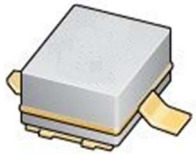
Gallium Nitride 28V 15W, RF Power Transistor

GTAH35015M2



Description

The GTAH35015M2 is a 15W GaN HEMT, designed for multiple applications, especially sub-6GHz MC-GSM/WCDMA/LTE/LTE-A from up to 6000MHz.

There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

•Typical performance (on 4.4-5GHz and 3.4-3.8GHzfixture with device soldered)

V_{DD}=28V I_{DQ}=120mA, Pulse CW, Pulse width=12uS, Duty cycle=10%.

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
4400	42.68	18.5	58.5	10.55	43.85	24.3	64.1
4500	42.79	19.0	59.6	10.83	43.91	24.6	65.2
4600	42.7	18.6	59.5	10.94	43.84	24.2	64.6
4700	42.75	18.9	64.0	11.26	43.97	24.9	69.0
4800	42.25	16.8	65.6	11.25	43.56	22.7	70.3
4900	41.15	13.0	64.0	11.4	42.78	19.0	69.1
5000	40.04	10.1	57.7	10.93	41.93	15.6	65.3

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
3400	41.56	14.3	58.9	13.19	42.68	18.5	63.0
3500	41.52	14.2	62.5	13.57	42.61	18.3	65.2
3600	41.36	13.7	62.8	13.76	42.44	17.5	64.8
3700	41.07	12.8	63.4	13.84	42.26	16.8	64.9
3800	40.59	11.5	62.9	13.58	41.92	15.6	65.2

Other available application: 0.8-3.5GHz

Applications and Features

- Suitable for wireless communication infrastructure, wideband amplifier, EMC testing, ISM etc.
- High Efficiency and Linear Gain Operations
- Thermally Enhanced Industry Standard Package
- High Reliability Metallization Process
- Excellent thermal Stability and Excellent Ruggedness
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage (28V)
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

Turning the device OFF

1. Turn RF power off
2. Reduce VGS down to VP, typically –5 V
3. Reduce VDS down to 0 V
4. Turn off VGS

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	150	Vdc
Gate--Source Voltage	V_{GS}	-10,+2	Vdc
Operating Voltage	V_{DD}	32	Vdc
Maximum Forward Gate Current @ TC = 25°C	Igmax	4	mA
Storage Temperature Range	Tstg	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature(See note 1)	T_J	+225	°C
Total Device Power Dissipation (Derated above 25°C, see note 2)	Pdiss	32	W

Note: 1. Continuous operation at maximum junction temperature will affect MTTF
2.Bias Conditions should also satisfy the following expression: Pdiss < (Tj – Tc) / RJC and Tc = Tcase

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case T_C= 85°C, T_J=200°C, RF CW operation, **FEA mode**	$R_{\theta JC}$	5.7	C/W

Table 3. Electrical Characteristics (T_C = 25℃ unless otherwise noted)

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=-8V; I_{DS}=4mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D = 4mA	V_{GS}(th)		-2.7		V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=100mA, Measured in Functional Test	$V_{GS(Q)}$		-2.27		V

Functional Tests (In 3.4-3.8GHz Production fixture, 50 ohm system) : V_{DD} = 28 Vdc, I_{DQ} = 100 mA, f = 3.6GHz, WCDMA, Pulse CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain @Psat	Gp		17		dB
Drain Efficiency @ P_{sat}	Eff		65		%
Saturated Power by CCDF test	P_{SAT}	16			W
Input Return Loss	IRL		-7		dB
Mismatch stress at all phases (Device no damage)	VSWR		10:1		Ψ

