CEL

Si LDMOSFET ANALOG RF INTEGRATED CIRCUIT

μPD5702TU

3V OPERATION SILICON LDMOSFET RF POWER AMPLIFIER INTEGRATED CIRCUIT FOR 1.9 GHz PHS AND 2.4 GHz APPLICATIONS

DESCRIPTION

The μPD5702TU is a silicon laterally diffused (LD) MOSFET IC designed for use as power amplifier 1.9 GHz PHS and 2.4 GHz applications. This IC consists of two stage amplifiers. The device is packaged in surface mount 8 pin L2MM (Lead Less Mini Mold) plastic package.

FEATURES

- Output Power : P_{out} = +21 dBm MIN. @P_{in} = –5 dBm, f = 1.9 GHz, V_{DS} = 3.0 V
  : P_{out} = +21 dBm MIN. @P_{in} = +2 dBm, f = 2.45 GHz, V_{DS} = 3.0 V
- Single Supply voltage : V_{DS} = 3.0 V TYP.
- Packaged in 8-pin Lead-Less Minimold (2.0 x 2.2 x 0.5mm) suitable for high-density surface mounting.

APPLICATIONS

- 1.9 GHz applications (Example : PHS etc.)
- 2.4 GHz applications (Example : Wireless LAN etc.)

ORDERING INFORMATION (Pb-Free)

Part Number	Package	Marking	Supplying Form
μPD5702TU-E2-A	8-pin Lead-Less Minimold	5702	• 8 mm wide embossed taping • Pin 5, 6, 7, 8 indicates pull-out direction of tape • Qty 5 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPD5702TU-A

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

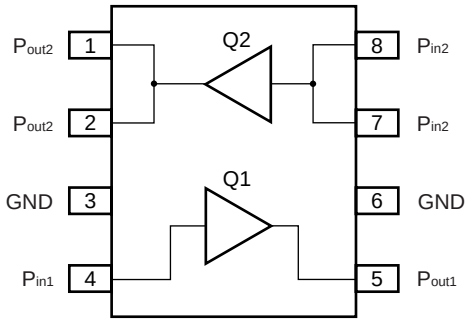
The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

Document No. PU10455EJ01V0DS (1st edition)
Date Published November 2003 CP(K)

© NEC Compound Semiconductor Devices 2003

PIN CONNECTION AND INTERNAL BLOCK DIAGRAM

(Top View)



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Test Conditions	Ratings	Unit
Drain to Source Voltage	V_{DS}	T_A = +25°C	8.0	V
Gate to Source Voltage	V_{GS}	T_A = +25°C	8.0	V
Drain Current of Q1	I_{ds1}	T_A = +25°C	45	mA
Drain Current of Q2	I_{ds2}	T_A = +25°C	259	mA
Total Power Dissipation	P_D	T_A = +85°C **Note**	4.33	W
Channel Temperature	T_{ch}		150	°C
Storage Temperature	T_{stg}		−65 to +150	°C
Operating Ambient Temperature	T_A		−40 to +85	°C
Maximum Input Power to Q1	P_{in1}	T_A = +25°C	6	dBm
Maximum Input Power to Q2	P_{in2}	T_A = +25°C	16	dBm

Note Mounted on 33 × 21 mm epoxy glass PWB

RECOMMENDED OPERATING RANGE

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Drain to Source Voltage	V_{DS}	T_A = +25°C	2.7	3.0	3.5	V
Gate to Source Voltage	V_{GS}	T_A = +25°C	0	2.0	2.5	V
Maximum Input Power to Q1	P_{in1}	V_{DS} = 3V, T_A = +25°C		2.0	5.0	dBm
Maximum Input Power to Q2	P_{in2}	V_{DS} = 3V, T_A = +25°C		11.0	15.0	dBm

ELECTRICAL CHARACTERISTICS

(f = 1.9 GHz, V_{DS} = 3.0 V, T_A = +25°C, unless otherwise specified, using our standard test fixture.)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Voltage	V_{GS}	P_{in} = −5 dBm	1.0	1.9	2.5	V
Power Added Efficiency	PAE	P_{out} = +21.0 dBm	–	28.0	–	%
Drain Current	I_{DS} **Note**		–	155	230	mA
Input Return Loss	IRL	P_{in} = −20 dBm	–	10	–	dB
Output Return Loss	ORL		–	8	–	dB
Output Power	P_{out}	P_{in} = −5 dBm	21.0	–	–	dBm
Power Gain	G_P		26.0	–	–	dB
Linear Gain	G_L	P_{in} = −20 dBm	–	26.5	–	dB
Adjacent Channel Power Leakage 1	P_{adj1}	P_{in} = −5 dBm, ⊿600 kHz	–	−60.0	−55.0	dBc
Adjacent Channel Power Leakage 2	P_{adj2}	P_{in} = −5 dBm, ⊿900 kHz	–	−70.0	−60	dBc
Occupied Band Width	OBW	P_{in} = −5 dBm	–	250	–	kHz

Note I_{DS} is total Drain currents of Q1 and Q2 part.

