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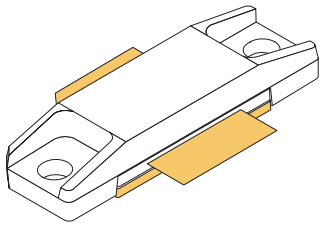
STAC1011-350

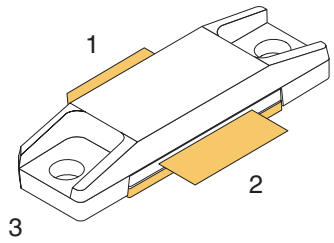
LDMOS avionics radar transistor

Datasheet - production 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} = 350 W with 15 dB gain over 1030 - 1090 MHz
- ST Air Cavity / STAC® package

Description

The STAC1011-350 is a common source N-channel enhancement-mode lateral field-effect RF power transistor designed for avionics applications in the 1030 to 1090 MHz frequency range.

Table 1. Device summary

Order code	Package	Branding
STAC1011-350	STAC265B	1011-350

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)	1440	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	0.09	°C/W

1. @ 50 µsec - 2%

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 = 50 µs, duty cycle = 2 %

Table 5. Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
Frequency		1030		1090	MHz
P_{OUT}	P_{IN} = 15 W	350	370		W
G_{PS}	P_{OUT} = 350 W	13	15		dB
η_D	P_{OUT} = 350 W	50	53		%
T_r	Rise Time - P_{OUT} = 350 W			50	ns
T_f	Fall Time - P_{OUT} = 350 W			25	ns
Droop	P_{OUT} = 350 W			0.2	dB
Load Mismatch	All phase angles at P_{OUT} = 350 W			10:1	VSWR

3 Impedance data

Figure 2. Impedance data

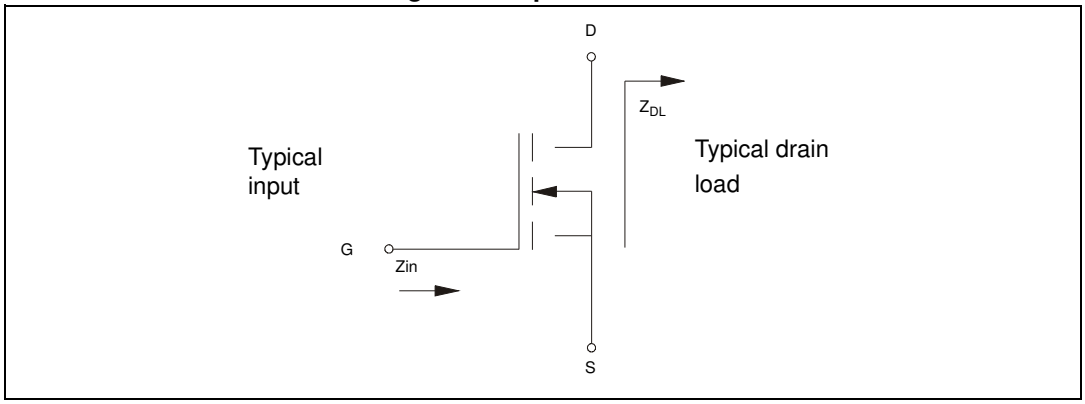


Table 6. Impedance data

Frequency (MHz)	Z_{source} (Ohm)	Z_{load} (Ohm)
1030	1+j0.126	1.12+j0.242
1060	0.855+j0.417	0.929+j0.560
1090	0.709+j0.764	0.752+j0.881

