



SGM2080xQ

Automotive 500mA, Fast Transient Response, Low Noise and High Accuracy LDO with Power-Good

GENERAL DESCRIPTION

The SGM2080xQ is a CMOS, fast transient response, low noise and high accuracy linear regulator. It is capable of supplying 500mA output current with typical dropout voltage of only 80mV. The operating input voltage range is from 1.5V to 5.5V. The fixed output voltage range is from 0.8V to 4.2V and adjustable output voltage range is from 0.55V to 5.0V.

Other features include an open-drain power-good (PG) output, logic-controlled shutdown mode, current limit and thermal shutdown protection. The SGM2080xQ has automatic discharge function to quickly discharge V_{OUT} in the disabled status.

This device is AEC-Q100 qualified (Automotive Electronics Council (AEC) standard Q100 Grade 1) and it is suitable for automotive applications.

The SGM2080xQ is available in Green TDFN-2×2-6DL and TDFN-3×3-8KL packages. It operates over an ambient temperature range of -40°C to +125°C.

FEATURES

- AEC-Q100 Qualified for Automotive Applications
Device Temperature Grade 1
 $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$
- Operating Input Voltage Range: 1.5V to 5.5V
- Fixed Output from 0.8V to 4.2V
- Adjustable Output from 0.55V to 5.0V
- 500mA Output Current
- Output Voltage Accuracy: $\pm 1\%$ at $+25^{\circ}\text{C}$
- Quiescent Current: 85 μA (TYP)
- Low Dropout Voltage:
80mV (TYP) at 500mA, $V_{OUT} = 5\text{V}$
- Current Limiting and Thermal Protection
- Excellent Load and Line Transient Responses
- With Output Automatic Discharge
- UVLO with Hysteresis
- Support Power-Good Indicator Function
- Stable with Small Case Size Ceramic Capacitors
- -40°C to $+125^{\circ}\text{C}$ Operating Temperature Range
- Available in Green TDFN-2×2-6DL and TDFN-3×3-8KL Packages

APPLICATIONS

General Purpose Automotive & Industrial
Automotive Entertainment System

TYPICAL APPLICATION CIRCUITS

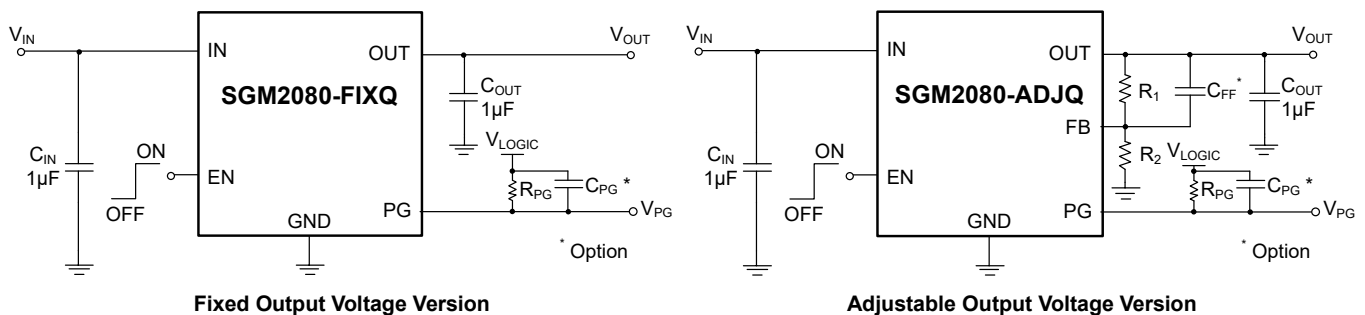


Figure 1. Typical Application Circuits

Automotive 500mA, Fast Transient Response, SGM2080xQ Low Noise and High Accuracy LDO with Power-Good

