TOSHIBA

MICROWAVE POWER GaAs FET TIM1414-10LA

Features

- Low intermodulation distortion
  - IM_3 = -45 dBc at Po = 29.0 dBm, Single Carrier Level
- High power
  - P_{1dB} = 40.5 dBm at 14.0 GHz to 14.5 GHz
- High gain
  - G_{1dB} = 6.0 dB at 14.0 GHz to 14.5 GHz
- Broadband internally matched
- Hermetically sealed package

RF Performance Specifications (T_a = 25°C)

Characteristic	Symbol	Condition	Unit	Min.	Typ.	Max.
Output Power at 1dB Compression Point	P_{1dB}	V_{DS} = 9V f = 14.0 ~ 14.5 GHz	dBm	40.0	40.5	–
Power Gain at 1dB Compression Point	G_{1dB}		dB	5.0	6.0	–
Drain Current	I_{DS1}		A	–	4.0	5.0
Gain Flatness	ΔG		dB	–	–	±0.8
Power Added Efficiency	η_{add}		%	–	21	–
3rd Order Intermodulation Distortion	IM_3	Note 1	dBc	-42	-45	–
Drain Current	I_{DS2}		A	–	4.0	5.0
Channel-Temperature Rise	ΔT_{ch}	V_{DS} x I_{DS} x $R_{th\ (c\text{-}c)}$	°C	–	–	90

Note 1: 2-tone Test Pout, Po = 29.0 dBm Single Carrier Level.

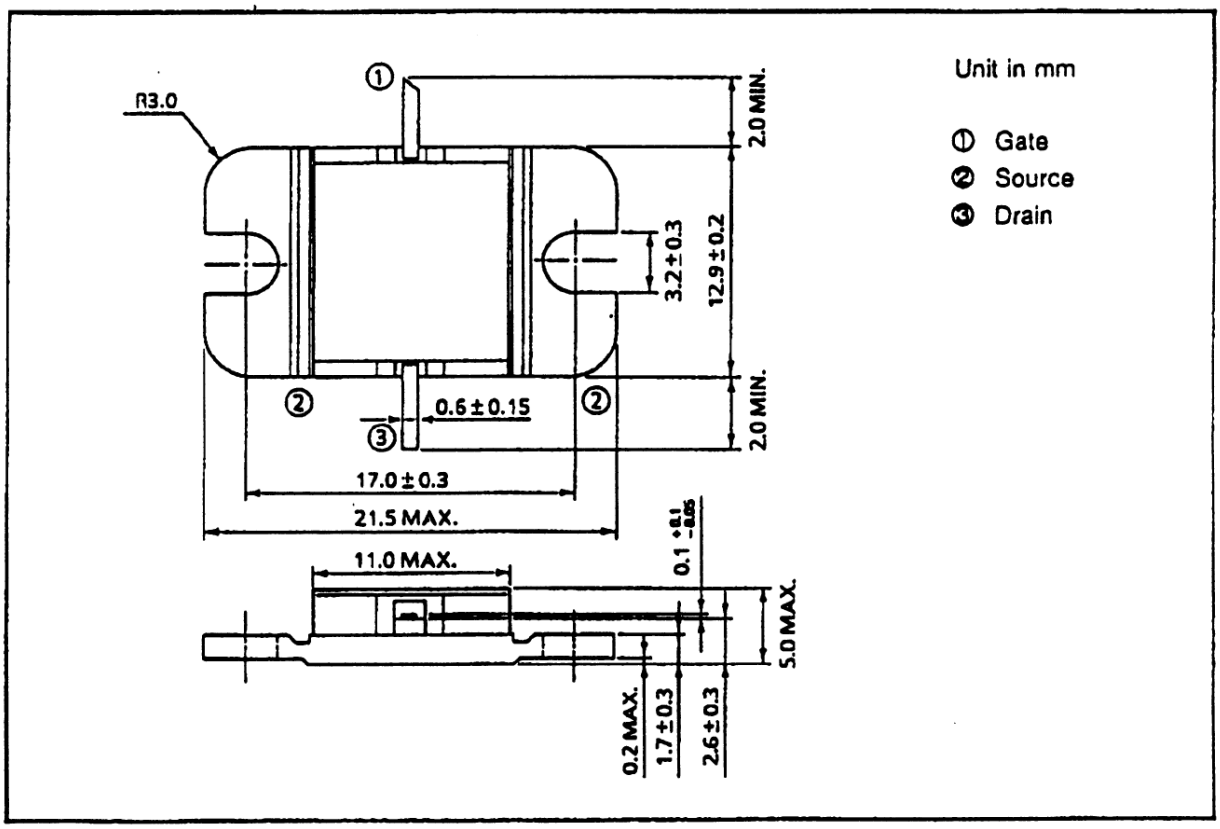
Electrical Characteristics (T_a = 25°C)

