

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type (PCT process)

2SC380TM

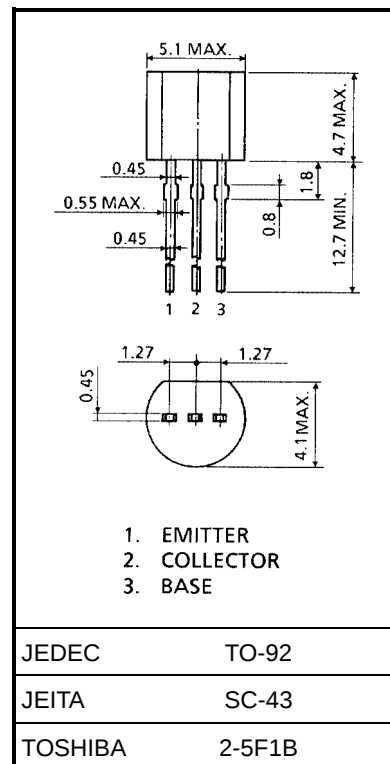
High Frequency Amplifier Applications

Unit: mm

- High power gain: $G_{pe} = 29\text{dB}$ (typ.) ($f = 10.7\text{ MHz}$)
- Recommended for FM IF, OSC stage and AM CONV. IF stage.

Maximum Ratings ($T_a = 25^\circ\text{C}$)

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	50	mA
Emitter current	I_E	−50	mA
Collector power dissipation	P_C	300	mW
Junction temperature	T_j	125	$^\circ\text{C}$
Storage temperature range	T_{stg}	−55~125	$^\circ\text{C}$



Weight: 0.21 g (typ.)

Electrical Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 35\text{ V}$, $I_E = 0$	—	—	0.1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 4\text{ V}$, $I_C = 0$	—	—	0.1	μA
DC current gain	h_{FE} (Note)	$V_{CE} = 12\text{ V}$, $I_C = 2\text{ mA}$	40	—	240	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$	—	—	0.4	V
Base-emitter voltage	V_{BE}	$I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$	—	—	1.0	V
Transition frequency	f_T	$V_{CE} = 10\text{ V}$, $I_C = 1\text{ mA}$	100	—	400	MHz
Collector output capacitance	C_{ob}	$V_{CB} = 10\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$	1.4	2.0	3.2	pF
Collector-base time constant	$C_c \cdot r_{bb'}$	$V_{CE} = 10\text{ V}$, $I_E = -1\text{ mA}$, $f = 30\text{ MHz}$	10	—	50	ps
Power gain	G_{pe}	$V_{CC} = 6\text{ V}$, $I_E = -1\text{ mA}$, $f = 10.7\text{ MHz}$ (Figure 1)	27	29	33	dB

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

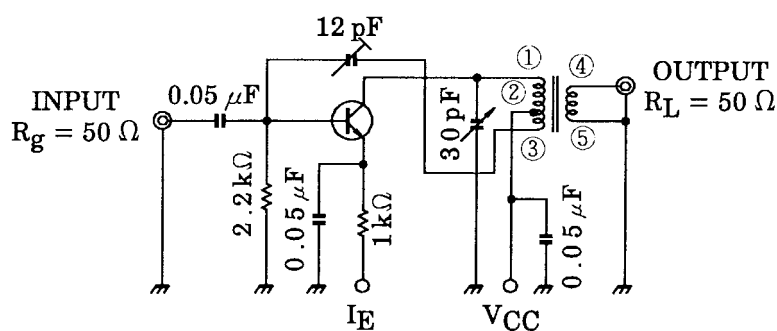
y Parameters (typ.)

