SGM6607
1.1A High Voltage Boost Converter in Small Packages

GENERAL DESCRIPTION

The SGM6607 is a high voltage switching regulator. It integrates a 40V low-side MOSFET to offer an output voltage up to 38V. It also accepts a wide input voltage range of 3V to 20V from multi-cell batteries or regulated 5V/12V power rails. A 1.2MHz switching frequency makes the use of low-profile inductors and low-value ceramic input and output capacitors available.

The device supports boost, SEPIC and some other standard switching-regulator topologies. The device regulates the output with PWM (pulse width modulation) control. This device also includes the built-in functions of output over-voltage protection, over-current limit, soft-start and thermal shutdown.

The SGM6607 is available in Green TDFN-2×2-6L and TSOT-23-6 packages and is rated over the -40℃ to +85℃ temperature range.

FEATURES

- **Input Voltage Range: 3V to 20V**
- **38V (MAX) High Output Voltage**
- **Integrated Switch of 1.1A**
- **Fixed Switching Frequency of 1.2MHz**
- **41V Over-Voltage Protection**
- **At 5V Input (TYP):**
  12V at 300mA
  24V at 150mA
- **93% Peak Efficiency**
- **500kΩ Pull-Down Resistor on EN Pin**
- **Light Load Skip-Switching**
- **Soft-Start and Thermal Shutdown Built-in Functions**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in Green TDFN-2×2-6L and TSOT-23-6 Packages**

APPLICATIONS

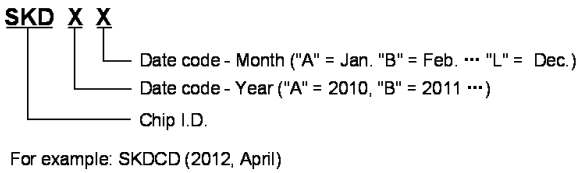
Mobile Phones
Portable Equipment

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM6607	TDFN-2×2-6L	-40℃ to +85℃	SGM6607YTDI6G/TR	6607 XXXX	Tape and Reel, 3000
	TSOT-23-6	-40℃ to +85℃	SGM6607YTN6G/TR	SKDXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code. XXXX = Date Code.



For example: SKDCD (2012, April)

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 on VIN ..... -0.3V to 22V
Voltage on EN ..... -0.3V to 5V
Voltages on FB and COMP ..... -0.3V to 3V
Voltage on SW ..... -0.3V to 40V
Junction Temperature ..... +150℃
Package Thermal Resistance
TDFN-2×2-6L, θ_{JA} ..... 120℃/W
TSOT-23-6, θ_{JA} ..... 190℃/W
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 4000V
MM 300V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range ..... -40℃ to +85℃

OVERSTRESS CAUTION

Stresses beyond those listed may cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational section of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

ESD SENSITIVITY CAUTION

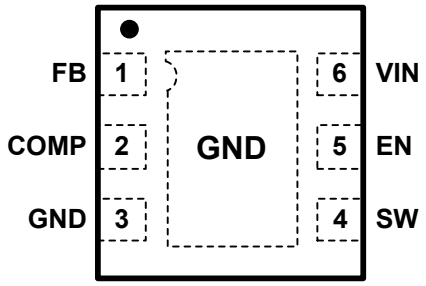
This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time.

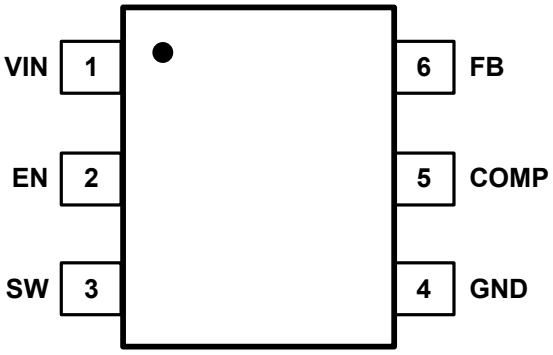
PIN CONFIGURATIONS

(TOP VIEW)



TDFN-2×2-6L

(TOP VIEW)



TSOT-23-6

PIN DESCRIPTION

PIN		NAME	I/O	FUNCTION
TDFN-2×2-6L	TSOT-23-6			
6	1	VIN	I	The Input Supply Pin.
5	2	EN	I	Enable Pin of the Boost Regulator. Logic low makes the device disabled. Logic high makes the device enabled.
4	3	SW	I	Switching Node. Connect SW to the switched side of the inductor.
3	4	GND	O	Ground.
2	5	COMP	O	Output of the Transconductance Error Amplifier. Connect an external RC network to this pin to compensate the regulator.
1	6	FB	I	Feedback Pin. Connect to the center tap of a resistor divider to program the output voltage.
Thermal Pad	—	GND	—	Solder the thermal pad to the analog ground plane and recommend to connect thermal vias to the ground plane when available.

