

Description

The HTU7G06S0P5P is an unmatched discrete LDMOS Power Amplifier with 0.5W saturated output power covering frequency range for VHF/UHF applications.

Features

- Operating Frequency Range: VHF/UHF
- Operating Drain Voltage: +4V
- Saturation Output Power: 0.5W
- Enhanced robustness design without device degradation
- Internally integrated enhanced ESD design

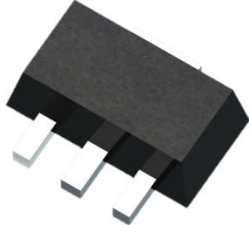
Freq (MHz)	Vdd (V)	Pout (W)	Eff (%)
430	4.0	0.7	70

Test conditions unless otherwise noted: 25 °C,


$V_{DD} = +4Vdc$, $I_{DQ} = 50mA$, CW Signal test on HOLTLO Application Board

Applications

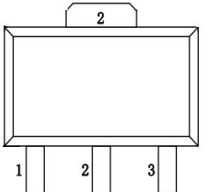

- VHF Band handheld Walkie-talkie
- UHF Band handheld Walkie-talkie
- 1.8-600 MHz other application Drivers or Final stage Amplifiers



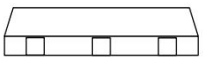
SOT-89-3L
HTU7G06S0P5P



OUTLINE DRAWING

Terminal No.
1 : Gate
2 : Source
3 : Drain
UNIT: mm



Note: Exposed backside of the package is the source terminal for the transistor

Pin Connections

Ordering Information

Part Number	Description
HTU7G06S0P5P	Reel Package
HTU7G06S0P5PEVB	135- 175 MHz EVB
HTU7G06S0P5PEVB1	400 - 470 MHz EVB
HTU7G06S0P5PEVB2	500 - 560 MHz EVB
HTU7G06S0P5PEVB3	880 - 950 MHz EVB

Absolute Maximum Ratings

Parameter	Range/Value	Unit
Drain voltage (V_{DSS})	-0.5 to +17	V
Gate voltage (V_{GS})	-5 to +10	V
Operation voltage (V_{DD})	+8.5	V
Storage Temperature (T_{STG})	-55 to +150	°C
Junction Temperature (T_J)	-40 to +150	°C
Thermal Resistance Junction to Case (R_{TH})	25	°C/W

Electrical Specification

DC Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Breakdown Voltage $V_{(BR)DSS}$	$V_{GS}=0V, I_{DS}=8\mu A$	17	-	-	V
Gate-Source Threshold Voltage $V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=8\mu A$	0.5	1.0	1.5	V
Drain Leakage Current I_{DSS}	$V_{GS}=0V, V_{DS}=17V$	-	-	1	μA
Gate Leakage Current I_{GSS}	$V_{GS}=10V, V_{DS}=0V$	-	-	1	μA

Load Mismatch Test

Condition	Test Result
VSWR=20:1, at all Phase Angles, $V_{DD} = +8.4V_{dc}$, $I_{DQ} = 50mA$, CW signal 32 dBm @435MHz test on HOTLO Application Board	No Device Degradation

RF Characteristics (CW)

Freq (MHz)	Vdd (V)@Idq (mA)	Pin (W)	Pout (W)	Eff (%)
430	4.0@50	0.1	0.7	70

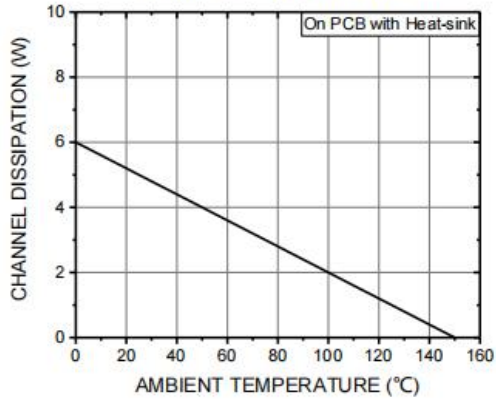
Test conditions unless otherwise noted: 25 °C test on HOTLO Application Board

Freq (MHz)	Vdd (V)@Idq (mA)	Pin (W)	Pout (W)	Eff (%)
530	7.2@50	0.03	1.5	73

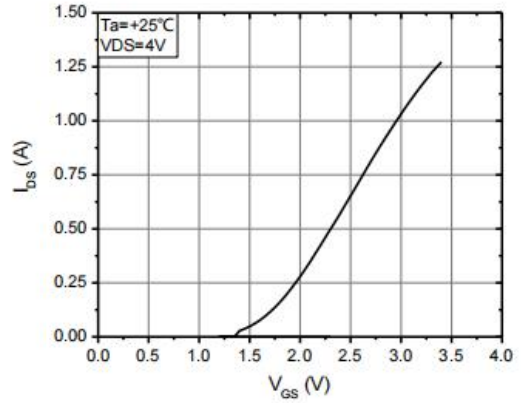
Test conditions unless otherwise noted: 25 °C test on HOTLO Application Board

DC Performance

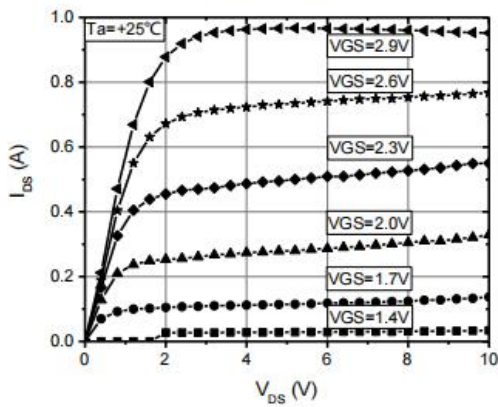
CHANNEL DISSIPATION VS.
AMBIENT TEMPERATURE



