

GENERAL DESCRIPTION

The SGM2240 is a low dropout positive voltage regulator. It is capable of supplying 1A output current with typical dropout voltage of 1.25V. The operating input voltage range is from 2.7V to 20V. The fixed output voltage range is from 1.5V to 12V and adjustable output voltage range is from 1.25V to 18V.

Other features include current limit and thermal shutdown protection. The SGM2240 is suitable for various applications.

The SGM2240 is available in Green SOT-223-3 and TO-252-2A packages. It operates over an operating temperature range of -40°C to +125°C.

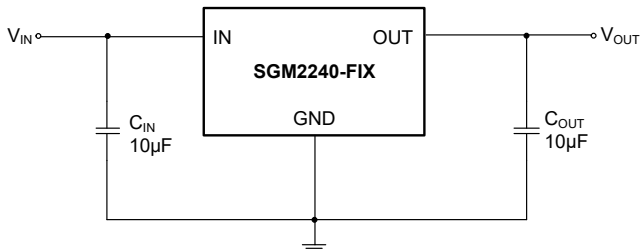
FEATURES

- Operating Input Voltage Range: 2.7V to 20V
- Fixed Output from 1.5V to 12V
- Adjustable Output from 1.25V to 18V
- 1A Output Current
- Output Voltage Accuracy: ±1% at +25°C
- Low Dropout Voltage: 1.25V (TYP) at 1A
- Can Start Up when the Output Voltage is Negative
- Current Limiting and Thermal Protection
- Stable with Small Case Size Ceramic Capacitors
- -40°C to +125°C Operating Temperature Range
- Available in Green SOT-223-3 and TO-252-2A Packages

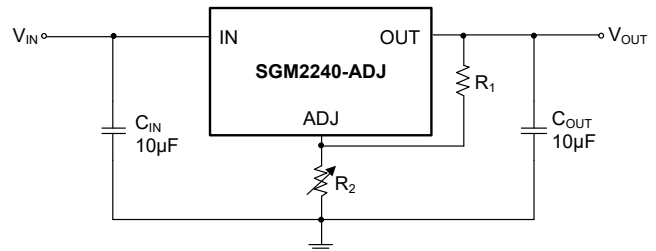
APPLICATIONS

Consumer and Industrial Equipment Regulation

TYPICAL APPLICATION



Fixed Voltage Typical Application Circuit



$$V_{OUT} = 1.25V \times (1 + R_2/R_1)$$

Adjustable Voltage Typical Application Circuit

Figure 1. Typical Application Circuits

PACKAGE/ORDERING INFORMATION

| MODEL | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION |
|--------------|---------------------|-----------------------------|----------------------|------------------------|---------------------|
| SGM2240-1.5 | SOT-223-3 | -40°C to +125°C | SGM2240-1.5XKC3G/TR | 1PW XXXXX | Tape and Reel, 2500 |
| SGM2240-1.8 | SOT-223-3 | -40°C to +125°C | SGM2240-1.8XKC3G/TR | 1DU XXXXX | Tape and Reel, 2500 |
| SGM2240-2.5 | SOT-223-3 | -40°C to +125°C | SGM2240-2.5XKC3G/TR | 1PX XXXXX | Tape and Reel, 2500 |
| SGM2240-2.8 | SOT-223-3 | -40°C to +125°C | SGM2240-2.8XKC3G/TR | 1PY XXXXX | Tape and Reel, 2500 |
| SGM2240-2.85 | SOT-223-3 | -40°C to +125°C | SGM2240-2.85XKC3G/TR | 1PZ XXXXX | Tape and Reel, 2500 |
| SGM2240-3.0 | SOT-223-3 | -40°C to +125°C | SGM2240-3.0XKC3G/TR | 1Q0 XXXXX | Tape and Reel, 2500 |
| SGM2240-3.3 | SOT-223-3 | -40°C to +125°C | SGM2240-3.3XKC3G/TR | 1DV XXXXX | Tape and Reel, 2500 |
| SGM2240-5.0 | SOT-223-3 | -40°C to +125°C | SGM2240-5.0XKC3G/TR | 1DW XXXXX | Tape and Reel, 2500 |
| SGM2240-12 | SOT-223-3 | -40°C to +125°C | SGM2240-12XKC3G/TR | 1Q1 XXXXX | Tape and Reel, 2500 |
| SGM2240-ADJ | SOT-223-3 | -40°C to +125°C | SGM2240-ADJXKC3G/TR | 1DT XXXXX | Tape and Reel, 2500 |
| SGM2240-1.5 | TO-252-2A | -40°C to +125°C | SGM2240-1.5XOC2G/TR | SGM1Q3 OC2 XXXXX | Tape and Reel, 2500 |
| SGM2240-1.8 | TO-252-2A | -40°C to +125°C | SGM2240-1.8XOC2G/TR | SGM1DQ OC2 XXXXX | Tape and Reel, 2500 |
| SGM2240-2.5 | TO-252-2A | -40°C to +125°C | SGM2240-2.5XOC2G/TR | SGM1Q4 OC2 XXXXX | Tape and Reel, 2500 |
| SGM2240-2.8 | TO-252-2A | -40°C to +125°C | SGM2240-2.8XOC2G/TR | SGM1Q5 OC2 XXXXX | Tape and Reel, 2500 |
| SGM2240-2.85 | TO-252-2A | -40°C to +125°C | SGM2240-2.85XOC2G/TR | SGM1Q6 OC2 XXXXX | Tape and Reel, 2500 |
| SGM2240-3.0 | TO-252-2A | -40°C to +125°C | SGM2240-3.0XOC2G/TR | SGM1Q7 OC2 XXXXX | Tape and Reel, 2500 |
| SGM2240-3.3 | TO-252-2A | -40°C to +125°C | SGM2240-3.3XOC2G/TR | SGM1DR OC2 XXXXX | Tape and Reel, 2500 |
| SGM2240-5.0 | TO-252-2A | -40°C to +125°C | SGM2240-5.0XOC2G/TR | SGM1DS OC2 XXXXX | Tape and Reel, 2500 |

PACKAGE/ORDERING INFORMATION (continued)

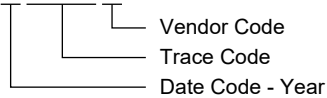
| MODEL | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION |
|-------------|---------------------|-----------------------------|---------------------|------------------------|---------------------|
| SGM2240-12 | TO-252-2A | -40°C to +125°C | SGM2240-12XOC2G/TR | SGM1Q8 OC2 XXXXX | Tape and Reel, 2500 |
| SGM2240-ADJ | TO-252-2A | -40°C to +125°C | SGM2240-ADJXOC2G/TR | SGM1DP OC2 XXXXX | Tape and Reel, 2500 |

MARKING INFORMATION

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

SOT-223-3/TO-252-2A

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..... | 24V |
| Package Thermal Resistance | |
| SOT-223-3, θ_{JA} | 67°C/W |
| SOT-223-3, θ_{JB} | 21°C/W |
| SOT-223-3, $\theta_{JC(TOP)}$ | 50°C/W |
| SOT-223-3, $\theta_{JC(BOT)}$ | 21°C/W |
| TO-252-2A, θ_{JA} | 39°C/W |
| TO-252-2A, θ_{JB} | 14°C/W |
| TO-252-2A, $\theta_{JC(TOP)}$ | 48°C/W |
| TO-252-2A, $\theta_{JC(BOT)}$ | 12°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..... | ±3000V |
| CDM | ±1000V |

NOTES:

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

RECOMMENDED OPERATING CONDITIONS

| | |
|--|----------------------------|
| Input Voltage Range | 2.7V to 20V |
| Input Effective Capacitance, C_{IN} | 2.2 μ F (MIN) |
| Output Effective Capacitance, C_{OUT} | 2.2 μ F to 200 μ F |
| Capacitor Equivalent Series Resistance, ESR... 1m Ω to 2.2 Ω | |
| 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.

