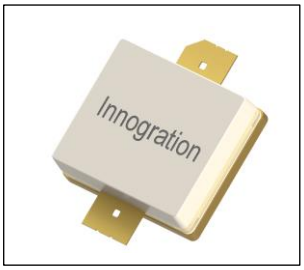
GaN HEMT 28V,HF-1.5GHz 100W, RF Power Transistor



Description

The GTAH15100A2C is a 100W GaN HEMT, designed for multiple application up to 1.5GHz
It can be used in CW, Pulse and any other modulation modes. There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

- Typical 1.3-1.5GHz class AB RF Performance with device soldered on heatsink
  Vds=28V, Idq=100mA, CW

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
1300	49.85	96.6	58.7	16.38	51.03	126.9	65.5
1400	49.94	98.6	66.9	16.58	51.12	129.6	74.0
1500	48.82	76.3	69.5	16.19	50.03	100.7	76.6

- Typical 0.7-0.9GHz class AB RF Performance with device soldered on heatsink
  Vds=28V, Idq=100mA, CW

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB (dBm)	P3dB (W)	P3dB Eff(%)
700	49.46	88.2	60.0	17.18	50.32	107.7	65.5
750	48.9	77.6	56.0	19.05	50.08	101.8	63.6
800	49.59	90.9	62.2	19.23	50.8	120.3	70.5
850	49.17	82.6	64.7	18.73	50.52	112.6	73.9
900	50.34	108.1	74.8	18.13	50.96	124.7	80.2

Applications

- L band power amplifier
- P band power amplifier
- ISM/RF Energy power amplifier

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
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}	-8 to +0.5	Vdc
Operating Voltage	V_{DD}	36	Vdc
Maximum gate current	Igs	30	mA
Storage Temperature Range	Tstg	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature	T_J	+225	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit

Thermal Resistance, Junction to Case by FEA T_C= 85°C, at Pdiss=40W	$R_{\theta JC}$	1.5	°C /W

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

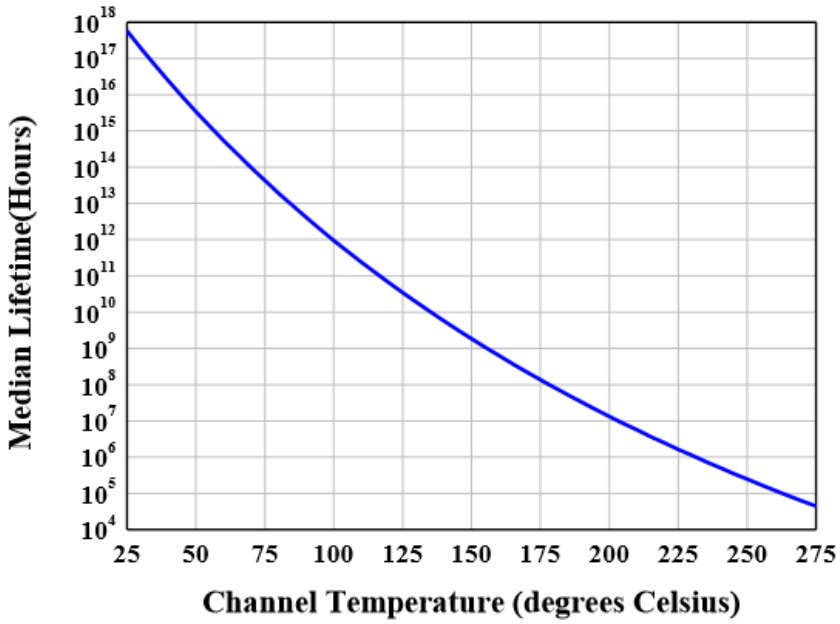
DC Characteristics (measured on wafer prior to packaging)

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	VGS=-8V; IDS=30mA	V_{DSS}		200		V
Gate Threshold Voltage	VDS =10V, ID = 30mA	$V_{GS(th)}$	-4		-2	V
Gate Quiescent Voltage	VDS =28V, IDS=250mA, Measured in Functional Test	$V_{GS(Q)}$		-2.4		V

Ruggedness Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Load mismatch capability	1.5GHz, Pout=100W Pulsed CW All phase, No device damages	VSWR		10:1		