ELECTRICAL CHARACTERISTICS

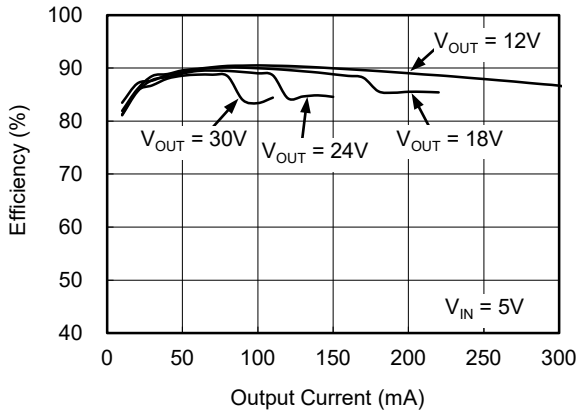
(V_{IN} = 3.6V, V_{EN} = V_{IN}, Full = -40℃ to +85℃, typical values are at T_A = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
SUPPLY CURRENT							
Input Voltage Range	V_{IN}		+25℃	3		20	V
Operating Quiescent Current into VIN	I_Q	Device PWM switching no load	+25℃		400	600	μA
Shutdown Current	I_{SHDN}	V_{EN} = GND, V_{IN} = 4.2V	+25℃			1	μA
Under-Voltage Lockout Threshold	UVLO	V_{IN} falling	+25℃		2.2	2.5	V
Under-Voltage Lockout Hysteresis	V_{HYS}		+25℃		70		mV
ENABLE AND REFERENCE CONTROL							
EN Logic High Voltage	V_{IH}	V_{IN} = 3V to 20V	Full	1.5			V
EN Logic Low Voltage	V_{IL}	V_{IN} = 3V to 20V	Full			0.4	V
EN Pull-Down Resistor	R_{EN}		+25℃	300	500	700	kΩ
VOLTAGE AND CURRENT CONTROL							
Voltage Feedback Regulation Voltage	V_{REF}		Full	1.186	1.211	1.236	V
Voltage Feedback Input Bias Current	I_{FB}	V_{FB} = 1.3V	Full			200	nA
Oscillator Frequency	f_{OSC}		Full	0.96	1.2	1.44	MHz
Maximum Duty Cycle	D	V_{FB} = 1.1V	+25℃	90	94		%
Minimum ON Pulse Width	t_{MIN_ON}		+25℃		80		ns
COMP Pin Sink Current	I_{SINK}		+25℃		55		μA
COMP Pin Source Current	I_{SOURCE}		+25℃		55		μA
Error Amplifier Transconductance	G_{EA}		Full	220	300	440	μmho
POWER SWITCH							
N-Channel MOSFET On-Resistance	$R_{DS(ON)}$	V_{IN} = 3.6V	+25℃		0.36	0.55	Ω
		V_{IN} = 3.0V	+25℃			0.6	
N-Channel Leakage Current	I_{LN_NFET}	V_{SW} = 35V, V_{EN} = 0V	+25℃			1	μA
OC AND SS							
N-Channel MOSFET Current Limit	I_{LIM}		+25℃	0.8	1.1	1.3	A
V_{REF} Ramp Up Time	t_r		+25℃		2		ms
THERMAL SHUTDOWN							
Thermal Shutdown Threshold	T_{SHDN}				150		℃
Thermal Shutdown Threshold Hysteresis	T_{HYS}				15		℃

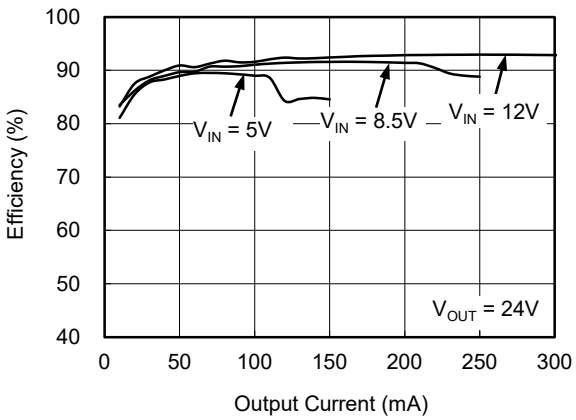
TYPICAL PERFORMANCE CHARACTERISTICS

T_A = +25℃, L = 10μH, D1 = ONsemi MBR0540T1, unless otherwise noted.

