OMMIC
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Advance Information

CGY2651UH/C1

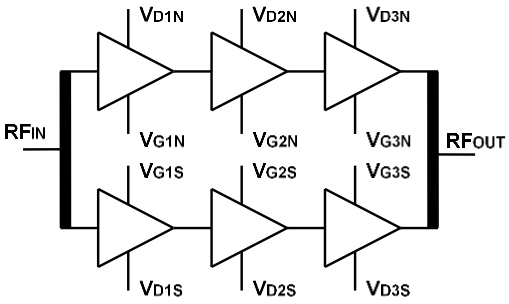
37 – 43 GHz 10 W Power Amplifier

Description

The CGY2651UH/C1 is a high-performance GaN Power Amplifier MMIC designed to operate in the Ka-band.

The CGY2651UH/C1 has 40 dBm of output power and 30% PAE @ Psat & 40 GHz.

The performances of the CGY2651UH/C1 make it well suited to be used in Radar, Telecommunication and Space applications.
This technology is being evaluated for space applications.



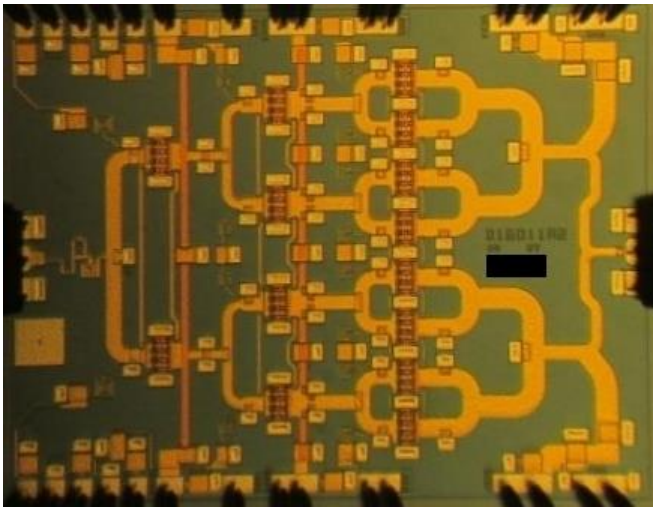
CGY2651UH/C1 Power Amplifier block diagram

Application

- Radar
- Telecommunications
- Spatial

Features

- Operating Range: 37 GHz to 43 GHz
- Gain: 18 dB
- Pout: 40 dBm @40 GHz
- PAE: 30 %
- Power Consumption:
  - V_D = 12 V
  - I_{Qtot} = 0.84 A
- Chip size = 3.6 x 2.8 mm²
- 50 Ohms input and output matched



Bare die : 3.6 x 2.8 mm²

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MAXIMUM VALUES

Symbol	Parameter	Conditions	MIN.	MAX.	UNIT
V_{G1N}, V_{G2N}, V_{G3N}, V_{G1S}, V_{G2S}, V_{G3S}	Gate Voltage		-2.5	0	V
V_{D1N}, V_{D2N}, V_{D3N}, V_{D1S}, V_{D2S}, V_{D3S}	Drain Voltage		10	15	V
I_{DQ1N}, I_{DQ1S}	Quiescent Drain current			450	mA
I_{DQ2N}, I_{DQ2S}				900	
I_{DQ3N}, I_{DQ3S}				1800	
P_{IN}	RF Input Power			+ 25	dBm
T_j (operating)	Operating Junction temperature			+ 200	° C
T_j (one minute)	Junction temperature	During one minute		+ 310	°C
T_{stg}	Storage temperature		- 55	+ 85	° C

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	UNIT
Rth_{amb}	Thermal Resistance at ambient temperature	3.25	° C/W
$Rth_{60°C}$	Thermal Resistance at 60 °C	4.78	° C/W

