

GENERAL DESCRIPTION

The SGM2217S is a low noise, high current and low dropout voltage linear regulator. It is capable of supplying 1.5A output current with typical dropout voltage of 1.3V. The operating input voltage range is from 2.8V to 27V. The fixed output voltage range is from 1.8V to 12V. The adjustable output voltage range is from 1.25V to 25V.

Other features include short-circuit current limit and thermal shutdown protection.

The SGM2217S is available in Green TO-252-2A, TO-263-3A and TDFN-4x4-8L packages. It operates over an operating temperature range of -40 °C to +125°C.

FEATURES

- **Wide Input Voltage Range: 2.8V to 27V**
- **Adjustable Output from 1.25V to 25V**
- **Fixed Output from 1.8V to 12V**
- **1.5A Output Current**
- **Output Voltage Accuracy: ±1% at +25°C**
- **Low Dropout Voltage: 1.3V (TYP) at 1.5A**
- **Line Regulation: 0.04% (TYP)**
- **Load Regulation: 0.1% (TYP)**
- **Can Start Up when the Output Voltage is Negative**
- **Current Limiting and Thermal Protection**
- **Excellent Load and Line Transient Responses**
- **Stable with Small Case Size Ceramic Capacitors**
- **-40°C to +125°C Operating Temperature Range**
- **Available in Green TO-252-2A, TO-263-3A and TDFN-4x4-8L Packages**

APPLICATIONS

- Battery Chargers
- Microprocessor Supplies
- Switching Power Supplies
- Constant Current Monitoring System

TYPICAL APPLICATION

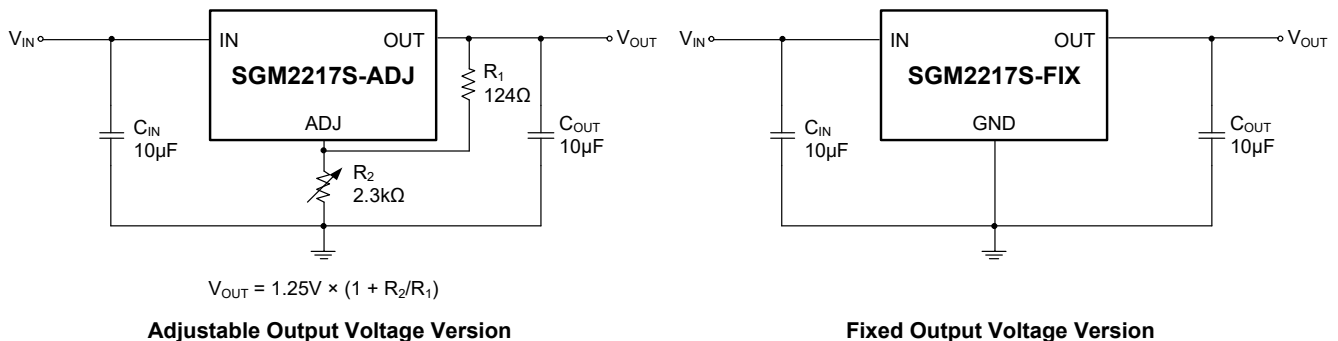


Figure 1. Typical Application Circuits

PACKAGE/ORDERING INFORMATION

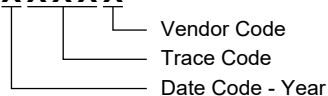
MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2217S-1.8	TO-252-2A	-40°C to +125°C	SGM2217S-1.8XOC2G/TR	SGM0ZH OC2 XXXXX	Tape and Reel,2500
	TO-263-3A	-40°C to +125°C	SGM2217S-1.8XOA3G/TR	SGM0ZO OA3 XXXXX	Tape and Reel,800
	TDFN-4x4-8L	-40°C to +125°C	SGM2217S-1.8XTEL8G/TR	0ZD XTEL8 XXXXX	Tape and Reel,3000
SGM2217S-2.5	TO-252-2A	-40°C to +125°C	SGM2217S-2.5XOC2G/TR	SGM0ZI OC2 XXXXX	Tape and Reel,2500
	TO-263-3A	-40°C to +125°C	SGM2217S-2.5XOA3G/TR	SGM0ZP OA3 XXXXX	Tape and Reel,800
	TDFN-4x4-8L	-40°C to +125°C	SGM2217S-2.5XTEL8G/TR	0ZE XTEL8 XXXXX	Tape and Reel,3000
SGM2217S-2.8	TO-252-2A	-40°C to +125°C	SGM2217S-2.8XOC2G/TR	SGM0ZJ OC2 XXXXX	Tape and Reel,2500
	TO-263-3A	-40°C to +125°C	SGM2217S-2.8XOA3G/TR	SGM0ZQ OA3 XXXXX	Tape and Reel,800
	TDFN-4x4-8L	-40°C to +125°C	SGM2217S-2.8XTEL8G/TR	0ZF XTEL8 XXXXX	Tape and Reel,3000
SGM2217S-3.0	TO-252-2A	-40°C to +125°C	SGM2217S-3.0XOC2/TR	SGM0ZK OC2 XXXXX	Tape and Reel,2500
	TO-263-3A	-40°C to +125°C	SGM2217S-3.0XOA3G/TR	SGM0ZR OA3 XXXXX	Tape and Reel,800
	TDFN-4x4-8L	-40°C to +125°C	SGM2217S-3.0XTEL8G/TR	0ZG XTEL8 XXXXX	Tape and Reel,3000
SGM2217S-3.3	TO-252-2A	-40°C to +125°C	SGM2217S-3.3XOC2G/TR	SGM0NB OC2 XXXXX	Tape and Reel,2500
	TO-263-3A	-40°C to +125°C	SGM2217S-3.3XOA3G/TR	SGM0ND OA3 XXXXX	Tape and Reel,800
	TDFN-4x4-8L	-40°C to +125°C	SGM2217S-3.3XTEL8G/TR	0N3 XTEL8 XXXXX	Tape and Reel,3000
SGM2217S-5.0	TO-252-2A	-40°C to +125°C	SGM2217S-5.0XOC2G/TR	SGM0ZL OC2 XXXXX	Tape and Reel,2500
	TO-263-3A	-40°C to +125°C	SGM2217S-5.0XOA3G/TR	SGM0ZS OA3 XXXXX	Tape and Reel,800
	TDFN-4x4-8L	-40°C to +125°C	SGM2217S-5.0XTEL8G/TR	0ZC XTEL8 XXXXX	Tape and Reel,3000

PACKAGE/ORDERING INFORMATION (Continued)

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2217S-12	TO-252-2A	-40°C to +125°C	SGM2217S-12XOC2G/TR	SGM0ZM OC2 XXXXX	Tape and Reel,2500
	TO-263-3A	-40°C to +125°C	SGM2217S-12XOA3G/TR	SGM0ZT OA3 XXXXX	Tape and Reel,800
	TDFN-4x4-8L	-40°C to +125°C	SGM2217S-12XTEL8G/TR	0ZN XTEL8 XXXXX	Tape and Reel,3000
SGM2217S-ADJ	TO-252-2A	-40°C to +125°C	SGM2217S-ADJOC2G/TR	SGM0NA OC2 XXXXX	Tape and Reel,2500
	TO-263-3A	-40°C to +125°C	SGM2217S-ADJXOA3G/TR	SGM0N OA3 XXXXX	Tape and Reel,800
	TDFN-4x4-8L	-40°C to +125°C	SGM2217S-ADJXTEL8G/TR	0N2 XTEL8 XXXXX	Tape and Reel,3000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.

TO-252-2A/TO-263-3A/TDFN-4x4-8L**XXXXX**

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

Input to Output Voltage	31V
Package Thermal Resistance	
TO-252-2A, θ_{JA}	29.7°C/W
TO-252-2A, θ_{JB}	6.4°C/W
TO-252-2A, $\theta_{JC(TOP)}$	40.6°C/W
TO-252-2A, $\theta_{JC(BOT)}$	2.6°C/W
TO-263-3A, θ_{JA}	23°C/W
TO-263-3A, θ_{JB}	4.3°C/W
TO-263-3A, $\theta_{JC(TOP)}$	32.3°C/W
TO-263-3A, $\theta_{JC(BOT)}$	3°C/W
TDFN-4x4-8L, θ_{JA}	35.9°C/W
TDFN-4x4-8L, θ_{JB}	12.2°C/W
TDFN-4x4-8L, $\theta_{JC(TOP)}$	29.7°C/W
TDFN-4x4-8L, $\theta_{JC(BOT)}$	1.8°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	±4000V
CDM	±1000V

NOTES:

1. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
2. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Input Voltage Range	2.8V to 27V
Input Effective Capacitance, C_{IN}	2.2µF (MIN)
Output Effective Capacitance, C_{OUT}	2.2µF to 100µF
Capacitor Equivalent Series Resistance, ESR.....	1mΩ to 8Ω
Operating Junction Temperature Range.....	-40°C to +125°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.

