GSR2701

2.4 GHz Front End Module

Product Description

The GSR2701 is an integrated front end module (FEM) designed for 2.4GHz Bluetooth, 802.11b/g/n/ac/ax systems. The device provides all the functionality of a fully matched power amplifier (PA), power detector, low-noise amplifier (LNA), and two single-pole, dual-throw (SPDT) switches.

The GSR2701 provides a complete 2.4 GHz WLAN RF solution from the output of the transceiver to the antenna, and from the antenna to the input of the transceiver. The LNA increases the receive sensitivity of embedded solutions to improve range or to overcome the insertion loss of cellular filters (often included for mobile applications).

The GSR2701 also includes a digital enable control for transmitter power ramp on/off control.

The device is provided in a compact, 16-pin 2.3 x 2.3 mm Quad Flat No-Lead (QFN) package. Pin map is shown in Figure 1. A functional block diagram is shown in Figure 2.

Pin Map

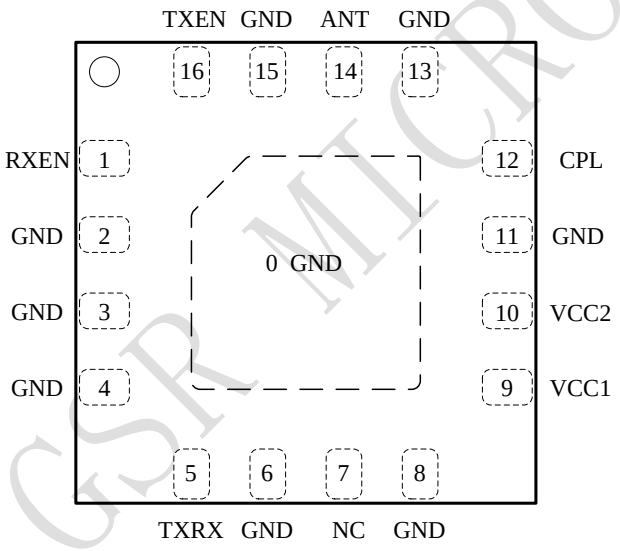


Figure 1 GSR2701 Pin Map (Top View)

Functional Block Diagram

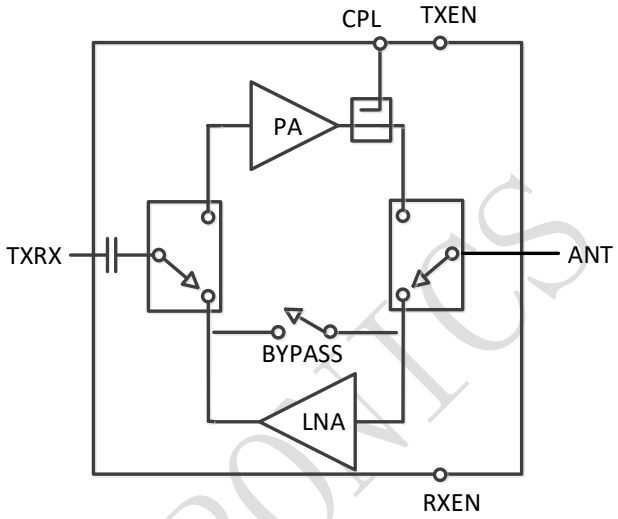


Figure 2 Block Diagram

Key Features

- Saturated output power: 30.5 dBm @ 5V
- Saturated output power: 27 dBm @ 3.3V
- Pout = 24 dBm @ -30 dB EVM, HT40 MCS7,5V
- Pout = 22 dBm @ -40 dB EVM, HE40 MCS11,5V
- Pout = 20.5 dBm @ -30 dB EVM , HT40 MCS7,3.3V
- Pout = 18.5 dBm @ -40 dB EVM, HE40 MCS11,3.3V
- Transmit gain: 28 dB@ 5V
- High efficiency
- Integrated positive slope power detector
- Receive gain: 14 dB
- 1.6 dB LNA Noise Figure
- Input and output matched to 50 ohm
- High Impedance Control Pin

