

PTVA030121EA

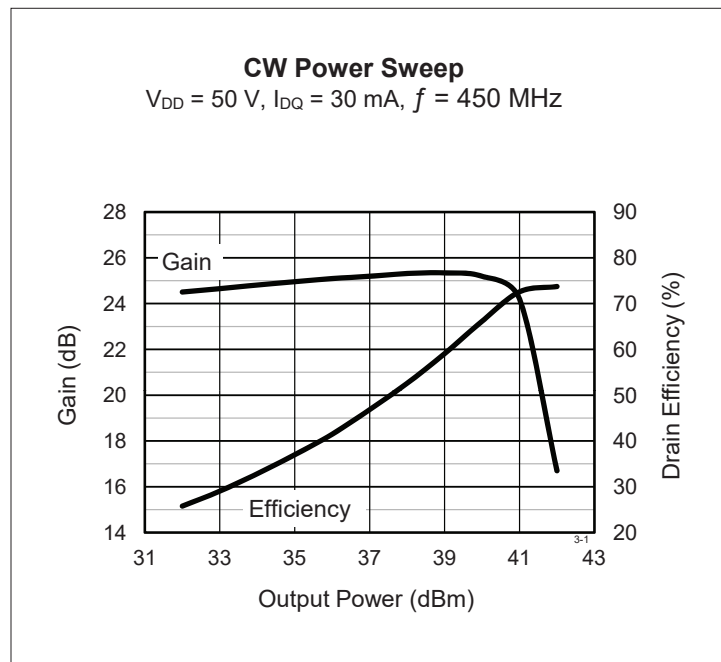
Thermally-Enhanced High Power RF LDMOS FET 12 W, 50 V, 390 – 450 MHz

Description

The PTVA030121EA is an LDMOS FET characterized for use in power amplifier applications in the 390 MHz to 450 MHz frequency band. Features include high gain and a thermally-enhanced package. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTVA030121EA
Package H-36265-2



Features

- Unmatched input and output
- Integrated ESD protection
- Human Body Model Class 1C (per ANSI/ESDA/ JEDEC JS-001)
- High gain, low thermal resistance
- Excellent ruggedness
- Capable of withstanding a 13:1 load mismatch at 50 V, 12 W, CW conditions
- Pb-free and RoHS compliant

RF Characteristics

CW Measurements

$V_{DD} = 50\text{ V}$, $I_{DQ} = 50\text{ mA}$, $P_{OUT} = 12\text{ W}$, $f = 450\text{ MHz}$

| Characteristic | Symbol | Min | Typ | Max | Unit |
|------------------|----------|-----|-----|-----|------|
| Gain | Gps | 23 | 25 | — | dB |
| Drain Efficiency | η_D | 66 | 69 | — | % |

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------|---|---------------|-----|-----|------|---------------|
| Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_{DS} = 1\text{ mA}$ | $V_{(BR)DSS}$ | 105 | — | — | V |
| Drain Leakage Current | $V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 1.0 | μA |
| | $V_{DS} = 105\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 10.0 | μA |
| On-State Resistance | $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 2.8 | — | Ω |
| Operating Gate Voltage | $V_{DS} = 50\text{ V}, I_{DQ} = 50\text{ mA}$ | V_{GS} | — | 3.6 | — | V |
| Gate Leakage Current | $V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$ | I_{GSS} | — | — | 1.0 | μA |

