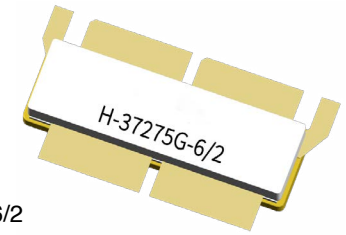
PXAD184218FV

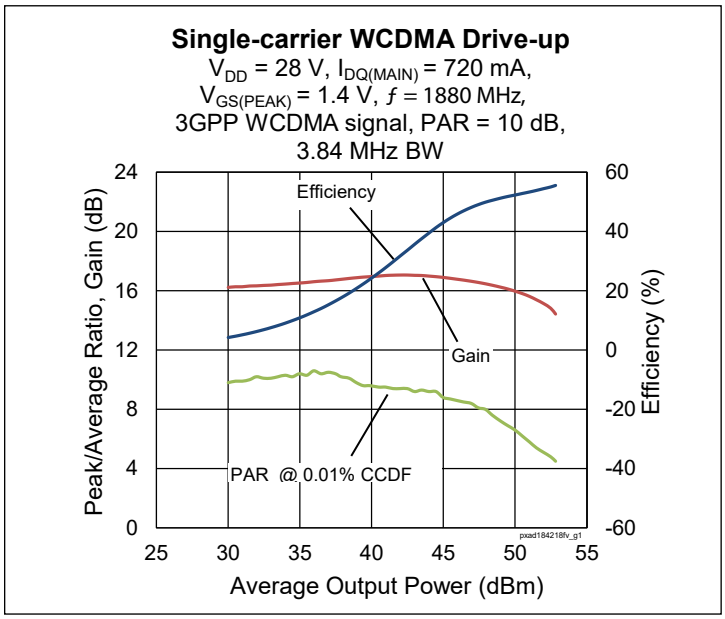
Thermally-Enhanced High Power RF LDMOS FET
420 W, 28 V, 1805 – 1880 MHz

Description

The PXAD184218FV is a 420-watt (P_{3dB}) LDMOS FET with an asymmetrical design intended for use in multi-standard cellular power amplifier applications in the 1805 to 1880 MHz frequency band. Features include dual-path design, input and output matching, high gain and thermally-enhanced package with earless flanges. Manufactured with an advanded LDMOS process, this device provides excellent thermal performance and superior reliability.



PXAD184218FV
Package H-37275G-6/2



Features

- Broadband internal input and output matching
- Asymmetrical Doherty design
  - Main : P_{1dB} = 130 W Typ
  - Peak : P_{1dB} = 290 W Typ
- Typical Pulsed CW performance, 1842.5 MHz, 28 V, Doherty configuration
  - Output power at P_{3dB} = 420 W
  - Efficiency = 62%
  - Gain = 14 dB
- Capable of handling 10:1 VSWR @ 28 V, 110 W (WCDMA) output power
- Integrated ESD protection
- Human Body Model class 2 (per ANSI/ESDA/JEDEC JS-001)
- Low thermal resistance
- Pb-free and RoHS compliant

RF Characteristics

Two-carrier WCDMA Specifications (tested in the Doherty production test fixture)
V_{DD} = 28 V, I_{DQ} = 720 mA, $V_{GS(PEAK)}$ = 1.4 V, P_{OUT} = 60 W avg, f = 1880 MHz, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

Characteristic	Symbol	Min	Typ	Max	Unit
Linear Gain	G_{ps}	15	16	—	dB
Drain Efficiency	η_D	49	51.5	—	%
Adjacent Channel Power Ratio	ACPR	—	–28	–25.0	dBc
Output PAR@0.01% CCDF	OPAR	6.8	7.7	—	dBc

All published data at T_{CASE} = 25°C unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

Rev. 04, 2023-06-26

DC Characteristics (each side)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_{DS} = 10 mA	$V_{(BR)DSS}$	65	—	—	V
Drain Leakage Current	V_{DS} = 28 V, V_{GS} = 0 V	I_{DSS}	—	—	1	µA
	V_{DS} = 63 V, V_{GS} = 0 V	I_{DSS}	—	—	10	µA
Gate Leakage Current	V_{GS} = 10 V, V_{DS} = 0 V	I_{GSS}	—	—	1	µA
On-State Resistance (Main)	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.03	—	Ω
(Peak)	V_{GS} = 10 V, V_{DS} = 0.1 V	$R_{DS(on)}$	—	0.02	—	Ω
Operating Gate Voltage (Main)	V_{DS} = 28 V, I_{DQ} = 720 mA	V_{GS}	2.3	2.6	2.9	V
(Peak)	V_{DS} = 28 V, I_{DQ} = 0 mA	V_{GS}	—	1.5	—	V

