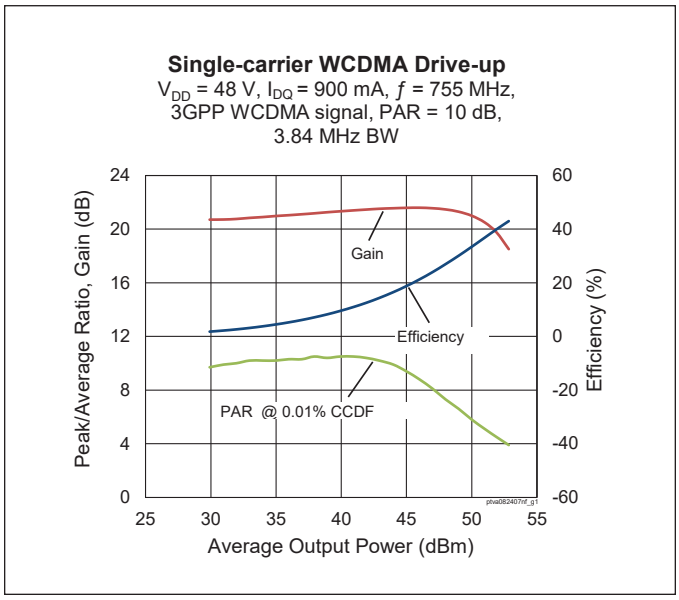
PTVA082407NF

Thermally-Enhanced High Power RF LDMOS FET
240 W, 48 V, 746 – 821 MHz

Package Types: PG-HBSOF-4-2

Description

The PTVA082407NF is a 240-watt LDMOS FET manufactured with Wolfspeed's 48-V LDMOS process. It is designed for use in multi-standard cellular power amplifier applications. It features a single ended design and input matching that allow for use from 746 MHz to 821 MHz. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.



Features

- Broadband internal input matching
- Typical CW performance, 755 MHz, 48 V
  - Output power at P_{1dB} = 225 W
  - Output power at P_{3dB} = 250 W
  - Gain = 20.5 dB
  - Efficiency = 43%
- Capable of handling 10:1 VSWR @ 48 V, 80 W CW 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

Single-carrier WCDMA Specifications (tested in Wolfspeed production test fixture)
V_{DD} = 48 V, I_{DQ} = 900 mA, P_{OUT} = 80 W avg, f = 755 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}	21	22.5	—	dB
Drain Efficiency	η_D	33	35.5	—	%
Adjacent Channel Power Ratio	ACPR	—	–31.5	–29.5	dBc

Note:
All published data at T_{CASE} = 25°C unless otherwise indicated
ESD: Electrostatic discharge sensitive device—observe handling precautions!

RoHS compliant

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DC Characteristics

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Conditions
Drain-Source Breakdown Voltage	$V_{BR(DSS)}$	105	—	—	V	V_{GS} = 0 V, I_{DS} = 10 mA
Drain Leakage Current	I_{DSS}	—	—	1	µA	V_{DS} = 50 V, V_{GS} = 0 V
		—	—	10		V_{DS} = 105 V, V_{GS} = 0 V
Gate Leakage Current	I_{GSS}	—	—	1		V_{GS} = 10 V, V_{DS} = 0 V
On-State Resistance	$R_{DS(on)}$	—	0.16	—	Ω	V_{GS} = 10 V, V_{DS} = 0.1 V
Operating Gate Voltage	V_{GS}	3.3	3.7	4	V	V_{DS} = 48 V, I_{DQ} = 0.9 A

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	105	V
Gate-source Voltage	V_{GS}	–6 to +12	
Operating Voltage	V_{DD}	0 to +55	
Junction Temperature	T_J	225	°C
Storage Temperature Range	T_{STG}	–65 to +150	

1. Operation above the maximum values listed here may cause permanent damage. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the component. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. For reliable continuous operation, the device should be operated within the operating voltage range (V_{DD}) specified above.
2. Parameters values can be affected by end application and product usage. Values may change over time.

