Document Number: MRFE6VP61K25N
Rev. 2, 4/2015

RoHS

# RF Power LDMOS Transistors

## High Ruggedness N-Channel Enhancement-Mode Lateral MOSFETs

These high ruggedness devices are designed for use in high VSWR industrial, medical, broadcast, aerospace and mobile radio applications. Their unmatched input and output design allows for wide frequency range use from 1.8 to 600 MHz.

**Typical Performance:** $V_{DD}$ = 50 Vdc

| Frequency (MHz) | Signal Type | $P_{out}$ (W) | $G_{ps}$ (dB) | $\eta_D$ (%) |
|---|---|---|---|---|
| 87.5–108 (1,2) | CW | 1309 CW | 24.1 | 77.6 |
| 230 (3) | Pulse (100 μsec, 20% Duty Cycle) | 1250 Peak | 23.0 | 72.3 |

**Load Mismatch/Ruggedness**

| Frequency (MHz) | Signal Type | VSWR | $P_{in}$ (W) | Test Voltage | Result |
|---|---|---|---|---|---|
| 230 (3) | Pulse (100 μsec, 20% Duty Cycle) | > 65:1 at all Phase Angles | 11.5 Peak (3 dB Overdrive) | 50 | No Device Degradation |

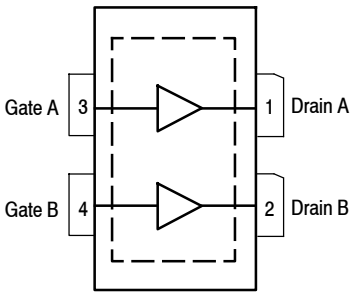
1. Measured in 87.5–108 MHz broadband reference circuit.
2. The values shown are the center band performance numbers across the indicated frequency range.
3. Measured in 230 MHz narrowband test circuit.

**MRFE6VP61K25N**
**MRFE6VP61K25GN**

**1.8–600 MHz, 1250 W CW, 50 V WIDEBAND RF POWER LDMOS TRANSISTORS**

OM-1230-4L
PLASTIC
MRE6VP61K25N

OM-1230G-4L
PLASTIC
MRE6VP61K25GN




(Top View)

Note: Exposed backside of the package is the source terminal for the transistors.

**Figure 1. Pin Connections**

### Features

- Unmatched Input and Output Allowing Wide Frequency Range Utilization
- Device can be used Single-Ended or in a Push-Pull Configuration
- Qualified up to a Maximum of 50 $V_{DD}$ Operation
- Characterized from 30 to 50 V for Extended Power Range
- Suitable for Linear Application with Appropriate Biasing
- Integrated ESD Protection with Greater Negative Gate-Source Voltage Range for Improved Class C Operation
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Recommended drivers: AFT05MS004N (4 W) or MRFE6VS25N (25 W)

### Typical Applications

- Broadcast
  - FM broadcast
  - HF and VHF broadcast
- Industrial, Scientific, Medical (ISM)
  - $CO_2$ laser generation
  - Plasma etching
  - Particle accelerators (synchrotrons)
  - MRI
  - Industrial heating/welding
- Aerospace
  - VHF omnidirectional range (VOR)
  - Weather radar
- Mobile Radio
  - HF and VHF communications
  - PMR base stations



freescale

**Table 1. Maximum Ratings**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | –0.5, +133 | Vdc |
| Gate-Source Voltage | $V_{GS}$ | –6.0, +10 | Vdc |
| Storage Temperature Range | $T_{stg}$ | –65 to +150 | °C |
| Case Operating Temperature Range | $T_C$ | –40 to +150 | °C |
| Operating Junction Temperature Range (1,2) | $T_J$ | –40 to +225 | °C |
| Total Device Dissipation @ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 3333<br>16.67 | W<br>W/°C |

**Table 2. Thermal Characteristics**

| Characteristic | Symbol | Value (2,3) | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case<br>CW: Case Temperature 109°C, 1250 W CW, 50 Vdc, $I_{DQ(A+B)}$ = 245 mA, 98 MHz | $R_{\theta JC}$ | 0.06 | °C/W |
| Thermal Impedance, Junction to Case<br>Pulse: Case Temperature 74°C, 1250 W Peak, 100 μsec Pulse Width, 20% Duty Cycle, $I_{DQ(A+B)}$ = 100 mA, 230 MHz | $Z_{\theta JC}$ | 0.016 | °C/W |

**Table 3. ESD Protection Characteristics**

| Test Methodology | Class |
|---|---|
| Human Body Model (per JESD22-A114) | 2, passes 2500 V |
| Machine Model (per EIA/JESD22-A115) | B, passes 250 V |
| Charge Device Model (per JESD22-C101) | IV, passes 2000 V |

**Table 4. Moisture Sensitivity Level**

| Test Methodology | Rating | Package Peak Temperature | Unit |
|---|---|---|---|
| Per JESD22-A113, IPC/JEDEC J-STD-020 | 3 | 260 | °C |

**Table 5. Electrical Characteristics** ($T_A$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **Off Characteristics (4)** | | | | | |
| Gate-Source Leakage Current<br>($V_{GS}$ = 5 Vdc, $V_{DS}$ = 0 Vdc) | $I_{GSS}$ | — | — | 1 | μAdc |
| Drain-Source Breakdown Voltage<br>($V_{GS}$ = 0 Vdc, $I_D$ = 100 mAdc) | $V_{(BR)DSS}$ | 133 | — | — | Vdc |
| Zero Gate Voltage Drain Leakage Current<br>($V_{DS}$ = 50 Vdc, $V_{GS}$ = 0 Vdc) | $I_{DSS}$ | — | — | 10 | μAdc |
| Zero Gate Voltage Drain Leakage Current<br>($V_{DS}$ = 100 Vdc, $V_{GS}$ = 0 Vdc) | $I_{DSS}$ | — | — | 20 | μAdc |
| **On Characteristics** | | | | | |
| Gate Threshold Voltage (4)<br>($V_{DS}$ = 10 Vdc, $I_D$ = 1776 μAdc) | $V_{GS(th)}$ | 1.7 | 2.2 | 2.7 | Vdc |
| Gate Quiescent Voltage<br>($V_{DD}$ = 50 Vdc, $I_{D(A+B)}$ = 100 mAdc, Measured in Functional Test) | $V_{GS(Q)}$ | 1.9 | 2.4 | 2.9 | Vdc |
| Drain-Source On-Voltage (4)<br>($V_{GS}$ = 10 Vdc, $I_D$ = 2 Adc) | $V_{DS(on)}$ | — | 0.2 | — | Vdc |
| Forward Transconductance (4)<br>($V_{DS}$ = 10 Vdc, $I_D$ = 30 Adc) | $g_{fs}$ | — | 28.0 | — | S |

1. Continuous use at maximum temperature will affect MTTF.
2. MTTF calculator available at http://www.freescale.com/rf/calculators.
3. Refer to AN1955 – *Thermal Measurement Methodology of RF Power Amplifiers.* Go to http://www.freescale.com/rf and search AN1955.
4. Each side of device measured separately.

(continued)

**Table 5. Electrical Characteristics** ($T_A$ = 25°C unless otherwise noted) **(continued)**

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **Dynamic Characteristics** | | | | | |
| Reverse Transfer Capacitance (1)<br>($V_{DS}$ = 50 Vdc ± 30 mV(rms)ac @ 1 MHz, $V_{GS}$ = 0 Vdc) | $C_{rss}$ | — | 2.8 | — | pF |
| Output Capacitance (1)<br>($V_{DS}$ = 50 Vdc ± 30 mV(rms)ac @ 1 MHz, $V_{GS}$ = 0 Vdc) | $C_{oss}$ | — | 185 | — | pF |
| Input Capacitance (1)<br>($V_{DS}$ = 50 Vdc, $V_{GS}$ = 0 Vdc ± 30 mV(rms)ac @ 1 MHz) | $C_{iss}$ | — | 562 | — | pF |
| **Functional Tests** (2,3) (In Freescale Test Fixture, 50 ohm system) $V_{DD}$ = 50 Vdc, $I_{DQ(A+B)}$ = 100 mA, $P_{out}$ = 1250 W Peak (250 W Avg.), f = 230 MHz, 100 μsec Pulse Width, 20% Duty Cycle | | | | | |
| Power Gain | $G_{ps}$ | 22.0 | 23.0 | 24.5 | dB |
| Drain Efficiency | $\eta_D$ | 68.5 | 72.3 | — | % |
| Input Return Loss | IRL | — | –13 | –9 | dB |