4 Typical performances

Figure 3. Output power vs gain and supply voltage @ 1030 MHz

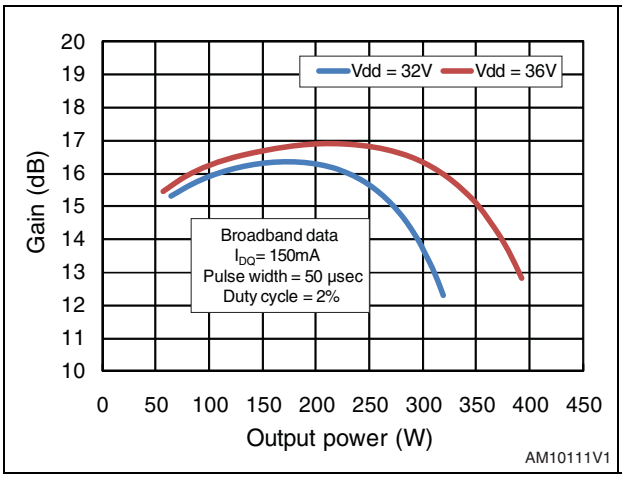


Figure 4. Output power and efficiency vs frequency - broadband data

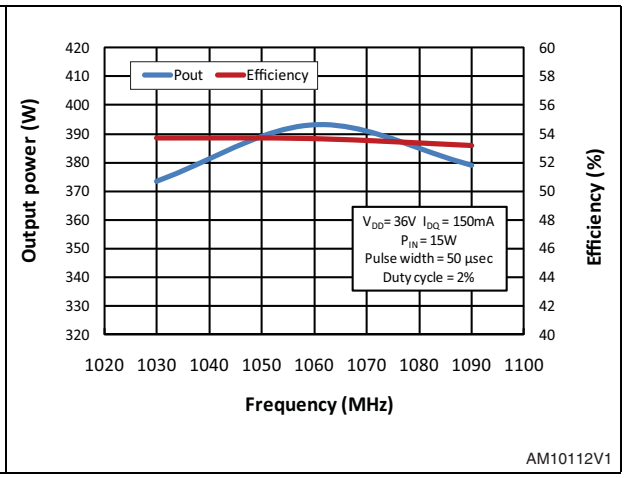


Figure 5. Output power vs gain and supply voltage @ 1060 MHz

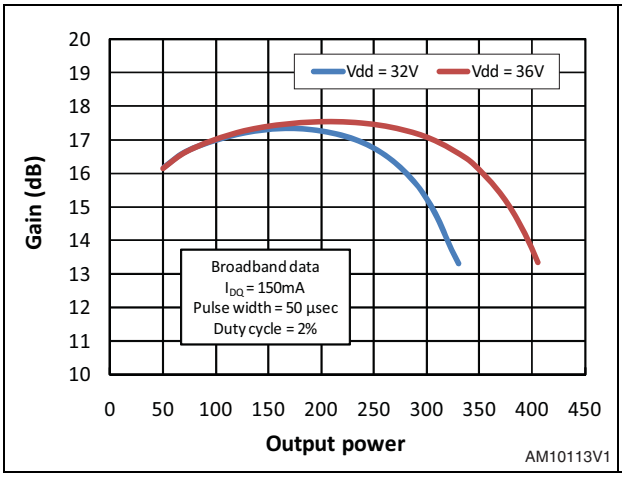


