HEWLETT® PACKARD

C-Band Internally-Matched Power GaAs FETs (IMFETs) 5.2 to 5.9 GHz

Technical Data

IM5259-4L
IM5259-8L
IM5259-16L
IM5259-32L

Features

- **High Output Power:**
  - **IM5259-4L: 36.5 dBm typ. (4.5W)**
  - **IM5259-8L: 39.5 dBm typ. (9W)**
  - **IM5259-16L: 42.5 dBm typ. (18W)**
  - **IM5259-32L: 45.0 dBm typ. (32W)**
- **High Power-Added Efficiency: Up to 42%**
- **High Linearity: -45 dBc IMD_3 @ Specified Output Single Carrier Level**
- **Superior Gain Flatness: ± 0.5 dB max.**
- **Linear, Class A Operation**
- **Input and Output Internally Matched To 50 Ohms**
- **Industry Compatible Packages**

Applications

- **Digital Point-to-Point and Point-to-Multipoint Communications**

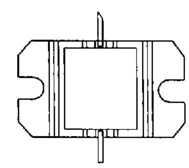
Description

The Hewlett-Packard IM5259-xL series of internally-matched GaAs power FETs, or IMFETs™ is designed to provide efficient power amplification in the 5.2 to 5.9 GHz communications band. Designed for Point-to-Point Radio communications, these products offer the system designer benefits associated with higher output power, gain, and net power-added efficiency.[1] Typical output power of the IM5259-4L exceeds 4 watts, with similar performance advantages for the IM5259-8L, -16L, and -32L models. Higher levels of gain and operating efficiency are the result of leading edge GaAs MESFET technology developed at Hewlett-Packard.

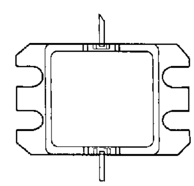
HP IMFETs are manufactured using hybrid construction techniques, combining GaAs power MESFETs with low loss, thin-film substrates. Internal 50 ohm matching networks eliminate the RF matching, handling, and die attach difficulties usually associated with using large geometry, high power chip devices. Automated assembly and test procedures provide excellent unit-to-unit repeatability and uniformity for easier cascading. HP IMFETs are housed in copper/ceramic packages to allow for maximum heat transfer from the GaAs FET device to the heatsink. The sealing process used is a commercial standard, non-hermetic epoxy, proven for environmental protection. Each unit conforms to the industry's standard outline dimensions. Electrical performance is guaranteed at +25°C.

Refer to Application Note AN-1083 for complete details regarding proper mounting guidelines, recommended biasing procedures, and electrical interconnect methods.

C21A



C24A



Note:
1. Net power added efficiency = $(P_{out} - P_{in})/(I_{ds} \times V_{ds})$, where P_{out} and P_{in} are in watts.

IM5259-xL Absolute Maximum Ratings (T_{Flange}= 25°C)

Symbols	Parameters	Units	Ratings			
			IM5259-4L	IM5259-8L	IM5259-16L	IM5259-32L
V_{DS}	Drain to Source Voltage	V	15	15	15	15
V_{GS}	Gate to Source Voltage	V	-10	-10	-10	-10
V_{GD}	Gate to Drain Voltage	V	-15	-15	-15	-15
I_{DS}	Drain Current	A	I_{DSS}	I_{DSS}	I_{DSS}	I_{DSS}
I_{GRF}	Gate Current	mA	±25	±50	±100	±200
T_{CH}	Max. Channel Temperature	°C	175	175	175	175
T_{STG}	Storage Temperature	°C	-65 to +175	-65 to +175	-65 to +175	-65 to +175
P_T [1]	Total Power Dissipation	W	31	38	83	150

IM5259-xL Electrical Characteristics (T_{Flange} = 25°C)