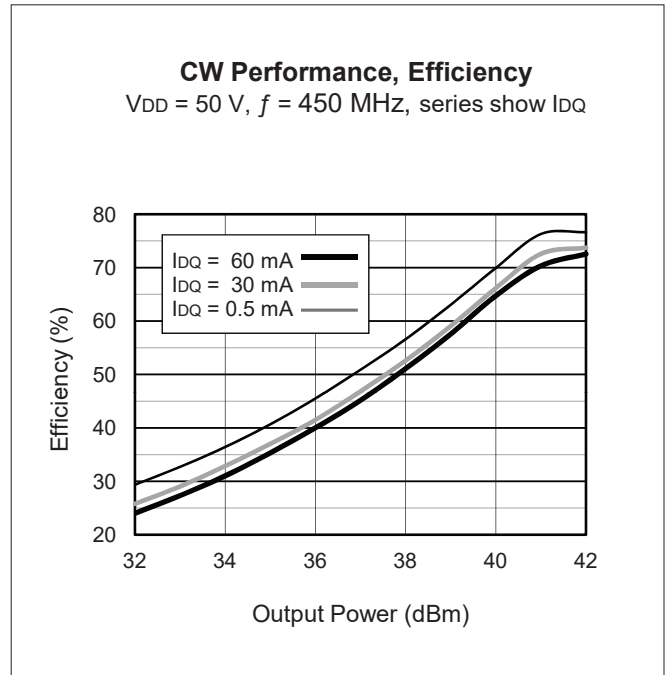
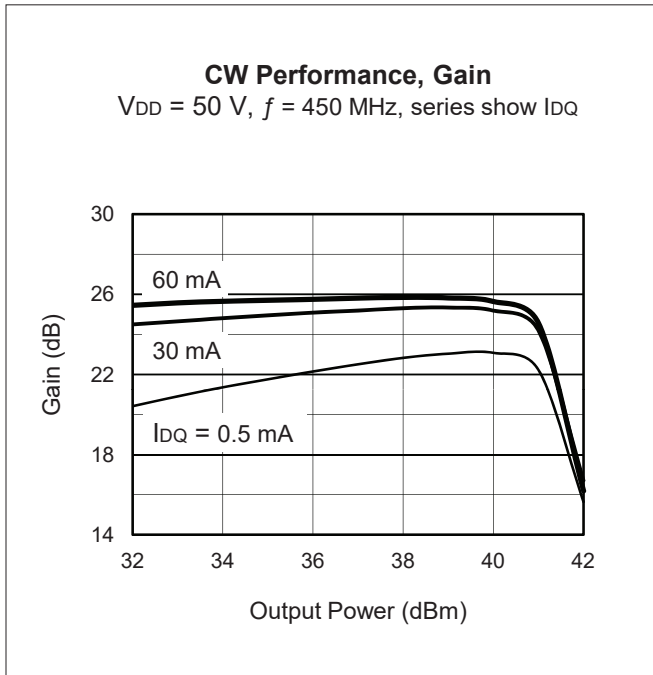
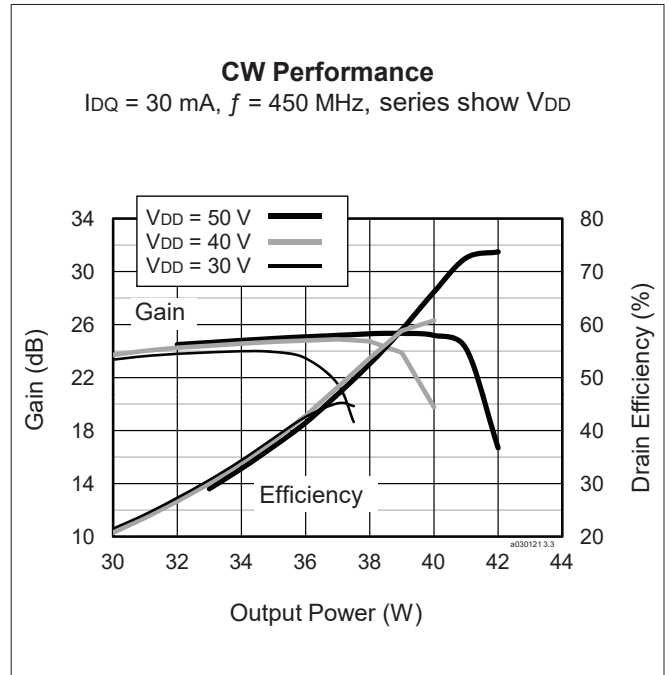
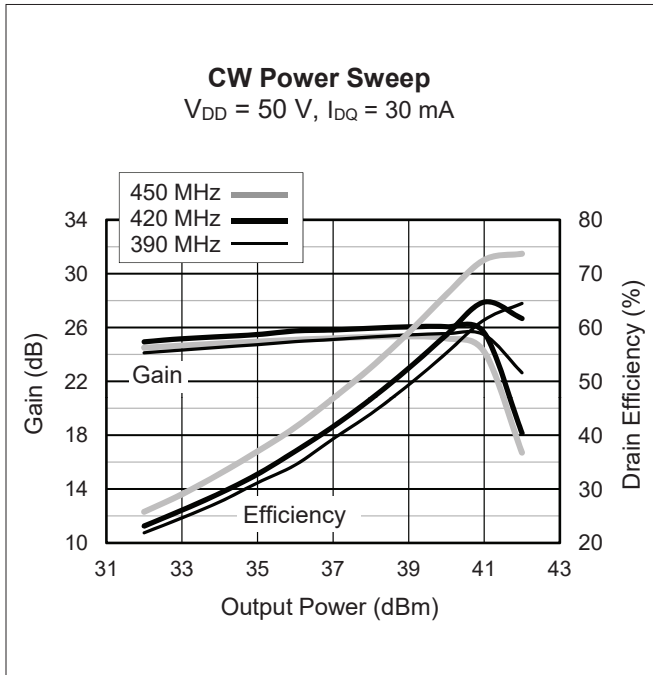
Maximum Ratings