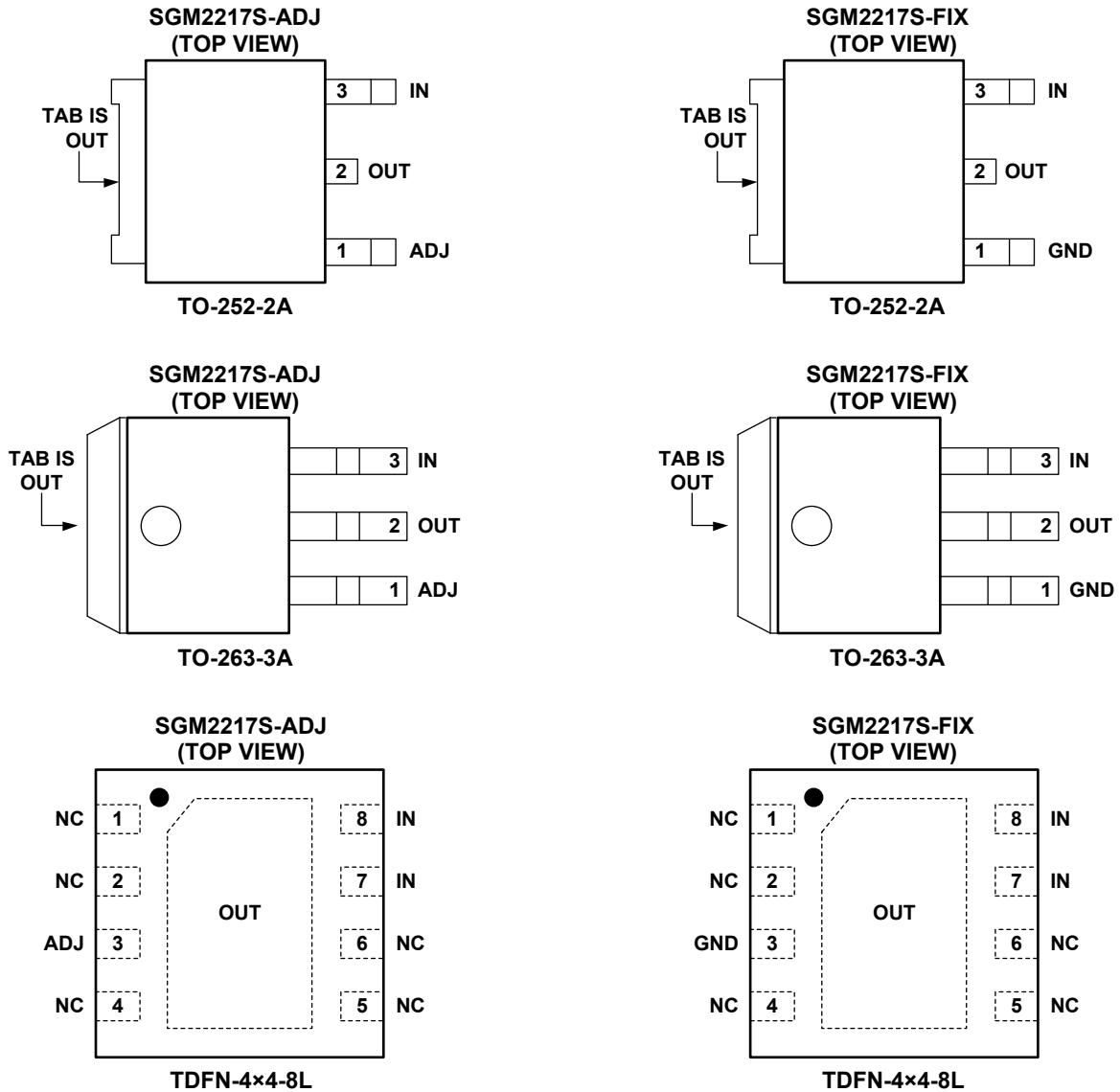
ESD SENSITIVITY CAUTION

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
TO-252-2A	TO-263-3A	TDFN-4x4-8L		
1	1	3	ADJ	Feedback Voltage 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.
			GND	Ground (fixed output voltage version only).
2, TAB	2, TAB	Exposed Pad	OUT	Regulator Output Pin. It is recommended to use a ceramic capacitor with effective capacitance in the range of 2.2µF to 100µF to ensure stability. This ceramic capacitor should be placed as close as possible to OUT pin.
3	3	7, 8	IN	Input Supply Voltage Pin. It is recommended to use a 4.7µF 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.
—	—	1, 2, 4, 5, 6	NC	No Connection.

FUNCTIONAL BLOCK DIAGRAMS

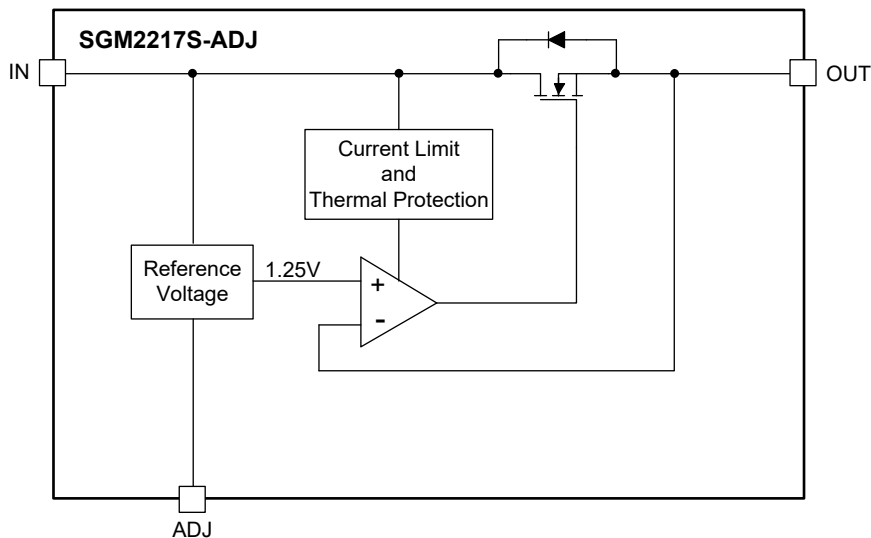


Figure 2. Internal Block Diagram of Adjustable Output Voltage

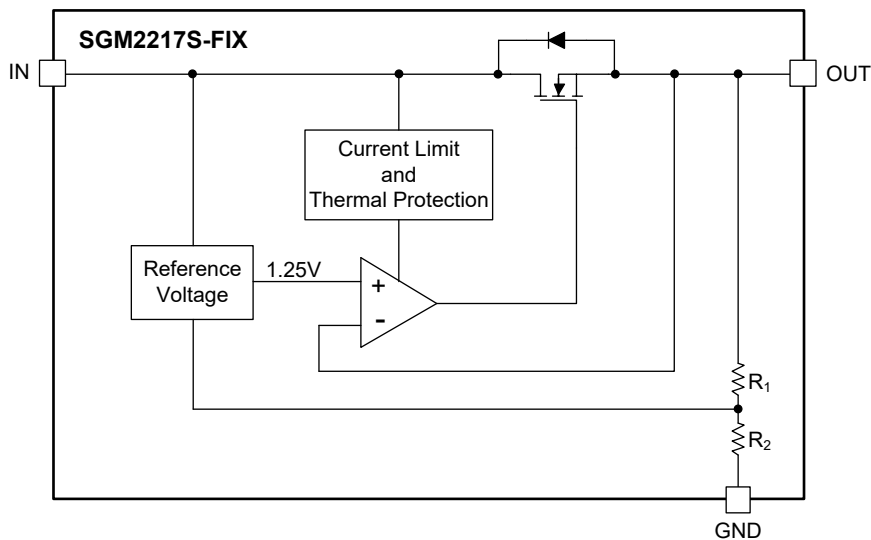


Figure 3. Internal Block Diagram of Fixed Output Voltage

ELECTRICAL CHARACTERISTICS

(C_{IN} = 10μF, C_{OUT} = 10μF (ceramic capacitor), T_J = -40°C to +125°C, typical values are at T_J = +25°C, unless otherwise noted.)

