

GENERAL DESCRIPTION

The SGM33685L2 is a high performance RF front-end module (FEM), which integrates a power amplifier (PA), low noise amplifier (LNA), SP3T T/R switch, and a controller inside.

The device is designed for IoT and industrial applications supporting the frequency range from 423MHz to 510MHz. External V_{REF} is not required.

The SGM33685L2 is available in a Green TLGA-4×4-24L package.

FEATURES

- **VCC0/VCC1/VCC2 Supply Voltage:** 3.2V to 5.0V
- **Saturated Power**
 - ♦ 33.9dBm at $V_{CC} = 5.0V$, 423MHz to 443MHz
 - ♦ 33.2dBm at $V_{CC} = 5.0V$, 470MHz to 510MHz
- **RX Noise Figure**
 - ♦ 1.9dB at $V_{CC} = 5.0V$, 423MHz to 443MHz
 - ♦ 1.8dB at $V_{CC} = 5.0V$, 470MHz to 510MHz
- **Integrated LNA with Bypass**
- **Controller Integrated**
- **Available in a Green TLGA-4×4-24L Package**
(MSL3, 260°C per JEDEC J-STD-020)

APPLICATIONS

Internet of Things
Industrial Applications
Smart Meters

BLOCK DIAGRAM

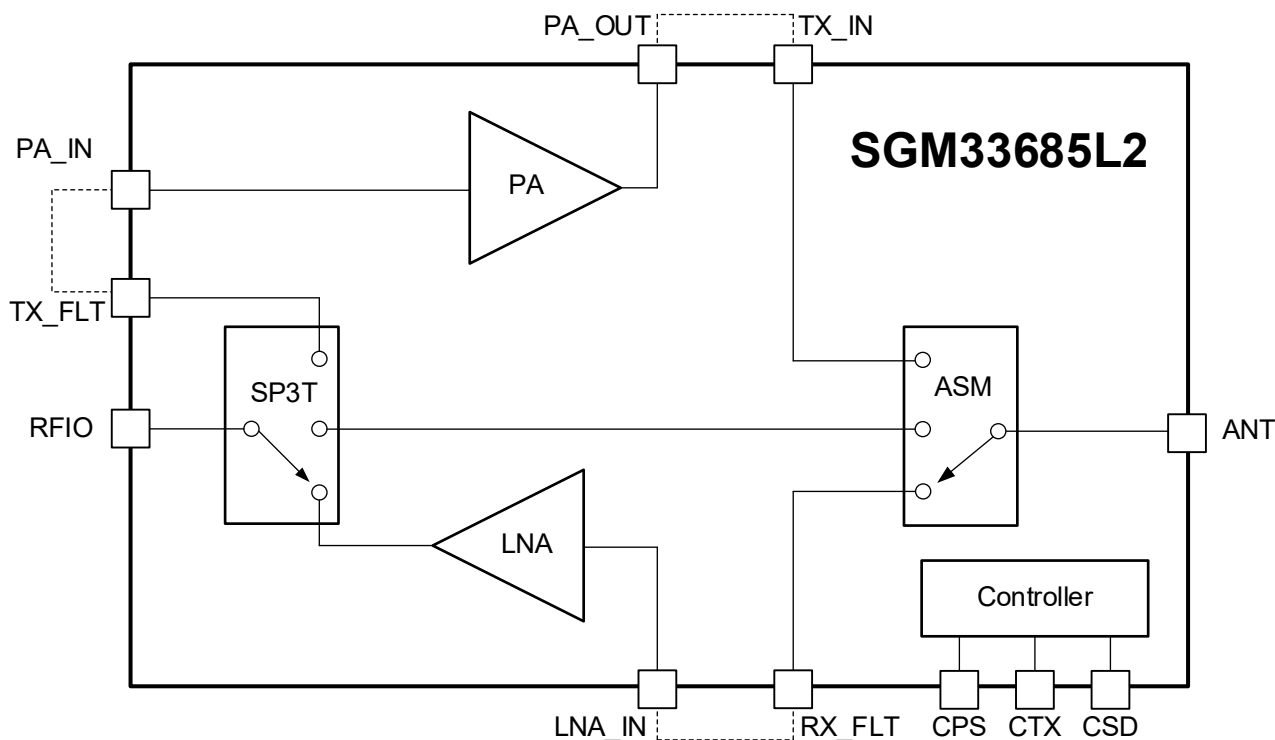


Figure 1. SGM33685L2 Block Diagram

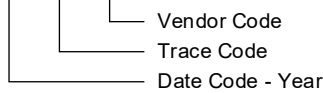
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM33685L2	TLGA-4×4-24L	-40°C to +105°C	SGM33685L2GTLAM24G/TR	SGM2A7 GTLAM24 XXXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.

XXXXX



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage V_{CC0} , V_{CC1} , V_{CC2}	5.5V
Control Voltage, CPS, CSD, CTX	3.6V
Max TX Input Power, P_{IN}	15dBm
Max RX Input Power, P_{IN}	15dBm
Package Thermal Resistance	
TLGA-4×4-24L, θ_{JA}	34.4°C/W