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------------|----------------------|
| Drain-Source Voltage | V_{DSS} | 105 | V |
| Gate-Source Voltage | V_{GS} | -6 to +12 | V |
| Operating Voltage | V_{DD} | 0 to +55 | V |
| Junction Temperature | T_J | 225 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 to +150 | $^{\circ}\text{C}$ |
| Thermal Resistance ($T_{CASE} 70^{\circ}\text{C}, 12\text{ W CW}$) | $R_{\theta JC}$ | 6.5 | $^{\circ}\text{C/W}$ |

Ordering Information

| Type and Version | Order Code | Package and Description | Shipping |
|----------------------|----------------------|-------------------------|---------------------|
| PTVA030121EA V1 R0 | PTVA030121EA-V1-R0 | H-36265-2, bolt-down | Tape & Reel, 50pcs |
| PTVA030121EA V1 R250 | PTVA030121EA-V1-R250 | H-36265-2, bolt-down | Tape & Reel, 250pcs |

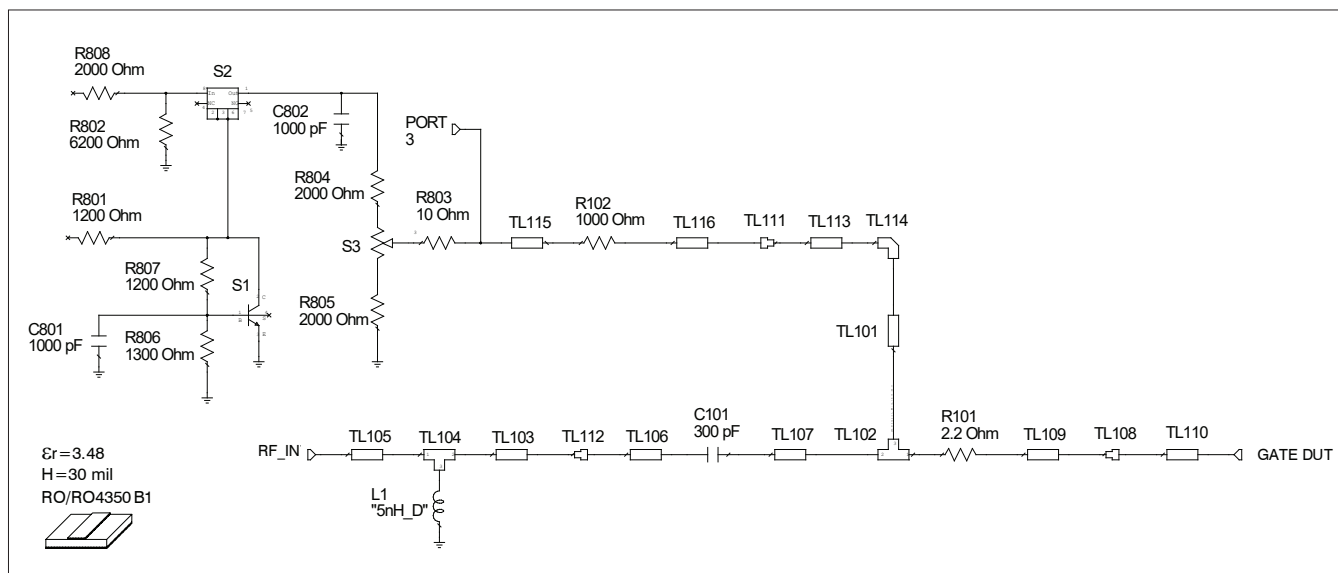
Typical Performance (data taken in a production test circuit)



