

**Features**

- **High Output Power:**  $P_{1dB}=34.5\text{dBm}(\text{typ.})$
- **High Gain:**  $G_L=15\text{dB}(\text{typ.})$
- **High Efficiency:**  $\text{PAE}=43\%(\text{typ.})$
- **High Linearity:**  $\text{IP}_3=48\text{dBm}(\text{typ.})$
- **Class A or Class AB Operation**
- **Low Cost**

**Description**

The HWF1681RA is a high power GaAs MESFET designed for various RF and Microwave applications. It is presently offered in a low cost, surface-mountable ceramic package.

**Absolute Maximum Ratings**

$V_{DS}^{[1]}$	Drain to Source Voltage	+15V
$V_{GS}$	Gate to Source Voltage	-5V
$I_D$	Drain Current	$I_{DSS}$
$I_G$	Gate Current	6 mA
$T_{CH}$	Channel Temperature	175°C
$T_{STG}$	Storage Temperature	-65 to +175°C
$P_T^{[2]}$	Power Dissipation	15W

[1] Hexawave recommends that the quiescent drain-source operating voltage ( $V_{DS}$ ) should not exceed 10 Volts.

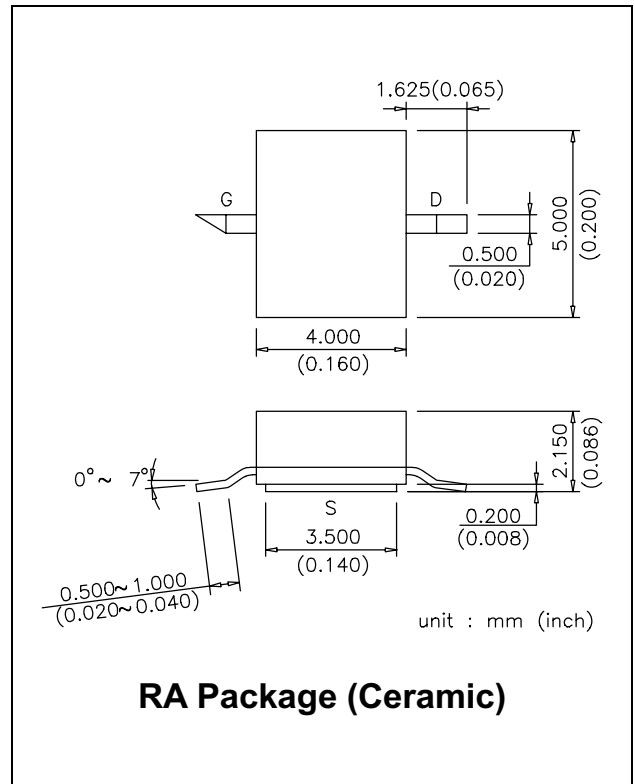
[2] Mounted on an infinite heat sink.

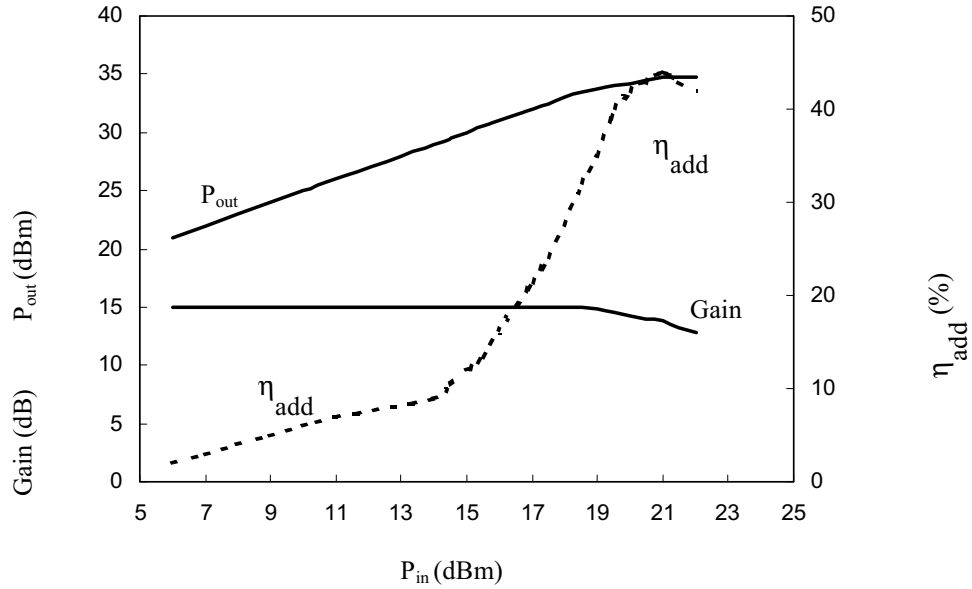
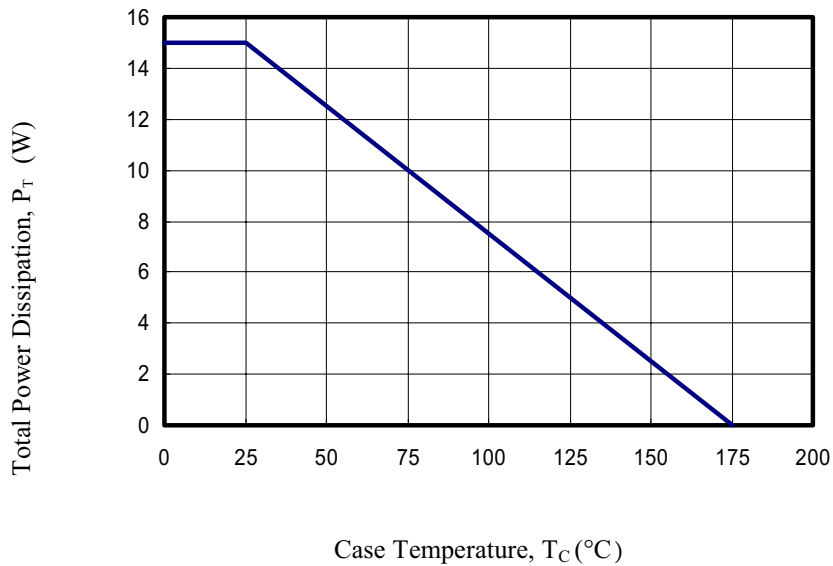
**Electrical Specifications at 25°C**