(1) (common emitter $f = 455 \text{ kHz}$, $T_a = 25^\circ\text{C}$)

Characteristics	Symbol	2SC380TM-R	2SC380TM-O	2SC380TM-Y	Unit
Collector-emitter voltage	V_{CE}	6	6	6	V
Emitter current	I_E	-1	-1	-1	mA
Input conductance	g_{ie}	0.58	0.41	0.26	mS
Input capacitance	C_{ie}	53	46	38	pF
Output conductance	g_{oe}	1.9	2.7	4.8	μS
Output capacitance	C_{oe}	2.6	2.8	3.6	pF
Forward transfer admittance	$ y_{fe} $	38	38	38	mS
Phase angle of forward transfer admittance	θ_{fe}	-0.79	-0.83	-0.92	°
Reverse transfer admittance	$ y_{re} $	5.7	5.7	6.2	μS
Phase angle of reverse transfer admittance	θ_{re}	-90	-90	-90	°

(2) (common emitter $f = 10.7 \text{ MHz}$, $T_a = 25^\circ\text{C}$)

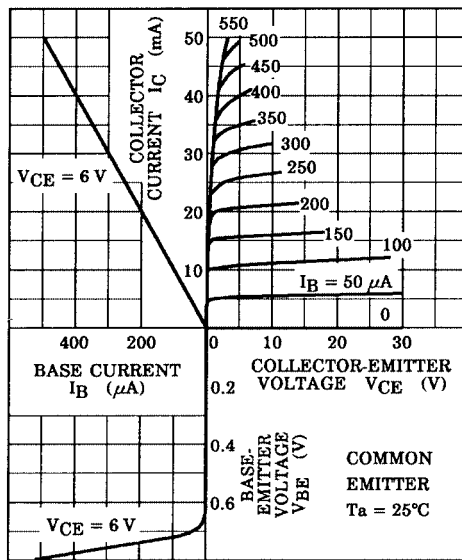
Characteristics	Symbol	2SC380TM-R	2SC380TM-O	2SC380TM-Y	Unit
Collector-emitter voltage	V_{CE}	6	6	6	V
Emitter current	I_E	-1	-1	-1	mA
Input conductance	g_{ie}	1.04	0.85	0.65	mS
Input capacitance	C_{ie}	49	43	36	pF
Output conductance	g_{oe}	10	15	28	μS
Output capacitance	C_{oe}	2.7	2.9	3.6	pF
Forward transfer admittance	$ y_{fe} $	37	37	37	mS
Phase angle of forward transfer admittance	θ_{fe}	-9.6	-10.4	-11.5	°
Reverse transfer admittance	$ y_{re} $	120	120	140	μS
Phase angle of reverse transfer admittance	θ_{re}	-90	-90	-90	°