Applications

- Mobile Access Points
- Mobile Phones
- Consumer Electronics
- Customer Premise Equipment
- Internet of Things

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Pin Description

Pin	Name	Description
0	GND	Ground
1	RXEN	Control voltage for the LNA
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	TXRX	RF signal to/from the transceiver
6	GND	Ground
7	NC	Not connected
8	GND	Ground
9	VCC1	Supply voltage for PA first stage
10	VCC2	Supply voltage for PA second stage
11	GND	Ground
12	CPL	DPD coupler output
13	GND	Ground
14	ANT	RF bidirectional antenna port
15	GND	Ground
16	TXEN	Control voltage for the PA

Absolute Maximum Ratings

Parameter	Conditions	Rating
DC Supply Voltage		-0.5 to +6 V
Control Voltage (TXEN, RXEN)		-0.5 to +3.6 V
Storage Temperature		-40 to 150 ℃
Junction Temperature		Max 150 ℃
RF Input Power at TXRX	ANT connect 50 Ω Load	+10 dBm
RF Input Power at ANT	RX connect 50 Ω Load, LNA active	+10 dBm

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

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Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Operating Frequency	2400	-	2500	MHz
DC Supply Voltage	3.1	3.3	5.25	V
Control Voltage – High	1.2	3.3	3.6	V
Control Voltage – Low	0	-	0.3	V
Operating temperature	-40	25	85	℃

Logic Truth Table

Mode	TXEN	RXEN
Transmit Mode	High	Low
Receive Mode	Low	High
Bypass Mode	Low	Low

Electrical Specifications

Parameter	Conditions	Min	Typ	Max	Units
Transmit Mode	Unless otherwise noted: VCC1, VCC2=5V, Temp=+25ºC, TXEN=High , RXEN=Low				
Saturated output power			30.5		dBm
11ax Output Power	HE40 MCS11 1024QAM		22		dBm
Dynamic EVM			-40		dB
11ac Output Power	VHT40 MCS9 64QAM		23		dBm
Dynamic EVM			-35		dB
11n Output Power	HT20 MCS7 64QAM		24		dBm
Dynamic EVM			-30		dB
Mask compliant power	802.11n HT20 MCS0		27		dBm
Mask compliant power	802.11b 1Mbps		28		dBm
Small signal gain			28		dB
Gain Flatness	Across any 40 MHz Channel	-0.5		+0.5	dB
TXRX Port Return Loss			-13		dB
ANT Port Return Loss			-13		dB
Isolation	From ANT to TXRX		-45		dB
Quiescent Current	RF OFF		165		mA
Operating Current	Modulated Signal@24 dBm		310		mA
TXEN Current	TXEN=High		4		uA
Coupling factor	TX mode		21		dB
2nd Harmonics	Pout=27dBm, 802.11b 1M		-18		dBm/MHz

