

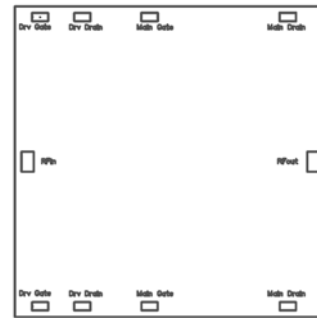
MR500CB

50 W, 28 V, 5.0-6.0 GHz, GaN PA MMIC



Product Features

- Radar band 5000-6000 MHz
- Small signal gain 24.2 dB
- Saturation power 47 dBm (50 W)
- Drain efficiency 42.5% @ $P_{\text{sat}}=47$ dBm (50 W)
- 2-stage power amplifier MMIC
- GaN-HEMT MMIC
- 3.95×3.95 mm² size bare die



3.95 mm × 3.95 mm bare die

Applications

- AESA Radar
- Weather Radar
- Defense Radar

Description

The MR500CB is a 2-stage power amplifier MMIC designed for radar applications, covering frequency range from 5.0 GHz to 6.0 GHz. The device delivers up to 50 W of saturation power and has 43.0% drain efficiency at saturation power with operating drain voltage of 28 V.

Electrical Specifications

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITIONS
Frequency Range	f	5.0	5.5	6.0	GHz	
Small Signal Gain	G	24.2	25.6	26.2	dB	
Gain Flatness	ΔG	-1		+1	dB	Over any 100 MHz bandwidth
Input Return Loss	S_{11}	7.5		25.8	dB	
Output Return Loss	S_{22}	8.0		28.7	dB	
Saturated Output Power	P_{sat}	-	47	-	dBm	
Drain Efficiency	η	41.5	43.5	44.5	%	$P_{\text{IN}}=26$ dBm

Note: $I_q=200$ mA, $V_{\text{dd}}=28$ V, $T=+25^\circ\text{C}$,
5ms / 10% pulse signal

DC Characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	CONDITIONS
Gate Threshold Voltage	V_{GS_TH}		-2.6		V_{DC}	$V_D=28\text{ V}$, $I_D=1\text{ mA}$
Gate Quiescent Voltage	V_{GS_Q}		-2.4		V_{DC}	$V_D=28\text{ V}$, $I_D=200\text{ mA}$
Saturated Drain Current	I_{D_SAT}	4.0	4.6		A	$V_D=28\text{ V}$, $I_{D_Q}=200\text{ mA}$
Drain-Source Breakdown Voltage	V_{D_B}		120		V_{DC}	$I_D=1\text{ mA/mm}$

Absolute Maximum Ratings

PARAMETER	SYMBOL	RATING	UNIT	CONDITIONS
Drain-Source Voltage	V_{DSS}	120	V_{DC}	
Gate-Source Voltage	V_{GS}	-10, +2	V_{DC}	
Storage Temperature	T_{STG}	200	$^{\circ}\text{C}$	
Operating Junction Temperature	T_J	250	$^{\circ}\text{C}$	
Soldering Temperature	T_S	240	$^{\circ}\text{C}$	
Thermal Resistance	R_{TH}	TBD	$^{\circ}\text{C/W}$	
Forward Gate Current	I_{GS}	TBD	mA	

Electrostatic Discharge (ESD) Classification

PARAMETER	SYMBOL	CLASS	TEST METHODOLOGY
Human Body Model	HBM	TBD	TBD
Charge Device Model	CDM	TBD	TBD