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	MIN.	TYP.	MAX.	UNIT
RF_{IN}	Input Frequency		37		43	GHz
$V_{D1N, 2N, 3N}$ $V_{D1S, 2S, 3S}$	Drain Supply Voltage			12		V
I_{DD}	Total supply current @Psat	Drain Voltage 12 V		2.7		A
G	Gain			18		dB
P_{sat}	Saturated Power			41		dBm
PAE	Power Added Efficiency	PAE at 40 GHz		30.5		%
OIP3	Output Third Order Intercept Point			TBD		dBm
S_{11}	Input Reflexion Coefficient	50 Ohms		- 8		dB
S_{22}	Output Reflexion Coefficient	50 Ohms		- 10		dB

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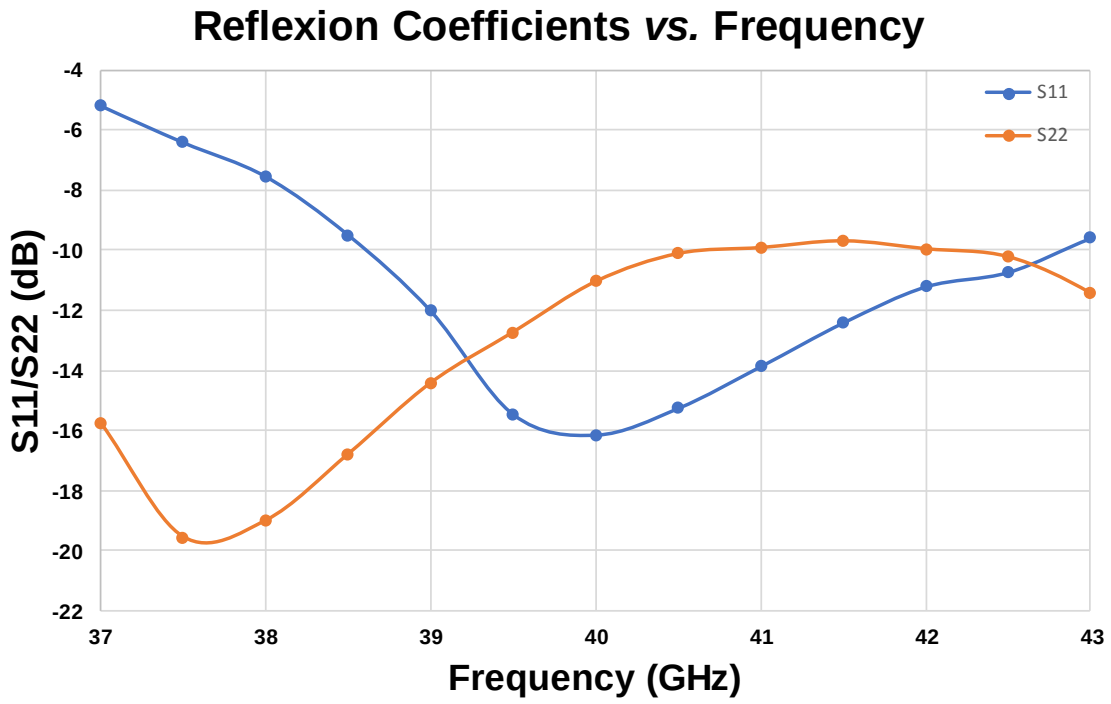
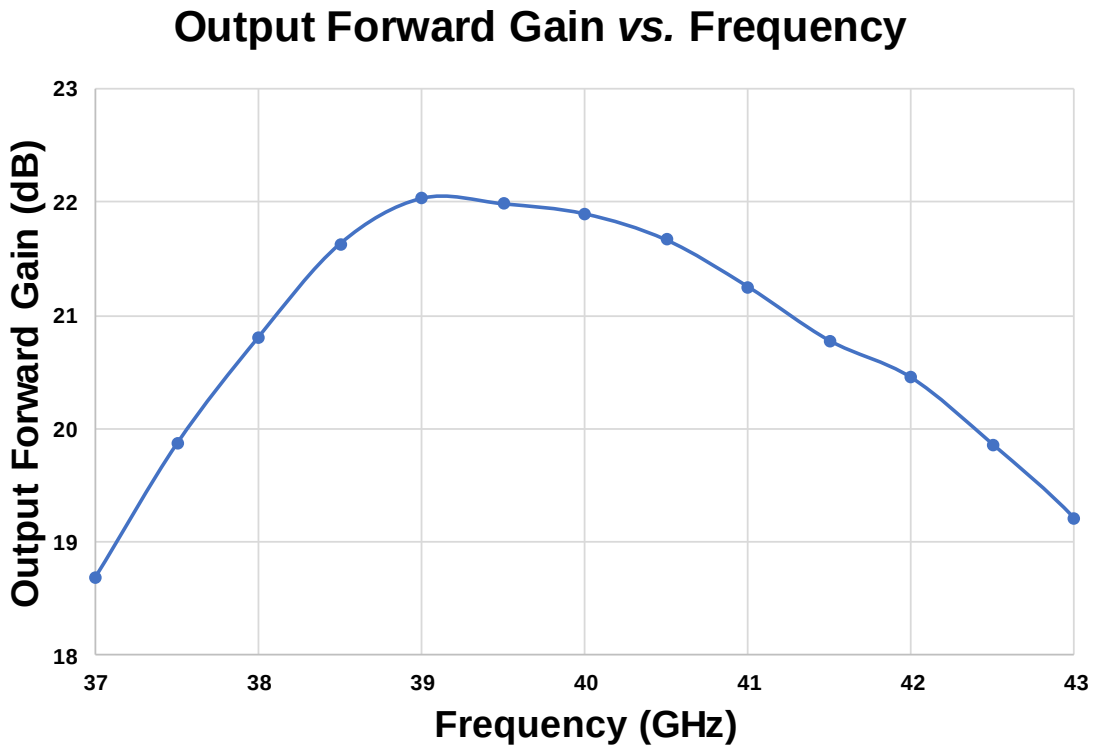
ON WAFER MEASUREMENTS

