

LDMOS avionics radar transistor

Datasheet - production data

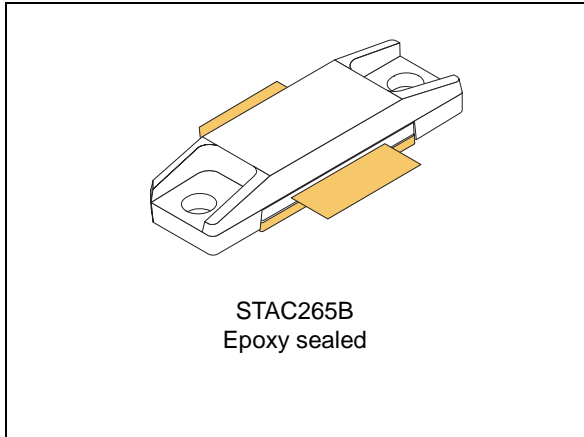
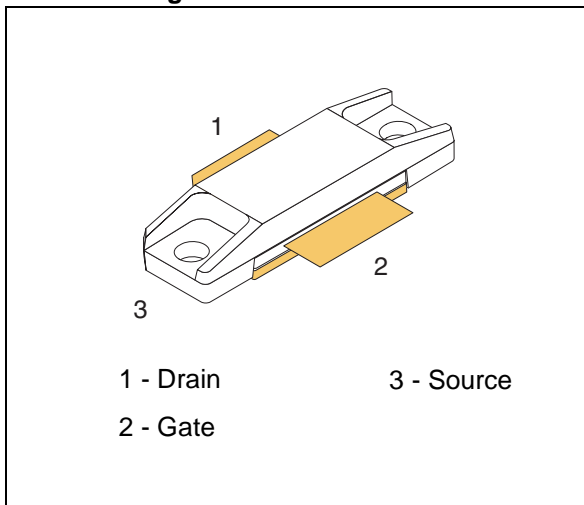


Figure 1. Pin connection



Features

- Excellent thermal stability
- Common source configuration push-pull
- $P_{OUT} = 350\text{ W}$ 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 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 5**

- 4 Typical performances 6**

- 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 (@ $T_C = 70\text{ °C}$) | 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 μ sec - 2%

2 Electrical characteristics

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

2.1 Static

Table 4. Static (per section)

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

2.2 Dynamic

$V_{dd} = 36\text{ V}$, $I_{dq} = 150\text{ mA}$, pulse width = $50\text{ }\mu\text{s}$, duty cycle = 2 %

