

## Silicon NPN transistor epitaxial type 6C963

### [ Applications ]

General purpose amplifier and switch

Suitable for small surface mount package built-in with shrinked die size

### [ Feature ]

Equivalent performance with MMBT3904

High collector-emitter breakdown voltage  $BV_{CEO}= 40V$

High collector current  $I_C= 200mA$

### [ Absolute maximum ratings (Ta=25C) ]

Characteristic	Symbol	Maximum ratings	Unit
Collector-base voltage	VCBO	40	V
Collector-emitter voltage	VCEO	40	V
Emitter-base voltage	VEBO	6	V
Collector current	IC	200	mA
Junction temperature	Tj	150	C
Storage temperature	Tstg	-55 to 150	C

### [ Electrical characteristics (Ta=25C) ]

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BVCBO	40	-	-	V	$I_C= 10\mu A, I_E= 0A$
Collector-emitter breakdown voltage	BVCEO	40	-	-	V	$I_C= 1mA, I_B= 0A$
Emitter-base breakdown voltage	BVEBO	6	-	-	V	$I_E= 10\mu A, I_C= 0A$
Collector cut-off current	ICEX	-	-	50	nA	$V_{CE}= 30V, V_{EB}= 3V$
Emitter cut-off current	IEBO	-	-	50	nA	$V_{EB}= 5V, I_C= 0A$
DC current gain 1	hFE 1	40	-	-	-	$V_{CE}= 1V, I_C= 0.1mA$
DC current gain 2	hFE 2	70	-	-	-	$V_{CE}= 1V, I_C= 1mA$
DC current gain 3	hFE 3	100	-	300	-	$V_{CE}= 1V, I_C= 10mA$
DC current gain 4	hFE 4	60	-	-	-	$V_{CE}= 1V, I_C= 50mA$
DC current gain 5	hFE 5	30	-	-	-	$V_{CE}= 1V, I_C= 100mA$
Collector-emitter saturation voltage 1	$V_{CE(sat) 1}$	-	-	0.2	V	$I_C= 10mA, I_B= 1mA$
Collector-emitter saturation voltage 2	$V_{CE(sat) 2}$	-	-	0.3	V	$I_C= 50mA, I_B= 5mA$
Base-emitter saturation voltage 1	$V_{BE(sat) 1}$	0.65	-	0.85	V	$I_C= 10mA, I_B= 1mA$
Base-emitter saturation voltage 2	$V_{BE(sat) 2}$	-	-	0.95	V	$I_C= 50mA, I_B= 5mA$
Transition frequency	f T	300	-	-	MHz	$V_{CE}= 20V, I_E= -10mA$
Output capacitance	Cob	-	-	4	pF	$V_{CB}= 5V, f = 1MHz, I_E= 0A$
Input capacitance	Cib	-	-	8	pF	$V_{EB}= 0.5V, f = 1MHz, I_E= 0A$
Delay Time	td	-	-	35	ns	$V_{CC}= 3V, V_{BE}= -0.5V$
Rise Time	tr	-	-	35	ns	$I_C= 10mA, I_{B1}= 1mA$
Storage Time	tstg	-	-	200	ns	$V_{CC}= 3V, I_C= 10mA$
Fall Time	tf	-	-	50	ns	$I_{B1}= -I_{B2}= 1mA$

Notice 1) These are measured data of transistors assembled by PHENITEC SEMICONDUCTOR Corp. and are for reference only.

Notice 2) The contents described herein are subject to change without notice.

