

## RMPA2059

### WCDMA PowerEdge™ Power Amplifier Module

#### Features

- 40% CDMA efficiency at +27dBm average output power
- Single positive-supply operation and low power and shutdown modes
- Meets UTMS/WCDMA and HSDPA performance requirements
- Compact Lead-free compliant LCC package  
- 4.0 x 4.0 x 1.5 mm
- Industry standard pinout
- Internally matched to 50Ω and DC blocked RF input/output

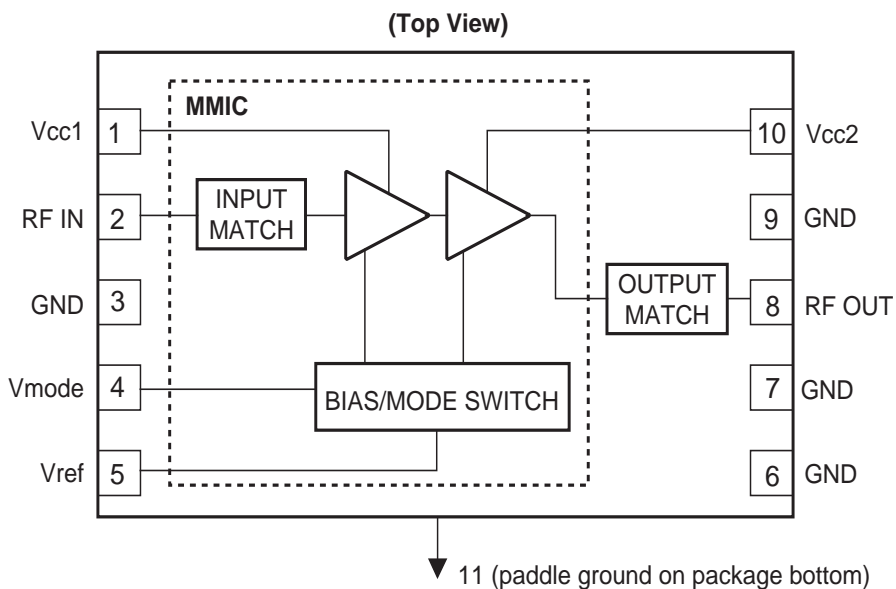
#### General Description

The RMPA2059 power amplifier module (PAM) is designed for WCDMA applications. The 2 stage PAM is internally matched to 50Ω to minimize the use of external components and features a low-power mode to reduce standby current and DC power consumption during peak phone usage. High power-added efficiency and excellent linearity are achieved using our InGaP Heterojunction Bipolar Transistor (HBT) process.

#### Device



#### Functional Block Diagram



## Absolute Ratings<sup>1</sup>

| Symbol           | Parameter             | Min | Max  | Units |
|------------------|-----------------------|-----|------|-------|
| Vcc1, Vcc2       | Supply Voltages       | 0   | 5.0  | V     |
| Vref             | Reference Voltage     | 2.7 | 5.0  | V     |
| Vmode            | Power Control Voltage | 0   | 3.0  | V     |
| Pin              | RF Input Power        | -   | +5   | dBm   |
| T <sub>STG</sub> | Storage Temperature   | -55 | +150 | °C    |

**Note:**

1: No permanent damage with only one parameter set at extreme limit. Other parameters set to typical values.

