

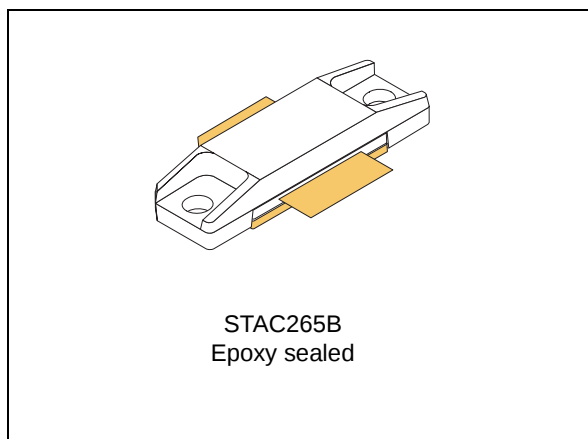
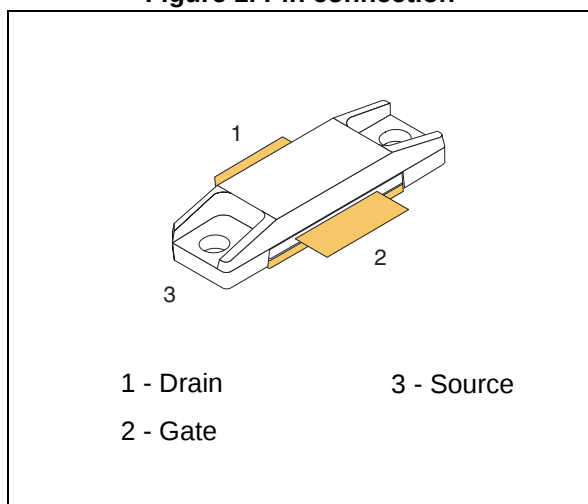


Figure 1. Pin connection



Features

- Excellent thermal stability
- Common source configuration push-pull
- $P_{OUT} = 250$ W with 16 dB gain over 960 - 1215 MHz
- ST Air Cavity / STAC package

Description

The STAC0912-250 is a common source N-channel enhancement-mode lateral field-effect RF power transistor designed for mode -S, T-CAS, JTIDS, DME or TACAN applications in the 960 to 1215 MHz frequency range.

Table 1. Device summary

Order code	Package	Branding
STAC0912-250	STAC265B	0912-250

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1 Electrical data

1.1 Maximum ratings

$T_{\text{CASE}} = 25\text{ °C}$

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{(\text{BR})\text{DSS}}$	Drain-source voltage	80	V
V_{GS}	Gate-source voltage	± 20	V
P_{DISS}	Power dissipation (@ $T_{\text{C}} = 70\text{ °C}$)	928	W
T_{J}	Max. operating junction temperature	200	°C
T_{STG}	Storage temperature	- 65 to + 150	°C

1.2 Thermal data

Table 3. Thermal data @ 100 μs - 10 %

Symbol	Parameter	Value	Unit
R_{thJC}	Junction - case thermal resistance	0.14	°C/W

2 Electrical characteristics

$$T_{\text{CASE}} = +25\text{ }^{\circ}\text{C}$$

2.1 Static

Table 4. Static

Symbol	Test conditions	Min.	Typ.	Max.	Unit
$V_{(\text{BR})\text{DSS}}$	$I_{\text{DS}} = 10\text{ mA}$	80			V
I_{DSS}	$V_{\text{DS}} = 28\text{ V}$			2	μA
I_{GSS}	$V_{\text{GS}} = 15\text{ V}$			1	μA
$V_{\text{GS(Q)}}$	$V_{\text{DS}} = 28\text{ V}$ $I_{\text{DS}} = 150\text{ mA}$	2.0		5.0	V
$V_{\text{DS(ON)}}$	$V_{\text{GS}} = 10\text{ V}$ $I_{\text{DS}} = 6\text{ A}$		550	600	mV
G_{FS}	$V_{\text{DS}} = 10\text{ V}$ $I_{\text{DS}} = 6\text{ A}$	2.5			mho

