



## SD2932

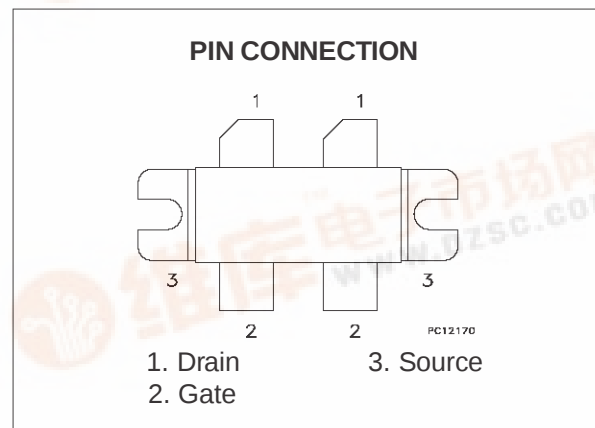
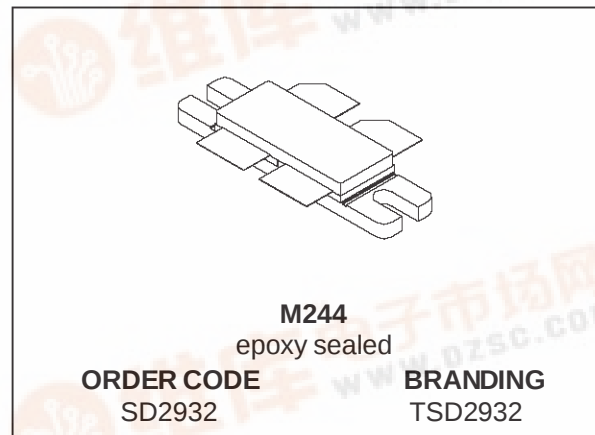
### RF POWER TRANSISTORS HF/VHF/UHF N-CHANNEL MOSFETs

#### PRELIMINARY DATA

- ✓ GOLD METALLIZATION
- ✓ EXCELLENT THERMAL STABILITY
- ✓ COMMON SOURCE CONFIGURATION, PUSH-PULL
- ✓ POUT = 300W MIN. WITH 15 dB GAIN @175 MHz

#### DESCRIPTION

The SD2932 is a gold metallized N-Channel MOS field-effect RF power transistor. The SD2932 is intended for use in 50V dc large signal applications up to 250 MHz



#### ABSOLUTE MAXIMUM RATINGS ( $T_{case} = 25^{\circ}C$ )

| Symbol        | Parameter                                  | Value      | Unit        |
|---------------|--------------------------------------------|------------|-------------|
| $V_{(BR)DSS}$ | Drain Source Voltage                       | 125        | V           |
| $V_{DGR}$     | Drain-Gate Voltage ( $R_{GS} = 1M\Omega$ ) | 125        | V           |
| $V_{GS}$      | Gate-Source Voltage                        | $\pm 20$   | V           |
| $I_D$         | Drain Current                              | 40         | A           |
| $P_{DISS}$    | Power Dissipation                          | 500        | W           |
| $T_j$         | Max. Operating Junction Temperature        | +200       | $^{\circ}C$ |
| $T_{STG}$     | Storage Temperature                        | -65 to 150 | $^{\circ}C$ |

#### THERMAL DATA

|               |                                    |      |               |
|---------------|------------------------------------|------|---------------|
| $R_{th(j-c)}$ | Junction-Case Thermal Resistance   | 0.35 | $^{\circ}C/W$ |
| $R_{th(c-s)}$ | Case Heatsink Thermal Resistance * | 0.12 | $^{\circ}C/W$ |

\* Determined using a flat aluminum or copper heatsink with thermal compound applied (Dow Corning 340 or equivalent).

# SD2932

## ELECTRICAL SPECIFICATION (T<sub>case</sub> = 25 °C)

### STATIC (per section)

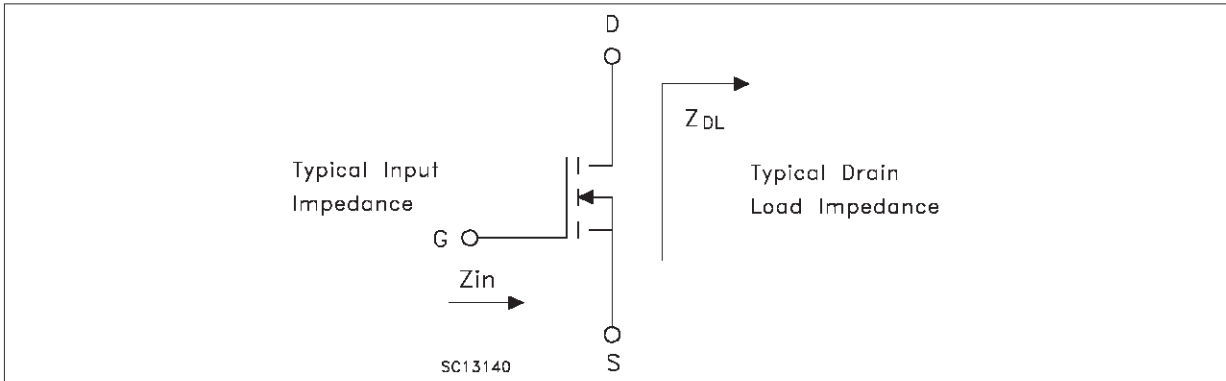
| Symbol               | Parameter              |                          |           | Min. | Typ. | Max. | Unit |
|----------------------|------------------------|--------------------------|-----------|------|------|------|------|
| V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V  | I <sub>DS</sub> = 100 mA |           | 125  |      |      | V    |
| I <sub>DSS</sub>     | V <sub>GS</sub> = 0 V  | V <sub>DS</sub> = 50 V   |           |      |      | 5    | mA   |
| I <sub>GSS</sub>     | V <sub>GS</sub> = 20 V | V <sub>DS</sub> = 0 V    |           |      |      | 5    | μA   |
| V <sub>GS(Q)</sub>   | V <sub>DS</sub> = 10 V | I <sub>D</sub> = 250 mA  |           | 2    |      | 5    | V    |
| V <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V  | I <sub>D</sub> = 10 A    |           |      |      | 3    | V    |
| g <sub>fs</sub>      | V <sub>DS</sub> = 10V  | I <sub>D</sub> = 5 A     |           | 5    |      |      | mho  |
| C <sub>ISS</sub>     | V <sub>GS</sub> = 0V   | V <sub>DS</sub> = 50 V   | f = 1 MHz |      | 480  |      | pF   |
| C <sub>OSS</sub>     | V <sub>GS</sub> = 0V   | V <sub>DS</sub> = 50 V   | f = 1 MHz |      | 190  |      | pF   |
| C <sub>RSS</sub>     | V <sub>GS</sub> = 0V   | V <sub>DS</sub> = 50 V   | f = 1 MHz |      | 18   |      | pF   |