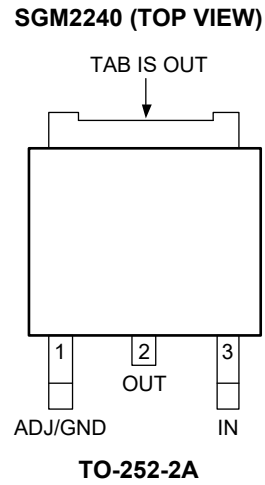
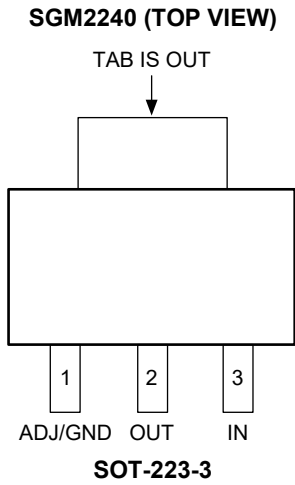
ESD SENSITIVITY CAUTION

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 |
|-----------|-----------|------|--|
| SOT-223-3 | TO-252-2A | | |
| 1 | 1 | ADJ | Feedback Voltage Input Pin (adjustable output 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 | OUT | Regulator Output Pin. It is recommended to use a ceramic capacitor with effective capacitance in the range of 2.2 μ F to 200 μ F to ensure stability. This ceramic capacitor should be placed as close as possible to OUT pin. |
| 3 | 3 | IN | Input Supply Voltage Pin. It is recommended to use a 4.7 μ F 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. |