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3rd Harmonics			-28		dBm/MHz
Switching Time	RX or Bypass Mode to Transmit Mode		350		nS
All spurious	Pout=27dBm HT20-MCS0 VSWR = 6:1, 20 MHz to 20 GHz			-42	dBm/MHz
Ruggedness	Pin= 10 dBm, load VSWR 10:1	No damage			
Transmit Mode	Unless otherwise noted: VCC1, VCC2=3.3V, Temp=+25ºC, TXEN=High , RXEN=Low				
Saturated output power			27		dBm
11ax Output Power	HE40 MCS11 1024QAM		18.5		dBm
Dynamic EVM			-40		dB
11ac Output Power	VHT40 MCS9 64QAM		19.5		dBm
Dynamic EVM			-35		dB
11n Output Power	HT20 MCS7 64QAM		20.5		dBm
Dynamic EVM			-30		dB
Mask compliant power	802.11n HT20 MCS0		22.5		dBm
Mask compliant power	802.11b 1Mbps		23.5		dBm
Small signal gain			28		dB
Gain Flatness	Across any 40 MHz Channel	-0.5		+0.5	dB
TXRX Port Return Loss			-13		dB
ANT Port Return Loss			-15		dB
Isolation	From ANT to TXRX		-45		dB
Quiescent Current	RF OFF		155		mA
Operating Current	Modulated Signal@20 dBm		220		mA
TXEN Current	TXEN=High		4		uA
Coupling factor	TX mode		21		dB
2nd Harmonics	Pout=23 dBm, 802.11b 1M		-25		dBm/MHz
3rd Harmonics			-35		dBm/MHz
Switching Time	RX or Bypass Mode to Transmit Mode		350		nS
All spurious	Pout=22dBm HT20-MCS0 VSWR = 6:1, 20 MHz to 20 GHz			-42	dBm/MHz
Ruggedness	Pin = 10 dBm, load VSWR 10:1	No damage			
Receive Mode	Unless otherwise noted: VCC1, VCC2=3.3V or 5V , Temp=+25ºC, TXEN=Low, RXEN=High				
Noise Figure			1.6		dB
Gain			13		dB
Out of Band Gain	f = 5000 ~ 6000 MHz		-10		dB
RX Port Return Loss			-8		dB
ANT Port Return Loss			-9		dB
Quiescent Current			15		mA
RXEN Current	RXEN=High		4		uA
Input P1dB			-3.5		dBm

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Switching Time	Transmit or Bypass to Receive Mode		350		nS
Bypass Mode	Unless otherwise noted: VCC1, VCC2=3.3V or 5V , Temp=+25ºC, TXEN=Low, RXEN=Low				
Gain			-3		dB
RX Port Return Loss			-8		dB
ANT Port Return Loss			-16		dB
Quiescent Current	RF OFF		40		uA
Switching Time	Transmit to Bypass Mode		450		nS
	Receive to Bypass Mode		60		nS

