

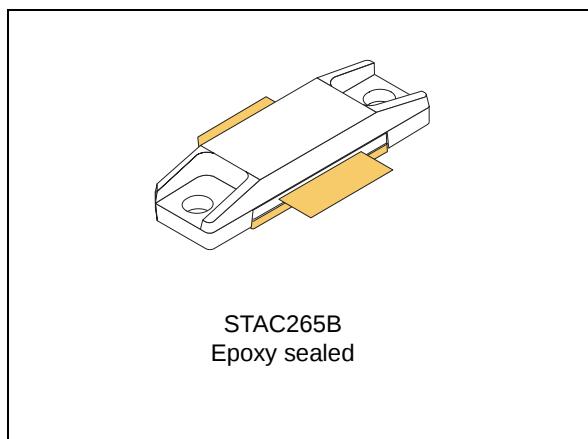
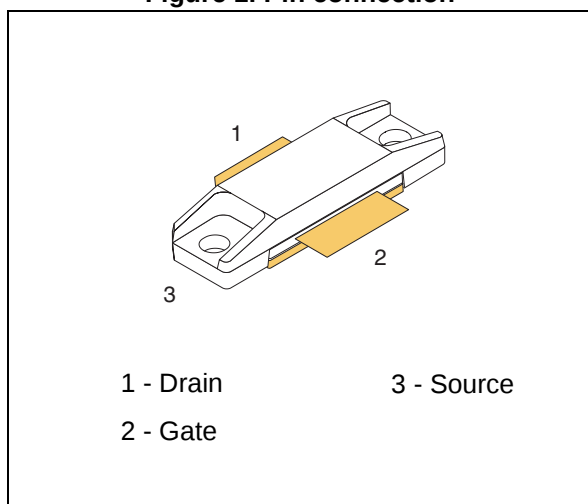


Figure 1. Pin connection



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

Contents

1 **Electrical data** **3**

 1.1 Maximum ratings 3

 1.2 Thermal data 3

2 **Electrical characteristics** **4**

 2.1 Static 4

 2.2 Dynamic 4

3 **Impedance data** **6**

4 **Typical performance** **7**

5 **Circuit and BOM** **8**

6 **Package mechanical data** **11**

7 **Revision history** **13**



1 Electrical data

1.1 Maximum ratings

$T_{CASE} = 25\text{ °C}$

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-source voltage	80	V
V_{GS}	Gate-source voltage	± 20	V
P_{DISS}	Power dissipation (@ $T_C = 70\text{ °C}$)	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 μ s - 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

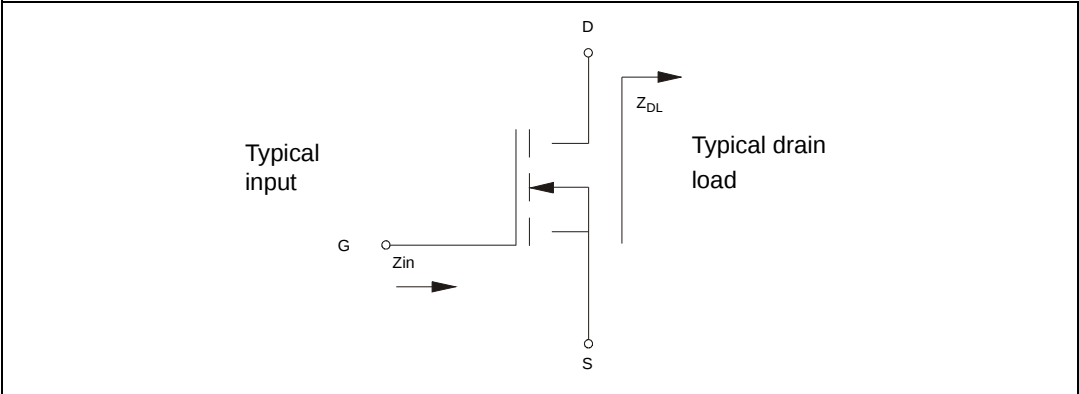


Table 7. Impedance data

Freq (MHz)	Source	Load
960	2.437 - j2.029	1.865 - j2.469
1030	2.332 - j1.106	1.827 - j1.972
1090	2.278 - j0.369	1.765 - j1.643
1140	2.246 - j0.214	1.664 - j 1.413
1215	2.193 -j1.042	1.401 - j1.065