FUNCTIONAL BLOCK DIAGRAMS

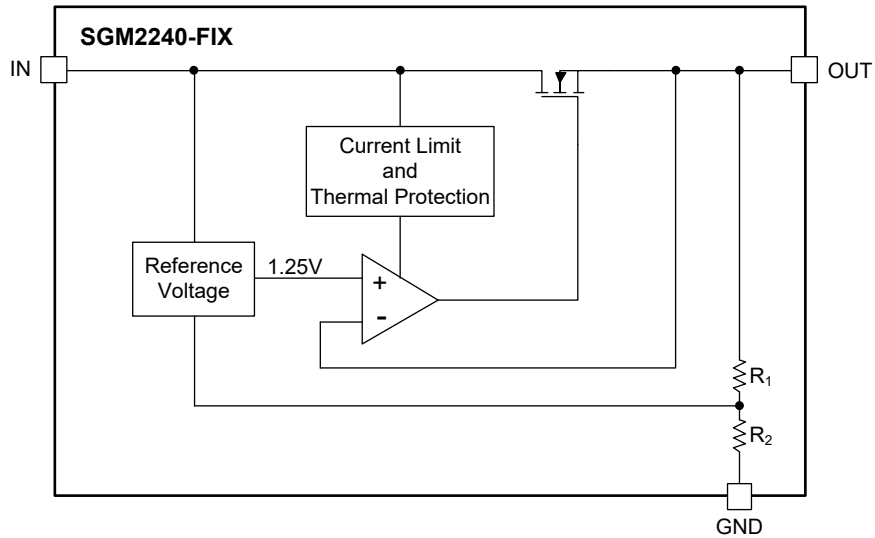


Figure 2. Internal Block Diagram of Fixed Output Voltage

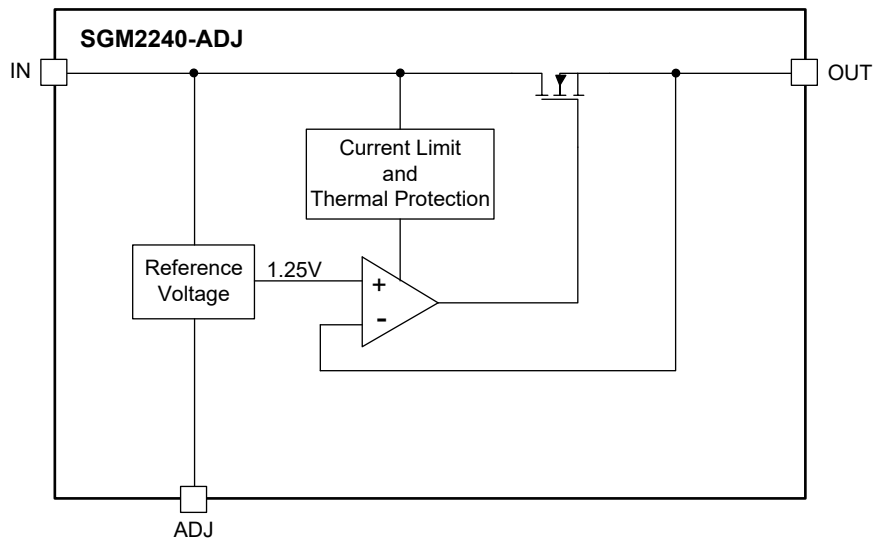


Figure 3. Internal Block Diagram of Adjustable Output Voltage

ELECTRICAL CHARACTERISTICS

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

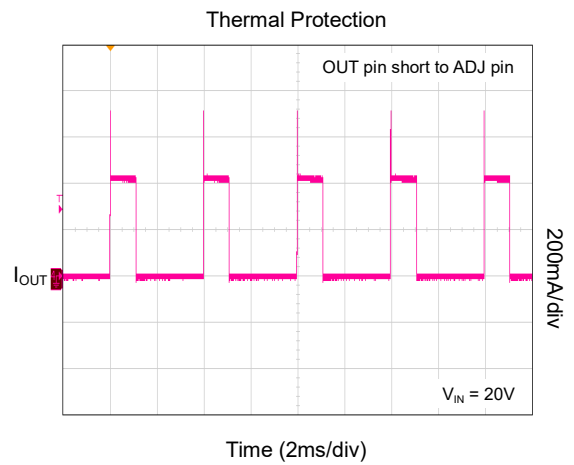
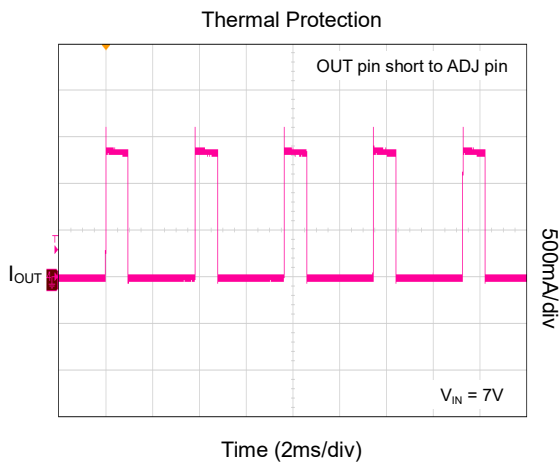
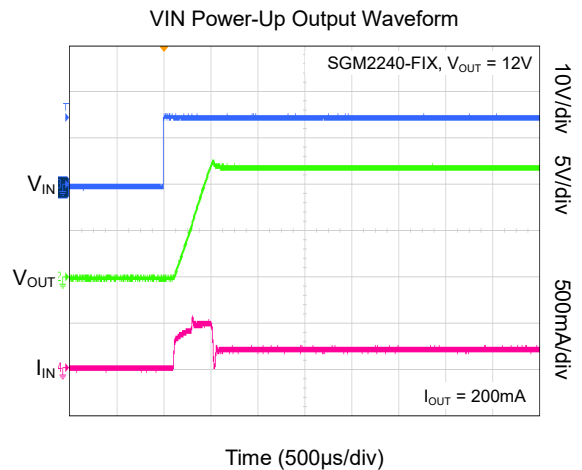
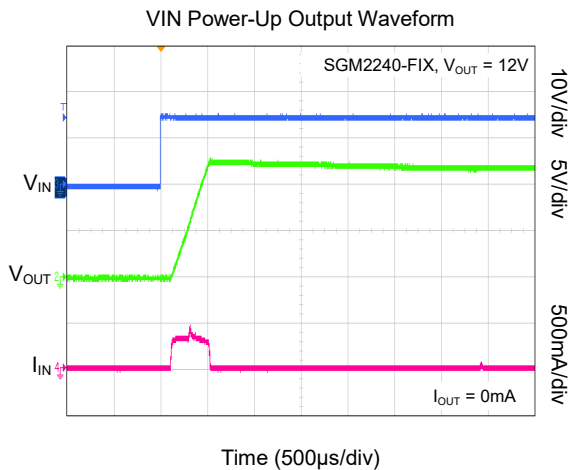
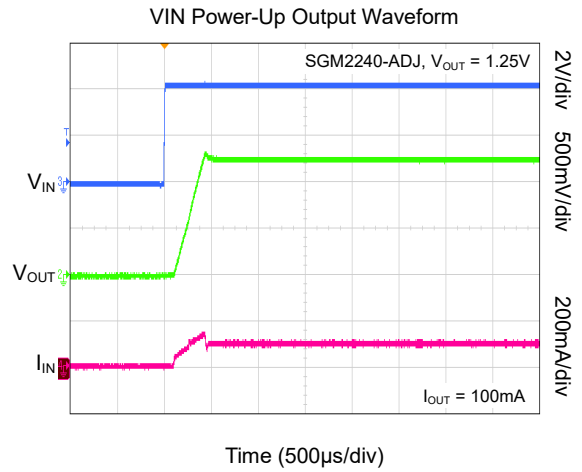
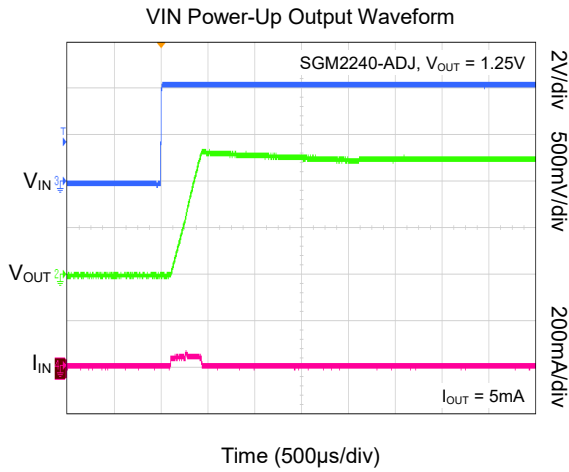
| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---------------------------------------|-------------------------------------|---|------------------------------|--------|-------|-------|
| Input Voltage Range | V _{IN} | | 2.7 | | 20 | V |
| Output Voltage Accuracy (SGM2240-FIX) | V _{OUT} | (V _{IN} - V _{OUT}) = 1.4V, I _{OUT} = 0mA, T _J = +25°C | -1 | | +1 | % |
| | | (V _{IN} - V _{OUT}) = 1.4V, I _{OUT} = 0mA to 1A | -2 | | +2 | |
| | | V _{IN} = (V _{OUT} + 1.4V) to 20V, I _{OUT} = 0mA | -2 | | +2 | |
| Reference Voltage (SGM2240-ADJ) | V _{ADJ} | (V _{IN} - V _{OUT}) = 1.4V, I _{OUT} = 5mA, T _J = +25°C | 1.238 | 1.25 | 1.262 | V |
| | | (V _{IN} - V _{OUT}) = 1.4V, I _{OUT} = 5mA to 1A | 1.225 | | 1.275 | |
| | | V _{IN} = (V _{OUT} + 1.4V) to 20V, I _{OUT} = 5mA | 1.225 | | 1.275 | |
| Adjust Pin Current | I _{ADJ} | V _{IN} = 20V, I _{OUT} = 5mA, SGM2240-ADJ | | 22 | 35 | μA |
| Adjust Pin Current Change | ΔI _{ADJ} | (V _{IN} - V _{OUT}) = 1.4V, I _{OUT} = 5mA to 1A, SGM2240-ADJ | | 0.3 | 1 | μA |
| | | V _{IN} = (V _{OUT} + 1.4V) to 20V, I _{OUT} = 5mA, SGM2240-ADJ | | 0.3 | 1 | |
| Line Regulation | ΔV _{OUT} /V _{OUT} | V _{IN} = (V _{OUT} + 1.4V) to 20V, I _{OUT} = 5mA, SGM2240-ADJ | | 0.01 | 0.3 | % |
| | | V _{IN} = (V _{OUT} + 1.4V) to 20V, I _{OUT} = 0mA, SGM2240-FIX | | 0.01 | 0.3 | |
| Load Regulation | ΔV _{OUT} /V _{OUT} | (V _{IN} - V _{OUT}) = 1.4V, I _{OUT} = 5mA to 1A, SGM2240-ADJ | | 0.01 | 0.4 | % |
| | | (V _{IN} - V _{OUT}) = 1.4V, I _{OUT} = 0mA to 1A, SGM2240-FIX | | 0.01 | 0.4 | |
| Dropout Voltage ⁽¹⁾ | V _{DROP} | I _{OUT} = 100mA | | 1.05 | 1.20 | V |
| | | I _{OUT} = 500mA | | 1.15 | 1.30 | |
| | | I _{OUT} = 800mA | | 1.21 | 1.37 | |
| | | I _{OUT} = 1A | | 1.25 | 1.40 | |
| Output Current Limit | I _{LIMIT} | (V _{IN} - V _{OUT}) = 5V, ΔV _{OUT} = 5% | 1.0 | 1.45 | | A |
| | | (V _{IN} - V _{OUT}) = 20V, V _{OUT} = 0V | 0.2 | 0.45 | | |
| Minimum Load Current ⁽²⁾ | I _{OUT_MIN} | V _{IN} = 20V, SGM2240-ADJ | | 2 | 5 | mA |
| Supply Pin Current | I _Q | V _{IN} = 20V, I _{OUT} = 0mA, SGM2240-FIX | | 2.2 | 5 | mA |
| Start-Up Time | t _{STR} | From assertion of V _{IN} to V _{OUT} = 95% × V _{OUT(NOM)} | | 0.45 | 1.2 | ms |
| Temperature Stability | S _T | | | 0.4 | | % |
| Power Supply Ripple Rejection | PSRR | ΔV _{RIPPLE} = 3V _{P-P} , (V _{IN} - V _{OUT}) = 3V, I _{OUT} = 500mA, f _{RIPPLE} = 120Hz, C _{OUT} = 10μF | SGM2240-ADJ | 76 | | dB |
| | | | V _{OUT(NOM)} = 3.3V | 67 | | |
| | | | V _{OUT(NOM)} = 5.0V | 64 | | |
| | | | V _{OUT(NOM)} = 12V | 56 | | |
| Output Voltage Noise | e _n | f = 10Hz to 10kHz, I _{OUT} = 1A | | 0.0035 | | % |
| Thermal Regulation | | 30ms Pulse, T _J = +25°C | | 0.002 | 0.02 | %/W |
| Long Term Stability | S _t | 1000Hrs End Point Measurement, T _J = +125°C | | 0.1 | | % |
| Thermal Shutdown Temperature | T _{SHDN} | | | 180 | | °C |
| Thermal Shutdown Hysteresis | ΔT _{SHDN} | | | 25 | | °C |

NOTES:

- The dropout voltage is defined as the difference between V_{IN} and V_{OUT} when V_{OUT} falls to (V_{OUT(NOM)} - 100mV).
- The minimum output current required to maintain regulation.

