

GENERAL DESCRIPTION

The SGM3209 is a charge pump voltage converter which is used to generate a negative supply from a positive input. The 3V to 18V input voltage can be converted into a corresponding -3V to -18V output supply. The SGM3209 is also capable of delivering up to 100mA of output current. The switching frequency is resistor programmable from 120kHz to 1.25MHz. The device also has the advantage of using a combination of few external components to eliminate the inductors and their associated cost, size and EMI.

The SGM3209 enters into shutdown status by external enable control signal to reduce system power dissipation. The device is used for design requirements with higher output current and/or lower input/output voltage drop.

The SGM3209 is available in Green TDFN-2×2-8L and SOIC-8 packages. It operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- **Input Voltage Range:** 3V to 18V
- **Output Current:** 100mA
- **Pull-Low Resistor on EN Pin:** 600kΩ
- **Programmable Oscillator Frequency:** 120kHz to 1.25MHz
- **No External Diodes Required**
- **Low Output Impedance:** 15Ω (TYP) at $I_{OUT} = 20mA$
- **CMOS Construction**
- **-40°C to +85°C Operating Temperature Range**
- **Available in Green TDFN-2×2-8L and SOIC-8 Packages**

APPLICATIONS

Laptop Computers
Disk Drives
Process Instrumentation

TYPICAL APPLICATION

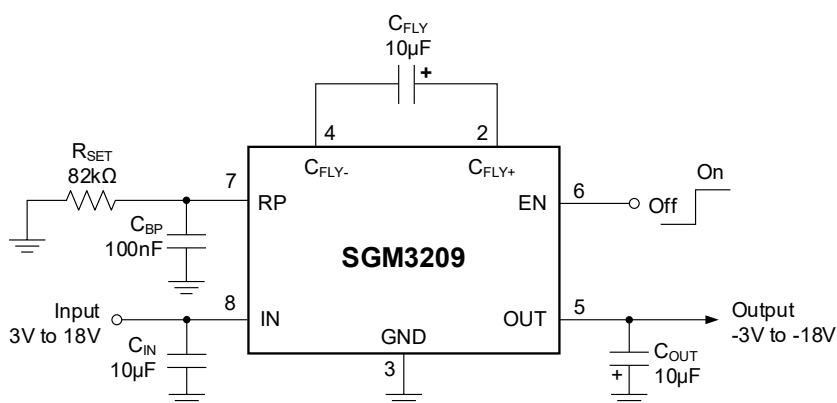


Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

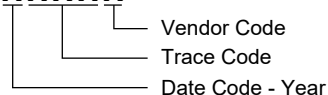
MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM3209	SOIC-8	-40°C to +85°C	SGM3209YS8G/TR	SGM 3209YS8 XXXXX	Tape and Reel, 2500
	TDFN-2×2-8L	-40°C to +85°C	SGM3209YTDE8G/TR	3209 XXXX	Tape and Reel, 3000

MARKING INFORMATION

SOIC-8

(1) XXXXX = Date Code, Trace Code and Vendor Code.

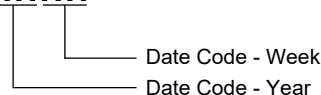
XXXXX



TDFN-2×2-8L

(2) XXXX = Date Code.

XXXX



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 22V
OUT to GND	-(V _{IN} + 0.3V) to 0.3V
EN, RP to GND	-0.3V to 6V
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility	
HBM	8000V
MM	400V
CDM	1000V

RECOMMENDED OPERATING CONDITIONS

Input Voltage Range	3V to 18V
Operating Temperature Range	-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.

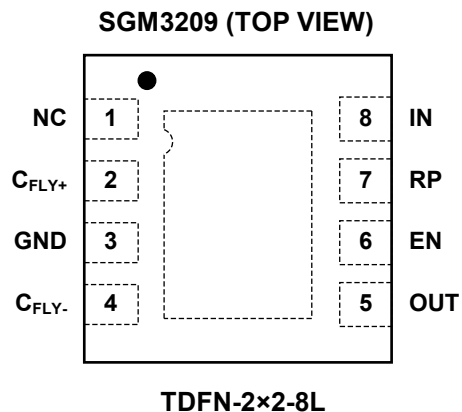
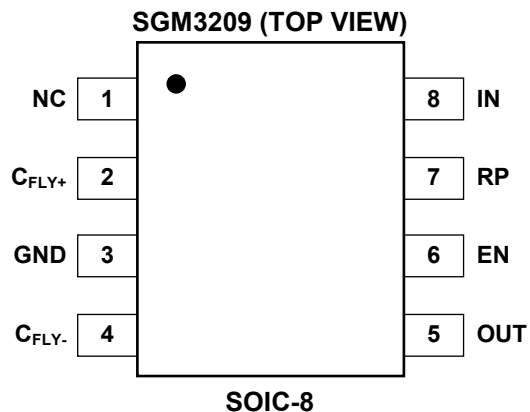
ESD SENSITIVITY CAUTION