Figure 6. Gain and input return loss vs frequency - broadband data

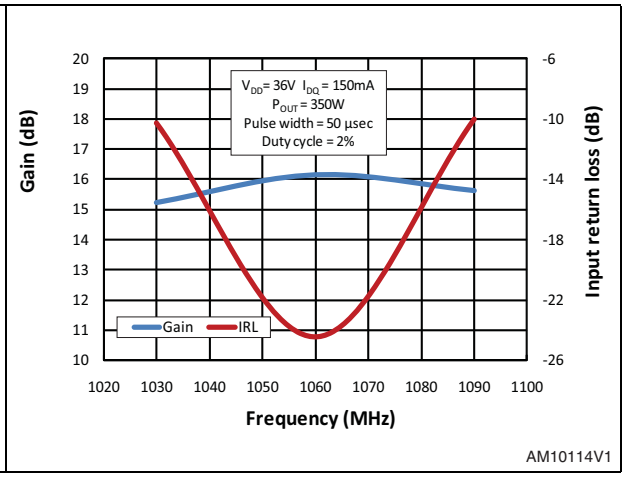


Figure 7. Output power vs gain and supply voltage @ 1090 MHz

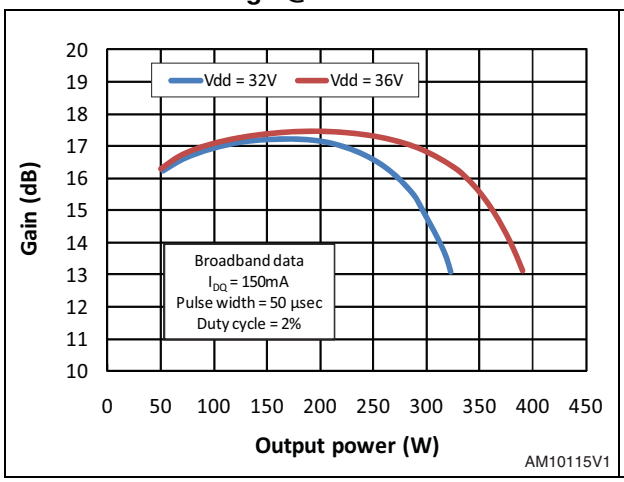


Figure 8. Output power vs input power - broadband data

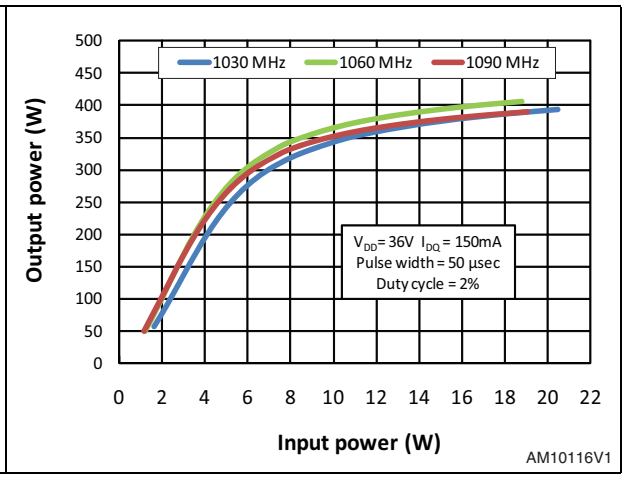
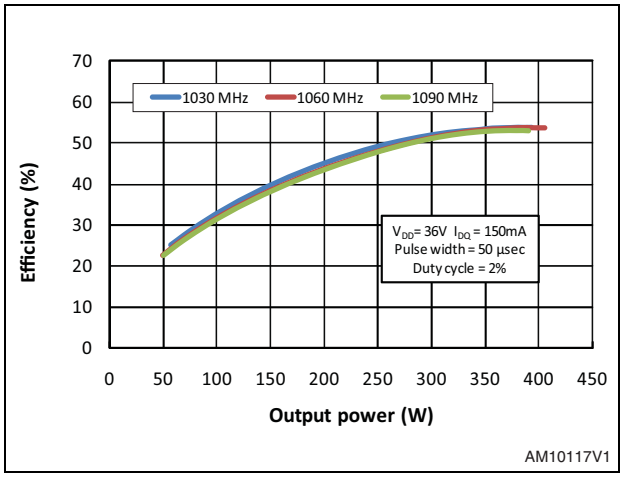