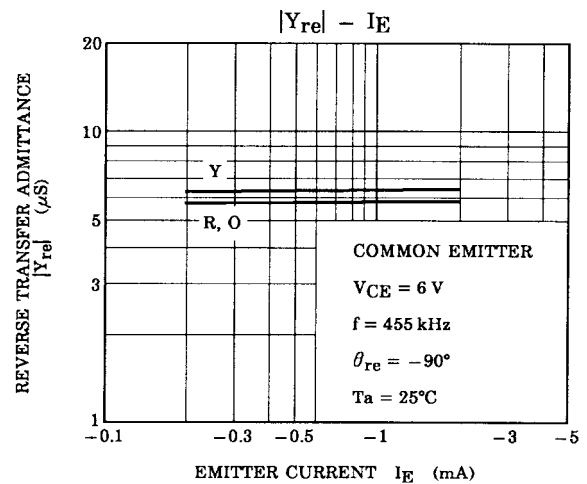
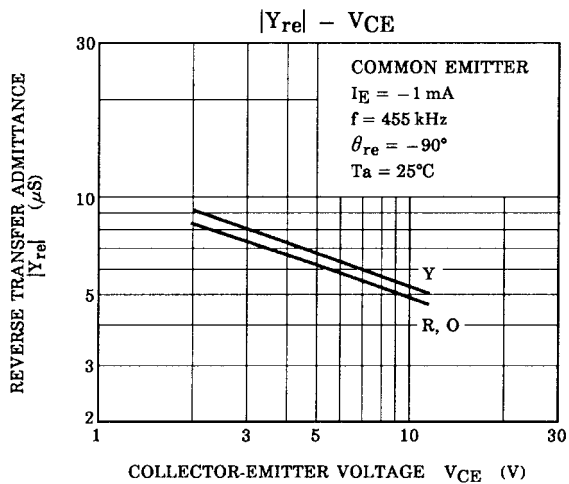
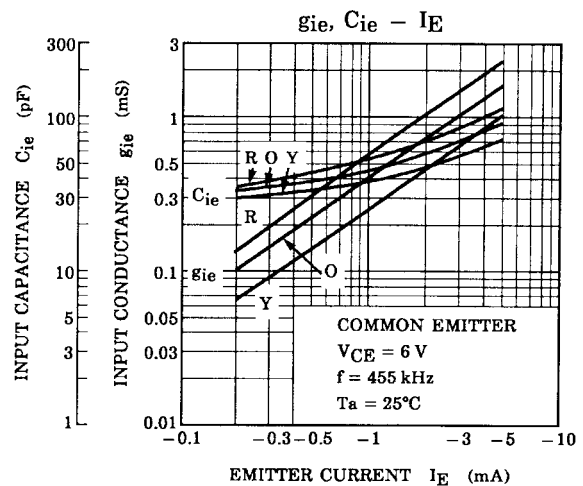
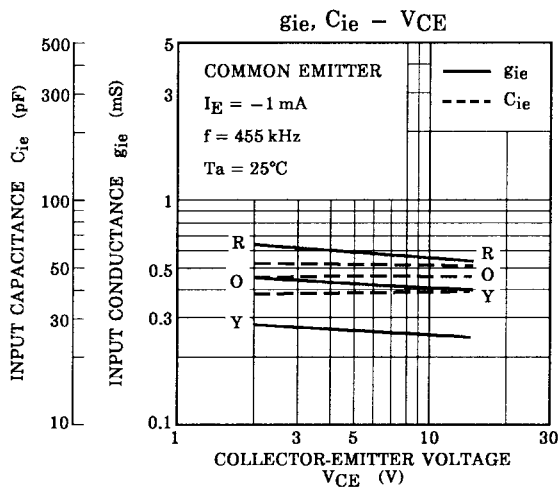
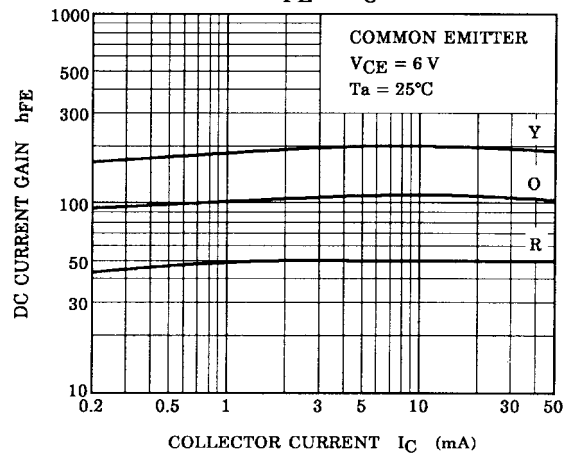
T : ①-② 0.1 mm ϕ UEW 20T
 ②-③ 0.1 mm ϕ UEW 8T
 ④-⑤ 0.1 mm ϕ UEW 2T

