

# TOSHIBA

## MICROWAVE POWER GaAs FET

**TIM1414-10LA**

### Features

- Low intermodulation distortion
  - $IM_3 = -45$  dBc at  $P_o = 29.0$  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 ( $T_a = 25^\circ\text{C}$ )

Characteristic	Symbol	Condition	Unit	Min.	Typ.	Max.
Output Power at 1dB Compression Point	$P_{1dB}$	$V_{DS} = 9V$ $f = 14.0 \sim 14.5$ 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	$\Delta G$		dB	–	–	$\pm 0.8$
Power Added Efficiency	$\eta_{add}$		%	–	21	–
3rd Order Intermodulation Distortion	$IM_3$	Note 1	dBc	-42	-45	–
Drain Current	$I_{DS2}$		A	–	4.0	5.0
Channel-Temperature Rise	$\Delta T_{ch}$	$V_{DS} \times I_{DS} \times R_{th (c-c)}$	$^\circ\text{C}$	–	–	90

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

### Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

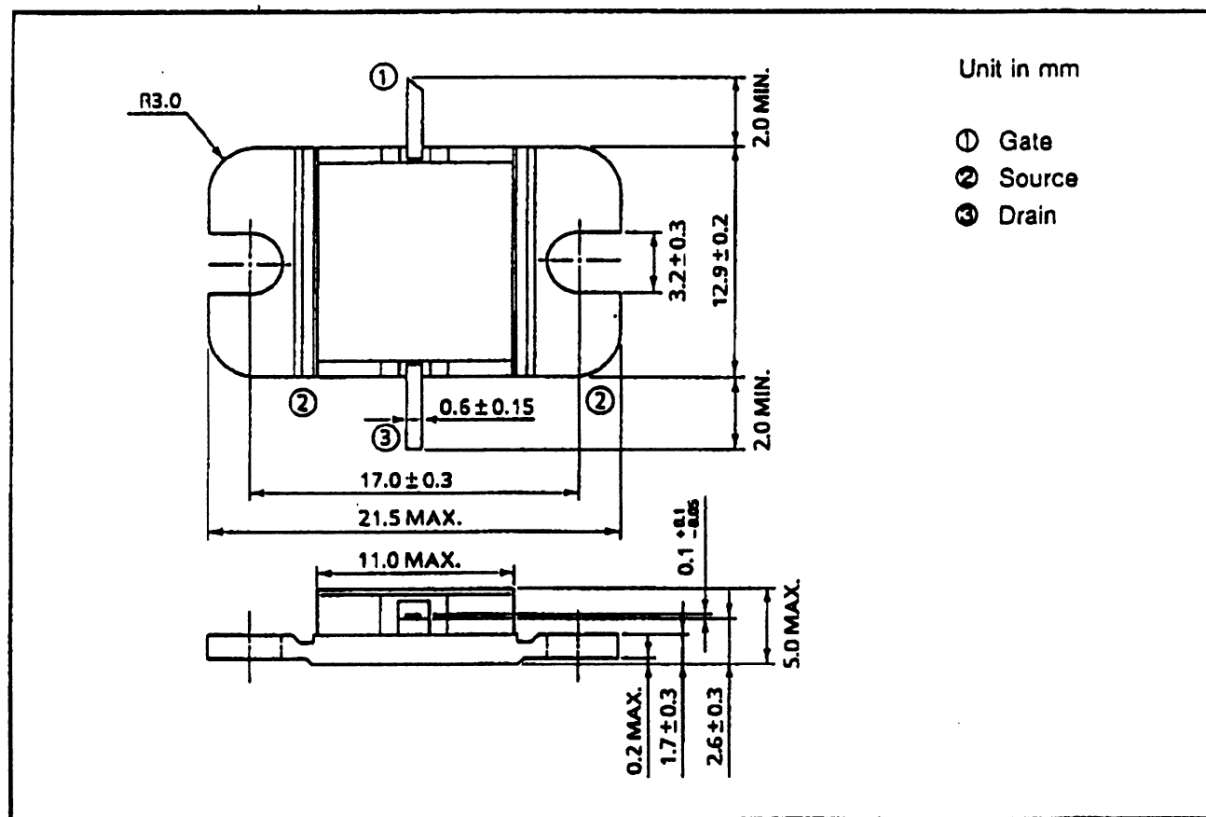
Characteristic	Symbol	Condition	Unit	Min.	Typ.	Max.
Transconductance	gm	$V_{DS} = 3V$ $I_{DS} = 4.8A$	mS	–	2800	–
Pinch-off Voltage	$V_{GSoff}$	$V_{DS} = 3V$ $I_{DS} = 145$ mA	V	-2.0	-3.5	-5.0
Saturated Drain Current	$I_{DSS}$	$V_{DS} = 3V$ $V_{GS} = 0V$	A	–	10.0	11.5
Gate-Source Breakdown Voltage	$V_{GSO}$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

