

## Thermally-Enhanced High Power RF LDMOS FET 50 W, 28 V, 2300 – 2400 MHz

### Description

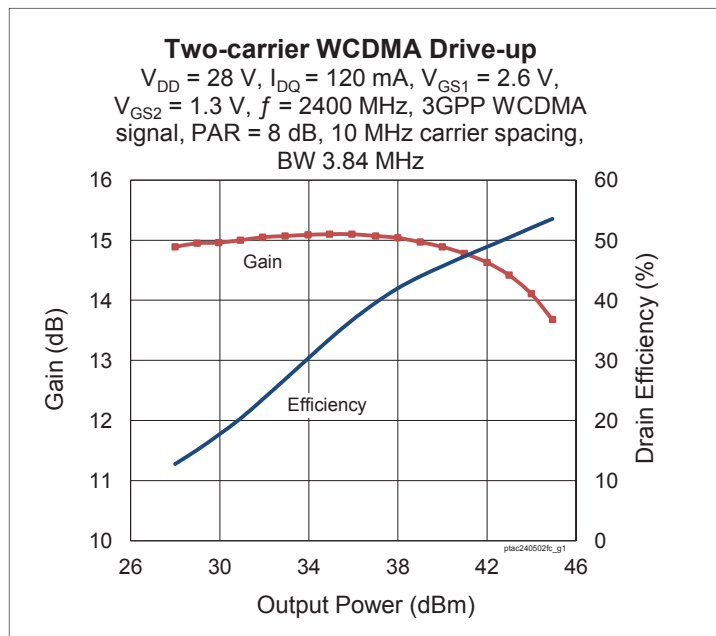
The PTAC240502FC is a 47-watt LDMOS FET with an asymmetrical design intended for use in multi-standard cellular power amplifier applications in the 2300 to 2400 MHz frequency band. Features include dual-path design, input matching, high gain and thermally-enhanced package with earless flanges. Manufactured with Infineon's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



PTAC240502FC  
Package H-37248-4

### Features

- Input matched
- Asymmetric Doherty design
  - Main: P1dB = 17 W Typ
  - Peak: P1dB = 33 W Typ
- Typical Pulsed CW performance, 2350 MHz, 28 V, 160  $\mu$ s pulse width, 10% duty cycle, Doherty Configuration
  - Output power at P1dB = 45.7 W
  - Efficiency = 46.2%
  - Gain = 14.6 dB
- Typical single-carrier WCDMA performance, 2350 MHz, 28 V, 8.4 dB PAR @ 0.01% CCDF
  - Output power = 8.91 W
  - Efficiency = 44.2%
  - Gain = 14.2 dB
  - ACPR = -31 dBc @ 5 MHz
- Capable of handling 10:1 VSWR @ 28 V, 50 W (CW) output power
- Integrated ESD protection : Human Body Model, Class 1B (per JESD22-A114)
- Low thermal resistance
- Pb-free and RoHS compliant



### RF Characteristics

#### Two-carrier WCDMA Specifications (tested in Infineon Doherty test fixture)

$V_{DD} = 28$  V,  $I_{DQ} = 120$  mA,  $P_{OUT} = 10$  W avg,  $V_{GS2} = 1.3$  V,  $f_1 = 2345$  MHz,  $f_2 = 2355$  MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 8 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Linear Gain	$G_{ps}$	13	14.3	—	dB
Drain Efficiency	$\eta_D$	41	44	—	%
Intermodulation Distortion	IMD	—	-33	-25	dBc

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	$V_{GS} = 0\text{ V}$ , $I_{DS} = 10\text{ mA}$	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	$V_{DS} = 28\text{ V}$ , $V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	1	$\mu\text{A}$
	$V_{DS} = 63\text{ V}$ , $V_{GS} = 0\text{ V}$	$I_{DSS}$	—	—	10	$\mu\text{A}$
On-State Resistance (main)	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.4	—	$\Omega$
	(peak) $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.1\text{ V}$	$R_{DS(on)}$	—	0.2	—	$\Omega$
Operating Gate Voltage (main)	$V_{DS} = 28\text{ V}$ , $I_{DQ} = 120\text{ mA}$	$V_{GS}$	2.6	2.7	2.8	V
	(peak) $V_{DS} = 28\text{ V}$ , $I_{DQ} = 0\text{ mA}$	$V_{GS}$	1.2	1.3	1.5	V
Gate Leakage Current	$V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$	$I_{GSS}$	—	—	1	$\mu\text{A}$

