



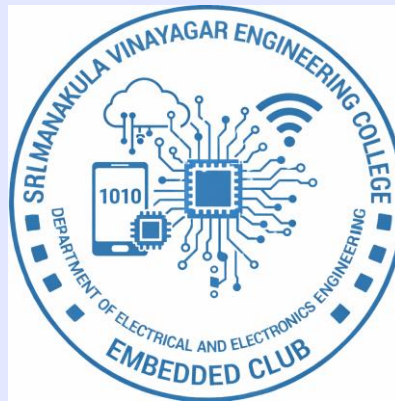
**SRI MANAKULA VINAYAGAR**  
ENGINEERING COLLEGE  
(AN AUTONOMOUS INSTITUTION)



DEPARTMENT OF  
ELECTRICAL AND ELECTRONICS ENGINEERING

## EMBEDDED CLUB

(Academic Year: 2025 to 2026)



Submitted by  
Mr.S.John Powl  
Assistant Professor  
Faculty Coordinator




## Preface

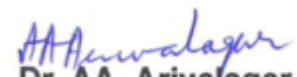
The Embedded Club of the Department of Electrical and Electronics Engineering at Sri Manakula Vinayagar Engineering College functions as a vibrant technical forum established to cultivate innovation, design thinking, and application-oriented competence among students. The club provides a structured academic platform where theoretical foundations are strengthened through systematic technical engagement, collaborative learning, and experiential exposure. Guided by faculty coordinators and actively managed by student office bearers, the club promotes an integrated approach to understanding modern electronic systems from a holistic perspective, emphasizing conceptual clarity, logical reasoning, and structured problem-solving methodologies. It regularly organizes technical discussions, knowledge-sharing sessions, design-oriented activities, interactive workshops, simulation-based explorations, and innovation-driven mini projects to enhance practical insight and analytical capability. The club also encourages interdisciplinary collaboration, teamwork, leadership development, and professional ethics, enabling students to adapt to rapidly evolving technological environments. By fostering creativity, critical thinking, and real-time application perspectives, the Embedded Club plays a significant role in equipping students with industry-relevant competencies, strengthening their technical confidence, and preparing them to become future-ready engineers capable of addressing complex engineering challenges with precision, responsibility, and innovation.




**Faculty Coordinator**  
**Mr.S.John Powl**



**H&D/ EEE**  
**(Dr.P.Jamuna)**



**Dr. AA. Arivalagar**  
**IQAC coordinator**



**Dean Academics**  
**(Dr.S.Abbumalar)**



**Director cum Principal**  
**(Dr.V.S.K.Venkatachalapathy)**

**TABLE OF CONTENTS**

**01 About Institution**

**04 About Club**

**02 Vision & Mission**

**05 Activity Details**

**03 About Department**



## ABOUT THE INSTITUTE

Sri Manakula Vinayaga Educational Trust was founded to provide quality and affordable education to the weaker sections of society. The trust established Sri Manakula Vinayagar Engineering College (SMVEC) in 1999. SMVEC is an autonomous institution affiliated to Pondicherry University. It offers 13 undergraduate, 8 postgraduate and 11 Research programs in engineering. SMVEC has been accredited by NAAC with “A” grade and NBA. The institution is also accredited by TATA consultancy services. The college has a good placement record with students getting job offers from top companies in India and abroad. SMVEC students have won many awards and accolades for their academic achievements. To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

### Vision

- To nurture the cornerstone of excellence in engineering education and drive innovation by seamlessly integrating the fundamentals of Science and Humanities

### Mission

**M1: Quality Education** : To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

**M2: Research and Innovation** : To foster value-based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

**M3: Employability and Entrepreneurship** : To inculcate the employability and entrepreneurial skills through value and skill based training.

**M4: Ethical Values** : To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.



## ABOUT DEPARTMENT

### Vision

To promote proficiency in the field of Electrical and Electronics Engineering by creating a stimulating environment for research, innovation and entrepreneurship

