SOON

SON3130

PRODUCT DESCRIPTION

The SON3130 is designed for heart rate output with SON1303(heart rate sensor) offering low cost. It has a wide input common mode voltage range and output voltage swing, and takes the minimum operating supply voltage down to 2.1V. The maximum recommended supply voltage is 5.5V. It is specified over the extended -40℃ to +85℃ temperature range.

The SON3130 provides 1MHz bandwidth at a low current consumption of 60μA .Very low input bias currents of 10pA enable SON3130 to be used for the heart rate sensors.

The SON3130 is offered in the Green TQFN-3×3-16L package.

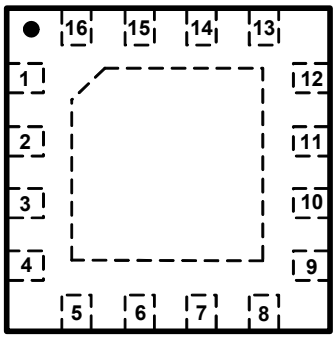
APPLICATIONS

Heart rate chips

FEATURES

- **Low Cost**
- **Rail-to-Rail Input and Output**
  0.8mV Typical V_{OS}
- **Unity Gain Stable**
- **Gain-Bandwidth Product: 1MHz**
- **Very Low Input Bias Current: 10pA**
- **Supply Voltage Range: 2.1V to 5.5V**
- **Input Voltage Range:**
  -0.1V to +5.6V with V_S = 5.5V
- **Low Supply Current: 60μA**
- **Available in Green TQFN-3×3-16L Package**

PIN CONFIGURATION (TOP VIEW)



TQFN-3×3-16L

PACKAGE/ORDERING INFORMATION

MODEL	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SON3130	TQFN-3×3-16L	-40℃ to +85℃	SON3130YTQ16G/TR	3130TQ XXXX	Tape and Reel, 3000

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, $+V_S$ to $-V_S$.....6V
Common Mode Input Voltage
..... ($-V_S$) - 0.3V to ($+V_S$) + 0.3V
Storage Temperature Range.....-65℃ to +150℃
Junction Temperature.....150℃
Operating Temperature Range.....-40℃ to +85℃
Lead Temperature (Soldering 10sec).....260℃
ESD Susceptibility
HBM.....4000V
MM.....400V

NOTE:
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SOON 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 very small parametric changes could cause the device not to meet its published specifications.

SOON reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SOON sales office to get the latest datasheet.

