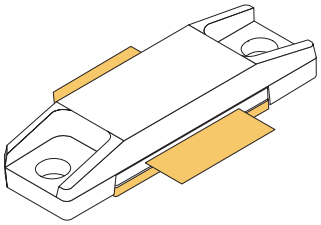
STAC1214-250

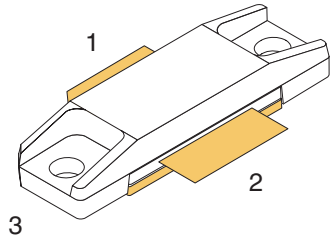
LDMOS L-band radar transistor

Datasheet - preliminary data



STAC265B
Epoxy sealed

Figure 1. Pin connection



1 - Drain
2 - Gate
3 - Source

Features

- Excellent thermal stability
- Common source configuration push-pull
- P_{OUT} = 250 W with 14 dB gain over 1200 - 1400 MHz
- ST air cavity / STAC® package

Description

The STAC1214-250 is a common source N-channel enhancement-mode lateral field-effect RF power transistor designed for L band radar applications.

Table 1. Device summary

Order code	Package	Branding
STAC1214-250	STAC265B	1214-250

Contents

1 Electrical data

1.1 Maximum ratings

T_{CASE} = 25 °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 °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(1)

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

1. @100 µsec - 10%

2 Electrical characteristics

T_{CASE} = + 25 °C

2.1 Static

Table 4. Static (per section)

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

2.2 Dynamic

Vdd = 36 V, Idq = 150 mA, pulse width = 100 µs, duty cycle = 10 %

Table 5. Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
Frequency		1200		1400	MHz
P_{OUT}	P_{IN} = 10 W	250	260		W
G_{PS}	P_{OUT} = 250 W	13	14		dB
η_D	P_{OUT} = 250 W	50			%
T_r	Rise time - P_{OUT} = 250 W			100	ns
T_f	Fall Time - P_{OUT} = 250 W			30	ns
Droop	P_{OUT} = 250 W			0.25	dB
Load mismatch	All phase angles at P_{OUT} = 250 W			10:1	VSWR

3 Impedance data

Figure 2. Impedance data

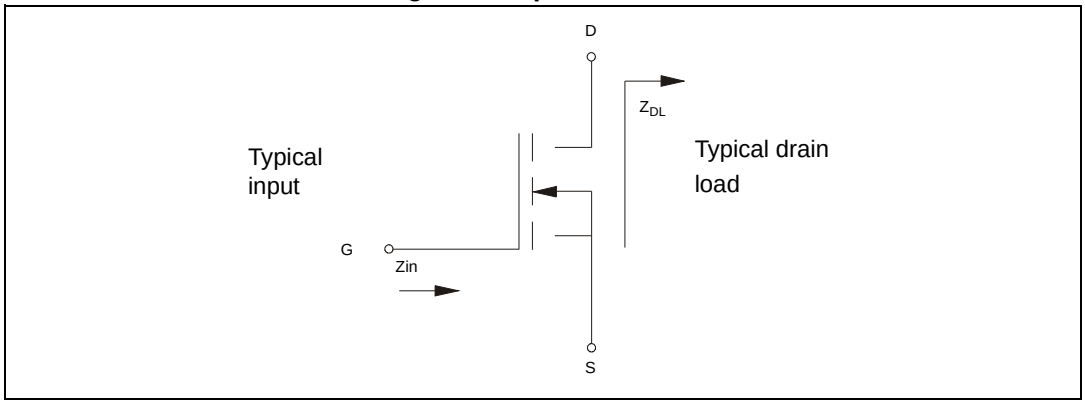


Table 6. Impedance data

Frequency (MHz)	Z_{source} (Ohm)	Z_{load} (Ohm)
1200	1.1+j1.9	1.5+j2.8
1300	1.0+j3.1	1.5+j3.1
1400	1.4+j4.3	1.0+j3.6