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	V
Gate-Source Voltage	V_{GS}	–6 to +10	V
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	°C

Thermal Characteristics

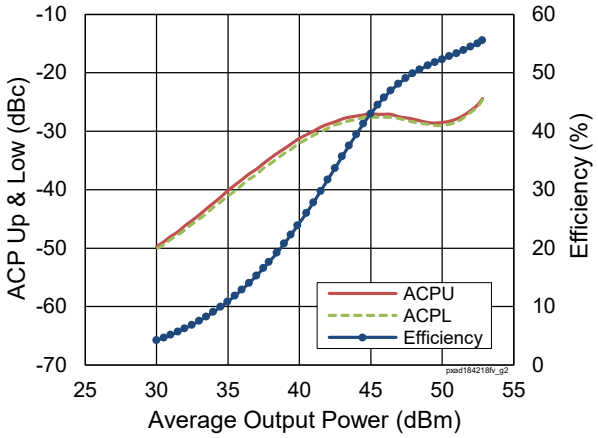
Parameter	Symbol	Value	Unit
Thermal Resistance (Main, T_{CASE} = 70°C, 60 W CW)	$R_{\theta JC}$	0.514	°C/W
(Peak, T_{CASE} = 70°C, 280 W CW)	$R_{\theta JC}$	0.297	°C/W

Ordering Information

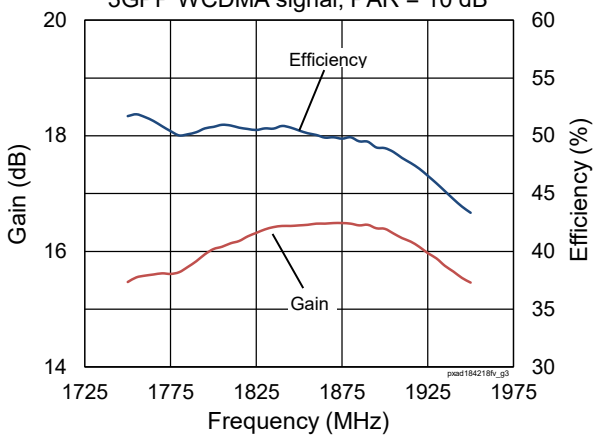
Type and Version	Order Code	Package Description	Shipping
PXAD184218FV V1 R0	PXAD184218FV-V1-R0	H-37275G-6/2, earless flange	Tape & Reel, 50 pcs
PXAD184218FV V1 R2	PXAD184218FV-V1-R2	H-37275G-6/2, earless flange	Tape & Reel, 250 pcs

Typical RF Performance (data taken in production test fixture)

Single-carrier WCDMA Drive-up
V_{DD} = 28 V, $I_{DQ(MAIN)}$ = 720 mA,
$V_{GS(PEAK)}$ = 1.4 V, f = 1880 MHz,
3GPP WCDMA signal, PAR = 10 dB,
BW = 3.84 MHz



Single-carrier WCDMA Broadband Performance
V_{DD} = 28 V, $I_{DQ(MAIN)}$ = 720 mA,
$V_{GS(PEAK)}$ = 1.4 V, P_{OUT} = 47.8 dBm,
3GPP WCDMA signal, PAR = 10 dB



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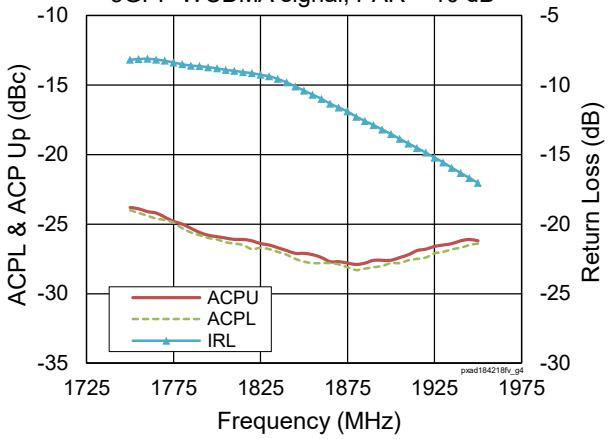


Load Pull Performance

Main Side Load Pull Performance – Pulsed CW signal: 10 μs, 10% duty cycle, V_{DD} = 28 V, I_{DQ} = 960 mA, class AB