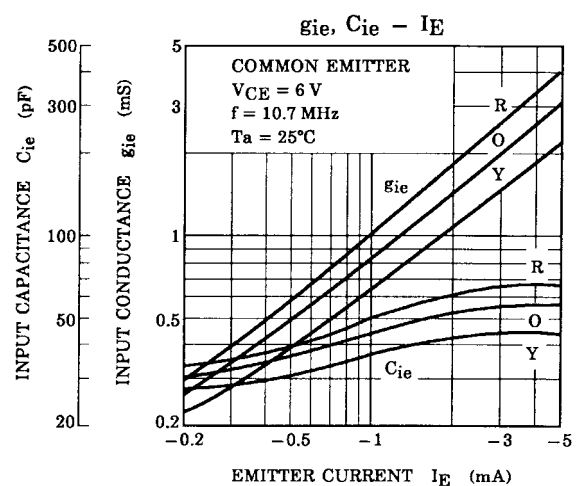
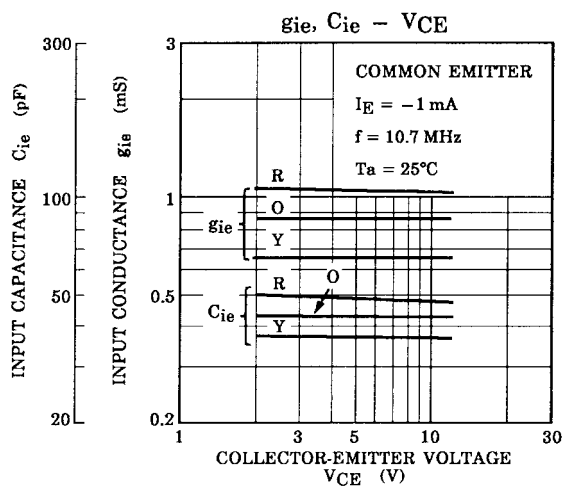
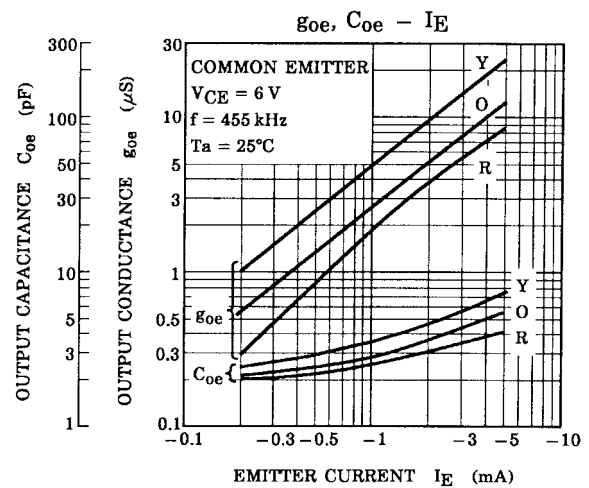
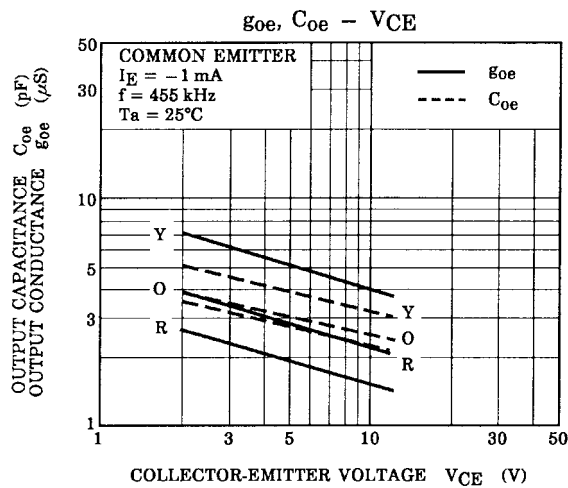
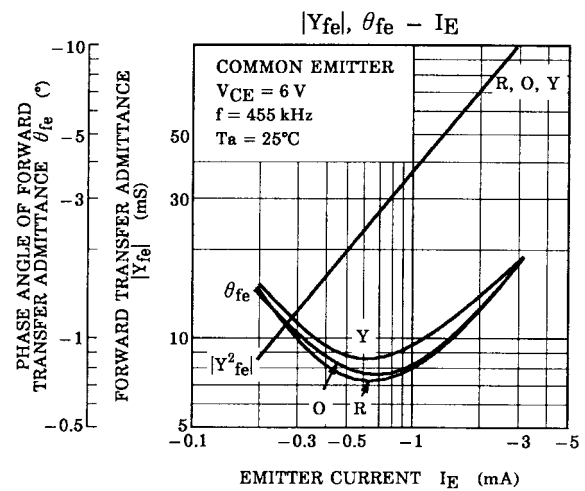
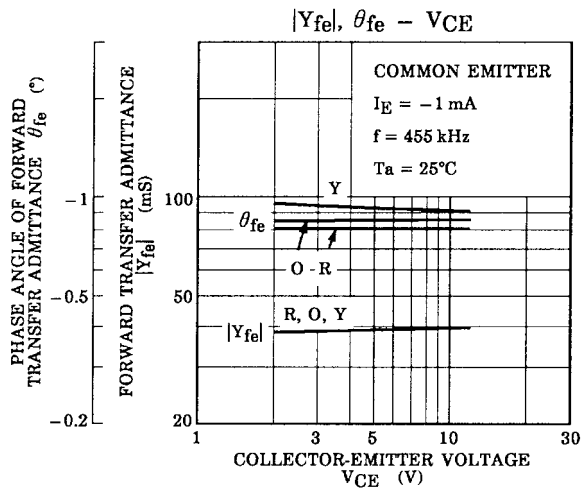
Figure 1 G_{pe} Test Circuit