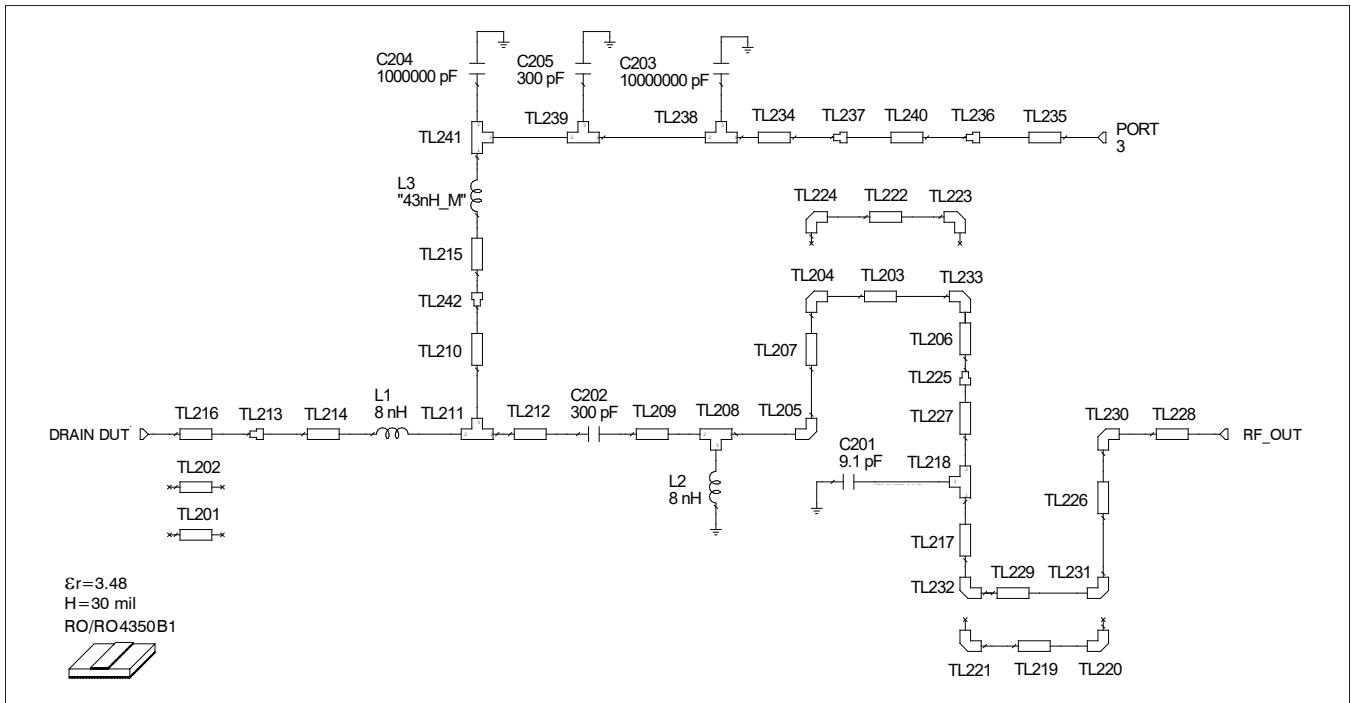
Broadband Circuit Impedance

| Frequency MHz | Z Source Ω | | Z Load Ω | |
|------------------|-------------------|-------|-----------------|-------|
| | R | jX | R | jX |
| 390 | 22.20 | 34.88 | 4.26 | 15.04 |
| 405 | 21.95 | 34.74 | 4.46 | 15.82 |
| 420 | 21.39 | 34.99 | 4.66 | 16.62 |
| 435 | 20.61 | 35.80 | 4.88 | 17.42 |
| 450 | 19.77 | 37.03 | 5.11 | 18.23 |

Reference Circuit



Reference Circuit (cont.)



