



SEGR test in Catania

Mauro Menichelli

AMS Electronics Meeting

Geneva



MOSFET Tested I

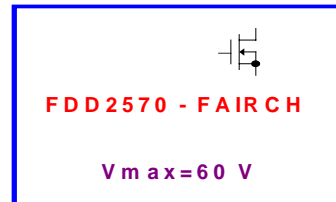
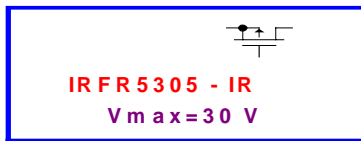
- FDD2570 max 60V
- IRFR18N15D max 60V
- IRFR5305 (P-Channel) max 28V
- SUB60N06 max 15V
- IRF3205 max 15V
- MTD20N06 max 15V

MOSFET tested II

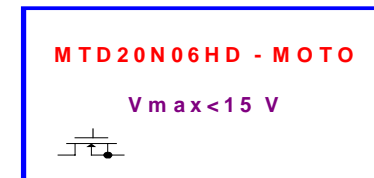
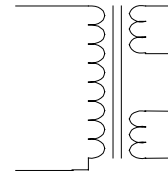
S9048 - S9051 - S9052 - S9057 - S9055 - S9056

Max. working voltage

SSF_MOSFET



SWITCHING_MOSFET



SEMI SYNCHRONOUS
RECTIFIER_MOSFET*

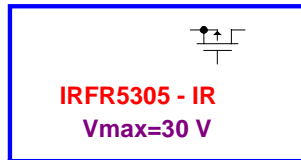
* NOT PRESENT FOR S9052,S9055 and S9056 - ONLY DIODES

