

GENERAL DESCRIPTION

The SGM3720 is a high efficiency constant current LED driver with a 600kHz PWM boost converter. The internal low-side N-channel MOSFET and 600kHz switching frequency make the SGM3720 easy to use small components and optimized for compact solutions.

The SGM3720 is capable of driving either up to 10 LEDs in series for 38V output or total 260mA current with 3 LEDs in series per string while achieving high conversion efficiency. The LED current can be programmed by digital PWM dimming interface. The PWM frequency is in the range from 2kHz to 60kHz.

The SGM3720 provides very low shutdown current. It also includes a comprehensive set of protection features such as over-voltage protection, cycle-by-cycle input current limit and thermal shutdown.

The SGM3720 is available in a Green TSOT-23-6 package. It operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- **Input Voltage Range: 2.7V to 5.5V**
- **Support up to 10 LEDs in Series**
- **Integrated 40V/1.6A Switch**
- **High Efficiency PWM Boost Converter**
- **Switching Frequency: 600kHz**
- **Low Feedback Voltage: 300mV**
- **PWM Dimming Frequency: 2kHz to 60kHz**
- **38V LED Open Protection**
- **500kΩ Pull-Down Resistor on CTRL Pin**
- **Automatic Soft-Start for Reducing Inrush Current**
- **Less than 1μA Shutdown Current**
- **-40°C to +85°C Operating Temperature Range**
- **Available in a Green TSOT-23-6 Package**

APPLICATIONS

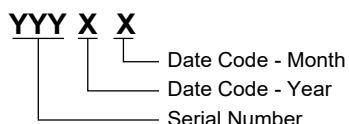
LED Backlighting
Mobile Phones and Digital Photo Frames
Portable Devices
Automotive Navigation

PACKAGE/ORDERING INFORMATION

| MODEL | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION |
|---------|---------------------|-----------------------------|-----------------|-----------------|---------------------|
| SGM3720 | TSOT-23-6 | -40°C to +85°C | SGM3720YTN6G/TR | SMFXX | Tape and Reel, 3000 |

MARKING INFORMATION

NOTE: XX = Date Code.



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 Voltage, V_{IN} -0.3V to 6V
- High Voltage Nodes, SW, VOUT -0.3V to 40V
- Other Pins, FB, CTRL.....-0.3V to $V_{IN} + 0.3V$
- Package Thermal Resistance
- TSOT-23-6, θ_{JA} 120°C/W
- Junction Temperature.....+150°C
- Storage Temperature Range-65°C to +150°C
- Lead Temperature (Soldering, 10s).....+260°C
- ESD Susceptibility
- HBM.....4000V
- MM.....200V

RECOMMENDED OPERATING CONDITIONS

- Input Voltage Range2.7V to 5.5V
- 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.

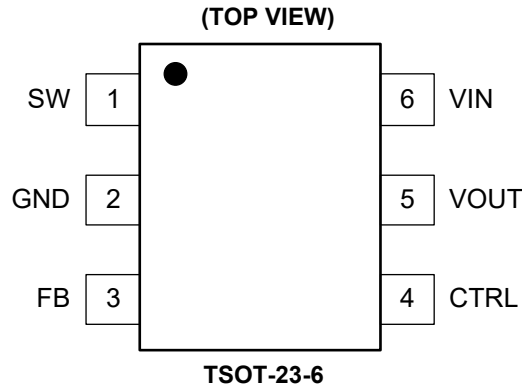
ESD SENSITIVITY CAUTION

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 CONFIGURATION



PIN DESCRIPTION

| PIN | NAME | FUNCTION |
|-----|------|---|
| 1 | SW | Boost Converter Switching Node. |
| 2 | GND | Ground Pin. |
| 3 | FB | Feedback Input for Current. It is regulated at 300mV. |
| 4 | CTRL | Boost Regulator Control Pin. It is used for enable and PWM dimming control. |
| 5 | VOUT | Output Voltage Pin. |
| 6 | VIN | Input Supply Pin. |