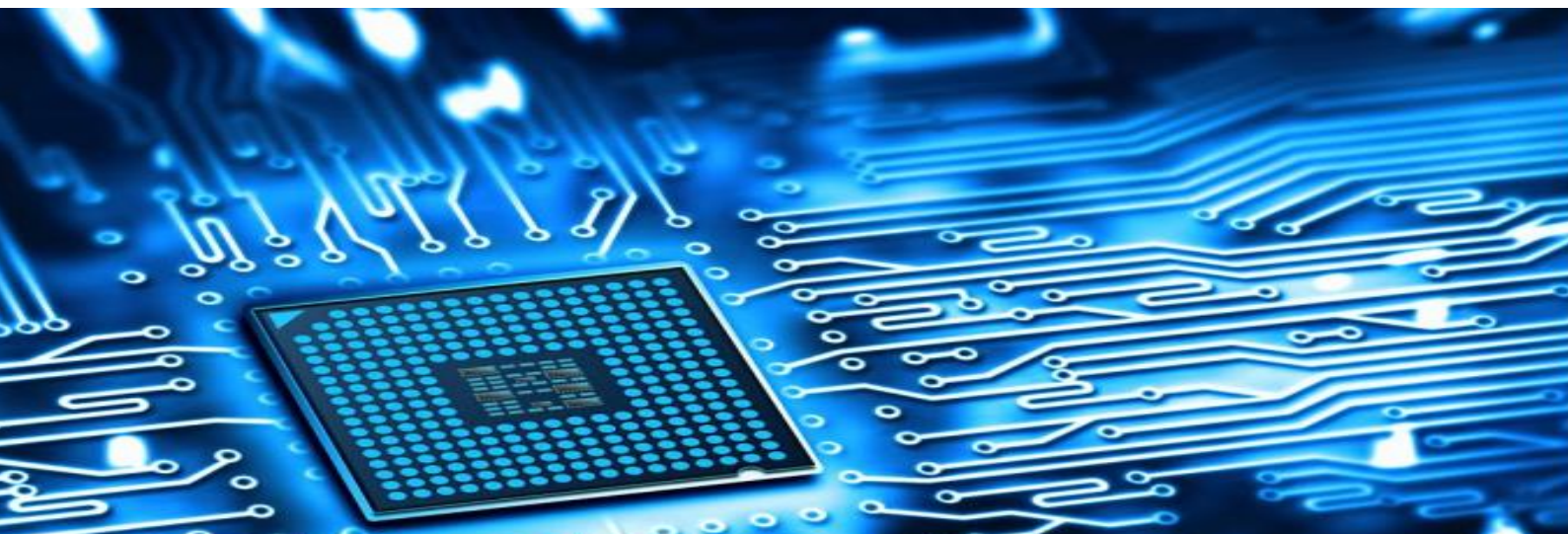
### Mission

**M1: Quality Education:** To impart high quality technical education with problem solving capabilities by innovative pedagogy in emerging technologies.

**M2: Industrial and Societal Needs:** To cater the dynamic needs of the industry and society by strengthening industry-institute interaction.

**M3: Research and Innovation:** To nurture the spirit of research attitude by carrying out innovative technologies pragmatically.

**M4: Placement and Entrepreneurship:** To inculcate the professionalism in career by advancing synergetic skills to compete in the corporate world.



*“Transforming energy into ideas, and ideas into impact.”*

## ABOUT EMBEDDED CLUB

Embedded systems are referred to as control systems tailored for specific applications. Embedded systems are used in many different fields such as automotive, robotics, IoT, AI, ML, biomedical equipment, and instrumentation etc. Looking at its diversity of applications and potential for production of highly innovative products, embedded system can be considered as the primary technology of the present and future.

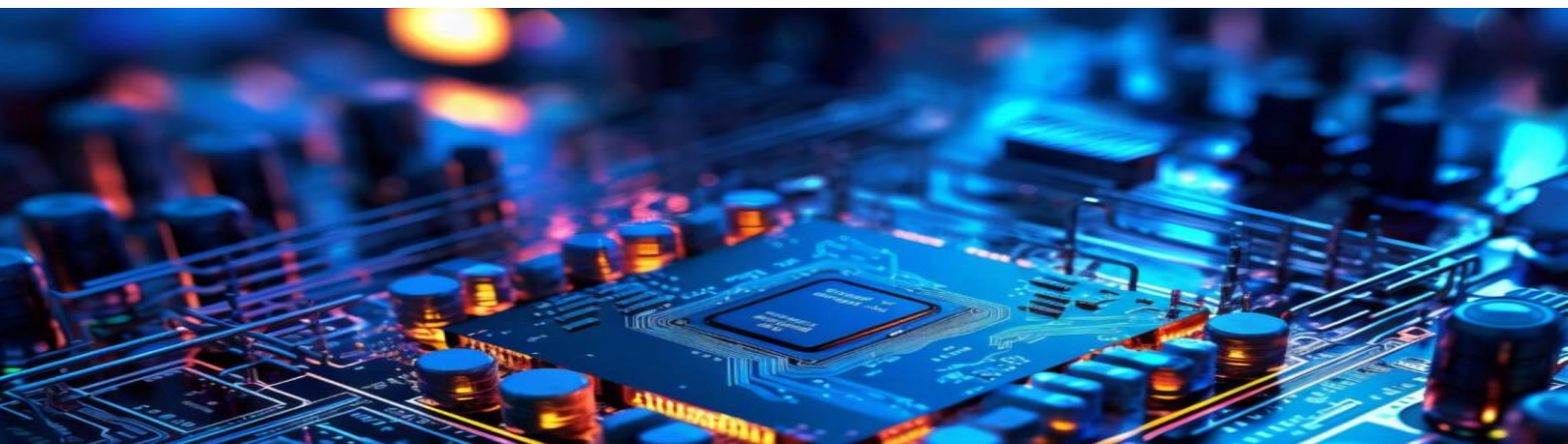
The function of the club is to deal from basics of electronics. This club aims to uncover those key topics that are not part of the curriculum. The club helps the students by integrating their skills in the various fields of engineering and technology to cope up with the highly competitive environment

### Objectives of Engineering Clinic

- To make the students aware of the upcoming embedded system technologies.
- To understand hardware and software design requirements of embedded system.
- To analyze the embedded system specifications and develop software program.
- To create a platform for sharing innovative ideas and to develop mini projects.
- To make students to design real time applications.