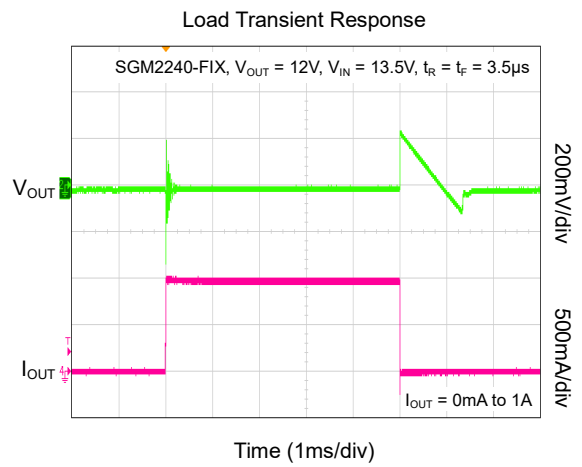
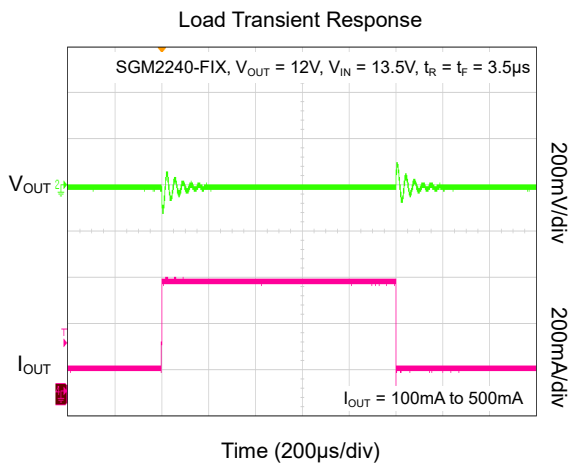
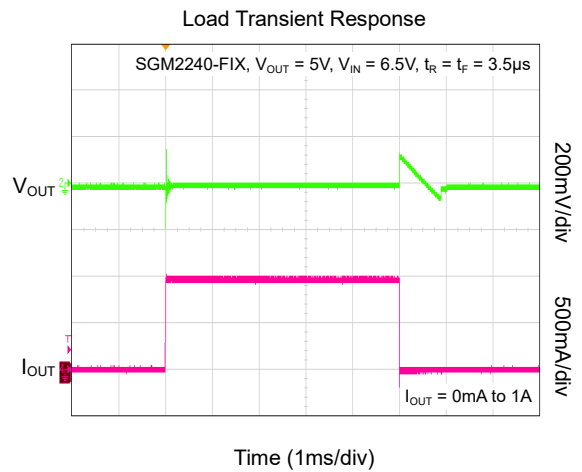
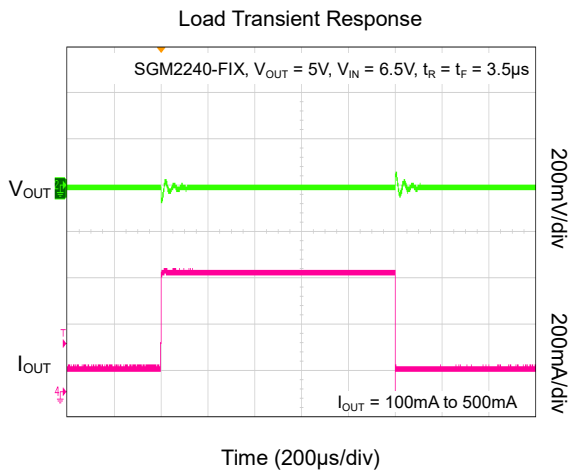
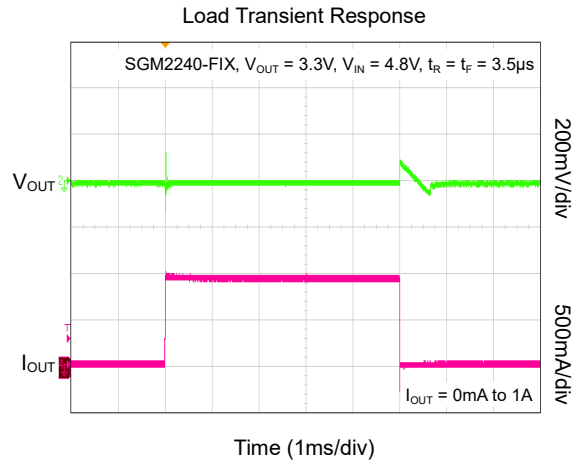
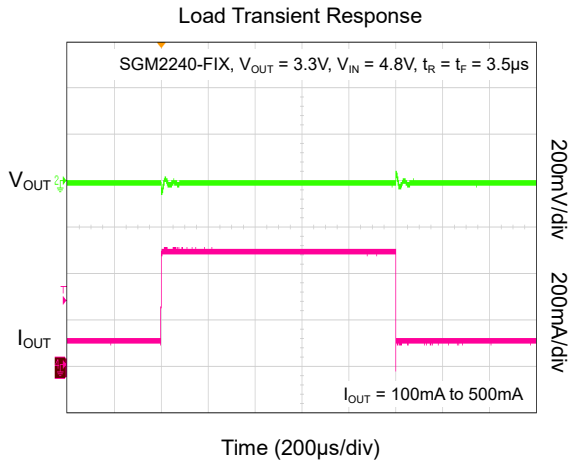
TYPICAL PERFORMANCE CHARACTERISTICS

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



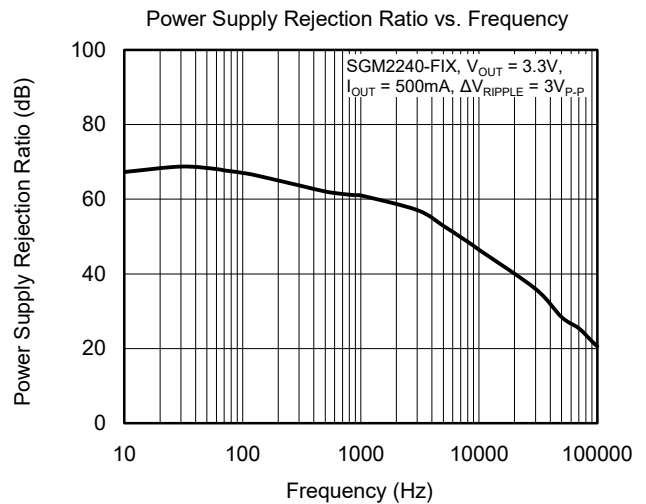
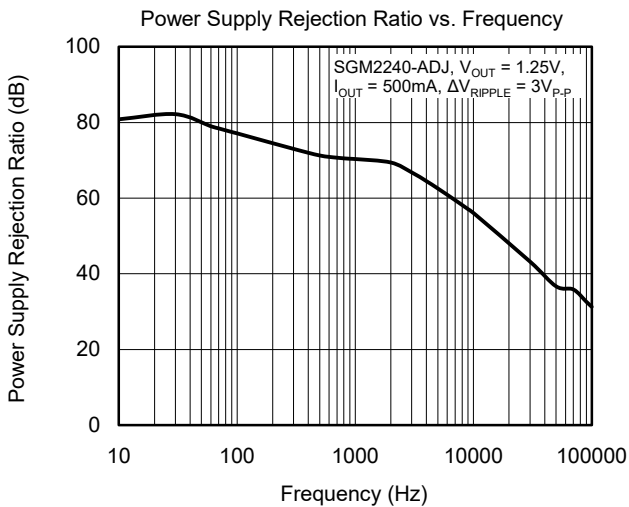
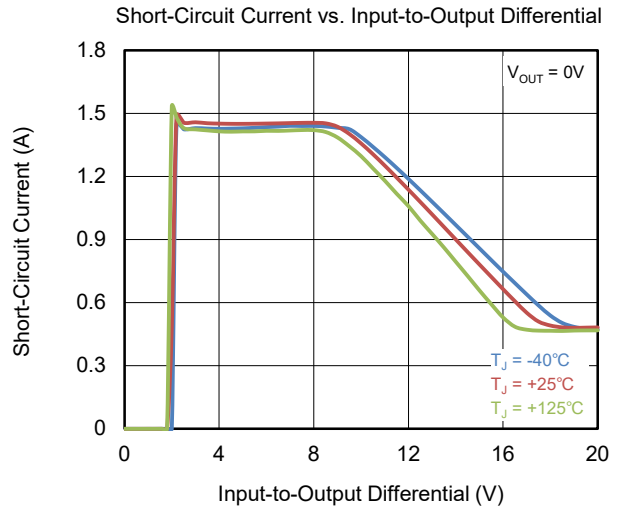
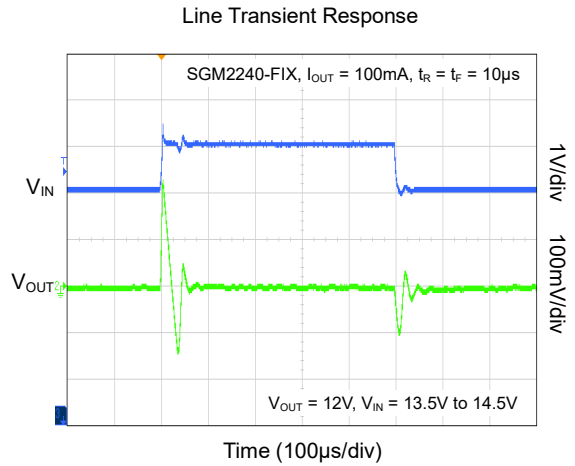
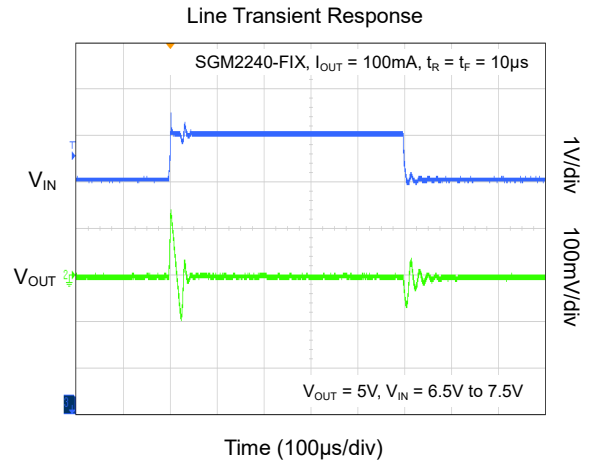
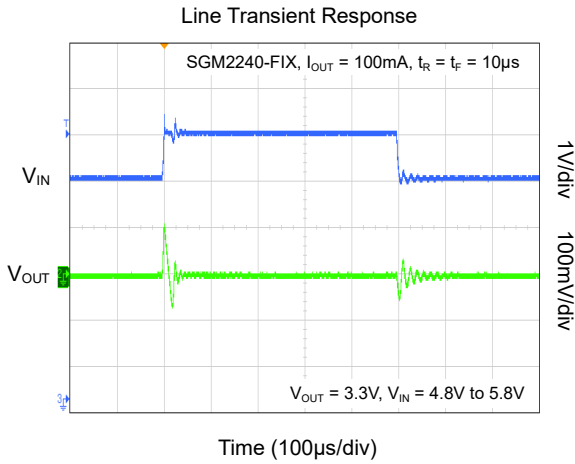
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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