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Evaluation Board Schematic

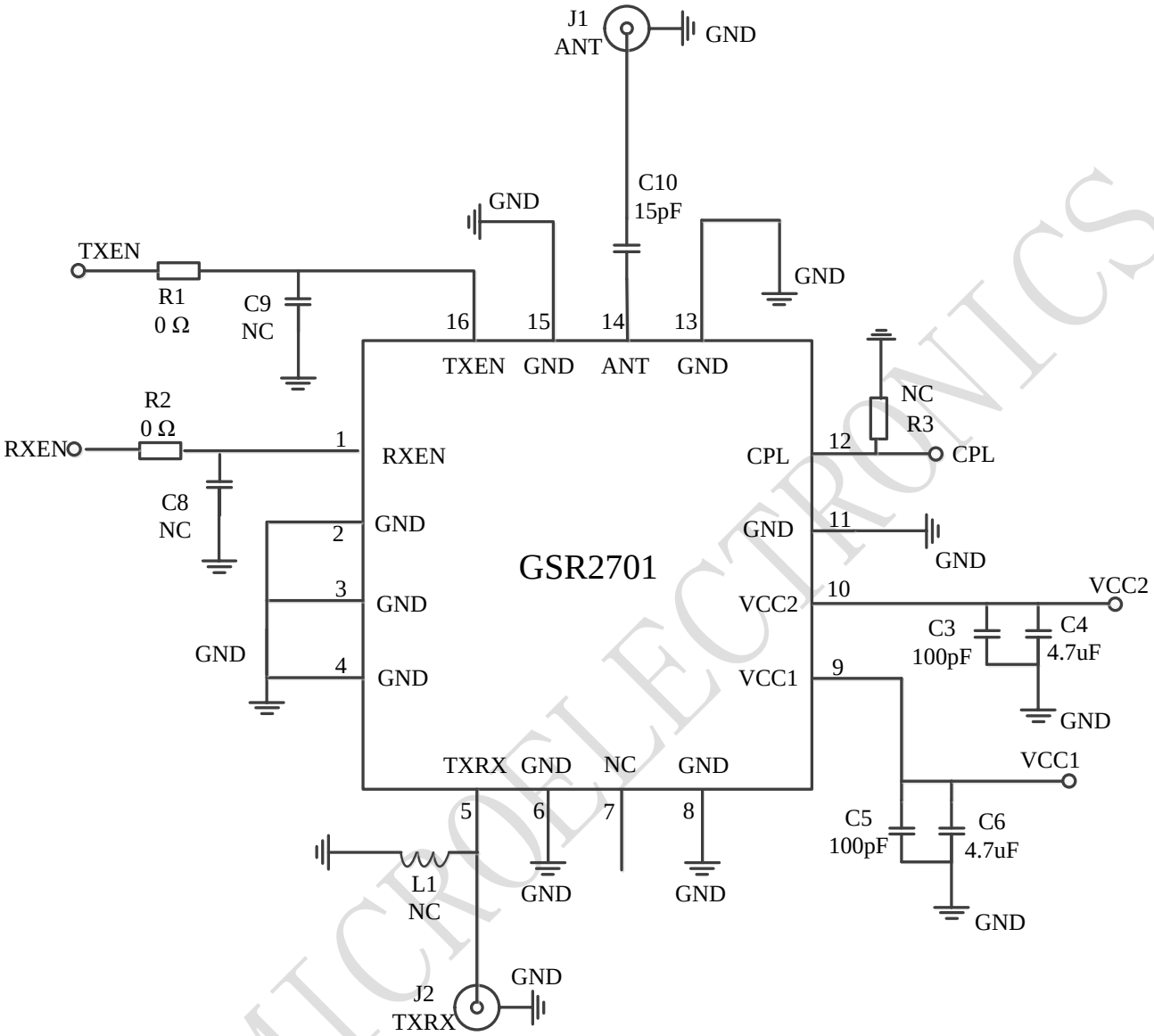


Figure 3 GSR2701 Application Schematic

Part Marking

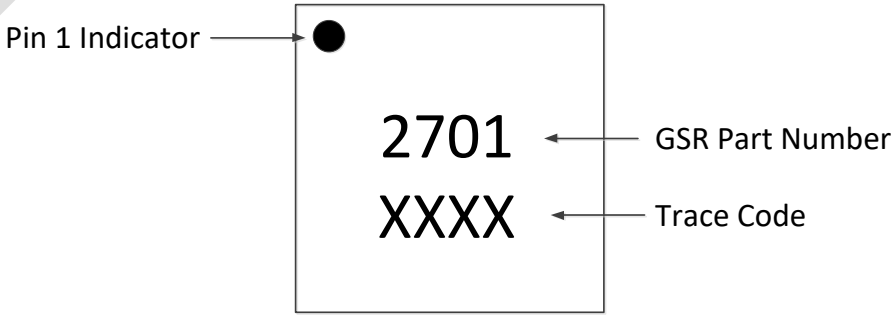
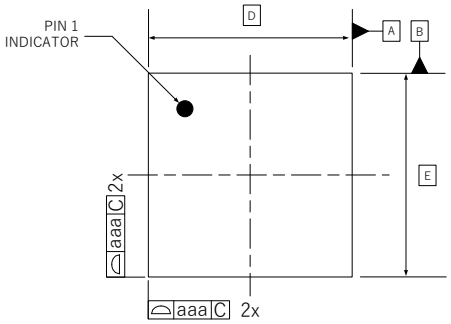


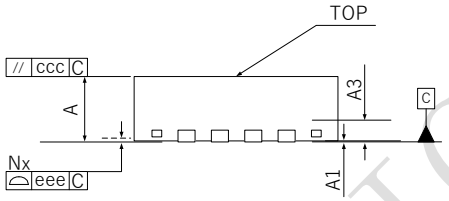
Figure 4 GSR2701 Marking

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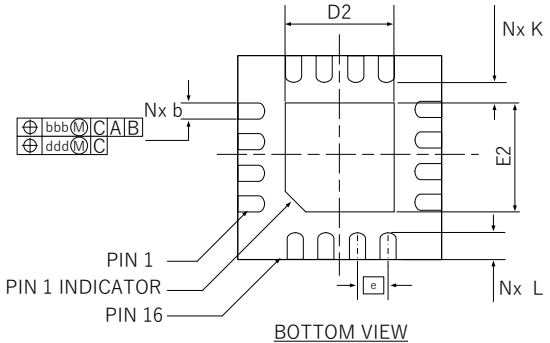
Package Outline