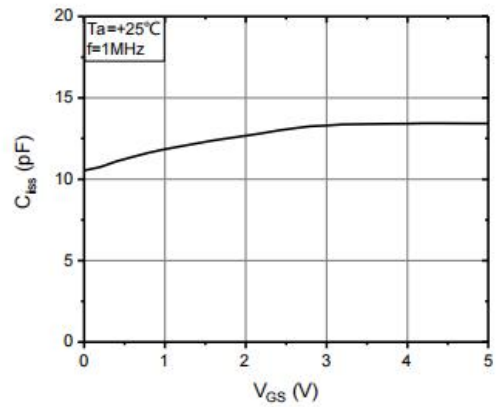
I_{DS} VS. V_{GS}



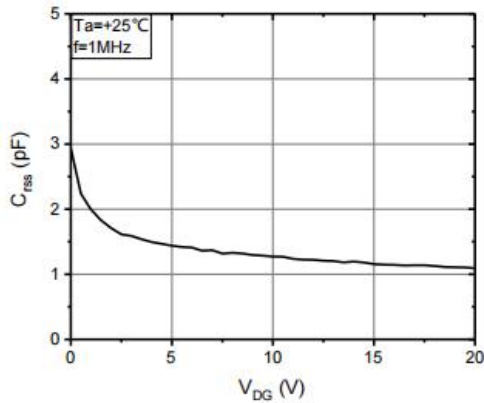
I_{DS} VS. V_{DS}



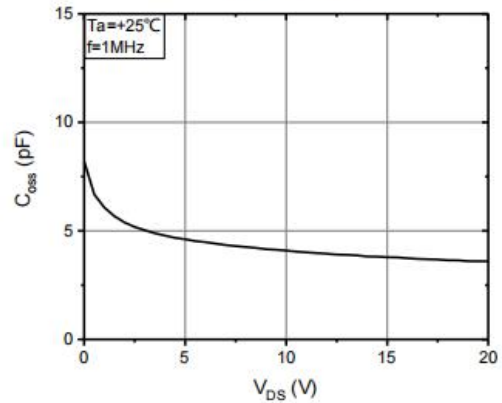
C_{iss} VS. V_{GS}



C_{rss} VS. V_{DG}

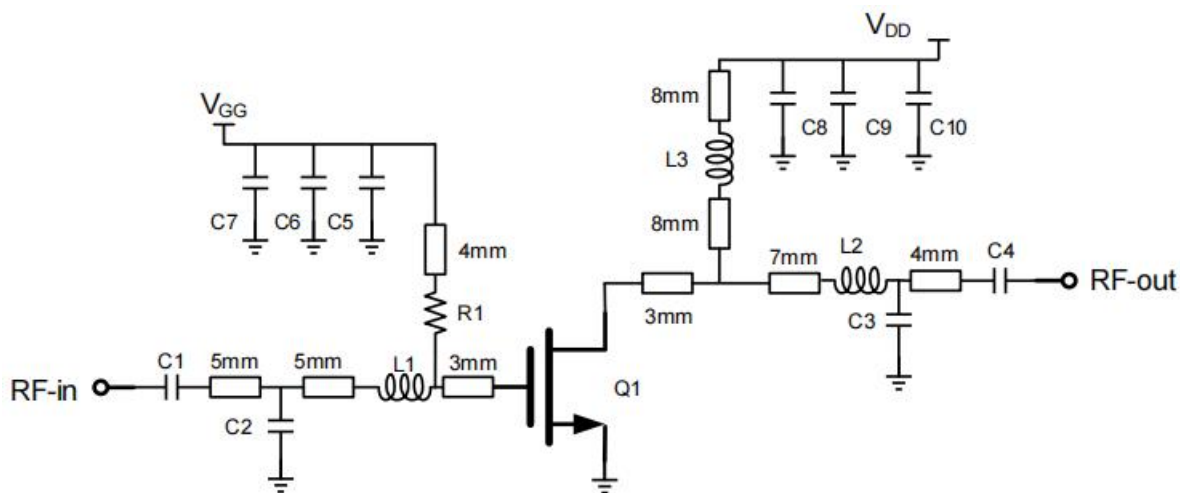


C_{oss} VS. V_{DS}



Test conditions unless otherwise noted: 25 °C

HTU7G06S0P5P 400 - 470 MHz Reference Design, 4.0V@50mA

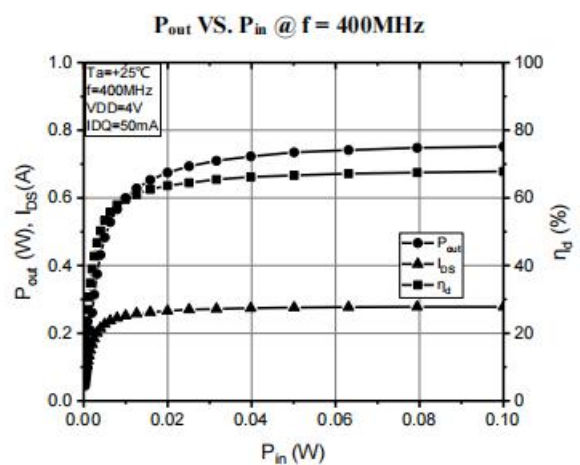
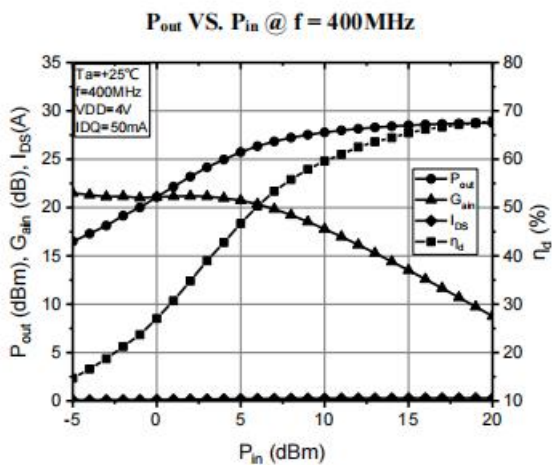
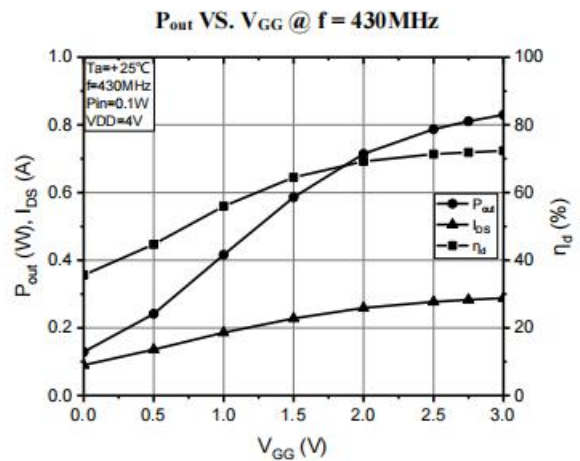
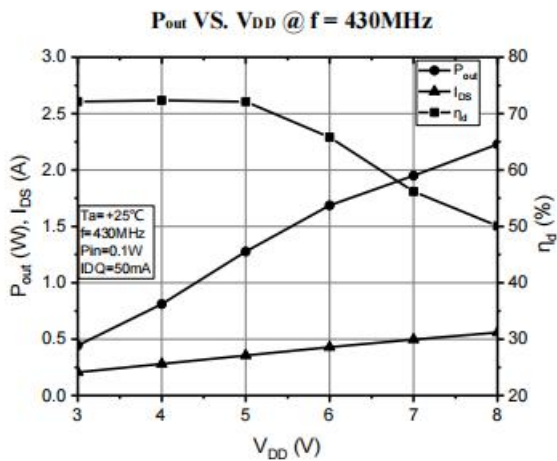
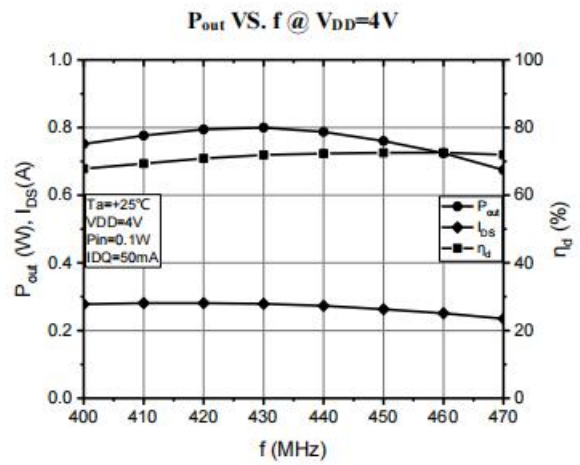
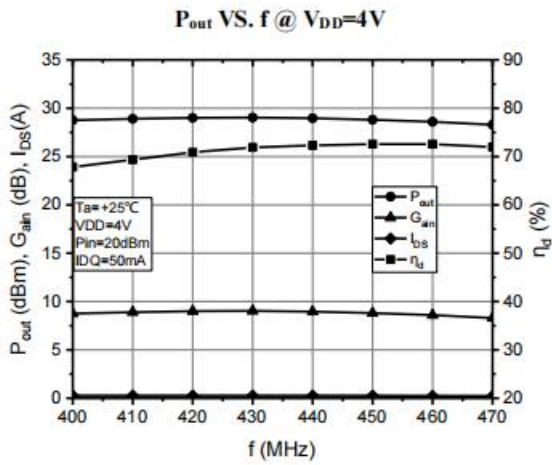


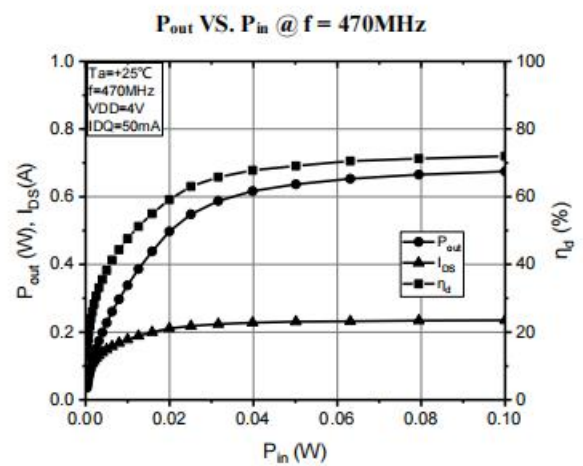
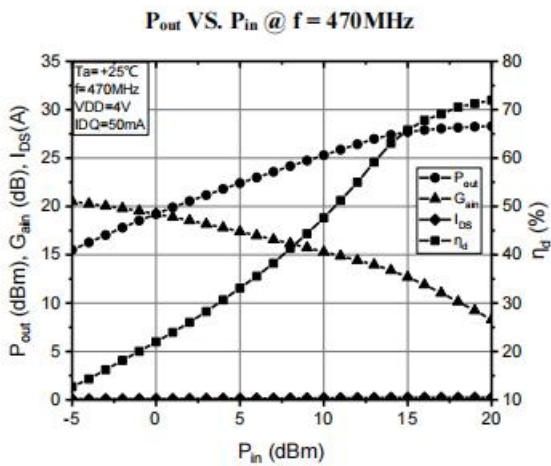
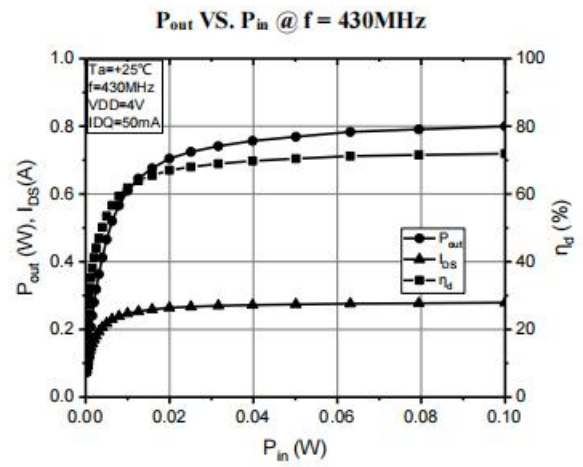
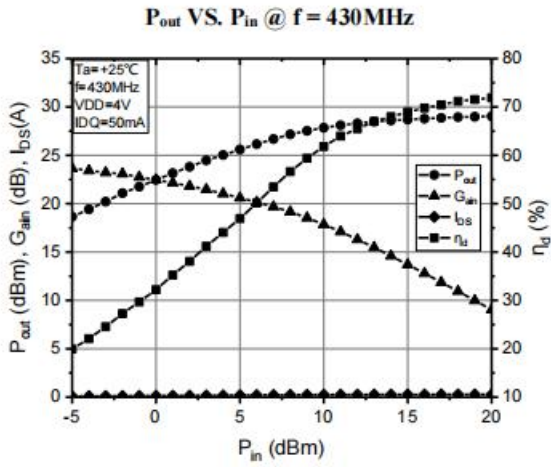
EVB Layout