Thermal Characteristics

Parameter	Symbol	Value	Unit	Conditions
Thermal Resistance	$R_{\theta JC}$	0.32	°C/W	T_{CASE} = 70°C, 240 W CW

Moisture Sensitivity Level

Level	Test Signal	Package Temperature	Unit
3	IPC/JEDEC J-STD-020	260	°C

Ordering Information

Type and Version	Order Code	Package Description	Shipping
PTVA082407NF V2 R5	PTVA082407NF-V2-R5	PG-HBSOF-4-2	Tape & Reel, 500 pcs

Typical RF Performance (data taken in production test fixture)

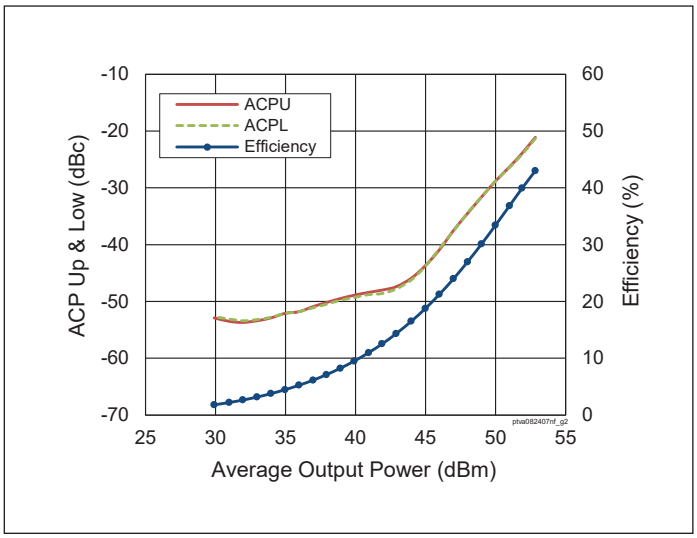


Figure 1. Single-carrier WCDMA Drive-up

V_{DD} = 48 V, I_{DQ} = 900 mA, f = 755 MHz,
3GPP WCDMA signal, PAR = 10 dB,
BW = 3.84 MHz

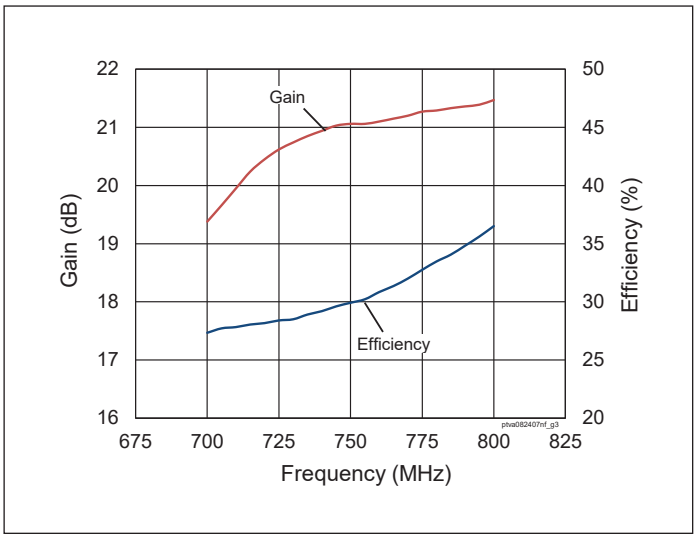


Figure 2. Single-carrier WCDMA Broadband Performance

V_{DD} = 48 V, I_{DQ} = 900 mA, P_{OUT} = 49.03 dBm,
3GPP WCDMA signal, PAR = 10 dB