Figure 1. Gain and Return Losses vs. Frequency of the MR500CB

$V_{DD}=28$ V, $I_Q=200$ mA, $T=25^\circ\text{C}$

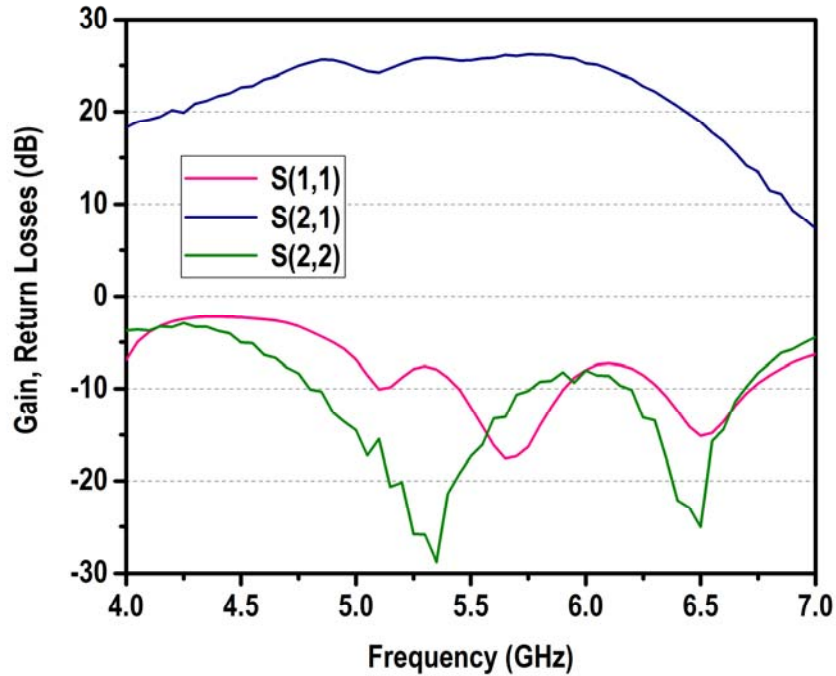


Figure 2. Output Power, Gain, and Drain Efficiency vs. Frequency of the MR500CB

$V_{DD}=28$ V, $I_Q=200$ mA, $T=25^\circ\text{C}$, $P_{IN}=26$ dBm, Pulse Width=500 μs , Duty Cycle=10%

