SGM2035S
500mA, Low Dropout, Low Power, RF Linear Regulator

GENERAL DESCRIPTION

The SGM2035S is a low dropout and low power linear regulator. It provides 500mA output current capability. The operating input voltage range is from 1.6V to 5.5V. The adjustable output voltage range is from 0.8V to 5.0V.

Other features include logic-controlled shutdown mode, short-circuit current limit and thermal shutdown protection. The SGM2035S has automatic discharge function to quickly discharge V_{OUT} in the disabled status.

The SGM2035S is available in Green UTDFN-1.6×1.6-6L and TDFN-2×2-6L packages. It operates over an operating temperature range of -40℃ to +125℃.

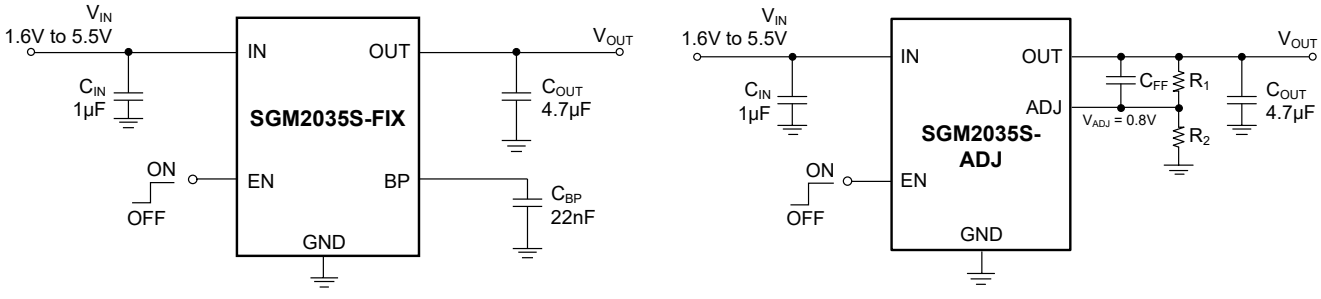
APPLICATIONS

Portable Equipment
Smartphone
Industrial and Medical Equipment

FEATURES

- **Operating Input Voltage Range: 1.6V to 5.5V**
- **Enable Pin Accept Voltages Higher than the Supply Voltage and up to 5.5V**
- **Fixed Output from 1.0V to 3.3V**
- **Adjustable Output from 0.8V to 5.0V**
- **500mA Output Current**
- **Output Voltage Accuracy: ±2.5% at +25℃**
- **Low Dropout Voltage: 275mV (TYP) at V_{OUT} = 3.3V**
- **Shutdown Supply Current: 0.01μA (TYP)**
- **High PSRR: 76dB (TYP) at 1kHz**
- **Turn-On Time: 80μs (TYP)**
- **Current Limiting and Thermal Protection**
- **Excellent Load and Line Transient Responses**
- **With Output Automatic Discharge**
- **Stable with Small Case Size Ceramic Capacitors**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green UTDFN-1.6×1.6-6L and TDFN-2×2-6L Packages**

TYPICAL APPLICATION CIRCUITS



Fixed Output Voltage Version **Adjustable Output Voltage Version**

Figure 1. Typical Application Circuits

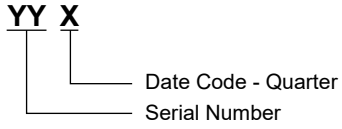
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2035S-ADJ	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-ADJXUDN6G/TR	01X	Tape and Reel, 3000
SGM2035S-1.0	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-1.0XUDN6G/TR	06X	Tape and Reel, 3000
SGM2035S-1.1	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-1.1XUDN6G/TR	07X	Tape and Reel, 3000
SGM2035S-1.2	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-1.2XUDN6G/TR	08X	Tape and Reel, 3000
SGM2035S-1.5	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-1.5XUDN6G/TR	09X	Tape and Reel, 3000
SGM2035S-1.8	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-1.8XUDN6G/TR	04X	Tape and Reel, 3000
SGM2035S-2.5	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-2.5XUDN6G/TR	0AX	Tape and Reel, 3000
SGM2035S-2.8	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-2.8XUDN6G/TR	05X	Tape and Reel, 3000
SGM2035S-3.0	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-3.0XUDN6G/TR	03X	Tape and Reel, 3000
SGM2035S-3.3	UTDFN-1.6×1.6-6L	-40℃ to +125℃	SGM2035S-3.3XUDN6G/TR	02X	Tape and Reel, 3000
SGM2035S-ADJ	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-ADJXTDI6G/TR	0U2 XXXX	Tape and Reel, 3000
SGM2035S-1.0	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-1.0XTDI6G/TR	19D XXXX	Tape and Reel, 3000
SGM2035S-1.1	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-1.1XTDI6G/TR	19E XXXX	Tape and Reel, 3000
SGM2035S-1.2	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-1.2XTDI6G/TR	19F XXXX	Tape and Reel, 3000
SGM2035S-1.5	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-1.5XTDI6G/TR	19G XXXX	Tape and Reel, 3000
SGM2035S-1.8	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-1.8XTDI6G/TR	0U5 XXXX	Tape and Reel, 3000
SGM2035S-2.5	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-2.5XTDI6G/TR	19H XXXX	Tape and Reel, 3000
SGM2035S-2.8	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-2.8XTDI6G/TR	0U6 XXXX	Tape and Reel, 3000
SGM2035S-3.0	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-3.0XTDI6G/TR	0U4 XXXX	Tape and Reel, 3000
SGM2035S-3.3	TDFN-2×2-6L	-40℃ to +125℃	SGM2035S-3.3XTDI6G/TR	0U3 XXXX	Tape and Reel, 3000

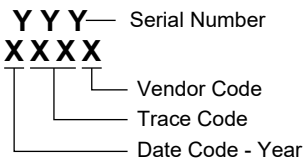
MARKING INFORMATION

NOTE: X = Date Code. XXXX = Date Code, Trace Code and Vendor Code.

