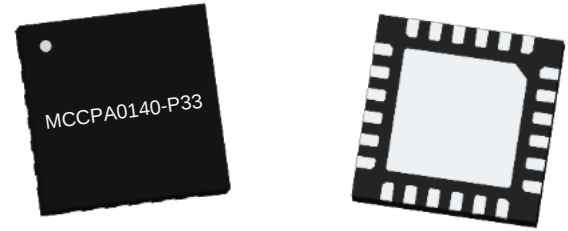


Product Overview

The MCCPA0140-P33 is a single-stage HBT high power wideband amplifier for indoor /outdoor wireless application such as basestation ,radio system application.It works for 2140MHz and can deliver 35dBm output peak power with 15dB power gain,and excellent linearity.It has integrated temperature compensation circuits within a tiny lead frame package.

ROHS compliant

Evaluation boards are available upon request.



24Pin 4×4mm QFN Package

Figure1.

Functional Block Diagram

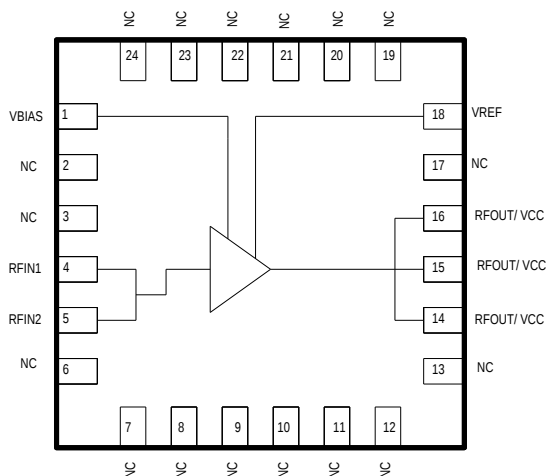


Figure2.

Key Features

- Frequency Range: 100-4000MHz
- 15dB Gain @2140MHz
- 50% PAE at 33dBm output power
- 35dBm output peak power
- Integrated temperature compensation circuits
- Compact and low-cost 4mm×4mm QFN package (MSL3,260 per JEDEC J-STD-020)

Applications

- Wireless Systems
- Power Amplifier Module
- Customer Permits Equipment (CPE)
- Automatic Meter Readers
- RFID Readers

Ordering info

Part No.	Description
MCCPA0140-P33	13' Reel with 4000pcs

Pin Description

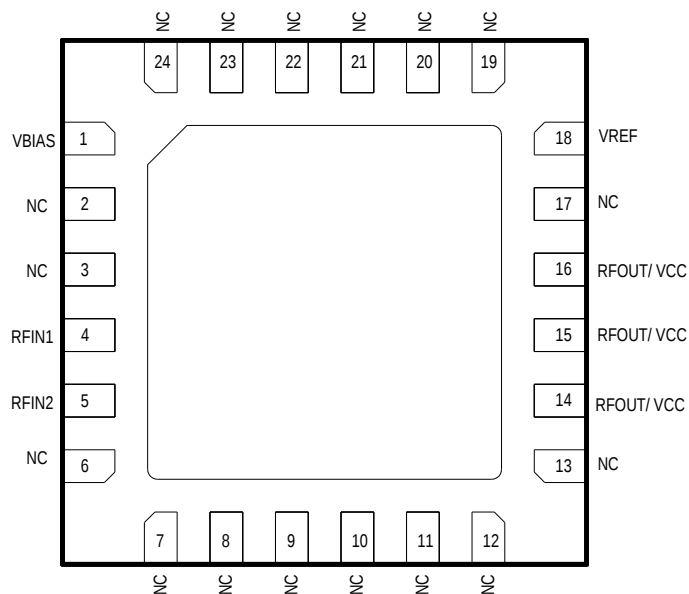


Figure 3. Pinout (Top View)

Pin	Name	Description	Pin	Name	Description
1	VBIAS	Bias circuit voltage	13	NC	Not connected
2	NC	Not connected	14	RFOUT/VCC	RF output port with external collector supply voltage
3	NC	Not connected	15	RFOUT/VCC	
4	RFIN	RF input port	16	RFOUT/VCC	
5	RFIN	RF input port	17	NC	Not connected
6	NC	Not connected	18	VREF	Reference voltage
7	NC	Not connected	19	NC	Not connected
8	NC	Not connected	20	NC	Not connected
9	NC	Not connected	21	NC	Not connected
10	NC	Not connected	22	NC	Not connected
11	NC	Not connected	23	NC	Not connected
12	NC	Not connected	24	NC	Not connected