TYPICAL CHARACTERISTICS
3.4-3.8GHz

Figure 1. Power gain and drain efficiency as function of average load power

Vdd=28V,Idq=100mA, Pulsed condition: 12us, 10%

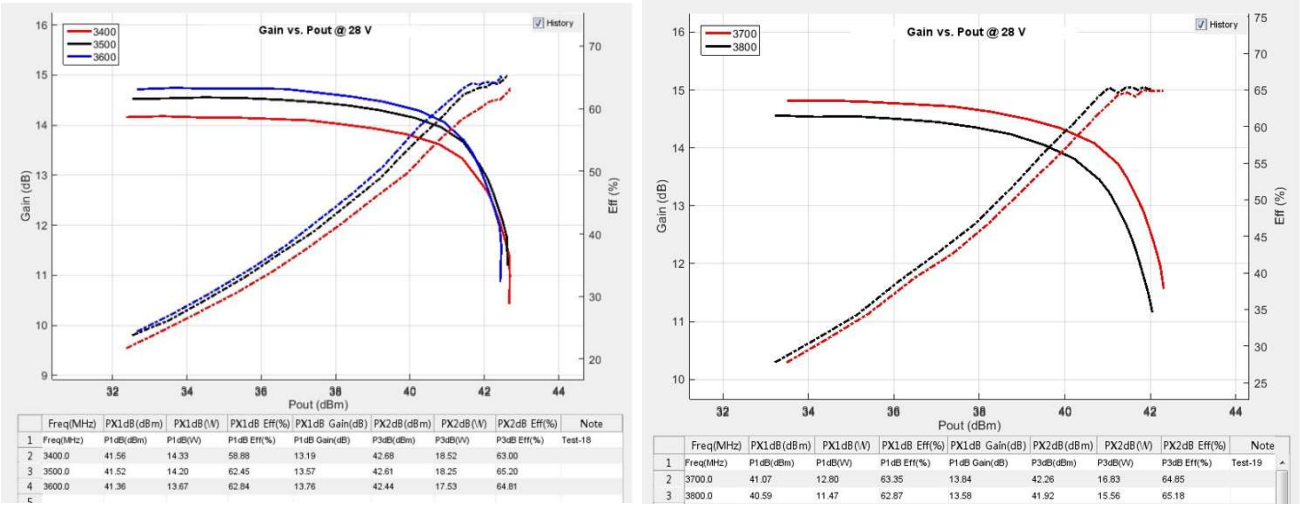


Figure 2. Network analyzer plots (S11/S21)

Vdd=28V,Idq=100mA

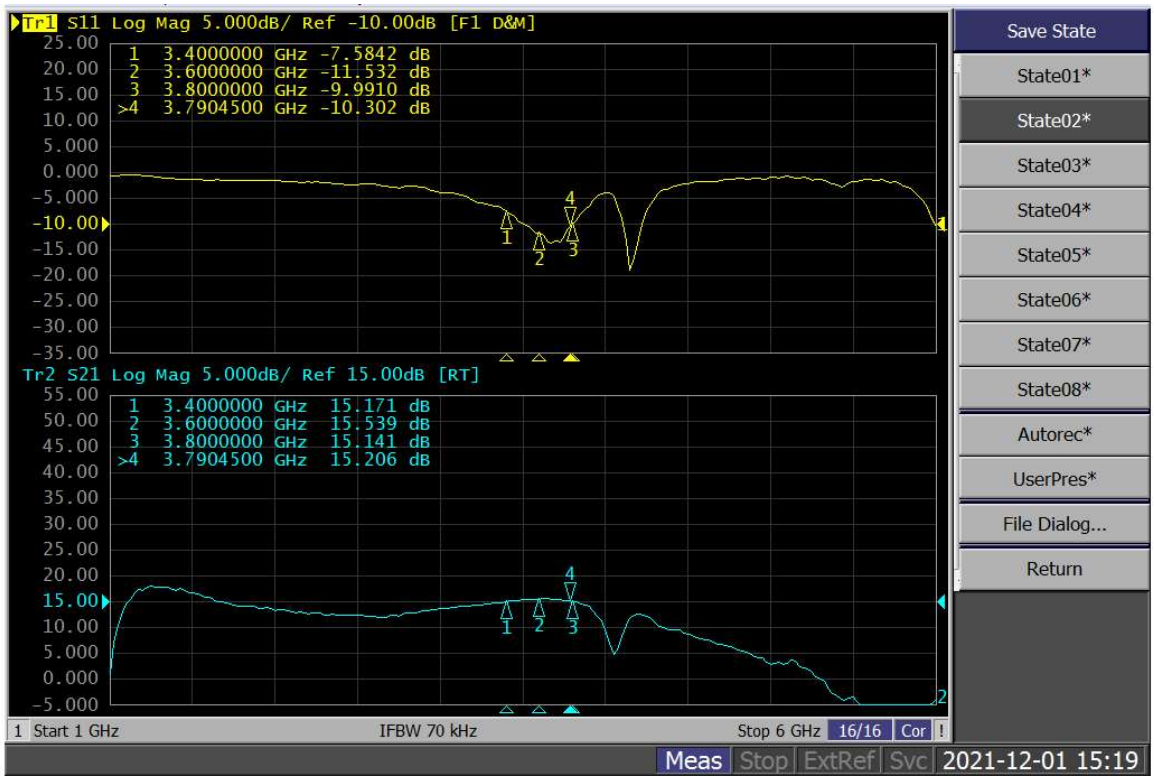
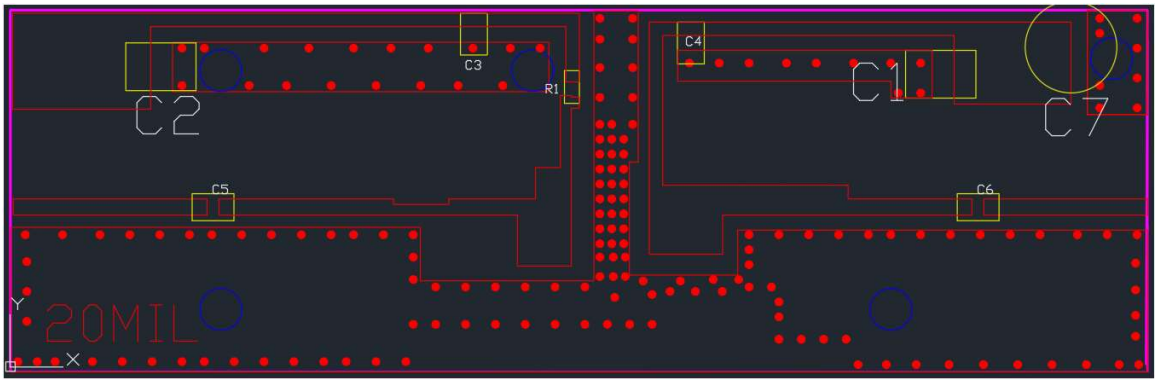