REF.7163911A

### DYNAMIC

| Symbol           | Parameter        |                        |                          | Min. | Typ. | Max. | Unit |
|------------------|------------------|------------------------|--------------------------|------|------|------|------|
| P <sub>OUT</sub> | f = 175 MHz      | V <sub>DD</sub> = 50 V | I <sub>DQ</sub> = 500 mA | 300  |      |      | W    |
| G <sub>PS</sub>  | f = 175 MHz      | V <sub>DD</sub> = 50 V | P <sub>out</sub> = 300 W | 15   | 16   |      | dB   |
| η <sub>D</sub>   | f = 175 MHz      | V <sub>DD</sub> = 50 V | P <sub>out</sub> = 300 W | 50   | 60   |      | %    |
| Load Mismatch    | f = 175 MHz      | V <sub>DD</sub> = 50 V | P <sub>out</sub> = 300 W | 5:1  |      |      | VSWR |
|                  | All Phase Angles |                        |                          |      |      |      |      |

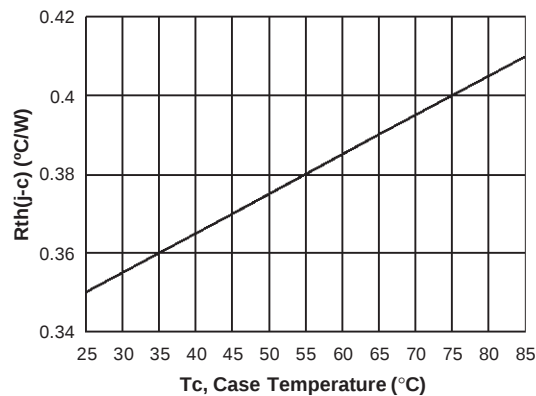
### IMPEDANCE DATA



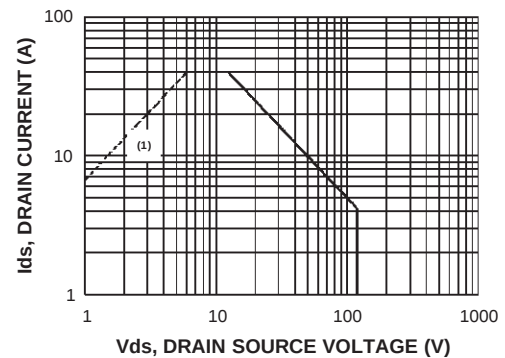
| FREQ.   | Z <sub>IN</sub> (Ω) | Z <sub>DL</sub> (Ω) |
|---------|---------------------|---------------------|
| 175 MHz | 0.92 - j 0.14       | 3.17 + j 4.34       |

Measured Gate to Gate and Drain to Drain, respectively.

Maximum Thermal Resistance vs Case Temperature

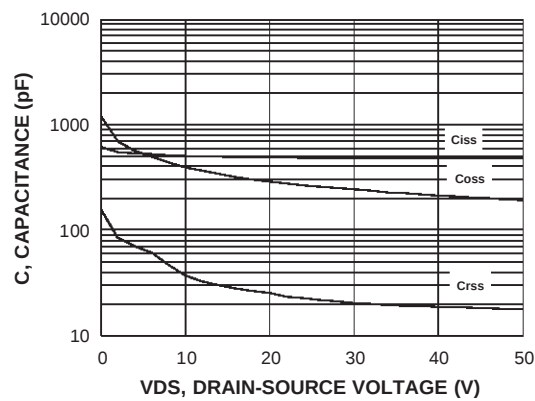


DC Safe Operating Area

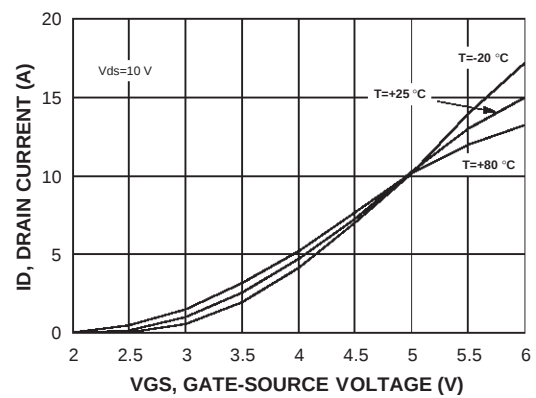


(1) Current in this area may be limited by  $R_{DS(on)}$   
Two sides, each section equally loaded