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2080-0.8Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-0.8QTGC6G/TR	1QI XXXX	Tape and Reel, 3000
SGM2080-0.9Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-0.9QTGC6G/TR	1QJ XXXX	Tape and Reel, 3000
SGM2080-1.0Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-1.0QTGC6G/TR	1QK XXXX	Tape and Reel, 3000
SGM2080-1.05Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-1.05QTGC6G/TR	1QL XXXX	Tape and Reel, 3000
SGM2080-1.1Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-1.1QTGC6G/TR	1QM XXXX	Tape and Reel, 3000
SGM2080-1.2Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-1.2QTGC6G/TR	1QN XXXX	Tape and Reel, 3000
SGM2080-1.5Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-1.5QTGC6G/TR	1QO XXXX	Tape and Reel, 3000
SGM2080-1.8Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-1.8QTGC6G/TR	1QP XXXX	Tape and Reel, 3000
SGM2080-2.5Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-2.5QTGC6G/TR	1QQ XXXX	Tape and Reel, 3000
SGM2080-2.8Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-2.8QTGC6G/TR	1QR XXXX	Tape and Reel, 3000
SGM2080-3.0Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-3.0QTGC6G/TR	1QS XXXX	Tape and Reel, 3000
SGM2080-3.3Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-3.3QTGC6G/TR	1QT XXXX	Tape and Reel, 3000
SGM2080-4.2Q	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-4.2QTGC6G/TR	1QU XXXX	Tape and Reel, 3000
SGM2080-ADJQ	TDFN-2×2-6DL	-40°C to +125°C (T _A)	SGM2080-ADJQTGC6G/TR	1QV XXXX	Tape and Reel, 3000

Automotive 500mA, Fast Transient Response, SGM2080xQ Low Noise and High Accuracy LDO with Power-Good

PACKAGE/ORDERING INFORMATION (continued)

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2080-0.8Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-0.8QTHW8G/TR	1QWTHW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-0.9Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-0.9QTHW8G/TR	1QXTHW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-1.0Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-1.0QTHW8G/TR	1QYTHW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-1.05Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-1.05QTHW8G/TR	1QZTHW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-1.1Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-1.1QTHW8G/TR	1R0THW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-1.2Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-1.2QTHW8G/TR	1R1THW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-1.5Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-1.5QTHW8G/TR	1R2THW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-1.8Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-1.8QTHW8G/TR	1R3THW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-2.5Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-2.5QTHW8G/TR	1R4THW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-2.8Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-2.8QTHW8G/TR	1R5THW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-3.0Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-3.0QTHW8G/TR	1R6THW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-3.3Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-3.3QTHW8G/TR	1R7THW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-4.2Q	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-4.2QTHW8G/TR	1R8THW XXXXXX XX#XX	Tape and Reel, 4000
SGM2080-ADJQ	TDFN-3×3-8KL	-40°C to +125°C (T _A)	SGM2080-ADJQTHW8G/TR	1R9THW XXXXXX XX#XX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXX = Date Code, Trace Code and Vendor Code. XXXXX = Date Code, Trace Code and Vendor Code. XX#XX = Coordinate Information and Wafer ID Number.

TDFN-2×2-6DL

Y Y Y — Serial Number
 X X X X
 Vendor Code
 Trace Code
 Date Code - Year

TDFN-3×3-8KL

Date Code - Year
 Trace Code
 Vendor Code
 X X X X X
 X X # X X
 Coordinate Information
 Wafer ID Number ("A" = 01, "B" = 02, ... "Y" = 25)
 Coordinate Information

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.

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ABSOLUTE MAXIMUM RATINGS

IN to GND	-0.3V to 6V
OUT to GND	-0.3V to ($V_{IN} + 0.3V$)
EN, PG to GND	-0.3V to 6V
Power-Good Current	$\pm 12mA$
Package Thermal Resistance	
TDFN-2x2-6DL, θ_{JA}	59.2°C/W
TDFN-2x2-6DL, θ_{JB}	26.6°C/W
TDFN-2x2-6DL, $\theta_{JC(TOP)}$	71.4°C/W
TDFN-2x2-6DL, $\theta_{JC(BOT)}$	8.6°C/W
TDFN-3x3-8KL, θ_{JA}	45.7°C/W
TDFN-3x3-8KL, θ_{JB}	21.1°C/W
TDFN-3x3-8KL, $\theta_{JC(TOP)}$	47.1°C/W
TDFN-3x3-8KL, $\theta_{JC(BOT)}$	8.2°C/W
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility ^{(1) (2)}	
HBM	$\pm 8000V$
CDM	$\pm 1000V$