ELECTRICAL CHARACTERISTICS

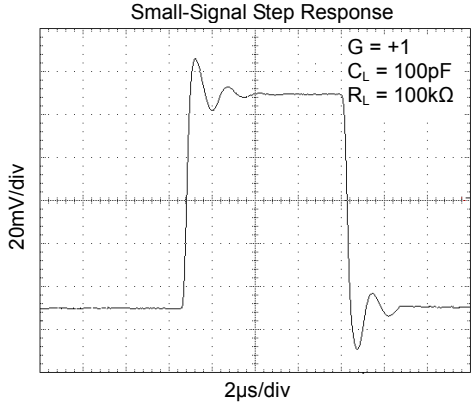
(At V_S = +5V, R_L = 100kΩ connected to V_S/2, and V_{OUT} = V_S/2, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	SON3130				
			TYP	MIN/MAX OVER TEMPERATURE			
			+25℃	+25℃	-40℃ to +85℃	UNITS	MIN/MAX
INPUT CHARACTERISTICS							
Input Offset Voltage	V_{OS}	V_{CM} = V_S/2	0.8	5	5.6	mV	MAX
Input Bias Current	I_B		10			pA	TYP
Input Offset Current	I_{OS}		10			pA	TYP
Input Common Mode Voltage Range	V_{CM}	V_S = 5.5V	-0.1 to +5.6			V	TYP
Common Mode Rejection Ratio	CMRR	V_S = 5.5V, V_{CM} = -0.1V to 4V	70	62	62	dB	MIN
		V_S = 5.5V, V_{CM} = -0.1V to 5.6V	68	56	55		
Open-Loop Voltage Gain	A_{OL}	R_L = 5kΩ, V_O = +0.1V to +4.9V	80	70	70	dB	MIN
		R_L = 100kΩ, V_O = +0.035V to +4.965V	84	80	80		
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta_T$		2.7			μV/℃	TYP
OUTPUT CHARACTERISTICS							
Output Voltage Swing from Rail	V_{OH}	R_L = 100kΩ	4.997	4.980	4.970	V	MIN
	V_{OL}	R_L = 100kΩ	5	20	30	mV	MAX
	V_{OH}	R_L = 10kΩ	4.992	4.970	4.960	V	MIN
	V_{OL}	R_L = 10kΩ	8	30	40	mV	MAX
Output Current	I_{SOURCE}	R_L = 10Ω to V_S/2	84	60	45	mA	MIN
	I_{SINK}		75	60	45		
POWER SUPPLY							
Operating Voltage Range				2.1	2.5	V	MIN
				5.5	5.5	V	MAX
Power Supply Rejection Ratio	PSRR	V_S = +2.5V to +5.5V, V_{CM} = +0.5V	82	60	58	dB	MIN
Quiescent Current	I_Q		60	80	86	μA	MAX
DYNAMIC PERFORMANCE (C_L = 100pF)							
Gain-Bandwidth Product	GBP		1			MHz	TYP
Slew Rate	SR	G = +1, 2V Output Step	0.52			V/μs	TYP
Settling Time to 0.1%	t_S	G = +1, 2V Output Step	5.3			μs	TYP
Overload Recovery Time		V_{IN} ·Gain = V_S	2.6			μs	TYP
NOISE PERFORMANCE							
Voltage Noise Density	e_n	f = 1kHz	27			nV/$\sqrt{Hz}$	TYP
		f = 10kHz	20			nV/$\sqrt{Hz}$	TYP

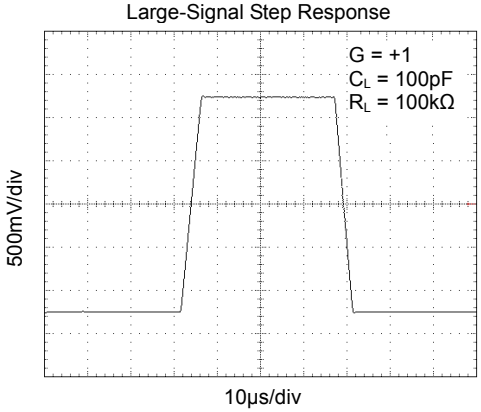
TYPICAL PERFORMANCE CHARACTERISTICS

At T_A = +25°C, V_S = +5V, and R_L = 100kΩ connected to V_S/2, unless otherwise noted.