		P_{1dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{1dB} [W]	η_D [%]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{1dB} [W]	η_D [%]
1805	2.3 - j6.3	1.6 - j3.3	20.9	52.40	173	58.7	3.5 - j3.1	23.1	50.60	116	66.6
1842.5	3.2 - j7.4	1.4 - j3.5	20.2	52.45	176	56.2	2.7 - j2.7	22.4	51.30	134	67.7
1880	5.1 - j8.9	1.4 - j3.5	20.7	52.50	180	57.4	2.7 -j 3.1	22.8	51.40	138	67.5

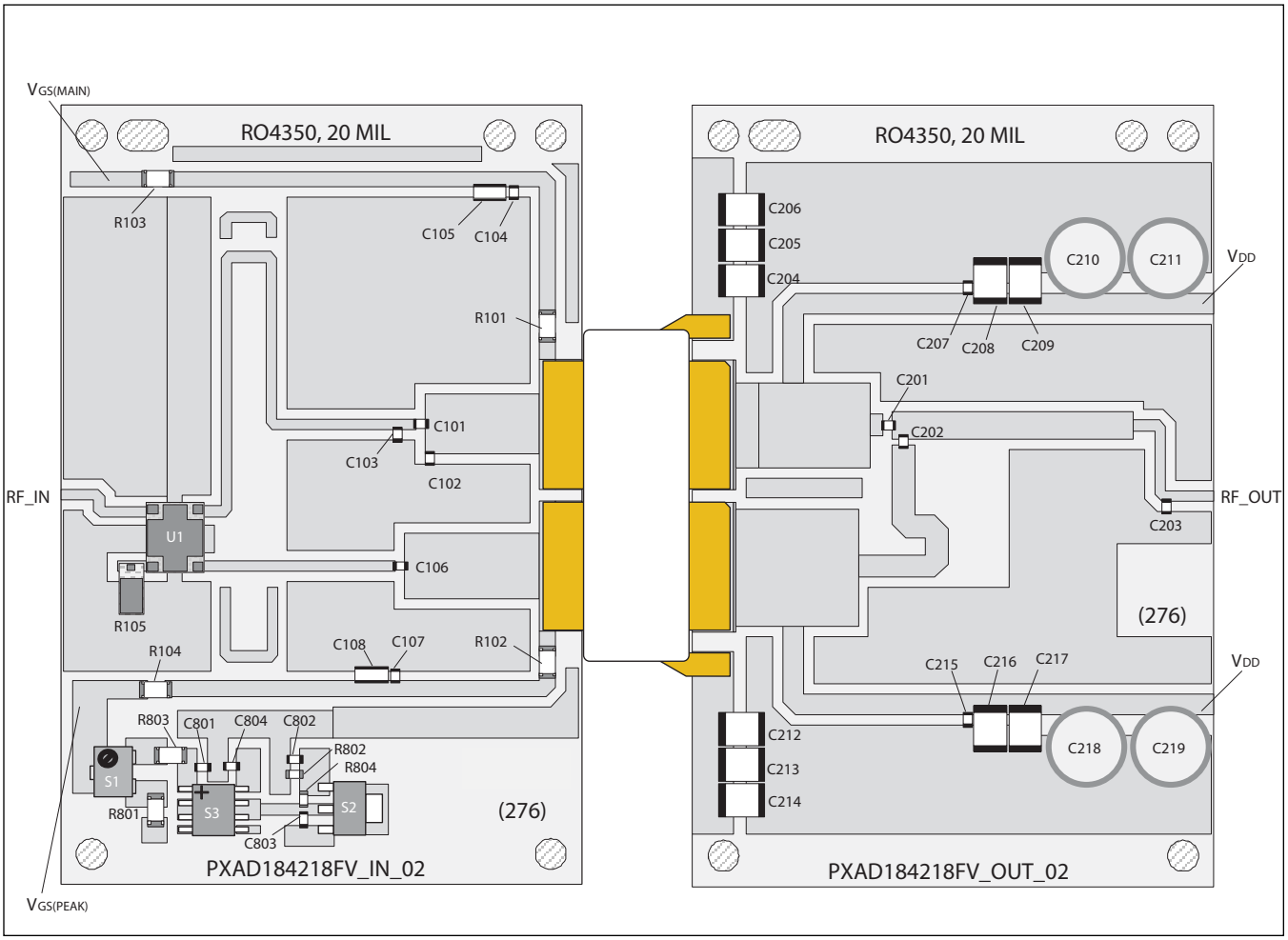
		P_{3dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	η_D [%]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	η_D [%]
1805	2.3 - j6.3	1.4 - j3.5	18.4	53.20	210	58.5	2.9 - j3.7	20.6	52.00	157	67.4
1842.5	3.2 - j7.4	1.3 - j3.6	18.1	53.29	213	58.6	2.6 - j3.3	20.2	52.20	167	68.4
1880	5.1 - j8.9	1.4 - j3.7	18.6	53.27	212	58.8	2.7 - j3.2	20.7	52.10	162	68.6