### Functions

- Organising Lecture session on embedded systems.
- Conducting frequent weekend contest.
- Weekly Hands-on training sessions.
- Designing of interfacing circuits.
- Conducting Hackathon for the benefit of students.



**"Where circuits connect and innovation flows."**

**Office Bearers and portfolios**

S.No	Name	Position
1.	Mr.S.John Powl Assistant professor/EEE	Staff Coordinator
2.	Mr. K.Thangaraj Assistant professor/EEE	
3.	Mr. Devanadhan	President
4.	Mr. Gowtham	Vice president
5.	Mr. Gunanidhi	Secretary
6.	Mr. Manimurugan	Joint Secretary
7.	Mr. Mohamad farook	Executive Members
8.	Mr. Raja Sabari	Technical Members



Mr.S.john Powl  
Assistant professor/EEE  
Staff Coordinator



Devanadhan  
President



Gowtham  
Vice president



Gunanidhi  
Secretary



ManiMurgan  
Joint Secretar



Mohamad Farook  
Executive Members

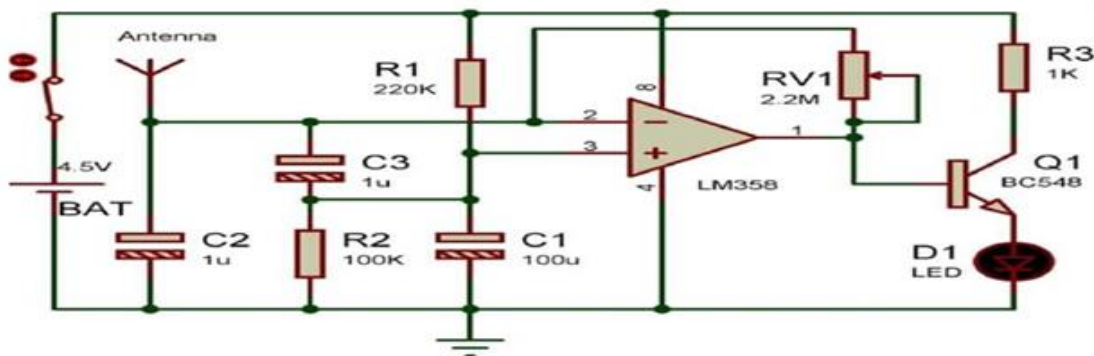
Academic Year	:	<b>2025 – 2026</b>	
Date/Day	:	<b>09.08.2025/Saturday</b>	<b>Year/Sem/Sec: II/III/A ,B</b>
Activity	:	<b>DESIGN OF MOBILE PHONE DETECTOR CIRCUIT</b>	

## INTRODUCTION

- The mobile phone detector circuit is an electronic device designed to sense the presence of an active mobile phone by detecting the electromagnetic signals emitted during communication or data transmission.
- When a mobile phone is used for making or receiving calls, sending messages, or accessing the internet, it generates radio frequency (RF) signals typically in the range of 0.9 GHz to 3 GHz. The detector circuit captures these signals and indicates the phone's activity through visual or audible alerts.
- The circuit is compact, low-cost, and highly sensitive, making it useful in places where mobile phone usage is restricted, such as examination halls, conference rooms, and military areas.
- The design demonstrates the practical application of RF detection techniques using basic electronic components such as capacitors, transistors, and inductors to convert invisible electromagnetic signals into detectable outputs.

## APPLICATIONS:

1. **Examination Halls** – Prevents unfair practices by detecting phone activity.
2. **Confidential Meetings** – Protects sensitive discussions from eavesdropping.
3. **Libraries & Auditoriums** – Maintains silence by warning about active mobile phones.
4. **Secure/Restricted Zones** – Enhances security by identifying unauthorized phone usage.
5. **Hospitals** – Ensures mobile phones don't interfere with sensitive equipment.



## CIRCUIT DIAGRAM OF MOBILE PHONE DETECTOR:

### WORKING OF MOBILE PHONE DETECTOR:

The detector circuit works by using an antenna to pick up electromagnetic signals generated whenever a mobile phone is active nearby. The input signal is filtered and amplified through a combination of passive capacitors (C1, C2, C3) and an operational amplifier (LM358). The amplified signal is then passed through a variable resistor (RV1) that adjusts the sensitivity as required by the application. The resulting output is fed to the base of a transistor (Q1 BC548), which drives an LED (D1) as a visual indicator. When a transmission is detected within the proximity (typically up to 1–2 meters), the LED glows, alerting the presence of a transmitting mobile phone. Power is supplied by a small 4.5V battery, making the system portable and easy to deploy.