BoM - HTU7G06S0P5P 400 - 470 MHz Reference Design, 4.0V@50mA

Reference	Value	Description	Manufacturer	P/N
Q1	-	0.5W, 1.8 - 600 MHz LDMOS PA	Holto	HTU7G06S0P5P
C1, C4, C5, C8	220pF	MLCC	Murata	GRM1885C1H221JA01
C2, C3	15pF	MLCC	Murata	GRM1885C1H150JA01
C6, C9	1nF	MLCC	Murata	GRM1885C1H102JA01
C7	4.7uF	MLCC	Murata	GRM32ER61H474KA12L
C10	10uF	MLCC	Murata	GRM32ER61H105KA12L
L1	6.8nH/0603		-	-
L2	D: 0.3 mm, Inside: 1.50 mm, 2 Turns		-	Enameled wire
L3	D: 0.3 mm, Inside: 1.5 mm, 8 Turns		-	Enameled wire
R1	100 Ω	Thick Film Resistor	-	-
PCB	FR-4 (er = 4.3), 30 mil (0.762 mm), 35 μm (1oz)			

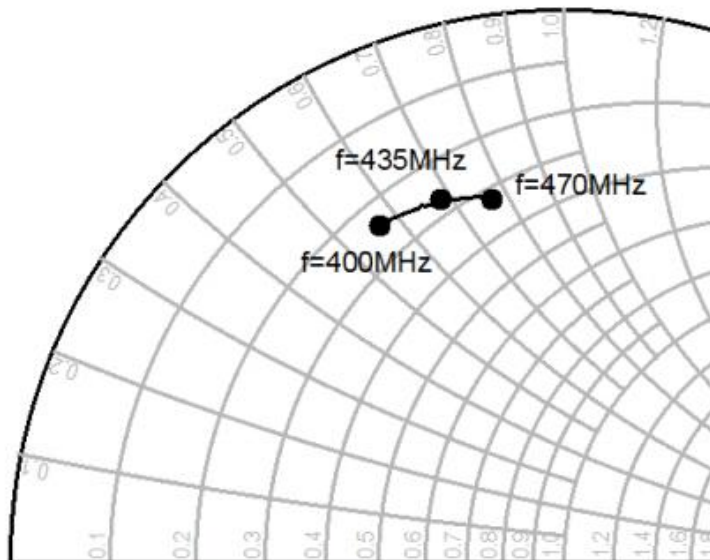
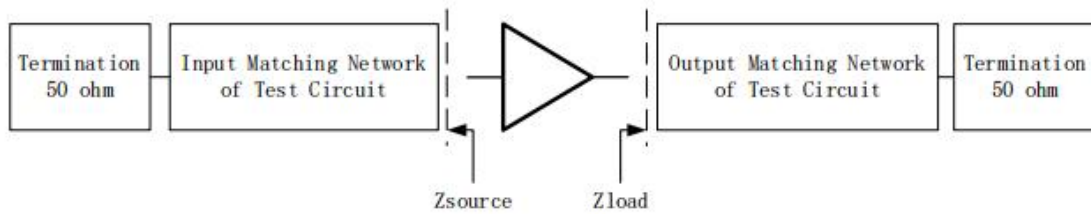
Performance Plots 400 - 470 MHz Reference Design, 4.0V@50mA



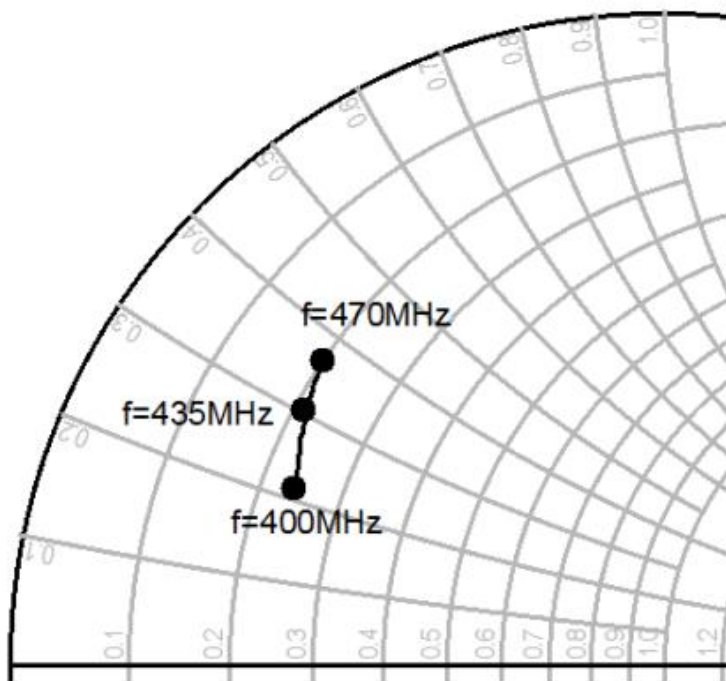


Test conditions unless otherwise noted: 25 °C, VDD = +4Vdc, IDQ=50mA, CW test on HOTLO Application Board

Input/Output Impedance Characteristics @4V, 400-470MHz



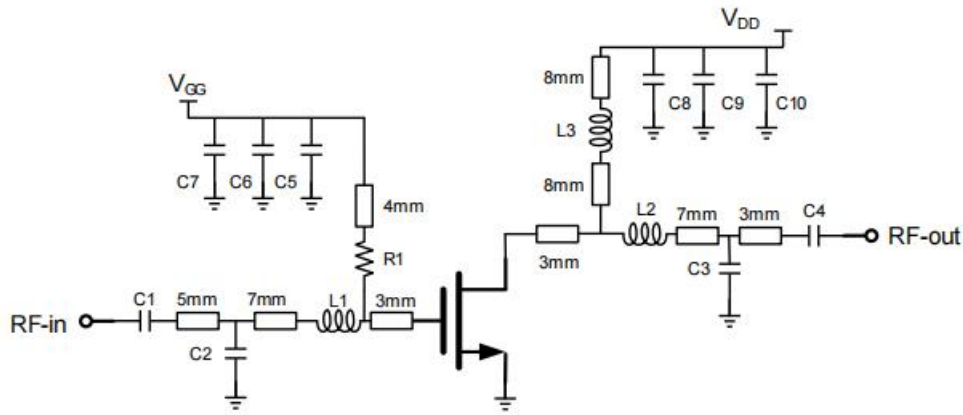
@Pin=0.1W, V _{DD} =4V, I _{DQ} =50mA	
f(MHz)	Z _{source} (ohm)
400	11.88 + j 28.26
435	13.56 + j 33.71
470	15.93 + j 38.83



@Pin=0.1W, V _{DD} =4V, I _{DQ} =50mA	
f(MHz)	Z _{load} (ohm)
400	12.25 + j 10.64
435	11.03 + j 14.55
470	10.14 + j 18.41

Test conditions unless otherwise noted: 25 °C, V_{DD} = +4Vdc, I_{DQ}=50mA, CW test on HOTLO Application Board

HTU7G06S0P5P 500 - 560 MHz Reference Design, 7.2V@50mA

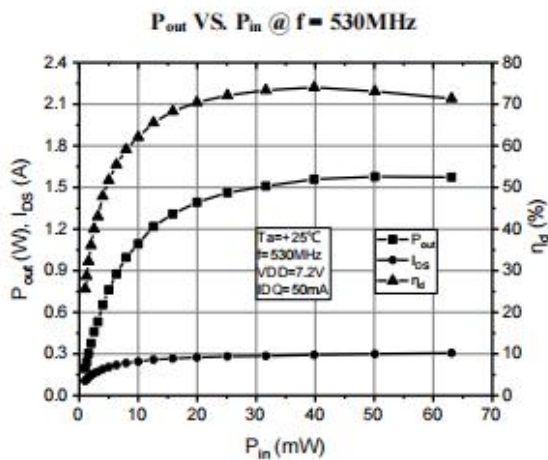
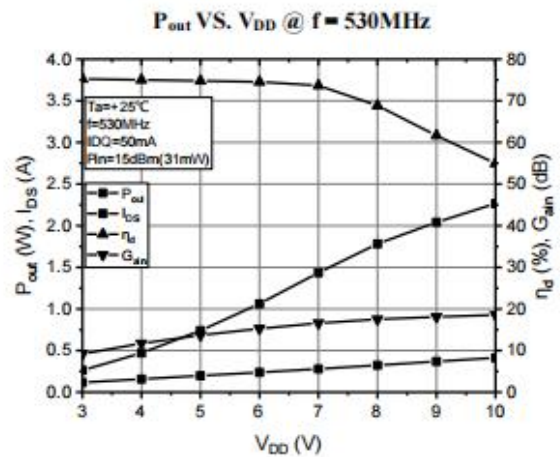
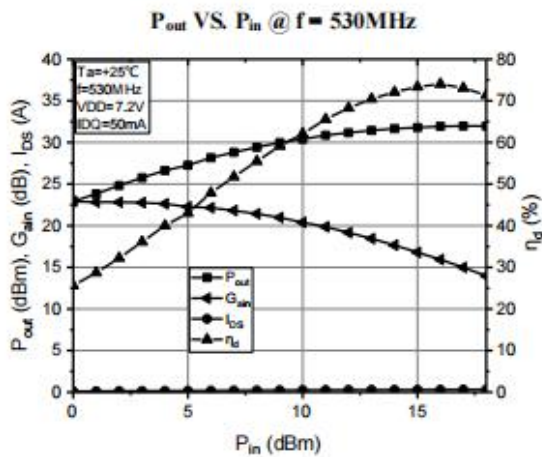
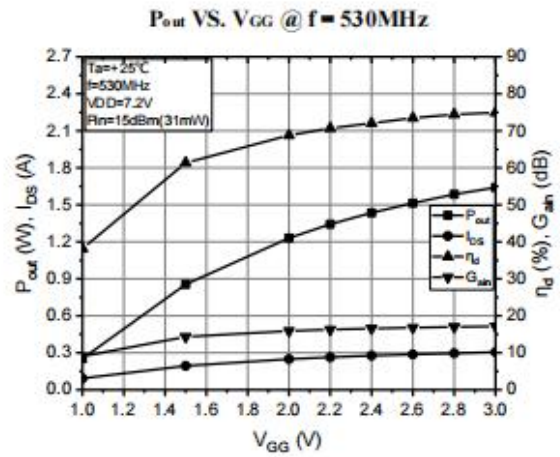
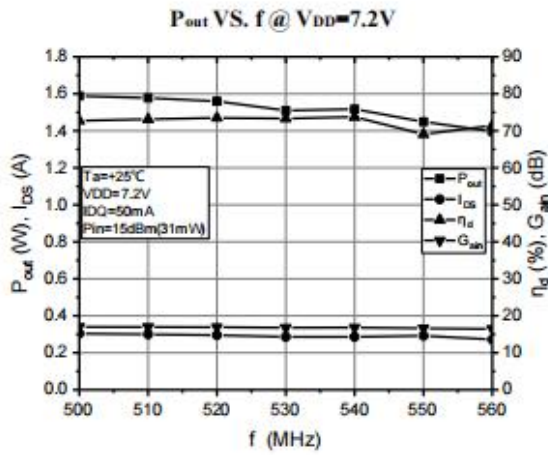