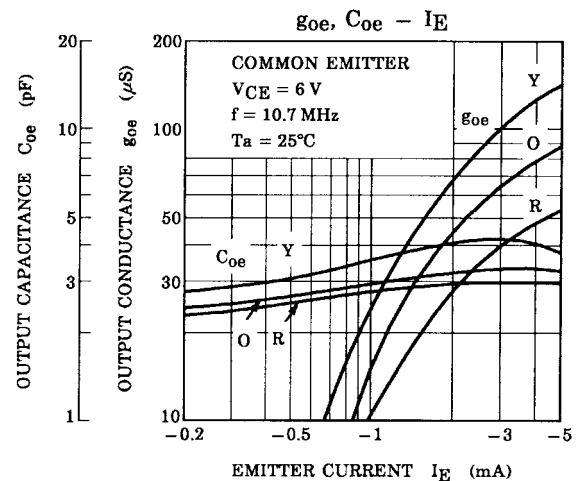
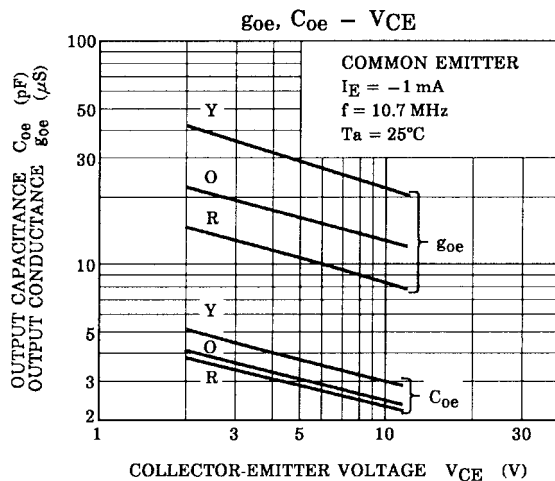
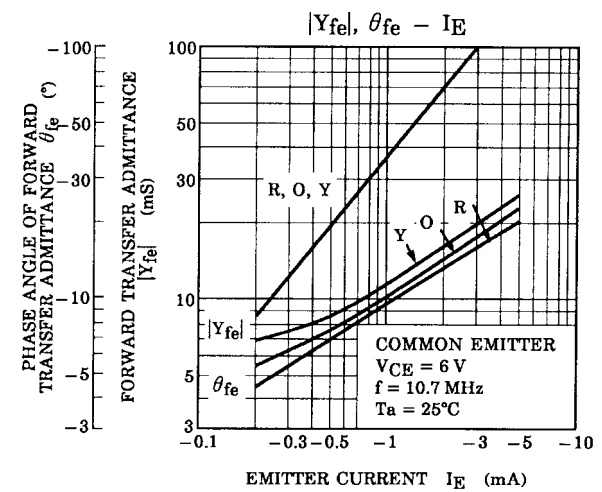
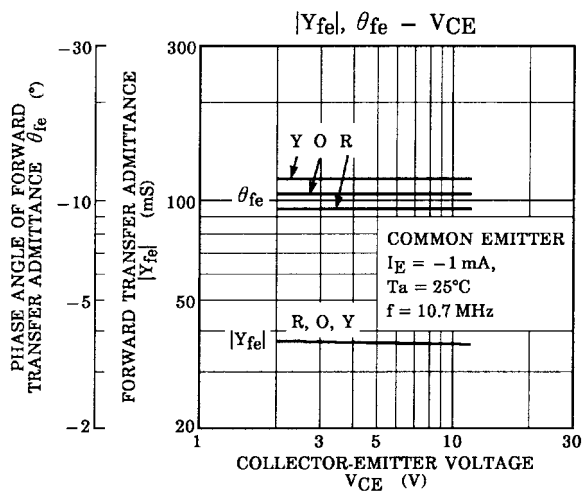
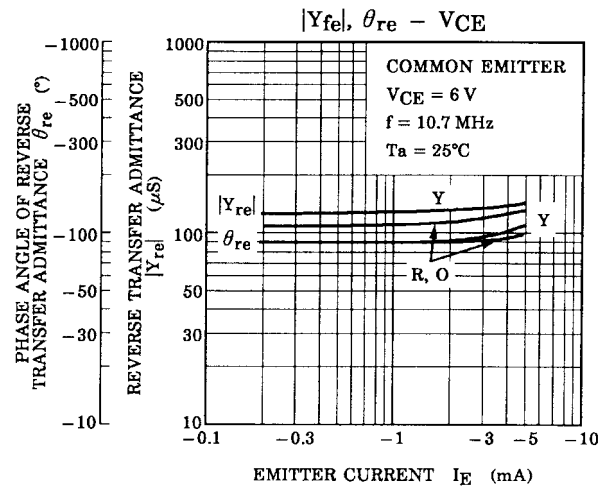