4 Typical performances

Figure 3. Output power vs input power

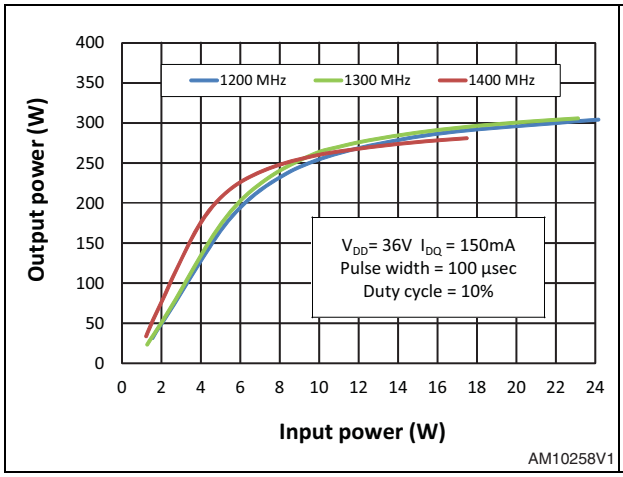


Figure 4. Power gain vs output power

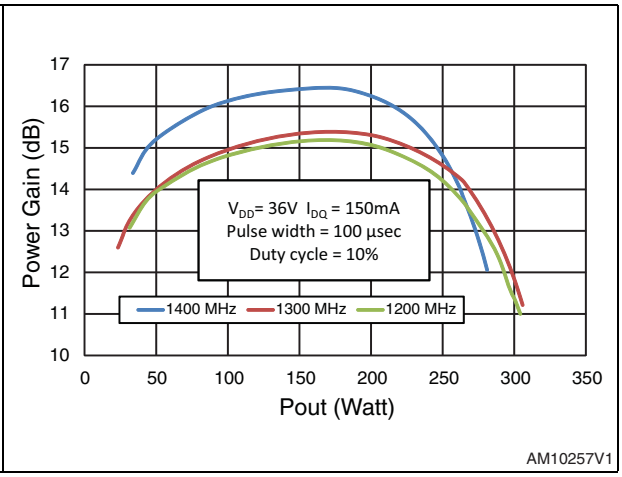


Figure 5. Efficiency vs output power

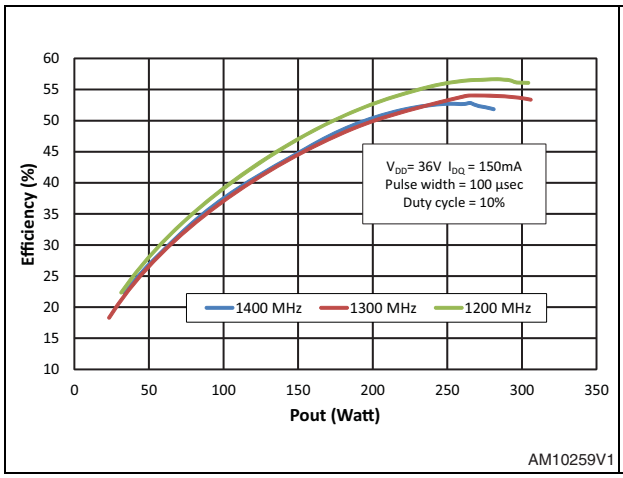
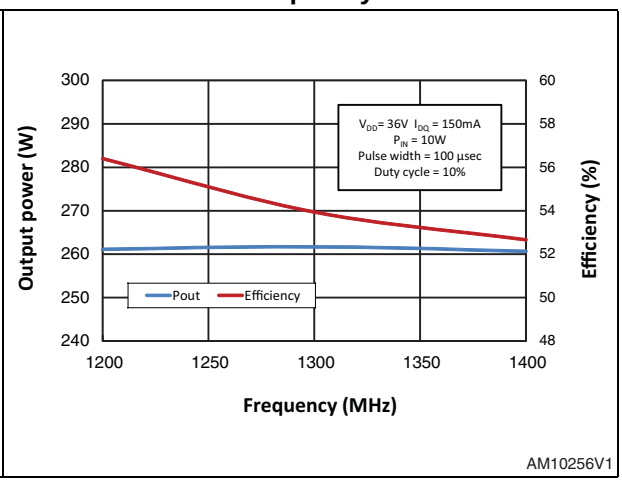