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 CONFIGURATIONS



PIN DESCRIPTION

PIN		NAME	FUNCTION
TDFN-2x2-8L	SOIC-8		
1	1	NC	No Connection.
2	2	C_{FLY+}	Positive Terminal of the Flying Capacitor.
3	3	GND	Ground.
4	4	C_{FLY-}	Negative Terminal of the Flying Capacitor.
5	5	OUT	Output Pin.
6	6	EN	Enable Control Pin. Logic high to enable chip and logic low to shut down chip.
7	7	RP	Switching Frequency Setting. Connect one resistor (R_{SET}) between RP pin and GND to program switching frequency. The resistor should be located very close to this pin. Frequency range is from 120kHz to 1.25MHz.
8	8	IN	Power Input Pin.
Exposed Pad	-	NC	No Connection.

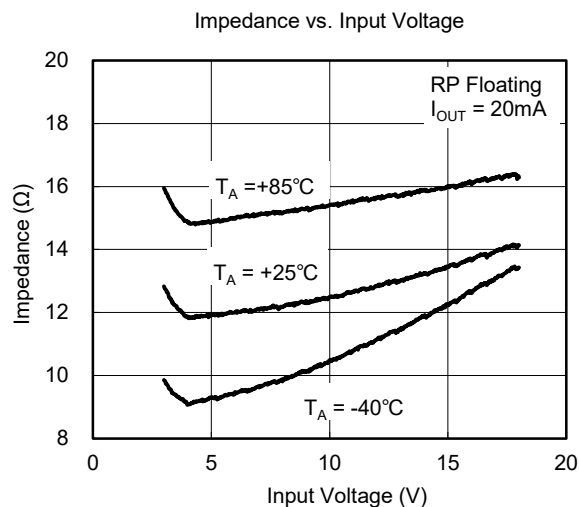
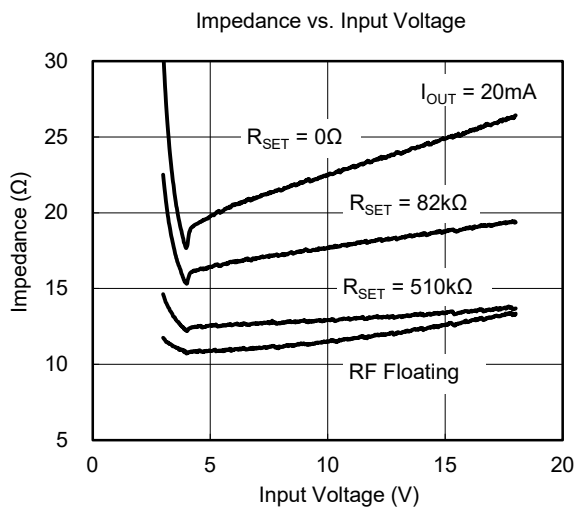
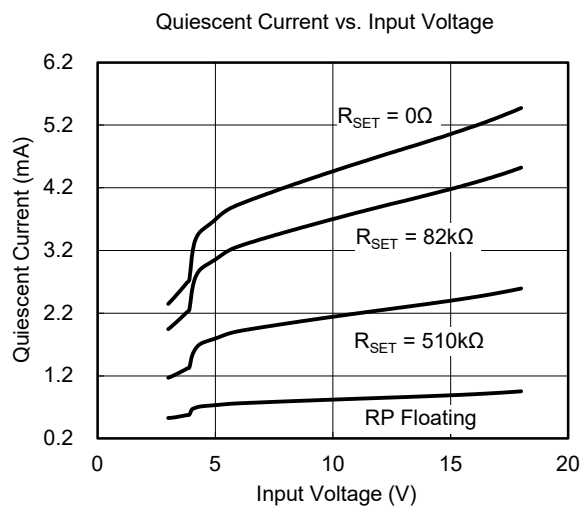
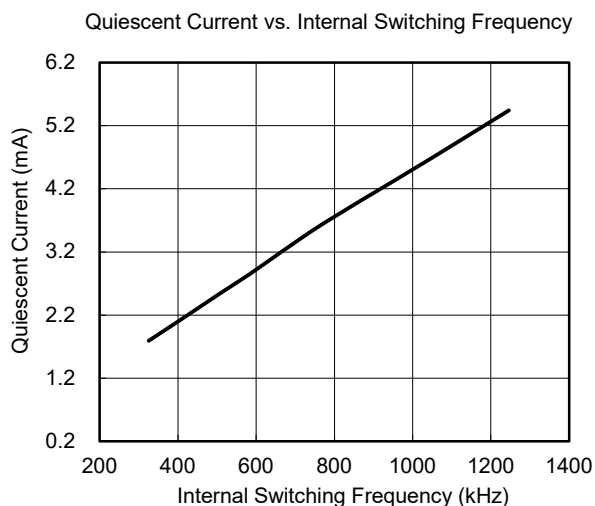
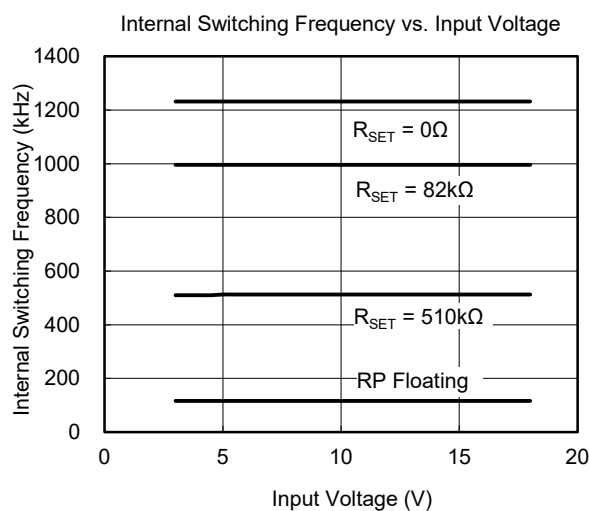
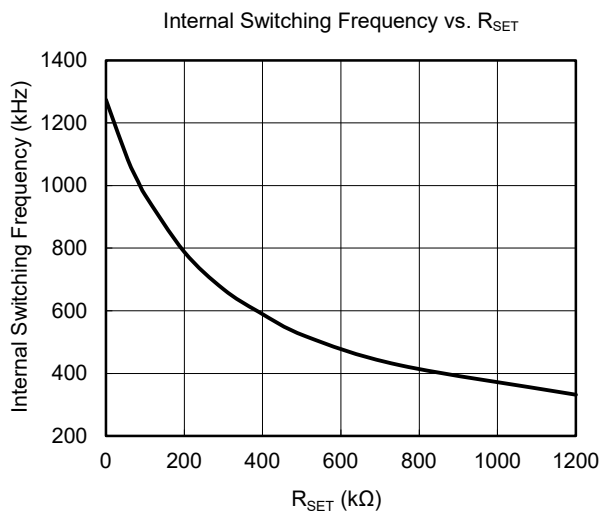
ELECTRICAL CHARACTERISTICS

