

## Workgroup: Solid State Power Amplifier - Outlook



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## Present Solid State Technology Status

### Transistor Technology versus Maximum Power

Technology	Maximum Power (W)	Frequency (MHz)	Application
Bipolar	1500	1000	Pulsed
Bipolar	200	250	CW
VDMOS	700	300	Pulsed
VDMOS	400	300	CW
LDMOS	1000	450	Pulsed
LDMOS	500	500	CW

## Present Solid State Technology Status

### Transistor Survey

Part Number	Frequency (MHz)	Vdd (V)	Output Power (W)	Gain (dB)	Efficiency (%)	Remarks
MRF6P3300H	470-860	32	300	20	45	Push-pull
MRF6V2300NB	10-600	50	300	25.5	68	Push-pull, Plastic Package
MRF6V2600NB	10-250	50	600	25.8	29	Push-pull, Plastic Package, Pulsed
MRF6VP41KH	450	50	1000	20	64	Pulsed, 100us
BLF369	500	32	500	20	60	Push-pull
BLF872	470-860	32	300	16.5	55	Push-pull
BLF574	170-230	50	400	28	45	Push-pull
BLF878	470-860	42	300	18	45	Push-pull
IDM50DCW300	500	28	330		68	Single Bipolar
IB1011S1500	1030	60	1620	9.84	53.5	Single Bipolar, Pulsed, 10us, 1%
SD3932	250	100	400	28.8	66	Push-pull, MOS

## Present Solid State Amplifier Status

### • Amplifier Topology:

Topology	Advantages	Disadvantages
Push-Pull	Cancels 2 <sup>nd</sup> Harmonic Power handling is splitted into 2 transistors May reach higher power	Needs Baluns (more area needed)
Single-Ended	May have better Efficiency Needs less area (smaller)	Doesn't cancel 2 <sup>nd</sup> Harmonic

### • Amplifier Bandwidth:

Topology	Advantages	Disadvantages	Remarks
Narrowband	Lower harmonic composition Better efficiency Higher Gain Simple design Cheaper May have circulator	Limited to single frequency application	Better adapted to accelerator applications
Broadband	May be used in different frequencies	More expensive Lower efficiency Lower gain More expensive No circulator available	Better adapted to comercial broadcast applications

## Present Solid State Amplifier Status

### • Amplifier Power Supply:

Topology	Advantages	Disadvantages
Switch-mode DC_DC converter	Compact Cheaper High efficiency Auxiliary power supply for monitoring	Needs transformer plus rectifier or voltage stabilizer
Switch-mode AC_DC converter	Compact High efficiency Doesn't require transformer plus rectifier	A bit more expensive than DC-DC converter No auxiliary power supply output available

### • Power Combining/Sppliting Schemes:

Topology	Advantages	Disadvantages
Coaxial Combiner	Compact Low Losses	Bigger size for low frequencies
Microstrip Combiner/Sppliter	Very Compact Cheaper	Cannot handle very high powers High Losses
Cavity Combiner	Compact Low Losses	Bigger size for low frequencies More Complex Design
Radial Combiner	Similar to Coax Low Loss Larger number of channels possible	Bigger size for low frequencies More complex Design

## Conclusions

- Transistor technology is in continuous development in contrast with vacuum tube technology.
- Larger and larger single transistor output power is becoming available.
- Expected continuous decrease in Price/Watt and Size/Watt.
- Increase in power supply voltage will increase maximum available output power.
- LDMOS seems to be the dominant technology.
- As the available output power increases the requirements for other components as circulators, loads and capacitors will become more and more critical.
- Power supply components are improving and getting smaller with better efficiency.