2.2 Dynamic

$$V_{\text{DD}} = 36\text{ V} \quad I_{\text{DQ}} = 150\text{ mA} \quad \text{pulse width} = 100\text{ }\mu\text{sec} \quad \text{duty cycle} = 10\%$$

Table 5. Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
Frequency		960		1215	MHz
P_{OUT}	$P_{\text{IN}} = 12\text{ W}$	250	285		W
G_{PS}	$P_{\text{OUT}} = 250\text{ W}$	14	16.3		dB
η_{D}	$P_{\text{OUT}} = 250\text{ W}$	50	58		%
T_{r}	Rise Time - $P_{\text{OUT}} = 250\text{ W}$			25	ns
T_{f}	Fall Time - $P_{\text{OUT}} = 250\text{ W}$			10	ns
Droop	$P_{\text{OUT}} = 250\text{ W}$			0.2	dB
Load mismatch	All phase angles at $P_{\text{OUT}} = 250\text{ W}$			10:1	VSWR

Table 6. Reference data⁽¹⁾

Mode of operation	Pulse conditions	V _{DD} (V)	P _{OUT} (W)	Gain (dB)	Delta gain (dB)	Eff. (%)	Pulse droop (dB)	TR (nsec)	TF (nsec)	RTH _{J-C} (°C/W)
All modes	100µsec - 10%	36	250	16	0.7	58	0.1	25	5	0.14
TCAS 1030 - 1090 MHz	32µsec - 1%	36	250	16	0.3	57	0.1	25	5	0.06
Mode-S 1030 - 1090 MHz	128µsec - 2%	36	250	15.5	0.3	56	0.2	25	5	0.125
	340µsec - 1%	36	250	15.5	0.3	56	0.25	25	5	0.17

1. Typical RF performance measured in common source class-AB broadband circuit 960 MHz to 1215 MHz frequency band.
Th = 25 °C; RTH_{J-C} = 0.15°C/W; unless specified otherwise.

3 Impedance data

Figure 2. Impedance data

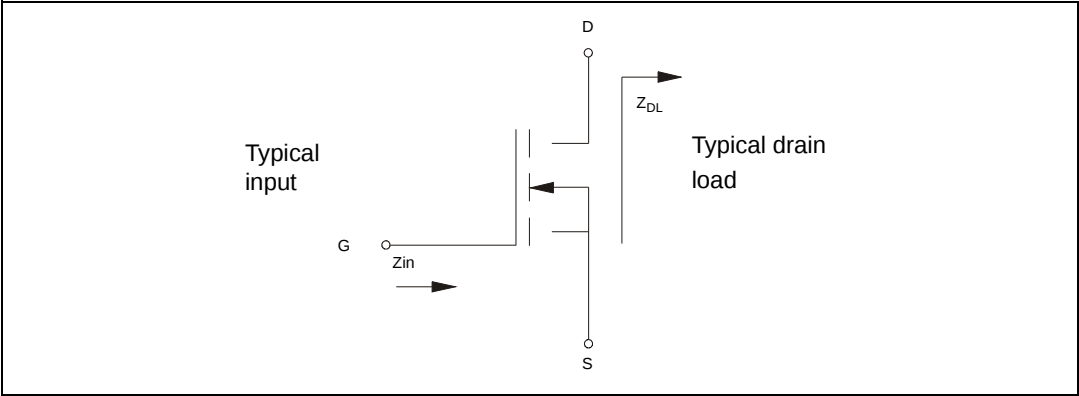


Table 7. Impedance data

Frequency (MHz)	Z_{source} (Ohm)	Z_{load} (Ohm)
960	$0.96+j0.75$	$2.2+j0.57$
1030	$1.01+j1.3$	$1.57+j0.97$
1090	$1.18+j1.73$	$1.25+j1.5$
1140	$1.29+j1.86$	$1.1+j1.88$
1215	$1.1+j1.9$	$1.01+j2.44$