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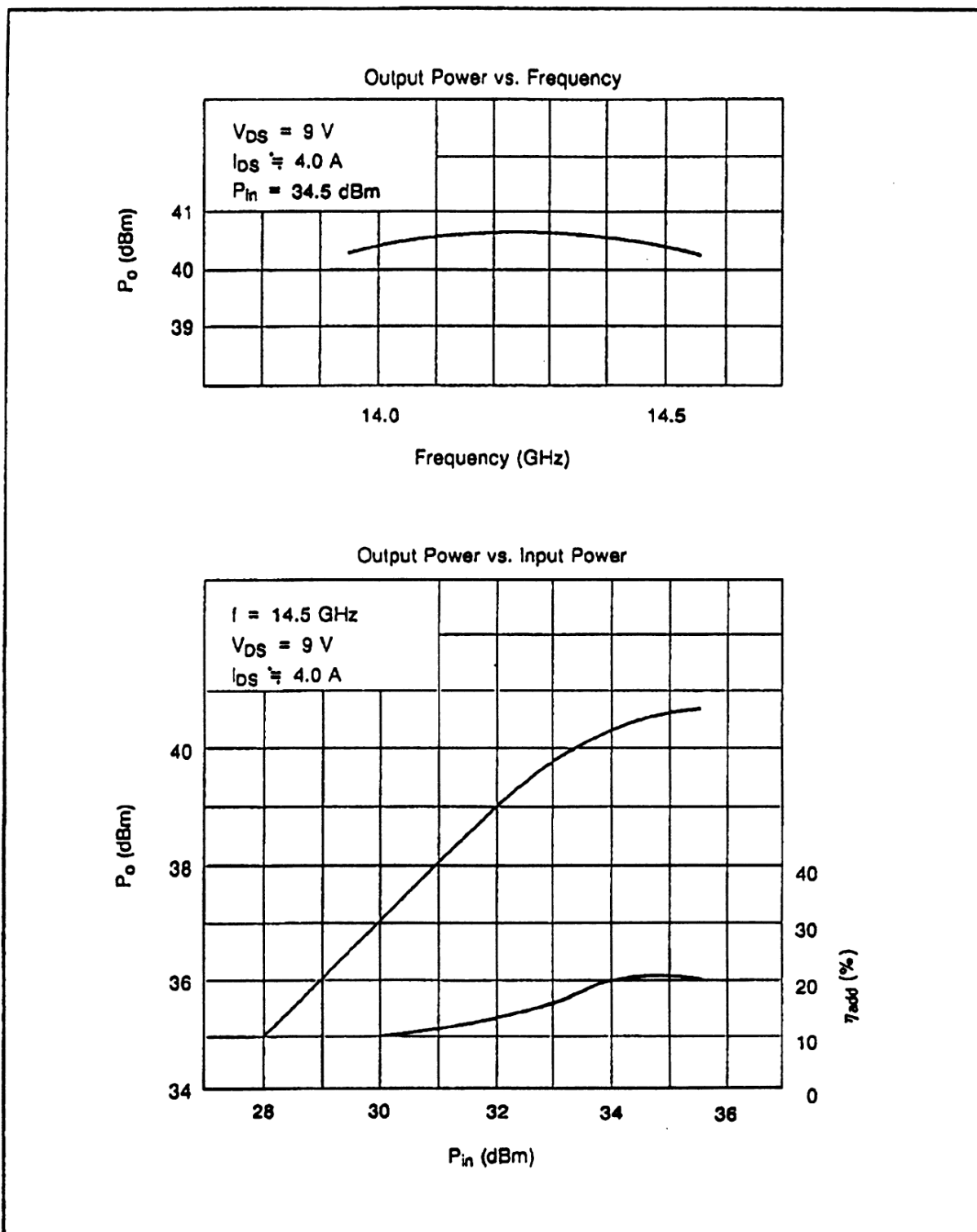
**TIM1414-10LA****Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )**