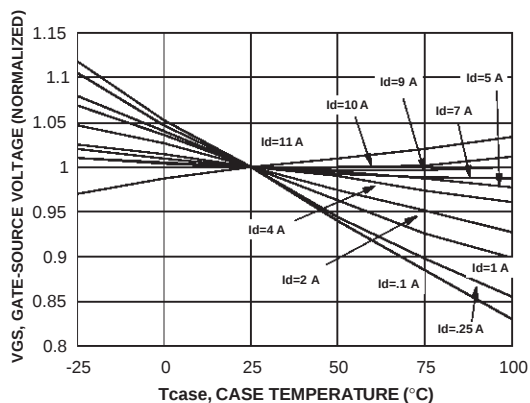
Capacitance vs Drain-Source Voltage



Drain Current vs Gate Voltage

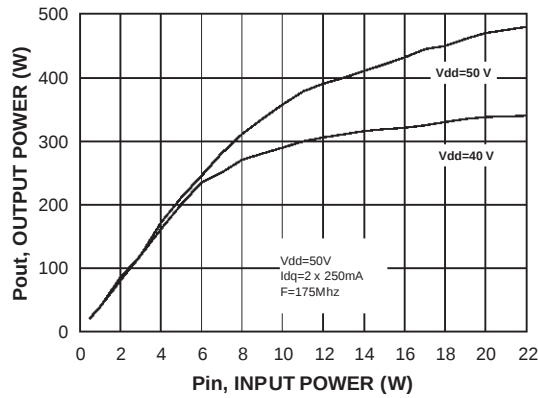


Gate Voltage vs Case Temperature

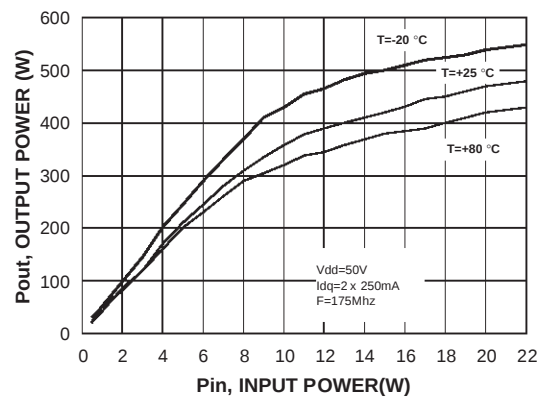


TYPICAL PERFORMANCE (175 MHz)