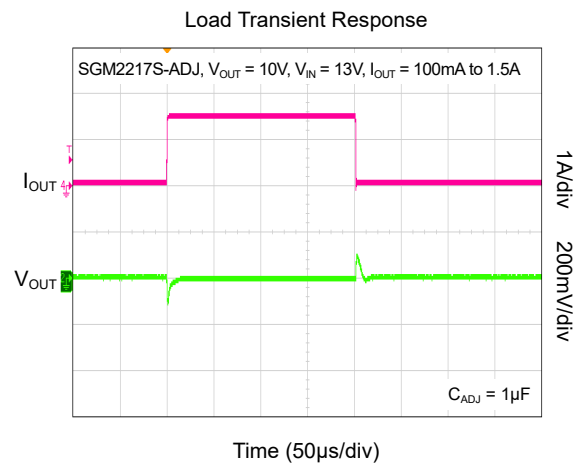
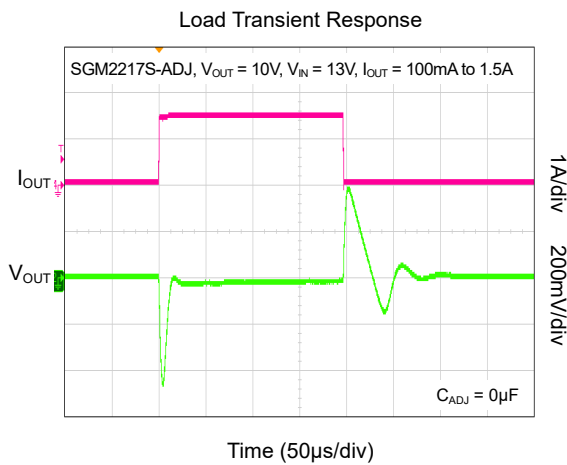
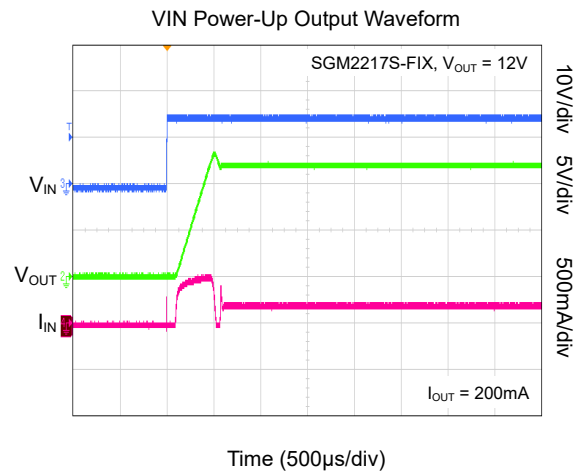
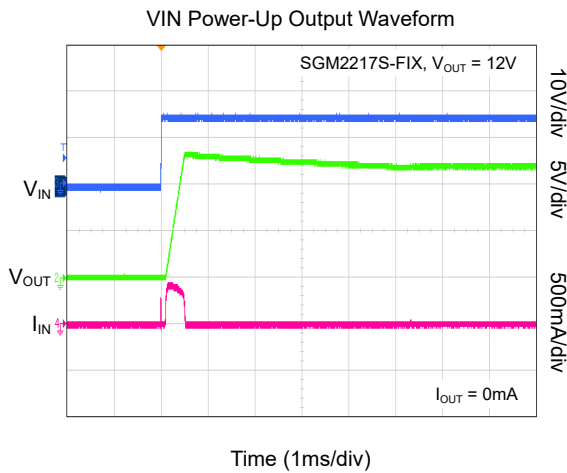
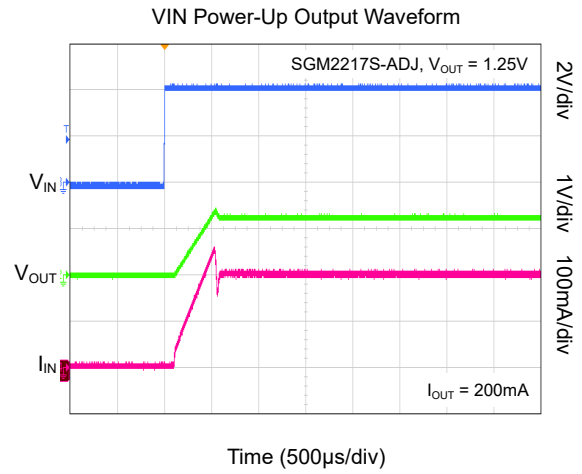
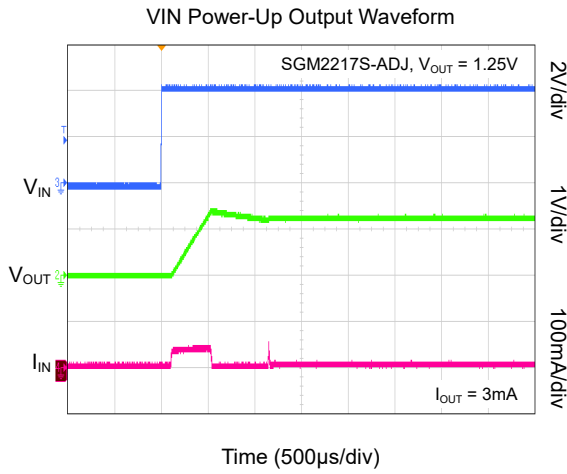
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Input Voltage Range	V _{IN}		2.8		27	V	
Reference Voltage (SGM2217S-ADJ)	V _{ADJ}	I _{OUT} = 5mA, V _{IN} - V _{OUT} = 3V, T _J = +25°C	1.238	1.25	1.262	V	
		I _{OUT} = 5mA to 1.5A ⁽¹⁾ , V _{IN} = (1.55V + V _{OUT}) to 27V	1.225		1.275		
Output Voltage Accuracy (SGM2217S-FIX)	V _{OUT}	I _{OUT} = 0mA, V _{IN} - V _{OUT} = 3V, T _J = +25°C	-1		+1	%	
		I _{OUT} = 0mA to 1.5A ⁽¹⁾ , V _{IN} = (1.55V + V _{OUT}) to 27V	-2		+2		
ADJ Pin Current	I _{ADJ}	I _{OUT} = 5mA, V _{IN} - V _{OUT} = 3V, SGM2217S-ADJ		9	20	μA	
ADJ Pin Current Change	ΔI _{ADJ}	I _{OUT} = 5mA to 1.5A ⁽¹⁾ , V _{IN} - V _{OUT} = 1.55V to 15V, SGM2217S-ADJ		0.1	1	μA	
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	V _{IN} = (1.55V + V _{OUT}) to 27V, I _{OUT} = 5mA, SGM2217S-ADJ	T _J = +25°C		0.04	0.16	%
			T _J = -40°C to +125°C			0.20	
		V _{IN} = (1.55V + V _{OUT}) to 27V, I _{OUT} = 0mA, SGM2217S-FIX	T _J = +25°C		0.04	0.16	
			T _J = -40°C to +125°C			0.20	
Load Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	I _{OUT} = 5mA to 1.5A, V _{IN} - V _{OUT} = 3V, SGM2217S-ADJ	T _J = +25°C		0.10	0.20	%
			T _J = -40°C to +125°C			0.40	
		I _{OUT} = 0mA to 1.5A, V _{IN} - V _{OUT} = 3V, SGM2217S-FIX	T _J = +25°C		0.04	0.20	
			T _J = -40°C to +125°C			0.40	
Dropout Voltage	V _{DROP}	I _{OUT} = 1.5A, ΔV _{OUT} = 1%		1.3	1.55	V	
Output Current Limit	I _{LIMIT}	V _{IN} - V _{OUT} = 5V, ΔV _{OUT} = 5%	1.55	2.6		A	
		V _{IN} - V _{OUT} = 25V, V _{OUT} = 0V	0.05	0.3			
Minimum Load Current ⁽²⁾	I _{OUT_MIN}	V _{IN} = 27V, SGM2217S-ADJ		2	5	mA	
Supply Pin Current	I _Q	V _{IN} = 27V, I _{OUT} = 0mA, SGM2217S-FIX		2.4	5	mA	
Start-Up Time	t _{STR}	From assertion of V _{IN} to V _{OUT} = 95% × V _{OUT(NOM)}		0.5	1	ms	
Temperature Stability				0.6		%	
Long Term Stability		1000 hours, T _J = +125°C		0.1		%	
Power Supply Rejection Ratio	PSRR	ΔV _{RIPPLE} = 2V _{P-P} , V _{IN} - V _{OUT} = 3V, f _{RIPPLE} = 120Hz, I _{OUT} = 1.5A, C _{OUT} = 20μF	C _{ADJ} = 25μF, SGM2217S-ADJ		79	dB	
			V _{OUT} = 3.3V		70		
			V _{OUT} = 5.0V		67		
			V _{OUT} = 12V		60		
Output Voltage Noise	e _n	f = 10Hz to 10kHz, I _{OUT} = 1.5A		0.003		%	
Thermal Regulation		30ms Pulse, T _J = +25°C		0.02	0.07	%/W	
Thermal Shutdown Temperature	T _{SHDN}			165		°C	
Thermal Shutdown Hysteresis	ΔT _{SHDN}			30		°C	

NOTES:

- Output current limit is a function of input-to-output voltage. See short-circuit current curve for available output current at the input-to-output differential.
- The minimum output current required to maintain regulation.

