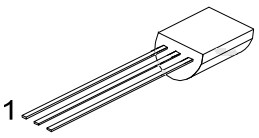
2N3904

NPN SILICON TRANSISTOR

NPN GENERAL PURPOSE AMPLIFIER



TO-92

■ FEATURES

* Collector-Emitter Voltage: V_{CEO}=40V
* Collector Dissipation: $P_{C(MAX)}$=625mW
* Complementary to 2N3906

■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2N3904L-T92-B	2N3904G-T92-B	TO-92	E	B	C	Tape Box
2N3904L-T92-K	2N3904G-T92-K	TO-92	E	B	C	Bulk
2N3904L-T92-R	2N3904G-T92-R	TO-92	E	B	C	Tape Reel

2N3904L-T92-B (1)Packing Type (2)Package Type (3)Lead Free	(1) B: Tape Box, K: Bulk, R: Tape Reel (2) T92: TO-92 (3) G: Halogen Free, L: Lead Free

■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current	I_C	200	mA
Collector Dissipation	P_C	625	mW
Junction Temperature	T_J	150	°C
Operating and Storage Temperature	T_{STG}	-55 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

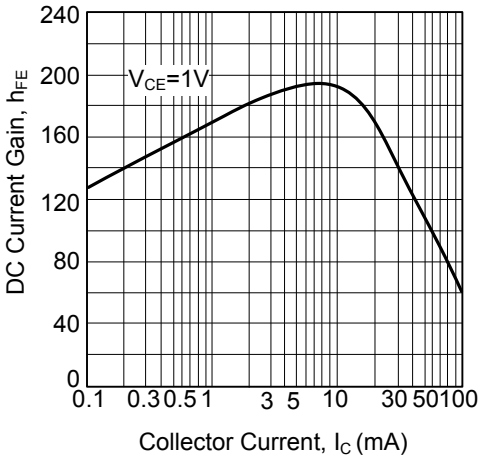
■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Collector-Base Breakdown Voltage	BV_{CBO}	I_C=10μA, I_E=0	60			V
Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C=1mA,I_B=0 (Note)	40			V
Emitter-Base Breakdown Voltage	BV_{EBO}	I_E=10μA, I_C=0	6			V
Collector-Emitter Saturation Voltage (Note)	$V_{CE(SAT)1}$	I_C=10mA, I_B=1mA			0.2	V
	$V_{CE(SAT)2}$	I_C=50mA, I_B=5mA			0.3	V
Base-Emitter Saturation Voltage (Note)	$V_{BE(SAT)1}$	I_C=10mA, I_B=1mA	0.65		0.85	V
	$V_{BE(SAT)2}$	I_C=50mA, I_B=5mA			0.95	V
Collector Cut-off Current	I_{CBO}	V_{CE}=30V, V_{EB}=3V			50	nA
Base Cut-off Current	I_{BL}	V_{CE}=30V, V_{EB}=3V			50	nA
DC Current Gain (note)	h_{FE1}	V_{CE}=1V, I_C=0.1mA	40			
	h_{FE2}	V_{CE}=1V, I_C=1mA	70			
	h_{FE3}	V_{CE}=1V, I_C=10mA	100		300	
	h_{FE4}	V_{CE}=1V, I_C=50mA	60			
	h_{FE5}	V_{CE}=1V, I_C=100mA	30			
Current Gain Bandwidth Product	f_T	V_{CE}=20V, I_C=10mA, f=100MHz	300			MHz
Output Capacitance	C_{OB}	V_{CB}=5V, I_E=0, f=1MHz			4	pF
Turn on Time	t_{ON}	V_{CC}=3V,V_{BE}=0.5V,I_C=10mA, I_B1=1mA			70	ns
Turn off Time	t_{OFF}	I_B1=1_B2=1mA			250	ns

