

**VOLTAGE** 40 Volts **POWER** 200 mWatts

### FEATURES

- Epitaxial silicon, planar design
- Collector-emitter voltage  $V_{CE} = 40V$
- Collector current  $I_C = 200mA$
- In compliance with EU RoHS 2002/95/EC directives
- Transition Frequency  $> 300MHz$   $f_T@I_C=10mA, V_{CE}=20V, f=100MHz$

### MECHANICAL DATA

- Case: SOT-363, Plastic
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.006 gram
- Marking: S3A

SOT-363 Unit: inch (mm)

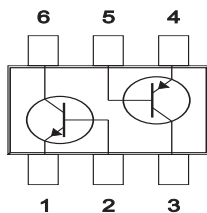
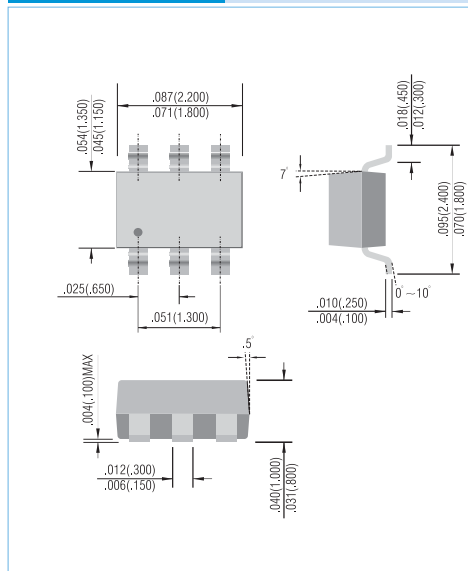


Fig.55

### ABSOLUTE RATINGS

ABSOLUTE RATING		NPN 3904 Section	PNP 3906 Section	-
PARAMETER	Symbol	Value	Value	Units
Collector - Emitter Voltage	$V_{CEO}$	40	-40	V
Collector - Base Voltage	$V_{CBO}$	60	-40	V
Emitter - Base Voltage	$V_{EBO}$	6.0	-5.0	V
Collector Current - Continuous	$I_C$	200	-200	mA

### THERMAL CHARACTERISTICS

PARAMETER	Symbol	Value	Units
Max Power Dissipation (Note 1)	$P_{TOT}$	200	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	625	$^{\circ}C/W$
Junction Temperature	$T_J$	-55 to 150	$^{\circ}C$
Storage Temperature	$T_{STG}$	-55 to 150	$^{\circ}C$

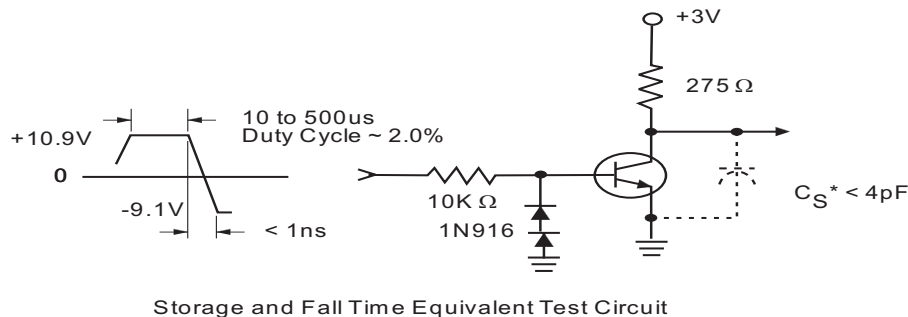
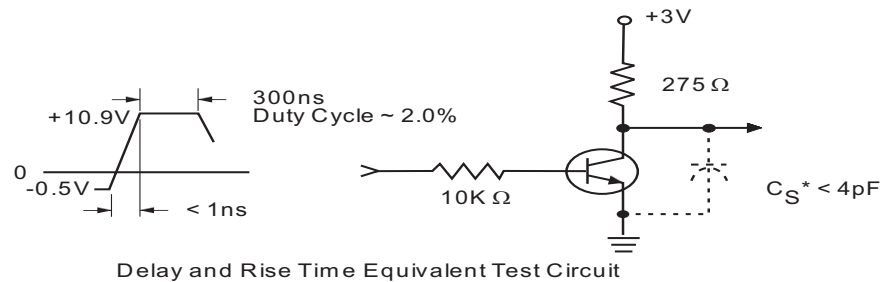
Note 1: Transistor mounted on FR-5 board 1.0 x 0.75 x 0.062 in.