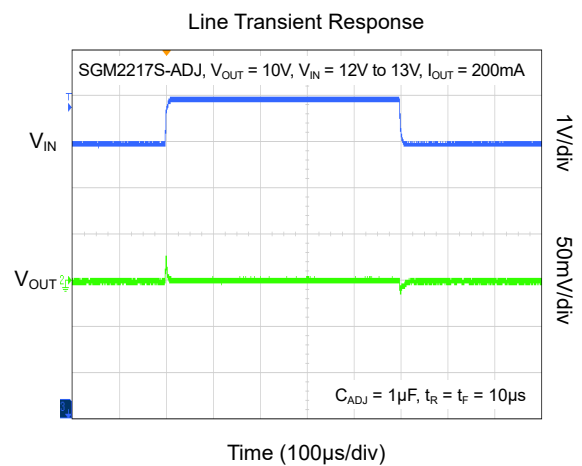
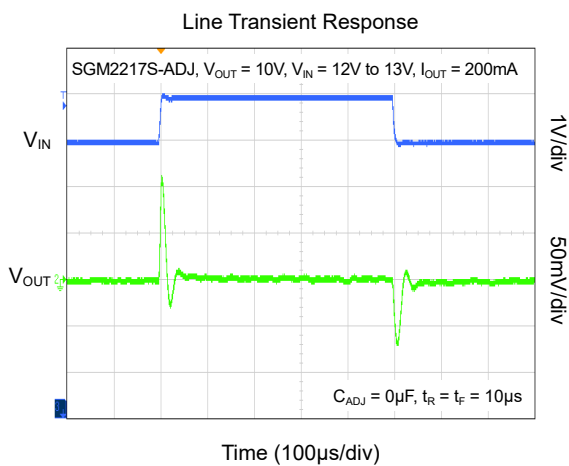
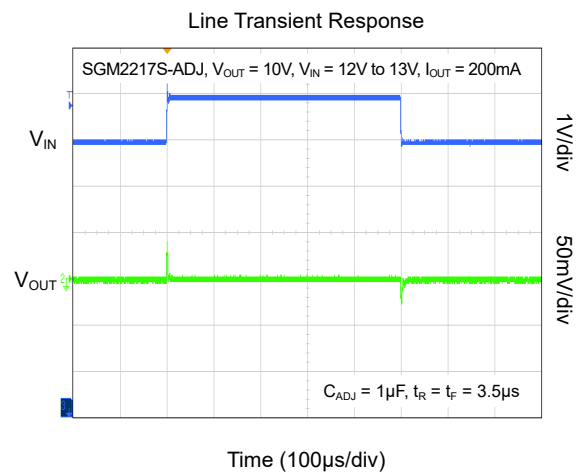
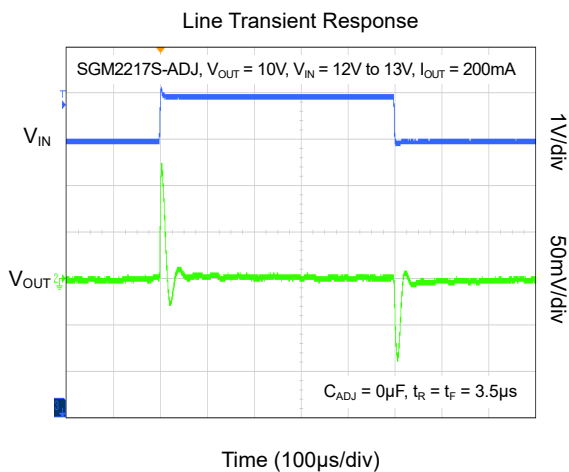
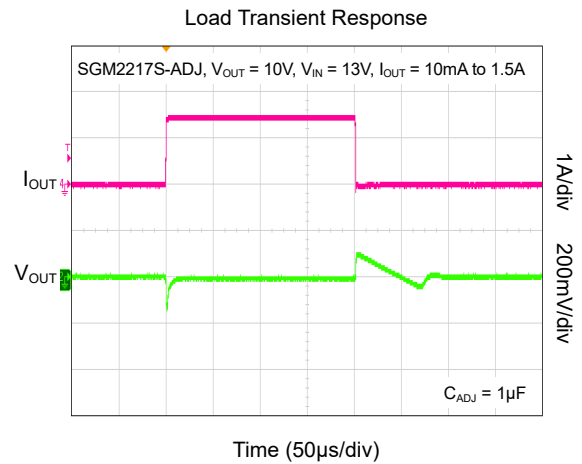
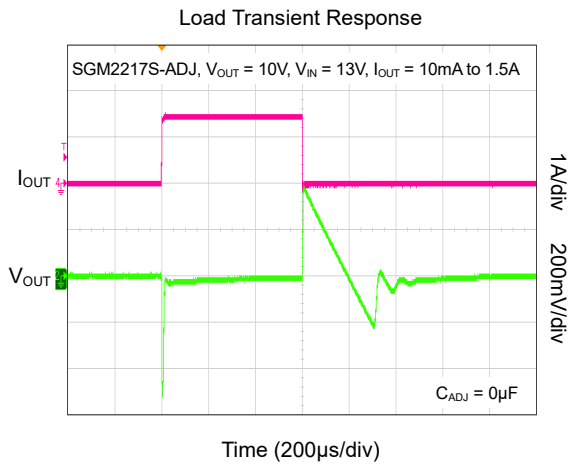
TYPICAL PERFORMANCE CHARACTERISTICS

T_J = +25°C, (V_{IN} - V_{OUT}) = 3V, C_{IN} = 10μF, C_{OUT} = 10μF (ceramic capacitor), unless otherwise noted.



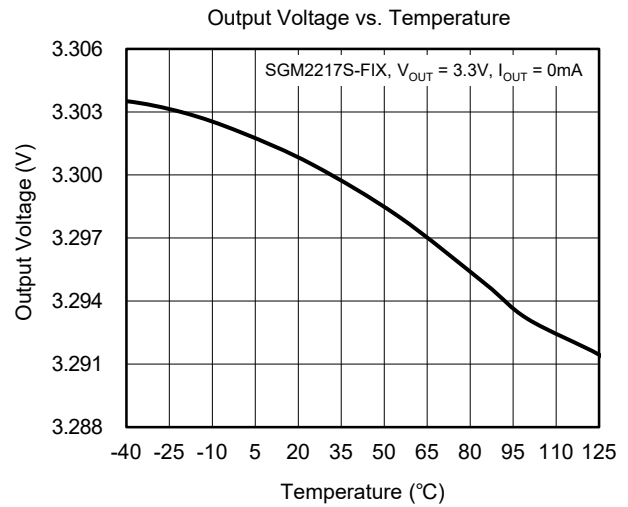
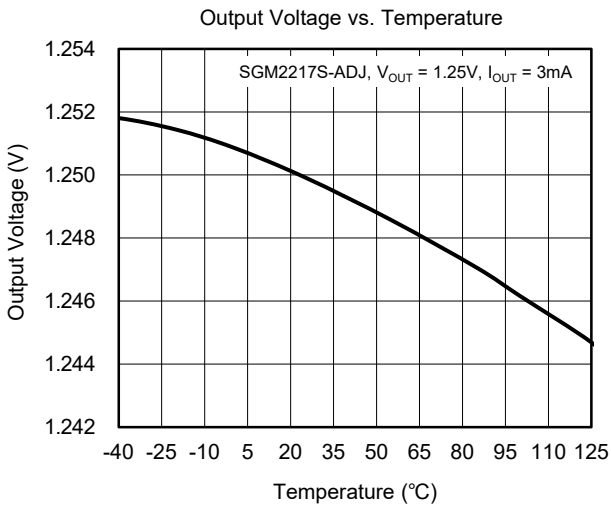
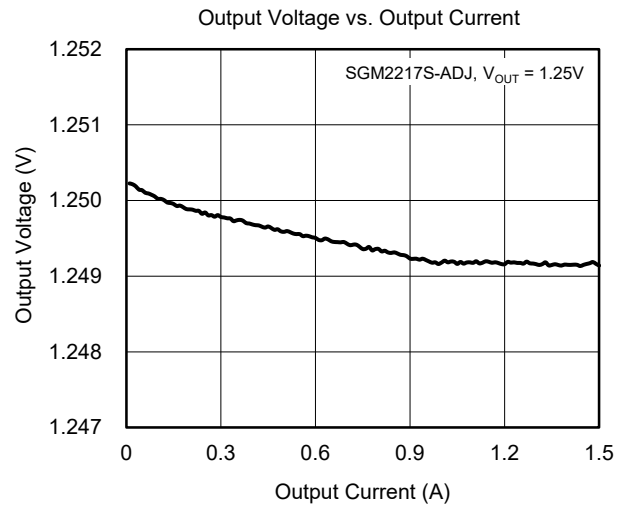
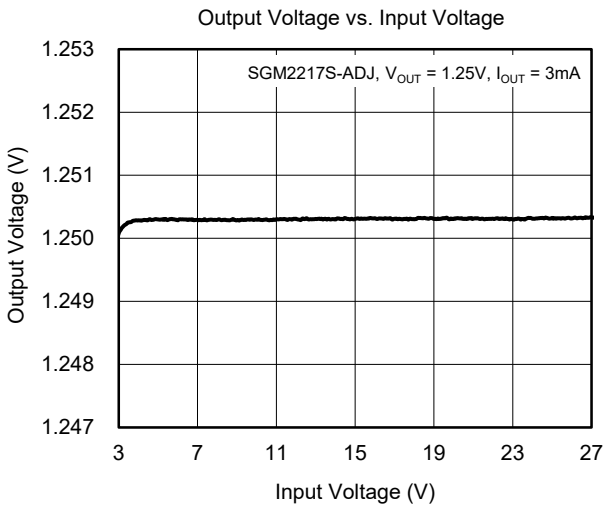
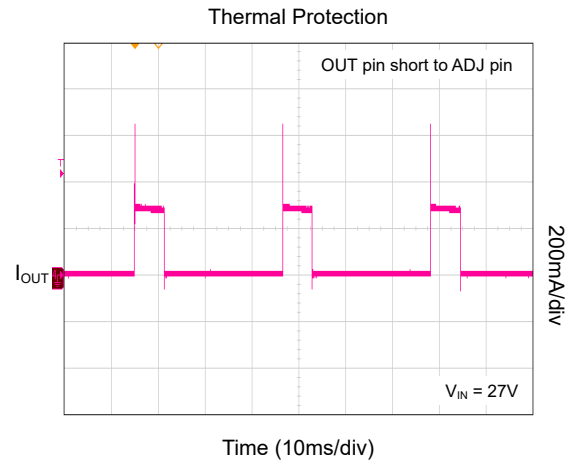
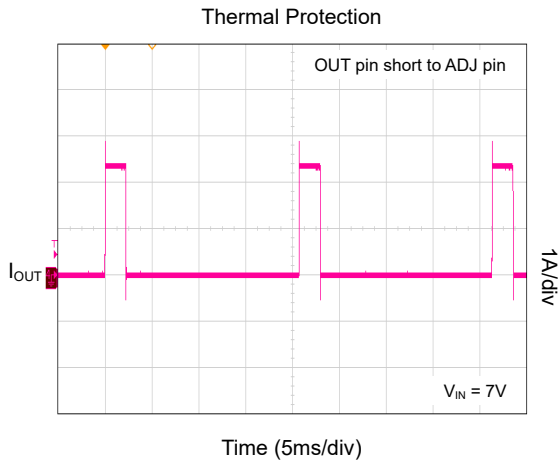
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_J = +25^\circ\text{C}$, $(V_{IN} - V_{OUT}) = 3\text{V}$, $C_{IN} = 10\mu\text{F}$, $C_{OUT} = 10\mu\text{F}$ (ceramic capacitor), unless otherwise noted.



