MGA-83563
+22 dBm P_{SAT} 3V Power Amplifier for 0.5–6 GHz Applications

Data Sheet

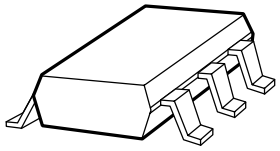
Description

Avago's MGA-83563 is an easy-to-use GaAs RFIC amplifier that offers excellent power output and efficiency. This part is targeted for 3V applications where constant-envelope modulation is used. The output of the amplifier is matched internally to 50Ω. However, an external match can be added for maximum efficiency and power out (PAE = 37%, P_o = 22 dBm). The input is easily matched to 50 Ω.

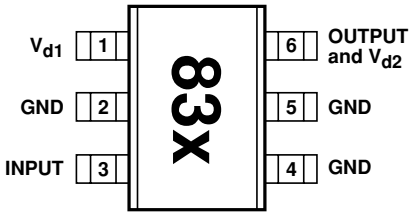
Due to the high power output of this device, it is recommended for use under a specific set of operating conditions. The thermal sections of the Applications Information explain this in detail.

The circuit uses state-of-the-art PHEMT technology with proven reliability. On-chip bias circuitry allows operation from single supply voltage.

Surface Mount Package SOT-363 (SC-70)



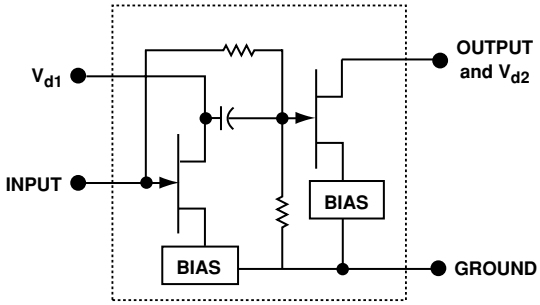
Pin Connections and Package Marking



Note:
Package marking provides orientation and identification; "x" is date code.

Equivalent Circuit

(Simplified)



Features

- **Lead-free Option Available**
- **+22 dBm P_{SAT} at 2.4 GHz, 3.0 V**
  +23 dBm P_{SAT} at 2.4 GHz, 3.6 V
- **22 dB Small Signal Gain at 2.4 GHz**
- **Wide Frequency Range 0.5 to 6 GHz**
- **Single 3V Supply**
- **37% Power Added Efficiency**
- **Ultra Miniature Package**

Applications

- **Amplifier for Driver and Output Applications**

Attention:
Observe precautions for handling electrostatic sensitive devices.

ESD Machine Model (Class A)

ESD Human Body Model (Class 0)

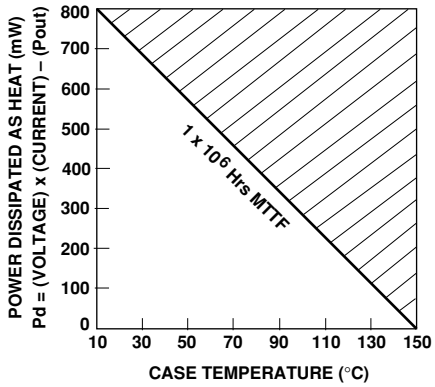
Refer to Avago Application Note A004R: Electrostatic Discharge Damage and Control.

MGA-83563 Absolute Maximum Ratings

Symbol	Parameter	Units	Absolute Maximum[1]
V	Maximum DC Supply Voltage	V	4
P_{in}	CW RF Input Power	dBm	+13
T_{ch}	Channel Temperature	°C	165
T_{STG}	Storage Temperature	°C	-65 to 150

Thermal Resistance[2]:
$\theta_{ch\ to\ c} = 175°C/W$

Notes:
1. Operation of this device above any one of these limits may cause permanent damage.
2. $T_C = 25°C$ (T_C is defined to be the temperature at the package pins where contact is made to the circuit board).



Temperature/Power Derating Curve.

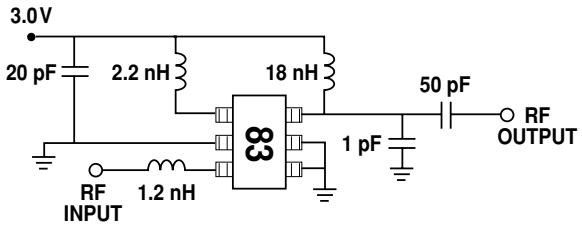
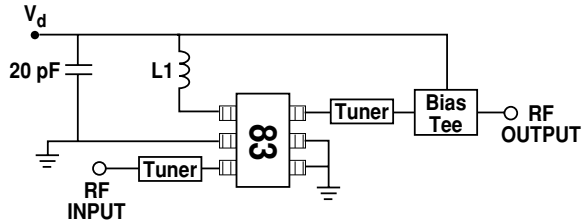


Figure 1. MGA-83563 Final Production Test Circuit.



Circuit A: L1 = 2.2 nH for 0.1 to 3 GHz
Circuit B: L1 = 0 nH (capacitor as close as possible) for 3 to 6 GHz

Figure 2. MGA-83563 Test Circuit for Characterization.

MGA-83563 Electrical Specifications, V_d = 3 V, T_C = 25°C, using test circuit of Figure 2, unless noted.