### ELECTRICAL CHARACTERISTICS NPN SECTION

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	$V_{(BR)CBO}$	$I_C=10\mu A, I_E=0$	60	-	-	V
Emitter - Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E=10\mu A, I_C=0$	6.0	-	-	V
Base Cutoff Current	$I_{BI}$	$V_{CE}=30V, V_{EB}=3.0V$	-	-	50	nA
Collector Cutoff Current	$I_{CEX}$	$V_{CE}=30V, V_{EB}=3.0V$	-	-	50	nA
DC Current Gain (Note 2)	$h_{FE}$	$I_C=0.1mA, V_{CE}=1.0V$ $I_C=1.0mA, V_{CE}=1.0V$ $I_C=10mA, V_{CE}=1.0V$ $I_C=50mA, V_{CE}=1.0V$ $I_C=100mA, V_{CE}=1.0V$	40 70 100 60 30	- - - - -	- - 300 - -	-
Collector - Emitter Saturation Voltage (Note 2)	$V_{CE(SAT)}$	$I_C=10mA, I_B=1.0mA$ $I_C=50mA, I_B=5.0mA$	-	-	0.2 0.3	V
Base - Emitter Saturation Voltage (Note 2)	$V_{BE(SAT)}$	$I_C=10mA, I_B=1.0mA$ $I_C=50mA, I_B=5.0mA$	0.65 -	- -	0.85 0.95	V
Collector - Base Capacitance	$C_{CBO}$	$V_{CB}=5V, I_E=0, f=1MHz$	-	-	4.0	pF
Emitter - Base Capacitance	$C_{EBO}$	$V_{CB}=0.5V, I_C=0, f=1MHz$	-	-	8.0	pF
Delay Time	$t_d$	$V_{CC}=3V, V_{BE}=-0.5V,$ $I_C=10mA, I_B=1.0mA$	-	-	35	ns
Rise Time	$t_r$	$V_{CC}=3V, V_{BE}=-0.5V,$ $I_C=10mA, I_B=1.0mA$	-	-	35	ns
Storage Time	$t_s$	$V_{CC}=3V, I_C=10mA$ $I_{B1}=I_{B2}=1.0mA$	-	-	200	ns
Fall Time	$t_f$	$V_{CC}=3V, I_C=10mA$ $I_{B1}=I_{B2}=1.0mA$	-	-	50	ns

Note 2: Pulse Test: Pulse Width  $\leq 300 \mu s$ , Duty Cycle  $\leq 2.0\%$ .

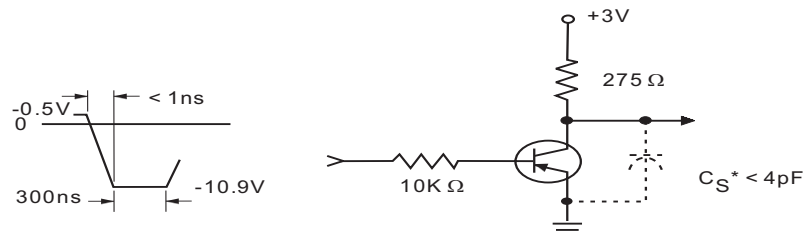
### SWITCHING TIME EQUIVALENT TEST CIRCUITS