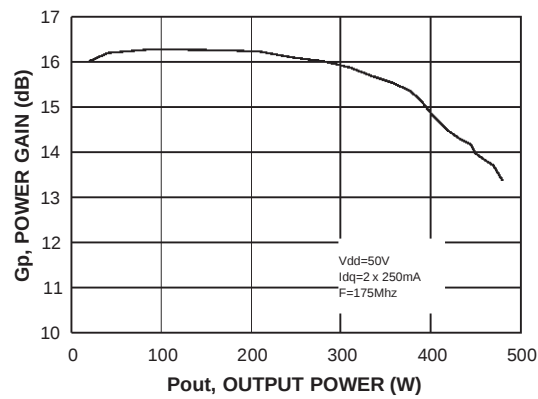
Output Power vs Input Power



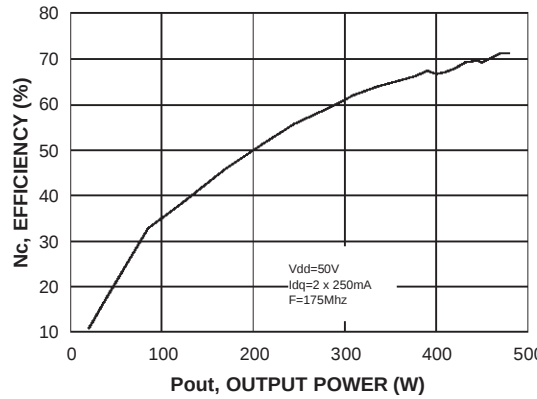
Output Power vs Input Power



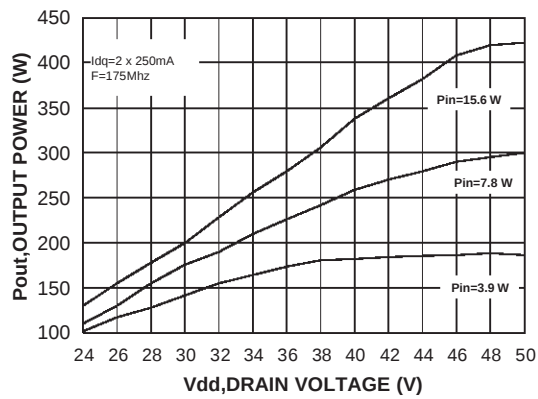
Power Gain vs. Output Power



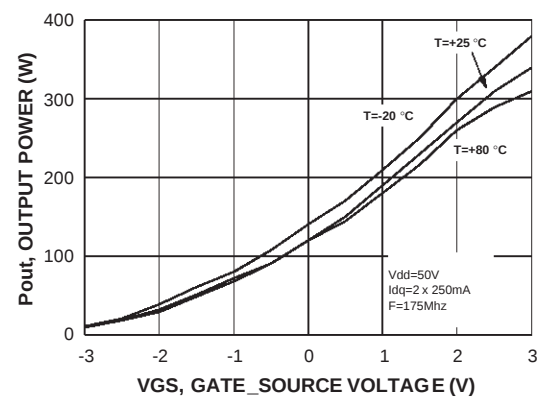
Efficiency vs. Output Power



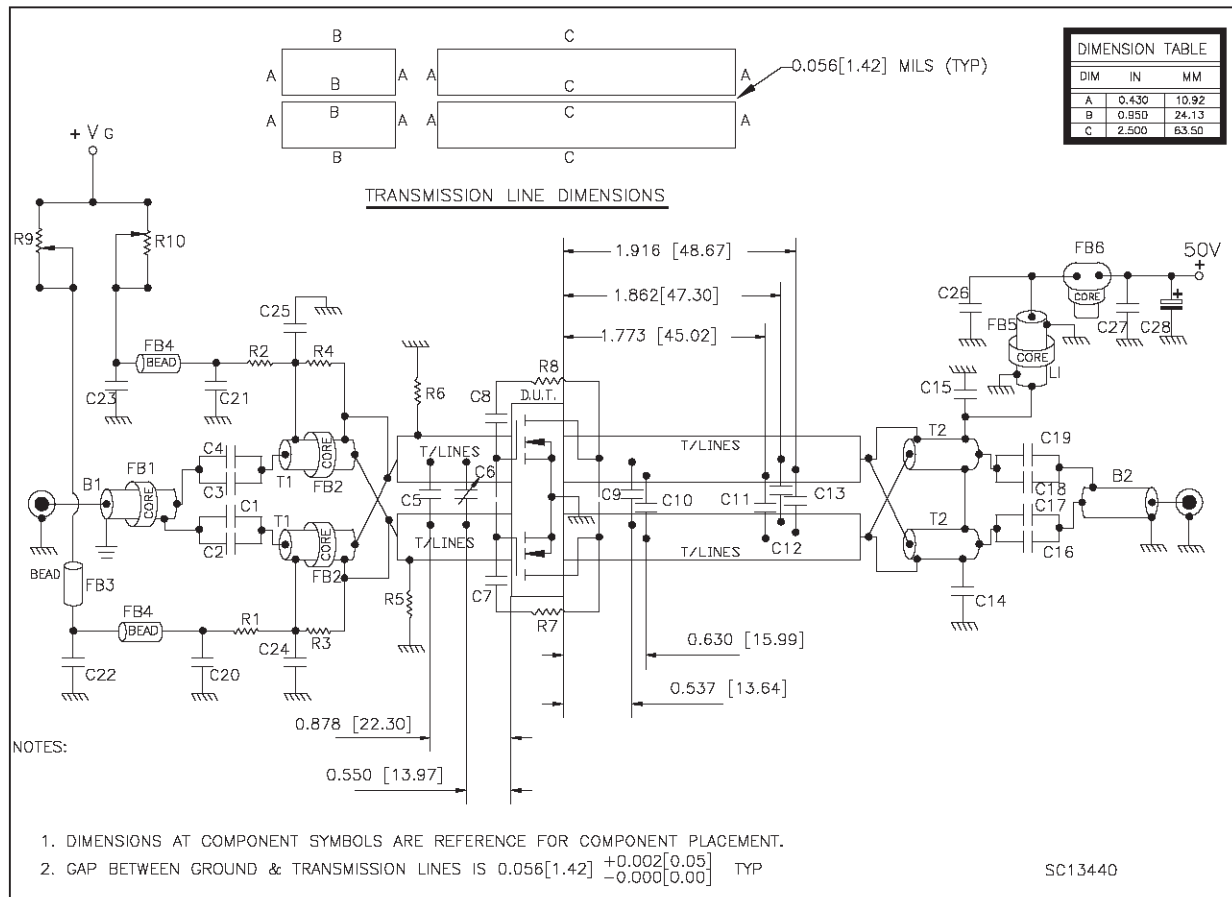
Output Power vs Supply Voltage



Output Power vs Gate Voltage



## 175 MHz Test Circuit Schematic (Production Test Circuit)

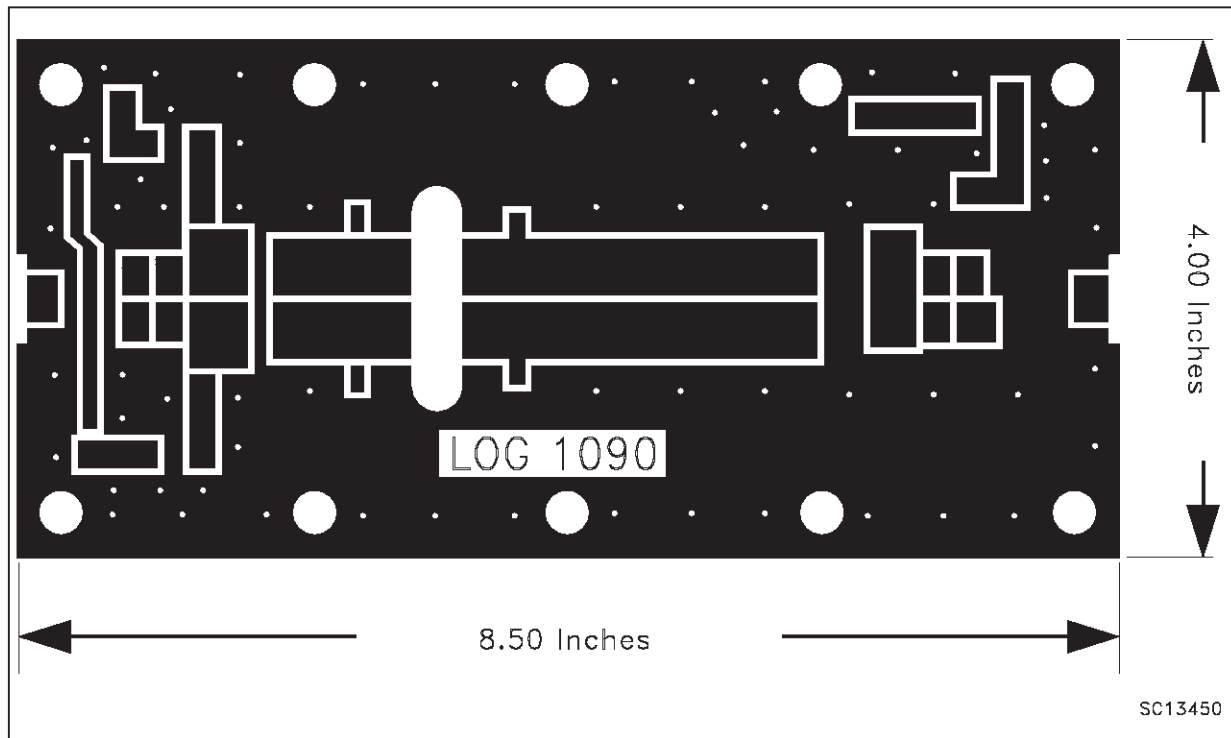


REF. 1022256B

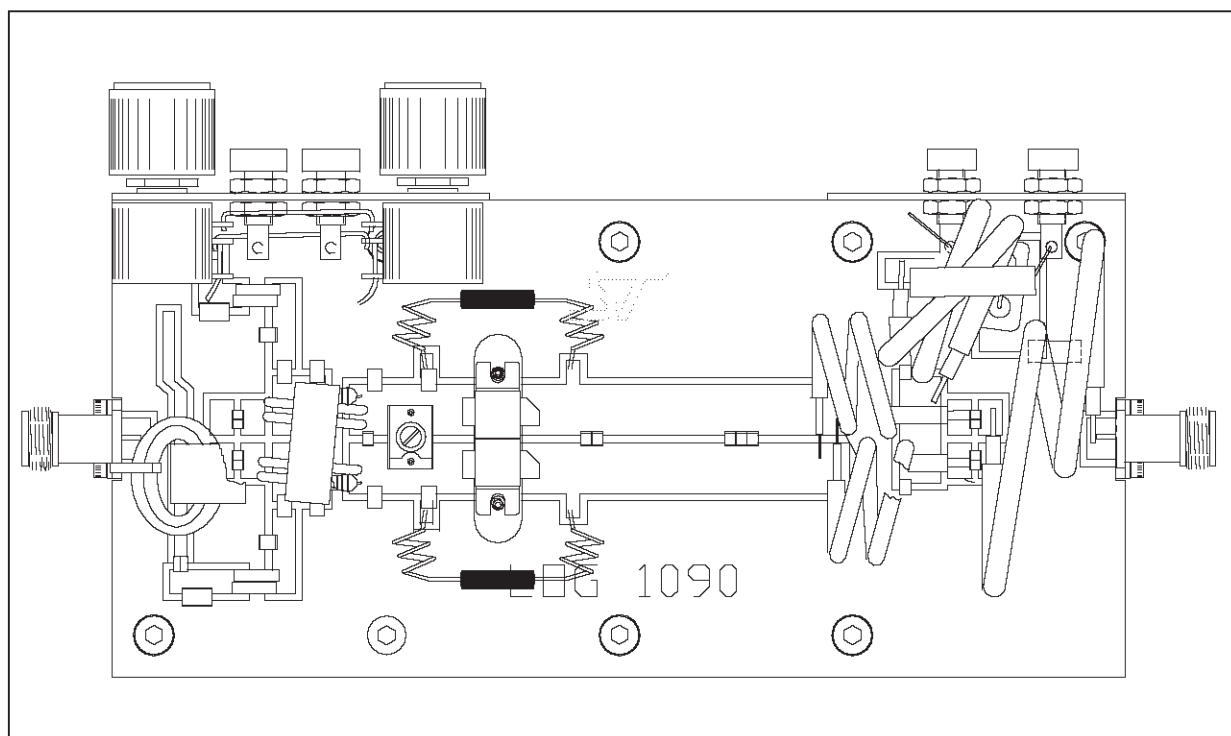
## 175 MHz Test Circuit Component Part List

| Component                      | Part Number        | Vendor         | Description                                                                                                                              |
|--------------------------------|--------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------|
| R1/R2                          | CR2412-1W-471JB    | VENKEL         | 470 Ohm 1 W, Surface Mount Chip Resistor                                                                                                 |
| R3/R4                          |                    | DALE           | 360 Ohm 0.5 W, Carbon Comp. Axial Lead Resistor or Equiv.                                                                                |
| R5/R6                          | CR2512-1W-471JB    | VENKEL         | 470 Ohm 1 W, Surface Mount Chip Resistor                                                                                                 |
| R7/R8                          | RS 2B              | DALE           | 560 Ohm 2 W, Resistor Two Turn Wire Air-Wound Axial Lead Resistor                                                                        |
| R9/R10                         | 534 - 1 - 1 - 203  | SPECTROL       | 20 KOhm 3.09 W, 10 Turn Wirewound Precision Potentiometer                                                                                |
| C1/C4                          | ATC130B681KP50X    | ATC            | 680 pF ATC 130B Surface Mount Ceramic Chip Capacitor                                                                                     |
| C2/C7/C8<br>C17/C19<br>C20/C21 | ATC200B103MW50X    | ATC            | 10000 pF ATC 200B Surface Mount Ceramic Chip Capacitor                                                                                   |
| C3                             | ATC200B122MW50X    | ATC            | 10000 pF ATC 200B Surface Mount Ceramic Chip Capacitor                                                                                   |
| C5                             | ATC100B750KP500X   | ATC            | 75 pF ATC 100B Surface Mount Ceramic Chip Capacitor                                                                                      |
| C6                             | 406                | ARCO           | ST40 25 pF -115pF Miniature Variable Trimmer                                                                                             |
| C9/C10                         | ATC100B470KP500X   | ATC            | 47 pF ATC 100B Surface Mount Ceramic Chip Capacitor                                                                                      |
| C11-C12<br>C13                 | ATC100B430KP500X   | ATC            | 43 pF ATC 100B Surface Mount Ceramic Chip Capacitor                                                                                      |
| C14-C15<br>C24-C25             | ATC700B122MW50X    | ATC            | 1200 pF ATC 700B Surface Mount Ceramic Chip Capacitor                                                                                    |