**Table 6. Load Mismatch/Ruggedness** (In Freescale Test Fixture, 50 ohm system) $I_{DQ(A+B)}$ = 100 mA

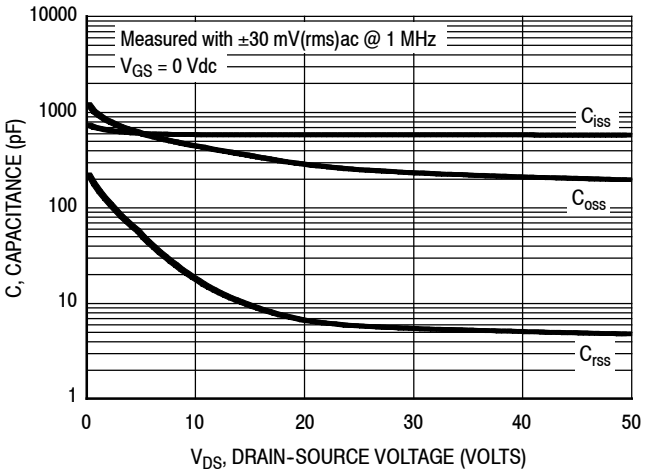
| Frequency (MHz) | Signal Type | VSWR | $P_{in}$ (W) | Test Voltage, $V_{DD}$ | Result |
|---|---|---|---|---|---|
| 230 | Pulse<br>(100 μsec, 20% Duty Cycle) | > 65:1 at all<br>Phase Angles | 11.5 Peak<br>(3 dB Overdrive) | 50 | No Device Degradation |

**Table 7. Ordering Information**

| Device | Tape and Reel Information | Package |
|---|---|---|
| MRFE6VP61K25NR6 | R6 Suffix = 150 Units, 56 mm Tape Width, 13-Reel | OM-1230-4L |
| MRFE6VP61K25GNR6 | | OM-1230G-4L |

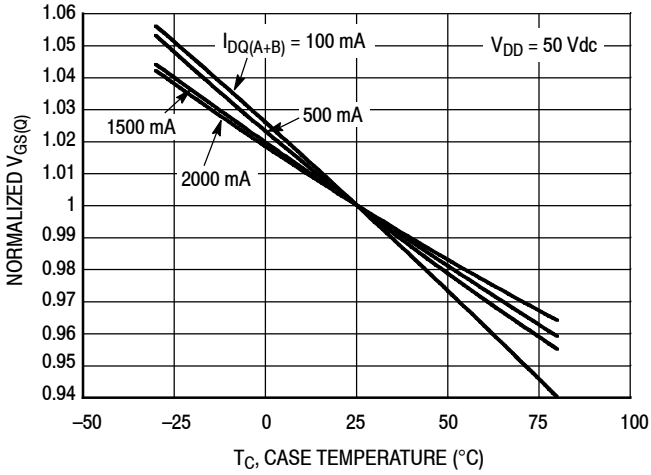
1. Each side of device measured separately.
2. Devices tested without thermal grease.
3. Measurements made with device in straight lead configuration before any lead forming operation is applied. Lead forming is used for gull wing (GN) parts.

## TYPICAL CHARACTERISTICS




**Note:** Each side of device measured separately.

**Figure 2. Capacitance versus Drain-Source Voltage**




| $I_{DQ}$ (mA) | Slope (mV/°C) |
|---|---|
| 100 | –2.70 |
| 500 | –2.42 |
| 1500 | –2.22 |
| 2000 | –2.05 |

**Figure 3. Normalized $V_{GS}$ versus Quiescent Current and Case Temperature**

## 230 MHz NARROWBAND PRODUCTION TEST FIXTURE

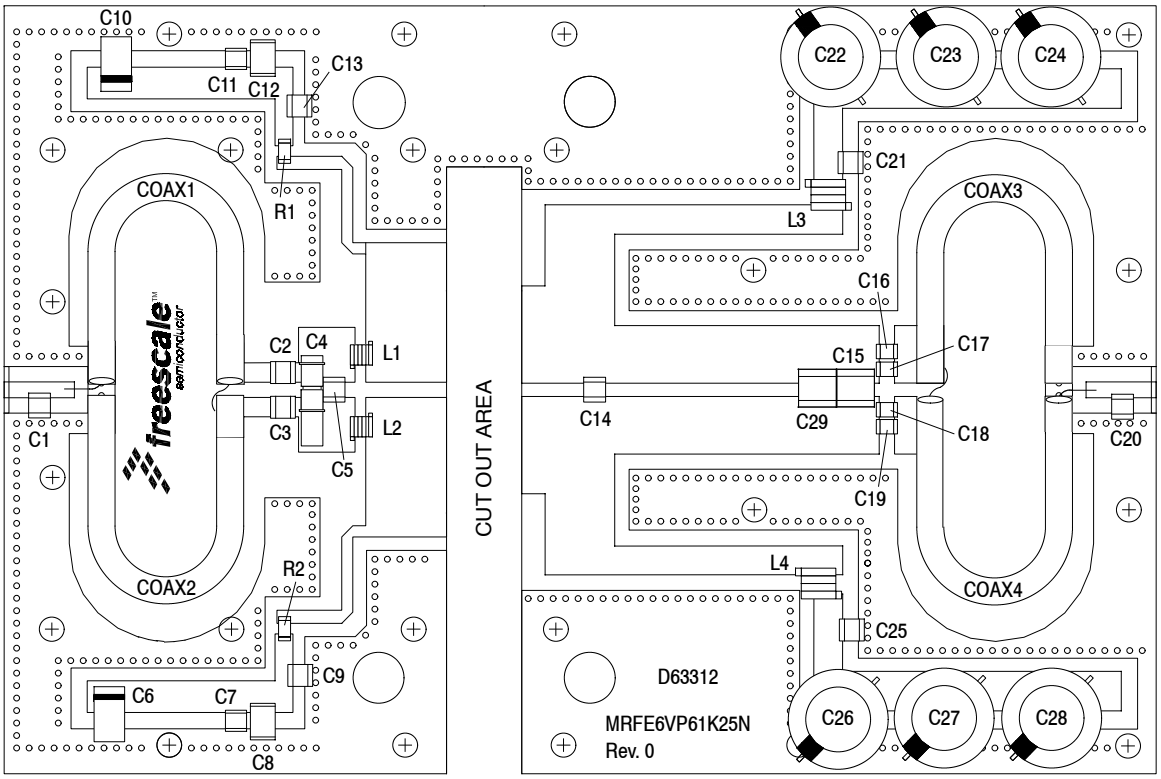



**Figure 4. MRFE6VP61K25N Narrowband Test Circuit Component Layout — 230 MHz**

**Table 8. MRFE6VP61K25N Narrowband Test Circuit Component Designations and Values — 230 MHz**

| Part | Description | Part Number | Manufacturer |
|---|---|---|---|
| C1 | 20 pF Chip Capacitor | ATC100B200JT500XT | ATC |
| C2, C3, C5 | 27 pF Chip Capacitors | ATC100B270JT500XT | ATC |
| C4 | 0.8–8.0 pF Variable Capacitor, Gigatrim | 27291SL | Johanson |
| C6, C10 | 22 μF, 35 V Tantalum Capacitors | T491X226K035AT | Kemet |
| C7, C11 | 0.1 μF Chip Capacitors | CDR33BX104AKWS | AVX |
| C8, C12 | 220 nF Chip Capacitors | C1812C224K5RAC-TU | Kemet |
| C9, C13, C21, C25 | 1000 pF Chip Capacitors | ATC100B102JT50XT | ATC |
| C14 | 39 pF Chip Capacitor | ATC100B390JT500XT | ATC |
| C15 | 39 pF Chip Capacitor | ATC100C390JT250XT | ATC |
| C16, C17, C18, C19 | 240 pF Chip Capacitors | ATC100B241JT200XT | ATC |
| C20 | 9.1 pF Chip Capacitor | ATC100B9R1BT500XT | ATC |
| C22, C23, C24, C26, C27, C28 | 470 μF, 63 V Electrolytic Capacitors | MCGPR63V477M13X26-RH | Multicomp |
| C29 | 47 pF Chip Capacitor | ATC100C470JT250XT | ATC |
| Coax1, 2, 3, 4 | 25 Ω Semi Rigid Coax, 2.2″ Shield Length | UT-141C-25 | Micro-Coax |
| L1, L2 | 5 nH Inductors | A02TKLC | Coilcraft |
| L3, L4 | 6.6 nH Inductors | GA3093-ALC | Coilcraft |
| R1, R2 | 10 Ω, 1/4 W Chip Resistors | CRCW120610R0JNEA | Vishay |
| PCB | Arlon AD255A 0.030″, $\varepsilon_r$ = 2.55 | D63312 | MTL |