Table 5. Dynamic

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

3 Impedance data

Figure 2. Impedance data

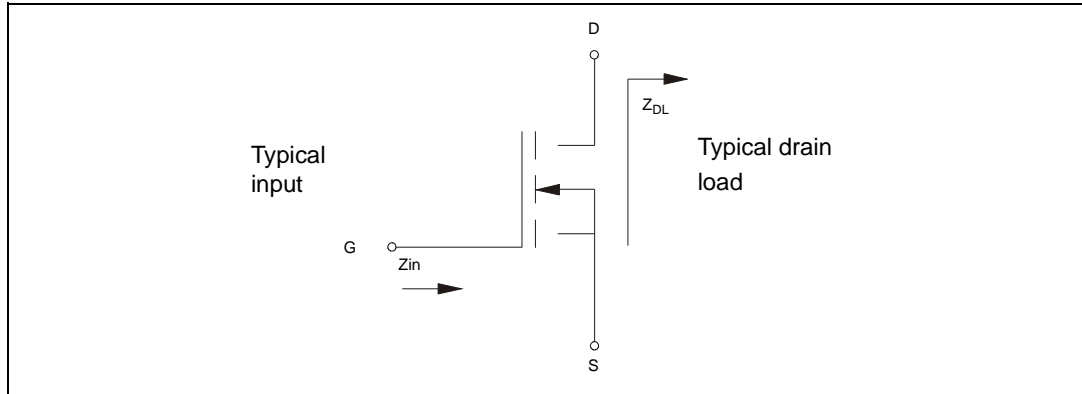


Table 6. Impedance data

| 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

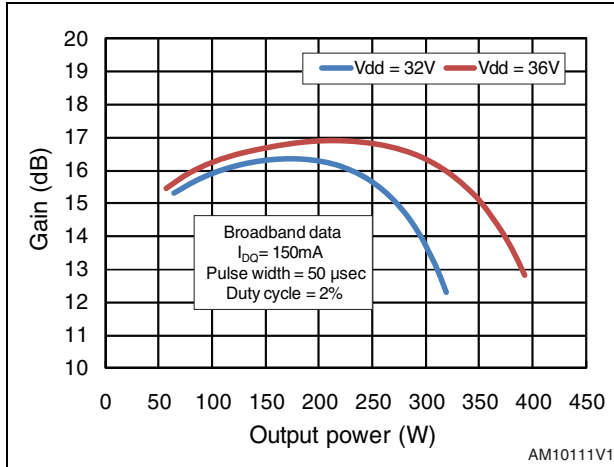


Figure 4. Output power and efficiency vs frequency - broadband data

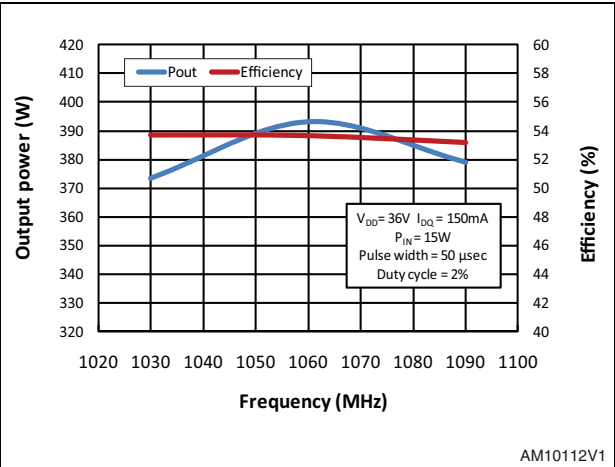


Figure 5. Output power vs gain and supply voltage @ 1060 MHz