1. For human body model (HBM), all pins comply with AEC-Q100-002 specification.
2. For charged device model (CDM), all pins comply with AEC-Q100-011 specification.

RECOMMENDED OPERATING CONDITIONS

Input Voltage Range	1.5V to 5.5V
Enable Input Voltage Range	0V to 5.5V
Power-Good Voltage Range	0V to 5.5V
Power-Good Current	$\pm 10mA$
Input Effective Capacitance, C_{IN}	0.5 μF (MIN)
Output Effective Capacitance, C_{OUT}	0.5 μF to 220 μF
Operating Ambient Temperature Range	-40°C to +125°C
Operating Junction Temperature Range	-40°C to +150°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

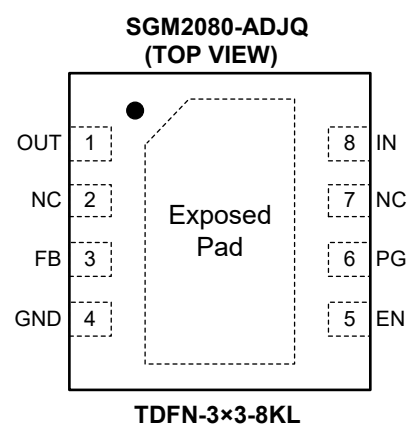
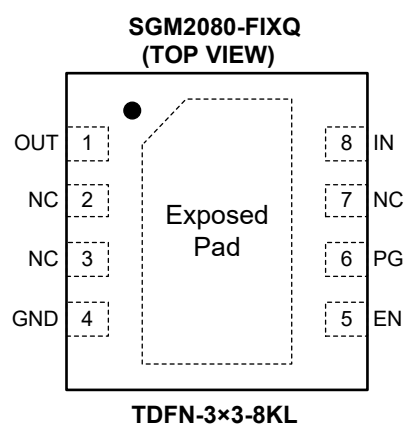
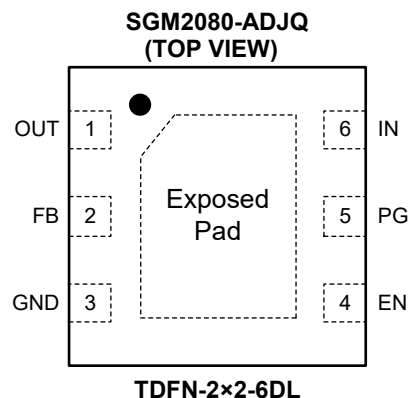
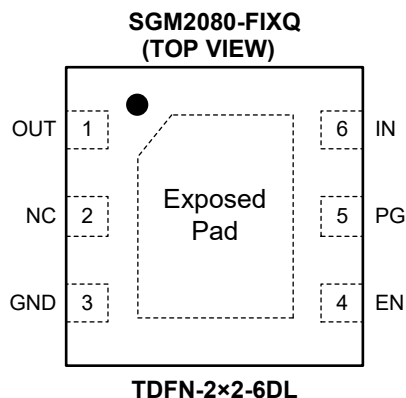
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

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PIN CONFIGURATIONS



PIN DESCRIPTION

PIN		NAME	FUNCTION
TDFN-2x2-6DL	TDFN-3x3-8KL		
1	1	OUT	Regulator Output Pin. It is recommended to use a ceramic capacitor with effective capacitance in the range of 0.5μF to 220μF to ensure stability. This ceramic capacitor should be placed as close as possible to OUT pin.
2	3	NC	No Connection (fixed voltage version only).
		FB	Feedback 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.
3	4	GND	Ground.
4	5	EN	Enable Pin. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator.
5	6	PG	Open-Drain Power-Good Output Pin. An open-drain output and active high when the output voltage reaches the target voltage.
6	8	IN	Input Supply Voltage Pin. It is recommended to use a 1μF or larger ceramic capacitor from IN pin to ground to get good power supply decoupling. This ceramic capacitor should be placed as close as possible to IN pin.
—	2, 7	NC	No Connection.
Exposed Pad	Exposed Pad	—	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.