Figure 9. Efficiency vs output power - broadband data



5 Circuit and BOM

Figure 10. Broadband 1030-1090 MHz circuit

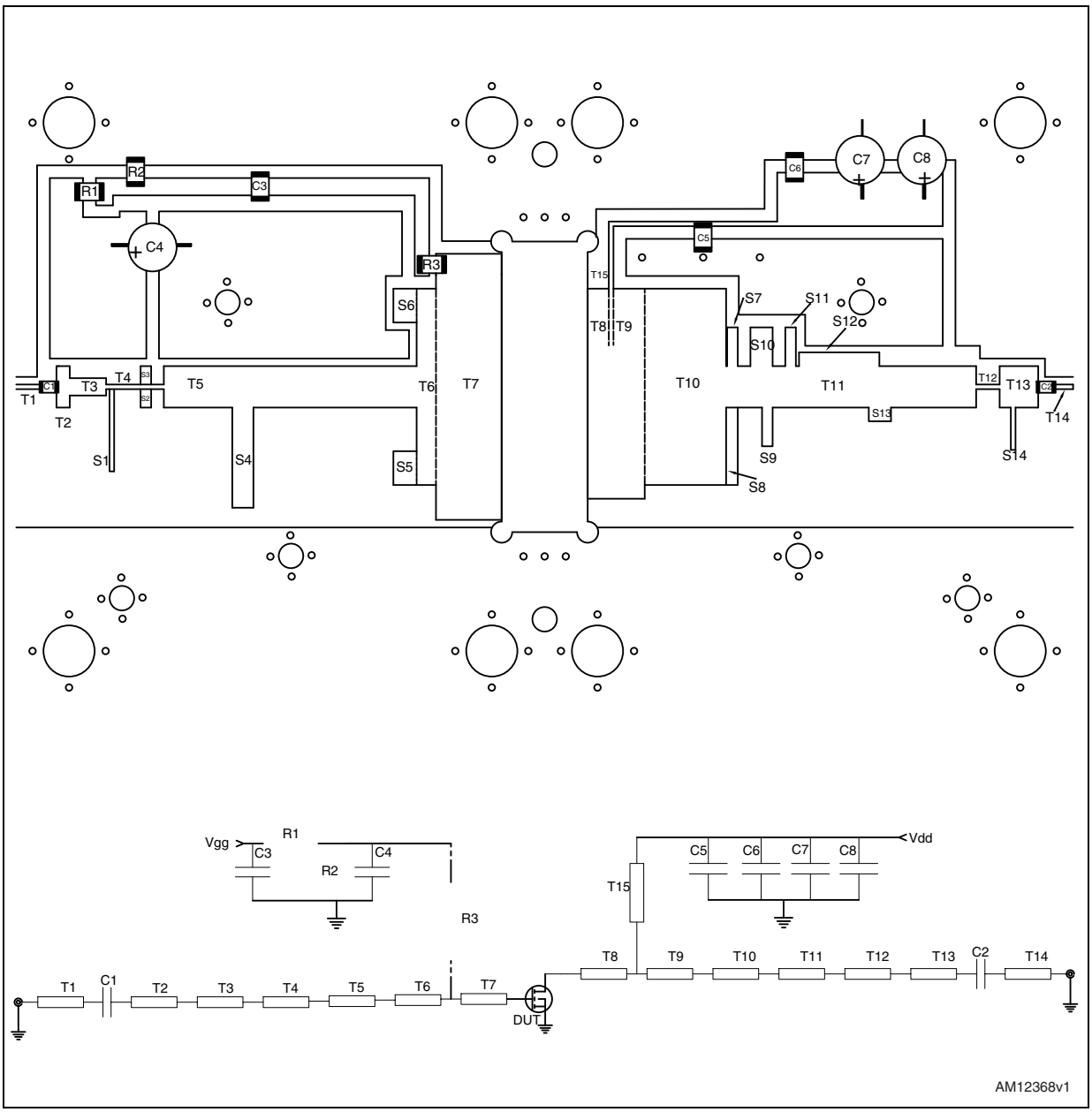


Table 7. Component list

Componenent	Description	Dimension (X,Y)	Values
TL1	Stripline	L=0.111" W=0.022"	
TL2	Stripline	L=0.063" W=0.196"	
TL3	Stripline	L=0.172" W=0.082"	

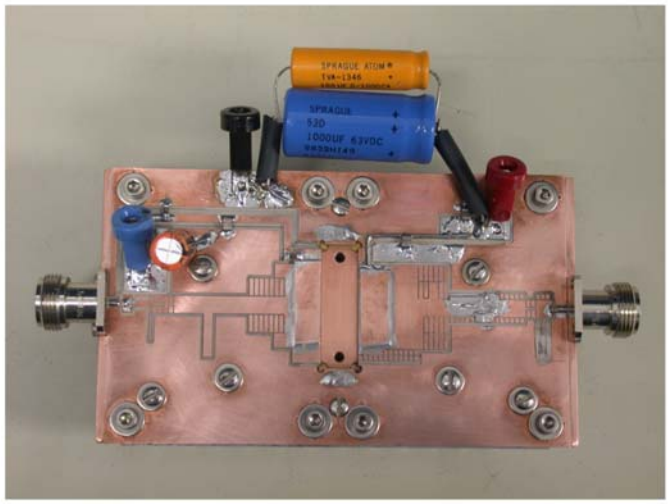
Table 7. Component list (continued)

Componenent	Description	Dimension (X,Y)	Values
TL4	Stripline	L=0.273" W=0.022"	
TL5	Stripline	L=1.196" W=0.196"	
TL6	Stripline	L=0.092" W=0.929"	
TL7	Stripline	L=0.311" W=1.259"	
TL8	Stripline	L=0.100" W=0.994"	
TL9	Stripline	L=0.148" W=0.994"	
TL10	Stripline	L=0.385" W=0.929"	
TL11	Stripline	L=1.183" W=0.196"	
TL12	Stripline	L=0.111" W=0.022"	
TL13	Stripline	L=0.183" W=0.196"	
TL14	Stripline	L=0.145" W=0.022"	
TL15	Stripline	L=0.741" W=0.022"	
S1	Shim	L=0.022" W=0.389"	
S2	Shim	L=0.050" W=0.087"	
S3	Shim	L=0.050" W=0.087"	
S4	Shim	L=0.100" W=0.0474"	
S5	Shim	L=0.110" W=0.160"	
S6	Shim	L=0.110" W=0.160"	
S7	Shim	L=0.050" W=0.183"	
S8	Shim	L=0.055" W=0.366"	
S9	Shim	L=0.050" W=0.183"	
S10	Shim	L=0.105" W=0.183"	
S11	Shim	L=0.050" W=0.183"	
S12	Shim	L=0.380" W=0.065"	
S13	Shim	L=0.105" W=0.065"	
S14	Shim	L=0.022" W=0.200"	
C8	1000 µF, 63 V Electrolytic Capacitor		1000 µF
C7	100 µF, 100 V Electrolytic Capacitor		100 µF
C6	ATC700B122JT 50 X		1200 pF
C5	ATC100B330KW500X		33 pF
C4	ATC100B101KW500X		100 pF
C3	220 µF, 63 V Electrolytic Capacitor		220 µF
C2	ATC100A300JP 150X		30 pF
C1	ATC100A300JP 150X		30 pF
R3	CR1206-4W-132JB		1.3 kΩ