ELECTRICAL CHARACTERISTICS

(f = 2.4 GHz, T_A = +25°C, unless otherwise specified, using our standard test fixture.)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
V_{DS} = 3.3 V						
Gate to Source Voltage	V_{GS}	P_{in} = +2 dBm P_{out} = +22.0 dBm	–	1.9	–	V
Power Added Efficiency	PAE		–	28.0	–	%
Drain Current	I_{DS} Note		–	180	–	mA
Input Return Loss	IRL	P_{in} = –20 dBm	–	10	–	dB
Output Return Loss	ORL		–	10	–	dB
Output Power	P_{out}	P_{in} = +2 dBm	22.0	–	–	dBm
Power Gain	G_P		20.0	–	–	dB
V_{DS} = 3.0 V						
Gate to Source Voltage	V_{GS}	P_{in} = +2 dBm P_{out} = +21.0 dBm	–	1.9	–	V
Power Added Efficiency	PAE		–	27.5	–	%
Drain Current	I_{DS} Note		–	150	–	mA
Input Return Loss	IRL	P_{in} = –20 dBm	–	10	–	dB
Output Return Loss	ORL		–	10	–	dB
Output Power	P_{out}	P_{in} = +2 dBm	21.0	–	–	dBm
Power Gain	G_P		19.0	–	–	dB

Note I_{DS} is total Drain currents of Q1 and Q2 part.

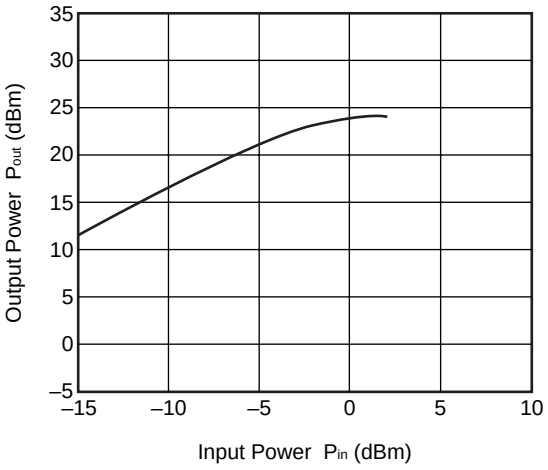
DC CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Q1						
On-state Resistance1	R_{on1}	V_{DS} = 0.1 V, V_{GS} = 6 V	–	4.35	–	Ω
Drain to Source Breakdown Voltage1	BV_{DSS1}	I_{DS} = 1.4 μA	10.0	–	–	V
Gate to Source Breakdown Voltage1	BV_{GSS1}	I_{GS} = 1.4 μA	4.0	–	–	V
Gate Threshold Voltage1	V_{th1}	V_{DS} = 3.5 V, I_{DS} = 1.4 mA	1.15	1.40	1.65	V
Transconductance1	g_{m1}	V_{DS} = 3.5 V, I_{DS} = 25 mA	50	70	–	mS
Q2						
On-state Resistance2	R_{on2}	V_{DS} = 0.1 V, V_{GS} = 6 V	–	1.02	–	Ω
Drain to Source Breakdown Voltage2	BV_{DSS2}	I_{DS} = 8.0 μA	10.0	–	–	V
Gate to Source Breakdown Voltage2	BV_{GSS2}	I_{GS} = 8.0 μA	4.0	–	–	V
Gate Threshold Voltage2	V_{th2}	V_{DS} = 3.5 V, I_{DS} = 8.0 mA	1.15	1.40	1.65	V
Transconductance2	g_{m2}	V_{DS} = 3.5 V, I_{DS} = 150 mA	290	370	–	mS

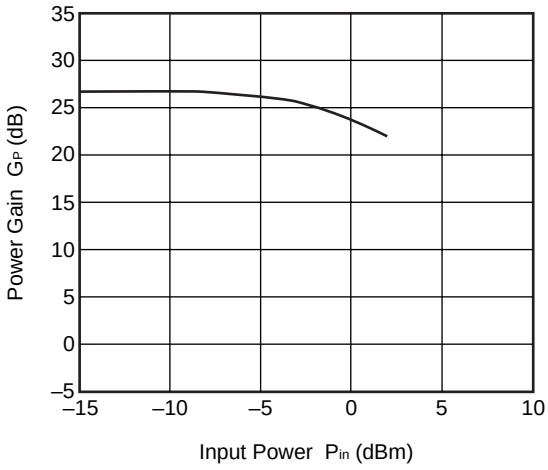
TYPICAL CHARACTERISTICS (Preliminary)