Reference circuit output schematic for $f = 450 \text{ MHz}$

Reference Circuit Assembly

| | |
|---|---|
| DUT | PTFA030121EA |
| Test Fixture Part No. | LTN/PTFA030121EA |
| PCB | Rogers RO4350, 0.508 mm [0.020"] thick, 1 oz. copper, $\epsilon_r = 3.48$ |
| Find Gerber files for this test fixture on the Wolfspeed Web site at www.wolfspeed.com/RF | |

Electrical Characteristics at 450 MHz

| Transmission Line | Electrical Characteristics | Dimensions: mm | Dimensions: mils |
|-------------------|----------------------------------|---------------------------------|---------------------------|
| Input | | | |
| TL101 | 0.009 λ , 92.76 Ω | W = 0.51, L = 3.81 | W = 20, L = 150 |
| TL102 | 0.001 λ , 45.29 Ω | W1 = 2.03, W2 = 2.03, W3 = 0.51 | W1 = 80, W2 = 80, W3 = 20 |
| TL103 | 0.001 λ , 52.21 Ω | W = 1.63, L = 0.43 | W = 64, L = 17 |
| TL105 | 0.025 λ , 52.21 Ω | W = 1.63, L = 10.13 | W = 64, L = 39 |
| TL106, TL109 | 0.003 λ , 45.29 Ω | W = 2.03, L = 1.27 | W = 80, L = 50 |
| TL107 | 0.002 λ , 45.29 Ω | W = 2.03, L = 0.76 | W = 80, L = 30 |
| TL110 | 0.013 λ , 16.51 Ω | W = 7.62, L = 5.08 | W = 300, L = 200 |
| TL113 | 0.002 λ , 92.76 Ω | W = 0.51, L = 1.02 | W = 20, L = 40 |
| TL115 | 0.013 λ , 54.31 Ω | W = 1.52, L = 5.08 | W = 60, L = 200 |
| TL116 | 0.003 λ , 54.31 Ω | W = 1.52, L = 1.02 | W = 60, L = 40 |