(V_{IN} = 15V, C_{IN} = C_{FLY} = C_{OUT} = 10μF, Full = -40°C to +85°C. Typical values are at T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Input Voltage Range	V _{IN}		Full	3		18	V
Maximum Output Current Range at OUT Pin	I _{OUT}		+25°C	100			mA
Output Voltage	V _{OUT}		+25°C		-V _{IN}		V
Output Voltage Ripple	V _{PP}	I _{OUT} = 100mA, RP Floating	+25°C		250		mV _{P-P}
		I _{OUT} = 100mA, R _{SET} = 82kΩ	+25°C		40		
		I _{OUT} = 100mA, R _{SET} = 0Ω	+25°C		35		
Quiescent Current	I _Q	RP Floating, I _{OUT} = 0mA	+25°C		0.9	1.4	mA
		R _{SET} = 82kΩ, I _{OUT} = 0mA	+25°C		4.3	5.5	
		R _{SET} = 0Ω, I _{OUT} = 0mA	+25°C		5.3	7.0	
		Shutdown Mode, V _{EN} = 0V	+25°C		0.5	1.2	μA
Internal Switching Frequency	f _{OSC}	RP Floating	+25°C	100	120	145	kHz
		R _{SET} = 82kΩ	+25°C	850	1000	1160	
		R _{SET} = 0Ω	+25°C	1050	1250	1520	
Impedance	R _O	I _{OUT} = 20mA, RP Floating	+25°C		15	19	Ω
		I _{OUT} = 20mA, R _{SET} = 82kΩ	+25°C		23	38	
		I _{OUT} = 20mA, R _{SET} = 0Ω	+25°C		33	57	
EN Logic Level High	V _{IH}	V _{IN} = 3V to 18V	Full	1.4			V
EN Logic Level Low	V _{IL}	V _{IN} = 3V to 18V	Full			0.6	V
EN Internal Pull Low Resistance	R _{PULL-LOW}		+25°C		600		kΩ
Thermal Shutdown Temperature	T _{SHDN}				150		°C
Thermal Shutdown Hysteresis	ΔT _{SHDN}				20		°C