| C16-C18                        | ATC700B471MP200X   | ATC            | 470 pF ATC 700B Surface Mount Ceramic Chip Capacitor                                                                                     |
| C22-C23                        | GRM43-4X7R104K500  | MURATA         | 0.1 $\mu$ F / 500V Surface Mount Ceramic Chip Capacitor                                                                                  |
| C26                            | C1812X7R501-103KNE | VENKEL         | 0.01 $\mu$ F / 500V Surface Mount Ceramic Chip Capacitor                                                                                 |
| C27                            | GRM43-4X7R-104K500 | MURATA         | 0.01 $\mu$ F / 500V Surface Mount Ceramic Chip Capacitor                                                                                 |
| C28                            | SME63T10RM         | MARCON         | 10 $\mu$ F / 63 V Aluminum Electrolytic Axial Lead Capacitor                                                                             |
| B1                             |                    |                | 50 Ohm RG316, O.D. 0.076[1.93] L=11.80[299.72] Flexible Coaxial Cable 4 Turns thru Fair-rite Bead                                        |
| B2                             | 83242              | BELDEN         | 50 Ohm RG-142B O.D. 0.165[4.19] L=11.80[299.72] Flexible Coaxial Cable                                                                   |
| T1                             |                    |                | R.F. Transformer 4:1, 25 Ohm RG316-25, O.D. 0.080[2.03] L=5.90[149.86] Flexible Coaxial Cable 2 Turns Thru Fair-rite Multi-aperture Core |
| T2                             | UT141-25           | MICRO COAX     | R.F. Transformer 1:4, 25 Ohm Semi-rigid Coaxial Cable O.D. 0.141[3.58] L=5.90[149.86]                                                    |
| L1                             | 83242              | BELDEN         | Inductor $\lambda$ 1/4 Wave 50 Ohm O.D. 0.165[4.19] L=11.80[299.72] Flexible Coaxial Cable 2 Turns Thru Fair-rite Bead                   |
| FB1                            | 2643665802         | FAIR-RITE CORP | Shield Bead                                                                                                                              |
| FB2                            | 2843009902         | FAIR-RITE CORP | Multi-aperture Core                                                                                                                      |
| FB3                            | 2518068007         | FAIR-RITE CORP | Multilayer Ferrite Chip Bead (Surface Mount)                                                                                             |
| FB4                            | 2743021447         | FAIR-RITE CORP | Surface Mount Emi Shield Bead                                                                                                            |
| FB5                            | 2643801002         | FAIR-RITE CORP | Shield Bead                                                                                                                              |
| FB6                            | 2843010402         | FAIR-RITE CORP | Multi-aperture Core                                                                                                                      |
| PCB                            | G0600M1016QA       | ROGERS CORP    | Woven Glass Reinforced PTFE Microwave Laminate 0.06", 1oz EDCu, Both sides, $\epsilon_r = 2.55$                                          |