### DESIGN CALCULATION:

#### 1. Op-Amp Gain Calculation

The voltage gain ( $A_v$ ) of the amplifier section (using LM358) is primarily set by the ratio of the feedback resistor RV1 (2.2MΩ max) to the input resistor R2 (100kΩ):

$$A_v = 1 + (R_{V1}/R_2)$$

$$\text{If } R_{V1} \text{ is at max, } A_v = 1 + \frac{2.2M\Omega}{100k\Omega} = 23$$

#### 2. Signal Coupling and Filtering

Capacitors C2 (1 µF) and C3 (1 µF) filter unwanted DC offsets and pass only the high-frequency mobile signals (around 900 MHz–1.8 GHz, heavily attenuated to ~kHz for circuit processing).

#### 3. Transistor Switch

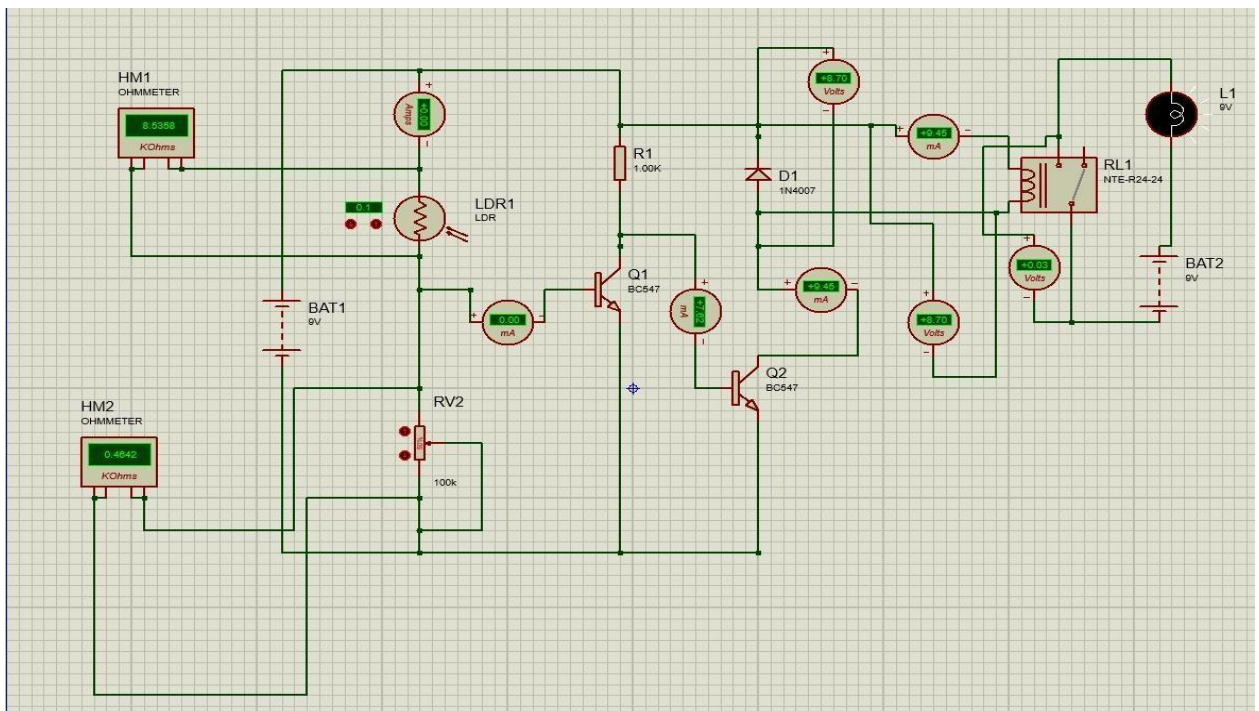
The output current to activate the LED depends on the transistor's gain and the series resistor R3 (1kΩ). For a forward LED voltage of 2V and a supply of 4.5V, current per:

$$I_{LED} = \frac{V_{BAT} - V_{LED}}{R3} = \frac{4.5V - 2V}{1000\Omega} = 2.5 \text{ mA}$$