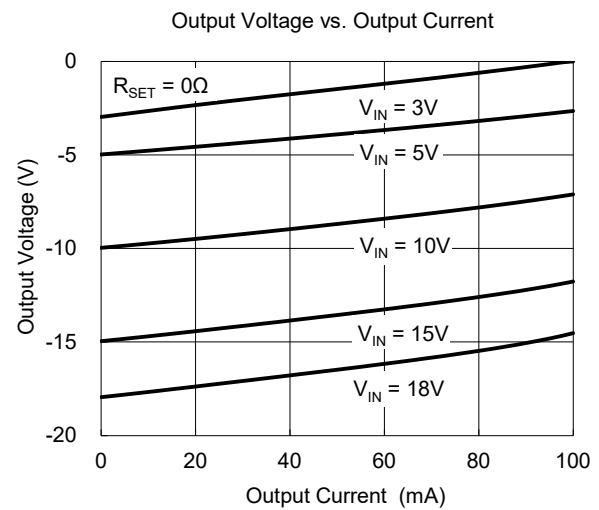
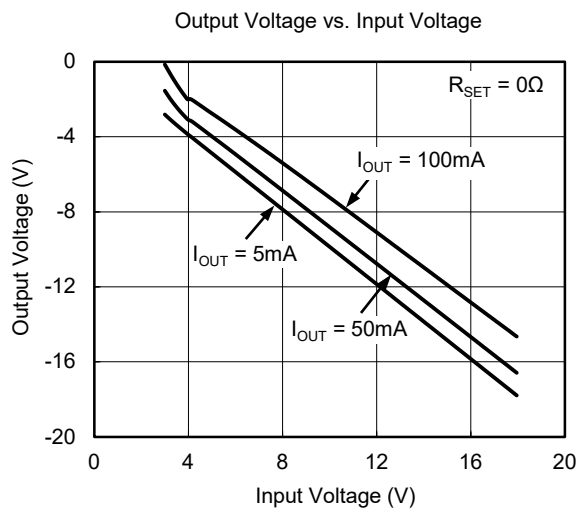
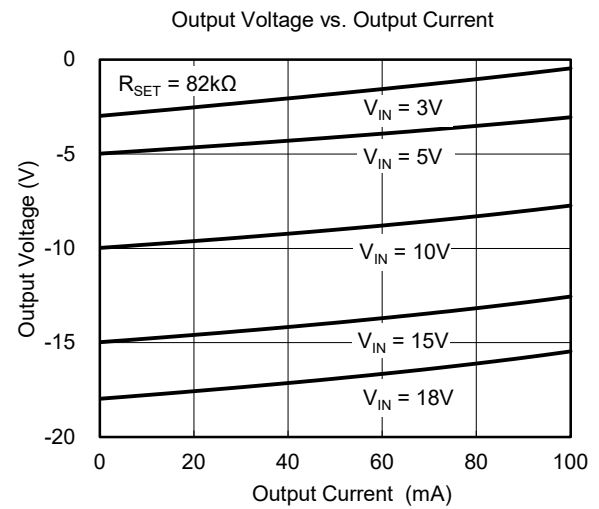
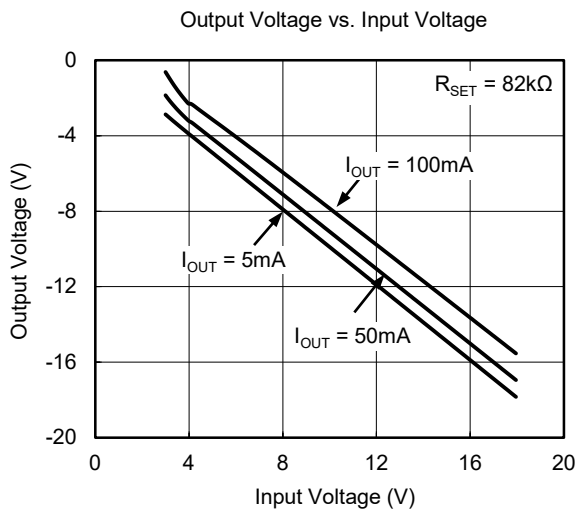
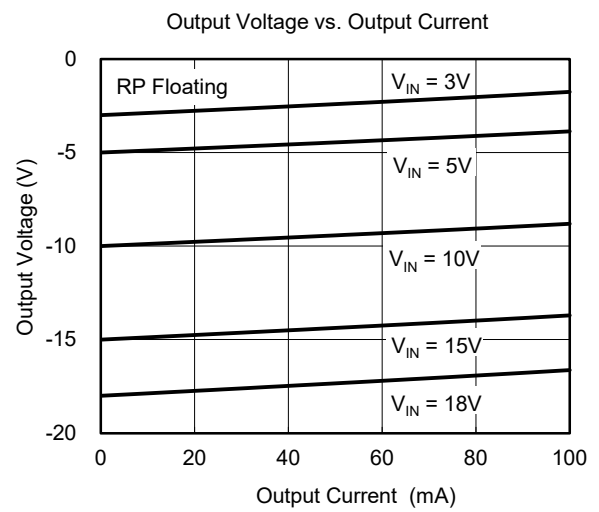
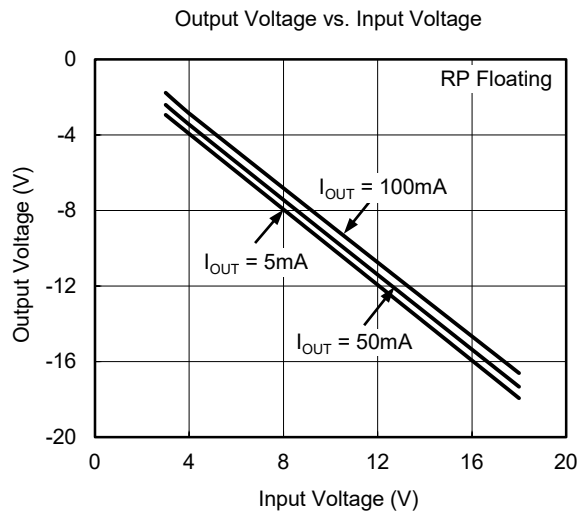
TYPICAL PERFORMANCE CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $V_{IN} = 15\text{V}$, $C_{IN} = C_{FLY} = C_{OUT} = 10\mu\text{F}$, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