Table 3. 1 Carrier WCDMA RF performance (Input CCDF: 10dB)

Freq (MHz)	Pout (dBm)	CCDF (dB)	Ppeak (dBm)	Ppeak (W)	ACPR (dBc)	Gain (dB)	Efficiency (%)
3400	32.02	9.40	41.42	13.9	-45.7	14.1	21.9
3500	32.01	9.43	41.43	13.9	-45.2	14.5	22.8
3600	32.00	9.39	41.39	13.8	-45.0	14.7	23.3
3700	32.03	9.37	41.39	13.8	-44.4	14.8	24.0
3800	32.01	9.14	41.15	13.0	-43.1	14.5	24.7

Figure 4. test fixture ,BOM and layout (Layout file upon request,)

PCB: 20 Mil Rogers 4350B



Designator	Value	Quantity	Package
C1 C2	10 uF	2	1210
C3 C4 C5 C6	8.2pF	4	0805
C7	470uF	1	
R1	10ohm	1	0805

4.4-5GHz

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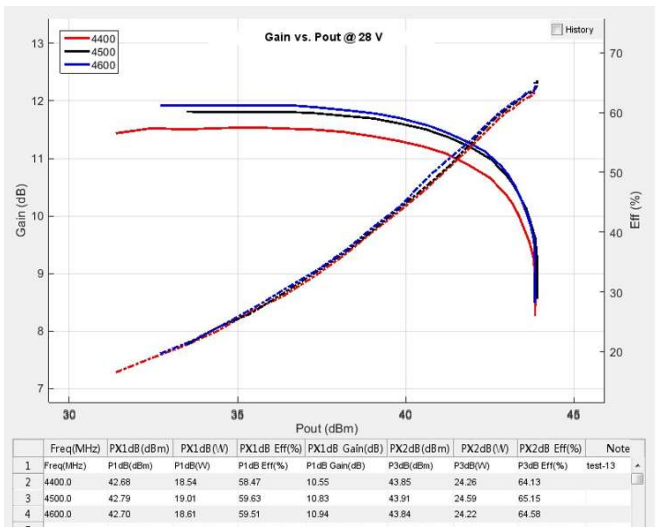