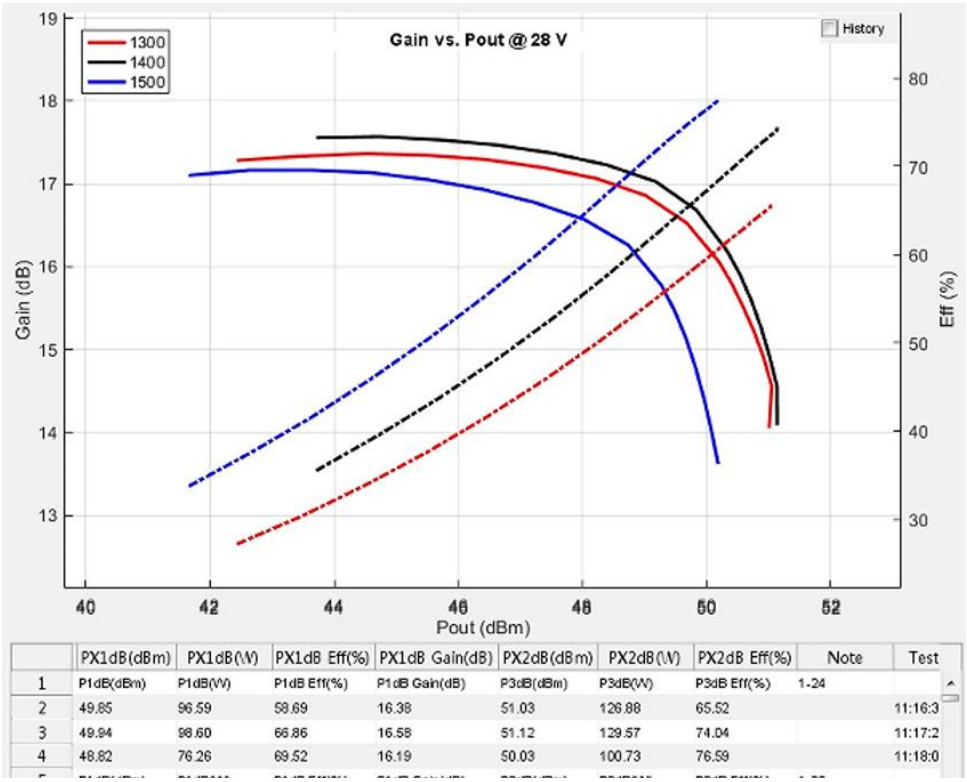
Figure 2: Median Lifetime vs. Channel Temperature



1.3-1.5GHz

Typical performance

Figure 3: Efficiency and power gain as function of Pout at 28V



	PX1dB(dBm)	PX1dB(W)	PX1dB Eff(%)	PX1dB Gain(dB)	PX2dB(dBm)	PX2dB(W)	PX2dB Eff(%)	Note	Test
1	P1dB(dBm)	P1dB(W)	P1dB Eff(%)	P1dB Gain(dB)	P3dB(dBm)	P3dB(W)	P3dB Eff(%)	1-24	
2	49.85	96.59	58.69	16.38	51.03	126.88	65.52		11:16:3
3	49.94	98.60	66.86	16.58	51.12	129.57	74.04		11:17:2
4	48.82	76.26	69.52	16.19	50.03	100.73	76.59		11:18:0