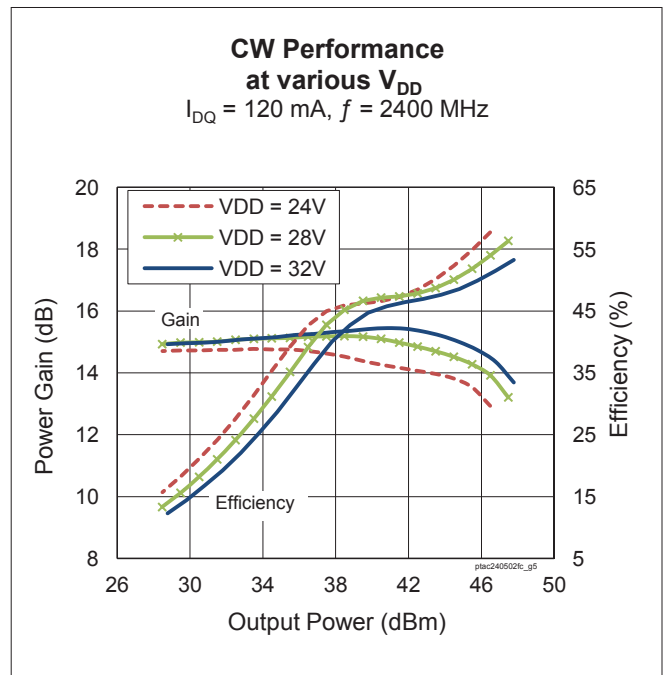
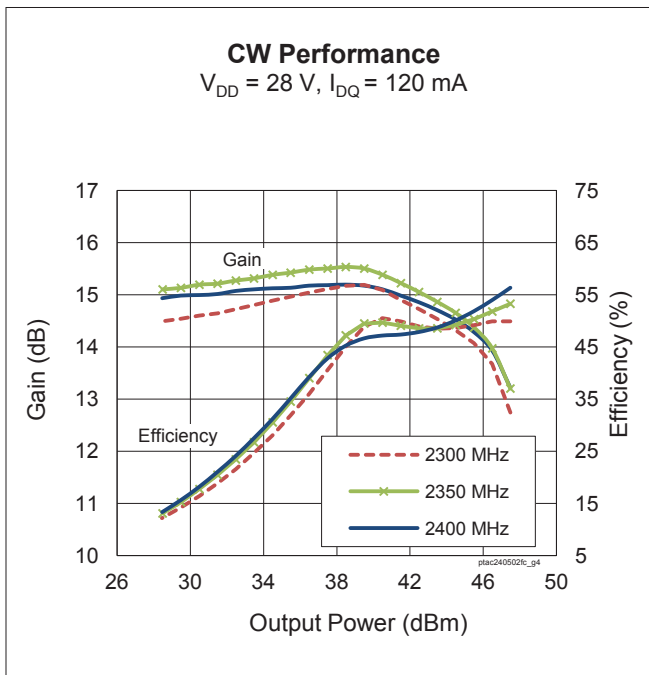
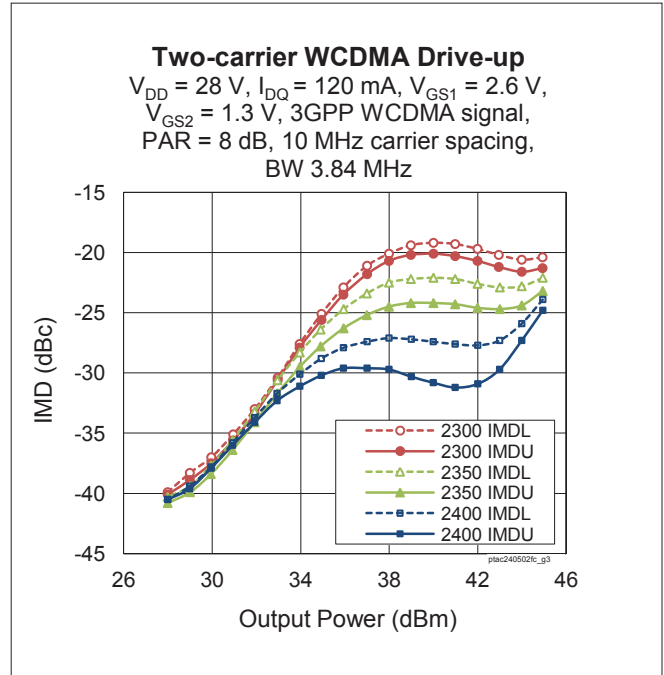
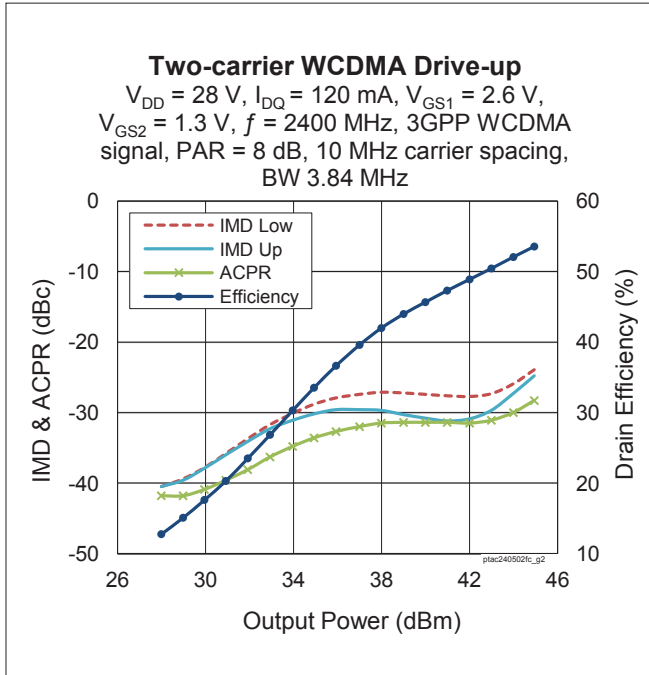
## Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	65	V
Gate-Source Voltage	$V_{GS}$	-6 to +10	V
Operating Voltage	$V_{DD}$	0 to +32	V
Junction Temperature	$T_J$	225	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65 to +150	$^{\circ}\text{C}$
Thermal Resistance ( $T_{CASE} = 60^{\circ}\text{C}$ , 50 W CW)	$R_{\theta JC}$	1.29	$^{\circ}\text{C/W}$