## Electrical Characteristics<sup>1</sup>

| Symbol                         | Parameter                                | Min  | Typ   | Max  | Units  | Comments                                       |
|--------------------------------|--|------|-------|------|--------|--|
| f                              | Operating Frequency                      | 1920 |       | 1980 | MHz    |  |
| <b>WCDMA Operation</b>         |  |      |       |      |        |  |
| Gp                             | Power Gain                               |      | 26.5  |      | dB     | Po=+27dBm; Vmode=0V                            |
|                                |  |      | 24    |      | dB     | Po=+16dBm; Vmode≥2.0V                          |
| Po                             | Linear Output Power                      | 27   |       |      | dBm    | Vmode=0V                                       |
|                                |  | 16   |       |      | dBm    | Vmode≥2.0V                                     |
| PAEd                           | PAEd (digital) @ +27dBm                  |      | 40    |      | %      | Vmode=0V                                       |
|                                | PAEd (digital) @ +16dBm                  |      | 9.5   |      | %      | Vmode≥2.0V                                     |
|                                | PAEd (digital) @ +16dBm                  |      | 20    |      | %      | Vmode≥2.0V, Vcc=1.4V                           |
| Itot                           | High Power Total Current                 |      | 365   |      | mA     | Po=+27dBm, Vmode=0V                            |
|                                | Low Power Total Current                  |      | 120   |      | mA     | Po=+16dBm, Vmode≥2.0V                          |
|                                | Adjacent Channel Leakage Ratio           |      |       |      |        | WCDMA Modulation 3GPP 3.2 03-00 DPCCH+1 DCDCCH |
| ACLR1                          | ±5.0MHz Offset                           |      | -40   |      | dBc    | Po=+27 dBm; Vmode=0V                           |
|                                |  |      | -44   |      | dBc    | Po=+16 dBm; Vmode≥2.0V                         |
| ACLR2                          | ±10.0MHz Offset                          |      | -55   |      | dBc    | Po=+27 dBm; Vmode=0V                           |
|                                |  |      | -63   |      | dBc    | Po=+16 dBm; Vmode≥2.0V                         |
| <b>General Characteristics</b> |  |      |       |      |        |  |
| VSWR                           | Input Impedance                          |      | 2.0:1 |      |        |  |
| NF                             | Noise Figure                             |      | 3     |      | dB     |  |
| Rx No                          | Receive Band Noise Power                 |      | -139  |      | dBm/Hz | Po<+27dBm; 2110 to 2170MHz                     |
| 2fo-5fo                        | Harmonic Suppression <sup>3</sup>        |      |       | -30  | dBc    | Po≤+27 dBm                                     |
| S                              | Spurious Outputs <sup>2,3</sup>          |      |       | -60  | dBc    | Load VSWR ≤ 5.0:1                              |
|                                | Ruggedness w/ Load Mismatch <sup>3</sup> |      |       | 10:1 |        | No permanent damage                            |
| Tc                             | Case Operating Temperature               | -30  |       | 85   | °C     |  |
| <b>DC Characteristics</b>      |  |      |       |      |        |  |
| Iccq                           | Quiescent Current                        |      | 50    |      | mA     | Vmode≥2.0V                                     |
| Iref                           | Reference Current                        |      | 4     | 8    | mA     | Po≤+27dBm                                      |
| Icc(off)                       | Shutdown Leakage Current                 |      | 1     | 5    | µA     | No applied RF signal                           |

**Notes:**

1: All parameters met at Tc = +25°C, Vcc = +3.4V, f = 1950MHz, and load VSWR ≤ 1.2:1.

2: All phase angles.

3: Guaranteed by design.

## Recommended Operating Conditions<sup>1</sup>

| Symbol     | Parameter                  | Min  | Typ  | Max  | Units |
|------------|----------------------------|------|------|------|-------|
| f          | Operating Frequency        | 1920 |      | 1980 | MHz   |
| Vcc1, Vcc2 | Supply Voltage             | 3.0  | 3.4  | 4.2  | V     |
| Vref       | Reference Voltage          |      |      |      |       |
|            | Operating                  | 2.7  | 2.85 | 3.1  | V     |
|            | Shutdown                   | 0    |      | 0.5  | V     |
| Vmode      | Bias Control Voltage       |      |      |      |       |
|            | Low-Power                  | 1.8  | 2.0  | 3.0  | V     |
|            | High-Power                 | 0    |      | 0.5  | V     |
| Pout       | Linear Output Power        |      |      |      |       |
|            | High-Power                 |      |      | +27  | dBm   |
|            | Low-Power                  |      |      | +16  | dBm   |
| Tc         | Case Operating Temperature | -30  |      | +85  | °C    |