Absolute Maximum Ratings¹

Parameter	Rating	Unit
Operating Temp, T _c	-40 to +85	
Operating Junction Temp, T _j	175	
Storage Temp, T _{STG}	-55 to +125	
Thermal Resistance, R _{θjc}		/W
Operating Voltage, V _{CC} , V _{BIAS}	5.5	V
Operating Voltage, V _{REF}	3.5	V
Input Power, P _{IN}	20	dBm

Notes¹: Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of the Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Operating Frequency, F	100		4000	MHz
Operating Temp, T _c	-40	25	85	
Operating Voltage, V _{CC} , V _{BIAS}	3	5	5.5	V
Operating Voltage, V _{REF}		3.2		V

Electrical Specifications¹

Parameter	Conditions	Min	Typ	Max	Unit
Frequency		100	2140	4000	MHz
Output P _{1dB}			33		dBm
Output P _{3dB}			35		dBm
Gain@Small signal			15		dB
Power added efficiency					%
Quiescent current			435		mA
ACPR@24dBm	WCDMA, TM1 + 64DPCH, PAR=9.7dB		-49		dBc
Input return loss			-10		dB

Notes¹: V_{CC}=V_{BIAS}=5V, V_{REF}=3.2V, F=2140MHz, T_C=25 , Input/Output Load=50Ω