TLGA-4×4-24L, θ_{JB}	10.3°C/W
TLGA-4×4-24L, θ_{JC} (TOP)	42.1°C/W
TLGA-4×4-24L, θ_{JC} (BOT)	7.2°C/W
Storage Temperature Range	-40°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility ^{(1) (2)}	
HBM	±900V
CDM	±2000V

NOTES:

- For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
- For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Operating Frequency Range, f_0	423MHz to 443MHz
Operating Frequency Range, f_1	470MHz to 510MHz
Supply Voltage, V_{CC0} , V_{CC1} , V_{CC2}	3.2V to 5.0V
Control Voltage, CPS _{IH} , CSD _{IH} , CTX _{IH}	1.55V to 3.3V
Control Voltage, CPS _{IL} , CSD _{IL} , CTX _{IL}	0V to 0.45V
Operating Ambient Temperature Range	-40°C to +105°C
Operating Ambient Temperature Range (TX Power > 30dBm)	-40°C to +85°C

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

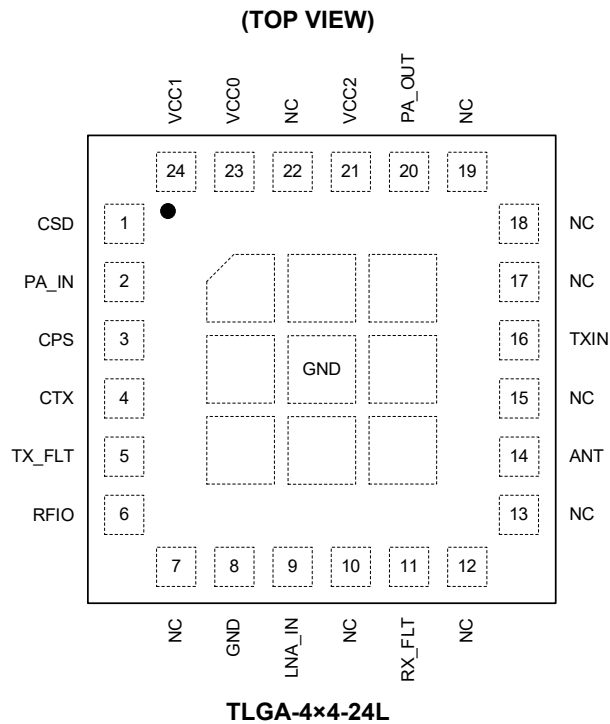
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION



PIN DESCRIPTION

PIN	NAME	FUNCTION
1	CSD	Control Input Shutdown.
2	PA_IN	PA Input from TX_FLT Pin.
3	CPS	RX Path Select Control.
4	CTX	TX Enable.
5	TX_FLT	TX Input from SP2T.
6	RFIO	TX Input from Transceiver/RX Output to Transceiver.
7, 10, 12, 13, 15, 17, 18, 19, 22	NC	No Connection.
8	GND	Ground.
9	LNA_IN	LNA Input (from RX_FLT).
11	RX_FLT	RX Signal from Antenna.
14	ANT	Antenna Port.
16	TXIN	TX Input from PA_OUT Pin.
20	PA_OUT	TX Output to TXIN Pin.
21	VCC2	Supply Voltage 2 for FEM.
23	VCC0	Supply Voltage 0 for FEM.
24	VCC1	Supply Voltage 1 for FEM.
Exposed Pad	GND	Exposed Pad. Must be connected to ground.

