

A-002-005-002 (C)

What are the two stable operating conditions of a silicon controlled rectifier (SCR)?

- A NPN conduction and PNP conduction
- B Oscillating and quiescent
- C Conducting and non-conducting
- D Forward conducting and reverse conducting

A-002-005-003 (B)

When a silicon controlled rectifier (SCR) is triggered, to what other semiconductor diode are its electrical characteristics similar (as measured between its cathode and anode)?

- A The varactor diode
- B The junction diode
- C The PIN diode
- D The hot-carrier (Schottky) diode

A-002-005-004 (A)

Under what operating condition does a silicon controlled rectifier (SCR) exhibit electrical characteristics similar to a forward-biased silicon rectifier?

- A When it is gated "on"
- B When it is gated "off"
- C When it is used as a detector
- D During a switching transition

A-002-005-005 (D)

The silicon controlled rectifier (SCR) is what type of device?

- A NPPN
- B PNNP
- C PPNN
- D PNPN

A-002-005-006 (D)

The control element in the silicon controlled rectifier (SCR) is called the:

- A anode
- B cathode
- C emitter
- D gate

A-002-005-007 (A)

The silicon controlled rectifier (SCR) is a member of which family?

- A Thyristors
- B Phase locked loops
- C Varactors
- D Varistors

A-002-005-008 (A)

In amateur radio equipment, which is the major application for the silicon controlled rectifier (SCR)?

- A Power supply overvoltage "crowbar" circuit
- B Class C amplifier circuit
- C Microphone preamplifier circuit
- D SWR detector circuit

A-002-005-009 (A)

Which of the following devices has anode, cathode, and gate?

- A The silicon controlled rectifier (SCR)
- B The bipolar transistor
- C The field effect transistor
- D The triode vacuum tube

A-002-005-010 (A)

When it is gated "on", the silicon controlled rectifier (SCR) exhibits electrical characteristics similar to a:

- A forward-biased silicon rectifier
- B reverse-biased silicon rectifier
- C forward-biased PIN diode
- D reverse-biased hot-carrier (Schottky) diode

A-002-005-011 (B)

Which of the following is a PNPN device?

- A Zener diode
- B Silicon controlled rectifier (SCR)
- C PIN diode
- D Hot carrier (Schottky) diode

A-002-006-001 (A)

For what portion of a signal cycle does a Class A amplifier operate?

- A The entire cycle
- B Exactly 180 degrees
- C More than 180 degrees but less than 360 degrees
- D Less than 180 degrees

A-002-006-002 (B)

Which class of amplifier has the highest linearity and least distortion?

- A Class C
- B Class A
- C Class AB
- D Class B

A-002-006-003 (C)

For what portion of a cycle does a Class AB amplifier operate?

- A The entire cycle
- B Less than 180 degrees
- C More than 180 degrees but less than 360 degrees
- D Exactly 180 degrees

A-002-006-004 (D)

For what portion of a cycle does a Class B amplifier operate?

- A Less than 180 degrees
- B More than 180 degrees but less than 360 degrees
- C The entire cycle
- D 180 degrees

A-002-006-005 (B)

For what portion of a signal cycle does a Class C amplifier operate?

- A 180 degrees
- B Less than 180 degrees
- C More than 180 degrees but less than 360 degrees
- D The entire cycle

A-002-006-006 (D)

Which of the following classes of amplifier provides the highest efficiency?

- A Class A
- B Class AB
- C Class B
- D Class C

A-002-006-007 (A)

Which of the following classes of amplifier would provide the highest efficiency in the output stage of a CW, RTTY or FM transmitter?

- A Class C
- B Class AB
- C Class B
- D Class A

A-002-006-008 (A)

Which class of amplifier provides the least efficiency?

- A Class A
- B Class C
- C Class B
- D Class AB

A-002-006-009 (A)

Which class of amplifier has the poorest linearity and the most distortion?

- A Class C
- B Class AB
- C Class A
- D Class B

A-002-006-010 (B)

Which class of amplifier operates over the full cycle?

- A Class C
- B Class A
- C Class AB
- D Class B

**A-002-006-011 (D)**

Which class of amplifier operates over less than 180 degrees of the cycle?

- A Class AB
- B Class A
- C Class B
- D Class C

**A-002-007-001 (A)**

What determines the input impedance of a FET common-source amplifier?

- A The input impedance is essentially determined by the gate biasing network
- B The input impedance is essentially determined by the resistance between the source and substrate
- C The input impedance is essentially determined by the resistance between the source and the drain
- D The input impedance is essentially determined by the resistance between the drain and substrate

**A-002-007-002 (C)**

What determines the output impedance of a FET common-source amplifier?