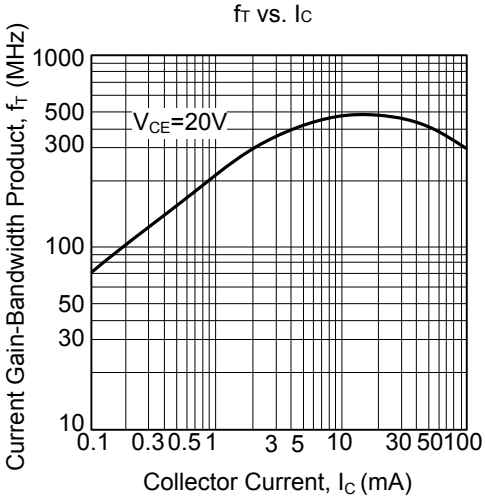
Note: Pulse test: Pulse Width≦300μs, Duty Cycle≦2%

■ TYPICAL CHARACTERISTICS

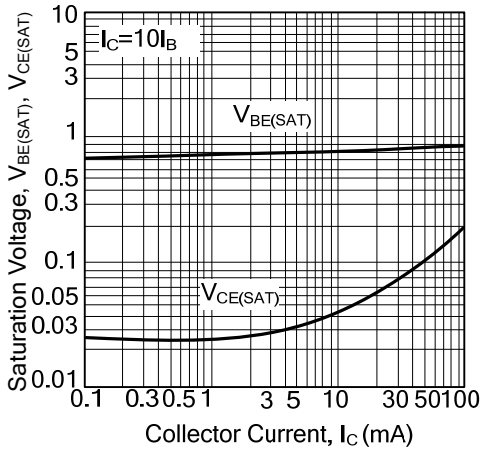
h_{FE} vs. I_C



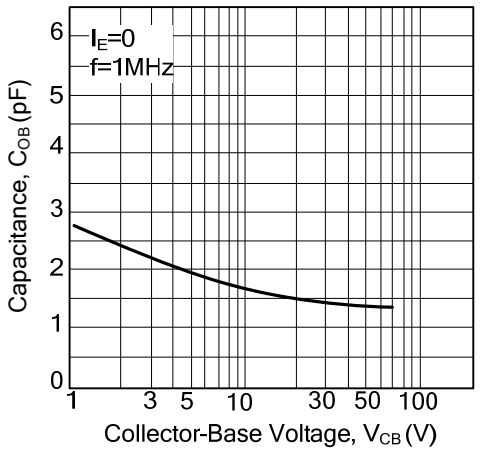
f_T vs. I_C



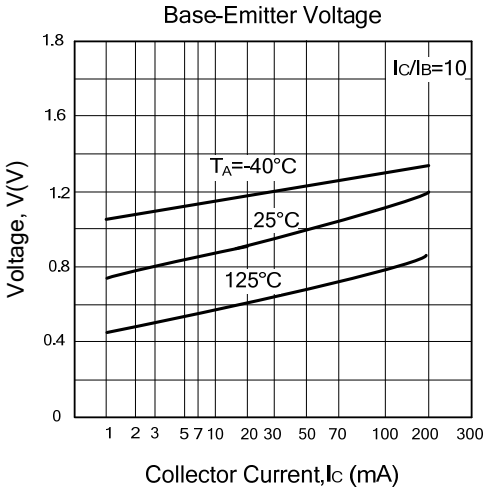
$V_{(SAT)}$ vs. I_C



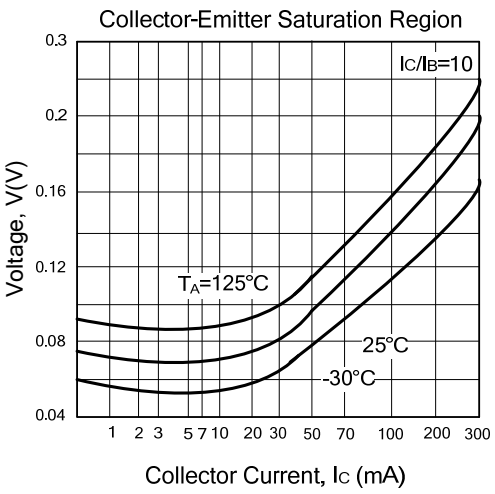
C_{OB} vs. V_{CB}



Base-Emitter Voltage



Collector-Emitter Saturation Region



■ TYPICAL CHARACTERISTICS(Cont.)