CONTROL LOGIC

Mode	CPS	CSD	CTX
RX LNA Bypass Mode-ANT	0	1	0
RX LNA Mode-ANT	1	1	0
TX-ANT EN	X	1	1
Sleep Mode	0	0	0

TIMING SEQUENCE

The SGM33685L2 recommended control timing for high power mode operation is shown below. The control signal CTX/CPS/CSD must be set after VCC0/VCC1/VCC2 has been applied at least $t_1 = 1\mu\text{s}$. The control signal CTX/CPS/CSD shall be turned off before $1\mu\text{s}$ of the falling stage of VCC0/VCC1/VCC2.

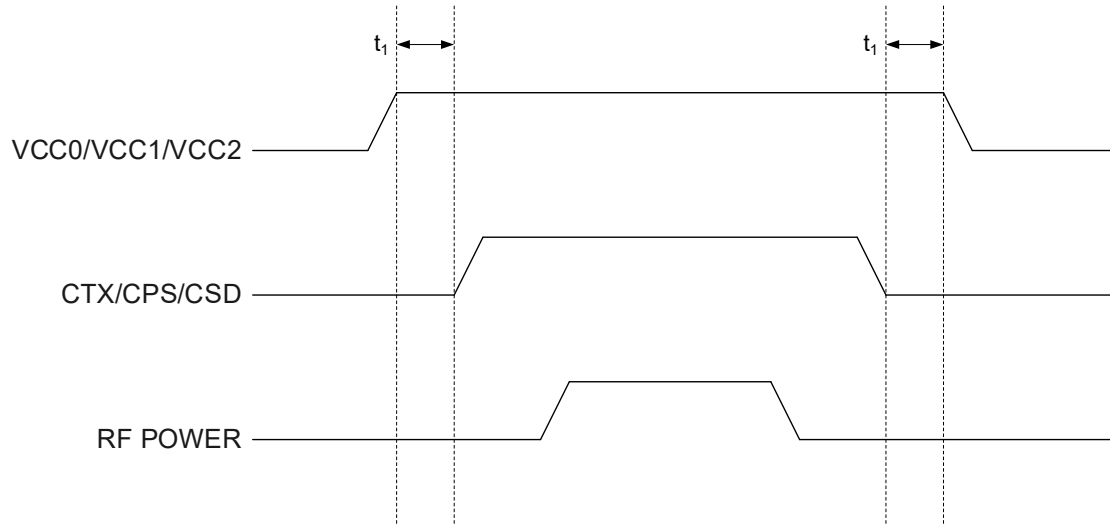


Figure 2. Detail Timing Sequence

TYPICAL APPLICATION CIRCUIT (423MHz to 443MHz)