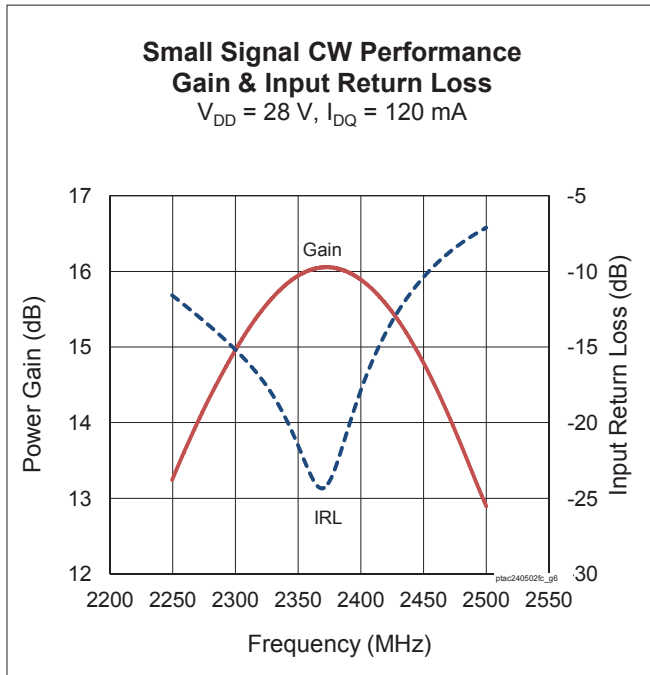
## Ordering Information

Type and Version	Order Code	Package Description	Shipping
PTAC240502FC V1	PTAC240502FCV1XWSA1	H-37248-4, earless flange	Tray
PTAC240502FC V1 R250	PTAC240502FCV1R250XTMA1	H-37248-4, earless flange	Tape & Reel, 250 pcs