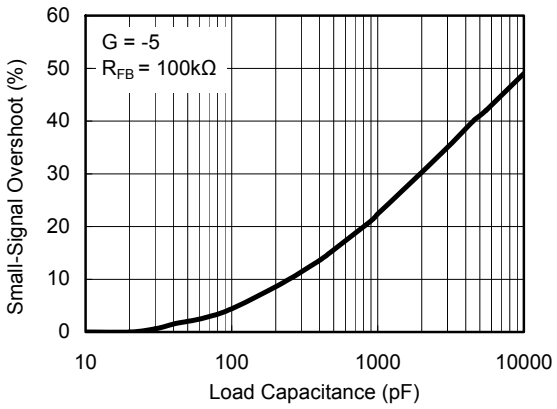
Small-Signal Step Response



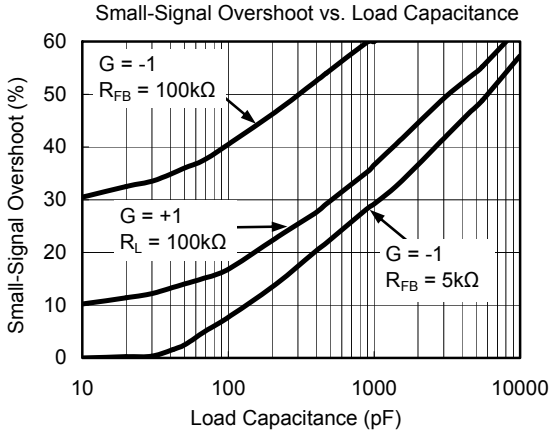
Large-Signal Step Response



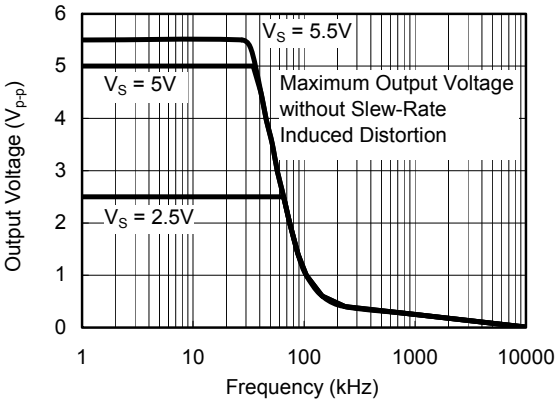
Small-Signal Overshoot vs. Load Capacitance



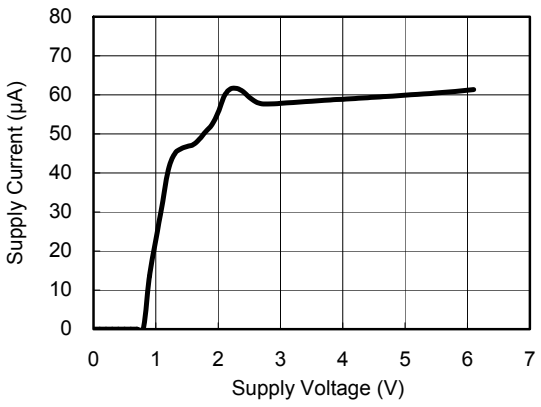
Small-Signal Overshoot vs. Load Capacitance



Maximum Output Voltage vs. Frequency



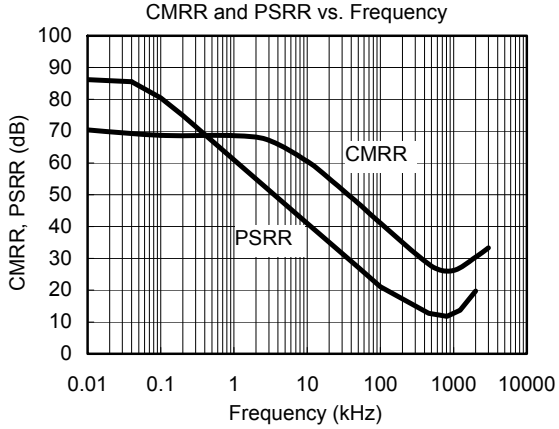
Supply Current vs. Supply Voltage



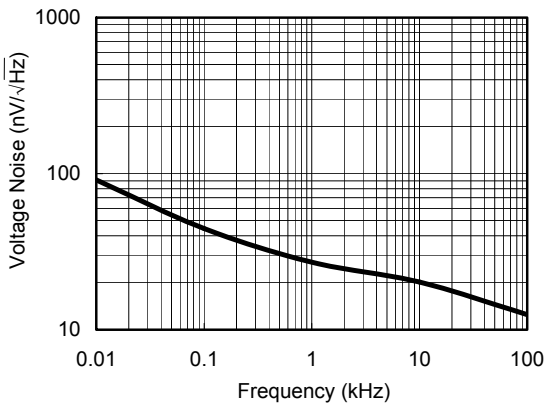
TYPICAL PERFORMANCE CHARACTERISTICS

At T_A = +25℃, V_S = +5V, and R_L = 100kΩ connected to V_S/2, unless otherwise noted.