Figure 6. Output power and efficiency vs frequency



5 Circuit and BOM

Figure 7. Broadband 1200-1400 MHz circuit

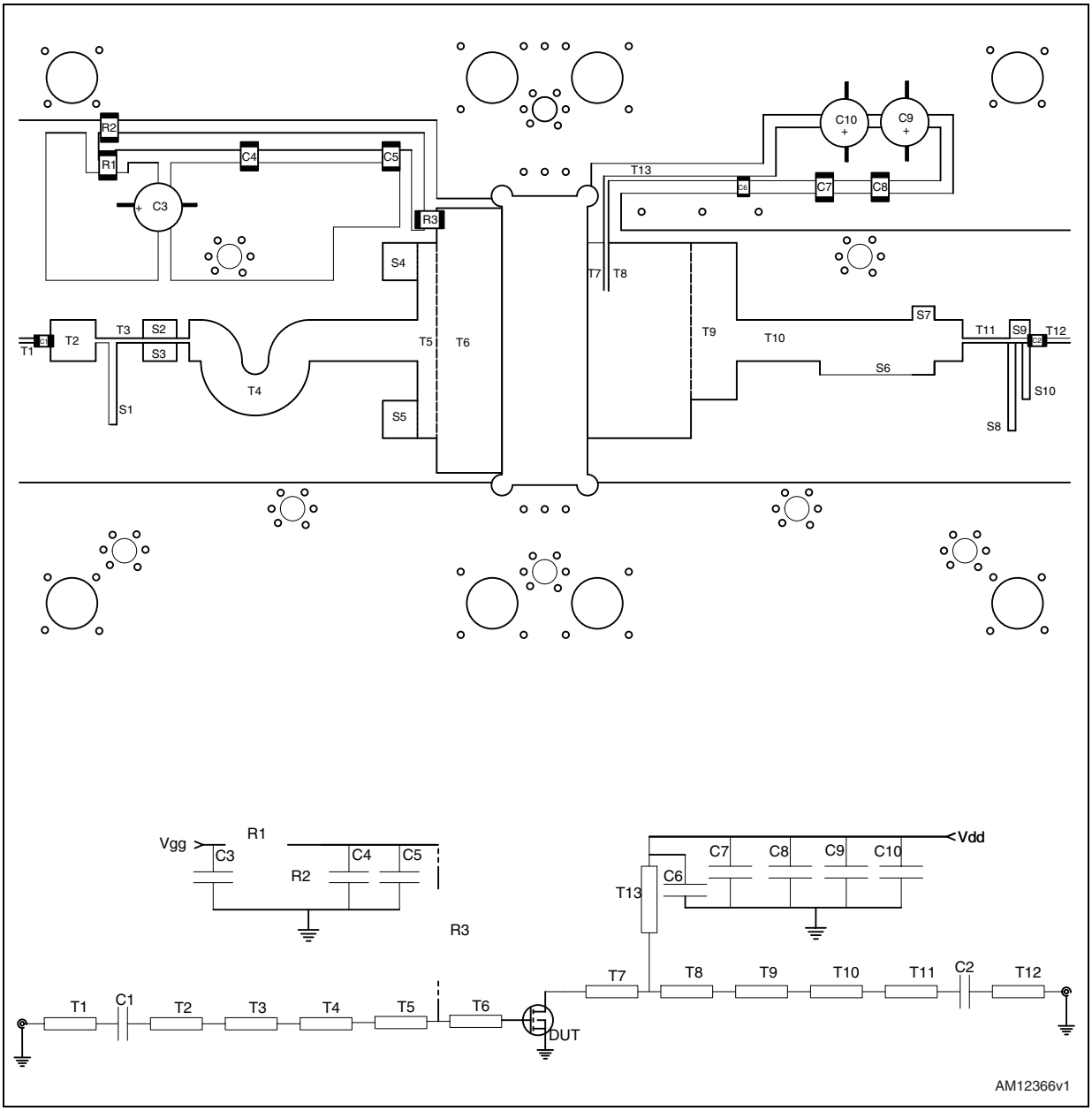


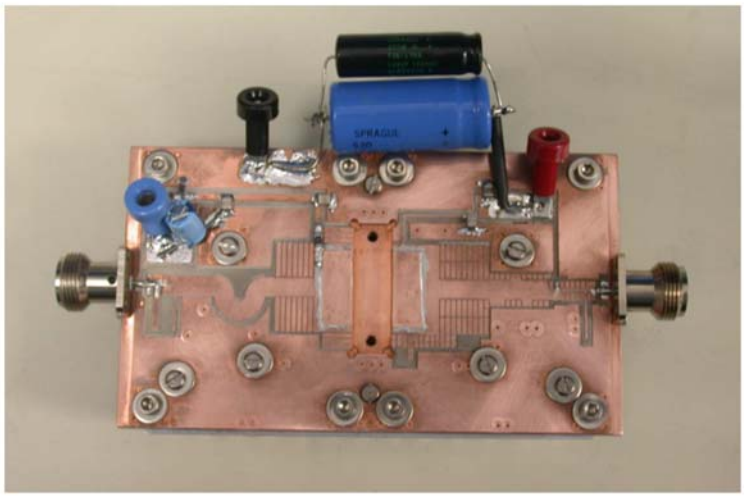
Table 7. Component list

Component	Description	Dimensions (X,Y)	Values
TL1	Stripline	L=0.111" W=0.022"	
TL2	Stripline	L=0.304" W=0.022"	
TL3	Stripline	L=1.74" W=0.196"	

Table 7. Component list (continued)

Component	Description	Dimensions (X,Y)	Values
TL4	Stripline	L=0.402" W=0.929"	
TL5	Stripline	L=0.100" W=0.929"	
TL6	Stripline	L=0.368" W=0.929"	
TL7	Stripline	L=1.136" W_1=0.196"	
TL8	Stripline	L=0.165" W=0.109"	
TL9	Stripline	L=0.341" W=0.022"	
TL10	Stripline	L=0.145" W=0.221"	
S1	Shim	L=0.048" W=0.091"	
S2	Shim	L=0.048" W=0.091"	