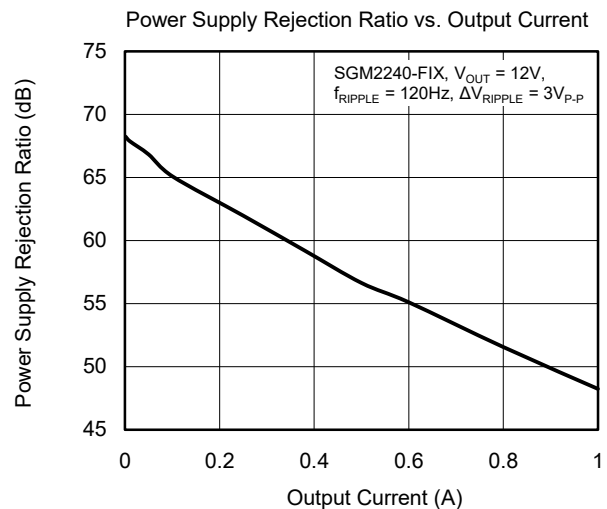
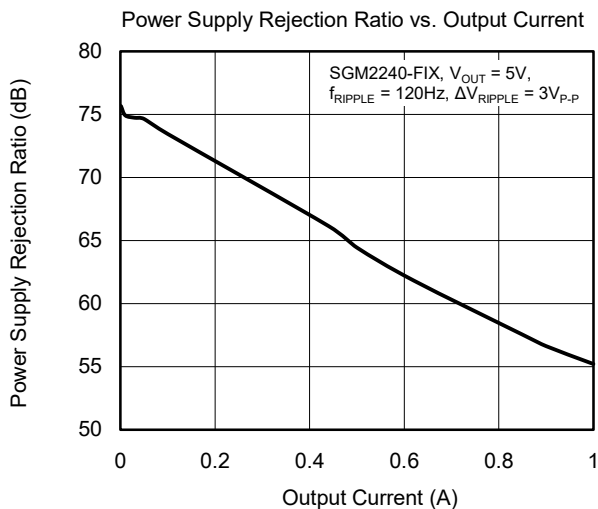
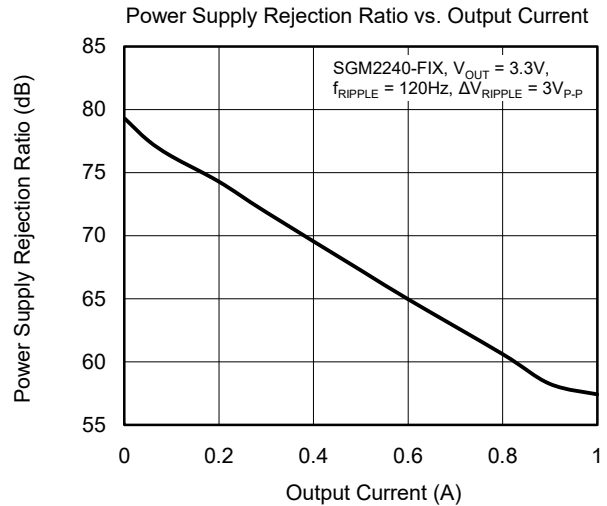
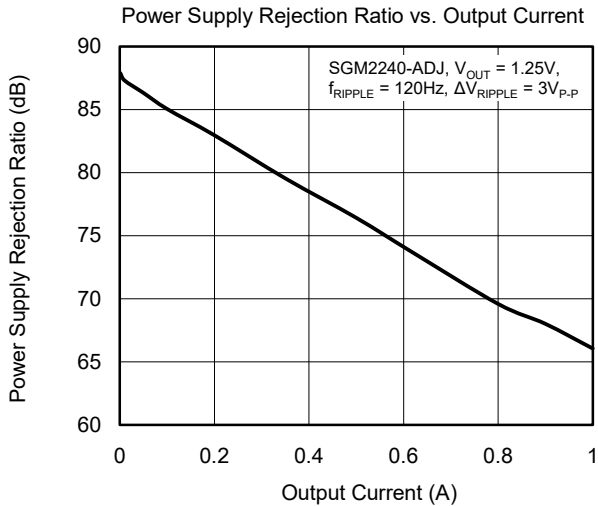
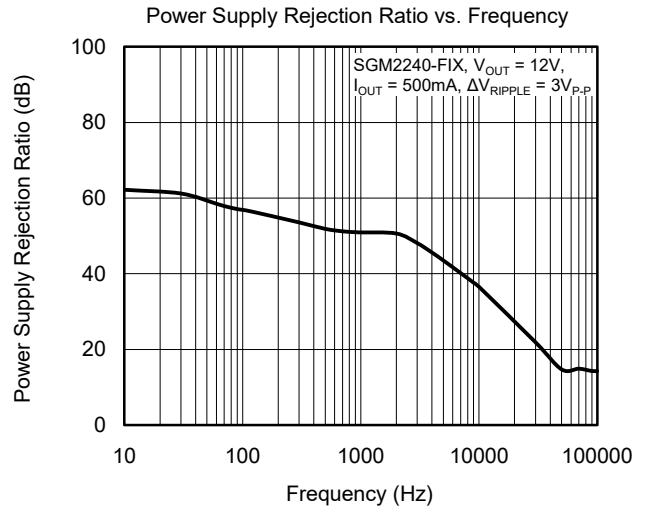
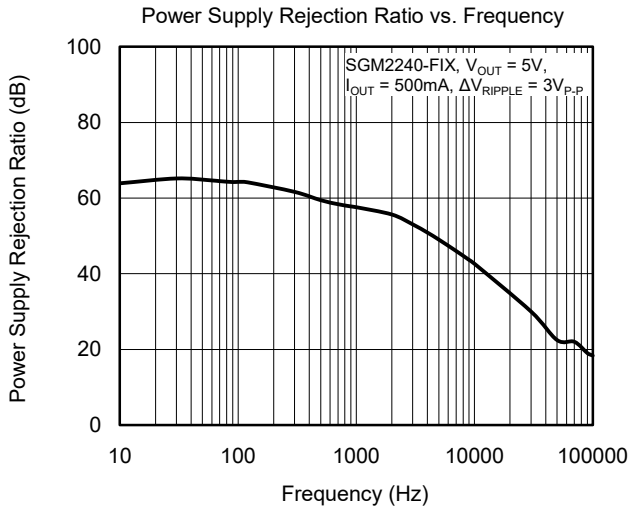
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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



