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CEL California Eastern Laboratories

Evaluation Board Document

NE5550979A-EV04-A

Evaluation Board

- Circuit Description
- Typical Performance Data
- o Circuit Schematic and Assembly Drawing

Circuit Description

The NE5550979A-EV04-A is an evaluation circuit board for Renesas' LDMOS power FET, NE5550979A optimized for the performance at 460MHz. The circuit board is RoHS compliant.

Matching and Bias Circuits

Both input and output matching networks consist of shunt capacitors and sections of transmission lines (refer to the schematic and assembly drawing in the two last pages for the component designation). The electrical lengths of the transmission lines labeled on the schematic are estimated and for reference only. Some bench tuning on the actual circuit board is usually required to achieve optimal performance. For applications where there is a constraint on the board space, a serial inductor, instead of transmission lines, can be used for the matching circuits. The efficiency, PAE, will be slightly lower in that case. The resistor, R1(=10hm) at input is used to improve the stability margin. The gain is reduced by about 1dB when R1 used.

LDMOSFETs essentially draw no gate current under normal operation conditions. Therefore a large value resistor, in the order of $k\Omega$, can be used for the bias at gate so that the RF path is completely isolated from the DC line. At the drain an inductor is used as the RF choke. The current rating for this inductor should be high enough to provide the required current at the operation conditions.

Bias Conditions

This evaluation board was optimized at a specific drain voltage, 7.5V. For different supply voltages, the matching circuits should be adjusted to fully utilize the device capability. The quiescent current is 200mA for the data shown below. The gain is higher at higher quiescent currents, particularly when the device is not completely saturated. For many communication systems, where the PA is never at idle state, a high quiescent current might be used.

PCB Material:

The PCB is Getek 28mil two layer board. The dielectric constant of Getek is 4.2.

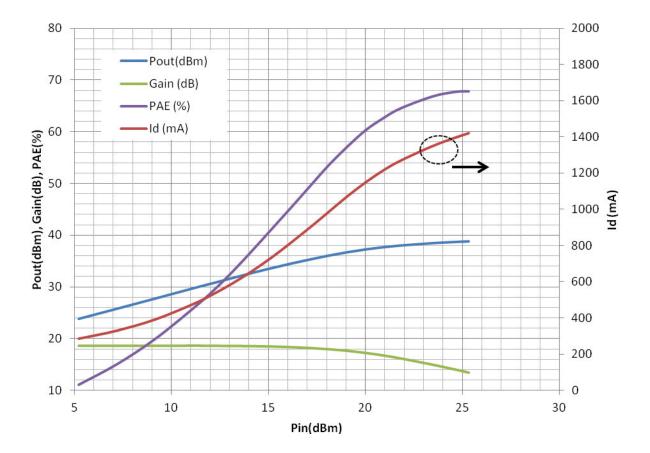
Typical Performance Data

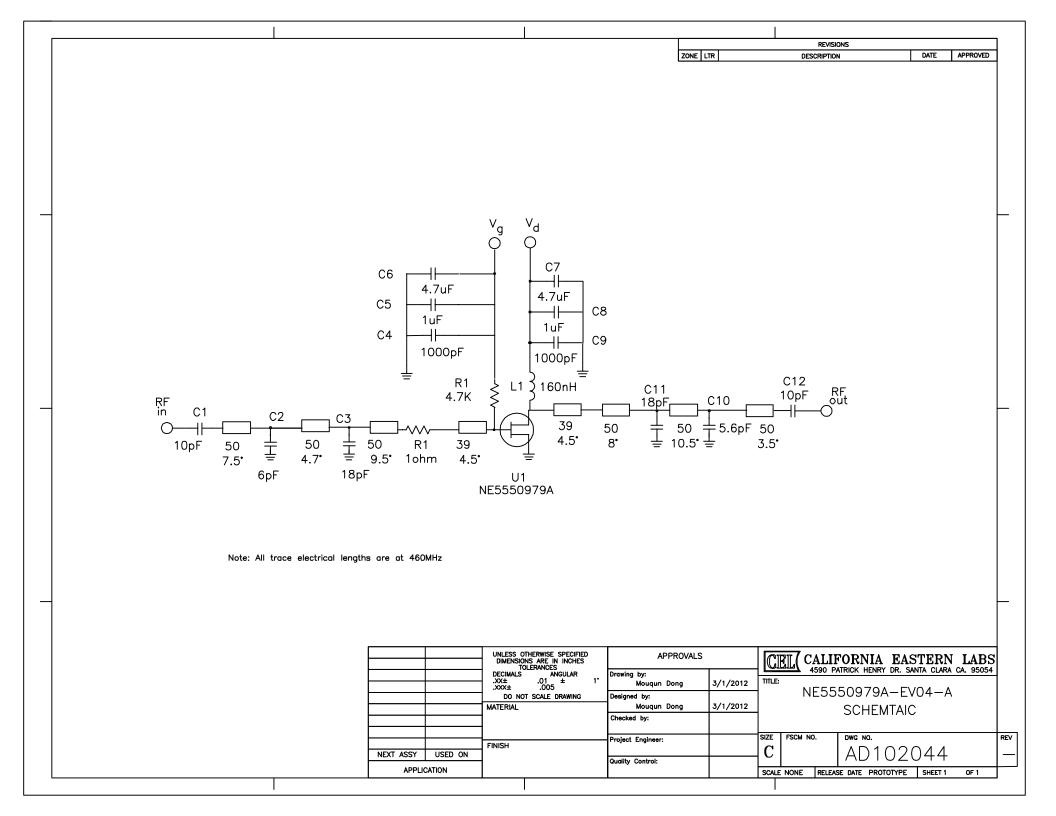
Test Conditions:

f=460MHz

Vd=7.5V, Idsq=200mA

Pout, Gain, PAE and Current vs Pin are shown in the following plot.





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			1 2 2	GRM185R61C105	KE44D SJA01B+A01	C5,C8 C4,C9		0603 1u 0603 10	F CAP MURAT	TA IRATA		14 13
			2	GRM185R61C105 GRM1885C1H102 GRM1885C1H180	KE44D 2JA01B+A01 0JA01B+A01	C5,C8 C4,C9 C3,C11		0603 1u 0603 10 0603 18	F CAP MURAT 00pF CAP MUI pF CAP MURA	TA IRATA ATA		14 13 12
			_	GRM185R61C105 GRM1885C1H102 GRM1885C1H180 267M1002475K	5KE 44D 2JA01B+A01 0JA01B+A01	C5,C8 C4,C9 C3,C11 C6,C7		0603 1u 0603 10 0603 18 4.7uF 10	F CAP MURAT 00pF CAP MUI pF CAP MURA 0∨ TANT CHI	TA IRATA ATA IP CAP B MATS	5	14 13 12 11
			222	GRM185R61C105 GRM1885C1H102 GRM1885C1H102 267M1002475K GRM1885C1H6R0	5KE 44D 2JA01B+A01 0JA01B+A01 0DZ01B+C01	C5,C8 C4,C9 C3,C11 C6,C7 C2		0603 1u 0603 10 0603 18 4.7uF 10 0603 6.0	F CAP MURAT 00pF CAP MUI pF CAP MURA 0∨ TANT CHII 0pF CAP MUR	TA IRATA ATA IP CAP B MATS ATA	S	14 13 12 11 10
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			2 2 2 2 1 2 2 1 1 2 2 1 1 1 1 1 1 1 1 1	GRM185R61C105 GRM1885C1H102 GRM1885C1H102 GRM1885C1H180 267M1002475K GRM1885C1H6R GRM1885C1H6R GRM1885C1H6R GENERIC GENERIC 2222SQ-161-JE 2340-6111 TG 5308-2CC NE5550979A-A CL-102044 PART NUMBER IDENTIFYING NO RWISE SPECIFIED ANGULAR ± 1'	INE 44D INFORMATION INFORMATION INFORMATI	C5,C8 C4,C9 C3,C11 C6,C7 C2 C1,C12 R3,R4 R1 L1 P1,P2,P3 J1,J2 U1 DRAWING NOMENC DESC	3/1/2012	0603 10 0603 10 0603 18 4.7uF 11 0603 6.1 0603 10 0603 10 0603 1 0603 4. 160nH I PIN HEA SMA 4H RENESAS COMPONE PARTS LIST	F CAP MURAT 00pF CAP MURA 100pF CAP MURA 1007 TANT CHI 10pF CAP MURA 1007 TANT CHI 10pF CAP MURA 10pF CA	TA IRATA ATA P CAP B MATS ATA ATA ATA STOR STOR ICCRAFT	STERN ANTA CLARA (/04-A	14 13 12 11 10 9 8 7 6 5 4 3 2 1 ITEM NO. LABS CA. 95054
			2 2 2 2 1 1 2 2 2 2 2 1 1 1 1 1 1 1 1 1	GRM185R61C105 GRM1885C1H102 GRM1885C1H102 GRM1885C1H180 267M1002475K GRM1885C1H6R GRM1885C1H6R GRM1885C1H6R GENERIC GENERIC 2222SQ-161-JE 2340-6111 TG 5308-2CC NE5550979A-A CL-102044 PART NUMBER IDENTIFYING NO RWISE SPECIFIED ANGULAR ± 1'	IKE 44D IL A01B+A01 ID A01B+A	C5,C8 C4,C9 C3,C11 C6,C7 C2 C1,C12 R3,R4 R1 L1 P1,P2,P3 J1,J2 U1 DRAWING NOMENC DESC	3/1/2012	0603 10 0603 