Conditions : T_{amb} = + 25°C.
$V_{D1} = V_{D2} = V_{D3}$ = 12 V; I_{D1} = 120 mA; I_{D2} = 240 mA; I_{D3} = 480 mA

- **S-PARAMETERS**





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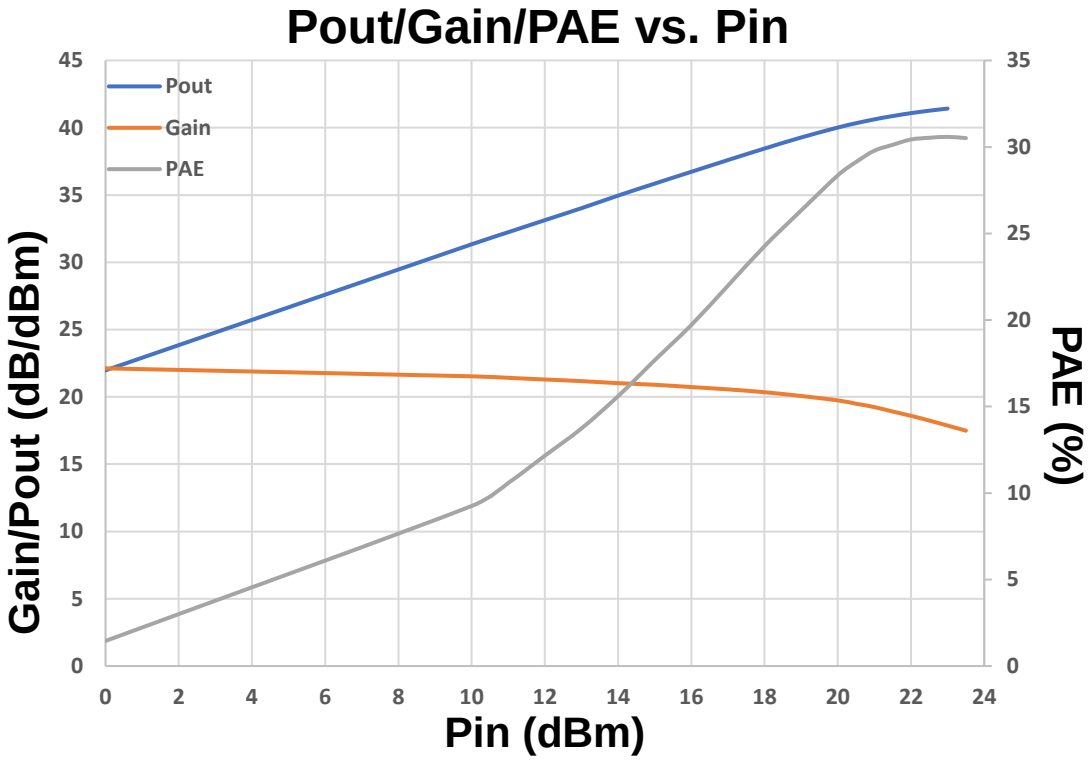
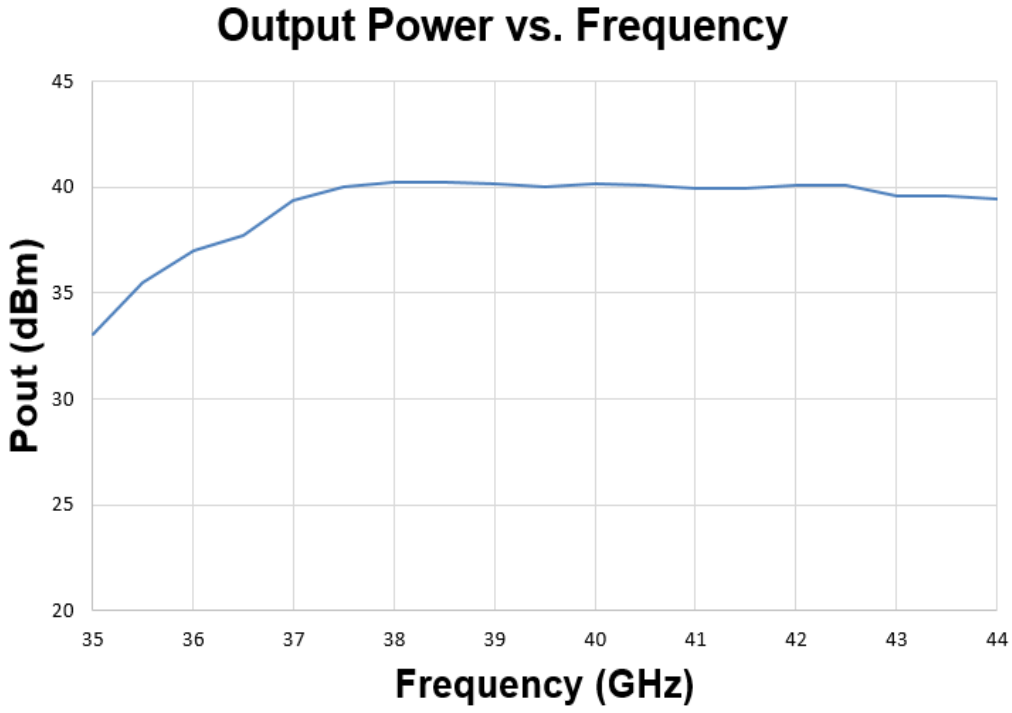
- **PSAT OUTPUT POWER, POWER GAIN AND PAE**





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APPLICATION SCHEMATIC

Decoupling scheme depends on customer implementation, in order to prevent unstability it is hightly recommended to place a 47pF RF decoupling chip capacitor at each DC terminal with the shortest possible bonding wires. Additionnaly, a 10nF chip capacitor can be added on the drain 3 connection.

The decoupling network depends on supply, on grounding environement, on form factor, on all parasitics added by the customer environement. According to this, the appropriate network sometimes need to be fine-tuned in accordance with rules applyable in the high frequency domain.