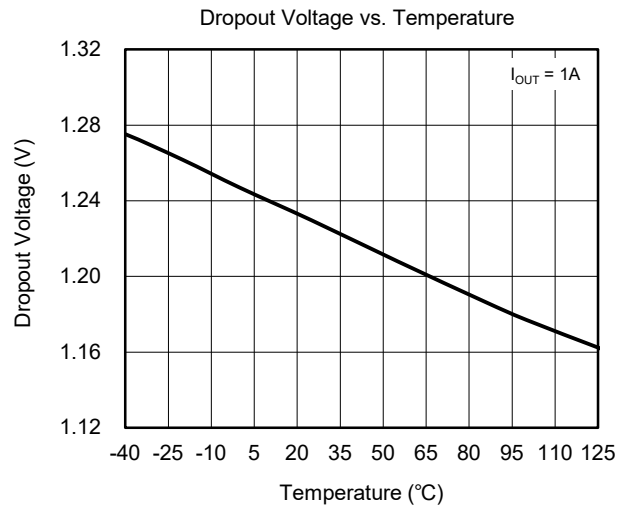
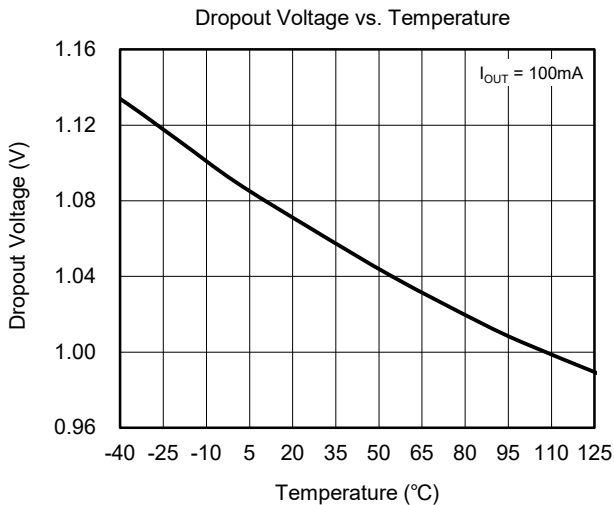
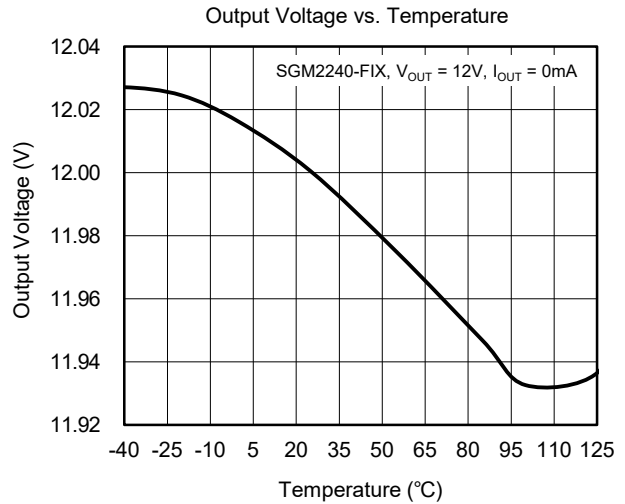
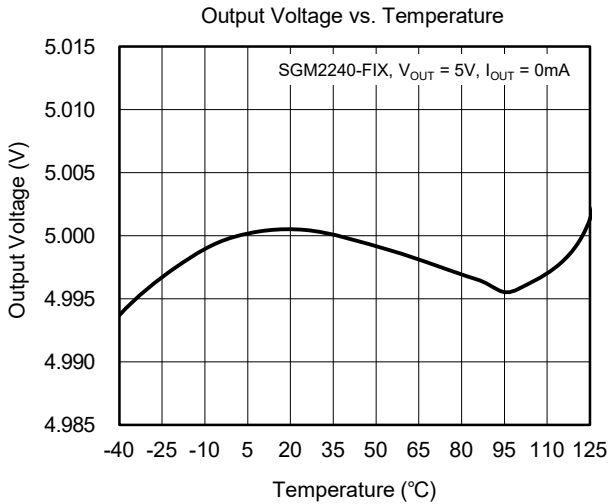
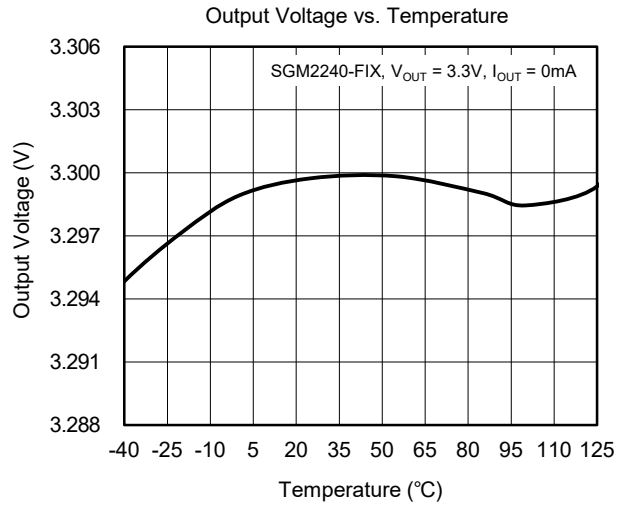
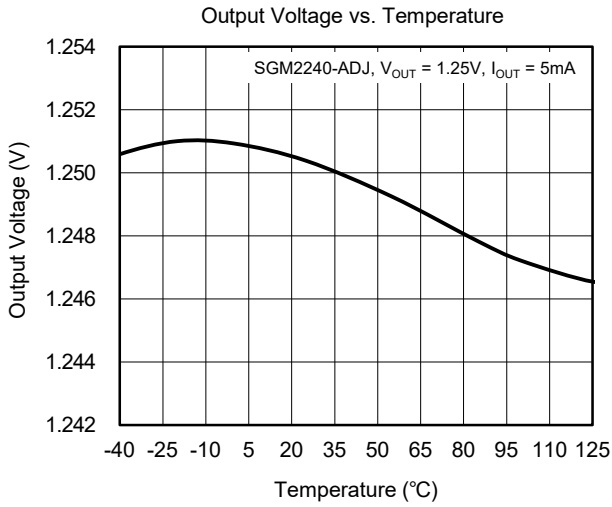
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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