**COMPONENTS REQUIRED FOR CIRCUIT:**

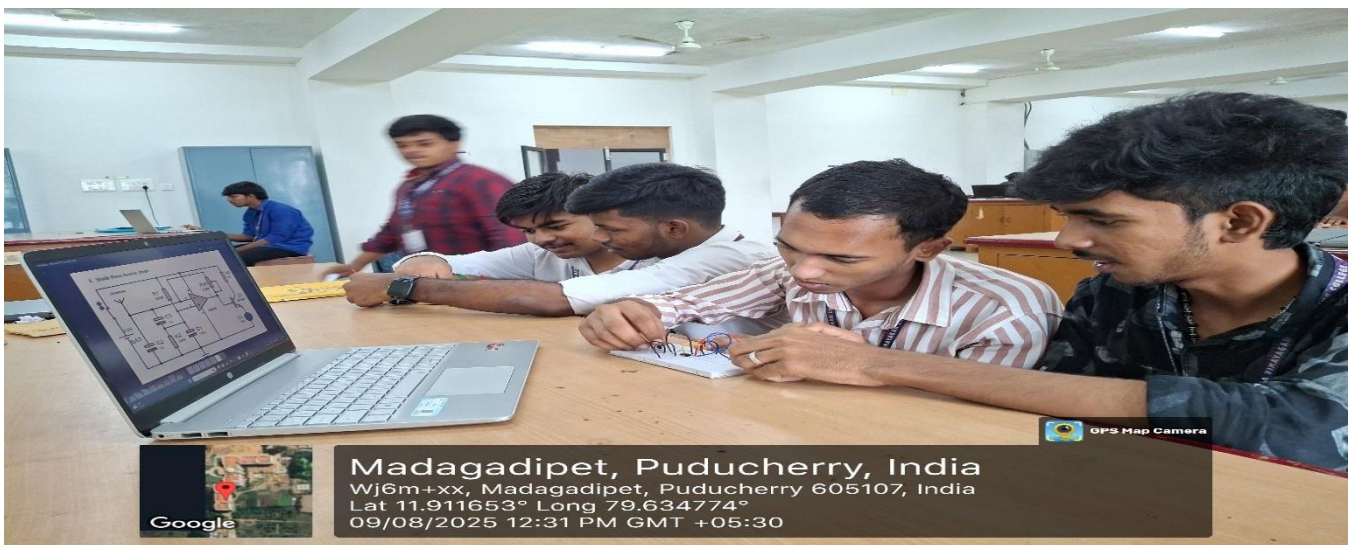
S.No	Components	Specifications	Quantity
1	Antenna	RF Wire	1
2	Resistor	220kΩ, 100kΩ, 1kΩ	1 each
3	Potentiometer	2.2MΩ	1
4	Capacitor	1μF (2), 100μF (1)	3
5	Op-amp	LM358	1
6	Transistor	BC548	1
7	LED	Standard	1
8	Battery	4.5V	1
9	Wires	—	As needed