EVB Layout

BoM - HTU7G06S0P5P 500 - 560 MHz Reference Design, 7.2V@50mA

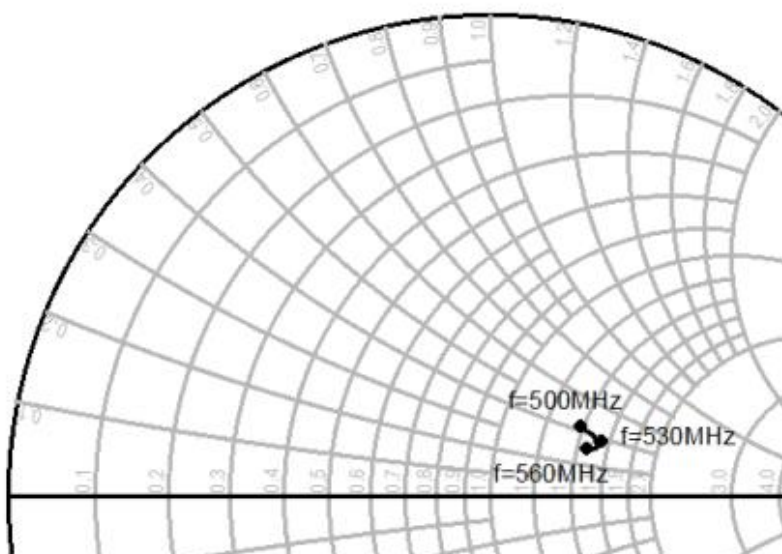
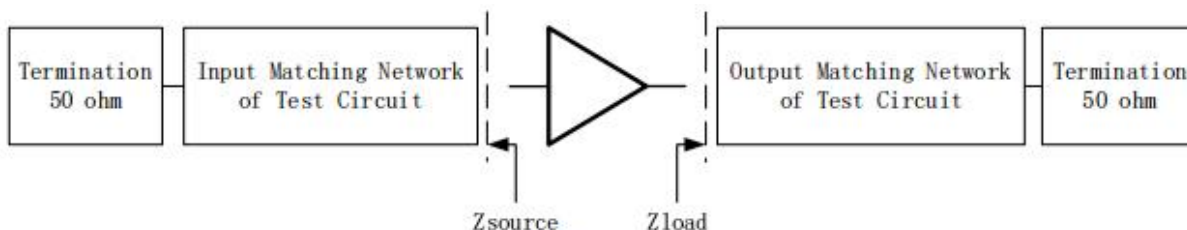
Reference	Value	Description	Manufacturer	P/N
Q1	-	0.5W, 1.8 - 600 MHz LDMOS PA	Holto	HTU7G06S0P5P
C1, C4, C5, C8	100pF	MLCC	Murata	GRM1885C1H101JA01
C2	10pF	MLCC	Murata	GRM1885C1H100JA01
C3	6pF	MLCC	Murata	GRM1885C1H060JA01
C6, C9	1nF	MLCC	Murata	GRM1885C1H102JA01
C7	4.7uF	MLCC	Murata	GRM32ER61H474KA12L
C10	10uF	MLCC	Murata	GRM32ER61H105KA12L
L1	6.8nH/0603		-	-
L2	D: 0.35 mm, Inside: 1.5 mm, 2 Turns		-	Enameled wire
L3	D: 0.3 mm, Inside: 1.5 mm, 8 Turns		-	Enameled wire
R1	100 Ω	Thick Film Resistor	-	-
PCB	FR-4 (er = 4.3), 30 mil (0.762 mm), 35 μm (1oz)			

Performance Plots 500 - 560 MHz Reference Design, 7.2V@50mA



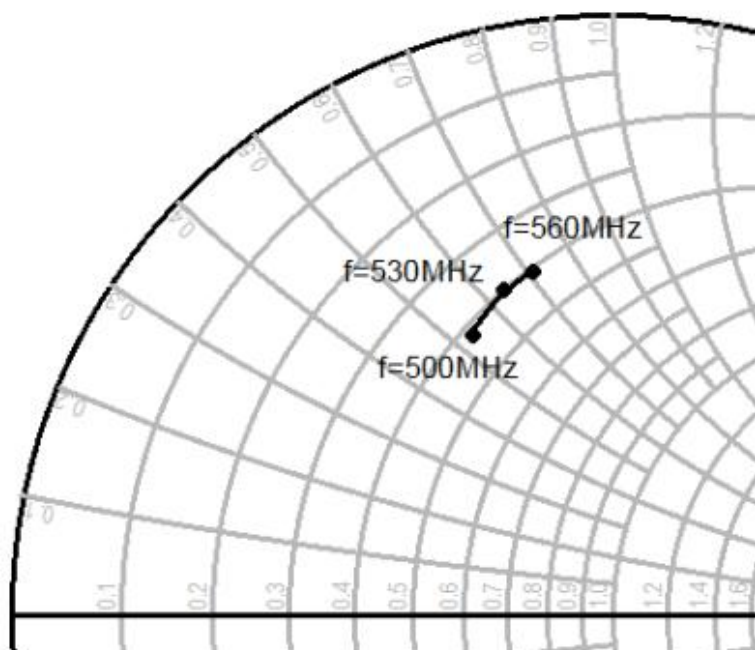
Test conditions unless otherwise noted: 25 °C, VDD = +7.2Vdc, IDQ=50mA, CW test on HOTLO Application Board

Input/Output Impedance Characteristics @7.2V, 500 - 560MHz



@ $P_{in}=31\text{ mW}, V_{DD}=7.2\text{ V}, I_{DQ}=50\text{ mA}$

f(MHz)	Zsource (ohm)
500	70.45 + j 20.79
530	76.29 + j 16.66
560	74.05 + j 16.43

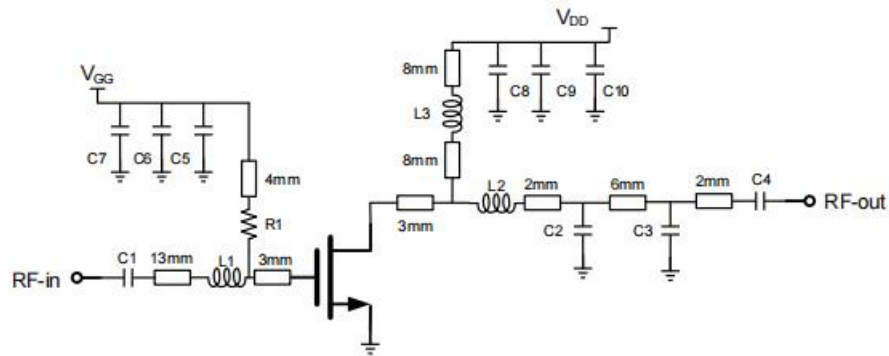


@ $P_{in}=31\text{ mW}, V_{DD}=7.2\text{ V}, I_{DQ}=50\text{ mA}$

f(MHz)	Zload (ohm)
500	20.66 + j 27.01
530	20.16 + j 31.00
560	20.08 + j 35.28

Test conditions unless otherwise noted: 25 °C, VDD = +7.2Vdc, IDQ=50mA, CW test on HOTLO Application Board

