



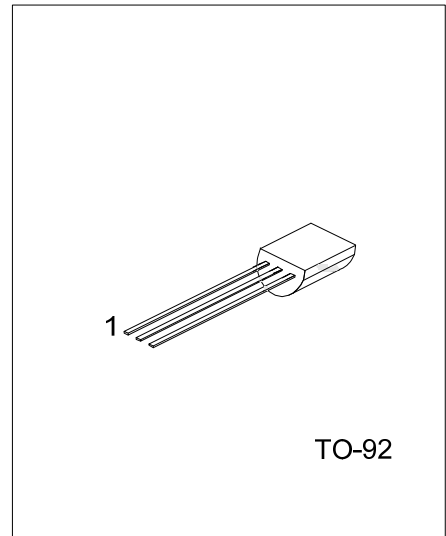
2N3904

NPN SILICON TRANSISTOR

NPN GENERAL PURPOSE AMPLIFIER

■ FEATURES

- * Collector-Emitter Voltage: $V_{CE0}=40V$
- * 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

<p>2N3904L-T92-B</p> <p>(1)Packing Type (2)Package Type (3)Lead Free</p>	<p>(1) B: Tape Box, K: Bulk, R: Tape Reel (2) T92: TO-92 (3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATING ($T_A=25^{\circ}\text{C}$, 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	$^{\circ}\text{C}$
Operating and Storage Temperature	T_{STG}	-55 ~ +150	$^{\circ}\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

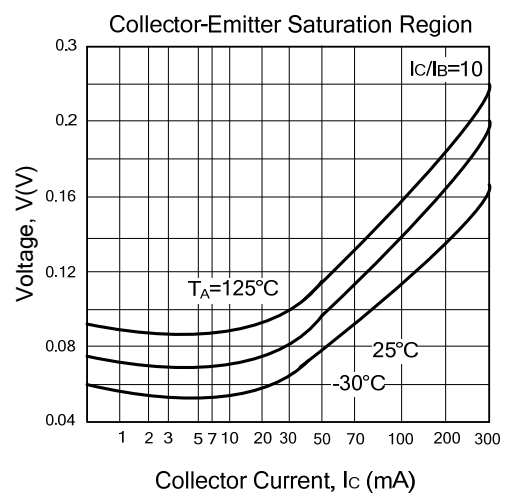
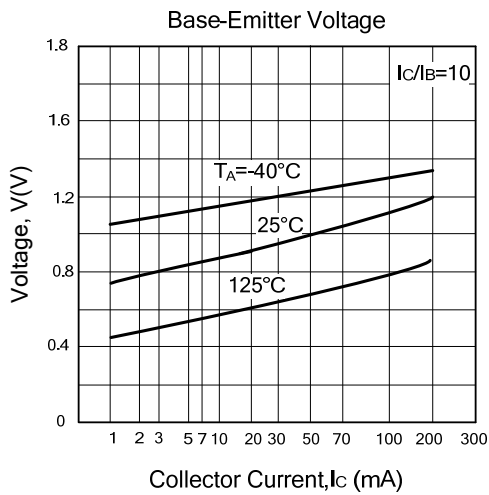
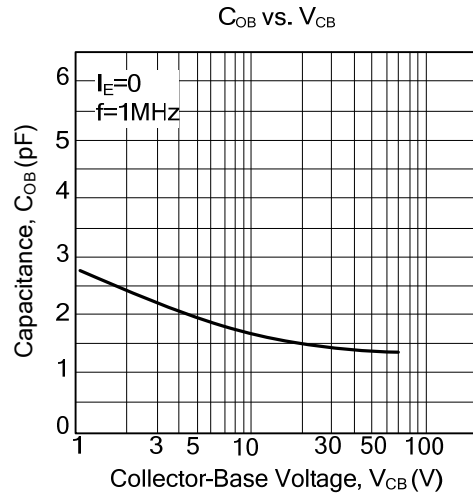
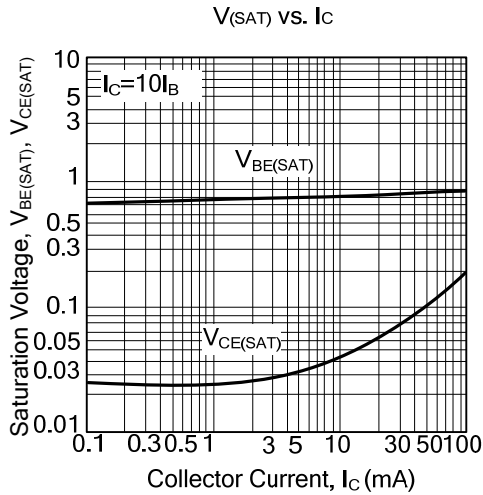
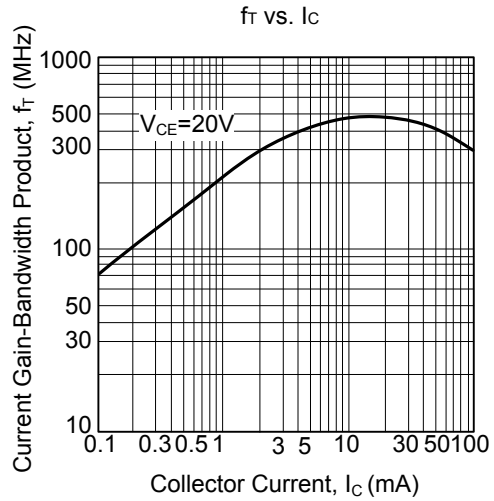
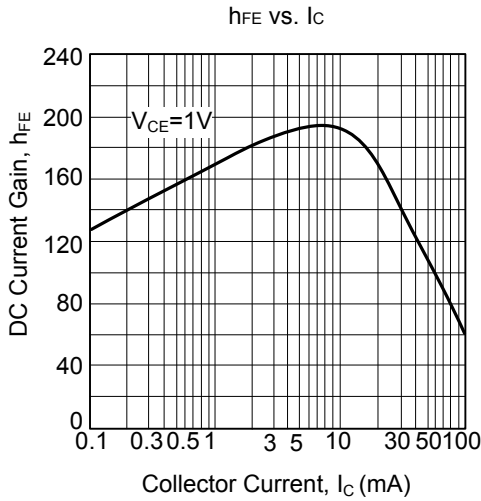
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