175 MHz Test Circuit Photomaster

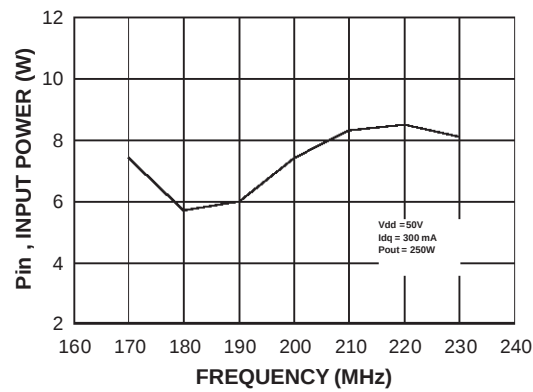


175 MHz Test Fixture

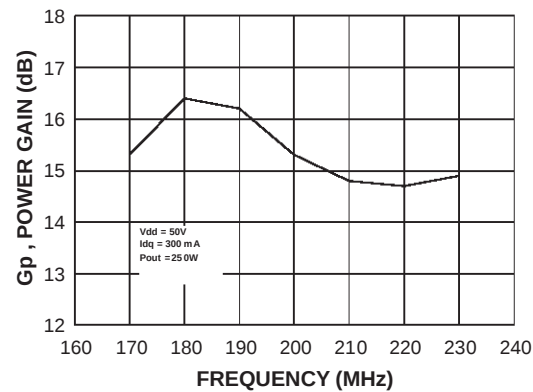


TYPICAL BROADBAND DATA (175 - 230 MHz)

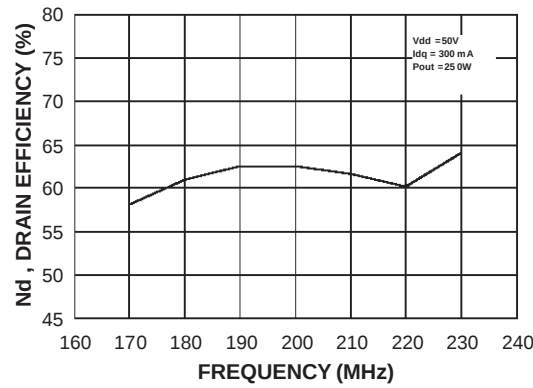
Input Power vs Frequency



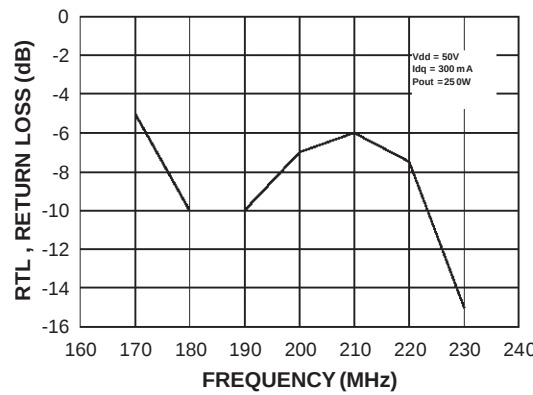
Power Gain vs Frequency



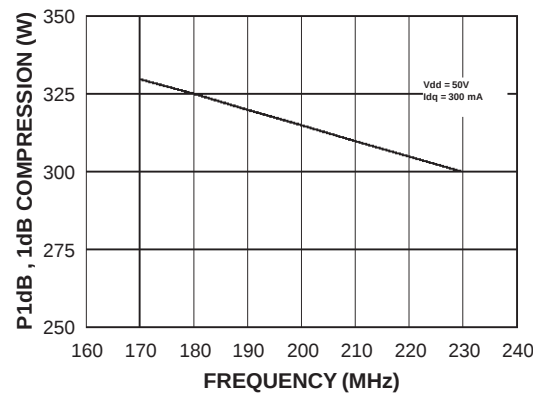
Efficiency vs Frequency



Return Loss vs Frequency



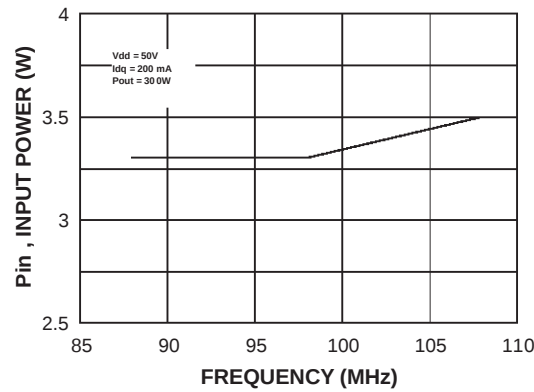
1 dB Compression Point vs Frequency



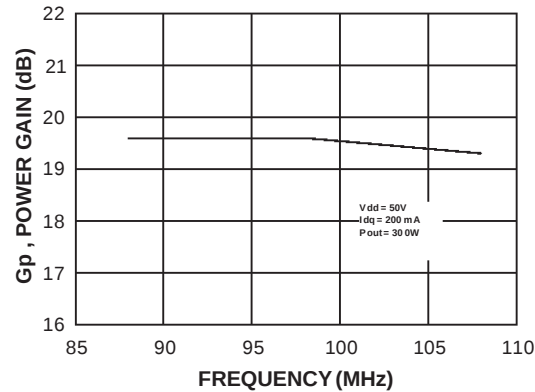


TYPICAL BROADBAND DATA (88 - 108 MHz)