S3	Shim	L=0.105" W=0.091"	
S4	Shim	L=0.105" W=0.091"	
S5	Shim	L=0.050" W=0.361"	
S6	Shim	L=0.022" W=0.303"	
S7	Shim	L=0.105" W=0.069"	
S8	Shim	L=0.048" W=0.187"	
S9	Shim	L=0.158" W=0.069"	
S10	Shim	L=0.105" W=0.069"	
S11	Shim	L=0.105" W=0.069"	
S12	Shim	L=0.022" W=0.424"	
C1, C2	ATC100A300J chip capacitor		30 pF
C3	ATC100B101 chip capacitor		100 pF
C4	ATC100B910 chip capacitor		91 pF
C5	220 µF, 63 V Electrolytic Capacitor		220 µF
C6	ATC100B390 Chip Capacitor		39 pF
C7	ATC700B122JT Chip Capacitor		1200 pF
C8	1000 µF, 63 V Electrolytic Capacitor		1000 µF
C9	100 µF, 100 V Electrolytic Capacitor		100 µF
R1	CR1206-8W-102JB		1 kΩ
R2	CR1206-8W-202JB		2 kΩ
R3	CR1206-8W-501JB		50 Ω
Board material	Rogers Duroid 6010 Er = 10.2, Th = 0.64 mm	3x5 in^2	