UTDFN-1.6×1.6-6L



TDFN-2×2-6L



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

IN to GND ..... -0.3V to 6V
EN to GND ..... -0.3V to 6V
OUT, BP, ADJ to GND ..... -0.3V to (V_{IN} + 0.3V)
Package Thermal Resistance
UTDFN-1.6×1.6-6L, θ_{JA} ..... 102.2℃/W
UTDFN-1.6×1.6-6L, θ_{JB} ..... 62.5℃/W
UTDFN-1.6×1.6-6L, $\theta_{JC(TOP)}$ ..... 106.9℃/W
UTDFN-1.6×1.6-6L, $\theta_{JC(BOT)}$ ..... 29.4℃/W
TDFN-2×2-6L, θ_{JA} ..... 92℃/W
TDFN-2×2-6L, θ_{JB} ..... 57.2℃/W
TDFN-2×2-6L, $\theta_{JC(TOP)}$ ..... 110.3℃/W
TDFN-2×2-6L, $\theta_{JC(BOT)}$ ..... 25.3℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 3000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Input Supply Voltage Range ..... 1.6V to 5.5V
Enable Input Voltage Range ..... 0V to 5.5V
Input Effective Capacitance, C_{IN} ..... 0.5μF (MIN)
Output Effective Capacitance, C_{OUT} ..... 1μF to 10μF
Operating Junction Temperature Range ..... -40℃ to +125℃

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

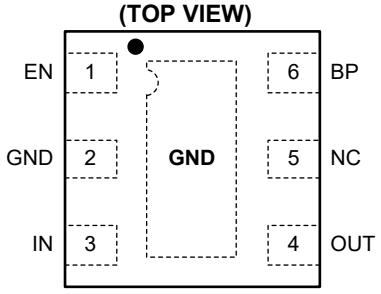
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

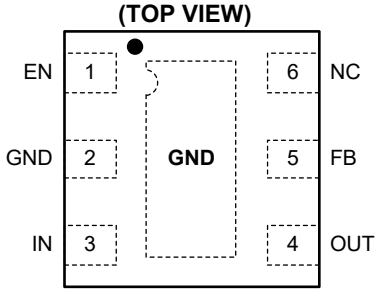
PIN CONFIGURATIONS

SGM2035S-FIX
(TOP VIEW)



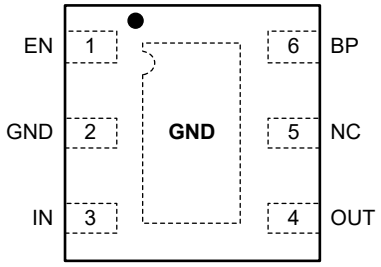
UTDFN-1.6×1.6-6L

SGM2035S-ADJ
(TOP VIEW)



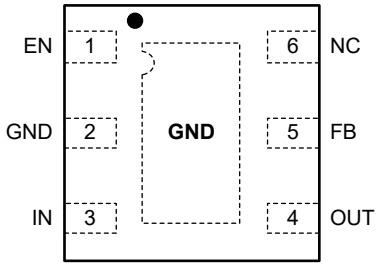
UTDFN-1.6×1.6-6L

SGM2035S-FIX
(TOP VIEW)



TDFN-2×2-6L

SGM2035S-ADJ
(TOP VIEW)



TDFN-2×2-6L

PIN DESCRIPTION

PIN	NAME	FUNCTION
UTDFN-1.6×1.6-6L/ TDFN-2×2-6L		
1	EN	Enable Pin. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator.
2	GND	Ground.
3	IN	Input Voltage Supply Pin. It is recommended to use a 2.2μF or larger ceramic capacitor from IN pin to ground.
4	OUT	Regulator Output Pin. It is recommended to use a ceramic capacitor with effective capacitance in the range of 1μF to 10μF. This ceramic capacitor should be placed as close as possible to OUT pin.
5	NC	No Connection (fixed voltage version only).
	FB	Feedback Input Pin (adjustable voltage version only). Connect this pin to the midpoint of an external resistor divider to adjust the output voltage. Place the resistors as close as possible to this pin.
6	BP	Reference-Noise Bypass Pin (fixed voltage version only). Bypass with an external capacitor C_{BP} can reduce output noise to very low level.
	NC	No Connection (adjustable voltage version only).
Exposed Pad	GND	Exposed Pad. Connect it to GND internally. Connect it to a large ground plane to maximize thermal performance. This pad is not an electrical connection point.