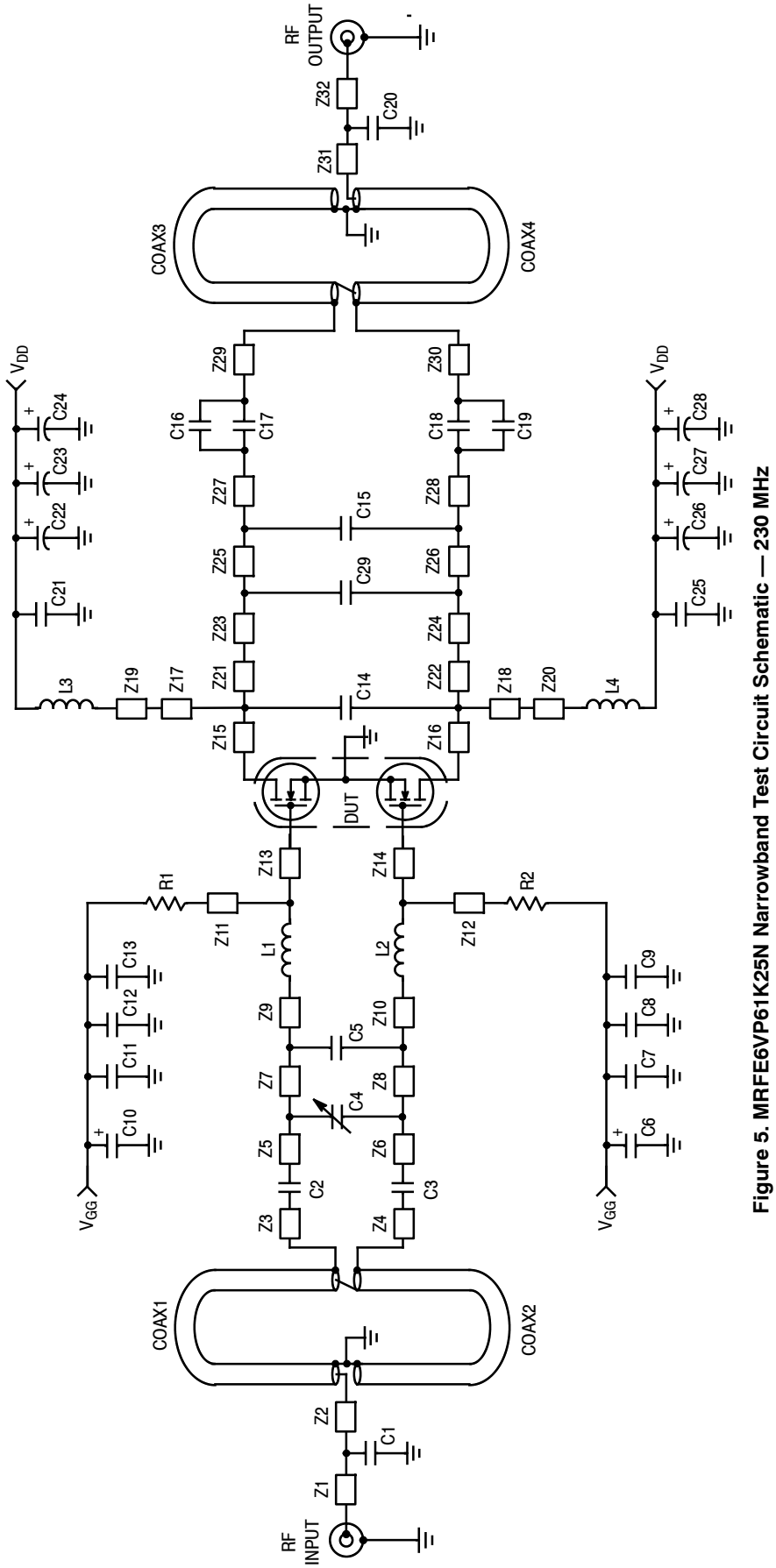



**Figure 5. MRFE6VP61K25N Narrowband Test Circuit Schematic — 230 MHz**

**Table 9. MRFE6VP61K25N Narrowband Test Circuit Microstrips — 230 MHz**

| Microstrip | Description |
|---|---|
| Z1 | 0.192″ × 0.082″ Microstrip |
| Z2 | 0.175″ × 0.082″ Microstrip |
| Z3, Z4 | 0.170″ × 0.100″ Microstrip |
| Z5, Z6 | 0.116″ × 0.285″ Microstrip |
| Z7, Z8 | 0.116″ × 0.285″ Microstrip |
| Z9, Z10 | 0.108″ × 0.285″ Microstrip |
| Z11*, Z12* | 0.872″ × 0.058″ Microstrip |
| Z13, Z14 | 0.412″ × 0.726″ Microstrip |
| Z15, Z16 | 0.416″ × 0.507″ Microstrip |
| Z17*, Z18* | 0.466″ × 0.363″ Microstrip |
| Z19*, Z20* | 0.187″ × 0.154″ Microstrip |
| Z21, Z22 | 0.059″ × 0.507″ Microstrip |
| Z23, Z24 | 1.006″ × 0.300″ Microstrip |
| Z25, Z26 | 0.247″ × 0.300″ Microstrip |
| Z27, Z28 | 0.125″ × 0.300″ Microstrip |
| Z29, Z30 | 0.116″ × 0.300″ Microstrip |
| Z31 | 0.186″ × 0.082″ Microstrip |
| Z32 | 0.179″ × 0.082″ Microstrip |

* Line lengths include microstrip bends

## TYPICAL CHARACTERISTICS — 230 MHz

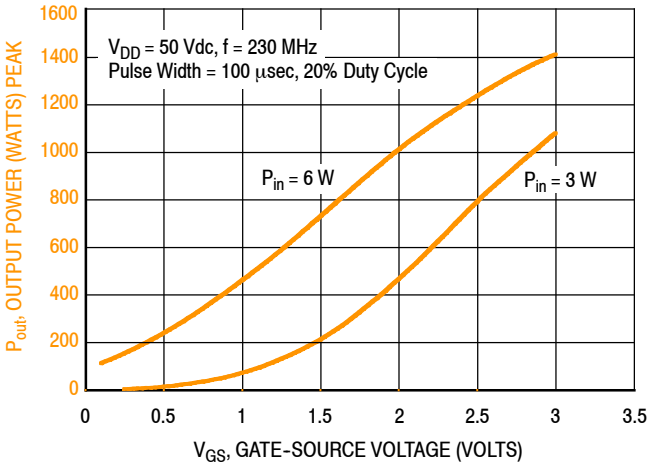
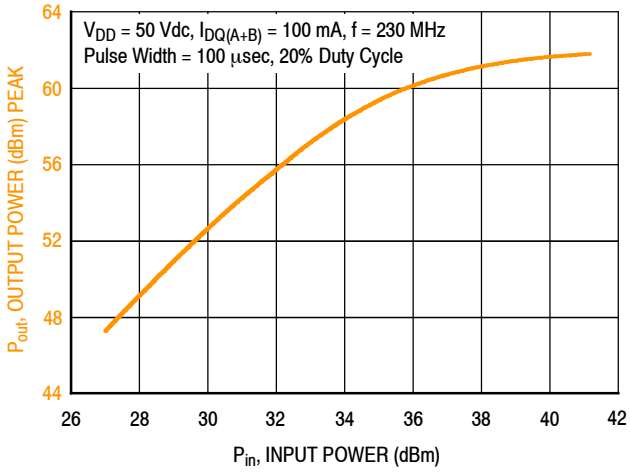