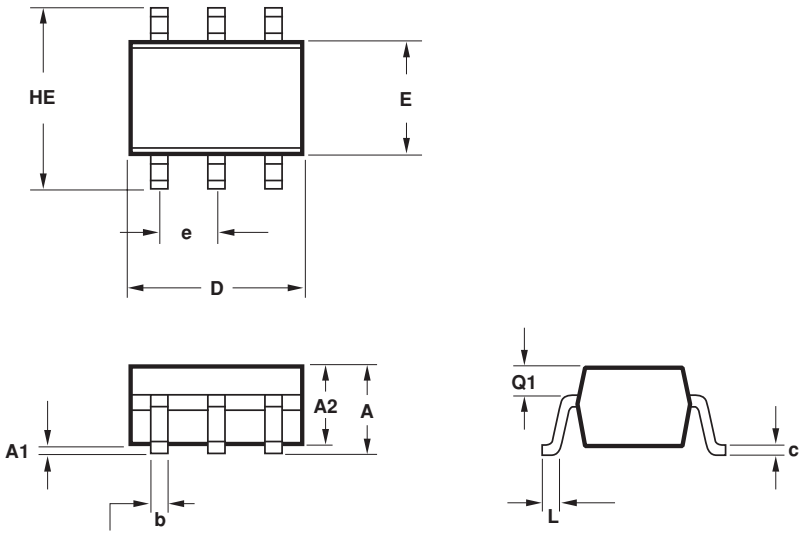
Symbol	Parameters and Test Conditions		Units	Min.	Typ.	Max.	Std. Dev.[4]
P_{SAT}	Saturated Output Power[3]	f = 2.4 GHz	dBm	20.5	22.4		0.75
PAE	Power Added Efficiency[3]	f = 2.4 GHz	%	25	37		2.5
I_d	Device Current[3,5]		mA		152	200	12.4
Gain	Small Signal Gain	f = 0.9 GHz	dB		20		
		f = 1.5 GHz			22		
		f = 2.0 GHz			23		
		f = 2.4 GHz			22		
		f = 4.0 GHz			22		
		f = 5.0 GHz			19		
		f = 6.0 GHz			17		
P_{SAT}	Saturated Output Power	f = 0.9 GHz	dBm		20.9		
		f = 1.5 GHz			21.7		
		f = 2.0 GHz			21.8		
		f = 2.4 GHz			22		
		f = 4.0 GHz			21.9		
		f = 5.0 GHz			19.7		
		f = 6.0 GHz			18.2		
PAE	Power Added Efficiency	f = 0.9 GHz	%		41		
		f = 1.5 GHz			41		
		f = 2.0 GHz			40		
		f = 2.4 GHz			37		
		f = 4.0 GHz			32		
		f = 5.0 GHz			18		
		f = 6.0 GHz			14		
$P_{1\,dB}$	Output Power at 1 dB Gain Compression[5]	f = 0.9 GHz	dBm		19.1		
		f = 1.5 GHz			19.7		
		f = 2.0 GHz			19.7		
		f = 2.4 GHz			19.2		
		f = 4.0 GHz			18.1		
		f = 5.0 GHz			16		
		f = 6.0 GHz			15		
$VSWR_{in}$	Input VSWR into 50 Ω						
	Circuit A	f = 0.9 to 1.7 GHz			3.5		
		f = 1.8 to 3.0 GHz			2.6		
	Circuit B	f = 3.0 to 6.0 GHz			2.3		
$VSWR_{out}$	Output VSWR into 50 Ω						
	Circuit A	f = 0.9 to 2.0 GHz			1.4		
		f = 2.0 to 3.0 GHz			2.5		
	Circuit B	f = 3.0 to 4.0 GHz			3.5		
		f = 4.0 to 6.0 GHz			4.5		
ISOL	Isolation	f = 0.9 to 3.0 GHz	dB		-38		
		f = 3.0 to 6.0 GHz			-30		
IP_3	Third Order Intercept Point	f = 0.9 GHz to 6.0 GHz	dBm		29		

Notes:

3. Measured using the final test circuit of Figure 1 with an input power of +4 dBm.
4. Standard Deviation number is based on measurement of at least 500 parts from three non-consecutive wafer lots during the initial characterization of this product, and is intended to be used as an estimate for distribution of the typical specification.
5. For linear operation, refer to thermal sections in the Applications section of this data sheet.

Package Dimensions

Outline 63 (SOT-363/SC-70)



SYMBOL	DIMENSIONS (mm)	
	MIN.	MAX.
E	1.15	1.35
D	1.80	2.25
HE	1.80	2.40
A	0.80	1.10
A2	0.80	1.00
A1	0.00	0.10
Q1	0.10	0.40
e	0.650 BCS	
b	0.15	0.30
c	0.10	0.20
L	0.10	0.30

NOTES:
1. All dimensions are in mm.
2. Dimensions are inclusive of plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. All specifications comply to EIAJ SC70.
5. Die is facing up for mold and facing down for trim/form, ie: reverse trim/form.
6. Package surface to be mirror finish.

Part Number Ordering Information

Part Number	No. of Devices	Container
MGA-83563-TR1	3000	7" Reel
MGA-83563-TR2	10000	13" Reel
MGA-83563-BLK	100	antistatic bag
MGA-83563-TR1G	3000	7" Reel
MGA-83563-TR2G	10000	13" Reel
MGA-83563-BLKG	100	antistatic bag

Note: For lead-free option, the part number will have the character “G” at the end.