TOP VIEW



SIDE VIEW



BOTTOM VIEW

NOTE:
1. Dimensioning and tolerancing conform to ASME Y14.5-2009.
2. All dimensions are in millimeters.
3. N is the total number of terminals.
4. The location of the marked terminal #1 identifier is within the hatched area.
5. ND and NE refer to the number of terminals on each D and E side respectively.
6. Dimension b applies to the metalized terminal and is measured between 0.15mm and 0.30mm from the terminal tip. If the terminal has a radius on the other end of it, dimension b should not be measured in that radius area.
7. Coplanarity applies to the terminals and all other bottom surface metallization.

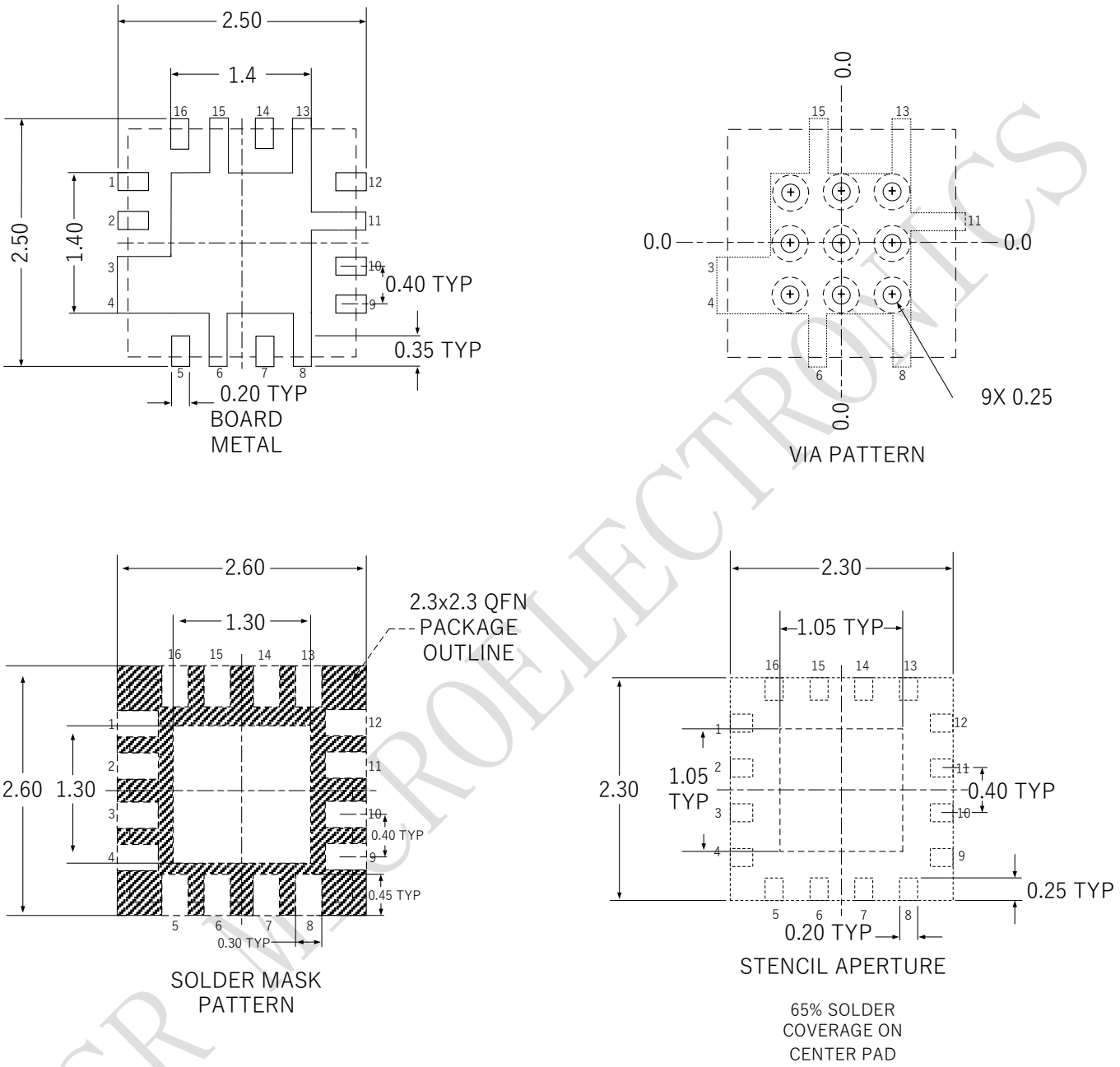