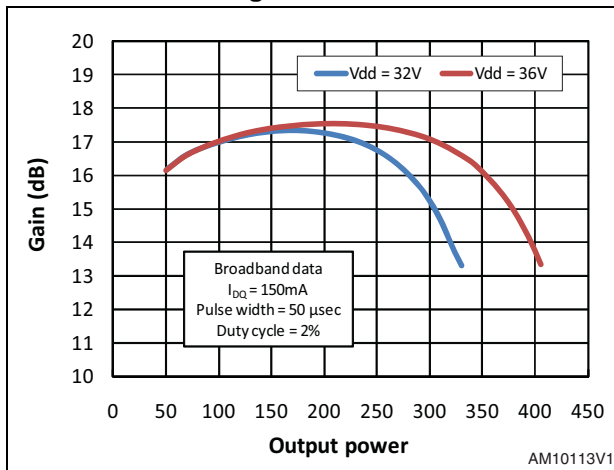


Figure 6. Gain and input return loss vs frequency - broadband data

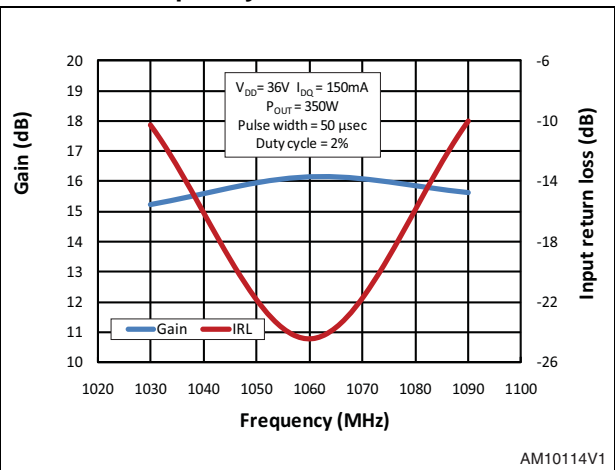


Figure 7. Output power vs gain and supply voltage @ 1090 MHz

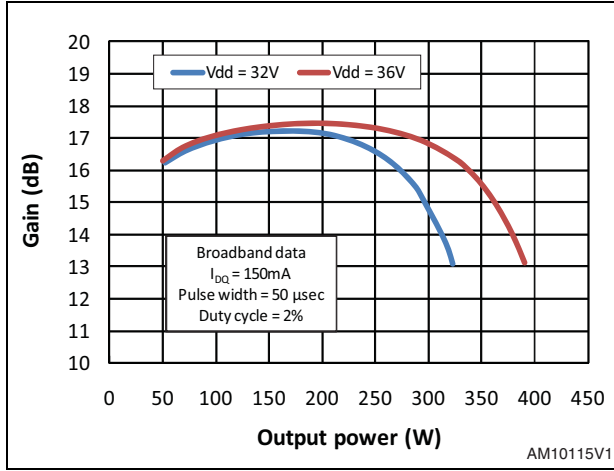


Figure 8. Output power vs input power - broadband data

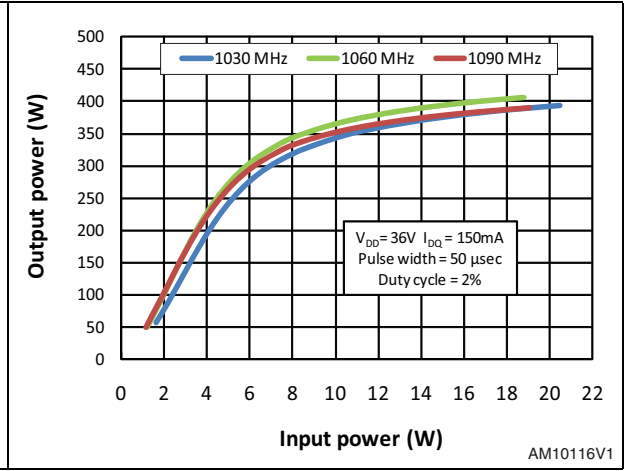
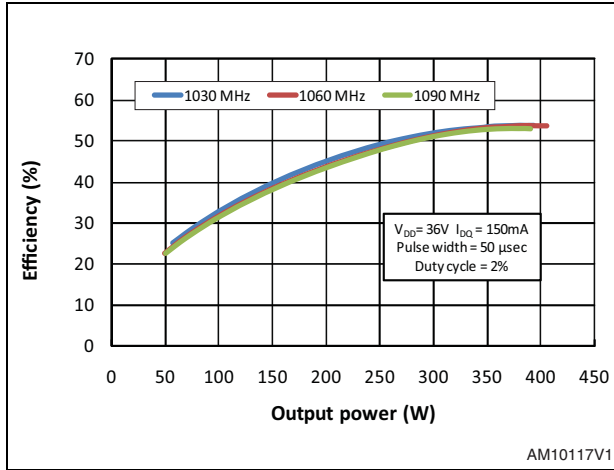