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 ( $T_c = 25^\circ\text{C}$ )	$P_T$	W	60
Channel Temperature	$T_{ch}$	$^\circ\text{C}$	175
Storage Temperature	$T_{stg}$	$^\circ\text{C}$	-65 ~ 175

**Package Outline (2-11C1B)****Handling Precautions for Packaged Type**

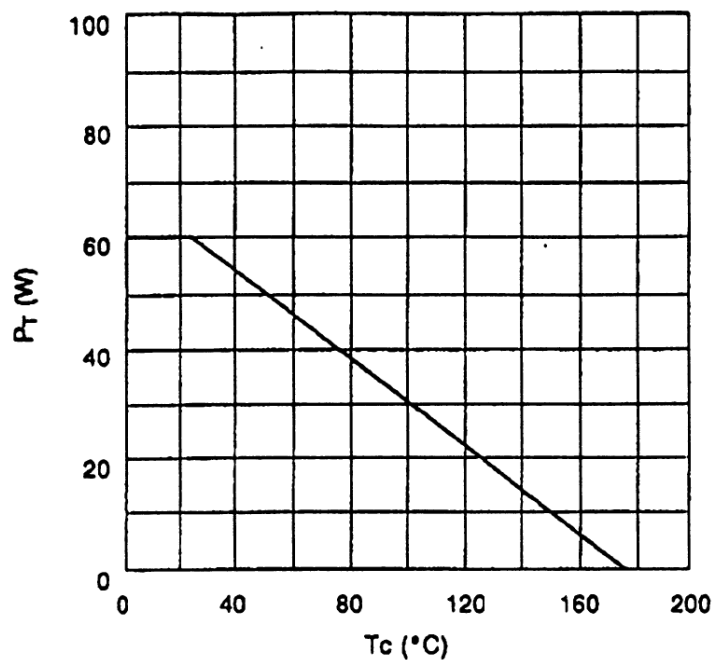
Soldering iron should be grounded and the operating time should not exceed 10 seconds at 260°C.