**Typical Performance** (data taken in a production test fixture)



**Typical Performance** (cont.)



**Load Pull Performance**

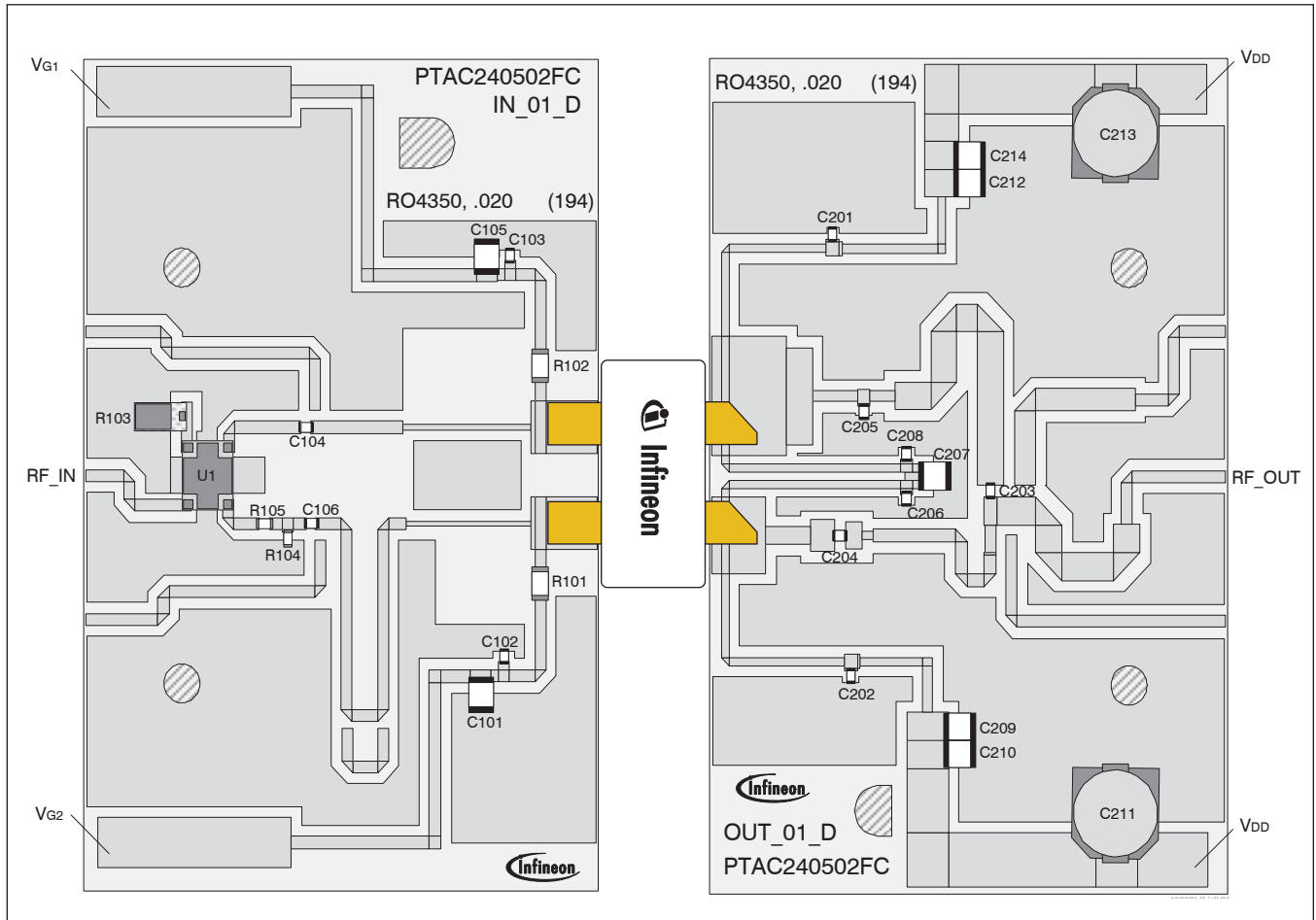
**Main Side Load Pull Performance** – Pulsed CW signal: 160  $\mu\text{s}$ , 10% duty cycle, 28 V, 114 mA

		P1dB									
		Max Output Power					Max PAE				
Freq [MHz]	Zs [ $\Omega$ ]	ZI [ $\Omega$ ]	Gain [dB]	POUT [dBm]	POUT [W]	PAE [%]	ZI [ $\Omega$ ]	Gain [dB]	POUT [dBm]	POUT [W]	PAE [%]
2300	10-j31	9.4-j11.6	20.96	42.89	19.45	53.2	4.7-j8.3	22.8	41.03	12.68	61.5
2350	12.7-j35	9.7-j12.2	20.7	42.83	19.19	52.7	5.1-j9.4	22.4	41.34	13.61	62.1
2400	16.2-j38	9.31-j12.6	20.8	42.65	18.41	52.6	5.2-j10.2	22.2	41.45	13.96	61.3