(f = 1.9 GHz, V_{DS} = 3 V, V_{GS} = 2 V, T_A = +25°C, unless otherwise specified)

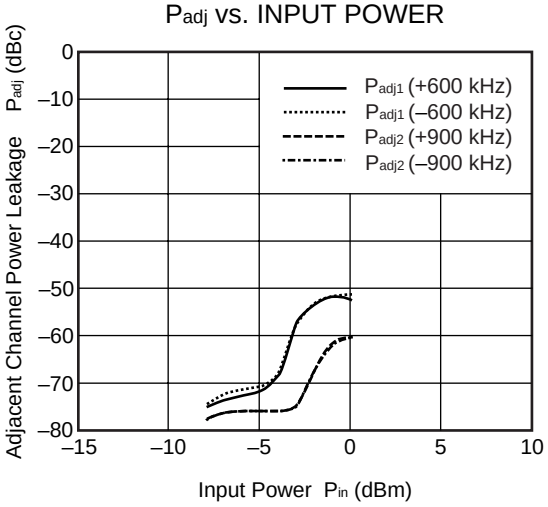
OUTPUT POWER vs. INPUT POWER



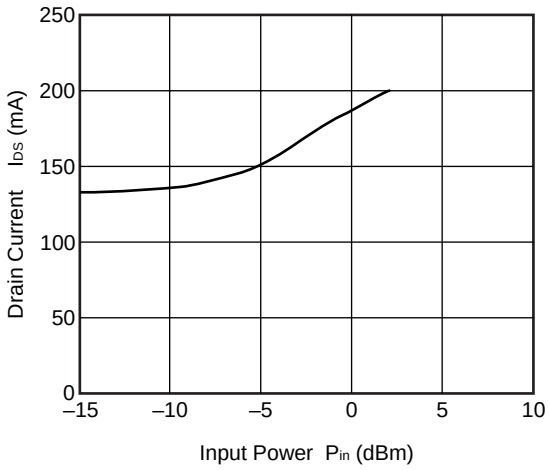
POWER GAIN vs. INPUT POWER



Padj vs. INPUT POWER



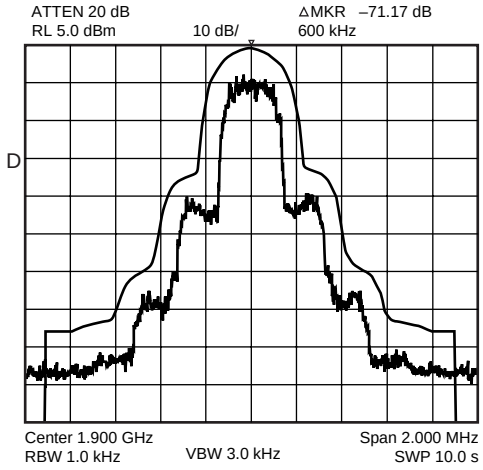
DRAIN CURRENT vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

ADJACENT CHANNEL POWER

(f = 1.9 GHz, V_{DS} = 3 V, P_{in} = –5 dBm, T_A = +25°C, unless otherwise specified)

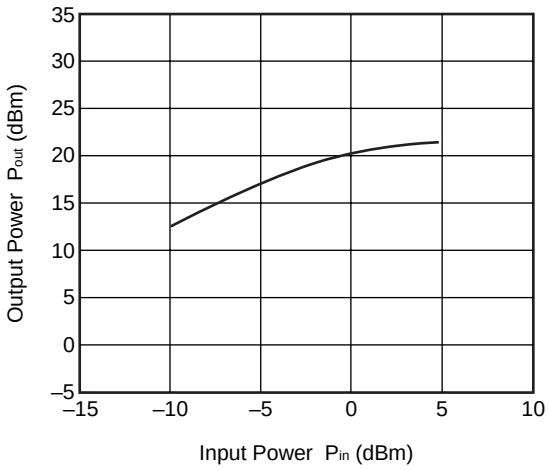


Remark The graphs indicate nominal characteristics.