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FUNCTIONAL BLOCK DIAGRAMS

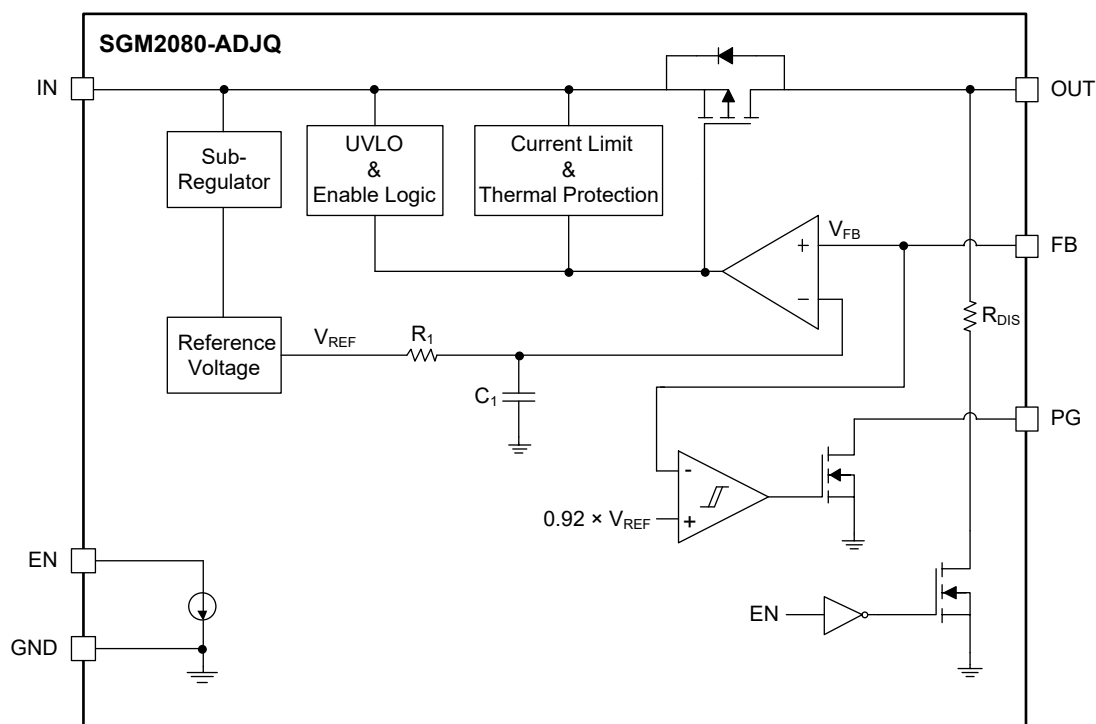