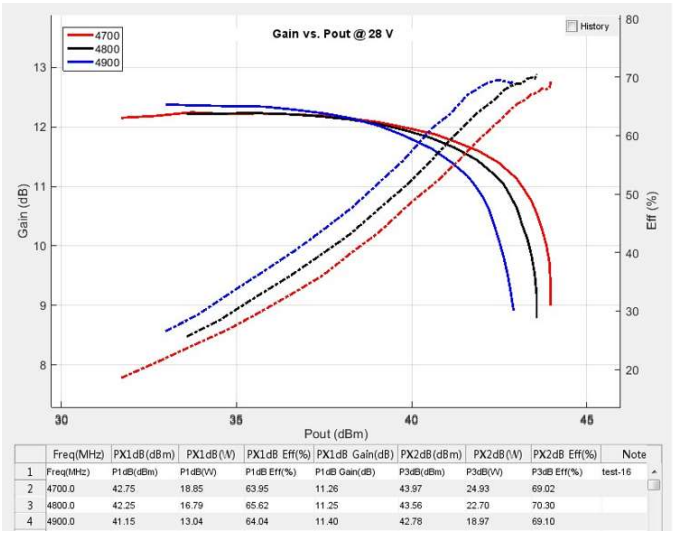

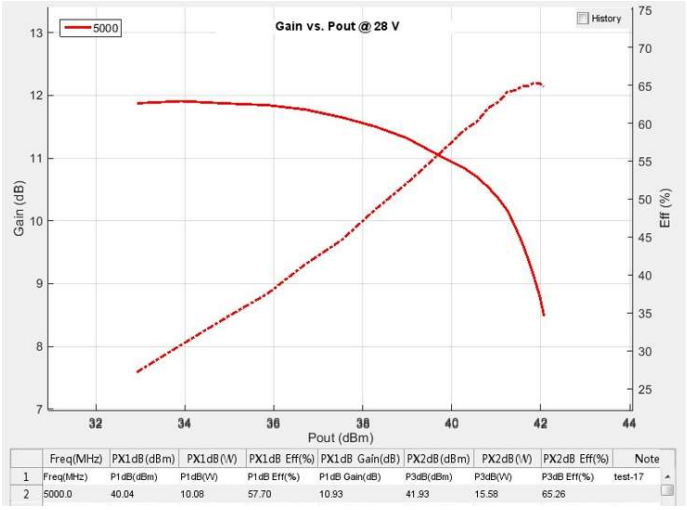

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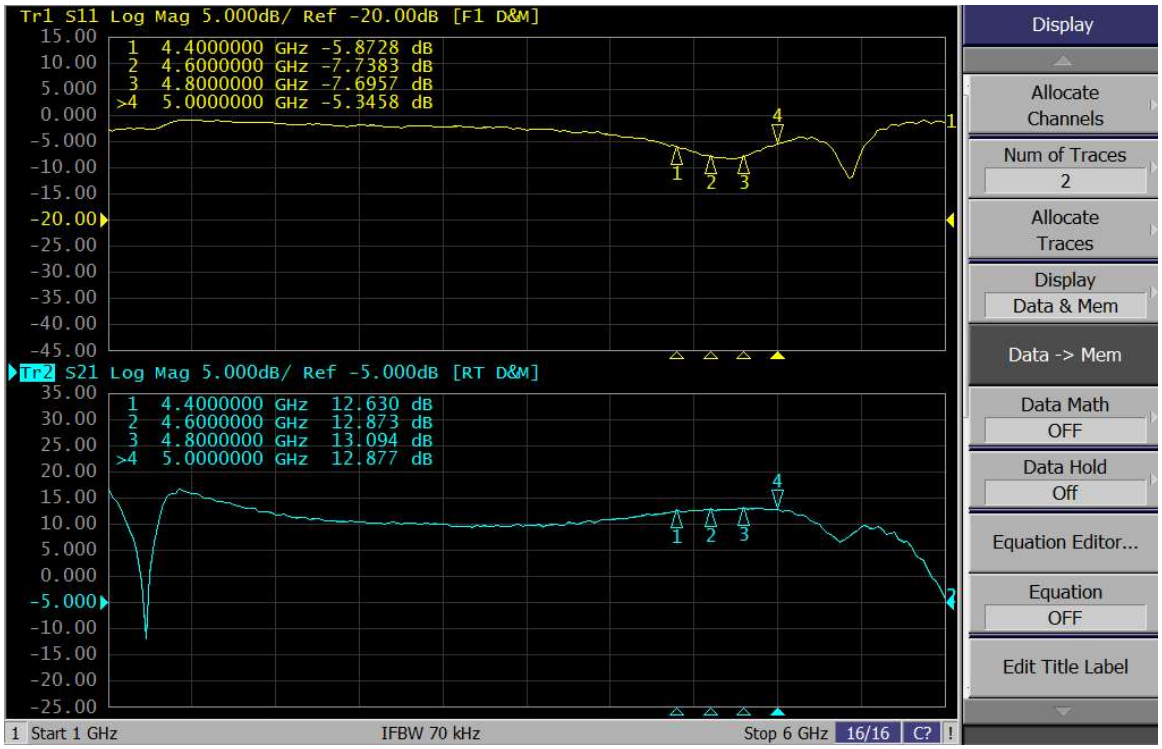