**Figure 6. Output Power versus Gate-Source Voltage at a Constant Input Power**




| f (MHz) | P1dB (W) | P3dB (W) |
|---|---|---|
| 230 | 1295 | 1518 |

**Figure 7. Output Power versus Input Power**

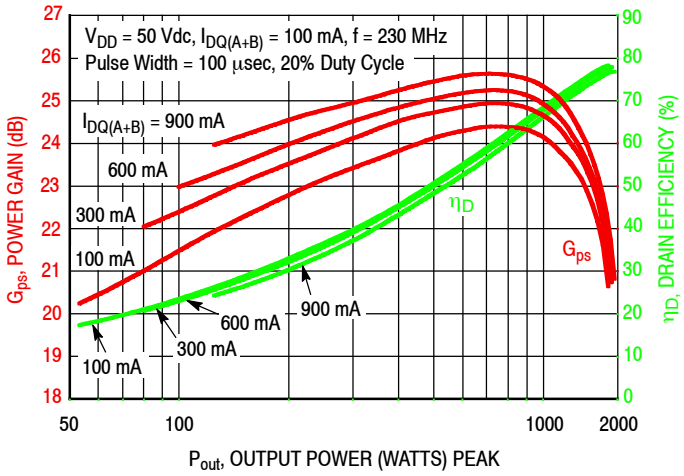



**Figure 8. Power Gain and Drain Efficiency versus Output Power and Quiescent Current**

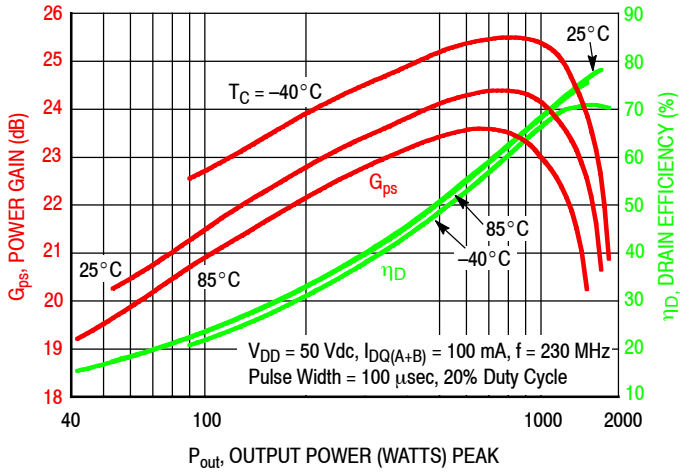



**Figure 9. Power Gain and Drain Efficiency versus Output Power**

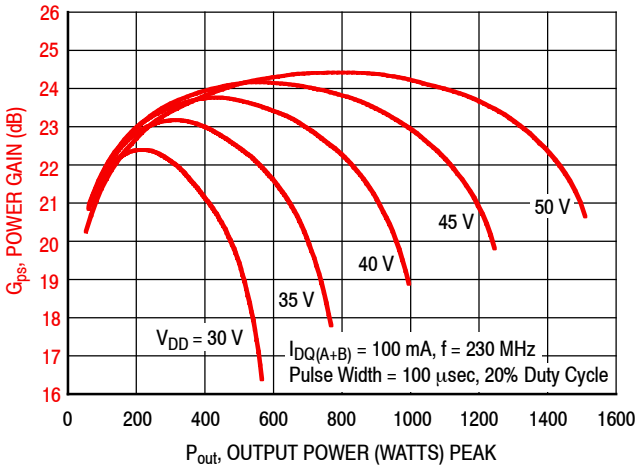



**Figure 10. Power Gain versus Output Power and Drain-Source Voltage**

| f<br>MHz | $Z_{source}$<br>Ω | $Z_{load}$<br>Ω |
|---|---|---|
| 230 | 2.10 + j3.70 | 2.55 + j1.90 |

$Z_{source}$ = Test circuit impedance as measured from gate to gate, balanced configuration.

$Z_{load}$ = Test circuit impedance as measured from drain to drain, balanced configuration.

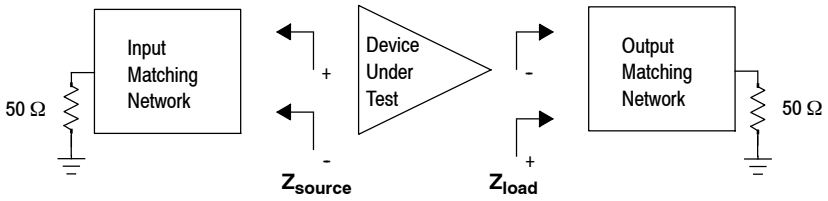


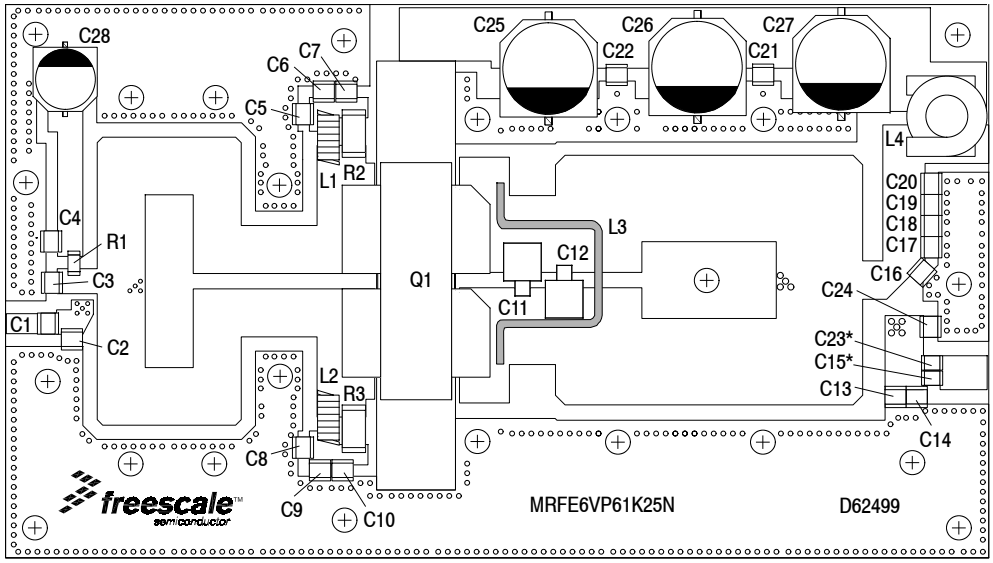

**Figure 11. Narrowband Series Equivalent Source and Load Impedance — 230 MHz**

## 87.5–108 MHz BROADBAND REFERENCE CIRCUIT

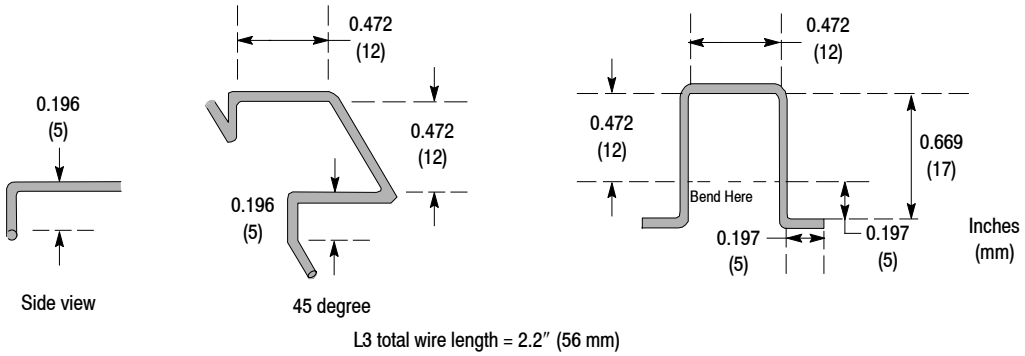
**Table 10. 87.5–108 MHz Broadband Performance** (In Freescale Reference Circuit, 50 ohm system)
$V_{DD}$ = 50 Vdc, $I_{DQ(A+B)}$ = 250 mA, $P_{in}$ = 5 W, CW

| Frequency (MHz) | $G_{ps}$ (dB) | $\eta_D$ (%) | $P_{out}$ (W) |
|---|---|---|---|
| 87.5 | 23.8 | 78.3 | 1212 |
| 98 | 24.1 | 77.6 | 1309 |
| 108 | 23.6 | 77.8 | 1161 |

## 87.5–108 MHz BROADBAND REFERENCE CIRCUIT — 2.88″ × 5.11″ (73.1 mm × 130 mm)




*C15 and C23 are mounted vertically.




L3 total wire length = 2.2″ (56 mm)