Figure 2. Block Diagram for Adjustable Output Version

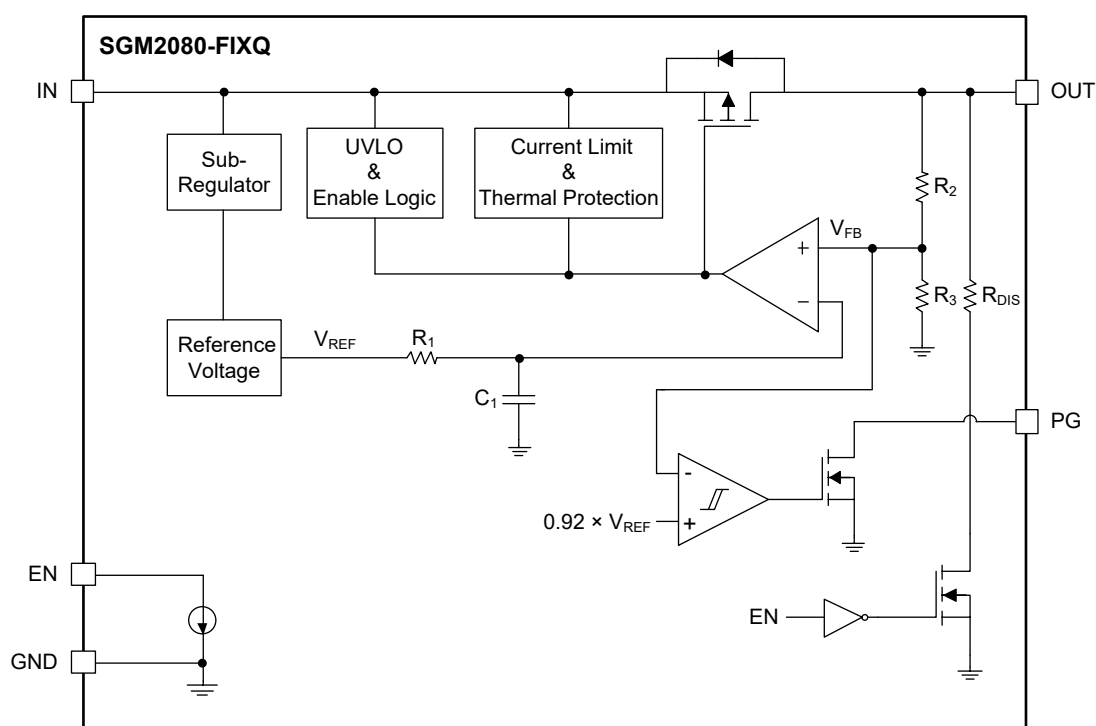
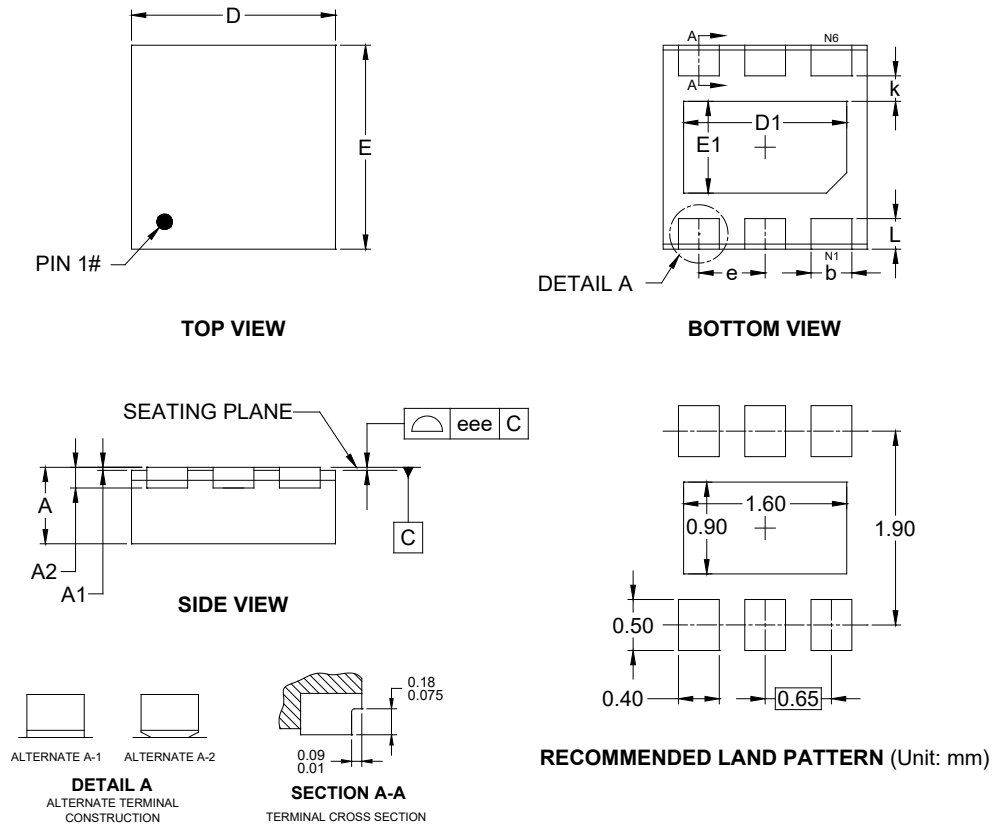