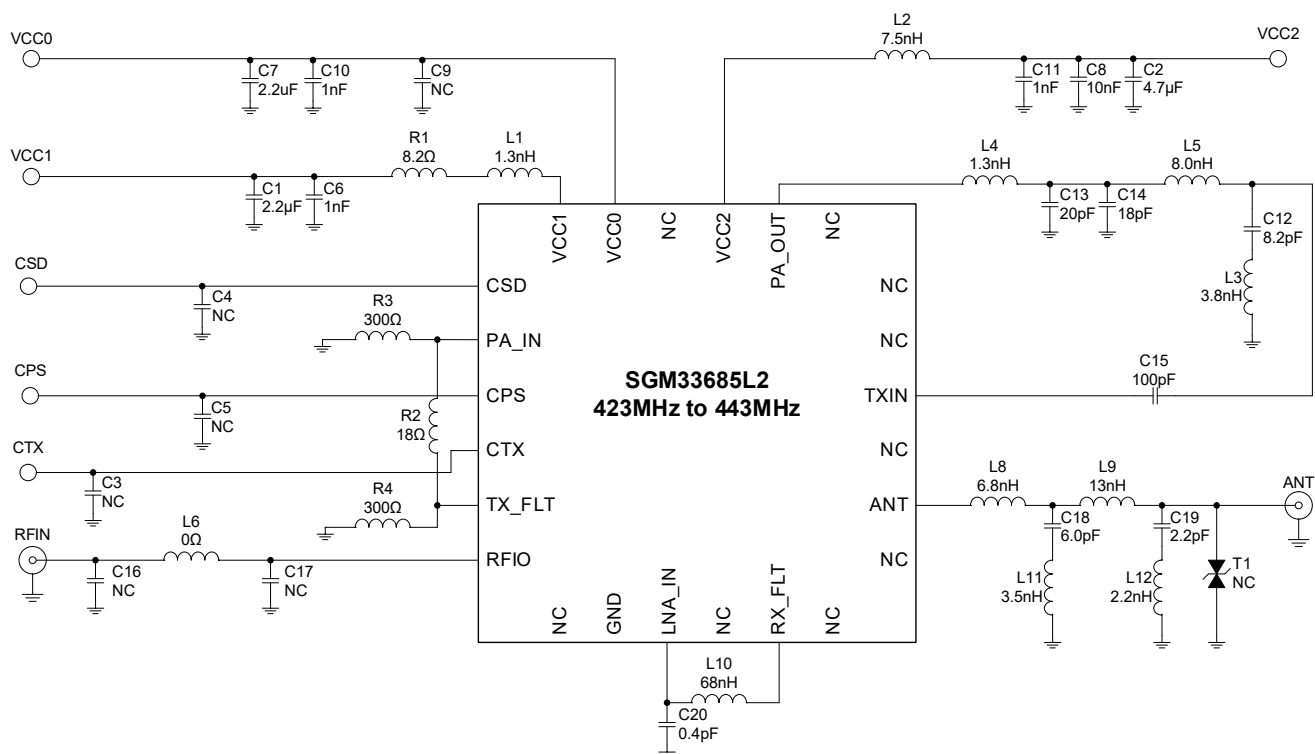


Figure 3. SGM33685L2 Typical Application Circuit

TYPICAL APPLICATION CIRCUIT (470MHz to 510MHz)