Figure 8. Photo of the demonstration board



6 Package mechanical data

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Figure 9. Package dimensions

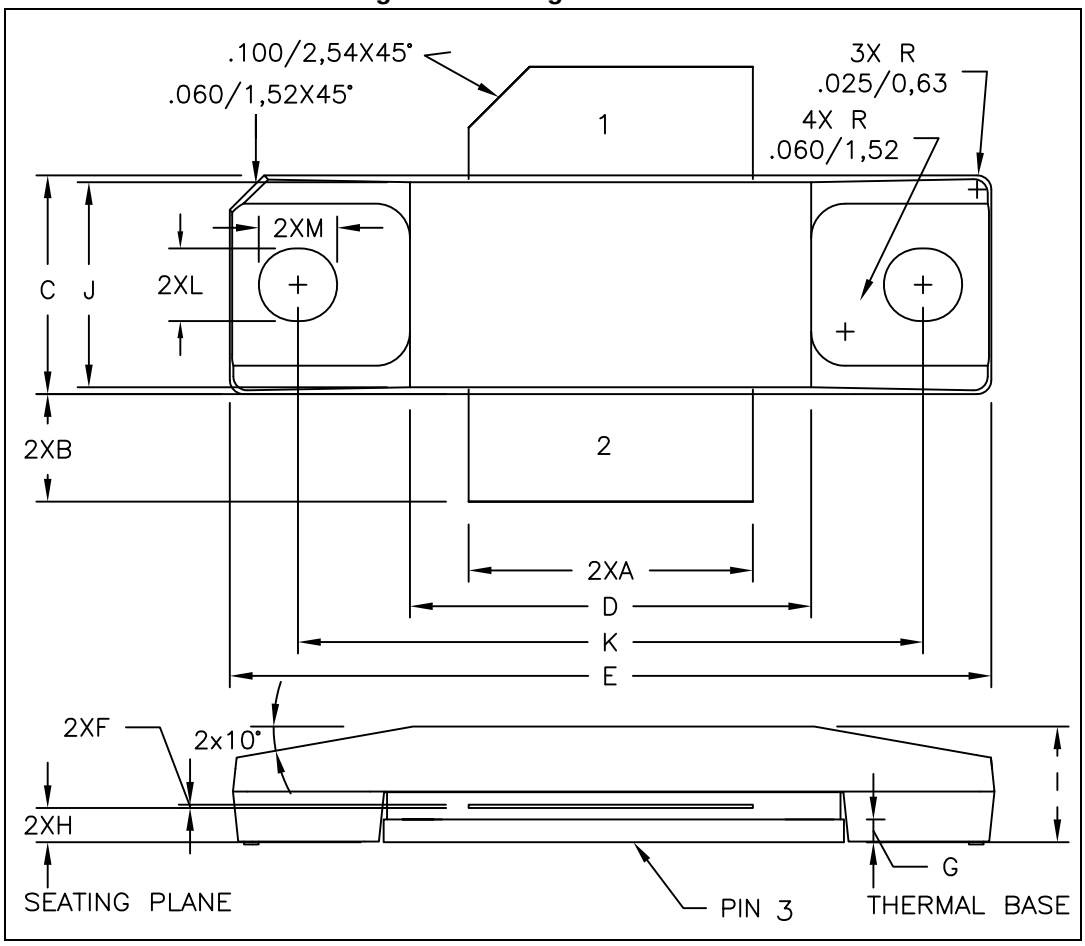

Table 8. STAC265B mechanical data

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 9. Document revision history

Date	Revision	Changes
27-Jan-2012	1	First release.
06-Jun-2012	2	– Modified: *Figure 7* – Added: *Figure 8* – Updated the entire *Table 7*
24-Sep-2012	3	Updated title on the coverpage and *Table 4*.
20-May-2014	4	Updated *Table 8: STAC265B mechanical data*. Minor text changes.

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