

SILICON TRANSISTOR

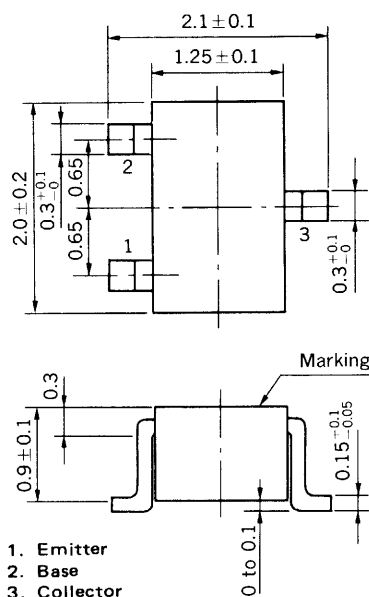
2SC4176

HIGH SPEED SWITCHING

NPN SILICON EPITAXIAL TRANSISTOR

PACKAGE DIMENSIONS

in millimeters



FEATURE

- High Speed: $t_{on} < 12 \text{ ns}$ $t_{off} < 18 \text{ ns}$

ABSOLUTE MAXIMUM RATINGS

Maximum Voltages and Current ($T_a = 25^\circ\text{C}$)

Collector to Base Voltage	V_{CBO}	40	V
Collector to Emitter Voltage	V_{CEO}	15	V
Emitter to Base Voltage	V_{EBO}	5.0	V
Collector Current (DC)	I_C	200	mA

Maximum Power Dissipation

Total Power Dissipation at 25°C Ambient Temperature	P_T	150	mW
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Maximum Temperatures

Junction Temperature	T_j	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

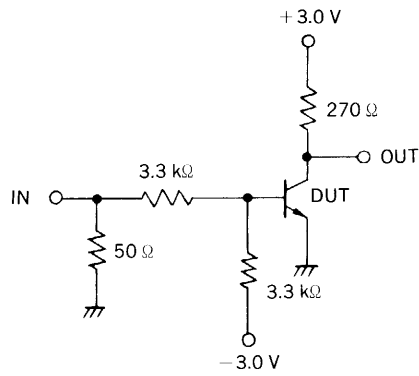
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I_{CBO}			100	nA	$V_{CB} = 20 \text{ V}, I_E = 0$
Emitter Cutoff Current	I_{EBO}			100	nA	$V_{EB} = 3.0 \text{ V}, I_C = 0$
DC Current Gain	h_{FE1}	40	90	200		$V_{CE} = 1.0 \text{ V}, I_C = 10 \text{ mA}$
Collector Saturation Voltage	$V_{CE(sat)}$		0.15	0.25	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$
Base Saturation Voltage	$V_{BE(sat)}$		0.80	0.85	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$
Gain Bandwidth Product	f_T	500	750		MHz	$V_{CE} = 10 \text{ V}, I_E = -10 \text{ mA}$
Output Capacitance	C_{ob}		1.8	4.0	pF	$V_{CB} = 5.0 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$
Turn-on Time	t_{on}		8.0	12	ns	See Test Circuit
Storage Time	t_{stg}		6.0	13	ns	
Turn-off Time	t_{off}		12	18	ns	

* Pulsed: $PW \leq 350 \mu\text{s}$, Duty Cycle $\leq 2\%$

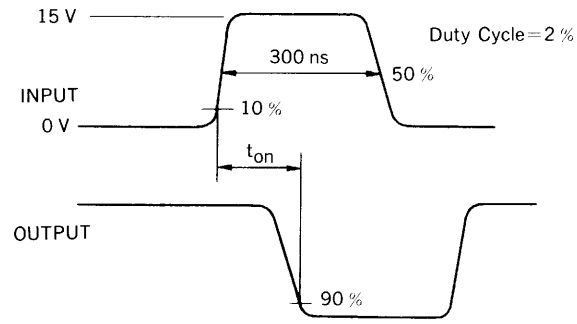
h_{FE} Classification

Marking	B33	B34	B35
h_{FE}	40 to 80	60 to 120	100 to 200

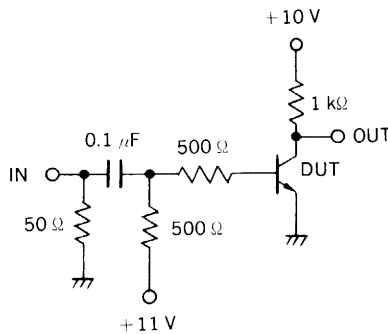
SWITCHING TIME TEST CIRCUIT



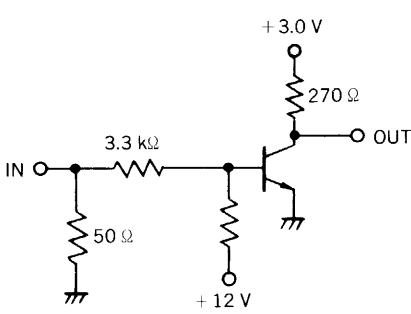
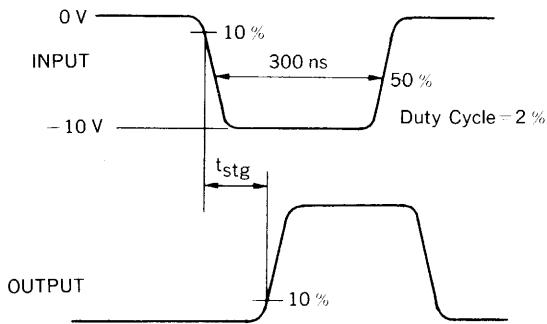
t_{on} SWITCHING



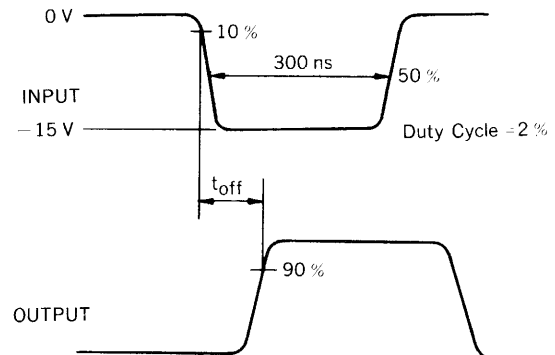
VOLTAGE WAVEFORMS



t_{stg} SWITCHING



t_{off} SWITCHING



TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

