



POWER ELECTRONICS

PROJECTS

PROJECT 1: DC POWER SUPPLY SYSTEM

1. Single-phase high-power factor rectifier
2. Multiple-output flyback regulator
3. Interleaved buck regulator

PROJECT 2: UNINTERRUPTIBLE POWER SUPPLY SYSTEM

1. Three-phase high-power-factor rectifier
2. Battery charger
3. Three-phase inverter

PROJECT 3: GRID-CONNECTED PHOTOVOLTAIC SYSTEM

1. MPPT boost converter
2. Three-phase inverter: DC-link control
3. Three-phase inverter: grid current control

PROJECT 4: ENERGY MANAGEMENT IN ELECTRICAL MICROGRIDS

1. Normal AC power without renewable energy production (distribution network – no microgrid)
2. Normal AC power with renewable energy production (microgrid in grid-connected mode)
3. Faulty AC power with renewable energy production (microgrid in islanded mode)

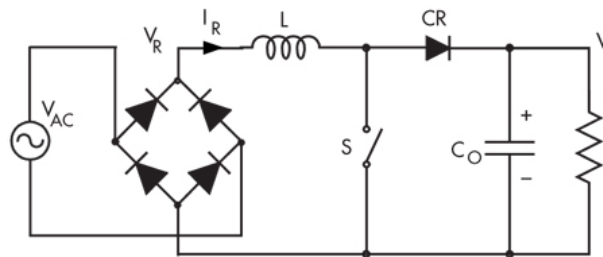
PROJECT 1: DC POWER SUPPLY SYSTEM

1. Single-phase high-power factor rectifier
2. Multiple-output flyback regulator
3. Interleaved buck regulator



230 Vrms

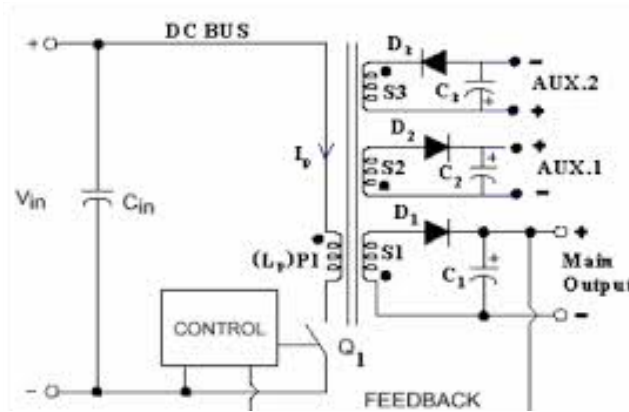
50 Hz



450 V

150 W

450 V

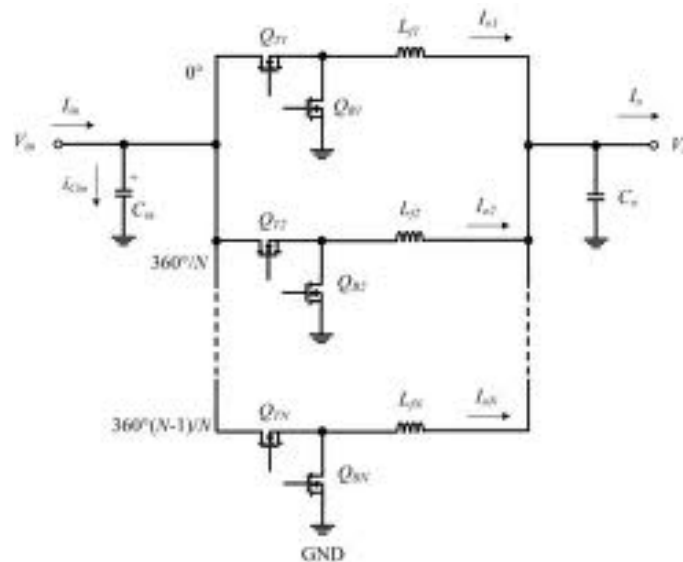


- 5V
25 W

5 V
25 W

12 V
100 W

12 V

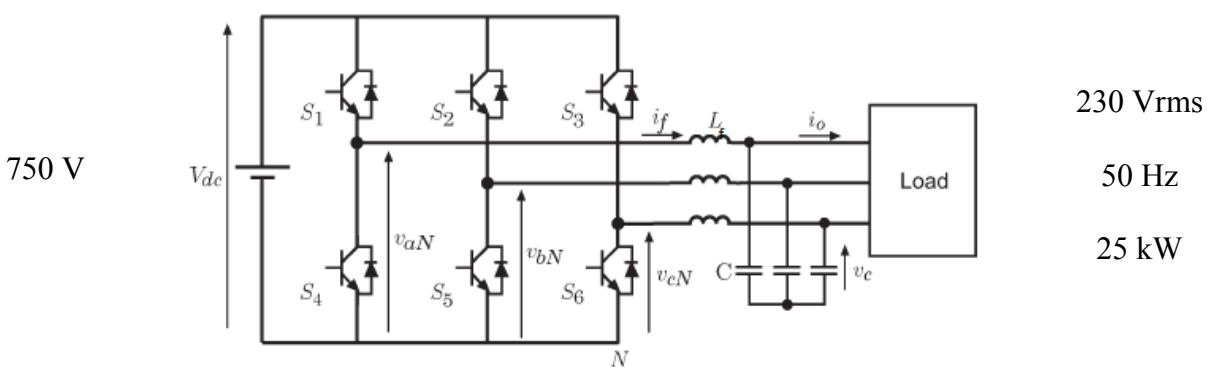
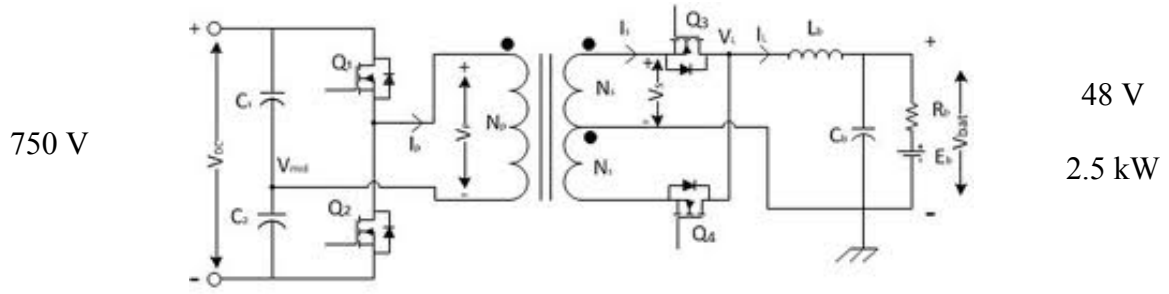
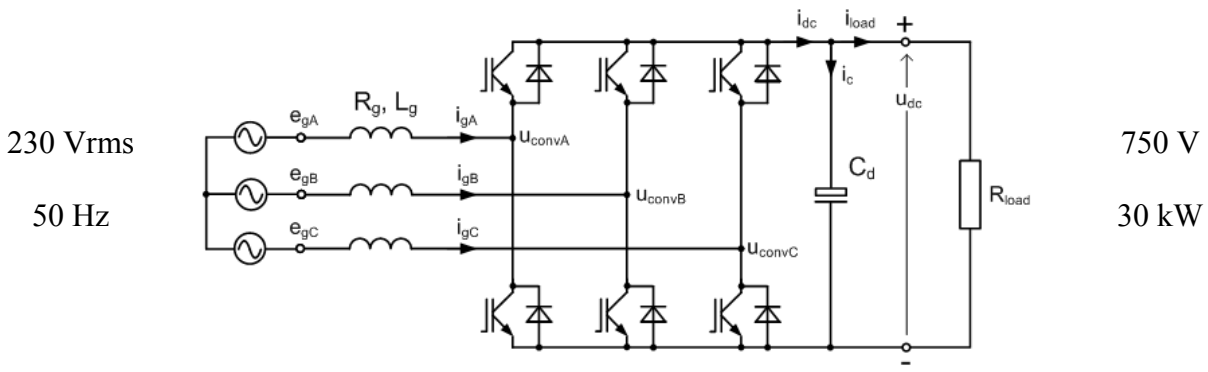
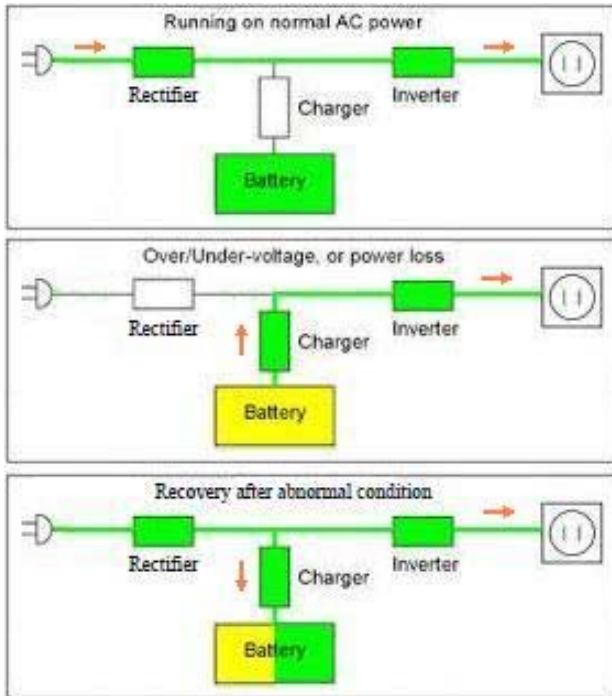