TYPICAL APPLICATION

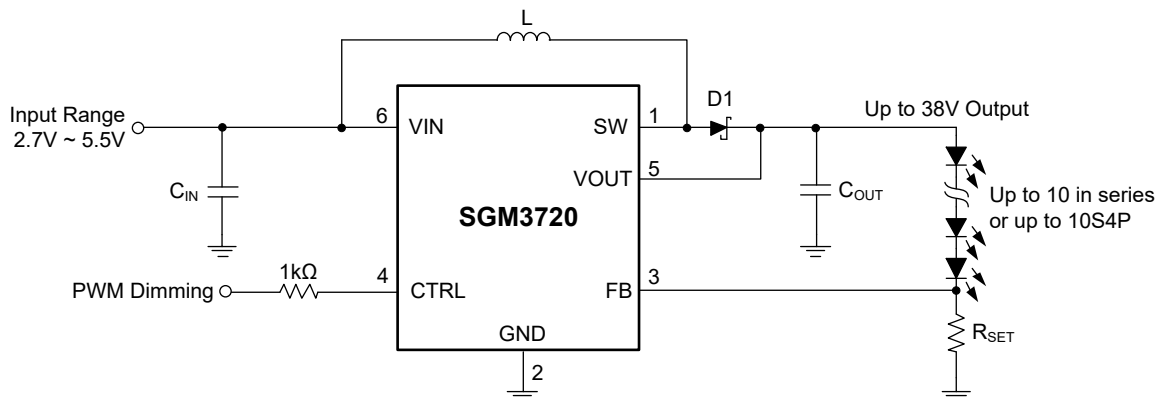


Figure 1. Typical Application Circuit

ELECTRICAL CHARACTERISTICS ⁽¹⁾(V_{IN} = 3.6V, L = 22μH, C_{IN} = 10μF, C_{OUT} = 0.47μF, 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 |
|--|-----------------------|---|-------|------|-------|------|-------|
| IC Supply | | | | | | | |
| Input Voltage Range | V _{IN} | | Full | 2.7 | | 5.5 | V |
| Input Under-Voltage Lockout | UVLO | Rising edge | +25°C | | 2.5 | 2.6 | V |
| UVLO Hysteresis | V _{HYS} | | +25°C | | 0.15 | | V |
| Quiescent Current (Non Switching) | I _Q | V _{FB} = 0.4V | +25°C | | 0.20 | 0.35 | mA |
| Operating Current (Switching) | | V _{FB} = 0V | +25°C | | 0.5 | 0.9 | mA |
| VIN Pin Shutdown Current | I _{SHDN} | V _{EN} = 0V | +25°C | | 0.1 | 1 | μA |
| Boost Converter | | | | | | | |
| Voltage Feedback Regulation Voltage | V _{REF} | | Full | 289 | 300 | 311 | mV |
| Voltage Feedback Regulation Voltage Under Brightness Control | V _{REF_PWM} | f _{PWM} = 10kHz, duty cycle = 3% | +25°C | 6.5 | 9 | 11.5 | mV |
| V _{REF} Filter 3dB Frequency | f _{REF(3dB)} | | +25°C | | 600 | | Hz |
| Voltage Feedback Input Bias Current | I _{FB} | | Full | | 0.001 | 0.3 | μA |
| SW Pin Leakage Current | I _{SW} | | +25°C | | 0.01 | 1 | μA |
| Peak NMOS Current Limit | I _{LIM} | | +25°C | | 1.6 | | A |
| Oscillator Frequency | f _S | | Full | 480 | 600 | 750 | kHz |
| Over-Voltage Threshold | V _{OV} | Measured at VOUT pin | Full | 35.5 | 38.0 | 40.5 | V |
| Start-Up Time | t _S | | +25°C | | 800 | | μs |
| Control | | | | | | | |
| Logic Low Threshold | V _{IL} | | Full | | | 0.35 | V |
| Logic High Threshold | V _{IH} | | Full | 1.5 | | | V |
| PWM Dimming Frequency Range | DFR | | +25°C | 2 | | 60 | kHz |
| Minimum Shutdown Pulse Width Timing | t _{OFF} | | +25°C | 3 | | | ms |
| Junction Thermal Shutdown Threshold | | | | | 150 | | °C |
| Junction Thermal Shutdown Hysteresis | | | | | 15 | | °C |

NOTE:

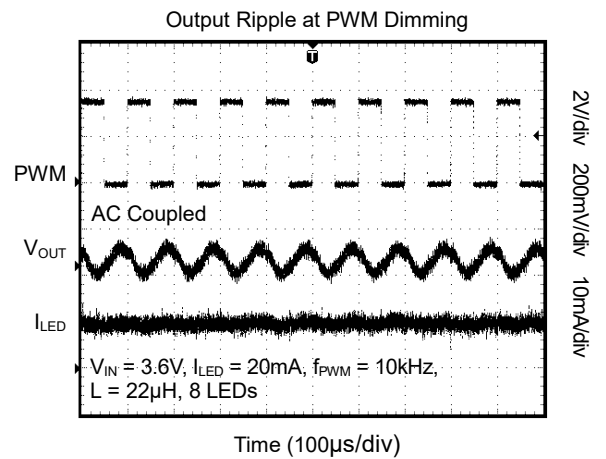
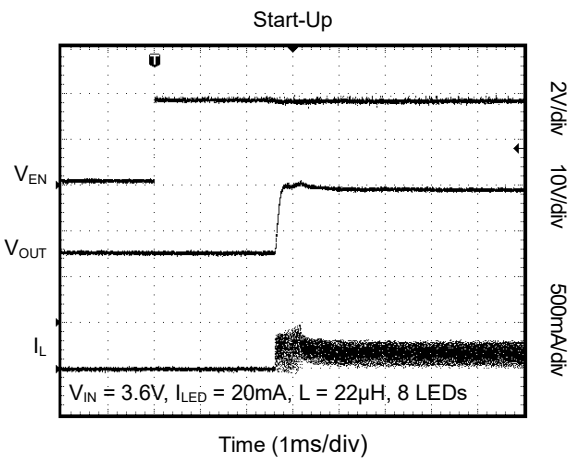
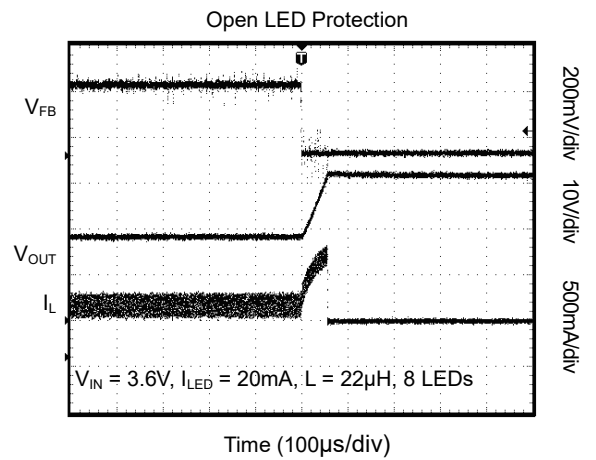
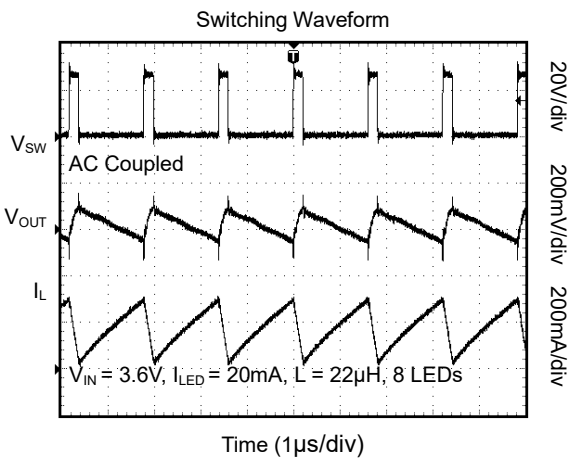
1. The SGM3720 is guaranteed to meet performance specifications over the -40°C to +85°C operating temperature range by design, characterization and correlation with statistical process controls.

RECOMMENDED COMPONENTS OF TEST CIRCUITS

| | Component | | Component |
|----------|-------------------------|-----------|------------------------------|
| Inductor | 22 μ H/CD75NP-220KC | Capacitor | 10 μ F/C2012X7R1H106KT |
| Diode | MBR0540 | | 0.47 μ F/C2012X7R1H474KT |