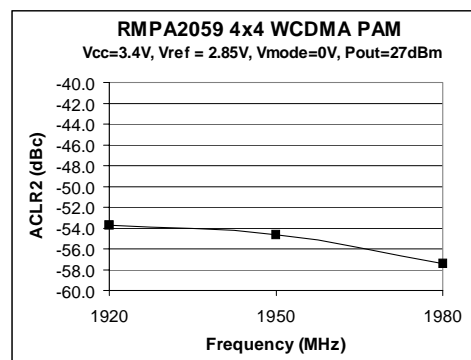
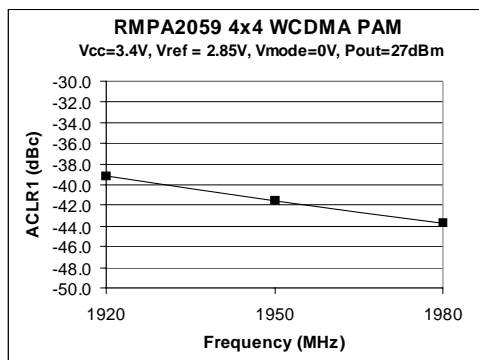
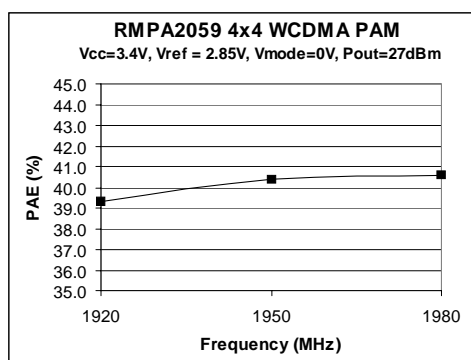
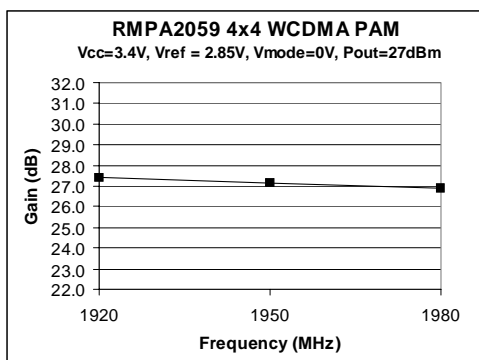
**Note:**

1: RF input power for WCDMA Pout = +27dBm.

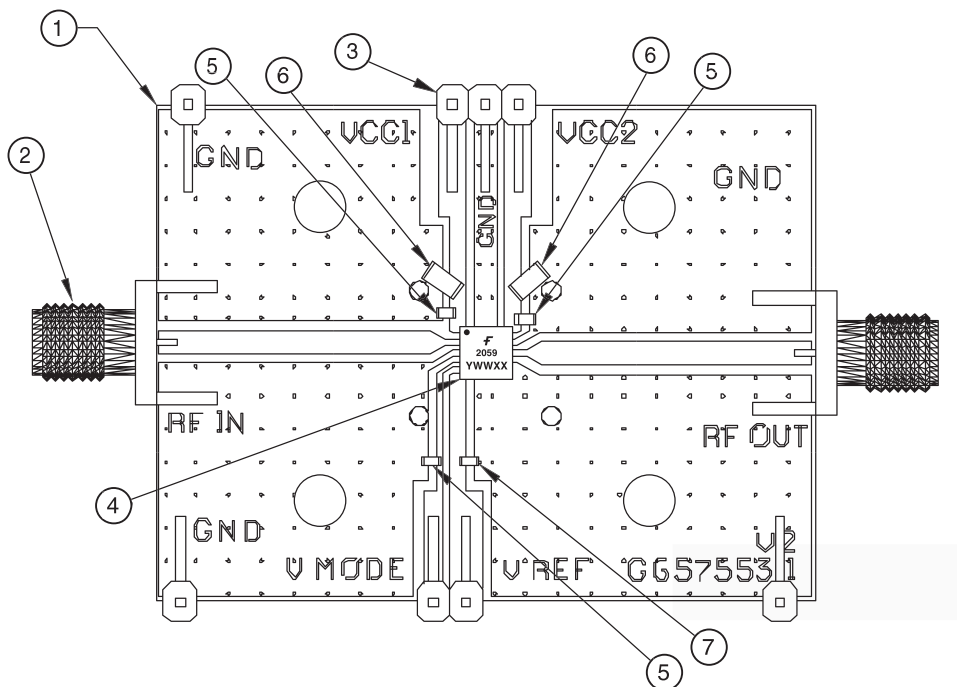
### DC Turn On Sequence:

- Vcc1 = Vcc2 = 3.4V (typical)
- Vref = 2.85V (typical)
- High-Power: Vmode = 0V (Pout > 16dBm)  
Low-Power: Vmode = 2.0V (Pout < 16dBm)

### Performance Data



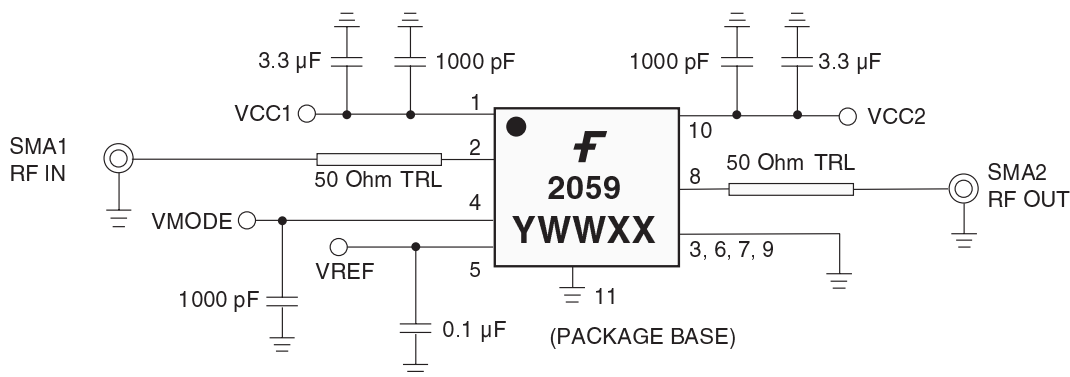
### Evaluation Board Layout



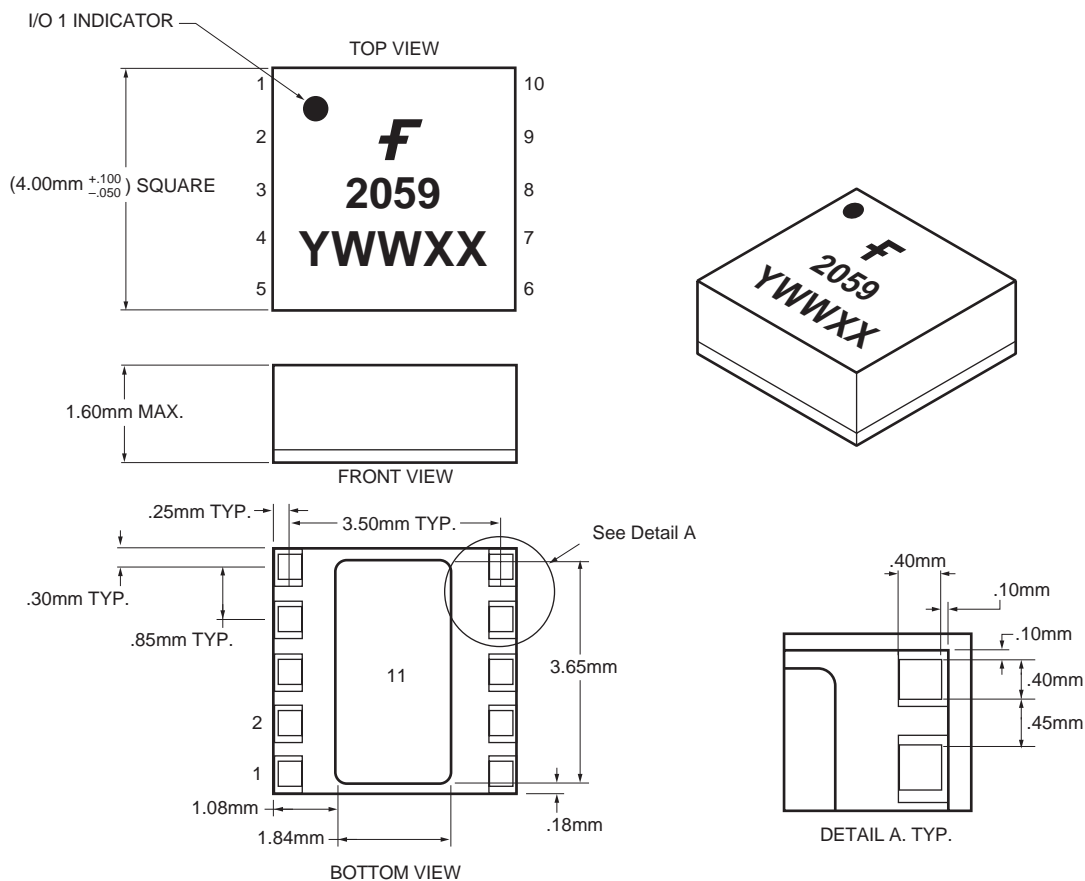
### Materials List

| Qty | Item No. | Part Number     | Description             | Vendor       |
|-----|----------|-----------------|-------------------------|--------------|
| 1   | 1        | G657553-1 V2    | PC Board                | Fairchild    |
| 2   | 2        | #142-0701-841   | SMA Connector           | Johnson      |
| 3   | 3        | #2340-5211TN    | Terminals               | 3M           |
| Ref | 4        | G657637         | Assembly, RMPA2059      | Fairchild    |
| 3   | 5        | GRM39XR102KS0V  | 1000pF Capacitor (0603) | Murata       |
| 3   | 5 (Alt)  | ECJ-1V81H102K   | 1000pF Capacitor (0603) | Panasonic    |
| 2   | 6        | C3216X5R1A335M  | 3.3µF Capacitor (1206)  | TDK          |
| 1   | 7        | GRM39YSV104Z16V | 0.1µF Capacitor (0603)  | Murata       |
| 1   | 7 (Alt)  | ECJ-1VB1CID4K   | 0.1µF Capacitor (0603)  | Panasonic    |
| A/R | 8        | SN63            | Solder Paste            | Indium Corp. |
| A/R | 9        | SN96            | Solder Paste            | Indium Corp. |

### Evaluation Board Schematic



## Package Outline



## Signal Descriptions

| Pin # | Signal Name | Description                       |
|-------|-------------|-----------------------------------|
| 1     | Vcc1        | Reference Voltage                 |
| 2     | RF In       | High Power/Low Power Mode Control |
| 3     | GND         | Ground                            |
| 4     | Vmode       | RF Input Signal                   |
| 5     | Vref        | Supply Voltage to Input Stage     |
| 6     | GND         | Ground                            |
| 7     | GND         | Ground                            |
| 8     | RF Out      | RF Output Signal                  |
| 9     | GND         | Ground                            |
| 10    | Vcc2        | Supply Voltage to Output Stage    |