4 Typical performance

Figure 3. Gain vs. output power

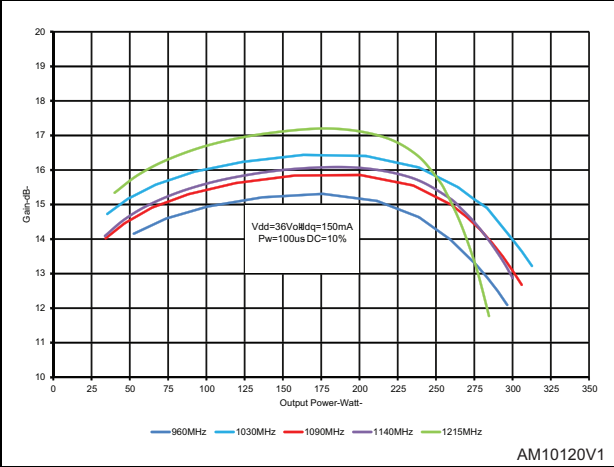


Figure 4. Efficiency vs output power

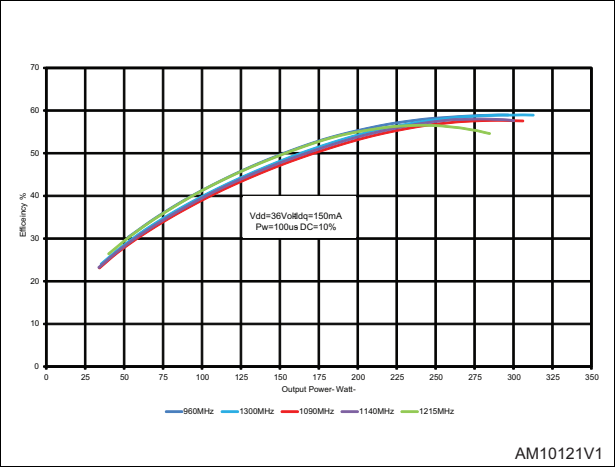
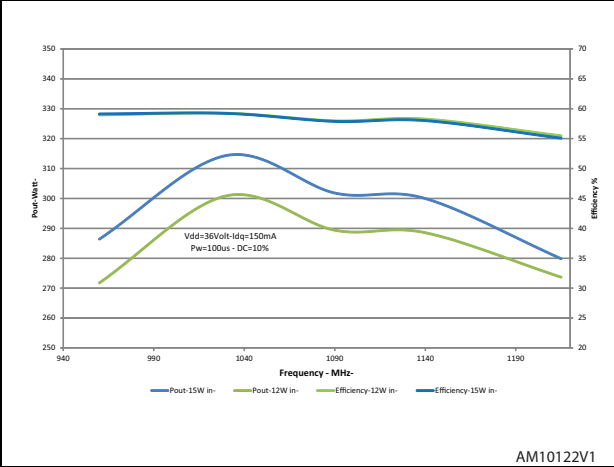
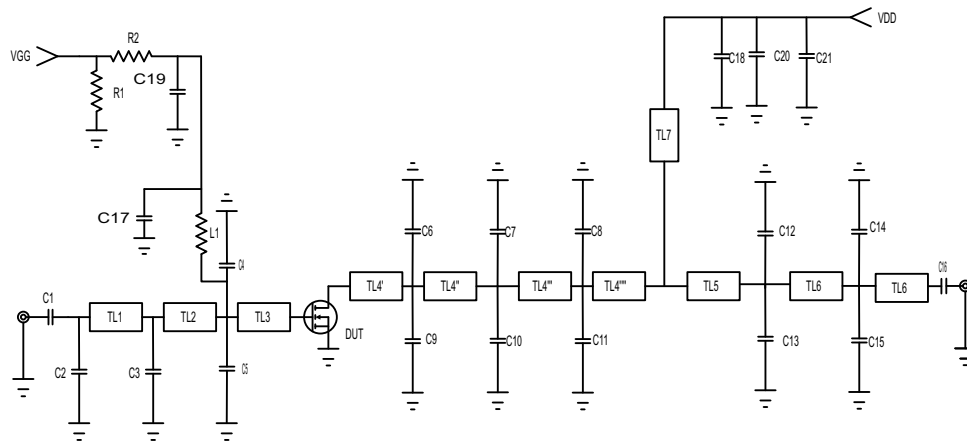
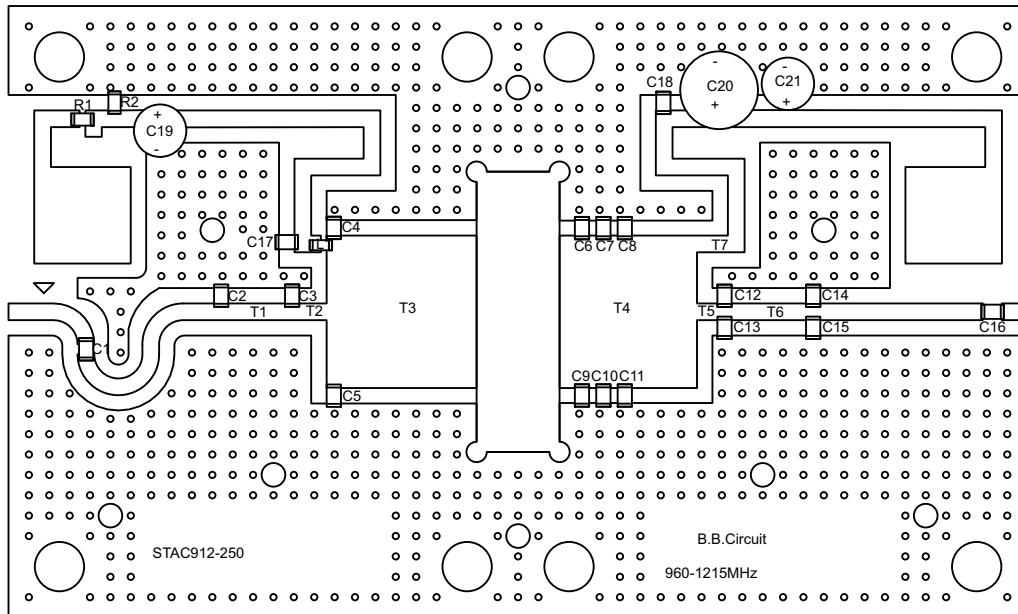