	Part Number		IM5259-4L			IM5259-8L			
Symbols	Parameters	Units	Min.	Typ.	Max.	Min.	Typ.	Max.	Test Conditions
P1dB	Output Power @ 1 dB Gain Compression I_{DSQ} = 1.0 A I_{DSQ} = 2.0 A	 dBm dBm	 36.0	 36.5		 39.0	 39.5		V_{DS} = 10.0 V Freq.= 5.2 – 5.9 GHz Zs = Zl = 50 ohms R_G = 20 Ω
ηADD	Power-Added Efficiency @ 1 dB Gain Compression	%		42			40		
I_{DS}	Drain Current @ P1dB	A		1.1	1.5		2.2	3.0	
G1dB	Power Gain @ 1 dB Gain Compression	dB	9.0	10.0		8.5	9.5		
ΔG	Gain Flatness	dB		±0.3	±0.5		±0.3	±0.5	
IMD_3	3rd Order Intermod Distortion P_{out} SCL [2] I_{DSQ} 26 dBm 1.0 A 29 dBm 2.0 A	 dBc dBc		 -45	 -42		 -45	 -42	V_{DS} = 10.0 V Two Equal Tone Test f_1 = 5.89 GHz f_2 = 5.90 GHz
I_{DSS}	Saturated Drain Current	A	1.5	2.5	3.5	3.0	5.0	7.0	V_{GS} = 0 V; V_{DS} = 2.5 V
V_P	Pinch Off Voltage I_{DS} = 63 mA I_{DS} = 125 mA	 V V	 -4.5	 -3.0	 -1.5	 -4.5	 -3.0	 -1.5	V_{DS} = 2.5 V
BV_{GDO}	Gate-Drain Breakdown Voltage I_{GD} = -6 mA I_{GD} = -12 mA	 V V	 -16.0			 -16.0			
g_m	Transconductance I_{DS} = 1.0 A I_{DS} = 2.0 A	 S S		 1.3			 2.5		V_{DS} = 2.5 V
R_{TH}	Thermal Resistance (Channel to Flange)	°C/W		4.9			4.0		I. R. Method; V_{DS} = 10.0 V I_{DS} = 1 and 2 A
ΔT	Temperature Rise Channel to Flange; DC on and RF off	°C		49			80		I. R. Method
	Case Style		C21A						

Notes:
1. See Application Note, AN 1083
2. SCL: Single Carrier Level

IM5259-xL Electrical Characteristics (T_{Flange} = 25°C)

	Part Number		IM5259-16L			IM5259-32L			
Symbols	**Parameters**	**Units**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Test Conditions**
P1dB	Output Power @ 1 dB Gain Compression I_{DSQ} = 4.0 A I_{DSQ} = 8.0 A	 dBm dBm	 41.5	 42.5		 44.5	 45.0		V_{DS} = 10.0 V Freq.= 5.2 – 5.9 GHz Zs = Zl = 50 ohms R_G = 5 Ω
ηADD	Power-Added Efficiency @ 1 dB Gain Compression	%		38		36			
I_{DS}	Drain Current @ P1dB	A		4.4	6.0		8.8	12.0	
G1dB	Power Gain @ 1 dB Gain Compression	dB	8.5	9.5		8.0	9.0		
ΔG	Gain Flatness	dB		±0.3	±0.5		±0.3	±0.5	
IMD_3	3rd Order Intermod Distortion P_{out} SCL[1] I_{DSQ} 31.5 dBm 4.0 A 34.5 dBm 8.0 A	 dBc dBc		 -45	 -42		 -45	 -42	V_{DS} = 10.0 V Two Equal Tone Test f_1 = 5.89 GHz f_2 = 5.90 GHz
I_{DSS}	Saturated Drain Current	A	6.0	10.0	14.0	12.0	20.0	28.0	V_{GS} = 0 V; V_{DS} = 2.5 V
V_P	Pinch Off Voltage I_{DS} = 250 mA I_{DS} = 500 mA	 V V	 -4.5	 -3.0	 -1.5	 -4.5	 -3.0	 -1.5	V_{DS} = 2.5 V
BV_{GDO}	Gate-Drain Breakdown Voltage I_{GD} = -36 mA I_{GD} = -72 mA	 V V	 -16.0			 -16.0			
g_m	Transconductance I_{DS} = 4.0 A I_{DS} = 8.0 A	 S S		 5.0			 10.0		V_{DS} = 2.5 V
R_{TH}	Thermal Resistance (Channel to Flange)	°C/W		1.8			1		I. R. Method; V_{DS} = 10.0 V I_{DS} = 4 and 8 A
ΔT	Temperature Rise Channel to Flange; DC on and RF off	°C		72			80		I. R. Method
	Case Style		C24A						