**SIMULATION DIAGRAM OF MOBILE PHONE DETECTOR:**

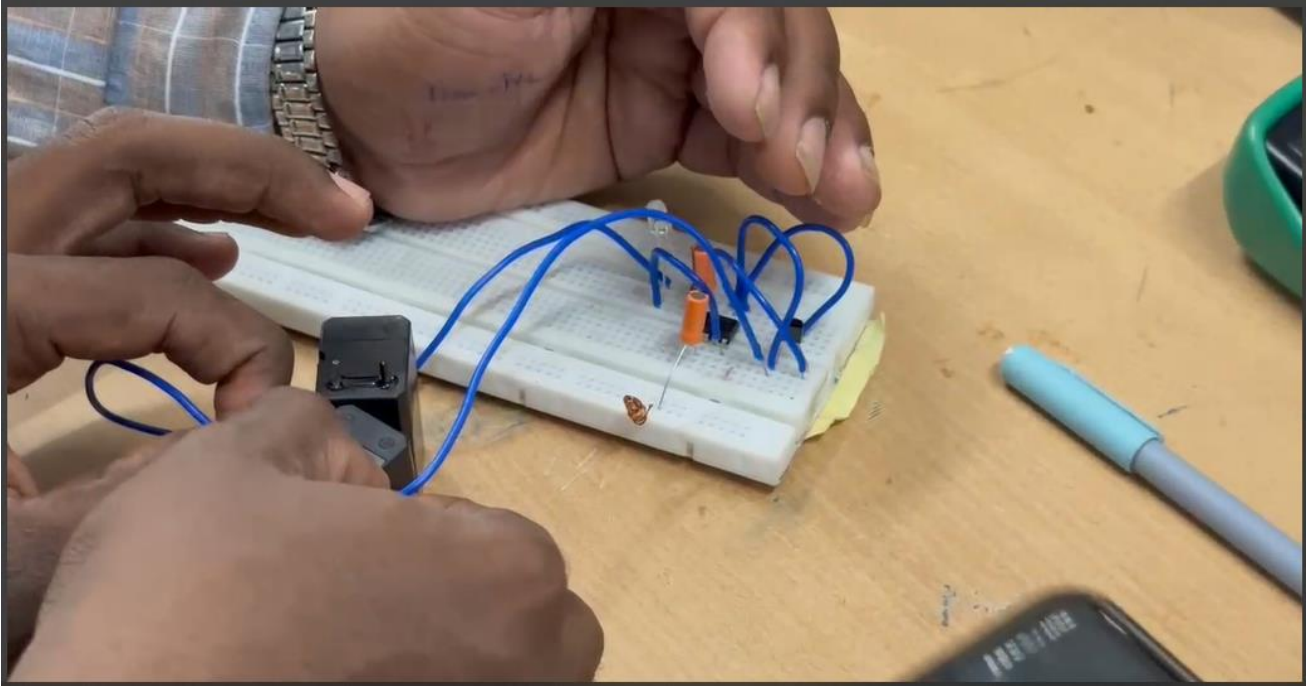


**OUTPUT:**

PARAMETERS	THEORETICAL VALUE	SIMULATION VALUE	PRACTICAL VALUE
Supply Voltage	4.5 V	4.48 V	4.5 V
Standby Current	2 mA	2.1 mA	2.2 mA
LED Current on Detect	2.5 mA	2.3 mA	2.6 mA
Detection Range	1.5 m	1.3 m	1.5 m
Sensitivity (RV1 Max)	High	High	High



When Mobile Phone receives the signal output LED will Glow



When the Mobile Phone not receives the signal output LED will not Glow



# 1N4001-1N4007

## PLASTIC SILICON RECTIFIERS

**VOLTAGE** 50 to 1000 Volts **CURRENT** 1.0 Ampere

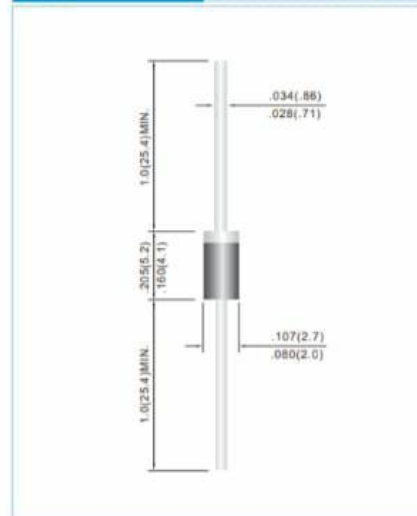
DO-41 Unit: inch(mm)

### FEATURES

- Low forward voltage drop
- High current capability
- High reliability
- High surge current capability
- Exceeds environmental standards of MIL-S-19500/228
- In compliance with EU RoHS 2002/95/EC directives

### MECHANICAL DATA

- Case: DO-41 Molded plastic
- Epoxy: UL 94V-O rate flame retardant.
- Lead: Axial leads, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode end
- Mounting Position: Any
- Weight: 0.012 ounces, 0.30 gram



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified. Single phase, half wave, 60 Hz, resistive or inductive load. For capacitive load, derate current by 20%.

PARAMETER	SYMBOL	1N4001	1N4002	1N4003	1N4004	1N4005	1N4006	1N4007	UNITS
Maximum Recurrent Peak Reverse Voltage	$V_{RRM}$	50	100	200	400	600	800	1000	V
Maximum RMS Voltage	$V_{RMS}$	35	70	140	280	420	560	700	V
Maximum DC Blocking Voltage	$V_{DC}$	50	100	200	400	600	800	1000	V
Maximum Average Forward Current .375"(9.5mm) lead length at $T_a=75^\circ\text{C}$	$I_{F(AV)}$	1.0							A
Peak Forward Surge Current : 8.3ms single half sine-wave superimposed on rated load (JEDEC method)	$I_{FSM}$	30							A
Maximum Forward Voltage at 1.0A	$V_F$	1.1							V
Maximum DC Reverse Current at $T_j=25^\circ\text{C}$ Rated DC Blocking Voltage $T_j=100^\circ\text{C}$	$I_R$	5 50							uA
Typical Junction capacitance (Note 1)	$C_j$	15							pF
Typical Thermal Resistance(Note 2)	$R_{\theta JA}$ $R_{\theta JL}$	50 25							$^\circ\text{C} / \text{W}$
Operating Junction and Storage Temperature Range	$T_j, T_{STG}$	-55 TO +150							$^\circ\text{C}$

### NOTES:

1. Measured at 1 MHz and applied reverse voltage of 4.0 VDC.
2. Thermal Resistance from Junction to Ambient and from junction to lead at 0.375"(9.5mm)lead length P.C.B.mounted.