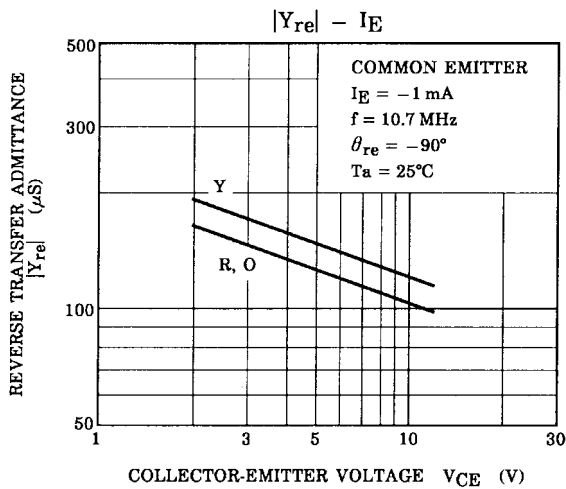
STATIC CHARACTERISTICS

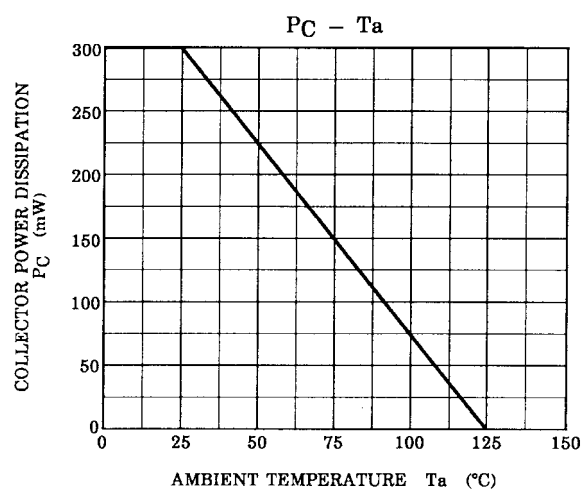


$h_{FE} - I_C$









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