Evaluation Board Schemic

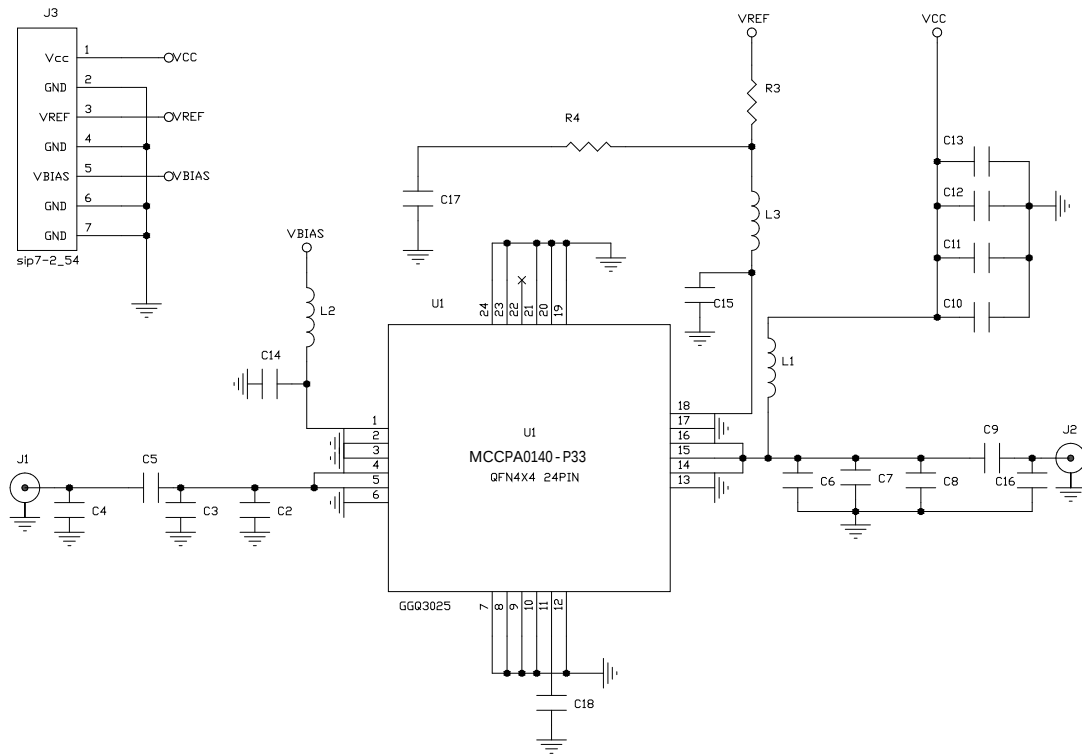


Figure 4. Evaluation Board Schemic

Electrical Specifications--- EVB Typical Performance¹

Parameter	Demo Typical Performance								Unit
DEMO Frequency	137	578	700	1300	1805	2110	2300		MHz
	-	-	-	-	-	-	-		
	178	678	750	1500	1880	2170	2400		
Test Frequency	155	628	725	1400	1845	2140	2350		MHz
Output P1dB	31	32.5	33.5	33	33	33	34		dBm
Output P3dB	33	33.5	35	34	34	35	35		dBm
Gain @ Small signal	22	22	21.5	15	15	15	15.5		dB
ACPR @ 24dBm, 20M LTE	/	-46	-47	-47	-46	-48	-48		dBc
Input Return loss	-14	-10	-17	-16	-25	-18	-14		dB

Notes¹: VCC=VBAIS=5V, VREF=5V, F=2140MHz, TC=25 , Input/Output Load=50Ω

Evaluation Board Bill of Materials (BOM) for 137-178MHz application

Ref,Des	Value	Size
C2	22nH	C0603
C5	100pF 25V ±0.1pF X7R	C0603
C6	68pF 25V ±2% X7R	C0603
C9	12nH	C0603
C9'	100pF 25V ±10% X7R (Add a new block capacitor)	C0603
C10	100pF 25V ±2% X7R	C0603
C11	10nF 25V ±10% X7R	C0603
C13	10uF 25V ±10% X7R	C1210
C14, C15	1uF 25V ±10% X7R	C0603
C16	24pF 25V ±10% X7R	C0603
L1	27nH, Sunlord SDWL1608CP24NNHSTF	L0603
L3	220R ±5% 1/16W	R0603
R3, L2	0R ±5% 1/16W	R0603

Evaluation Board Bill of Materials (BOM) for 578-678MHz application

Component	Description	Size
C2	3.3nH	C0603
C5	15pF 25V ±0.1pF X7R	C0603
C4	3.3nH(Distance to C2: 6.5mm)	L0603
C6	10pF 25V ±2% X7R(Distance to MCCPA0140-P33: 17mm)	C0603
C9, C10	100pF 25V ±2% X7R	C0603
C11	10nF 25V ±10% X7R	C0603
C13	10uF 25V ±10% X7R	C1210
C14, C15	1uF 25V ±10% X7R	C0603
L1	27nH, Sunlord SDWL1608CP24NNHSTF	L0603
L3	220R ±5% 1/16W	R0603
R3, L2	0R ±5% 1/16W	R0603

Evaluation Board Bill of Materials (BOM) for 700-750MHz application

Component	Description	Size
C5	10pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C4	1.8nH(Distance to MCCPA0140-P33: 11.5mm)	L0603
C6	9.1pF 25V $\pm 2\%$ X7R(Distance to MCCPA0140-P33: 12mm)	C0603
C9, C10	47pF 25V $\pm 2\%$ X7R	C0603
C11	10nF 25V $\pm 10\%$ X7R	C0603
C13	10uF 25V $\pm 10\%$ X7R	C1210
C14, C15	1uF 25V $\pm 10\%$ X7R	C0603
L1	27nH, Sunlord SDWL1608CP24NNHSTF	L0603
L3	220R $\pm 5\%$ 1/16W	R0603
R3, L2	0R $\pm 5\%$ 1/16W	R0603

Electrical Specifications--- 1.3-1.8GHz EVB Electrical Performance¹

Parameter	1.3-1.8GHz Demo Typical Performance						Unit
Frequency	1300	1400	1500	1600	1700	1800	MHz
Output P1dB	35	35	34.5	33.5	33.5	35	dBm
Output P3dB	36	36	35	34.5	34.5	36	dBm
Gain @ Small signal	16.1	16.1	15.8	15.8	16	15.3	dB
ACPR @ 24dBm, 20M LTE	-45	-45	-45	-45	-45	-45	dBc
Input Return loss	-11	-18	-20	-16	-15	-13	dB