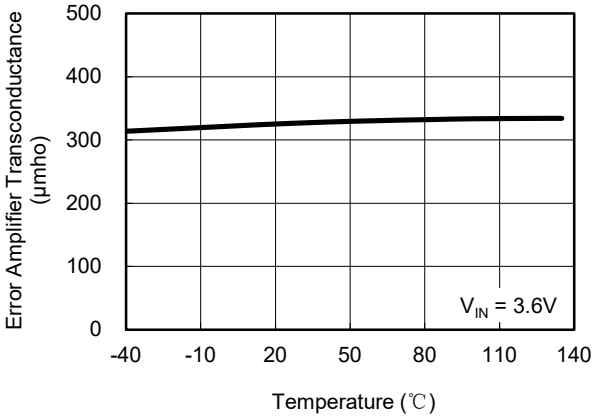
Efficiency vs. Output Current



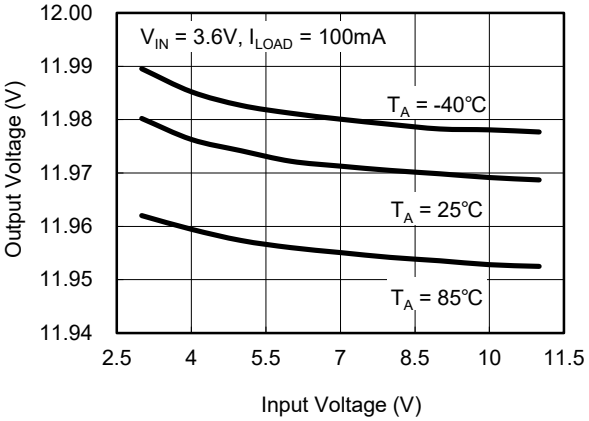
Efficiency vs. Output Current



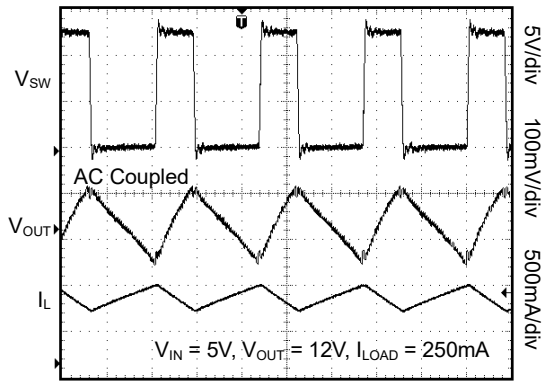
Error Amplifier Transconductance vs. Temperature



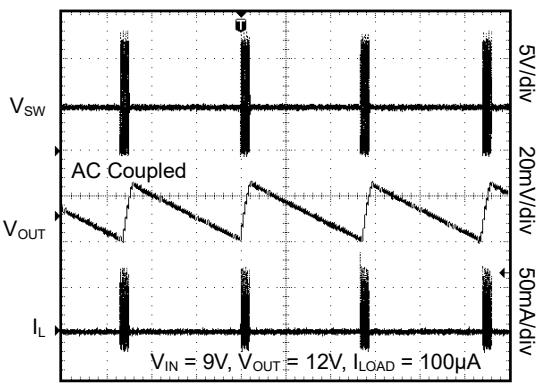
Output Voltage vs. Input Voltage



PWM Switching Operation



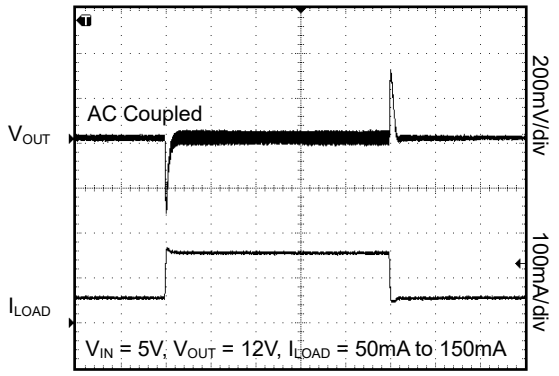
Skip-Cycle Switching



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

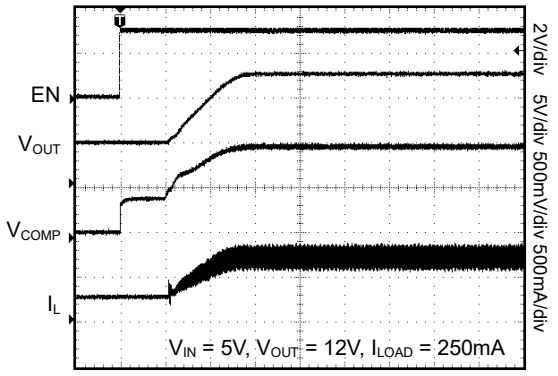
T_A = +25℃, L = 10μH, D1 = ONsemi MBR0540T1, unless otherwise noted.