Peak Side Load Pull Performance – Pulsed CW signal: 10 μs, 10% duty cycle, V_{DD} = 28 V, I_{DQ} = 10 mA, class B

		P_{1dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{1dB} [W]	η_D [%]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{1dB} [W]	η_D [%]
1805	2.1 - j4.6	1.1 - j3.3	17.1	55.38	345	54.7	2.8 - j2.2	18.7	53.27	212	66.7
1842.5	2.8 - j5.4	1.2 - j3.4	17.4	55.43	349	54.9	2.7 -j 2.2	18.8	53.30	214	66.7
1880	4.4 - j5.6	1.3 - j3.7	17.7	55.42	348	54.6	2.5 - j2.2	19.2	53.33	215	66.3

		P_{3dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	η_D [%]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	η_D [%]
1805	2.1 - j4.6	1.2 - j3.6	14.9	56.17	414	56.9	2.8 - j2.6	16.5	54.20	265	66.8
1842.5	2.8 - j5.4	1.2 - j3.7	15	56.20	417	56.2	2.6 - j2.7	16.6	54.40	277	67.1
1880	4.4 - j5.6	1.3 - j3.8	15.6	56.14	411	56.2	2.4 - j2.9	17	54.80	301	66.9

Reference Circuit, 1805 – 1880 MHz



Reference circuit assembly diagram (not to scale)

Reference Circuit (cont.)

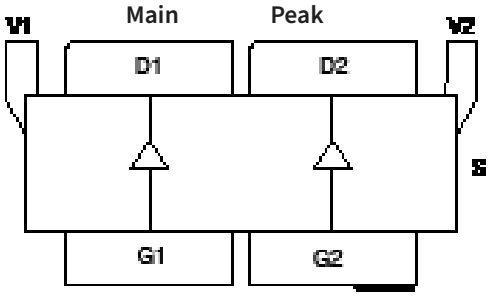
Reference Circuit Assembly

DUT	PXAD184218FV V1
Test Fixture Part No.	LTA/PXAD184218FV V1
PCB	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, ε_r = 3.66, f = 1805 – 1880 MHz

Components Information

Component	Description	Manufacturer	P/N
Input			
C101, C106	Capacitor, 22 pF	ATC	ATC800A220JT250T
C102	Capacitor, 1.8 pF	ATC	ATC800A1R8CT250T
C103	Capacitor, 0.6 pF	ATC	ATC800A0R6CT250T
C104, C107	Capacitor, 33 pF	ATC	ATC800A330JT250T
C105, C108	Capacitor, 10 μF	Murata Electronics North America	LLL31MR60J106ME01L
R101, R102, R103, R104	Resistor, 10 ohms	Panasonic Electronic Components	ERJ-8GEYJ100V
R105	Resistor, 50 ohms	Richardson	C16A50Z4
C801, C802, C803, C804	Capacitor, 1000 pF	AVX Corporation	06031C102KAT2A
R801	Resistor, 100 ohms	Panasonic Electronic Components	ERJ-8GEYJ101V
R802	Resistor, Chip 1.3K ohms	Panasonic Electronic Components	ERJ-3GEYJ132V
R803	Resistor, 10 ohms	Panasonic Electronic Components	ERJ-8GEYJ100V
R804	Resistor, CHIP 1.2K ohms	Panasonic Electronic Components	ERJ-3GEYJ122V
S1	Resistor, Variable 2K ohms	Bourns Inc.	3224W-1-202E
S2	Transistor	Diodes Incorporated	BCP5616TA
S3	Voltage Regulator	Texas Instruments	LM78L05ACM
U1	Hybrid Coupler	Anaren	05X3C19P1-05S
Output			
C201	Capacitor, 7.5 pF	ATC	ATC800A7R5JT250T
C202	Capacitor, 33 pF	ATC	ATC800A330JT250T
C203	Capacitor, 0.3 pF	ATC	ATC800A0R3CT250T
C204, C205, C206, C208, C209, C212, C213 C214, C216, C217	Capacitor,10 μF	Taiyo Yuden	UMK325C7106MM-T
C207, C215	Capacitor, 22 pF	ATC	ATC800A220JT250T
C210, C211, C218, C219	Capacitor, 220 μF	Panasonic Electronic Components	PCE4444TR-ND