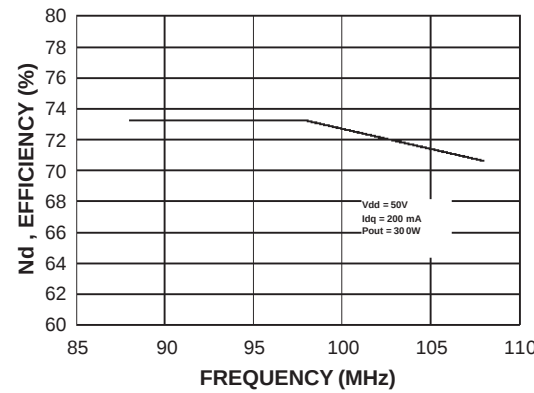
Input Power vs Frequency



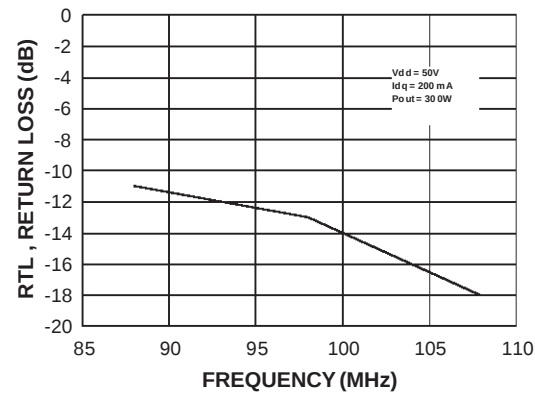
Power Gain vs Frequency



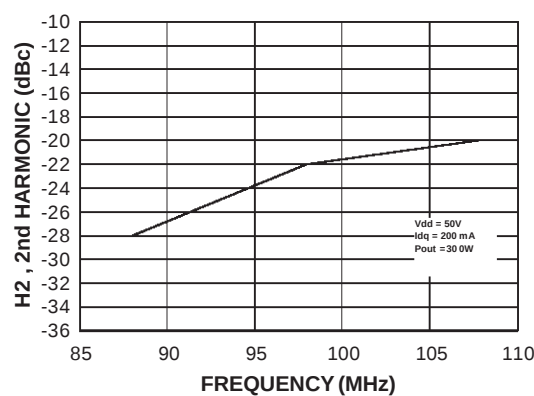
Efficiency vs Frequency



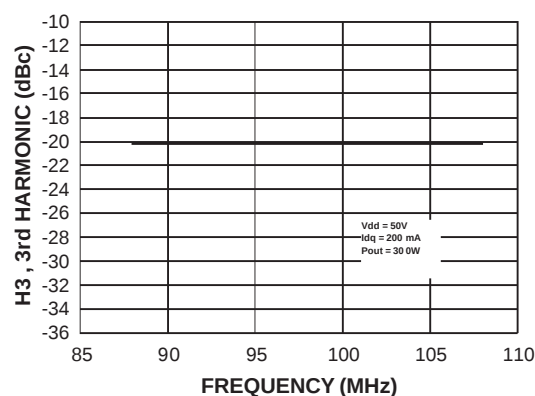
Return Loss vs Frequency



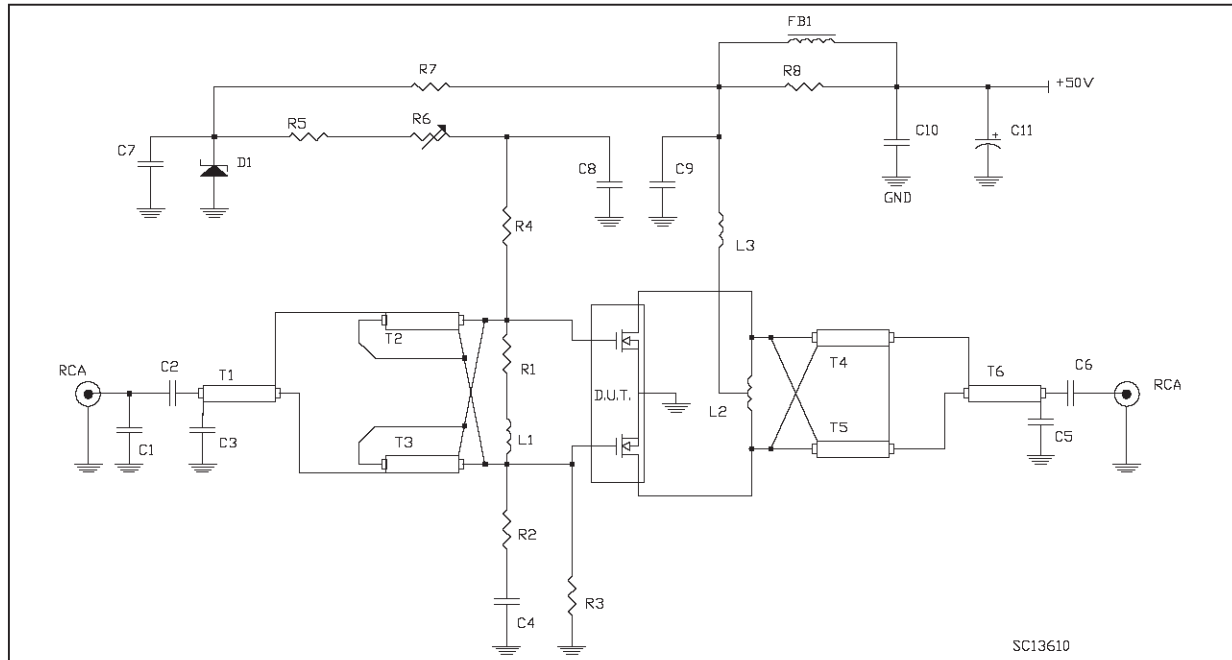
2nd Harmonic vs Frequency (88 - 108 MHz)