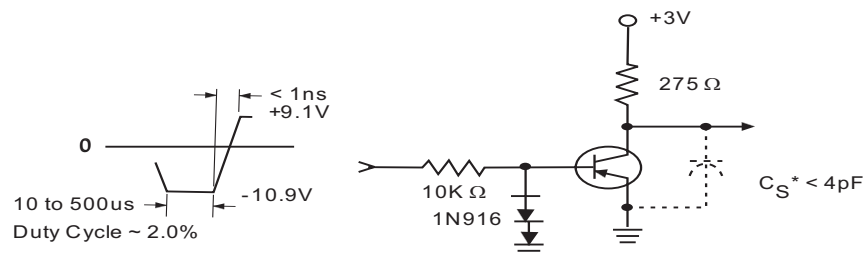
### ELECTRICAL CHARACTERISTICS PNP SECTION

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	$V_{(BR)CBO}$	$I_C = -10\mu A, I_E = 0$	-40	-	-	V
Emitter - Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = -10\mu A, I_C = 0$	-5.0	-	-	V
Base Cutoff Current	$I_{BI}$	$V_{CE} = -30V, V_{EB} = -3.0V$	-	-	-50	nA
Collector Cutoff Current	$I_{CEX}$	$V_{CE} = -30V, V_{EB} = -3.0V$	-	-	-50	nA
DC Current Gain (Note 2)	$h_{FE}$	$I_C = -0.1mA, V_{CE} = -1.0V$ $I_C = -1.0mA, V_{CE} = -1.0V$ $I_C = -10mA, V_{CE} = -1.0V$ $I_C = -50mA, V_{CE} = -1.0V$ $I_C = -100mA, V_{CE} = -1.0V$	60 80 100 60 30	- - - - -	- - 300 - -	-
Collector - Emitter Saturation Voltage (Note 2)	$V_{CE(SAT)}$	$I_C = -10mA, I_B = -1.0mA$ $I_C = -50mA, I_B = -5.0mA$	-	-	-0.25 -0.4	V
Base - Emitter Saturation Voltage (Note 2)	$V_{BE(SAT)}$	$I_C = -10mA, I_B = -1.0mA$ $I_C = -50mA, I_B = -5.0mA$	-0.65 -	- -	-0.85 -0.95	V
Collector - Base Capacitance	$C_{CBO}$	$V_{CB} = -5V, I_E = 0, f = 1MHz$	-	-	4.0	pF
Emitter - Base Capacitance	$C_{EBO}$	$V_{CB} = -0.5V, I_C = 0, f = 1MHz$	-	-	10	pF
Delay Time	$t_d$	$V_{CC} = -3V, V_{BE} = -0.5V,$ $I_C = -10mA, I_B = -1.0mA$	-	-	35	ns
Rise Time	$t_r$	$V_{CC} = -3V, V_{BE} = -0.5V,$ $I_C = -10mA, I_B = -1.0mA$	-	-	35	ns
Storage Time	$t_s$	$V_{CC} = -3V, I_C = -10mA$ $I_{B1} = I_{B2} = -1.0mA$	-	-	225	ns
Fall Time	$t_f$	$V_{CC} = -3V, I_C = -10mA$ $I_{B1} = I_{B2} = 1.0mA$	-	-	75	ns

