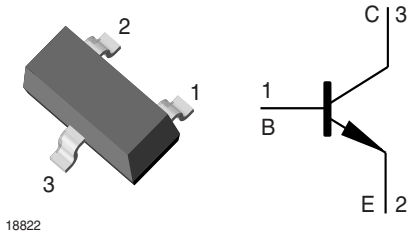
Small Signal Transistors (NPN)

Features

- NPN Silicon Epitaxial Planar Transistors
- Suited for low level, low noise, low frequency applications in hybrid cicuits.
- Low Current, Low Voltage.
- As complementary types, BCW61 Series PNP transistors are recommended.



Mechanical Data

Case: SOT-23 Plastic case

Weight: approx. 8.8 mg

Marking:
BCW60A = AA
BCW60B = AB
BCW60C = AC
BCW60D = AD

Packaging Codes/Options:
GS18 / 10 k per 13" reel (8 mm tape), 10 k/box
GS08 / 3 k per 7" reel (8 mm tape), 15 k/box

Pinning:
1 = Base, 2 = Emitter, 3 = Collector

Absolute Maximum Ratings

T_{amb} = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Value	Unit
Collector-emitter voltage		V_{CEO}	32	V
		V_{CBO}	32	V
Emitter-base voltage		V_{EBO}	5.0	V
Collector current (DC)		I_C	100	mA
Collector peak current		I_{CM}	200	mA
Base current (DC)		I_B	50	mA
Power dissipation	T_A = 25 °C	P_{tot}	250	mW

Maximum Thermal Resistance

Parameter	Test condition	Symbol	Value	Unit
Maximum junction temperature		T_j	150	°C
Storage temperature range		T_S	- 65 to + 150	°C
Thermal resistance junction to ambient air		$R_{\theta JA}$	500[1)]	°C/W

[1)] Mounted on FR-4 printed-circuit board.

Electrical DC Characteristics

Parameter	Test condition	Part	Symbol	Min	Typ	Max	Unit
DC current gain	V_{CE} = 5 V, I_C = 10 µA	BCW60A	h_{FE}				
		BCW60B	h_{FE}	20			
		BCW60C	h_{FE}	40			
		BCW60D	h_{FE}	100			
	V_{CE} = 5 V, I_C = 2 mA	BCW60A	h_{FE}	120		220	
		BCW60B	h_{FE}	180		310	
		BCW60C	h_{FE}	250		460	
		BCW60D	h_{FE}	380		630	
	V_{CE} = 1 V, I_C = 50 mA	BCW60A	h_{FE}	50			
		BCW60B	h_{FE}	70			
		BCW60C	h_{FE}	90			
		BCW60D	h_{FE}	100			
Collector - emitter saturation voltage	I_C = 10 mA, I_B = 0.25 mA		V_{CEsat}	50		350	mV
	I_C = 50 mA, I_B = 1.25 mA		V_{CEsat}	100		550	mV
Base - emitter saturation voltage	I_C = 10 mA, I_B = 0.25 mA		V_{BEsat}	600		850	mV
	I_C = 50 mA, I_B = 1.25 mA		V_{BEsat}	700		1050	mV
Base - emitter voltage	V_{CE} = 5 V, I_C = 2 mA		V_{BE}	550	650	750	mV
	V_{CE} = 5 V, I_C = 10 µA		V_{BE}		520		mV
	V_{CE} = 1 V, I_C = 50 mA		V_{BE}		780		mV
Collector-emitter cut-off current	V_{CE} = 32 V, V_{BE} = 0 V		I_{CES}			20	nA
	V_{CE} = 32 V, V_{BE} = 0 V, T_A = 150 °C		I_{CES}			20	µA
Emitter - base cut - off current	V_{EB} = 4 V, I_C = 0		i_{EBO}			20	nA

Electrical AC Characteristics

Parameter	Test condition	Part	Symbol	Min	Typ	Max	Unit
Gain - bandwidth product	V_{CE} = 5 V, I_C = 10 mA, f = 100 MHz		f_T	100	250		MHz
Collector - base capacitance	V_{CB} = 10 V, f = 1 MHz, I_E = 0		C_{CBO}		2.5		pF
Emitter - base capacitance	V_{EB} = 0.5 V, f = 1 MHz, I_C = 0		C_{EBO}		8		pF
Noise figure	V_{CE} = 5 V, I_C = 200 µA, R_S = 2 kΩ, f = 1 kHz, B = 200 Hz		F		2	6	dB
Small signal current gain	V_{CE} = 5 V, I_C = 2 mA, f = 1.0 kHz	BCW60A	h_{fe}		200		
		BCW60B	h_{fe}		260		
		BCW60C	h_{fe}		330		
		BCW60D	h_{fe}		520		
Turn - on time	R_L = 990 Ω (see fig.1) V_{CC} = 10 V, I_C = 10 mA, $I_{B(on)}$ = - $I_{B(off)}$ = 1 mA		t_{on}		85	150	ns
Turn - off time	R_L = 990 Ω (see fig.1) V_{CC} = 10 V, I_C = 10 mA, $I_{B(on)}$ = - $I_{B(off)}$ = 1 mA		t_{off}		480	800	ns