Note:
1. SCL: Single Carrier Level

IM5259-4L and -8L Typical Performance (T_{Flange} = 25°C)

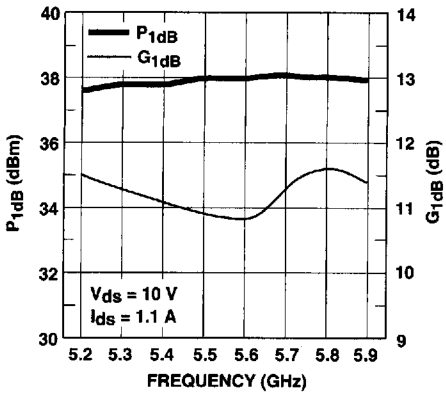


Figure 1. IM5259-4L Output Power, Gain vs. Frequency.

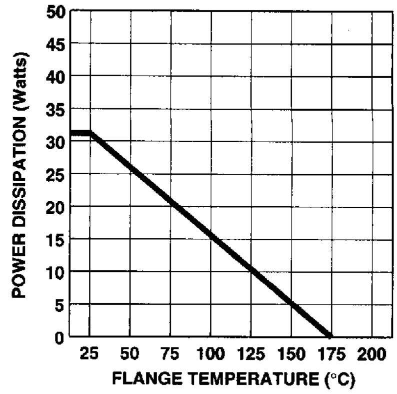


Figure 2. IM5259-4L Maximum Total Power Dissipation vs. Flange Temperature.

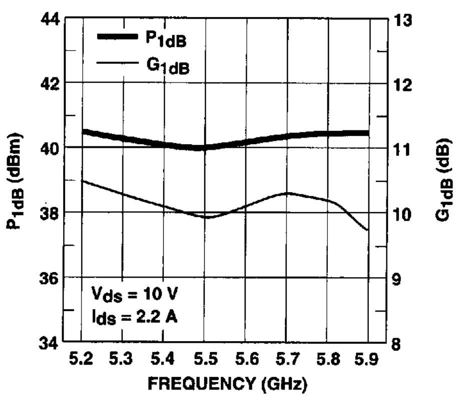


Figure 3. IM5259-8L Output Power, Gain vs. Frequency.

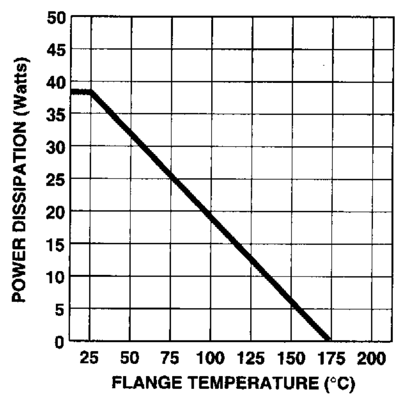


Figure 4. IM5259-8L Maximum Total Power Dissipation vs. Flange Temperature.

IM5259-16L and -32L Typical Performance (T_{Flange} = 25°C)

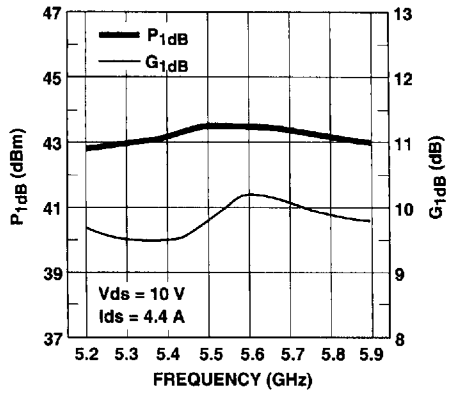


Figure 5. IM5259-16L Output Power, Gain vs. Frequency.

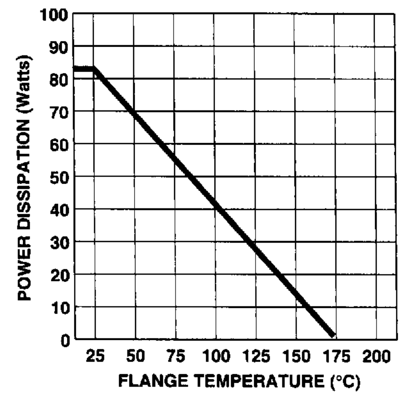


Figure 6. IM5259-16L Maximum Total Power Dissipation vs. Flange Temperature.