1 V

100 W

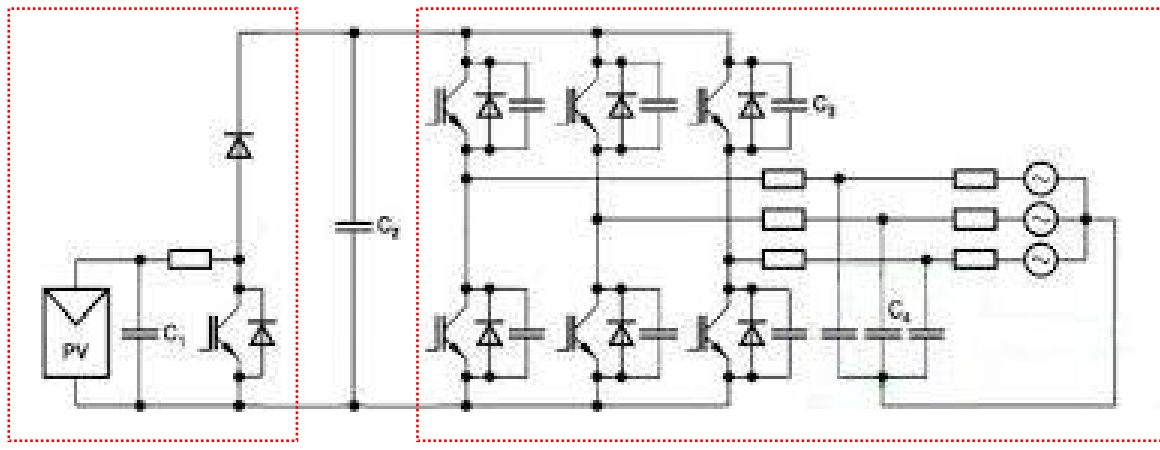
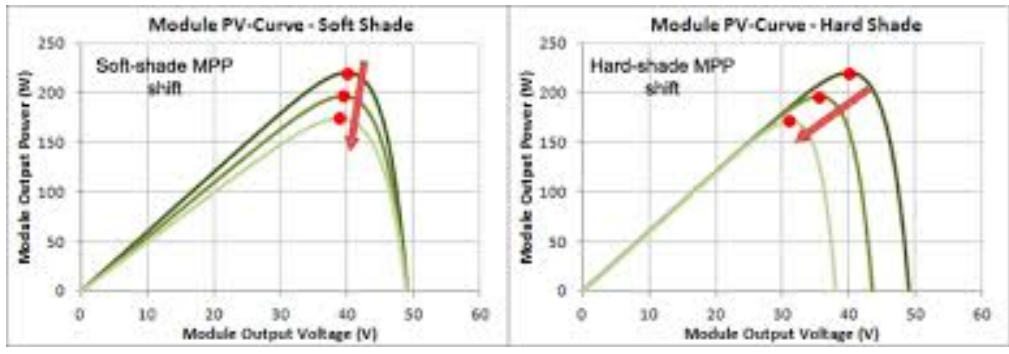