Figure 4: Network analyzer output S11/S21

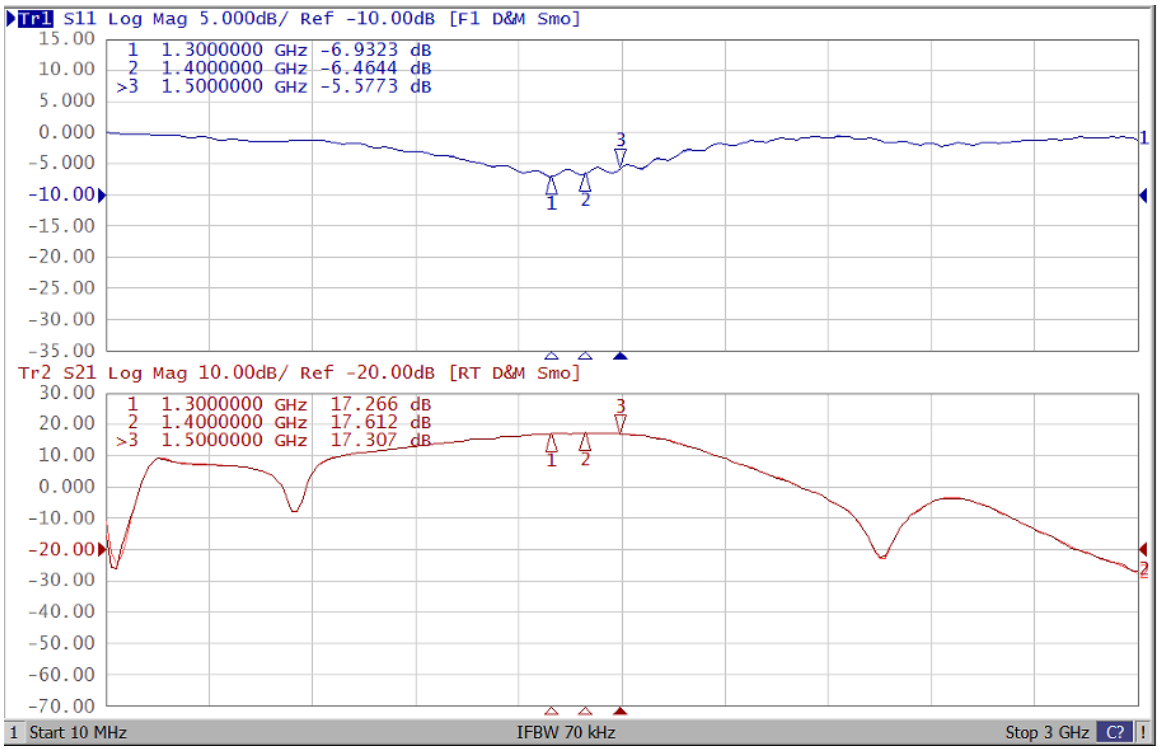


Figure 5: Picture of application board

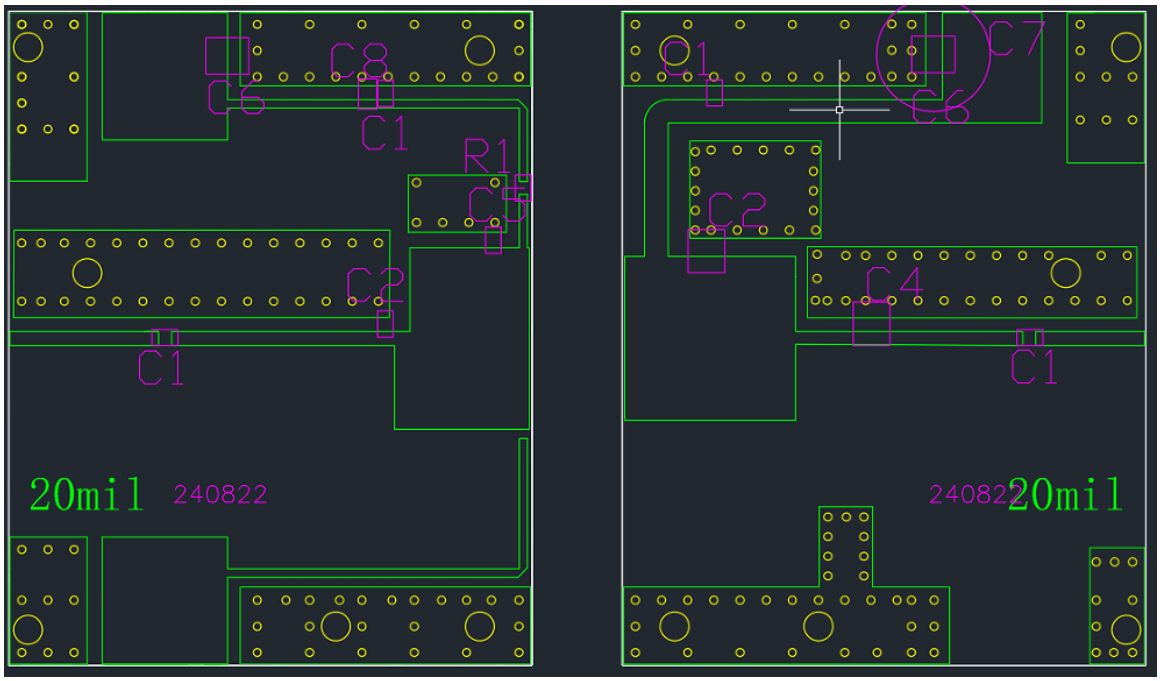


Table 4. Bill of materials of application board (PCB layout upon request)