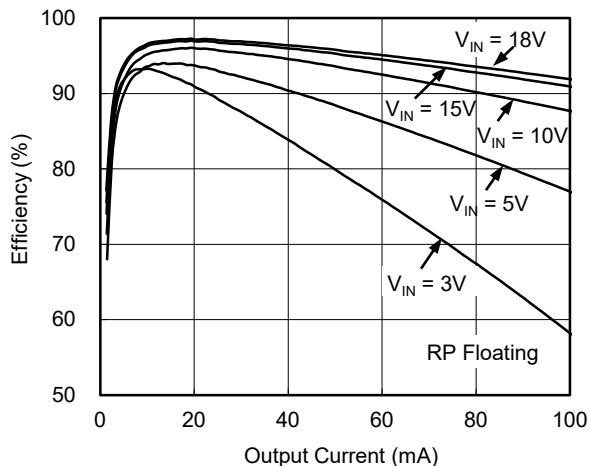
At $T_A = +25^\circ\text{C}$, $V_{IN} = 15\text{V}$, $C_{IN} = C_{FLY} = C_{OUT} = 10\mu\text{F}$, unless otherwise noted.



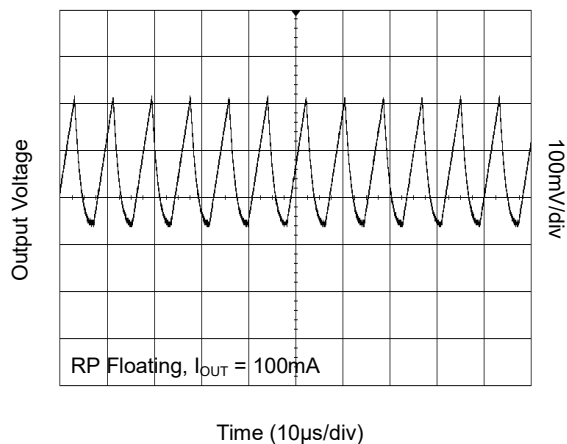
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At $T_A = +25^\circ\text{C}$, $V_{IN} = 15\text{V}$, $C_{IN} = C_{FLY} = C_{OUT} = 10\mu\text{F}$, unless otherwise noted.