Figure 9. Efficiency vs output power - broadband data



5 Circuit and BOM

Figure 10. Broadband 1030-1090 MHz circuit

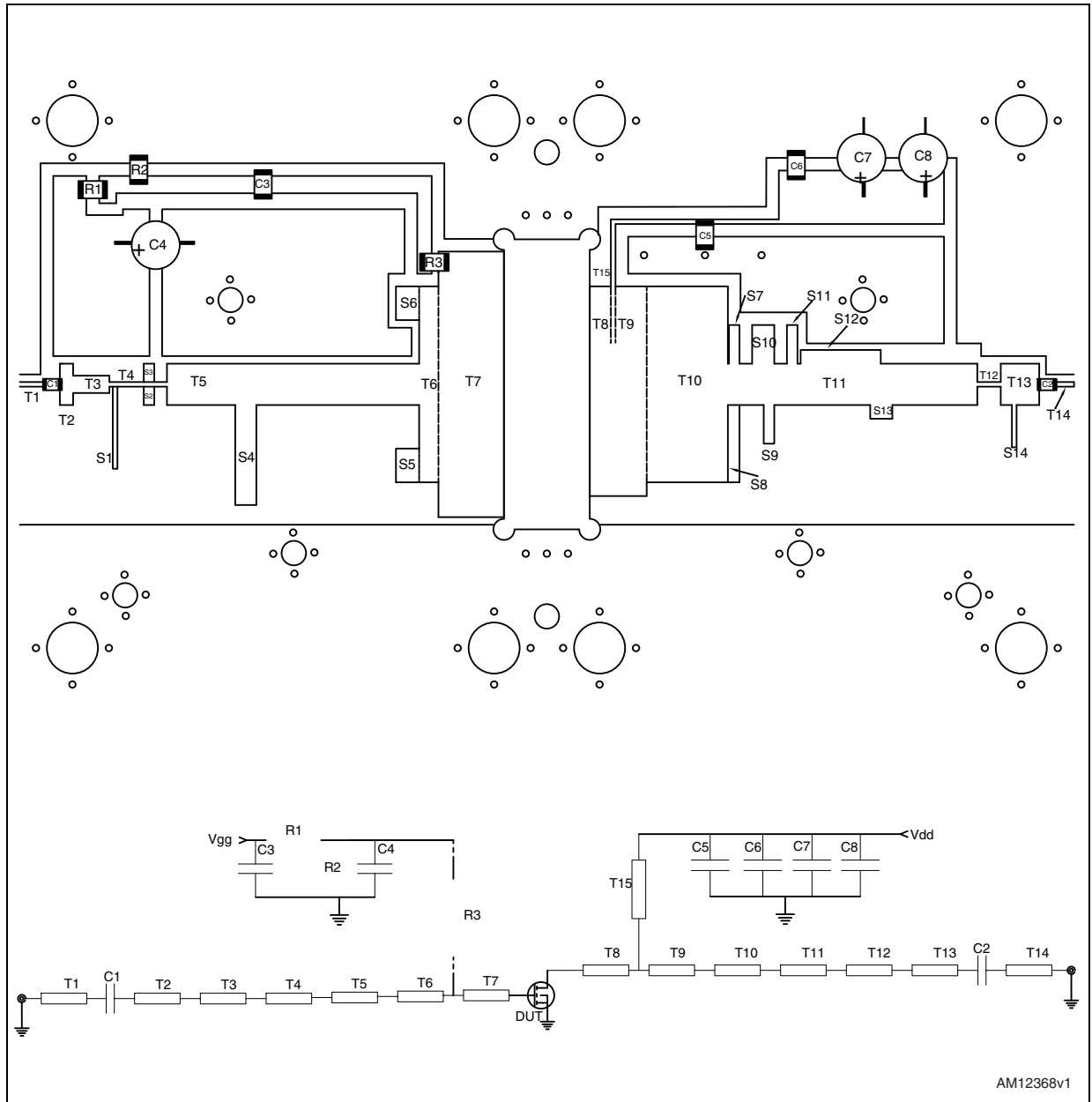


Table 7. Component list

| Component | 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" | |

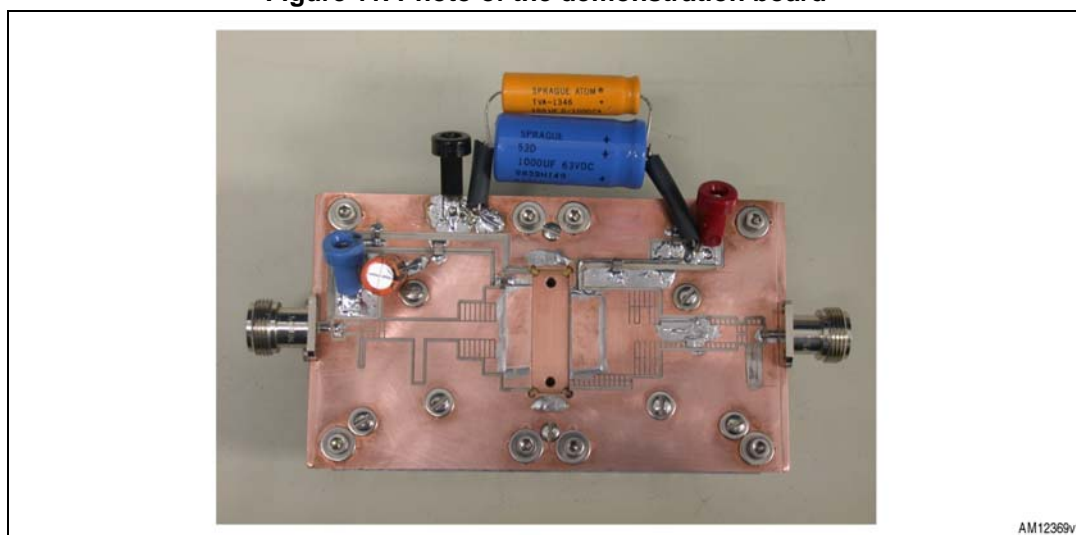
Table 7. Component list (continued)