- A The output impedance is essentially determined by the gate supply voltage
- B The output impedance is essentially determined by the input impedance of the FET
- C The output impedance is essentially determined by the drain resistor
- D The output impedance is essentially determined by the drain supply voltage

**A-002-007-003 (C)**

What are the advantages of a Darlington pair audio amplifier?

- A Mutual gain, low input impedance and low output impedance
- B Low output impedance, high mutual impedance and low output current
- C High gain, high input impedance and low output impedance
- D Mutual gain, high stability and low mutual inductance

**A-002-007-004 (D)**

In the common base amplifier, when the input and output signals are compared:

- A the output signal lags the input signal by 90 degrees
- B the output signals leads the input signal by 90 degrees
- C the signals are 180 degrees out of phase
- D the signals are in phase

**A-002-007-005 (C)**

In the common base amplifier, the input impedance, when compared to the output impedance is:

- A only slightly lower
- B very high
- C very low
- D only slightly higher

**A-002-007-006 (D)**

In the common emitter amplifier, when the input and output signals are compared:

- A the output signal leads the input signal by 90 degrees
- B the output signal lags the input signal by 90 degrees
- C the signals are in phase
- D the signals are 180 degrees out of phase

**A-002-007-007 (B)**

In the common collector amplifier, when the input and output signals are compared:

- A the signals are 180 degrees out of phase
- B the signals are in phase
- C the output signal leads the input signal by 90 degrees
- D the output signal lags the input signal by 90 degrees

**A-002-007-008 (C)**

The FET amplifier source follower circuit is another name for:

- A common mode circuit
- B common gate circuit
- C common drain circuit
- D common source circuit

**A-002-007-009 (D)**

The FET amplifier common source circuit is similar to which of the following bipolar transistor amplifier circuits?

- A Common collector
- B Common base
- C Common mode
- D Common emitter

**A-002-007-010 (C)**

The FET amplifier common drain circuit is similar to which of the following bipolar transistor amplifier circuits?

- A Common base
- B Common mode
- C Common collector
- D Common emitter

**A-002-007-011 (B)**

The FET amplifier common gate circuit is similar to which of the following bipolar transistor amplifier circuits?

- A Common emitter
- B Common base
- C Common mode
- D Common collector

**A-002-008-001 (C)**

What is an operational amplifier (op-amp)?

- A An amplifier used to increase the average output of frequency modulated amateur signals to the legal limit
- B A program subroutine that calculates the gain of an RF amplifier
- C A high-gain, direct-coupled differential amplifier whose characteristics are determined by components mounted externally
- D A high-gain, direct-coupled audio amplifier whose characteristics are determined by internal components of the device

**A-002-008-002 (B)**

What would be the characteristics of the ideal op-amp?

- A Zero input impedance, infinite output impedance, infinite gain, and flat frequency response
- B Infinite input impedance, zero output impedance, infinite gain, and flat frequency response
- C Zero input impedance, zero output impedance, infinite gain, and flat frequency response
- D Infinite input impedance, infinite output impedance, infinite gain and flat frequency response

**A-002-008-003 (B)**

What determines the gain of a closed-loop op-amp circuit?

- A The collector-to-base capacitance of the PNP stage
- B The external feedback network
- C The PNP collector load
- D The voltage applied to the circuit

**A-002-008-004 (B)**

What is meant by the term op-amp offset voltage?

- A The output voltage of the op-amp minus its input voltage
- B The potential between the amplifier input terminals of the op-amp in a closed-loop condition
- C The difference between the output voltage of the op-amp and the input voltage required for the next stage
- D The potential between the amplifier input terminals of the op-amp in an open-loop condition

**A-002-008-005 (B)**

What is the input impedance of a theoretically ideal op-amp?

- A Exactly 1000 ohms
- B Very high
- C Very low
- D Exactly 100 ohms

**A-002-008-006 (B)**

What is the output impedance of a theoretically ideal op-amp?

- A Exactly 1000 ohms
- B Very low
- C Very high
- D Exactly 100 ohms

**A-002-008-007 (D)**

What are the advantages of using an op-amp instead of LC elements in an audio filter?

- A Op-amps are more rugged and can withstand more abuse than can LC elements
- B Op-amps are available in more styles and types than are LC elements
- C Op-amps are fixed at one frequency
- D Op-amps exhibit gain rather than insertion loss

**A-002-008-008 (A)**

What are the principal uses of an op-amp RC active filter in amateur circuitry?