**Figure 12. MRFE6VP61K25N 87.5–108 MHz Broadband Reference Circuit Component Layout**

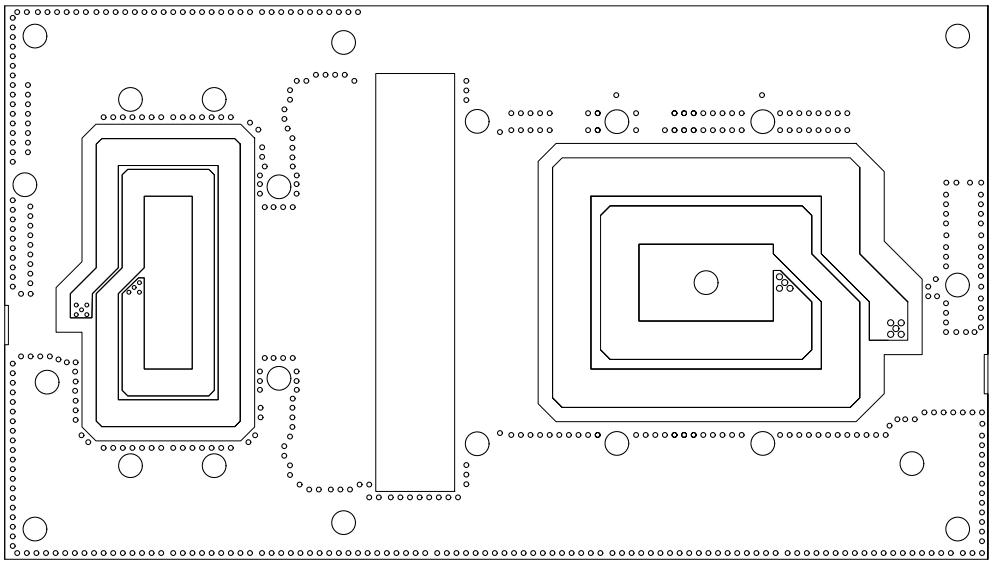


**Figure 13. MRFE6VP61K25N 87.5–108 MHz Broadband Reference Circuit Component Layout — Bottom**

**Table 11. MRFE6VP61K25N 87.5–108 MHz Broadband Reference Circuit Component Designations and Values**

| Part | Description | Part Number | Manufacturer |
|---|---|---|---|
| C1, C3, C6, C9, C18, C19, C20, C21, C22 | 1000 pF Chip Capacitors | ATC100B102JT50XT | ATC |
| C2 | 22 pF Chip Capacitor | ATC100B220JT500XT | ATC |
| C4, C5, C8 | 10000 pF Chip Capacitors | ATC200B103KT50XT | ATC |
| C7, C10, C15, C16, C17, C23 | 470 pF Chip Capacitors | ATC100B471JT200XT | ATC |
| C11 | 100 pF, 300 V Mica | MIN02-002EC101J-F | CDE |
| C12 | 15 pF, 300 V Mica | MIN02-002CC150J-F | CDE |
| C13 | 6.2 pF Chip Capacitor | ATC100B6R2BT500XT | ATC |
| C14 | 15 pF Chip Capacitor | ATC100B150JT500XT | ATC |
| C24 | 12 pF Chip Capacitor | ATC100B120JT500XT | ATC |
| C25, C26, C27 | 220 μF, 63 V Electrolytic Capacitors | EEU-FC1J221 | Panasonic |
| C28 | 22 μF, 35 V Electrolytic Capacitor | UUD1V220MCL1GS | Nichicon |
| L1, L2 | 17.5 nH Inductors, 6 Turns | B06TJLC | Coilcraft |
| L3 | 1.5 mm Non-Tarnish Silver Plated Copper Wire, Total Wire Length = 2.2″/56 mm | SP1500NT-001 | — |
| L4 | 22 nH Inductor | 1212VS-22NMEB | Coilcraft |
| Q1 | RF Power LDMOS Transistor | MRFE6VP61K25NR6 | Freescale |
| R1 | 10 Ω, 1/4 W Chip Resistor | CRCW120610R0JNEA | Vishay |
| R2, R3 | 33 Ω, 2 W Chip Resistors | 1-2176070-3 | TE Connectivity |
| PCB | Arlon TC350 0.030″, $\varepsilon_r$ = 3.5 | D62499 | MTL |

Note: Refer to MRFE6VP61K25N's printed circuit boards and schematics to download the 87.5–108 MHz heatsink drawing.

## TYPICAL CHARACTERISTICS — 87.5–108 MHz BROADBAND REFERENCE CIRCUIT

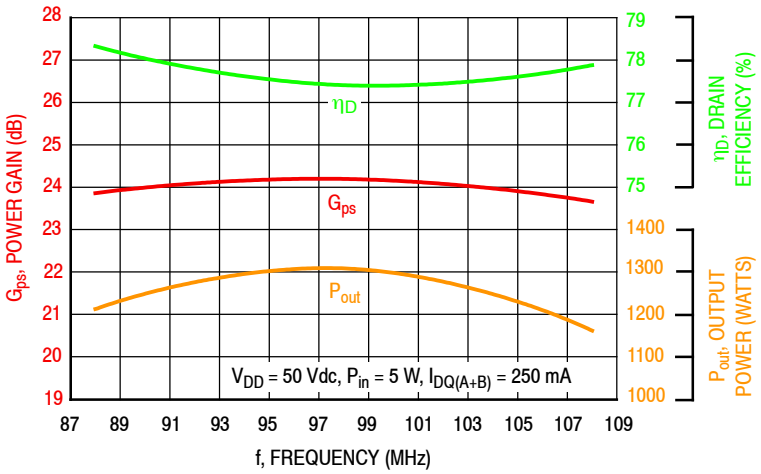



**Figure 14. Power Gain, Drain Efficiency and CW Output Power versus Frequency**

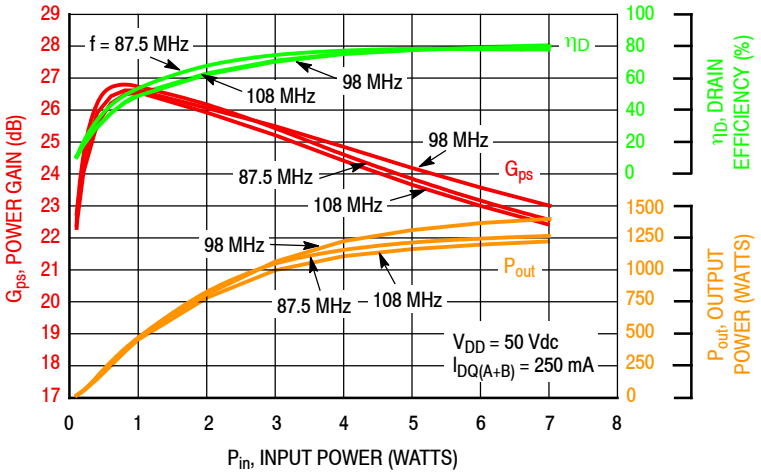
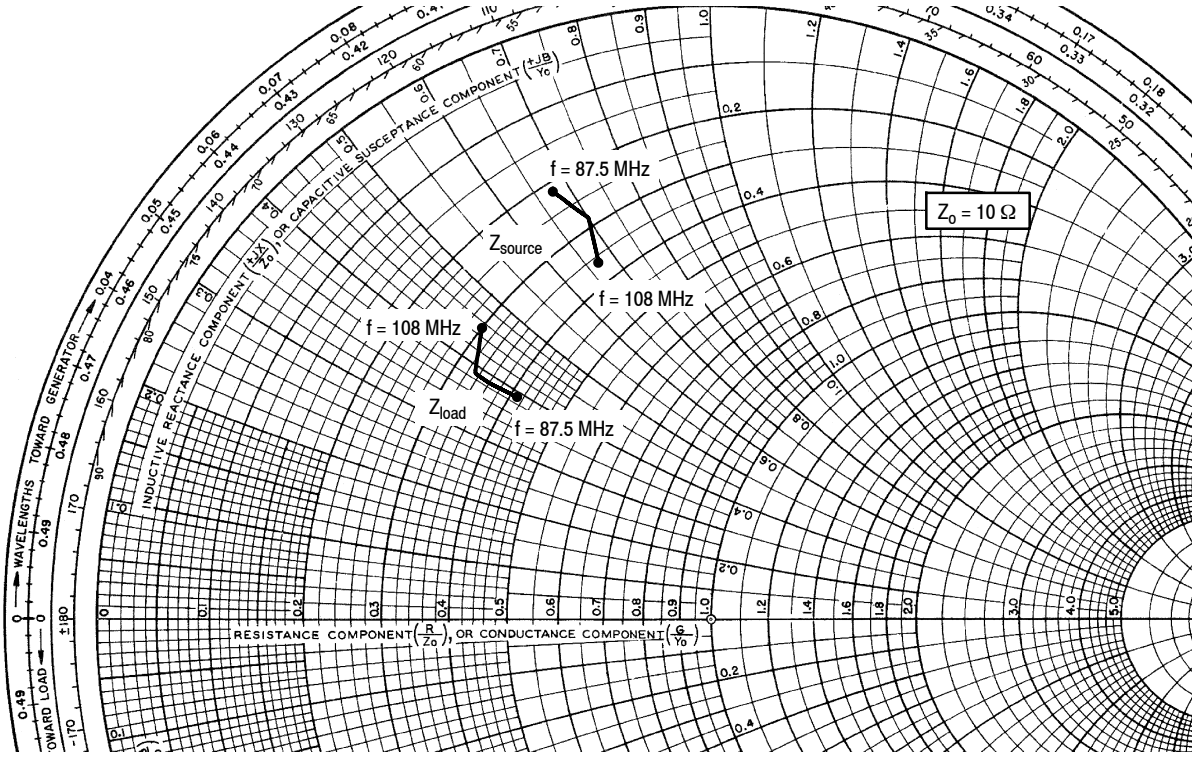



**Figure 15. Power Gain, Drain Efficiency and CW Output Power versus Input Power and Frequency**

## 87.5–108 MHz BROADBAND REFERENCE CIRCUIT




| f<br>MHz | $Z_{source}$<br>Ω | $Z_{load}$<br>Ω |
|---|---|---|
| 87.5 | 2.10 + j6.67 | 4.11 + j3.87 |
| 98 | 2.80 + j6.96 | 3.33 + j3.85 |
| 108 | 3.60 + j6.65 | 2.97 + j4.45 |

$Z_{source}$ = Test circuit impedance as measured from gate to gate, balanced configuration.