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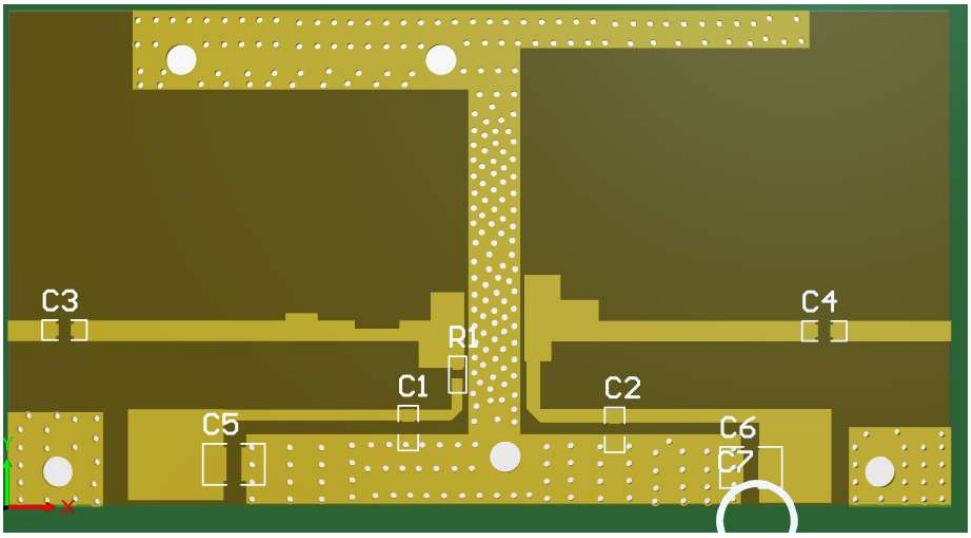
4400	32.03	9.29	41.33	13.6	-44.0	11.4	19.1
4500	32.01	9.41	41.42	13.9	-44.4	11.7	19.1
4600	32.00	9.22	41.22	13.2	-43.3	11.8	19.2
4700	32.01	9.34	41.34	13.6	-42.8	12.1	20.4
4800	32.01	9.29	41.29	13.5	-43.8	12.2	22.3
4900	32.00	8.96	40.96	12.5	-41.9	12.3	24.2
5000	32.01	8.81	40.82	12.1	-40.5	11.7	25.0

Figure 4. test fixture ,BOM and layout (Layout file upon request,)