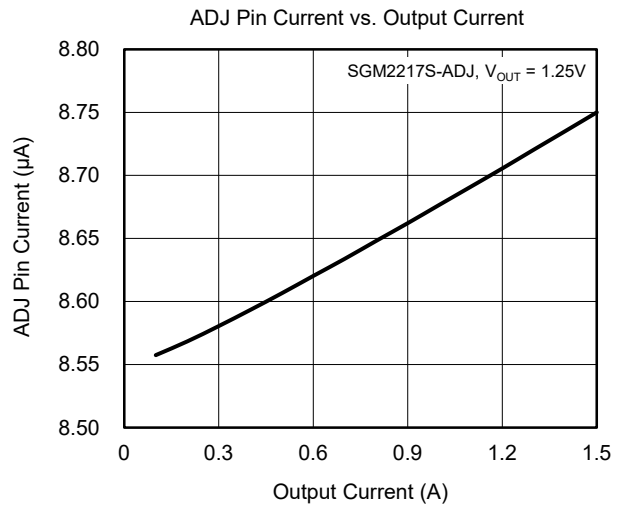
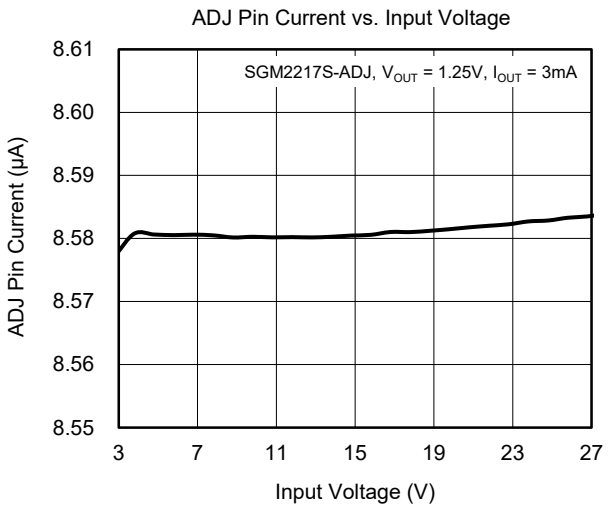
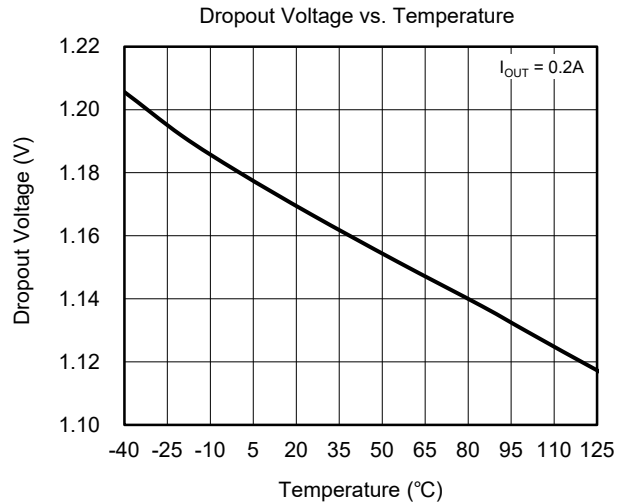
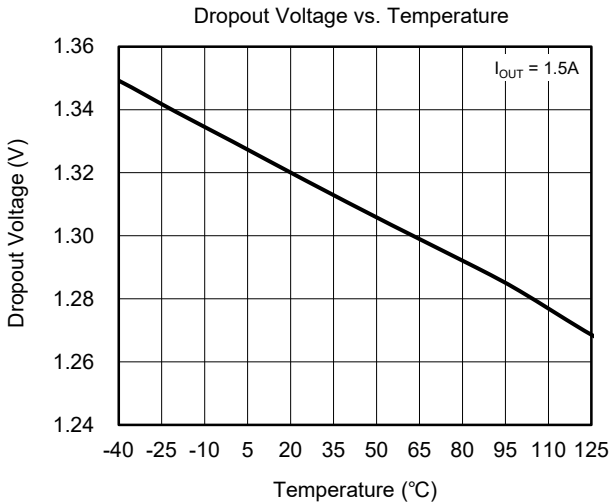
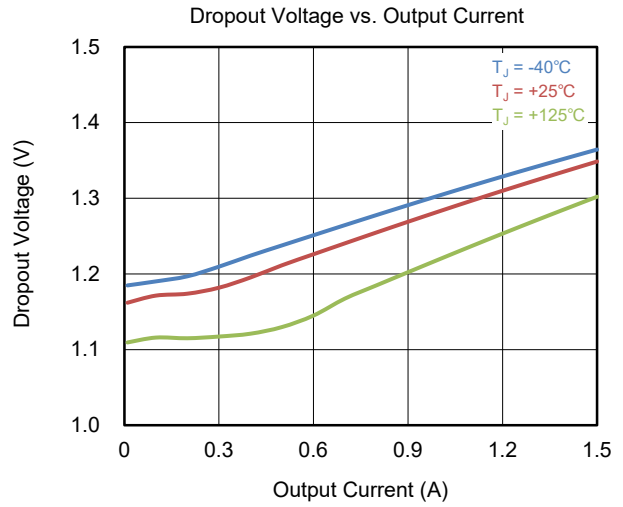
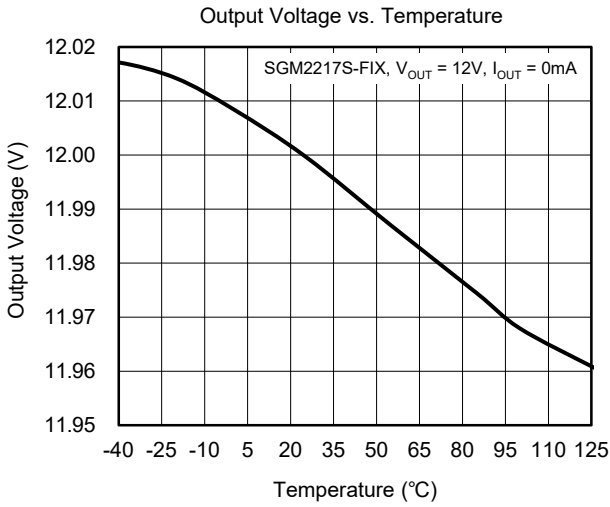
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_J = +25^\circ\text{C}$, $(V_{IN} - V_{OUT}) = 3\text{V}$, $C_{IN} = 10\mu\text{F}$, $C_{OUT} = 10\mu\text{F}$ (ceramic capacitor), unless otherwise noted.