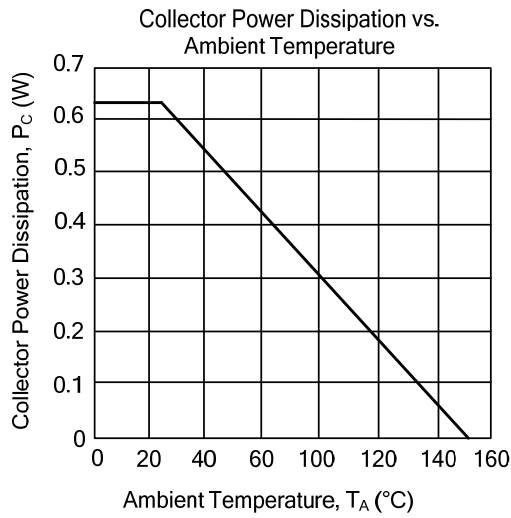
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Collector-Base Breakdown Voltage	BV_{CBO}	$I_C=10\mu\text{A}, I_E=0$	60			V
Collector-Emitter Breakdown Voltage	BV_{CEO}	$I_C=1\text{mA}, I_B=0$ (Note)	40			V
Emitter-Base Breakdown Voltage	BV_{EBO}	$I_E=10\mu\text{A}, I_C=0$	6			V
Collector-Emitter Saturation Voltage (Note)	$V_{CE(SAT)1}$	$I_C=10\text{mA}, I_B=1\text{mA}$			0.2	V
	$V_{CE(SAT)2}$	$I_C=50\text{mA}, I_B=5\text{mA}$			0.3	V
Base-Emitter Saturation Voltage (Note)	$V_{BE(SAT)1}$	$I_C=10\text{mA}, I_B=1\text{mA}$	0.65		0.85	V
	$V_{BE(SAT)2}$	$I_C=50\text{mA}, I_B=5\text{mA}$			0.95	V
Collector Cut-off Current	I_{CBO}	$V_{CE}=30\text{V}, V_{EB}=3\text{V}$			50	nA
Base Cut-off Current	I_{BL}	$V_{CE}=30\text{V}, V_{EB}=3\text{V}$			50	nA
DC Current Gain (note)	h_{FE1}	$V_{CE}=1\text{V}, I_C=0.1\text{mA}$	40			
	h_{FE2}	$V_{CE}=1\text{V}, I_C=1\text{mA}$	70			
	h_{FE3}	$V_{CE}=1\text{V}, I_C=10\text{mA}$	100		300	
	h_{FE4}	$V_{CE}=1\text{V}, I_C=50\text{mA}$	60			
	h_{FE5}	$V_{CE}=1\text{V}, I_C=100\text{mA}$	30			
Current Gain Bandwidth Product	f_T	$V_{CE}=20\text{V}, I_C=10\text{mA}, f=100\text{MHz}$	300			MHz
Output Capacitance	C_{OB}	$V_{CB}=5\text{V}, I_E=0, f=1\text{MHz}$			4	pF
Turn on Time	t_{ON}	$V_{CC}=3\text{V}, V_{BE}=0.5\text{V}, I_C=10\text{mA}, I_{B1}=1\text{mA}$			70	ns
Turn off Time	t_{OFF}	$I_{B1}=1\text{mA}, I_{B2}=1\text{mA}$			250	ns

Note: Pulse test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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