### SWITCHING TIME EQUIVALENT TEST CIRCUITS



Delay and Rise Time Equivalent Test Circuit



Storage and Fall Time Equivalent Test Circuit

## ELECTRICAL CHARACTERISTICS CURVE NPN SECTION

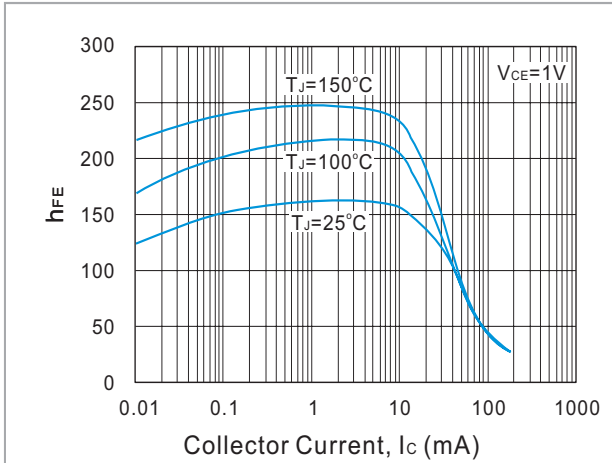


Fig. 1. Typical  $h_{FE}$  vs. Collector Current

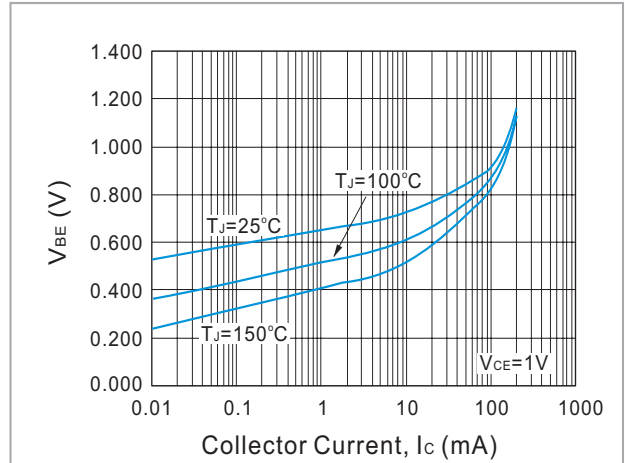


Fig. 2. Typical  $V_{BE}$  vs. Collector Current

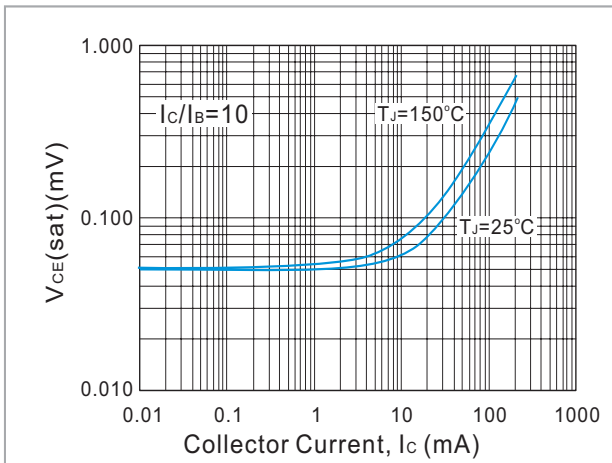


Fig. 3. Typical  $V_{CE(sat)}$  vs. Collector Current