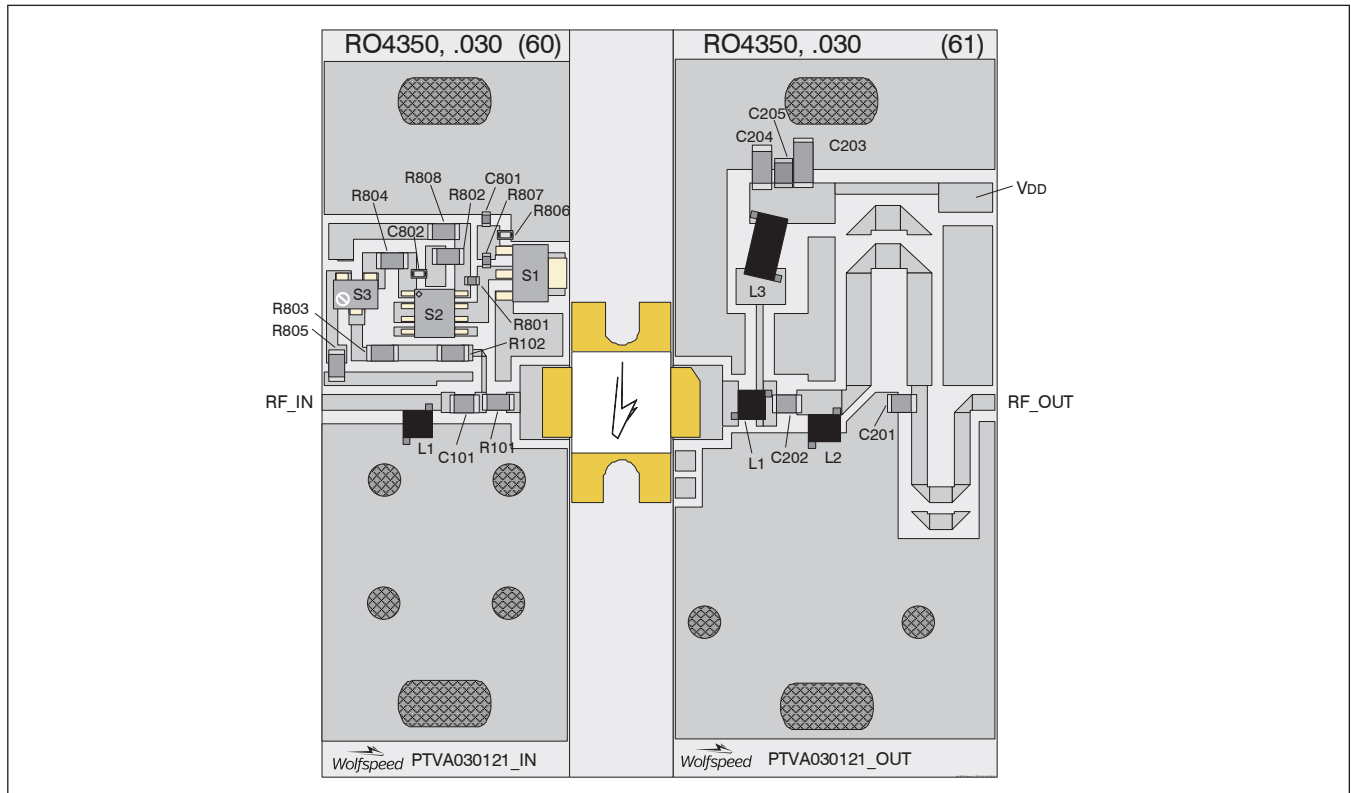
table continued next page

Reference Circuit (cont.)

Electrical Characteristics at 450 MHz

| Transmission Line | Electrical Characteristics | Dimensions: mm | Dimensions: mils |
|-------------------|----------------------------------|---------------------------------|------------------------------|
| Output | | | |
| TL201, TL202 | 0.005 λ , 45.29 Ω | W = 2.03, L = 2.04 | W = 80, L = 81 |
| TL203 | 0.006 λ , 38.92 Ω | W = 2.54, L = 2.54 | W = 100, L = 100 |
| TL206, TL207 | 0.029 λ , 38.92 Ω | W = 2.54, L = 11.43 | W = 100, L = 450 |
| TL209 | 0.009 λ , 38.92 Ω | W = 2.54, L = 3.56 | W = 100, L = 140 |
| TL210 | 0.018 λ , 78.46 Ω | W = 0.76, L = 7.62 | W = 30, L = 300 |
| TL211 | 0.002 λ , 25.11 Ω | W1 = 4.57, W2 = 4.57, W3 = 0.76 | W1 = 180, W2 = 180, W3 = 30 |
| TL212 | 0.003 λ , 25.11 Ω | W = 4.57, L = 1.27 | W = 180, L = 50 |
| TL214 | 0.004 λ , 25.11 Ω | W = 4.57, L = 1.52 | W = 180, L = 60 |
| TL215 | 0.010 λ , 23.09 Ω | W = 5.08, L = 3.81 | W = 200, L = 150 |
| TL216 | 0.013 λ , 16.51 Ω | W = 7.62, L = 5.08 | W = 300, L = 200 |
| TL217 | 0.018 λ , 52.21 Ω | W = 1.63, L = 7.29 | W = 64, L = 287 |
| TL219 | 0.006 λ , 52.21 Ω | W = 1.63, L = 2.41 | W = 64, L = 95 |
| TL222 | 0.006 λ , 38.92 Ω | W = 2.54, L = 2.54 | W = 100, L = 100 |
| TL226 | 0.018 λ , 52.21 Ω | W = 1.63, L = 7.34 | W = 64, L = 289 |
| TL227 | 0.002 λ , 52.21 Ω | W = 1.63, L = 0.84 | W = 64, L = 33 |
| TL228 | 0.006 λ , 52.21 Ω | W = 1.63, L = 2.30 | W = 64, L = 91 |
| TL229 | 0.006 λ , 52.21 Ω | W = 1.63, L = 2.41 | W = 64, L = 95 |
| TL234 | 0.005 λ , 27.14 Ω | W = 4.14, L = 2.12 | W = 163, L = 84 |
| TL235 | 0.014 λ , 34.38 Ω | W = 3.02, L = 5.51 | W = 119, L = 2 17 |
| TL240 | 0.026 λ , 61.53 Ω | W = 1.23, L = 10.63 | W = 48, L = 419 |
| TL241 | 0.010 λ , 38.92 Ω | W1 = 2.54, W2 2.54, W3 = 4.14 | W1 = 100, W2 = 100, W3 = 163 |

Reference Circuit (cont.)