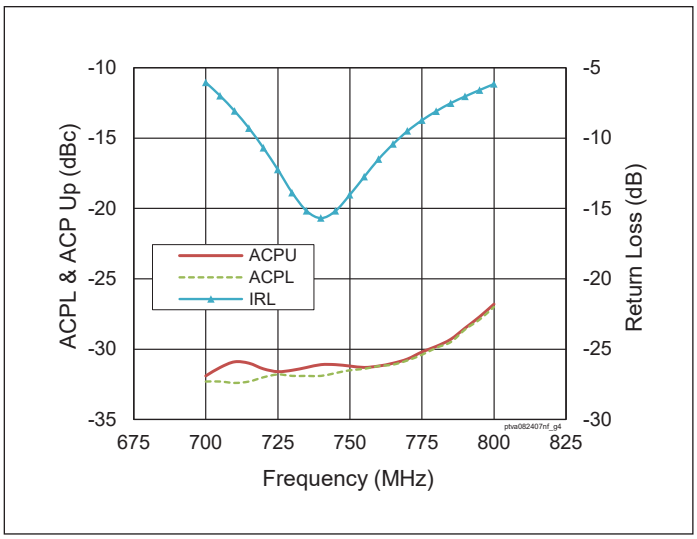


Figure 3. Single-carrier WCDMA Broadband Performance

V_{DD} = 48 V, I_{DQ} = 900 mA, P_{OUT} = 49.03 dBm,
3GPP WCDMA signal, PAR = 10 dB

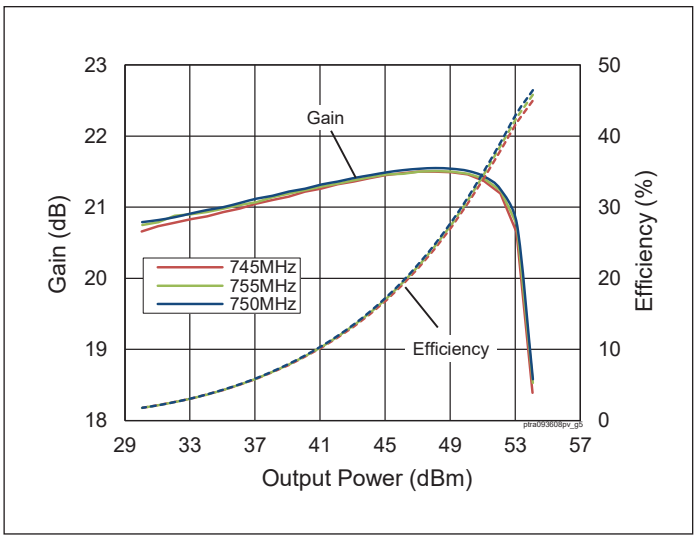


Figure 4. CW Performance

V_{DD} = 48 V, I_{DQ} = 900 mA

Typical Performance (cont.)