It may also be required to add very low frequency, high capacitor value. On each drain a 10 Ohms / 10 nF RC serie network made of 0402 format capacitors have been implemented on the reference test-jig.

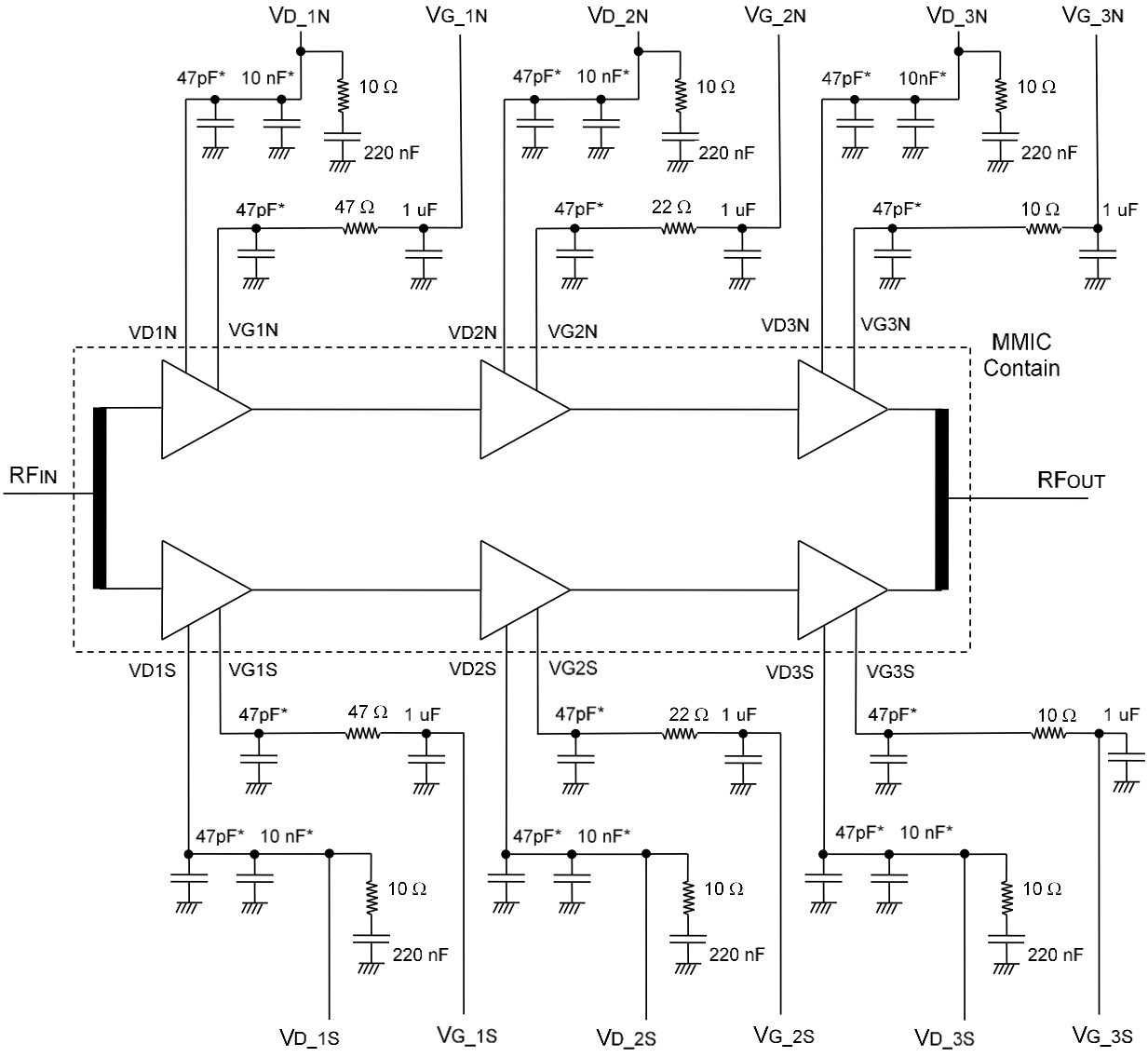

Figure 1 : CGY2651UH Application Schematic

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PAD LAYOUT

The Die is symmetrical on the RF axis. The die positionned top view with RF input on the left and RF output on the right show DC accesses on the top labelled north (N) and DC accesses on the bottom labelled south (S).

