EMCU Component Stress Analysis

•All EMCU components are being evaluated to insure that manufacturer absolute maximum ratings are not exceeded for: voltage, current, power, and temperature, where applicable.
•Moog Electronics Management Plan specifies SD-18 (*Naval Part Requirement & Application Guide*).
–For COTS IC's, SD-18 Guideline "Normal Environ" category has been used to account for lack of specification for using COTS parts in "Severe Environ".
–"Severe Environ" determines EMCU component derating levels, defined as: uninhabited environments, varying temperature extremes (-55 ˚C to +125 ˚C), medium to high shock & pressure, >10yr storage life, 10yr to 20yr application life.

Stress Derating Criteria

Connector (per RAC derating) :
–Pin Current = 70% of Imax
–Pin-Pin Voltage = 70% of Vmax
–Temp = Tmax - 50˚C
Capacitors:
•Film
• Voltage = 55% of Vmax
• Temp = Tmax - 10˚C
•Ceramic
• Voltage = 60% of Vmax
• Temp = Tmax - 10˚C
•Tantalum
• Voltage = 60% of (Vmax @ temp)
• Temp = Tmax - 10˚C
Resistors (Low Power) :
•Film
• Power = 70% of (Pmax @ temp)
• Voltage = 70% of Vmax
•Wirewound (high power)
• Power = 55% of (Pmax @ temp)
• Voltage = 70% of Vmax

Magnetics:

- Transformer
  - I = 80% of Ipk
  - V = 80% of Vmax
  - Temp (hot spot) = Tmax -30˚C
- Inductor
  - I = 80% of Ipk
  - V = 80% of Vmax
  - Temp (hot spot) = Tmax -30˚C

Discrete Semiconductors

(assume SD-18 “Normal” Environment)

- Rectifier
  - Junction Temp = Tjmax - 40˚C
  - If = 85% of Imax
  - Reverse Voltage = 75% of Vmax
- Zener
  - Junction Temp = Tjmax -40˚C
  - Power Dissipation = 80% of Pmax
- Transient Suppressor
  - Junction Temp = Tjmax -40˚C
  - Power Dissipation = 80% of Pmax
- Bipolar Transistor
  - Junction Temp = Tjmax -40˚C
  - VCE = 75% VCEmax
- MOSFET
  - Junction Temp = Tjmax -40˚C
  - Vds = 75% of Vdsmax

Integrated Circuits

(assume SD-18 “Normal” Environment) :

- Linear IC’s
  - Junction Temp = Tjmax -40˚C
  - Vmin < Vsup < Vmax
- Digital IC’s
  - Junction Temp = Tjmax -40˚C
  - Vmin < Vsup < Vmax