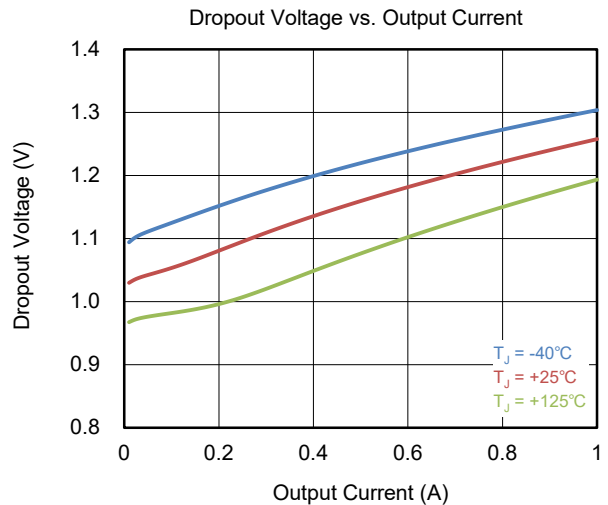
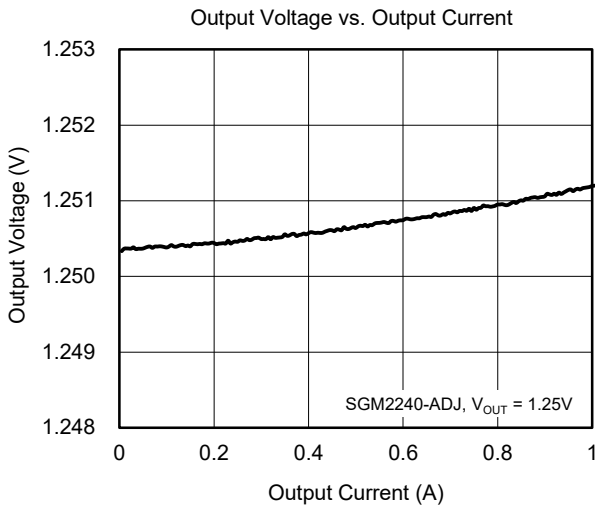
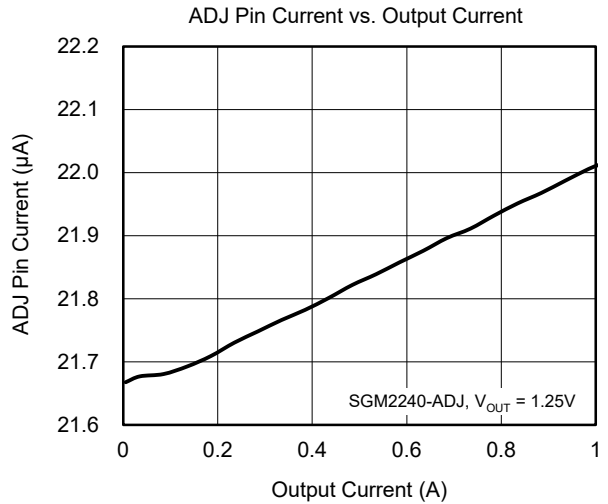
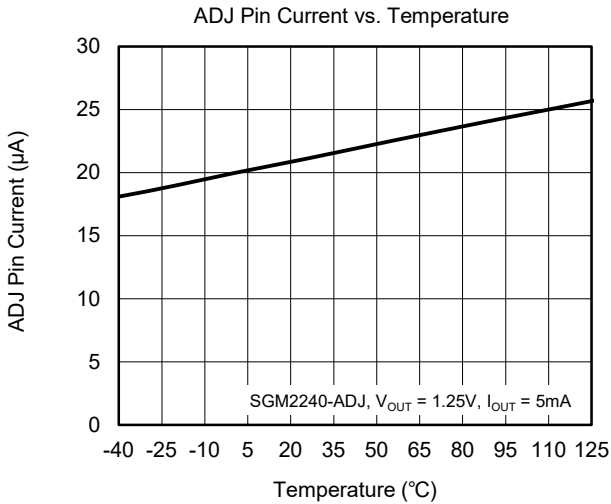
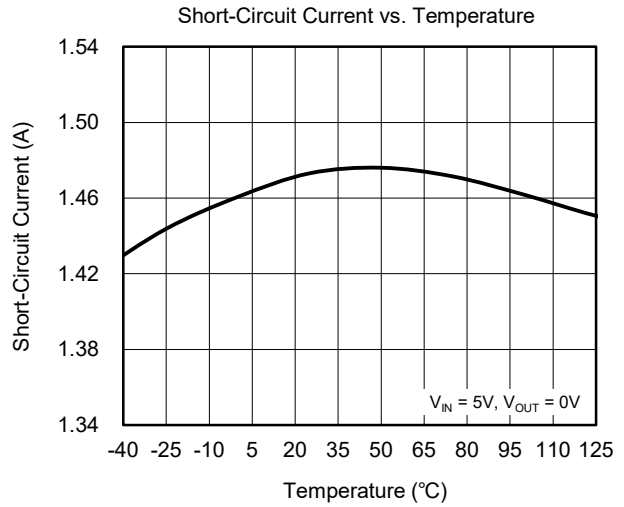
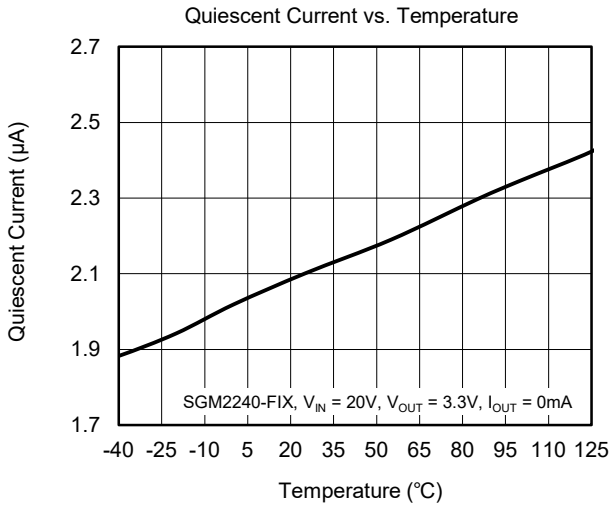
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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



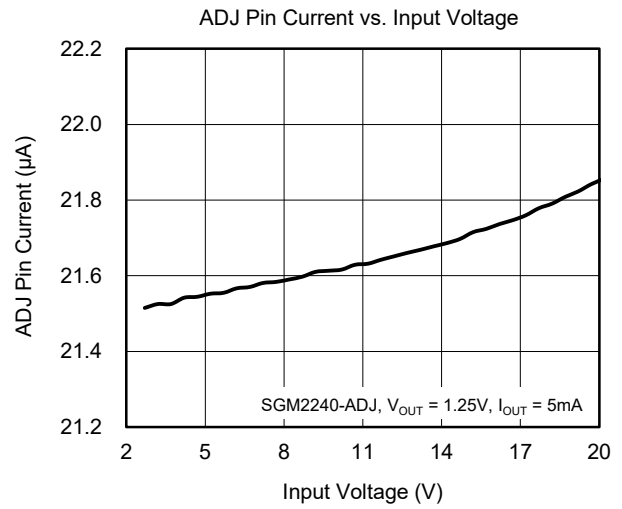
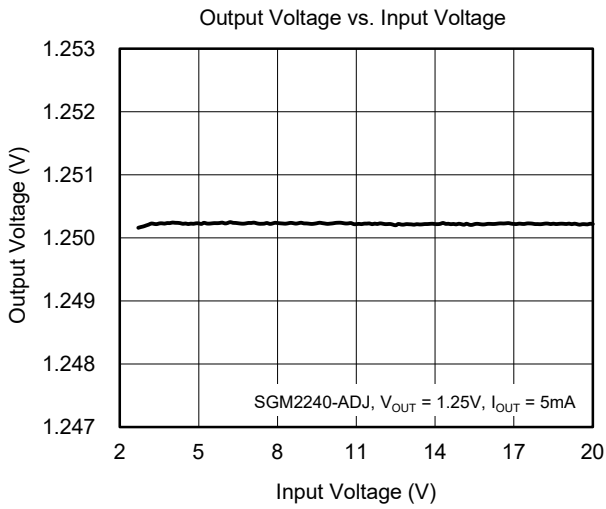
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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



APPLICATION INFORMATION

The SGM2240 is a low noise, high current and low dropout LDO and provides 1A 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 SGM2240 useful in a variety of applications. The SGM2240 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.