VD1N, VD2N, VD3N, VG1N, VG2N, VG3N are DC signals applied on the north side while VD1S, VD2S, VD3S, VG1S, VG2S, VG3S are DC signals applied on the south side. Many ground accesses are complementing the pad layout. The backside is the ground reference plan.

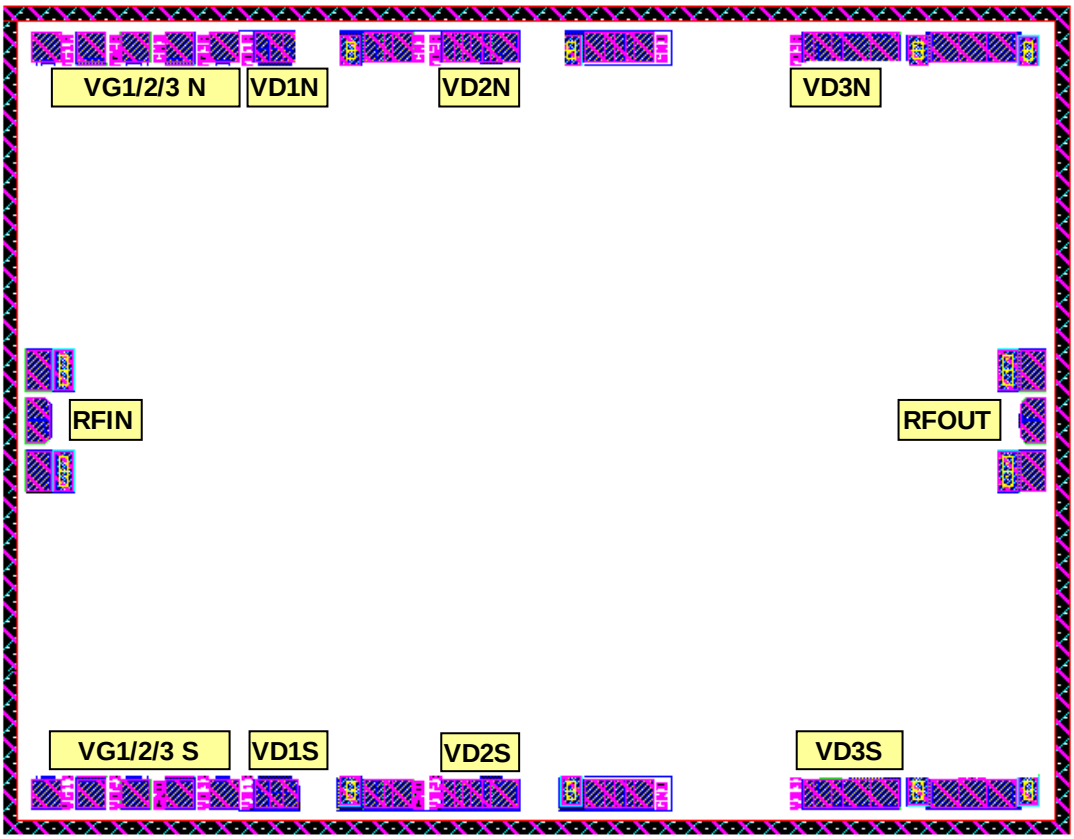

Figure 2: CGY2651UH/C1 Pad allocation

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DEFINITIONS

Limiting values definition

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information

Applications that are described herein for any of these products are for illustrative purposes only. OMMIC makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

DISCLAIMERS

Life support applications

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