HTU7G06S0P5P 135 - 175 MHz Reference Design, 7.2V@50mA

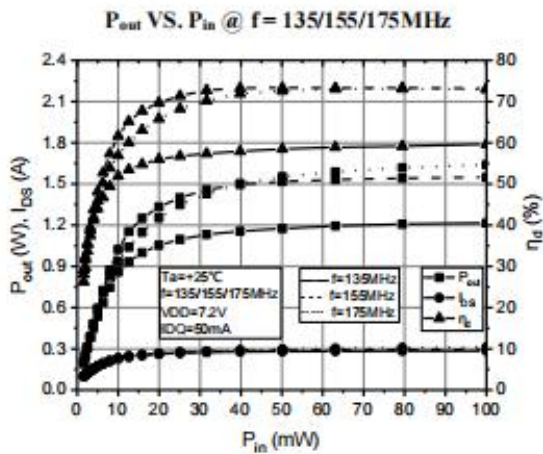
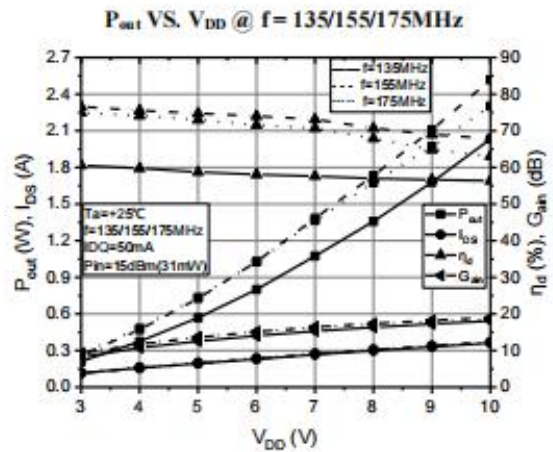
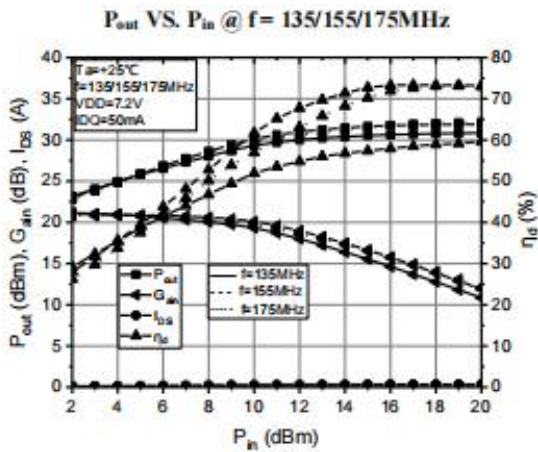
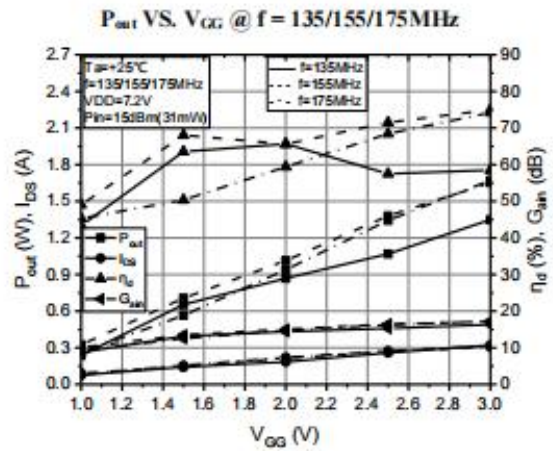
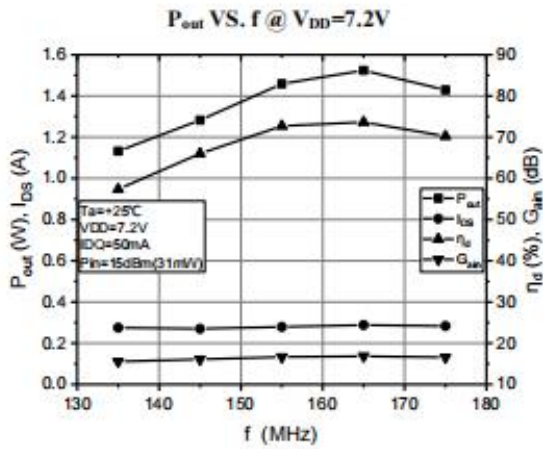


EVB Layout

BoM - HTU7G06S0P5P 135 - 175 MHz Reference Design, 7.2V@50mA

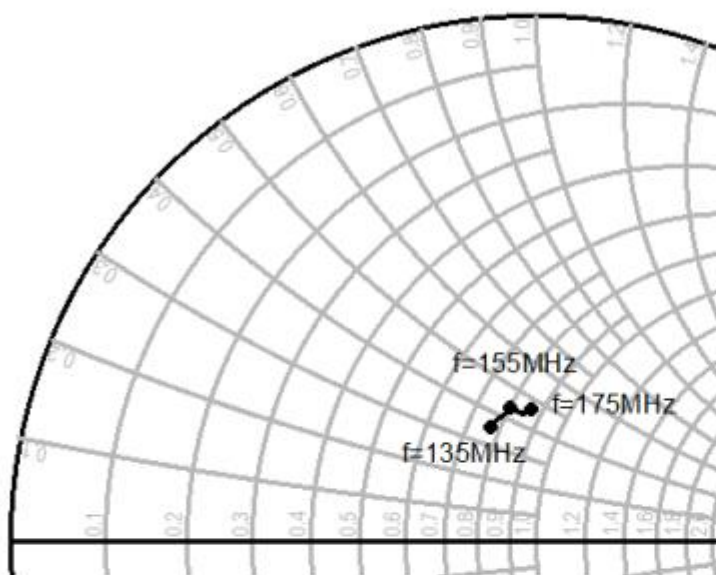
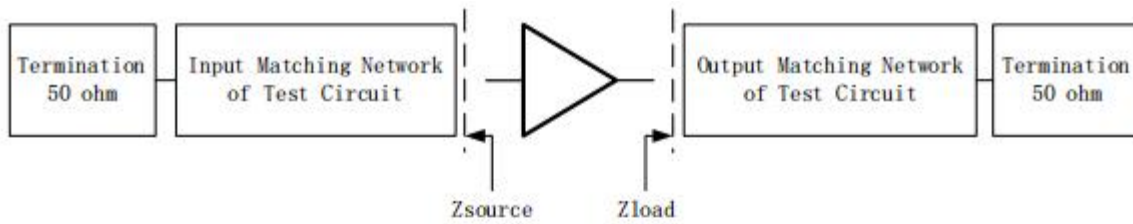
Reference	Value	Description	Manufacturer	P/N
Q1	-	0.5W, 1.8 - 600 MHz LDMOS PA	Holto	HTU7G06S0P5P
C1, C4, C5, C8	470pF	MLCC	Murata	GRM1885C1H471JA01
C2	10pF	MLCC	Murata	GRM1885C1H100JA01
C3	15pF	MLCC	Murata	GRM1885C1H150JA01
C6, C9	1nF	MLCC	Murata	GRM1885C1H102JA01
C7	4.7uF	MLCC	Murata	GRM32ER61H474KA12L
C10	10uF	MLCC	Murata	GRM32ER61H105KA12L
L1	47nH/0603		-	-
L2	D: 0.35 mm, Inside: 1.5 mm, 3 Turns		-	Enameled wire
L3	D: 0.3 mm, Inside: 1.5 mm, 8 Turns		-	Enameled wire
R1	100 Ω	Thick Film Resistor	-	-
PCB	FR-4 (er = 4.3), 30 mil (0.762 mm), 35 μm (1oz)			

Performance Plots 135 - 175 MHz Reference Design, 7.2V@50mA

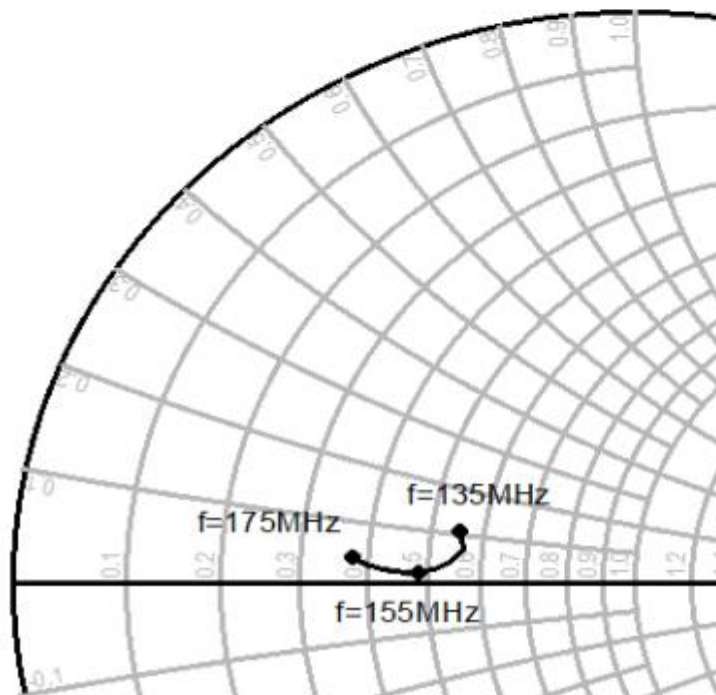


Test conditions unless otherwise noted: 25 °C, V_{DD} = +7.2Vdc, I_{DQ}=50mA, CW test on HOTLO Application Board