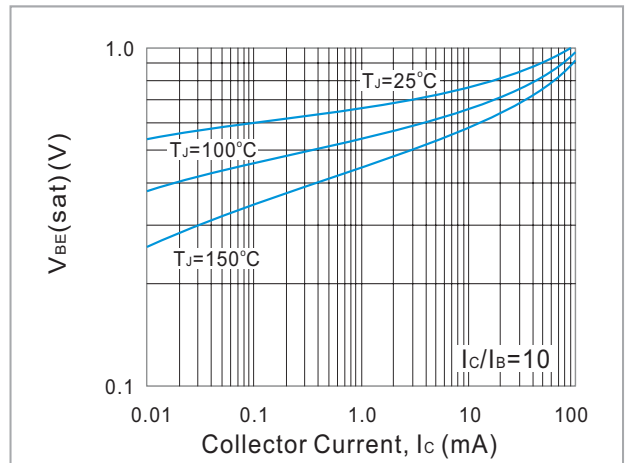


Fig. 4. Typical  $V_{BE(sat)}$  vs. Collector Current

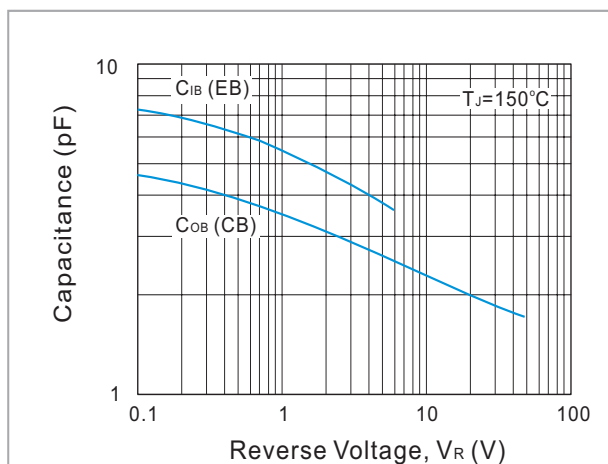


Fig. 5. Typical Capacitances vs. Reverse Voltage

## ELECTRICAL CHARACTERISTICS CURVE PNP SECTION

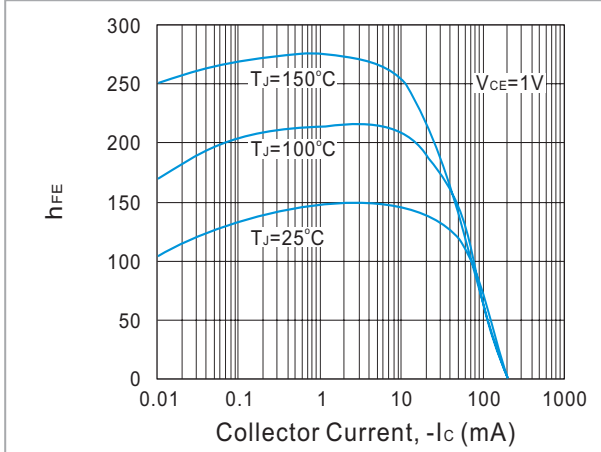


Fig. 1. Typical  $h_{FE}$  vs Collector Current

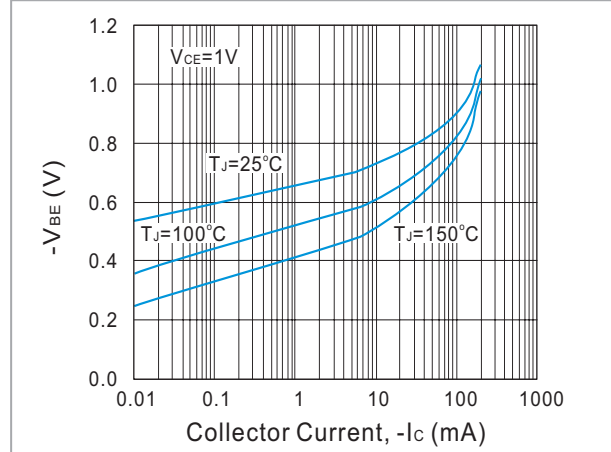


Fig. 2. Typical  $V_{BE}$  vs Collector Current

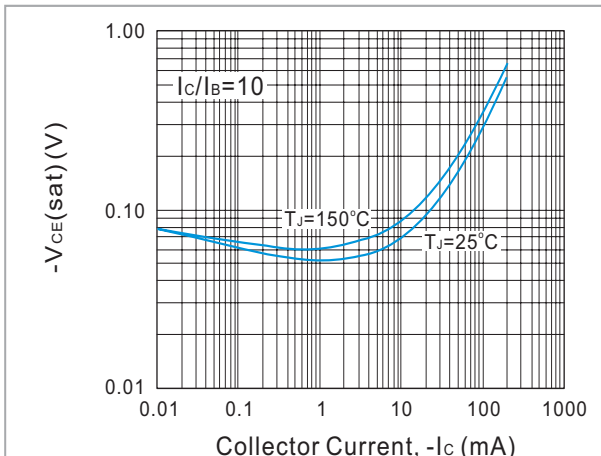