Micro Commercial Components



Micro Commercial Components  
 20736 Marilla Street Chatsworth  
 CA 91311  
 Phone: (818) 701-4933  
 Fax: (818) 701-4939

**SMAJ4728A  
 THRU  
 SMAJ4764A**

**1 Watt  
 Zener Diode  
 3.3 to 100 Volts**

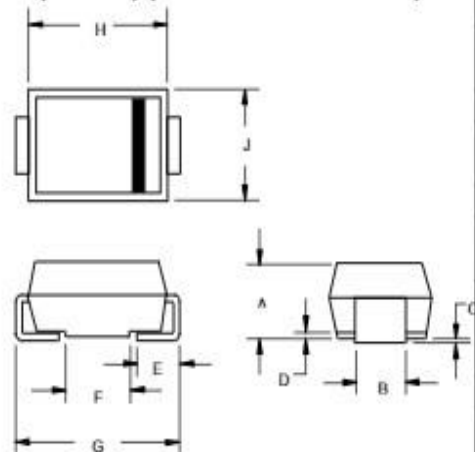
**Features**

- Halogen free available upon request by adding suffix "-HF"
- Low Zener Impedance
- Low Regulation Factor
- $V_z$  - tolerance:  $\pm 5\%$
- For Surface Mount Applications
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- Lead Free Finish/Rohs Compliant (Note1) ("P" Suffix designates Compliant. See ordering information)

**Maximum Ratings@25 °C Unless Otherwise Specified**

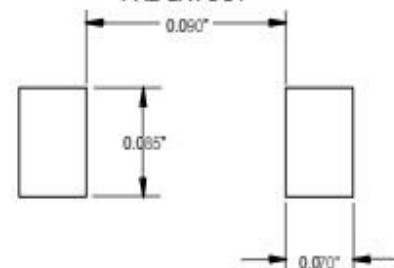
Parameters	Test Conditions	Symbol	Value	Unit
Power Dissipation	$T_{amb} \leq 50^\circ C$	$P_d$	1	W
Z-Current		$I_z$	$P_d/V_z$	mA
Operating Junction Temperature		$T_j$	-65~+150	°C
Storage Temperature		$T_{stg}$	-65~+150	°C
Thermal Resistance	FR-4 Board, MCC's	$R\theta_{ja}$	100	K/W
	Suggested Solder Pad	$R\theta_{jL}$	75	
Max. Forward Voltage Drop	$I_F=100mA$	$V_f$	1.2	V

**DO-214AC  
 (SMA)(LEAD FRAME)**



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.079	.096	2.00	2.44	
B	.050	.064	1.27	1.63	
C	.002	.008	.05	.20	
D	—	.02	—	.51	
E	.030	.060	.76	1.52	
F	.065	.091	1.65	2.32	
G	.189	.220	4.80	5.59	
H	.157	.181	4.00	4.60	
J	.090	.115	2.25	2.92	

**SUGGESTED SOLDER PAD LAYOUT**



Note: 1. High Temperature Solder Exemptions Applied, see EU Directive Annex 7.

**ELECTRICAL CHARACTERISTICS @25°C**

Micro Commercial Components

MCC PART NUMBER	ZENER VOLTAGE $V_z$	TEST CURRENT $I_{zT}$	MAXIMUM DYNAMIC IMPEDANCE $Z_{zT} @ I_{zT}$	MAXIMUM REVERSE CURRENT $I_R$	REVERSE VOLTAGE $V_R$	KNEE IMPEDANCE $Z_{zK}$	KNEE CURRENT $I_{zK}$	DEVICE MARKING
	VOLTS	mA	OHMS	$\mu$ A	VOLTS	OHMS	mA	
SMAJ4728A	3.3	76	10	100	1	400	1	728A
SMAJ4729A	3.6	69	10	100	1	400	1	729A
SMAJ4730A	3.9	64	9	50	1	400	1	730A
SMAJ4731A	4.3	58	9	10	1	400	1	731A
SMAJ4732A	4.7	53	8	10	1	500	1	732A
SMAJ4733A	5.1	49	7	10	1	550	1	733A
SMAJ4734A	5.6	45	5	10	2	600	1	734A
SMAJ4735A	6.2	41	2	10	3	700	1	735A
SMAJ4736A	6.8	37	3.5	10	4	700	1	736A
SMAJ4737A	7.5	34	4	10	5	700	0.5	737A
SMAJ4738A	8.2	31	4.5	10	6	700	0.5	738A
SMAJ4739A	9.1	28	5	10	7	700	0.5	739A
SMAJ4740A	10	25	7	10	7.6	700	0.25	740A
SMAJ4741A	11	23	8	5	8.4	700	0.25	741A
SMAJ4742A	12	21	9	5	9.1	700	0.25	742A
SMAJ4743A	13	19	10	5	9.9	700	0.25	743A
SMAJ4744A	15	17	14	5	11.4	700	0.25	744A
SMAJ4745A	16	15.5	16	5	12.2	700	0.25	745A
SMAJ4746A	18	14	20	5	13.7	750	0.25	746A
SMAJ4747A	20	12.5	22	5	15.2	750	0.25	747A
SMAJ4748A	22	11.5	23	5	16.7	750	0.25	748A
SMAJ4749A	24	10.5	25	5	18.2	750	0.25	749A
SMAJ4750A	27	9.5	35	5	20.6	750	0.25	750A
SMAJ4751A	30	8.5	40	5	22.8	1000	0.25	751A
SMAJ4752A	33	7.5	45	5	25.1	1000	0.25	752A
SMAJ4753A	36	7	50	5	27.4	1000	0.25	753A
SMAJ4754A	39	6.5	60	5	29.7	1000	0.25	754A
SMAJ4755A	43	6	70	5	32.7	1500	0.25	755A
SMAJ4756A	47	5.5	80	5	35.8	1500	0.25	756A
SMAJ4757A	51	5	95	5	38.8	1500	0.25	757A
SMAJ4758A	56	4.5	110	5	42.6	2000	0.25	758A
SMAJ4759A	62	4	125	5	47.1	2000	0.25	759A
SMAJ4760A	68	3.7	150	5	51.7	2000	0.25	760A
SMAJ4761A	75	3.3	175	5	56	2000	0.25	761A
SMAJ4762A	82	3	200	5	62.2	3000	0.25	762A
SMAJ4763A	91	2.8	250	5	69.2	3000	0.25	763A
SMAJ4764A	100	2.5	350	5	76	3000	0.25	764A