Reference circuit assembly diagram (not to scale)

| Component ID | Description | Suggested Supplier | P/N |
|------------------|------------------------|---------------------------------|-------------------|
| Input | | | |
| C101 | Chip capacitor, 300 pF | ATC | ATC100B301JW200XB |
| C801, C802 | Capacitor, 1000 pF | Panasonic Electronic Components | ECJ-1VB1H102K |
| L1 | Inductor, 5 nH | Coilcraft | A02TGLB |
| R101 | Resistor, 2.2 Ω | Panasonic Electronic Components | ERJ-8GEYJ2R2V |
| R102 | Resistor, 1000 Ω | Panasonic Electronic Components | ERJ-8GEYJ102V |
| R801, R807 | Resistor, 1200 Ω | Panasonic Electronic Components | ERJ-3GEYJ122V |
| R802 | Resistor, 6200 Ω | Panasonic Electronic Components | ERJ-8GEYJ622V |
| R803 | Resistor, 10 Ω | Panasonic Electronic Components | ERJ-8GEYJ100V |
| R804, R805, R808 | Resistor, 2000 Ω | Panasonic Electronic Components | ERJ-8GEYJ202V |
| R806 | Resistor, 1300 Ω | Panasonic Electronic Components | ERJ-3GEYJ132V |
| S1 | Transistor | Infineon Technologies | BCP56 |
| S2 | Voltage regulator | Fairchild Semiconductor | LM7805CT |
| S3 | Potentiometer, 2K Ω | Bourns Inc. | 3224W-1-202E |