$Z_{load}$ = Test circuit impedance as measured from drain to drain, balanced configuration.

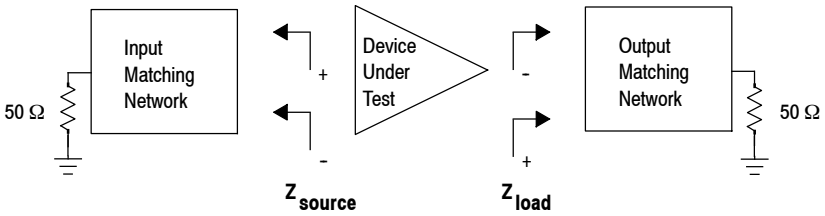
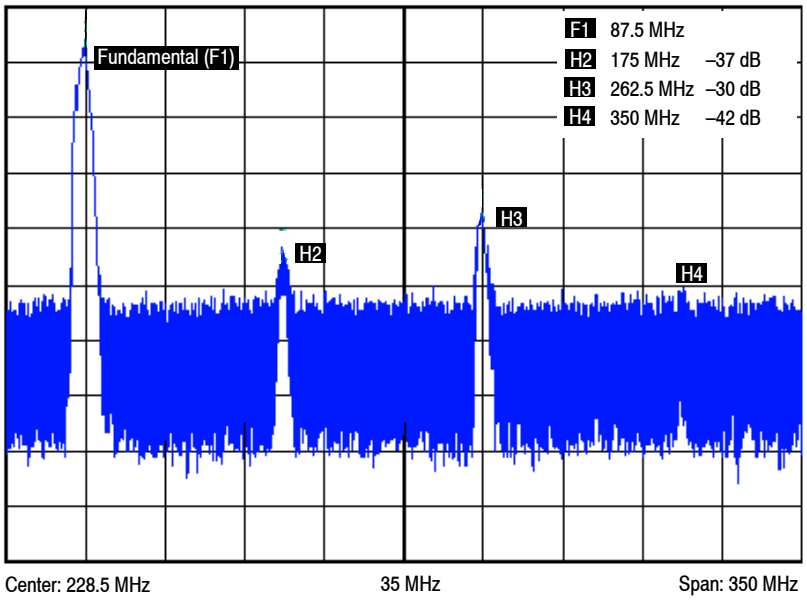



**Figure 16. Broadband Series Equivalent Source and Load Impedance — 87.5–108 MHz**

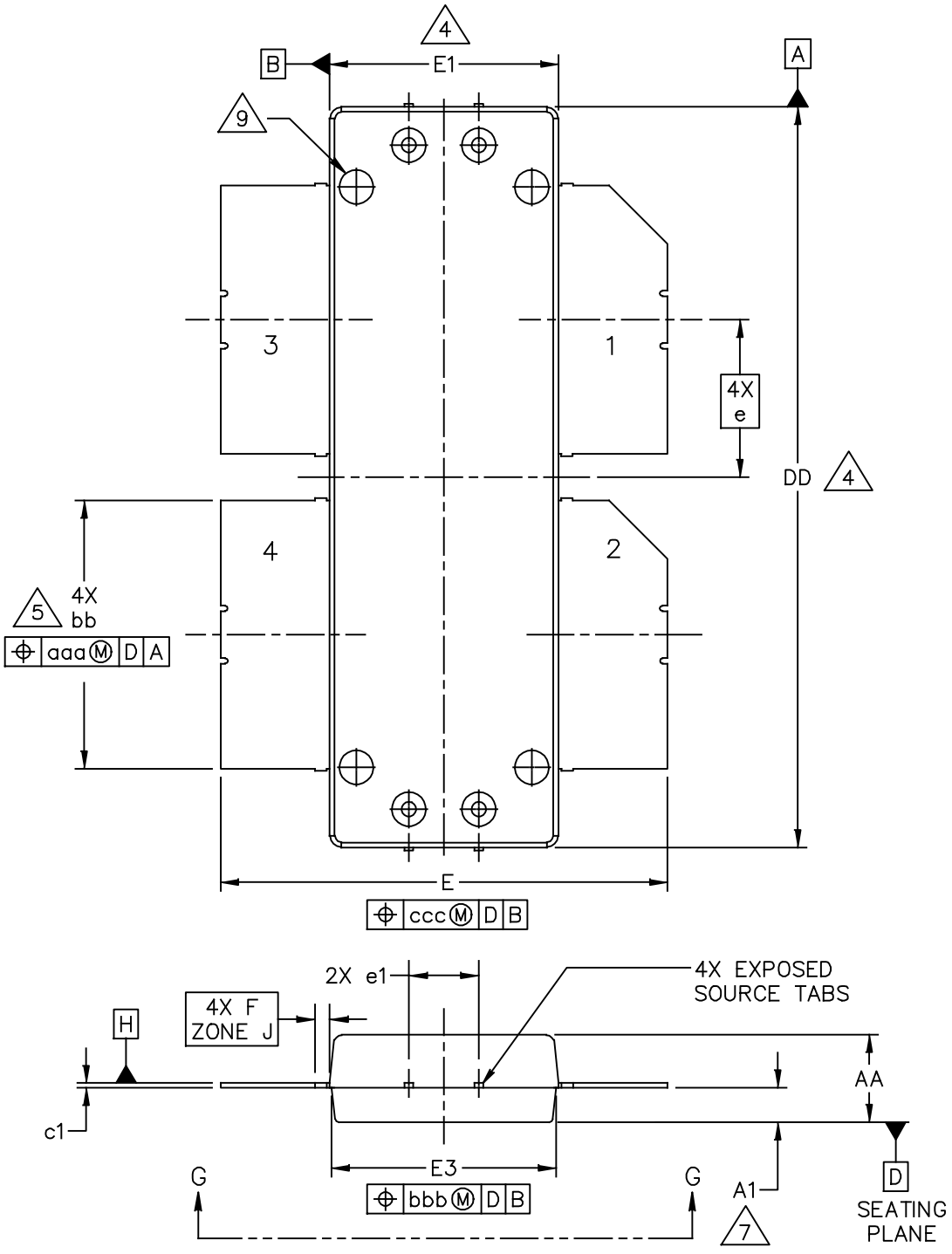
## HARMONIC MEASUREMENTS — 87.5–108 MHz
## BROADBAND REFERENCE CIRCUIT