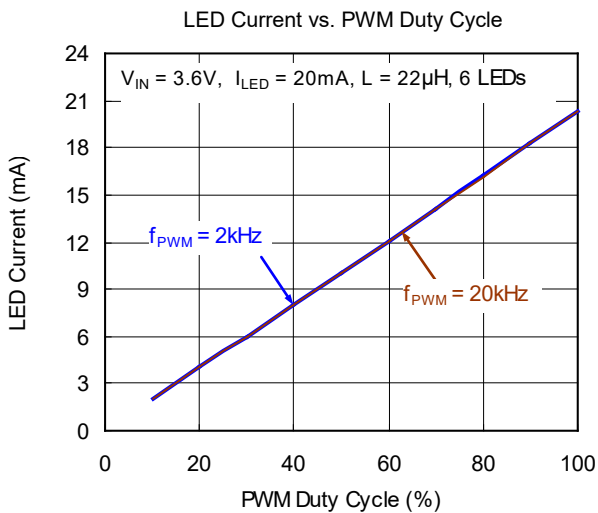
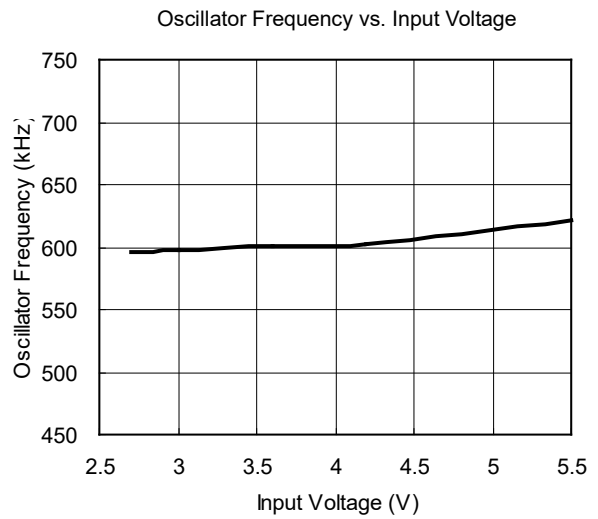
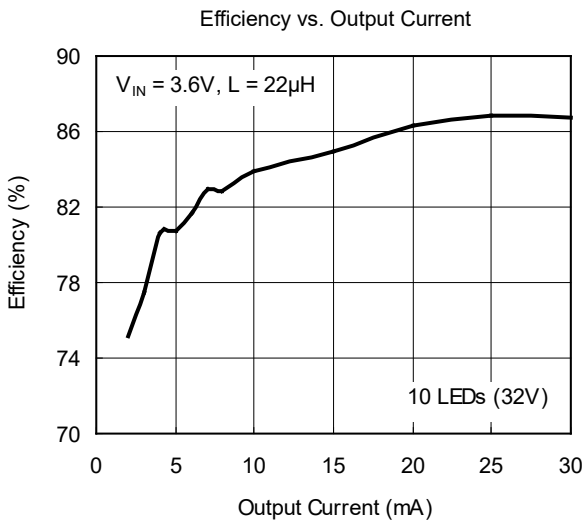
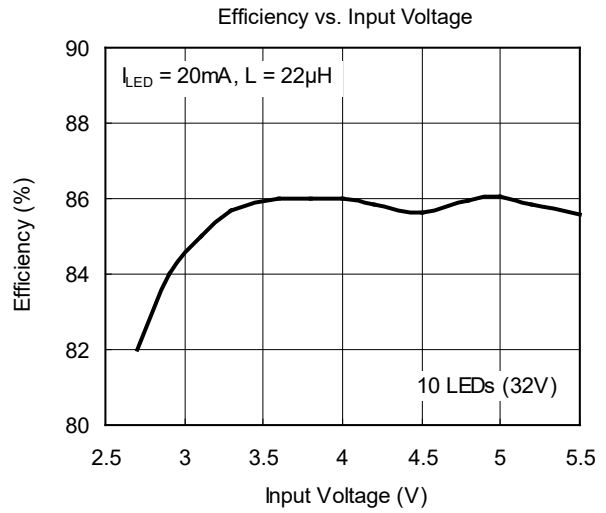
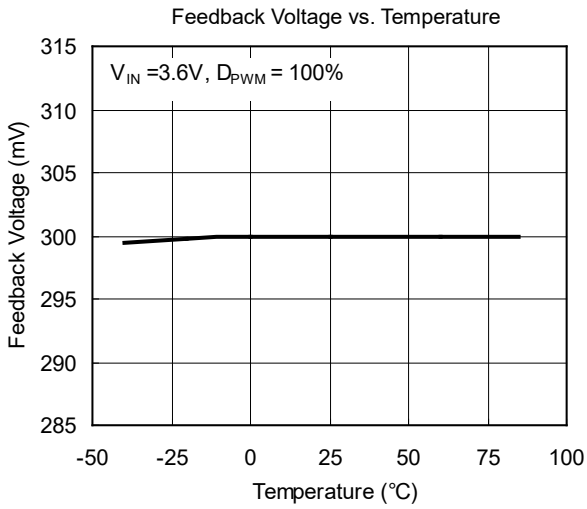
TYPICAL PERFORMANCE CHARACTERISTICS

T_A = +25°C, L = 22 μ H, C_{IN} = 10 μ F, C_{OUT} = 0.47 μ F, unless otherwise noted.