Characteristic	Symbol	Condition	Unit	Min.	Typ.	Max.
Transconductance	gm	V_{DS} = 3V I_{DS} = 4.8A	mS	–	2800	–
Pinch-off Voltage	V_{GSoff}	V_{DS} = 3V I_{DS} = 145 mA	V	-2.0	-3.5	-5.0
Saturated Drain Current	I_{DSS}	V_{DS} = 3V V_{GS} = 0V	A	–	10.0	11.5
Gate-Source Breakdown Voltage	V_{GSO}	I_{GS} = -145 μA	V	-5	–	–
Thermal Resistance	$R_{th\ (c\text{-}c)}$	Channel to Case	°C/W	–	2.0	2.5

Absolute Maximum Ratings (T_a = 25°C)

Characteristic	Symbol	Unit	Rating
Drain-Source Voltage	V_{DS}	V	15
Gate-Source Voltage	V_{GS}	V	-5
Drain Current	I_{DS}	A	11.5
Total Power Dissipation (T_c = 25°C)	P_T	W	60
Channel Temperature	T_{ch}	°C	175
Storage Temperature	T_{stg}	°C	-65 ~ 175

Package Outline (2-11C1B)

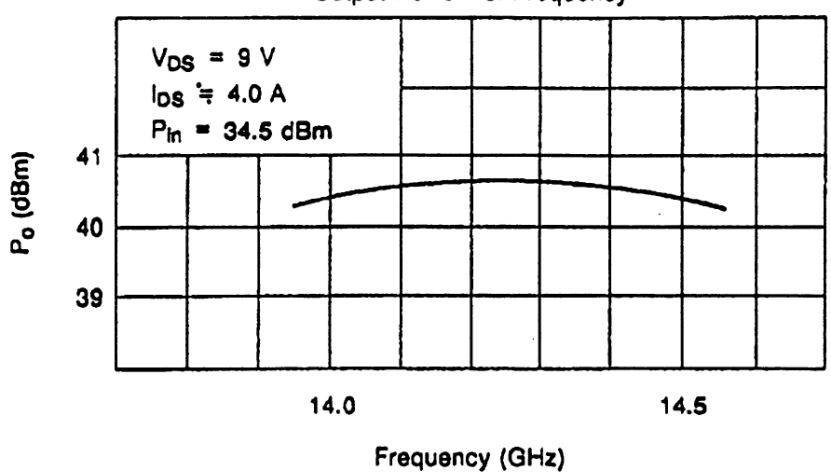


Handling Precautions for Packaged Type

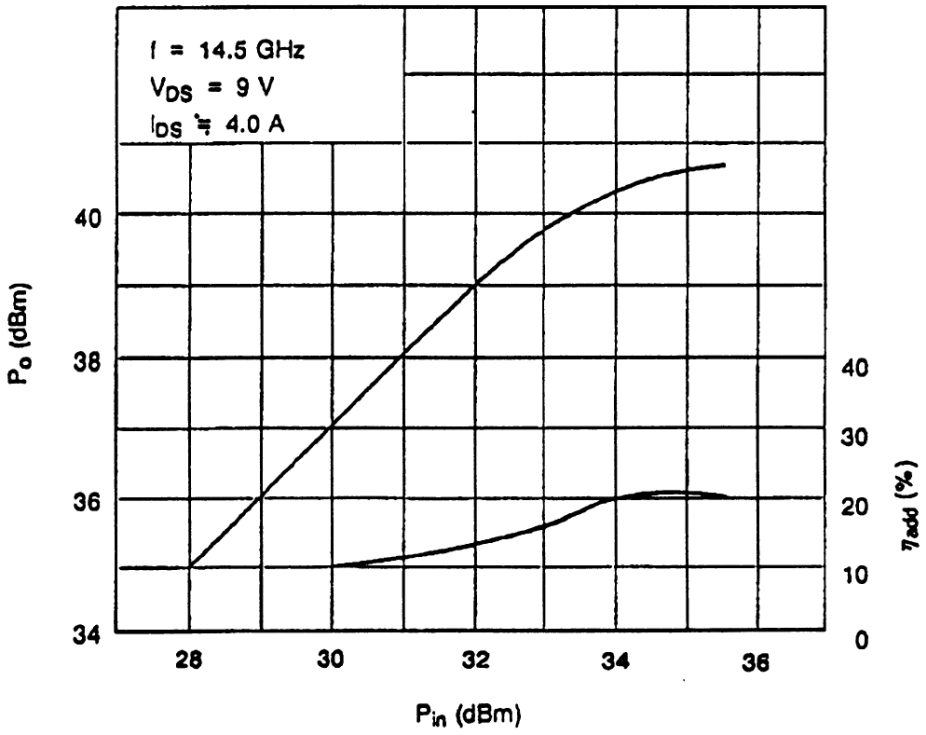
Soldering iron should be grounded and the operating time should not exceed 10 seconds at 260°C.