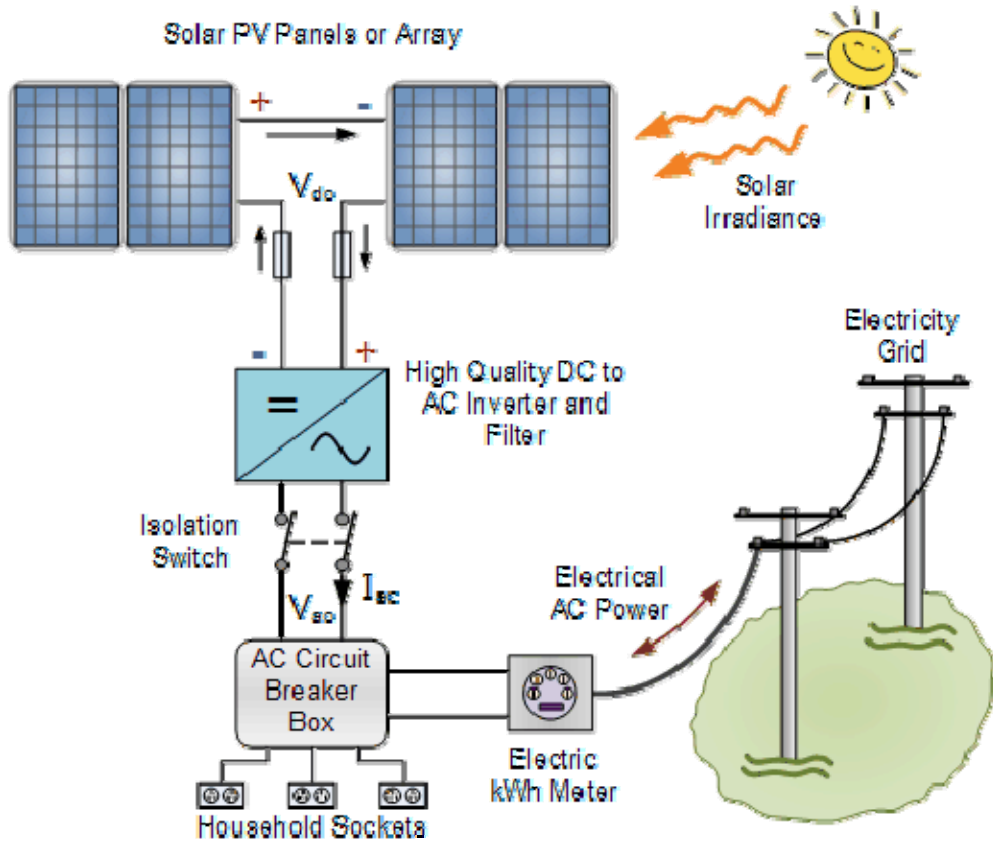
PROJECT 2: UNINTERRUPTIBLE POWER SUPPLY SYSTEM