**Peak Side Load Pull Performance** – Pulsed CW signal: 160  $\mu\text{s}$ , 10% duty cycle, 28 V, 252 mA

		P1dB									
		Max Output Power					Max PAE				
Freq [MHz]	Zs [ $\Omega$ ]	ZI [ $\Omega$ ]	Gain [dB]	POUT [dBm]	POUT [W]	PAE [%]	ZI [ $\Omega$ ]	Gain [dB]	POUT [dBm]	POUT [W]	PAE [%]
2300	5.6-j22	3.0-j7.0	18.2	46.50	44.67	52.1	2.2-j5.8	20.5	45.20	33.11	56.9
2350	6.7-j25	2.9-j7.9	17.4	46.46	44.26	48.5	2.2-j5.9	21.1	44.91	30.97	55.9
2400	9.7-j29	3.3-j7.9	17.9	46.62	45.92	49.6	2.2-j6.2	20.8	45.31	33.96	57.2

Reference Circuit , 2300 – 2400 MHz



Reference circuit assembly diagram (not to scale)

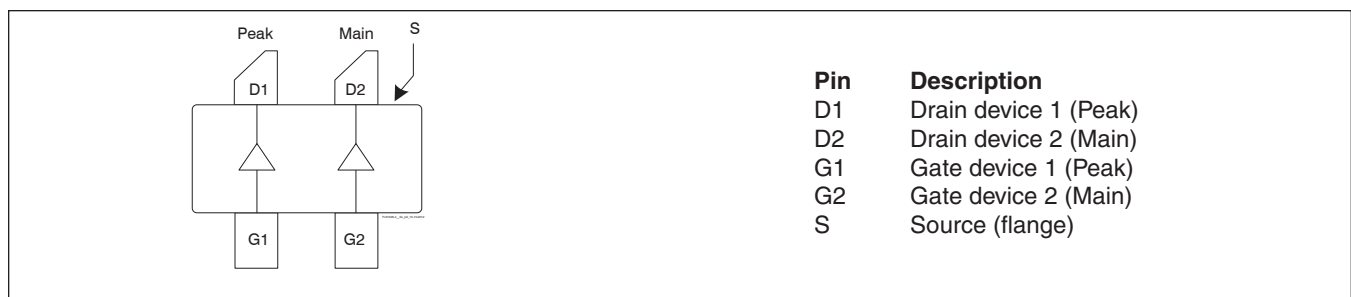
**Reference Circuit** (cont.)