Notes¹: VCC=VBAIS=5V, VREF=5V, TC=25 $^{\circ}$ C, Input/Output Load=50 Ω

Evaluation Board Bill of Materials (BOM) for 1300-1800MHz application

Component	Description	Size
C2	7.5pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C5	22pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C4	2.4pF 25V $\pm 0.1\text{pF}$ X7R (distance to C2 14mm)	C0603
C8	10pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C7	3.6pF 25V $\pm 0.1\text{pF}$ X7R (distance to C8 6.3mm)	C0603
C9, C10	22pF 25V $\pm 2\%$ X7R	C0603
C11	10nF 25V $\pm 10\%$ X7R	C0603
C13	10uF 25V $\pm 10\%$ X7R	C1210
C14, C15	1uF 25V $\pm 10\%$ X7R	C0603
L1	24nH, Sunlord SDWL1608CP24NNHSTF	L0603
L3	220R $\pm 5\%$ 1/16W	R0603
R3, L2	0R $\pm 5\%$ 1/16W	R0603

Evaluation Board Bill of Materials (BOM) for 1805-1880MHz application

Component	Description	Size
C2	6.2pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C5	22pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C4	3pF 25V $\pm 0.1\text{pF}$ X7R (distance to C2 15mm)	C0603
C8	8.2pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C7	3.9pF 25V $\pm 0.1\text{pF}$ X7R (distance to C8 6mm)	C0603
C9, C10	22pF 25V $\pm 2\%$ X7R	C0603
C11	10nF 25V $\pm 10\%$ X7R	C0603
C13	10uF 25V $\pm 10\%$ X7R	C1210
C14, C15	1uF 25V $\pm 10\%$ X7R	C0603
L1	24nH, Sunlord SDWL1608CP24NNHSTF	L0603
L3	220R $\pm 5\%$ 1/16W	R0603
R3, L2	0R $\pm 5\%$ 1/16W	R0603

Evaluation Board Bill of Materials (BOM) for 2110-2170MHz application

Component	Description	Size
C2	2.4pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C5	1.3pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C7, C8	2.2pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C9, C10	15pF 25V $\pm 2\%$ X7R	C0603
C11	10nF 25V $\pm 10\%$ X7R	C0603
C13	10uF 25V $\pm 10\%$ X7R	C1210
C14, C15	1uF 25V $\pm 10\%$ X7R	C0603
L1	24nH, Sunlord SDWL1608CP24NNHSTF	L0603
L3	220R $\pm 5\%$ 1/16W	R0603
R3, L2	0R $\pm 5\%$ 1/16W	R0603

Rest of the components on the schematic are not used in this part.

Evaluation Board Bill of Materials (BOM) for 2300-2400MHz application

Component	Description	Size
C2	1.5pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C5	1pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C8	3pF 25V $\pm 0.1\text{pF}$ X7R	C0603
C7	1.8pF 25V $\pm 0.1\text{pF}$ X7R(distance to C8 3.5mm)	C0603
C9, C10	15pF 25V $\pm 2\%$ X7R	C0603
C11	10nF 25V $\pm 10\%$ X7R	C0603
C13	10uF 25V $\pm 10\%$ X7R	C1210
C14, C15	1uF 25V $\pm 10\%$ X7R	C0603
L1	24nH, Sunlord SDWL1608CP24NNHSTF	L0603
L3	220R $\pm 5\%$ 1/16W	R0603
R3, L2	0R $\pm 5\%$ 1/16W	R0603