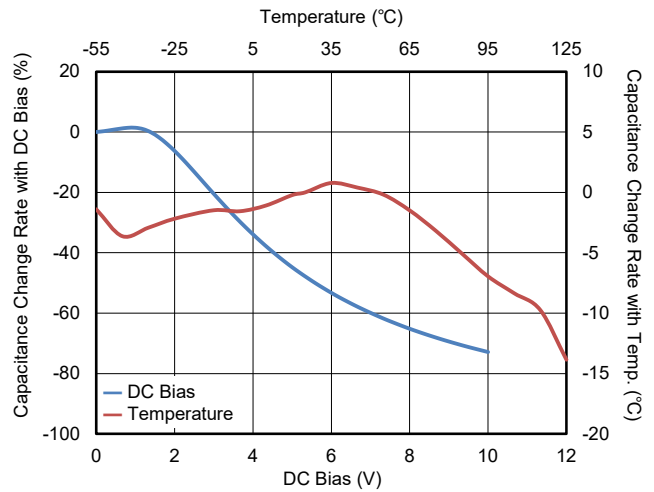


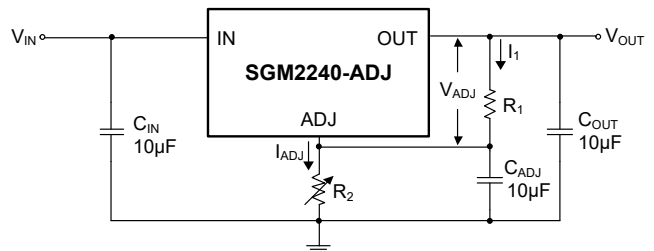
Figure 4. Capacitance vs. DC Bias and Temperature Characteristics

The SGM2240 requires an output capacitor with effective capacitance in the range of 2.2µF to 200µF with an ESR of 2.2Ω 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 SGM2240-ADJ can be adjusted from 1.25V to 18V. 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)

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 1.45A to 0.45A when (V_{IN} - V_{OUT}) is greater than about 18V.

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.

Reverse Current Protection

The SGM2240-ADJ doesn't incorporate reverse current protection circuit, must add protection diodes prevents current flow backwards through the pass element when the output voltage is greater than the input voltage.

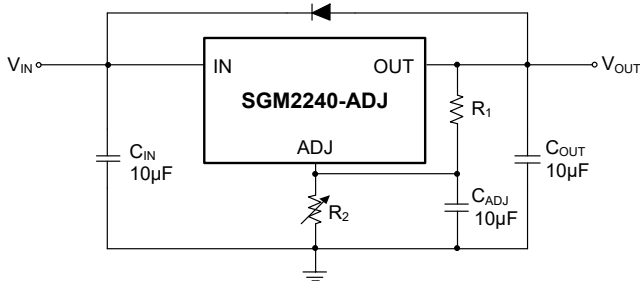


Figure 6. Reverse Protection Reference Design

Thermal Shutdown

When the die temperature exceeds the threshold value of thermal shutdown, the SGM2240 will be in shutdown state and it will remain in this state until the die temperature decreases to +155°C.

Power Dissipation (P_D)

Power dissipation (P_D) of the SGM2240 can be calculated by the equation P_D = (V_{IN} - V_{OUT}) × I_{OUT}. The maximum allowable power dissipation (P_{D(MAX)}) of the SGM2240 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.

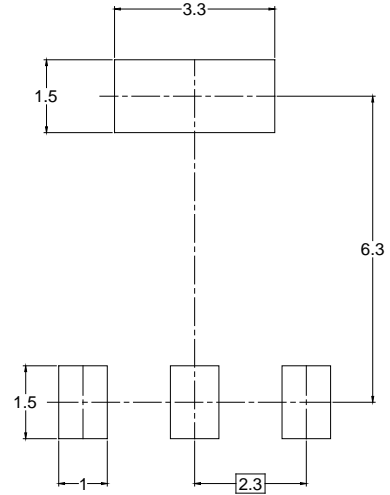
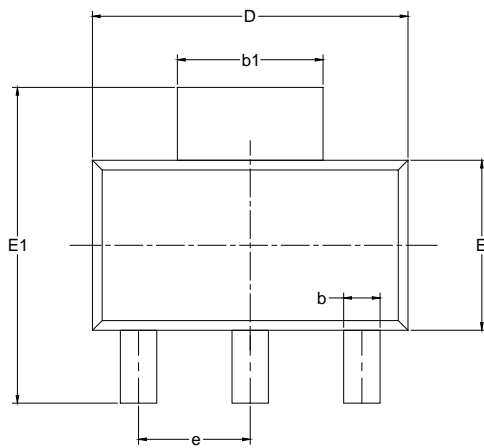
REVISION HISTORY

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

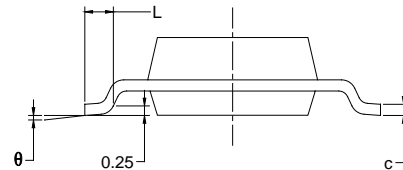
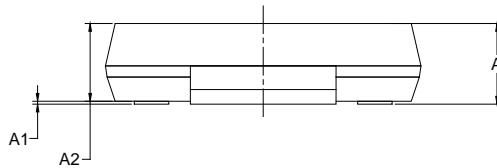
| Changes from Original (OCTOBER 2024) to REV.A | Page |
|--|------|
| Changed from product preview to production data..... | All |

PACKAGE OUTLINE DIMENSIONS

SOT-223-3



RECOMMENDED LAND PATTERN (Unit: mm)



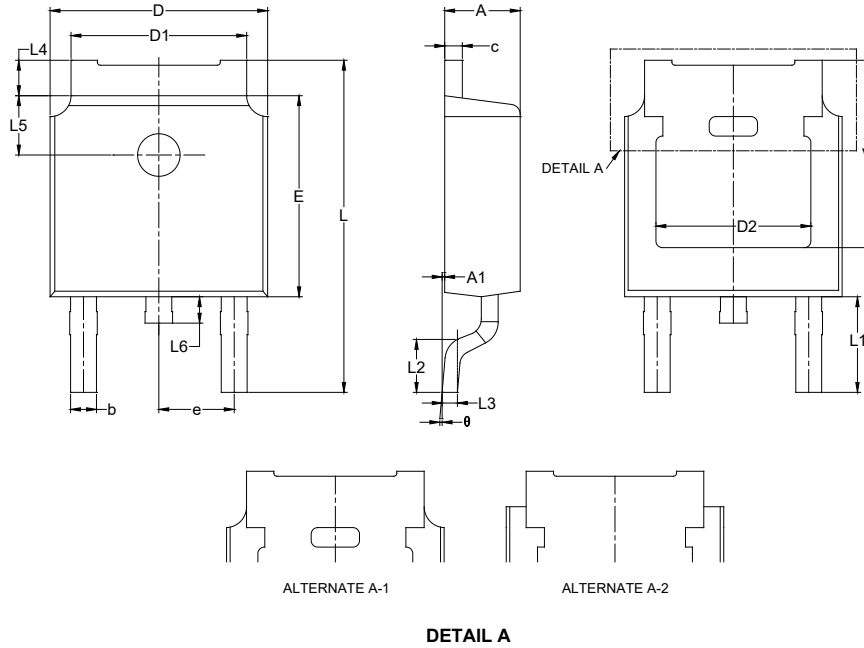
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | | 1.800 | | 0.071 |
| A1 | 0.020 | 0.100 | 0.001 | 0.004 |
| A2 | 1.500 | 1.700 | 0.059 | 0.067 |
| b | 0.660 | 0.840 | 0.026 | 0.033 |
| b1 | 2.900 | 3.100 | 0.114 | 0.122 |
| c | 0.230 | 0.350 | 0.009 | 0.014 |
| D | 6.300 | 6.700 | 0.248 | 0.264 |
| E | 3.300 | 3.700 | 0.130 | 0.146 |
| E1 | 6.700 | 7.300 | 0.264 | 0.287 |
| e | 2.300 BSC | | 0.091 BSC | |
| L | 0.750 | | 0.030 | |
| θ | 0° | 10° | 0° | 10° |

NOTES:

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

PACKAGE OUTLINE DIMENSIONS

TO-252-2A



| Symbol | Dimensions In Millimeters | | |
|----------|---------------------------|-----|--------|
| | MIN | MOD | 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 |
| θ | 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 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 |
|--------------|---------------|--------------------|---------|---------|---------|---------|---------|---------|--------|---|
| SOT-223-3 | 13" | 12.4 | 6.55 | 7.25 | 1.90 | 4.0 | 8.0 | 2.0 | 12.0 | Q3 |
| TO-252-2A | 13" | 16.4 | 6.90 | 10.50 | 2.70 | 4.0 | 8.0 | 2.0 | 16.0 |  |

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