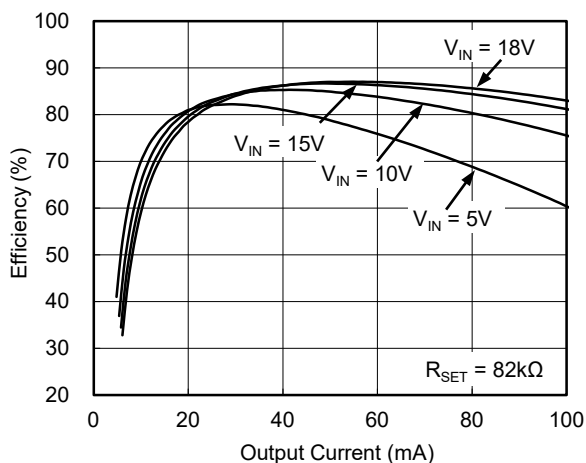
Efficiency vs. Output Current



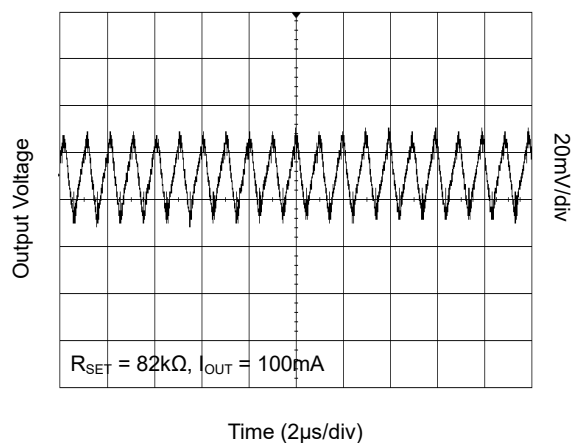
Output Voltage Ripple



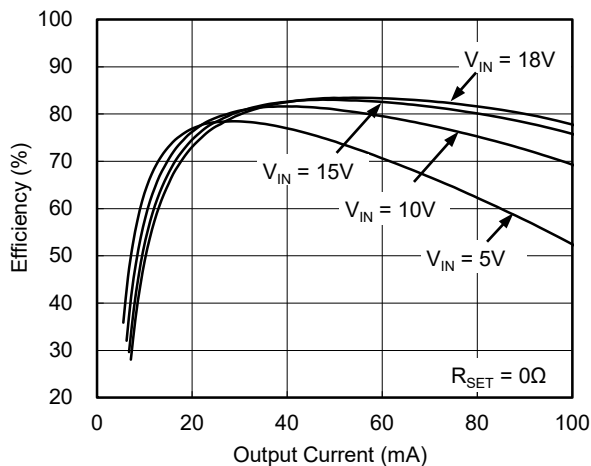
Efficiency vs. Output Current



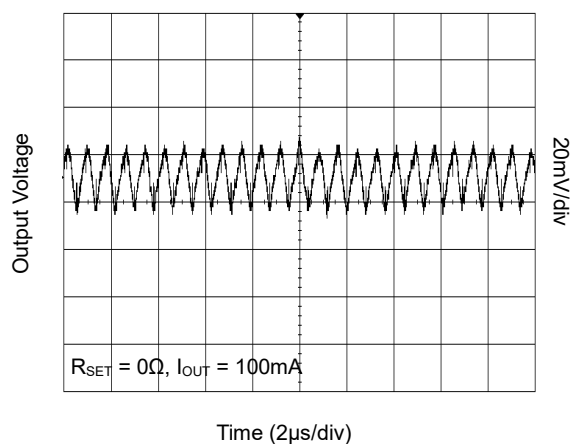
Output Voltage Ripple



Efficiency vs. Output Current

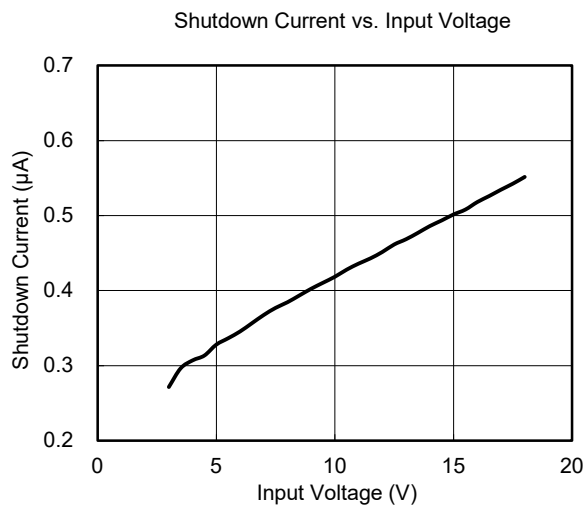


Output Voltage Ripple



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At $T_A = +25^\circ\text{C}$, $V_{IN} = 15\text{V}$, $C_{IN} = C_{FLY} = C_{OUT} = 10\mu\text{F}$, unless otherwise noted.