RF Performances

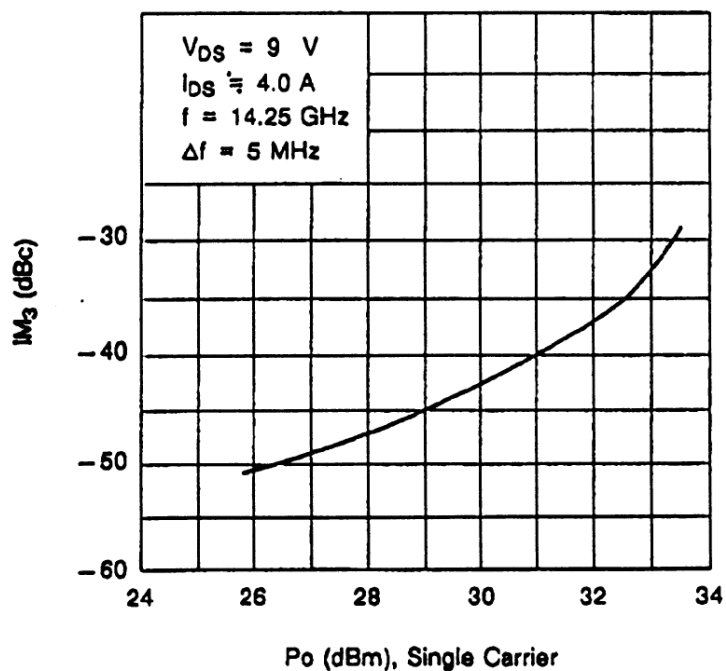


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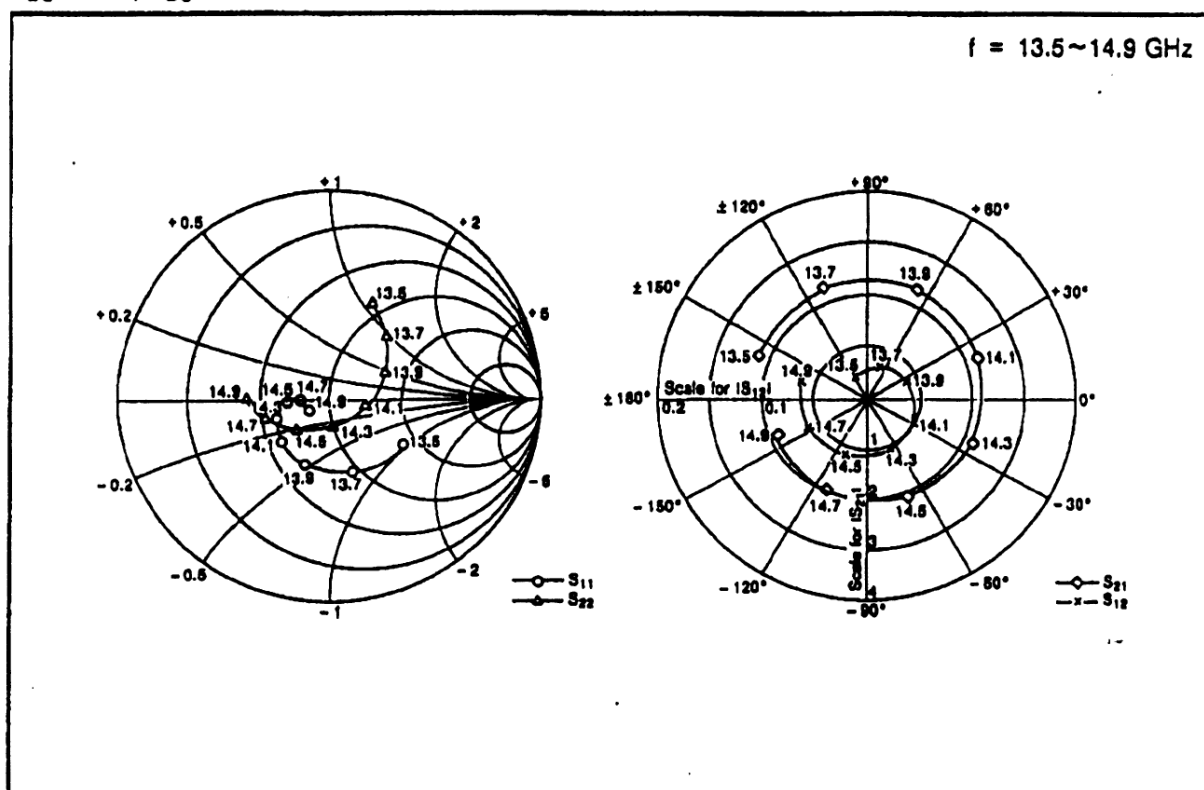
### Power Dissipation vs. Case Temperature



### $\text{IM}_3$ vs. Output Power Characteristics



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

 $V_{DS} = 9\text{ V}$ ,  $I_{DS} = 4.0\text{ A}$ 

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	-165	0.45	-158
14.90	0.28	-174	1.75	-146	0.114	175	0.48	-166