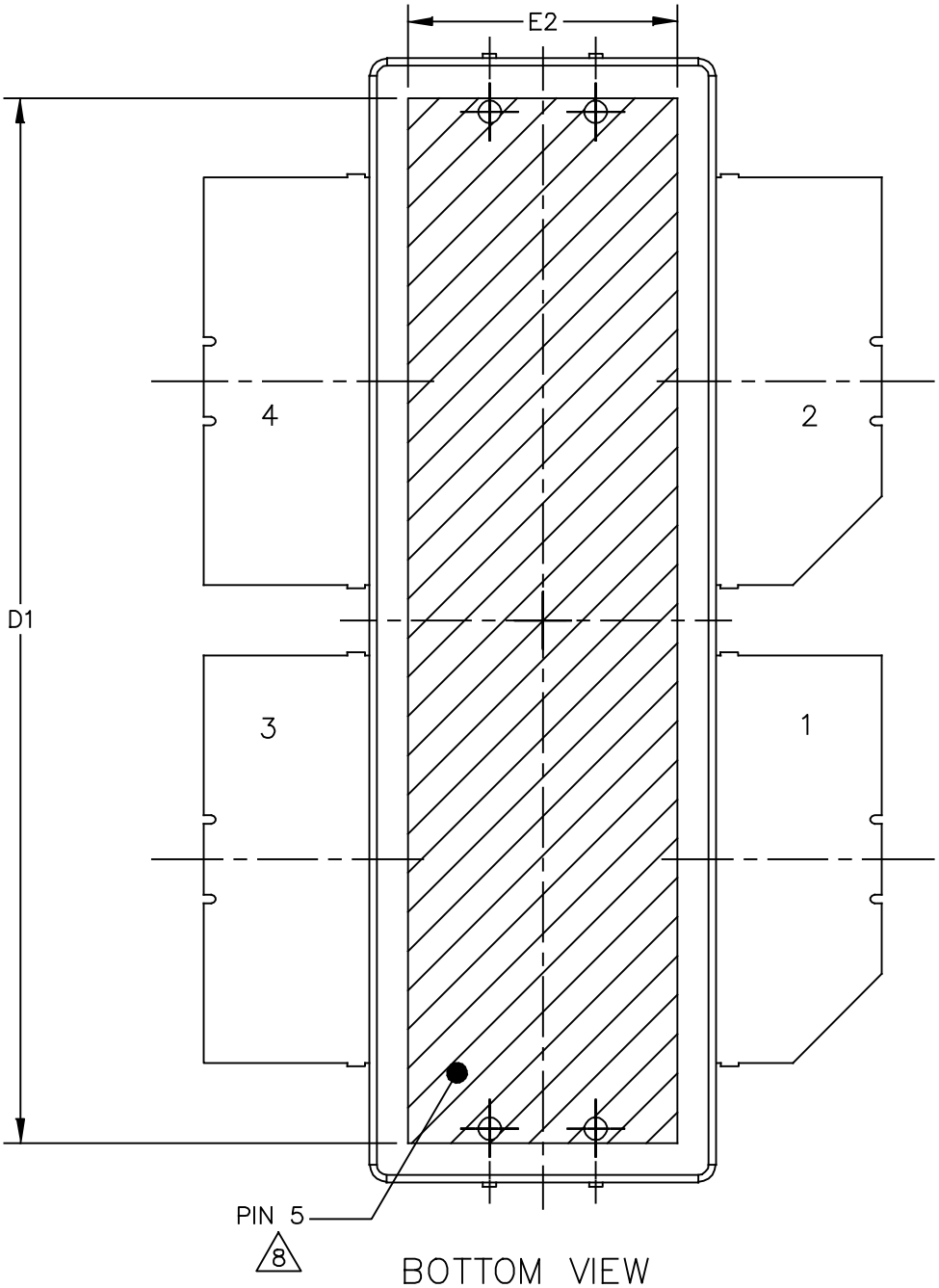

| H2 (175 MHz) | H3 (262.5 MHz) | H4 (350 MHz) |
|---|---|---|
| –37 dB | –30 dB | –42 dB |

**Figure 17. 87.5 MHz Harmonics @ 1215 W CW**

## PACKAGE DIMENSIONS




| © FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED. | MECHANICAL OUTLINE | PRINT VERSION NOT TO SCALE |
|---|---|---|
| TITLE: OM-1230-4L | DOCUMENT NO: 98ASA00506D | REV: B |
| | STANDARD: NON-JEDEC | |
| | 03 DEC 2014 | |




BOTTOM VIEW
VIEW G–G

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|---|---|---|
| TITLE: OM–1230–4L | DOCUMENT NO: 98ASA00506D | REV: B |
| | STANDARD: NON–JEDEC | |
| | 03 DEC 2014 | |

NOTES:

1. CONTROLLING DIMENSION: INCH

2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994.

3. DATUM PLANE H IS LOCATED AT TOP OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE TOP OF THE PARTING LINE.

4. DIMENSIONS DD AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS .006 INCH (0.15 MM) PER SIDE. DIMENSIONS DD AND E1 DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE H.

5. DIMENSION bb DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE .005 INCH (0.13 MM) TOTAL IN EXCESS OF THE bb DIMENSION AT MAXIMUM MATERIAL CONDITION.

6. DATUMS A AND B TO BE DETERMINED AT DATUM PLANE H.

7. DIMENSION A1 APPLIES WITHIN ZONE J ONLY.

8. HATCHING REPRESENTS THE EXPOSED AREA OF THE HEAT SLUG. THE DIMENSIONS D1 AND E2 REPRESENT THE VALUES BETWEEN THE TWO OPPOSITE POINTS ALONG THE EDGES OF EXPOSED AREA OF HEAT SLUG.

9. DIMPLED HOLE REPRESENTS INPUT SIDE.

| DIM | INCH MIN | INCH MAX | MILLIMETER MIN | MILLIMETER MAX | DIM | INCH MIN | INCH MAX | MILLIMETER MIN | MILLIMETER MAX |
|---|---|---|---|---|---|---|---|---|---|
| AA | .148 | .152 | 3.76 | 3.86 | bb | .457 | .463 | 11.61 | 11.76 |
| A1 | .059 | .065 | 1.50 | 1.65 | c1 | .007 | .011 | 0.18 | 0.28 |
| DD | 1.267 | 1.273 | 32.18 | 32.33 | e | .270 BSC | | 6.86 BSC | |
| D1 | 1.180 | ---- | 29.97 | ---- | e1 | .116 | .124 | 2.95 | 3.15 |
| E | .762 | .770 | 19.35 | 19.56 | | | | | |
| E1 | .390 | .394 | 9.91 | 10.01 | aaa | .004 | | 0.10 | |
| E2 | .306 | ---- | 7.77 | ---- | bbb | .006 | | 0.15 | |
| E3 | .383 | .387 | 9.73 | 9.83 | ccc | .010 | | 0.25 | |
| F | .025 BSC | | 0.635 BSC | | | | | | |



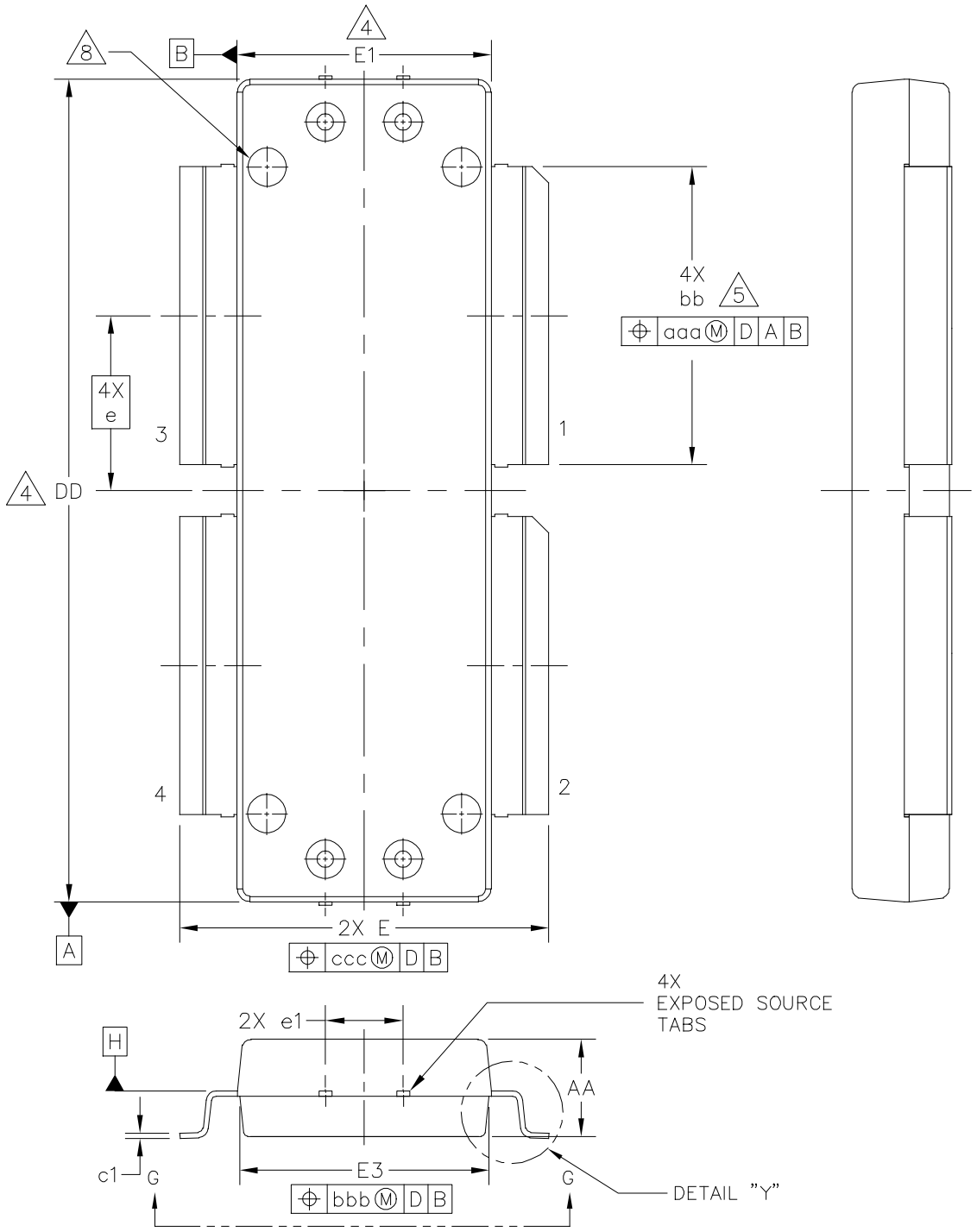
MECHANICAL OUTLINE | PRINT VERSION NOT TO SCALE