**REVISION HISTORY**

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

NOVEMBER 2020 – REV.A to REV.A.1**Page**

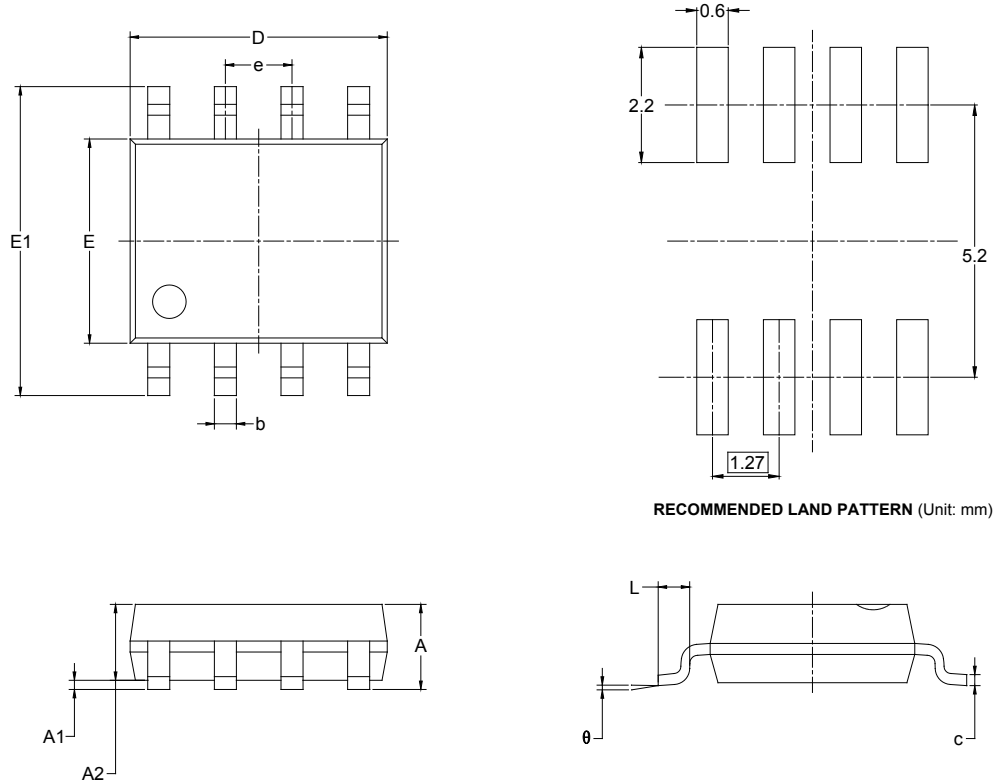
Updated Marking Information section.....2

Changes from Original (JANUARY 2016) to REV.A**Page**

Changed from product preview to production data.....All

PACKAGE OUTLINE DIMENSIONS

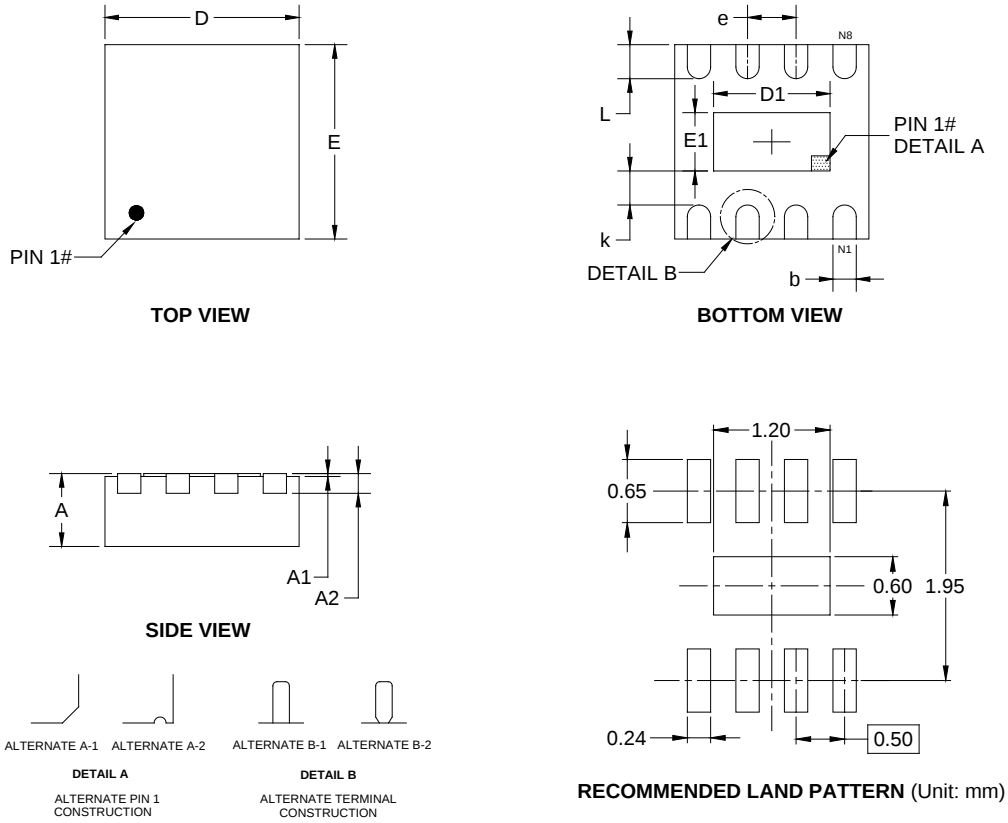
SOIC-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