Pinout Diagram (top view)



Pin	Description
D1	Drain Device 1 (Main)
D2	Drain Device 2 (Peak)
G1	Gate Device 1 (Main)
G2	Gate Device 2 (Peak)
S	Source (flange)
V1, V2	V_{DD}

Package Outline Specifications

Package H-37275G-6/2

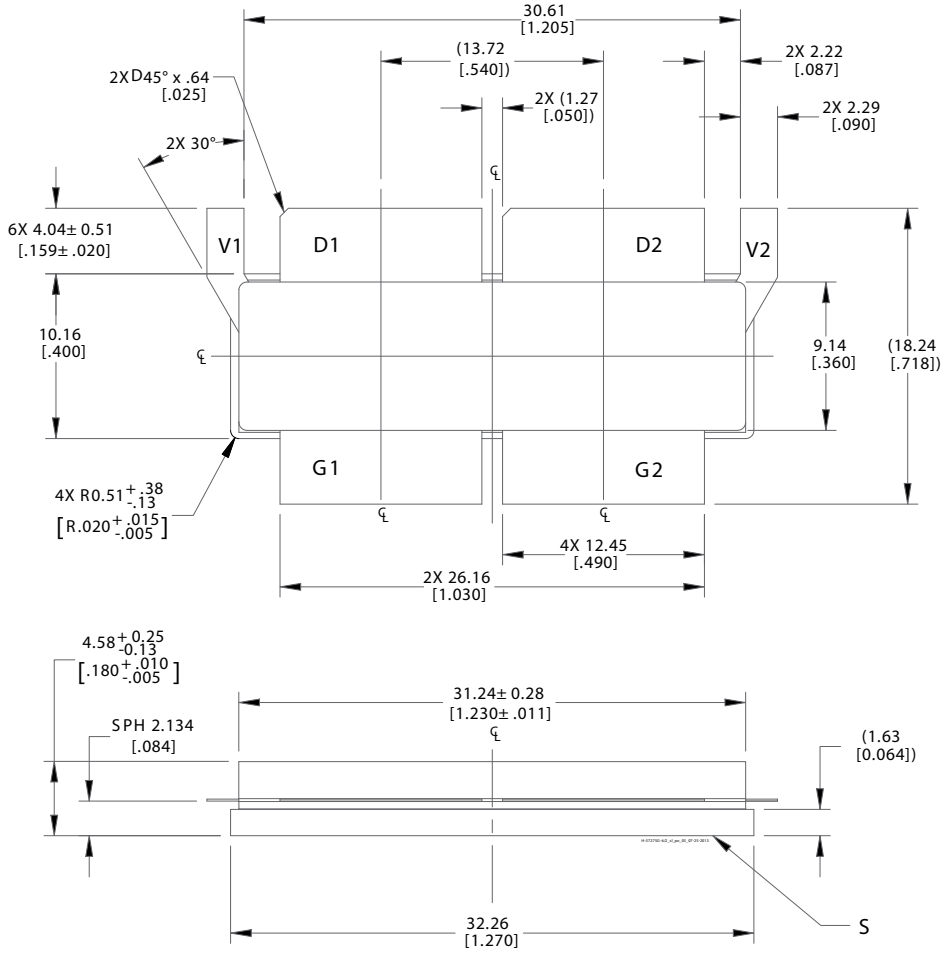


Diagram Notes—unless otherwise specified:

1. Interpret dimensions and tolerances per ASME Y14.5M-1994.
2. Primary dimensions are mm. Alternate dimensions are inches.
3. All tolerances ± 0.127 [.005] unless specified otherwise.
4. Pins: D1, D2 – drains; G1, G2 – gates; S – source; V1, V2 – V_{DD}.
5. Lead thickness: 0.13 + 0.051/–0.025 mm [0.005+0.002/–0.001 inch].
6. Gold plating thickness: 1.14 ± 0.38 micron [45 ± 15 microinch].

Revision History

Revision	Date	Data Sheet Type	Page	Subjects (major changes since last revision)
01	2016-04-20	Advance	All	Data Sheet reflects advance specification for product development
02	2016-11-07	Production	All	Data Sheet reflects released product specification
02.1	2016-12-07	Production	1, 4	Revised typo in Features, revised PAE to Drain Eff inLoad Pull performance
03	2018-06-25	Production	All	Converted to the Data Sheet

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