Figure 5. Output power and efficiency vs frequency



5 Circuit and BOM

Figure 6. Broadband 960-1215 MHz circuit



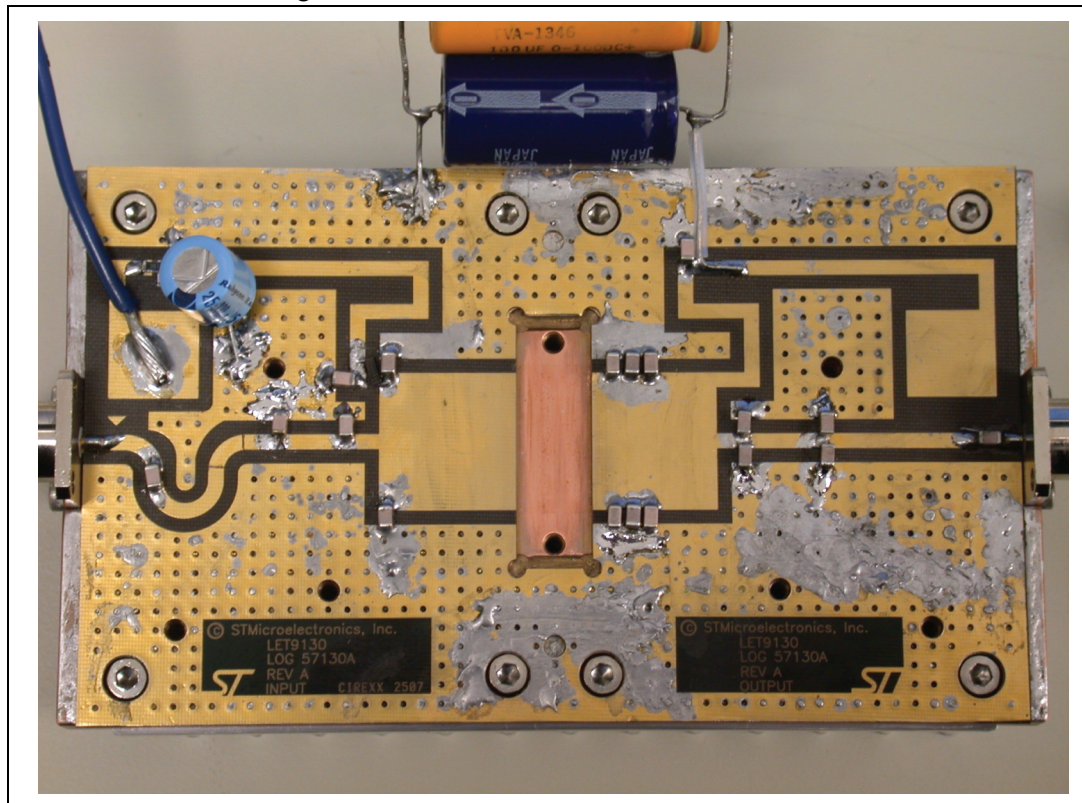
Note : $TL4' + TL4'' + TL4''' + TL4'''' = TL4$

AM12366v2

Table 8. Components list

Item	Qty	Part NO	Vendor	Description, dimension (x,y)
C1, C16,C17,C18	4	1111C360G501X	Passive Plus Inc.	36pF chip ceramic capacitor
C2	1	1111C2R2G501X	Passive Plus Inc.	2.2pF chip ceramic capacitor
C3	1	1111C3R0G501X	Passive Plus Inc.	3.0pF chip ceramic capacitor
C4,C5	2	1111C5R6G501X	Passive Plus Inc.	5.6pF chip ceramic capacitor
C6,C9	2	1111C1R4G501X	Passive Plus Inc.	1.4pF chip ceramic capacitor
C7,C10	2	1111C3R9G501X	Passive Plus Inc.	3.9pF chip ceramic capacitor
C8,C11	2	1111C4R7G501X	Passive Plus Inc.	4.7pF chip ceramic capacitor
C12,C13	2	1111C1R7G501X	Passive Plus Inc.	1.7pF chip ceramic capacitor
C14,C15	2	1111C1R6G501X	Passive Plus Inc.	1.6pF chip ceramic capacitor
C19	1	UPW1E331MPD	Nichicon	230μF, 25V electrolytic capacitor
C20	1	TVX1J102MCD	Nichicon	1000μF, 63V electrolytic capacitor
C21	1	TVA1346	Vishay Sprague	100μF, 100V electrolytic capacitor
R1	1	CR1206-4W-681JB	Venkel	390 Ohm surface mount resistor
R2	1	CR1206-4W-821JB	Venkel	820 Ohm surface mount resistor
L1	1	1606-9G	Coil Craft	9.85nH air core inductor
T1				L= 0.278in W=0.082in
T2				L= 0.134in W=0.082in
T3				L= 0.736in W=0.748in
T4				L= 0.674in W=0.748in
T5				L= 0.100in W=0.082in
T6				L= 0.365in W=0.082in
T7				L= 1.160in W=0.082in
Board 3X5	1		Rogers Corp	0.030 THK, Er=2.5, 2Oz Cu both sides