Figure 3. Block Diagram for Fixed Output Version

PACKAGE OUTLINE DIMENSIONS

TDFN-2×2-6DL

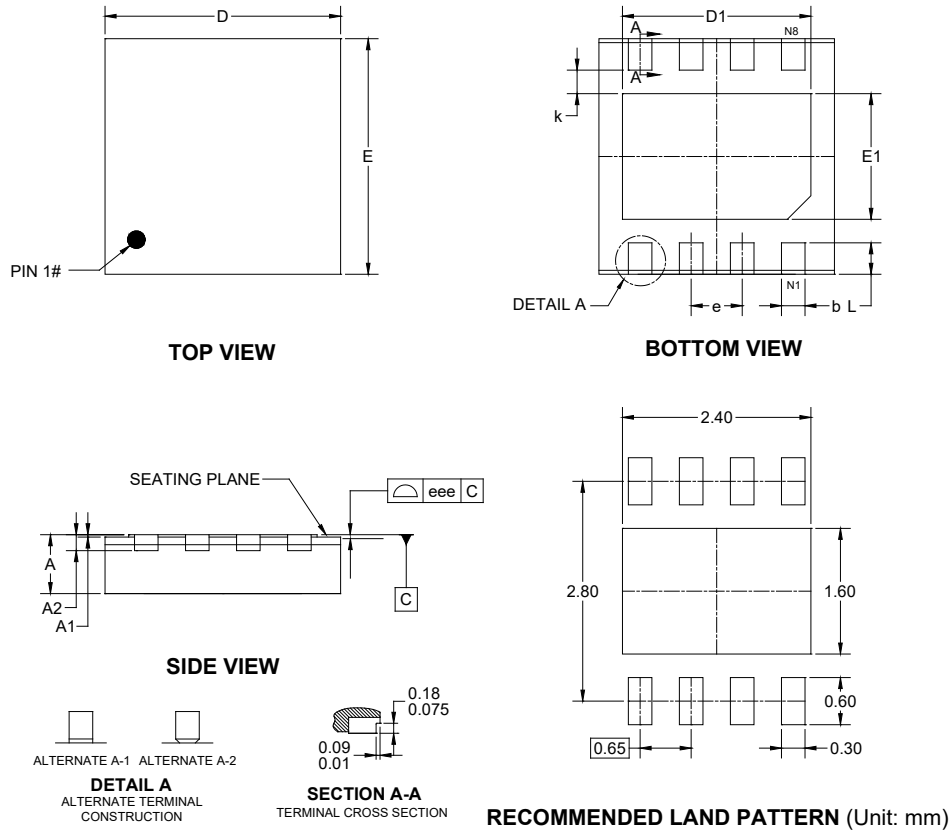


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.700	-	0.800
A1	0.000	-	0.050
A2	0.203 REF		
b	0.350	-	0.450
D	1.900	-	2.100
E	1.900	-	2.100
D1	1.500	-	1.700
E1	0.800	-	1.000
e	0.650 BSC		
L	0.250	-	0.350
k	0.250 REF		
eee	0.080		