FUNCTIONAL BLOCK DIAGRAMS

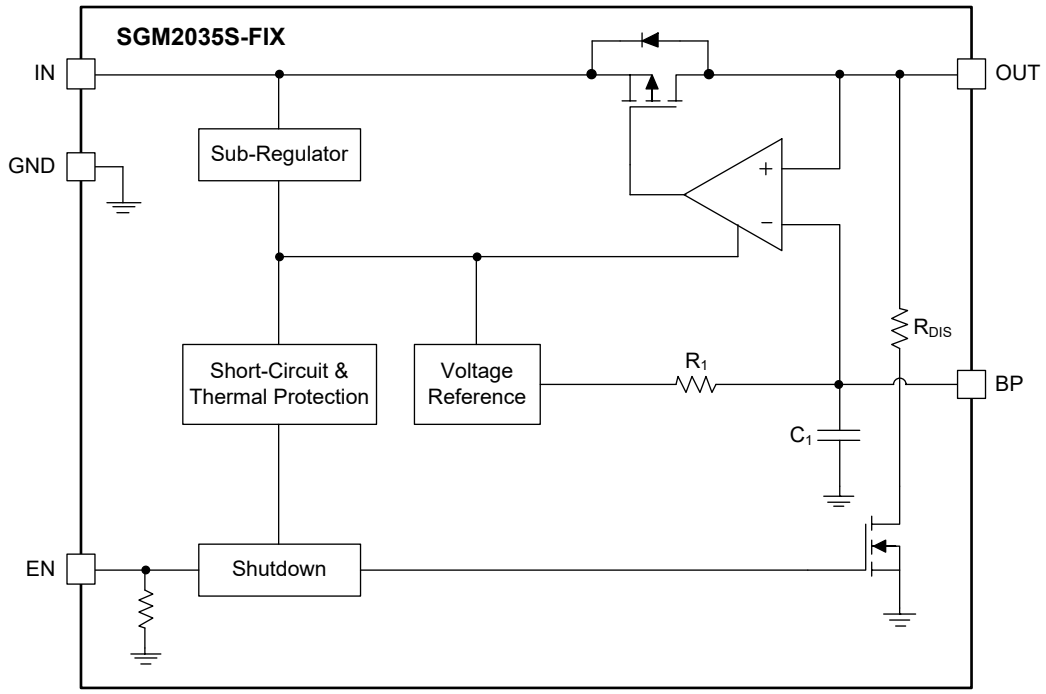


Figure 2. Fixed Output Regulator Block Diagram

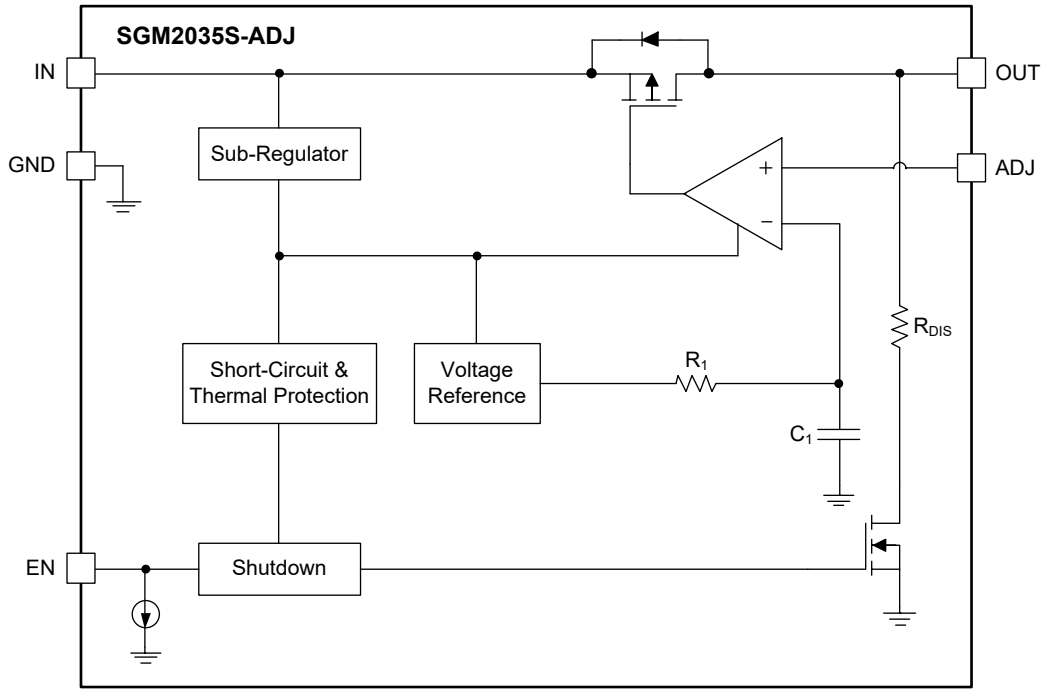


Figure 3. Adjustable Output Regulator Block Diagram

ELECTRICAL CHARACTERISTICS

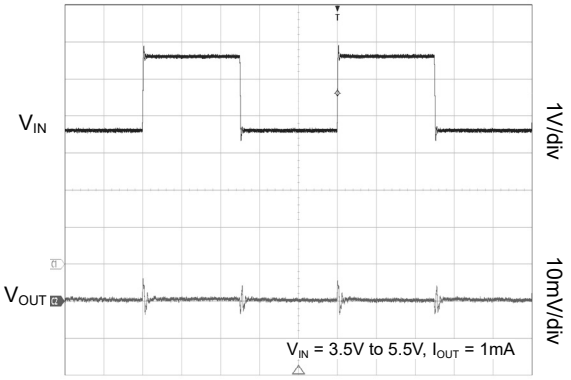
(V_{IN} = ($V_{OUT(NOM)}$ + 0.5V) or 1.6V (whichever is greater). For SGM2035S-ADJ, V_{OUT} = 0.8V, V_{ADJ} = V_{OUT}, C_{IN} = 1μF, C_{OUT} = 1μF and C_{BP} = 22nF, T_J = -40℃ to +125℃, typical values are at T_J = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Input Voltage Range	V_{IN}			1.6		5.5	V
Output Voltage Accuracy	V_{OUT}	V_{IN} = ($V_{OUT(NOM)}$ + 0.5V) to 5.5V, I_{OUT} = 1mA	T_J = +25℃	-2.5		2.5	%
			T_J = -40℃ to +125℃	-3		3	
Feedback Voltage	V_{ADJ}	V_{IN} = ($V_{OUT(NOM)}$ + 0.5V) to 5.5V, I_{OUT} = 1mA	T_J = +25℃	0.78	0.8	0.82	V
			T_J = -40℃ to +125℃	0.776		0.824	
ADJ Pin Input Bias Current	I_{ADJ}	V_{ADJ} = 0.9V			1	20	nA
Under-Voltage Lockout Thresholds	V_{UVLO}	V_{IN} rising			1.45	1.6	V
		V_{IN} falling			1.3		
Line Regulation	ΔV_{OUT}	V_{IN} = ($V_{OUT(NOM)}$ + 0.5V) to 5.5V, I_{OUT} = 1mA			0.2	6.5	mV
Load Regulation	$\Delta V_{OUT}/I_{OUT}$	I_{OUT} = 1mA to 500mA	SGM2035S-FIX		0.06	0.2	mV/mA
			SGM2035S-ADJ		0.001	0.02	mV/mA
Dropout Voltage	V_{DROP}	V_{OUT} = $V_{OUT(NOM)}$ × 95%, I_{OUT} = 300mA	0.8V ≤ $V_{OUT(NOM)}$ < 1.1V		860	980	mV
			1.1V ≤ $V_{OUT(NOM)}$ < 1.8V		615	830	
			1.8V ≤ $V_{OUT(NOM)}$ <2.8V		280	450	
			2.8V ≤ $V_{OUT(NOM)}$ <3.0V		185	310	
			3.0V ≤ $V_{OUT(NOM)}$ <3.3V		175	290	
			$V_{OUT(NOM)}$ ≥ 3.3V		165	280	
		V_{OUT} = $V_{OUT(NOM)}$ × 95%, I_{OUT} = 500mA	0.8V ≤ $V_{OUT(NOM)}$ < 1.1V		1120	1300	mV
			1.1V ≤ $V_{OUT(NOM)}$ < 1.8V		875	1140	