RF Performances

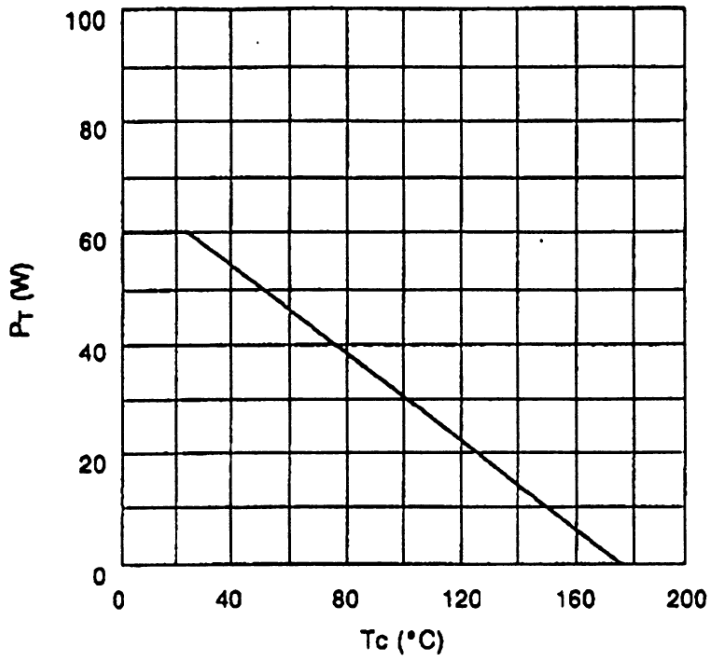
Output Power vs. Frequency



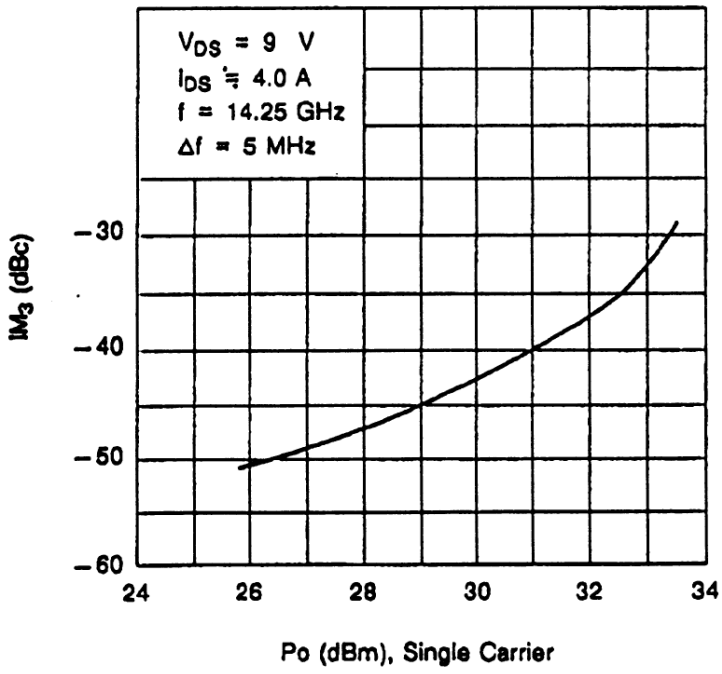
Output Power vs. Input Power



Power Dissipation vs. Case Temperature



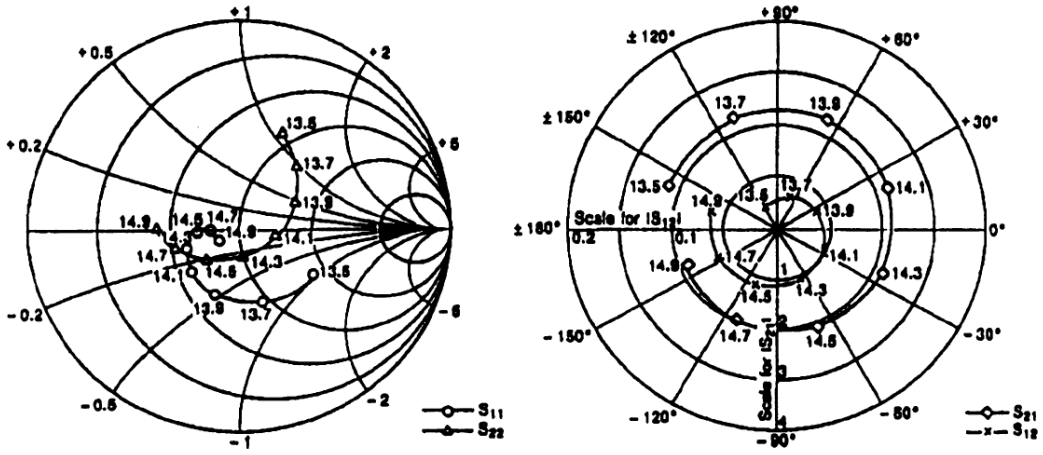
IM_3 vs. Output Power Characteristics



TIM1414-10LA S-Parameters (Magn. and Angles)

V_{DS} = 9 V, I_{DS} = 4.0 A

f = 13.5~14.9 GHz



FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
13.50	0.48	– 30	2.12	159	0.039	118	0.43	70
13.60	0.46	– 48	2.16	136	0.046	95	0.39	59
13.70	0.44	– 65	2.16	113	0.052	71	0.33	48
13.80	0.43	– 80	2.16	91	0.059	48	0.28	34
13.90	0.42	– 94	2.13	68	0.066	28	0.23	17
14.00	0.41	– 106	2.10	46	0.073	4	0.19	– 7
14.10	0.40	– 118	2.08	25	0.079	– 18	0.17	– 38
14.20	0.39	– 128	2.06	3	0.086	– 39	0.18	– 70
14.30	0.38	– 139	2.01	– 19	0.091	– 61	0.22	– 95
14.40	0.36	– 147	1.97	– 40	0.097	– 82	0.27	– 114
14.50	0.35	– 155	1.93	– 62	0.101	– 103	0.32	– 129
14.60	0.33	– 161	1.88	– 83	0.105	– 124	0.37	– 140
14.70	0.32	– 166	1.83	– 104	0.108	– 144	0.41	– 150
14.80	0.30	– 171	1.79	– 125	0.112	– 166	0.45	– 158
14.90	0.28	– 174	1.75	– 146	0.114	175	0.48	– 166