4 Typical performance

Figure 3. Gain vs. output power

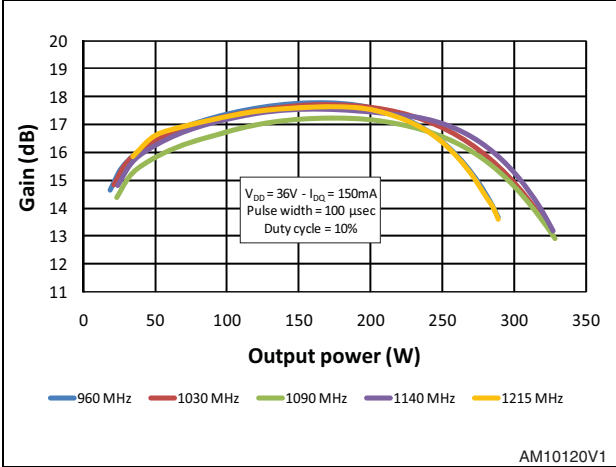


Figure 4. Efficiency vs output power

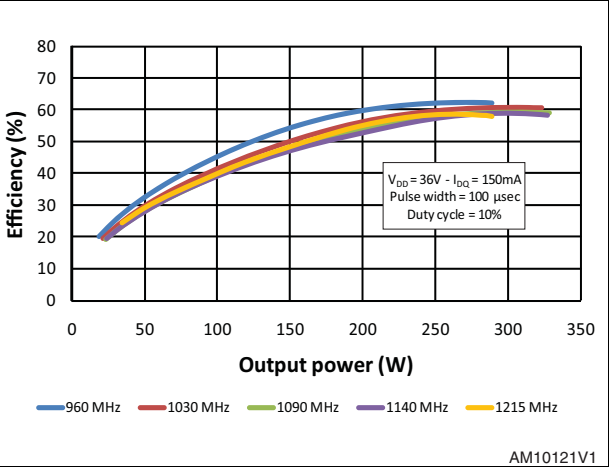
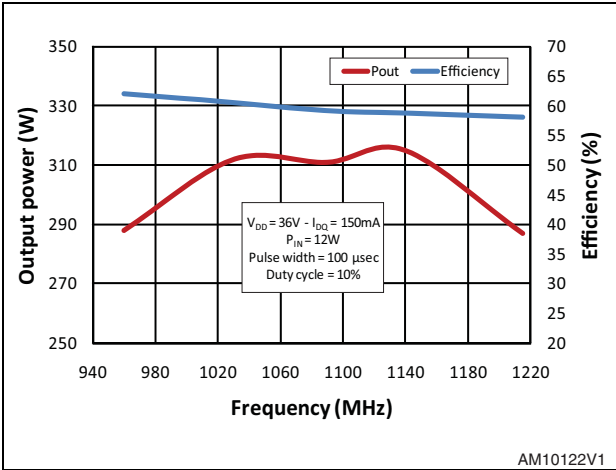