April 2014

## BC546 / BC547 / BC548 / BC549 / BC550 NPN Epitaxial Silicon Transistor

### Features

- Switching and Amplifier
- High-Voltage: BC546,  $V_{CE0} = 65\text{ V}$
- Low-Noise: BC549, BC550
- Complement to BC556, BC557, BC558, BC559, and BC560



### Ordering Information

Part Number	Marking	Package	Packing Method
BC546ABU	BC546A	TO-92 3L	Bulk
BC546ATA	BC546A	TO-92 3L	Ammo
BC546BTA	BC546B	TO-92 3L	Ammo
BC546BTF	BC546B	TO-92 3L	Tape and Reel
BC546CTA	BC546C	TO-92 3L	Ammo
BC547ATA	BC547A	TO-92 3L	Ammo
BC547B	BC547B	TO-92 3L	Bulk
BC547BBU	BC547B	TO-92 3L	Bulk
BC547BTA	BC547B	TO-92 3L	Ammo
BC547BTF	BC547B	TO-92 3L	Tape and Reel
BC547CBU	BC547C	TO-92 3L	Bulk
BC547CTA	BC547C	TO-92 3L	Ammo
BC547CTFR	BC547C	TO-92 3L	Tape and Reel
BC548BU	BC548	TO-92 3L	Bulk
BC548BTA	BC548B	TO-92 3L	Ammo
BC548CTA	BC548C	TO-92 3L	Ammo
BC549BTA	BC549B	TO-92 3L	Ammo
BC549BTF	BC549B	TO-92 3L	Tape and Reel
BC549CTA	BC549C	TO-92 3L	Ammo
BC550CBU	BC550C	TO-92 3L	Bulk
BC550CTA	BC550C	TO-92 3L	Ammo

BC546 / BC547 / BC548 / BC549 / BC550 — NPN Epitaxial Silicon Transistor

### Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage	BC546	80
		BC547 / BC550	50
		BC548 / BC549	30
$V_{CEO}$	Collector-Emitter Voltage	BC546	65
		BC547 / BC550	45
		BC548 / BC549	30
$V_{EBO}$	Emitter-Base Voltage	BC546 / BC547	6
		BC548 / BC549 / BC550	5
$I_C$	Collector Current (DC)	100	mA
$P_C$	Collector Power Dissipation	500	mW
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-65 to +150	$^\circ\text{C}$

### Electrical Characteristics

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector Cut-Off Current	$V_{CB} = 30\text{ V}, I_E = 0$			15	nA
$h_{FE}$	DC Current Gain	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}$	110		800	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 10\text{ mA}, I_B = 0.5\text{ mA}$		90	250	mV
		$I_C = 100\text{ mA}, I_B = 5\text{ mA}$		250	600	
$V_{BE(sat)}$	Collector-Base Saturation Voltage	$I_C = 10\text{ mA}, I_B = 0.5\text{ mA}$		700		mV
		$I_C = 100\text{ mA}, I_B = 5\text{ mA}$		900		
$V_{BE(on)}$	Base-Emitter On Voltage	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}$	580	660	700	mV
		$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$			720	
$f_T$	Current Gain Bandwidth Product	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}, f = 100\text{ MHz}$		300		MHz
$C_{ob}$	Output Capacitance	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$		3.5	6.0	pF
$C_{ib}$	Input Capacitance	$V_{EB} = 0.5\text{ V}, I_C = 0, f = 1\text{ MHz}$		9		pF
NF	Noise Figure	BC546 / BC547 / BC548	$V_{CE} = 5\text{ V}, I_C = 200\text{ }\mu\text{A}, f = 1\text{ kHz}, R_G = 2\text{ k}\Omega$	2	10	dB
		BC549 / BC550		1.2	4.0	
		BC549		1.4	4.0	
		BC550		1.4	3.0	

### $h_{FE}$ Classification

Classification	A	B	C
$h_{FE}$	110 ~ 220	200 ~ 450	420 ~ 800

