mmTron
Unleashing the mmWave Frontier

TMC685-D
DC-80 GHz Distributed Amplifier

Product Features

- RF frequency: DC to 80 GHz
- Linear Gain: 12 dB
- Noise Figure: 8 dB
- Die Size: X=2.6 mm, Y=1.45 mm, Z=0.05mm
- DC Power: 5 VDC, 270 mA

Application

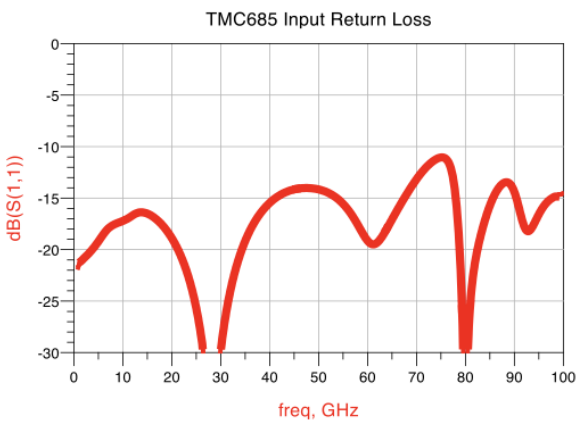
- Point-to-Point Radios and VSATs
- Test instrumentation
- Fiber Optics
- Military, EW and Space

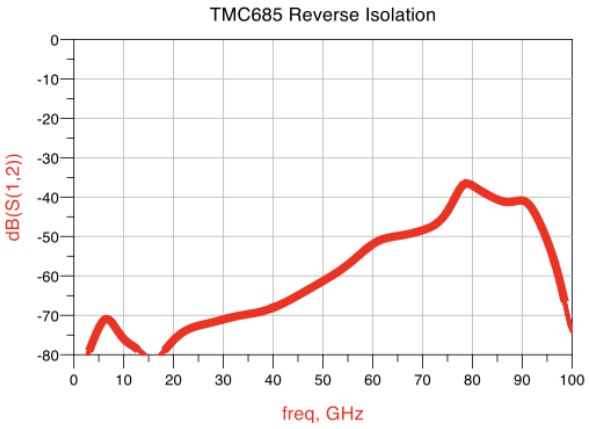
Product Description

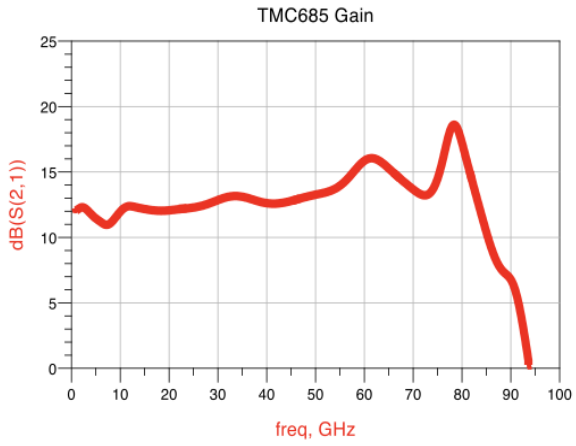
The TMC685D GaAs PHEMT Distributed amplifier is a broadband high gain device with positive gain slope, designed for use in Radios, Test instrumentation, Military, EW and Space applications. The TMC685D is a 50 W matched design providing 8dB of noise figure, offers excellent return loss at low-end for optical instrumentation, interface to photodiodes, and eliminates the need for RF port matching. Both bond pad and backside metallization are Au-based that is compatible with ribbon and wedge bonding and high conductivity epoxy and eutectic die attach methods.

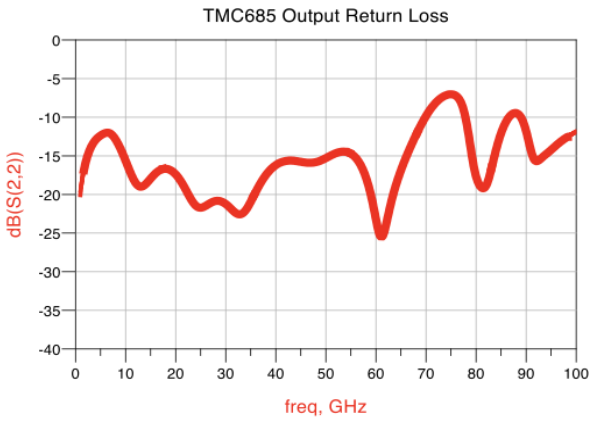
Electrical Performance : **Vdd = 5 V, Vgg = -0.4 V, TA = 25 °C, F = 70 GHz**