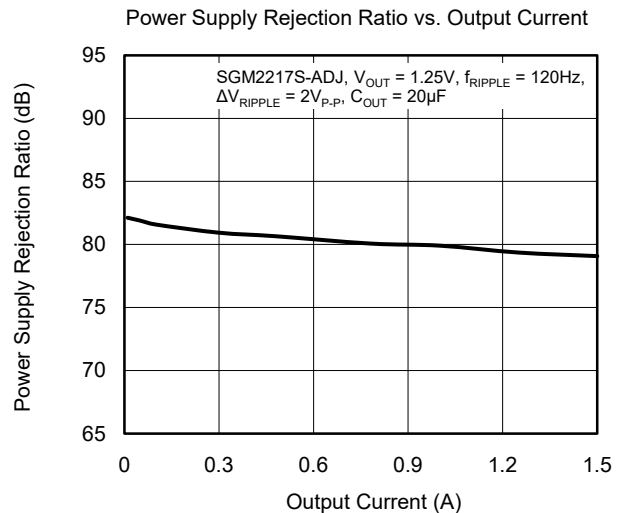
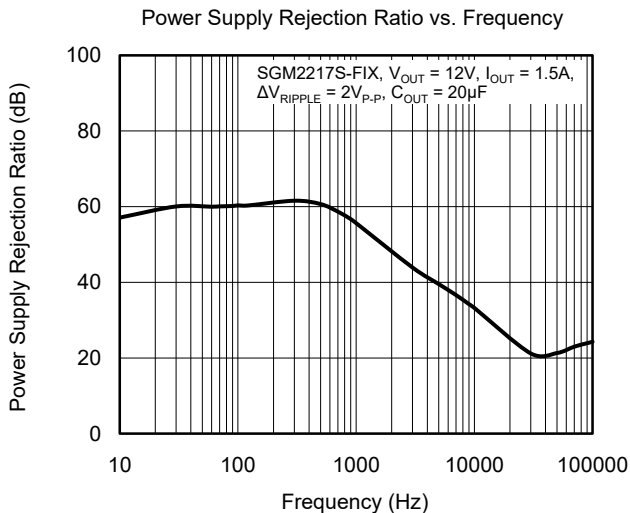
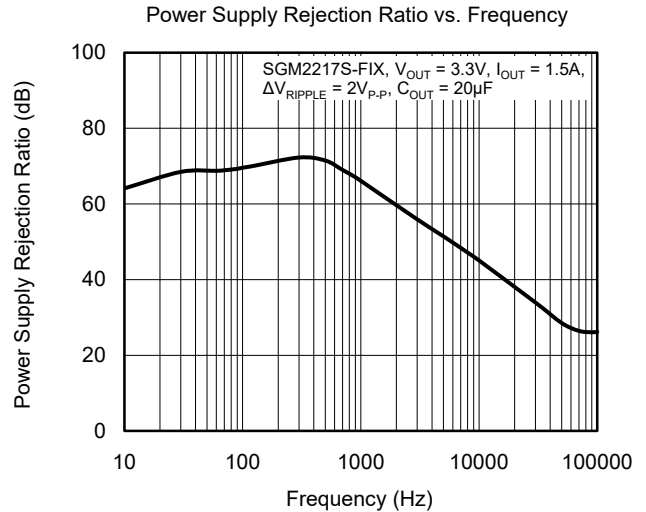
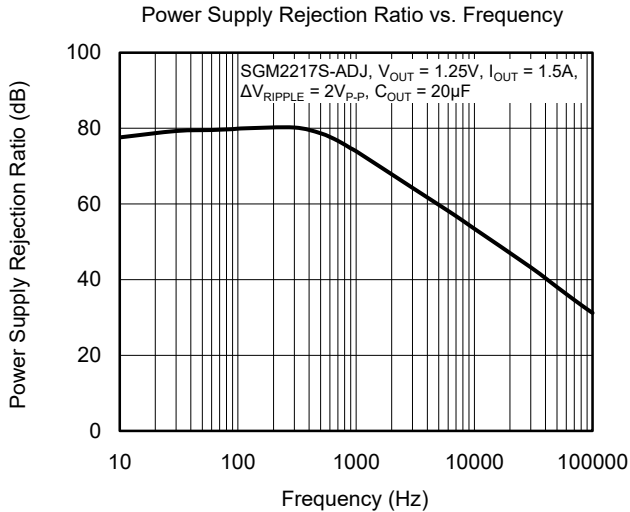
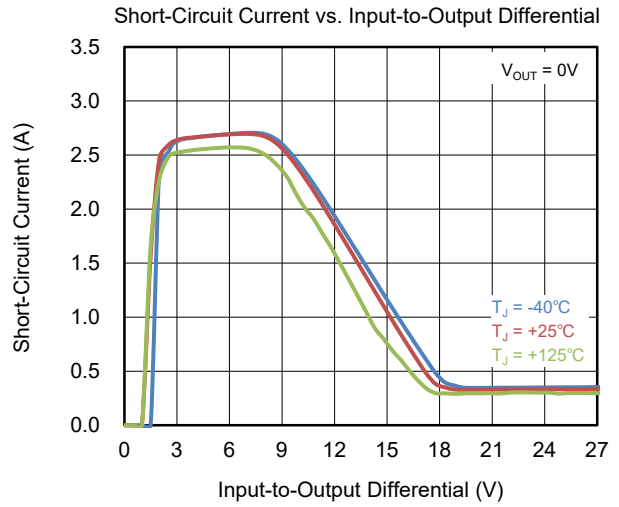
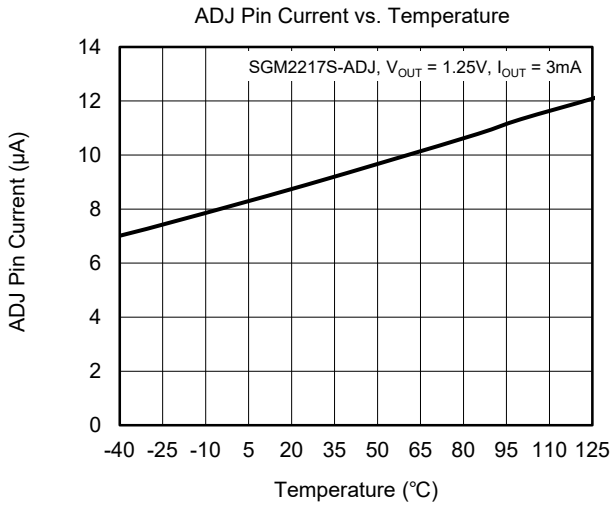
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_J = +25°C, (V_{IN} - V_{OUT}) = 3V, C_{IN} = 10µF, C_{OUT} = 10µF (ceramic capacitor), unless otherwise noted.



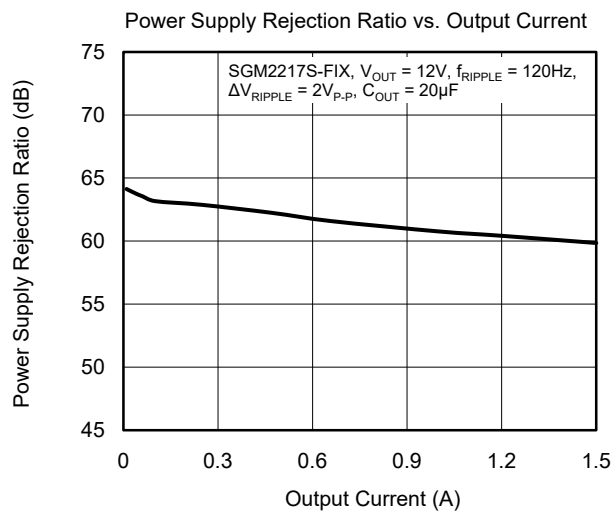
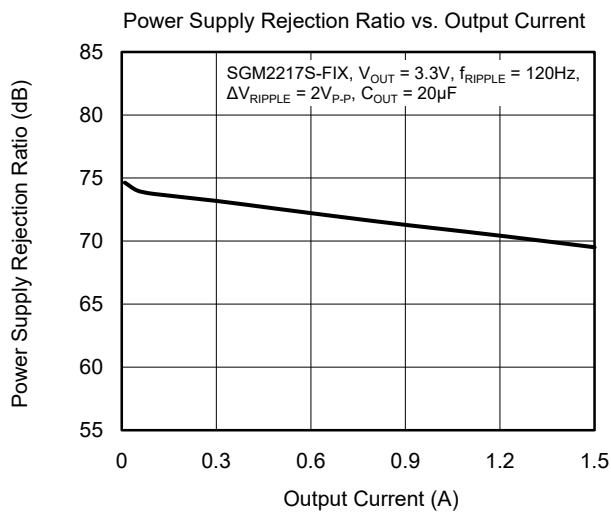
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_J = +25^\circ\text{C}$, $(V_{IN} - V_{OUT}) = 3\text{V}$, $C_{IN} = 10\mu\text{F}$, $C_{OUT} = 10\mu\text{F}$ (ceramic capacitor), unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_J = +25^\circ\text{C}$, $(V_{IN} - V_{OUT}) = 3\text{V}$, $C_{IN} = 10\mu\text{F}$, $C_{OUT} = 10\mu\text{F}$ (ceramic capacitor), unless otherwise noted.



