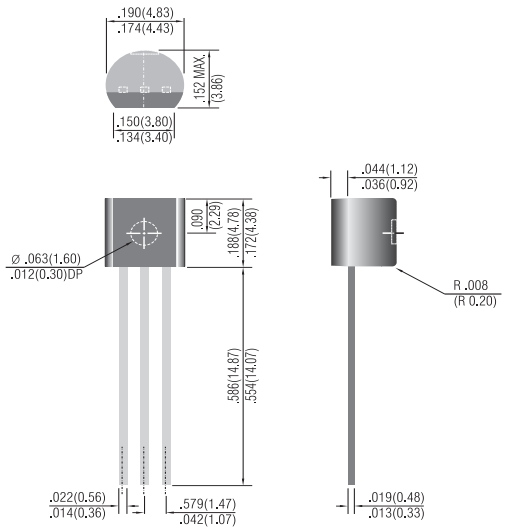
2N3904

NPN GENERAL PURPOSE SWITCHING TRANSISTOR

VOLTAGE 40 Volts **POWER** 625 mWatts

TO-92 Unit: inch (mm)



FEATURES

- NPN epitaxial silicon, planar design
- Collector-emitter voltage V_{CE} = 40V
- Collector current I_C = 200mA
- Complimentary (PNP) device:2N3906
- Pb free product are available :99% Sn above can meet RoHS environment substance directive request

MECHANICAL DATA

Case: TO-92

Terminals: Solderable per MIL-STD-202, Method 208

Approx Weight : 0.02grams

Marking : 3904

ABSOLUTE MAXIMUM RATINGS

PARAMETER	Symbol	Value	Units
Collector - Emitter Voltage	V_{CEO}	40	V
Collector - Base Voltage	V_{CBO}	60	V
Emitter - Base Voltage	V_{EBO}	6.0	V
Collector Current - Continuous	I_C	200	mA

THERMAL CHARACTERISTICS

PARAMETER	Symbol	Value	Units
Max Power Dissipation	P_{TOT}	625	mW
Storage Temperature	T_{STG}	-55 to 150	^{O}C
Junction Temperature	T_J	-55 to 150	^{O}C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	^{O}C/W

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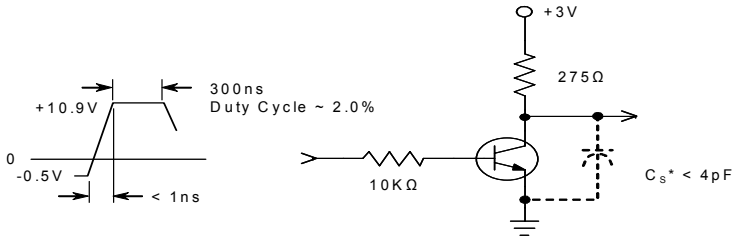
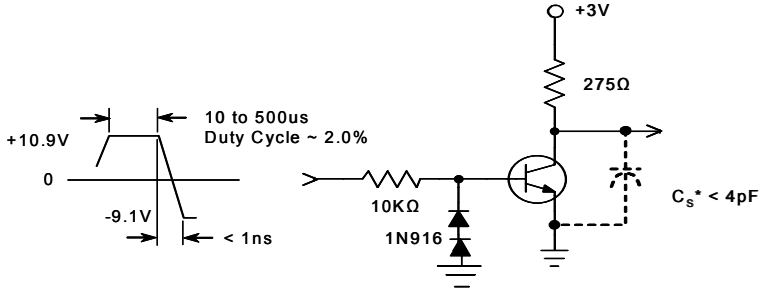
ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise noted)

PARAMETER	Symbol	Test Condition	MIN.	TYP.	MAX.	Units
Collector - Emitter Breakdown Voltage	$V_{(BR)}CEO$	I_C=1.0mA, I_B=0	40	-	-	V
Collector - Base Breakdown Voltage	$V_{(BR)}CBO$	I_C=10uA, I_E=0	60	-	-	V
Emitter - Base Breakdown Voltage	$V_{(BR)}EBO$	I_E=10uA, I_C=0	6.0	-	-	V
Base Cutoff Current	I_{BEV}	V_{CE}=30V, V_{EB}=3.0V	-	-	50	nA
Collector Cutoff Current	I_{CEX}	V_{CE}=30V, V_{EB}=3.0V	-	-	50	nA
DC Current Gain	h_{FE}	I_C=0.1mA, V_{CE}=1.0V I_C=1.0mA, V_{CE}=1.0V I_C=10mA, V_{CE}=1.0V I_C=50mA, V_{CE}=1.0V I_C=100mA, V_{CE}=1.0V	40 70 100 60 30	- - - - -	- - 300 - -	-
Collector - Emitter Saturation Voltage	$V_{CE(SAT)}$	I_C=10mA, I_B=1.0mA I_C=50mA, I_B=5.0mA	- -	- -	0.2 0.3	V
Base - Emitter Saturation Voltage	$V_{BE(SAT)}$	I_C=10mA, I_B=1.0mA I_C=50mA, I_B=5.0mA	0.65 -	- -	0.85 0.95	V
Current-Gain - Bandwidth Product	f_T	I_C=10mA, V_{CE}=20V f=100MH_Z	300	-	-	MH_Z
Collector-Base Capacitance	C_{CBO}	V_{CB}=5.0V, I_E=0, f=1MH_Z	-	-	4.0	$_PF$
Emitter - Base Capacitance	C_{EBO}	V_{CB}=0.5V, I_E=0, f=1MH_Z	-	-	8	$_PF$
Delay Time	t_d	V_{CC}=3V, V_{BE}=0.5V, I_C=10mA, I_{B1}=1mA	-	-	35	ns
Rise Time	t_r		-	-	35	ns
Storage Time	t_s	V_{CC}=3V,I_C=10mA I_{B1}=I_{B2}=1mA	-	-	200	ns
Fall Time	t_f		-	-	50	ns