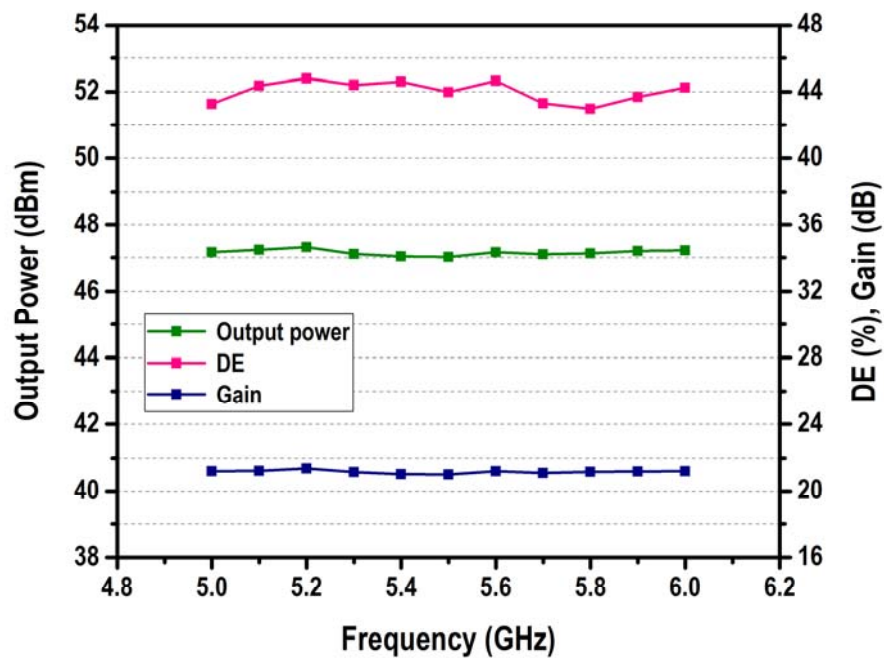
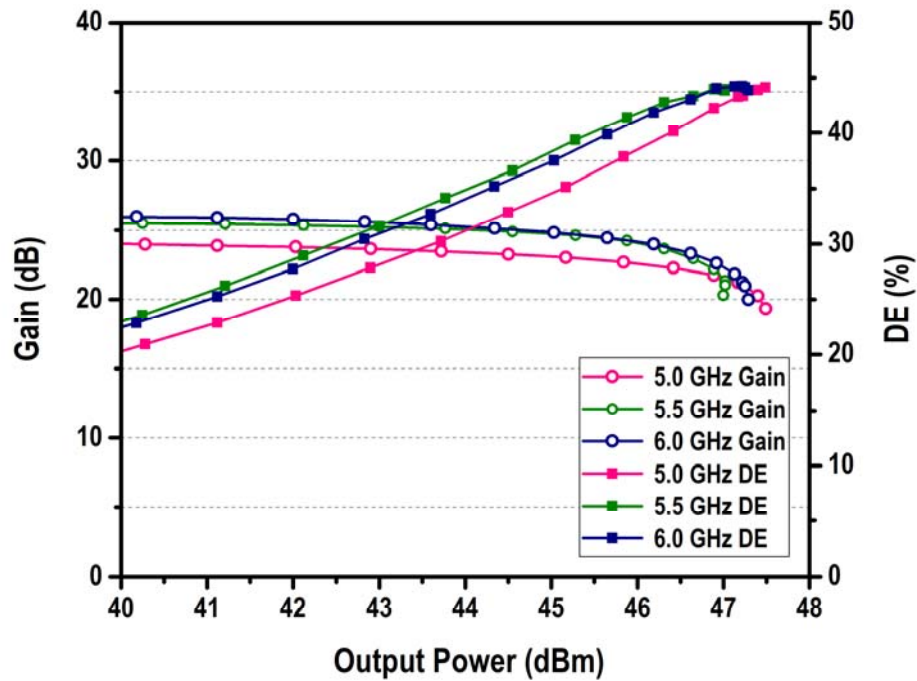
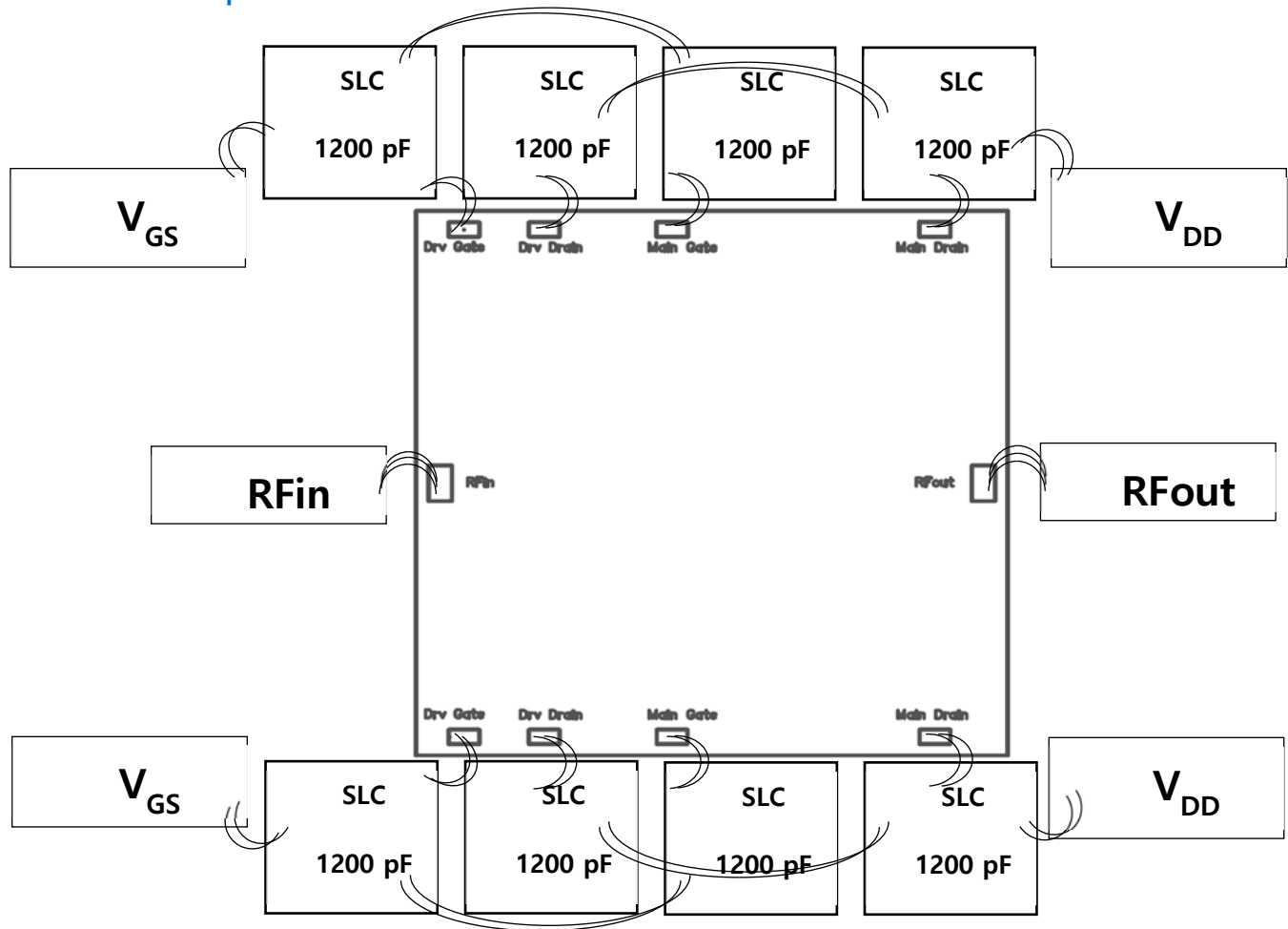