Figure 5. Output power and efficiency vs frequency



5 Circuit and BOM

Figure 6. Broadband 960-1215 MHz circuit

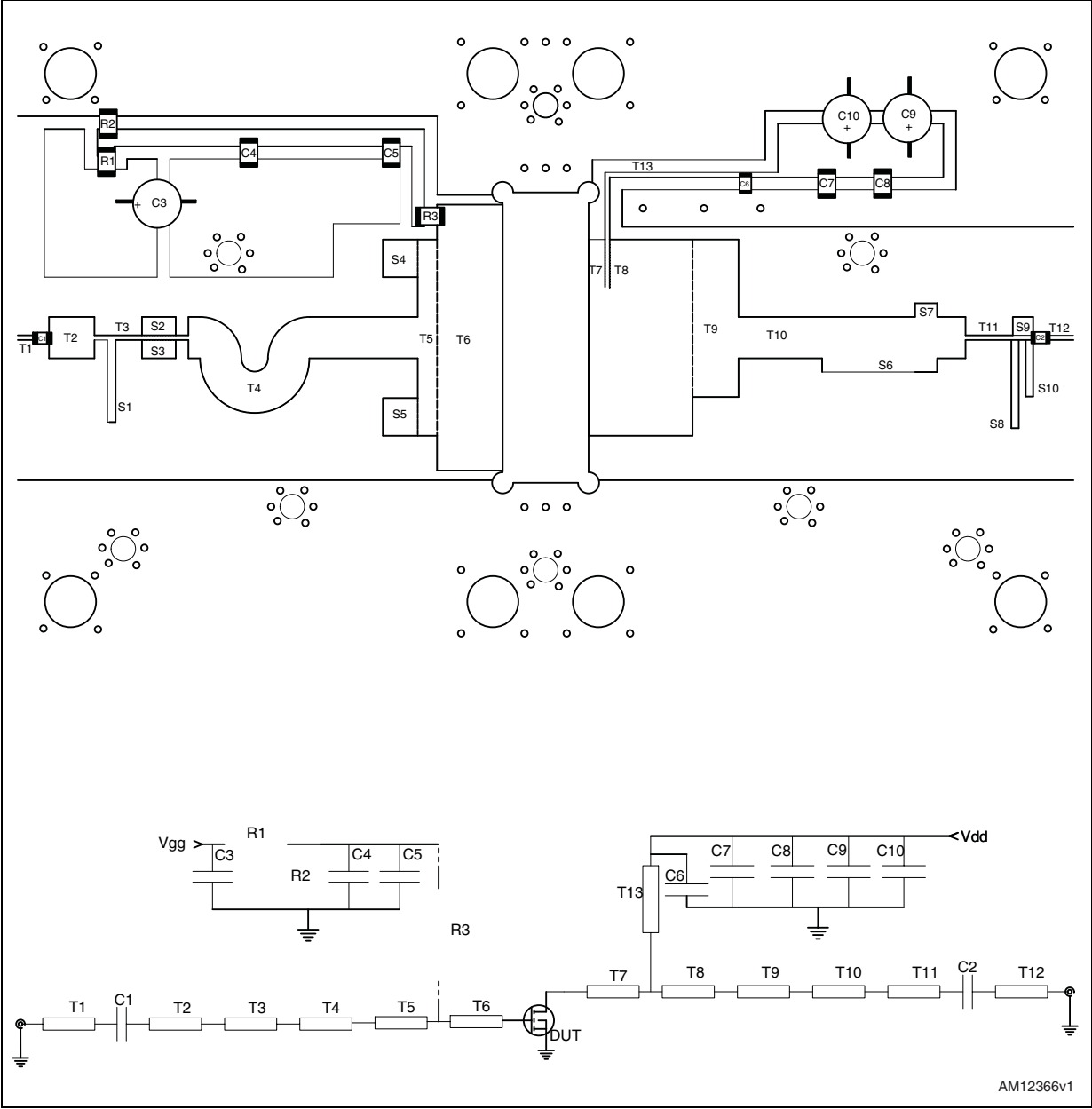


Table 8. Components list

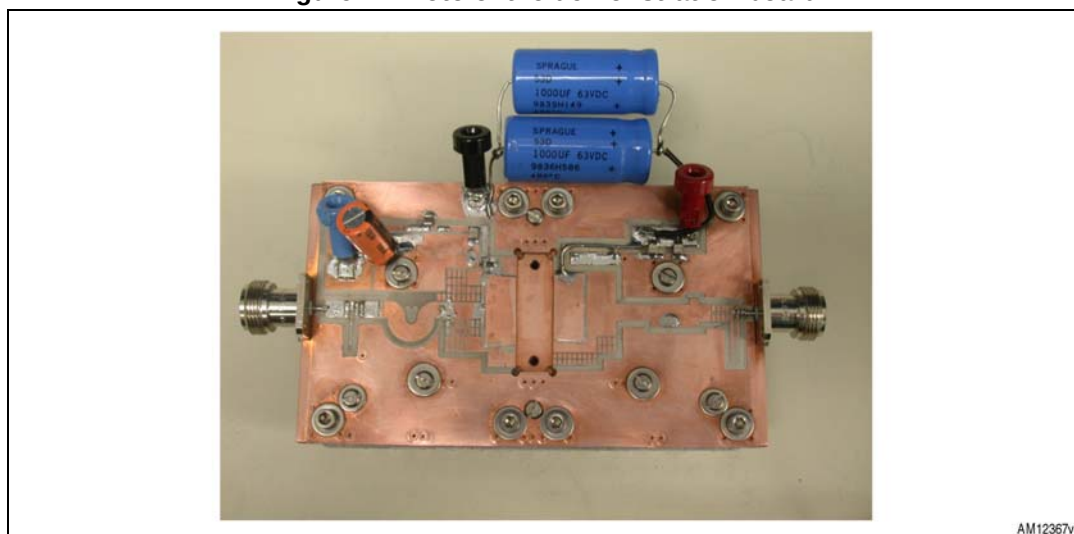
Component	Description	Dimension (X,Y)	Values
TL1	Stripline	L=0.090" W=0.022"	
TL2	Stripline	L=0.215" W=0.196"	
TL3	Stripline	L=0.445" W=0.022"	



Table 8. Components list (continued)

Component	Description	Dimension (X,Y)	Values
TL4	Stripline	L=1.381" W=0.196"	
TL5	Stripline	L=0.092" W=0.929"	
TL6	Stripline	L=0.311" W=1.259"	
TL7	Stripline	L=0.078" W=0.929"	
TL8	Stripline	L=0.393" W=0.929"	
TL9	Stripline	L=0.218" W=0.746"	
TL10	Stripline	L=1.075" W=0.196"	
TL11	Stripline	L=0.321" W=0.022"	
TL12	Stripline	L=0.112" W=0.022"	
TL13	Stripline	L=0.960" W=0.022"	
S1	Shim	L=0.038" W=0.389"	
S2	Shim	L=0.016" W=0.087"	