			1.8V ≤ $V_{OUT(NOM)}$ <2.8V		460	720	
			2.8V ≤ $V_{OUT(NOM)}$ <3.0V		310	500	
			3.0V ≤ $V_{OUT(NOM)}$ <3.3V		295	470	
			$V_{OUT(NOM)}$ ≥ 3.3V		275	460	
Output Current Limit	I_{LIMIT}	V_{IN} = Min(($V_{OUT(NOM)}$ + 2V), 5.5V), V_{OUT} = $V_{OUT(NOM)}$ × 85%	T_J = -40℃ to +85℃	500	700		mA
			T_J = -40℃ to +125℃	450			
Short-Circuit Current Limit	I_{SHORT}	V_{OUT} = 0V, V_{IN} = 5.5V			380		mA
Ground Pin Current	I_Q	No load, V_{EN} = V_{IN} = 5.5V			30	60	μA
Shutdown Current	I_{SHDN}	V_{EN} = 0V, V_{IN} = 5.5V			0.01	1	μA
EN Input Thresholds	V_{IH}	V_{IN} = 1.6V to 5.5V		1.5			V
	V_{IL}					0.4	
EN Input Bias Current	I_{ENH}	V_{EN} = V_{IN} = 5.5V			0.7	1.5	μA
	I_{ENL}	V_{EN} = 0V, V_{IN} = 5.5V			0.01	1	
Output Discharge Resistance	R_{DIS}	V_{EN} = 0V, V_{OUT} = 0.3V, V_{IN} = 4V			70		Ω
Turn-On Time	t_{ON}	From EN rising from 0V to V_{IN} to $V_{OUT(NOM)}$ × 90%, C_{BP} = 22nF, no load			80		μs
Power Supply Rejection Ratio	PSRR	C_{BP} = 0nF, C_{OUT} = 1μF, I_{OUT} = 30mA, V_{IN} = 2.8V, $V_{OUT(NOM)}$ = 1.8V, ΔV_{RIPPLE} = 0.2V_{P-P}	f = 217Hz		82		dB
			f = 1kHz		76		
		C_{BP} = 10nF, C_{OUT} = 1μF, I_{OUT} = 30mA, V_{IN} = 2.8V, $V_{OUT(NOM)}$ = 1.8V, ΔV_{RIPPLE} = 0.2V_{P-P}	f = 217Hz		92		
			f = 1kHz		86		
Output Voltage Noise	e_n	$V_{OUT(NOM)}$ = 1.8V, I_{OUT} = 30mA, f = 10Hz to 100kHz	C_{BP} = 0nF		100		μV_{RMS}
			C_{BP} = 10nF		60		
Thermal Shutdown Temperature	T_{SHDN}				160		℃
Thermal Shutdown Hysteresis	ΔT_{SHDN}				20		℃

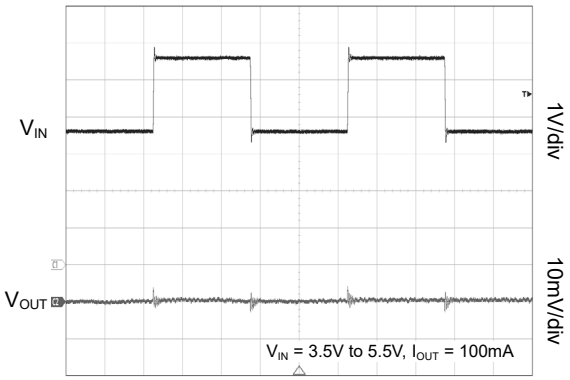
TYPICAL PERFORMANCE CHARACTERISTICS

T_J = +25℃, V_{IN} = $V_{OUT(NOM)}$ + 1V, V_{OUT} = 0.8V, V_{ADJ} = V_{OUT}, C_{IN} = 2.2μF, C_{OUT} = 1μF and C_{BP} = 22nF, unless otherwise noted.