Input/Output Impedance Characteristics @7.2V, 135 - 175 MHz



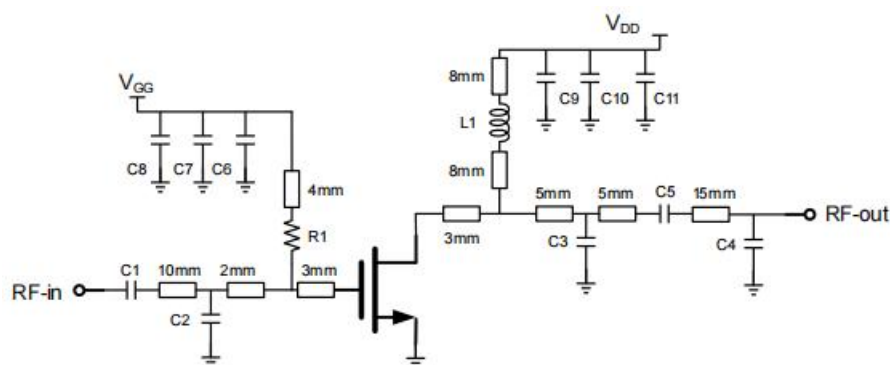
@ $P_{in}=31\text{ mW}, V_{DD}=7.2\text{ V}, I_{DQ}=50\text{ mA}$	
f(MHz)	Zsource (ohm)
135	38.34 + j 17.95
155	40.96 + j 21.88
175	42.73 + j 22.86



@ $P_{in}=31\text{ mW}, V_{DD}=7.2\text{ V}, I_{DQ}=50\text{ mA}$	
f(MHz)	Zload (ohm)
135	27.70 + j 5.53
155	24.01 + j 1.02
175	18.70 + j 2.03

Test conditions unless otherwise noted: 25 °C, VDD = +7.2Vdc, IDQ=50mA, CW test on HOTLO Application Board

HTU7G06S0P5P 880 - 950 MHz Reference Design, 7.2V@50mA

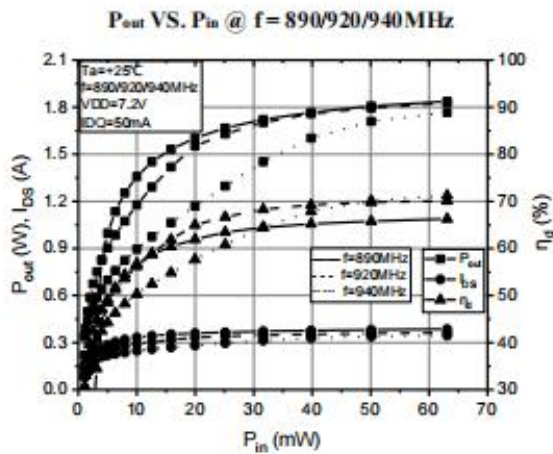
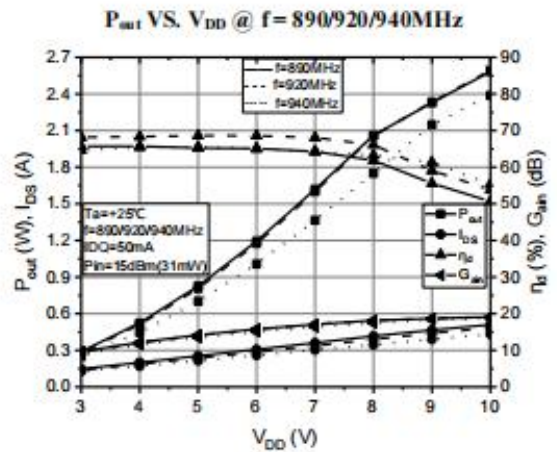
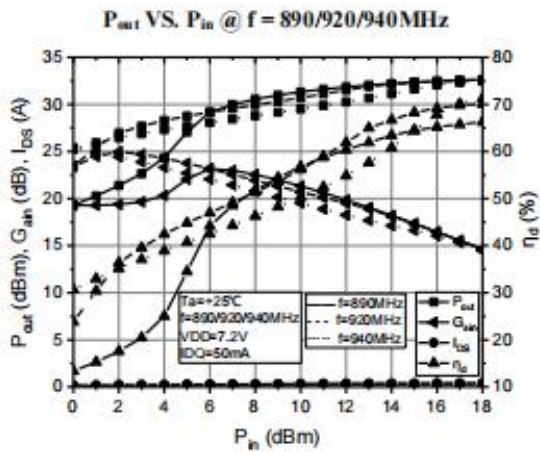
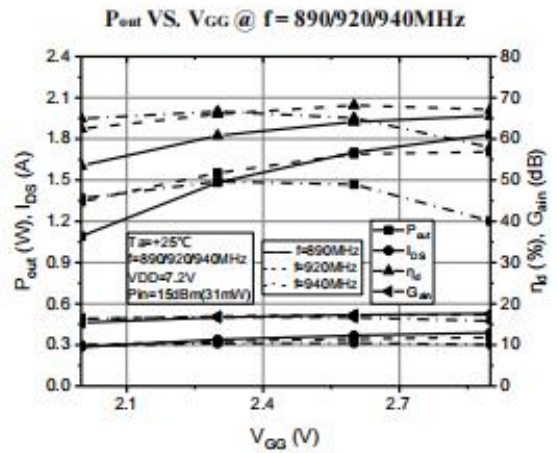
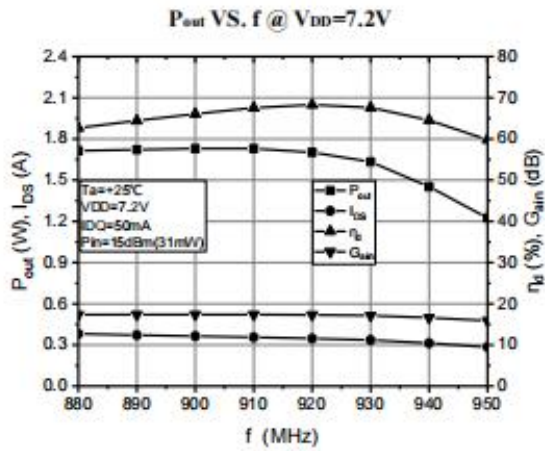


EVB Layout

BoM - HTU7G06S0P5P 880 - 950 MHz Reference Design, 7.2V@50mA

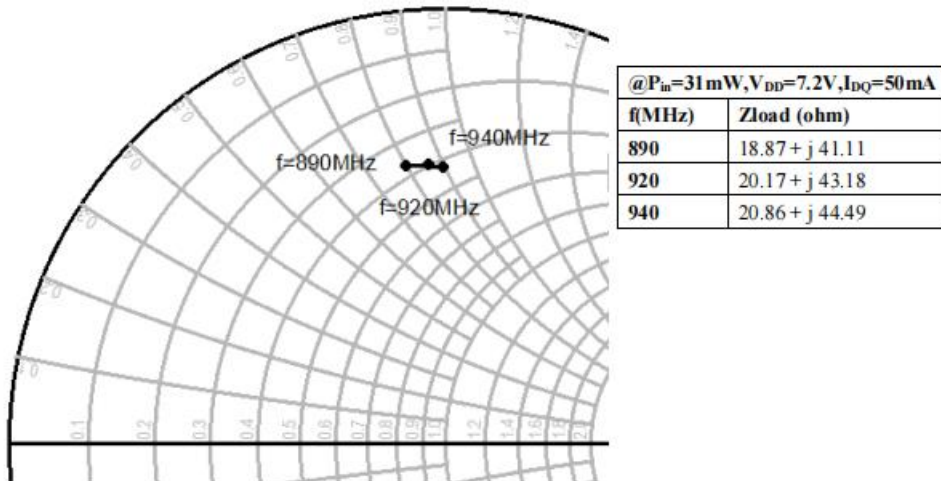
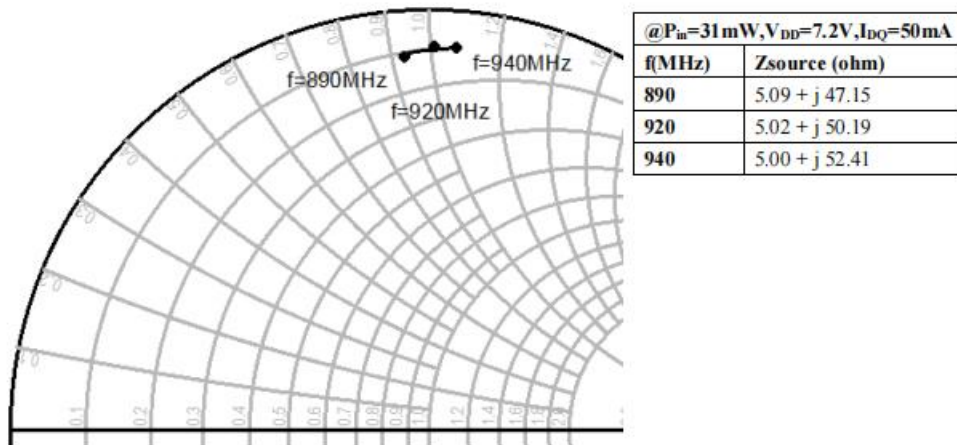
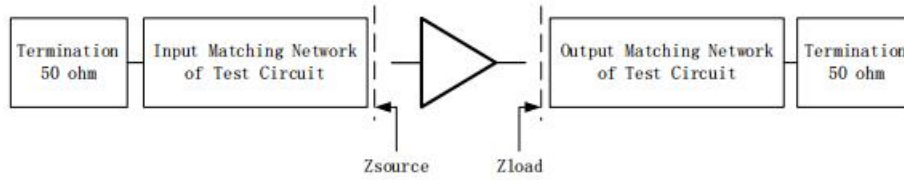
Reference	Value	Description	Manufacturer	P/N
Q1	-	0.5W, 1.8 - 600 MHz LDMOS PA	Holto	HTU7G06S0P5P
C1, C5	47pF	MLCC	Murata	GRM1885C1H470JA01
C2	15pF	MLCC	Murata	GRM1885C1H150JA01
C3	6pF	MLCC	Murata	GRM1885C1H060JA01
C4	2pF	MLCC	Murata	GRM1885C1H020JA01
C6, C9	100pF	MLCC	Murata	GRM1885C1H101JA01
C7, C10	1nF	MLCC	Murata	GRM1885C1H102JA01
C10	4.7uF	MLCC	Murata	GRM32ER61H474KA12L
C11	10uF	MLCC	Murata	GRM32ER61H105KA12L
L1	D: 0.35 mm, Inside: 1.5 mm, 2 Turns		-	Enameled wire
R1	51 Ω	Thick Film Resistor	-	-
PCB	FR-4 (er = 4.3), 30 mil (0.762 mm), 35 μm (1oz)			