S3	Shim	L=0.016" W=0.087"	
S4	Shim	L=0.165" W=0.178"	
S5	Shim	L=0.165" W=0.178"	
S6	Shim	L=0.545" W=0.065"	
S7	Shim	L=0.105" W=0.065"	
S8	Shim	L=0.035" W=0.418"	
S9	Shim	L=0.096" W=0.087"	
S10	Shim	L=0.035" W=0.268"	
C10	1000 μ F, 63 V Electrolytic capacitor		1000 μ F
C9	100 μ F, 100 V Electrolytic capacitor		100 μ F
C8	ATC100B390KP500X		39 pF
C7	ATC100B390KP500X		39 pF
C6	ATC100A300JT 150X		30 pF
C5	ATC100B390KP500X		39 pF
C4	ATC200B393MW50X		39000 pF
C3	220 μ F, 63 V Electrolytic capacitor		220 μ F
C2	ATC100A300JP 150X		30 pF
C1	ATC100A300JP 150X		30 pF
R3	CR1206-4W-132JB		1.3 k Ω
R2	CR1206-4W-681JB		680 Ω
R1	CR1206-4W-361JB		360 Ω
PCB	Rogers Duroid 6010 Er = 10.2, Th = 0.64 mm	3X5"	

Figure 7. Photo of the demonstration board



6 Package mechanical data

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Figure 8. Package dimensions