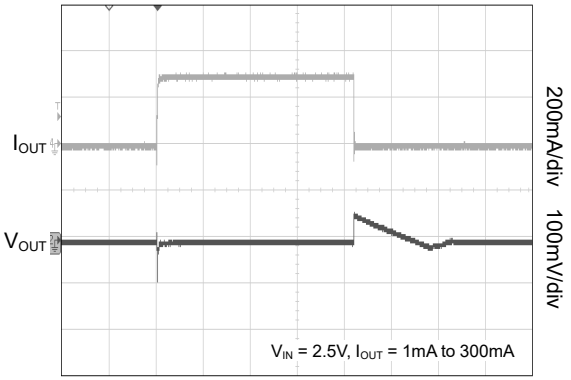
Line Transient Response



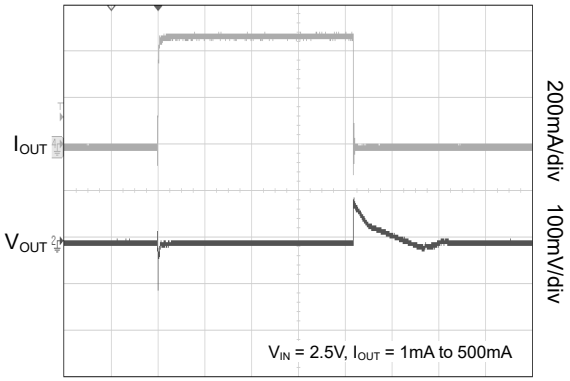
Line Transient Response



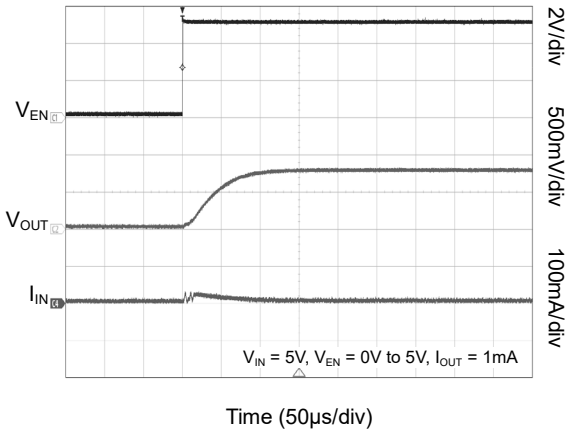
Load Transient Response



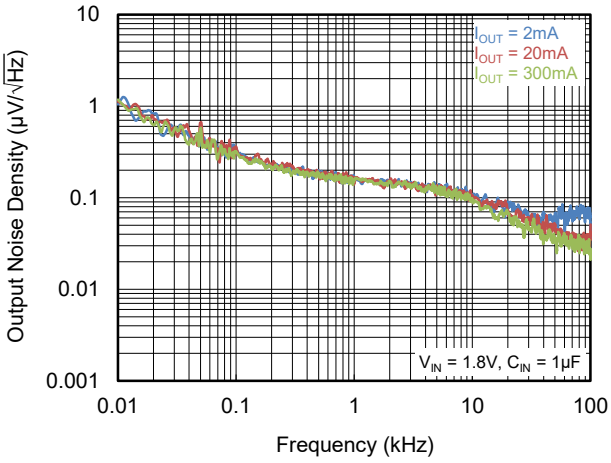
Load Transient Response



Turn-On Time



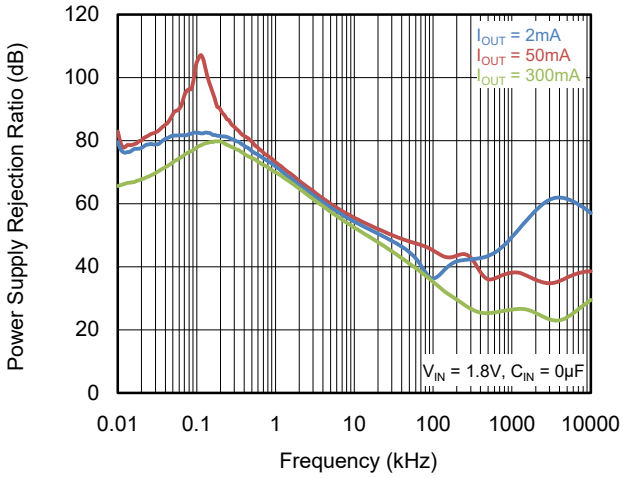
Output Noise Density vs. Frequency



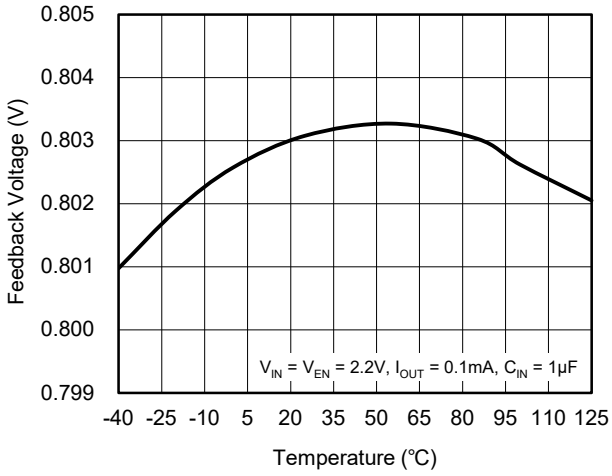
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_J = +25℃, V_{IN} = $V_{OUT(NOM)}$ + 1V, V_{OUT} = 0.8V, V_{ADJ} = V_{OUT}, C_{IN} = 2.2μF, C_{OUT} = 1μF and C_{BP} = 22nF, unless otherwise noted.