Performance Plots 880 - 950 MHz Reference Design, 7.2V@50mA



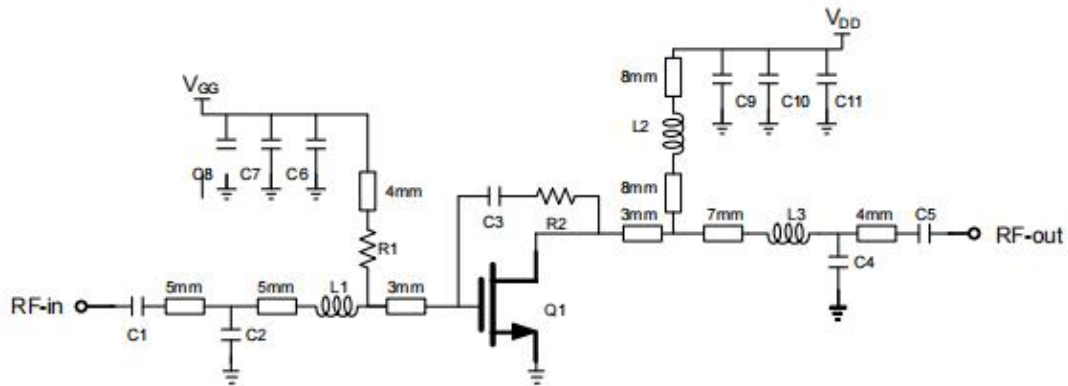
Test conditions unless otherwise noted: 25 °C, VDD = +7.2Vdc, IDQ=50mA, CW test on HOTLO Application Board

Input/Output Impedance Characteristics @7.2V, 880 - 950 MHz



Test conditions unless otherwise noted: 25 °C, V_{DD} = +7.2Vdc, I_{DQ}=50mA, CW test on HOTLO Application Board

HTU7G06S0P5P 400 - 470 MHz Reference Design, 4V@50mA (Feedback)



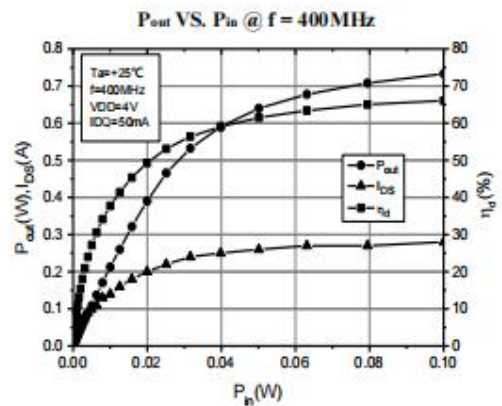
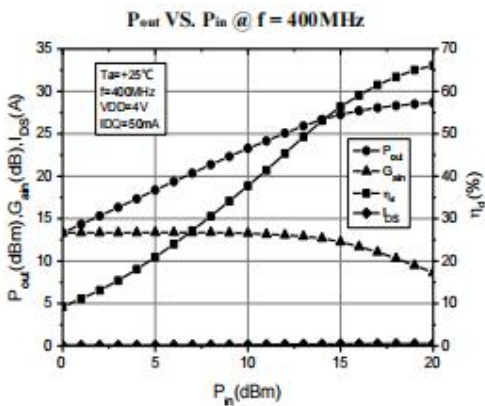
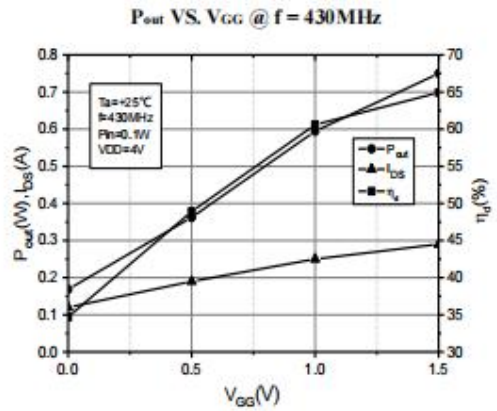
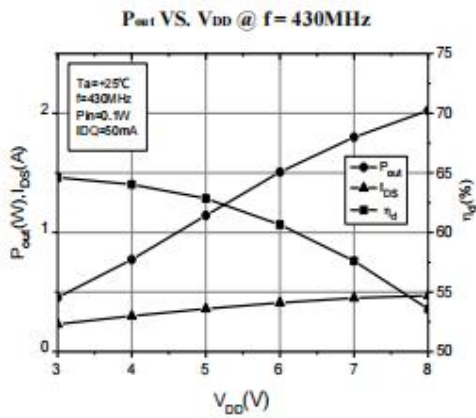
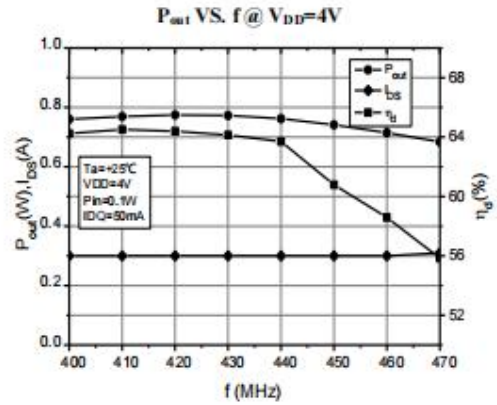
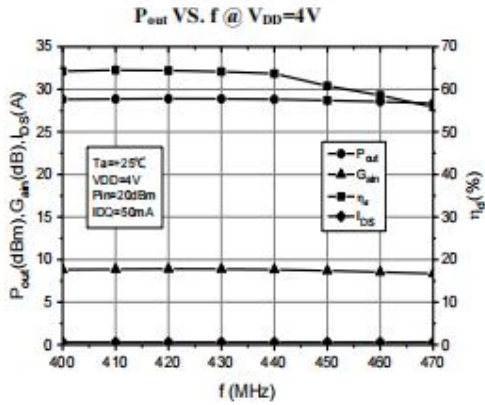
EVB Layout

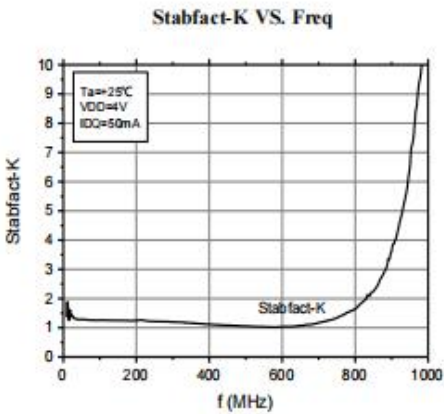
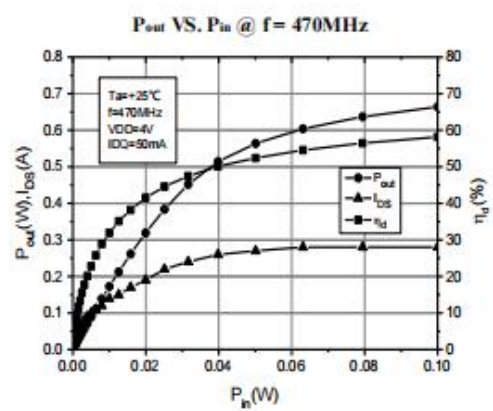
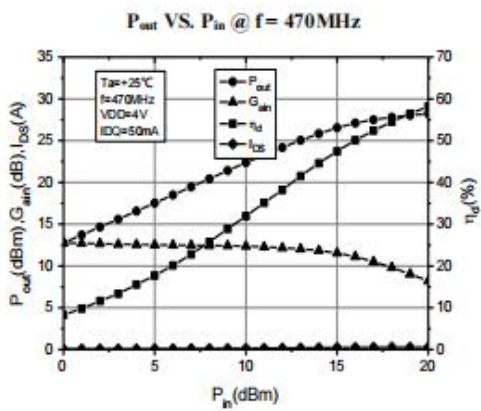
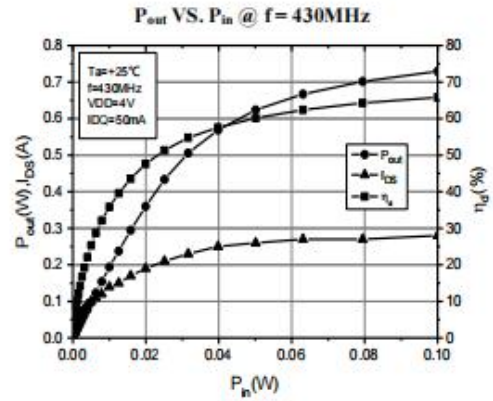
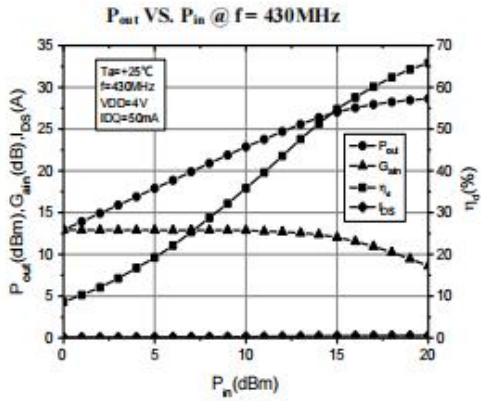
BoM - HTU7G06S0P5P 400 - 470 MHz Reference Design, 4V@50mA (Feedback)