Symbol	Parameters	Conditions	Units	Min.	Typ.	Max.
$I_{DSS}$	Saturated Drain Current	$V_{DS}=3V, V_{GS}=0V$	mA	900	1200	1600
$V_P$	Pinch-off Voltage	$V_{DS}=3V, I_{DS}=60\text{mA}$	V	-3.5	-2.0	-1.5
$g_m$	Transconductance	$V_{DS}=3V, I_{DS}=600\text{mA}$	mS	-	600	-
$R_{th}$	Thermal Resistance	Channel to Case	°C/W	-	8	10
$P_{1dB}$	Output Power @1dB Gain	$V_{DS}=10V$ $I_{DS}=0.5I_{DSS}$ $f=2.4\text{GHz}$	dBm	33.5	34.5	-
$G_L$	Linear Power Gain		dB	14	15	-
PAE	Power-added Efficiency ( $P_{out} = P_{1dB}$ )		%	-	43	-
$\text{IP}_3$	Third-order Intercept Point <sup>[3]</sup>		dBm	-	48	-

[3] Single carrier level 15dBm, 1 MHz apart between 2 tones, current adjusted for best  $\text{IP}_3$

**Outline Dimensions**



**Output Power, Efficiency & Gain vs. Input Power**
 $V_{DS}=10V, I_{DS}=0.5I_{DSS}$ 
**f=2.4GHz**

**Power Derating Curve**


**Typical S-Parameters** (Common Source,  $T_A=25^\circ\text{C}$ ,  $V_{DS}=10\text{V}$ ,  $I_{DS}=0.5I_{DSS}$ )

Freq (GHz)	$S_{11}$		$S_{21}$		$S_{12}$		$S_{22}$	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
0.5	0.961	-124.49	9.861	106.06	0.022	23.72	0.369	-150.63
0.6	0.952	-134.90	8.463	99.11	0.022	19.53	0.377	-154.42
0.7	0.942	-142.12	7.408	93.45	0.022	14.98	0.386	-157.47
0.8	0.944	-148.55	6.578	88.25	0.022	11.87	0.396	-159.31
0.9	0.941	-153.89	5.920	83.67	0.022	10.37	0.403	-160.80
1.0	0.940	-158.45	5.356	79.59	0.023	6.36	0.410	-162.18
1.1	0.941	-162.39	4.881	75.68	0.023	5.54	0.418	-163.20
1.2	0.943	-165.79	4.472	72.11	0.023	3.17	0.428	-164.10
1.3	0.946	-168.63	4.126	68.68	0.022	1.24	0.434	-165.09
1.4	0.948	-171.41	3.828	65.38	0.022	0.58	0.442	-165.61
1.5	0.952	-173.82	3.559	62.26	0.022	-0.90	0.449	-166.70
1.6	0.951	-176.22	3.332	59.28	0.022	-1.77	0.457	-167.17
1.7	0.953	-178.44	3.125	56.23	0.022	-3.02	0.466	-167.85
1.8	0.955	179.47	2.942	53.34	0.022	-3.65	0.474	-168.45
1.9	0.954	177.65	2.776	50.53	0.022	-4.27	0.484	-169.16
2.0	0.952	175.99	2.633	47.94	0.021	-5.34	0.493	-169.97
2.1	0.958	174.15	2.494	45.06	0.021	-5.92	0.502	-170.60
2.2	0.953	172.54	2.369	42.62	0.021	-6.59	0.515	-171.20
2.3	0.954	170.93	2.254	40.12	0.021	-6.87	0.525	-171.83
2.4	0.952	169.33	2.153	37.76	0.020	-6.36	0.533	-172.33
2.5	0.949	167.95	2.062	35.43	0.021	-8.04	0.542	-173.11
2.6	0.949	166.18	1.977	33.00	0.020	-7.87	0.550	-173.45
2.7	0.949	165.04	1.899	30.71	0.020	-7.05	0.559	-174.00
2.8	0.946	163.49	1.825	28.44	0.020	-8.59	0.570	-174.61
2.9	0.941	162.44	1.760	26.19	0.020	-8.24	0.579	-175.17
3.0	0.941	160.91	1.692	24.02	0.020	-8.93	0.588	-175.83
4.0	0.914	148.31	1.285	2.67	0.019	-11.93	0.664	175.94
5.0	0.917	134.13	1.073	-19.80	0.021	-16.48	0.701	162.90
6.0	0.915	119.10	0.915	-42.54	0.018	-12.90	0.722	146.81
7.0	0.900	103.42	0.791	-64.88	0.023	-26.48	0.767	132.80
8.0	0.884	91.69	0.730	-83.19	0.028	-38.21	0.764	122.26
9.0	0.858	79.20	0.765	-99.89	0.041	-34.61	0.726	113.57
10.0	0.796	59.03	0.928	-123.21	0.072	-57.11	0.711	99.85