



2027 IEEE EMC SOCIETY STUDENT HARDWARE DESIGN COMPETITION

(Sponsored by Education committee)

CELEBRATING
THE
70th
ANNIVERSARY
OF THE
EMC SOCIETY

Characterize the EMC of a Working Gadget: Find the Path **INSPIRE - MEASURE - MITIGATE**



The IEEE Electromagnetic Compatibility (EMC) Society invites student teams to participate in the 2027 Student Hardware Design Competition. Building on the inaugural competition, the 2027 challenge continues the open-ended **Inspire - Measure - Mitigate** approach while adding a new technical emphasis: **Find the Path**.

Students will investigate the EMC behavior of a working electronic device, identify significant electromagnetic phenomena, determine the likely source and coupling mechanism responsible for at least one observed EMC issue, and experimentally demonstrate that their explanation is correct. Teams will then implement and verify a mitigation strategy. The goal is not simply to find electromagnetic noise. It is to understand **where it comes from, how it couples, and what can be done about it**.

THE CHALLENGE

Each team will select or construct a working electronic “gadget” that performs a clearly defined function. Examples might include a microcontroller-based sensor system, LED display or lighting system, motor controller, wireless device, or other small embedded electronic system. Teams are encouraged to choose their own working electronic gadget. The choice of device is intentionally open-ended and is part of the challenge.

TEAMS WILL:

1. INSPIRE - EXPLORE/DEVELOP THE SYSTEM

Select/develop a working electronic system and develop an experimental plan for investigating its EMC characteristics.

2. MEASURE - DISCOVER SIGNIFICANT EMC BEHAVIOR

Measure and characterize significant emissions or coupling phenomena associated with operation of the device. Teams should identify features in the measured data that warrant further investigation rather than simply producing a broadband spectrum.

3. FIND THE PATH - EXPLAIN WHAT IS HAPPENING

Select at least one significant EMC phenomenon and develop a technically supported explanation of its dominant **source** → **coupling path** → **radiator/receptor mechanism**. Teams must experimentally test their hypothesis. Examples might include near-field probing, cable-current measurements, operating-mode comparisons, component substitution, cable removal or repositioning, or other controlled experiments.

4. MITIGATE - MAKE IT BETTER

Implement at least one engineering modification intended to reduce the identified EMC problem while preserving the intended function of the gadget. Teams must measure the system before and after mitigation and quantitatively demonstrate the effect of the modification.



FREQUENCY RANGE

To maintain accessibility while encouraging meaningful EMC investigation, the primary competition frequency range will be **100 MHz to 1 GHz**.

Where appropriate to the selected gadget and available instrumentation, teams are encouraged to investigate behavior in the **2.4 GHz ISM region** as an optional extension. Investigation at 2.4 GHz is **not required** and the use of higher-frequency or laboratory-grade instrumentation will not, by itself, result in a higher score.

ELIGIBILITY

The team must consist of 2 to 5 students, and at least 50% of the team members must be undergraduate students by the end of July 2027. For a 5-year Bachelor-cum-Master degree program, students in years 1 to 3 are considered undergraduates.

Each team should be advised by one professional mentor who is a member of the IEEE EMC-S, but the work needs to be done primarily by the students.

No student or mentor should be involved in more than one team. To encourage participation across institutions, **no more than two teams per institution** may enter the competition.

THE GOAL

The EMC Student Hardware Design Competition is intended to provide students with the opportunity to experience EMC as practicing engineers do:

Observe something interesting. Measure it. Ask why. Find the path. Change something. Measure again.

The objective is not simply to produce the quietest gadget or the most sophisticated measurement system. The objective is to demonstrate **understanding through experiment**.



DEADLINES

MILESTONE	DEADLINE
Team Registration and Initial Abstract (≤ 1 page)	December 1, 2026
Preliminary Report (≤ 3 pages) – test plan, setup photos, early data	March 12, 2027
Final Submission (By invitation only) – Technical report (≤ 5 pages) describing objectives, setup, measurements, data, and conclusions and a 3-minute video showing the device, measurement process, and key results	June 13, 2027
Live Demonstrations & Judging at IEEE EMC+SIPI Symposium (Poster or PPT presentation, remote/hybrid)	July 13, 2027

READ THE RULES, ELIGIBILITY, AND FULL COMPETITION REQUIREMENTS ON THE EMC+SIPI SYMPOSIUM WEBSITE

2027.emcsipi.org/programs/student-hardware-competition