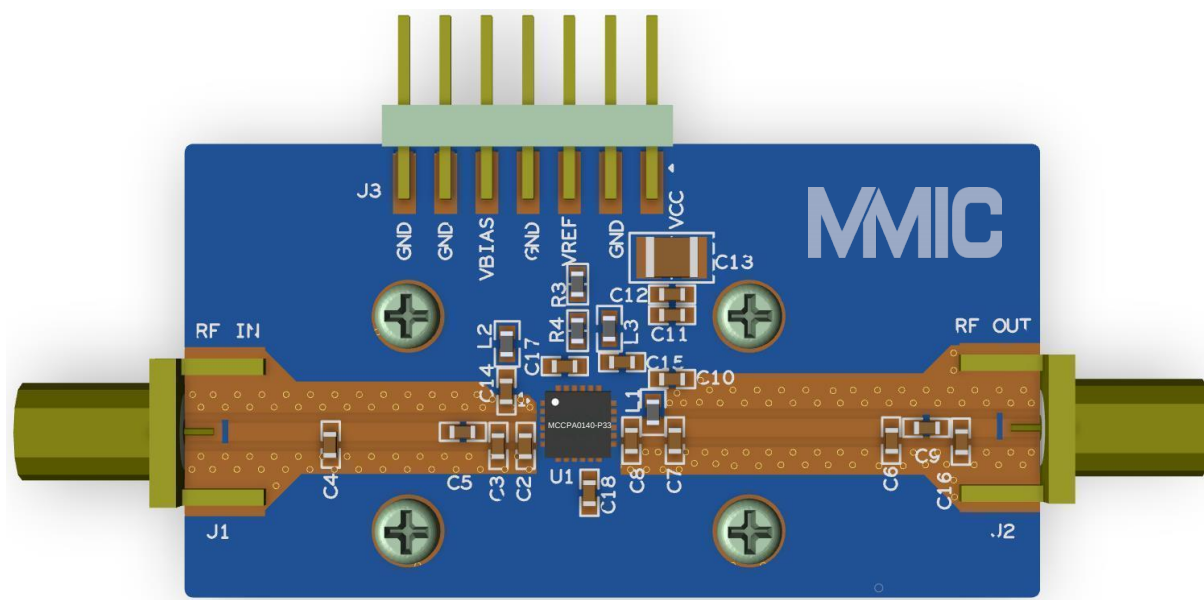


Figure 5 .Evaluation Board PCB information

Evaluation board test procedure

Turn-on sequence

- 1.Connect test equipment to the input and output port of Evaluation board and then connect DC ground.
- 2.Turn on VCC and VBIAS to 5V,turn on VREF to 5V in order.
- 3.Apply RF signal