Dimension Table

	MINIMUM	NOMINAL	MAXIMUM	NOTE
A	0.45	0.5	0.55	
A1	0.00	0.02	0.05	8
A3	---	0.127 Ref	---	
b	0.15	0.20	0.25	6
D	2.30 BSC			
E	2.30 BSC			
e	0.40 BSC			
D2	1.25	1.40	1.50	
E2	1.25	1.40	1.50	
K	0.15	---	---	
L	0.15	0.25	0.35	
aaa	0.05			
bbb	0.07			
ccc	0.10			
ddd	0.05			
eee	0.08			
N	16			3
ND	4			5
NE	4			5
NOTES	1,2			

Figure 5 GSR2701 Package Outline

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PCB Layout Print



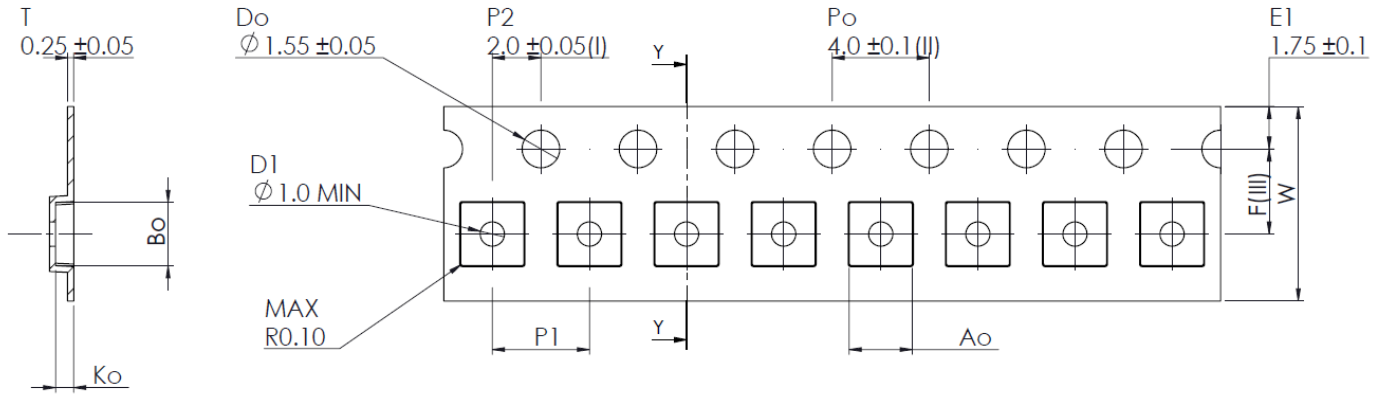
Notes:

1. All dimensions are in millimeters.
2. Unless specified, dimensions are symmetrical about center lines.

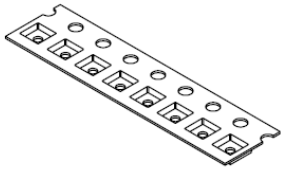
Figure 6 GSR2701 Recommended PCB Footprint