TITLE: OM–1230–4L

DOCUMENT NO: 98ASA00506D REV: B

STANDARD: NON–JEDEC

03 DEC 2014

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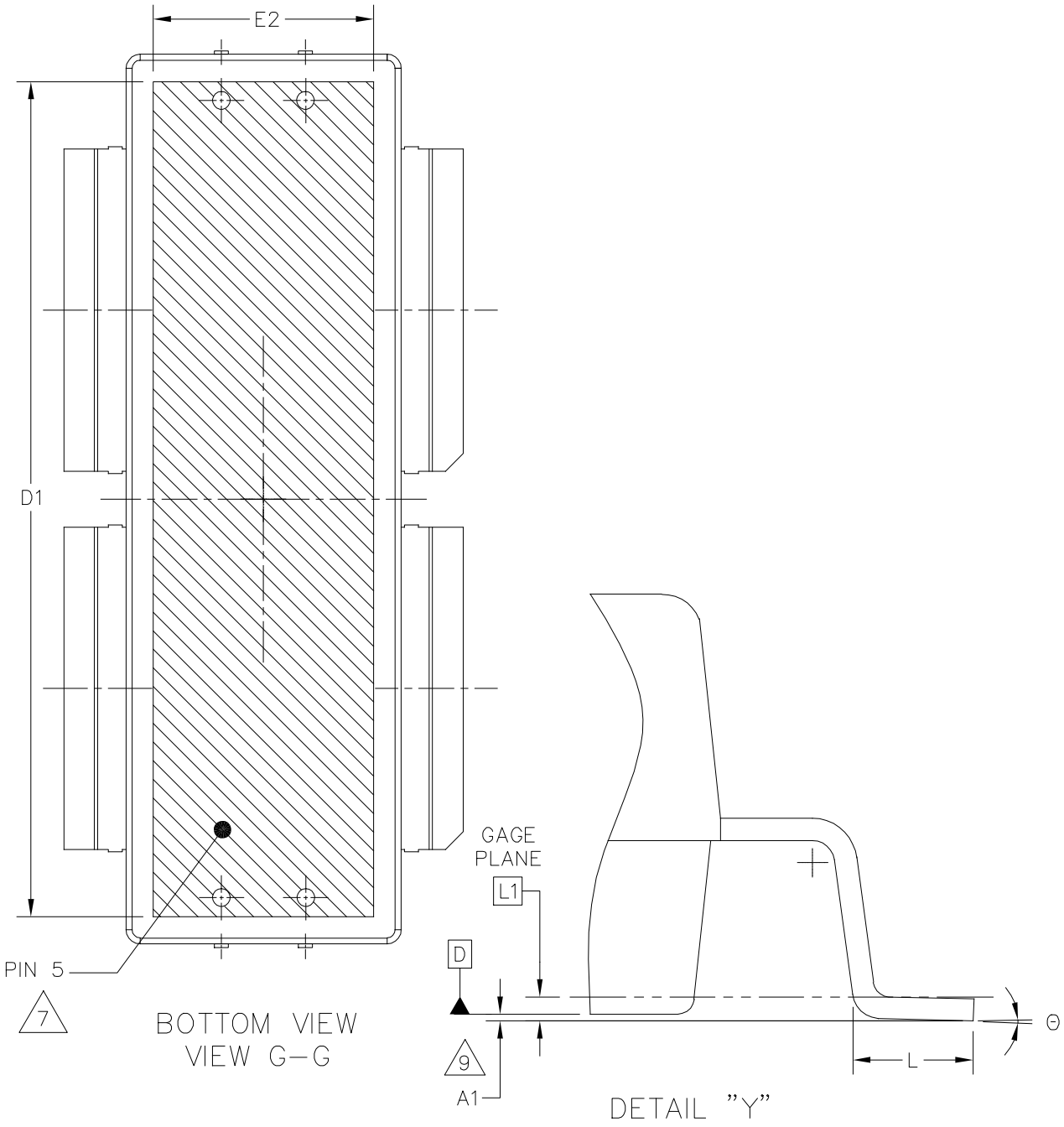
|---|---|---|
| TITLE: OM-1230G-4L | DOCUMENT NO: 98ASA00818D | REV: A |
| | STANDARD: NON-JEDEC | |
| | 12 MAR 2015 | |

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|---|---|---|
| TITLE: OM–1230G–4L | DOCUMENT NO: 98ASA00818D | REV: A |
| | STANDARD: NON–JEDEC | |
| | 12 MAR 2015 | |

NOTES:

1. CONTROLLING DIMENSION: INCH

2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994.

3. DATUM PLANE H IS LOCATED AT TOP OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE TOP OF THE PARTING LINE.

4. DIMENSIONS DD AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS .006 INCH (0.15 MM) PER SIDE. DIMENSIONS DD AND E1 DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE H.

5. DIMENSION bb DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE .005 INCH (0.13 MM) TOTAL IN EXCESS OF THE bb DIMENSION AT MAXIMUM MATERIAL CONDITION.

6. DATUMS A AND B TO BE DETERMINED AT DATUM PLANE H.

7. HATCHING REPRESENTS THE EXPOSED AND SOLDERABLE AREA OF THE HEAT SLUG. THE DIMENSIONS D1 AND E2 REPRESENT THE VALUES BETWEEN THE TWO OPPOSITE POINTS ALONG THE EDGES OF EXPOSED AREA OF HEAT SLUG.

8. DIMPLED HOLE REPRESENTS INPUT SIDE.

9. DIMENSION A1 IS MEASURED WITH REFERENCE TO DATUM D. THE POSITIVE VALUE IMPLIES THAT THE BOTTOM OF THE PACKAGE IS HIGHER THAN THE BOTTOM OF THE LEAD.

| DIM | INCH MIN | INCH MAX | MILLIMETER MIN | MILLIMETER MAX | DIM | INCH MIN | INCH MAX | MILLIMETER MIN | MILLIMETER MAX |
|---|---|---|---|---|---|---|---|---|---|
| AA | .148 | .152 | 3.76 | 3.86 | bb | .457 | .463 | 11.61 | 11.76 |
| A1 | –.003 | .003 | –0.08 | 0.08 | c1 | .007 | .011 | 0.18 | 0.28 |
| DD | 1.267 | 1.273 | 32.18 | 32.33 | e | .270 BSC | | 6.86 BSC | |
| D1 | 1.180 | ---- | 29.97 | ---- | e1 | .116 | .124 | 2.95 | 3.15 |
| E | .563 | .575 | 14.30 | 14.61 | Θ | 0° | 8° | 0° | 8° |
| E1 | .390 | .394 | 9.91 | 10.01 | aaa | .004 | | 0.10 | |
| E2 | .306 | ---- | 7.77 | ---- | bbb | .006 | | 0.15 | |
| E3 | .383 | .387 | 9.73 | 9.83 | ccc | .010 | | 0.25 | |
| L | .034 | .046 | 0.86 | 1.17 | | | | | |
| L1 | .010 BSC | | 0.25 BSC | | | | | | |



MECHANICAL OUTLINE | PRINT VERSION NOT TO SCALE

| TITLE: | DOCUMENT NO: 98ASA00818D | REV: A |
|---|---|---|
| OM–1230G–4L | STANDARD: NON–JEDEC | |
| | 12 MAR 2015 | |

## PRODUCT DOCUMENTATION, SOFTWARE AND TOOLS

Refer to the following resources to aid your design process.

**Application Notes**

- AN1907: Solder Reflow Attach Method for High Power RF Devices in Over-Molded Plastic Packages
- AN1955: Thermal Measurement Methodology of RF Power Amplifiers

**Engineering Bulletins**

- EB212: Using Data Sheet Impedances for RF LDMOS Devices

**White Paper**

- RFPLASTICWP: Designing with Plastic RF Power Transistors

**Software**

- Electromigration MTTF Calculator
- RF High Power Model
- .s2p File

**Development Tools**

- Printed Circuit Boards

**To Download Resources Specific to a Given Part Number:**

1. Go to http://www.freescale.com/rf
2. Search by part number
3. Click part number link
4. Choose the desired resource from the drop down menu

## REVISION HISTORY

The following table summarizes revisions to this document.

| Revision | Date | Description |
|---|---|---|
| 0 | Feb. 2015 | • Initial Release of Data Sheet |
| 1 | Feb. 2015 | • Table 2, Maximum Ratings: added Total Device Dissipation, p. 2<br>• Table 3, Thermal Characteristics: added CW Thermal Resistance, p. 2<br>• Added Fig. 11, Narrowband Series Equivalent Source and Load Impedance - 230 MHz, p. 8 |
| 2 | Apr. 2015 | • Added part number MRFE6VP61K25GN, p. 1<br>• Added OM-1230G-4L package photo, p. 1, and Mechanical Outline, pp. 18-20 |

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Document Number: MRFE6VP61K25N
Rev. 2, 4/2015

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