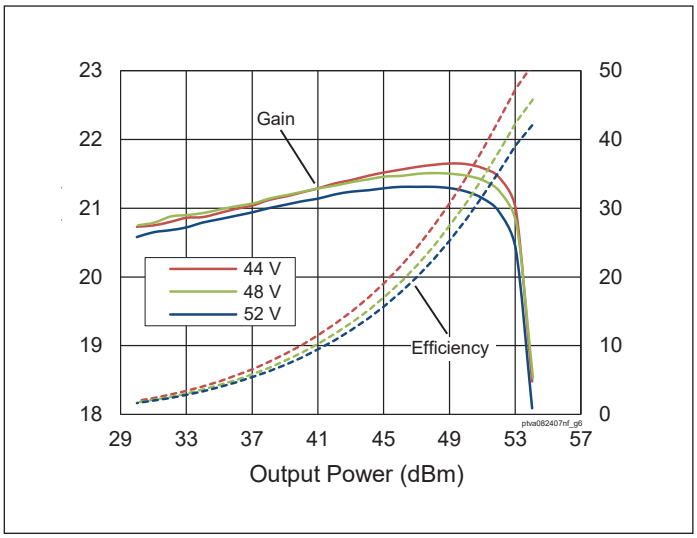


Figure 5. CW Performance at various V_{DD}

I_{DQ} = 900 mA, f = 755 MHz

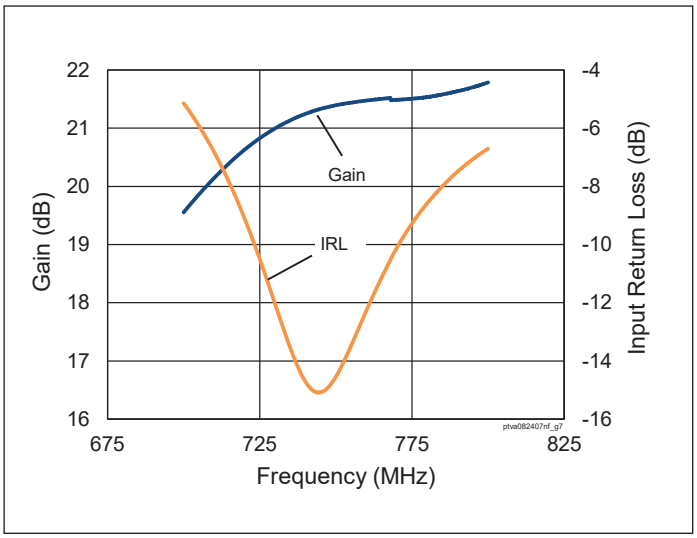


Figure 6. CW Performance Small Signal Gain & Input Return Loss

V_{DD} = 48 V, I_{DQ} = 900 mA

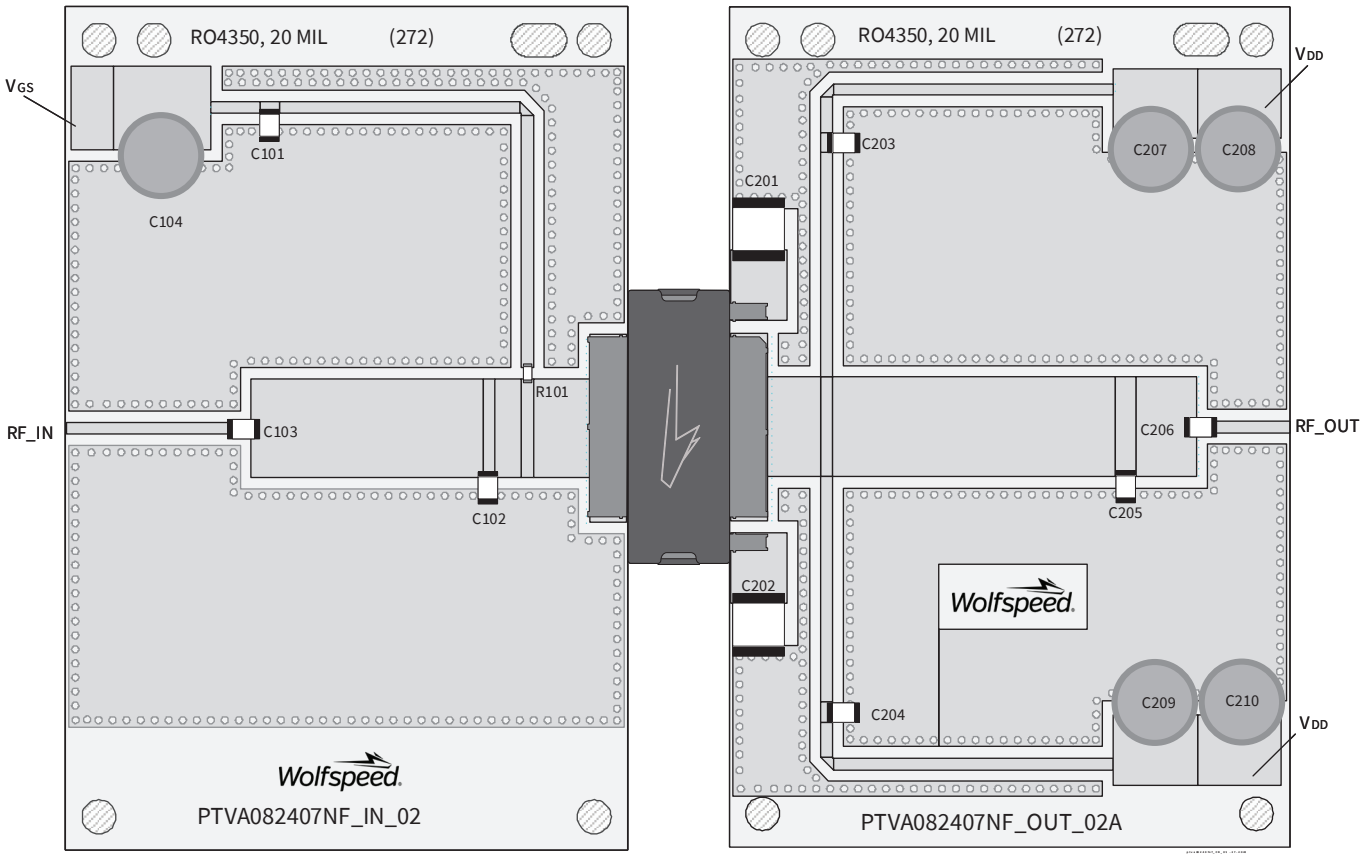
Load Pull Performance

Load Pull Performance – Pulsed CW signal: 10 µs, 10% duty cycle, 48 V, I_{DQ} = 500 mA

		P_{1dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{1dB} [W]	ηD [%]	Zl [Ω]	Gain [dB]	P_{1dB} [dBm]	P_{1dB} [W]	ηD [%]
740	0.76 – j2.72	1.85 – j0	21.29	55.11	324.3	61.1	3.12 + j1.74	23.18	53.18	208.0	71.0
760	1.03 – j2.98	1.6 – j0	21.26	55.38	345.1	59.5	2.67 + j1.87	23.42	53.05	201.8	71.2
820	3.27 – j2.56	1.63 – j0.26	21.95	54.76	299.2	57.0	2.42 + j1.49	24.13	52.91	195.4	68.6

		P_{3dB}									
		Max Output Power					Max Drain Efficiency				
Freq [MHz]	Zs [Ω]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	ηD [%]	Zl [Ω]	Gain [dB]	P_{3dB} [dBm]	P_{3dB} [W]	ηD [%]
740	0.76 – j2.72	1.83 – j0.45	19.09	55.73	374.1	60.3	2.81 + j1.11	20.82	54.47	279.9	71.7