TDFN-2x2-8L



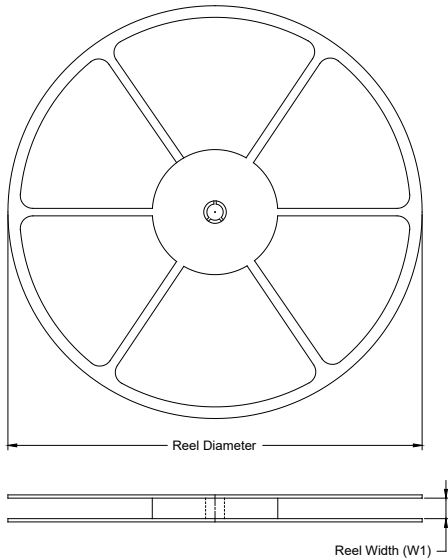
Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.700	0.750	0.800
A1	0.000	-	0.050
A2	0.203 REF		
D	1.900	2.000	2.100
E	1.900	2.000	2.100
D1	1.100	1.200	1.300
E1	0.500	0.600	0.700
b	0.180	-	0.300
e	0.500 TYP		
k	0.200 MIN		
L	0.250	0.350	0.450

NOTE: This drawing is subject to change without notice.

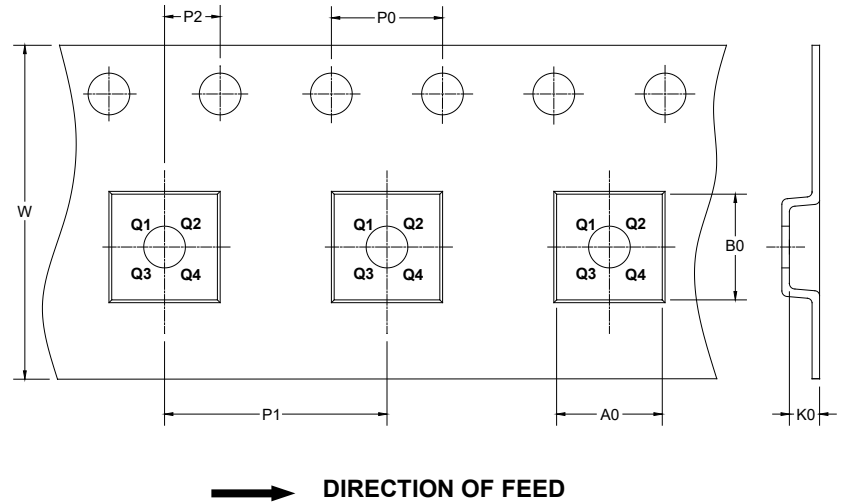
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

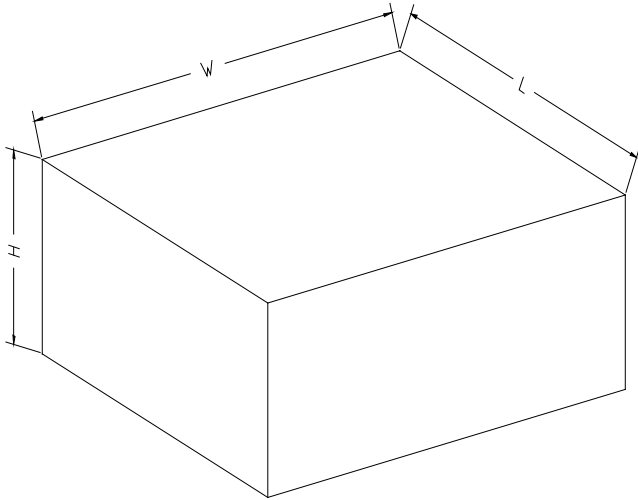
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOIC-8	13"	12.4	6.40	5.40	2.10	4.0	8.0	2.0	12.0	Q1
TDFN-2×2-8L	7"	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q1

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

DD0002