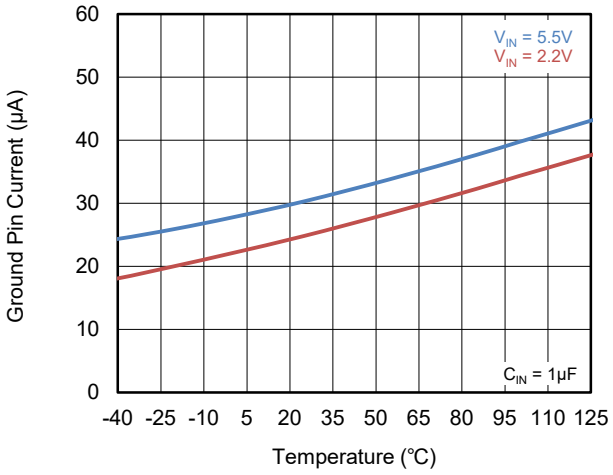
Power Supply Rejection Ratio vs. Frequency



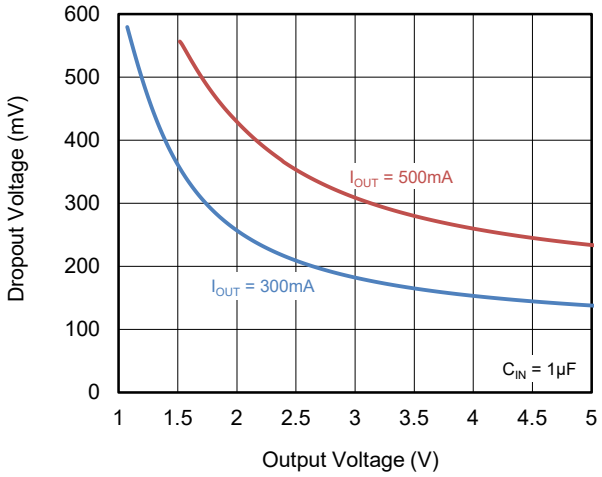
Feedback Voltage vs. Temperature



Ground Pin Current vs. Temperature



Dropout Voltage vs. Output Voltage



APPLICATION INFORMATION

The SGM2035S is a low dropout and low input voltage LDO and provides 500mA output current. These features make the device a reliable solution to solve many challenging problems in the generation of clean and accurate power supply. The high performance also makes the SGM2035S useful in a variety of applications. The SGM2035S provides the protection functions for output overload, output short-circuit condition and overheating.

The SGM2035S provides an EN pin as an external chip enable control to enable/disable the device. When the regulator is in shutdown state, the shutdown current consumes as low as 0.01μA (TYP).

Input Capacitor Selection (C_{IN})

The input decoupling capacitor should be placed as close as possible to the IN pin to ensure the device stability. A 1μF or greater X7R or X5R ceramic capacitor is selected to get good dynamic performance.

When V_{IN} is required to provide large current instantaneously, a large effective input capacitor is required. Multiple input capacitors can reduce the impact from input trace inductance. Adding more input capacitors is available to restrict the ringing and to keep it below the device absolute maximum ratings. For C_{OUT} with larger capacitance, it is recommended to choose the larger capacitance C_{IN}.

Output Capacitor Selection (C_{OUT})

One or more output capacitors are required to maintain the stability of the LDO, and the output capacitors should be placed as close as possible to the OUT pin. In addition, in order to obtain the best transient performance, it is recommended to use X7R and X5R ceramic capacitors as output capacitors. Ceramic capacitors have low equivalent series resistance (ESR), excellent temperature and DC bias characteristics. However, it cannot be ignored that the effective capacitance of ceramic capacitors is affected by temperature, DC bias and package size.

For example, Figure 4 shows the capacitance and DC bias and temperature characteristics of 0805, 10V, 10μF±10%, X7R capacitor. Therefore, it is necessary to evaluate whether the effective capacitance of the output capacitor can meet the stability requirements of the LDO in practical applications. In general, a capacitor in higher voltage rating and a larger package exhibits better stability, and the effective capacitance can be obtained from the manufacturer datasheet.

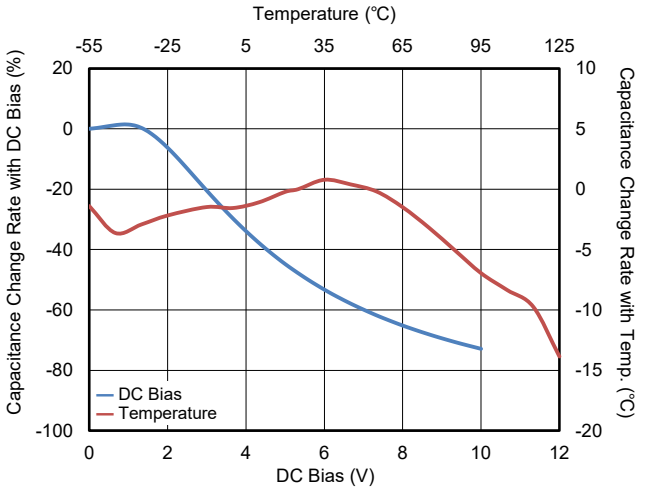


Figure 4. Capacitance vs. DC Bias and Temperature Characteristics

The SGM2035S requires a minimum effective capacitance of 1μF for C_{OUT} to ensure stability. Additionally, C_{OUT} with larger capacitance and lower ESR will help increase the high frequency PSRR and improve the load transient response.

Adjustable Regulator

The output voltage of the SGM2035S-ADJ can be adjusted from 0.8V to 5.0V. The ADJ pin will be connected to two external resistors as shown in Figure 5, the output voltage is determined by the following equation:

$$V_{OUT} = V_{ADJ} \times \left(1 + \frac{R_1}{R_2}\right) \quad (1)$$

where:

V_{OUT} is output voltage and V_{ADJ} is the internal voltage reference, V_{ADJ} = 0.8V. One parallel capacitor (C_{FF}) with R_1 can be used to improve the feedback loop stability and PSRR, increase the transient response and reduce the output noise. Use R_2 = 160kΩ to maintain a 5μA minimum load.

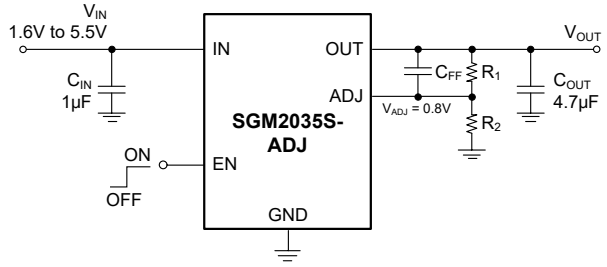


Figure 5. Adjustable Output Voltage Application

APPLICATION INFORMATION (continued)

Enable Operation

The EN pin of the SGM2035S is used to enable/disable its device and to deactivate/activate the output automatic discharge function.