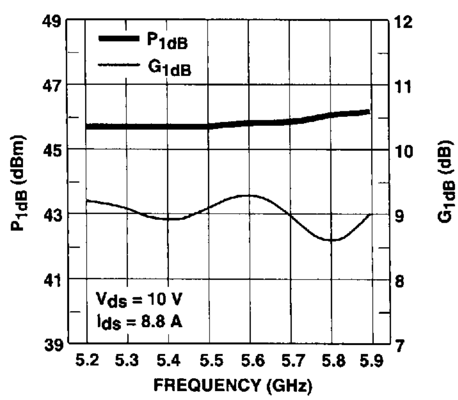


Figure 7. IM5259-32L Output Power, Gain vs. Frequency.

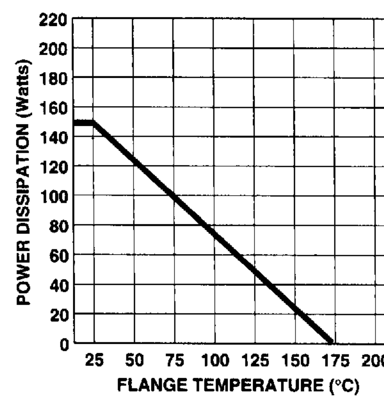
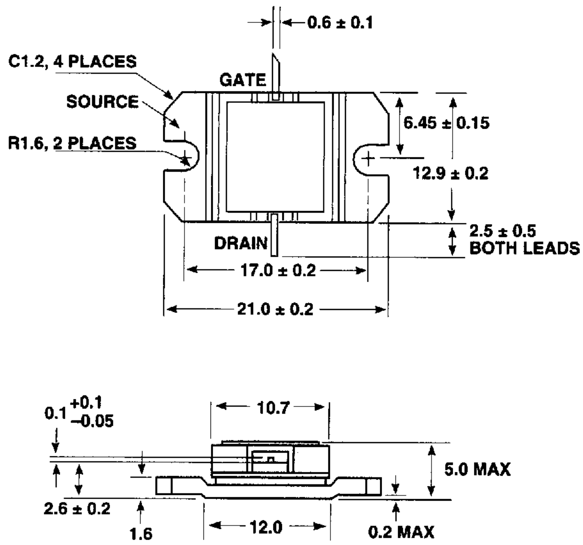


Figure 8. IM5259-32L Maximum Total Power Dissipation vs. Flange Temperature.

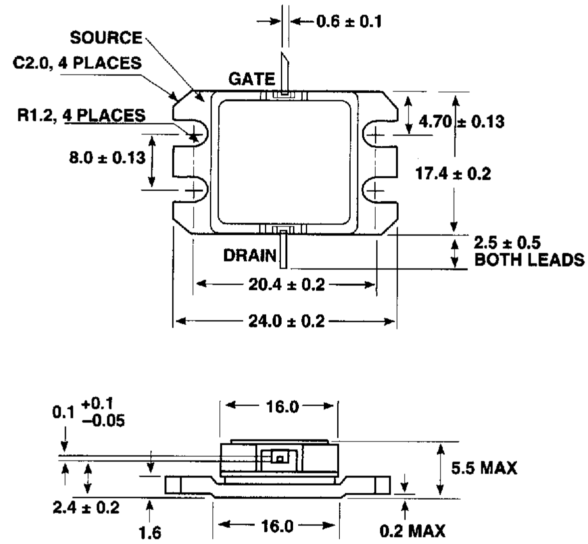
HEWLETT® PACKARD

Case Dimensions

C21A Package Outline
IM5259-4L and IM5259-8L



C24A Package Outline
IM5259-16L and IM5259-32L



NOTES (UNLESS OTHERWISE SPECIFIED):
1. DIMENSIONS ARE SPECIFIED IN mm

For technical assistance or the location of your nearest Hewlett-Packard sales office, distributor or representative call:

Americas/Canada: 1-800-235-0312 or 408-654-8675

Far East/Australasia: Call your local HP sales office.

Japan: (81 3) 3335-8152

Europe: Call your local HP sales office.

Printed in U.S.A.   5965-7392E (3/97)