SWITCHING TIME EQUIVALENT TEST CIRCUITS



Delay and Rise Time Equivalent Test Circuit



Storage and Fall Time Equivalent Test Circuit

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ELECTRICAL CHARACTERISTICS CURVE

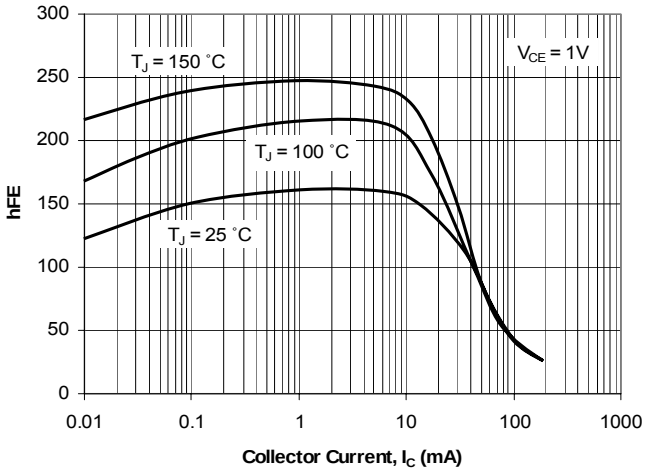

Fig. 1. Typical h_{FE} vs Collector Current

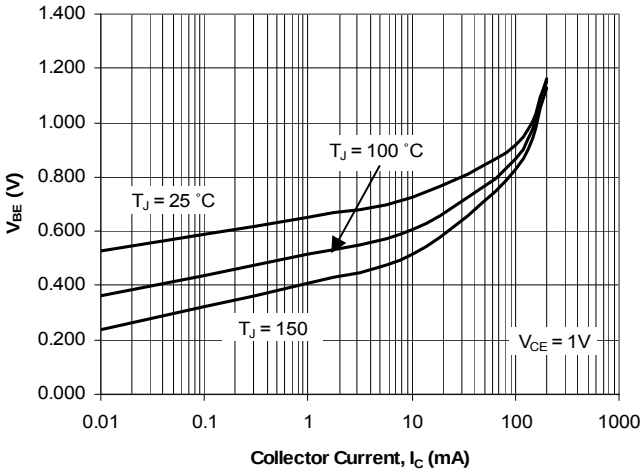

Fig. 2. Typical V_{BE} vs Collector Current

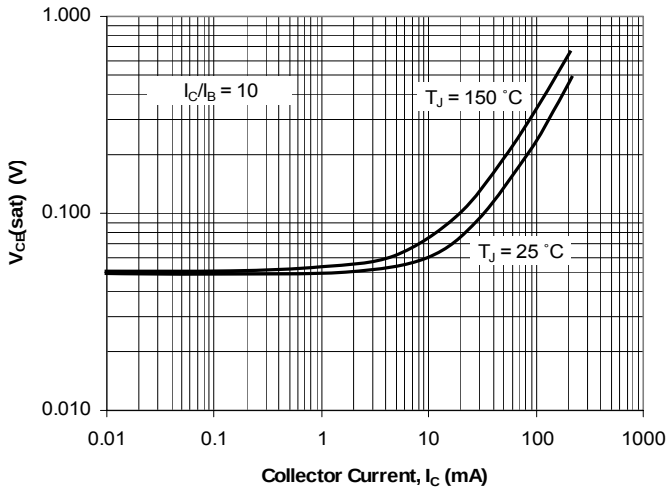