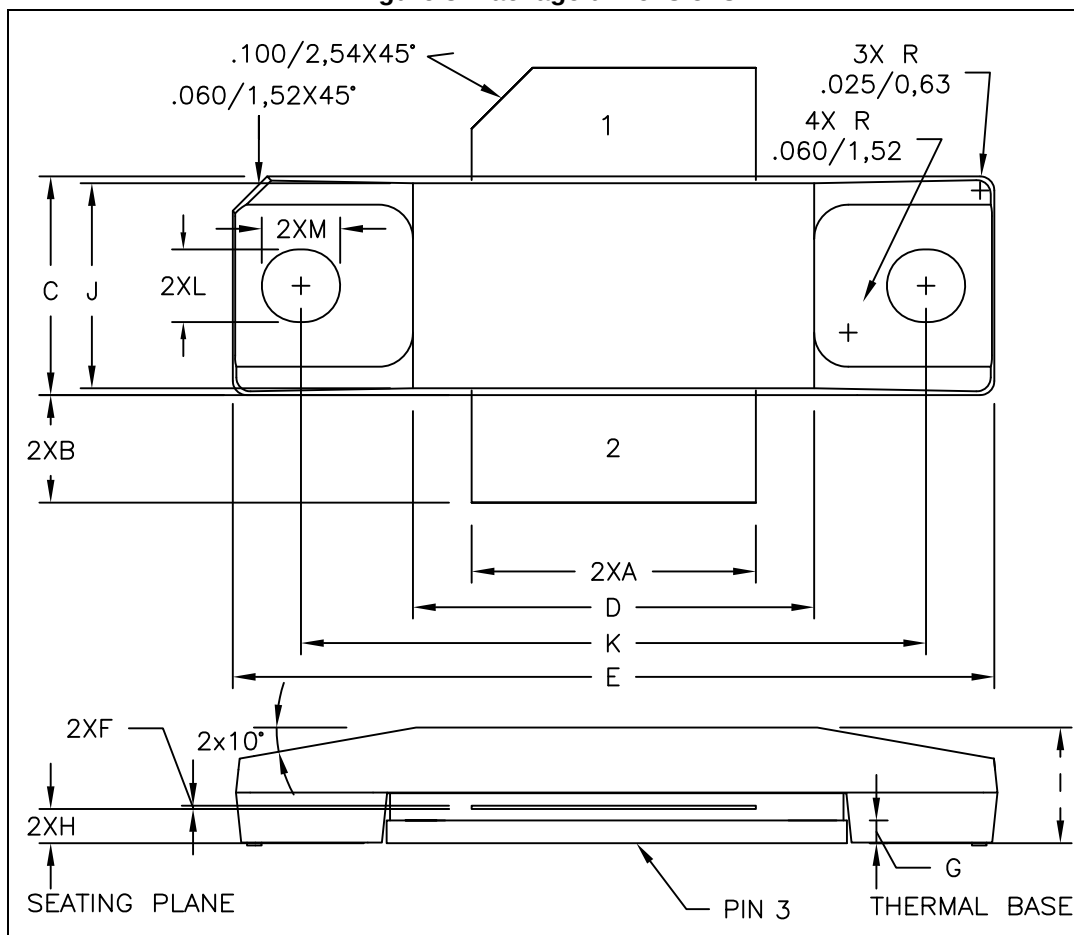


Table 9. STAC265B mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	12.57		12.83
B	4.32		5.33
C	9.65		9.91
D	17.78		18.08
E	33.88		34.19
F	0.10		0.15
G		1.02	
H	1.45		1.70
I	4.83		5.33
J	9.27		9.52
K	27.69		28.19
L		3.23	
M		3.45	

7 Revision history

Table 10. Document revision history

Date	Revision	Changes
20-Apr-2011	1	First release.
09-Aug-2011	2	– Updated features on cover page. – Updated P_{DISS} value in Table 2: Absolute maximum ratings, R_{thJC} value in Table 3: Thermal data @ 100 μs - 10 %. – Updated typical and maximum values in Table 5: Dynamic – Inserted new Table 6: Reference data and Section 3: Impedance data. – Updated figures: 3, 4 and 5. – Minor text changes.
13-Sep-2011	3	Added Section 5: Circuit and BOM .
06-Jun-2012	4	– Modified: Figure 6 – Added: Figure 7 – Updated the entire Table 8
24-Sep-2012	5	Updated title on the cover page. Updated Table 4.
15-May-2014	6	Updated Figure 8: Package dimensions. Minor text changes. Document status promoted from preliminary to production data.

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