**Reference Circuit Assembly**

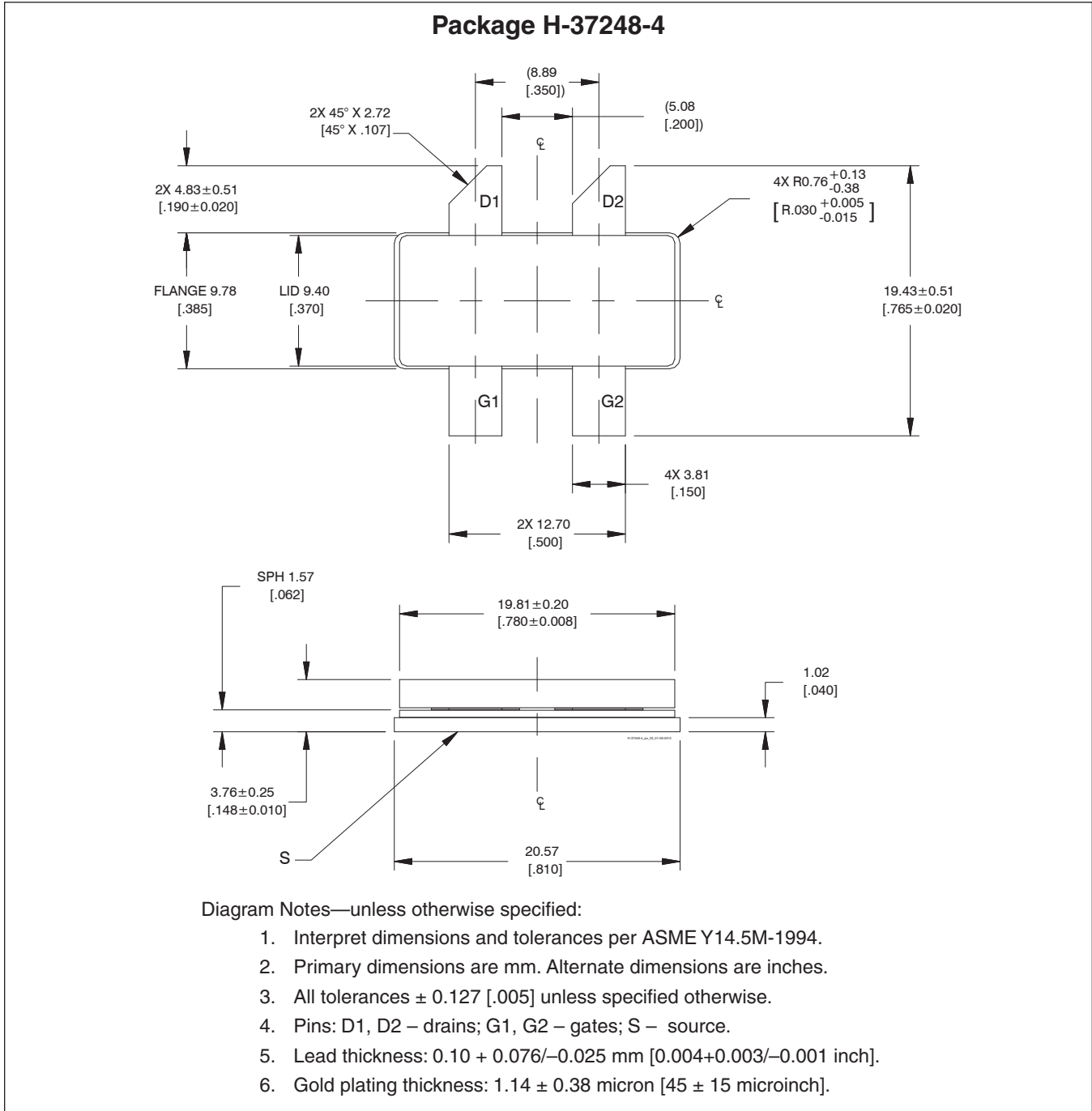
DUT	PTAC240502FC V1
Test Fixture Part No.	LTA/PTAC240502FC V1
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$ , $f = 2300 - 2400$ MHz
Find Gerber files for this test fixture on the Infineon Web site at <a href="http://www.infineon.com/rfpower">http://www.infineon.com/rfpower</a>	

**Components Information**

Component	Description	Suggested Manufacturer	P/N
<b>Input</b>			
C101, C105	Capacitor, 4.7 $\mu$ F	Murata Electronics North America	GRM32ER71H475KA88L
C102, C103, C104, C106	Capacitor, 18 pF	ATC	ATC800A180JT250T
R101, R102	Resistor, 10 $\Omega$	Panasonic Electronic Components	ERJ-8GEYJ100V
R103	Resistor, 50 $\Omega$	Anaren	060120A15Z50
R104	Resistor, 300 $\Omega$	Venkel	CR0603-16W-3010FB
R105	Resistor, 12.1 $\Omega$	Venkel	CR0603-16W-12R1FB
U1	Directional coupler	Anaren	X3C25P1-05S
<b>Output</b>			
C201, C202, C203, C204, C206, C208	Capacitor, 18 pF	ATC	ATC800A180JT250T
C205	Capacitor, 0.5 pF	ATC	ATC800A180JT250T
C207, C210, C214	Capacitor, 4.71 $\mu$ F	Murata Electronics North America	GRM32ER71H475KA88L
C209, C212	Capacitor, 10 $\mu$ F	Taiyo Yuden	UMK325C7106MM-T
C211, C213	Capacitor, 100 $\mu$ F	Panasonic Electronic Components	EEE-FP1V101AP

**Pinout Diagram** (top view)

*Lead connections for PTAC240502FC*

Package Outline Specifications



Find the latest and most complete information about products and packaging at the Infineon Internet page <http://www.infineon.com/rfpower>

## Revision History

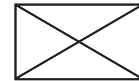
Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2013-07-16	Advance	All	Data Sheet reflects advance specification for product development
02	2013-11-13	Production	All	Data Sheet reflects released product specification
02.1	2013-11-27	Production	1	Revised ESD classification
02.2	2014-05-14	Production	2	Revised junction temperature in Maximum Ratings table

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