Load Transient Response



Time (1ms/div)

Start-Up



Time (1ms/div)

REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

FEBRUARY 2018 – REV.A to REV.A.1

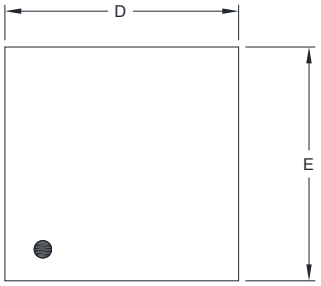
Updated Package Thermal Resistance of TDFN-2×2-6L	2

Changes from Original (FEBRUARY 2014) to REV.A

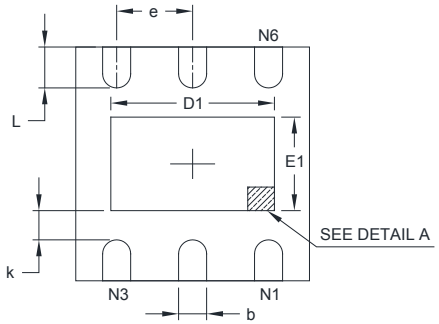
Changed from product preview to production data	All

PACKAGE OUTLINE DIMENSIONS

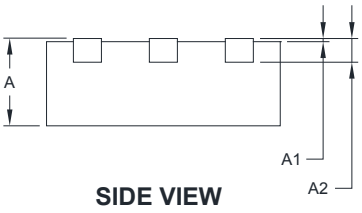
TDFN-2×2-6L



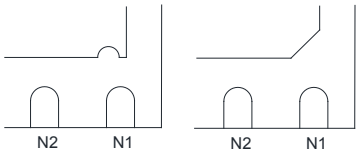
TOP VIEW



BOTTOM VIEW



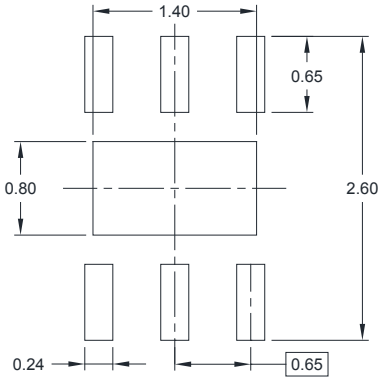
SIDE VIEW



DETAIL A

Pin #1 ID and Tie Bar Mark Options

NOTE: The configuration of the Pin #1 identifier is optional, but must be located within the zone indicated.

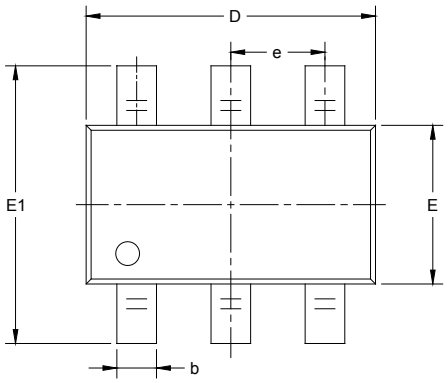


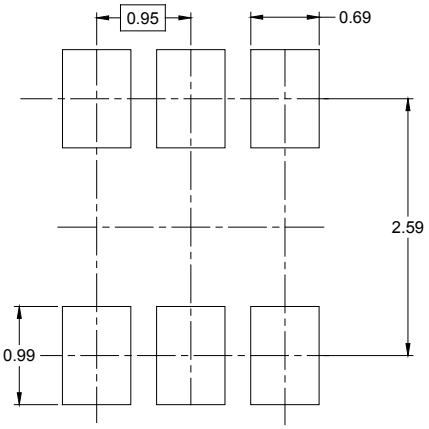
RECOMMENDED LAND PATTERN (Unit: mm)

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	1.900	2.100	0.075	0.083
D1	1.100	1.450	0.043	0.057
E	1.900	2.100	0.075	0.083
E1	0.600	0.850	0.024	0.034
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.650 TYP		0.026 TYP	
L	0.250	0.450	0.010	0.018