MOSFET tested III

S9053 - S9054

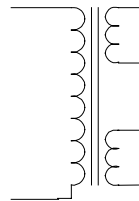
Max. working voltage

SSF_MOSFET



FDD2570 - FAIRCH
Vmax=60 V

SWITCHING_MOSFET



SUB60N06-18 -
SILICONIX

Vmax<20 V



SEMI SYNCHRONOUS
RECTIFIER_MOSFET*

IRF3205S - IR

Vmax<10 V

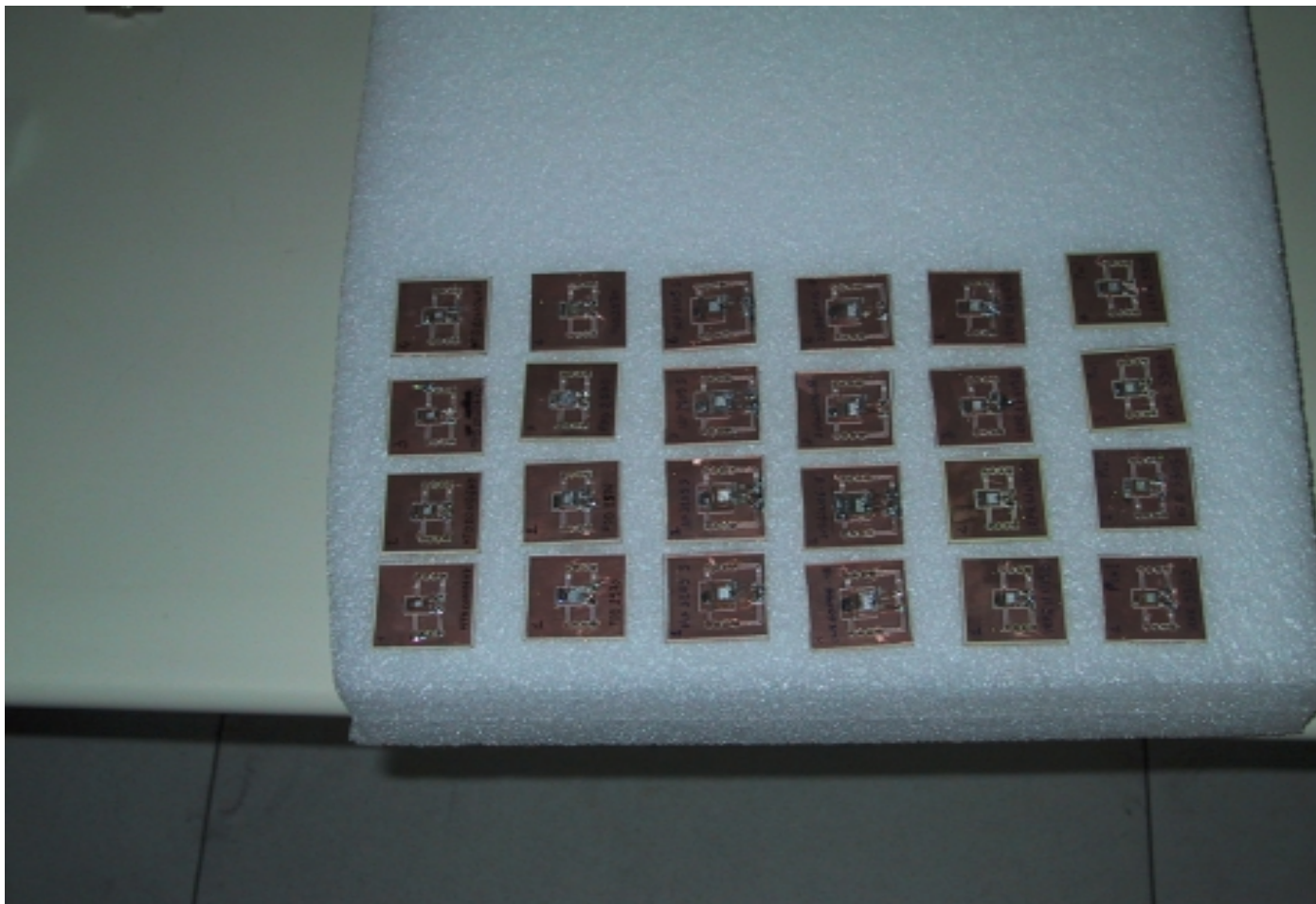


OR_MOSFET

Beam line



Samples before test



Team



Device Under test





Beam parameters I

- We used Kr94 at 25 MeV* nucleon with a beam spot of about 2 x 3 cm²
- We changed LET by changing the distance in air attenuating the ion We made the test at:
 - 12 cm (LET= 26.4 MeV/(mg/cm²))
 - 20 cm (LET= 30.2 MeV/(mg/cm²))
 - 30 cm (LET= 38.7 MeV/(mg/cm²))



Beam Parameters II

- Except for the first few runs we used a fluence of 5×10^5 ions/(cm² s) for 60 seconds for a total flux of 3×10^7 ions/cm².



FDD2570

- At $26.4 \text{ MeV}/(\text{mg}/\text{cm}^2)$ it broke at 70V after 12 s
- At $30.2 \text{ MeV}/(\text{mg}/\text{cm}^2)$ it broke at 70V
- Suppose to work at maximum 60V



IRFR18N15D

- At 26.4 MeV/(mg/cm²) did not break up to 70V
- At 30.2 MeV/(mg/cm²) 2 samples broke at 70V one sample did not
- At 38.7 MeV/(mg/cm²) the sample which did not break at 30.2 did not break at 70V



IRFR5305

- This component was never broken up to 55V at any LET.



MTD20N06

- At 26.4 MeV/(mg/cm²) broke at 50V after 30s
- At 30.2 MeV/(mg/cm²) broke at 64V
- At 38.7 MeV/(mg/cm²) broke at 50V after 10s



SUB60N06

- At 26.4 MeV/(mg/cm²) did not break up to 30V
- At 30.2 MeV/(mg/cm²) broke at 35V
- At 38.7 MeV/(mg/cm²) broke at 30V after 35s



IRF3205

- At 26.4 MeV/(mg/cm²) it broke at 38V
- At 30.2 MeV/(mg/cm²) it broke at 38V
- At 38.7 MeV/(mg/cm²) it broke at 35V after 38s



Conclusions

- All MOSFETs could resist up to 38.7 MeV/(mg/cm²) at Voltages higher then their maximum operating Voltage
- The two components which were broken close to their maximum operating voltages (i.e. The two swtching MOSFETs FDD2570 and IRFR18N15D) work at maximum voltage only on transients