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Tape and Reel Information



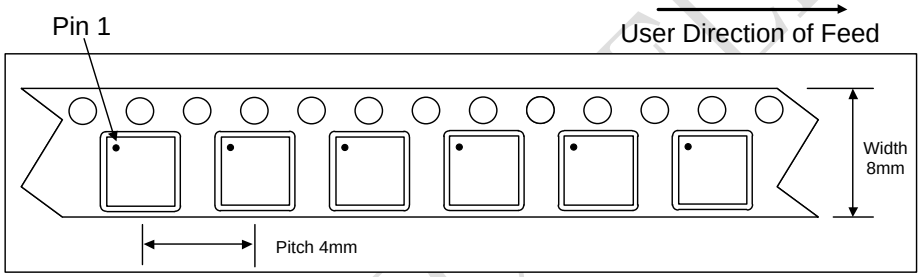
SECTION Y-Y

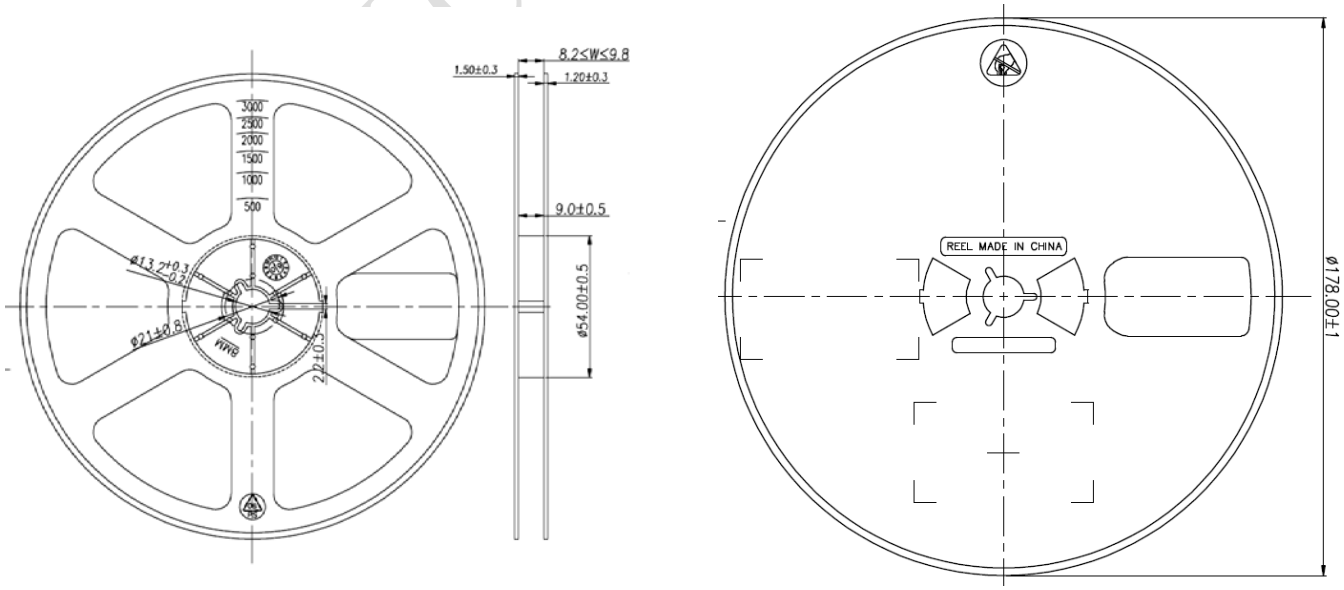


Ao	2.60	+/- 0.1
Bo	2.60	+/- 0.1
Ko	0.75	+/- 0.1
F	3.50	+/- 0.05
P1	4.00	+/- 0.1
W	8.00	+0.3/- 0.1

(I) Measured from centreline of sprocket hole to centreline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20 .
(III) Measured from centreline of sprocket hole to centreline of pocket.
(IV) Other material available.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.





Notes: All dimensions are in millimeters.