Figure 7. Photo of the demonstration board



6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Figure 8. Package dimensions

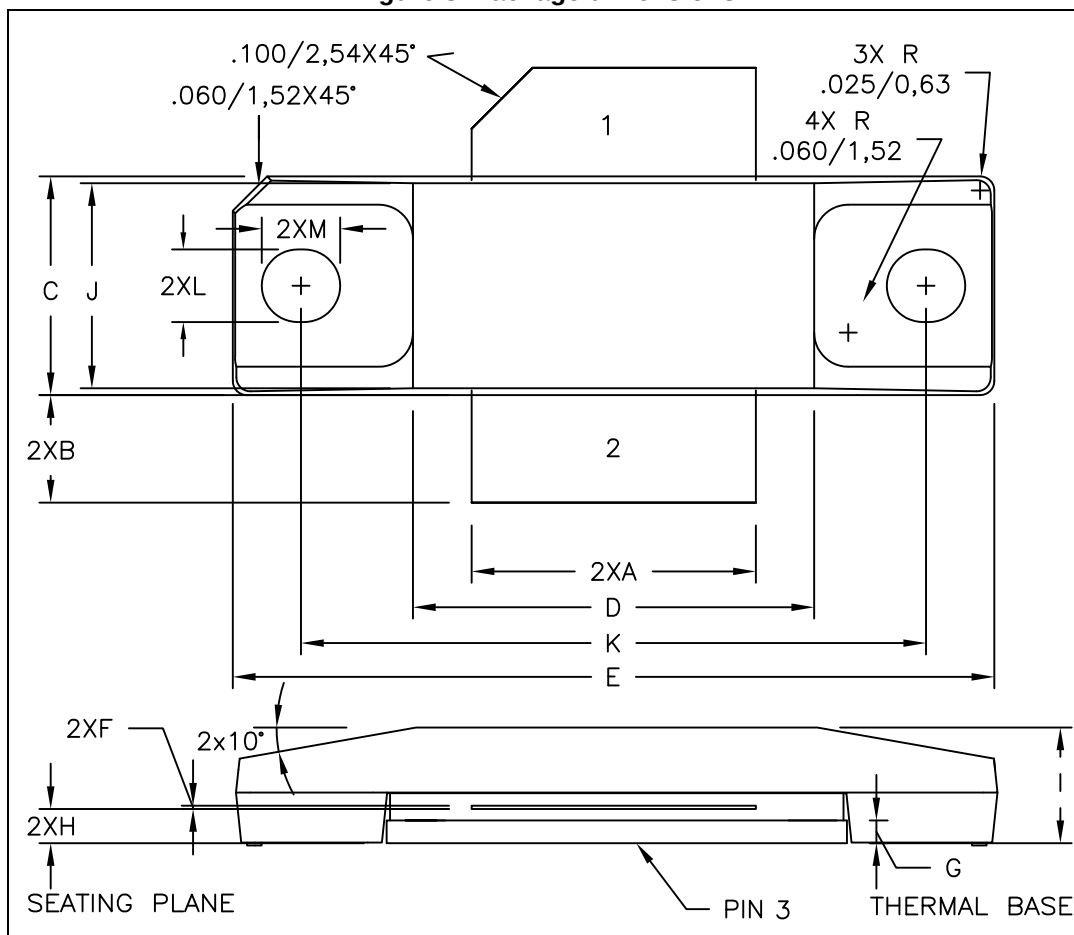


Table 9. STAC265B mechanical data

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 data. – 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.
11-Jun-2015	7	Updated Section 3: Impedance data , Section 4: Typical performance and Section 5: Circuit and BOM .

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