Component	Value	Quantity
C1	30pF	4
C2	2pF	2
R1	10 ohm	1
C4	2.2pF	1
C5	3.9pF	1
C6	10uF	2
C7	470uF	1
C8	1uF	1

0.7-0.9GHz

Typical performance

Figure 6: Efficiency and power gain as function of Pout at 28V

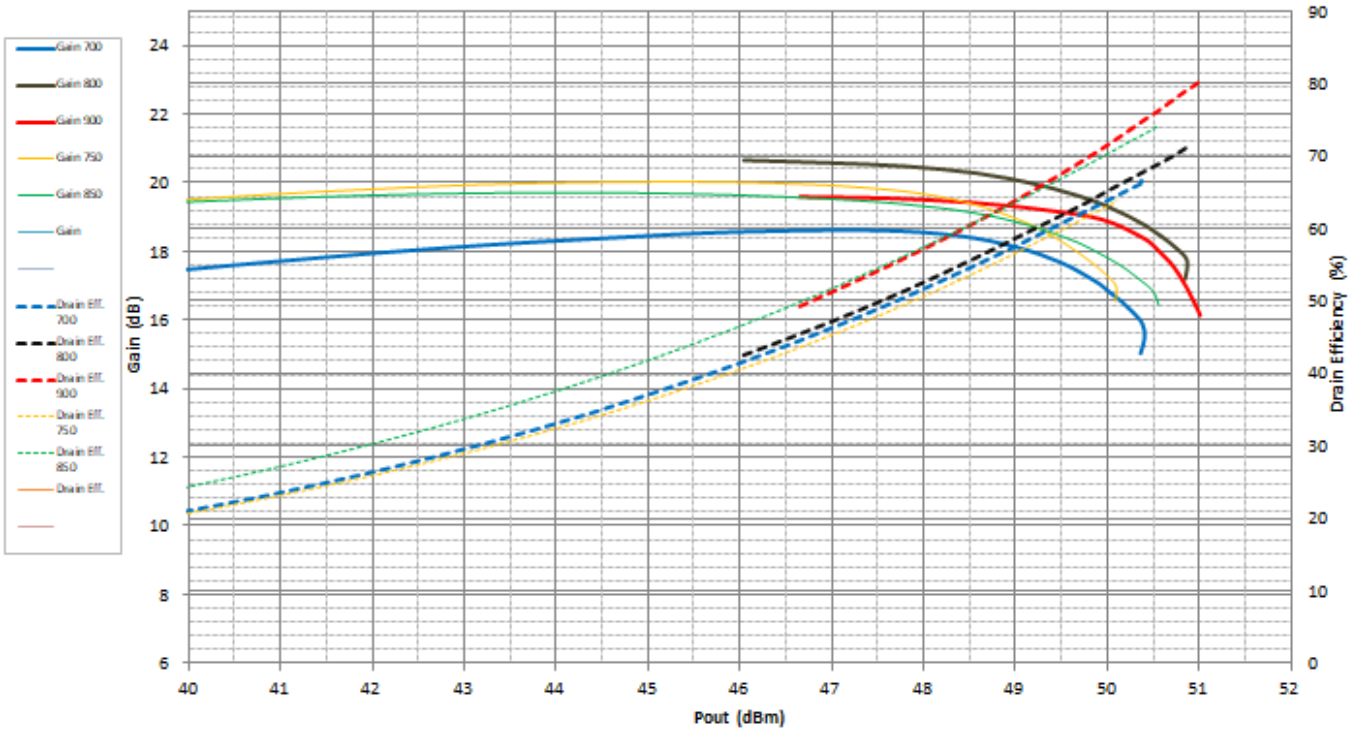


Figure 7: Network analyzer output S11/S21

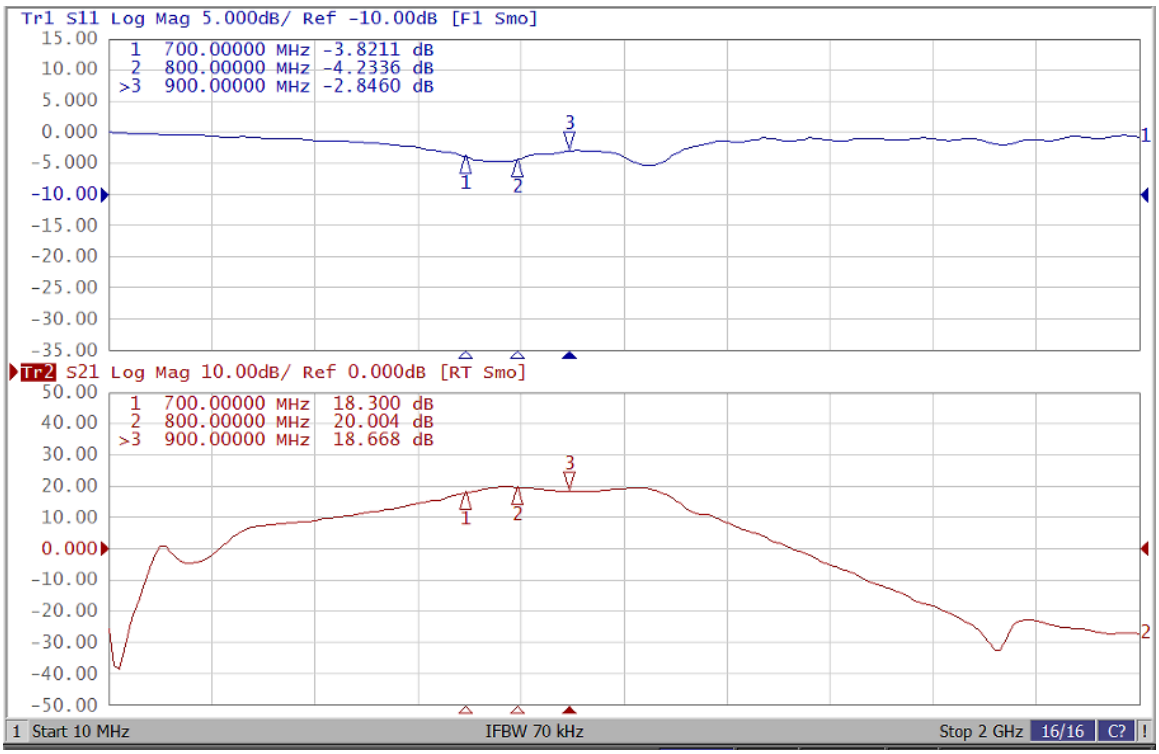


Figure 8: Picture of application board