Turn-on sequence

- 1.Turn off RF signal
- 2.Turn off VD,VBIS and VCC in order

Package Dimensions

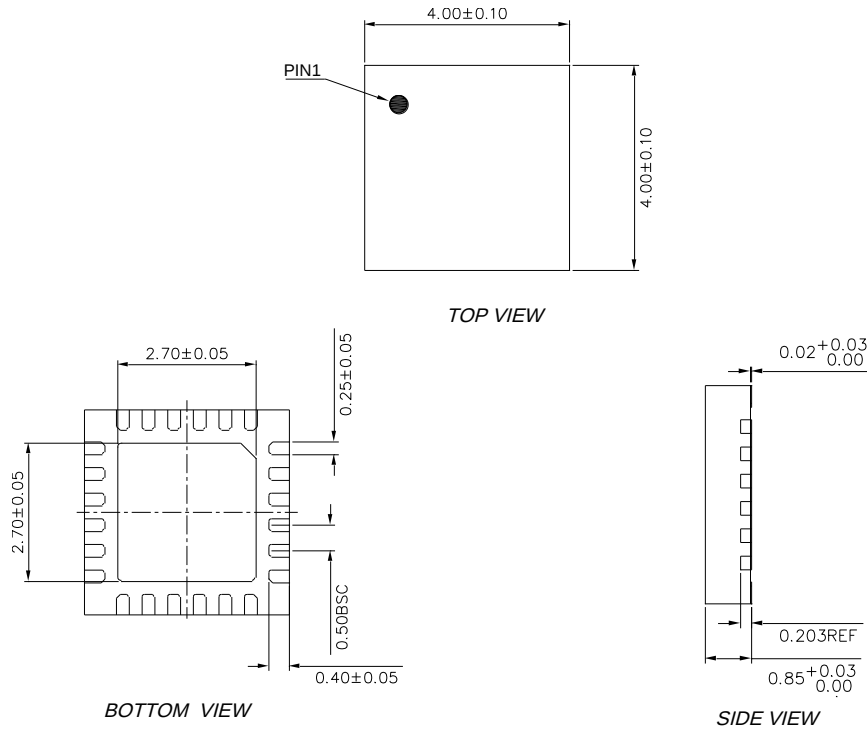


Figure 6.Package Dimensions

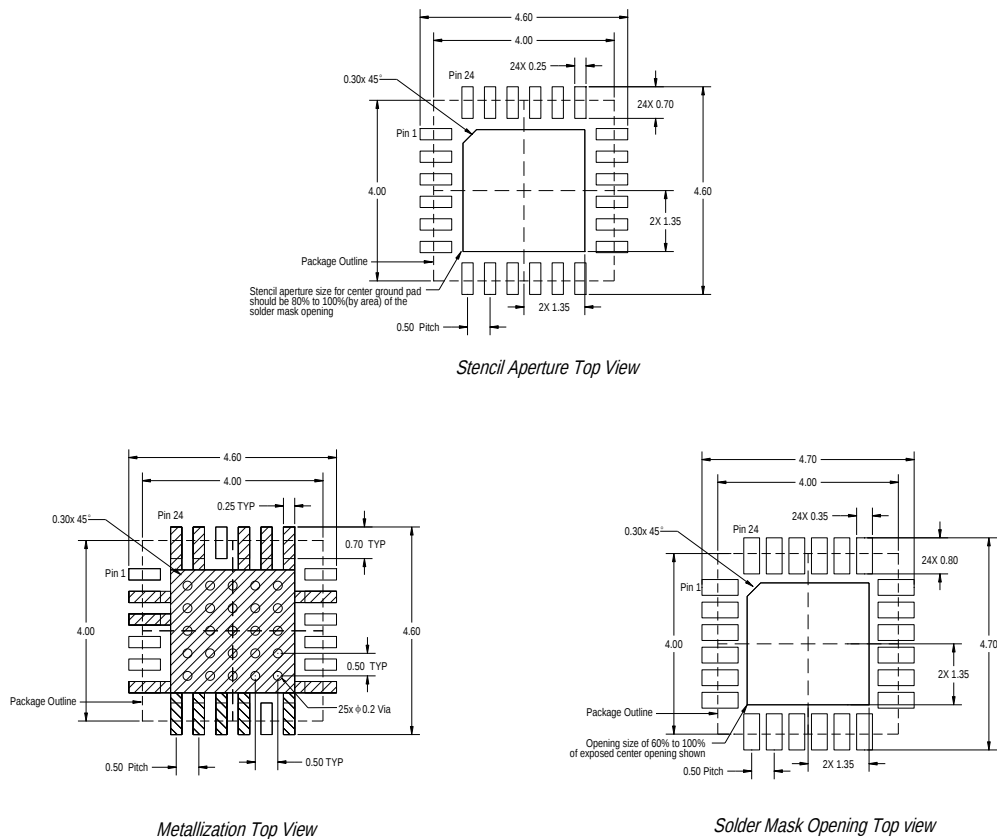


Figure 7.PCB Layout Footprint

Tape and Reel Information

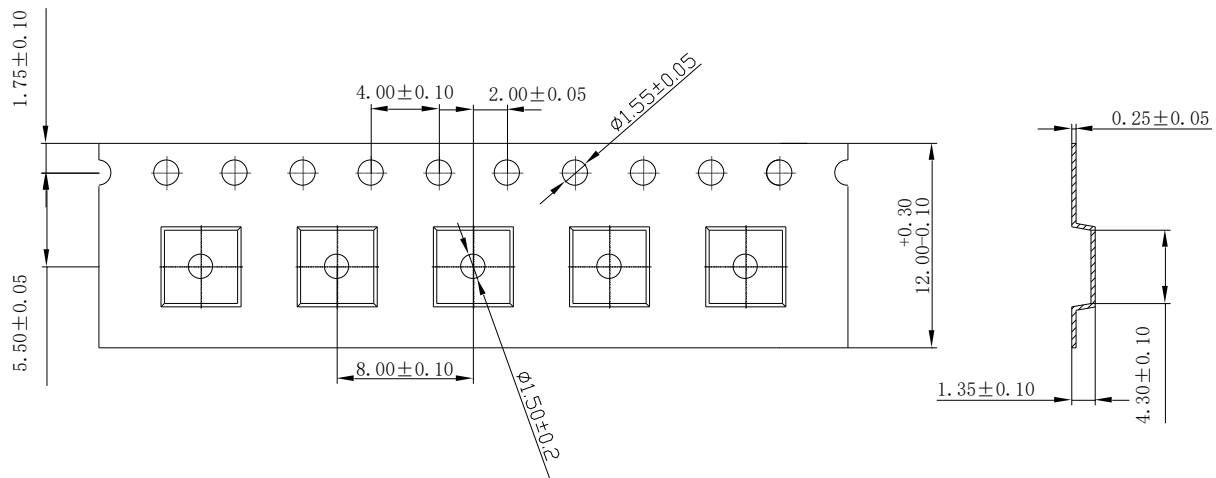


Figure 8.

Technical requirements:

1. The accumulative error of the distance between any 10 transmitting holes is ± 0.1 mm; 2. The lateral bending of the belt along the length direction is ≤ 1 mm/100 mm;
3. Roughness: $Ra < 0.8 \mu\text{m}$;
4. Carrier tape color: Black.