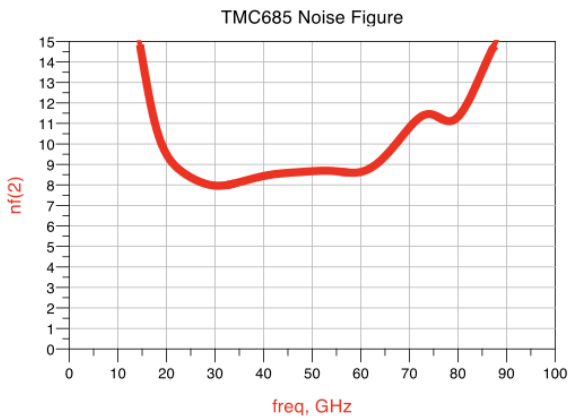
	min	Typ	Max	Units
Frequency	DC		80	GHz
Gain		12		dB
P1dB		18		dBm
Psat		19		dBm
Noise Figure		8		dB
OIP3		26		dBm
Bias Voltage		5		V
Bias Current		260		mA

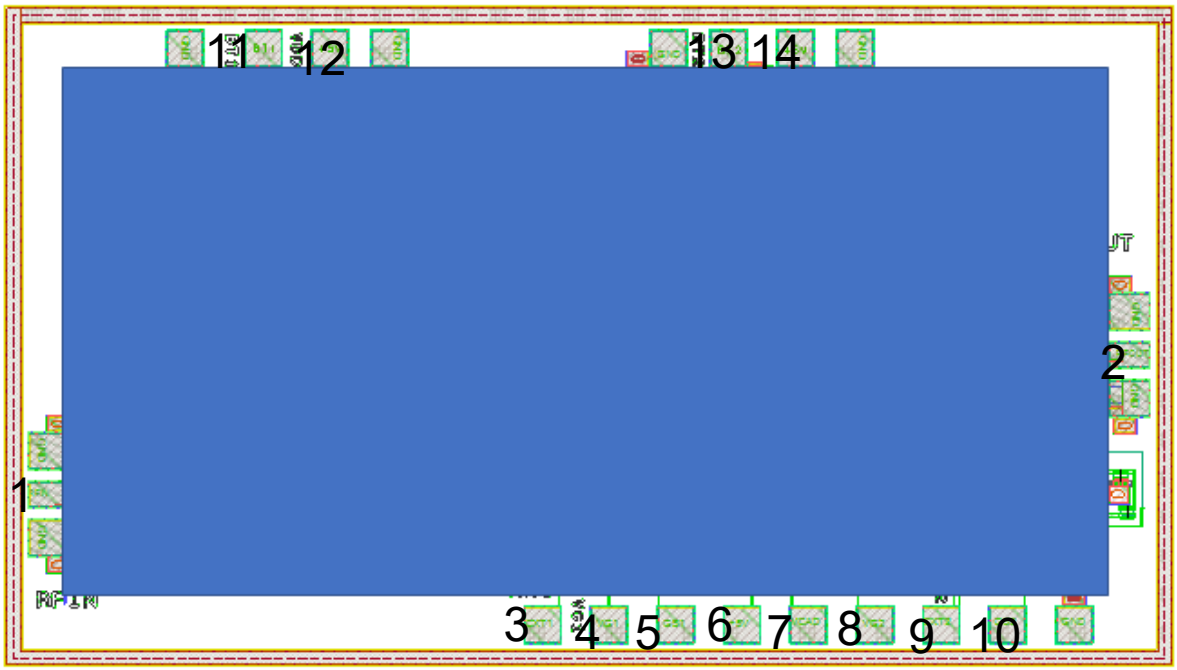

TMC685 Input Return Loss
dB(S(1,1))
freq, GHz


TMC685 Reverse Isolation
dB(S(1,2))
freq, GHz

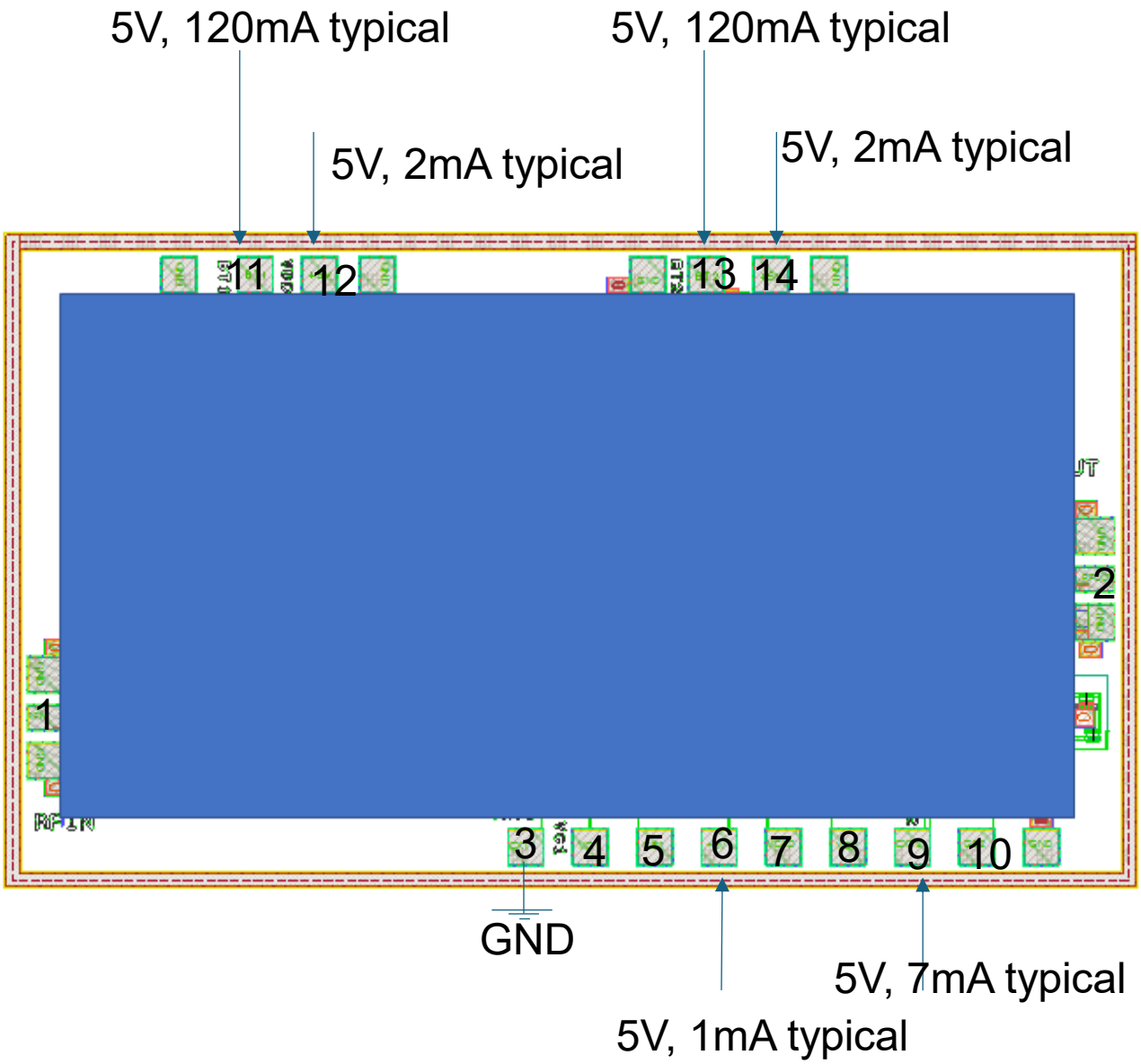

TMC685 Gain
dB(S(2,1))
freq, GHz


TMC685 Output Return Loss
dB(S(2,2))
freq, GHz


TMC685 Noise Figure
nf(2)
freq, GHz



Pad #	Function	Connection
1	RF INPUT	DC-Coupled
2	RF OUTPUT	DC-Coupled
3	CXT1	Short wire bond to GND
4	VG1	-0.4V (adjust to achieve desired currents), draws -1mA
5	GS1	
6	VDD	5V, draws 1mA
7	VCAD	Short wire bond to 100pF+1nF Cap to GND, adjust for the low frequency end
8	VG2	
9	CXT2	5V, draws 7mA
10	GS2	
11	BT1	5V, draws 120mA
12	VDD	5V, draws 2mA
13	BT2	5V, draws 120mA
14	VDD	5V, draws 2mA


5V, 120mA typical
5V, 120mA typical
5V, 2mA typical
5V, 2mA typical
11
12
13
14
2
1
3
4
5
6
7
8
9
10
GND
5V, 7mA typical
5V, 1mA typical

Notes and Q&A

- Absolute max Idd:
- Absolute max Vdd :8V
- Absolute max Vg2 (relative to GND and relative to Vdd) : -1V
- Absolute max Vg1 (relative to GND) : -1V

Can we apply Idd through the on-chip termination? - No

If so, what is the maximum current? Which bonding pad to use?

Can we apply Idd through an external bias tee on the RF OUTPUT?

If so, what is the maximum current?

Are these depletion mode devices? - Yes

What is the pinch-off voltage of Vg1? -0.7V

If we apply Vg1=-0.4V and Vdd=5V through an external bias tee, what is the expected Idd? Is it 230mA or 270mA?

Please provide pin functionality descriptions for all bonding pads, especially CXT1, GS1, VCAD, CXT2, GS2, BT1, BT2?

Are there any bonding pads not needed for powering the device but which require external bypass capacitors?

What is your recommended power-up procedure?



Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. mmTron Inc. recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications. III-V MMICs are ESD-sensitive. Preventative ESD measures must be employed in all aspects of storage, handling, and assembly. MMIC ESD precautions, handling considerations, and die-attach and bonding methods are critical factors in successful III-V MMIC performance and reliability.



RoHS Compliant

This part is RoHS compliant, meeting the requirements of the EU Restriction of Hazardous Substances Directive 2002/95/EC, commonly known as RoHS. Six substances are regulated: lead, mercury, cadmium, chromium VI (hexavalent chromium), polybrominated biphenyls (PBB), and polybrominated biphenyl ethers (PBDE). RoHS compliance requires that any residual concentration of these substances is below the Directive's maximum concentration values (MCV): cadmium 100ppm by weight and all others 1000ppm by weight.

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