760	1.03 – j2.98	1.64 – j0.06	19.29	55.98	396.3	61.4	2.49 + j1.36	21.10	54.20	263.0	71.5
820	3.27 – j2.56	1.65 – j0.41	19.85	55.49	354.0	58.6	2.36 + j1.16	21.91	53.94	247.7	69.2

Evaluation Board, 746 – 821 MHz



Reference circuit assembly diagram (not to scale)

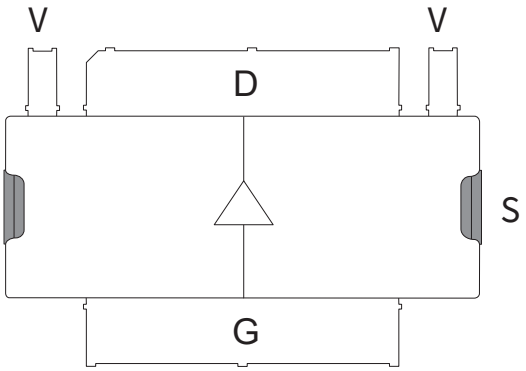
Evaluation Board Part Number	LTN/PTVA082407NF-V2
PCB Information	Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, ε_r = 3.66, f = 746 – 821 MHz

Find Gerber files for this test fixture on the Wolfpseed Web site at www.wolfspeed.com/RF

Components Information

Component	Description	Manufacturer	P/N
Input			
C101, C103	Capacitor, 56 pF	ATC	ATC100B560KW500XT
C102	Capacitor, 10 pF	ATC	ATC100B100KW500XT
C104	Capacitor, 100 µF, 50 V	United Chemi-Con	EMVA500ADA101MHA0G
R101	Resistor, 10 ohms	Panasonic Electronic Components	ERJ-8GEYJ100V
Output			
C201, C202	Capacitor, 100 µF, 100 V	TDK Corporation	C5750X7S2A106M230KB
C203, C204, C206	Capacitor, 56 pF	ATC	ATC100B560KW500XT
C205	Capacitor, 6.8 pF	ATC	ATC100B6R8CW500XB
C207, C208, C209, C210	Capacitor, 100 µF, 63 V	Panasonic Electronic Components	EEE-FK1J101P