APPLICATION INFORMATION

The SGM2217S is a low noise, high current and low dropout LDO and provides 1.5A 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 SGM2217S useful in a variety of applications. The SGM2217S provides protection functions for output overload, output short-circuit condition and overheating.

Input Capacitor Selection (C_{IN})

The input decoupling capacitor should be placed as close as possible to the IN pin for ensuring the device stability. 4.7µF or larger 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 limit the input tracking 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.

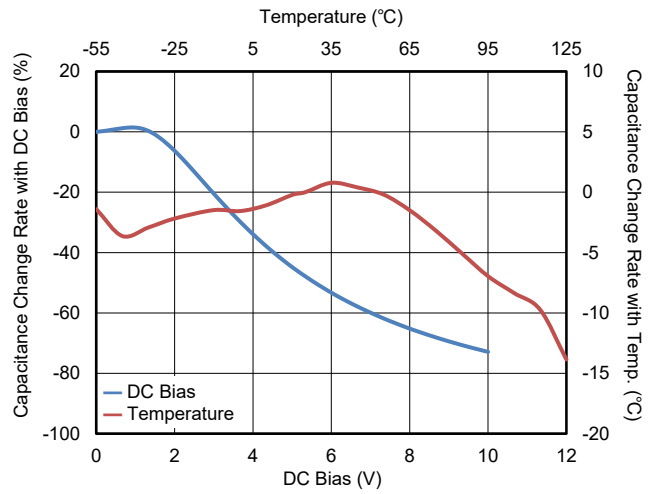


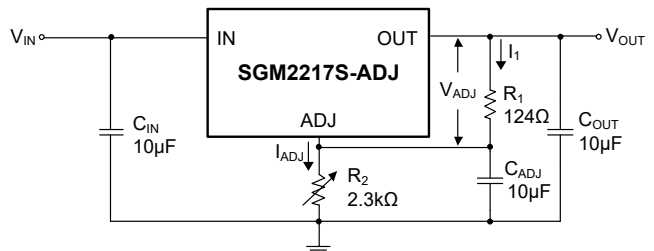
Figure 4. Capacitance vs. DC Bias and Temperature Characteristics

The SGM2217S requires an output capacitor with effective capacitance in the range of 2.2µF to 100µF with an ESR of 8Ω or less. 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 SGM2217S-ADJ can be adjusted from 1.25V to 25V. The ADJ pin will be connected to two external resistors as shown in Figure 5.

The PSRR and noise of adjustable LDO circuit can be modified slightly to levels close to that of the unity-gain LDO. The adjustment terminal can be bypassed to ground with a capacitor (C_{ADJ}). The impedance of the C_{ADJ} should be equal to or less than R₂ at the desired frequency.



$$V_{OUT} = V_{ADJ} \times (1 + R_2/R_1) + I_{ADJ} \times R_2, I_1 = V_{ADJ}/R_1$$

But I_{ADJ} is far less than I_1 , so $V_{OUT} = V_{ADJ} \times (1 + R_2/R_1)$.
Where V_{OUT} is output voltage and $V_{ADJ} = 1.25V$.

Figure 5. Adjustable Output Voltage Application

APPLICATION INFORMATION (continued)

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 SGM2217S-ADJ. 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 SGM2217S-ADJ.

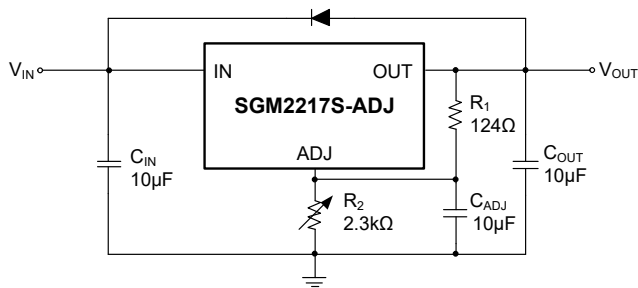


Figure 6. Reverse Protection Reference Design

Output Current Limit and Short-Circuit Protection

The current limiting circuit reduces the output current as the input-to-output differential increases after 2ms of power-on. The current limit is reduced from 2.6A to 0.3A when $(V_{IN} - V_{OUT})$ is greater than about 20V.

During normal start-up, the input-to-output differential is small since the output follows the input. But, if the output is shorted, then the recovery involves a large input-to-output differential. Sometimes during this condition the current limiting circuit is slow in recovering. If the limited current is too low to develop a voltage at the output, the voltage will stabilize at a lower level. Under these conditions it may be necessary to recycle the power of the regulator in order to get the smaller differential voltage and thus adequate start-up conditions.

Thermal Shutdown

When the die temperature exceeds the threshold value of thermal shutdown, the SGM2217S will be in shutdown state and it will remain in this state until the die temperature decreases to +135°C.

Power Dissipation (P_D)

Power dissipation (P_D) of the SGM2217S 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 SGM2217S 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:

$$P_{D(MAX)} = (T_{J(MAX)} - T_A) / \theta_{JA} \quad (1)$$

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.