1. Three-phase high-power-factor rectifier
2. Battery charger
3. Three-phase inverter



PROJECT 3: GRID-CONNECTED PHOTOVOLTAIC SYSTEM

1. MPPT boost converter
2. Three-phase inverter: DC-link control
3. Three-phase inverter: grid current control



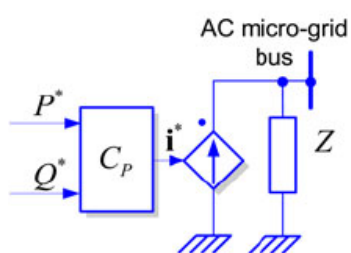
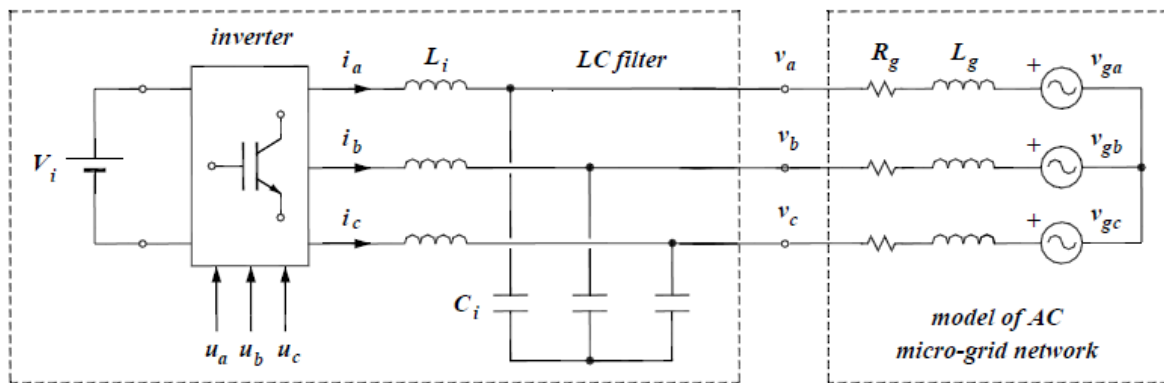
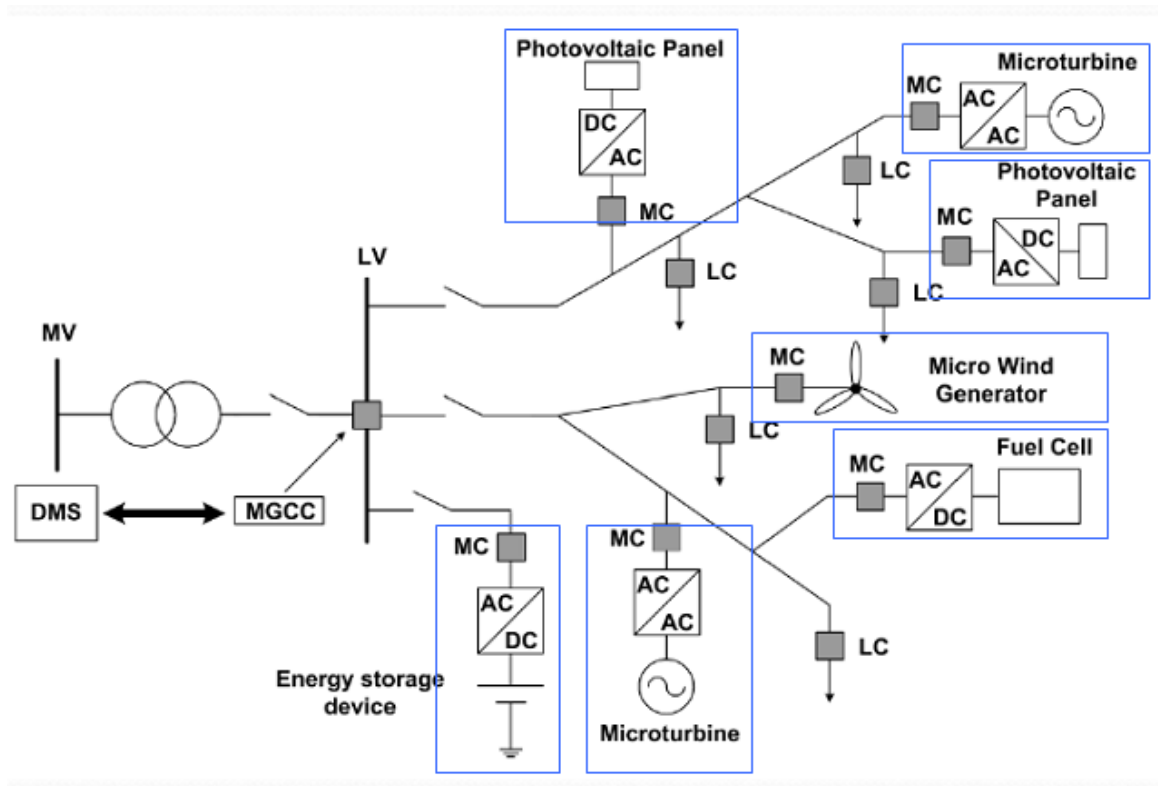
192 V