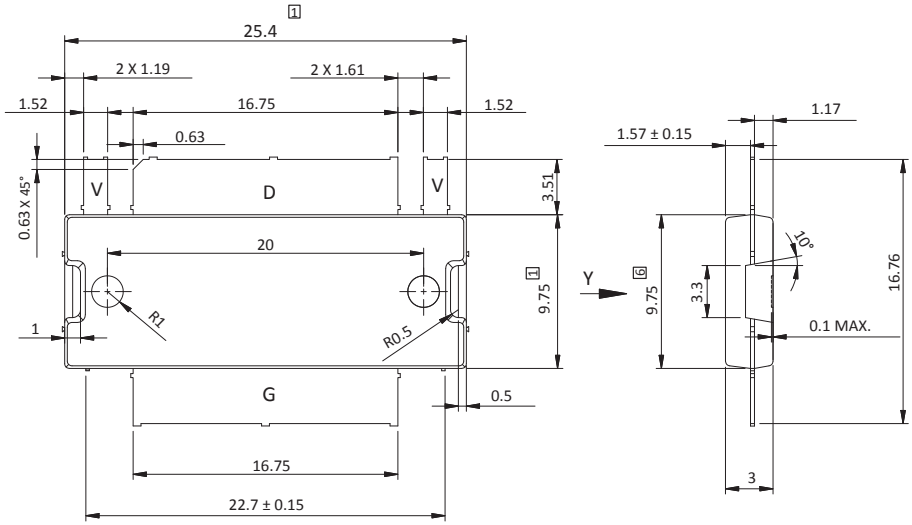
Pinout Diagram (top view)



Pin	Description
D	Drain
G	Gate
S	Source (flange)
V	Drain video decoupling (use only for decoupling), not for DC bias

Package Outline Specifications – Package PG-HBSOF-4-2

TOP VIEW



SIDE VIEW

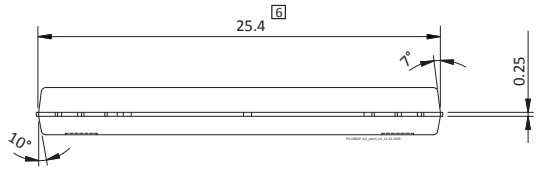
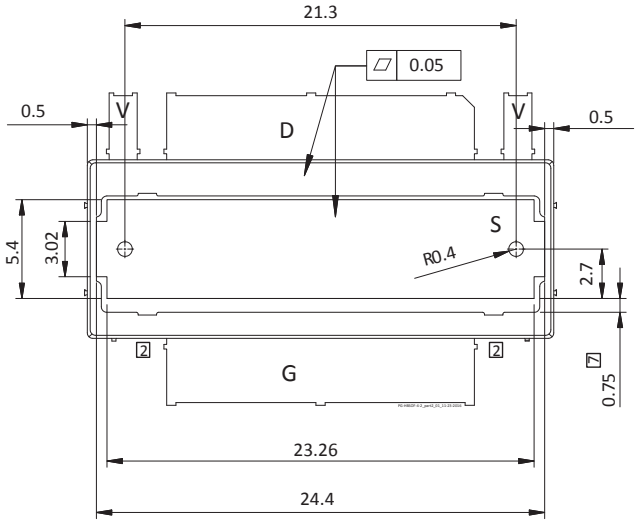


Diagram Notes–unless otherwise specified:

1. Mold/dam bar/metal protrusion of 0.30 mm max per side not included.
2. Metal protrusion are connected to source and shall not exceed 0.10 mm max.
3. Fillets and radii: all radii are 0.3 mm max.
4. Interpret dimensions and tolerances per ISO 8015.
5. Dimensions are mm.
6. Does not include mold/dam bar/metal protrusion.
7. Exposed metal surface tin-plated, may not be covered by mold compound.
8. All tolerances ± 0.1 mm unless specified otherwise.
9. All metal surfaces are tin-plated, except area of cut.
10. Lead thickness: 0.25 mm.
11. Pins: D – drain; G – gate; S – source; V – drain video decoupling (use only for decoupling), not for DC bias

Package Outline Specifications – Package PG-HBSOF-4-2

BOTTOM VIEW



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