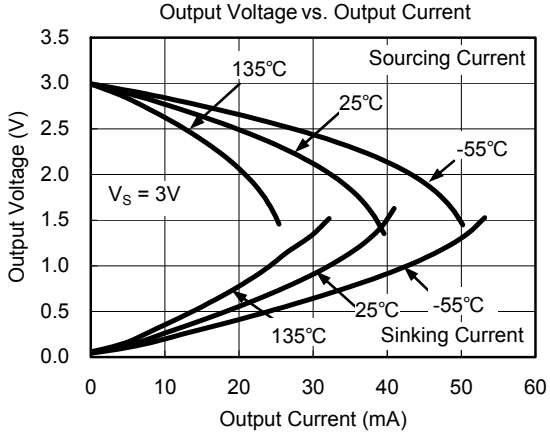
CMRR and PSRR vs. Frequency



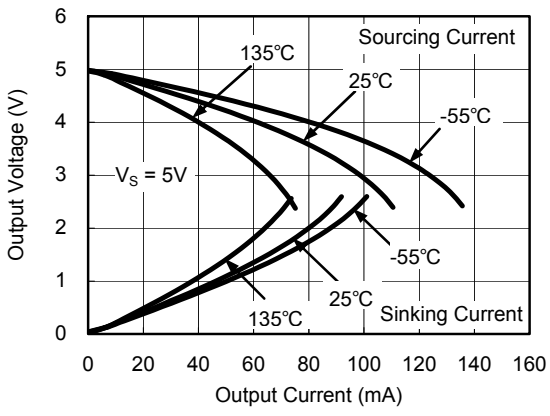
Input Voltage Noise Spectral Density vs. Frequency