750 V

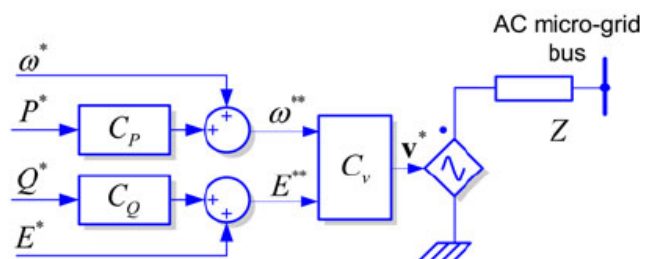
230 Vrms, 50 Hz
10 kW, 3 kVAr

PROJECT 4: ENERGY MANAGEMENT IN ELECTRICAL MICROGRIDS

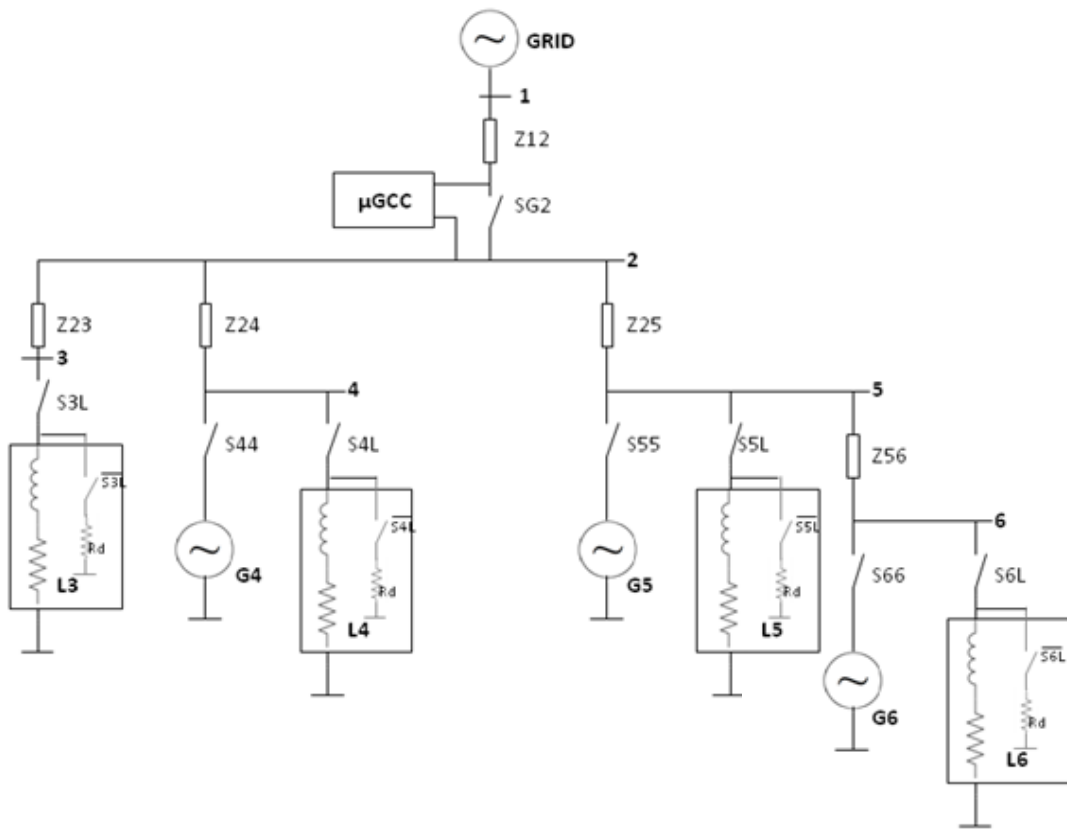
1. Normal AC power without renewable energy production (distribution network – no microgrid)
2. Normal AC power with renewable energy production (microgrid in grid-connected mode)
3. Faulty AC power with renewable energy production (microgrid in islanded mode)



Grid-feeding power converter



Grid-forming power converter



GRID: 230 Vrms, 50 Hz

LOADS	P [kW]	Q [kVAr]
L3	440	0
L4	500	340
L5	240	180
L6	414	280

IMPEDANCES	R [mΩ]	L [μH]
Z12	3.0	14.7
Z23	2.9	46.7
Z24	7.8	50.1
Z25	1.3	28.0
Z56	8.9	13.0

LOAD DISCHARGE CIRCUIT: $R_d = 1 \Omega$