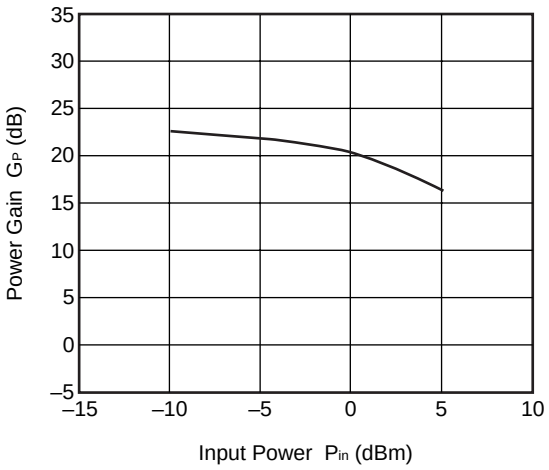
TYPICAL CHARACTERISTICS (Preliminary)

(f = 2.4 GHz, V_{DS} = 3 V, V_{GS} = 2 V, T_A = +25°C, unless otherwise specified)

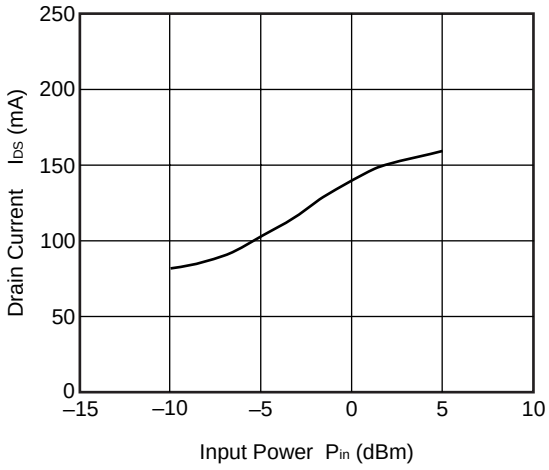
OUTPUT POWER vs. INPUT POWER



POWER GAIN vs. INPUT POWER



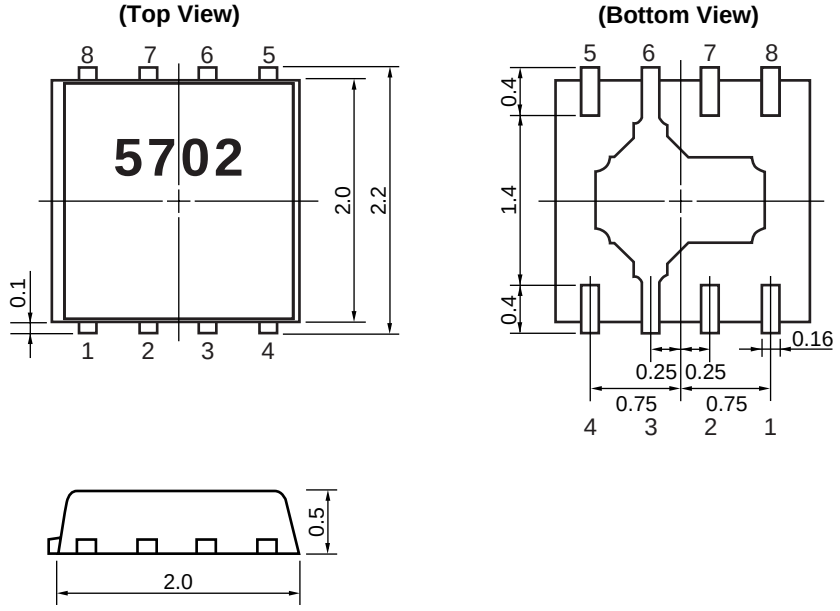
DRAIN CURRENT vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

8-PIN LEAD-LESS MINIMOLD (UNIT: mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

Soldering Method	Soldering Conditions		Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature)	: 260°C or below	IR260
	Time at peak temperature	: 10 seconds or less	
	Time at temperature of 220°C or higher	: 60 seconds or less	
	Preheating time at 120 to 180°C	: 120±30 seconds	
	Maximum number of reflow processes	: 3 times	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	
VPS	Peak temperature (package surface temperature)	: 215°C or below	VP215
	Time at temperature of 200°C or higher	: 25 to 40 seconds	
	Preheating time at 120 to 150°C	: 30 to 60 seconds	
	Maximum number of reflow processes	: 3 times	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	
Wave Soldering	Peak temperature (molten solder temperature)	: 260°C or below	WS260
	Time at peak temperature	: 10 seconds or less	
	Preheating temperature (package surface temperature)	: 120°C or below	
	Maximum number of flow processes	: 1 time	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	
Partial Heating	Peak temperature (pin temperature)	: 350°C or below	HS350
	Soldering time (per side of device)	: 3 seconds or less	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	

Caution Do not use different soldering methods together (except for partial heating).

CEL California Eastern Laboratories

4590 Patrick Henry Drive
Santa Clara, CA 95054-1817
Telephone: (408) 919-2500
Facsimile: (408) 988-0279

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
Lead (Pb)	< 1000 PPM	-A	-AZ
		Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

Important Information and Disclaimer: Information provided by CEL on its website or in other communications concerting the substance content of its products represents knowledge and belief as of the date that it is provided. CEL bases its knowledge and belief on information provided by third parties and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. CEL has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. CEL and CEL suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.
In no event shall CEL's liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.
See CEL Terms and Conditions for additional clarification of warranties and liability.