10 0603 18 4.70F 11 0603 6.1 0603 10 0603 10 0603 10 0603 1 0603 4.1 160nH 11 PIN HEA SMA 4H RENESAS COMPONE PARTS LIST	F CAP MURAT 00pF CAP MURA 100pF CAP MURA 100 TANT CHI 10pF CAP MURA 100 TANT CHI 10pF CAP MURA 10pF CAP	TA IRATA ATA P CAP B MATS ATA ATA ATA STOR ICCRAFT IR STOR ICCRAFT IR STOR ICCRAFT IR STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT ICCRAF	STERN NNTA CLARA (/04—A AND	14 13 12 11 10 9 8 7 6 5 4 3 2 1 ITEM NO. BOM
		NEXT ASSY USED ON	2 2 2 2 1 1 2 2 2 2 2 1 1 1 1 1 1 1 1 1	GRM185R61C105 GRM1885C1H102 GRM1885C1H102 GRM1885C1H180 267M1002475K GRM1885C1H6R GRM1885C1H6R GRM1885C1H6R GENERIC GENERIC 2222SQ-161-JE 2340-6111 TG 5308-2CC NE5550979A-A CL-102044 PART NUMBER IDENTIFYING NO RWISE SPECIFIED ANGULAR ± 1'	IKE 44D 2JA01B+A01 DJA01B+A01 DDZ01B+C01 JA01B+A01 E E OR Drawing by: M Dong Designed by: M Dong Checked by: Project Enginee	C5,C8 C4,C9 C3,C11 C6,C7 C2 C1,C12 R3,R4 R1 L1 P1,P2,P3 J1,J2 U1 DRAWING NOMENC DESC	3/1/2012	0603 10 0603 10 0603 18 4.7uF 11 0603 6.1 0603 10 0603 10 0603 1 0603 4. 160nH I PIN HEA SMA 4H RENESAS COMPONE PARTS LIST	F CAP MURAT 00pF CAP MURA 100pF CAP MURA 100 TANT CHI 10pF CAP MURA 100 TANT CHI 10pF CAP MURA 10pF CAP	TA IRATA ATA P CAP B MATS ATA ATA ATA STOR STOR ICCRAFT	STERN NNTA CLARA (/04—A AND	14 13 12 11 10 9 8 7 6 5 4 3 2 1 ITEM NO. BOM
		NEXT ASSY USED ON APPLICATION	2 2 2 2 1 1 2 2 2 2 2 1 1 1 1 1 1 1 1 1	GRM185R61C105 GRM1885C1H102 GRM1885C1H102 GRM1885C1H180 267M1002475K GRM1885C1H6R GRM1885C1H6R GRM1885C1H6R GENERIC GENERIC 2222SQ-161-JE 2340-6111 TG 5308-2CC NE5550979A-A CL-102044 PART NUMBER IDENTIFYING NO RWISE SPECIFIED ANGULAR ± 1'	INE 44D INFORMATION INFORMATION INFORMATI	C5,C8 C4,C9 C3,C11 C6,C7 C2 C1,C12 R3,R4 R1 L1 P1,P2,P3 J1,J2 U1 DRAWING NOMENC DESC	3/1/2012	0603 10 0603 10 0603 18 4.70F 11 0603 6.1 0603 10 0603 10 0603 10 0603 1 0603 4.1 160nH 11 PIN HEA SMA 4H RENESAS COMPONE PARTS LIST	F CAP MURAT 00pF CAP MURAT 00y TANT CHII 00pF CAP MURAT 00y TANT CHII 00pF CAP MURAT	TA IRATA ATA P CAP B MATS ATA ATA ATA STOR ICCRAFT IR STOR ICCRAFT IR STOR ICCRAFT IR STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT STOR ICCRAFT ICCRAF	STERN NITA CLARA (/04–A AND 1	14 13 12 11 10 9 8 7 6 5 4 3 2 1 ITEM NO. BOM