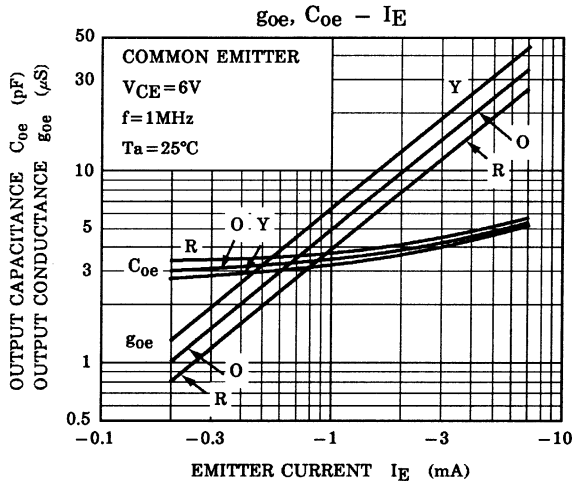


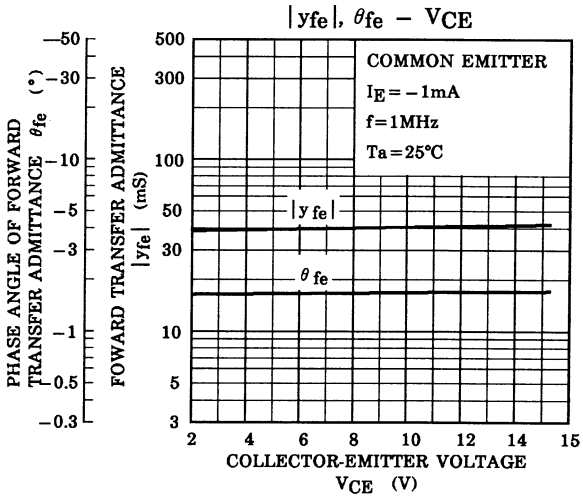
$|y_{re}| - I_E$

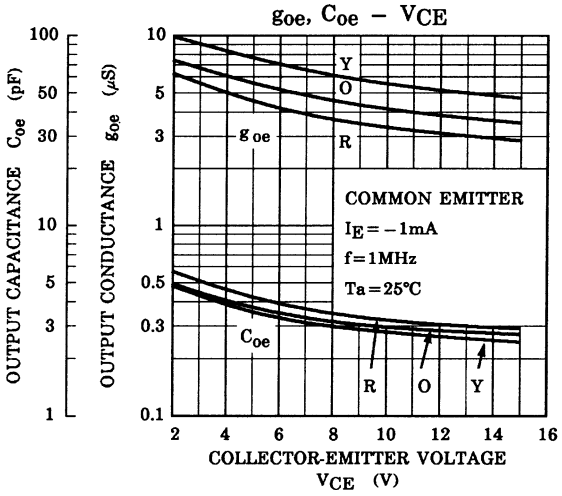


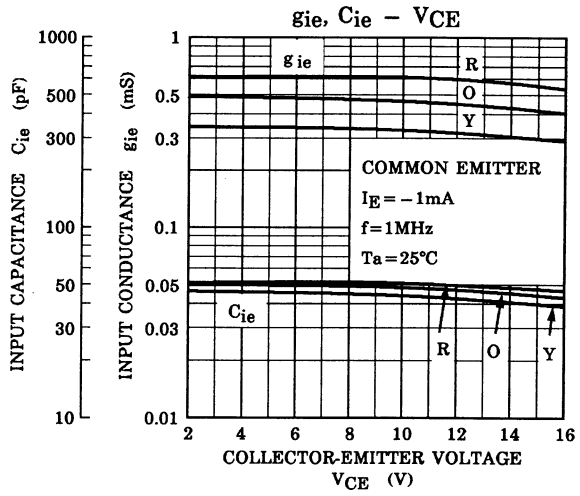
$|y_{re}|$, $\theta_{fe} - I_E$

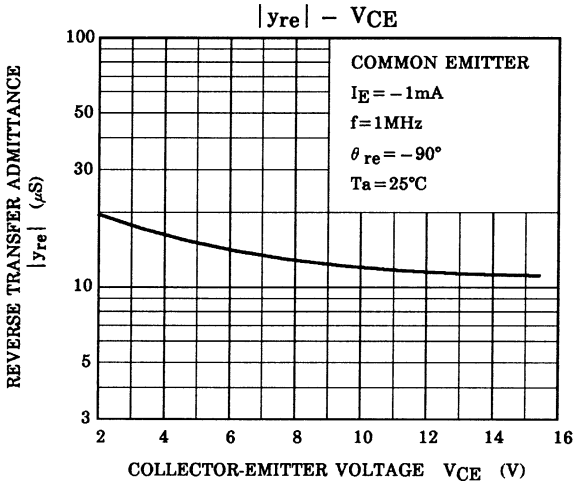



goe, Coe – IE
COMMON EMITTER
VCE=6V
f=1MHz
Ta=25°C
OUTPUT CAPACITANCE Coe (pF)
OUTPUT CONDUCTANCE goe (μS)
EMITTER CURRENT IE (mA)
Y
O
R
Coe
goe


|yfe|, θfe – VCE
COMMON EMITTER
IE=–1mA
f=1MHz
Ta=25°C
PHASE ANGLE OF FORWARD TRANSFER ADMITTANCE θfe (°)
FOWARD TRANSFER ADMITTANCE |yfe| (mS)
|yfe|
θfe
COLLECTOR-EMITTER VOLTAGE VCE (V)


goe, Coe – VCE
COMMON EMITTER
IE=–1mA
f=1MHz
Ta=25°C
OUTPUT CAPACITANCE Coe (pF)
OUTPUT CONDUCTANCE goe (μS)
goe
Coe
Y
O
R
COLLECTOR-EMITTER VOLTAGE VCE (V)


gie, Cie – VCE
COMMON EMITTER
IE=–1mA
f=1MHz
Ta=25°C
INPUT CAPACITANCE Cie (pF)
INPUT CONDUCTANCE gie (mS)
gie
Cie
R
O
Y
COLLECTOR-EMITTER VOLTAGE VCE (V)


|yre| – VCE
COMMON EMITTER
IE=–1mA
f=1MHz
θre=–90°
Ta=25°C
REVERSE TRANSFER ADMITTANCE |yre| (μS)
COLLECTOR-EMITTER VOLTAGE VCE (V)

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