- A Op-amp circuits are used as audio filters for receivers
- B Op-amp circuits are used as low-pass filters at the output of transmitters
- C Op-amp circuits are used as filters for smoothing power supply output
- D Op-amp circuits are used as high-pass filters to block RFI at the input of receivers

**A-002-008-009 (A)**

What is an inverting op-amp circuit?

- A An operational amplifier circuit connected such that the input and output signals are 180 degrees out of phase
- B An operational amplifier circuit connected such that the input and output signals are in phase
- C An operational amplifier circuit connected such that the input and output signals are 90 degrees out of phase
- D An operational amplifier circuit connected such that the input impedance is held to zero, while the output impedance is high

**A-002-008-010 (B)**

What is a non-inverting op-amp circuit?

- A An operational amplifier circuit connected such that the input and output signals are 180 degrees out of phase
- B An operational amplifier circuit connected such that the input and output signals are in phase
- C An operational amplifier circuit connected such that the input and output signals are 90 degrees out of phase
- D An operational amplifier circuit connected such that the input impedance is held low, and the output impedance is high

**A-002-008-011 (A)**

What term is most appropriate for a high gain, direct-coupled differential amplifier whose characteristics are determined by components mounted externally?

- A Operational amplifier
- B Difference amplifier
- C High gain audio amplifier
- D Summing amplifier

**A-002-009-001 (C)**

What is the mixing process?

- A The recovery of intelligence from a modulated signal
- B The elimination of noise in a wideband receiver by phase comparison
- C The combination of two signals to produce sum and difference frequencies
- D The elimination of noise in a wideband receiver by phase differentiation

**A-002-009-002 (C)**

What are the principal frequencies that appear at the output of a mixer circuit?

- A The sum, difference and square root of the input frequencies
- B Two and four times the original frequency
- C The original frequencies and the sum and difference frequencies
- D 1.414 and 0.707 times the input frequencies

**A-002-009-003 (D)**

What occurs when an excessive amount of signal energy reaches the mixer circuit?

- A Automatic limiting occurs
- B A beat frequency is generated
- C Mixer blanking occurs
- D Spurious signals are generated

**A-002-009-004 (D)**

In a frequency multiplier circuit, the input signal is coupled to the base of a transistor through a capacitor. A radio frequency choke is connected between the base of the transistor and ground. The capacitor is:

- A part of the input tuned circuit
- B a by-pass for the circuit
- C part of the output tank circuit
- D a DC blocking capacitor

**A-002-009-005 (A)**

A frequency multiplier circuit must be operated in:

- A class C
- B class AB
- C class B
- D class A

**A-002-009-006 (A)**

In a frequency multiplier circuit, an inductance (L1) and a variable capacitor (C2) are connected in series between VCC+ and ground. The collector of a transistor is connected to a tap on L1. The purpose of the variable capacitor is to:

- A tune L1 to the desired harmonic
- B by-pass RF
- C tune L1 to the frequency applied to the base
- D provide positive feedback

**A-002-009-007 (C)**

In a frequency multiplier circuit, an inductance (L1) and a variable capacitor (C2) are connected in series between VCC+ and ground. The collector of a transistor is connected to a tap on L1. A fixed capacitor (C3) is connected between the VCC+ side of L1 and ground. The purpose of C3 is to:

- A resonate with L1
- B by-pass any audio components
- C provide an RF ground at the VCC connection point of L1
- D form a pi filter with L1 and C2

**A-002-009-008 (D)**

In a frequency multiplier circuit, an inductance (L1) and a variable capacitor (C2) are connected in series between VCC+ and ground. The collector of a transistor is connected to a tap on L1. C2 in conjunction with L1 operate as a:

- A frequency divider
- B voltage divider
- C voltage doubler
- D frequency multiplier

**A-002-009-009 (D)**

In a circuit where the components are tuned to resonate at a higher frequency than applied, the circuit is most likely a:

- A a VHF/UHF amplifier
- B a linear amplifier
- C a frequency divider
- D a frequency multiplier

**A-002-009-010 (C)**

In a frequency multiplier circuit, an inductance (L1) and a variable capacitor (C2) are connected in series between VCC+ and ground. The collector of a transistor is connected to a tap on L1. A fixed capacitor (C3) is connected between the VCC+ side of L1 and ground. C3 is a:

- A tuning capacitor
- B coupling capacitor
- C RF by-pass capacitor
- D DC blocking capacitor