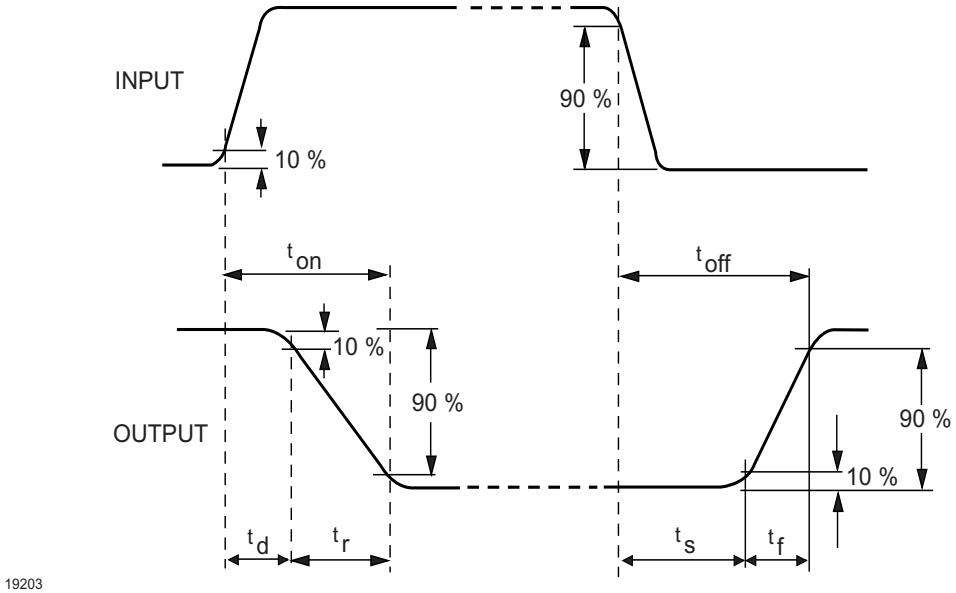
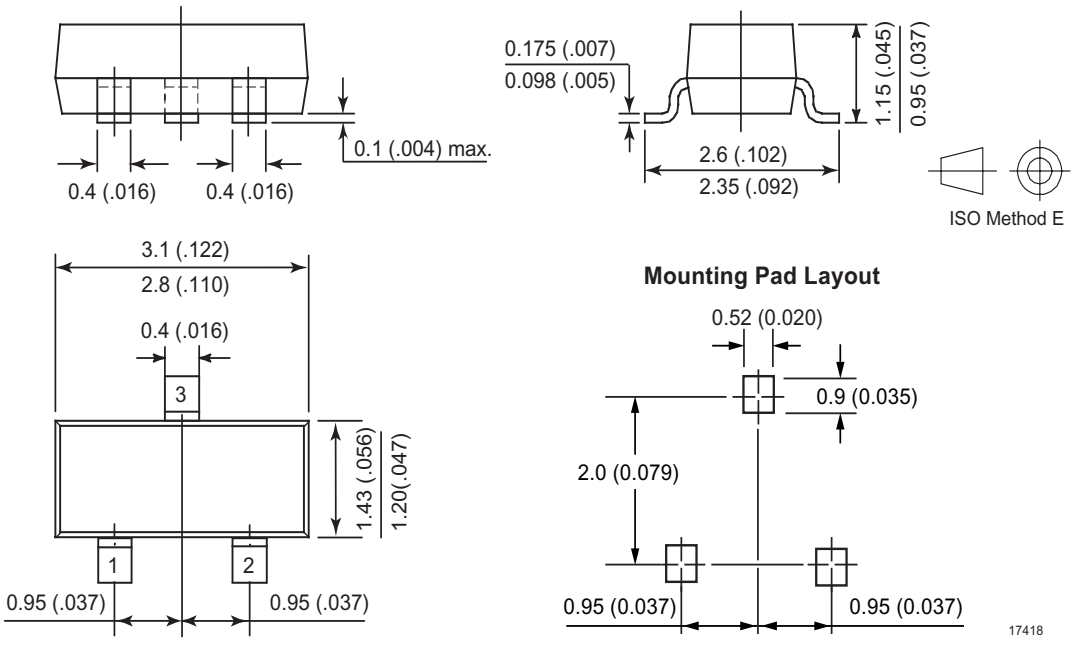


Figure 1. Switching Waveform

Package Dimensions in mm (Inches)



Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operatingsystems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423