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REVISION HISTORY

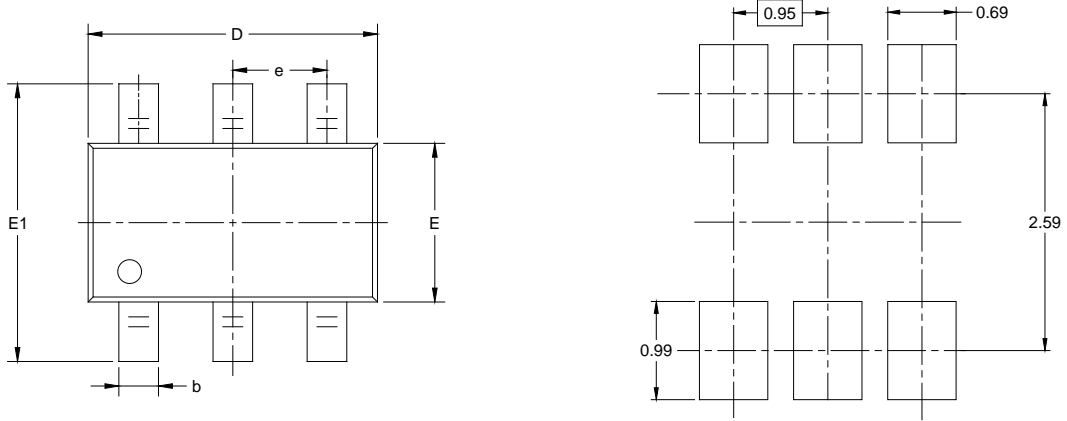
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

| SEPTEMBER 2021 – REV.A.3 to REV.A.4 | | Page |
|--|--|-------------|
| Changed Ordering Information section | | 2 |
| Changed Package Outline Dimensions section | | 10 |
| JULY 2016 – REV.A.2 to REV.A.3 | | Page |
| Changed Ordering Number..... | | 2 |
| Changed Package Outline Dimensions section | | 11 |
| FEBRUARY 2015 – REV.A.1 to REV.A.2 | | Page |
| New version..... | | All |
| JULY 2014 – REV.A to REV.A.1 | | Page |
| Changed General Description section..... | | 1 |
| Changed Figure 1..... | | 9 |
| Changes from Original (MARCH 2014) to REV.A | | Page |
| Changed from product preview to production data..... | | All |

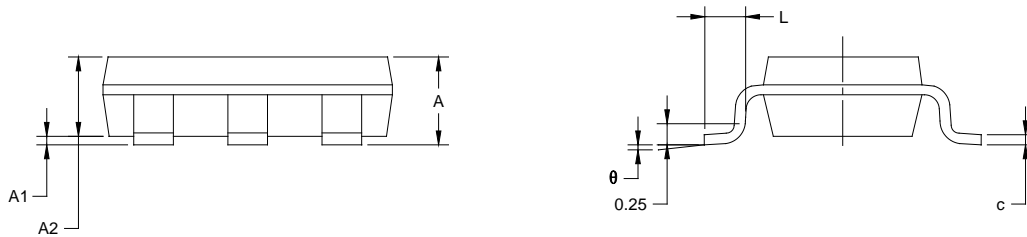
PACKAGE INFORMATION

PACKAGE OUTLINE DIMENSIONS

TSOT-23-6



RECOMMENDED LAND PATTERN (Unit: mm)



| Symbol | Dimensions In Millimeters | | |
|----------|---------------------------|-----|-------|
| | MIN | MOD | MAX |
| A | - | - | 1.100 |
| A1 | 0.000 | - | 0.100 |
| A2 | 0.700 | - | 1.000 |
| b | 0.300 | - | 0.500 |
| c | 0.080 | - | 0.200 |
| D | 2.820 | - | 3.050 |
| E | 1.550 | - | 1.700 |
| E1 | 2.650 | - | 2.950 |
| e | 0.950 BSC | | |
| L | 0.300 | - | 0.600 |
| θ | 0° | - | 8° |

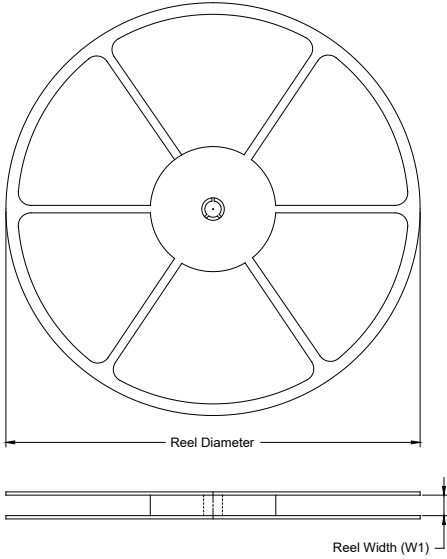
NOTES:

1. Body dimensions do not include mode flash or protrusion.
2. 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 |
|--------------|---------------|--------------------|---------|---------|---------|---------|---------|---------|--------|---------------|
| TSOT-23-6 | 7" | 9.5 | 3.20 | 3.10 | 1.10 | 4.0 | 4.0 | 2.0 | 8.0 | Q3 |

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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 |

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