When the EN pin voltage is lower than 0.4V, the device is in shutdown state. There is no current flowing from IN to OUT pins. In this state, the automatic discharge transistor is active to discharge the output voltage through a 70Ω (TYP) resistor.

When the EN pin voltage is higher than 1.5V, the device is in active state. The output voltage is regulated to the expected value and the automatic discharge transistor is turned off.

Reverse Current Protection

The power transistor has an inherent body diode. This body diode will be forward biased when V_{OUT} > (V_{IN} + 0.3V). When V_{OUT} > (V_{IN} + 0.3V), the reverse current flowing from the OUT pin to the IN pin will damage the SGM2035S. If V_{OUT} > (V_{IN} + 0.3V) event would happen in system, one external Schottky diode will be added between OUT pin and IN pin in circuit design to protect the SGM2035S.

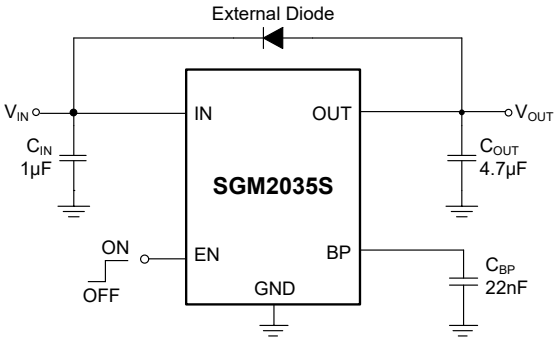


Figure 6. Reverse Protection Reference Design

Negatively Biased Output

When the output voltage is negative, the chip may not start up due to parasitic effects. Ensure that the output is greater than -0.3V under all conditions. If negatively biased output is excessive and expected in the application, a Schottky diode can be added between the OUT pin and GND pin.

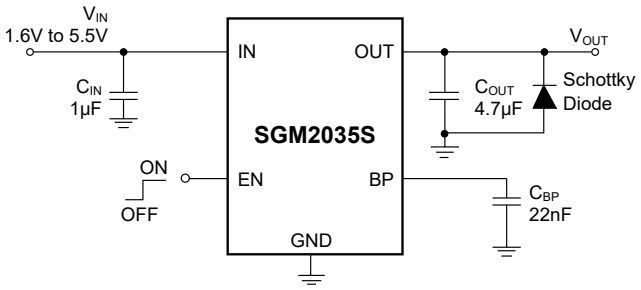


Figure 7. Negatively Biased Output Application

Output Current Limit and Short-Circuit Protection

When overload events happen, the output current is internally limited to 700mA (TYP). When the OUT pin is shorted to ground, the short-circuit protection will limit the output current to 380mA (TYP).

Thermal Shutdown

When the die temperature exceeds the threshold value of thermal shutdown, the SGM2035S will be in shutdown state and it will remain in this state until the die temperature decreases to +140℃.

Power Dissipation (P_D)

Power dissipation (P_D) of the SGM2035S can be calculated by the equation $P_D = (V_{IN} - V_{OUT}) \times I_{OUT}$. The maximum allowable power dissipation ($P_{D(MAX)}$) of the SGM2035S is affected by many factors, including the difference between junction temperature and ambient temperature ($T_{J(MAX)} - T_A$), package thermal resistance from the junction to the ambient environment (θ_{JA}), the rate of ambient airflow and PCB layout. $P_{D(MAX)}$ can be approximated by the following equation:

$$P_{D(MAX)} = (T_{J(MAX)} - T_A)/\theta_{JA} \quad (2)$$

Layout Guidelines

To get good PSRR, low output noise and high transient response performance, the input and output bypass capacitors must be placed as close as possible to the IN pin and OUT pin separately.

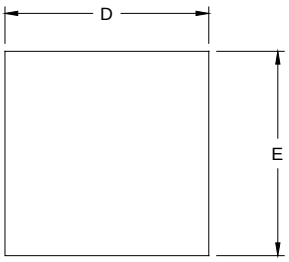
REVISION HISTORY

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

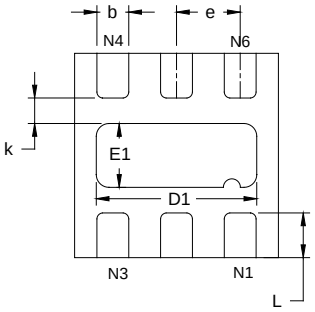
Changes from Original (JULY 2024) to REV.A	Page
Changed from product preview to production data	All

PACKAGE OUTLINE DIMENSIONS

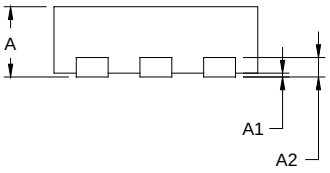
UTDFN-1.6×1.6-6L



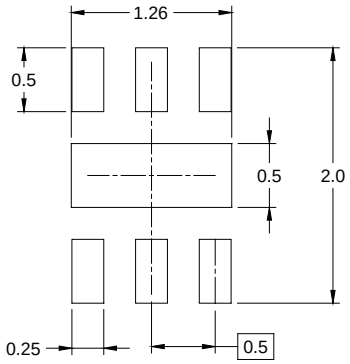
TOP VIEW



BOTTOM VIEW



SIDE VIEW



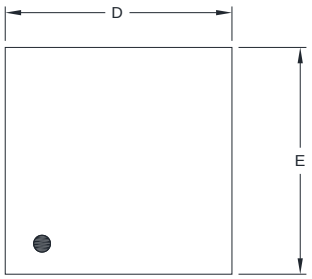
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.500	0.600	0.020	0.024
A1	0.000	0.050	0.000	0.002
A2	0.152 REF.		0.006 REF.	
D	1.524	1.676	0.060	0.066
E	1.524	1.676	0.060	0.066
D1	1.160	1.360	0.046	0.054
E1	0.400	0.600	0.016	0.024
k	0.150 MIN		0.006 MIN	
b	0.200	0.300	0.008	0.012
e	0.500 TYP		0.020 TYP	
L	0.274	0.426	0.011	0.017