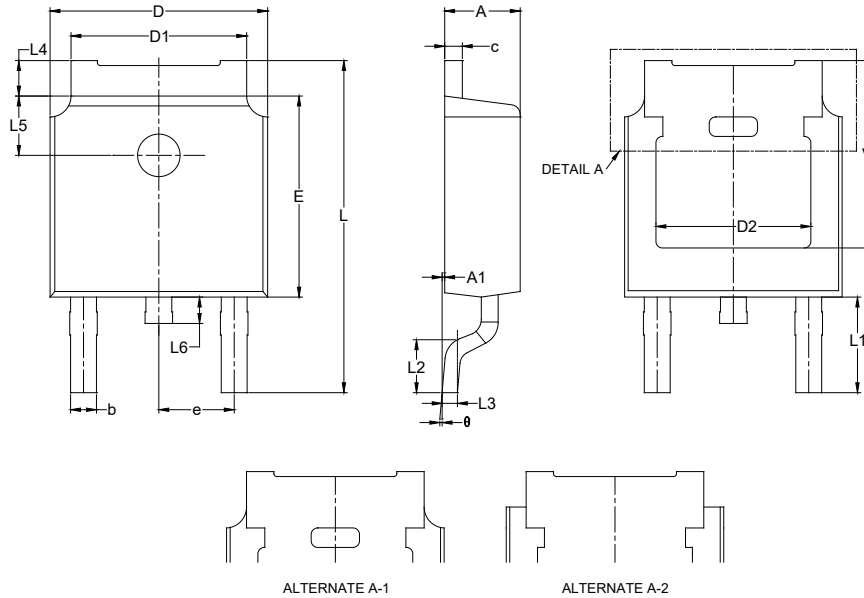
REVISION HISTORY

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

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

PACKAGE OUTLINE DIMENSIONS

TO-252-2A



DETAIL A

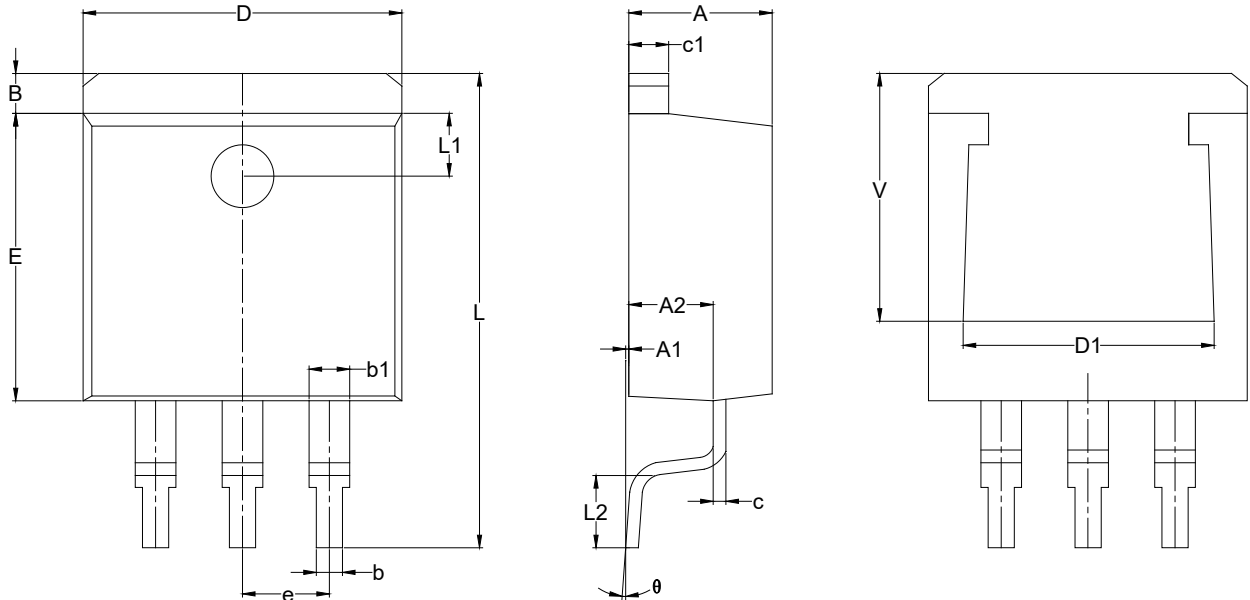
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	2.184	-	2.388
A1	0.000	-	0.127
b	0.635	-	0.889
c	0.457	-	0.889
D	6.350	-	6.731
D1	4.953	-	5.461
D2	4.318	-	5.500
E	5.969	-	6.223
e	2.286 BSC		
L	9.398	-	10.414
L1	2.900 REF		
L2	1.397	-	1.778
L3	0.508 BSC		
L4	0.889	-	1.270
L5	1.800 REF		
L6	0.600	-	1.106
V	5.150	-	5.650
theta	0°	-	10°

NOTES:

1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC TO-252.

PACKAGE OUTLINE DIMENSIONS

TO-263-3A

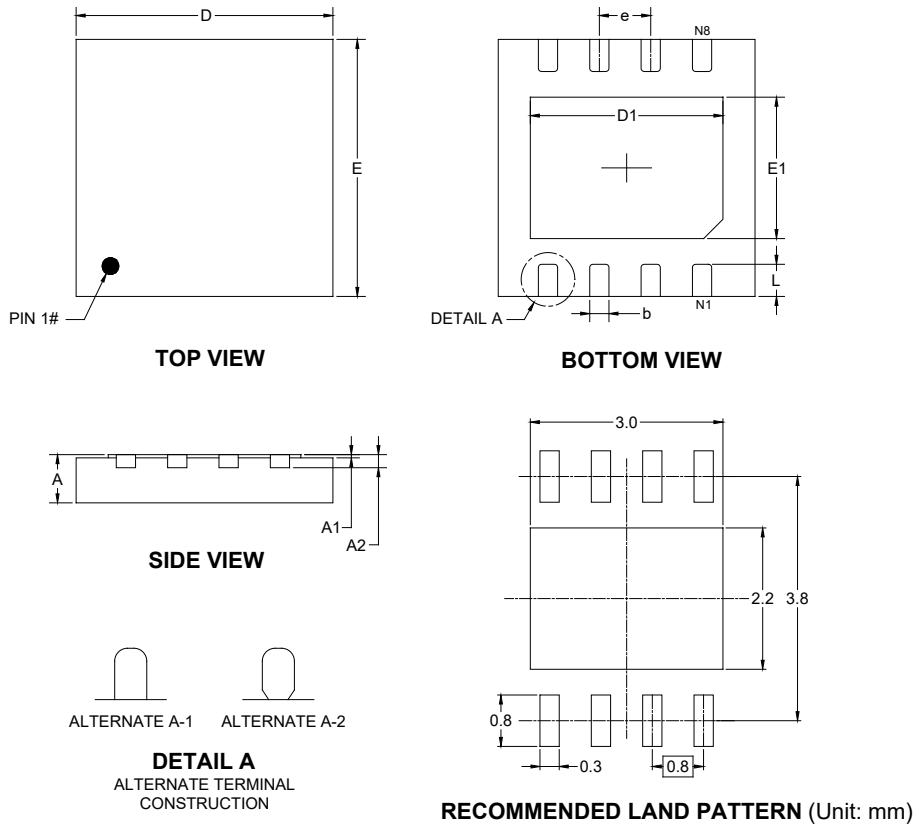


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	4.400	4.570	4.700
A1	0.000	0.100	0.250
A2	2.590	2.690	2.790
B	1.170	1.270	1.400
b	0.770	-	0.900
b1	1.230	-	1.360
c	0.340	-	0.470
c1	1.220	-	1.320
D	10.060	10.160	10.260
D1	7.800	-	8.200
E	9.050	9.150	9.250
e	2.540 BSC		
L	14.700	15.100	15.500
L1	2.000 REF		
L2	2.000	2.300	2.600
V	6.600	-	-
theta	0°		8°

- NOTES:
 1. Body dimensions do not include mode flash or protrusion.
 2. This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

TDFN-4×4-8L



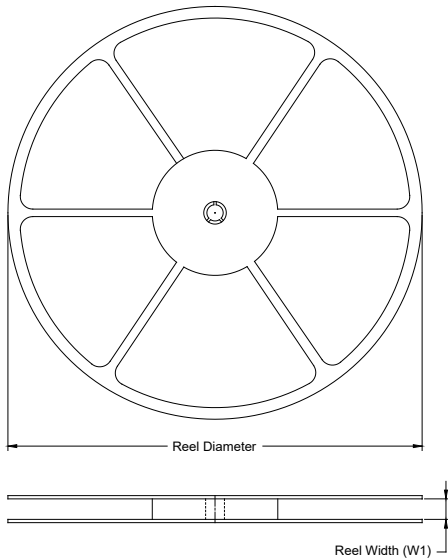
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.700	0.750	0.800
A1	-	-	0.050
A2	0.203 REF		
D	3.950	4.000	4.050
D1	2.950	3.000	3.050
E	3.950	4.000	4.050
E1	2.150	2.200	2.250
b	0.250	0.300	0.350
e	0.800 BSC		
L	0.450	0.500	0.550

NOTE: This drawing is subject to change without notice.

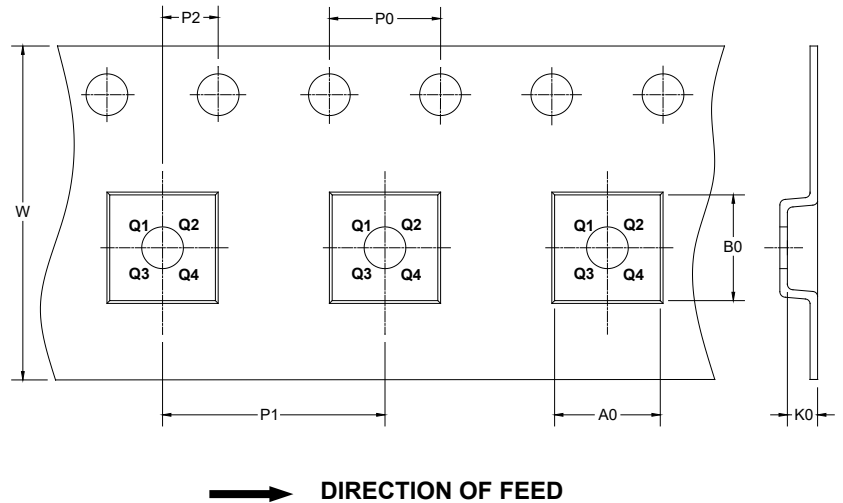
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

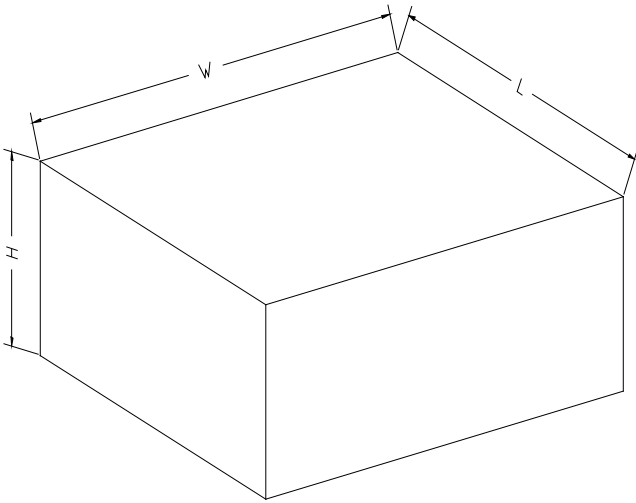
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TO-252-2A	13"	16.4	6.90	10.50	2.70	4.0	8.0	2.0	16.0	
TO-263-3A	13"	24.4	10.80	16.30	5.11	4.0	16.0	2.0	24.0	
TDFN-4x4-8L	13"	12.4	4.30	4.30	1.10	4.0	8.0	2.0	12.0	Q2

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
13"	386	280	370	5

DD0002