| Component | 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 μ F, 63 V Electrolytic Capacitor | | 1000 μ F |
| C7 | 100 μ F, 100 V Electrolytic Capacitor | | 100 μ F |
| C6 | ATC700B122JT 50 X | | 1200 pF |
| C5 | ATC100B330KW500X | | 33 pF |
| C4 | ATC100B101KW500X | | 100 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 |

Table 7. Component list (continued)

| Component | 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

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 12. Package dimensions

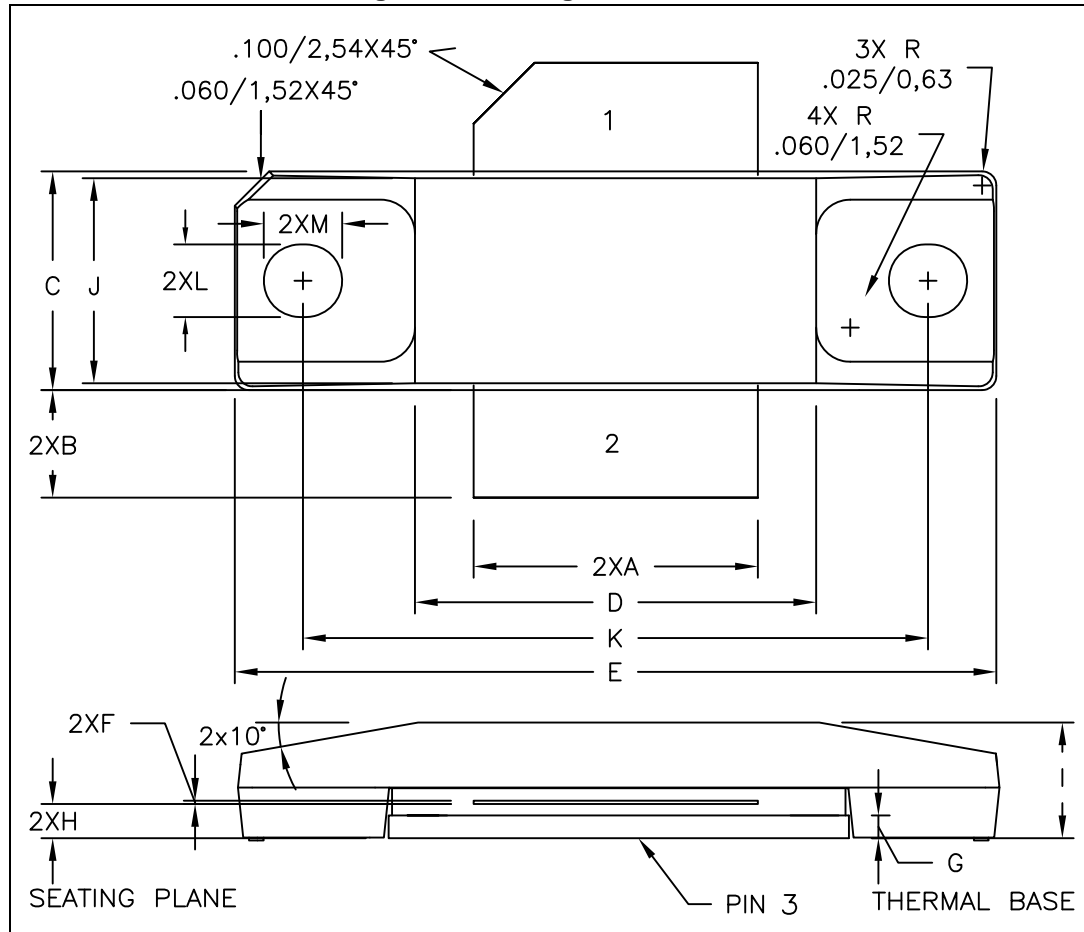


Table 8. STAC265B mechanical data

| 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. |

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2014 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics:](#)

[STAC1011-350](#)