Table 7. Component list (continued)

Componenent	Description	Dimension (X,Y)	Values
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 11. Photo of the demonstration board



6 Package mechanical data

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Figure 12. Package dimensions

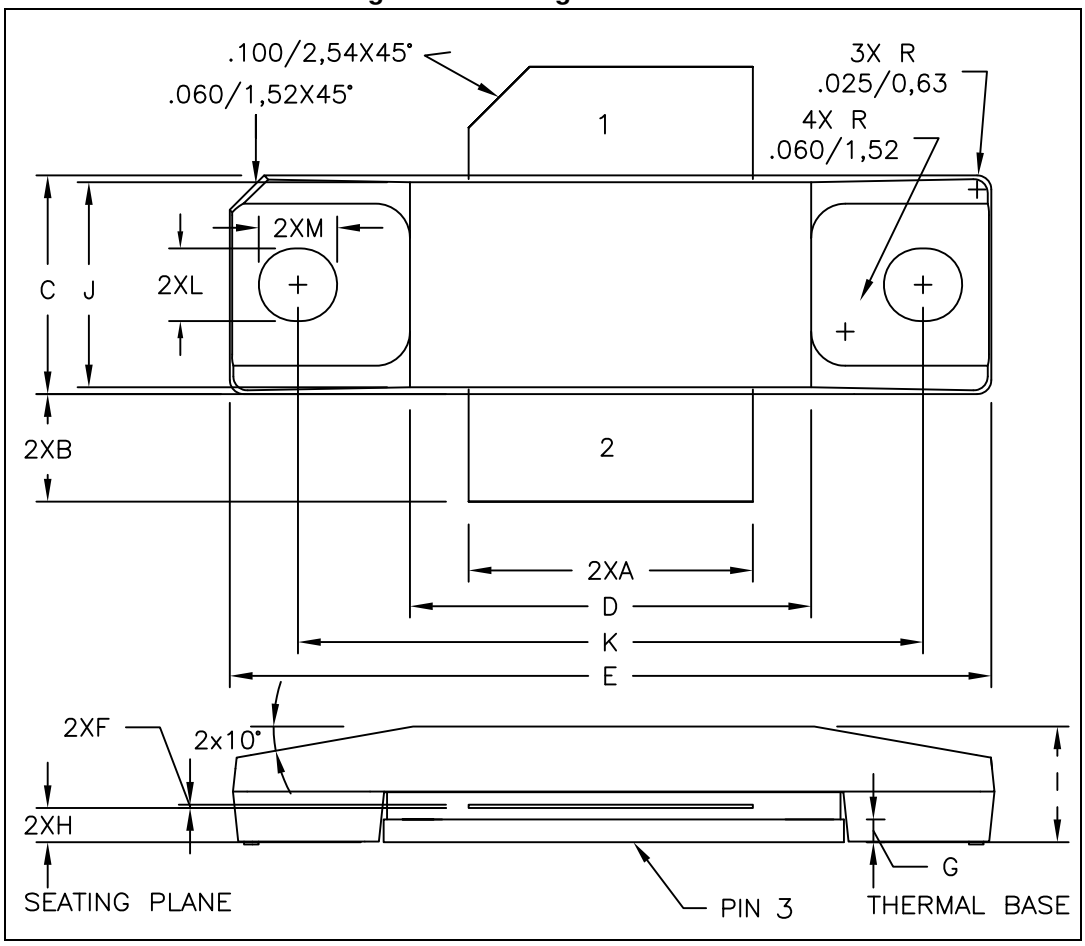

Table 8. STAC265B mechanical data

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
25-Jul-2011	1	First release.
12-Sep-2011	2	Inserted *Section 5: Circuit and BOM*.
13-Sep-2011	3	Updated dimensions in *Table 8: STAC265B mechanical data*.
06-Jun-2012	4	– Modified: *Figure 10* – Added: *Figure 11* – Updated the entire *Table 7*
24-Sep-2012	5	Updated title on the coverpage. Updated *Table 4*.
20-May-2014	6	Updated *Figure 12: Package dimensions*. Minor text changes. Document status promoted from preliminary to production data.

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