Fig. 3. Typical  $V_{CE(sat)}$  vs Collector Current

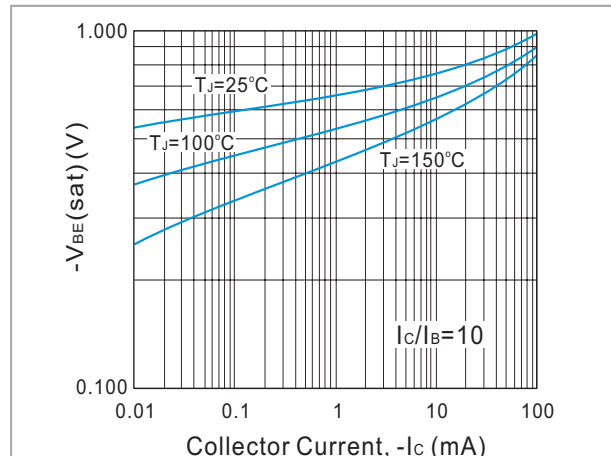


Fig. 4. Typical  $V_{BE(sat)}$  vs Collector Current

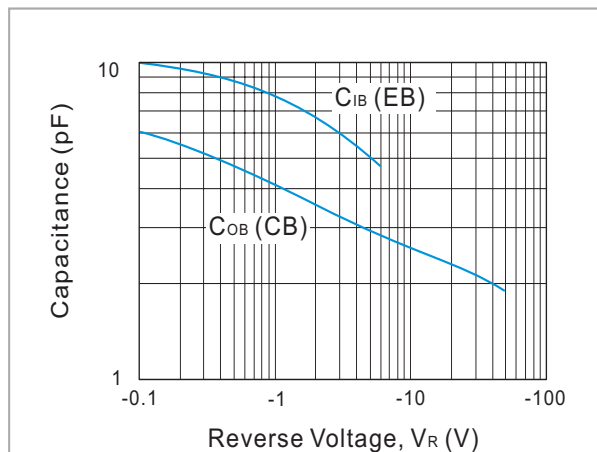
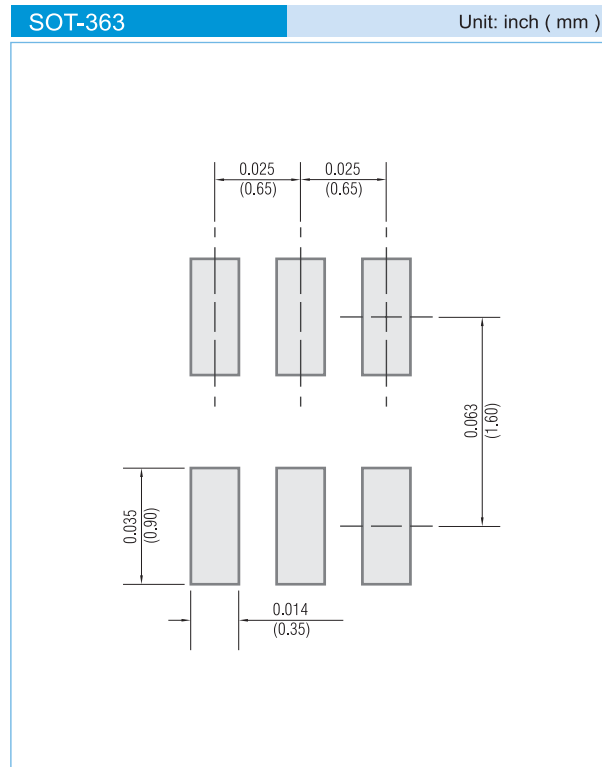


Fig. 5. Typical Capacitances vs Reverse Voltage

## MOUNTING PAD LAYOUT



## ORDER INFORMATION

- Packing information
  - T/R - 10K per 13" plastic Reel
  - T/R - 3K per 7" plastic Reel

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