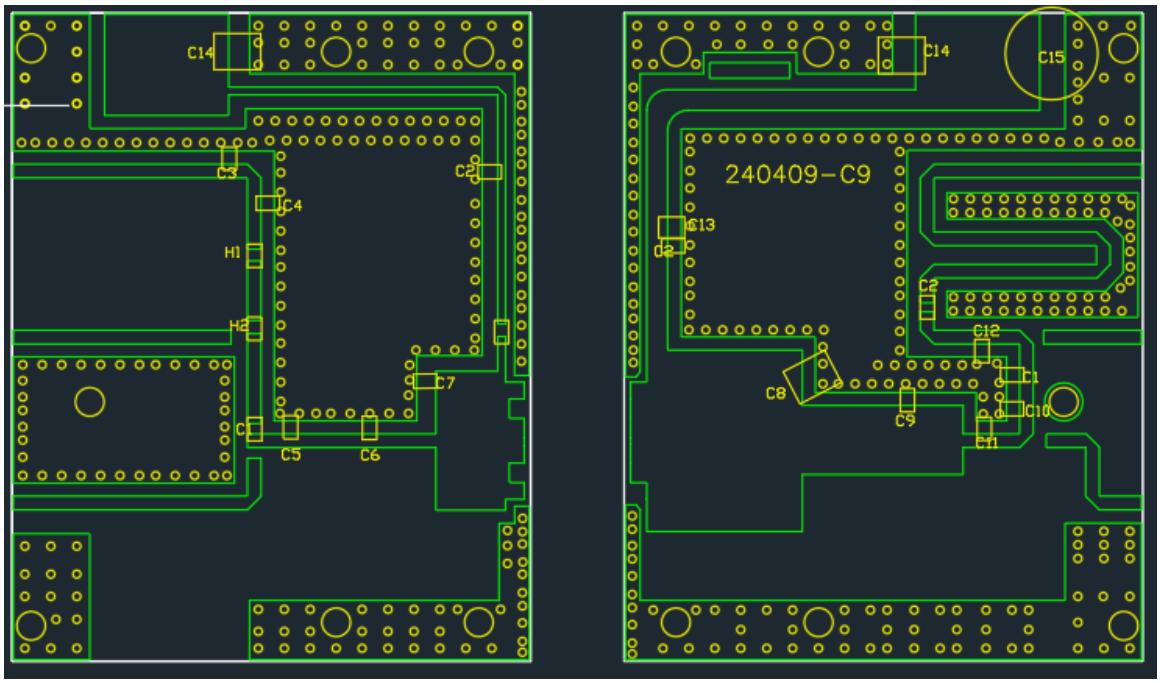
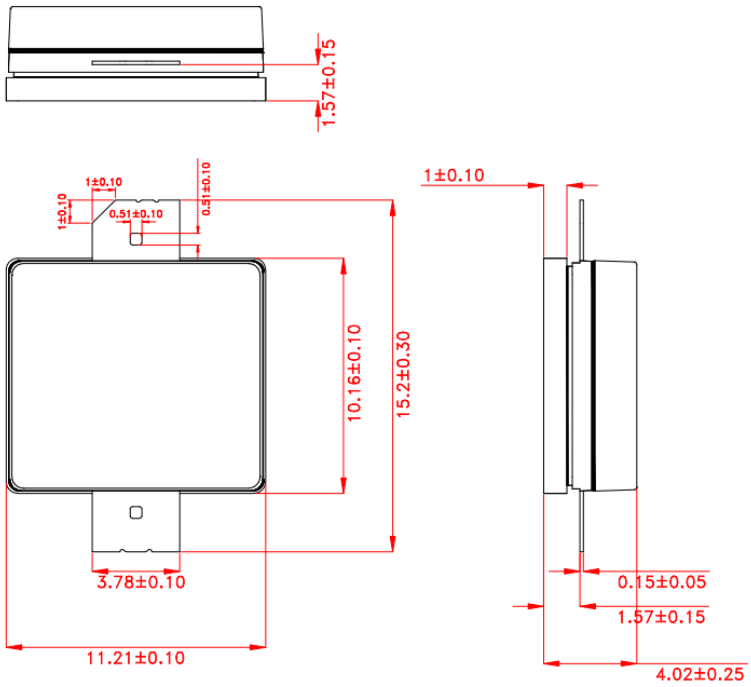
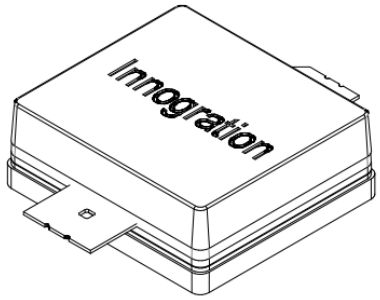


Table 5. Bill of materials of application board (PCB layout upon request)

Component	Value	Quantity
C1	3pF	2
C2	100pF	3
R1	10 ohm	1
C3	1pF	1
C4	2pF	1
C14	10uF	2
C15	470uF	1
C13	1uF	1
C5	3.6pF	1
C6	4.7pF	1
C7	3.9pF	1
C8	10pF	1
C9	2.4pF	1
C10	0.5pF	1
C11	1pF	1
C12	1.2pF	1
H1	2.2nH	1
H2	8.2nH	1

Package Dimensions （Unit:mm）





Unit:mm

Tolerance ±0.10mm,Except as Noted.

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2024/9/23	V1.0	Preliminary Datasheet Creation

Application data based on: ZXY-24-28/31

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