3rd Harmonic vs Frequency (88 - 108 MHz)



## 88 - 108 MHz Circuit Layout (Engineering Fixture)

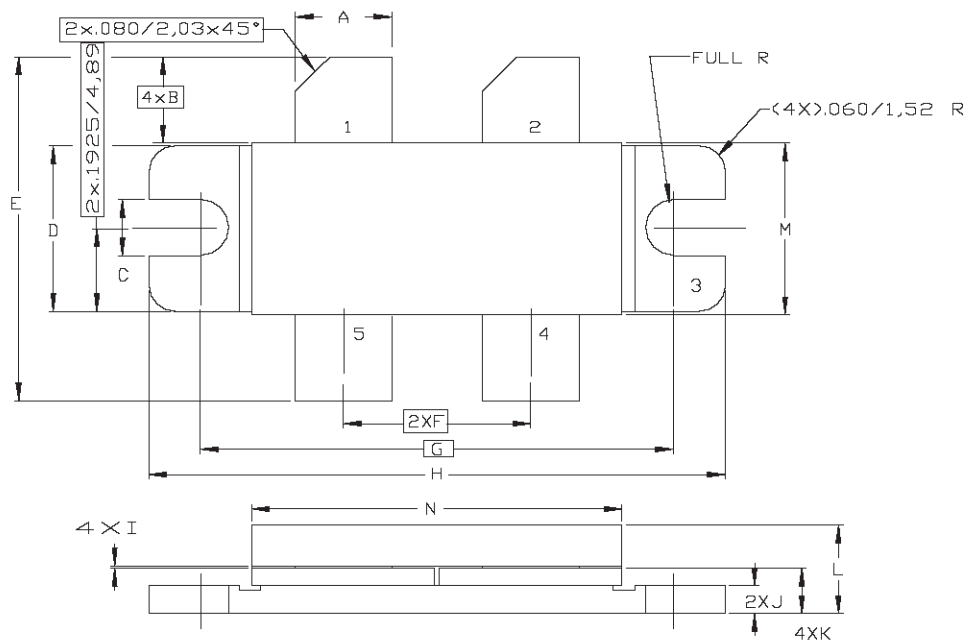


## 88 -108 MHz Circuit Layout Component Part List

|                        |                                                                                 |
|------------------------|---------------------------------------------------------------------------------|
| PCB                    | 1/32" Woven Fiberglass 0.030 Cu, 2 sides, er = 4.8                              |
| T1                     | 50 Ohm Flexible Coax Cable OD 0.06", 5" Long                                    |
| T2 / T3                | 9:1 Transformer, 25 Ohm Flexible Coax Cable OD 0.1", 3.9". Ferrite Core NEOSIDE |
| T4 / T5                | 4:1 Transformer, 25 Ohm Flexible Coax Cable OD 0.1", 5" Long                    |
| T6                     | 50 Ohm Flexible Coax Cable OD 0.1", 5" Long                                     |
| FB1                    | vk200                                                                           |
| C1                     | 10 pF Ceramic Cap                                                               |
| C2 / C3 / C4 / C7 / C8 | 1 nF Chip Cap                                                                   |
| C5 / C6                | 1 nF ATC chip Cap                                                               |
| C9                     | 470 pF ATC Chip Cap                                                             |
| C10                    | 100 nF Chip Cap                                                                 |
| C11                    | 100 uF / 63 V Electrolytic Cap                                                  |
| R1                     | 56 Ohm Resistor                                                                 |
| R2 / R4                | 10 Ohm Chip Resistor                                                            |
| R3                     | 10K Ohm Resistor                                                                |
| R5                     | 5.6 Ohm Resistor                                                                |
| R6                     | 10K Ohm, 10 Turn Trim Resistor                                                  |
| R7                     | 3.3K Ohm / 5 W Resistor                                                         |
| R8                     | 15 Ohm / 1 W Resistor                                                           |
| D1                     | 6.6 V Zener Diode                                                               |
| L1                     | 10 nH Inductor                                                                  |
| L2                     | 40 nH Inductor                                                                  |
| L3                     | 70 nH Inductor                                                                  |

**M244 (.400 x .860 4/L BAL N/HERM W/FLG) MECHANICAL DATA**

| DIM. | mm    |       |       | Inch  |       |       |
|------|-------|-------|-------|-------|-------|-------|
|      | MIN.  | TYP.  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 5.59  |       | 5.84  | 0.220 |       | 0.230 |
| B    |       | 5.08  |       |       | 0.200 |       |
| C    | 3.02  |       | 3.28  | 0.119 |       | 0.129 |
| D    | 9.65  |       | 9.91  | 0.380 |       | 0.390 |
| E    | 19.81 |       | 20.83 | 0.780 |       | 0.820 |
| F    | 10.92 |       | 11.18 | 0.430 |       | 0.440 |
| G    |       | 27.94 |       |       | 1.100 |       |
| H    | 33.91 |       | 34.16 | 1.335 |       | 1.345 |
| I    | 0.10  |       | 0.15  | 0.004 |       | 0.006 |
| J    | 1.52  |       | 1.78  | 0.060 |       | 0.070 |
| K    | 2.59  |       | 2.84  | 0.102 |       | 0.112 |
| L    | 4.83  |       | 5.84  | 0.190 |       | 0.230 |
| M    | 10.03 |       | 10.34 | 0.395 |       | 0.407 |
| N    | 21.59 |       | 22.10 | 0.850 |       | 0.870 |



Note: Controlling dimension in Inches

1020876B

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics

© 2000 STMicroelectronics – Printed in Italy – All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco -  
Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.

<http://www.st.com>