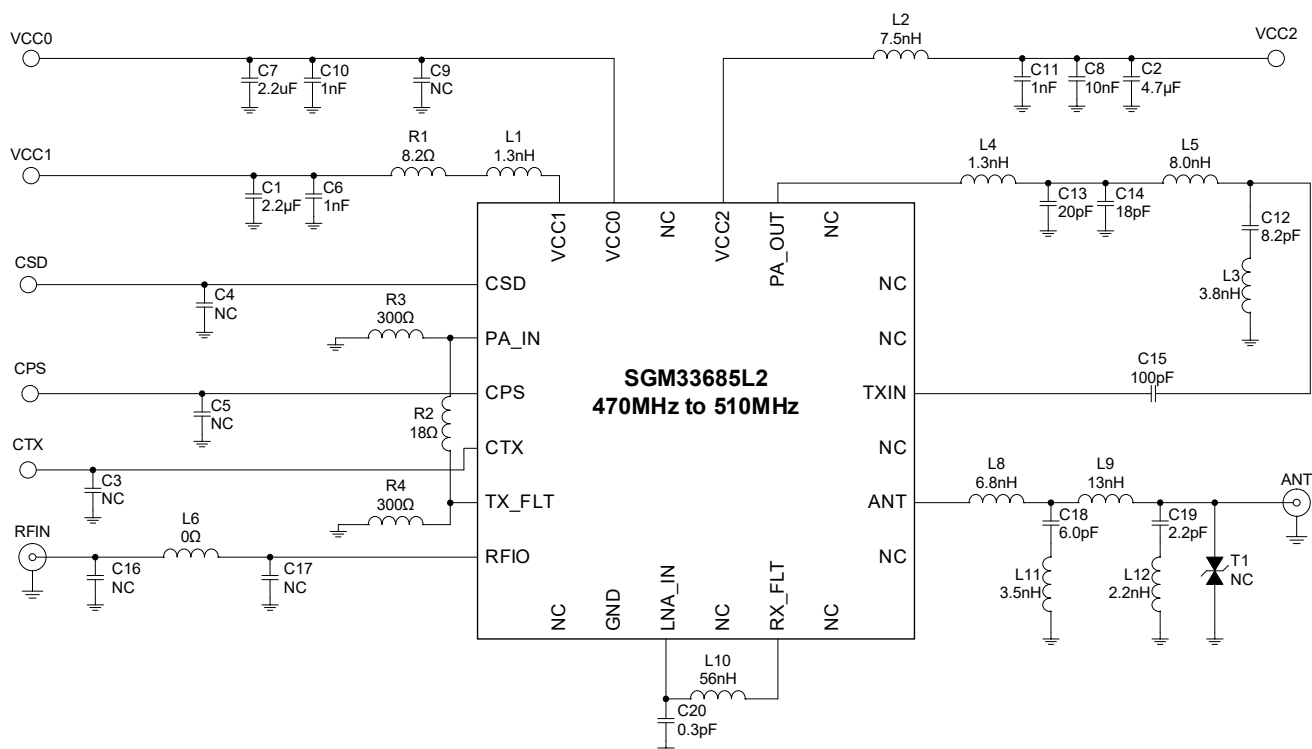
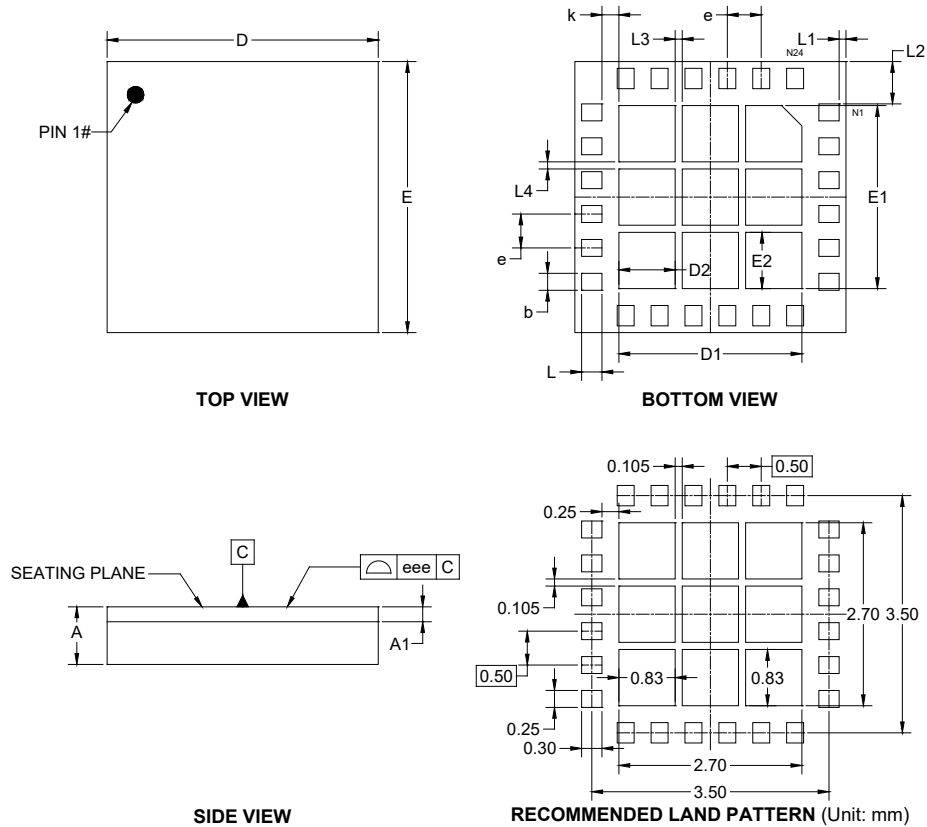