Figure 3. Gain and Drain Efficiency vs. Output Power of the MR500CB

$V_{DD}=28\text{ V}$, $I_Q=200\text{ mA}$, $T=25^\circ\text{C}$, Pulse Width=500 μs , Duty Cycle=10%



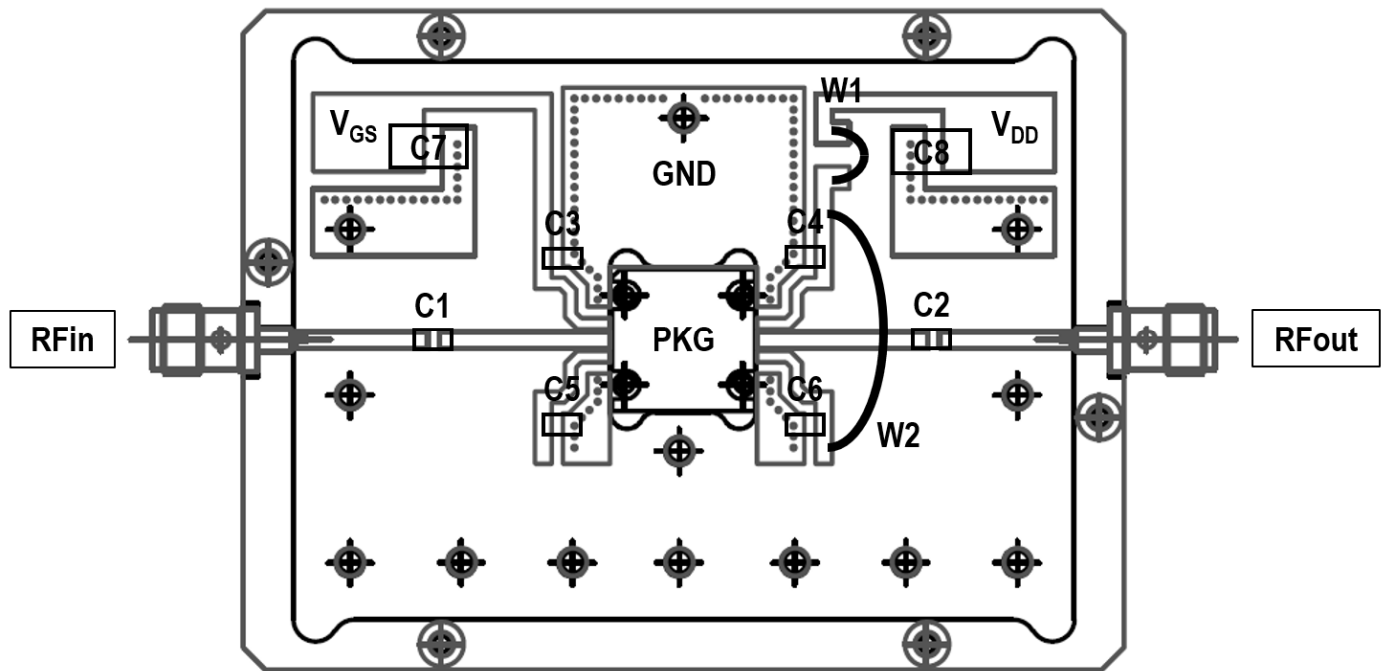
MR5005060B Pin Map



Pin Number

PIN NO.	DESCRIPTION
1	V_{GS}
2	RFin
3	V_{GS}
4	V_{DD}
5	RFout
6	V_{DD}

MR500CB Demonstration Circuit



Demonstration Circuit Components

PART NO.	DESCRIPTION
C1, C2	ATC 600S 3.9 pF
C3, C4, C5, C6	Walsin General Purpose Caps (0.1 uF; 1608 size)
C7, C8	Murata GRM32DC72A475KE01L (4.7 uF; 3225 size)
W1, W2	Wire

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