No. 6C963-20190910

Fig.1 hFE - IC  
at VCE= 1V, Ta= 25C

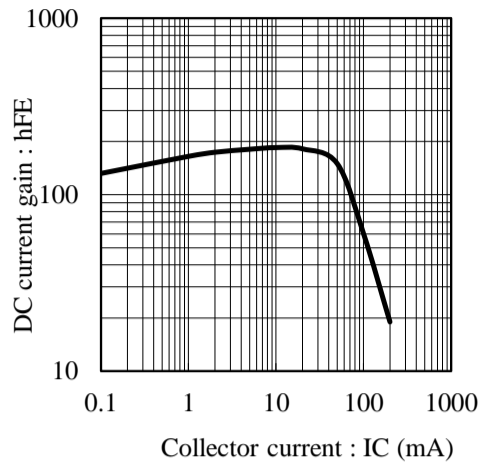


Fig.2 VCE(sat) - IC  
at IC/IB= 10, Ta= 25C

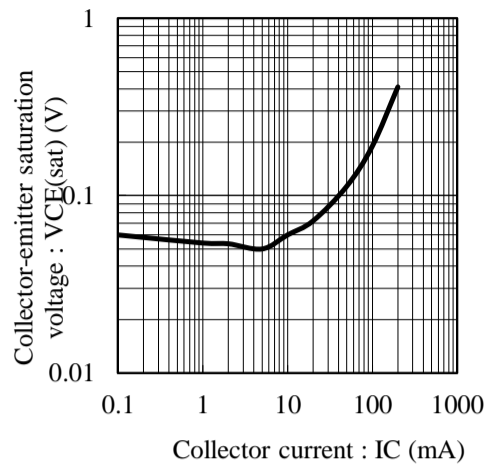


Fig.3 VBE(sat) - IC  
at IC/IB= 10, Ta= 25C

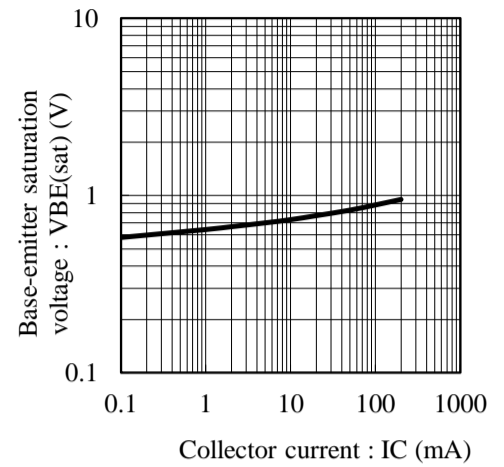


Fig.4 fT - IE  
at VCE= 20V, Ta= 25C

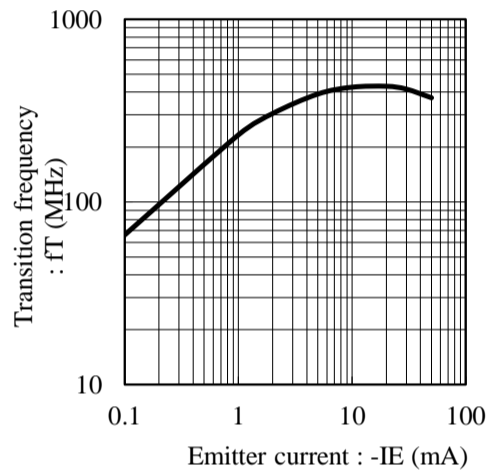


Fig.5 Cob - VCB  
at f= 1MHz, Ta= 25C

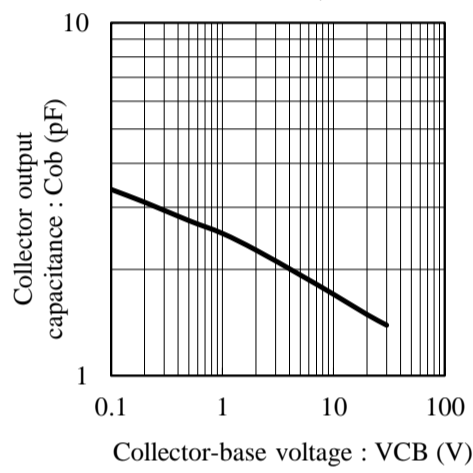


Fig.6 Cib - VEB  
at f= 1MHz, Ta= 25C