Ordering Information

Part Number	Product Description	Package Type	Package Quantity
GSR2701	2.4GHz WLAN Front-End Module	7” tape and reel	3000 pcs / real

Handling Precautions

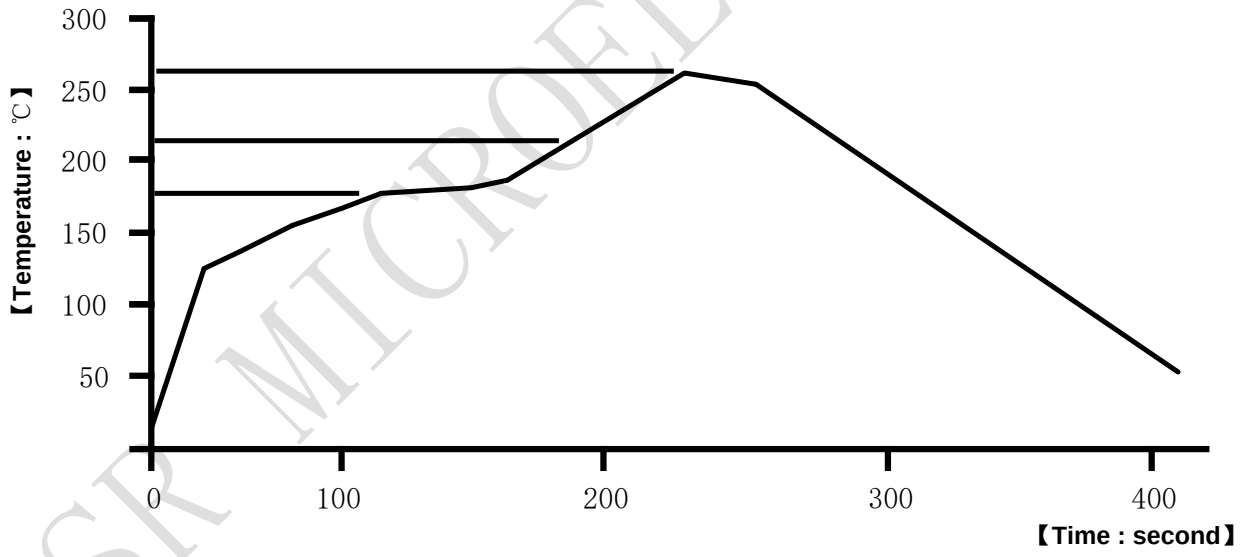
Test Model	ESD Rating	Value	Standard
Human Body Model (HBM)	Class 1C	≥ 1400 V	ESDA /JEDEC JS-001-2017
Charged Device Model (CDM)	Class C3	≥ 2000 V	ESDA /JEDEC JS-002-2018

Caution: Industry-standard ESD precautions should be used at all times.

MLS Rating

MSL Rating	Standard
3	JEDEC Standard IPC/JEDEC J-STD-020

Recommended IR Reflow Profile



Average ramp-up rate (200℃ to peak)	3°C/second max.
Preheat temperature (175±25)℃	60~120 secs
Temperature maintained above 217℃	60~150 secs
Time within 5℃ of actual peak temperature	30 seconds min.
Peak temperature range	(260±2)℃
Ramp down rate	6°C/second max.
Time 25℃ to peak temperature	8 minutes max.

Follow JEDEC spec J-STD-020D

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RoHS Compliant

The product does not contain lead, mercury, cadmium, hexavalent chromium, poly brominated biphenyls (PBB) or poly brominated diphenyl ethers (PBDE), and are therefore considered RoHS compliant.

Version History

Revision	Description
A	Initial release
B	Updated Electrical Specifications&PCB Layout Print&Package Outline
C	Updated Electrical Specification
D	Updated Package Outline
E	Updated Tape and Reel Information &Ordering information &Recommended IR Reflow Profile& RoHs compliant
F	Evaluation Board Schematic
G	Evaluation Board Schematic
H	Updated Electrical Specification

GSR MICROELECTRONICS

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