Fig. 3. Typical V_{CE} (sat) vs Collector Current

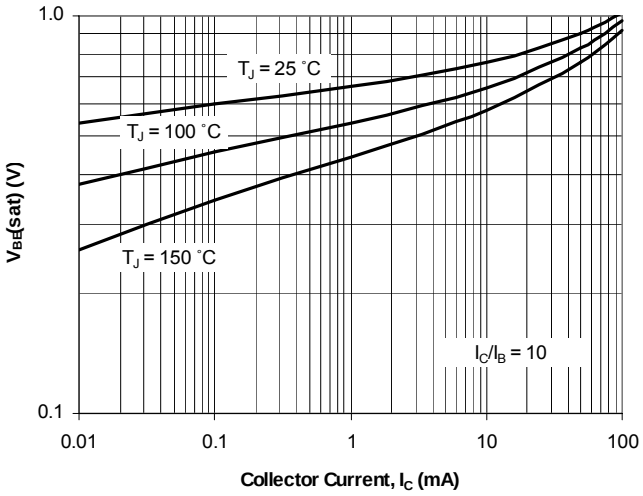

Fig. 4. Typical V_{BE} (sat) vs Collector Current

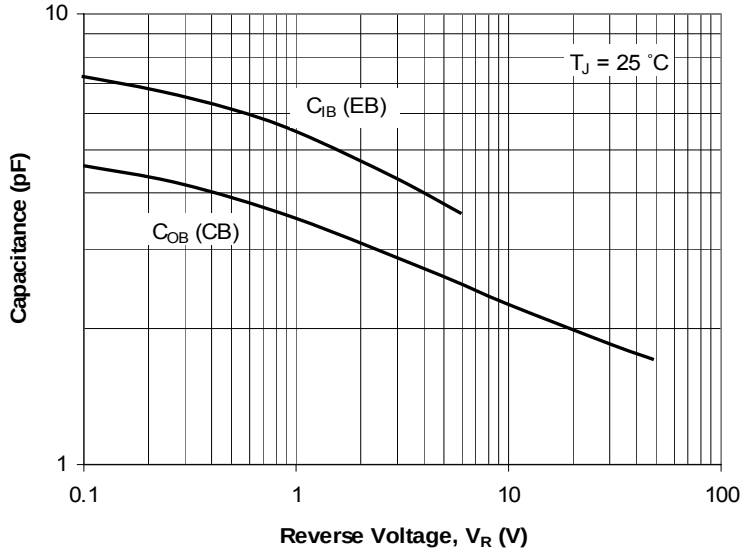

Fig. 5. Typical Capacitances vs Reverse Voltage

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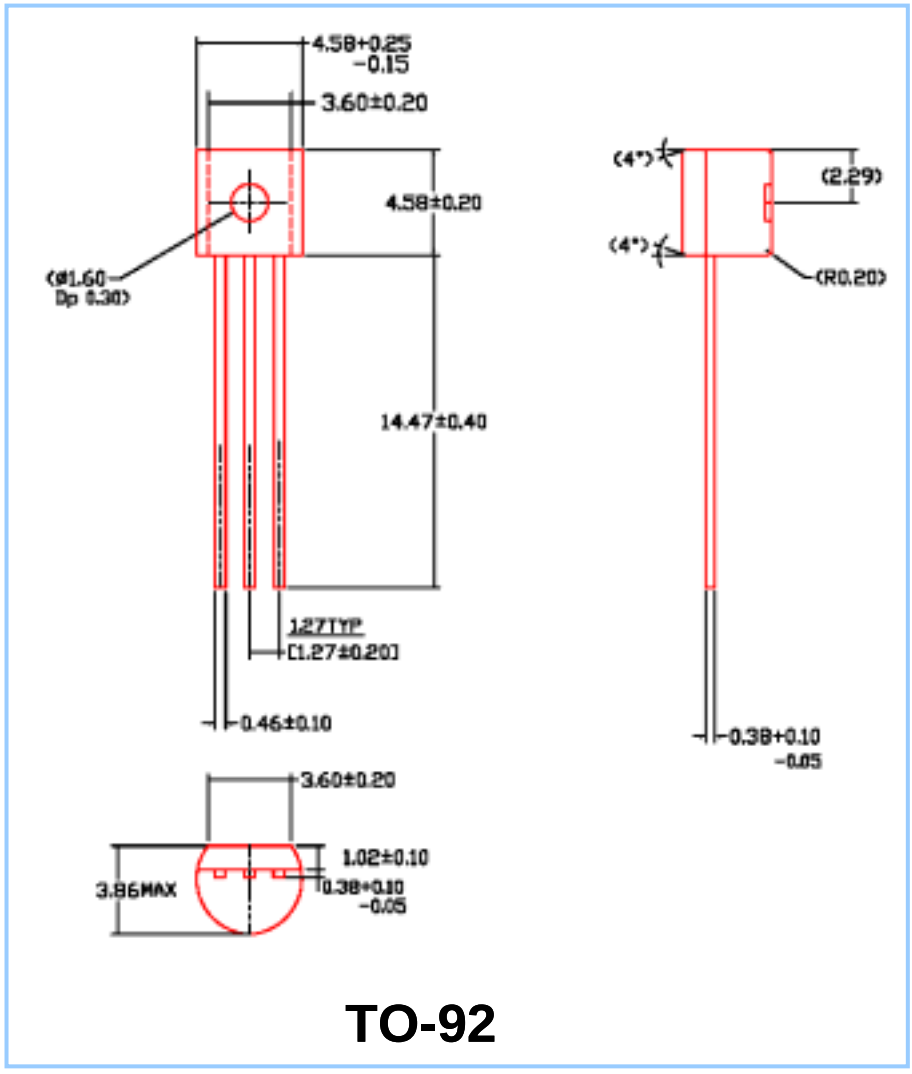
TO-92 Case Outline



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