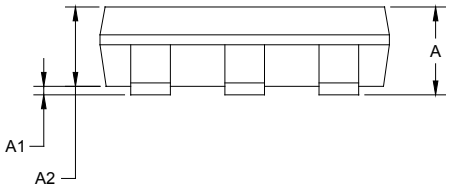
PACKAGE OUTLINE DIMENSIONS

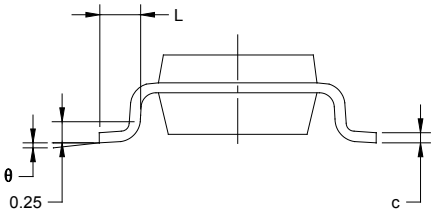
TSOT-23-6





RECOMMENDED LAND PATTERN (Unit: mm)

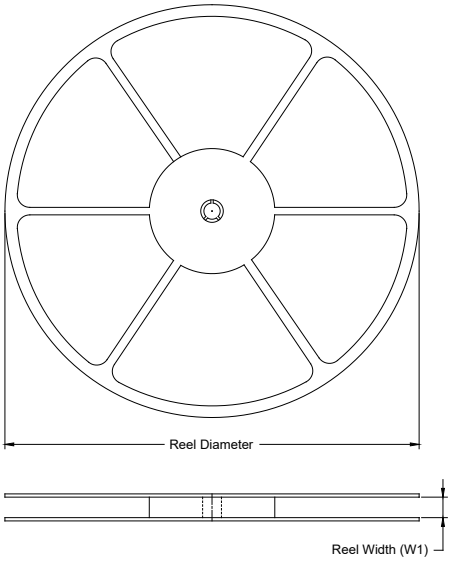




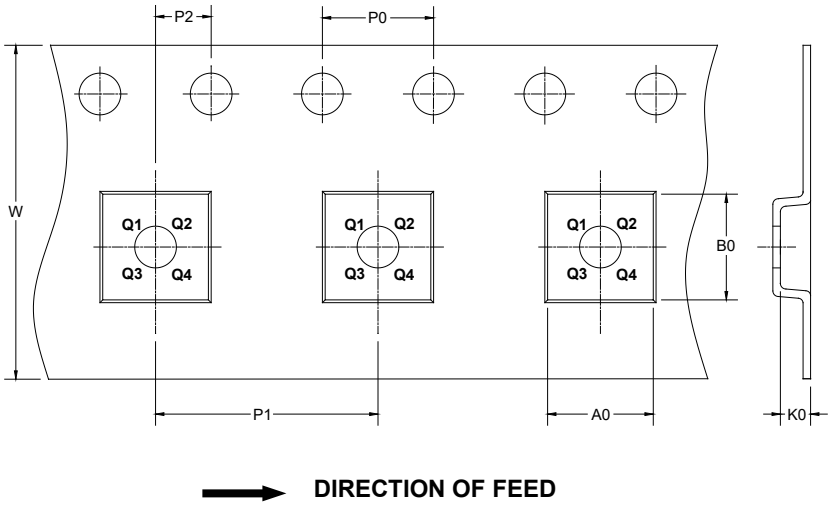
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.000		0.043
A1	0.000	0.100	0.000	0.004
A2	0.700	0.900	0.028	0.039
b	0.300	0.500	0.012	0.020
c	0.080	0.200	0.003	0.008
D	2.850	2.950	0.112	0.116
E	1.550	1.650	0.061	0.065
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



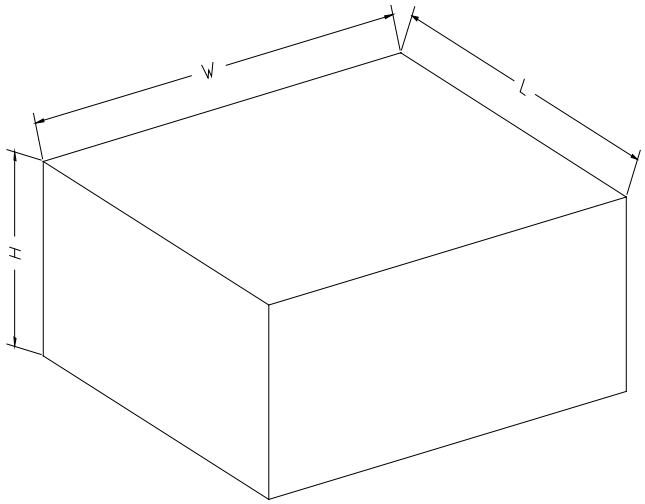
NOTE: The picture is only for reference. Please make the object as the standard.

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
TDFN-2×2-6L	7″	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q1
TSOT-23-6	7″	9.5	3.20	3.10	1.10	4.0	4.0	2.0	8.0	Q3

DD0001

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
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002