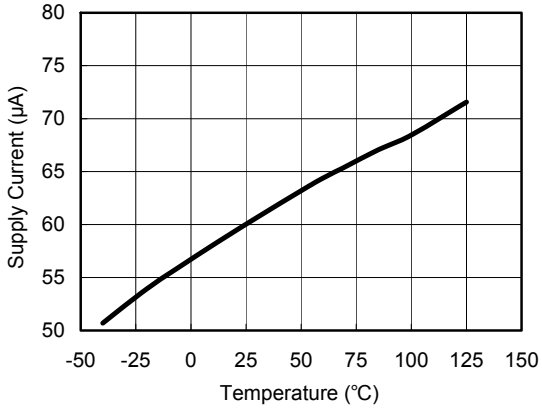
Output Voltage vs. Output Current



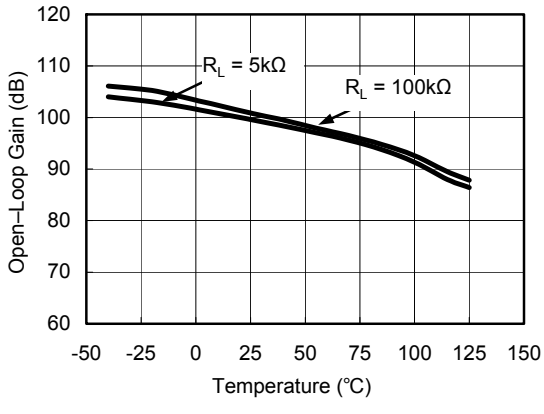
Output Voltage vs. Output Current



Supply Current vs. Temperature



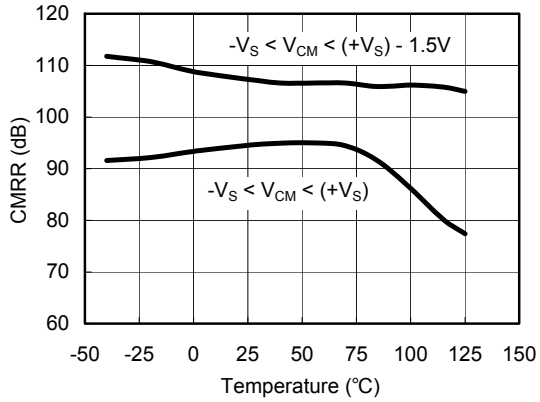
Open-Loop Gain vs. Temperature



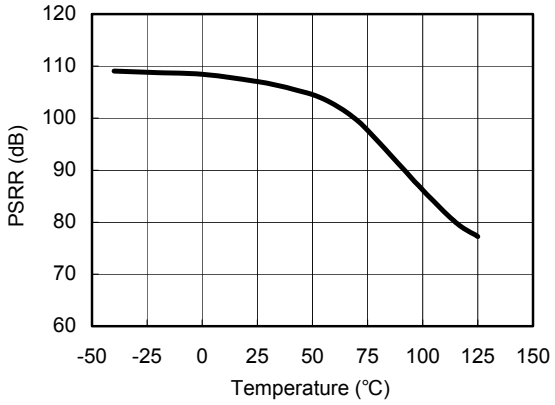
TYPICAL PERFORMANCE CHARACTERISTICS

At T_A = +25℃, V_S = +5V, and R_L = 100kΩ connected to V_S/2, unless otherwise noted.

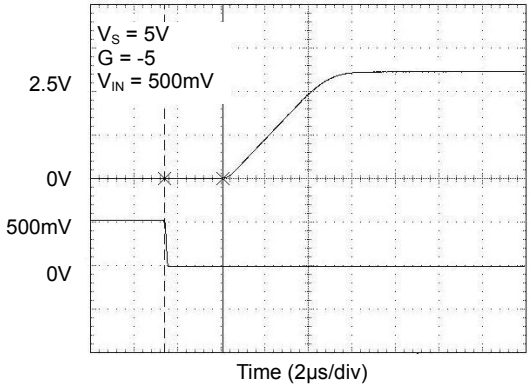
Common Mode Rejection Ratio vs. Temperature



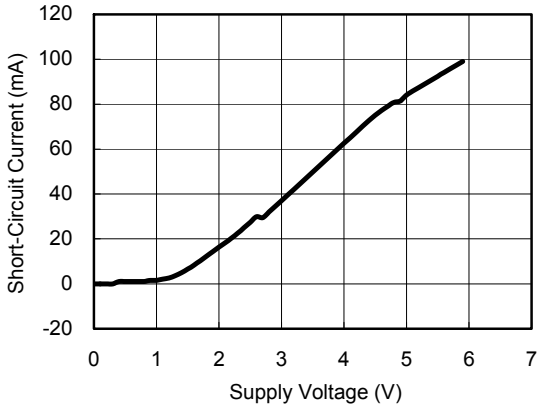
Power Supply Rejection Ratio vs. Temperature