| 11    | GND         | Paddle Ground                     |

## Applications Information

**CAUTION: THIS IS AN ESD SENSITIVE DEVICE.**

### Precautions to Avoid Permanent Device Damage:

- Cleanliness: Observe proper handling procedures to ensure clean devices and PCBs. Devices should remain in their original packaging until component placement to ensure no contamination or damage to RF, DC and ground contact areas.
- Device Cleaning: Standard board cleaning techniques should not present device problems provided that the boards are properly dried to remove solvents or water residues.
- Static Sensitivity: Follow ESD precautions to protect against ESD damage:
  - A properly grounded static-dissipative surface on which to place devices.
  - Static-dissipative floor or mat.
  - A properly grounded conductive wrist strap for each person to wear while handling devices.
- General Handling: Handle the package on the top with a vacuum collet or along the edges with a sharp pair of bent tweezers. Avoiding damaging the RF, DC, and ground contacts on the package bottom. Do not apply excessive pressure to the top of the lid.
- Device Storage: Devices are supplied in heat-sealed, moisture-barrier bags. In this condition, devices are protected and require no special storage conditions. Once the sealed bag has been opened, devices should be stored in a dry nitrogen environment.

### Device Usage:

Fairchild recommends the following procedures prior to assembly.

- Dry-bake devices at 125°C for 24 hours minimum. Note: The shipping trays cannot withstand 125°C baking temperature.
- Assemble the dry-baked devices within 7 days of removal from the oven.
- During the 7-day period, the devices must be stored in an environment of less than 60% relative humidity and a maximum temperature of 30°C
- If the 7-day period or the environmental conditions have been exceeded, then the dry-bake procedure must be repeated.

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| The Power Franchise®                 |                     | OPTOPLANAR™   | SILENT SWITCHER®    | UniFET™         |
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Rev. I15