Figure 4. SGM33685L2 Typical Application Circuit

PACKAGE OUTLINE DIMENSIONS

TLGA-4×4-24L



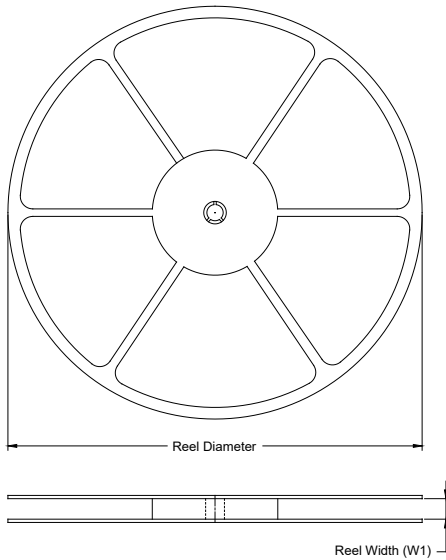
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.800	-	0.900
A1	0.220 REF		
b	0.200	-	0.300
D	3.900	-	4.100
E	3.900	-	4.100
D1	2.600	-	2.800
D2	0.830 REF		
E1	2.600	-	2.800
E2	0.830 REF		
e	0.500 BSC		
k	0.250 REF		
L	0.250	-	0.350
L1	0.100 REF		
L2	0.625 REF		
L3	0.105 REF		
L4	0.105 REF		
eee	0.100		

NOTE: This drawing is subject to change without notice.

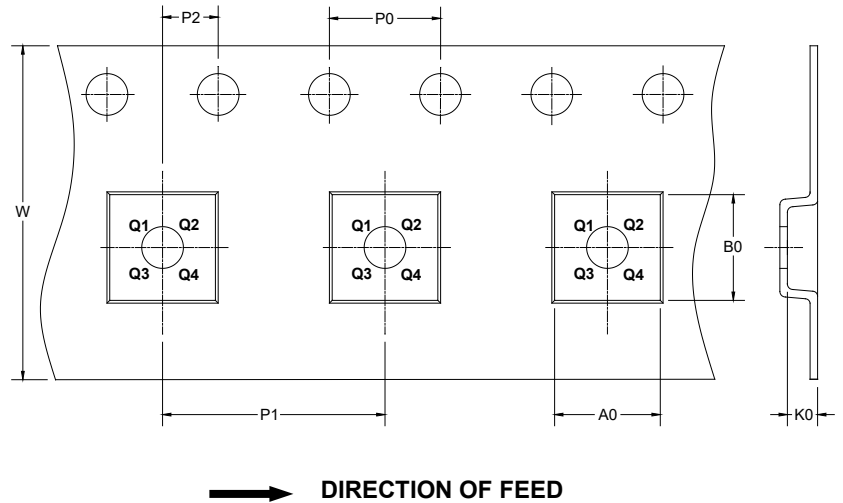
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

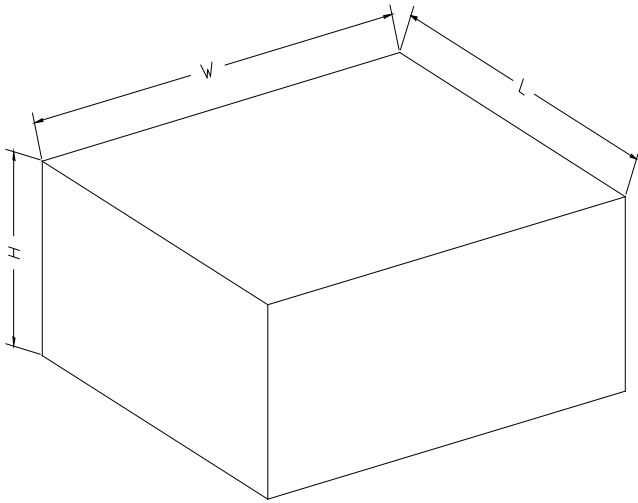
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TLGA-4×4-24L	13"	12.4	4.30	4.30	1.10	4.0	8.0	2.0	12.0	Q2

DD0001

PACKAGE INFORMATION

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
13"	386	280	370	5

DD0002