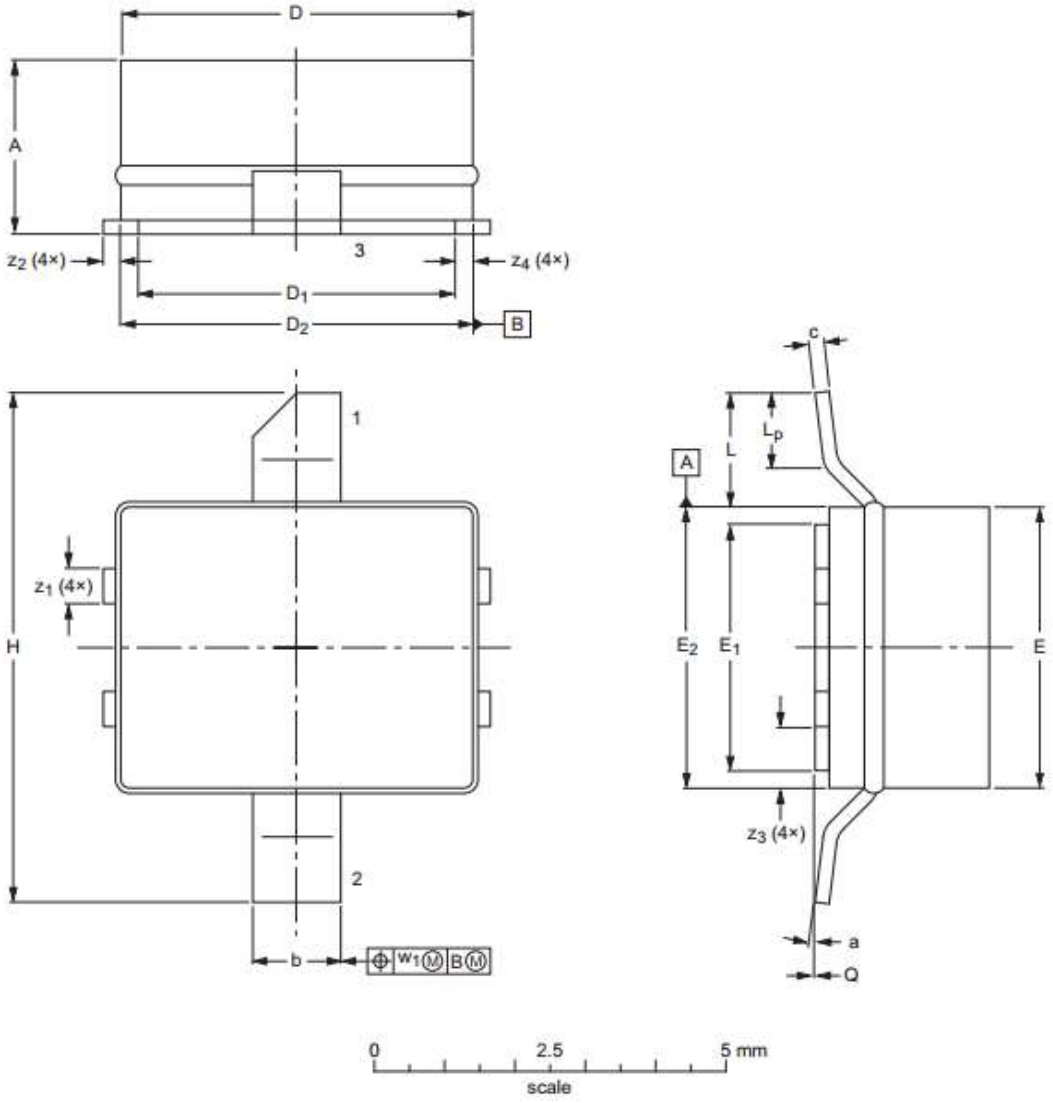
PCB: 30 Mil Rogers 4350B



Designator	Value	Quantity	Package
C1 C2 C3 C4	5.6 pF	5	0805
C5 C6	10uF	4	1210
C7	470uF	1	
R1	10ohm	1	0603

Package Outline

Earless Flanged ceramic package; 2 leads(1-Drain,2-Gate,3-Source)



UNIT	A	b	c	D	D_1	E	E_1	E_2	H	L	L_P	Q	w_1	z_1	z_2	z_3	z_4	α
mm	2.34	1.35	0.23	5.16	4.65	4.14	3.63	4.14	7.49	2.03	1.02	0.1	0.25	0.58	0.25	0.97	0.51	7°
	2.13	1.19	0.18	5.00	4.50	3.99	3.48	3.99	7.24	1.27	0.51	0.0		0.43	0.18	0.81	0.00	0°

OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-MM					18/6/2014

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2017/6/26	V1.0	Objective Datasheet Creation
2017/7/27	V1.0	Preliminary datasheet creation
2017/12/5	V1.1	Add mounting instructions
2017/12/27	V1.2	Add 0.8-3.5GHz wideband performance
2018/3/7	V1.3	Upper frequency modified
2021/12/2	V1.4	Using 3.4-3.8GHz, 4.4-5GHz application to specify the device

Application data based on ZXY-21

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