NOTE: This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

TDFN-3×3-8KL



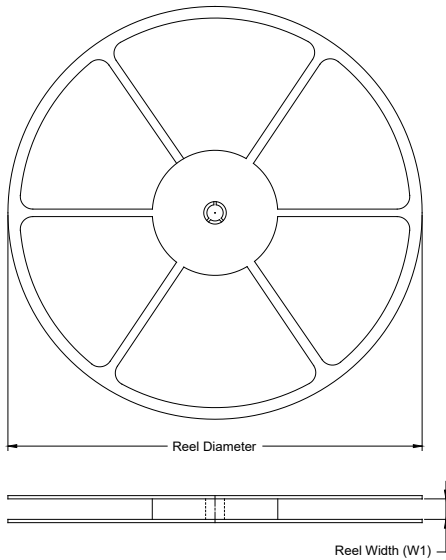
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.700	-	0.800
A1	0.000	-	0.050
A2	0.203 REF		
b	0.250	-	0.350
D	2.900	-	3.100
D1	2.300	-	2.500
E	2.900	-	3.100
E1	1.500	-	1.700
e	0.650 BSC		
k	0.300 REF		
L	0.300	-	0.500
eee	0.080		

NOTE: This drawing is subject to change without notice.

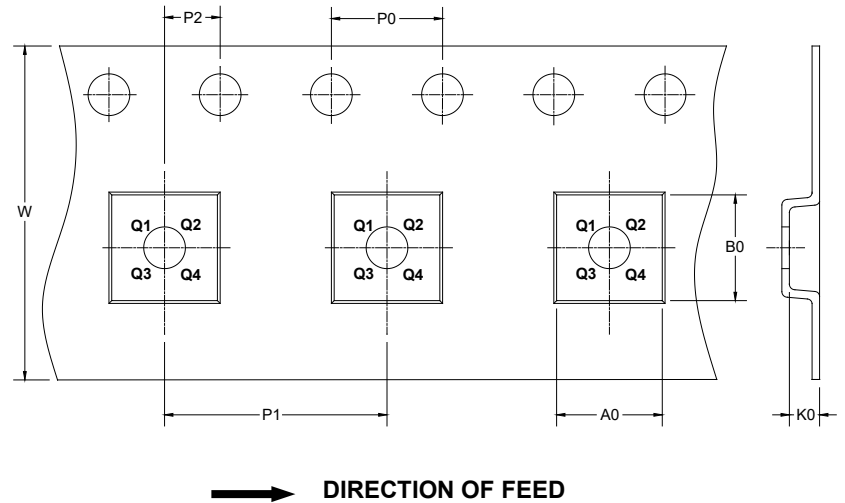
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

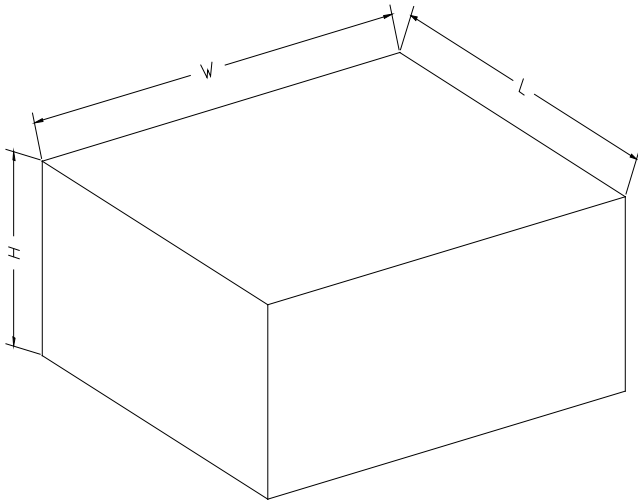
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TDFN-2×2-6DL	7"	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q2
TDFN-3×3-8KL	13"	12.4	3.35	3.35	1.13	4.0	8.0	2.0	12.0	Q2

DD00001

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
7" (Option)	368	227	224	8
7"	442	410	224	18
13"	386	280	370	5

DD0002