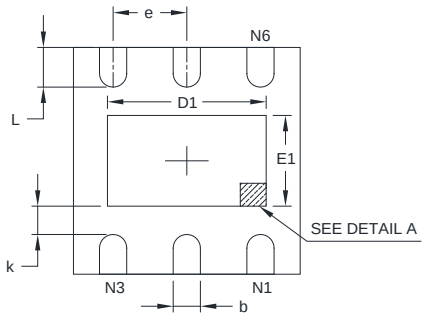
NOTE: This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

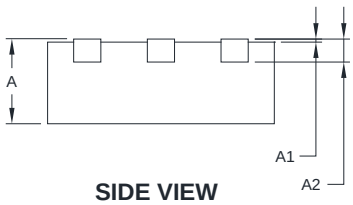
TDFN-2×2-6L



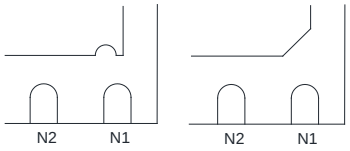
TOP VIEW



BOTTOM VIEW



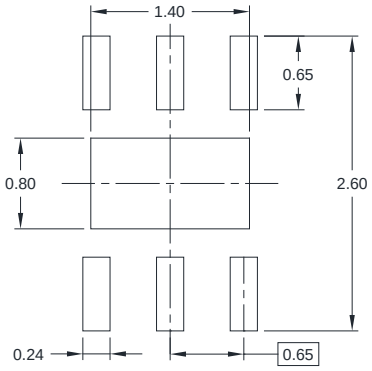
SIDE VIEW



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.



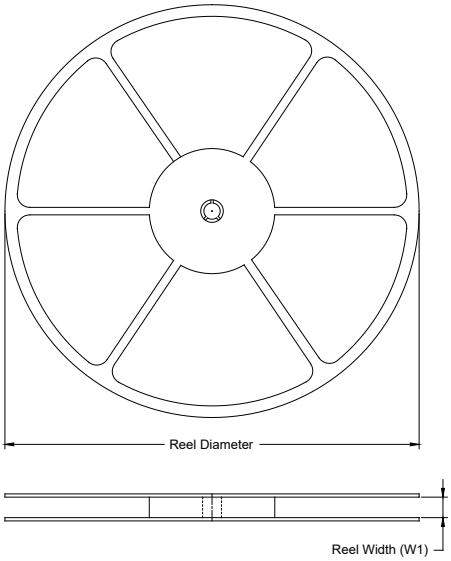
RECOMMENDED LAND PATTERN (Unit: mm)

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

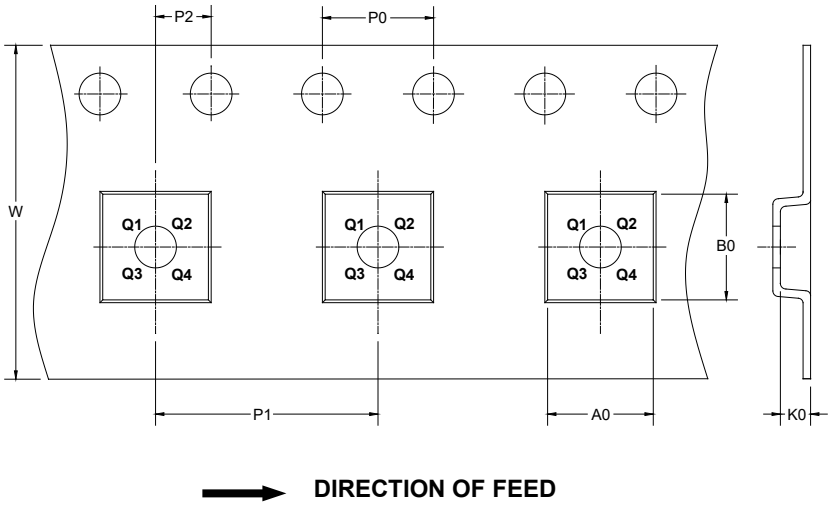
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



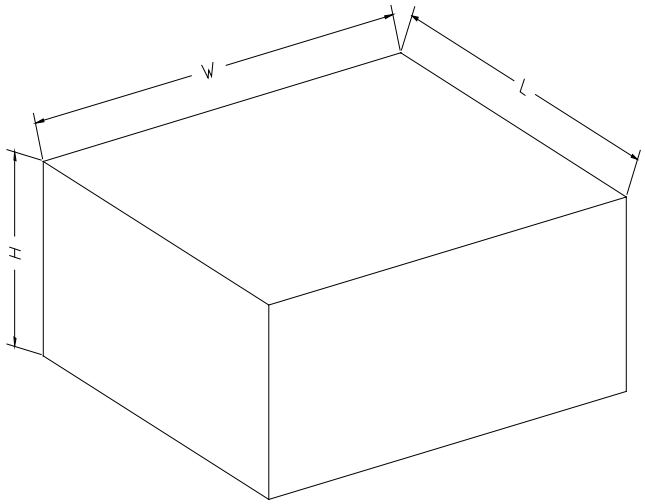
NOTE: The picture is only for reference. Please make the object as the standard.

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
UTDFN-1.6×1.6-6L	7"	9.0	1.78	1.78	0.69	4.0	4.0	2.0	8.0	Q1
TDFN-2×2-6L	7"	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q1

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