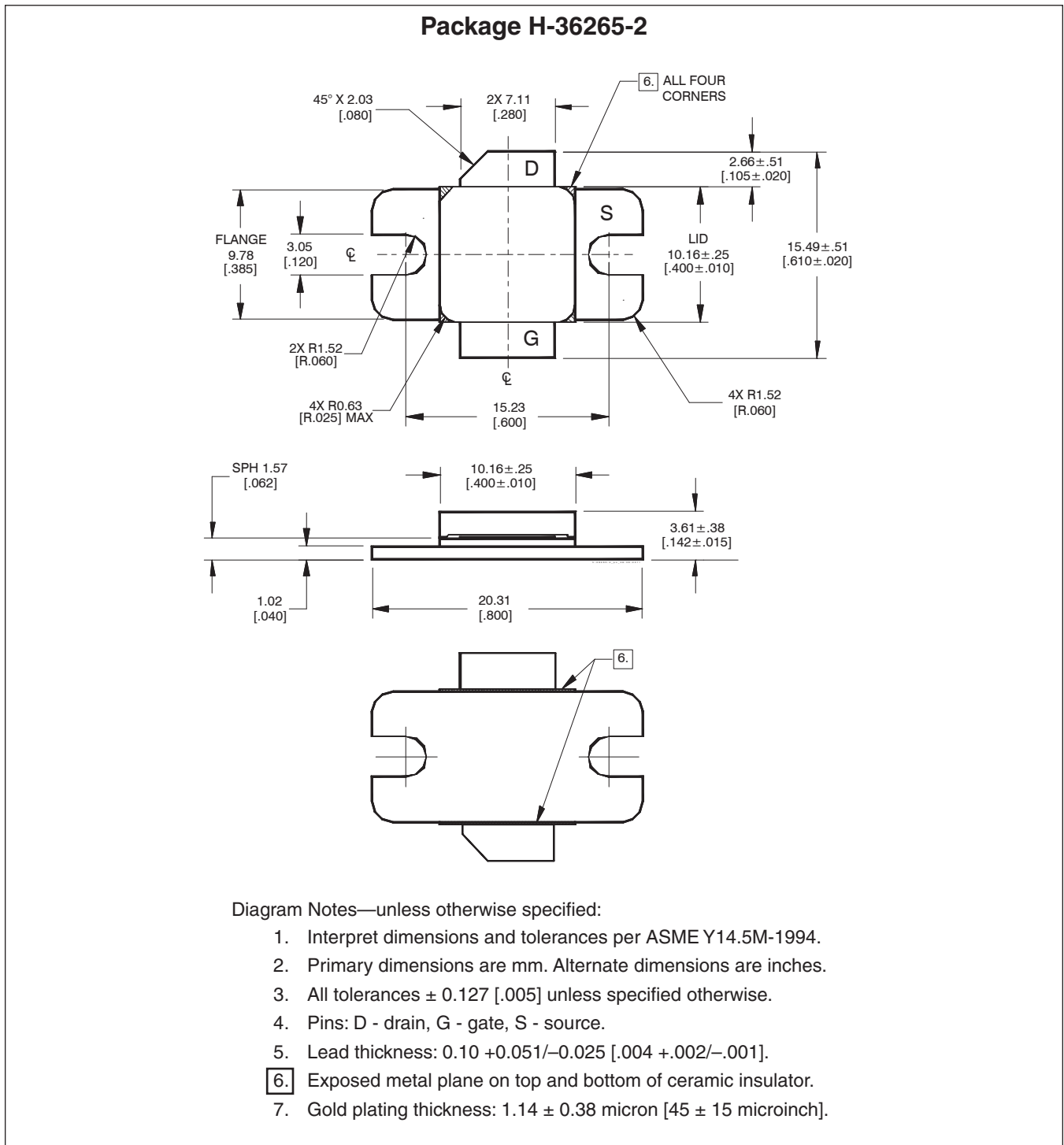
table continued next page

Reference Circuit (cont.)

| Component ID | Description | Suggested Supplier | P/N |
|---------------|----------------------------|--------------------|---------------------|
| Output | | | |
| C201 | Chip capacitor, 9.1 pF | ATC | ATC100B9R1BW500XB |
| C202 | Chip capacitor, 300 pF | ATC | ATC100B301JW200XB |
| C203 | Chip capacitor, 10 μ F | TDK Corporation | C5750X7S2A106M230KB |
| C204 | Capacitor, 1 μ F | TDK Corporation | C4532X7R2A105K230KA |
| C205 | Chip capacitor, 300 pF | ATC | ATC100B301JW200XB |
| L1, L2 | Inductor, 8 nH | Coilcraft | A03TGLB |
| L3 | Inductor, 43 nH | Coilcraft | B10TGLB |

See next page for package mechanical specifications

Package Outline Specifications



Revision History

| Revision | Date | Data Sheet Type | Page | Subjects (major changes since last revision) |
|----------|------------|-----------------|-----------|--|
| 01 | 2010-10-08 | Advance | All | Data Sheet reflects advance specification for product development |
| 02 | 2010-12-13 | Advance | All | Change part number |
| 03 | 2011-05-07 | Preliminary | All | Change part number, update to Preliminary, add specifications |
| 04 | 2011-11-10 | Production | All | Data Sheet reflects released product specification |
| 05 | 2013-07-02 | Production | 2 7, 8 | Update DC Characteristics and Max Ratings table, add order codes Add manufacturer |
| 05.1 | 2016-04-19 | Production | 1, 2 | Added ESD rating, updated ordering information |
| 05.2 | 2017-02-02 | Production | 2 | Updated operating voltage and junction temperature |
| 06 | 2018-06-13 | Production | All | Converted to Wolfspeed Data Sheet |

For more information, please contact:

4600 Silicon Drive
Durham, North Carolina, USA 27703
www.wolfspeed.com/RF

Sales Contact
RFSales@wolfspeed.com

RF Product Marketing Contact
RFMarketing@wolfspeed.com
919.407.7816

Notes

Disclaimer

Specifications are subject to change without notice. Cree, Inc. believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Cree 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 Cree. Cree makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose. "Typical" parameters are the average values expected by Cree in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer's technical experts for each application. Cree products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Cree product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility.

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: org@lifeelectronics.ru