Overload Recovery Time

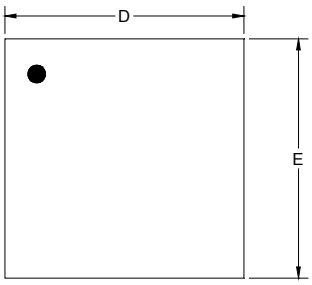


Short-Circuit Current vs. Supply Voltage

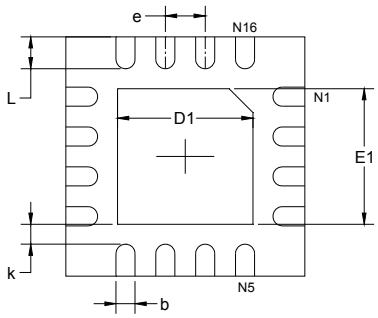


PACKAGE OUTLINE DIMENSIONS

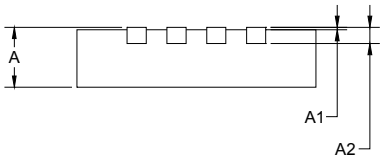
TQFN-3×3-16L



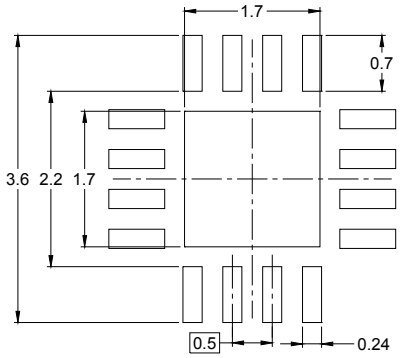
TOP VIEW



BOTTOM VIEW



SIDE VIEW

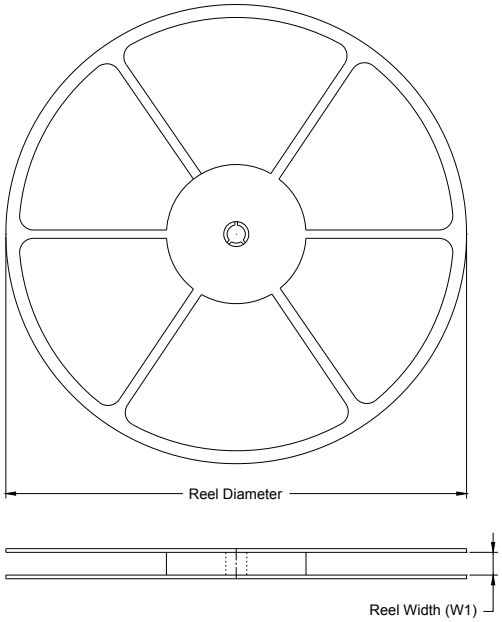


RECOMMENDED LAND PATTERN (Unit: mm)

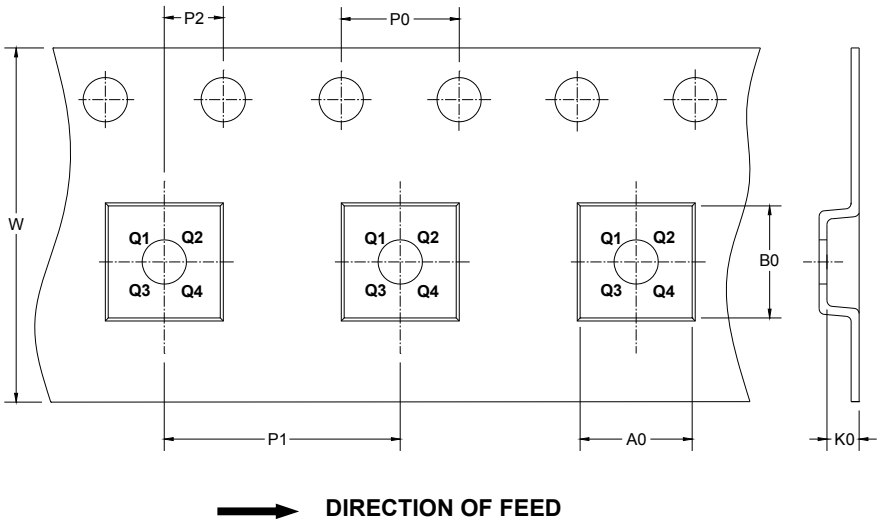
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	1.600	1.800	0.063	0.071
E	2.900	3.100	0.114	0.122
E1	1.600	1.800	0.063	0.071
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.500 TYP		0.020 TYP	
L	0.300	0.500	0.012	0.020

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS

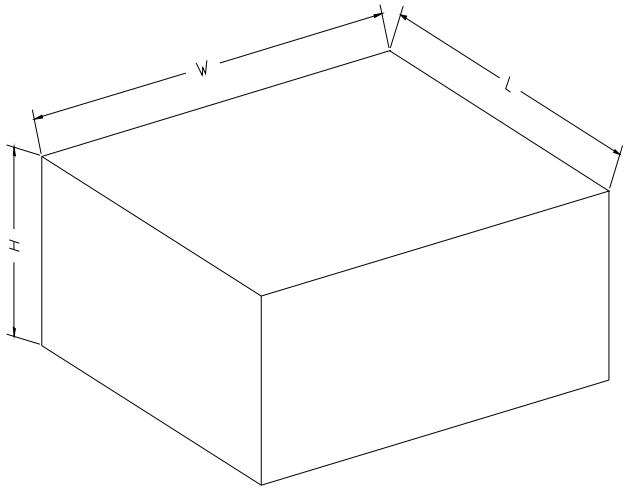


NOTE: The picture is only for reference. Please make the object as the standard.

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
TQFN-3×3-16L	13″	12.40	3.35	3.35	1.13	4.00	4.00	2.00	12.00	Q1

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