Reference	Value	Description	Manufacturer	P/N
Q1	-	0.5W, 1.8 - 600 MHz LDMOS PA	Holto	HTU7G06S0P5P
C1, C5, C6, C9	220pF	MLCC	Murata	GRM1885C1H221JA01
C2, C4	15pF	MLCC	Murata	GRM1885C1H150JA01
C3, C7, C10	1nF	MLCC	Murata	GRM1885C1H102JA01
C8	4.7uF	MLCC	Murata	GRM32ER61H474KA12L
C11	10uF	MLCC	Murata	GRM32ER61H105KA12L
L1	6.8nH/0603		-	-
L2	D: 0.3 mm, Inside: 1.5 mm, 2 Turns		-	Enameled wire
L3	D: 0.3 mm, Inside: 1.5 mm, 8 Turns		-	Enameled wire
R1	150 Ω	Thick Film Resistor	-	-
PCB	FR-4 (er = 4.3), 30 mil (0.762 mm), 35 μm (1oz)			

Performance Plots 400 - 470 MHz Reference Design, 4V@50mA (Feedback)

The Test Circuit is Absolutely Stable in the UHF-band with Feedback





Test conditions unless otherwise noted: 25 °C, VDD = +7.2Vdc, IDQ=50mA, CW test on HOTLO Application Board

HTU7G06S0P5P S-Parameters , 4.0V@50mA

Freq (MHz)	S11		S21		S12		S22	
	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)	(mag)	(ang)
300	0.954	-165.3	9.687	-74.5	0.088	-164.6	0.515	-96.1
350	0.890	-176.8	8.132	-113.8	0.086	157.0	0.531	-167.5
400	0.846	173.7	6.981	-151.1	0.083	120.5	0.539	126.5
430	0.829	168.6	6.440	-172.8	0.082	99.2	0.545	88.2
470	0.810	162.5	5.840	158.7	0.082	71.2	0.552	38.1
500	0.803	158.1	5.465	137.4	0.081	50.2	0.557	0.3
550	0.793	151.0	4.922	102.3	0.080	15.8	0.561	-61.5
600	0.783	144.0	4.473	67.4	0.079	-18.9	0.564	-122.8
650	0.773	137.5	4.069	32.9	0.077	-52.6	0.569	177.1
700	0.764	131.4	3.726	-1.1	0.076	-86.3	0.574	117.4
750	0.759	125.7	3.448	-34.7	0.075	-119.1	0.580	59.1
800	0.757	120.1	3.217	-68.3	0.074	-152.0	0.584	1.0
850	0.758	114.5	3.017	-102.0	0.074	174.3	0.584	-57.4
900	0.754	109.0	2.830	-135.6	0.072	141.3	0.577	-116.9
950	0.753	103.6	2.657	-169.2	0.071	108.2	0.575	-176.5
1000	0.749	98.2	2.493	157.4	0.070	75.6	0.575	124.3
1050	0.743	93.2	2.342	124.4	0.068	43.2	0.579	66.8
1100	0.740	88.5	2.217	91.8	0.068	11.0	0.581	10.2
1150	0.743	84.0	2.123	59.3	0.068	-21.2	0.581	-47.1
1200	0.747	79.2	2.040	26.3	0.067	-54.0	0.578	-105.2
1250	0.751	74.2	1.963	-6.7	0.066	-86.7	0.577	-163.5
1300	0.753	69.2	1.889	-39.8	0.066	-119.2	0.579	137.7
1350	0.754	64.2	1.816	-72.8	0.065	-151.8	0.580	79.7
1400	0.754	59.3	1.745	-105.7	0.064	175.5	0.580	21.6
1450	0.756	54.6	1.697	-138.1	0.064	144.2	0.578	-34.9
1500	0.756	49.6	1.655	-171.2	0.064	111.4	0.571	-92.9

S-Parameters

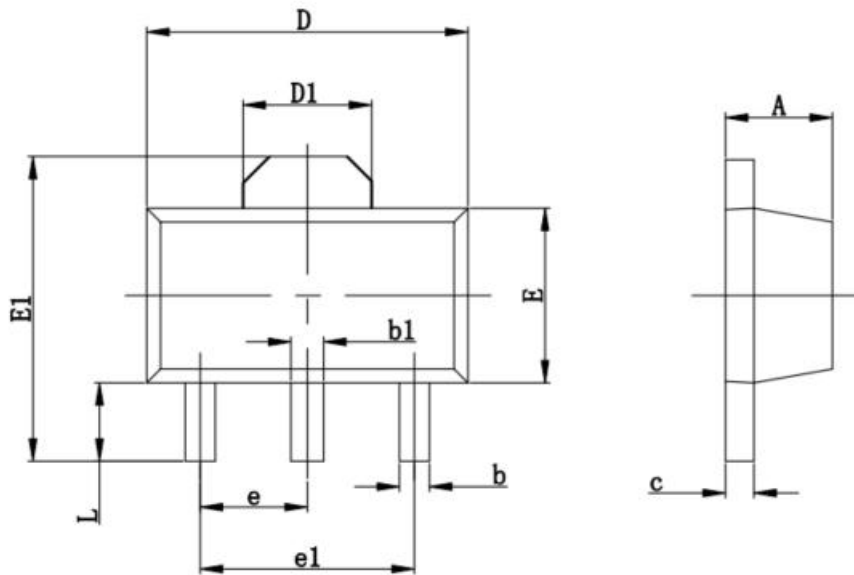
Package Marking and Dimensions



- Line1 (fixed): fixed code H0605A
- Line2 (unfixed): Date Code + SS(sub lot Number)

This Marking SPEC only stipulates the content of Marking. For marking requirements such as font and size, please refer to the latest version of “Holto Product Printing Specification”

Marking

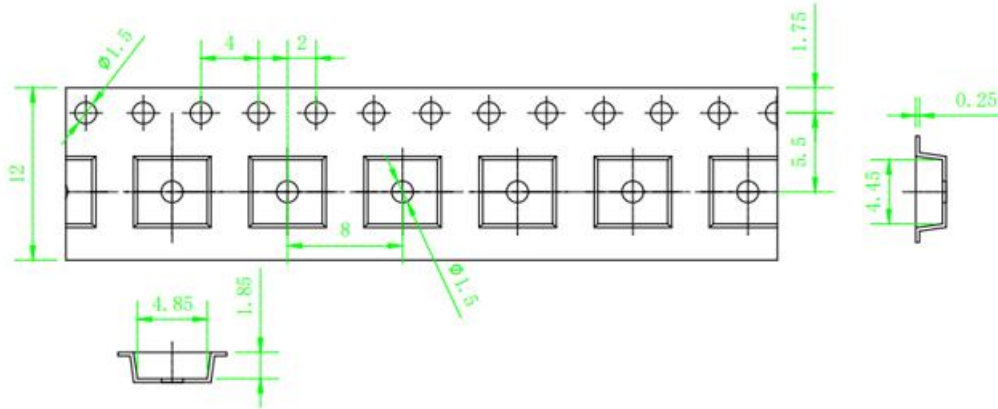


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.350	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.350	2.550	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.100	0.035	0.047

Package Dimensions

Tape and Reel Information

Package Type	Reel Size(inch)	Qty/Reel(pcs)	Qty/Box(pcs)	Qty/Carton(pcs)
SOT89	7inch	1000	10000	40000



Tape & Reel Packaging Descriptions

Handling Precautions

Parameter	Rating	Standard	
ESD – Human Body Model (HBM)	Class 1B	JESD22-A114	
ESD – Human Body Model (MM)	Class A	EIA/JESD22-A115	
ESD – Charged Device Model (CDM)	Class III	JESD22-C101	

RoHS Compliance

This product is compliant with the 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment), as amended by Directive 2015/863/EU.

Datasheet Status

Document status	Product status	Definition
Objective Datasheet	Design simulation	Product objective specification
Preliminary Datasheet	Customer sample	Engineering samples and first test results
Product Datasheet	Mass production	Final product specification

Abbreviations

Acronym	Definition
LDMOS	Laterally-Diffused Metal-Oxide Semiconductor
CW	Continuous Waveform

Revision history

Document ID	Datasheet Status	Release Date	Revision Version
Rev 2.7	Product	March 2023	New format based on English version datasheet
Rev 2.8	Product	March 2024	Version released after re review

Contact Information

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